BĪR-KOṬ-GHWAṆḌAI INTERIM REPORTS, XI

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VAJIRASTHĀNA

ARCHAEOLOGY OF THE BARIKOT HILLTOP (SWAT, PAKISTAN)

Volume 1



Luca M. Olivieri
In collaboration with Elisa Iori, Michele Minardi and Marco Pinelli

Foreword by Abdul Samad

Edited by Alice Casalini

"SAVE THE ARCHAEOLOGICAL SITE OF BAZIRA" PROJECT

ALIPH International alliance for the protection of heritage in conflict areas

ISMEO

Università Ca' Foscari Venezia

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English revision by Klara-Maeve O'Reilly

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BKG Interim Report Va = *Ceramics from the excavations in the historic settlement at Bīr-koṭ-ghwaṇḍai (Barikot) Swat, Pakistan (1984-1992)* / by Pierfrancesco Callieri and Luca M. Olivieri. ACT Field School Reports and Memoirs, Special Volume, 2.1-2. ISMEO/Alma mater University of Bologna. Sang-e-Meel Publications: Lahore, 2020.

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BKG Interim Reports, XII – *Apsidal Temple H. Archaeology of early Buddhism at Barikot (Swat, Pakistan)* / by Luca M. Olivieri, Elisa Iori and Michele Minardi (forthcoming).

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PRESENTATION

Adriano V. Rossi

President of ISMEO – International Association for Mediterranean and Oriental Studies

I am particularly pleased to introduce *Vajirasthāna. Archaeology of the Barikot Hilltop (Swat, Pakistan)*, a collective effort due to the ISMEO Italian Archaeological Mission in Swat. It reports about the recent discoveries and restorations by one of the oldest of the Italian missions still in operation among those established by Prof. Giuseppe Tucci and IsMEO in the 1950s, and it is being conducted since some years now in collaboration with the University of Venice Ca' Foscari.

The work in the field was in fact started in 1956 following the first visit to the Swat by Prof. Tucci during the previous year; and since then the mission has seen some of the leading Italian scholars in the field, such as Domenico Faccenna, Pierfrancesco Callieri, and Luca Maria Olivieri, take turns in its direction. We can undoubtedly say that it represents one of the most prestigious legacies to the Italian archaeology in Asia.

The present book, edited by Professor Olivieri and his collaborators, takes its title from the toponym Vajirasthāna, occurring in a Śāradā inscription found at Barikot and transferred to the Lahore Museum in 1898: it has been identified since many years with Barikot/Bazira, a pivotal site in the area and primary center of archaeological research. The book focuses its attention on the recent three-year period 2022-2024, during which the mission found the fundamental support of The International Alliance for the Protection of Heritage (ALIPH) Foundation through the project "Saving the archaeological site of Bazira". The project provided for the restoration of the structures in the Barikot area, allowing the conservation of the monumental artificial terraces of the acropolis, the valorization of the ancient religious and military monuments, and the creation of a buffer zone around the acropolis for the safeguard of the historical site.

As can be clearly seen from this publication, the implementation of the specific ALIPH/ISMEO project and, more generally, the work of the ISMEO/Ca' Foscari Mission, have benefited from a well-balanced international scientific network under the direction of Professor Olivieri, made up of expert scholars and younger researchers and students of an excellent level. This made it possible to carry out accurate research inspired by the criteria of

multidisciplinarity that are essential for modern archaeology, combining the excavation data with the detailed study of the construction methods and materials of artistic and artisan work, also through the contribution of archaeometry.

All this symbolizes one of the cornerstones of ISMEO's mission, which since its foundation has undertaken protocols and agreements for joint research projects with Italian, Pakistani and foreign universities, academies and cultural institutions, as well as with international organizations in the areas of its institutional activities. In this sense, the ALIPH/ISMEO Project has also further highlighted a peculiar aspect of the Archaeological Mission in Swat, which has been continuously promoting training projects for Pakistani, Italian and international students, with excellent results.

In the framework of the ALIPH/ISMEO project, another aspect very much felt by the contemporary scientific community is highlighted: that of the communication of research achievements, which must not be limited to a small circle of specialists, but must find innovative languages that allow its dissemination within a wider audience. Although the book itself represents a valuable and irreplaceable tool for dissemination, it is now appropriate to also turn to those tools that modern technologies make available. In this sense, I am pleased to underline how the project in question has been able to exploit this potential, too: in particular, an efficient Pakistani company has implemented detailed 3D reconstructions, which represent an important scientific and cognitive tool at the same time; and the production of documentaries, visible through links contained in the book and which refer to specific ISMEO platforms.

A decisive role in the most recent phases of the Mission has certainly been played by the ALIPH Foundation; I would like to thank Director Valery Freland and his collaborators for a consolidated and fruitful relationship, a collaboration which outside Pakistan has led to the important restoration of ancient vestiges at the UNESCO Heritage Site of Hatra. A grateful mention must be made of the Italian Ministry of Foreign Affairs and International Cooperation and the Italian Embassy in Islamabad for the essential logistical and economic support continuously provided to the Mission.

Finally, special thanks must be addressed to the Directorate General of Archaeology and Museums and the Provincial Government of Khyber Pakhtunkhwa, without whose contribution and generosity no activity in the Swat valley would be possible.

Foreword

Abdul Samad

Director-General Archaeology and Museums, Government of Khyber-Pakhtunkhwa (Pakistan)

The story of *Vajirasthāna*, a name synonymous with both mystique and historical intrigue, has been the object of extensive discussion, claim, and reclaim for centuries. However, much of the scholarship surrounding it has been based on literary evidence and has thus frequently been (re-)interpreted and revised. Only in recent decades, through the tireless work of Italian and Pakistani archaeological teams in Swat, has tangible evidence begun to shed light on this enigmatic place, offering a more comprehensive understanding of its significance. Among these efforts, the Italian Archaeological Mission's work in Swat over the past seventy years stands as a monumental achievement—one that has significantly advanced our knowledge of the region and its role in the broader history of Buddhism.

The roots of the Italian archaeological mission in Swat trace back to the pioneering scholar, Giuseppe Tucci, who initially had studied the origins of Tibetan Buddhism. Tucci's journey led him, almost serendipitously, to Swat, a region that, unbeknownst to many, held crucial connections to the early spread of Buddhism, especially the Vajrayāna school. His work laid the foundation for what became a legacy of cross-cultural collaboration between Italy and Pakistan, a partnership that has flourished through the generations.

Over the years, this collaboration has evolved into a vibrant, international endeavour, with scholars from the United Kingdom, Germany, Austria, France, China, Korea, USA, Japan, and beyond regularly contributing to the ongoing excavation and research. What began as a focused study on Tibetan Buddhism now spans multiple fields, from archaeology to religious studies, and has enriched our understanding of the cultural and historical tapestry of Swat.

In particular, the past decade has seen a surge of new archaeological findings in Swat, particularly from Barikot. Many of these directly correspond to the ancient Buddhist literature—revealing the deep historical layers of this once-thriving cultural hub. One of the most significant discoveries is the identification of Barikot with a site frequently mentioned in Tibetan literature as the ancient *Vajirasthāna.* Having saif this, the importance of Barikot extends beyond its association with Vajrayāna Buddhism; it was a centre of vibrant multiculturalism, serving as a crossroads for various dynasties, belief systems, and cultural influences. The layers of history evident in Barikot's archaeological remains reveal a rich tapestry of ancient civilizations that have long since faded but whose stories continue to resonate in the present.

Yet among the many remarkable discoveries, one inscription found at Barikot is particularly noteworthy. This inscription, now housed in the Lahore Museum, is one of the key pieces of evidence that affirms Barikot's role as the ancient *Vajirasthāna*, a place revered in Tibetan Buddhist literature as the birthplace of Vajrayāna Buddhism. Together with the recent excavations and conservation efforts on the Barikot hilltop, the inscription has provided invaluable insights into the region's spiritual and cultural significance.

This book, then, represents a significant step forward in the scholarly understanding of *Vajirasthāna*. It carefully and thoughtfully combines archaeological evidence with literary sources, offering a nuanced exploration of this ancient city and its profound influence on the development of Buddhism, particularly Vajrayāna Buddhism. By drawing on the rich history of archaeological research in Swat and the ever-growing body of discoveries, this work seeks to resolve the ambiguities and misconceptions that have surrounded the history of *Vajirasthāna*.

The Directorate of Archaeology and Museums, along with the Provincial Government of Khyber Pakhtunkhwa, takes immense pride in its ongoing collaboration with the Italian Archaeological Mission. This partnership stands as a testament to the enduring bonds between two countries, as well as the broader international community of scholars dedicated to uncovering and preserving the ancient history of Swat and Pakistan. It is our hope that this collaboration will continue to thrive, as future generations of researchers and archaeologists join hands in the quest to explore the hidden treasures of Swat—an area rich in historical, cultural, and spiritual heritage that has shaped the course of human civilisation for millennia.

May this book serve as both a record of our collective achievements thus far and a beacon guiding future discoveries, ensuring that the ancient history of *Vajirasthāna* is not forgotten but celebrated, shared, and understood by all.

Editorial Note

Alice Casalini

Editing such a prominent volume, both in terms of significance and sheer size, is both an honour and a great responsibility. The many contributions in this book are from a group of scholars, friends and colleagues, at different stages in their academic career – we have both seasoned academics with years of experience under their belt, and young scholars who are at the very start of their (hopefully long and successful) career, and everything in between. My editing interventions have strived to bring all contributions together in a cohesive whole that would do justice not only to the laborious work of our team and to that of our predecessors – who laid the solid foundation for the success of such work at the Italian Archaeological Mission in Swat – but also to the great monument of Bazira-*Vajirasthāna*.

…

The volume includes several contributions by the same author(s), and several intertextual references occur. To avoid cumbersome and confusing repetitions, we have decided to assign a number to each contribution by the same author, which is reported in superscript, according to the following scheme (here presented in alphabetical order):

Arcuri, Prota[1] = *Structural Overlaps in BKG 24* in Terrace W.

Arcuri, Prota[2] = *Macrophase 8b: Zoomorphic Spouts in* Terracotta and Ceramics.

Casalini[1] = *The Architecture of Temple 6: Excavated Materials and Reconstruction* in Religious Architecture: Temple 6.

Casalini[2] = *Macrophase 8b: The Three Hares Roundel* in The Barikot hilltop in 10 Objects.

Filigenzi[1] = *Śāhi Marble Sculptures in* Sculptures.

Filigenzi[2] = *Late Buddhist Rock Sculptures* in Sculptures.

Iori[1] = *Hindu Śāhi Settlements and the Fortified Limes* in Civil and Military Architecture.

Iori[2] = *Macrophase 8b: A Hindu-Śāhi Portrait* in The Barikot hilltop in 10 Objects.

Iori[3] = The Vajirasthāna Hilltop: Iconic Aspirations and Overlapping Religious Landscape

Minardi, Prota[1] = *Trench BKG 24.1* in Terrace W.

Minardi, Prota[2] = *The Islamic Graveyard Outside the Terrace W (BKG 24.1)* in TERRACE W.

Moscatelli[1] = *Gandhāran Stone Sculptures in* SCULPTURES.

Moscatelli[2] = *Macrophase 5: An enigmatic* Mahāparinirvāṇa in THE BARIKOT HILLTOP IN 10 OBJECTS.

Olivieri[1] = THE CITY OF VAJRA.

Olivieri[2] = ARCHAEOLOGICAL OUTLINES.

Olivieri[3] = THE SURVEY (1992–1993).

Olivieri[4] = *Methodology* in THE CONSERVATION PROJECT "SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA" (2022–2024).

Olivieri[5] = *The Monumental Terraces and the Central Fortress* in CIVIL AND MILITARY ARCHITECTURE.

Olivieri[6] = *Trench BKG 6: The Śāhi Temple on Terrace E* in RELIGIOUS ARCHITECTURE: TEMPLE 6.

Olivieri[6.1] = The quarry sources of *kañjur* [Addendum 1 to Olivieri[6]]

Olivieri[6.2] = Decorated sandstone cornices from Macrophases 8a–b [Addendum 1 to Casalini[1]]

Olivieri[7] = *Macrophase 9a: A Sphero-Conical Vessel* in THE BARIKOT HILLTOP IN 10 OBJECTS.

Rabbani[1] = *Common Pottery* in TERRACOTTA AND CERAMICS.

Rabbani[2] = BEADS AND ORNAMENTS.

The names of authors and other contributors are abbreviated to the first letters of their name/middle name/surname (e.g., LMO = Luca Maria Olivieri; MP = Marco Pinelli, etc.) in the chapter THE CONSERVATION PROJECT "SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA" (2022–2024), as this section includes several in-text references to the many people who have worked on the conservation and excavation of the hilltop. This style of abbreviation is also used whenever an author intervenes with a brief text within the larger text by another or others and in the captions. The full name is used for non-contributors in the image captions.

Individual contributions, at the APA level 1 and 2 (i.e. the headings both in small caps and italics in the table of contents), have their own numbering of footnotes and figures.

In the body of the text, the following typographic rules are followed to signal the different nature of every element: structures, such as walls, drains, etc. are within square brackets: e.g., [200]; layers are within round brackets: e.g., (150); cuts, pits, razed surfaces (negative stratigraphic units) are within angle brackets: e.g., ⟨320⟩; finally, cup-marks and similar features are written within curly brackets: e.g., {5}. Structures that are underlined within squared brackets refer to those surveyed in the 1990s (i.e., Olivieri[3] THE SURVEY) [<u>23</u>]). This is done to graphically separate the structures surveyed at the time from those excavated and documented in later excavation campaigns.

A parenthesis system is also used for epigraphic translations: [ ] mark uncertain readings, ( ) lost material, and ⟨ ⟩ material omitted by the author.

We have chosen to keep the terminology given to structures and areas used in the fieldwork documentation. For example, we refer to Terrace E (emphasis on 'E') rather than E Terrace (emphasis on 'terrace'), Terrace W rather than W Terrace. Words indicating architectural and/or archaeological features (e.g., terrace, trench, bastion) are capitalised

when followed by their specific designation (e.g., Terrace E, Trench 6.3, Bastion H). Walls and other common structural units are left in lowercase.

Cardinal directions are usually shortened and capitalised (e.g., N, S, E, W) in surveys, technical reports and stratigraphic studies for the sake of readability (namely, THE SURVEY (1992–1993); THE CONSERVATION PROJECT …; *The Monumental Terraces and the Central Fortress*; *The Fortress on the Hilltop [Trenches BKG 14 and 15]*; *The Architecture of Temple 6* …; TERRACE W). Directions are spelled out in all other contributions, especially when they are part of known phrases (e.g., the northwestern regions).

Stylistic choices for the images in each contribution have been left within the remit of individual authors. This accounts for slight discrepancies in the formatting of some graphic signs (e.g., N arrow, scale, etc.). These have been edited only for consistency in relation to the internal structure of each author's contribution. Figures and tables are capitalized in the text whenever they refer to images and illustrations from the present volume and are left in lowercase whenever they refer to images, plates and tables from other works. A special case is that of TABLE 1, TABLE 2 and TABLE 3 in Olivieri[2], which are in small caps in the whole text, as they refer to macrophases and chronological data that are valid for all contributions. Plates relative to this text are always formatted in small caps; all others are in lowercase.

All images are property of the Italian Archaeological Mission/ISMEO, unless otherwise noted in the captions. Objects in the inventory are marked by the label of the site (BKG = Barikot), followed by their individual number.

Catalogue entries the last part of the volume (MATERIAL CULTURE) follow the format:

Inv. No. – Fig./Figs

Location/museum.

Stratigraphy; year of discovery (if needed)

Material; Dimensions

Conditions, Joints and special marks (if present)

Bibliography, if available.

This information is followed by a brief comment on each object. In the catalogue, all measures are in centimetres, unless otherwise noted. Generally, measurements are expressed in metres when we are discussing buildings and/or areas of space, and in centimetres when we are dealing with individual objects. The catalogue of coins by E. Shavarebi follows criteria and format that are specific to numismatics. They are explained by the author in the contribution.

The following abbreviations are used throughout the text. Bibliographic abbreviations are listed at the beginning of the section REFERENCES.

a.s.l.	above the [mean] sea level
av.	average
cf.	see
cm	centimetre(s)
d.	diameter

Dept.	Department
DG	Director General
DOAM	Directorate of Archaeology and Museums, Government of Khyber Pakhtunkhwa
DoAM	Department of Archaeology and Museums, Government of Pakistan
dp.	depth
DR	Departmental Representative
DSAAM	Dipartimento di Studi sull'Asia e l'Africa Mediterranea [Department of Asian and North African Studies]
Fig., Figs	figure, figures
fn	footnote(s)
Govt.	Government
h.	height
ha	hectares
KP	Province of Khyber Pakhtunkhwa
l.	length
max.	maximum
m	metre(s)
N, S, E, W	north, south, east, west
pers. comm.	personal communication
Pl., Pls	plate, plates
ref./refs	reference, references
sqm	square metre(s)
SRO	Sub-Regional Office (DOAM KP)
t.	thickness
tr.	translated/translation
w.	width

I

ACTIVITIES ON THE HILLTOP (1992–2024)

The Conservation Project 'Saving the Archaeological Site of Bazira' (2022-2024)

Methodology (L.M. Olivieri)[56]

Heritage is a tool for social action, especially in the context of development and aid (e.g., Byrne 2008). The preservation, conservation, and management of a country's cultural heritage have now become a major force of social mobilisation – not least because they are intimately connected to the movement of people, cultural and religious tourism in particular (Winter 2008; 2009). In this context, and against the background of the rise of Asian economies, regional narratives of and claims to global heritage and conservation (Winter, Daly 2012) underwrite a dynamic field, especially after the debate on authenticity triggered by the Nara Charter (e.g., Court, Wijesuriya 2015; Wijesuriya, Lee 2017; Heritage, Copithorne, eds, 2018; Byrne 2013).

The presence of these new players, quite literally on the archaeological sites, brings about a radical transformation both of the philosophy of intervention and its results. On the one hand, the principle that only specialists can speak on heritage preservation and management is very much alive. On the other hand, however, there is a heightened awareness of the importance of identity politics and, therefore, of a local approach to heritage both conceptually and aesthetically. The unresolved tension between these two poles often leads to unbalanced outcomes, some detrimental to the sites. However, this process is irreversible, since the global balance of economic and financial power is moving aside from the paradigms developed after World War II in Europe and in the Westernised world (Byrne 1995, Falser 2010, Winter 2014).

The Italian Mission is proposing new solutions to the issue, as outlined below, based on the experience gained from heritage management projects in Swat, such as the 'Archaeology Community Tourism Field School Project' (ACT-Field School Project, 2011-2016; cf. Olivieri 2016a; Olivieri 2017a). These projects were conceived as development programs in areas that have been strongly marked by the aftermath of the political and social crisis of the 2007 Taliban insurgency, from which Swat has now luckily freed itself.

Sustainability

Sustainability should always be a priority when it comes to interventions in the physical, cultural and even economic landscape. There are several aspects to consider when it comes to this issue. Before delving in the details of the conservation work on the hilltop in the rest of the chapter, it is worth discussing some of these aspects here.

The first issue is, of course, the safety of all participants. Although for cultural reasons (I refer here to the unfortunate habit of working in objectively unsafe conditions) many workers may initially see this aspect as superfluous or limiting, we have implemented specific courses on the use of individual safety equipment, correct excavation and lifting

[56] This text is an abridged and totally revised version of the contents presented elsewhere (Olivieri 2025a).

procedures, and protection procedures (insect bites, sunstroke, weather, etc.). To these, we added specific courses on the use of acrobatic construction equipment and on handling chemical agents.

A second point is related to the environment. Any excavation or conservation project has an impact on the environment (e.g., the use of water resources, waste production, etc.). The Italian mission followed procedures that reduced the impact of plastic on the excavation almost to zero (using plant fibre materials as well as ceramic and aluminium crockery and containers wherever possible), reduced its water consumption, built four large rainwater tanks and increased the use of native plants for soil hardening. In addition, regular cleaning and waste collection campaigns were carried out on an area of about ten times the size of the project site. The undergrowth was cleared, and firebreaks were opened to prevent the spread of occasional fires. All these activities were the subject of specific introductory courses and were practised consistently, so as to make them habitual.

Thirdly, financial sustainability is another essential component. As is widely known, as fluctuations in funding allocations have a direct impact on the overall sustainability on the site (or any other given project). When one or more sources of funding fail, the resilience of a project is determined by its flexibility: roles and parameters must be reversed, and new approaches drawn up and tested – some of these key aspects are discussed below.

Lastly, and perhaps the most essential aspect of sustainability is the social one. It is of relevance how excavation and conservation work is perceived by the local population. Cultural awareness on the side of the excavators and visitors alike is another necessary ingredient. In this regard, the main educational contributions of excavation and restoration projects must be clearly set out both within the team and towards the public. Responsible tourism can be an important tool for fostering cultural awareness, besides representing a new economic potential.

Community engagement

For the ACT Project and the ALIPH-ISMEO Project, panning and continuity have emerged as successful responses to many of the challenges of sustainability as discussed above.

While 'community archaeology' generally refers to those cases where there is a direct relationship between the community and the cultural tradition under analysis, in this case the Italian Mission rephrased this to mean the progressive inclusion of the community in the archaeological work, at the decision-making and planning level. With the ACT and ALIPH-ISMEO experience, we achieved this involvement through sharing techniques and specialised knowledge and through a shared process of rethinking the technical approach to both conservation and excavation.

Let us imagine a case where one predominantly uses imported materials to carry out conservation on a local site – this happens in most cases. In this scenario, training members of local communities in conservation techniques inevitably utilise materials unavailable locally, unless these are imported with an external financial commitment (i.e., with another project). Funding is not always possible – indeed, we must consider that financial availability is often the exception. This scenario also implies that the maintenance of the site is wholly dependent on further future projects, which are almost always unpredictable.

Conversely, our approach was to a) use local techniques and develop them with long-term sustainability in mind; b) train sections of local populace to the highest degree of autonomy. Local team members use local techniques with ease: by using traditional techniques passed down through generations, they are actively aware of their contribution to the conservation project. In this scenario, the professional restorers, usually not part of local society, are present in the first phase of the project to study and implement a series of interventions based, as much as possible, on traditional techniques (e.g., dry-stone masonry, rammed earth masonry for elevations), while introducing innovative technical elements that can be realized with traditional techniques and/or locally available materials. In the presence of trained local expertise, the goal of the external professionals is to train and improve existing skills, rather than to create new ones. In a second

phase, their involvement can be reduced, while guiding the trained local practitioners by a) direct intervention and b) secondary training, where trained locals will in turn train other members of the team. In a relatively short time, it is thus possible to reduce external presence almost completely as local practitioners can carry out the work autonomously.

The result of this cooperation is twofold. On the one hand, local practitioners acquire new technical skills and thus a new type of specialised worker becomes available to the local labour market. Specialised workers with these technical skills are able to join cooperatives or associations and have greater bargaining weight in employment contracts outside the original project. On the other hand, through this work the community establishes a deeper connection with the heritage, even if it might pertain to material culture that is foreign or even antagonistic. This work raises awareness, as it is intimately connected to one's personal contribution and efforts.

If the virtuous process can be put in place in the field of conservation and restoration, the same can be done even in archaeological excavations. Under the best conditions, an excavation site can turn into a training environment to create new professional figures in this field as well. The Italian Mission collaborates with important professional figures at excavation sites as well. Their training develops in tandem with awareness of the cultural heritage, which in turn engenders both social awareness at a community level and a renewed self-esteem on the personal level. We call this archaeological practice 'community practice.'

The long-term sustainability of these results will depend on the creation of a series of smaller projects and on their integration within governmental activities meant to protect and manage the cultural heritage. A fundamental step towards this goal will be creating official channels for this type of vocational training, including a certification system, as well as the formation of associations of specialized workers that could be in some ways inserted within governmental structures in charge of heritage sites. [57]

[57] I am referring here to the recognition of professional training in the field of excavation, restoration and conservation of heritage. This often takes time. The recognition of the technical-vocational trainings carried out by these projects in the TVET framework is one of the objectives of a new project with 3m Euros from Spring 2025 onwards, with the support of (DOAM) and funded by the Italian Cooperation Program (AICS). The new project is named 'Khyber PATH' (Khyber Professions for climate Adaptation, ecoTourism and Heritage). This project is connected to another important contribution by the Italian Government which regards a soft loan of 4m Euros for strengthening the technical capacity of the KP province Museums ('Heritage Field School Project'). Meanwhile, the skilled personnel trained in these two projects have been employed by DOAM KP for the conservation and excavation activities in several projects in Swat, as well as in the British Council CPF project 'Preservation of the Buddhist Rock Reliefs of Swat (Digitization and Preventive Conservation)' executed in 2024 by EssaNoor Associates and DOAM KP with the support of ISMEO and Heritage Management.

Progress Phases Spring 2022-Autumn 2024: Overview (L.M. Olivieri, M. Pinelli, E. Iori)

The project was carried out under the direction of Luca M. Olivieri (Project Director, LMO) over the course of 12 seasons (February 2022 – December 2024) and under the supervision of Marco Pinelli (MP), Elisa Iori (EI) and Michele Minardi (MM). A team of 50 local workers from the Barikot village were hired and trained. They were selected from a pool of workers who were available and had been previously trained by the IAM/ISMEO during the 15-year archaeology and conservation projects at Barikot mentioned above (ACT-Field School Project; PIDSA/EAD). Among them, a selected team of 30 locals were trained on heritage, conservation and landscaping. Although at the beginning there was intentionally some rotation in the type of tasks to give the trainees a three-dimensional view of the project activities, specific tasks and responsibilities were later assigned to each trainee based on skills. Ten students were also trained, and two of them were also hired within the conservation project from Season 10 onwards.

The following reports describe the activities by season:

1) Seasons 1- 6: February 2022-March 2023 = Progress Phase I;

2) Seasons 7-9: April 2023-May 2024 = Progress Phase II;

3) Seasons 10-12: June-December 2024 = Final Phase III;

The project focused on the sector of the acropolis most affected by structural damages, Terrace E (Figs 1-2). Terrace E is composed of two retaining walls at right angles: one running along the N side of the hill (= N wall) and the other along the E side (= E wall). Together with the bedrock on the S and W, these walls shape a large terrace with religious buildings and a fortress. The surface of the wall on the N side is not completely visible, since the E part of the wall is mainly buried, while the N corner is mostly exposed. The N wall is about 50 m long at the base and 42 m at the top, while it measures 23 m at its highest point (NE corner) and 6 m at the minimum point which is in correspondence with the connection of the wall with the rocky outcrop at W. It is evident that the N Wall is built upon a rocky outcrop sharply sloping towards N-NE. The base is connected to the top of the terrace by a rough, narrow path that runs around the perimeter of the walls on the N and E slopes.

Subsequently, work focused on Terrace W. There, only part of the N wall at the NW corner, which had been exposed in a previous excavation work (Trench BKG 8), is visible. Therefore, conservation work covered the approximately 100 m of development of the N wall from the point where it connects to the N wall of Terrace E to the NW corner of Terrace W. The W section of Terrace W was only affected by superficial works given the poor or non-existent state of conservation of the perimeter structures of the Terrace itself (cf. Sector 8, Olivieri[3], this volume).

Conservation

As the most challenging and urgent aspect of the project, the conservation of the Terrace E was our priority since the first season. The main results achieved here can be summarised as follows:

1) cleaning of the N and E sector of Terrace E from perennial and seasonal greenery to stop the degradation of the structure and to give visibility to the site through the exposure of the entire surface of the N walls that was partially covered by soil (Seasons 2-5/10-13). This simple operation has transformed Terrace E to an eye-catching feature in the landscape clearly visible from the main road;

2) start of the work for the creation of access paths to the acropolis and to the lower part of the terrace (Season 4);

3) consolidation and restoration of 100% of the N wall's surface and 100% of the E wall's surface (Seasons 1-14). This was the most complex aspect of the project due to

a) the diversity of types of structural damages and, consequently, of intervention,

b) the logistic difficulties and,

c) the amount of work required in the filling of gaps in the masonry and in the consolidation of the upper part of the wall;

4) consolidation of 100% of the surviving structures of the Central Fortress, Temple 6, and all the other buildings whose elevation is fairly preserved on both terraces, with the creation of access paths (Seasons 2-3, 5-9).

Archaeology

The archaeological fieldwork envisaged by this project was initially limited to the enhancement of the monumental buildings previously excavated on the site. In the first year, the activity focused on Temple 6. The temple was cleared of the perennial greenery and soil that covered its top and the entire surface was consolidated. This activity led to the enhancement of the monument, which is now fully visible to visitors. In addition, the cleaning activity in this phase brought to light the access stairs to the temple cell, as well as an earlier structural phase of the monument. From the second year until the end of the project, the focus was the external area of Terrace E (Trenches BKG 20 N-E). Once this was completed, the focus shifted to Terrace W, and the following activities were carried out: reopening of the old excavation Trenches BKG 7, BKG 8 and BKG 9; the opening of a new trench at the intersection of BKG 9 and BKG 8 (known as BKG 23), and stratigraphic deepening along the N wall of Terrace W, especially at the ramparts (Trenches BKG 24.1-4).

Landscape

Throughout the project, activities of landscaping aimed at creating a sustainable buffer green zones around the acropolis were carried out only in those areas where conservation activity was completed for logistics reasons. 400 new olive trees were planted along the newly built paths and in two sectors of Terrace E shaded shelters for tourists have been planned. During the first two seasons about 1,000 wild trees were grafted and pruned while another 1,000 were pruned during the remaining seasons.

Phase I

Season 1 (M. Pinelli, E. Iori, L.M. Olivieri)

This first season of work was carried out in February-March 2022 to assess the state of conservation of Terrace E in situ and to organise and secure the working yard by

(1) clearing perennial and seasonal greenery;

(2) creating or restoring paths of access to the acropolis and to the base of the retaining walls for transport of materials;

(3) selecting and storing materials such as stones, lime, sand, bricks powder and other aggregates to be used in the structural reconstruction and consolidation of the terrace.

Preliminary activities of conservation involving the training of a group of local workers have been carried out in the NE sector of the terrace. Since the beginning, the training aimed to make them as independent as possible in the conservation phases of the wall.

Assessment of the site's conservation status

The preliminary survey revealed that the surface of the terrace wall was in a critical situation for several reasons. . In particular, the whole surface of the N wall was overrun by vegetation, mainly low-trunked bushes and spontaneous weeds, while sporadically tall shrubs and small trees had grown. The wall also presented a strong structural instability for about a metre of thickness: it was possible to observe a lack of cohesion in the binder, and a weak adhesion between the stones leaning against the wall and the rest of the structure; additionally, soil deposits were present. (Fig. 3). The base of the N side of the wall was inaccessible due to dense vegetation, while the path leading to the top of the terrace was rough and did not allow easy transport of materials needed for the conservation work.

Organisation of the working yard: materials and logistic

To make the work site accessible, its surrounding environment had to be organised first (Fig. 4). The following activities were carried out with the aim of guaranteeing safe access to the working yard and to the wall surface.

1) The slope at the base of the N wall was cleared off from perennial and seasonal greenery by manual and mechanical methods to evaluate more closely which was the best point where to carry out the intervention and to allow a safe base for the scaffolding. Several lines for abseiling were installed at a distance of 5 m from each other in order to better determine the portion of the wall where the scaffolding was to be erected;

2) the paths leading to the acropolis and linking the base of the wall to the top of the terrace were restored. The path was widened and its banks reinforced where necessary by creating small ramps that eliminated the high rock step and facilitated access for wheelbarrows and heavy loads;

3) heavy materials such as lime, bricks, sand and water were transported with donkeys;

4) water was stored in a tank equipped with a tap and a pipe, providing easy access;

5) twin pits for extinguishing lime were dug and fenced off. They measure 2 m × 0.7 m and are 0.7 m deep, with a capacity of 1000 litres each (Figs. 5-6). These pits were made waterproof by layering stone lined with cement. Once the cement was dry the tanks were half filled with blocks of lime of different sizes and covered with water up to 15 cm over the lime blocks. Once the lime was extinguished, it was left in immersion for seasoning. In this phase, each tank was filled to 2/3 of full capacity. Then, the tanks were covered with plastic sheets supported

by a wooden framework to keep the sheet suspended and to avoid contact with the lime. The cover was blocked at the ground with heavy stones along the entire perimeter so it would not fly away with strong winds;

6) finally, the entire perimeter of the tanks was fenced off with barbed to prevent trespassing and accidental falls;

7) a procurement survey for supplies of stone, lime, sand, bricks powder and other aggregates to be used in the structural reconstruction and consolidation of the terrace was also carried out on the site and in the surrounding area. In this process trainees were very collaborative, and their suggestions were taken into consideration in the selection of the materials.

Preliminary activities of conservation in the NE sector

After a careful analysis of the conservation state of the wall, a surface of 5 × 13 m was selected, 25 metres W of the NE corner. To obtain a flat base for a scaffold of bamboo with natural ropes, the base of the wall, previously cleaned from greenery, was excavated and levelled. Once completed, the scaffolding was composed of five stories made of wooden pallets, at two metres from each other. A pair of stairs provided access from above and below the wall. To secure it, the scaffolding was anchored from above by two synthetic ropes to a solid tree above the retaining wall (Fig. 7).

Cleaning of the N wall

The objective of this preliminary conservation activity was to test consolidation and reconstruction activities on a small area (10% of the surface of the N wall) and to familiarise the workers with all steps of the process.

To make the scaffolding area safe, we started by removing all the unsteady stones that were poorly attached to the wall structure, in precarious balance, or completely detached from it. Two workers carried this out, starting from the top of the scaffolding and secured from above with a harness. The collected stones were placed half at the base of the wall and half at the top of the terrace. In both cases they were divided according to their size (large, medium, and small) to facilitate the stone selection during the reconstruction phase. Once the scaffolding was safe, biocide was applied on the surface of the wall with manual pressure sprayers using a product based on glyphosate in water solution. The application took place several times during the day for the best results. Before applying the biocide on the whole wall, some tests were carried out on small portions of masonry to check any chromophore change or residues on the wall (Fig. 8).

In a second phase, the group mechanically cleaned the wall from the top to the ground and removed the vegetation from the surface and the soil deposit with most of the roots. A second layer of localized herbicide was applied on the uncovered roots.

Once the biocide was absorbed by the roots, it was possible to proceed with the third cleaning, with the aim of removing as much soil, roots and weak mortar as possible from the stone joints. The aim of this last step of cleaning was to arrive at a healthy surface of masonry from where it would be possible to start with reconstruction and consolidation. The third cleaning was carried out from the first floor up to the last one (Fig. 9).

Selection of mortar

The analysis of the original mortar revealed that in the superficial areas it was thin and only weakly adhered to the masonry, but was still healthy and solid from a depth of 15/50 cm depending on the areas. Moreover, the original use of a dry technique privileging the use of clayey earth was confirmed.

Several tests were executed to identify the best mortar to use on the consolidation and reconstruction phases. The tests were carried out in situ together with the trainees to show them the property of mortar we were looking for.

A lucky coincidence was that, at the same time of our intervention on the N wall, EI was conducting an archaeological excavation in the lower city of Bazira. The serendipitous occurrence allowed us to use a clayey soil on the composition of the conservation's mortars that came from Kushana layers, that is, coeval with the masonry object of the intervention. This clayey soil was used in most of mortar's recipe tests, to identify the most similar composition, as we wanted our mortar to have the same mechanical and optical properties of the original one.

Mortar tests were carried out using two limes: one was a natural hydraulic lime type NHL5 brought from Italy and the other was local lime after ⟩10 days from aging (slaking).

Thirty-five different mortar tests were prepared and, once dry, they were subjected to four different mechanical stresses. These tests were conducted empirically trying to be as consistent as possible.

Types of tests:

1) resistance to abrasion by scratching the surface of the mortar with the edge of a scalpel and evaluating its strength;

2) compressive resistance by taking the mortar between thumb and forefinger and gradually increasing the force until the mortar breaks;

3) hardness, by dropping a hammer from a standard height for all mortars counting how many times were needed until the mortar breaks;

4) resistance to bending, by flex the mortar between the hands and slowly increasing the force until it fractured.

Giving a score from 1 to 4 to each test and each mortar based on the performance in individual tests, specific mortars were identified for specific tasks.

Conservation activity: double approach

On the ground floor, deep consolidation was not necessary, as the masonry was solid and the original finishing texture still well readable. It was therefore decided to reintegrate the missing masonry gaps maintaining the same original construction technique but making it recognisable by keeping the reconstruction offset (recessed c. 3 cm) from the original profile. A reintegration of this kind on the ground floor was possible because the regular arrangement of the stones and the clear readability of the original pattern allowed replacements without falling into a 'fantasy restoration' (Fig. 10).

Conservation was performed with the stones previously removed from the wall or local stones that were manually cut to size. The trainees demonstrated great skills in this activity. The mortar identified for bedding and connections between the new stones and the old ones was composed of one part of NHL5 hydraulic lime, two parts clayey (obtained by sieving ancient waste soil coming from the excavation of the lower city) and one part of sand (river sand). This mortar was selected for its excellent hardness and compressive performance, as its use on the lower levels of the walls required greater resistance to weight and pressure.

The stones used in the reintegration were submerged in water until they were used, to create a better connection with the hydraulic mortar. Moreover, the areas involved during the reconstruction phase were constantly kept wet using manual pressure nebulisers. If during the application of the mortar, any drops or smears accidentally fell on the original stones, they were immediately removed with a spatula and then sponged off to avoid future bleaching.

Except for the ground floor (green area in Fig. 11), which was treated as one reconstruction area, the area of intervention from the first floor upwards was divided in two parts so as to have two large working areas. These were obtained by

dividing the scaffolding in half along its height, obtaining as a result two rectangles of 2.5 meters width by 11 meters hight (blue and red in Fig. 11). The work field was divided in this way to enable the execution of two different types of conservation, to evaluate the benefits and disadvantages of either.

In the right half (W side – blue area), a more complex and solid (but also more interventionist) reintegration methodology was used. This method required more materials and time of execution. In the left half (E side – red area), a simpler but less solid method of reintegration was applied. This method is closer to the ethics of minimal intervention as it requires less time and materials.

On the first floor, it was not possible to continue with the same model of intervention as had been used on the ground floor because the masonry was in a more degraded state. A first deep consolidation was needed, but it soon became clear that recreating the same aesthetic of the original texture was impossible without creating a false historical conservation.

Therefore, from the ground to the top floor, we proceeded by dividing the work into two phases: (1) structural consolidation, and (2) the reconstruction, proceeding as follows:

> (1) the consolidation phase was performed using a mortar composed of 1.5 parts of lime extinguished on site, 2 parts of clayey soil and 2 parts of sand. This mortar had a more fluid consistency than the reconstruction mortar and was applied with a trowel to all the gaps, holes and cracks inside the masonry, and even in the narrowest joints between the stones where the reconstruction mortar would have had been to dense. Before the application of the mortar, the wall was wet and kept wet during the drying phase;
>
> (2) once the mortar dried up, we proceeded with the reconstruction. We used the same stones previously removed from the wall and, when necessary, we found similar ones on site. These stones were bedded and connected to the original body with a mortar composed of 1.5 parts of local lime, 2 parts of sand and 2 parts of clayey soil. The mortar selected was the same as that used in the consolidation phase, since it proved to be the best in terms of tone and performance.

The reconstruction had two main objectives: firstly, to recover the structure of the wall, in order to obtain a solid and safe base for the reconstruction of the upper floors. Secondly, we sought to replicate the aesthetic appearance of the masonry in the area, which was characterised by the widespread and regular presence of large stones coming out and hanging from the rest of the wall surface.

Our reconstruction strove to maintain the same overall reading of the deterioration in that portion of the wall, while at the same time restoring a structural solidity that would allow the stones to have a secure structural support. The crux of this operation was maintaining a critical approach during the reconstruction, adapting it area by area according to the morphology of the wall and to the presence of overhanging and unsteady stones that needed support. Each time the morphology of the wall changed, new specific plans were drawn to fit the intervention to the structural and aesthetic need of the concerned areas.

Once the two phases had been defined, the work was carried out following a chain process: on one floor of the scaffolding the cleaning and consolidation was carried out (Fig. 12) while on the lower floor reconstruction began (Fig. 13). In this way, both phases could be executed on the following day by moving up one floor. During the cleaning and consolidation phase, the walk-on levels of the scaffolding were extended until they met the wall, covered with a tightly woven synthetic sheet and secured with nails, so as to prevent stones or soil from falling on the workers who were carrying out the reconstruction on the lower level. This chain method has been used till the end of the reconstruction phase on the right side of the scaffolding.

The second intervention strategy did not involve the use of stones to reconstruct the missing volumes of the masonry or to reproduce the original texture. In fact, the two methods of intervention were different only in the reconstruction phase, which was carried out using only mortar to fill in the gaps and to recover the connection between the original stones and the wall where necessary. The mortar used in all phases of the left half portion of the scaffolding consisted of 1.5 parts local lime, 2 parts clayey soil and 2 parts sand.

Once the reconstruction work was completed, the last soil deposit on top of the wall was covered with a temporary plinth built on the edge of the terrace wall to prevent the upper soil eroding, and rainwater drainage pipes were installed to prevent heavy exposure to rainwater percolation. Mortar made of 1.5 parts local lime, 1 part sand, 1 part clay soil and 1 part brick powder, was used for the construction of the cladding plinth. This mortar is totally reversible (Fig. 14).

In a last step, a second layer of dry mortar was applied wherever necessary. This second layer of finish gave our intervention a chromatic effect like the original mortar. It was composed of 4 parts of clayey soil and 1 part of sand. Because of the high temperatures and dry climate, the surface was well hydrated before and after the application in several stages.

Before the scaffolding was removed, a final layer of biocide was applied to the sides of the scaffolding to fight the flora in preparation for the next work phase on the N wall. We then dismantled the scaffolding, and a consolidation filler (mortar composed of 1.5 parts local lime on site, 2 parts sand and 2 parts clayey soil) was applied where it had not been possible to intervene due to the encumbrances of the bamboos resting on the masonry.

During the activities of the first season, a group of 25 local people was selected for the training program. The training was organised on 6 days a week/ 6 hours a day schedule. At the beginning, trainees were informed about the project, its objectives and the various steps. We taught them how to correctly and safely cut stones or slake quicklime, we increased their skills on mortar preparation. The use of local materials aimed at adopting a low-cost action model that in the future would facilitate serial maintenance and restoration action on a large-scale at a relatively low cost.

Over the course of the training, based on their pre-existing and acquired skills and experiences, trainees were each assigned a role as 'Chief Restorer', 'Sector Restorer', 'Unit Restorer', 'Sector foremen', 'Unit foremen'. At the end of the first season, the 'Chief Restorer' (1) was able to discern the feasibility of several types of intervention on the surface (cleaning, consolidation, restoration). They were able to independently manage conservation and restoration operations, including the appropriate treatment of mortar, and could supervise the chain of process. 'Sector Restorers' (10) acquired special skills in masonry restoration and could manage conservation activities in a specific sector of the site by themselves. 'Unit Restorers' (10) were able to manage in partial autonomy conservation activities in a specific unit (i.e., floor of the scaffold). 'Sector foremen' (3) trainees could autonomously execute a complex set of activities in a specific sector of the working yard (such as the site for the mortar preparation and the sites where stones were cut and selected). 'Unit foremen' (5) were able to carry out in partial autonomy specific activities performed in the unit of a sector. Protective gear was also introduced as compulsory in the training camps and classes on occupational safety were carried out. From the third week of the training, we progressively started giving trainees more autonomy in the process of decision-making and organisation of the activities, handing over specific responsibilities with the work process to each.

The grafting of Mediterranean olive trees onto wild olive trees was also carried out at the end of this season (Fig. 15). This operation involved 1000 trees, and the results were verified one year later. Three trainees followed the operation in collaboration with Mr. Azmat Khan PODB, Government of Pakistan.

Season 2 (E. Lant, E. Iori, L. M. Olivieri)

Emanuele Lant (EL) inspected the site between May and June 2022, under the direction of LMO. The inspection began at the Central Fortress, where most of the trainees were cleaning the structures. A new scaffolding was built to the W

of the area consolidated in the previous season, and the trainees replicated there procedure established during the first season.

The Central Fortress

During the first few days of the season, while the scaffolding was under construction, a group of six trainees treated the surfaces of the Śāhi building on the top of the terrace with herbicide and removed both soil deposits and unsteady stones from the structures. they also carried out minor conservation activities at the N bastion with the same type of mortar used for the consolidation of the terrace (Figs 16-17).

The most critical point was the inspection of the five-story scaffolding leaning against the large N wall built by the trainees (Fig. 18). Following inspection, the scaffolding was found to be strong, functional and well anchored. The various elements were bound by ropes and nails. The ropes were wet daily to ensure a better hold (Fig. 19). To work on the shelves, we considered the use of slings fixed at the top to some iron poles. Rope guardrails were added to the scaffolding to reduce the risk of falls without weighing down the structure (Figs. 20).

Work on the scaffolding began on 22 May. The local trainees showed competence in evaluating the damage, the consolidation and how they organised the work. However, an exaggerated confidence was observed in the way the trainees worked on top of this structure, and we noticed that some operations were sometimes carried out in a risky manner. Therefore, a special meeting was organised on site to explain again the potential risks of each activity and to emphasise the necessity to use protective gear.

We noticed a serious safety problem with the supply of mortar and stones at the highest levels of the structure. Specifically, workers were lowering material from above in baskets by means of ropes, without pulleys, leaning out both when the material was being lowered and when it was being grabbed by those working on the scaffolding. For these reasons, work was suspended for a couple of days. A solution was found whereby a PVC tube was used to lower the mortar from the top of the hill to the top floor of the scaffolding, from where it could then be easily lowered to the floor below, as the offset of the shelves allowed the basket to reach practically to the centre of the shelf below, without the need to lean out to grab it (Fig. 21). The work of consolidation of this portion of the wall was completed in early June, after which the scaffolding was dismantled.

The work at this point continued at the base of the wall. We carried out excavation activities there and to the W to expose the lower part of the wall. The bedrock was reached, and its outcrop was maintained in the remaining part without completely removing the sediment at the base to avoid stability problems. The wall, progressively cleared, was well preserved (Fig. 22). Consolidation was immediately carried out where necessary. During this operation, at the W end of the wall, a rampart began to emerge (Figs. 23-24).

Towards the E, work began on the reconstruction of a gap in the masonry, made with an undercut of at least two inches to make it distinguishable from the original (Fig. 25). Responsibility of this activity was given to Chief and Sector Restorers.

Before leaving, LMO and EL organized a meeting with the trainees to plan the rest of the work (the excavation at the base of the wall and the reconstruction work) and to distribute responsibilities.

Training on safety measures

This season revealed that trainees were able to carry out activities in a semi-independent manner. The work was well organised and outlined. Nevertheless, at the beginning it was necessary to intervene on some safety points to ensure greater safety for the workers, who tended to work, at times, heedless of trivial risks, such as the possibility of stones falling from the top of the wall while excavation operations were in progress below. Perhaps because of their high level

of skill, at times they tended to underestimate certain risks. This made supervision necessary given the exceptional working conditions. By teaching the proper use of tools and devices and by focusing on the risks that operators may face we sought to introduce a higher awareness of safety matters. By the end of this season most of the trainees had developed a sense of responsibility and awareness of the risks.

Season 3 (E. Lant, E. Iori, L. M. Olivieri)

Inspection, carried out in September 2022 by EL, under the direction of LMO, focused on the following objectives:

1) the supervision of the scaffolding construction;
2) cleaning and consolidating of the W portion of the N wall;
3) cleaning and consolidating of the Śāhi building on top of the acropolis;
4) additional training on workplace safety measures.

Supervision and evaluation of the local team of restorers at the N Wall

During the first day, a general inspection of the site was carried out. Trainees had cleaned the area treated in May and June. The bedrock had been reached, and the lower part of the wall had been cleaned and grouted as agreed during the last meeting with the team. The new scaffolding was practically doubled in length. It was identical in construction technique with the adjustment made in the previous campaign. The new scaffolding consisted of six vertical uprights spaced approximately 2 metres apart; it had five floors, also spaced 2 metres from one another. It was made of bamboo canes and wooden plank tops. The various elements were fastened together using nails and ropes, which were moistened daily to improve their hold. As in the previous campaign, the structure was anchored at the top of the hill to iron poles driven into the ground and supported from below by oblique buttresses, also made of bamboo, arranged on the N and E sides. On the short side towards the W, we built a staircase to access the various levels, except for the last level which was accessed directly from above. A further difference from the previous structure was the presence of parapets, also made of bamboo, to ensure better working safety (Fig. 26).

Cleaning and consolidation activity on the N wall

After this first inspection, which did not reveal any need for major interventions (only one parapet was missing and one plank was too far from the wall, defects that were immediately remedied), the cleaning work began on the joints between the stones. This operation took about two days. Afterwards, after the application of herbicide, the upper part of the wall was grouted and reconstructed to stabilize the surface at the top of the hill. The trainees working on the scaffolding were secured from above using harnesses and ropes, which were specially purchased and introduced to the site during this campaign.

For both the cleaning and the grouting operations, we started from the last shelf, the most critical in terms of safety (Fig. 27). Unfortunately, the supervision activity was slowed down for security reasons, following an attack that took place on 13 September in Swat, not far from our site.

We deemed it necessary to carry out the cleaning in two phases: one dedicated to the wall and one aimed at clearing the surviving upper part of the wall from the soil on top. Following this operation, the reconstruction could rest directly on the stones placed in ancient times, making it more stable. During this second cleaning, a fragment of wall transversal to the outer wall in a NS direction was noted, intersecting the wall itself. The reconstruction was halted to avoid concealing this structural evidence before proper documentation was carried out (Figs 28-29).

For the reconstruction of the upper part of the wall, the same adhesive mixture was used as in previous campaigns. The

supply of this material to the last shelf was carried out by means of a chute made of a PVC pipe, as in the previous campaign. On 19 September, the top shelf was completed.

Cleaning at the base of the N wall

At the base of the wall, we continued to clean and remove soil deposits and vegetation. The work was carried in a similar manner here as during the previous campaign for the W portion. In this case, the area covered was near the NE corner (Fig. 30). After an initial phase of vegetation removal, alternating phases of cleaning began, with soil removal and restoration. We decided to keep the bottom level of soil as to take advantage of it to easily set the scaffolding (Fig. 31).

Consolidation activities at the Central Fortress

A small group of trainees was asked to replicate the entire procedure of consolidation at the Śāhi Temple on the terrace top. The NE bastion in the upper part, which had already undergone cleaning and partial consolidation during the previous campaign, was fully restored (Fig. 32). Consolidation of the upper part of the fort continued (Fig. 33). Here too, once the necessary amount of soil was removed to reach a stable level of stones, we proceeded with a consolidation that improved the stability of the structures at the top and the walkability of the path between them.

At the end of this season, the team agreed on a number of next steps:

1) restoration of the NE portion of the retaining wall via scaffolding, using a system of material supply by means of buckets and pulley. We recommended the presence of no more than five people on the structure at the same time. Those people should distribute over two levels for stability reasons and their presence should be staggered because of safety concerns;

2) at the base of the wall and at the top of the hill, the work would continue as described above.

During this phase, the restoration progressed well thanks to the trainees being skilled and working autonomously. They knew all the steps in the process of consolidation (from mechanical/chemical cleaning to restoration, if necessary) and, in case of structural problems, were able to

(a) identify the problem,

(b) choose among alternative solutions,

(c) take action,

(d) review the decision and improve the work.

In general, all the local workers involved in the Project during Season 3 achieved excellent results, developing a genuine interest in the project.

Season 4 (F. Colombo, E. Iori, M. Minardi, L.M. Olivieri)

During the month of October 2022 four main activities were carried out:

1) inspection of the conservation work on the N wall of Terrace E;

2) reconstruction of a portion of the masonry at the NE corner;

3) reconstruction of the masonry volumes collapsed at the NE corner of Terrace E;

4) cleaning and consolidation of Temple 6.

The inspection and the work of restoration and conservation of the NE corner of Terrace E was carried out by Fabio Colombo (FC) from 8-16 October. Activities (3) and (4), set up by FC, were supervised by LMO in the following two months.

Inspection of the conservation work on the N wall

At the time of FC's first visit in early October, the partial compensation/consolidation work on the N walls of Terrace E had progressed to more than 60 % of the total area. The mortar and recovered stone elements were very well integrated within the original wall fabric. By knocking vigorously on the mortar fill and stressing the stone spikes in the wall fabric, there is no hint of voids, detachments or portions or points of brittleness, except for a partial shrinkage crack.

A crack closure campaign was immediately organized to prevent infiltration of water and soil. The use of olive-leaf spatulas and hard damp sponges for this activity also improved the aesthetic appearance of the wall: in fact, with sponging, the grain of the mortar was made visible while at the same time blending better with the stone. Our purpose has always been to highlight and bring out the masonry fabric.

Another critical point was the large wall portion near and around the scaffolding. A deep detachment seemed to affect a 2/3-meter-wide section extending from the top to the base. Two hollow areas were clearly visible here. We decided to proceed with the construction of a retaining buttress to stitch up the wall fabric at this point of fragility. This wall fabric was executed by dampening the stone elements in similar, but not identical, motions to those used in the original wall.

In addition, new work tools (spatulas, sponges, trowels) were provided to the workers to improve, facilitate and speed up the grouting operation. The list of materials is deposited at the Mission House in Saidu Sharif.

Reconstruction of a portion of the masonry at the NE corner

A large portion of the wall was missing in the NE corner – as is also visible in archival photographic documents (Figs 34-35). The dimensions of the gap were h: 4.86 m; E side: 3.40 m; N side: 2.30 m; inner diagonal: 2.70 m. At the base of the corner, we found a large outcropping boulder with a very pronounced slide angle.

The following operations were performed:

(1) removal of shrubs and weeds adjacent to the intervention area (Figs. 36-37);

(2) partial excavation of the foundation outcropping at the foot of the corner, by means of jackhammer, drill, chisels, wedges and sledgehammers. This operation allowed us to safely construct a foundation (Fig. 38);

(3) placement and bedding of rebar reinforcement. We drilled three holes in the rock foundation where we planned to attach the metal uprights (Figs. 39-40). We tied the vertical elements with rebar to chain them together and fasten them inside the wall gap. Four orders of horizontal chains were attached to the wall itself. Such a structure ensured a greater tightness of the compensation wall and consistency with the elements of the interior wall fabric (Figs. 41-42);

(4) construction of a stone ashlar basement bedded with 'bastard' mortar (bold and cement 1:1 as binders; sands and stone breaking). The plinth consisted of two steps out of square with respect to the walls and lathing to ensure welding between the two floors (Figs. 43-44);

(5) construction of a square stone ashlar retaining wall, like the original but with denser fabric, such that it is visually distinct from the original. The wall also had an undercut of about 3 cm from the original (Figs. 45-54).

(6) construction of the retaining wall using large stone elements on the inside, when possible, and binding them to the inner wall fabric by using mortar and by wedging them together. This was done to ensure and increase the holding capacity of the new intervention;

(7) application of mortar with the same recipe with that used for the grout on the N wall, with the addition of stone breakage in the mix of aggregates;

(8) masonry work following the curve of the original walls; in fact, in addition to not being straight but curved they have a sine wave pattern. The façade ashlars for the gap were cut not at right angles but at a very slight angle, so that we could follow a) the curve of the original walls; b) their sinusoidal pattern;

(9) levelling of the walking surface around the base to allow the placement of scaffolding.

E side wall gap

The overlap of two wall phases is clearly visible in this sector (Fig. 55). An older wall, with its axis shifted a few degrees from the outer belt, is clearly visible at the height of a collapsed portion of the later phase wall. A large arched gap opens from the top of the older wall. We agreed on the need to place two metal uprights on either side of the outcropping portion of the ancient wall. Therefore, we lay a horizontal beam provided with strong iron plates, to create a base where the filling for the gap can be set.

At the same time, steps were built to facilitate the access to the E wall of the terrace. We also built a water channel to avoid the accumulation of water at the base of the N wall (Fig. 56).

Conservation activities at Temple 6

A meticulous check of the tightness of the elements was performed by knocking and detecting the presence of voids or points of fragility. The stabilisation and consolidation work appeared solid. When points of fragility were found, 'bridging' depth consolidation work was recommended. Ready stabilisation and cleaning work was performed on some artifacts from the cleaning: stone; marble; stucco.

As per the cleaning, we removed excavated soil by means of soft, pointed tools (sticks; bamboo sticks; soft iron beak spatulas with blunt tips; tooth-special spatulas). These instruments were preferred as they are harder than the deposits but much softer than the surface of the finds. Bland washing with well water and massaging with soft brushes was also performed. The team also checked for presence of outcropping salts on the artifacts' surface, after drying and mechanically removing crystals with a hard brush and bamboo-sticks.

Pre-consolidation (when necessary) and the application of various solutions of Microacril in water and/or Paraloid B-52 in mild solution (3 percent) in solvent (Acetone; Denatured Alcohol >95°; Nitro premium diluent).

Season 5 (M. Pinelli, E. Iori, M. Minardi, L.M. Olivieri)

Conservation work in Season 5 was performed in November 2022 under the supervision of Marco Pinelli (MP). During this season, the goal was to:

1) complete all necessary conservation work along the N side of the retaining wall; finish restoring the entire vertical surface, and reconstruct the missing edge; expose the entire surface of the wall by removing the deposit soil at the base; prevent further water infiltration to the wall; enable the walkway section at the base of the wall to allow visitor access;

2) finish the restoration of the E wall; carry out temporary preventive restoration work to secure the stones that were most at risk of falling within the large arched gap; expose the base of the wall corresponding to the missing part; finally, clear the dense vegetation and set up a scaffolding on the E side;

3) on the terrace, remove the deposit soil from the W, N and E sides of the Temple to a thickness of about 30 cm to create mortar profiles.

Status of the site upon arrival

As we arrived at the site in November, the progress of the conservation of the N side of the retaining wall was 80% complete. A scaffolding 15 metres wide by 20 metres high had already been built on the last unrestored section of the wall. The wall surface covered by the scaffolding was already cleared of low vegetation and soil deposit (Fig. 57). At the height of the first floor of the scaffolding, a partial reconstruction of the wall had already been completed. That reconstruction was performed on two missing parts of the wall. The counterfort made at the end of the right side of the same wall showed no signs of failure or weak points.

The NE corner, which had already been reconstructed following FC's directives, showed no signs of weakening. The reconstruction work, easily detectable, was executed in an exemplary way. On the top of the terrace all conservation work was well done, but in some areas of the N side the retaining wall showed diffuse mortar shrinkage cracks. These was addressed in the following season

Conservation status

The state of preservation of the portion of the wall surrounding the scaffolding presented problems of weak adhesion between most of the stones. In addition, the mortar's loss of mechanical properties over time caused an overall situation of poor cohesion in the wall fabric. In some areas, repeated collapses over time removed the necessary physical support for some stones, leaving them in an unstable condition.

At about half of the total length of the retaining wall, darker areas were visible where moisture had accumulated. In the portion of the wall between the end of the scaffolding and the NE corner, there were still low trees and vegetation, and stones released from the structure. In addition, the summit edge of the corner-supporting bastion was missing; the measurements of this gap were 1.60 m high by 1.15 m long toward the N side and 1.27 m along the E side (Fig. 64).

Turning to the E side of the retaining wall, the conservation state of the entire surface differed according to the area: the edge was in a very good state of preservation, while a large section located 4 m above the walking surface was missing from the area immediately adjacent to it. This gap was in the shape of an arch, 4vm high at its highest point, 4 m wide at its widest point and 0.7 m deep at its deepest point. The missing part had a recessed belly which exposed the stones along the top profile of the arch for most of its surface. Proceeding E, the entire surface of the wall was covered by seasonal greenery and deposit soil. In addition, the base of the wall was covered with a sloping soil mound, where dense vegetation (including high and low trees) had grown over the years.

The perimeter stuccoes of the temple located in the centre of the terrace were in danger of being damaged by the possible fall of soil and stones. In fact, a thick layer of soil deposit varying from 0.3 m to 2.5 m was on the same vertical profile as the stucco decorations.

Conservation treatment

On the wall surface around the scaffolding, consolidation, restoration and reconstruction operations were carried out where necessary to give support to those stones in danger of falling. The consolidation was carried out with the use of the same mortar employed in the previous phases of wall conservation, which was composed of 2 parts fine sand, 2 parts

high local clay content soil, and 1.5 parts lime. The mortar was applied by means of trowels and double olive-leaf trowels along all sides of the original stones to restore the adhesion of the individual courses to the wall. In larger gaps, brick or stone elements were inserted as filler and to give more support to the mortar. The mortar was carefully sponged and trowelled to avoid the formation of superficial shrinkage cracks. Once the mortar used in the consolidation dried, the remaining crack on the wall surface were filled with mortar of the same composition (Figs 67-73).

Once these steps were completed, the scaffolding was removed (Figs 74-75), so that the soil deposit at the base of the wall could be removed as well (Figs 76-78). The operation proceeded until the wall was fully exposed, that is, until the stones that form the base of the wall along the N slope were unearthed. The most exposed areas are:

1) the contact angle between the corner bastion and the wall; the area of the wall exposed in this portion is 7.5 sqm, which corresponds to a height of 3 m at its highest point and 5 m in length;

2) the area located a couple of metres to the right of the first; the wall area is about 4.5 sqm for a maximum height of 1.3 m and a length of 6.8 m;

3) in the area located two meters to the right of the second, the wall was exposed for a total area of 6 sqm corresponding to an average height of 0.6 m by 11 m in length.

The earth removed from the base of the wall was moved partly below the road that surrounds the retaining wall and the other became part of it, and the inclination became sharper in two places. To facilitate the visitors' passage, two stone stairs were built, lined with the same mortar used in the restoration phases (Figs 79-80).

It was not possible to carry out the restoration operations on the area of the N wall between the end of the scaffolding and the NE corner, because the wall exceeded the maximum height of the scaffolding by several metres. Additionally, the support surface near the NE corner was not large enough to host the base of the scaffolding (Figs 81-82).

Restoration operations were carried out with ropes belaying from above over an area extending laterally 3 meters to the right and left from the corner and extending vertically from the end of the corner counterfort to the end of the retaining wall for a total development of 12 m high by 6 meters wide (72 sqm).

This work required the training of two men in the use of climbing gear and teaching them the necessary skills to descend, stop, and ascend a rope safely. The workers who specialised in rope work were also provided with all the necessary PPE to safely carry out the restoration. In addition, to facilitate the supply of necessary materials such as water mortar, small stones, etc., a pulley was built at the top of the terrace with a jutting arm for the safe handling of materials (Figs. 82, 84).

In this way, work on the NE corner could begin. First, stones dislodged from the structure or precariously balanced were removed. Second, a coat of glyphosate-based biocide was sprayed over the entire surface (Fig. 83). The operator was provided with the necessary PPE to safely carry out this large-scale operation. All vegetation and low-stemmed trees that had grown on the wall were then mechanically removed, so that the consolidation phase could begin. Particular care was taken in the low stem pruning of the shrubs and trees that had grown close to the large arched gap on the east side of the wall. In fact, we decided not to uproot them, but to leave the roots inside the structure for additional support and we merely devitalised the plants through the application of glyphosate-based biocide spray to prevent further growth (Figs 85-86).

Once all outside elements were removed or detached from the wall, we consolidated the stones with the same methodology used in previous seasons on the surfaces under scaffolding. Lastly, the edge was reconstructed by filling the volumes between the base of the edge and the end of the gap while maintaining the same inclination as the original

wall in the immediately adjacent areas. The reconstruction was done in lath stones with standard mortar imitating the original construction technique, keeping an undercut of 5 cm to make it recognizable (Fig. 88).

On the N side of the corner bastion, some localised consolidation was carried out where the wall texture was discontinuous and more exposed to mechanical stresses from weathering and biological agents. The operation was carried out with the same methodology used on the rest of the wall (Fig. 89). The latest restoration work carried out on the N side of the retaining wall was aimed at solving the problem of water infiltration inside the wall. The solution was achieved in two phases: (Fig. 90-98)

1) first by inserting 8 cm diameter plastic pipes inside the wall to a depth of 30-60 cm, depending on the conformation of the structure to drain the water and moisture present inside the wall and at the same time increasing its breathability;

2) at the top of the terrace, a 6 × 4 m trench was dug 30 to 60 cm deep based on the excavated area and roughly corresponding to the humidity spots present on the N side of the wall. The intent was to locate the area responsible for the water infiltration, possibly due to the co-presence of underground structural voids and water collecting areas where plants had previously been removed. The trench was first delineated by observing the pattern of water absorption in the soil after two weeks of rainless weather. Then we dug deep until a layer of stones was reached. This was documented photographically and later used as a base to create a sloping plane of rammed soil having, as its lowest point, the SW corner. From there, the bottom of this pit rose to the edges of the trench, leaving a bottom inclined plane 30 to 15 cm thick depending on morphological possibilities. The inclined plane was then lined with flat stones and covered with *cocciopesto* containing 2 parts sand, 1 part brick dust, 1 part brick fragments and 2 parts slaked lime. This mortar was chosen for its waterproof quality. Once the first layer of bedding had dried, a second layer of only mortar was applied; this was laid as smooth as possible (Figs 94-95). At the lowest point of the trench, a 4.5 m-long channel was excavated, leading directly to the trench on the N side of the Temple. The gully was used as a seat to insert a plastic pipe to drain water from one trench to the other (Fig. 96). Once the mortar layer had dried, a thick plastic layer larger than the trench was laid down. A hole was cut in it in correspondence to the pipe so it could pass through the plastic layer (Figs 97-98). The trench was then covered with topsoil, leaving stones all around the mouth of the pipe to facilitate both the draining of water inside the pipe and routine maintenance (Fig. 99).

Two other conservation operations were carried out on the terrace: 1) the refacing of the concrete finish of one of the two tanks used to quench and age the lime (Figs 100-101); 2) the preventive work performed on the W, N and E sides of the Temple. The work on the Temple was carried out purposefully to prevent stones and soil deposits falling onto the profile of the temple's decorative plasters. The soil and stones above the Temple profile on three sides were removed in order to create a terrace about 30cm deep. This perimeter was then covered with a layer of mortar with the dual function of protecting and consolidating the structure's edges (Figs 102-104).

Once the operational phases on the N side of the wall and the terrace were done, we devoted our attention to the E side. Two main tasks were carried out: 1) the study, planning and creation of a temporary support structure for the large arch-shaped gap; 2) the partial removal of greenery along the E side. The realisation of a temporary support structure for the gap was considered necessary because, over the past few years, the size of the gap had increased, as more stones had fallen from above. So, in order to preserve the current conservation state of the wall to the best of our ability, we proceeded to the construction of this structure dedicated to preventive conservation.

Initially, the whole missing part and its most fragile points were studied. These specifically were identified at four points at the top of the arch, about halfway along its total width. To work on the gap, the soil deposit at the base of the wall was removed in its entirety, thus exposing the contact point between the rock and the wall. As the soil was removed,

some wall structures overlying the older wall below emerged; these made the reading of the wall history clearer and we could identify the place where the corner bastion wall had been grafted onto the older wall (Figs. 105-106). To give the necessary support to the weak points, measurements of the gap's interior were taken. A scaffolding made of steel pipe was then designed to perfectly fit inside the volume of the arch. We needed to create a flat surface at the appropriate height to create a proper support for the weak stones.

The structure was made of Innocenti tubes and consisted of three main pillars cemented to the ground that reached the end of the arch. These were coupled with three other pillars set against the innermost point of the arch belly. All pillars were connected to each other horizontally with transversal elements, so that we could obtain two trapezoid-shaped planes. These two planes were covered with 5 cm-thick planks of walnut wood, and a side ladder was affixed to the scaffold so the operators could access the structure (Figs 107-110). The upper floor was covered superficially with thick plastic sheeting to protect the wooden planks from the weather during the winter season. The sheeting was bound to the wooden boards with nails, while the underside was left open so that the wood could breathe.

The support surface located 15 cm from the first two stones that needed support and 60 cm from the other two was the base for the construction of a small stone wall bedded with mortar that would give support to the weak points. The points of contact between the stone support and the original stone were carefully set up by using a minimum amount of mortar, as to prevent the creation of an excessively strong physical bond between the restoration elements and the original wall. The wooden beams used as a walking surface of the operators were removed along with the ladder once the work was completed (Figs 111-113).

Alongside the rest of the E side, the remaining greenery on the retaining wall was cleaned, and we removed every third tree to strengthen the grip of the roots on the ground to avert possible collapses and to make the area between the road and the wall accessible. In the end, the soil and stones removed during the work done on the E side were used to consolidate and widen the road that runs alongside the wall (Figs 114-116).

Project activities in Seasons 4-5 also included a total of three months' training for seven students from Swat University.

At the end of Season 5 the following work was completed:

1) conservation activity of the N side of the retaining wall, and a solution to the water infiltration problem was provided;
2) restoration of the wall surface on the corner (by rope) was completed, and reconstruction of the smaller corner;
3) preliminary work in preparation for the 2023 conservation season;
4) preventive conservation work on the large missing part on the E side in order to avoid further losses of original bricks;
5) vegetation was reduced to 5% over the total treated wall surface; the face of the E side wall can be reached by walking, renovation of the access road;
6) along the entire perimeter of the Temple, a preventive restoration work was carried out with the aim to preserve the Temple decorative plaster;
7) Last but not least, all the operators who worked on the conservation work-field improved their conservation-related skills; new skills and abilities were taught to rope-working operators.

Season 6 (E. Iori, M. Sesana, L.M. Olivieri)

The sixth season took place during the months of February-March 2023 under EI's supervision. The main targets of this season were as follows:

1) Inspection of the state of conservation and cleaning of the N wall, where activities of consolidation and restoration had been previously completed;

2) supervision of the restoration work on the damaged portion of the E wall adjacent to the NE corner, where activities began during the previous season under FC and LMO's direction;

3) supervision of the cleaning and consolidation of Temple 6.

Inspection of the state of conservation and cleaning of the N wall

During the first visit in February, conservation work had been carried out on 100 % of the N wall surface. In the areas consolidated during previous seasons, no voids, detachments or points of fragility were noted. The treated surface shows a homogenous intervention technique. All restored sections were highlighted by a 3 cm undercut to facilitate the differentiation of the ancient structure from the modern reconstruction. In comparison to February-March 2022, when the project had just begun under the direction of MP, the appearance of the lower part of the terrace and the Central Fortress had completely changed (Figs 116-118): the cleaning and consolidation work were carried out in a professional manner; the accessibility of the areas had greatly improved. The visual impact of the terrace and the Śāhi fortress is now remarkable, to the extent that this area of the acropolis, which was formerly barely visited by locals and tourists alike has now become one of the main points of interest of the site. For safety reasons, workers were tasked with preventing visitors from going places where conservation and related activities were ongoing. However, during breaks, they would sometimes proudly accompany visitors to see the N wall where the activities had been completed. We heard them explain to visitors the design, function and date of the artificial terrace of Barikot. The visitors, often from a much higher social and economic position than the trainees, showed great respect for the knowledge of our team members.

Restoration of the gap in the NE portion of the E Wall

The trainees began filling the void unearthed in the NE portion of the E wall during the previous season (Fig. 119). They showed confidence in their decision-making process. We replicated the procedure carried out during the work at the NE corner, adapting the process to the current situation.

After a thorough cleaning, the gap revealed three wall phases whose existence had already been highlighted by some observations conducted on the N wall (Fig. 120). The oldest phase (orange in Fig. 120b) presents a NNW-SSE alignment which is very different from the N-S orientation of the outer E wall of the corner. This phase is followed by an intermediate phase (yellow in Fig. 120b) in which the ancient wall is in line with the NNW-SSE alignment, but it should be noted that the wall in this phase is very distant in its SE end from the current terrace profile – an aspect that may imply many things, which we expect to clarify in next year project year. The third wall phase (red in Fig. 120b) is the later one, visible today, which lines the entire NE corner of the Terrace E (orientation N-S/E-W). This later lining was affected by two collapses (based on archival documentation, we know that one at the corner is pre-1926, while the arched gap is post-2000). They were the subject of the masonry repair works described above and below.

Since cleaning had already been carried out at the end of the previous season, we started by digging a small trench at the base of the wall to reach the bottom and expose the rocky outcrop, so we could safely build a foundation wall (Fig. 121). Then, using a jackhammer and drill, holes were drilled in the rock for the positioning and housing of the rebar (Fig. 122). We then built a stepped ashlar foundation with large stones bedded with the same mortar used for the corner foundation in the previous season (Figs 123-124). The masonry technique and the dimensions of the stones were also

the same as those from the previous season. The vertical elements were bound with reinforcement to chain and secure them within the wall cavity (Figs 125-126). This structure was intended to provide greater tightness of the compensation wall and consistency with the original wall fabric. A 3 cm undercut to the original wall was maintained throughout the intervention (Figs 127-130).

Following FC and LMO's suggestion, a small window was installed as an inspection window to regularly check the condition of the inner wall, e.g., for water percolation and humidity, and the interior wall was checked for water leakage. (Fig. 131-132). When this window was completed, a small scaffolding was erected to allow the restoration to continue on the upper part of the wall (Figs 133-134). The activity proceeded without any problems: the scaffolding was easy to build due to its small size (compared to previous seasons) and the ground had already been levelled for this purpose. The filling followed the procedure described above. The only complication was the change in the inclination of the wall which trainees paid attention to. To facilitate the access of materials to the second floor of the scaffold, a path was first cut into the soil against the E wall and then connected to the scaffolding through a small ramp. All the workers wore protective gear while working on site, without any reminders. After five weeks, the work was completed (Fig. 135).

Additional activity of restoration at the northern portion of the E Wall

During the cleaning carried out in the final phase of restoration of the large structural void, another smaller and less deep gap (h max 3.20 m; w. max 310 m; t. max. 1.40 m) in the wall left of the scaffolding was identified (Fig. 136). Once the previous work had been completed, we proceeded to the fill this point of fragility (Figs 137-138). As the lower part of the gap was easily accessible, a small scaffolding was set up only in a second phase to complete the upper part (Fig. 139). Due to the limited space available the actual work of restoration was carried out by only two trainees (Chief and Sector Restorers), while other two people were responsible for the selection of stones, the transport of materials and the partial cleaning of the area immediately S of the working site. The trainees, by now fully autonomous and experienced, completed this task in less than two weeks (Fig. 140-141).

The cleaning and conservation of Temple 6

While the restoration activity at the terrace was in progress, another team of trainees started the work of cleaning and conservation of Temple 6.

Since the stucco decoration of the podium had already undergone a consolidation program during the previous season, the targets of this season were to:

1) expose the upper part of the podium still covered by a mound of soil and vegetation in order to facilitate visibility and readability of the structure by visitors;

2) check whether any negative evidence of the upper structure of the Temple was still detectable on the upper surface of the podium.

The cleaning began with the removal of bushes and shrubs by manual and mechanical methods and continued to the removal of accumulated soil (Figs 142). A total of ten trainees participated in the operation and in the organisation of the work. The cleaning operation took a long time (about five weeks), due to the uneven level of the preserved floor, which was affected not only by ancient spoliation activities but also by recent clandestine excavations. Moreover, in preparation for the subsequent consolidation activity, the workers paid close attention to cleaning the joints between the stones to be filled with mortar in the next phase. Though time-consuming, this activity yielded excellent results. From the point of view of the musealisation of the site, the cleaning made it possible to highlight the Temple's monumentality. From an archaeological point of view, the cleaning revealed some important information regarding the layout of the temple: (a) the ancient access staircase to the cell (Figs 143-145), (b) the profile of the cell that once stood

on the podium and its drainage systems (Fig. 146), (3) the presence of an older structural phase of the temple (Figs 147-148).

Once the cleaning was completed, the trainees proceeded to consolidate the structure by adding mortar between loose stones. The stones were kept wet, to create a better connection with the hydraulic mortar. Any drops or smears that accidentally fell on the original stones during the application of the mortar were immediately removed with a spatula and then sponged off. Artificial pits incising the structure were refilled with stones to prevent the accumulation of water. These zones were highlighted by maintaining an undercut. Moreover, to facilitate rainwater drainage away from the temple an imperceptible difference in height was created by stones at the edge of the podium (Figs 149-151).

Landscaping activity: creation of a green buffer zone

While cleaning and conservation activities were in progress at the base and at the top of the terrace, a smaller group of trainees was involved in the first phase of the landscaping activity. This team oversaw planting of 200 new olive trees, evaluated the grafting of wild olives carried out during the first season of the project (March 2022) and their pruning (Figs 152-156).[58] The new olive trees acquired with the help of AICS Islamabad from Italian nurseries were planted in three different sectors:

1) along the new path that runs along the northern wall of Terrace E;
2) on top of Terrace E, at the passage between Terrace W and Terrace E and N of the Śāhi Brahmanical Temple, where a terraced flat area was in the meantime created using the soil removed from the temple in order to create a shelter for visitors;
3) along the access path to Temple 2 (BKG 13) immediately below the acropolis.

The inspection of the grafting done in Season 1 revealed that about 70% had been successful. With regard to pruning, we noticed that the trainees had no special knowledge in this field and a practical training, in addition to the brief one given at the end of this season, should be organised in the future. In addition, an English manual on the cultivation of olive trees (soon to be translated to Urdu) was provided to us by the PakOlive project (AICS).

During this season, the project 'Save Bazira' was invited to participate in the celebration of the first 'Olive Gala' organized at the Agriculture Research Institute Tarnab (Peshawar) on 11 March. The event was organised under the AICS-funded project 'OliveCulture-Holistic and Multi-professional Mechanism for a Pakistani Olive Oil Value Chain' and 'Promotion of Olive Cultivation on commercial scale in Pakistan (PODP)'. The participation in the event gave a good visibility to the ALIPH project whose representatives were interviewed by local and national media during the event.

Final fieldwork

On 25 March, the works on the second sealing were completed (Figs 156-158). On 26 March, the scaffolding was dismantled and reassembled on the adjacent portion of wall, in order to proceed with the removal and replacement of dangerous stones and with the consolidation of that section. Furthermore, until 30 March, the removal of soil to highlight the profile of the E wall continued (Fig. 159).

During the period of 12-30 March 2023, the cleaning and consolidation of Temple 6 also continued. Approximately 60% of the temple area consolidation was completed (Figs 160-165). On 26 March, images of the restored wall and the Temple consolidation were also acquired by an aerial drone.

[58] On the use of olive-tree for reforestation in Pakistan, see the recommendation of the IOC, PBC, and PARC (DeAndreis 2022; Piracha 2022; Putinja 2018).

It should also be noted that on 22 March at around 9:45 pm, an earthquake measuring 6.8 on the Richter scale occurred with its epicentre in Badakhshan (Afghanistan), close to the Pakistani border. The damage was considerable in Swat with several collapses, injuries, and deaths. The following day, 23 March, a thorough inspection was conducted around the restored wall and the temple. Following the inspection, no collapses or damages were found.

Fig. 1 – Terrace E from the NE
Fig. 2 – Terrace E from above
Fig. 3 – Conservation status of the N wall at the start of the work. Soil deposits
Fig. 4 – a) N wall before general cleaning; b) N wall during general cleaning; c-d) donkeys transporting water and other materials; e) new path leading to the hill.
Fig. 5 – Two twin pits to extinguish lime
Fig. 6 – Making lime
Fig. 7 – Scaffolding on N wall: various views
Fig. 8 – Biocide testing on small pieces of masonry and application to the wall
Fig. 9 – Third cleaning on N wall
Fig. 10 – Masonry conservation
Fig. 11 – Different conservation areas
Fig. 12 – Mortar tests under preparation
Fig. 13 – Restoration work on the lower floor of the scaffolding
Fig. 14 – Upper protection wall made of mortar and anchored to the topsoil deposit: various views
Fig. 15 – Grafting of olive trees
Figs 16-17 – N bastion and conservation work
Figs 18-19 – Scaffolding on N wall
Fig. 20 – Details of fastening system of the various scaffolding elements.
Fig. 21 – System for transporting mortar to the scaffolding shelves
Fig. 22 – Work progress on the W part of N wall.
Figs 23-24 – W profile of the newly re-emerged rampart
Fig. 25 – Reconstruction on the E part of N wall
Fig. 26 – Bamboo scaffolding on N wall
Fig. 27 – Conservation work on the top shelf
Figs 28-29 – Earlier wall running NS
Fig. 30 – Cleaning of the NE corner of N wall
Fig. 31 – Progressive cleaning and restoration on N wall
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Fig. 33a-b. Clearance operations at the bottom of the wall with the exposure of the lower part of the wall
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Figs 37-38 – Weak point at the NE corner of the terrace
Fig. 39
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Fig. 41 – Drill of the rocky outcrop
Fig. 42 – Placement of the rebar reinforcement
Fig. 43 – Placement of the rebar reinforcement
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Fig. 54 – Undercut indicating the reconstructed part of the NE corner
Fig. 55 – The earlier wall incorporated into the later wall
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Fig. 134 – The use of organic cotton cloth is intended to protect the inner wall from the rebuilt masonry, and to create a cavity in a substance that can positively degrade over time.
Fig. 135 – The 'window' (inspection flap or hole) during and after the restoration
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Fig. 137
Fig. 138 –The restored portion with inspection hole (later filled with dry stone masonry)
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Fig. 140
Fig. 141
Fig. 142
Fig. 143
Fig. 144 – Temple 6 during the 2000 excavation campaign (photo courtesy of Andrew Glass).
Fig. 145 – Detail of the stair to access the cell
Fig. 146 – View from S of the earlier Temple
with traces of plastered floor
Fig. 147 – N side of the Temple after the cleaning
Fig. 148 – Zenith view of the temple during the cleaning. Drains (left) and stairs of access (right) are also visible.
Fig. 149 – Detail of the stair to access the cell
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Fig. 154
Fig. 155 – Grafted wild olive trees along the path that lead to Trench BKG 13 below the Barikot hill
Fig. 157
Fig. 158 – Tree pruning in progress
Fig. 159 – Grafting of olive trees
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Phase II

The main work of seasons 7-10 took place in late spring and early autumn of. Season 7 involved the consolidation of the façade of Terrace E and the cleaning of the area in front of it. The topsoil was placed at the base of the rocky outcrop all along the N areas of both terraces. The consolidation of this portion of the artificial terrace was aided by the planting of local hopbush (Pastho *ghwarāske*, *Dodonea viscosa*).[59]

During Season 8 (summer 2023), we hired the team of EssaNoor Associates, a local NGO of young architects and surveyors to carry out the topographic survey and 3D documentation of the site. In Season 9 (autumn 2023), we exposed the archaeological structures of Terrace W and opened of a trench around a structure from the Ghaznavid period (Trench BKG 23). In Season 10 (winter 2024), we reopened some of the trenches excavated in 1999 (Trenches BKG 7, 8, 9).

Conservation work involved the surface cleaning of the outer slope on the terrace substructure (Trench BKG 24) and the exposure of a series of Ghaznavid ramparts built against the Śāhi-era wall. To ensure comfortable irrigation of the olive trees planted in previous seasons, three open drywall tanks equipped with a gravity irrigation system were built to collect rainwater. Two of the tanks were built to the S, and a larger one was built between Terrace W and the hilltop of the acropolis.

Prolonged delays in funding allocations from the donors compelled us to request a cost-neutral extension (Final Phase: from April to December 2024). However, we still managed to complete all activities by the end of Phase II.

Seasons 7-8 (M. Pinelli, K. Essa, E. Iori, M. Sesana, L.M. Olivieri)

The major intervention during Season 7-8 involved the consolidation of the entire façade of Terrace E, the cleaning of the rocky outcrop and the creation of an access path for visitors. The topsoil was placed at the base of the rocky outcrop and provided with retaining walls (Figs 1-4). The complete topographic survey and 3D documentation of the site was carried out under K. Essa's supervision.

Season 9 (M. Pinelli, E. Iori, L.M. Olivieri)

Upon returning to the site in 2023, the conservation of the E side of the retaining wall was 80% complete (Fig. 5). A scaffold (5.8 × 8 m) was erected at the S portion of the wall (Fig. 6); both the area adjacent to it (4.1 × 7.2 m) (Fig. 7) and the area at the N end of the wall (10.5 × 10 m) were unrestored. We built a dry-stone retaining wall bordering the path on the E side to store the soil deposits from the E wall.

The conservation work performed in previous campaigns was found to be in excellent conditions, including the reconstruction work on the NE corner and on the E side (Fig. 8).

The unrestored portions of the wall showed weak adhesion between surface stones (Figs 9-10). Moreover, the original mortar was found to be in a poor state, having lost its cohesive properties over time. In the N portion, low vegetation and soil deposits were still present over the entire surface (Fig. 11). At a height of 3 m from the string course of the corner counterfort there were several large gaps due to collapses (Fig. 12). These missing elements represented a structural problem for the wall, as the stones above the gap overhang the wall by approximately 1.20 m, creating a precarious situation and threatening the possible collapse of a large portion of the stone wall. All the rocks at the base of the E side of the wall were covered by a thick layer of soil deposit (2 to 6 m), which prevented the monument from being properly visibile (Fig. 13).

[59] According to a folktale collected in Barikot, the two plants of the Barikot tophill, the olive tree (*zaitūn*) and the *ghwarāske,* were brought to Barikot by Alexander the Great and Mahmud of Ghazna respectively [LMO].

Conservation activities

On the surface of the wall with the scaffold, we carried out cleaning and consolidation operations to give greater support to the stones that were about to fall. In some cases, segments of the wall were entirely reconstructed. The consolidation was carried out using the same mortar and technique employed in the previous restoration phases (Fig. 14).

Once these operations were completed, the scaffold was moved to the central portion of the E wall, where we partly reconstructed the original masonry (w: 10.6 to 13.2 m; h: 6; t: 0.5 to 3 m) (Fig. 15). The reconstruction was carried out in imitation of the original technique for the first 1.4 m of height (Fig. 16) and then in imitation of a false ruin but maintaining a more regular distance between the visible stones (Fig. 17) to make the reconstruction easily recognisable. We also maintained a constant inclination of approximately 75°, until we reached 50–70 cm from the top of the portion of the original wall. These final 50–70 cm were reconstructed by setting the stones in an irregular manner as to appear as a fake ruin. On the N side of the scaffold, a triangular-shaped sail was built (longest cathetus, base: 4.5 m; shortest cathetus: 2 m – this supports the original vertical curtain wall; hypotenuse: 5 m – cuts through the previously reconstructed wall; Figs 18–19). This element imitated the original execution technique, but we broke the hypotenuse to make it look as if a spontaneous collapse had occurred. We opted for this stone structure for two reasons: to give as much support as possible to the well-preserved original masonry curtain; to enhance the visibility of the transition between the masonry reconstruction imitating the original technique and the masonry reconstruction of the false-ruin type.

In the segment of the retaining wall to the S of the scaffold (4.10 × 7.2 m), conservation work was carried out on a fixed rope (Fig. 20). Stones were first cleaned from soil and later consolidated with mortar. Portions of masonry were reconstructed where necessary: along the top of this section of the wall, a small reconstruction of the original structure was carried out to give the necessary support to the top stones (Fig. 21). In this case we employed the fake-ruin type masonry as well.

The N part of the retaining wall (10 m × 10.5 m) was also restored using fixed ropes (Fig. 22), which were anchored to iron poles inserted 50–60 cm into the ground of Terrace E. In addition, a wooden pulley was constructed on top of the wall to supply the necessary materials for the conservation operations (Fig. 23). In this section, we also cleaned up the greenery and the soil deposits from the masonry (Figs 24–27), we removed the stones detached from the original structure, and we consolidated the masonry.

The overhanging part of the wall formed a large gap 6 m wide, 2.3 m high, and 1.3m deep (Figs 28–29). In order to secure the masonry, three T-head steel girders were set up underneath the most protruding stones. Those pipes were cut to size and embedded in the wall with the aid of stone wedges (Figs 30–31). The girders were supported and cemented to the solid masonry at the base of the gap (Fig. 32). Afterwards, a new stone wall was built to fill the gap and to be a structural support for the original wall (Fig. 33). The masonry, made of bedded stones, was well connected with mortar to the original structure, and now cover the steel girders. Visible stones were set down in a regular pattern, so that the conservation work could be easily discerned from the original wall fabric (Fig. 34).

At the SE edge of the retaining wall, we reconstructed part of the circular masonry bastions by imitating the original construction technique, as there were evident traces of their original presence and encumbrance (Figs 35–36).

While the conservation work on the E side of the retaining wall was carried out, the deposit soil that covered the N half of the base of the wall and the underlying rocks was removed (Fig. 37). The S half of the deposit soil that covered the E side of the wall was moved inside the stone retaining wall (2 × 16 × 1 m) (Figs 38–41). In this way, stones underneath the retaining wall and its base were uncovered, allowing the monument to be appreciated in its entirety

(Figs 42-43). The consolidation of this portion of the artificial terrace was aided by plantings of local, strongly rooted bush plants.

Project activities in Season 9 also included a total of three months' training for seven students from the universities of Quaid-e-Azama University (Islamabad) and Swat University. At the end of the season, two MA students were selected as restorers and included in the list of local operators. When free from their academic commitments, they can participate in the project with regular pay and insurance.

During this season, we achieved the following results:

1) restoration of the E side of the retaining wall of Terrace E was completed;
2) conservation operations were carried out in a state-of-the-art manner, using local materials, as close as possible to the originals, observing the criteria of recognisability, reversibility and in complete safety for the operators;
3) enhanced training and experience of local operators in carrying out conservation operations both on scaffolding and with fixed ropes.

At the end of Phase II, most of the graphic documentation work was also completed by the EssaNoor team of architects (Figs. 44-55), while the archaeologists, once Terrace E was completed (Fig. 56), began work on Terrace W (Fig. 57) (see Phase III).

The olive tree grafting and planting plan has continued, including the construction of tanks to collect rainwater for irrigation of the new plants (Figs 58-63).

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Phase III

Seasons 10–11 (E. Iori, M. Minardi, L.M. Olivieri)

During the period between November 2023 and July 2024, work focused on the slopes and the top of Terrace W. In the first phase (November 2023–January 2024), we reopened and emptied the excavation trenches dug in 1998 and 1999 (Trenches BKG 7, 8 and 9; cf. Olivieri, Micheli, this volume), and we cleaned Trench BKG 23 (Li Hong, this volume); we also demolished the various casemates built by the military between 2008 and 2012. From February until the summer break in July, the N slope of Terrace W was cleaned: we removed the topsoil and deposited it at the base of the slope, and we also constructed retaining walls reinforced with *ghwarāske* fences. Once the ancient anthropogenic plan was exposed, the area was fully landscaped and cleared for archaeological excavation and subsequent restoration that would begin in September 2024 and be completed in December of the same year (cf. Minardi, Prota; Cecchini; Muhmood; Li Hong, all in this volume).

Season 12 (M. Pinelli, E. Iori, M. Minardi, L.M. Olivieri)

The following conservation report refers to the period between early August and late September 2024. During this time, fieldwork focused on the hill of the acropolis, specifically, on the W walls of Terrace W (clearance, conservation; Fig. 1), on the entire masonry surface of Terrace E (cleaning, removal of bio disturbances, and application of new layers mortar wherever necessary), on the top corner of Terrace E and the façade of Temple 6 (waterproofing and rainwater drainage).

State of preservation

We registered a major conservation problem near Temple 6 due to the absence of a proper drainage system. After intense rainfall, the temple terraces would remain flooded for days (Fig. 2). This phenomenon created several distinct types of degradation:

1) growth of moss and biological patinas on the exposed structures and particularly on the stuccoes;
2) slow but steady infiltration of rainwater inside the retaining wall, which gradually weakened the mortar and created frost cracking during winter;
3) poor structural integrity in the top part of the exposed structures of Terrace W, which put the facing at risk of losing stones from the top;
4) degradation due to regrowth of seasonal greenery and increased moisture retained by the mortar and stones, especially on the N side of the retaining wall. The constant presence of high humidity levels within the mortar promotes biological disturbances that deteriorates its mechanical performance (cf. Salemi, this volume).

Conservation activity

The issue of standing water on Terrace E was remedied by introducing an efficient drainage system First, we linked the trenches on the terrace by pipes and constructed a waterproof floor with the purpose of preventing water infiltration to the structure while, at the same time, redirecting the water to the E side of the terrace. Second, we installed a custom-made pipe on the outer side of the retaining wall to collect and carry water for 20 m along the E side towards the S.

In the first phase, the areas that collected the most water during rainfall were identified; these were connected with 8 cm-wide PVC pipes to redirect rainwater to the area adjacent to the Temple staircase. The floor *in this* area was lowered about 15–20 cm to provide enough space for a waterproof substratum. We laid flat stones bedded with a fatty mortar

(1 lime, 1 brick grit, 1 clayey soil), making sure to maintain a constant slope, so the water would drain towards the pit we had made previously. Finally, the trench was covered with soil.

In the second phase, after careful measuring, we cut a strong PCV pipe (d. 8 cm) and temporarily installed it level along the E side of the wall. Once it was verified that the system was working properly and that the pipe fit well with the wall morphology, the individual pieces were numbered and removed in preparation for the final installation.

To camouflage the pipes within the wall, we scratched each pipe piece to create a rough surface, then a white primer was applied. On top of the primer, we added a coat of nitro sand colour by brush. Two additional layers of different colours were applied by brush or sponge. The pipe pieces were then finally secured in their positions using iron hooks (with anti-rust treatment), mechanically anchored to the exterior wall, and each 90-degree joint was fixed together with epoxy resin.

The pipe was thus shaped to bring the water to a large fissure between the rocks at the base of the wall. This way, the fissure now channels the water to the first terrace of deposit soil where a 3 × 3m, 2 m deep trench was dug and lined with concrete. It can hold up to 18,000 litres of rainwater that can be used for watering the olive plants. Two taps were installed at the bottom of the tank to facilitate manual water removal.

A team of operators specialised in carrying out conservation activities on ropes was further trained to independently carry out ordinary conservation activities on the retaining wall of the Temple terrace, particularly the N side. These operations consisted in removing deposit soil and seasonal greenery, applying biocide where necessary, checking the health of the mortar and stones and, if necessary, restoring them.

This latter operation was most delicate, as the mortar had to be carefully inspected for biological attack or persistent moisture. Where portions of mortar were found to adhere poorly to the masonry structure, they were removed, their gaps cleaned and new mortar applied (1 lime, 2 sand, 2 clayey earth).

The same equipment and methodologies used in previous campaigns were used to carry out the operations in a safe manner. Ordinary maintenance of the retaining wall will be carried out periodically on vertical sections approximately 5 m wide, until the end of the perimeter. Most of the conservation's problems are on the N, as high levels of humidity inside the structure foster the growth of greenery and the physical degradation of the mortar.

The masonry structures that were part of the outer walls along the W side of the terrace were exposed and once the greenery and soil had been removed, they were accurately cleaned, and where necessary, consolidated with mortar (1 lime, 2 sand, 2 clay soil). Only when structurally necessary, portions of the wall were rebuilt with new stones lined with the same mortar. The consolidation methodologies were the same of previous interventions. During this phase of conservations activities, eucalyptus trees were removed, but native olive trees were retained.

To sum up, we achieved these goals:

1) introduction of rainwater drainage on the Temple terrace (directed towards the E wall; including rainwater retention for further use);

2) training of periodic maintenance procedures on ground and on rope;

3) all conservations operations were carried out in a safe manner and following agreed procedures, using local materials, as close as possible to the originals, and following the criteria of recognisability and reversibility;

4) consolidation of knowledge and skill levels of local operators in conservation procedures.

Training programs

MP trained a group of local workers to conserve and restore over 30 Buddhist rock inscriptions and sculptures ('Project Preservation of the Late Buddhist rock reliefs of Swat, Digitization and Preventive Conservation', British Council-CPF, led by Essa Noor Associates, with DOAM KP, Heritage Management, and the logistic and scientific supervision of the Italian Archaeological Mission and ISMEO). The course took place during Season 12 with workers alternating between both sites. Usually 5 men were on the CPF sites and 22 on the ALIPH/ISMEO sites. They rotated every four to five days. The training took place between 25 August 25 and 30 September 2024. 20 specialised workers from the ALIPH/ISMEO project participated in this training. As part of the CPF project, ALIPH/ISMEO project staff participated in the 5-day 'Climate Change Adaptation Course for Cultural Heritage' held at the Swat Museum from 17 to 21 July 2024. Finally, two specialised restorers from the local team, Mr Qaisar Rahman (BA) and Mr Wasim Sajad were selected for the scholarship course organised by UNESCO Pakistan at the Mohenjo Daro Museum titled 'Disaster Risk Reduction (DDR) for the Safeguarding of Cultural Heritage in Pakistan' from 18 -22 November 2024.

Conclusions (PLATE XXIV)

At the end of the project, the yard's debris was removed and recycled, and the mortar materials (stones, brick dust, lime, sand) were properly stored, so that they could be ready for future interventions. The sowing of *ghwarāske* in the artificial slope areas was arranged for spring 2025. The steep areas below Terrace W were protected by supporting scarp walls and by supplementing the *ghwarāske* fences to naturally reinforce the slope. After the thermography (see Salemi below, 'thermal anomaly areas', i.e. situations of potential deterioration of the surface, were detected, especially on the Terrace E. In correspondence to these areas, seven rope descent anchors were set up (see PLATE XXIV; Fig. 18).

Additional olive trees were planted, to replace the few that had perished, and to enlarge the hillside buffer zone. The system of four cisterns put into operation in early 2024 with the controlled-release underground irrigation pipes (two on the S side of the hill, one for Terrace W, and one under Terrace E) reduced the runoff of rainwater and also allowed for a 70% saving in water demand on the hill between August and December 2024. This water, properly filtered, can be used for the preparation of mortar. A new information sign was made and placed at the new caretakers' house (*kotāgai* in Pashto), which was built of dry-stone masonry topped by a traditional wooden and earthen roof, and with a small verandah for visitor control. Both this new building and the previous one, now used for storage, are equipped with a solar system and are thus autonomous for light, heating, and fans (Figs 15-17). The general condition of the hill and the difficulty of sewage disposal discouraged the plan to build a latrine with a septic tank. A walled dry latrine was built near the second *kotāgai*. During the last four months, more than 500 people have visited the site (30% from Asia and Europe, fewer from the United States).

Figs 1- View of the site from above Terrace W (August 2024).
Fig. 2 – Terrace E, ENE top side: front of Temple 6 after the rain.
Fig. 3 – Terrace E, ENE top side: red lines mark the underground connection between two trenches at the sides of Temple 6.
Fig. 4 – Terrace E, NE top side: bedding of the stones on mortar for the realisation of a waterproof surface.
Fig. 5 – Terrace E. E side: preparation of the custom pipe following the morphology of the wall
Fig. 6 – Terrace E. E side: camouflaging of the pipe
Fig. 7 – Terrace E, E side: fixed pipe with 90° joint and iron hooks
Fig. 8 – Terrace E, E side, bottom: the tank seen from top
Figs 9 – Terrace E, E side, bottom: faucets exitinng the water tank close to the olive trees
Fig. 10 –Specialised operators carrying on preservation of the N side of Terrace E
Fig. 11 –Terrace W, N side: before removal of soil deposit
Fig. 12 –Terrace W, N side: after removal of soil deposit
Fig. 13 – Consolidation with mortar of the surface's stone of the wall (Terrace W, side E)
Fig. 14 – A serene day begins over the valley.

Fig. 15 – Solar system installed at the tool warehouse (*saman godown*)

Fig. 16 – Work in progress at the new *chowkidar kotāgai* (watchkeeper's barrack)

Fig. 17 – The new *chowkidar kotāgai* (watchkeeper's barrack)

Fig. 18 – Anchorage points for the rope descent system (acrobatic conservation) located along the edge of terrace E (see PLATE XXIV)

Thermography: Climate change and management sustainability (G. Salemi) (PLATES V–VII)

The numerous archaeological remains of Pakistan reflect its diverse history: ancient cities, temples, forts, mosques and even colonial-era structures are not only symbols of the country's enduring architectural ingenuity, they also serve as important sites for cultural tourism and education. This rich cultural heritage, however, has been impacted over the years by many natural and anthropic factors entangled with the complex history of the region. In recent years, as the climate crisis dramatically changed weather patterns all over the planet and the threat of extreme climate-related events has grown exponentially, archaeological sites, too, are now at a greater danger of being damaged or, worse, of disappearing completely.

This contribution is a preliminary attempt to document, quantify, and analyse how climate change affects historical buildings and their structural durability, as well as the effectiveness of conservation efforts.

Specifically, I have analysed the old walls of the terrace in Barikot with thermographic camera. Compared to traditional techniques, thermographic imaging significantly enhances the understanding of thermal conditions and fluctuations and is, therefore, a fundamental tool in the preservation and management of archaeological heritage (Avdelidis, Moropoulou 2004; Brooke 2018; Figueiredo, Silva 2020; Aydin, Ozturk 2021). Using visible and infrared imaging, this study underlines the need for continued preservation efforts and long-term policy interventions to protect the historical legacy of Barikot.

Climate effects on historical structures

Pakistan is experiencing dramatic shifts in climate patterns. According to the Pakistan Meteorological Department, the country has seen an average temperature rise of approximately 0.6° C per decade over the past 50 years, with predictions indicating a further increase of 2-4° C by the end of the century (Ali et al. 2013; Rasul et al. 2023: 9-12; Sarfaraz, Faisal 2024). The general warming trend is accompanied by erratic monsoon seasons, causing severe droughts and floods (Hussain et al. 2022).

The increased occurrence of extreme weather events, strong heatwaves, and heavy rainfall, (Farah et al. 2016) exacerbates the vulnerabilities of historical structures. First and foremost, higher temperatures can lead to thermal expansion in building materials, causing cracks and structural weaknesses (Bae et al. 2015). Many historical buildings in Pakistan are built of mud, brick, and stone and, as such, are particularly susceptible to damage from prolonged heat exposure. For instance, Turbat, a city in southern Balochistan, was recorded as the fourth hottest place on Earth in 2017 according the WMO (World Meteorological Organization).[60] The Lahore Fort, a UNESCO World Heritage site and model of Mughal architecture, has shown signs of deterioration due to temperature stresses (Raheem, Tahir 2008). Restoration efforts are complicated by the need to address both structural integrity and the effects of rising temperatures.

As said, erratic rainfall patterns give rise to both prolonged droughts and severe flooding. These changes are particularly concerning for archaeological sites which are very vulnerable to environmental conditions. Altered rainfall patterns can result in changing levels of moisture and humidity which accelerate the decay of historical structures (Naheed et al. 2013). The intricate plasterwork carvings of buildings like the Badshahi Mosque in Lahore or the Buddhist stupas of Taxila, for example, are at a high risk because plaster is particularly susceptible to water damage, as increased moisture fosters mold growth that slowly compromises material integrity.

Pakistan's geographical location makes it susceptible to earthquakes and floods as well. The 2010 floods, one of the worst in the country's history, caused extensive damage to numerous historical sites, including the ancient city of

[60] See the Climate Data Processing Centre of the Pakistan Meteorological Department at https://www.cdpc.pmd.gov.pk, accessed 12/12/2024.

Mohenjo-Daro. The combination of climate change and seismic activity poses a dual threat to preservation efforts. As one of the oldest urban settlements in the world, Mohenjo-Daro is particularly vulnerable to climate change. The site has suffered from increased flooding and water table rise, leading to erosion and salt damage. Efforts to implement drainage systems and moisture control are critical to preserving this and other archaeological sites. Conservationists nowadays are exploring sustainable practices that integrate climate resilience into restoration efforts (UNESCO 2023). The use of techniques such as thermography can be a great help in these efforts.

Thermographic camera surveys at Barikot

Thermographic camera inspection represents an emerging and critical tool for the no invasive assessment of archaeological buildings. This technology leverages infrared imaging to detect temperature variations on surfaces, providing insights into structural integrity, moisture content, and material composition.

Typical applications in archaeology are:

1) moisture detection. This is one of the primary applications of thermographic inspection in archaeology. Moisture infiltration can lead to material decay, mold growth, and structural weakening. For example, in the case of the Roman amphitheatre in Pula (Croatia), thermographic imaging revealed hidden moisture pockets, allowing for targeted remediation efforts (Bagavac et al. 2022);

2) structural integrity assessment. Thermographic cameras can identify temperature differentials that indicate structural issues, such as voids, cracks, or delamination in building materials. In the restoration of the ancient city of Pompeii (Italy), thermal imaging was employed to assess the condition of frescoes and structural components, guiding conservation strategies (Di Maio et al. 2012; Carpani et al. 2016).

3) material composition analysis. Thermographic imaging can also assist in determining material composition. Differences in thermal conductivity and emissivity can help identify various building materials, providing insights into construction techniques and historical alterations.

Thermographic cameras detect infrared radiation emitted by objects based on their temperature. All objects emit thermal radiation, which can be captured and translated into images that represent temperature variations. These variations can indicate underlying issues such as moisture infiltration, structural anomalies, and material degradation. Modern thermographic cameras are equipped with advanced sensors that capture thermal data with high resolution. For this case study, the Flir C5 thermal camera was used which has a real 160 × 120 (19,200 pixel) thermal image sensor, MSX® (Multi-Spectral Dynamic Imaging) technology, 5-megapixel camera and LED illuminator. The Flir C5 uploads and stores images directly to the FLIR Ignite™ cloud, where it is possible to organise and back up files, as well as instantly share images.

The methodology typically involves the following steps:

1) preparation: site assessment and identification of key areas for inspection;

2) imaging: capturing thermal images under controlled conditions, ideally during times of minimal solar radiation to avoid interference;

3) analysis: interpreting thermal images to identify anomalies and assess their implications for structural integrity.

The MSX® (Multi-Spectral Dynamic Imaging) technology proved to be particularly useful in the thermographic analysis of the structures at Barikot, as the detail of the visible spectrum and thermal imaging can be combined in real time for greater clarity, incorporating edge and contour details into thermal readings. It is not a fusion technique between a visible light image and a thermal image, as it does not dilute the thermal image or reduce thermal

transparency. As a matter of fact, the integrated software extracts the key elements of the visible image, i.e., the outlines, writings, numbers and all high contrast contours and adds them to the thermal image.

Thermal imaging provides a comprehensive overview of temperature distribution and offers a more accurate assessment of the material conditions compared to visual inspections alone. The usefulness of this technique is even more apparent when considering the saved images at a later stage. In fact, understanding what one is seeing through the camera's viewfinder is straightforward when on site, but a thermal image without reference details may not be easily interpretable later (PLATE V). Starting from 3D models of the structures (created with a photogrammetric approach both from the ground and from a drone) it was possible to document 'thermal anomalies', i.e., situations of deterioration of the surface due to the percolation of rainwater. While some biological indicators – such as small vegetation on the masonry or damp patches colonised by moss – already provide visual indication, thermal analysis (especially if addressed with MSX technology) creates images that can be mosaicked onto the 3D model (PLATE VI). Visible and thermal documentation tables with greater graphic impact and high spatial resolution are thus possible (PLATE VII). In the case of the walls of the Barikot hill, we can now analyse construction sequences, highlight the presence of water and underscore the need for more accurate humidity control.

Based on the results of the survey, seven rope descent anchors were set up along the Terrace E ridge near the areas found to be most at risk (see PLATE XXIV, see also Fig. 18 of previous chapter).

Conclusions and further developments

In Swat Valley, Barikot represents a particularly interesting site not only for traditional archaeology, but also for 'digital archaeology'. It can become a laboratory for experimenting with 2D and 3D technologies under multidisciplinary auspices. The walls of the hill, after careful recovery, conservation, and valorisation, require continuous environmental monitoring so as not to nullify the structural interventions carried out so far. Autoptic analysis can serve to identify macro-phenomena or to visualise large areas of water collection. Furthermore, the use of the proposed technology, especially if it is performed at regular intervals, will create comparability with visible and thermal data, thus obtaining a space-time mapping of the effects of water infiltration on structures. From this point of view, data storage in the Ignite cloud represents a first step for both storage and sharing. However, it would be desirable to create a spatial-temporal database that allows one to execute queries for time intervals even on areas of reduced extension. In this case, regular monitoring over time, in addition to validating drainage and water collection interventions, would help provide patterns of climate variability and could prevent the harmful effects of increasingly frequent and intensely harmful climatic episodes. In addition, following the call for case studies by UNESCO (in collaboration with ICCROM, ICOMOS, and IUCN) regarding the development of a joint toolkit on climate action for World Heritage, Barikot could be candidate for further interdisciplinary studies about the effects of climate change.

Plate V – Thermographic surveys at Barikot walls in November 2024 in the order of a) visible image, b) thermographic image, and below the overlapping of both

Plate VI – 3D model of a portion of Barikot walls with some mosaicked thermographic surveys

Plate VII – Two different case studies of thermographic surveys using MSX technology around the Barikot walls. Above: Drainage water collection tank (visible image, B/W thermic image, false colours thermographic image, picture-in-picture). Below: Humpback buttress on the north side (visible image, B/W thermic image, false colours thermographic image, picture-in-picture)

Budget and Administrative Reports (M. Baldi, E. Iori)

The project "Saving the Archaeological Site of Bazira", managed by ISMEO for the three-year period from 2022 to 2024, involved a total cost of USD 472,476.00. The project benefitted from funding from ALIPH - International alliance for the protection of heritage (Project ID 2021-2173) for a total amount of 416,576.00 USD, and an in-kind co-financing from ISMEO for the remaining sum of 55,900.00 USD.

60.7% of Aliph funding was used in Pakistan for expenses relating to workforce, documentation, visibility, materials, utilities, cars, food, land leases, insurances and security. The remaining 39.3% covered assisting technical personnel working in the field and their travel costs (flights, visas, insurance), in addition to equipment, archaeometrical analyses, shipments to Pakistan, visibility and administrative personnel.

As is common in multi-year projects, it was necessary to cope with unforeseen events and new needs in the organisation of work, resulting in a remodulation of the detailed expenditure items with respect to the budget. It is also thanks to this that all scientific objectives have been achieved.

In particular, the economic impact of Italian technical assistance decreased (47,004.00 USD compared to the 56,520.00 USD budgeted) due to the commitment of some collaborators who, meanwhile having been employed by other European universities, continued to work for free for the project. The savings generated in this way made it possible to cover the flight costs of experienced colleagues who provided their advice to the team at no cost. In this way, technical assistance accounted for only 11.3% of Aliph's funding for the project.

Our ongoing review of the work has also led to significant savings in scaffolding expenses, which have shrunk significantly (1,385.00 USD compared to the 72,000.00 USD budgeted), mainly thanks to the skill and experience of our Pakistani colleagues. The workers have been in fact part of the well-established excavation group of the Italian Mission in Pakistan and, depending on the needs, they worked for the project. This is the advantage of a project integrated into an already established archaeological undertaking, in which the pre-existing structure, ISMEO in this case, contributes to a specific project in terms of experience, workforce, logistic resources, and, if necessary, funds.

The restoration works on the north-east corner initially involved the construction of an extremely complex scaffolding, about 20 linear meters by 20 meters in height, with the use of an enormous quantity of materials; once the project had started, a revision of the work process resulted in the operations being carried out in double rope, with belay from above. Furthermore, initially it had been decided to entrust the rental and assembly to private companies, with estimates based on scaffolding made for the Jahanabad and Amluk-dara sites in the years 2012-2016. Once the project had begun, this was revised and the scaffolding entrusted to the workers, who took care of assembly, procurement, transport and storage, guided by master carpenters hired pro-tempore. This work was therefore also part of the training of the staff.

The significant savings allowed an increase in the local workforce (140,816.00 USD compared to the 115,472.00 USD budgeted), which ensured faster and more accurate work. The daily salary, which was higher in the budget than the Minimum Wage set down by the Government of Khyber Pakhtunkhwa since July 2022, was gradually increased to adjust it to inflation value; moreover, lifetime health insurance for all workers was added with a total cost of 9,682.00 USD.

In addition, the funds recovered from this review of the work and from a remodulation under the visibility item, made it possible to cover the costs of a detailed digital documentation of the structures under consideration, implemented using different techniques by Essanoor Associates of Lahore (total cost of 33,059.00 USD, not foreseen in the budget). This has significantly enriched the scientific value of the project, and it has contributed

to a more complete and correct dissemination of its results. It was accompanied by the documentaries by Umbrella Brands of Mingora (total cost of 6,295.00 USD compared to the 6,000.00 USD budgeted), the present volume by Sang-e-Meel of Lahore (total cost of 33,179.00 USD including a linguistic revision compared to the 30,000.00 USD budgeted), and the implementation of a webpage in progress (cost of 3,500.00 USD compared to the 1,000.00 USD budgeted).

At the same, the project benefited from the possibility of consulting the impressive archive and library of Prof. Domenico Faccenna, former director of the Italian archaeological mission in Pakistan. This material was donated by the Faccenna family to ISMEO during the project, and is of inestimable importance for the archaeological history of the region. The available Aliph funds allowed us to preliminarily catalogue the archive at the ISMEO headquarters in Rome and then send it to the mission headquarters in Pakistan (total cost of 10,319.00 USD), where it will be digitised by Jahanzeb College at no cost for the project.

MB

In addition to the above overview of the budget, we will turn to those specific budget units that best show the financial sustainability of the project.

To us, a considered use of financial resources includes the balancing of sustainability, community engagement and high-standard interventions. These three aspects, together with a focus on stable and enduring results, have shaped the financial policy and any budgetary adjustments during this project.

Budgeting according to these principles has meant (1) strategically allocating substantial financial resources towards local trainees to increase local skills while proportionally reducing the cost of foreign technical assistance and (2) investing in the local supply of restauration materials and reuse of material for a sustainable and resilient strategy.

As far as (1) is concerned, prioritising the development of skills of local trainees at expenses of external technical assistance was already part of the original planning as reflected in the approved budget (416,576.00 USD)[61] which envisaged an overall expense for local trainees in restoration, archaeology and landscaping (27.6%) twice that of foreign technical assistance (13.6%). This policy was further strengthened during the project as the resources allocated to the 'cash-for-training' program (36.3%) compared to technical assistance (11.2%) with a ratio exceeding 3:1 (see Table 1). As one of the main targets of the project, the training activities account for more than one third of the total budget. A peak of investment was achieved during the second year when the core of the local team trained during the first year reached the maturity to train and supervise other members as well as working with a certain degree of autonomy. Beside the individual safety equipment and courses, the safety of participants was safeguarded by the allocation of fundings to a life insurance for trainees in conservation (2.3% of the total budget) and to a standard health insurance for all other trainees.

All this supported the development of a group of skilled restorers and archaeologists able to autonomously carry out high standard work also in absence of external fundings and was therefore crucial for guaranteeing the sustainability of a project of this type.

As far as conservation is concerned, costs on technical assistance were distributed among two foreign experts. The first year saw both experts involved in the field for the evaluation of the status of preservations of structures,

[61] The following calculations and percentages refer to the ALIPH fundings, which has covered all the cost related to the activities. A reference to the total budget including ISMEO fundings would only strengthen the argument.

risk assessment, planning and starting conservation strategies and intensive training on different types of conservation with a total cost of 16% of the first year's cost (plus 9% in landscaping and archaeology). In the following two years, the on-site presence was reduced to one expert who came and went over the months to guarantee the monitoring of specific activities that were progressively entrusted to local 'Chief Restorers', 'Sector Restorers' and 'Unit Restorers' involved in the decision-making process from the beginning. This progressive empowerment of local trainees resulted in a substantial reduction of the cost on technical assistance (7% of the annual budget in the second and third year).

To enhance the local impact of the project, we decided to entrust the production of high-quality digital documentation of the archaeological remains (7.9% of total cost) - all available in tables and QR codes in this volume - and the making of a video documentary recording the progress of the work and its final results (1.5% of total cost) to Pakistani professionals instead of foreign companies. Correspondingly, the open access publication on the activities of the project was entrusted to a Pakistani publishing house (see above for details).

Another crucial aspect of the project that was clearly reflected in the budget concerns the creation of a supply chain for restoration materials that was independent from imported and thus costly materials, while also being less environmentally impactful and carbon free (point 2). Together trainers and trainees identified and tested locally available materials to be used or reused for conservation as well as sustainable strategies for guaranteeing a reliable water supply (a donkey line, construction of water tanks) and electric supply (acquisition of a small photovoltaic station) that saved 20% of the material cost of the total budget (see Table 1).

The reduction of costs on technical assistance and on materials, together with the 'pro bono' direction and coordination of the project had a positive financial impact on the overall budget dedicated to the activities. As the approved budget was based on a 24-month project, this policy resulted in an 8-month no cost extension that led to results beyond expectations.

EI

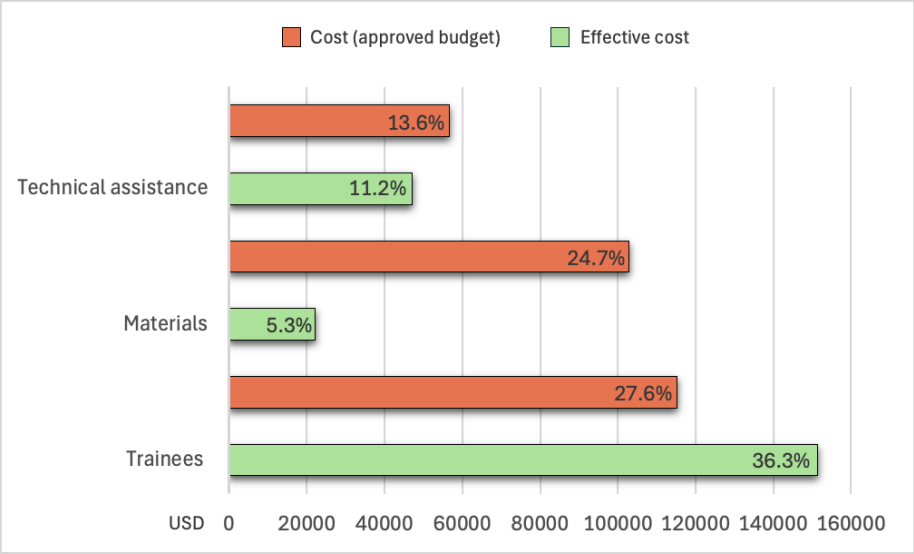


Table 1 – Percentage of expenses on total budget

The Local Staff (Photos by M. Minardi)

Rahimzada

Fazal Azim

M. Rashad

Khan Muhammad

Momin KS

Fazal Ali

Fawad Ali 1

Fazal Amin

Fawad Ali 2

Jawad Khan

Wasim Sajjad

M. Irfan

Abdul Wahid

Arshad

Sahib Shah

Farooq

Bhakti Gul

Sana Ullah

Adnan Khan

Qaisar

Dil Nawab

Sajid

Ayub

Danyal

Husan Zada

Arshad Ali

M. Nawab

Bakht Wahid

Saheb Shah

Bakht Gual

Arshad

Hussain Zada

Sajjid Khan

Dil Nawab

Khan Muhammad

Muhammad Farooq

Momin Khan

Adnan Khan

Qaisar Rahman

Sanah Ullah

Fawad 2

Muhammad Rashad

Irfan

Wasim

Fawad 1

Fazal Amin

Jawad Khan

Ayub Khan

Abdul Khaliq

Arshad Ali

Fazal Hayat

Hazrat Rahman

Asif Khan

Asghar Ali

Kelim Ullah

Adnan Khan

Bakht Hussain

Maaz

Sana Ullah

Furqan

Ajab Khan

Haji Nawab

Imad Khan

Fazal Kerim

Raza Khan

Afsar Khan

Muhammad Nawab

Faqir Said Raaza Khan

Naik Muhammad

Umar Wahid

Graphic Documentation (Kashif Essa, EssaNoor) (PLATES VIII-XV)

PLATE VIII – Barikot: general map (updated December 2024)

PLATE IX – Hilltop: general map (updated December 2024)

PLATE X – Terrace E, Side E: prospect with Macrophases and interventions

PLATE XI – Terrace E, Side N: prospect with Macrophases and interventions

PLATE XII – Terrace E: map

PLATE XIII – General map with sections

PLATE XIV– Terrace E, section A-A'‖ Terrace E, section B-B'

PLATE XV – Terrace W, section C-C' ‖ Terrace W, section D-D'

Note: for Pls see Volume 3

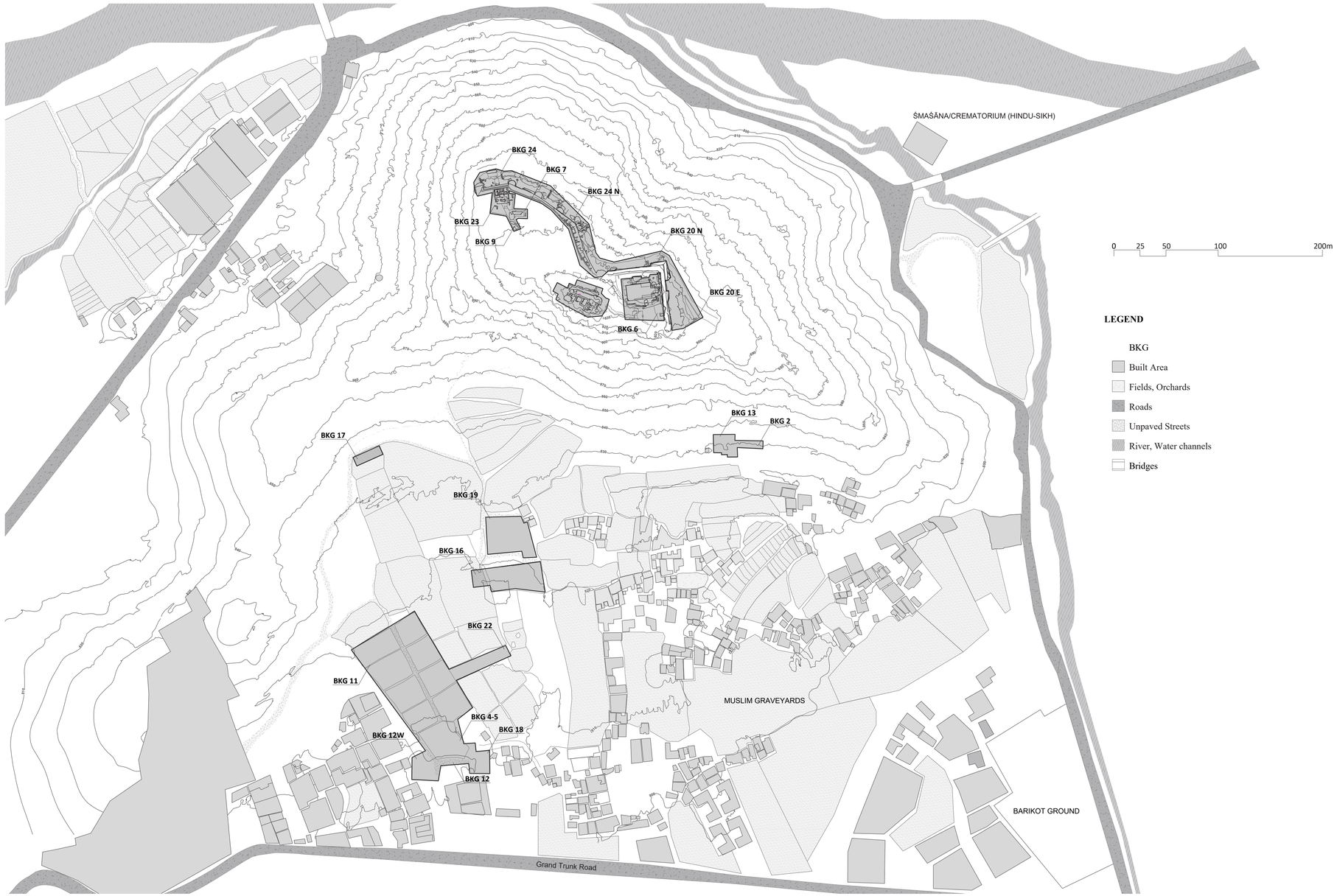


PLATE VIII – Barikot: general map (updated December 2024) (EssaNoor team, LMO)

E 244500
E 244550
E 244600
E 244650
E 244700
E 244750
E 244800
E 244850

N 3841350
N 3841300
N 3841250
N 3841200
N 3841150
N 3841100

D'
C
C'
B'
A
A'
D
B

0 10 20 30 40 50m

PLATE IX – Hilltop: general map (updated December 2024) (EssaNoor team, LMO)

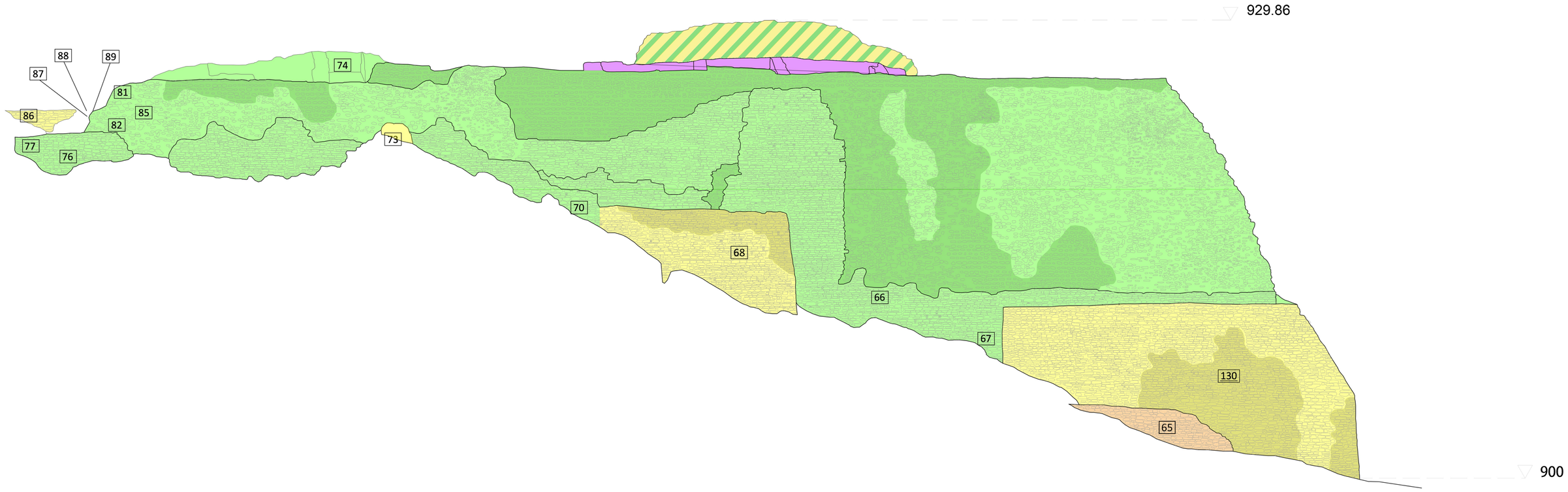


PLATE X – Terrace E, Side E: prospect with Macrophases and interventions (EssaNoor team, LMO).

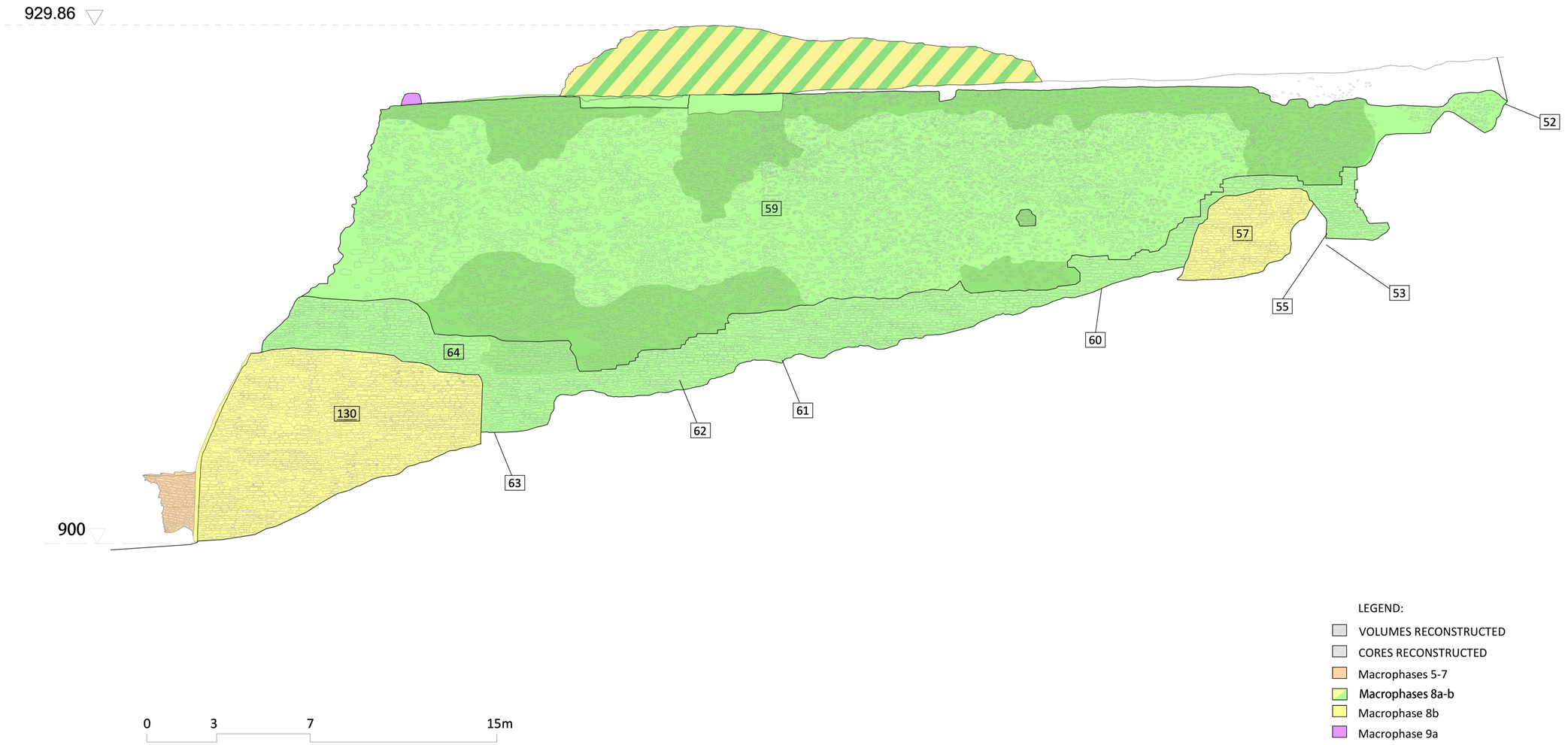


PLATE XI – Terrace E, Side N: prospect with Macrophases and interventions (EssaNoor team, LMO).

PLATE XII – Terrace E (Trench 6): general map (EssaNoor team, LMO)



E 244500 E 244550 E 244600 E 244650 E 244700 E 244750 E 244800 E 244850

N 3841350

N 3841300

N 3841250

N 3841200

N 3841150

N 3841100

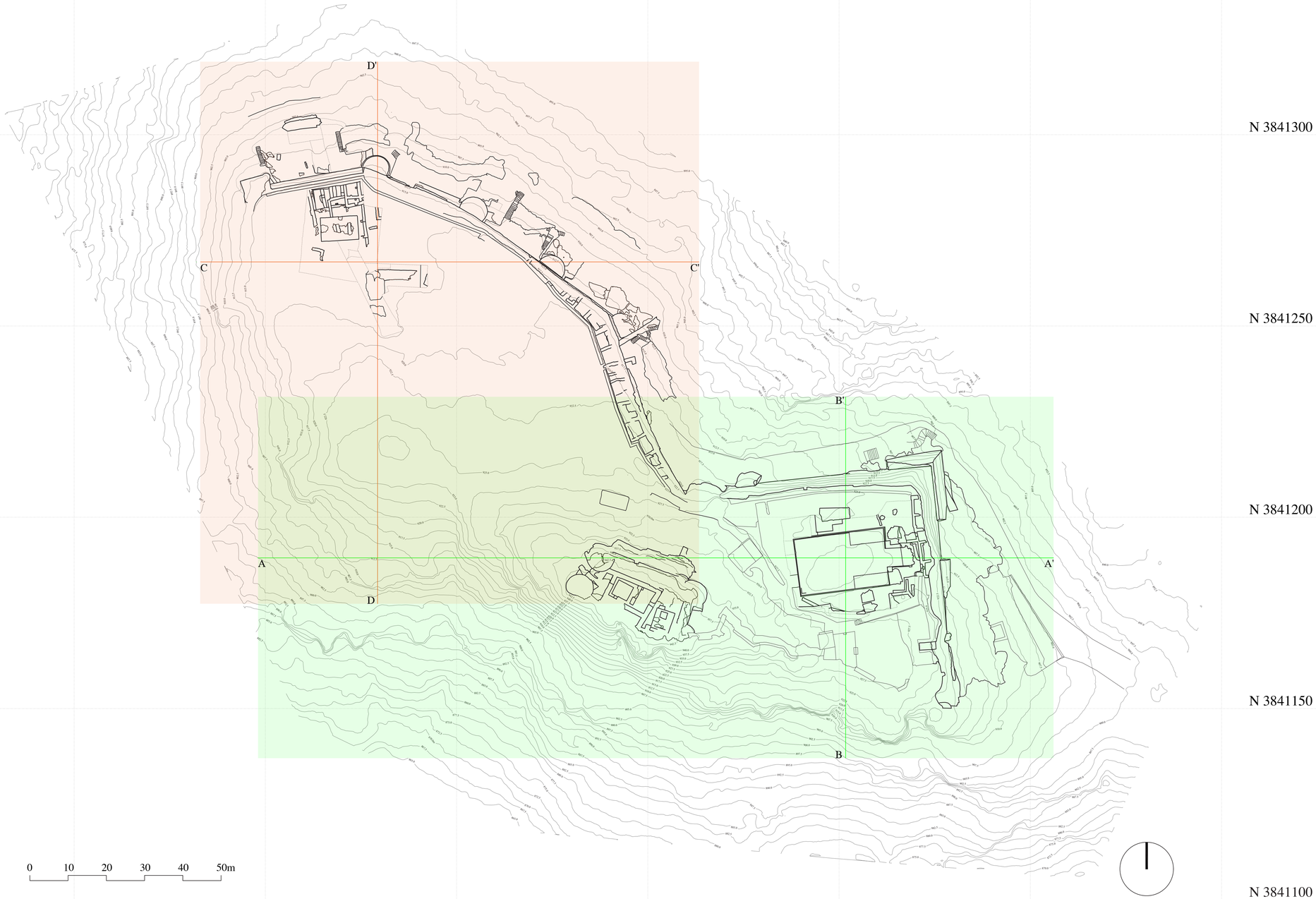
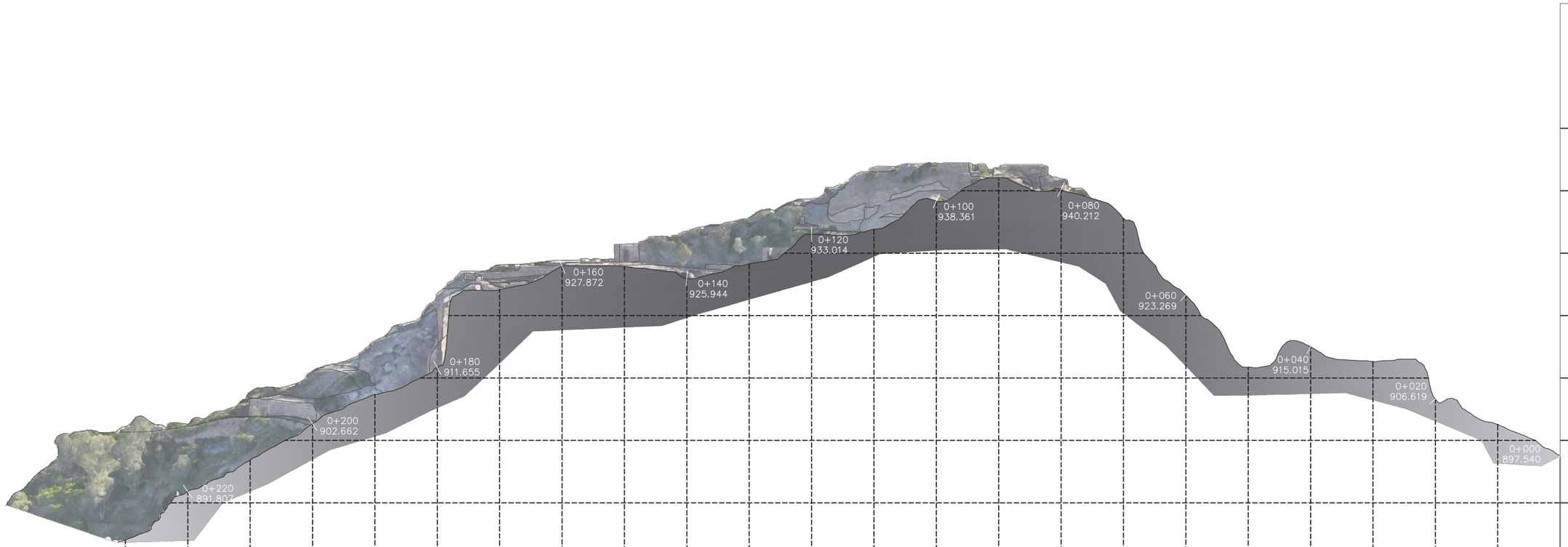


PLATE XIII – Hilltop: general map with sections (EssaNoor team)



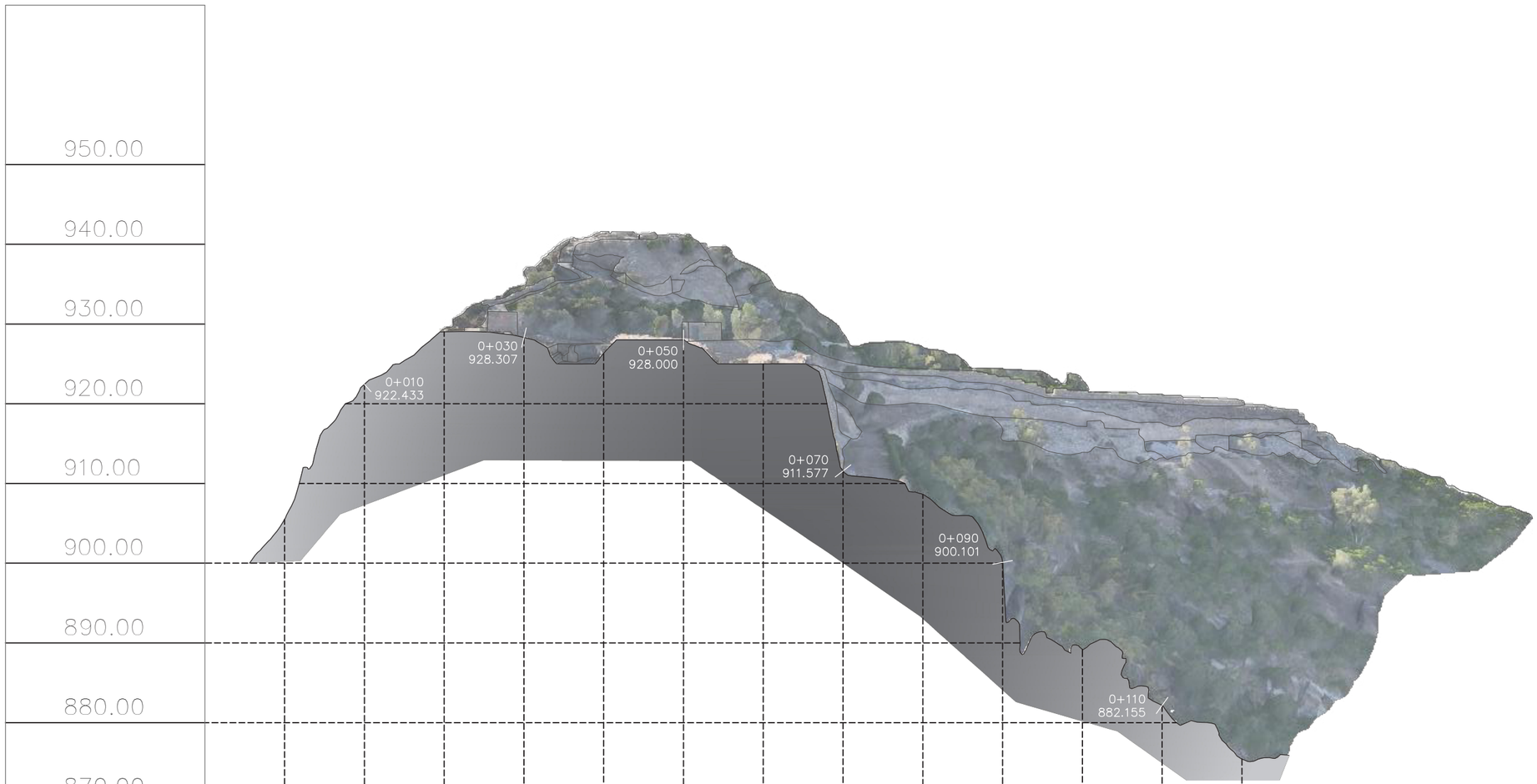
CHAINAGE	NATURAL GROUND LEVEL
0+000	897.540
0+010	902.556
0+020	906.619
0+030	912.636
0+040	915.015
0+050	911.742
0+060	923.269
0+070	935.588
0+080	940.212
0+090	942.107
0+100	938.361
0+110	933.828
0+120	933.014
0+130	928.265
0+140	925.944
0+150	927.870
0+160	927.872
0+170	924.140
0+180	911.655
0+190	907.329
0+200	902.662
0+210	896.838
0+220	891.807
0+230	884.061

DATUM (m)

SECTION AA'

0 3 7 15 30m

PLATE XIV – a) – Hilltop: section A-A'1 (EssaNoor team)

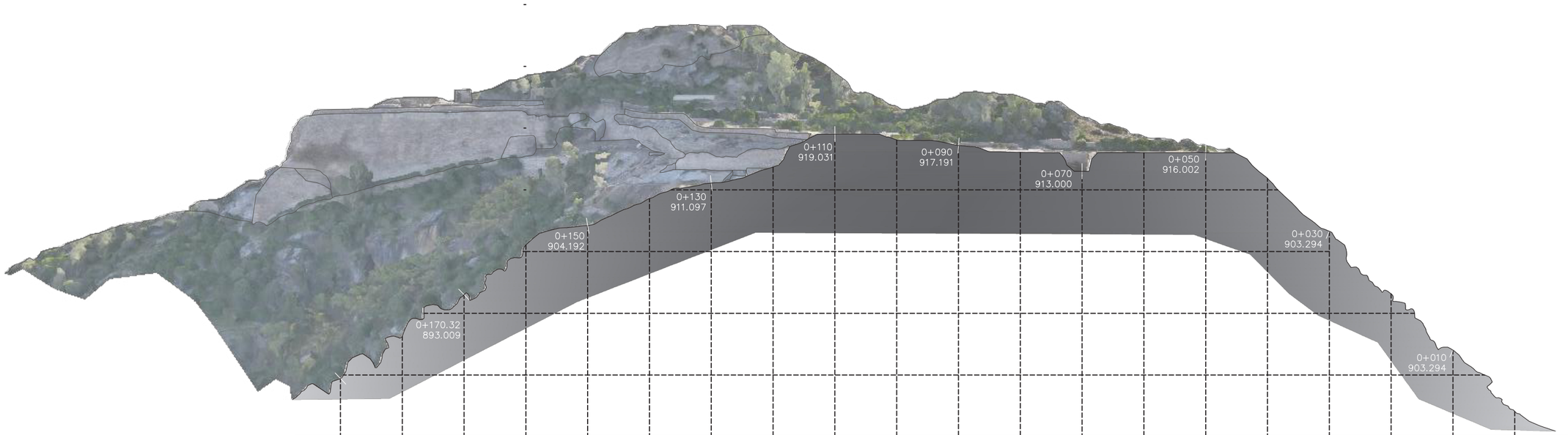


DATUM (m)												
CHAINAGE	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120
NATURAL GROUND LEVEL	905.498	922.433	929.011	928.307	926.322	928.000	924.999	911.577	908.623	900.101	889.175	882.155	875.432

SECTION BB'

0 3 7 15 30m

PLATE XIV – b) – Hilltop: section B-B' (EssaNoor team)



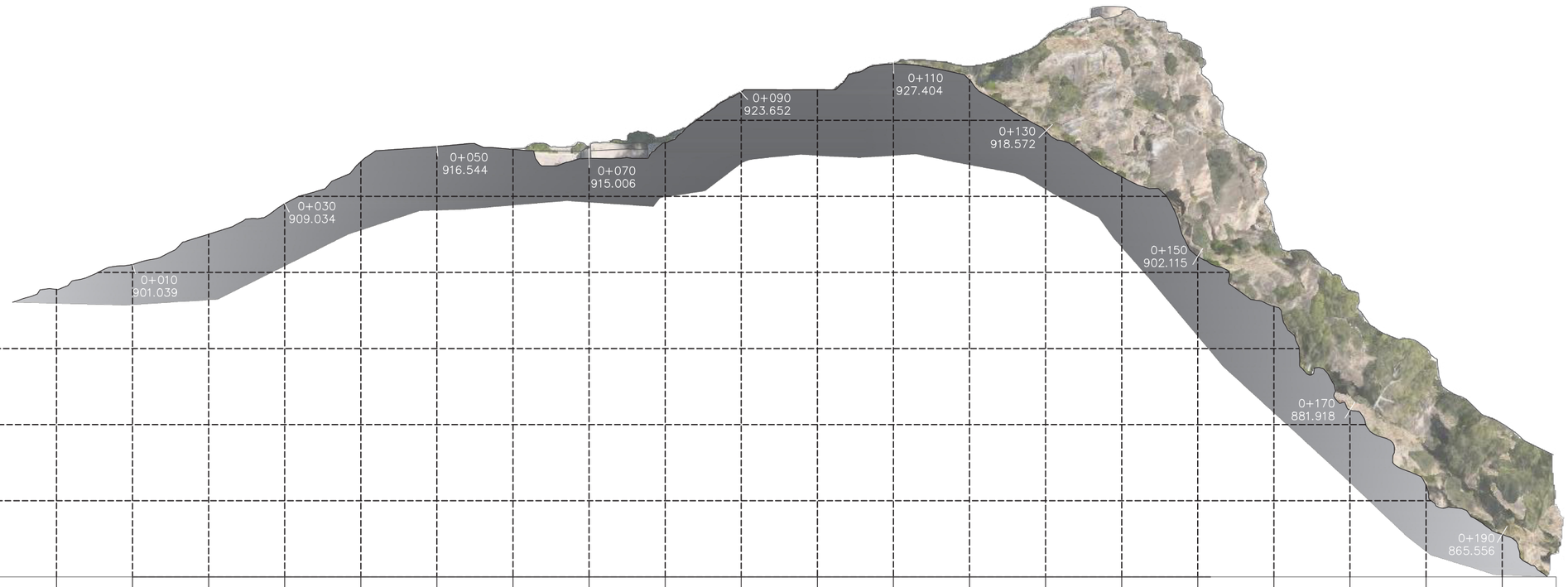
0+190	0+180	0+170	0+160	0+150	0+140	0+130	0+120	0+110	0+100	0+090	0+080	0+070	0+060	0+050	0+040	0+030	0+020	0+010	0+000	CHAINAGE
879.44	886.227	893.009	901.062	904.192	908.579	911.097	913.699	919.031	918.077	917.191	916.080	913.000	916.002	916.002	911.860	903.294	893.142	884.044	874.105	NATURAL GROUND LEVEL

960.00
950.00
940.00
930.00
920.00
910.00
900.00
890.00
880.00
DATUM (m)

SECTION CC'

0 3 7 15 30m

PLATE XV – a) – Hilltop: section C-C' (EssaNoor team)



960.00

950.00

940.00

930.00

920.00

910.00

900.00

890.00

880.00

870.00

DATUM (m)																				
CHAINAGE	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+090	0+100	0+110	0+120	0+130	0+140	0+150	0+160	0+170	0+180	0+190
NATURAL GROUND LEVEL	897.773	901.039	905.020	909.034	914.560	916.544	916.182	915.006	917.041	923.652	924.000	927.404	925.313	918.572	912.582	902.115	895.537	881.918	872.014	865.556

SECTION DD'

0 3 7 15 30m

PLATE XV – b) – section D-D' (EssaNoor team)

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Abbreviations

Arr. *Anab.* = Arrian, Ἀλεξάνδρου Ἀνάβασις

Curt. = Q. Curtius Rufus, *Historiae Alexandri, libri qui supersunt*

* * *

ARA = Archaeological Research in Asia

AION = Annali dell'Istituto Orientale di Napoli

AIUON = Annali dell'Istituto Universitario Orientale di Napoli

AMIT = Archäologische Mitteilungen aus Iran und Turan

BAVA = Beiträge zur Allgemeinen und Vergleichenden Archäologie

EA = Eurasia Antiqua. Zeitschrift für Archäologie Eurasiens

EI = Epigraphia Indica

EMSCAT = Études mongoles et sibériennes, centrasiatiques et tibétaines

EW = East and West

JA = Journal Asiatique

JIABS = Journal of the International Association of Buddhist Studies

JAC = Journal of Asian Civilizations

JRAS = The Journal of the Royal Asiatic Society of Great Britain and Ireland

ONS = Journal of the Oriental Numismatic Society

RET = Revue d'Etudes Tibétaines

SAS = South Asian Studies

SAA = South Asian Archaeology Conference

SAAA = South Asian Archaeology and Art Conference

* * *

ACT = Archaeology Community Tourism - Field School Project

ACT RepMem = ACT Reports and Memoirs

ANP = Antiquities of Northern Pakistan: Reports and Studies

ANU = Australian National University Press

ICCROM = International Centre for the Study of the Preservation and Restoration of Cultural Property

IGNA = Indira Gandhi National Centre for Arts

IsMEO RepMem = IsMEO Reports and Memoirs

IsIAO RepMem = IsIAO Reports and Memoirs

KNAW = Koninklijke Nederlandse Akademie van Wetenschappen

MANP = Materialien zur Archäologie der Nordgebiete Pakistans

MASI = Memoirs of the Archaeological Survey of India

MDAFA = Mémoires de la délégation archéologique française en Afghanistan

ÖAW = Österreichische Akademie der Wissenschaften (Verlag)

SOAS = School of Oriental and African Studies

SOR = Serie Orientale Roma

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VAJIRASTHĀNA

ARCHAEOLOGY OF THE BARIKOT HILLTOP (SWAT, PAKISTAN)

Volume 2



Luca M. Olivieri
In collaboration with Elisa Iori, Michele Minardi and Marco Pinelli

Foreword by Abdul Samad

Edited by Alice Casalini

"SAVE THE ARCHAEOLOGICAL SITE OF BAZIRA" PROJECT

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"SAVE THE ARCHAEOLOGICAL SITE OF BAZIRA" PROJECT









"Save the archaeological site of Bazira" is a project of ALIPH (International Alliance for the Protection of Heritage in Conflict Areas), ISMEO International Association for Mediterranean and Oriental Studies, and Directorate of Archaeology and Museums, Govt of Khyber Pakhtunkhwa (DOAM KP).

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N.B.: Some figures are intentionally left without captions; see descriptions in Volume 1.

0

INTRODUCTION



Fig. 1 – Terrace E, N side and E side [130] as it appeared in 1926 (after Stein 1930: figs 20-21)

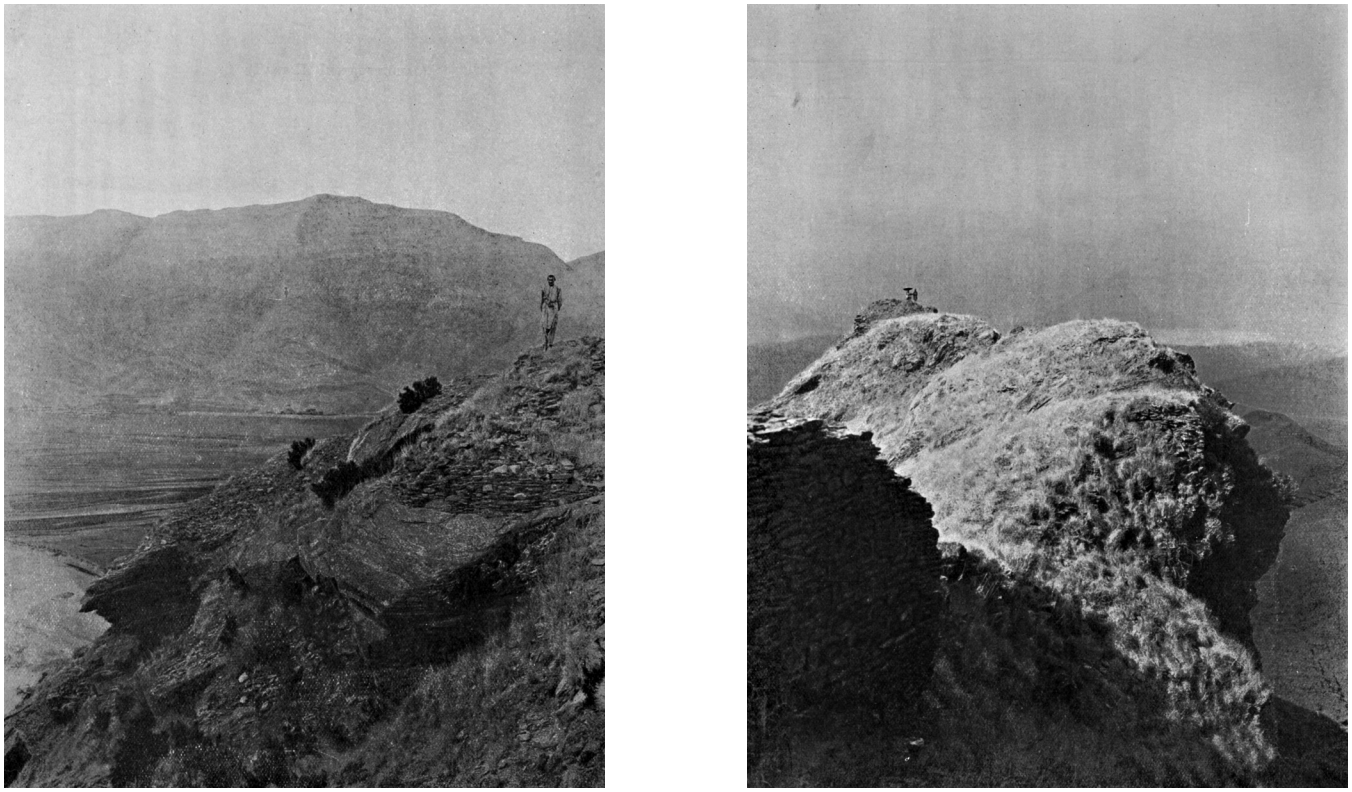


Fig. 2 – SW sides [136] and hilltop (BKG 14) as it appeared in 1926 (after Stein 1930: figs 22-23)

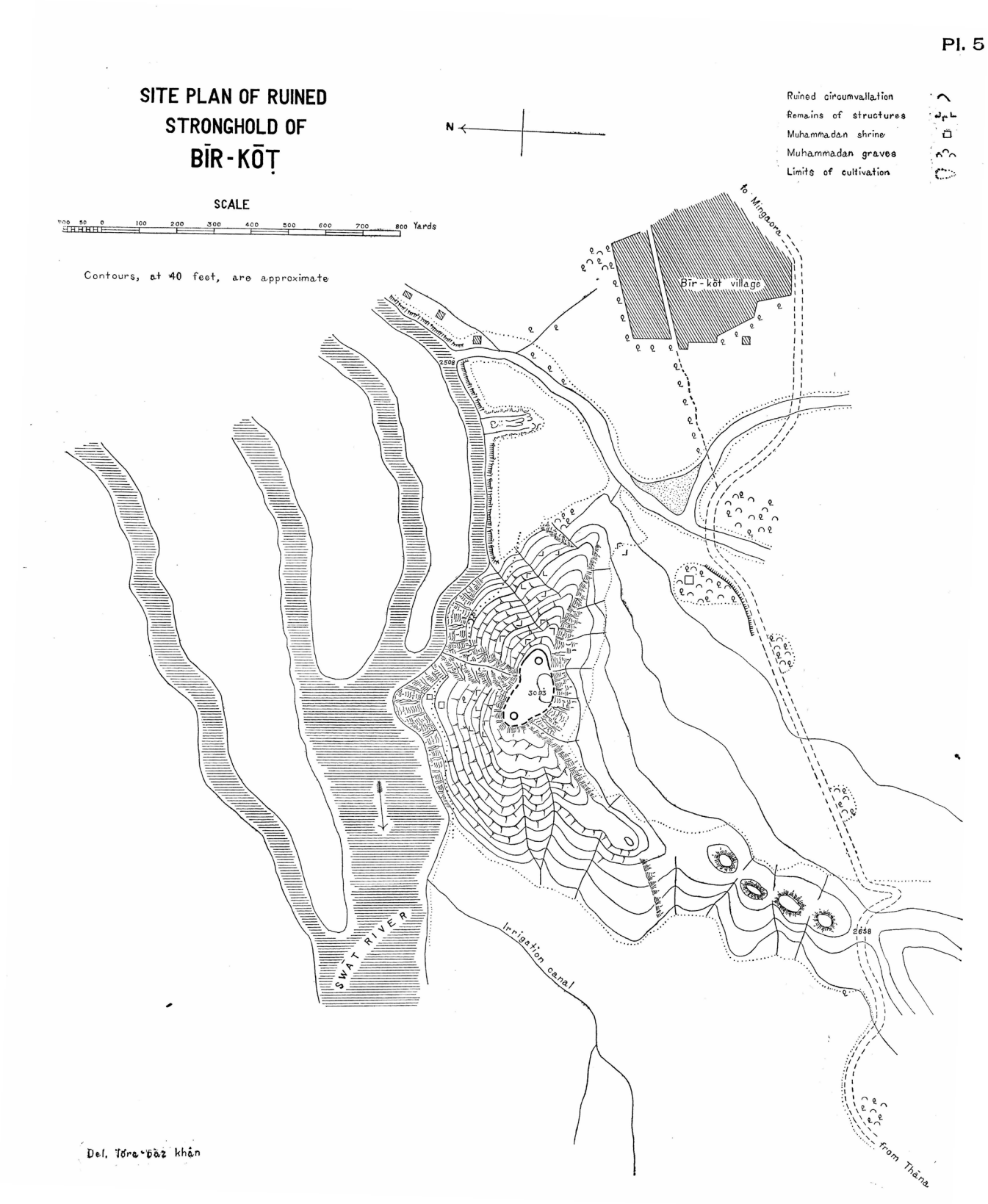


Fig. 3 – Map of the ruins at Barikot in 1926 (after Stein 1930: pl. 5)

0.2 - THE CITY OF VAJRA (L.M. Olivieri)



Fig. 1 – The valley of Swat with the hill of Barikot (N to the left). Photo by C. Biagioli/ISMEO, April 2018.

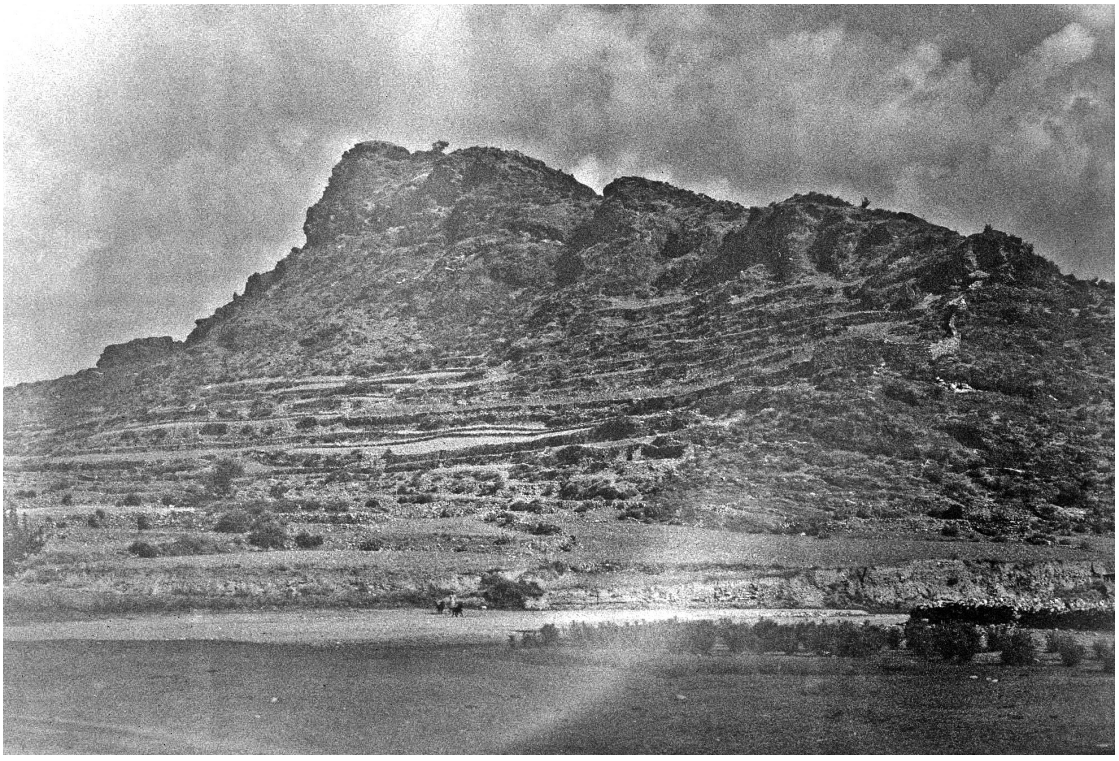


Fig. 2 – The hill of Barikot in 1938. Photo by T.D. Weatherhead (Neg. 663/2(17), British Library).



Fig. 3a – Kunsthistorisches Museum, Vienna (Göbl 1967 type 108): *jayatu baysara khota laka* (after Tandon 2013: table 3, coin 19).



Fig. 3b – British Museum, 1912.1214 (Göbl 1967 type 109): *jayatu baysara* (after Tandon 2013: table 3, coin 20).



Fig. 4 – Vajirasthāna inscription, L 119 (Photo CM)



Fig. 5 – The upper valley of Tal from the hill of Barikot 2 (N to the left). Photo MM, October 2021.



Fig. 6 – The hilltop of Beira-dheri at Barikot 2. Photo MM, October 2021.

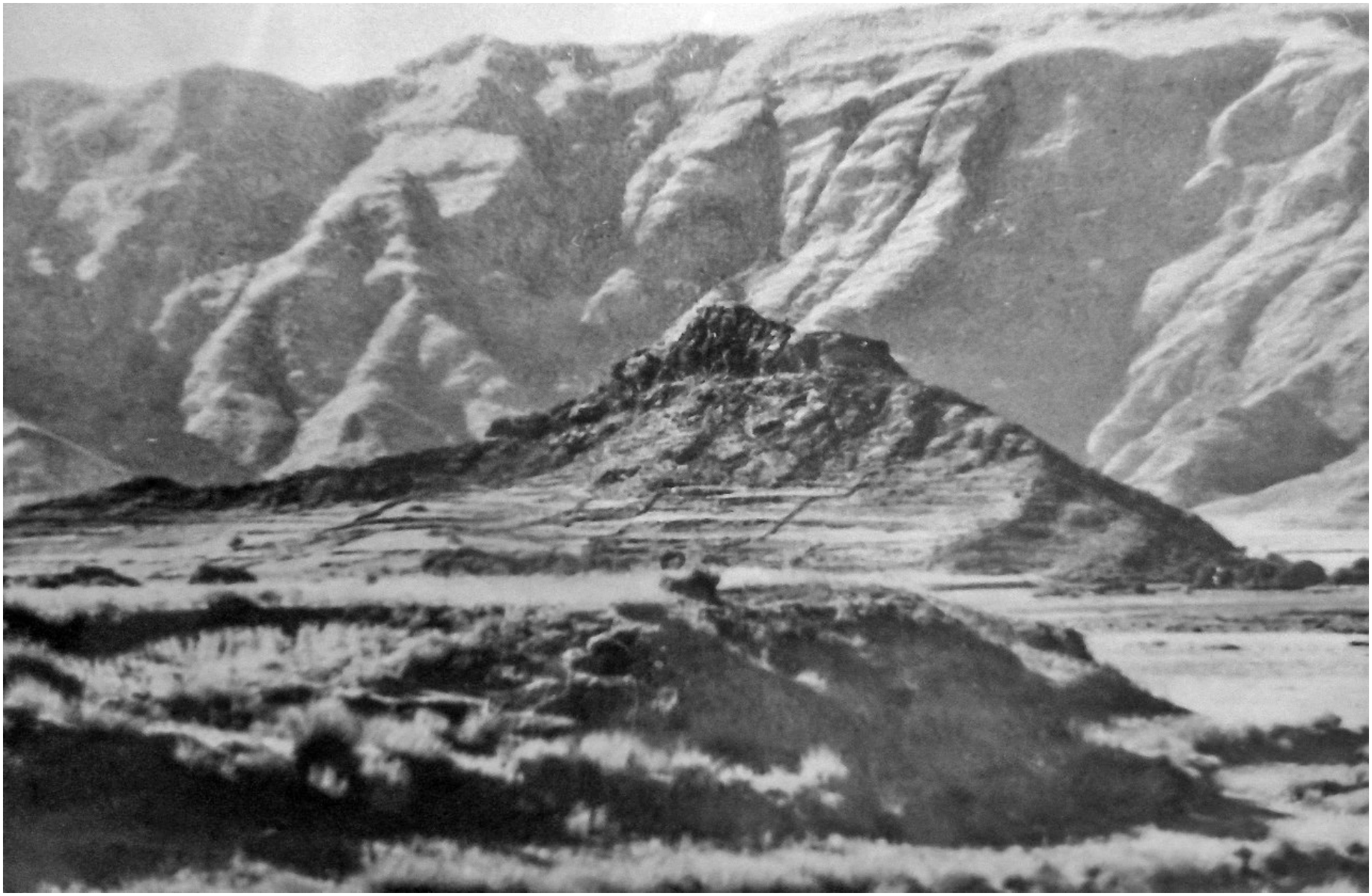


Fig. 7 – The hilltop of Barikot seen from ESE in 1938 (after Barger, Wright 1941: Fig. 2).

Chapter I

ACTIVITIES ON THE HILLTOP (1992-2024)



Fig. 1 – Aerial view of the archaeological site of Barikot: location of the excavated trenches (filled trenches in red).



Fig. 2a – Barikot archaeological site viewed from E.



Fig. 2b – The same viewed from NW

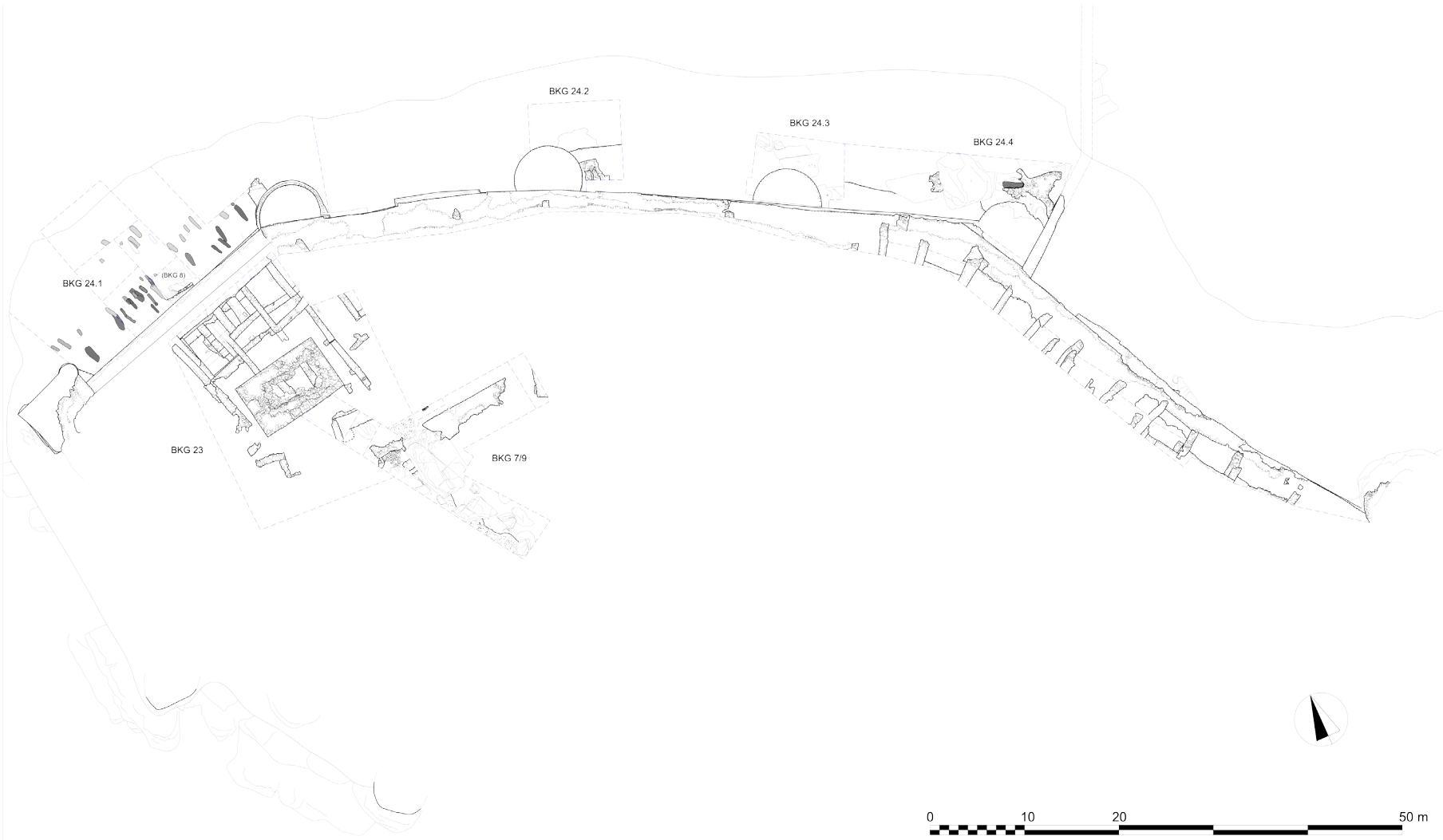


Fig. 4 – Upper hill of Barikot: Terrace W (cf. PLATE XXIII).



Fig. 3 – Electric storm at Vajirasthāna (cf. Minardi, this volume)



Fig. 5 – Upper hill of Barikot: Terrace E (cf. PLATE XII)



Fig. 6 – Barikot, S side of the hill: Trench BKG 2-13 seen from the W.



Fig. 7 – Temple 2 (view from the SE) (BKG 2)

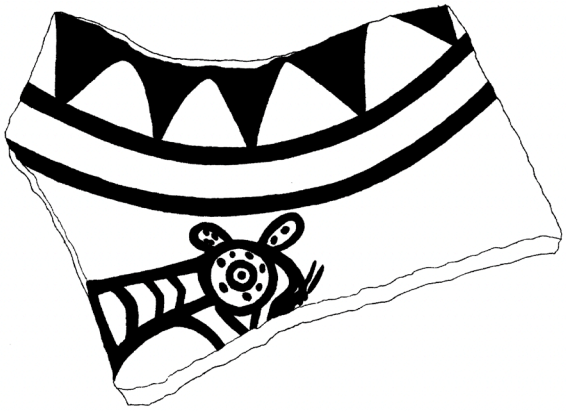


Fig. 8 – Bronze age sherd BKG 1903 from Trench BKG 8 (Macrophase 0; w. max. 18.6 cm).



Fig. 9 – Figurine with incised triśula. BKG 4767.

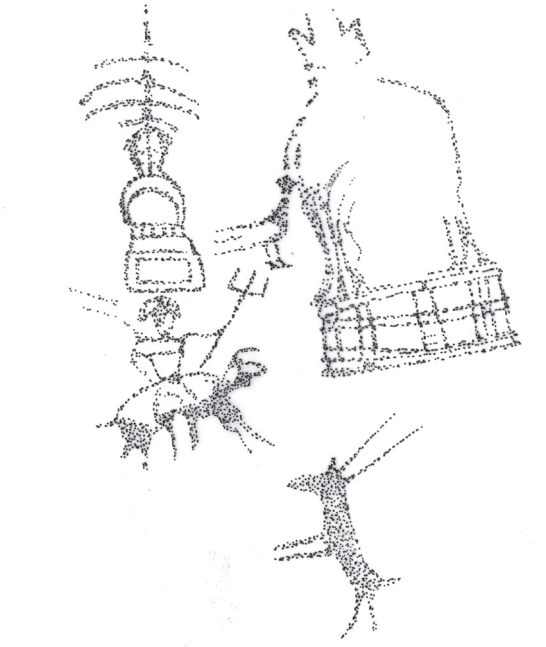


Fig. 10 – Thakt-Gat rock painting. Drawing by LMO.



Fig. 11 – Palangai 1 rock painting. Drawing by LMO.

TABLE 1 – Concordance between the Macrophases of Barikot and the Periods/Phases of individual Trenches (compiled by LMO).

Macrophase	Lower Town														Acropolis/Hill								Chronology (relative / absolute) *Toponym*	Representative coin finds		Climatic conditions
	BKG 4-5	BKG 11-22	BKG 12	BKG 1	BKG 3 outside	BKG 3	BKG 18	BKG 16-21	BKG 19	BKG 17	BKG 10	BKG 2-13	**Structural macro-events**	BKG 7-9	BKG 9-23	BKG 8-24	BKG 20	BKG 14	BKG 15	BKG 6	**Structural macro-events**	**Cultural phase**	coinage	
10											Per. IV	Per. VII	**construction of a *thana* (BKG 10) in early 20th cent.** ↑ Pashtun village from 16th cent. ↑ abandonment of Dardic settlement (clan of Baira or Baria) in 16th cent.			Per. 4	Per. 4	Per. 4		Per. 4	agricultural use hermitage place for local *fakirs*	**Yusufzai / Miangul** (16th to early 20th cent. CE) *Berikout / Bir-kot*		COOLING LITTLE ICE AGE (LIA)
9b-c				Per. X	Per. VII	Ph. 5				[?]		Per. VI	**Islamic occupation and graveyard (BKG 3 and BKG 17 [?]) at least from 13th cent.**	Per. VII	Per. VIII BKG 9 Per. 3 BKG 23	Per. 3	Per. 3	Per. 3	Per. 3	Per. 3b	**fortification of the *kot*** **establishment of a cemetery (BKG 24.1)**	**Dardic / Timurid** (13th to 15th cent. CE) *Qal'a-ye Wajīra (?)*		MEDIEVAL WARMING (MW)
9a												Per. V		Per. VI		Per. 2	Per. 3			Per. 3a	**podium (BKG 23)** ↑ **construction of a military watchtower (BKG 14) Fortification (BKG 24)** ↑ destruction of the Hindu Temple	**Ghaznavid / Ghurid** (11th to 12th cent. CE)	Ghaznavid	
8b												Per. IV	**construction of the turreted Temple (BKG 2)**		Per. VII BKG 9 Per. 2 BKG 23	Per. 1	Per. 2			Per. 2b	**reconstruction of the Hindu Temple (BKG 6) (Period 2b)**	**Hindu Śāhi** (9th to 10th cent. CE) *Vajirasthāna*	Hindu Śāhi	
8a		Per. X		Per. IX	Per. VI	Ph. 4						Per. III	**construction of the foothill palatial area (BKG 13)**	Per. V	Per. VI BKG 9 Per. 1 BKG 23		Per. 1	Per. 2	Per. 2	Per. 2a	hilltop fortified settlement **construction of the HinduTemple (BKG 6) (Period 2a)** **construction of a tank and Fortress on the hilltop (BKG 14, 15)** **Modification of the artificial Terraces E and W (BKG 20, 24)** demolition of the Buddhist sacred area (?) hilltop 'urban' phase	**Turk Śāhi** (7th to 9th cent. CE)	Turk Śāhi	LESS COOL DRY
Interphase C																						536-660 CE		COOL DRY LATE ANTIQUE LITTLE ICE AGE (LALIA)
7								Per. 9	Per. VII				**foundation of a Buddhist stupa upon the ruins of the abandoned city (BKG 19)**								abandonment phase sporadic human presence	**Kidarite / Alkhan** (5th to 7th cent. CE)	Kidārite Alkhan	STABLE WARM WET GANDHARAN OPTIMUM END
6	Per. X	Per. IX		Per. VIII	Per. V	Ph. 3	Per. 6	Per. 8	Per. VI				temporary non-urban re-occupation							Per. 1		**Early Kidarite** (mid/late 4th cent. CE)	Late Kušān Kušāno-Sāsānian small *aes*	

Macrophase	Lower Town													Acropolis/Hill							Chronology (relative / absolute) *Toponym*	Representative coin finds		Climatic conditions
	BKG 4-5	BKG 11-22	BKG 12	BKG 1	BKG 3 outside	BKG 3	BKG 18	BKG 16-21	BKG 19	BKG 17	BKG 10	BKG 2-13	**Structural macro-events**	BKG 7-9	BKG 9-23	BKG 8-24	BKG 20	BKG 14	BKG 15	BKG 6	**Structural macro-events**	**Cultural phase**	coinage	
5b	Per. IX	Per. VIII b	Ph. 8	Per. VII	Per. IVB	Ph. 2b	Per. 5	Per. 7	Per. V		Per. III		*earthquake* abandonment of the drainage system **pottery production area (BKG 1)**									**Kushano-Sasanian** (late 3rd / early 4th cent. CE)	Kušāno-Sāsānian	STABLE WARM WET GANDHARAN OPTIMUM END
5a	Per. VIII Per. VII	Per. VIIIa Per. VII	Ph. 7			Ph. 2a	Per. 4	Per. 6			Per. II		Modification of the Apsidal Temple (BKG 16) *earthquake* reconstruction	Per. IV-III BKG 7	Per. V-IV BKG 9				Per. 1	demolition of the Defensive Wall expansion of Terrace W construction of Terrace E	**Late Kushan** (3rd cent. CE) **Late Kushan** (3rd cent. CE)	Late Kušān Late Kušān	
4	Per. VI Per. V	Per. VI Per. V	Ph. 6 Ph. 5	Per. VI Per. V	Per. IVA	Ph. 1b	Per. 3		Per. IV		Per. II		intense building activity abandonment of the Defensive Wall initial abandonment of the Defensive Wall Re-construction of the Apsidal Temple (BKG 16)					Per. 1	Per. 1		**Buddhist sacred area (BKG 6) on Terrace E** **massive stepped structure (BKG 14 -15)**	**Kushan** (1st to 2nd cent. CE)	Kušān	MONSOON INTENSIFICATION
3b	Per. IV	Per. IIIB	Ph. 4	Per. IV	Per. III	Ph. 1a	Per. 2	Per. 5	Per. III	Per. 1	Per. I		*earthquake* rehabilitation of the Defensive Wall **pottery production area (BKG 19)**	Per. II	Per. III						construction of the new **Defensive Wall on the Acropolis Hill (BKG 8)**	**Saka-Parthian** (mid-1st cent. BCE to late 1st cent. CE) **Oḍirāja**	Indo-Scythian	GANDHARAN OPTIMUM PEAK
3a4		Per. IIIA 4		Per. III									fortified urban phase											LESS COLD DRY GANDHARAN OPTIMUM BEGINNING
3a3	Per. III	Per. IIIA 3	Ph. 3	Per. II Per. I	Per. IIB Per. IIA		Per. 1	Per. 4.2	Per. II				demolition of the previous structures and stratigraphy for the construction of the urban **Defensive Wall (BKG 11-12) with southern gate (BKG 18)**								construction of the earlier **Defensive Wall on the Acropolis Hill (BKG 9 & 7)**	**Indo-Greek** (mid-2nd to mid-1st cent. BCE) late post-Mauryan - unknown (early to mid-2nd cent. BCE)	Indo-Greek Taxila-Gandhāra Mauryan	
3a2		Per. IIIA 2											urban ↑occupation phase											
3a1		Per. IIIA 1																				**Late / post-Mauryan** (mid-3rd to early 2nd cent. BCE)	Taxila-Gandhāra Mauryan	
2b		Per. IIB	Ph. 2b					Per. 4.1	Per. I				**construction of the Apsidal Buddhist Temple (BKG 16)**									**Mauryan** (end-4th to mid-3rd cent. BCE)		
2a2		Per. IIA2						Per. 3					**earthen rampart and moat (BKG 12W)**								**Achaemenid - Assakenian** (5th to 4th cent. BCE) Macedonian conquest *Bazira / Beira* ↑		
2a1		Per. IIA1											urban ↑occupation phase								**Early or pre-Achaemenid** (6th to 5th cent. BCE)		

MACROPHASE	LOWER TOWN													ACROPOLIS/HILL								Chronology (relative / absolute) *Toponym*	Representative coin finds		Climatic conditions
	BKG 4-5	BKG 11-22	BKG 12	BKG 1	BKG 3 outside	BKG 3	BKG 18	BKG 16-21	BKG 19	BKG 17	BKG 10	BKG 2-13	**Structural macro-events**	BKG 7-9	BKG 9-23	BKG 8-24	BKG 20	BKG 14	BKG 15	BKG 6	**Structural macro-events**	**Cultural phase**	coinage	
													construction of a non-Buddhist Temple (BKG 16)											
Interphase B		Per. IC																							COLD DRY
1b	Per. II (?)	Per. IB	Ph. 1b BKG 12		Per. I			Per. 2					final collapse and abandonment of the fortified cluster Settlement/ reconstruction of the inner citadel (BKG 11-K) Graveyard	Per. IB	Per. II (BKG 9)	Per. II (BKG 8)					Settlement	**Iron Age** (*c.* 1000–900 BCE) = Period VII of the Ghalegai sequence (?) **Iron Age** (*c.* 1200–1000 BCE) = Period VI of the Ghalegai sequence		COOLING
1a		Per. IA	**Ph. 1a** BKG 12										Settlement **Fortified inner citadel (BKG 11-K)** Graveyard								Settlement	**Late Bronze Age / Early Iron Age** (*c.* 1300–1200 BCE) = Periods V–VI of the Ghalegai sequence		COOL DRY
Interphase A (?)																									COLD [?]
0	Per. I (?)		Ph. 0 (only in BKG 12)		Per. 0			Per. I					Settlement	Per. IA	Per. I (BKG 9)	Per. I (BKG 8)					Settlement	**Chalcolithic** (*c.* 1700–1400 BCE) = Period IV of the Ghalegai sequence		COOLING
-1 / - 3													sparse anthropic presence								sparse anthropic presence	Prehistoric phases (*c.* 3000 –1700 BCE) = Period III-I of the Ghalegai sequence and **Northern Neolithic**		HOLOCENE OPTIMAL NORTHERN NEOLOTHIC OPTIMUM
Holocene 2													loess capped landscapes alternated with erosion phases								loess capped landscapes alternated with erosion phases	(*c.* 5000 –3000 BCE)		COOL DRY MONSOON INTENSIFICATION PEAK
Holocene 1																						(*c.* 9000 –5000 BCE)		
Late Pleistocene													silt/loess deposits [?]								silt/loess deposits [?]	(*c.* 15000 –10000 BCE)		

MACROPHASE	LOWER TOWN													ACROPOLIS/HILL							Chronology (relative / absolute) *Toponym*	Representative coin finds		Climatic conditions
	BKG 4-5	BKG 11-22	BKG 12	BKG 1	BKG 3 outside	BKG 3	BKG 18	BKG 16-21	BKG 19	BKG 17	BKG 10	BKG 2-13	**Structural macro-events**	BKG 7-9	BKG 9-23	BKG 8-24	BKG 20	BKG 14	BKG 15	BKG 6	**Structural macro-events**	**Cultural phase**	coinage	
Philladic bedrock													*phylladic bedrock*								*phylladic bedrock*	——		

TABLE 1 – Concordance between the Macrophases of Barikot and the Periods/Phases of individual Trenches (L.M. Olivieri)

*The climatic data are all hypothetical and based on available information (see also Olivieri 2025b with refs)
**For radiocarbon data see TABLE 2.

Key:

upper limit of the archaeological deposit

uncertain limits

lower excavated limit of the archaeological deposit

gap in the archaeological evidence

1

TABLE 2 – List of radiocarbon measurements (compiled by LMO).

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
80	**Macrophase 9c-10**	INNOVA-17	BKG 13 (26)	1517-1594 CE	80.0	x		INNOVA	2019	charcoal
79	**Macrophase 9c**	ENEA-185	BKG 2 (17)	1300-1330 CE	27.1			ENEA	2008	charcoal
				1340-1400 CE	41.1					
77	**Macrophase 9b-9c**	PSUAMS-6205	BKG 11 <1002>	1287-1393 CE	*t.*			PSU	2019	bone
78		PSUAMS-4427	BKG 308 <139>	1276-1390 CE	*t.*			PSU	2019	bone
75	**Macrophase 9a**	BETA - 664153	BKG 2_13_3	1113 – 1156 CE	32.3	x		BETA An.	2023	soil
				1075-1108 CE	24.2	x				
				1028-1172 CE	95.4		x			
76		PSUAMS-6206	BKG 11 W (46)	1021-1154 CE	*t.*			PSUAMS	2019	bone
85		FTMC-NS41-5	BKG 17 <F2> (17)	1083-1151 CE	56.6	x		VILNIUS RC	2024	bone
				1025-1160 CE	95.4		x			
97		BETA - 726618	BKG 6.3 (1846)	1026-1158 CE	95.4		x	BETA An.	2025	seed
98		BETA - 726619	BKG 6.3 (1803)	1116-1219 CE	61.2		x	BETA An.	2025	seed
				1042-1107 CE	34.2		x			
99	**Macrophase 8b**	BETA - 726622	BKG 24.1 (21)	951-1034 CE	84.5		x	BETA An.	2025	charcoal
				896-923 CE	10.9		x			
69		ENEA-183	BKG 2 (344)	770–900 CE	55.6			ENEA	2008	charcoal
				920-960 CE	12.6					
70		ENEA-184	BKG 2 (365)	789-900 CE	47.7			ENEA	2008	charcoal
				910-960 CE	20.5					
71		DSH9629_CH	BKG 2 TT1E	873 CE	100.0	x		INNOVA	2019	charcoal
				894 CE	96.0		x			
106		DSH9646_CH	BKG 6.5 (38)	969-1018 CE	100.0	x		INNOVA	2019	charcoal
				942-1024 CE	84.0		x			
107		DSH9642_CH	BKG 6.5 (25)	886-991 CE	100.0	x		INNOVA	2019	charcoal
				944-975 CE	53.0		x			
108		DSH9574_WO	BKG 6.5 (25)	949-995 CE	70.0	x		INNOVA	2019	wood
				939–1018 CE	71.0		x			
109		DSH9575_SO	BKG 6.5 (55)	950-985 CE	62.0	x		INNOVA	2019	coprolyth (small mammal)
				891-994 CE	100.0		x			
110		DSH9635_CH	BKG 6.5 (23)	882-970 CE	100.0	x				
				856-982 CE	86.6		x			
100		BETA - 726623	BKG 235 (48)	871-992 CE	81.5		x	BETA An.	2025	charcoal
				828-860 CE	8.5		x			
				775-787 CE	5.4		x			
101		BETA - 726624	BKG 23.1 (218)	874-993 CE	88.2		x	BETA An.	2025	charcoal
				830-852 CE	3.9		x			
				775-786 CE	3.3		x			

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
67	**Macrophase 8a**	Sapienza (Callieri 2005: 423)	BKG 6.2 (477)	605-685 CE	*t.*			ENEA	2005	charcoal
68		DSH9644_CH	BKG 6.5 (33)	690-750 CE	86.0	x		INNOVA	2019	charcoal
				670-778 CE	93.0		x			
74		DSH9647_CH	BKG 6.5 (41)	791-826 CE	34.0	x		INNOVA	2019	charcoal
				764-882 CE	78.0		x			
72		DSH9643_CH	BKG 6.5 (30)	774-884 CE	100.0	x		INNOVA	2019	charcoal
				800-872 CE	93.0		x			
73		DSH9645_CH	BKG 6.5 (35)	802-844 CE	52.0	x		INNOVA	2019	charcoal
				774-886 CE	100.0		x			
112		DSH9633_CH	BKG 6.5 (15)	802-844 CE	47.0	x		INNOVA	2019	charcoal
				770-895	97.0		x			
111		*DSH9634_CH*	*BKG 6.5 (17)*	*802–844 CE*	*51.0*	*x*		*INNOVA*	*2019*	*charcoal*
				773-888 CE	*100.0*		*x*			
65	**Macrophase 7b**	DSH9630_CH	BKG 13 (275)	693-746 CE	74.0	x		INNOVA	2019	charcoal
				688-752 CE	55.0		x			
66		DSH9631_CH	BKG 13 (294)	664-694 CE	71.0	x		INNOVA	2019	charcoal
				660-720 CE	72.0		x			
64	**Macrophase 7a**	DSH9632_CH	BKG 13 (299)	488-533 CE	67.0	x		INNOVA	2019	charcoal
				410-536 CE	100.0		x			
56	**Macrophase 6**	LTL12768A	BKG 11 W 7-8 68 (30)	250-350 CE	62.6	x		CEDAD	2012	bone
				220-420 CE	95.4		x			
57		LTL12772A	BKG 11 W 5-6 54 (393)	130-250 CE	68.2	x		CEDAD	2012	bone
				120-340 CE	94.2		x			
58		LTL12774A	BKG 11W 3-4 53 (226)	130-260 CE	59.5	x		CEDAD	2012	bone
				120-350 CE	95.4		x			
59		LTL12776A	BKG 11 W 7-8 63 (101)	125-230 CE	68.2	x		CEDAD	2012	bone
				70-260 CE	94.3		x			
60		LTL13055A	BKG 11 W 3-4 28 (600)	380-440 CE	46.0	x		CEDAD	2013	bone
				330-540 CE	95.4		x			
61		LTL13056A	BKG 11 W 3-428 (592	320-310 CE	45.7	x		CEDAD	2013	bone
				250-300 CE	22.5	x				
				240-410 CE	95.4		x			
62		LTL13057A	BKG 11 W 3-428 (597)	480-540 CE	36.5	x		CEDAD	2013	bone
				410-470 CE	31.7	x				
				380-550 CE	95.4		x			
63		LTL12775A	BKG 11 W 3-4 37bis (256)	130-240 CE	68.2	x		CEDAD	2013	bone
				280-330 CE	1.0	x				
				70-260 CE	89.4		x			

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
	Macrophase 5b	*t.*								
53	**Macrophase 5a (H)**	DSH11289_CH	BKG 168 (428)	156-237 CE	87.0	x		INNOVA	2022	seed
				116-252 CE	93.0		x			
54		DSH11248_CH	BKG 168 (428)	118-210 CE	96.0	x		INNOVA	2022	seed
				60-236 CE	99.0		x			
55		DSH11249_CH	BKG 168 (455)	110-250 CE	87.9	x		INNOVA	2022	seed
				8-362 CE	99.6		x			
105	**Macrophase 5b**	DSH12607_CS	BKG 2110 (1499)	127-203 CE	68.3	x		ISOCORE	2025	seed
				114-220 CE	91.0		x			
106		DSH12649_CS	BKG 2110 (1487)	154-206 CE	53.3	x		ISOCORE	2025	seed
				120-231 CE	95.4		x			
52	**Macrophase 4b-5a**	DSH11245_CH	BKG 16 (165)	203-414 CE	96.0	x		INNOVA	2022	seed
				64-538 CE	100.0		x			
	Macrophase 4b	*t.*								
51	**Macrophase 4a**	DSH11285_CH	BKG 160 (452)	3-84 CE	68.0	x		INNOVA	2022	seed
				54-204 CE	99.0		x			
46	**Macrophase 3b**	BKG 19.1-915	BKG 191 (915)			*t.*		OXFORD	2023	seed
				BCE 56 - 20 CE	87.8		x			
47	Macrophase 3b (H)	DSH11290_CH	BKG 16 (332)	BCE 4 - 78 CE	76.0	x		INNOVA	2022	seed
				BCE 54 - 130 CE	99.0		x			
48		DSH9648_CH	BKG 13 (350)	BCE 40-20 CE	100.0	x		INNOVA	2019	charcoal
				BCE 48-52 CE	100.0		x			
49		PSUAMS-6207	BKG 12 E (48)	BCE 47-52 CE	*t.*			PSUAMS	2019	bone
50		DSH7906_SE	BKG 3 (592)	23-77 CE	100.0	x		INNOVA	2017	charcoal
				1-94 CE	90.0		x			
104		DSH12606_ CS	BKG 21104 (1457)	BCE 49-11 CE	68.3	x		ISOCORE	2025	seed
				BCE 59-32 CE	82.8		x			
43	**Macrophase 3a4**	DSH7931_SE	BKG 11-K (1676)	BCE 204-164	86.8	x		INNOVA	2017	seed
				BCE 208-109	82.8		x			
44	**Macrophase 3a4 (out cella H)**	FTMC-RF53-8	BKG 16 E (731)	BCE 156-91	49.3	x		VILNIUS RC	2023	seed
				BCE 147-92	95.4		x			
45		FTMC-RF53-9	BKG 16 E (715)	BCE 178-97	56.1	x		VILNIUS RC	2023	seed
				BCE 202-51	88.3		x			
84		FTMC-NS41-1	BKG 16 SE (725)	BCE 174-96		x		VILNIUS RC	2024	seed
				BCE 201-48			x			
42	**Macrophase 3a3-3a4**	DSH7930_SE	BKG 11-K (2113)	BCE 208-109	76.4	x		INNOVA	2017	seed
				BCE 235-53	72.8		x			
102		DSH7612_SE	BKG 11-K (1687)	BCE 356-285	55.2	x		INNOVA	2017	seed

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
				BCE 235-171	43.9	x				
				BCE 369-106	100		x			
103		DSH7615_SE	BKG 11-K (1680)	BCE 297-228	61.1	x		INNOVA	2017	seed
				BCE 385-352	31.0					
				BCE 330-204	68.7					
				BCE 395-334	31.3					
35	**Macrophase 3a3**	D-DSH7060	BKG 401 (328)	BCE 117-36	68.8	x		INNOVA	2016	bone
				BCE 193-28 CE	98.7		x			
36		D-DSH7061	BKG 401 (328)	BCE 174-91	92.1	x		INNOVA	2016	bone
				BCE 202-45	100.0		x			
37		D-DSH7060	BKG 401 (328)	BCE 163-128	40.0	x		INNOVA	2016	bone
				BCE 182-45	100.0		x			
38		ENEA-181	BKG 310 (592)	BCE 200-40 CE	68.2			ENEA	2005	charcoal
39		ENEA-182	BKG 302 (449)	BCE 180-70 CE	68.2			ENEA	2005	charcoal
40	Macrophase 3a3 (H)	FTMC-RF53-10	BKG 1615 = TT SW (924)	BCE 200-107	58.5	x		VILNIUS RC	2023	seed
				BCE 209-51	78.2		x			
41		FTMC-RF53-11	BKG 16 TTC (33)	BCE 176-97	57.7	x		VILNIUS RC	2023	seed
				BCE 201-51	88.9		x			
32	**Macrophase 3a2**	DSH7577_SE	BKG 11-K (1912bis)	BCE 210-156	51.5	x		INNOVA	2016	seed
				BCE 236-89	64.1		x			
33		OxA-38260	BKG 11-K (2131)			r.		OXFORD	2019	seed
				BCE 359-214	95.4		x			
34		DSH7933_SE	BKG 11-K (2117)	BCE 204-161	75.9	x		INNOVA	2017	seed
				BCE 210-94	81.2		x			
	Macrophase 3a1	r.								
29	**Macrophase 2b (H)**	BETA - 650199	BKG 16 (8) 2022	BCE 281-232	37.5	x		BETA An.	2023	charcoal
				BCE 389-355	30.7	x				
				BCE 311-206	59.1		x			
				BCE 395-349	36.3		x			
30		DSH11243_CH	BKG 1615 (473)	BCE 290-209	66.0	x		INNOVA	2022	seed
				BCE 400-196	99.0		x			
83	**Macrophase 2b (out cella H)**	FTMC-NS41-2	BKG 16 SE (745)	BCE 357-278	39.7		x	VILNIUS RC	2024	seed
				BCE 233-101	53.2		x			
31	Macrophase 2b	DSH7926_SE	BKG 11-K (2153)	BCE 206-173	62.1	x		INNOVA	2016	seed
				BCE 214-156	53.2		x			
28		DSH7578_SE	BKG 12 W (206)	BCE 260-205	50.4	x		INNOVA	2016	seed
				BCE 369-201	100.0		x			
19	**Macrophase 2a-2b (Shrine 16-H)**	FTMC-RF53-1	BKG 16 TTC (40)	BCE 356-280	45.2	x		VILNIUS RC	2023	seed

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
				BCE 367-171	95.4		x			
20		FTMC-RF53-2	BKG 16 TTC (37)	BCE 355-281	45.8	x		VILNIUS RC	2023	seed
				BCE 365-170	95.4		x			
21		FTMC-RF53-4	BKG 16 TTC (21)	BCE 351-290	41.5	x		VILNIUS RC	2023	seed
				BCE 361-241	52.2		x			
22		FTMC-RF53-6	BKG 16 TTC (1000)	BCE 397-359	48.7	x		VILNIUS RC	2023	seed
				BCE 403-351	54.2		x			
				BCE 293-208	41.2		x			
23		FTMC-RF53-10	BKG 16 TTC (41)	BCE 355-281	68.3	x		VILNIUS RC	2023	seed
				BCE 365-170	95.4		x			
81		FTMC-NS41-3	BKG 160 (2012)	BCE 375-290	15.2	x		VILNIUS RC	2024	bone
				BCE 290-209	53.1	x				
				BCE 389-342	24.2		x			
				BCE 321-201	71.2		x			
82		FTMC-NS41-4	BKG 160 [2000]	BCE 381-351	18.2	x		VILNIUS RC	2024	bone
				BCE 290-209	50.1	x				
				BCE 391-342	25.9		x			
				BCE 322-201	69.5		x			
24	**Macrophase 2a-2b (16-H)**	DSH11288_CH	BKG 1614 (414)	BCE 316-272	39.0	x		INNOVA	2022	seed
				BCE 384-195	99.0		x			
25		DSH11250_CH	BKG 1615 (278)	BCE 404-378	76.0	x		INNOVA	2022	seed
				BCE 413-358	61.0		x			
26		DSH11246_CH	BKG 1615 (483)-(485)	BCE 288-227	56.0	x		INNOVA	2022	seed
				BCE 322-200	66.0		x			
27		DSH11286_CH	BKG 1615 (483)	BCE 407-361	88.0	x		INNOVA	2022	seed
				BCE 422-384	67.0		x			
15	**Marcophase 2a.2 (H)**	DSH11247_CH	BKG 1615 (415)	BCE 540-362	99.0	x		INNOVA	2022	seed
				BCE 570-348	75.0		x			
16	**Macrophase 2a.2**	DSH7925_SE	BKG 11-K (2167)	BCE 399-385	100.0	x		INNOVA	2017	seed
				BCE 403-370	100.0		x			
18		DSH7954_C	BKG 11-K (2175)	BCE 494-410	89.5	x		INNOVA	2017	seed
				BCE 543-403	91.4		x			
12	**Macrophase 2a1**	DSH7928_SE	BKG 11-K (2182)	BCE 642-556	73.8	x		INNOVA	2017	seed
				BCE 654-541	61.9		x			
13		DSH7935_G	BKG 11-K (2184)	BCE 792-754	74.5	x		INNOVA	2017	bone
				BCE 608-595	13.8					
				BCE681-670	11.7					

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
				BCE 795-747	56.8		x			
				BCE 642-658	24.3					
				BCE 685-666	11.5					
				BCE 585-555	7.4					
				BCE 642-586	24.3					
11	**Interphase B**	DSH7891_SE	BKG 11-K (2203)	BCE 651-544	66.0	x		INNOVA	2017	seed
				BCE 777-487	100.0		x			
14		DSH7893_SE	BKG 11-K (2196)	BCE 555-471	41.8	x		INNOVA	2017	seed
				BCE 747-385	33.9	x				
				BCE 597-411	55.8		x			
				BCE 755-680	27.0		x			
8	**Macrophase 1b**	DSH11244_CH	BKG 1614 (426)	BCE 930-832	100.0	x		INNOVA	2022	seed
				BCE 996-820	100.0		x			
9		PSUAMS-2786	BKG T1 (= Tucci)	BCE 921-831	*t.*			PSUAMS	2019	bone
10		PSUAMS-2787	BKG T2 (= Tucci)	BCE 974-836	*t.*			PSUAMS	2019	bone
4	**Macrophase 1a-1b**	OxA -38259	BKG 11-K (3016)-(3017)	BCE 1161-1056	95.4			OXFORD	2019	seed
5		OxA-38258	BKG 11-K (3014)	BCE 1125-926	95.4			OXFORD	2019	seed
6		DSH7579_SE	BKG 12 W (211)	BCE 1045-973	84.1	x		INNOVA	2016	seed
				BCE 1089-922	98.4		x			
7		DSH7929_SE	BKG 12 W (318)	BCE 1117-1044	100.0	x		INNOVA	2017	seed
				BCE 1129-1008	94.8		x			
1	**Macrophase 1a**	DSH7932_SE	BKG 12 W (306)	BCE 1291-1224	96.1	x		INNOVA	2017	seed
				BCE 1309-1209	82.2		x			
2		DSH7934_SE	BKG 12 W (305)	BCE 1122-1046	100.0	x		INNOVA	2017	seed
				BCE 1131-1011	90.0		x			
3		DSH7905_SE	BKG 12 W (310)	BCE 1114-1002	100.0	x		INNOVA	2017	seed
				BCE1131-929	94.2		x			
90	*= Interphase A (?)*	*BETA - 664158*	*BKG 2,13_16*	*BCE 1546 - 1511*	*33.0*	*x*		*BETA An.*	*2023*	*soil*
				BCE 1623 - 1501	*95.4*		*x*			
96	*= Macrophase 0*	*BETA - 664164*	*BKG 2,13_21*	*BCE 2569 - 2521*	*46.0*	*x*		*BETA An.*	*2023*	*soil*
				BCE 2499 - 2475	*22.2*	*x*				
				BCE 2581 - 2465	*94.0*		*x*			
88		*BETA - 664156*	*BKG 2,13_19*	*BCE 2102 - 2036*	*49.3*	*x*		*BETA An.*	*2023*	*soil*
				BCE 2150 - 2019	*82.1*		*x*			
93		*BETA - 664161*	*BKG 2,13_18*	*BCE 1972 - 1888*	*65.4*	*x*		*BETA An.*	*2023*	*soil*
				BCE 2027 - 1877	90.6		x			
92		BETA - 664160	BKG 2,13_10	BCE 2027 - 1941	68.2	x		BETA An.	2023	soil
				BCE 2040 - 1891	89.8		x			

#	Macrophase	Sample ID	Source	Cal Date	relative probabilities (%)	1 σ	2 σ	Laboratory	Year	Material
86		BETA - 664154	BKG 2,13_12	BCE 2806 - 2754	38.3	x		BETA An.	2023	soil
				BCE 2815 - 2671	68.4		x			
				BCE 2895 - 2843	27.0		x			
87		BETA - 664155	BKG 2,13_13	BCE 2936 - 2897	40.9	x		BETA An.	2023	soil
				BCE 3021 - 2891	95.4		x			
95	**Holocenic deposits**	*BETA - 664163*	*BKG 2,13_32*	*BCE 6368 - 6304*	*68.2*	*x*		*BETA An.*	*2023*	*soil*
				BCE 6383 - 6230	*95.4*		*x*			
91		BETA - 664159	BKG 2,13_14	BCE 6775 - 6651	66.4	x		BETA An.	2023	soil
				BCE 6831 - 6644	85.8		x			
94	**Pleistocenic deposits**	BETA - 664162	BKG 2,13_29	BCE 16215 - 16028	68.2	x		BETA An.	2023	soil
				BCE 16257 - 15928	95.4		x			
89		BETA - 664157	BKG 2,13_34	BCE 14952 - 14721	68.2	x		BETA An.	2023	soil
				BCE 15033 - 14630	95.4		x			

Legend – *Italics*: potentially contaminated/less reliable layers.
Samples from contaminated/unreliable layers <u>are excluded</u> from the list.
v. = vacat
% relative probability – confidence refers to value 1s

TABLE 3 – Matrix of the interconnections of Macrophases and Interphases.

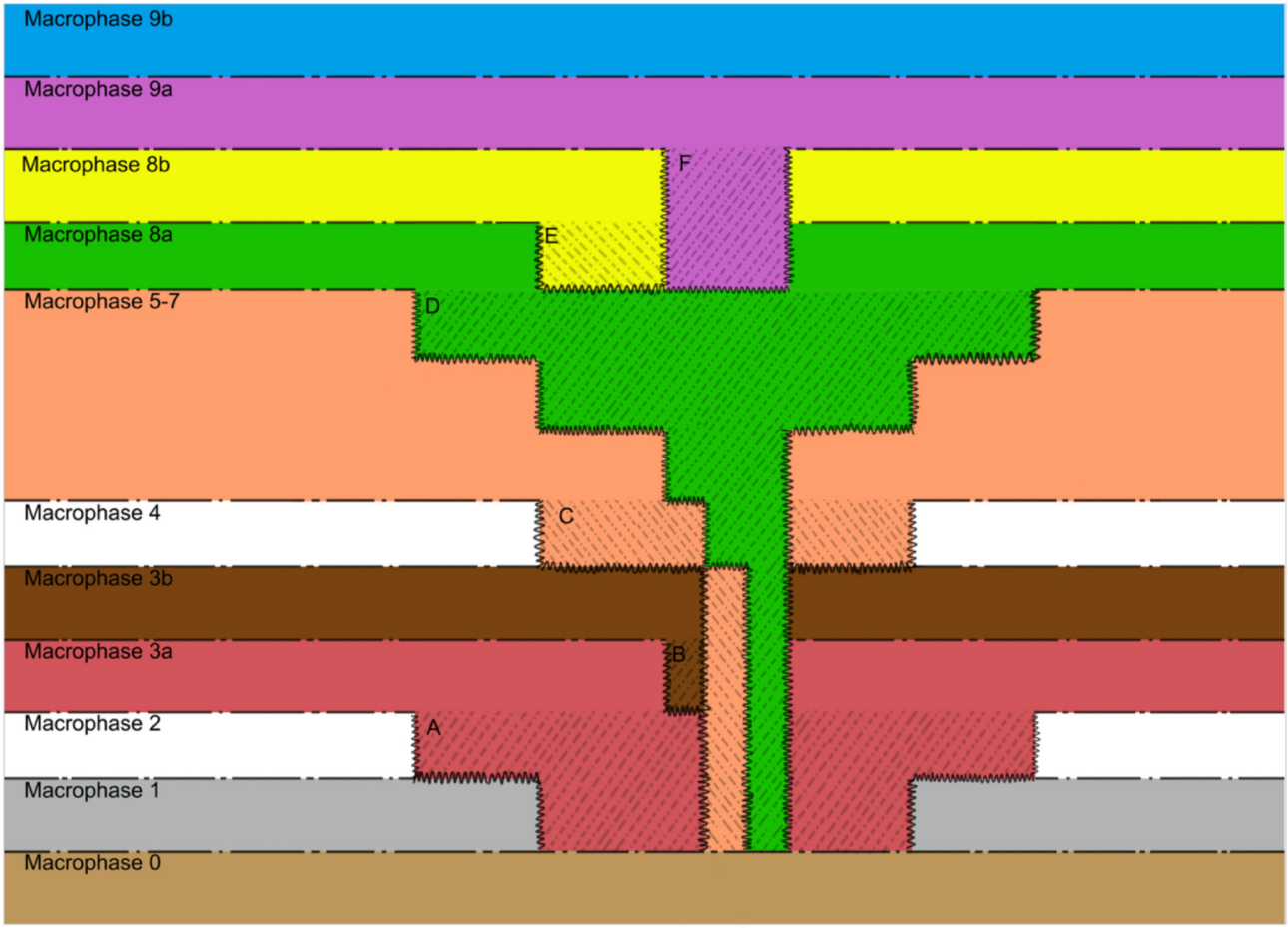




Fig. 1 – Survey sectors 1-9

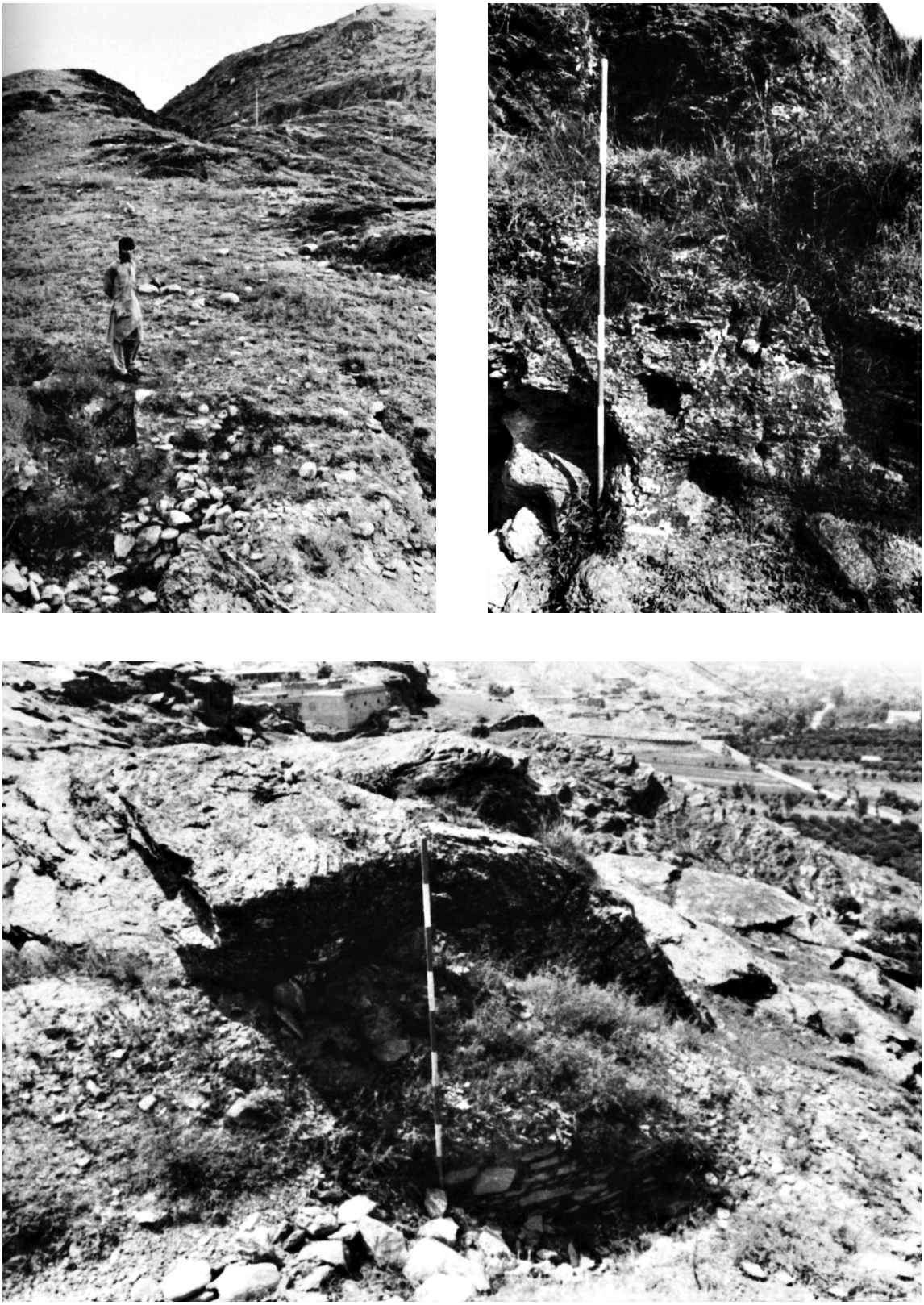


Fig. 2 – Olivieri 2003a: pl. I

N.B.: Fig. 3 is positioned on page ....together with Fig. 20

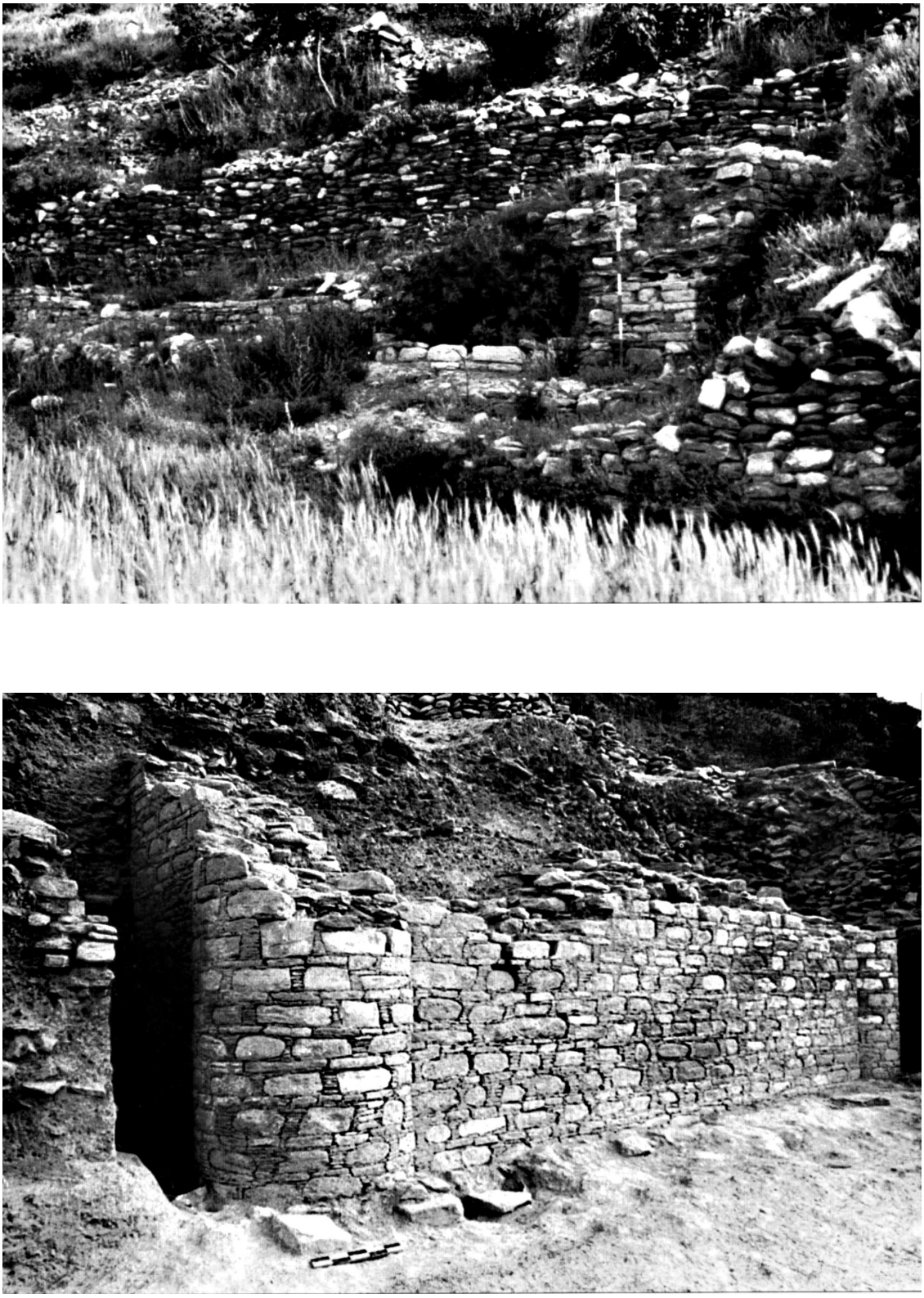


Fig. 4 - Olivieri 2003a: pl. VI



Fig. 5 – Olivieri 2003a: pl. XXIV

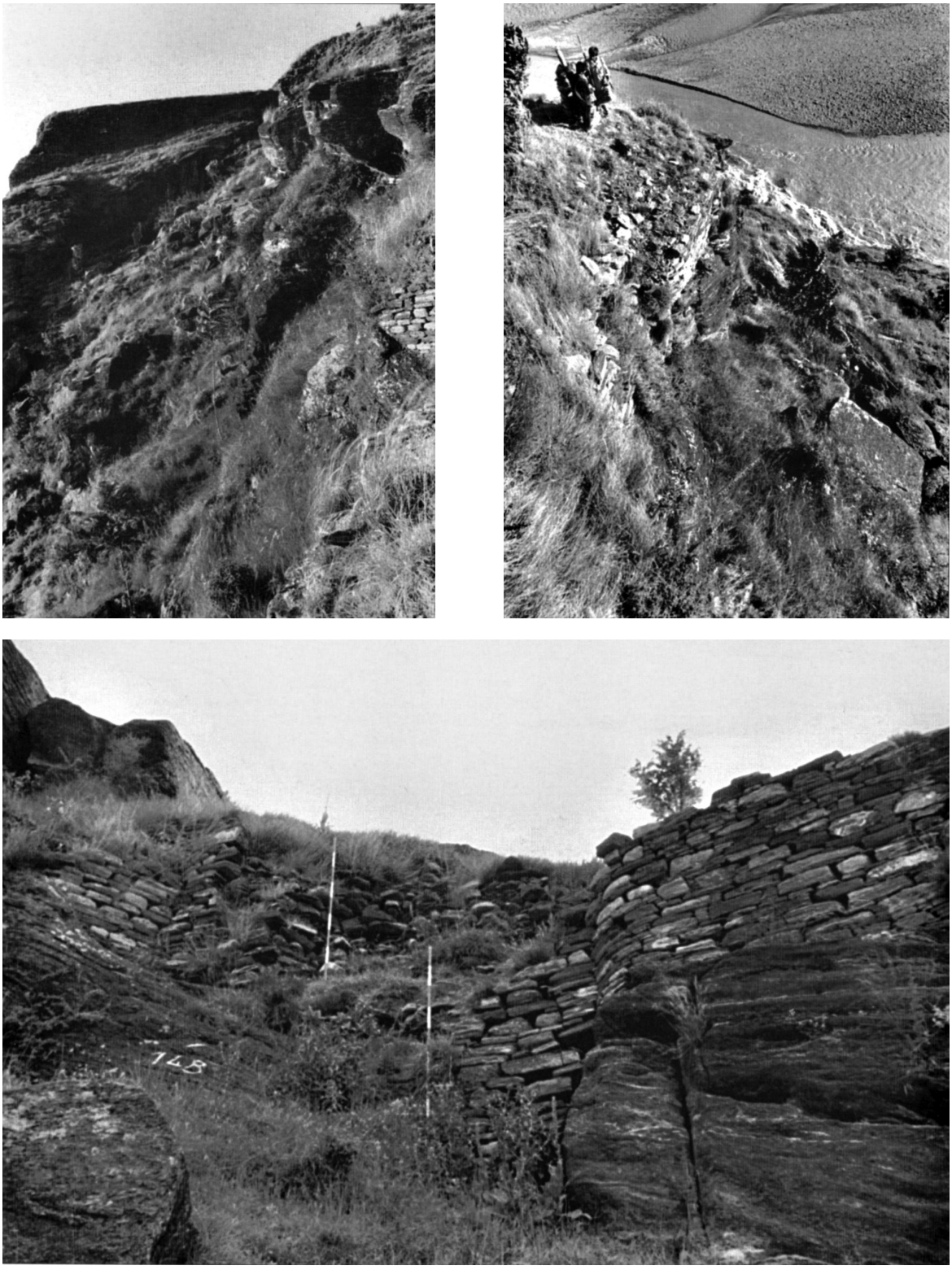


Fig. 6 - Olivieri 2003a: pl. XXV

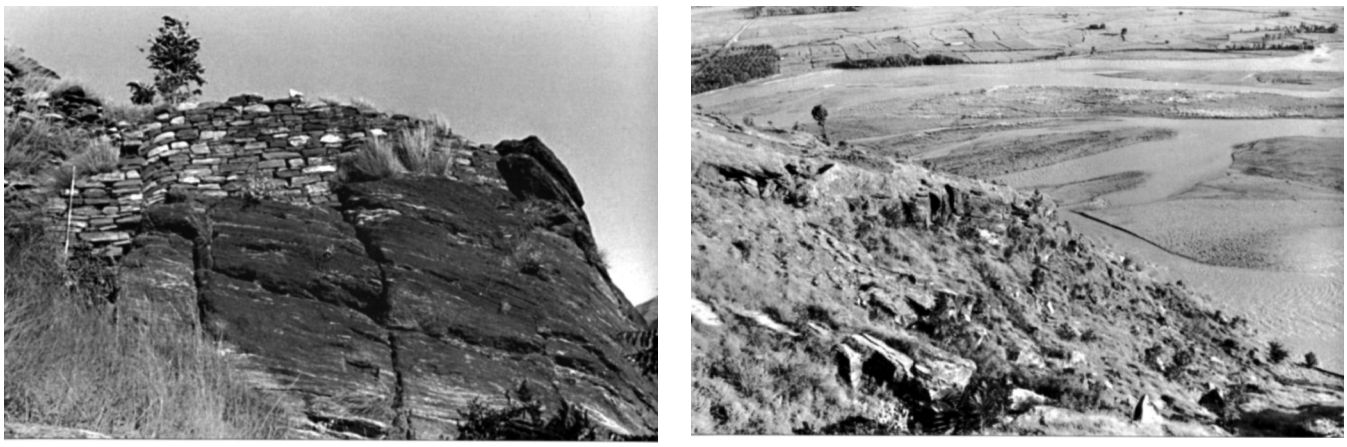


Fig. 7 - Olivieri 2003a: pl. XXVI

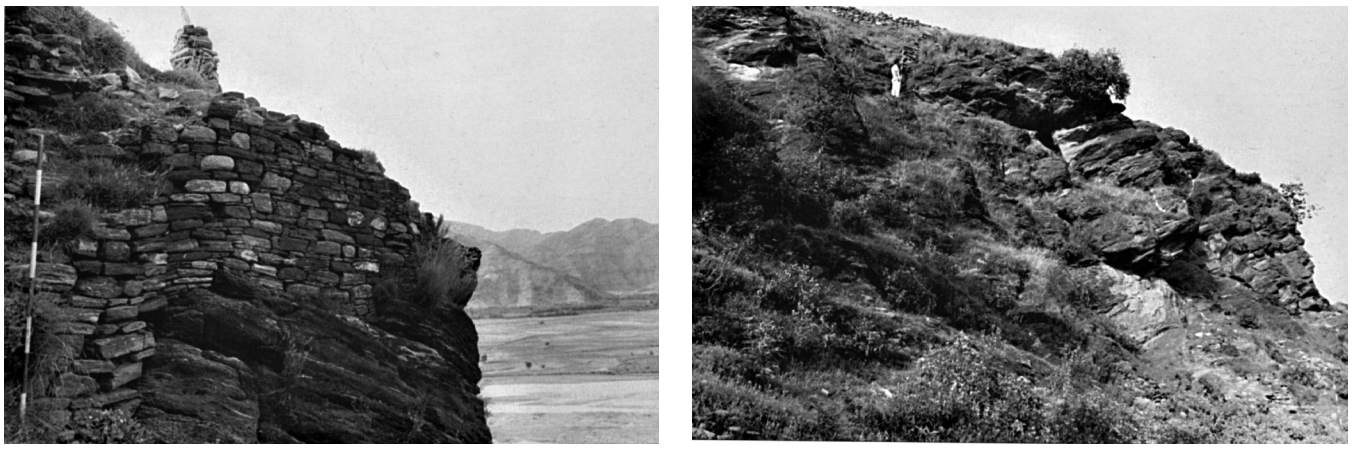


Fig. 8 - Olivieri 2003a: pl. XXVII



Fig. 9 - Olivieri 2003a: pl. XXVIII

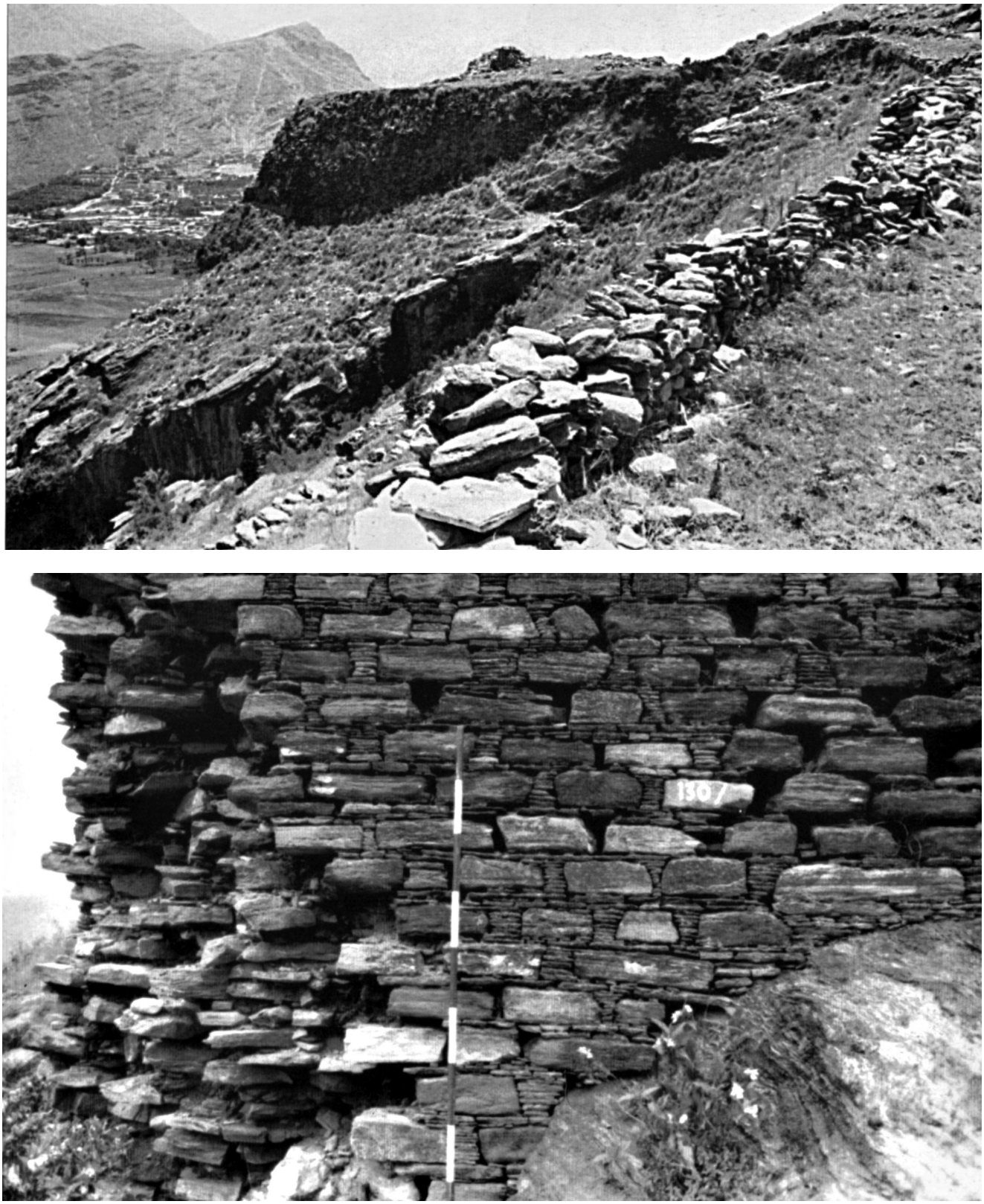


Fig. 10 - Olivieri 2003a: pl. XXIX

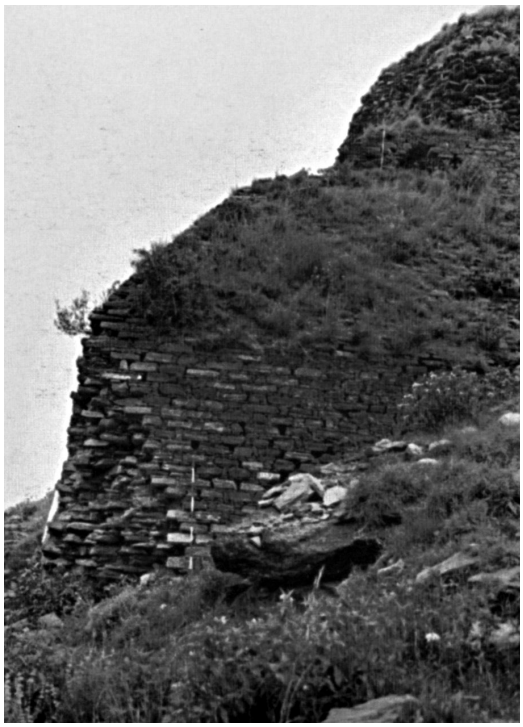






Fig. 11 - Olivieri 2003a: pl. XXX



Fig. 12 - Olivieri 2003a: pl. XXXI

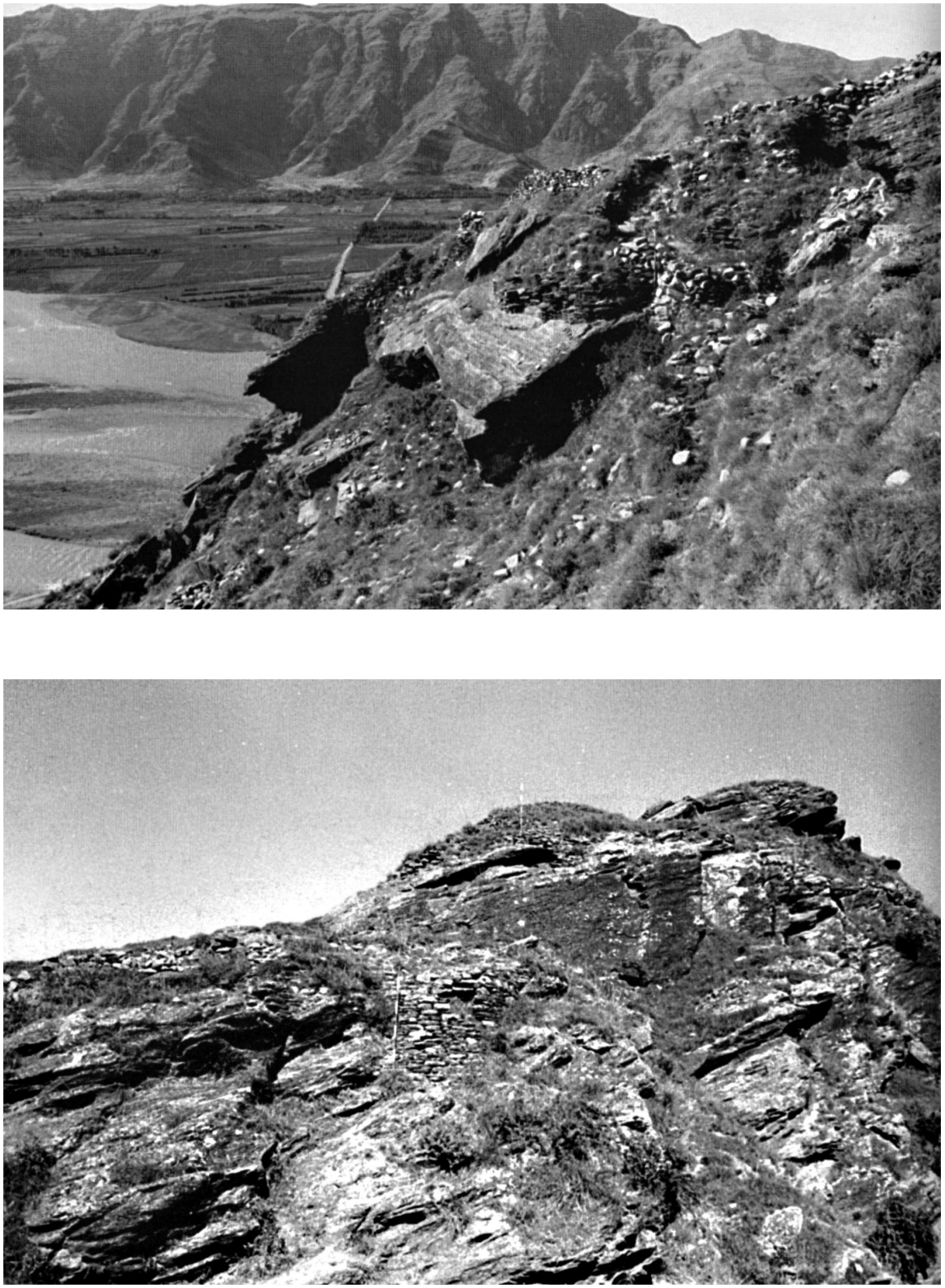


Fig. 13 - Olivieri 2003a: pl. XXXII



Fig. 14 - Olivieri 2003a: pl. XXXIII

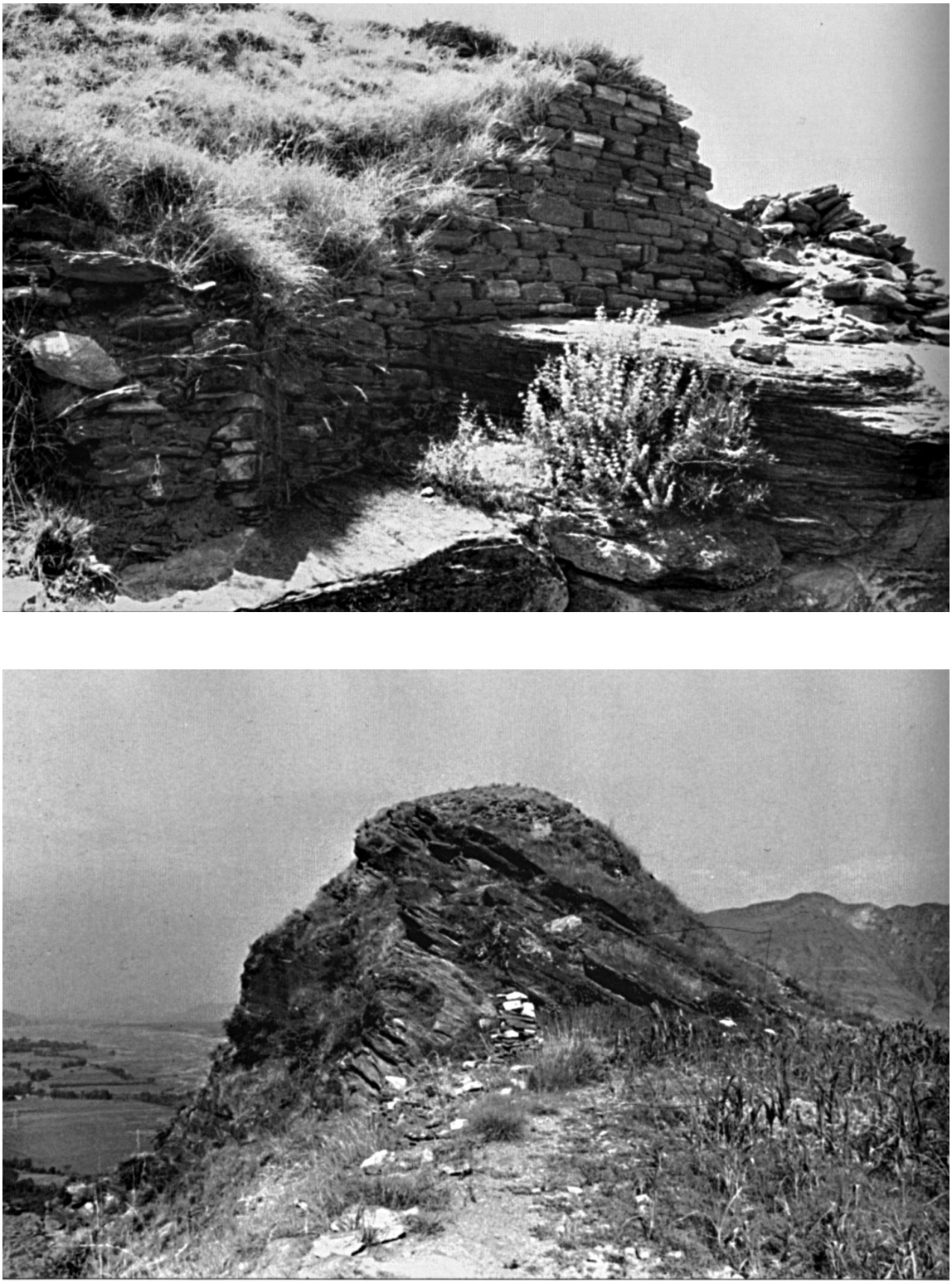


Fig. 15 - Olivieri 2003a: pl. XXXIV

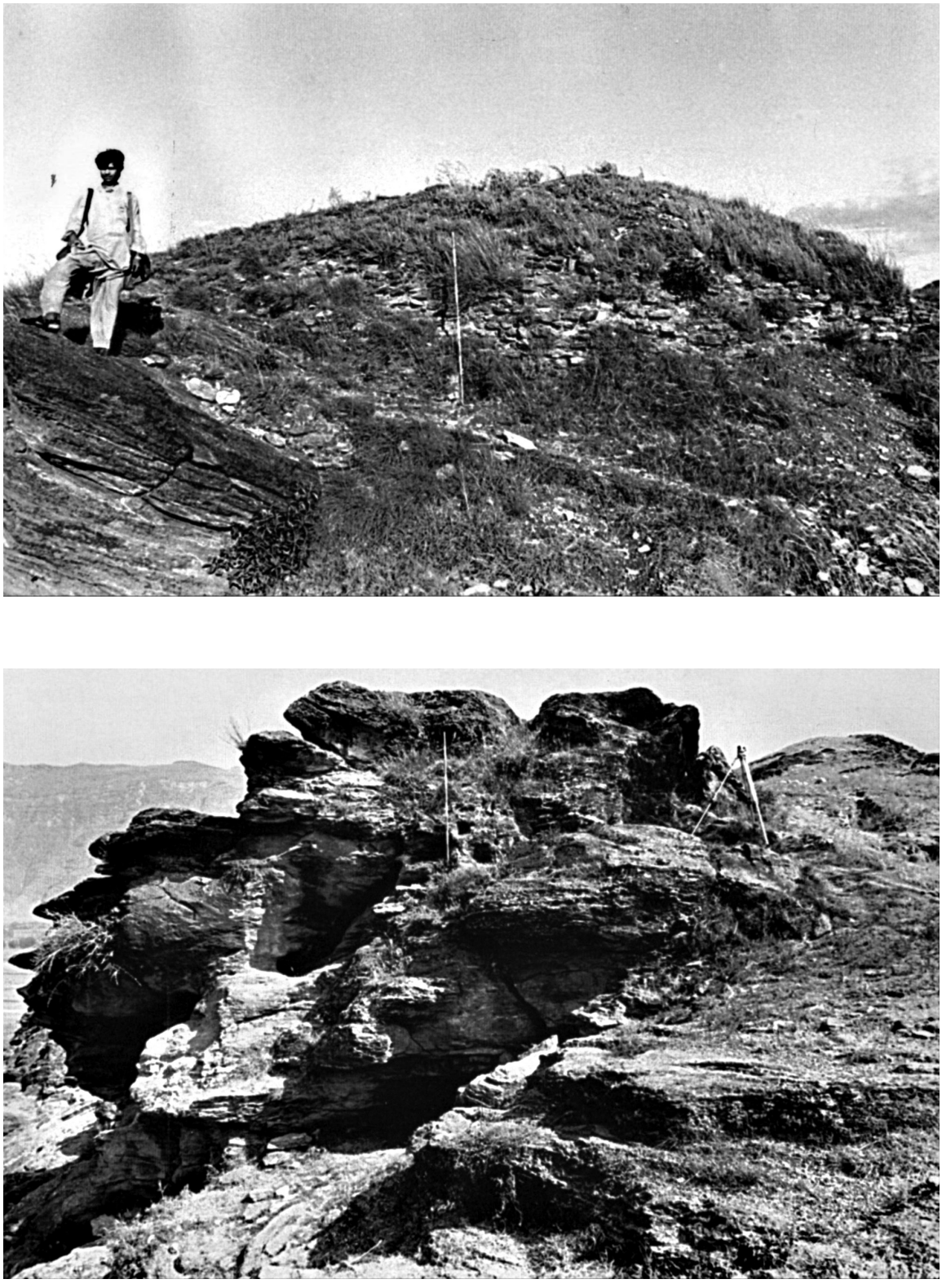


Fig. 16 - Olivieri 2003a: pl. XXXV

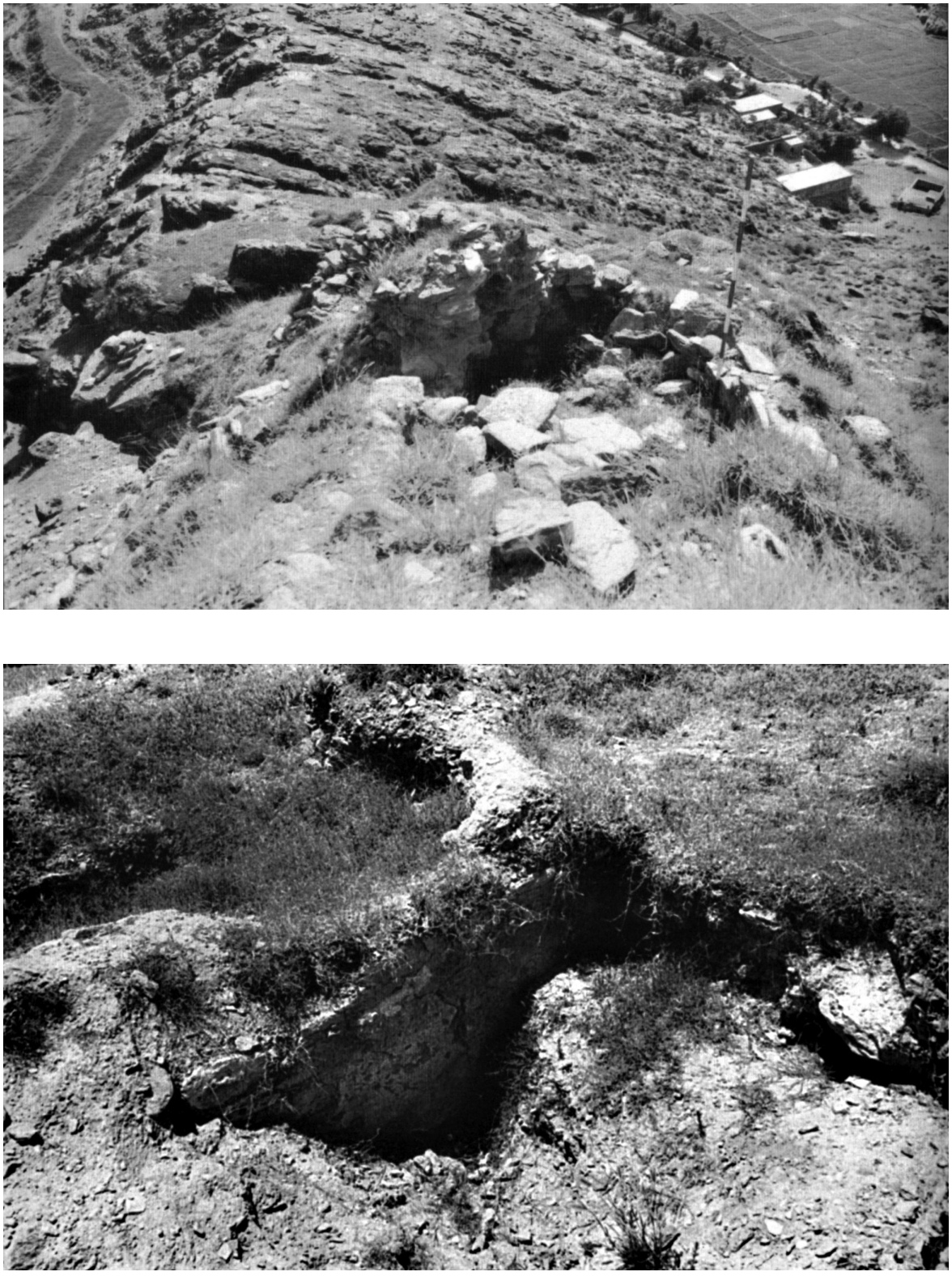


Fig. 17 - Olivieri 2003a: pl. XXXVI

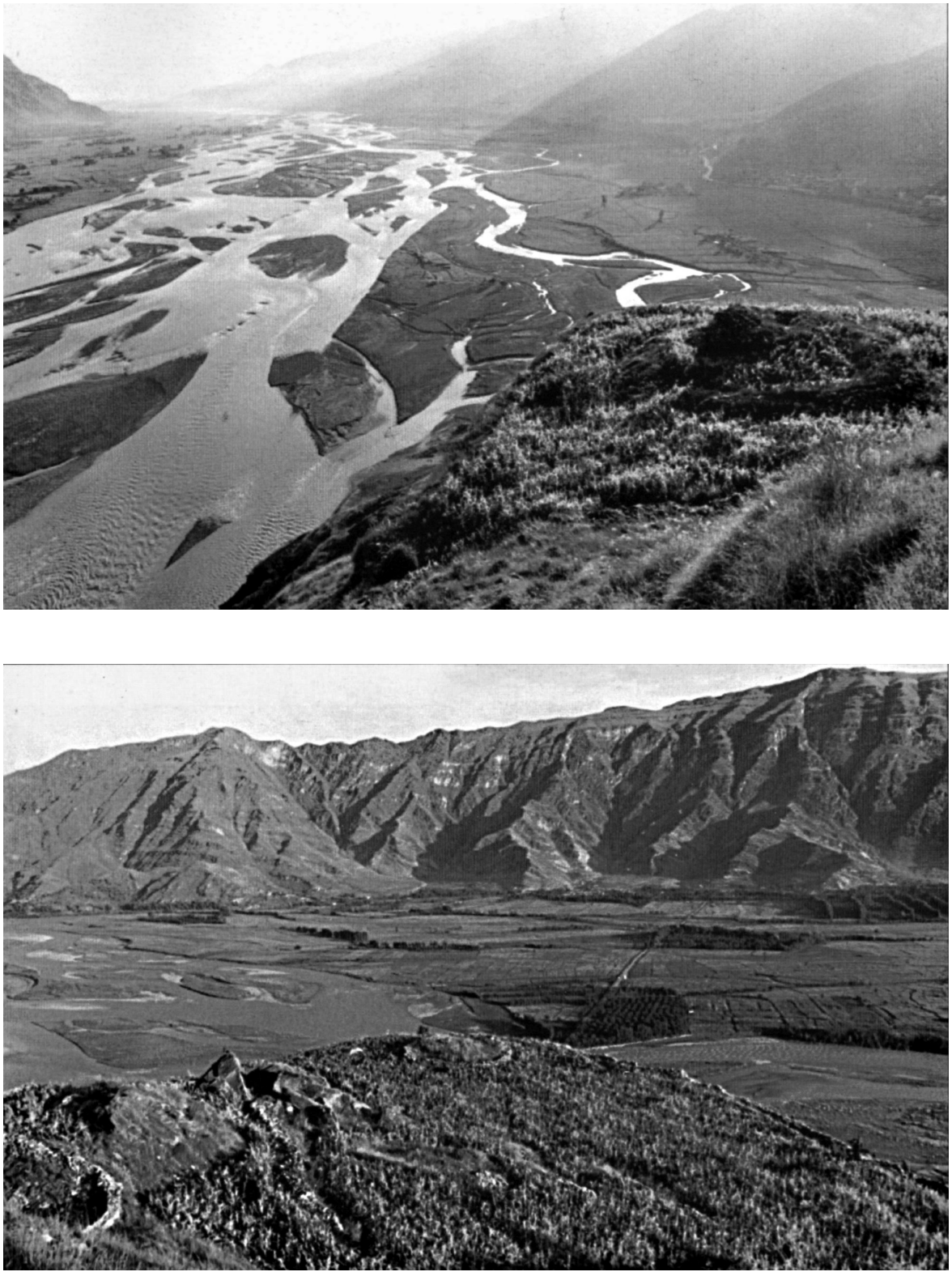


Fig. 18 - Olivieri 2003a: pl. XXXVII

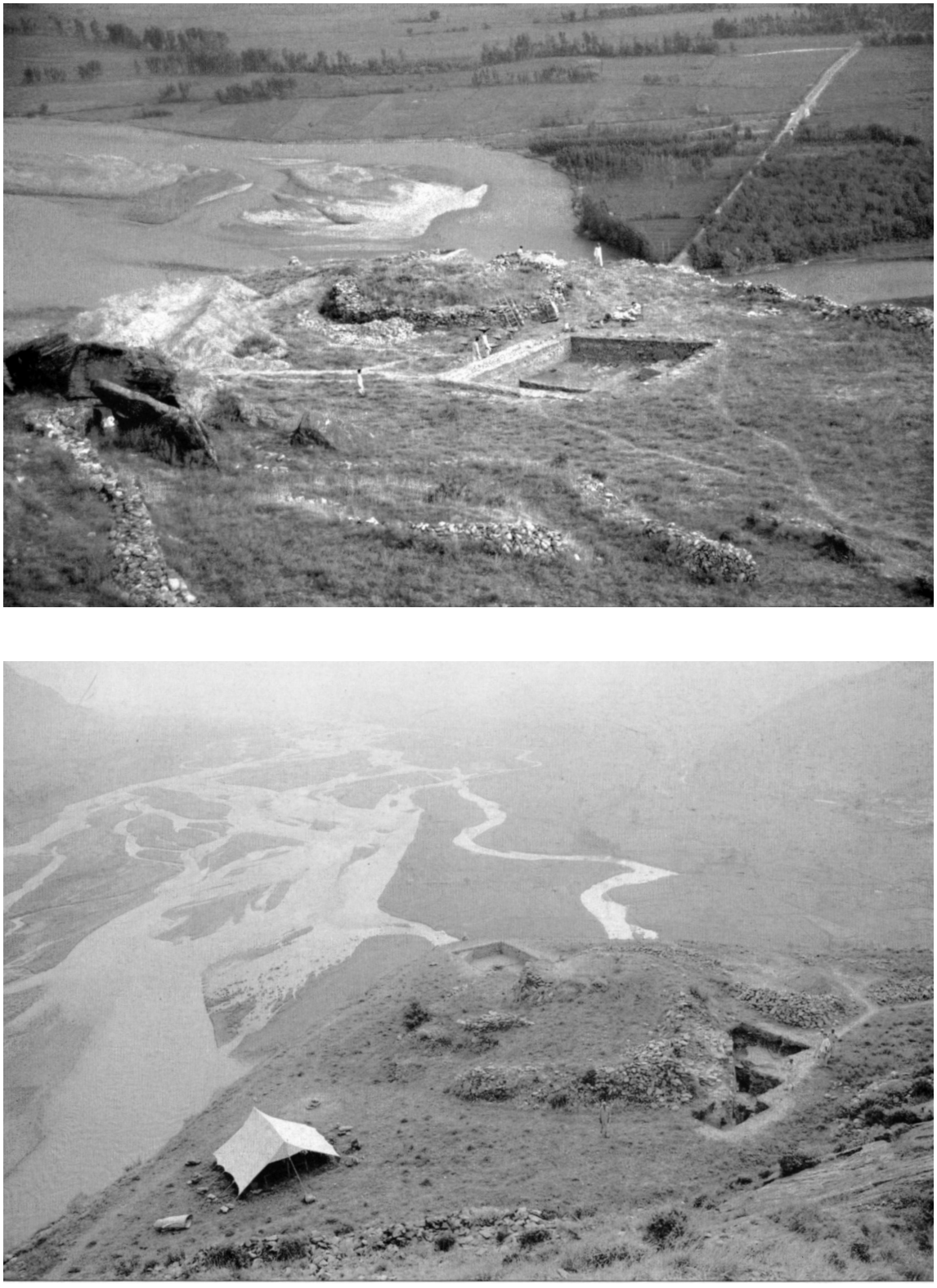


Fig. 19 - Olivieri 2003a: figs 25-26

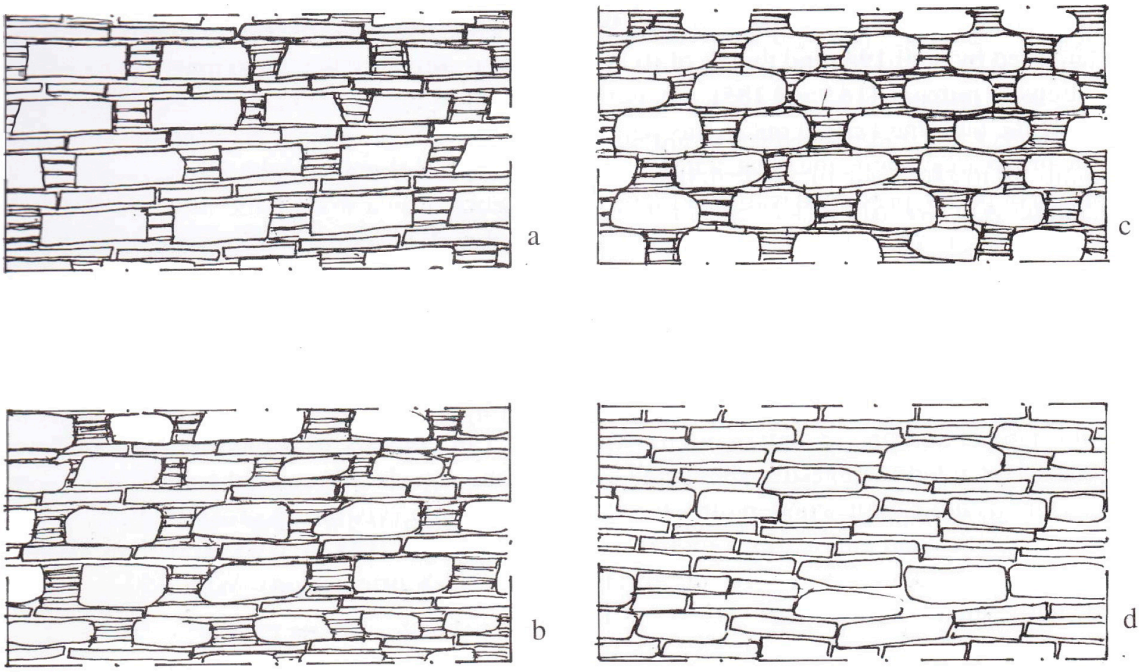


Fig. 3 - Typology of the masonry techniques.

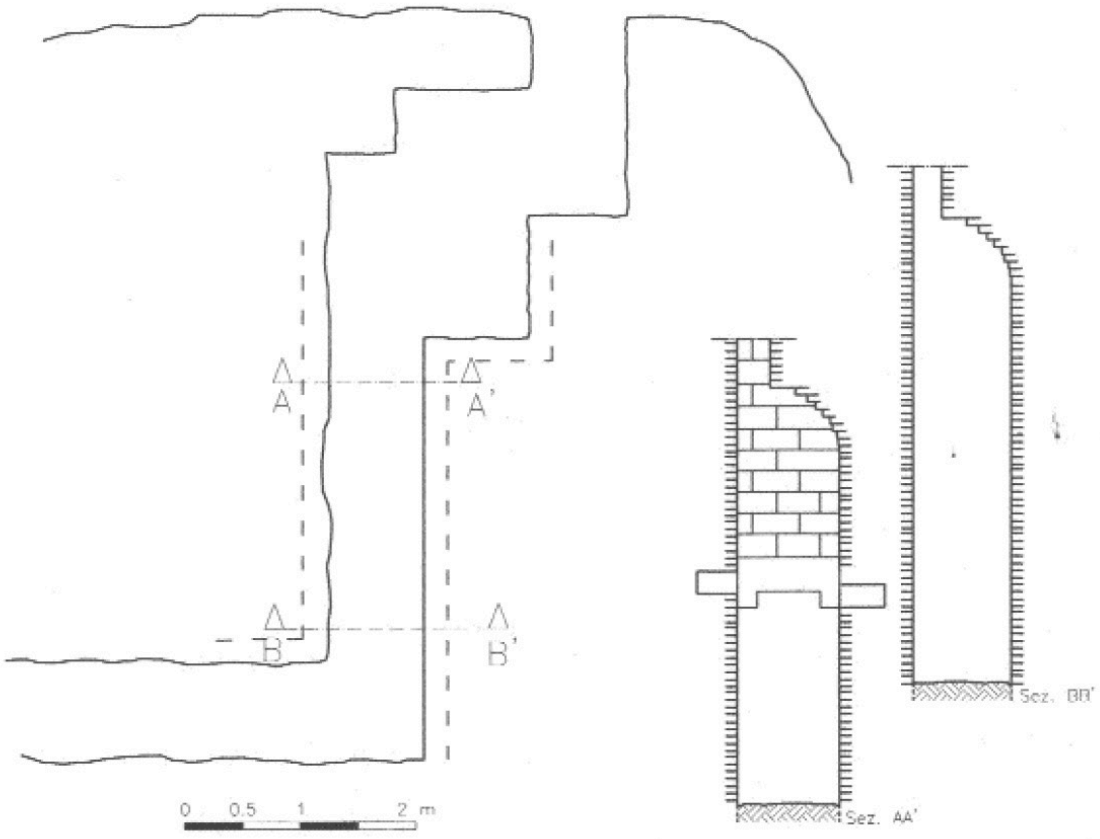


Fig. 20 - Olivieri 2003a: fig. 54 (R. Sabelli†).

1.3.1 - THE CONSERVATION PROJECT “SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA” (2022-2024) - Phase I (Figs 1-166)



Fig. 1 – Terrace E from the NE



Fig. 2 – Terrace E from above



Fig. 3a-b – Conservation status of the N wall at the start of the work. Soil deposits



Fig. 4 – a) N wall before general cleaning; b) N wall during general cleaning; c-d) donkeys transporting water and other materials; e) new path leading to the hill.



Fig. 5 – Two twin pits to extinguish lime



Fig. 6 – Making lime







Fig. 7 – Scaffolding on N wall: various views





Fig. 8a-b – Biocide testing on small pieces of masonry and application to the wall





Fig. 9a-b – Third cleaning on N wall






Fig. 10a-b-c-d – Masonry conservation




Fig. 12a-b – Mortar tests under preparation (N.B.: Fig. 11 on the next page).

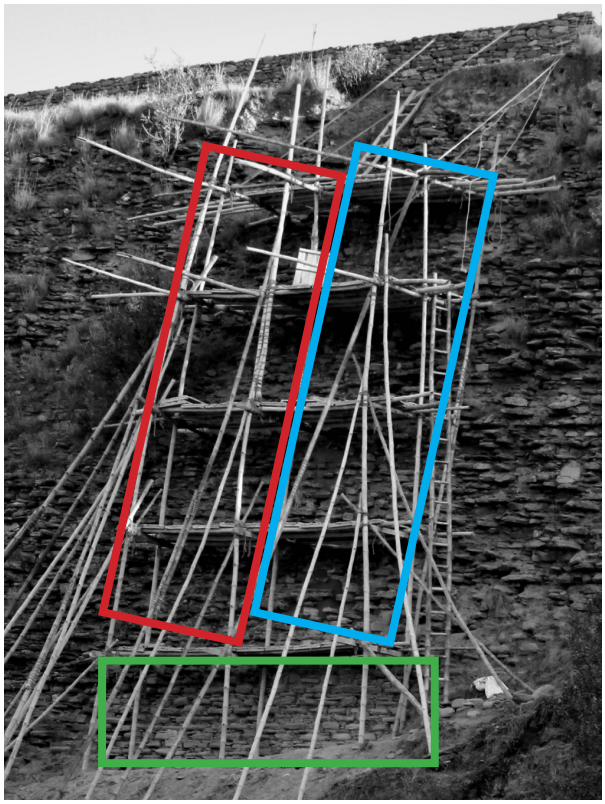


Fig. 11 – Different conservation areas





Fig. 13 – Restoration work on the lower floor of the scaffolding







Fig. 14a-b-c – Upper protection wall made of mortar and anchored to the topsoil deposit: various views



Fig. 15 – Grafting of olive trees



Fig. 18 – Scaffolding on N wall



Fig. 16 – N Bastion and conservation work





Figs 17a-b – N Bastion and conservation work



Fig. 19 – Scaffolding on N wall



Fig. 20a-b-c-d – Details of fastening system of the various scaffolding elements.



Fig. 21 – System for transporting mortar to the scaffolding shelves



Fig. 22 – Work progress on the W part of N wall.



Fig. 23 – W profile of the newly re-emerged rampart



Fig. 24 – W profile of the newly re-emerged rampart



Fig. 25 – Reconstruction on the E part of N wall



Fig. 26 – Bamboo scaffolding on N wall



Fig. 27 – Conservation work on the top shelf




Figs 28-29 – Earlier wall running NS




Fig. 30a-b – Cleaning of the NE corner of N wall



Fig. 31 – Progressive cleaning and restoration on N wall



Fig. 33 – Clearance operations at the bottom of the wall with the exposure of the lower part of the wall



Fig. 32



Fig. 35



Fig. 34



Fig. 36



Figs 37



Figs 38



Fig. 39



Fig. 40



Fig. 41 – Drill of the rocky outcrop



Fig. 42 – Placement of the rebar reinforcement



Fig. 43 – Placement of the rebar reinforcement



Fig. 44



Fig. 45



Fig. 46



Fig. 47



Fig. 48



Fig. 49



Fig. 50



Fig. 51



Fig. 52



Fig. 53

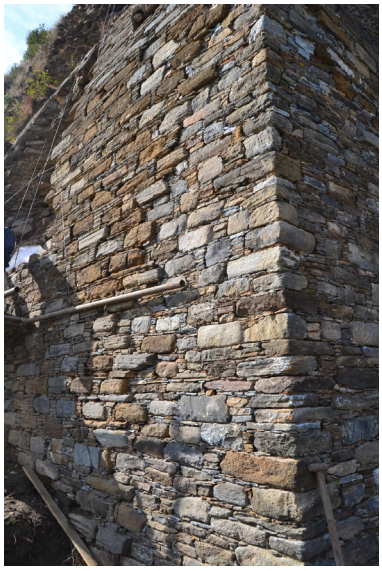


Fig. 54



Fig. 55



Fig. 56



Fig. 57



Fig. 58



Fig. 59



Fig. 60



Fig. 61



Fig. 62



Fig. 63



Fig. 64



Fig. 65



Fig. 66



Fig. 68



Fig. 67



Fig. 69



Fig. 70



Fig. 71



Fig. 72



Fig. 73



Fig. 74



Fig. 75



Fig. 76



Fig. 77



Fig. 78



Fig. 79



Fig. 80



Fig. 81



Fig. 82



Fig. 83



Fig. 84



Fig. 85



Fig. 86



Fig. 87



Fig. 88



Fig. 89



Fig. 90



Fig. 91



Fig. 92



Fig. 93



Fig. 94



Fig. 95



Fig. 96



Fig. 97



Fig. 98



Fig. 99



Fig. 100



Fig. 101



Fig. 102



Fig. 103



Fig. 104



Fig. 105



Fig. 106



Fig. 109



Fig. 107



Fig. 110



Fig. 111

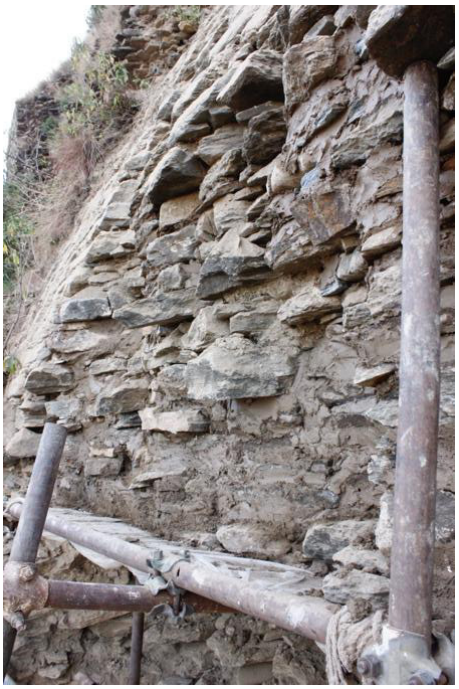


Fig. 112



Fig. 113



Fig. 114



Fig. 115



Fig. 116



Fig. 117



Fig. 119



Fig. 118



Fig. 120a



Fig. 120b



Fig. 121



Fig. 122



Fig. 123



Fig. 124





Fig. 125



Fig. 127



Fig. 128



Fig. 129



Fig. 130





Fig. 131





Fig. 132a-b



Fig. 133



Fig. 134



Fig. 135



Fig. 136



Fig. 137



Fig. 138



Fig. 139



Fig. 140



Fig. 145 – Detail of the stair to access the cell



Fig. 141



Fig.142



Fig. 143



Fig. 148 – Zenith view of the temple during the cleaning. Drains (left) and stairs of access (right) are also visible.



Fig. 144 - Temple 6 during the 2000 excavation campaign (photo courtesy of Andrew Glass).



Fig. 146 – View from S of the earlier Temple with traces of plastered floor



Fig. 147 – N side of the Temple after the cleaning



Fig. 149 – Detail of the stair to access the cell



Fig. 150



Fig. 151

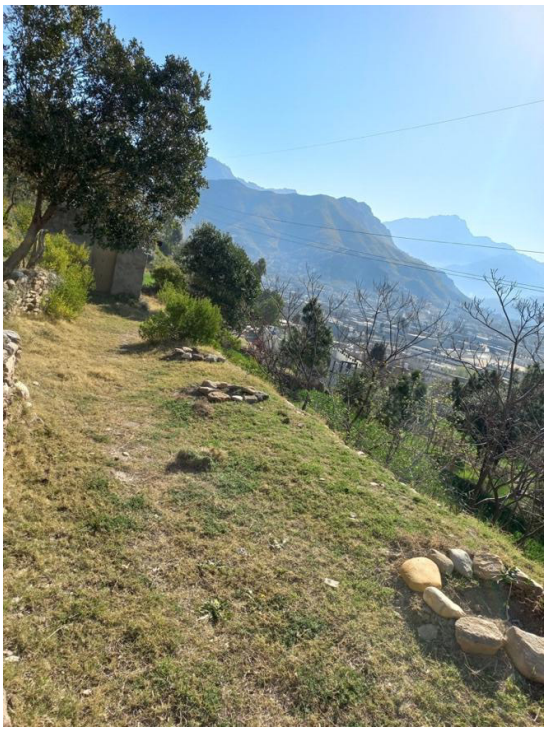


Fig. 152



Fig. 153



Fig. 154



Fig. 156



Fig. 155 – Grafted wild olive trees along the path that lead to Trench BKG 13 below the Barikot hill



Fig. 157



Fig. 158



Fig. 159



Fig. 160



Fig. 161



Fig. 162



Fig. 163



Fig. 164



Fig. 165

1.3.2 - THE CONSERVATION PROJECT "SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA" (2022-2024) - Phase II (Figs 1-47)



Fig. 1



Fig. 2



Fig. 4



Fig. 5



Fig. 3



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 13



Fig. 11



Fig. 12



Fig. 14



Fig. 15



Fig. 16



Fig. 17



Fig. 18



Fig. 19



Fig. 20



Fig. 21



Fig. 22



Fig. 23

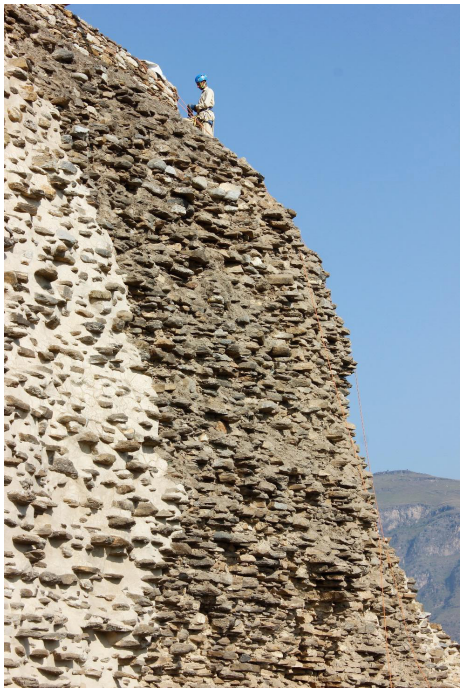


Fig. 24



Fig. 25



Fig. 26



Fig. 27



Fig. 28



Fig. 29



Fig. 30



Fig. 31



Fig. 32



Fig. 33



Fig. 34



Fig. 35



Fig. 36



Fig. 37



Fig. 39



Fig. 39



Fig. 40



Fig. 41



Fig. 42



Fig. 43



Fig. 48



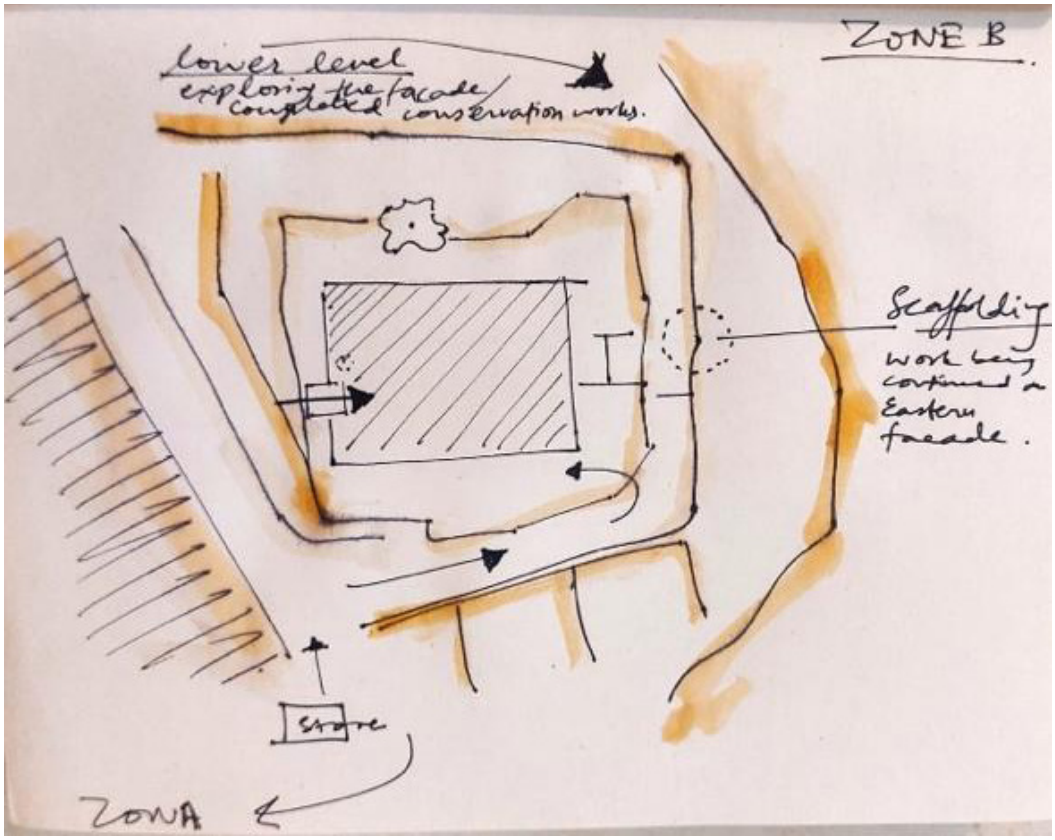
Fig. 49



Fig. 50



Fig. 51


ZONE B
lower level
exploring the facade
completed conservation works.
Scaffolding
work being
continued on
Eastern
facade.
Store
ZONA


ZONE A
store
ZONE B

Fig. 52a-b

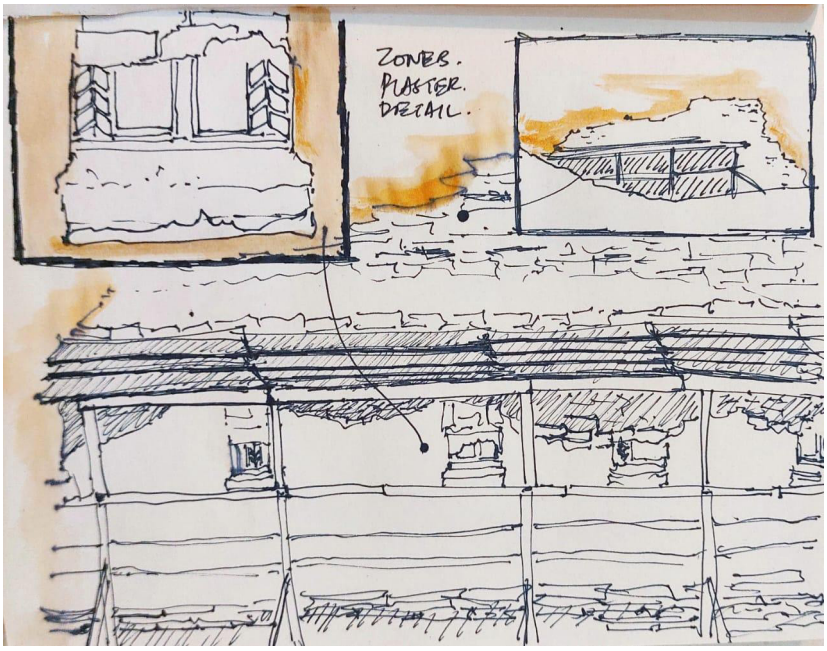


Fig. 53

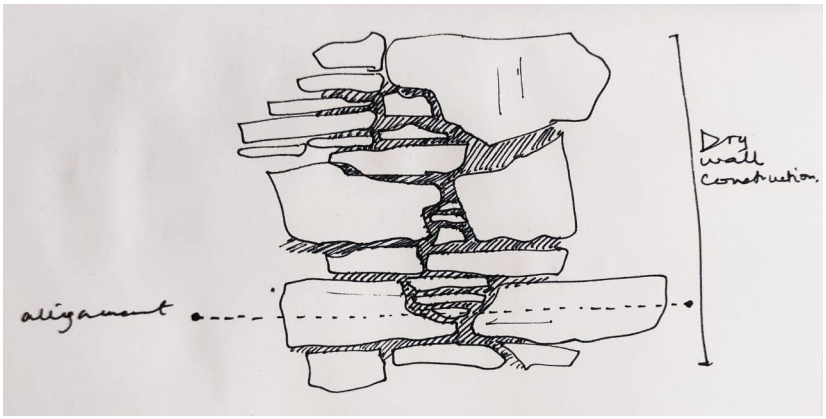


Fig. 54

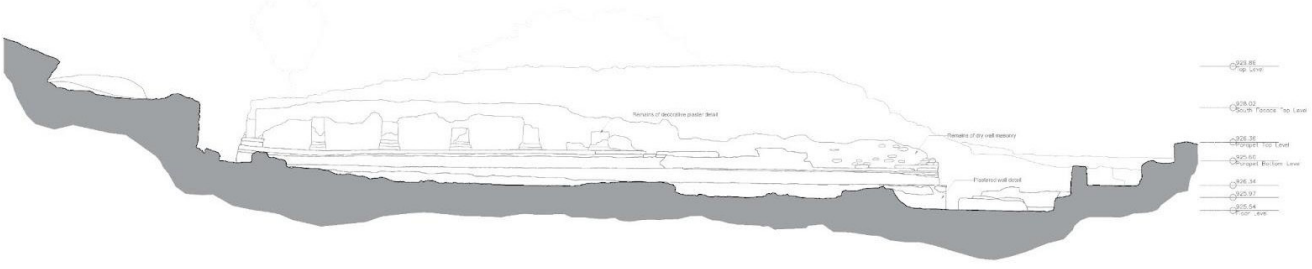


Fig. 55



Fig.56



Fig. 57


Germplasm Unit Olive
Agricultural Research Institute
Tarnab Peshawar
Area : 2.7 Acre
March-2013 : Arbequina, Arbosana, Koroneiki, Frantoio
Leccino, Coratina, Chetoui
May-2014 : Pendolino, Kalamata, Megaron
February-2016 : Picual, Oliana, Nabali
Financial Assistance : Government of Italy









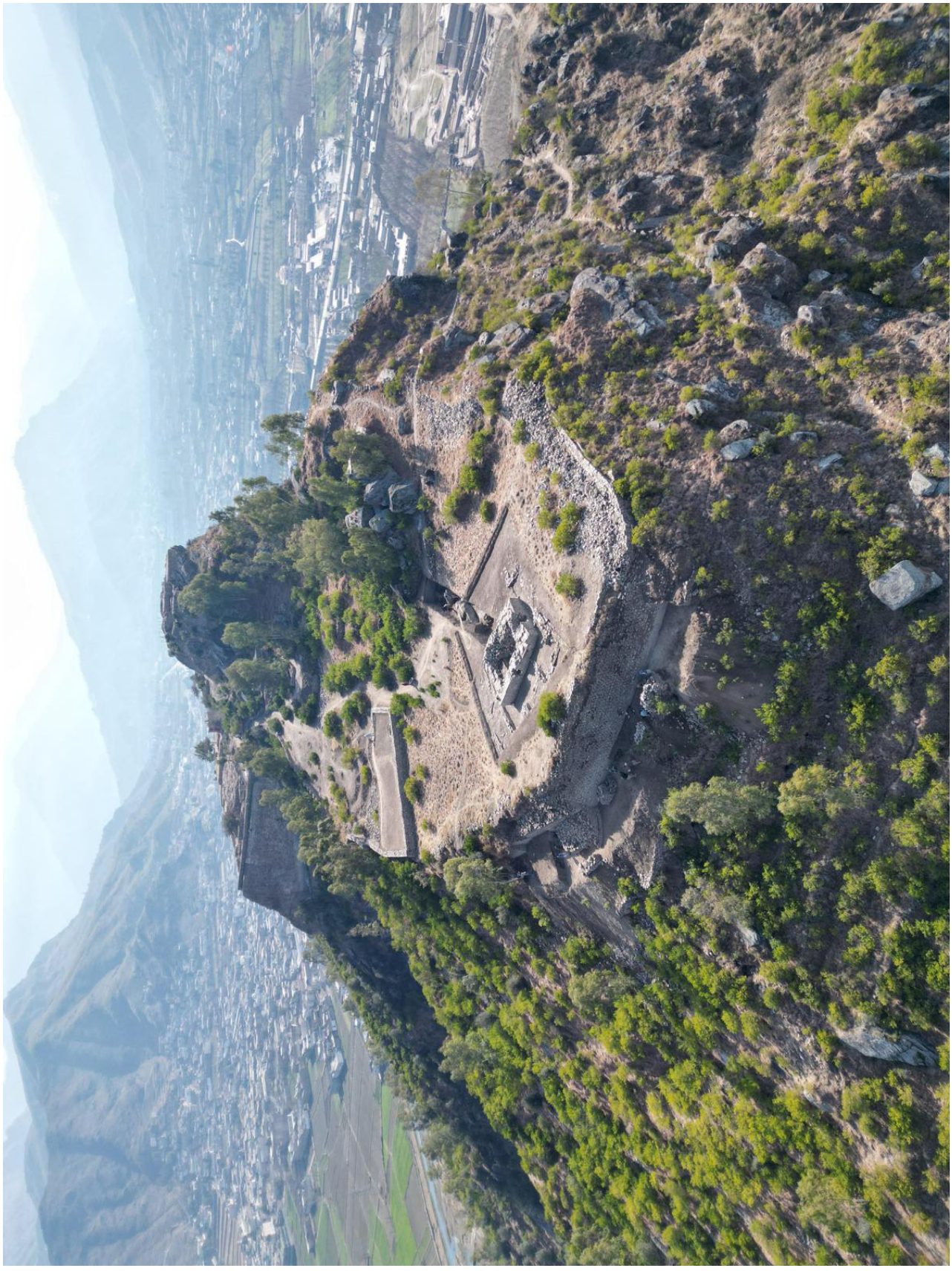


Fig. 58-63



Fig. 64

1.3.3 - THE CONSERVATION PROJECT "SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA" (2022-2024) - Phase III (Figs 1-18)



Figs 1- View of the site from above Terrace W (August 2024).



Fig. 2 – Terrace E, ENE top side: front of Temple 6 after the rain.



Fig. 3 – Terrace E, ENE top side: red lines mark the underground connection between two trenches at the sides of Temple 6.



Fig. 4 – Terrace E, NE top side: bedding of the stones on mortar for the realisation of a waterproof surface.



Fig. 5 – Terrace E. E side: preparation of the custom pipe following the morphology of the wall.



Fig. 6 – Terrace E. E side: camouflaging of the pipe



Fig. 7 – Terrace E, E side: fixed pipe with 90° joint and iron hooks



Fig. 8 – Terrace E, E side, bottom: the tank seen from top



Figs 9 – Terrace E, E side, bottom: faucets exitinng the water tank close to the olive trees.



Fig. 10 –Specialised operators carrying on preservation of the N side of Terrace E



Fig. 11 –Terrace W, N side: before removal of soil deposit



Fig. 12 –Terrace W, N side: after removal of soil deposit



Fig. 13 – Consolidation with mortar of the surface's stone of the wall (Terrace W, side E).



Fig. 14 – A serene day begins over the valley



Fig. 16 – Work in progress at the new *chowkidar kotāgai* (watchkeeper's barrack)



Fig. 17 – The new *chowkidar kotāgai* (watchkeeper's barrack)



Fig. 15 – Solar system installed at the tool warehouse (*saman godown*)



Fig. 18 – Anchorage points for the rope descent system (acrobatic conservation) located along the edge of terrace E (see PLATE XXIV).

1.3.4 - THE CONSERVATION PROJECT "SAVING THE ARCHAEOLOGICAL SITE OF BAZIRA" (2022-2024) - The local staff (Photos by M. Minardi)



Ajab Khan



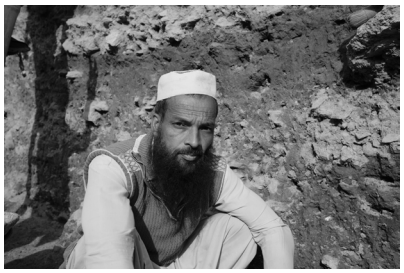
Fazal Azim



Momin Khan



Bakht Wahid



Saheb Shah



Bakht Gual



Arshad Ali



Hussain Zada



Sajjid Khan



Dil Nawab



Khan Muhammad



Muhammad Farooq



Adnan Khan



Sanah Ullah



Fawad 2



Muhammad Rashad



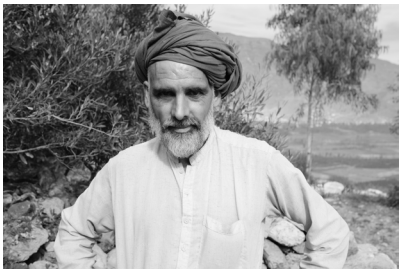
Irfan



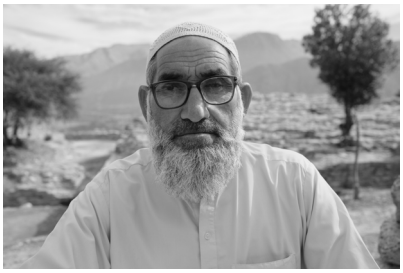
Fawad 1



Jawad Khan



Ayub Khan



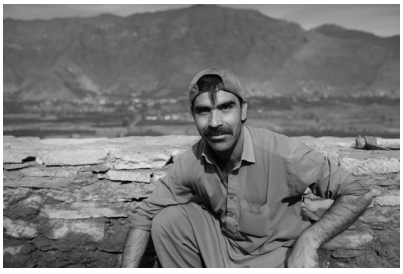
Abdul Khaliq



Arshad Ali



Fazal Hayat



Asif Khan



Asghar Ali



Kelim Ullah



Adnan Khan



Bakht Hussain



Maaz



Sana Ullah



Furqan



Haji Nawab



Imad Khan



Fazal Kerim



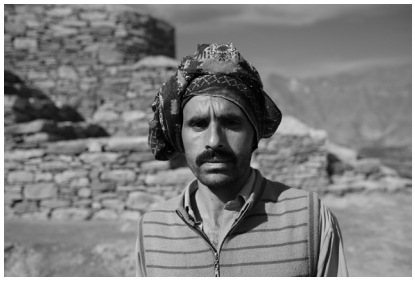
Raza Khan



Afsar Khan



Muhammad Nawab



Faqir Said



Umar Wahid



Rezwan



Fazal Amin



Hazrat Rahman



Kaisar Rahman



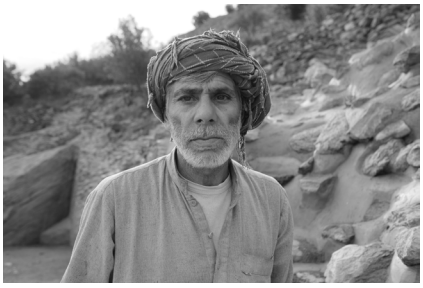
Mohammad Ibrahim



Mohammad Wahid



Momin Dregira



Momin Kohistane



Muhammad Kalim



Naik Muhammad



Rahimzada



Razia Khan



Wahid Khan



Wasim Sajjad

Chapter II

ARCHAEOLOGY AND ARCHITECTURE

II.1.1 - THE MONUMENTAL TERRACES AND THE CENTRAL FORTRESS (L.M. Olivieri)



Fig. 1 – Terrace E: plan with periodisation. Key: purple = Period 1; = Period 2a; yellow = Period 2b; green = Period 3 // Period 3 = Macrophase 9a; Period 2b = Macrophase 8b; Period 2a = Macrophase 8a; Period 1 = Macrophases 5-7 (= Pl. XIX).

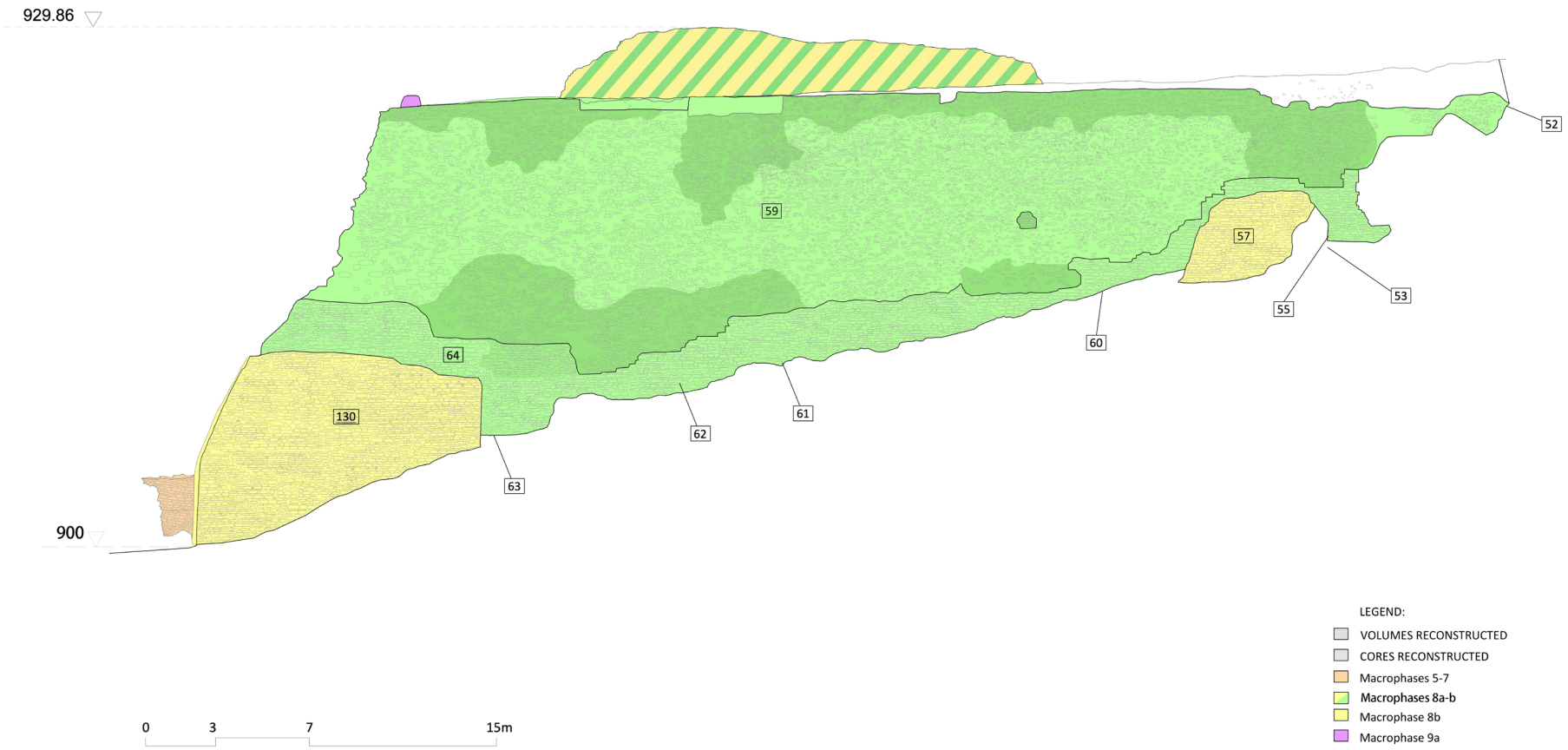


Fig. 2a-b – Terrace E: Elevations a) from N (=Pl. XI); b) from S (= Pl. X) Key as above.

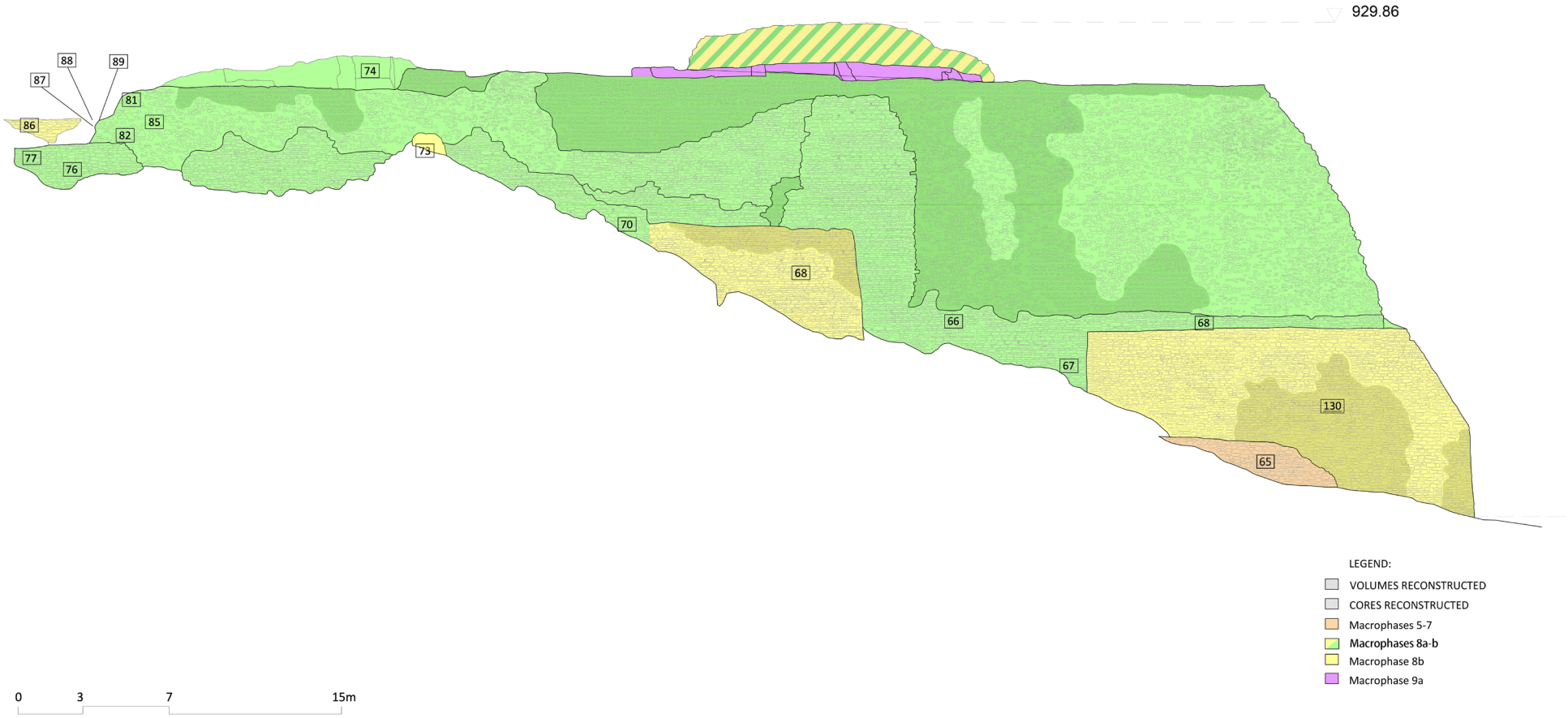


Fig. 2a-b – Terrace E: Elevations a) from N (=Pl. XI); b) from S (= Pl. X) Key as above.



Fig. 3 – Terrace E: NE corner during the restoration works.



Fig. 4 – Terrace E: gap E during the restoration works.



Fig. 5 – Terrace E: gap E during the restoration works: the overlap of walls from Period 1, Period 2a (1-2) is visible.



Fig. 6 – Terrace E, BKG 6: evidence of stupas from Period 1



Fig. 7 – Terrace E, N side: bastion or retaining wall from Period 2b



Fig. 8 – Terrace W: view towards the N (Period 1 wall; Period 2b and 3 bastions)



Fig. 9 – Terrace W: view facing WNW (Period 1 wall; Period 2b and 3 bastions)



Fig. 10 – Udegram 'Castle' (1962) . Photo IsMEO.



Fig. 11 – Shahr-e-Gholghola (2019). Photo by D. Rosati



Fig. 12 – Stone from Trench BKG 23 (13)

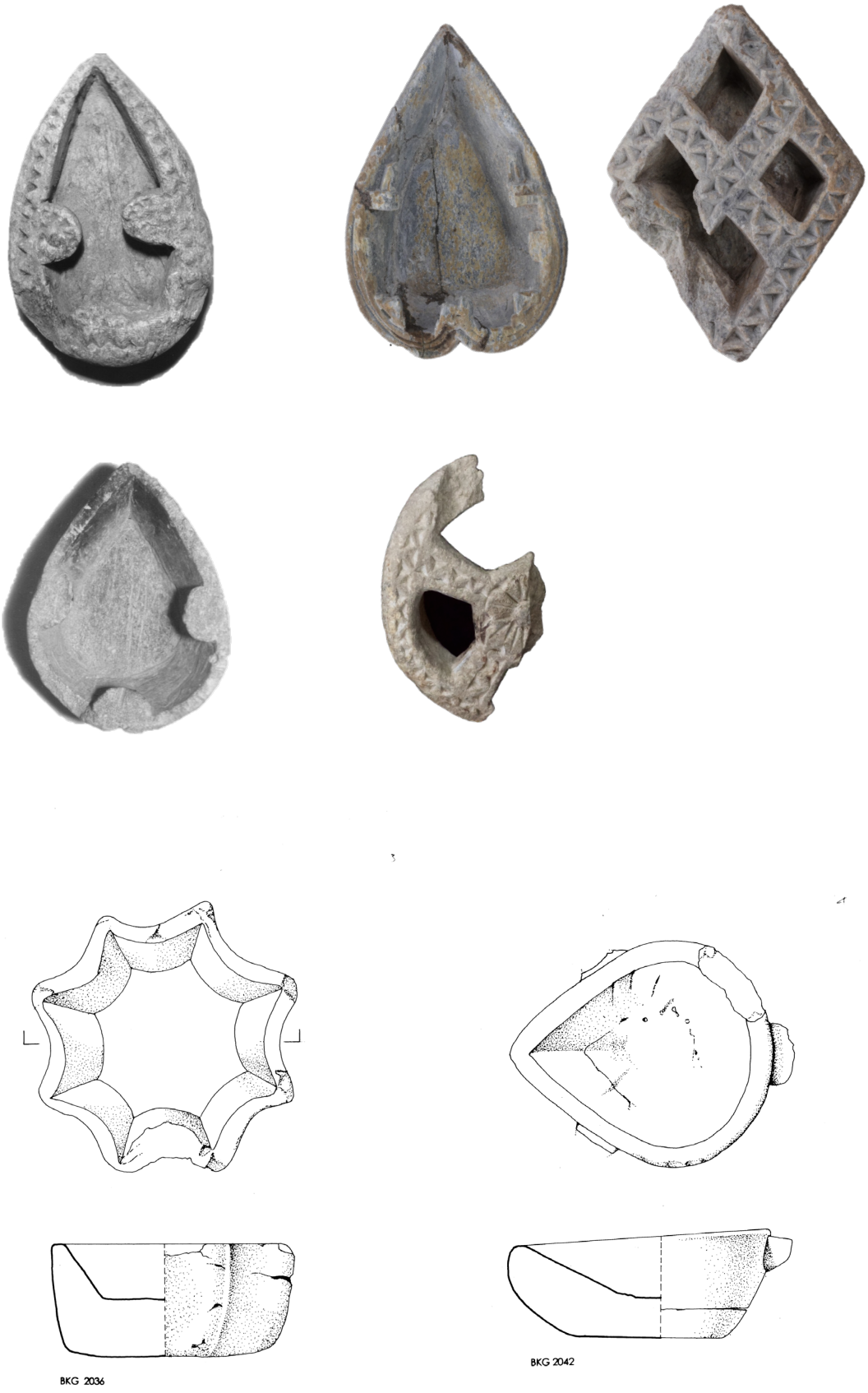


Fig. 13 – Lamps from Udegram (RGM) and Barikot: From top to bottom, left to right: RGM 319, BKG 9771, BKG 9772; UDF 317, BKG 11473; BKG 2036, BKG 2042 (av. l. 9 cm)



Fig. 14 – BKG 9702



Fig. 15 – Nishapur, calligraphic ware bowl, tenth century; d. 25.5 cm. The Metropolitan Museum of Art, MMA_ 40.170.25. Courtesy of The Metropolitan Museum of Art



Fig. 16 – Shergahr: wall stratigraphy: kanjur blocks + stone slabs \\ fired bricks



Fig. 17 – Shergahr: British era building: wall stratigraphy: kanjur blocks \\ fired bricks



Fig. 18 – Shergahr: wall stratigraphy: kanjur blocks \\ fired bricks \\ plastered cement blocks



Fig. 19-20 – Shergahr: kañjur cliffs



Fig. 19-20 – Shergahr: kañjur cliffs



Fig. 21-24 – Shergahr: kañjur outcrops for terraced quarry cultivation



Fig. 21-24 – Shergahr: kañjur outcrops for terraced quarry cultivation



Fig. 21-24 – Shergahr: kañjur outcrops for terraced quarry cultivation



Fig. 21-24 – Shergahr: kañjur outcrops for terraced quarry cultivation

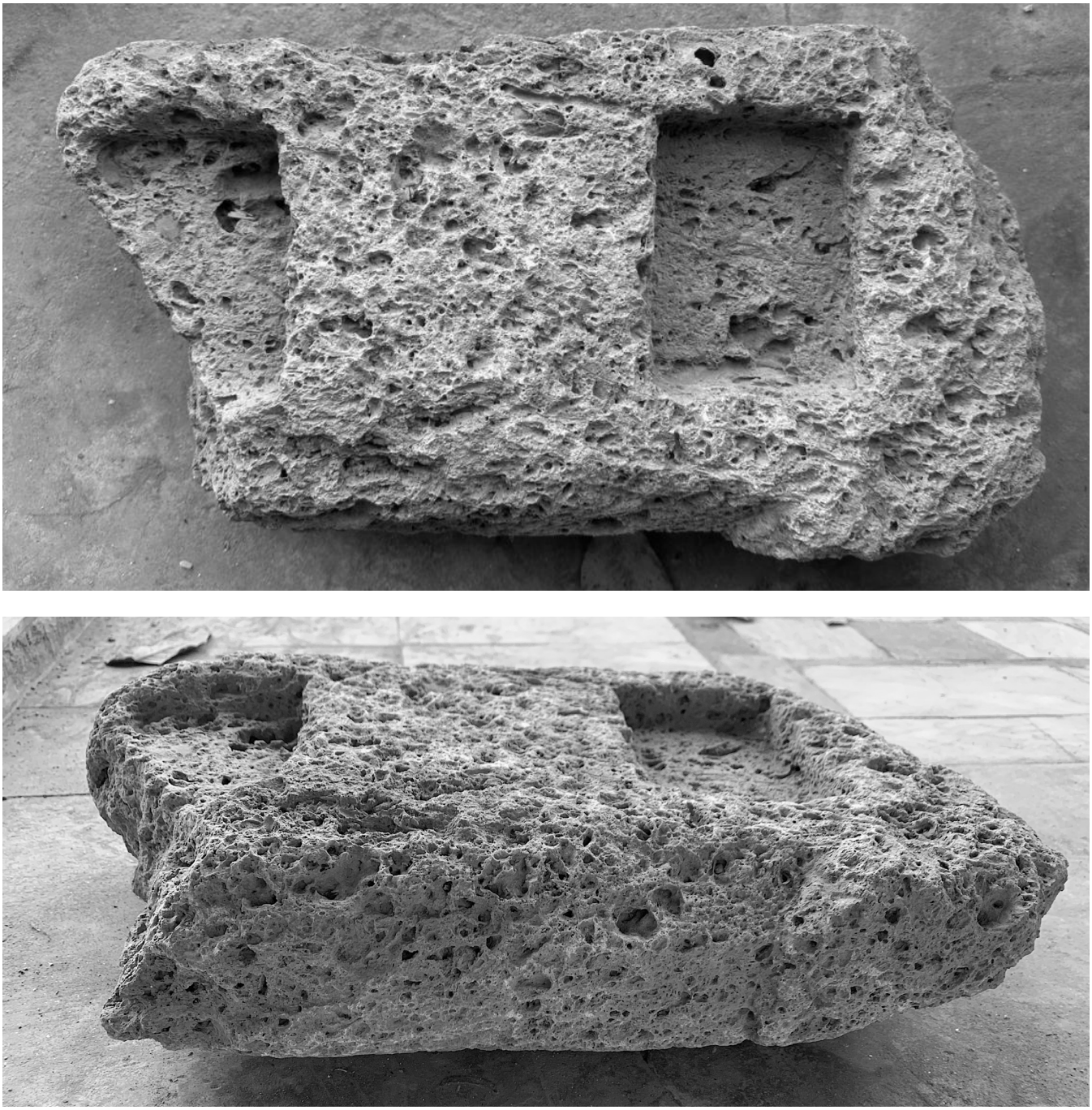


Fig. 26 – BKG 14, water tank: kanjur cover stones with tenons for vedikā posts (l. 41,5 max.; h.11,43 cm).

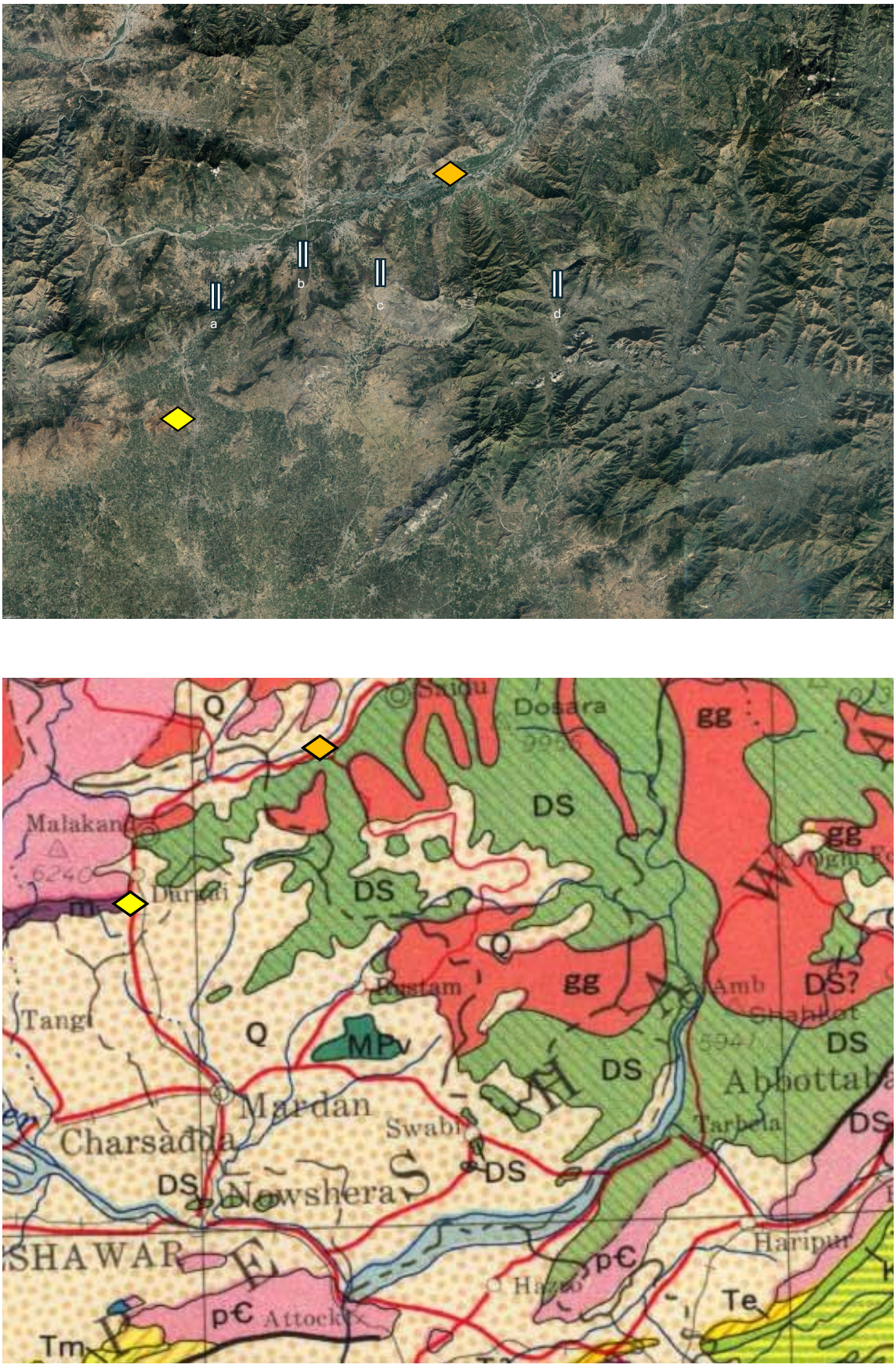


Fig. 25 – Map of the study area with major passes: a) Malakand, b) Shahkot, c) Gunyar-Cherat-Saffar, d) Karakar; yellow lozenge = quarry area; orange l. = Barikot (Credits: Google Earth; Geological Survey of Pakistan).

II.1.2 - THE FORTRESS ON THE HILLTOP (Trenches BKG 14 and 15) (M. Minardi) (PLATES XVI-XVIII)

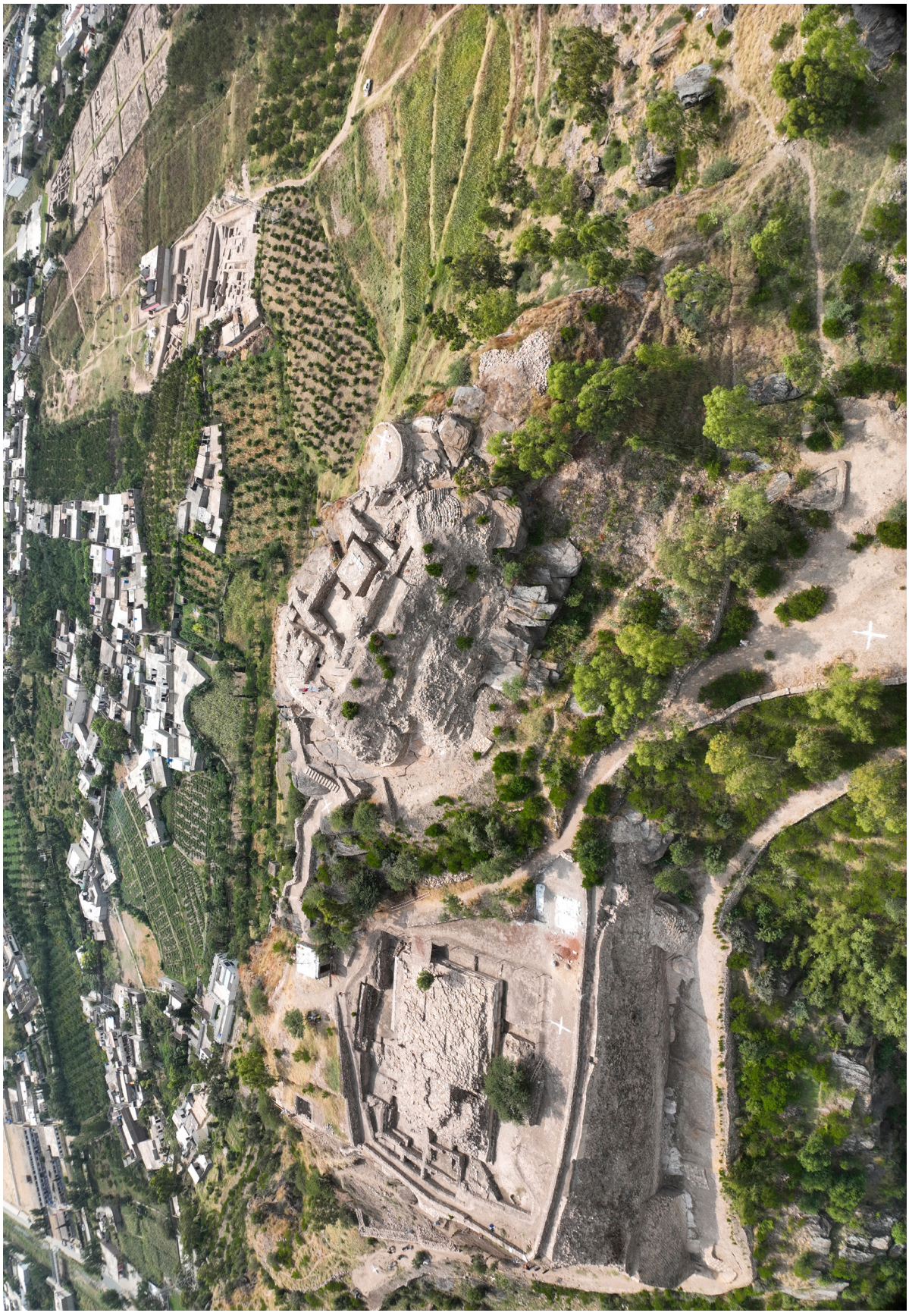


Fig. 1 – The acropolis from N



Fig. 2 – The Fortress BKG 14-15.



Fig. 3 – One of the two *tshas* (BKG 5667)



Fig. 4 – Part of a vessel: appliqued lion/Narasiṃha. (BKG 5767)



Fig. 5 – BKG 4767



Fig. 6 – The rock of the acropolis from S



Fig. 7 – Counterfort 2 of the NE tower



Fig. 8 – Detail of the ceramic piping system of the Period 2 tank drainage

Fig. 1 – Map of northern Gandhāra showing the distribution of Hindu Śāhi sites (base map Google Earth). 1, Sure Tangai; 2, Damghar, 3, Qala Tir; 4, Udegram;
5, Manyar; 6, Amluk-dara; 7, Barikot; 8, Bar Tangai; 9, Parrai; 10, Zalamkot; 11, Palai; 12, Cherat; 13, Torwarsak; 14, Girrai,; 15, Bampokha; 16, Nansar; 17, Kingargai; 18, Kashmir Smast; 19, Damkot; 20, Kamal-khan-china; 21, Kala-dheri; 22, Katkala; 23, Gumbatuna; 24, Mane-tangai; 25, Kamala; 26, Tauda-china; 27, Qala; 28, Kalungai; 29, Doda.



Fig. 2 – Sure Tangai. The area of the Swat Valley protected by the fortress.



Fig. 4 – Sure Tangai.



Fig. 3 – Sure Tangai. Defensive wall with semicircular bastions



Fig. 5 – The watchtower of Parrai



Fig. 6 - Amluk-dara.: general view of the Hindu Śāhi complex from NW



Fig. 7 – Amluk-dara: details of the western side.



Fig. 8 – Watchtower at the Cherat pass



Fig. 9– Kamala: general view of the fort



Fig. 10– Kalungai



Fig. 11 – Tauda-china



Fig. 12 – Udegram: view of the E side of the 'Castle'



Fig. 13 – Udegram: view of the N side of the terraced wall later occupied by the courtyard of the Ghaznavid Mosque of the citadel



Fig. 14 – Gumbatuna: decorated architectural element reused in the retaining wall of the road leading to the archaeological site.



Fig. 15 – Gumbatuna: decorated architectural element reused in the retaining wall of the road leading to the archaeological site



Fig. 16 – Ziarat graveyard: architectural elements reused in a grave: āmalaka from the decoration of the suprastructure of a Hindu temple is visible on the top, below is another architectural piece decorated with volutes.



Fig. 17– Ziarat graveyard: decorated architectural element (upside-down) bearing two candraśālās with rosetta sided by volutes





Fig. 18 – Ziarat graveyard: decorated architectural elements from the bases of pilaster bearing a leaf with two lateral volutes (cf. Zalamkot).



Fig. 19 – Gumbatuna: citadel



Fig. 20 – Gumbatuna: terraced system of the citadel



Fig. 21 – Zalamkot area: structures on the way to the temple



Fig. 22 – View of the ruins of the Zalamkot temple



Fig. 24 – Zalamkot: the upper part of the false pilaster



Fig. 27 – Zalamkot: decorated architectural element reused as step (front)



Fig. 23 – Zalamkot: the podium decorated with pilasters. On the bottom left, close up of the base of the pilaster (cf. Fig. 18)



Fig. 25 – Zalamkot: decorated architectural element with a *gaṇa* between columns



Fig. 26 – Zalamkot: decorated architectural element with a *candraśālā* sided by columns



Fig. 28 – Zalamkot: decorated architectural element in Fig. 26: Left side, with tenon for halving joint



Fig. 29 – Zalamkot: decorated architectural element in Fig. 26: Right side, with tenon for halving joint.



Fig. 30 – Zalamkot: decorated architectural element in Fig. 26: Top side.



Fig. 31 – Zalamkot: circular element with projecting feature



Fig. 32 – Zalamkot: exagonal pillar with flat back and tenon reused in a retaining wall in the village

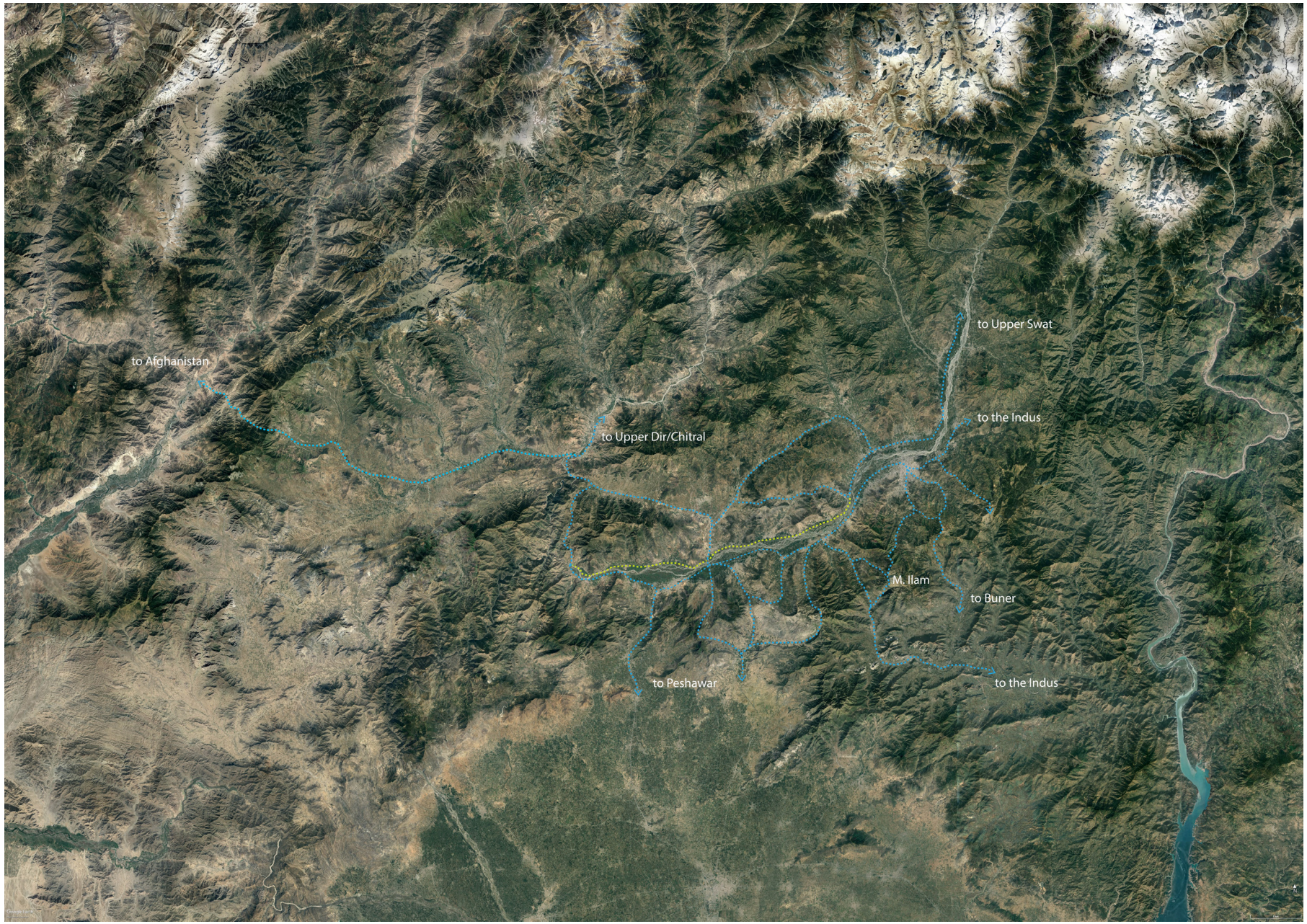


Fig. 33 – Map of northern Gandhāra showing the main routes (base map Google Earth)

II.2.1 - TRENCH BKG 6: THE ŚĀHI TEMPLE ON TERRACE E (L.M. Olivieri)



Fig. 1 – Terrace E, BKG 6, Temple 6 (N to the right)

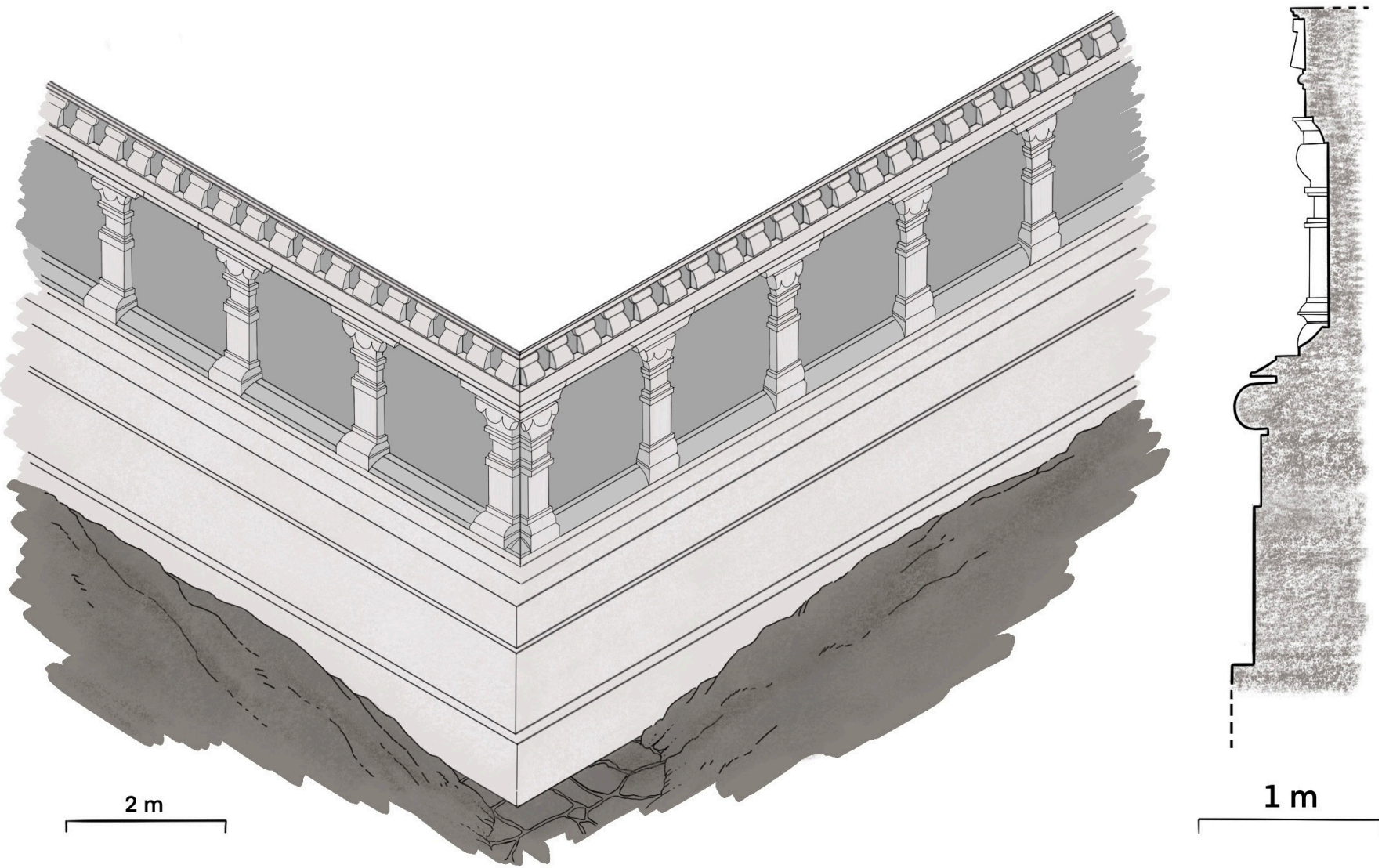


Fig. 2 – Details of the mouldings and entablatures of the Zalamkot temple. Drawings by AC after FM†.

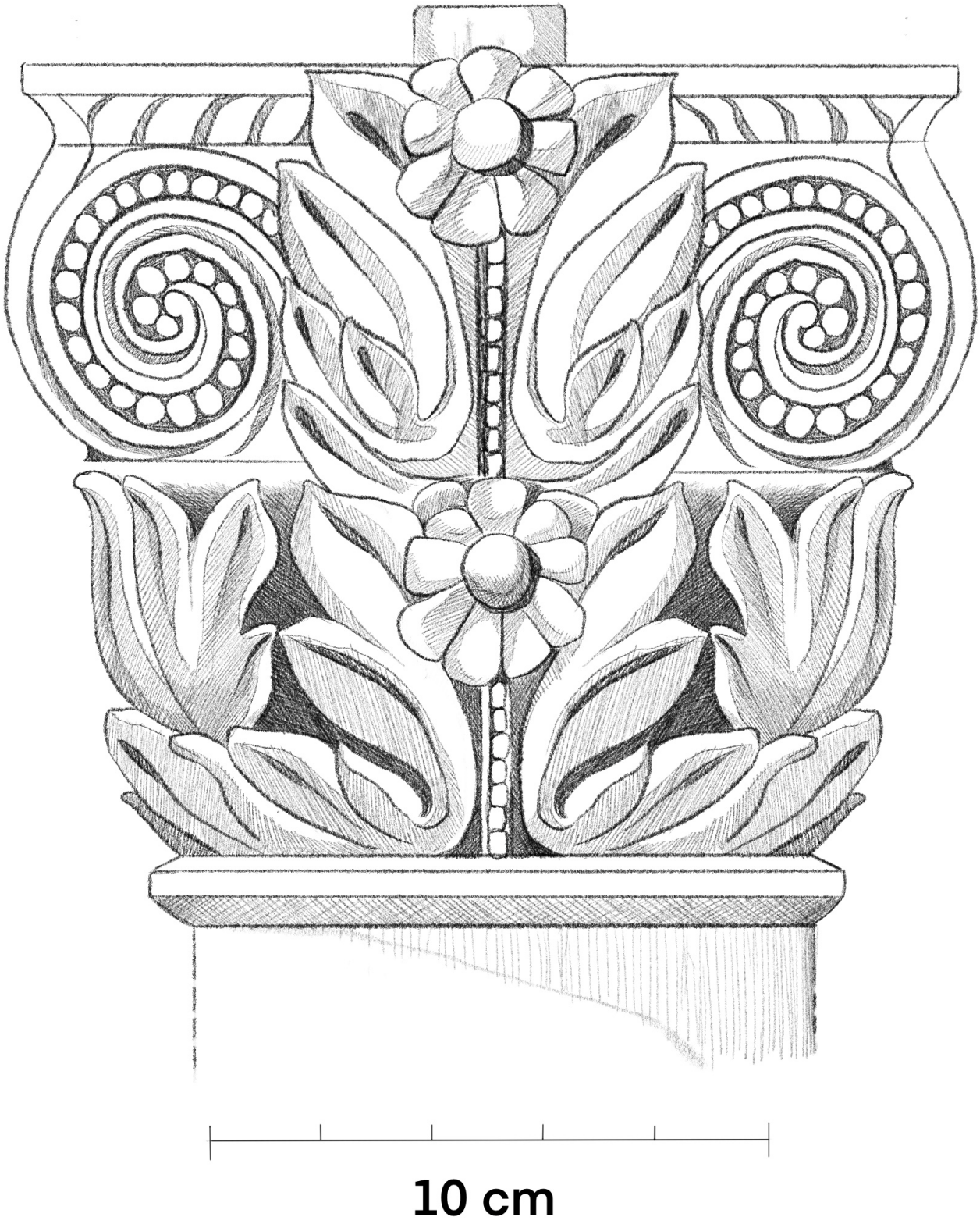


Fig. 3 – Ionic-Corinthian hybrid column (detail of the capital). From Kashmir Smast. 9th-10th century CE. Wood. 133 × 33 cm. British Museum, BM 1889,0703.8. Drawing by AC after FM†.



Fig. 4 – Terrace E, BKG 6, Temple 6, N side: evidence of the Period 2a and 2b infill wall of the lower podium



Fig. 5 – Terrace E, BKG 6, Temple 6, S side: evidence of the infill masonry from period 2a and 2b of the lower podium



Fig. 6 – Terrace E, BKG 6, Temple 6, N side: evidence of the façade of Temple 6 in Period 2a



Fig. 7 – Terrace E, BKG 6, Temple 6, S side: evidence of the façade and raised floor of Temple 6 in Period 2a. Note the presence of the stuccoed landing.



Fig. 8 – Terrace E, BKG 6, Temple 6, S side: close view of the front and raised floor of Temple 6 in Period 2a. Note the presence of the stuccoed landing.

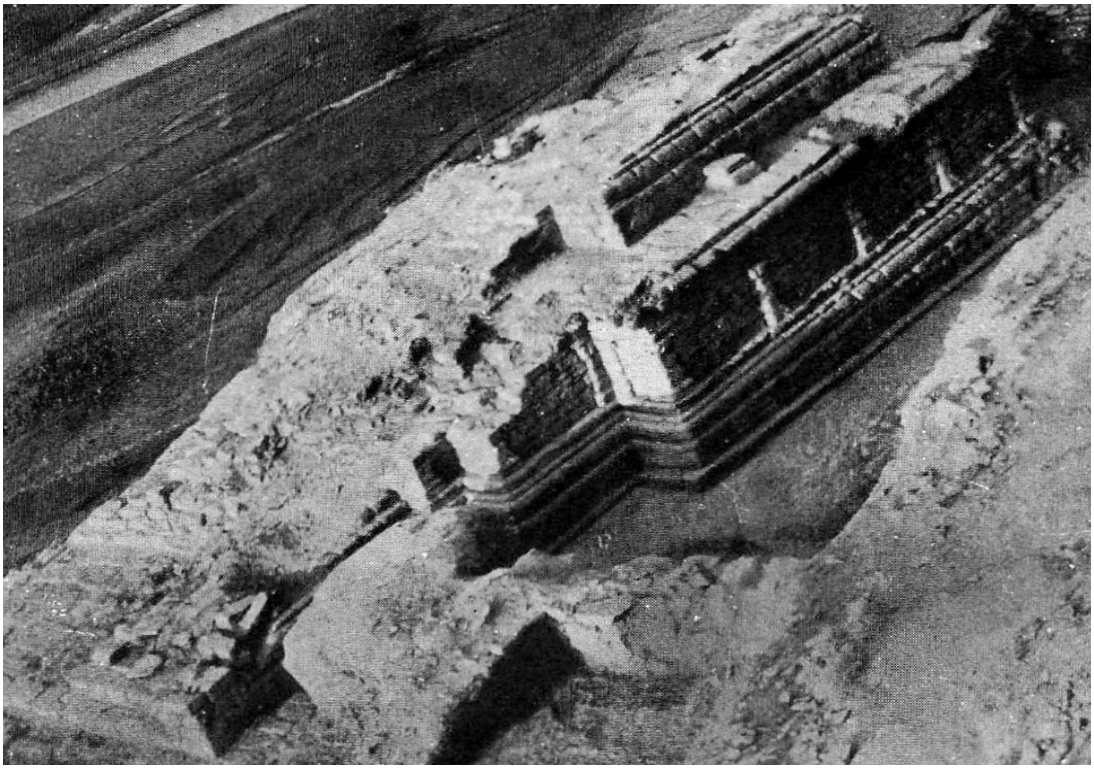


Fig. 9 – The Damkot 'stupa' (after Rahman 1968-1969: fig. 158)



Fig. 10 – Minor shrine N of Temple 6 (Period 2a)

II.2.2 - THE ARCHITECTURE OF TEMPLE 6: EXCAVATED MATERIALS AND RECONSTRUCTION (A. Casalini)

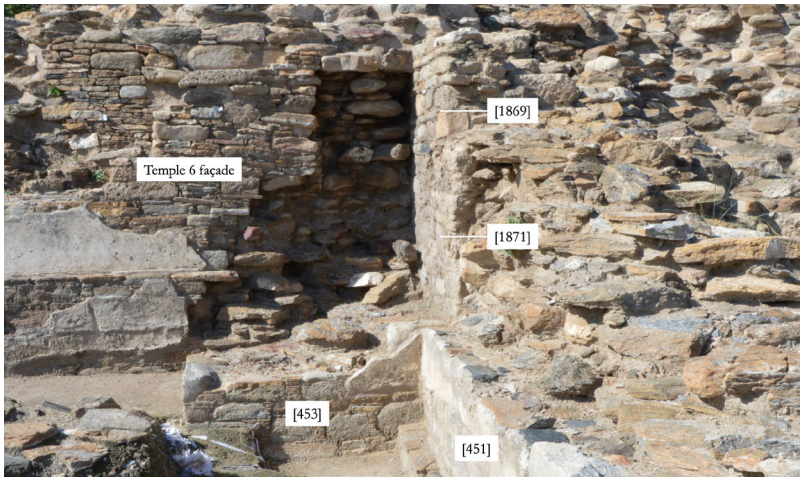


Fig. 1 – The E façade of Temple 6, S side



Fig. 2 – S shoulder of the staircase in BKG 6.3, seen from the S

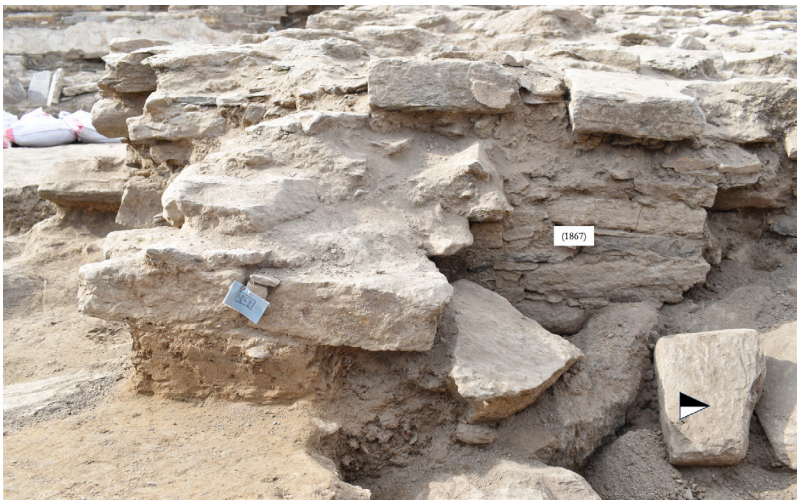


Fig. 3 – The first steps of the staircase. The structure [1867] behind [1868] belongs to an earlier phase of the staircase, which was then enveloped in the volume of the Hindu Śāhi structure.

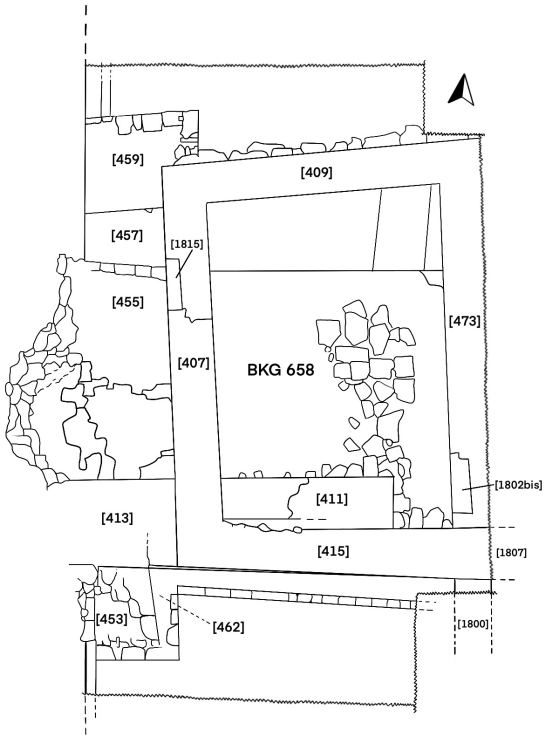


Fig. 4 – Plan of BKG 6.3. Walls [1800] and [1807], as well as thresholds [1815] and [1802bis] were unearthed during the 2023 excavation. Plan modified by AC from FM†'s drawing in Callieri et al., 2000: 223



Fig. 6 – Stairs [1802]+[1804] leading to BKG 658

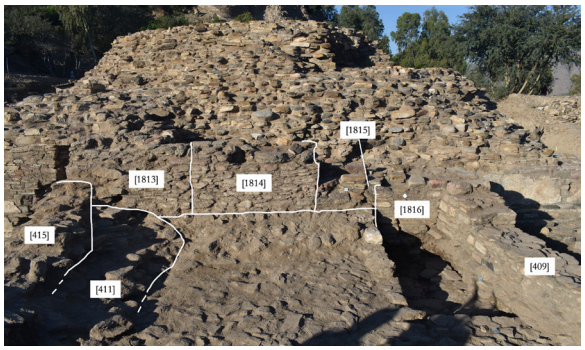


Fig. 8 - Macrophase 9a structures built on top of the staircase, W side

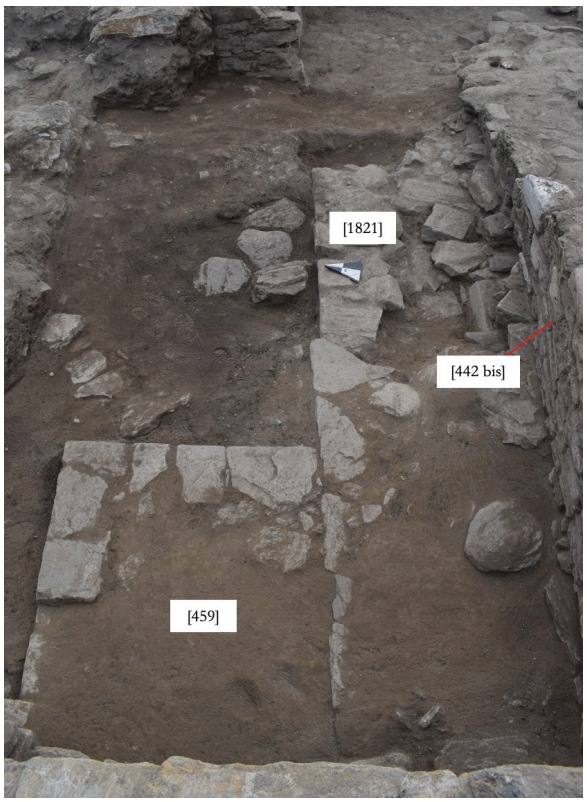


Fig. 5 – The N shoulder of the staircase

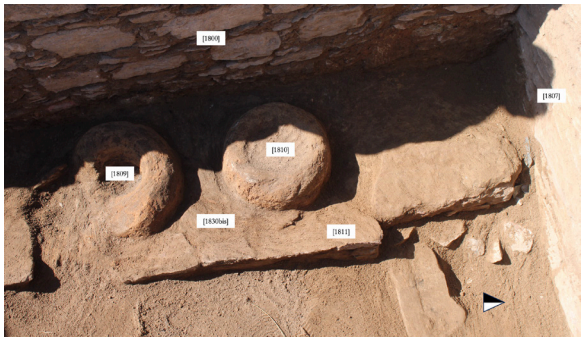


Fig. 7 – Fireplaces [1809] and [1810] in BKG 6.3



Fig. 9 – Reconstructions of the profile of Temple 6 during the Hindu Śāhi period (Macrophase 8b/ Period 2c). Volumetry profile drawn over a photograph taken from the SE corner of Terrace E.

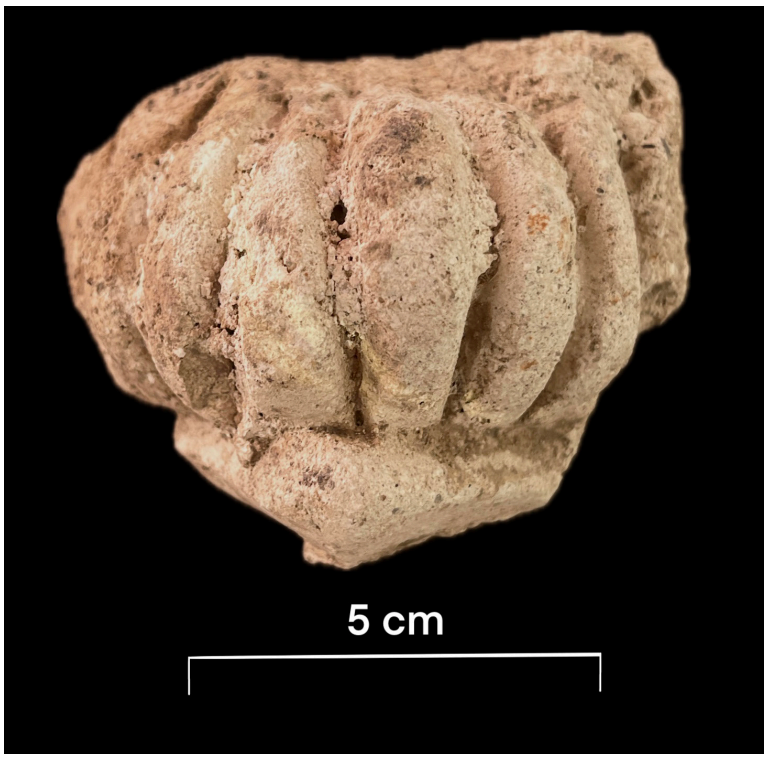


Fig. 12 – Miniature āmalaka stone (fragment) from BKG 20 E (8). Stucco and red pigments; w. 6.8 × h. max. 5.2 × t. 4.6.

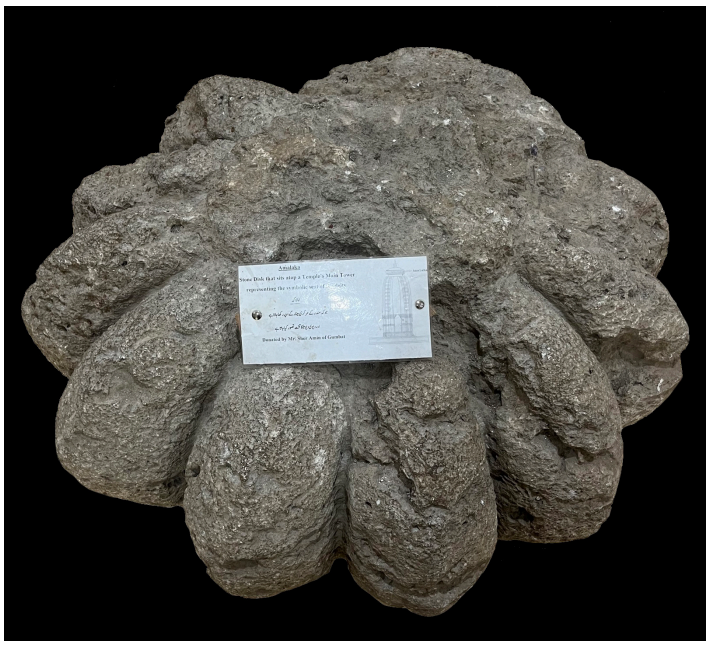


Fig. 13 – The āmalaka stone of Gumbat at the Dir Museum of Chakdara. Photo by AC.

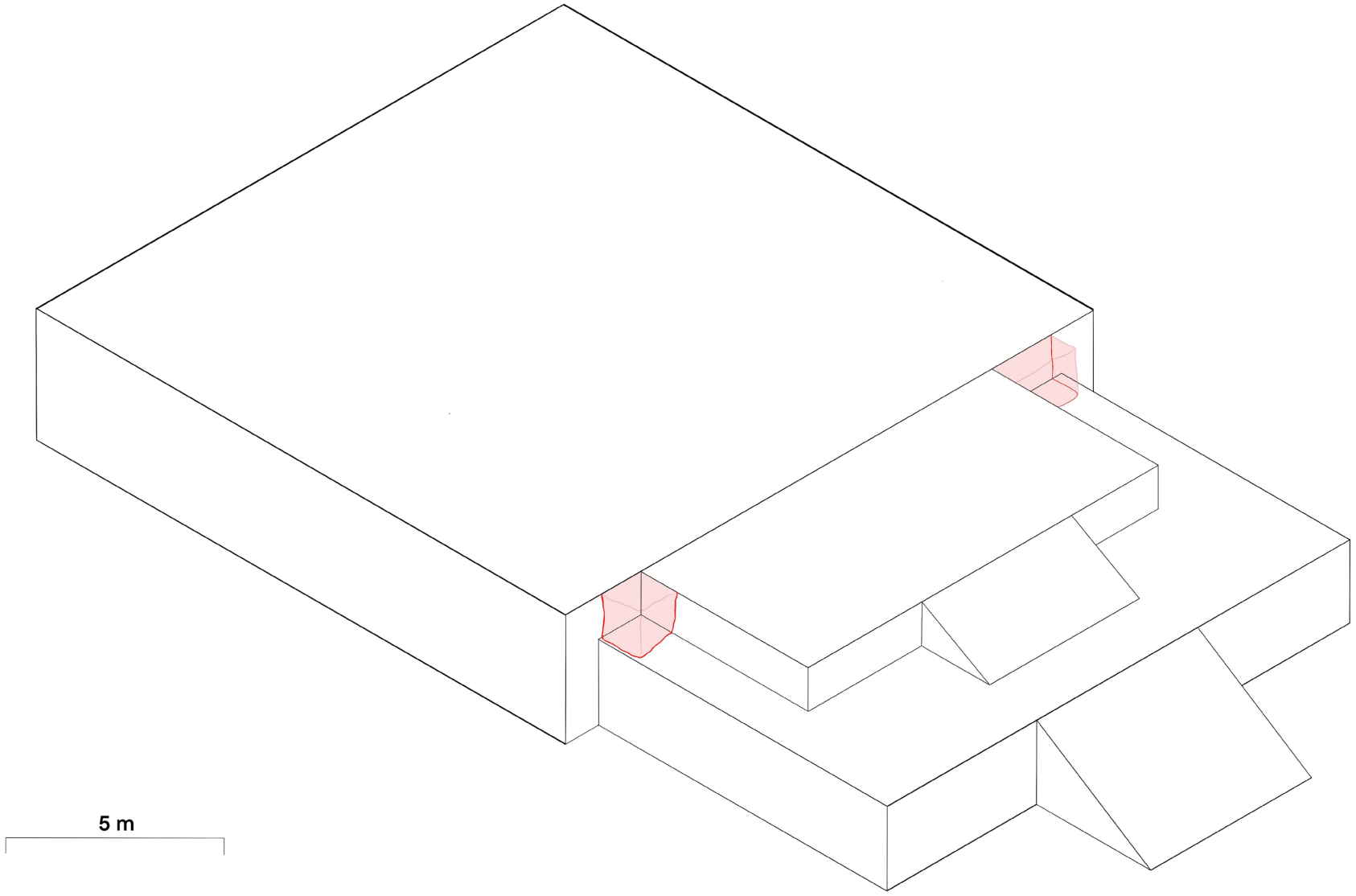


Fig. 10 – Possible reconstructions of the plan of Temple 6 during the Turk Śāhi period (Macrophase 8a/Period 2a). The red areas signal the position of the looter's pits. Drawing by AC.

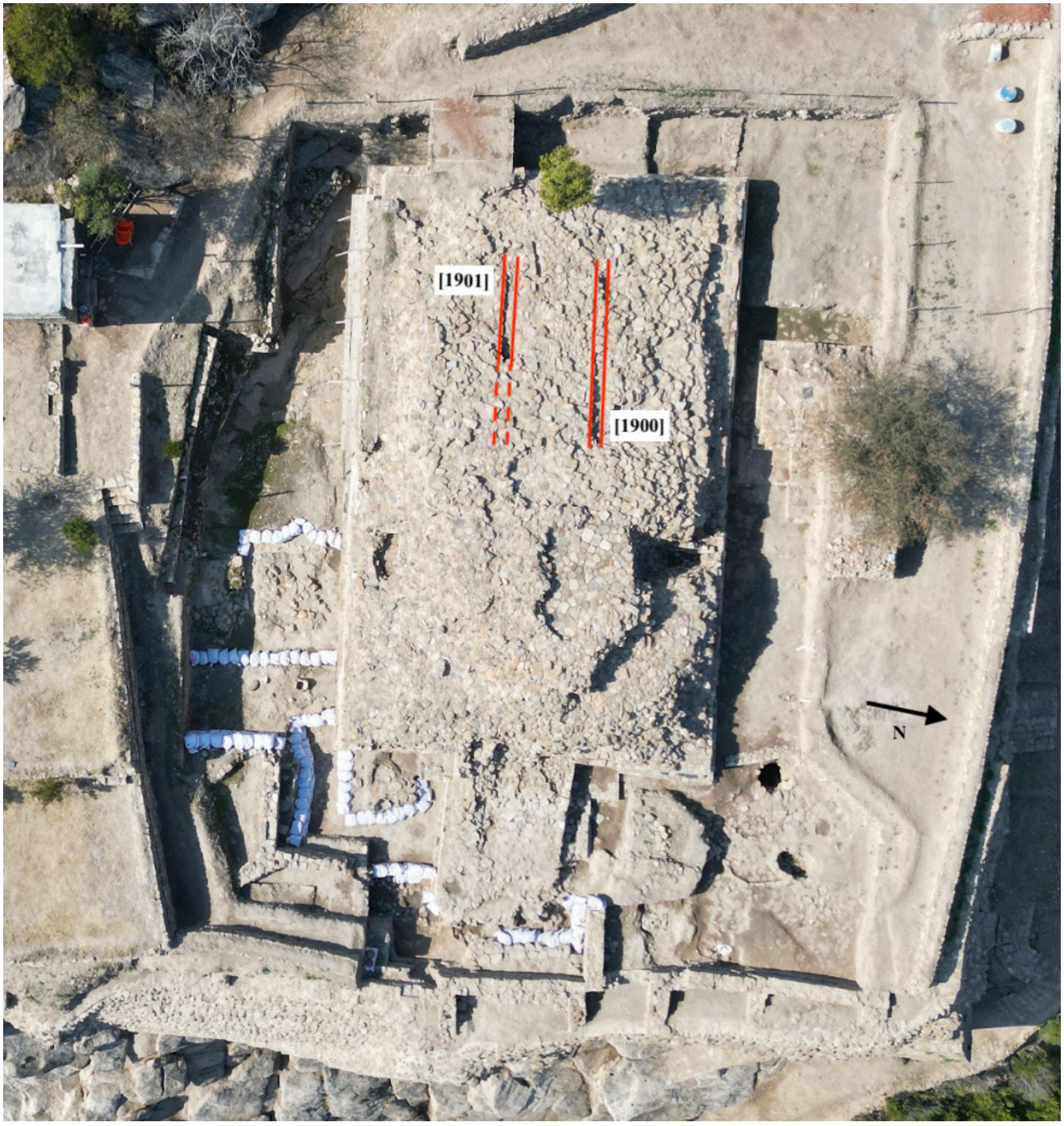


Fig. 11 – Drains [1900] and [1901] on the upper podium

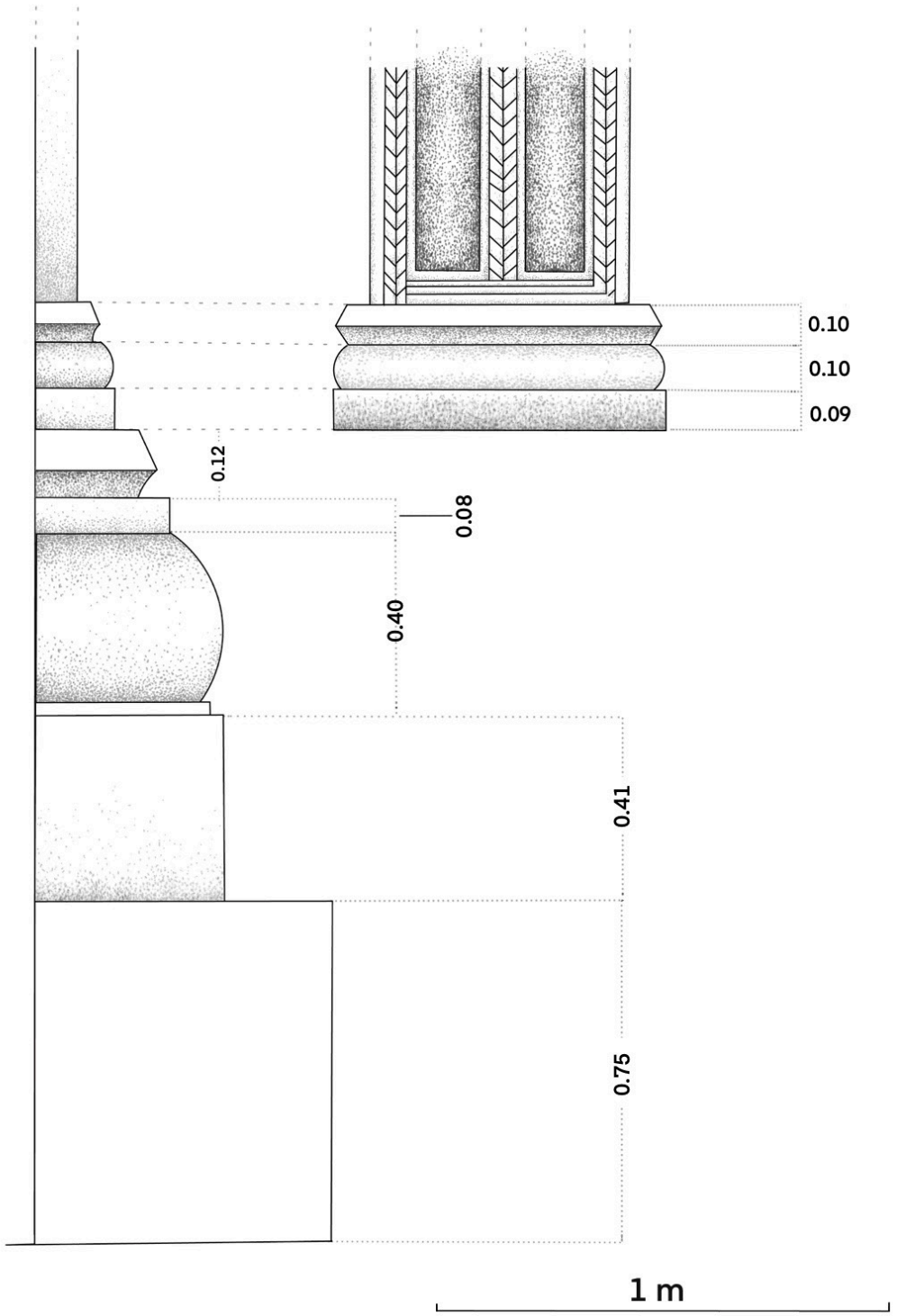


Fig. 14 – Base moulding of the lower podium of Temple 6. Measurements are in m. Drawings by AC.

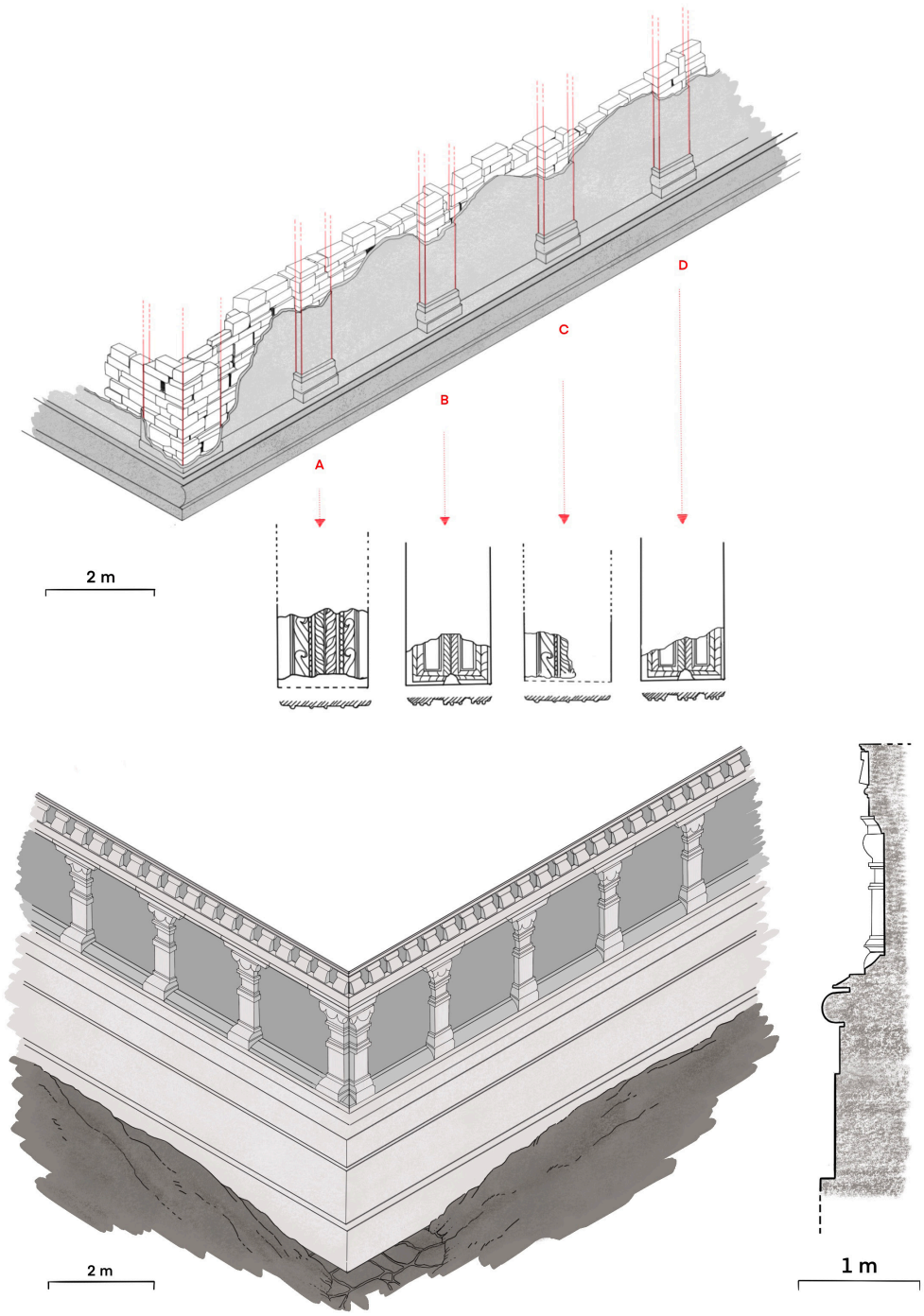


Fig. 15 – The lower podium of Barikot Temple 6 and of the temple at Zalamkot: isometric drawings of Barikot (above) and Zalamkot with moulding (below). Drawing by AC after FM†.

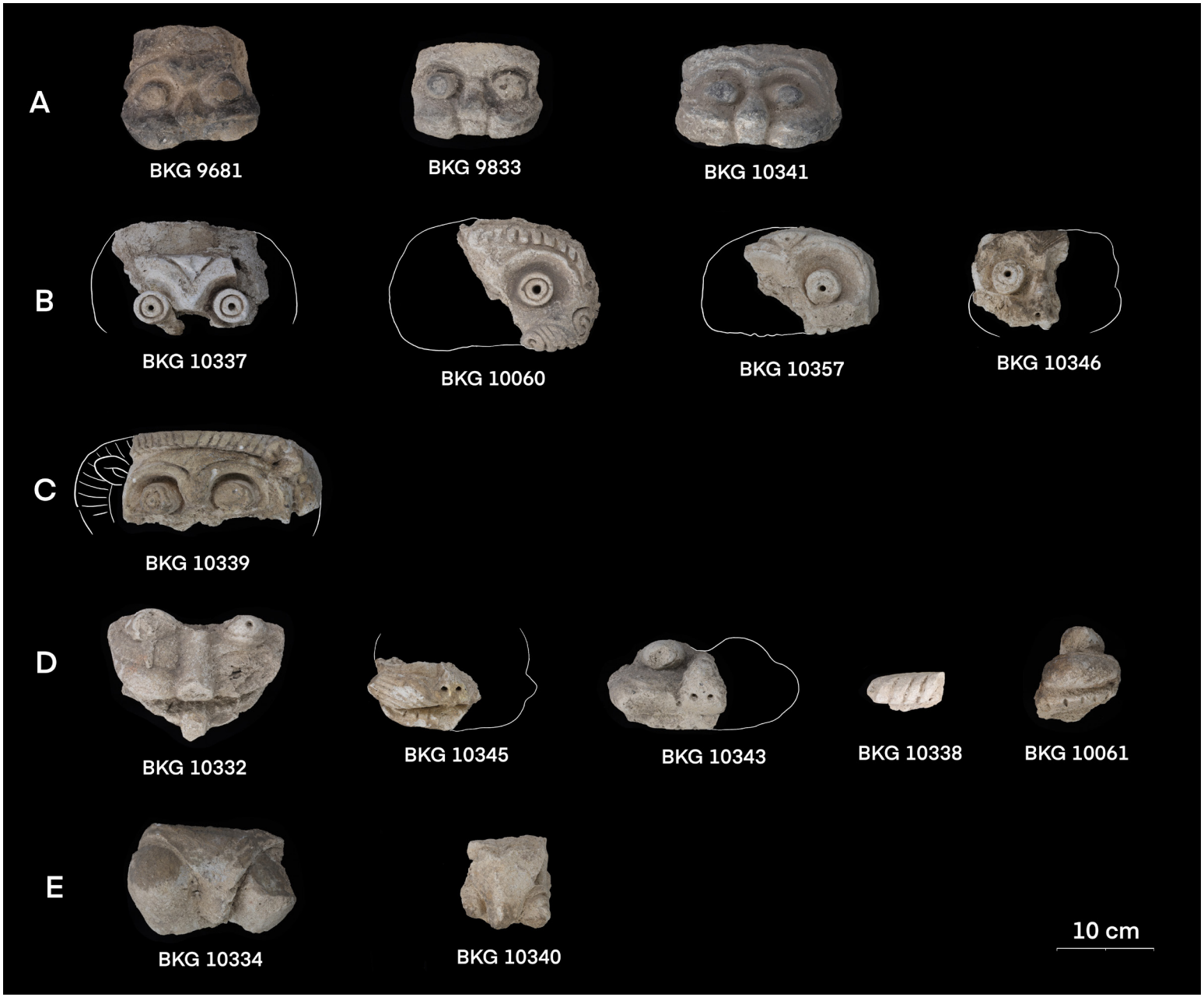


Fig. 16 - Zoomorphic masks from BKG 20 E



Fig. 17 – Elephant trunk (fragment) from BKG 20 E (10). Stucco; l. max. 8.9; w. max. 7.1 × t. max. 4.6



Fig. 18 – Similar stucco elements in two sizes



Fig. 19 – Part of a pilaster on the upper podium, BKG 9845. Kañjur and stucco; l. 21 × h. 11.5 × w. 10.5



Fig. 20 – Capital collar with phytomorphic design, BKG 9844. Kañjur and stucco; l. 16.6 × h. 8.5 × w. 14.5



Fig. 21 – The W door of the Viṣṇu temple at Deogarh, Uttar Pradesh, India. © Ismoon, 30/12/2020. Creative Commons License.

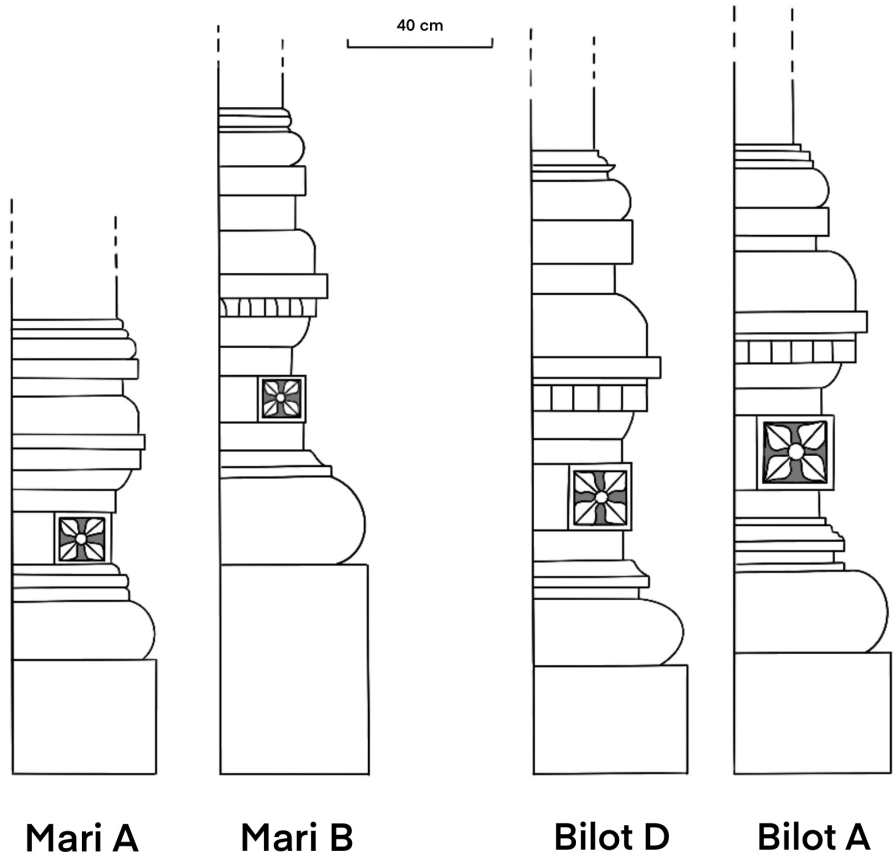
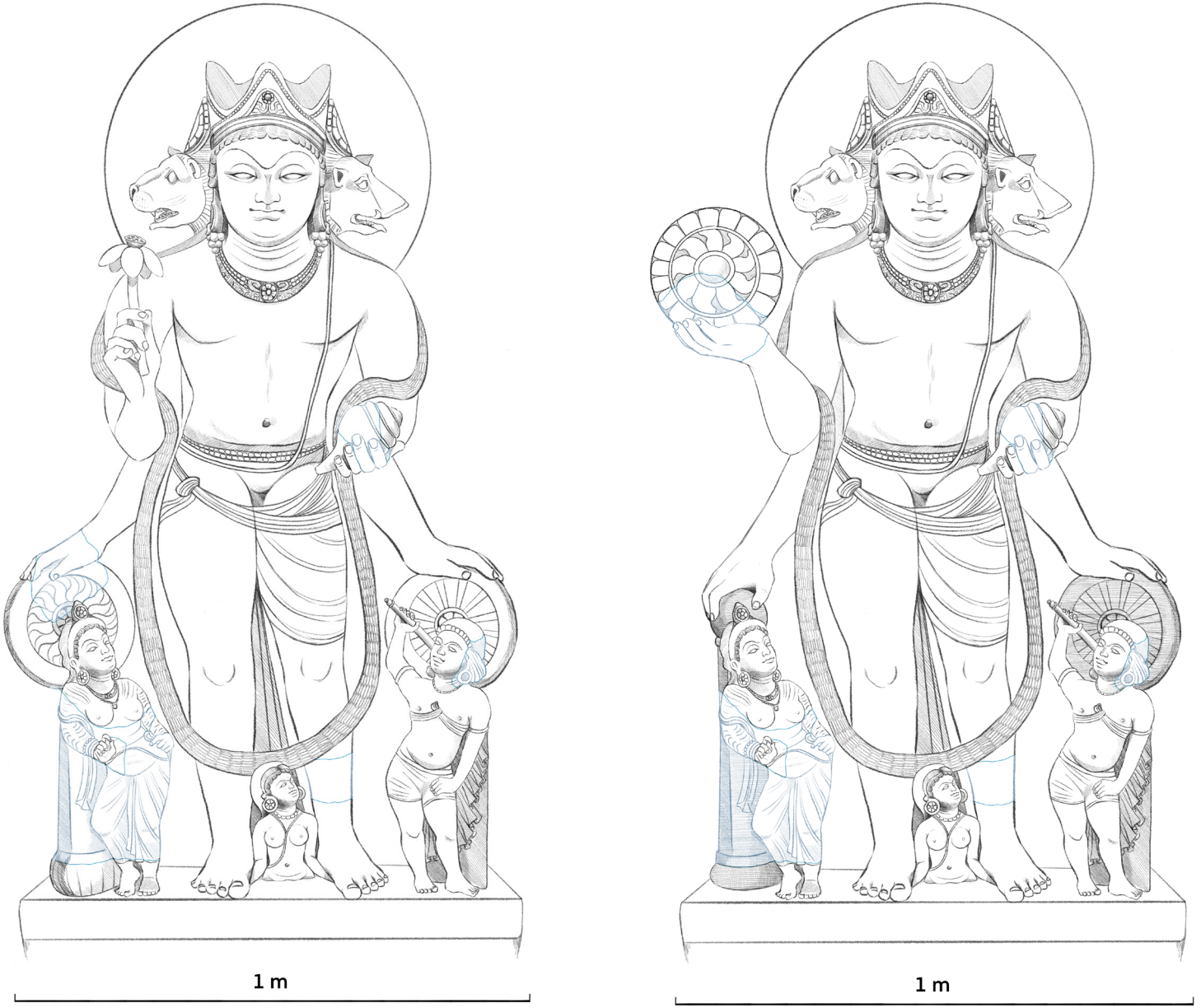


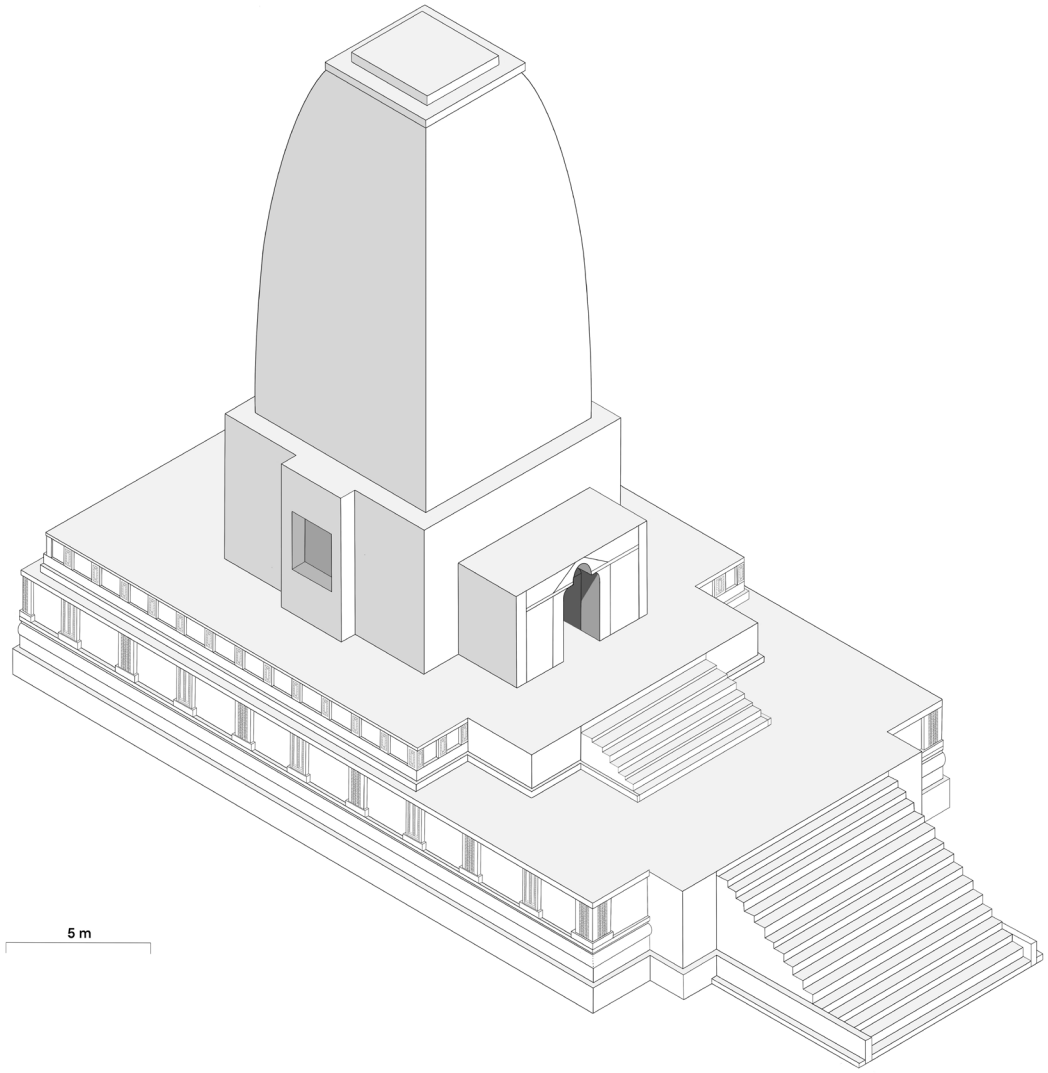
Fig. 22 – Mouldings of Salt Range Temples with the rosette element. Drawing by AC modified from Meister 2011: 45.



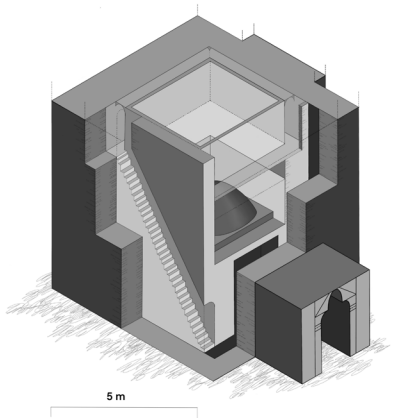
Fig. 23 – Pieces from the main sculptural group of Temple 6



[PLATE XXII – Main sculptural group of Temple 6: Viṣṇu Vaikuṇṭha/Caturānana. Two hypothetical reconstructions (drawing by AC)]



[PLATE XX – Temple 6. Reconstruction. Isometric view from SE corner (drawing by AC).]



[PLATE XXI - The temple of Gumbat. Reconstruction based on Stein's description (1921: 21-24). Exploded view (drawing by AC).]



Fig. 24 – BKG 6101



Fig. 25 – BKG 6101



Fig. 26 – BKG 6101



Fig. 27 – BKG 12019



Fig. 28 – BKG 12019



Fig. 29 – BKG 12019



Fig. 30 – BKG 12019



Fig. 31 – BKG 12019



Fig. 32 – Reused stones at Chigai-sar. After Edelberg 1957: 205



Fig. 33 – Lintel from Swat. After Scerrato, Taddei 1995: fig. 2

II.3.1 - TERRACE W (L.M. Olivieri, R. Micheli)



Fig. 1 – Macrophase 0 pit (1/4 excavated)



Fig. 2– Macrophase 3a: Defensive wall during the dig (view from E; 2024)



Fig. 3 – NW inner corner of Macrophase 3a Defensive wall.



Fig. 1 – W side of Terrace W



Fig. 2 – BKG 24.1, western side. N side of Terrace W



Fig. 3 – BKG 8, in BKG 24.1



Fig. 4 – Detail: springing point of [143]

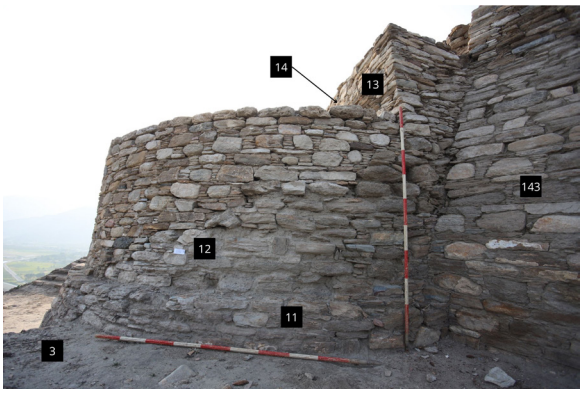


Fig. 5 – BKG 24.1, E side before excavation



Fig. 6 – Detail: [94], BKG 24.1

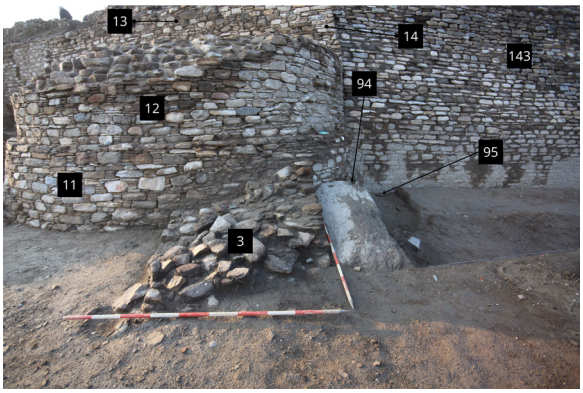


Fig. 7 – BKG 24.1, E side after excavation

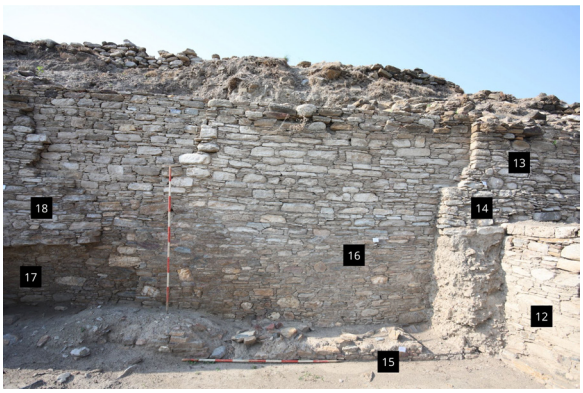


Fig. 8 – E side of Bastion I2 [12]

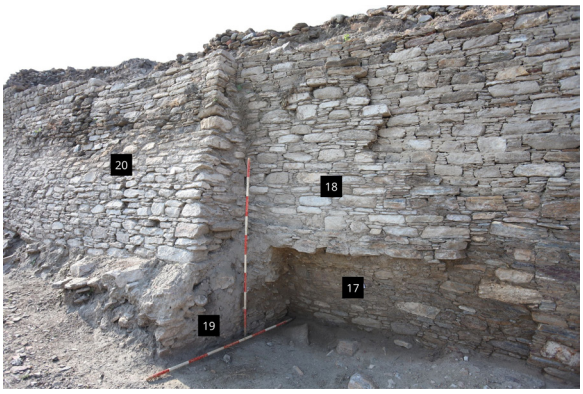


Fig. 9 – W side of Bastion H [22]



Fig. 10 – BKG 24.2, western side



Fig. 11 – Detail: upper part of BKG 24.2

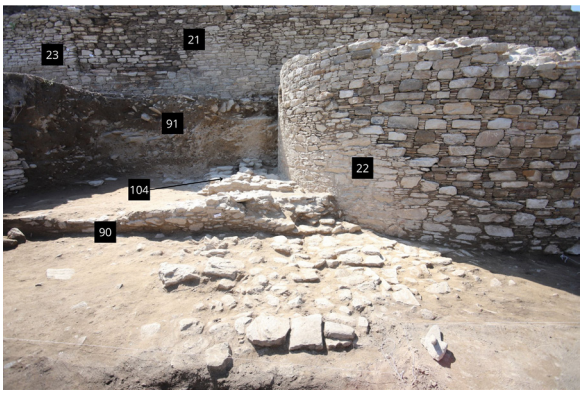


Fig. 12 – BKG 24.2



Fig. 13 – Detail: [92], BKG 24.2



Fig. 14 – Detail: E side BKG 24.2

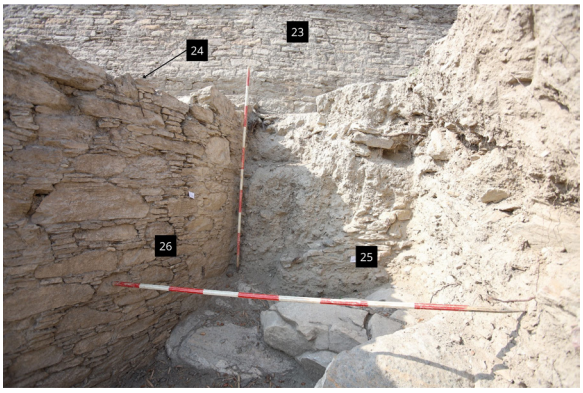


Fig. 15 – W side of Bastion G [26], BKG 24.3



Fig. 16 – BKG 24.3, W side

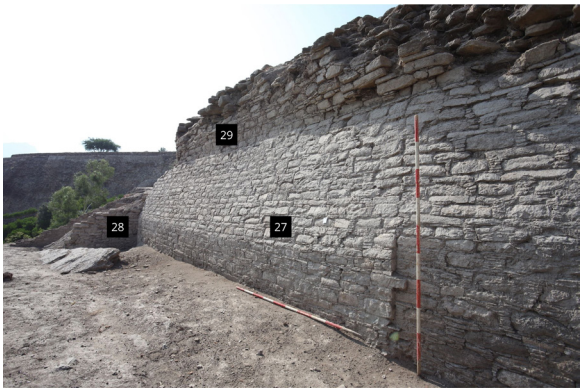


Fig. 17 – BKG 24.4, W side



Fig. 18 – N side of Bastion F [28], BKG 24.4

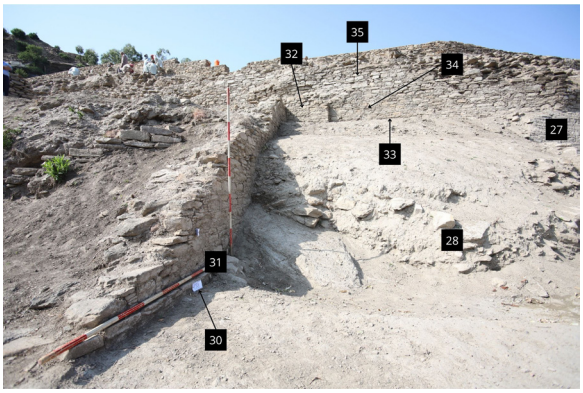


Fig. 19 – BKG 24.4, S-E side



Fig. 20 – Upper part of Bastion F [28], BKG 24.4



Fig. 21 – N side of wall [31], BKG 24.4



Fig. 22 – S side of wall [31], BKG 24.5

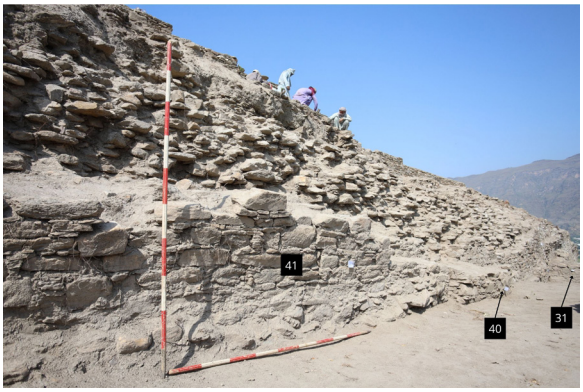


Fig. 23 – BKG 24.5, N side



Fig. 24 – BKG 24.5, central area 1



Fig. 25 – BKG 24.5, central area 2



Fig. 26 – BKG 24.5, S side



Fig. 27 – Bastion E [52], BKG 20 N, N side of Terrace E



Fig. 28 – W side of buttress [57], BKG 20 N



Fig. 29 – E side of buttress [57], BKG 20 N

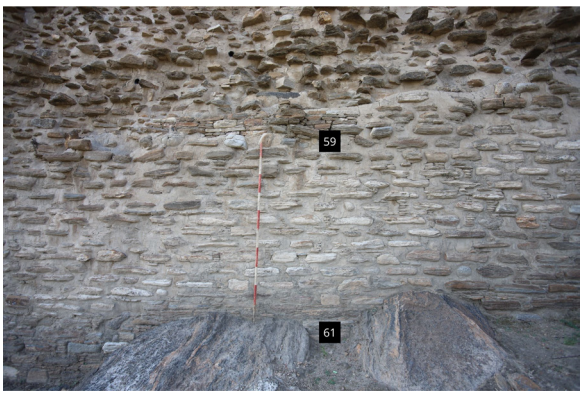


Fig. 30 – Detail: wall [59], BKG 20 N



Fig. 31 – W side of buttress [130], BKG 20 N



Fig. 35 – N side of Buttress [68], BKG 20 E



Fig. 33 – Detail: buttress [130], BKG 20 E



Fig. 34 – S side of buttress [130], BKG 20 E



Fig. 32 – E side of buttress [130], BKG 20 E



Fig. 36 – S side of Buttress [68], E wall, BKG 20 E



Fig. 37 – Bastion C [73], BKG 20 E

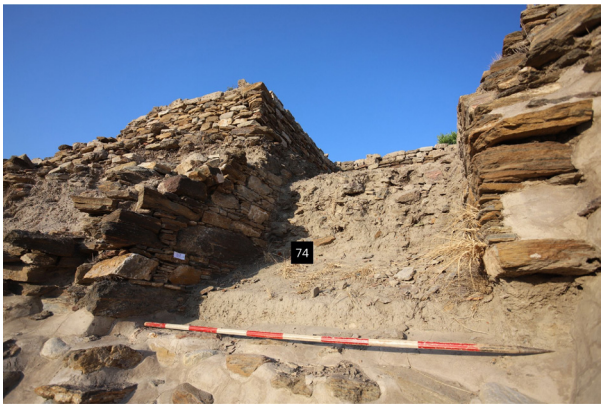


Fig. 38 – Stairway [74], BKG 20 E



Fig. 40 – S-E upper part of E side, BKG 20 E



Fig. 41 – S-E lower part of E side, BKG 20 E



Fig. 42 – Bastions in S-E upper part, BKG 20 E

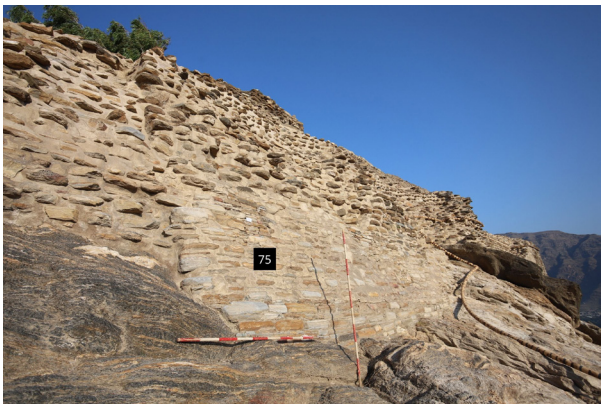


Fig. 39 – Detail: [75] of E side, BKG 20 E

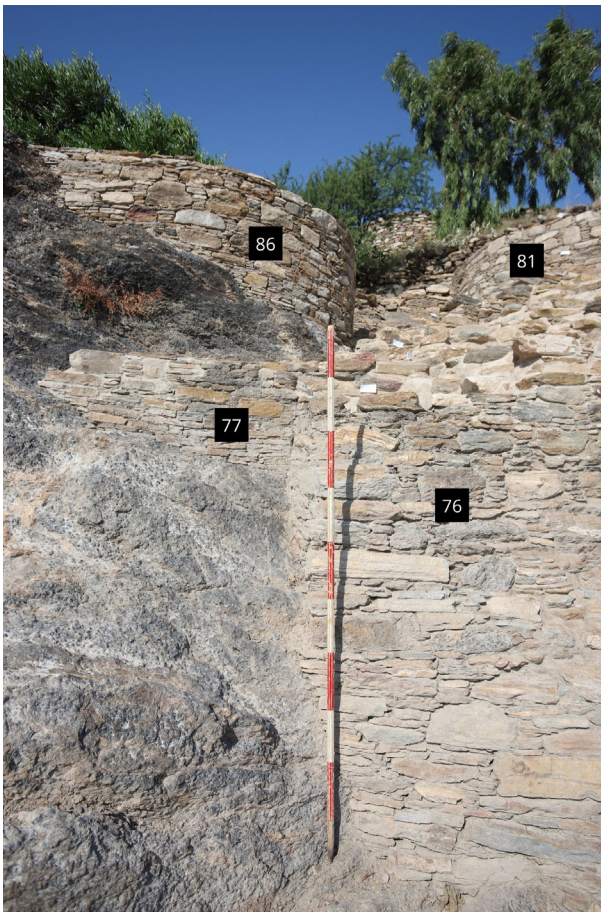


Fig. 43 – Detail: Bastions A-B [86]-[81], BKG 20 E

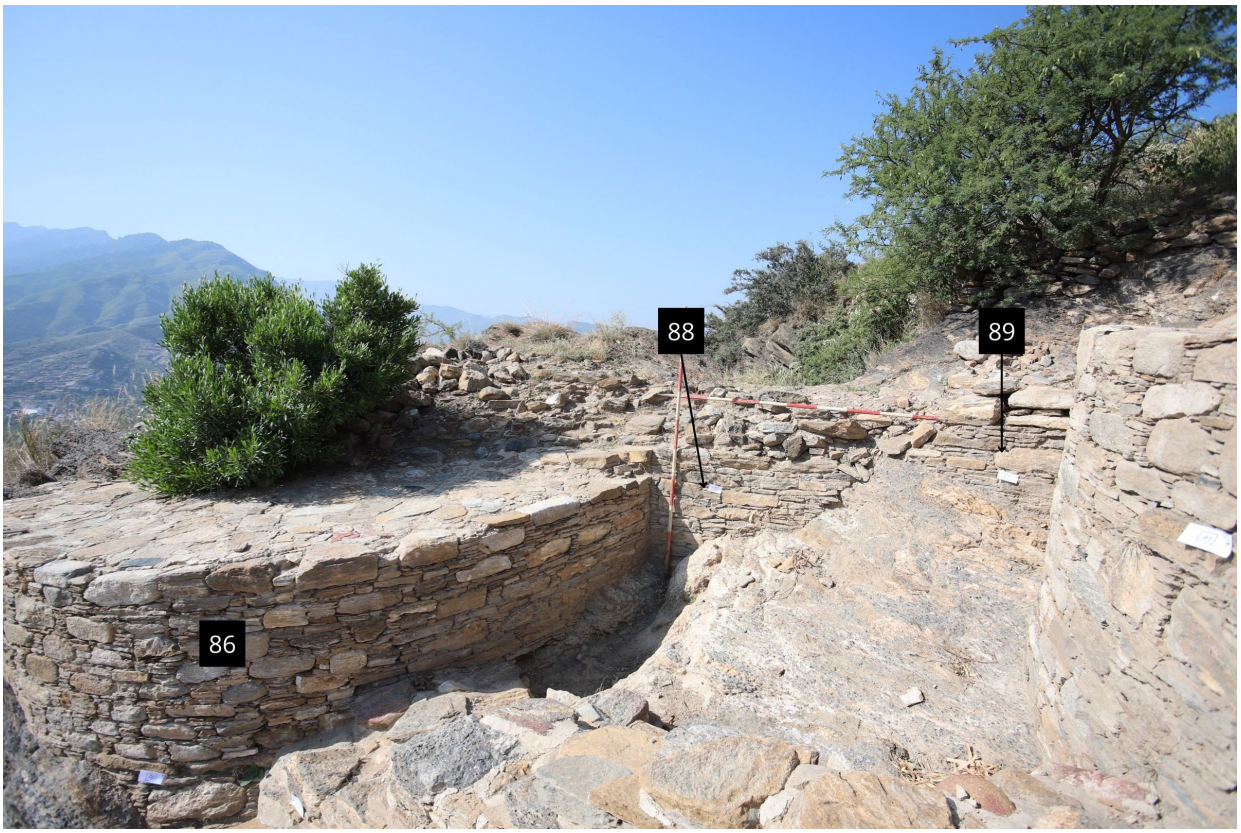


Fig. 44 – Detail: S-E upper part, 1, BKG 20 E



Fig. 45 – Detail: S-E upper part, 2, BKG 20 E

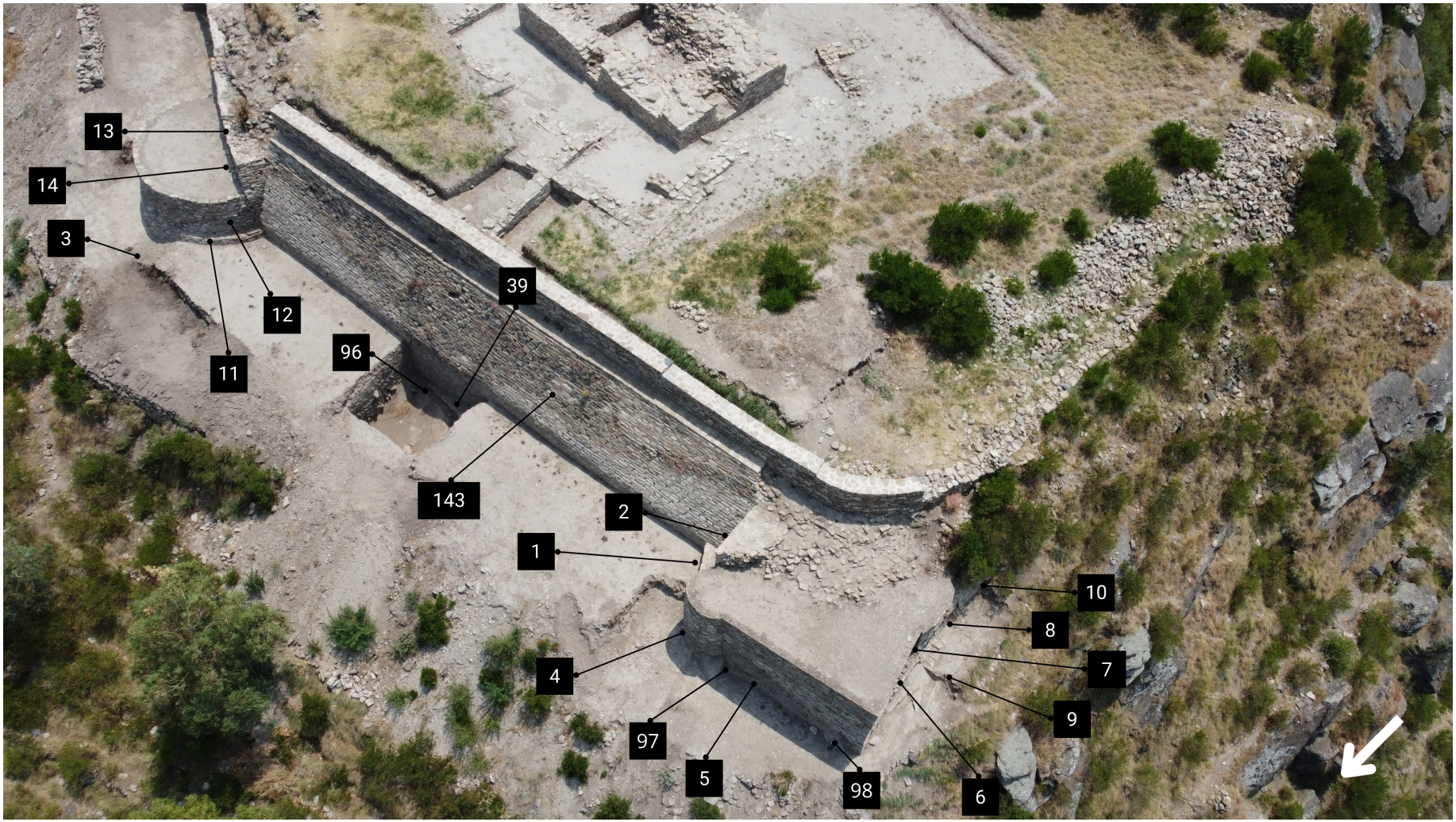


Fig. 46 – Aerial view of Terrace W (W)

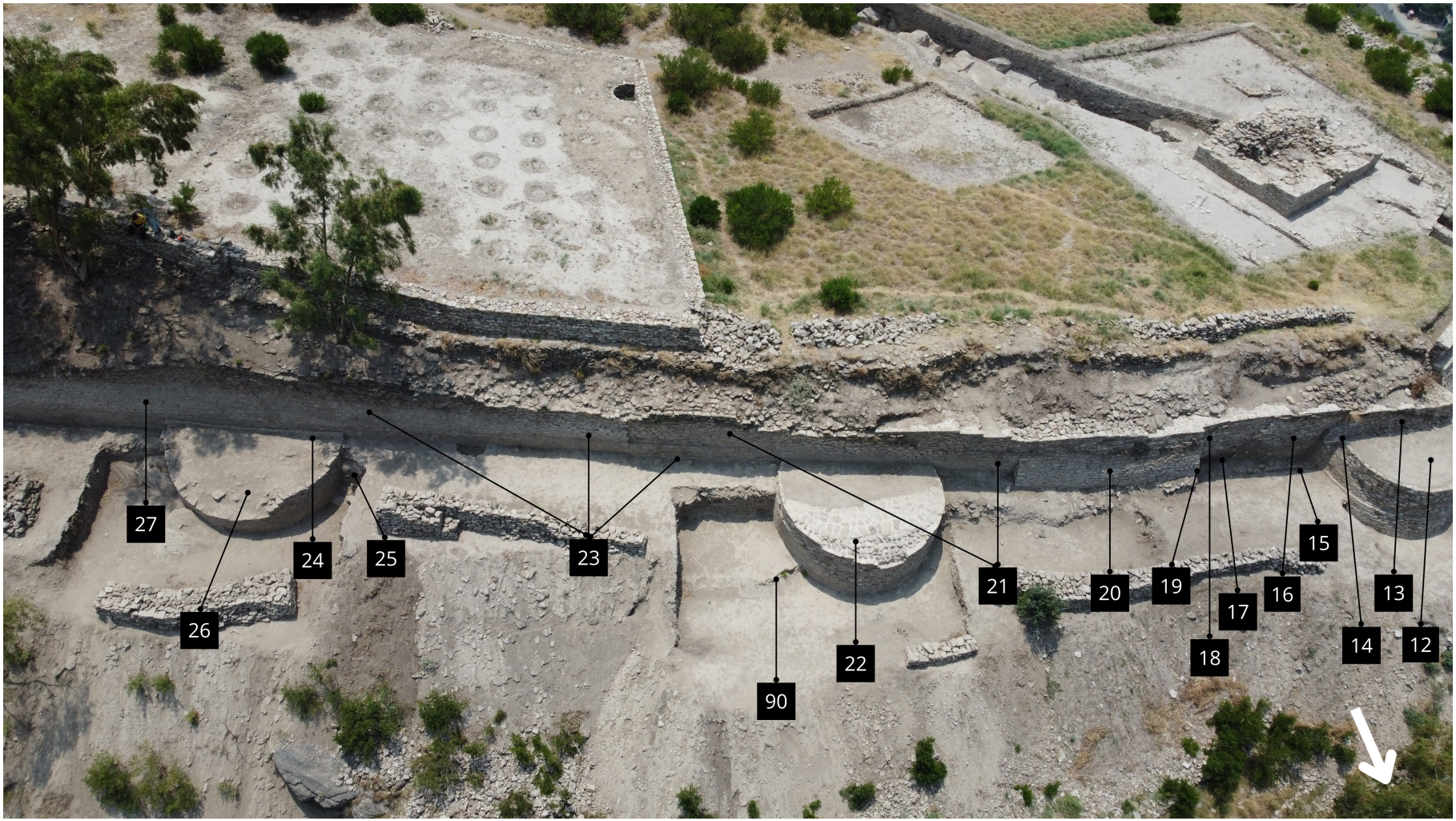


Fig. 47– Aerial view of Terrace W (C)

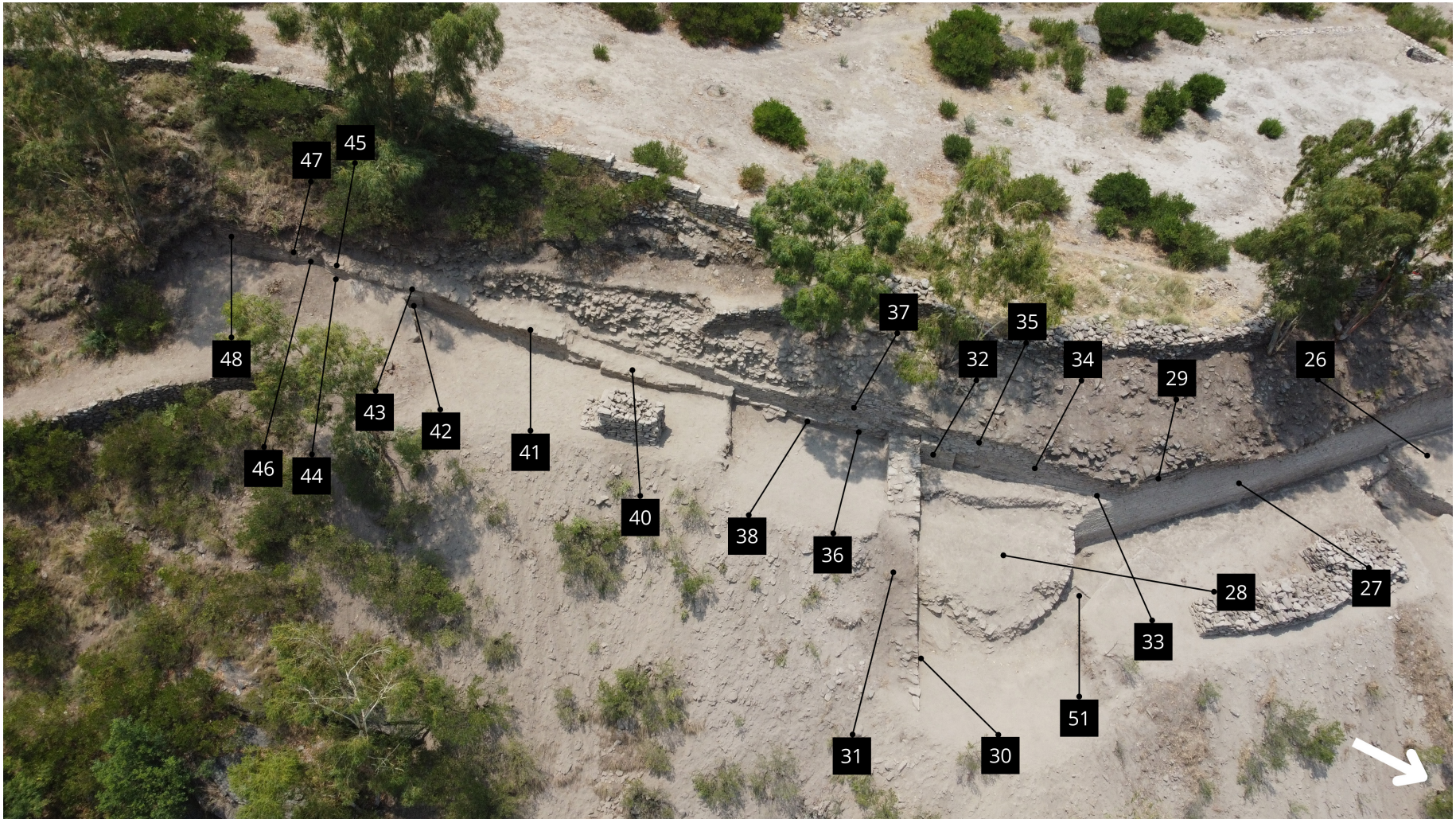


Fig. 48 – Aerial view of Terrace W (E)

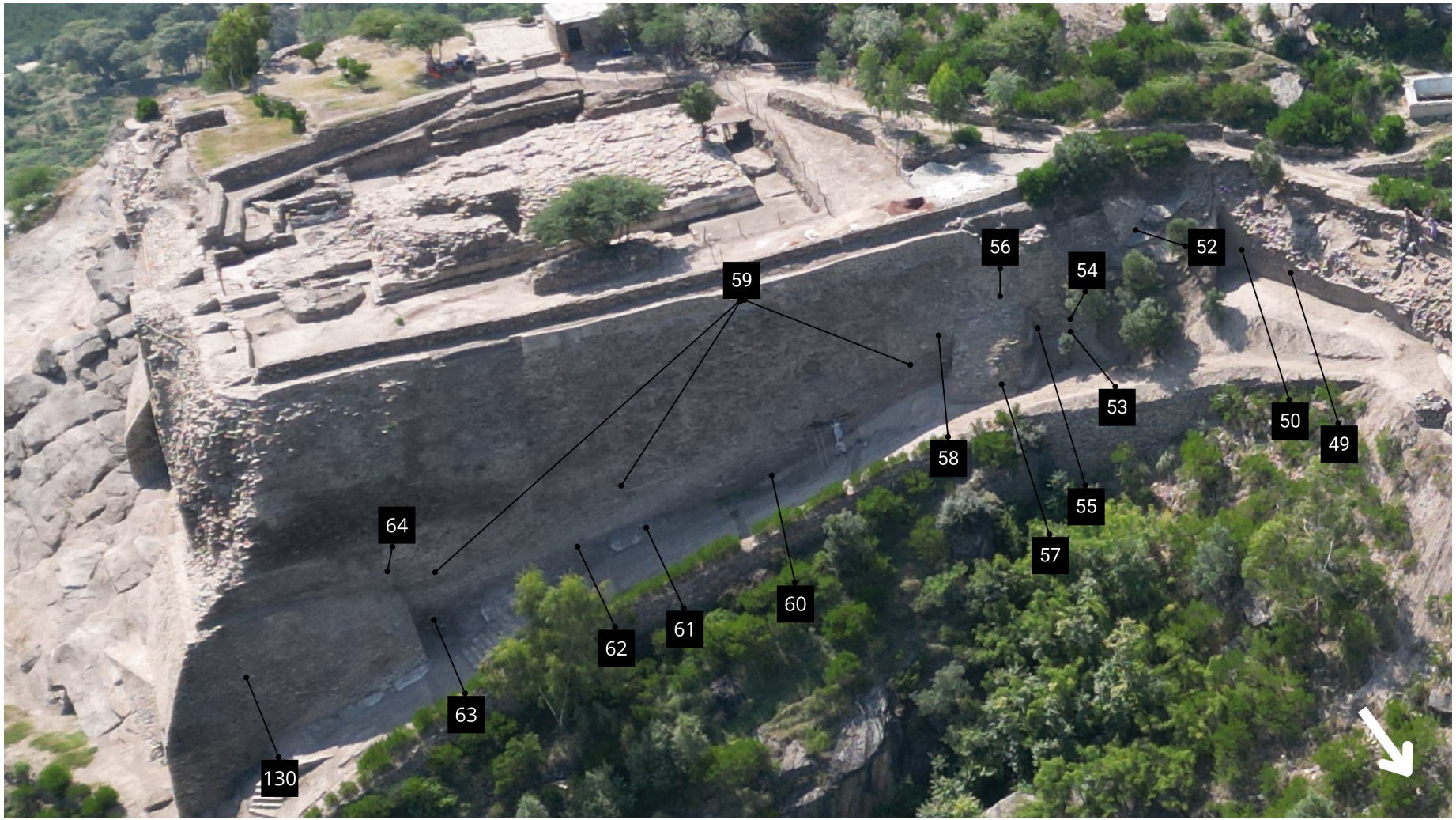


Fig. 49 – Aerial view of Terrace E (N)

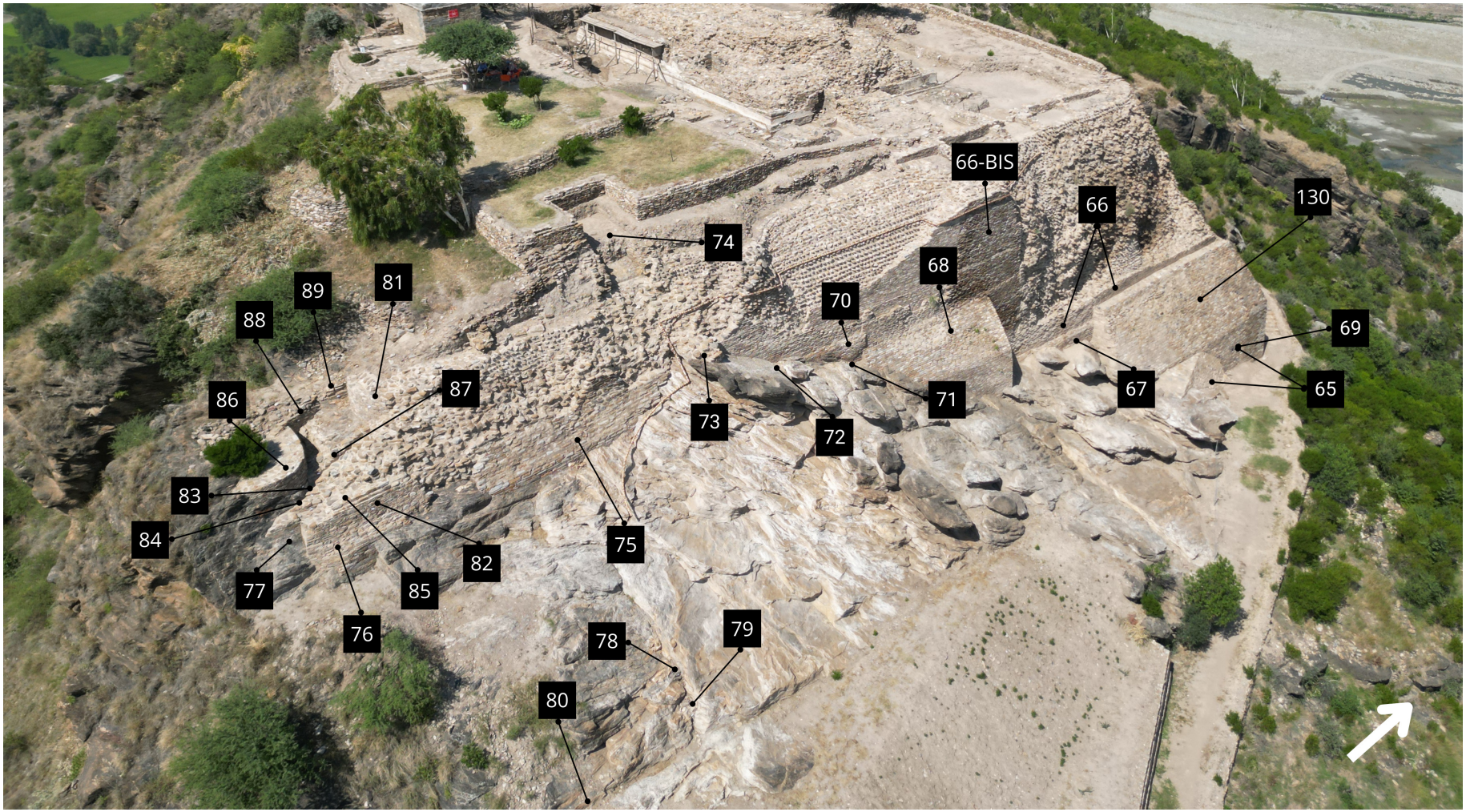


Fig. 50 – Aerial view of Terrace E (E)



Fig. 53 – Location of {2}, BKG 24 W



Fig. 54 – View from the top of {2}, BKG 24 W



Fig. 55 – Location of {3}, from N, BKG 24.1, W side



Fig. 56 – Location of {3}, from S, BKG 24.1, W side



Fig. 57 – View from the top of {3}, BKG 24.1, W side



Fig. 58 – Location of {4}, BKG 24.1, E side



Fig. 59 – View from the top of {4}, BKG 24.1, E side



Fig. 60 – Location of {5}, BKG 24.3, W side

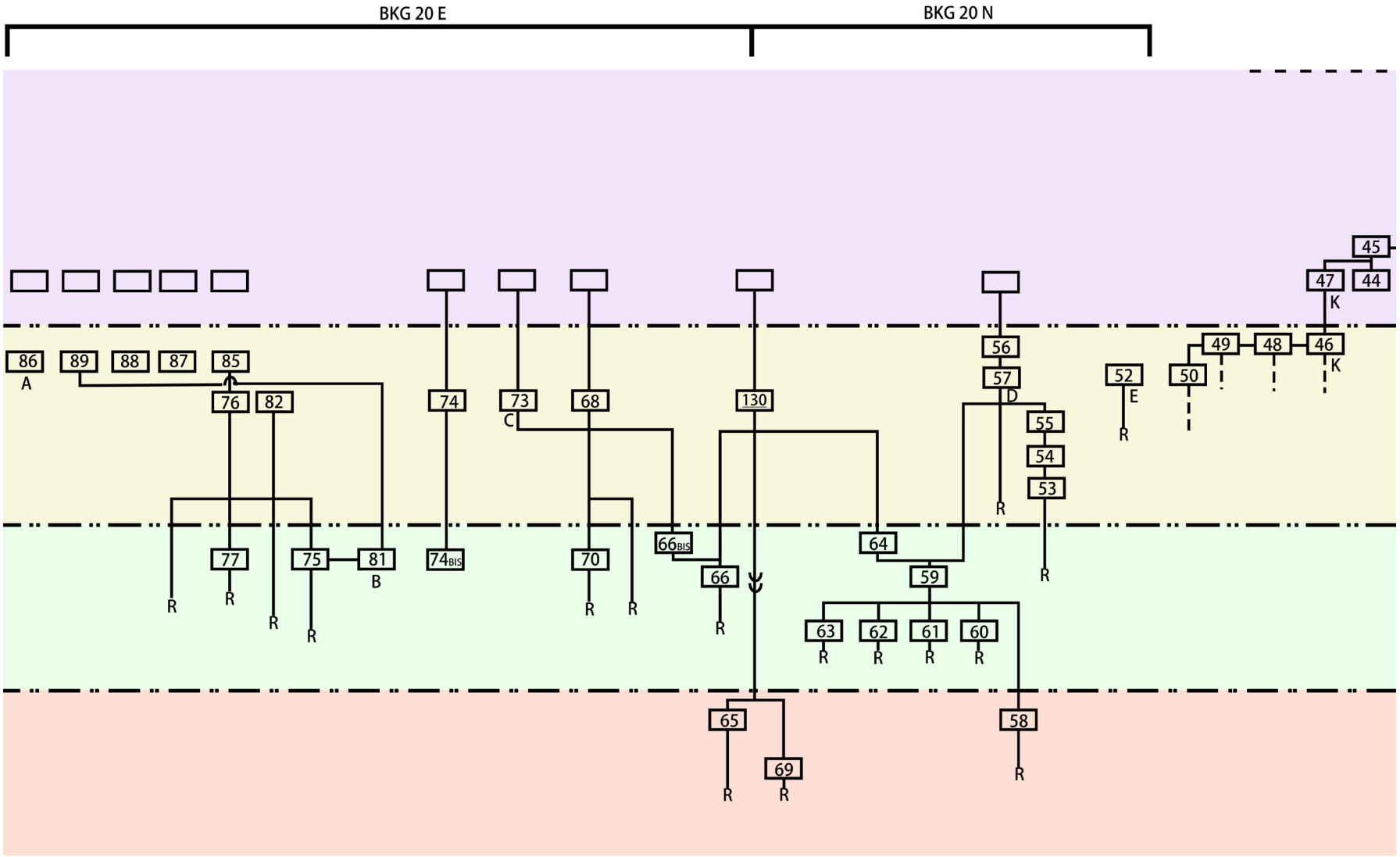


Fig. 51 – Matrix of structures on Terrace W (cf. PLATE XXV)

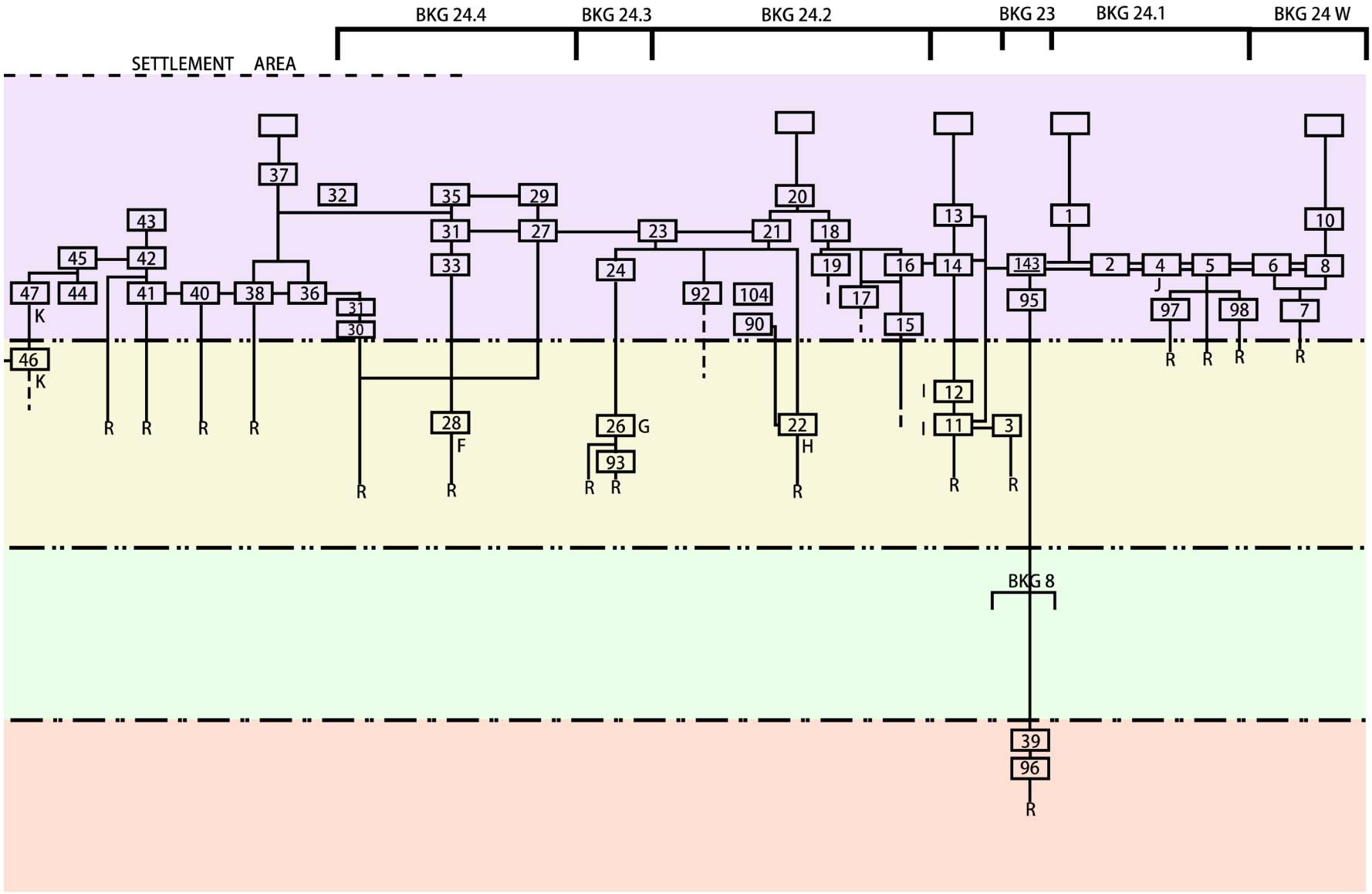


Fig. 52 – Matrix of structures on Terrace E (cf. PLATE XXV)



Fig. 61 – View from the top of {5}, BKG 24.3, W side



Fig. 62 – Location of {6}-{7}-{8}, BKG 24.3, central area



Fig. 63 – View from the top of {6}, bottom of boulder, BKG 24.3, central area



Fig. 64 – View from the top of {7}, BKG 24.3, central area



Fig. 65 – View from the top of {8}, top of boulder, BKG 24.3, central area



Fig. 66 – Location of {9}-{10}-{11}-{12}, BKG 24.3, E side



Fig. 67 – View from the top of {9}, BKG 24.3, E side



Fig. 68 – View from the top of {10}, BKG 24.3, E side



Fig. 69 – Frontal view of {11}, BKG 24.3, E side



Fig. 70 – View from the top of {12}, beside {10}, BKG 24.3, E side



Fig. 71 – Frontal view of {12}, bottom of boulder, BKG 24.3, E side



Fig. 72 – Location of {13.1}, BKG 24.4, N side Bastion F [28]



Fig. 73 – View from the top of {13.1}, BKG 24.4, N side Bastion F [28]



Fig. 74 – Location of {13.2}, BKG 24.4, Bastion F [28] (Aerial view)



Fig. 75 – View from the top of {13.2}, BKG 24.4, Bastion F [28]



Fig. 76 – Location of {14}, BKG 24.5, central area



Fig. 77 – View from the top of {14}, BKG 24.5, central area



Fig. 78 – Aerial view of the boulder on which {15} is



Fig. 79 – View from the top of {15}, BKG 20 E, Terrace E



Fig. 80 – Aerial view of the boulder on which {15} and {16} rest



Fig. 81 – View from the top of {16}, BKG 20 E, Terrace E



Fig. 82 – Aerial view of the boulder on which {17} rests



Fig. 83 – View from the top of {17}, BKG 20 E, Terrace E



Fig. 84 – Aerial view of the boulder on which {18} rests



Fig. 85 – View from the top of {18}, BKG 20 E, Terrace E



Fig. 86 – Location of {19}, BKG 20 E. Bottom of Terrace E.



Fig. 87 – Detail: little-size cup-mark of {19}, BKG 20 E, Terrace E



Fig. 88 – Aerial view of the boulder on which {20} rests



Fig. 89 – View from the top of {20}, BKG 20 E, Terrace E



Fig. 90 – Aerial view of the boulder on which {21} rests



Fig. 91 – View from the top of {21}, BKG 20 E, Terrace E



Fig. 92 – Aerial view of the boulder on which {22} rests



Fig. 93 – View from the top of {22}, BKG 20 E, Terrace E



Fig. 94 – Aerial view of the boulder on which {23} rests



Fig. 95 – View from the top of {23}, BKG 20 E, Terrace E



Fig. 96 – View from the top of {24}, BKG 20 E, Terrace E



Fig. 100 – Location of {25}, on a boulder inside BKG 9, Terrace W



Fig. 101 – Detail: two little cup-marks, BKG 9, Terrace W

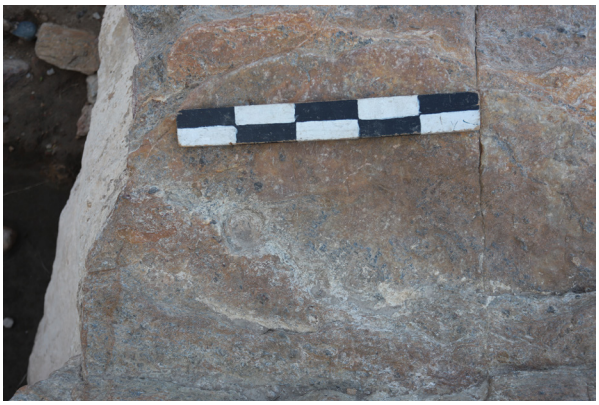


Fig. 102 – Detail: single little cup-mark, BKG 9, Terrace W



Fig. 97 – Location of {174.2}, inside Terrace W



Fig. 98 – View from the top of {174.2}, Terrace W



Fig. 99 – View from N of {174.2}, Terrace W

II.3.3 - TRENCH BKG 24.1 (M. Minardi, M. Prota)



Fig. 1 – General view of Terrace W. In the foreground BKG 24.1 after the clearance of the topsoil.



Fig. 2 – The clearance of the army trench at the bottom of the slope of BKG 24.1



Fig. 3 – General view from NNE of BKG 24.1 and BKG 23, separated by the enclosure wall 143, at the end of the archaeological works at BKG 24.1



Fig. 4 – Tombs T 298 and T 299 viewed from the south of (Phase 0)



Fig. 5 – BKG 11854



Fig. 6 – Tomb T 244/S 247 (Phase 2)



Fig. 7 – Tomb T 92/S 206 during excavation (detail of the 3D model); to note the animal bones placed behind the head (Phase 3)



Fig. 8 – Funerary items associated with skeleton S211 (Phase 3; inv. no. BKG 11632)



Fig. 9 – Skeleton S 242 during excavation (Phase 4); note the animal tooth posed on a stone above the sternum, and a second animal bone close to the head tilted toward the east.



Fig. 10 – Skeleton S 47 (Phase 6b) viewed with the still unopened Tomb T23 (S49) and S 48 of Phase 6. Wall [143] is in the foreground.



Fig. 11 – BKG 11505



Fig. 12 – BKG 12002



Fig. 13 – BKG 11945

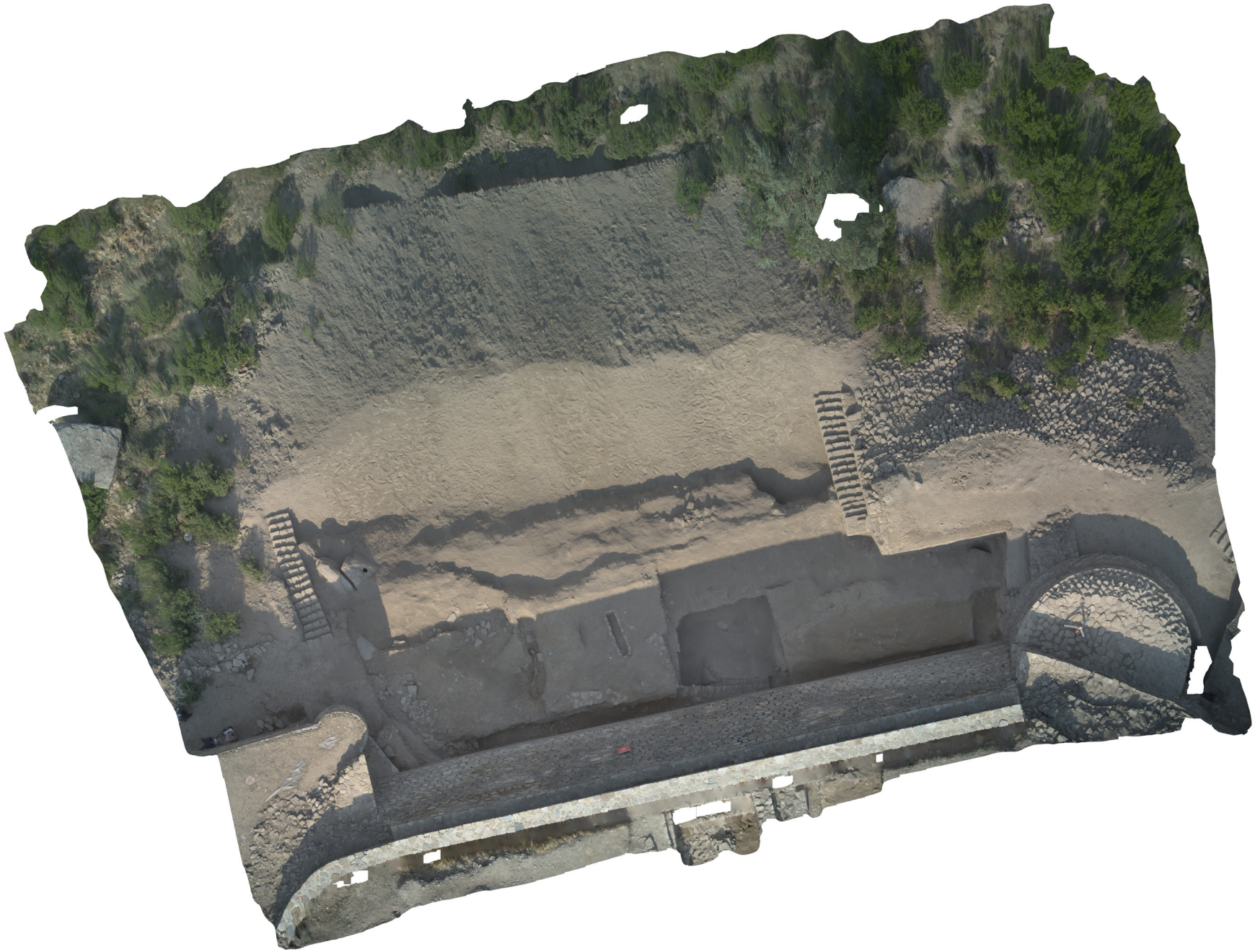


Fig. 14 – BKG 24.1: photomosaic 20 October 2024 (MM)



Fig. 15 – BKG 24.1: photomosaic 22 October 2024 (MM) [N to the top].



Fig. 16 – BKG 24.1: photomosaic 27 October 2024 (MM) [N to the top].



Fig. 17 – BKG 24.1: photomosaic 30 October 2024 (MM) [N to the top].

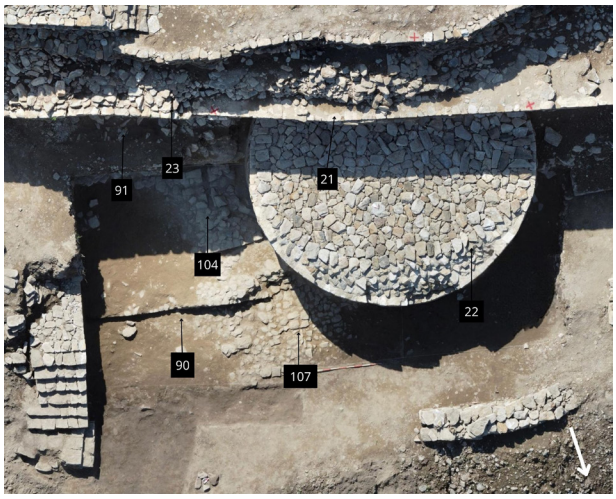


Fig. 1 – Trench BKG 24.2 at the beginning of excavation

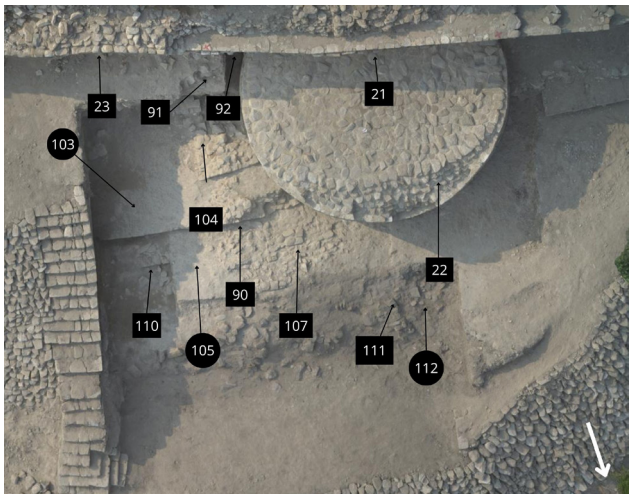


Fig. 2 – Trench BKG 24.2 at the end of excavation

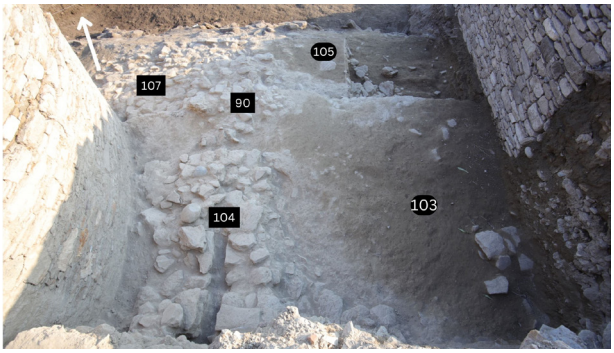


Fig. 3 – Trench BKG 24.2: the drain [104] and related structures

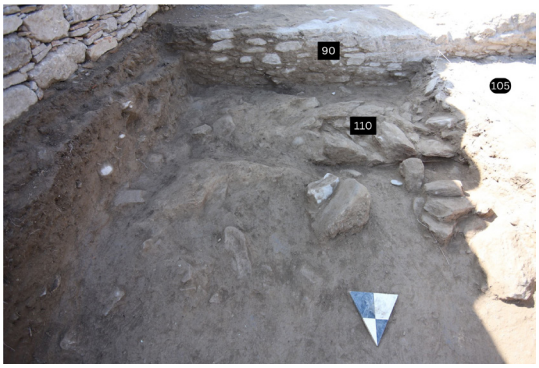


Fig. 4 – Trench BKG 24.2: the wall strand [110]



Fig. 5 – Trench BKG 24.2: settled collapse [111]



Fig. 6 – Trench BKG 24.3 at the beginning of excavation



Fig. 7 – Trench BKG 24.4 at the beginning of excavation



Fig. 8 – Trench BKG 24.3: collapse [115]



Fig. 9 – Trench BKG 24.3: wall [93]



Fig. 10 – Trench BKG 24.3: depression (124)



Fig. 11 – Trench BKG 24.4: layer (126)



Fig. 12 – Trench BKG 24.4: grave [127]



Fig. 13 – Grave T 127

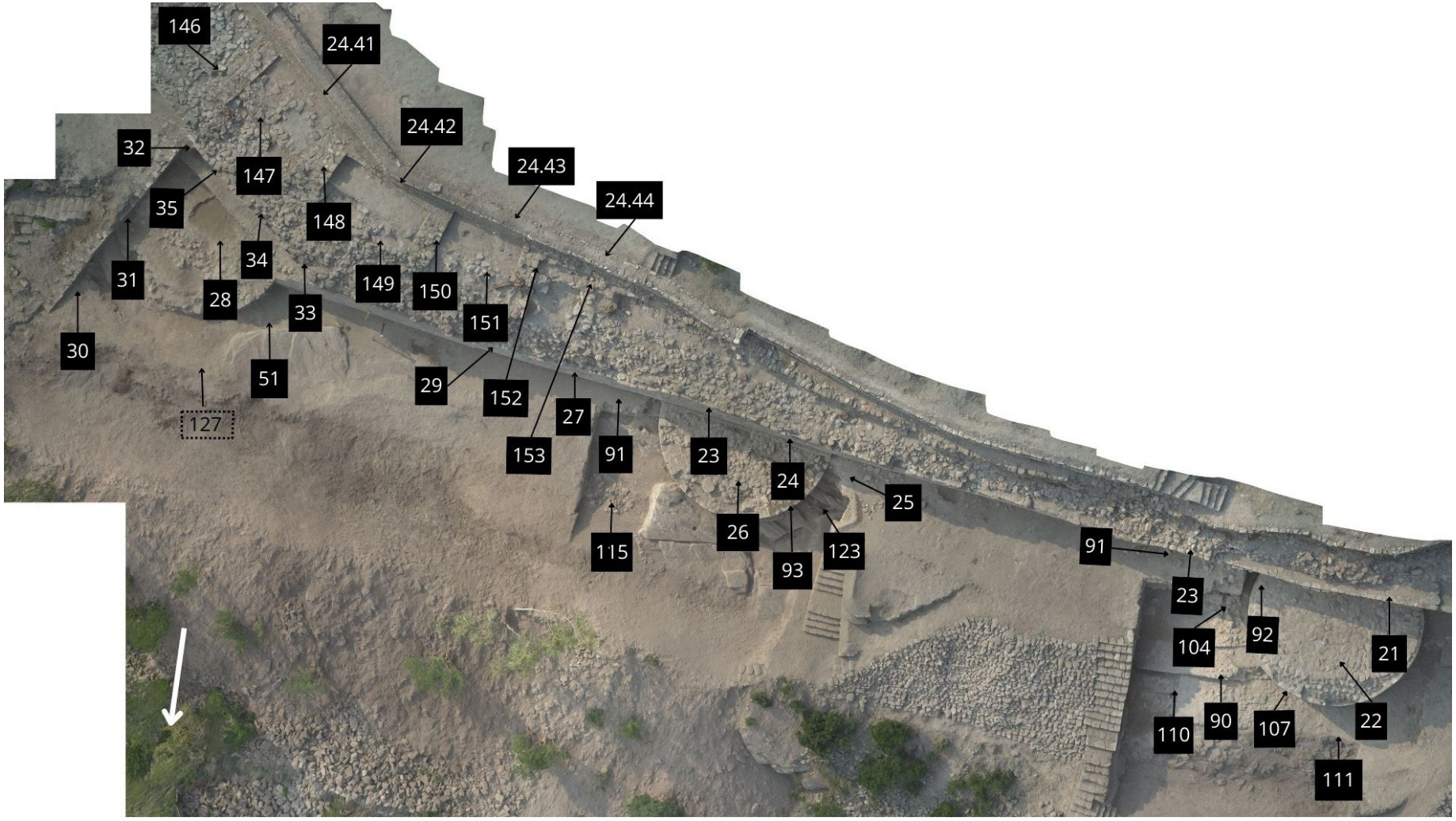


Fig. 14 – Trenches BKG 24.3 – 24.4: final phases of the dig; the end of excavation (with loci BKG 24.41, 24.42, 24.43, 24.44) [N to the bottom].

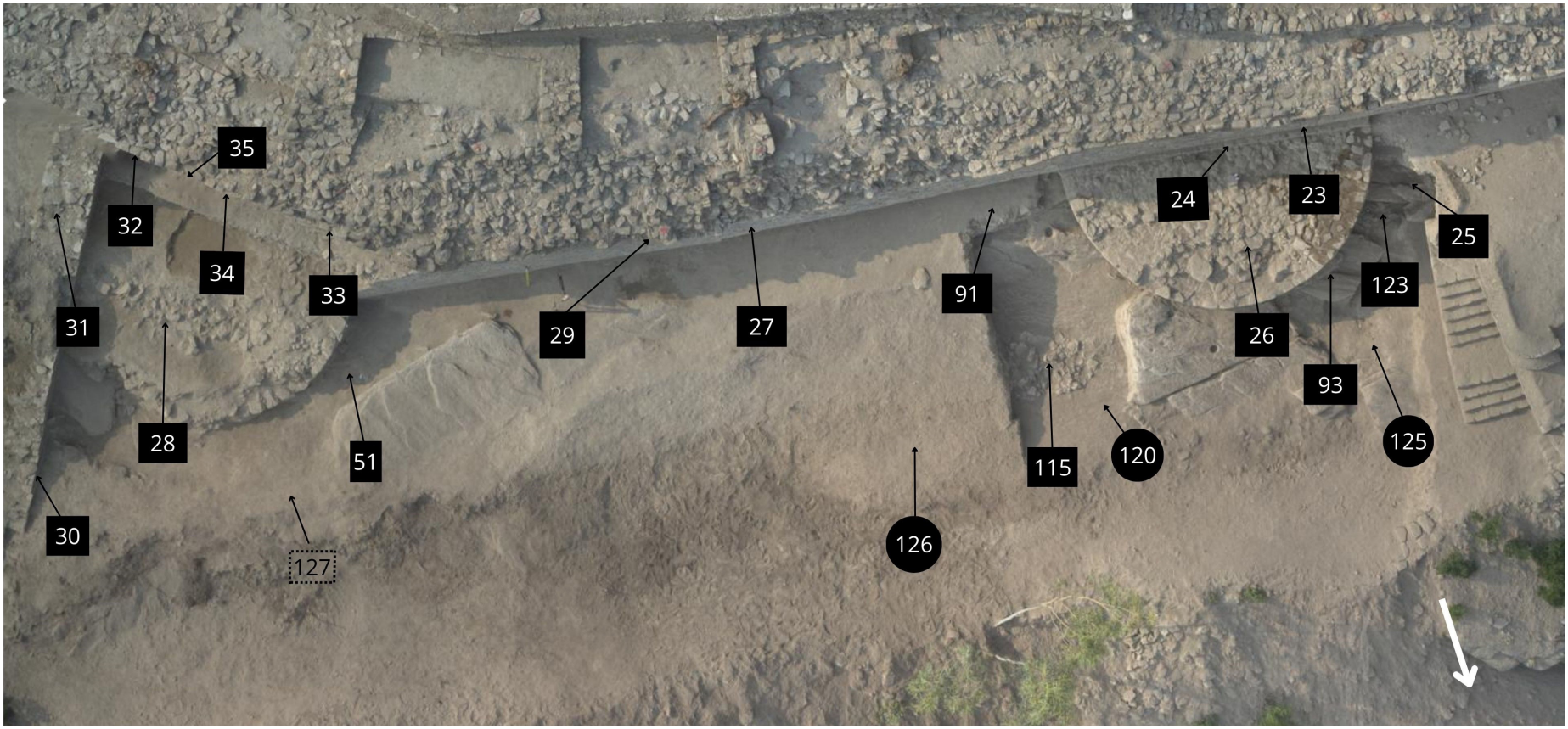


Fig. 15 – Trenches BKG 24.3-24.4 the end of excavation [N to the bottom]

II.3.5 - TRENCH BKG 24.5 (Nasir Muhmood, Kaisar Rahman)



Fig. 1 – TT 24.5



Fig. 2 – Layer (1) and collapse (2)



Fig. 3 – Drain [8]





Fig. 4 – Wall [161] (after Olivieri 2003a: pl. XXIII)



Fig. 5 – Pit 3 in layer (5)



Fig. 6 – The two boulders



Figs 7 – Final situation in TT 24.5



Figs 8 – Final situation in TT 24.5

II.3.6 - TRENCH BKG 23 (Li Hong)



Fig. 1 – BKG 23 N before Excavation



Fig. 3 – The substruction of wall 143



Fig. 4 – TT 235, Period 1

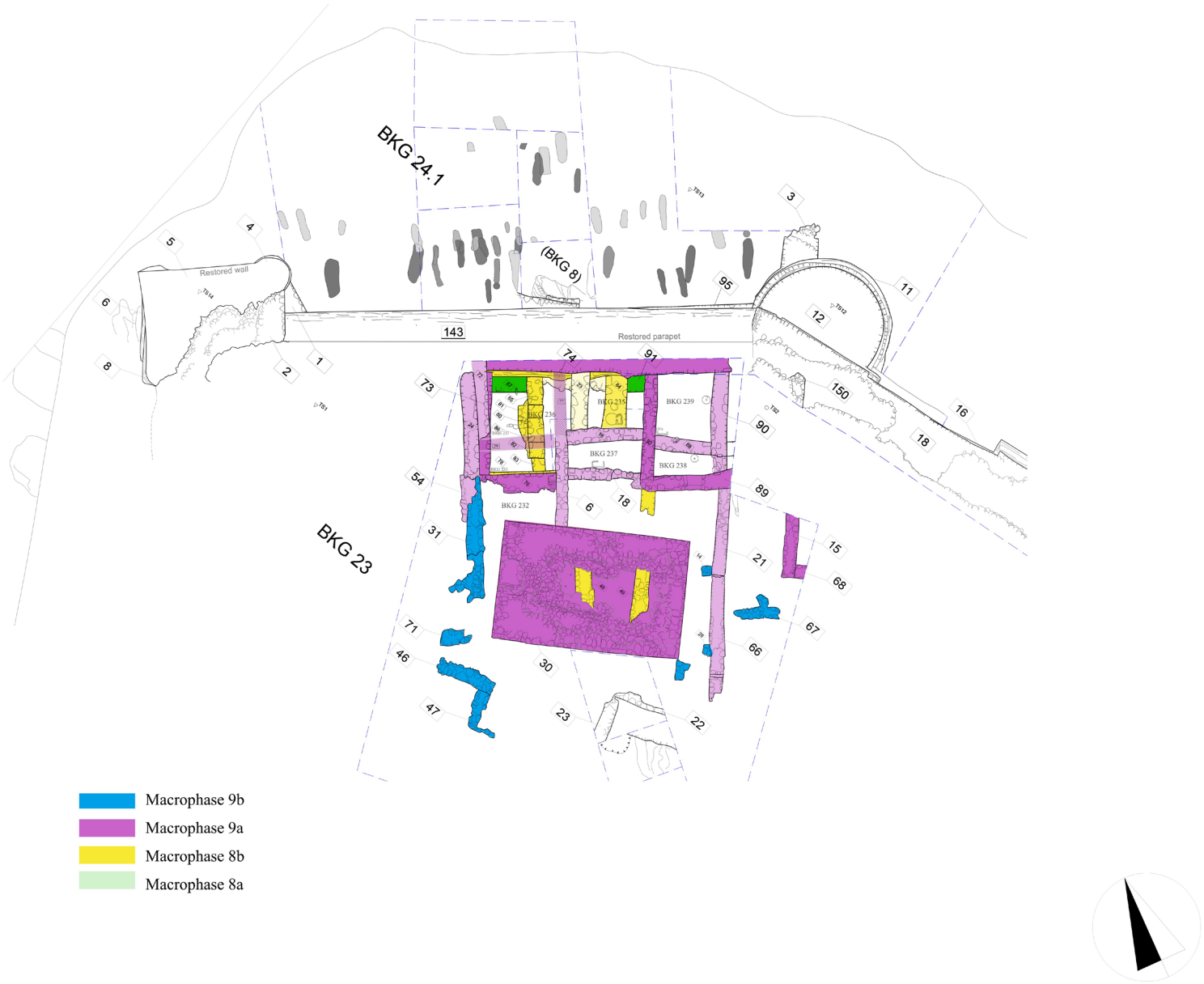


Fig. 2 – BKG 23 N structural plan. Drawing by MM.

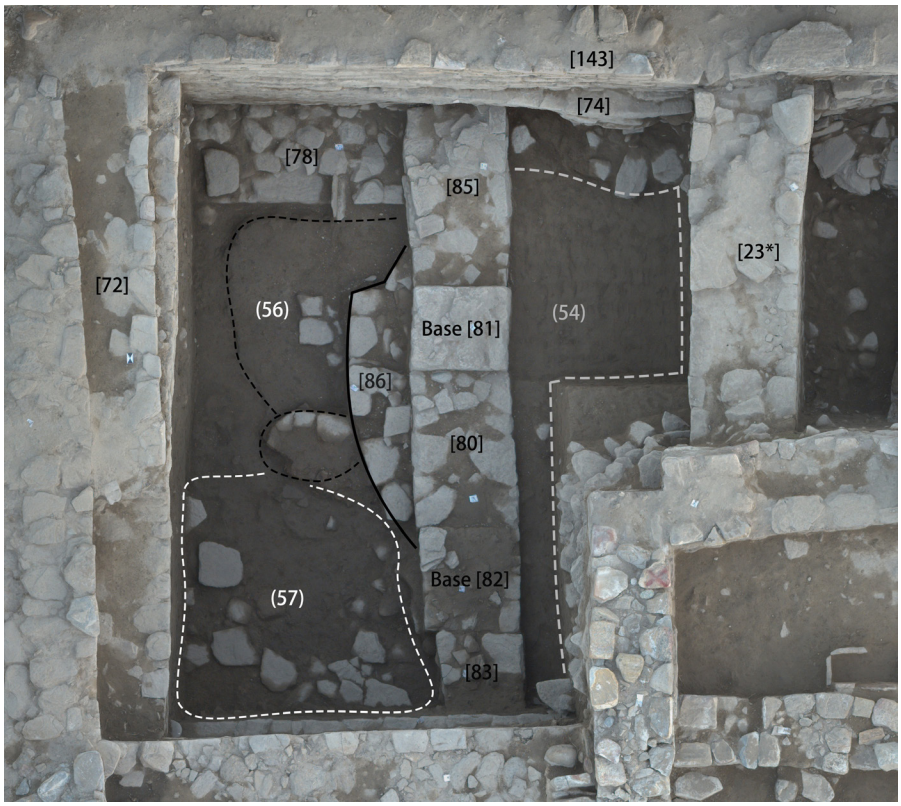


Fig. 5 – BKG 236, Period 3

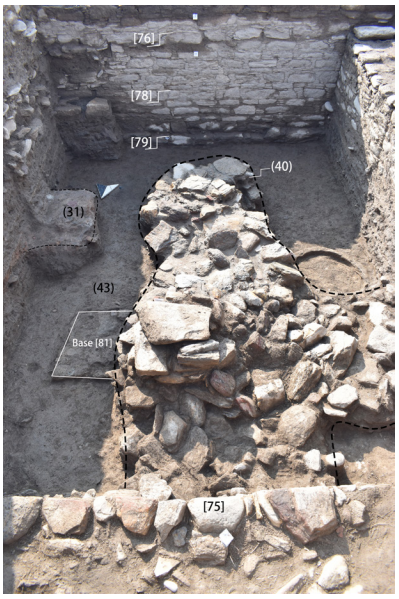


Fig. 6 – BKG 236, Period 5, Stone collapse

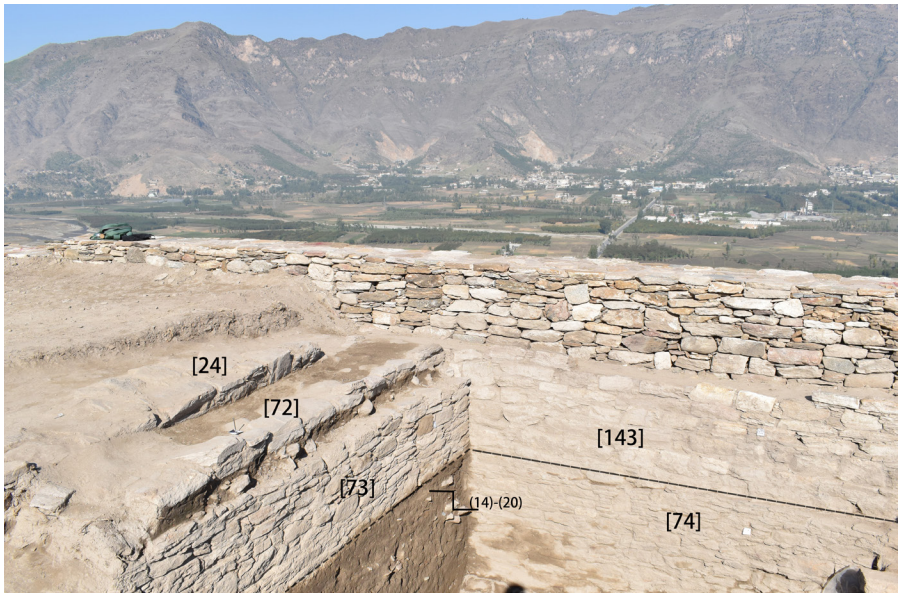


Fig. 7 – BKG 236, Period 7 (walls of Period 7-8)



Fig. 8 – BKG 231 E, the base of wooden pillar



Fig. 9 – BKG 235, Period 6

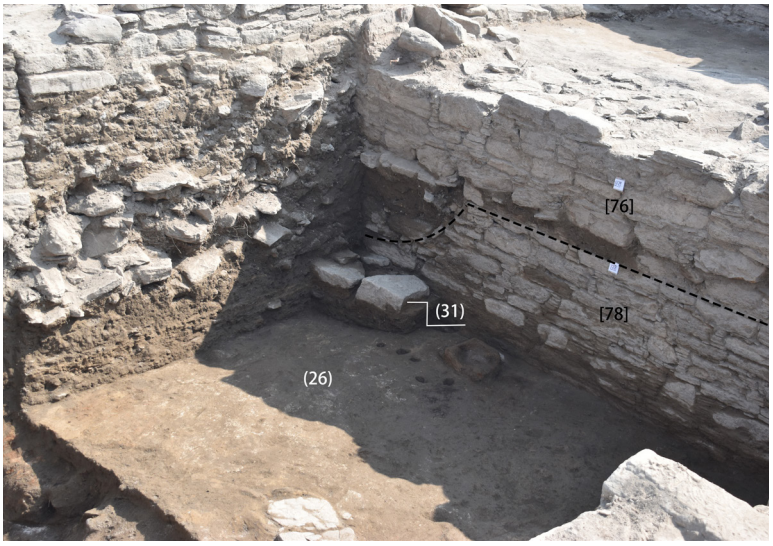


Fig. 10 – BKG 236, Period 7, the doorway of Room BKG 236



Fig. 11 – BKG 235, Period 8



Fig. 12 – BKG 23, Period 9, Platform [30]

Chapter III

MATERIAL CULTURE



Fig. 1 – BKG 4960



Fig. 2 – BKG 5107



Fig. 3 – BKG 5141



Fig. 4 – BKG 5143



Fig. 5 – BKG 5144



Fig. 6 – BKG 5145



Fig. 7 – BKG 5146



Fig. 8 – BKG 5147



Fig. 9 – BKG 5255.

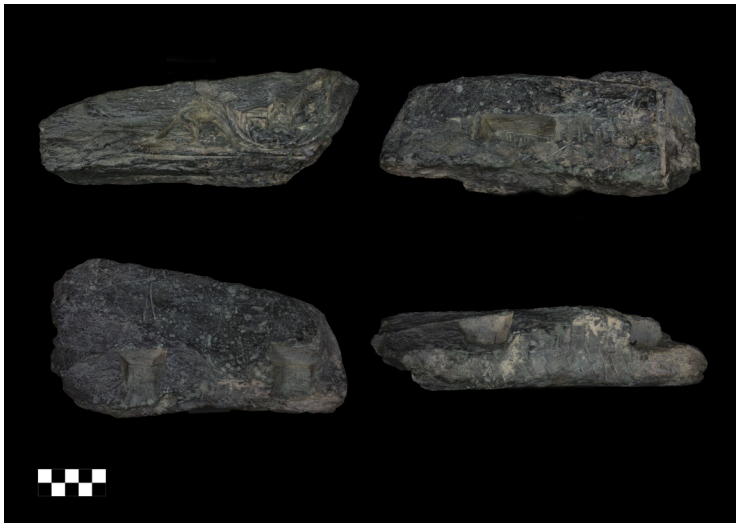


Fig. 10 – BKG 5386

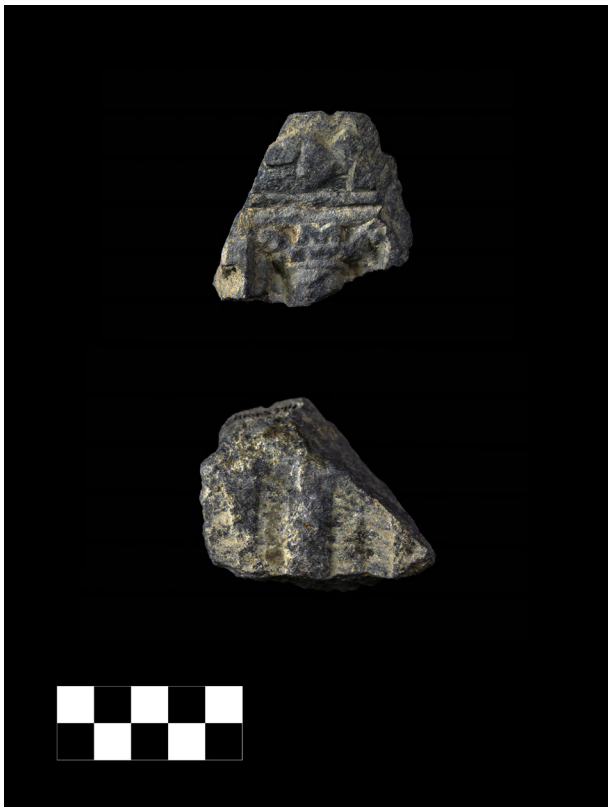


Fig. 11 – BKG 5394



Fig. 12 – BKG 11986



Fig. 13 – BKG 12056



Fig. 14 – BKG 12079



Fig. 15 – BKG 9649 (h. 4.8, l. 4.4., w. 1.8).



Fig. 16 – BKG 10039



Fig. 17 – BKG 11377



Fig. 18 – BKG 11378



Fig. 19 – BKG 11379



Fig. 20 – BKG 11380



Fig. 22 – BKG 11381



Fig. 21 – BKG 11477



Fig. 24 – BKG 11971



Fig. 23 – BKG 11234



Fig. 1 – BKG 2047



Fig. 2 – BKG 2044



Fig. 3 – BKG 6379



Fig. 4 - BKG 12018



Fig. 5 – BKG 5869



Fig. 6 – BKG 5429



Fig. 7 – BKG 5430





Fig. 8a-b – BKG 5430



Fig. 9 – BKG 11359



Fig. 10 – BKG 11360



Fig. 11 – Viṣṇu Anantaśayana. Dashavatara Temple, Deogarh, India, 6th century. Photo by Ismoon. CC BY-SA 4.0



Fig. 12 – BKG 1346.

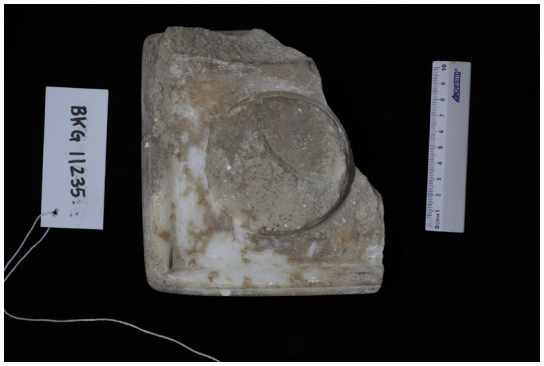


Fig. 13 – BKG 11235

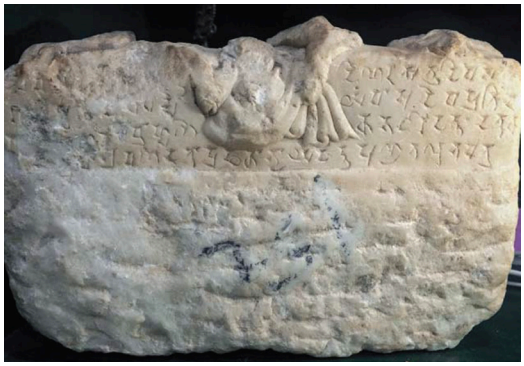


Fig. 14 – Base with Brāhmī inscription (after Salomon 2018: fig. 4)



Fig. 15 – Buddhist rock sculpture with Bodhisattvas and Buddha (Inv. Rep. C117)



Fig. 16 – Buddhist rock sculpture with Padmapāṇi and Maitreya (Inv. Rep. C118)



Fig. 17 – Rock sculpture C117 = DD_025 (Photo courtesy CPF project)



Fig. 18 – Rock sculpture C118 = DD_026 (Photo courtesy CPF project)



Fig. 1 – BKG 5784



Fig. 2 – BKG 5737



Fig. 3 – BKG 1955

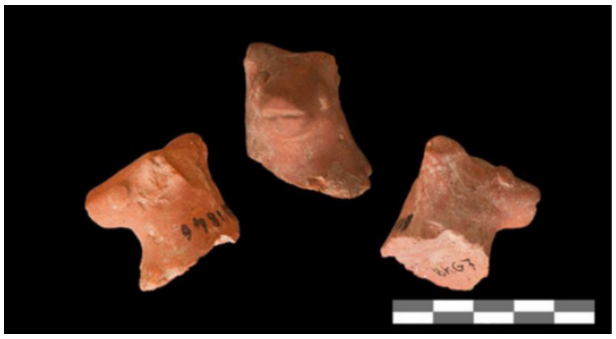


Fig. 4 – BKG 1846



Fig. 5 – BKG 4706



Fig. 6 – BKG 11286



Fig. 7 – BKG 4767



Fig. 8 – BKG 5042



Fig. 9 – BKG 1208



Fig. 10 – BKG 1205



Fig. 11 – BKG 4663



Fig. 12 - BKG 4617



Fig. 13 – BKG 5755



Fig. 14 – BKG 5660



Fig. 15 – BKG 5810



Fig. 16 – BKG 5821



Fig. 17 – BKG 5771



Fig. 18 – BKG 3428

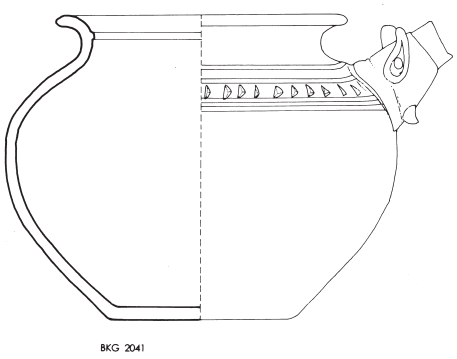


Fig. 1 – Example of CF 2 Śāhi spouted jugs, with zoomorphic spout, not to scale. (BKG 2041; Trench BKG 6; Macrophase 8b)



Fig. 2 – Example of Early Islamic CF 2 spouted jug with schematic spout, impressed decoration, with thumb stop. (BKG 11229; Trench BKG 6; Macrophase 9a)



Fig. 3 – Group a): appliqued circular eyes, pierced at the center



Fig. 4 – Group b): appliqued tear-drop shaped eyes, pierced at the center



Fig. 5 – Group c): Stylized zoomorphic spouts, with or without thumb-stop



Fig. 6 – Group d): Stylized zoomorphic spouts, with incised decoration



Fig. 7 – Group e): Zoomorphic spouts with an oval hole and pointed circular eyes

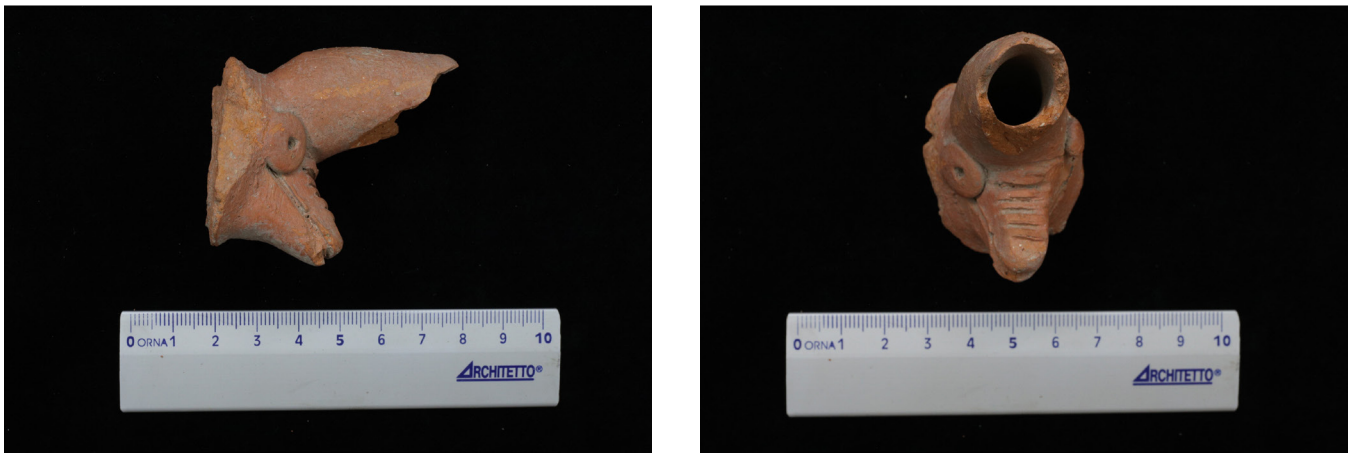


Fig. 8 – BKG 12142. Left: lateral view. Right: view from the top



Fig. 9 – BKG 12140. Left: frontal view. Right: lateral view

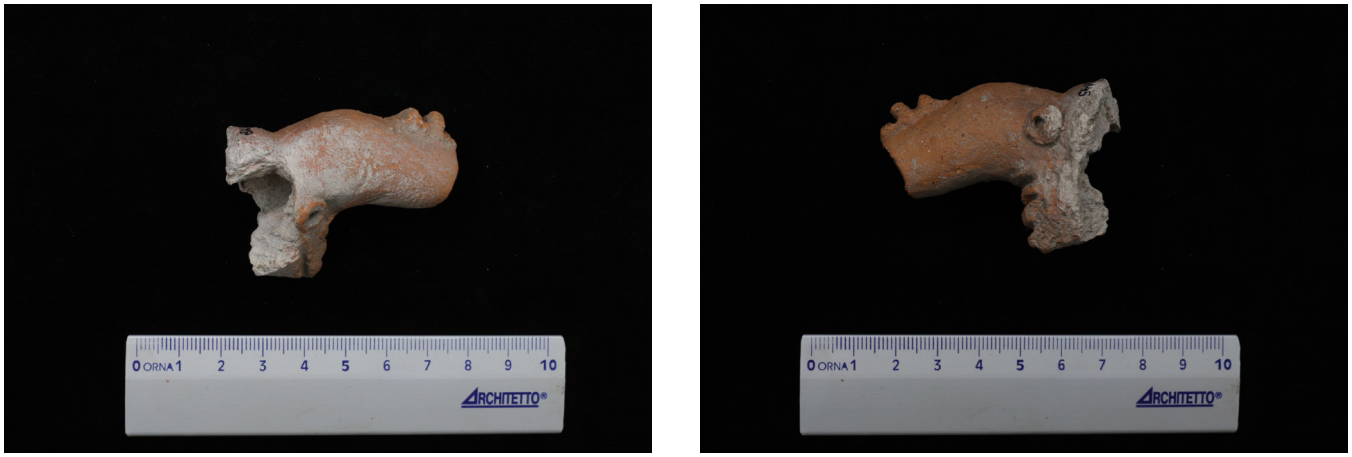


Fig. 10 – BKG 12145. Left: left side. Right: right side



Fig. 11 – BKG 12151. Left: lateral view. Right: view from the top



Fig. 12 – Horse-shaped spouts. From left to right: BKG 12150, BKG 12152, BKG 12153

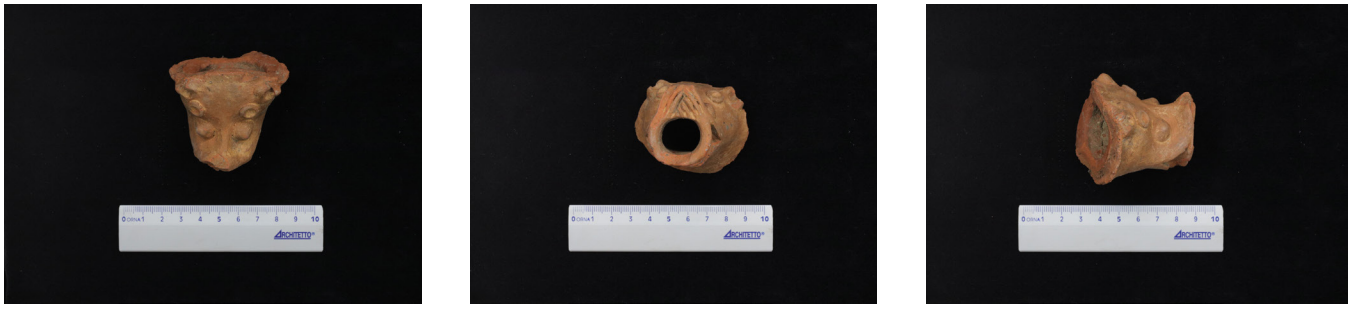


Fig. 13 – BKG 11916. From left to right: aerial view, frontal view, lateral view

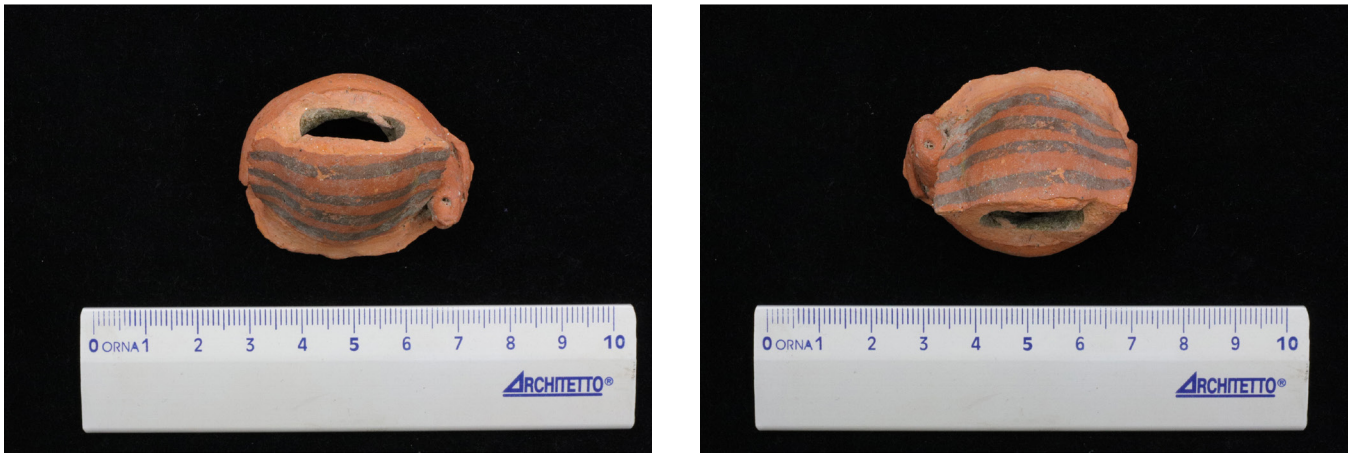


Fig. 14 – BKG 12082



Fig. 15 – BKG 12137. From left to right: frontal view, lateral view, aerial view



Fig. 16 – Terracotta figurine, human: head, BKG 4617

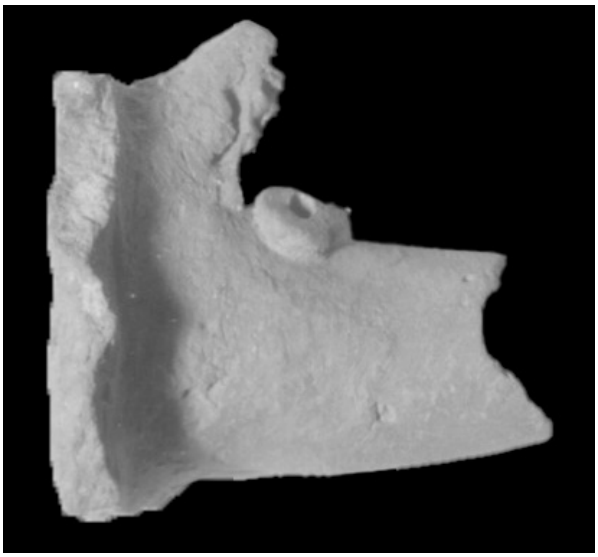


Fig. 17 – RGM 359. Zoomorphic spout of group one, not to scale



Fig. 18 – RGM NON-INV 15342 (a) and RGM NON-INV 15342 (b). Kuza with zoomorphic spouts and impressed decoration, not to scale (Bagnera 2015: fig. 119)

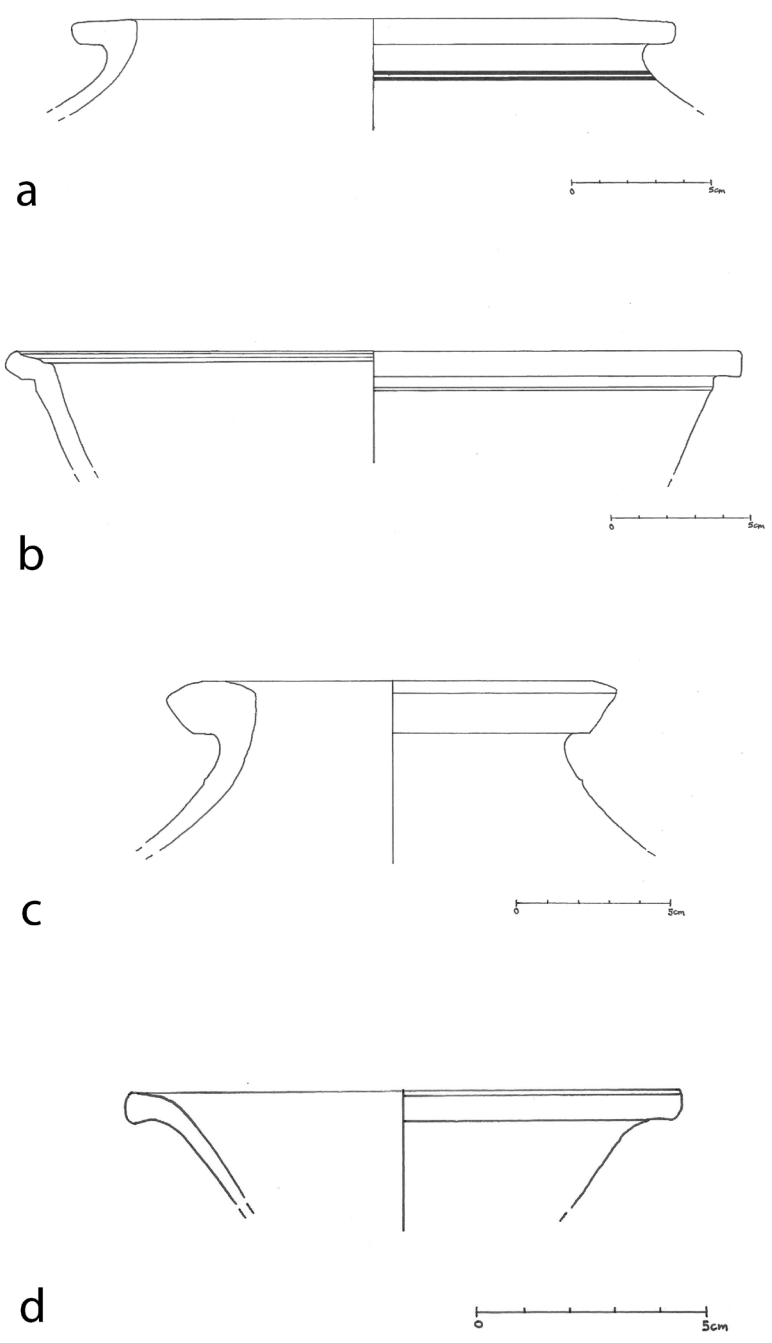


Fig. 1

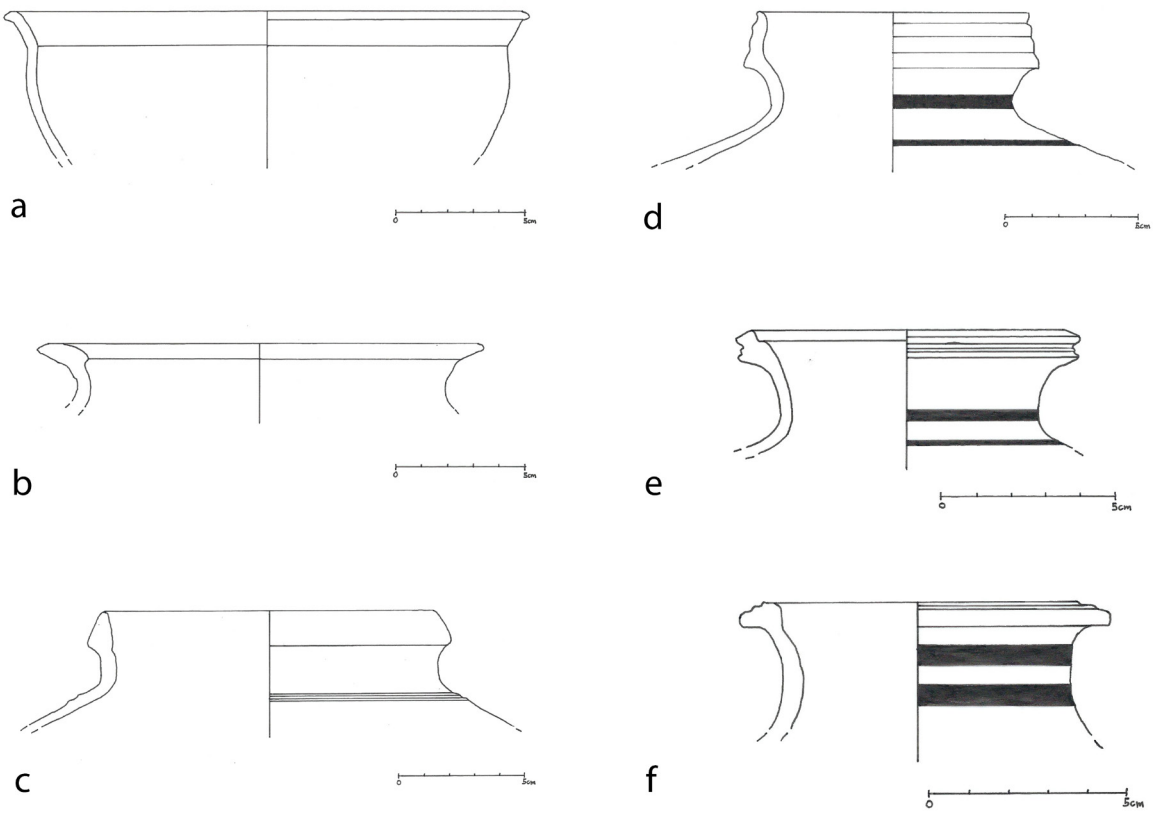

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Fig. 2

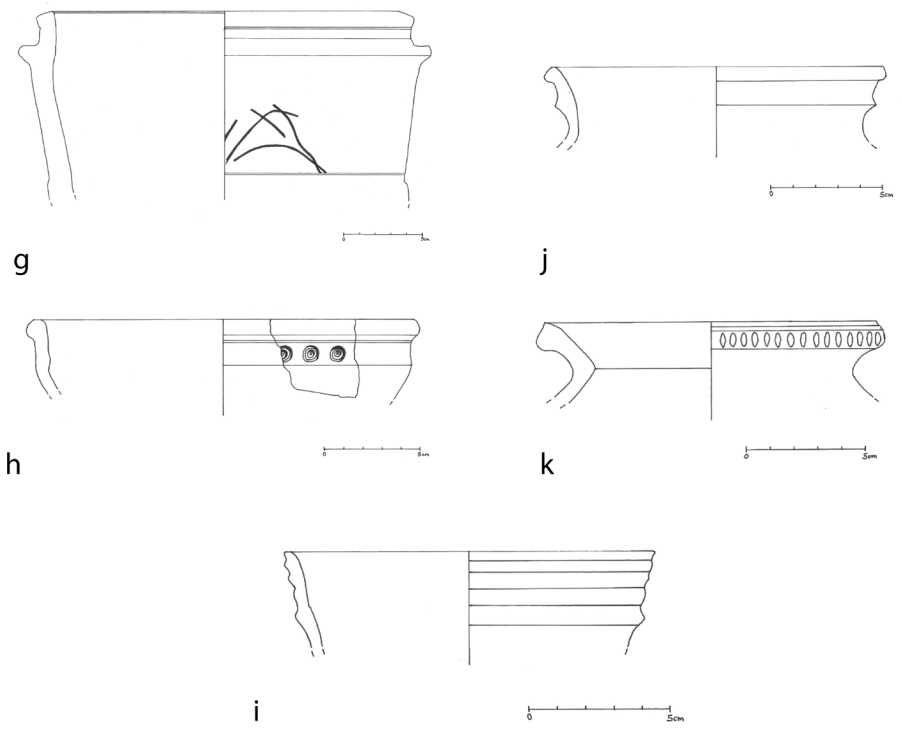
g
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Fig. 3

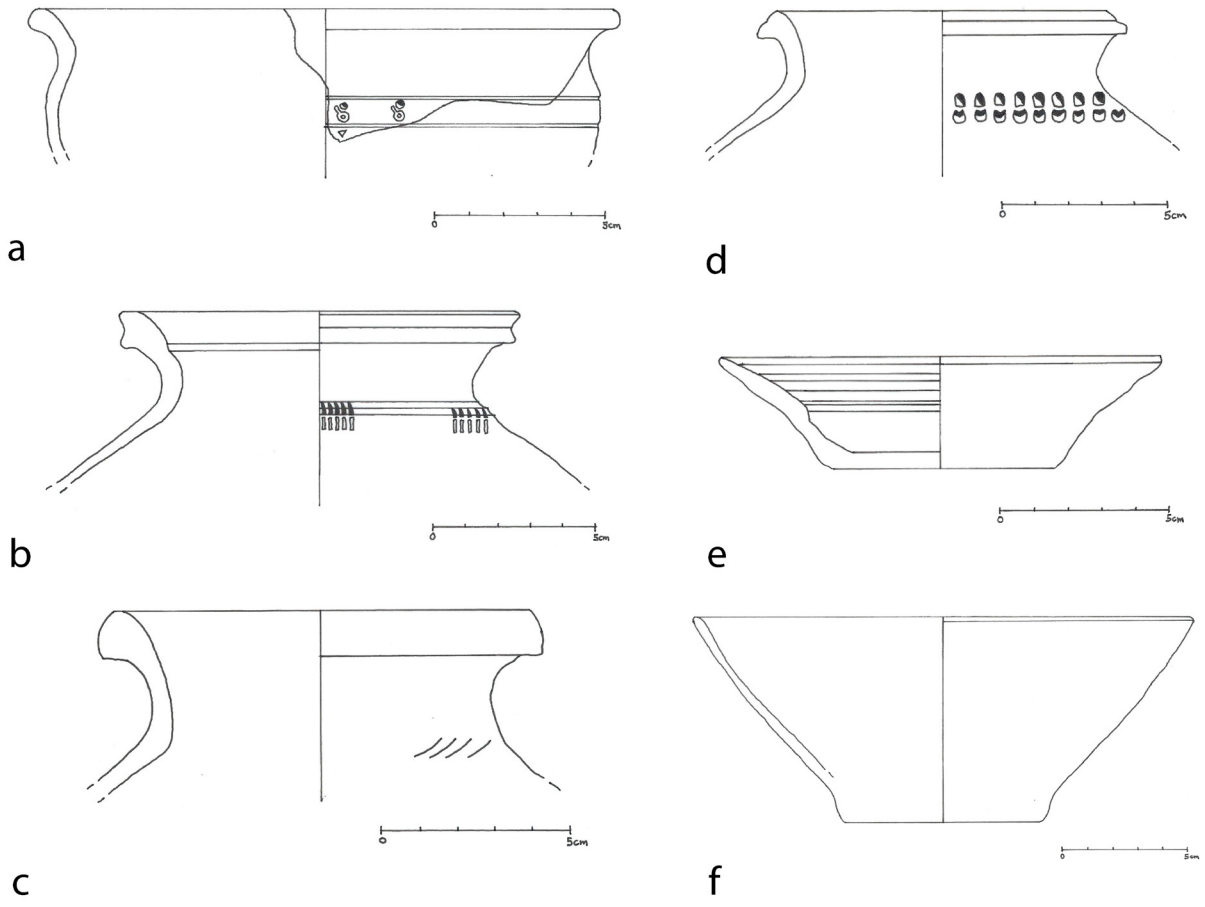
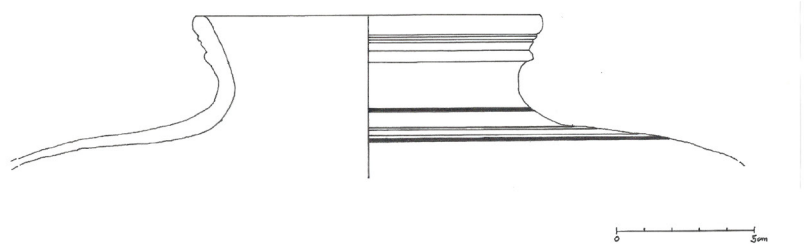
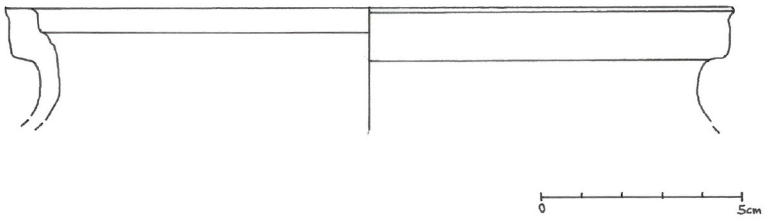


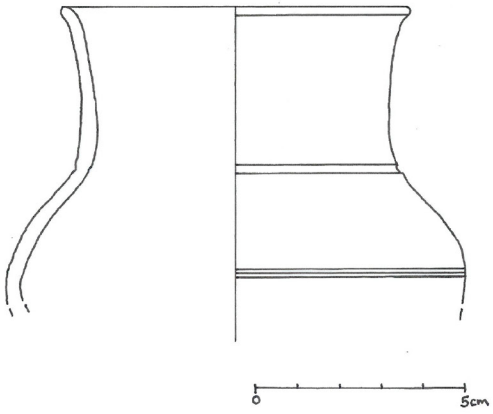
Fig. 4



g



h



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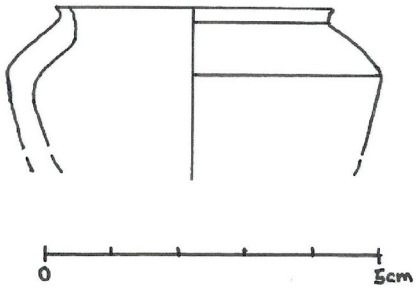


j

Fig. 5



Fig. 1 – Token reshaped from an underglaze painted bowl, BKG 11365 (photo MP)

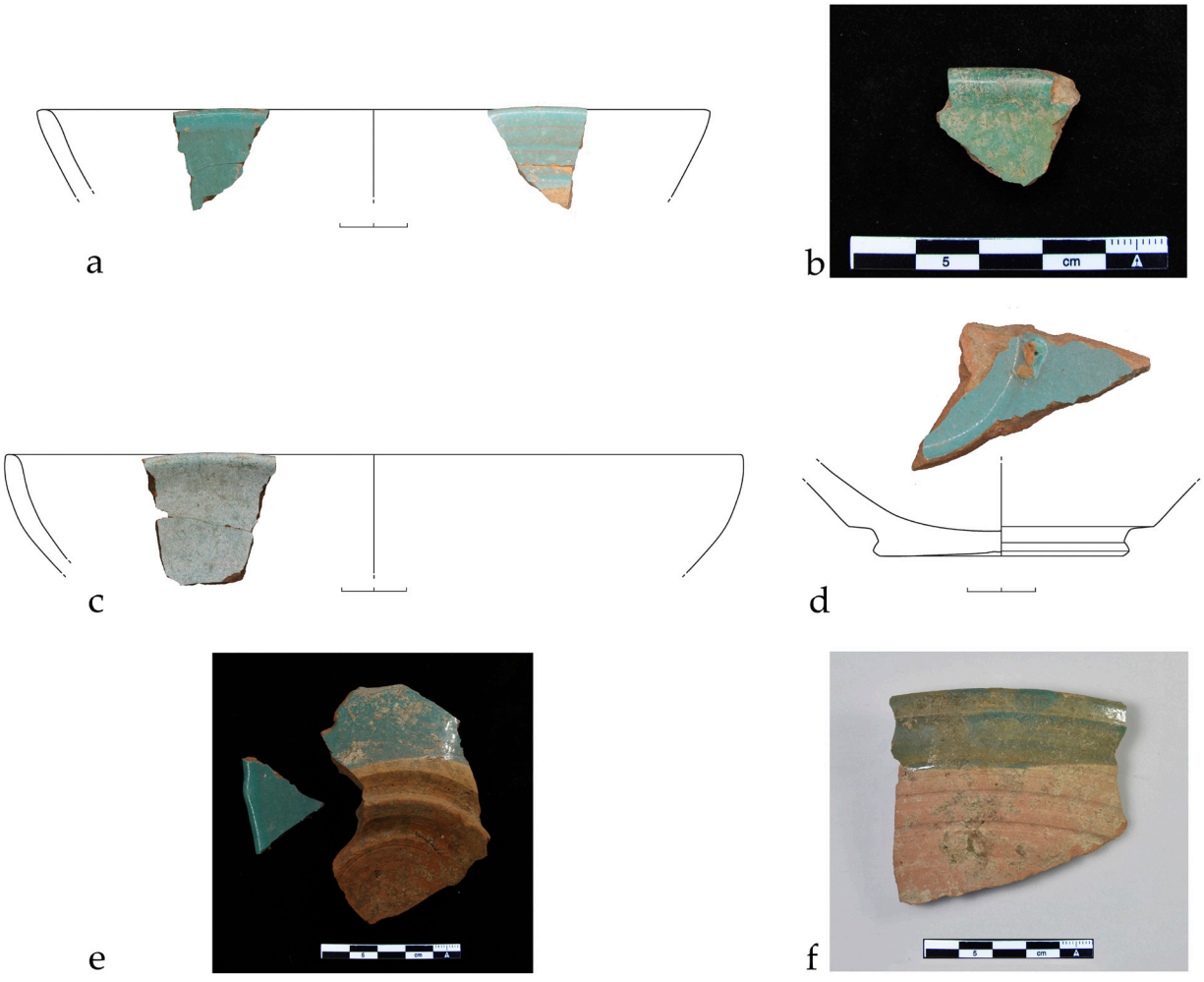


Fig. 2 – Turquoise opaque glazed ware. a) BKG 11636, b) BKG 11388, c) BKG 11633, d) BKG 11768, e) BKG 9577, f) BKG 8529 (drawings AC, photos MP)

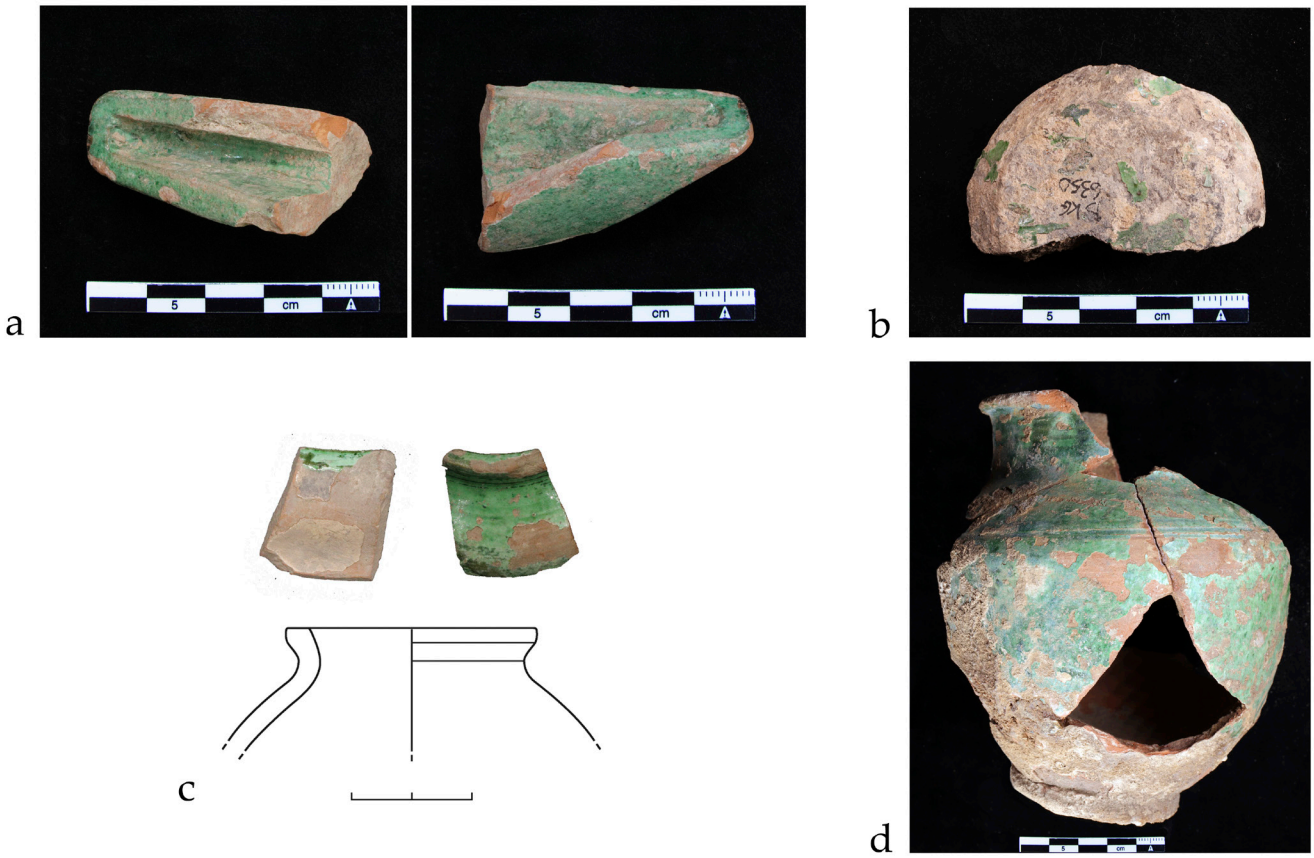


Fig. 3 – Green monochrome glazed ware. a) BKG 11401, b) BKG 6350, c) BKG 11394, d) BKG 6332 ((drawings AC, photos MP)

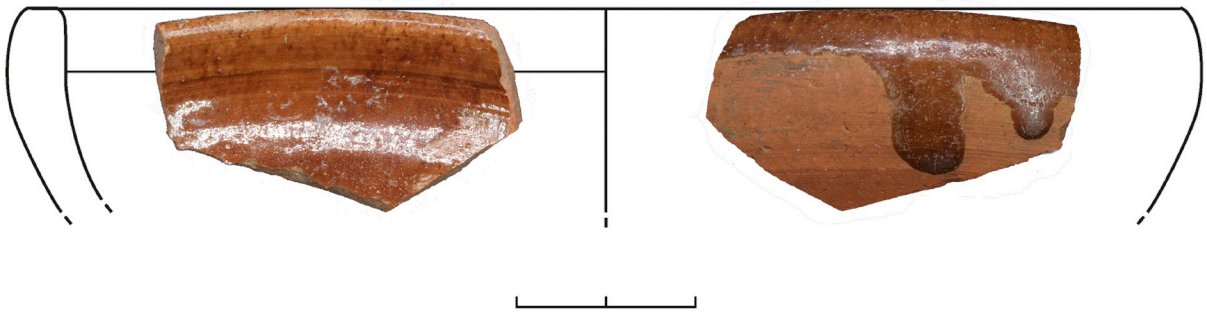


Fig. 4 – Brown monochrome glazed ware, BKG 11797 ((drawings AC, photos MP)

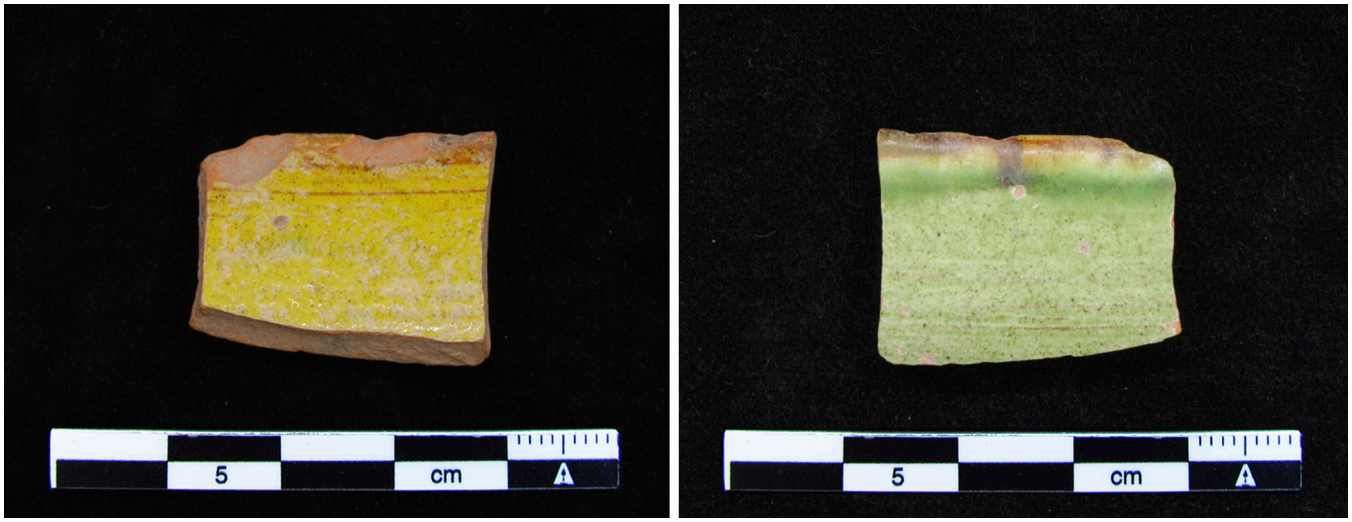


Fig. 5 – Bichrome glazed ware (?), BKG 11395 (photo M. Prota)

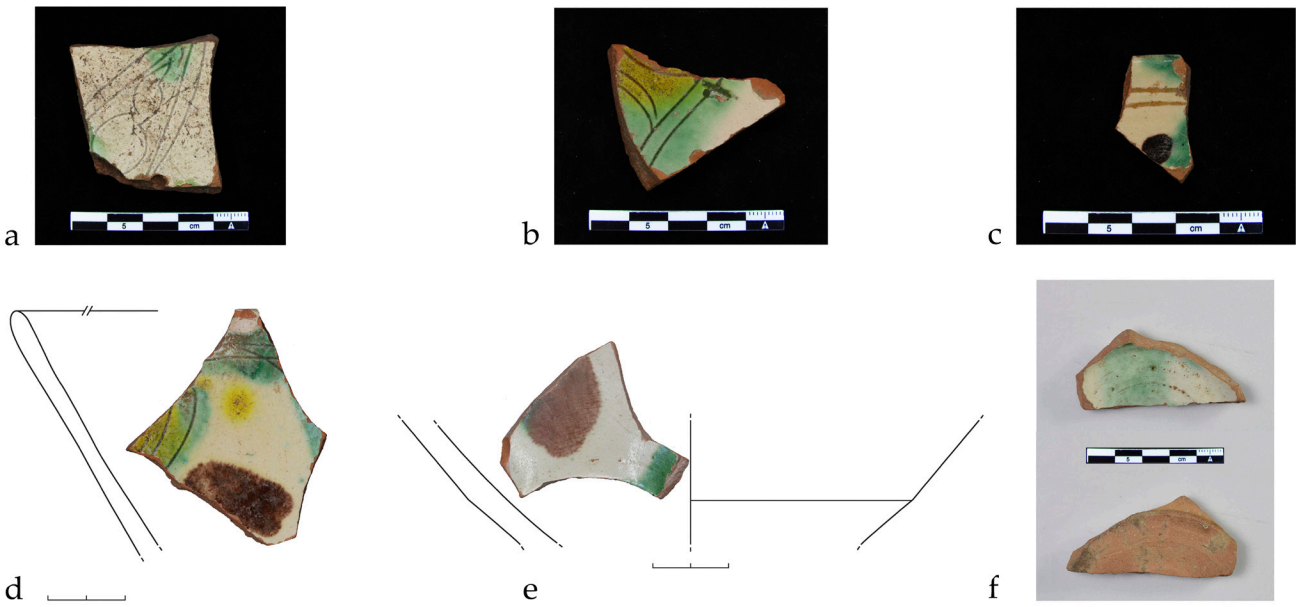


Fig. 6 – Sgraffiato splashed ware. a) BKG 11448, b) BKG 11850, c) BKG 11795, d) BKG 11399, e) BKG 11398, f) BKG 8536 (drawings AC, photos MP)

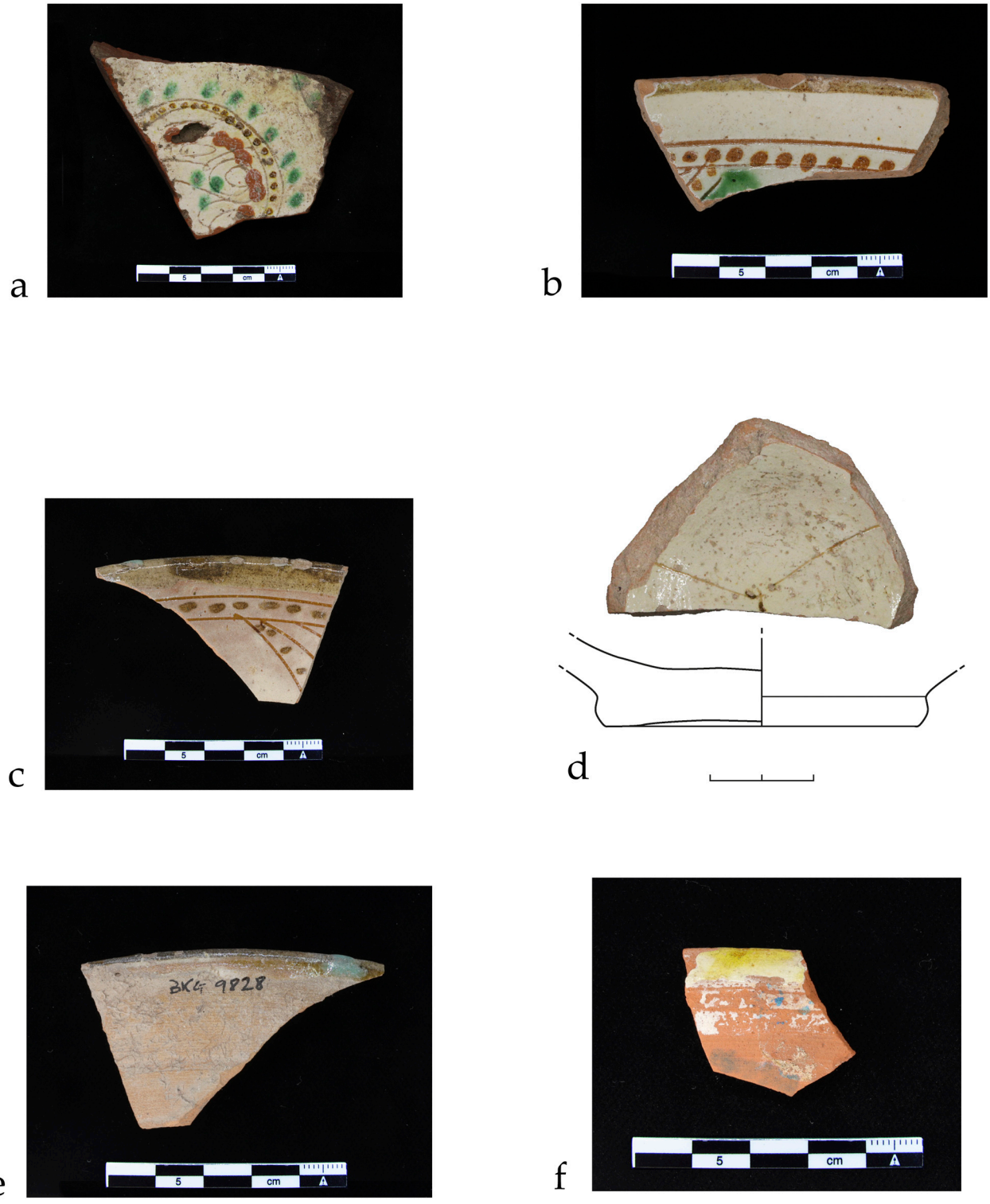


Fig. 7 – Sgraffiato and dot-painted ware. a) BKG 11899, b) BKG 9827, c) BKG 9828, d) BKG 11387, e) BKG 9828, outer surface, f) BKG 11050, outer surface (drawings AC, photos MP)

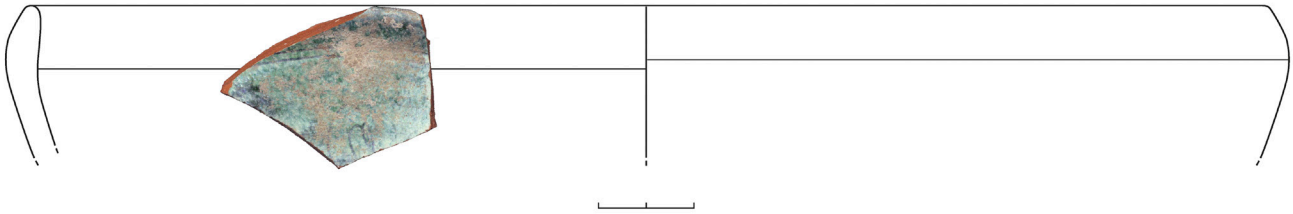


Fig. 8 – Sgraffiato green monochrome ware, BKG 12163 (drawings AC, photos MP)

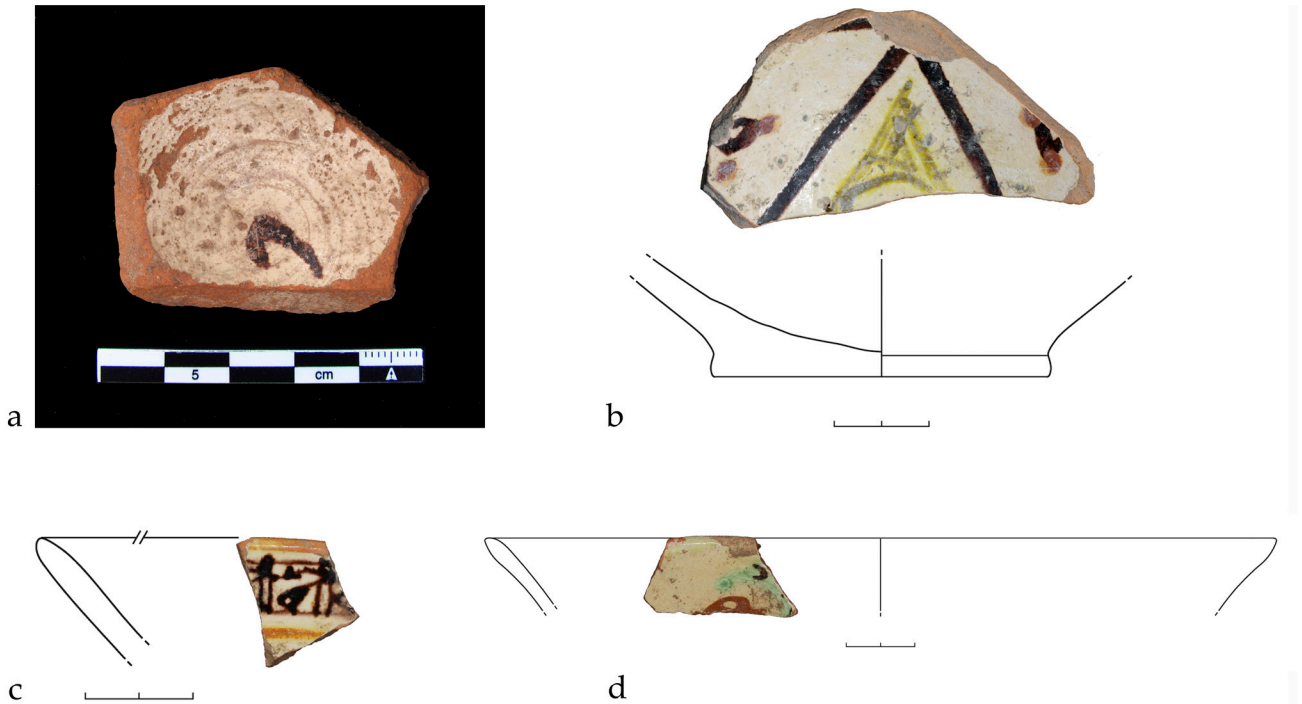


Fig. 9 – Underglaze painted ware. a) BKG 6162, b) BKG 11358, c) BKG 11727, d) BKG 11386 (drawings AC, photos MP)



Fig. 10 – Underglaze painted ware, BKG 10123 (photo MP)

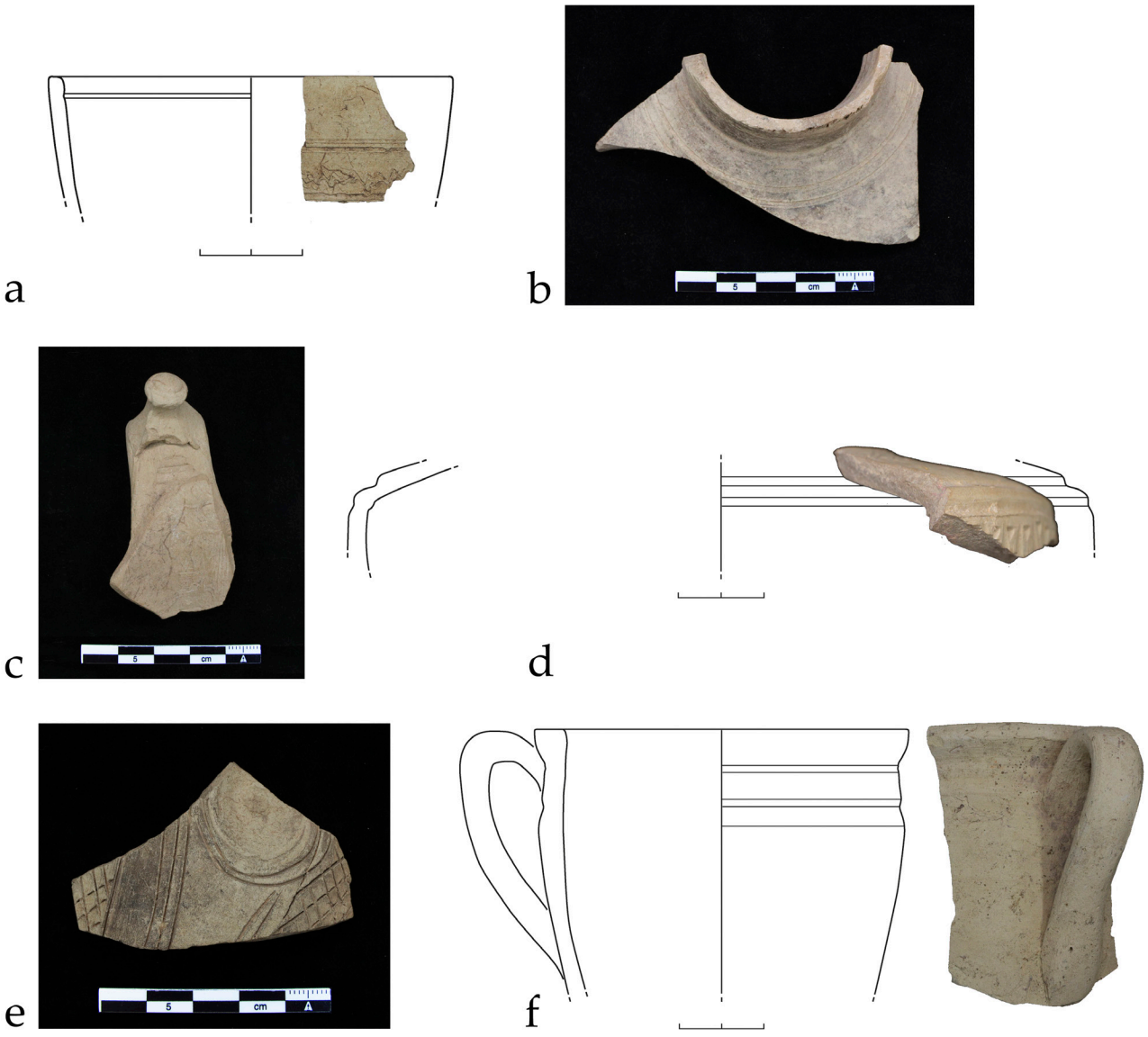


Fig. 11 – Unglazed fine vessels. a) BKG 11412, b) BKG 11397, c) BKG 11400, d) BKG 11939, e) BKG 11425, f) BKG 11396 (drawings AC, photos MP)



Fig. 1 – A bleached short barrel bead of carnelian (BKG 6075)



Fig. 2 – Various irregular short spherical/globular or short barrel-shaped beads of carnelian (not to scale)

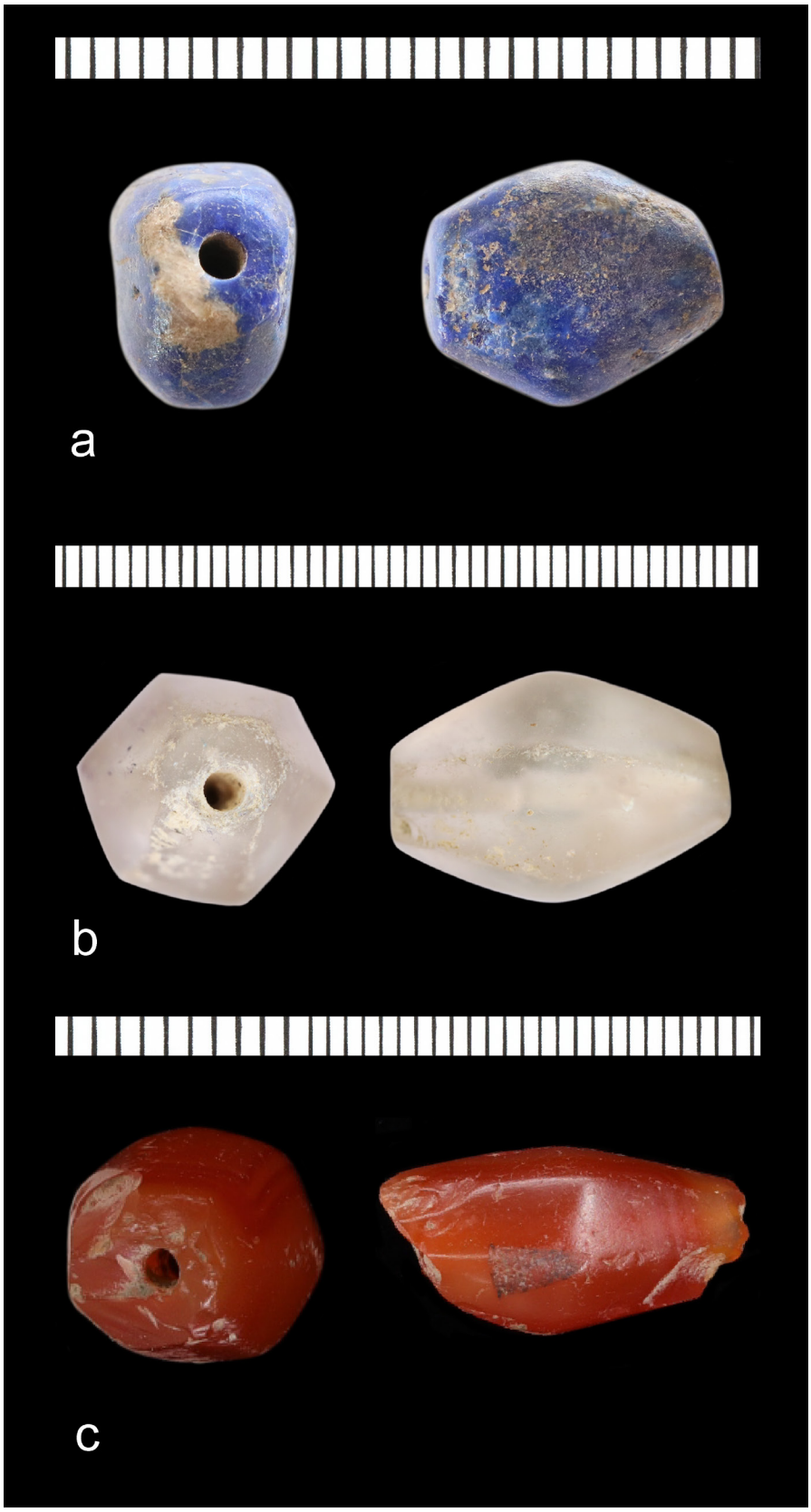


Fig. 3 – A) an octagonal faceted long biconical bead of lapis lazuli (BKG 2057); b) a hexagonal-faceted long barrel bead of rock crystal (BKG 4683); c) a hexagonal faceted long biconical bead of carnelian (BKG 10168).



Fig. 4 – A very short barrel bead of amber (BKG 2055). Photo by MAR.

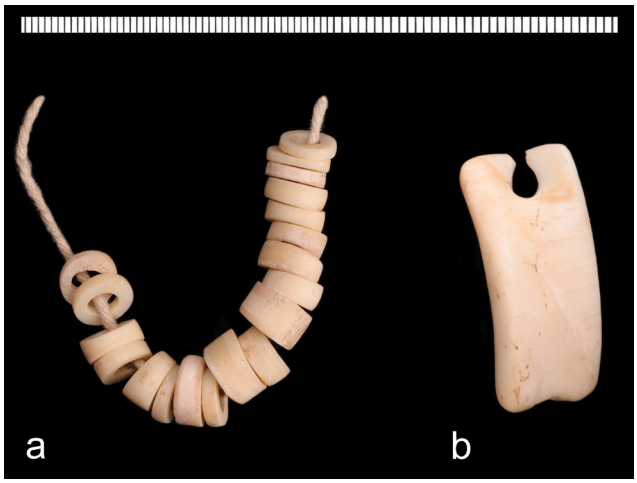


Fig. 5 – a) short cylindrical beads of marine shell (BKG 6267); b) a slightly curved rectangular short cylindrical pendant of marine shell (BKG 6434)



Fig. 6 – Two different cowrie shells (BKG 9959)

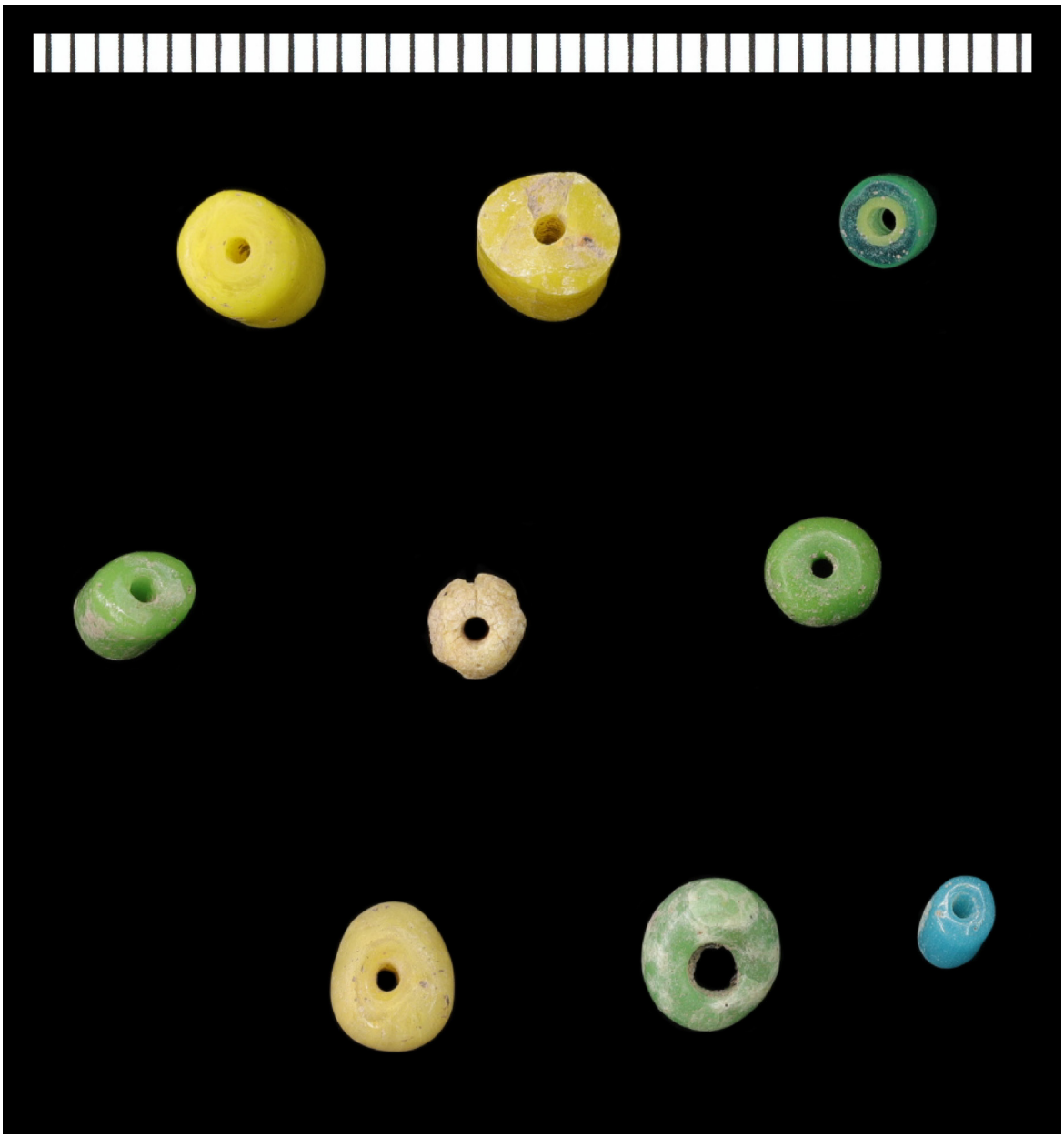


Fig. 7 – Various Indo-Pacific glass beads (BKG 10286)

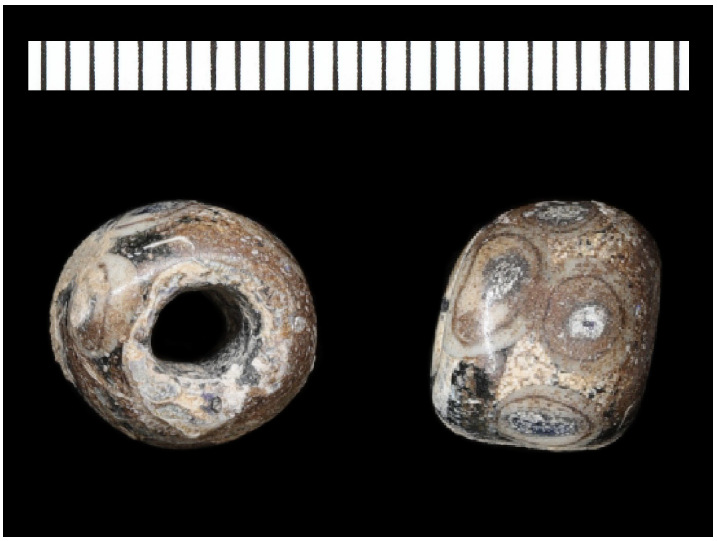


Fig. 8 – Barrel shaped 'eye' glass bead (BKG 11108)



Fig. 9 – a) A ghata-shaped bead of terracotta (BKG 5540); b) a group of terracotta beads (BKG 9870)

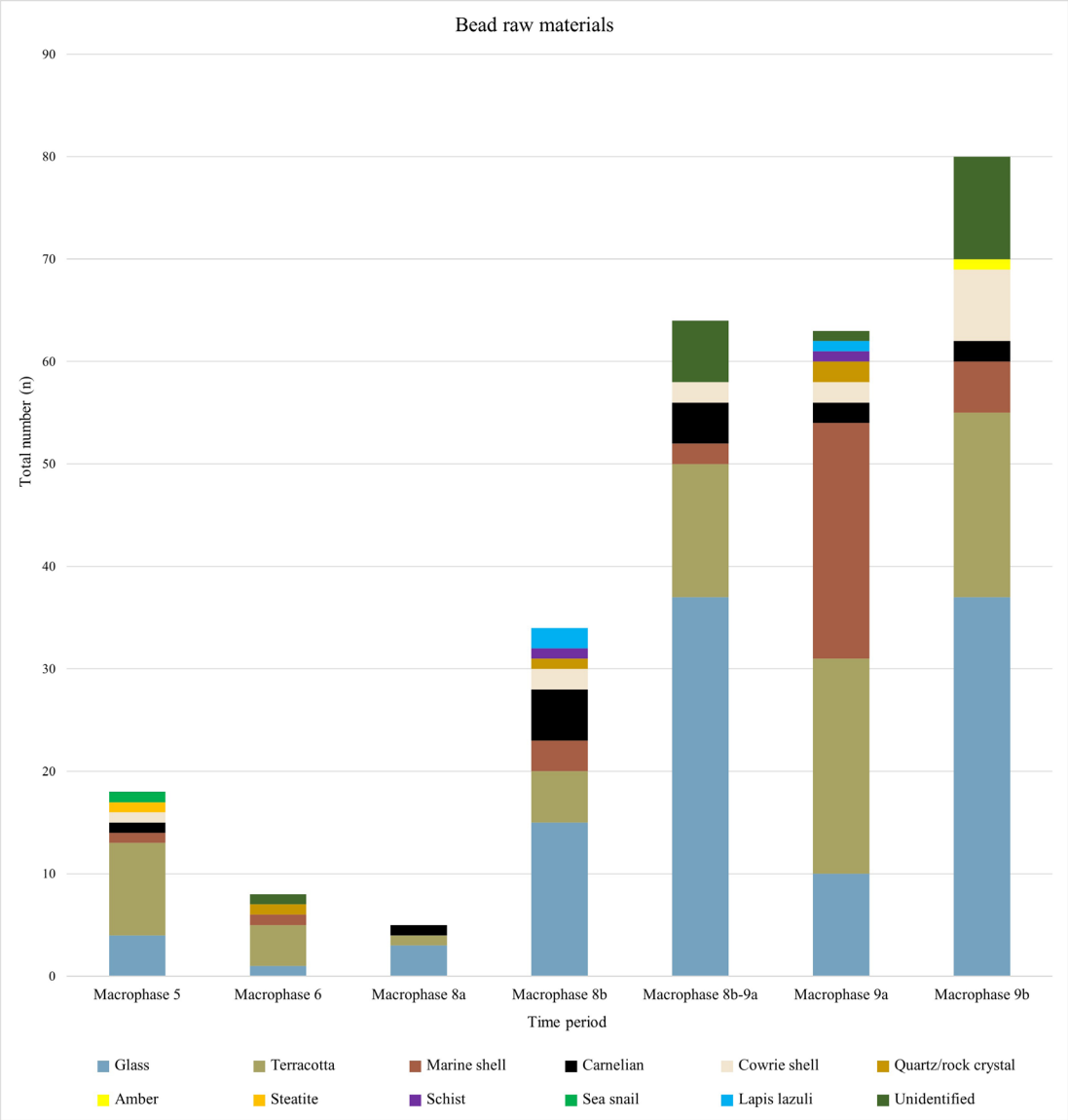


Table 1 – Raw materials of the new collection of beads (Note: Number of beads shown is not representative of the total number of beads in circulation at the site during the individual periods).

Indo-Greek Coinage



1

Kušān Coinage



2



3



4



5











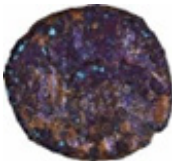
6



7



8



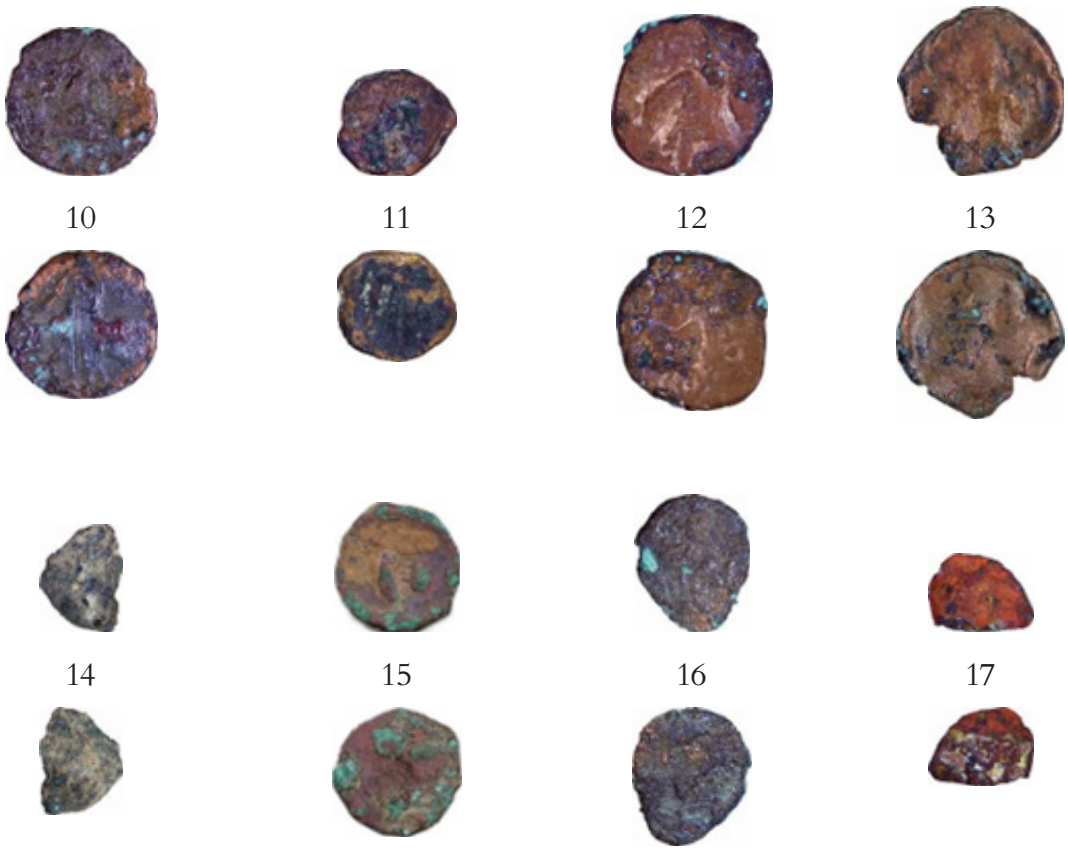
9







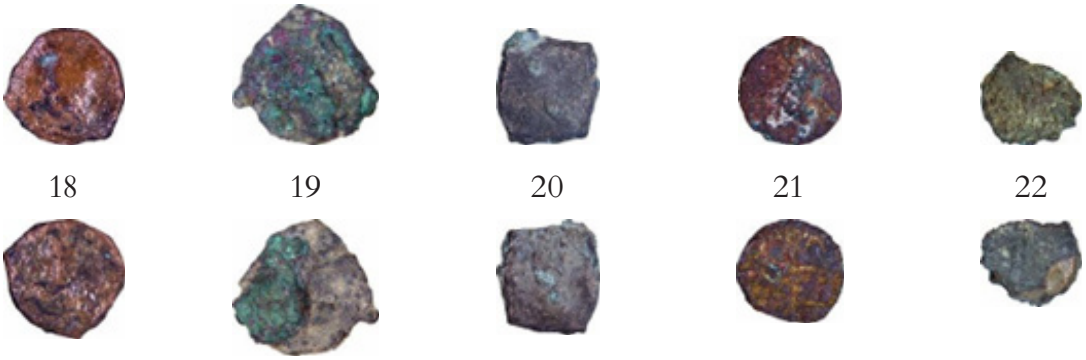




10 11 12 13

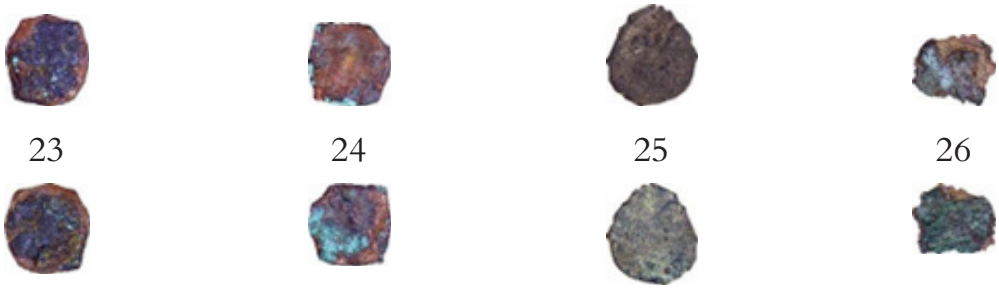
14 15 16 17

Kušāno-Sāsānian Coinage



18 19 20 21 22

Small Copper Coinage of Gandhāra-Uḍḍiyāna



23 24 25 26

Turk-Śāhi Coinage



27

Hindu-Śāhi Coinage



28



29



30



31











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34



35











36



37



38



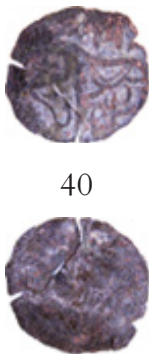
39











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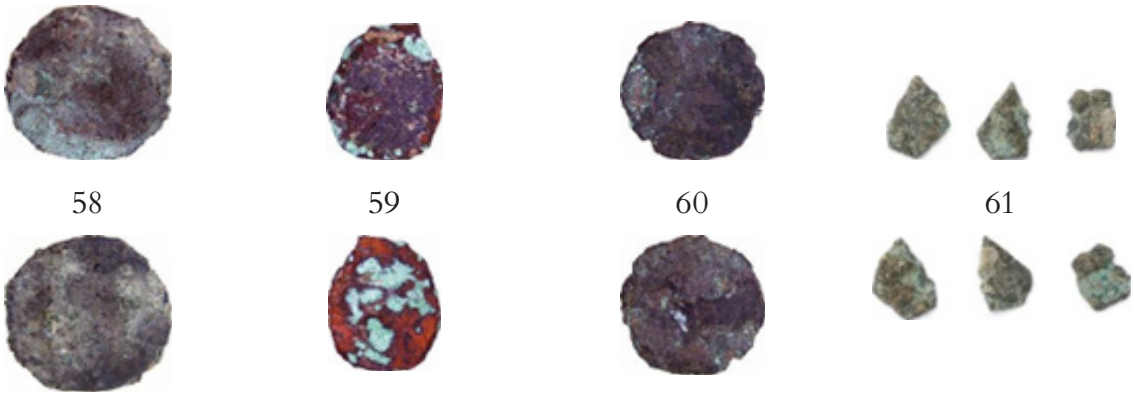
Ghaznavid Coinage



56 57

Unidentified Coins



58 59 60 61

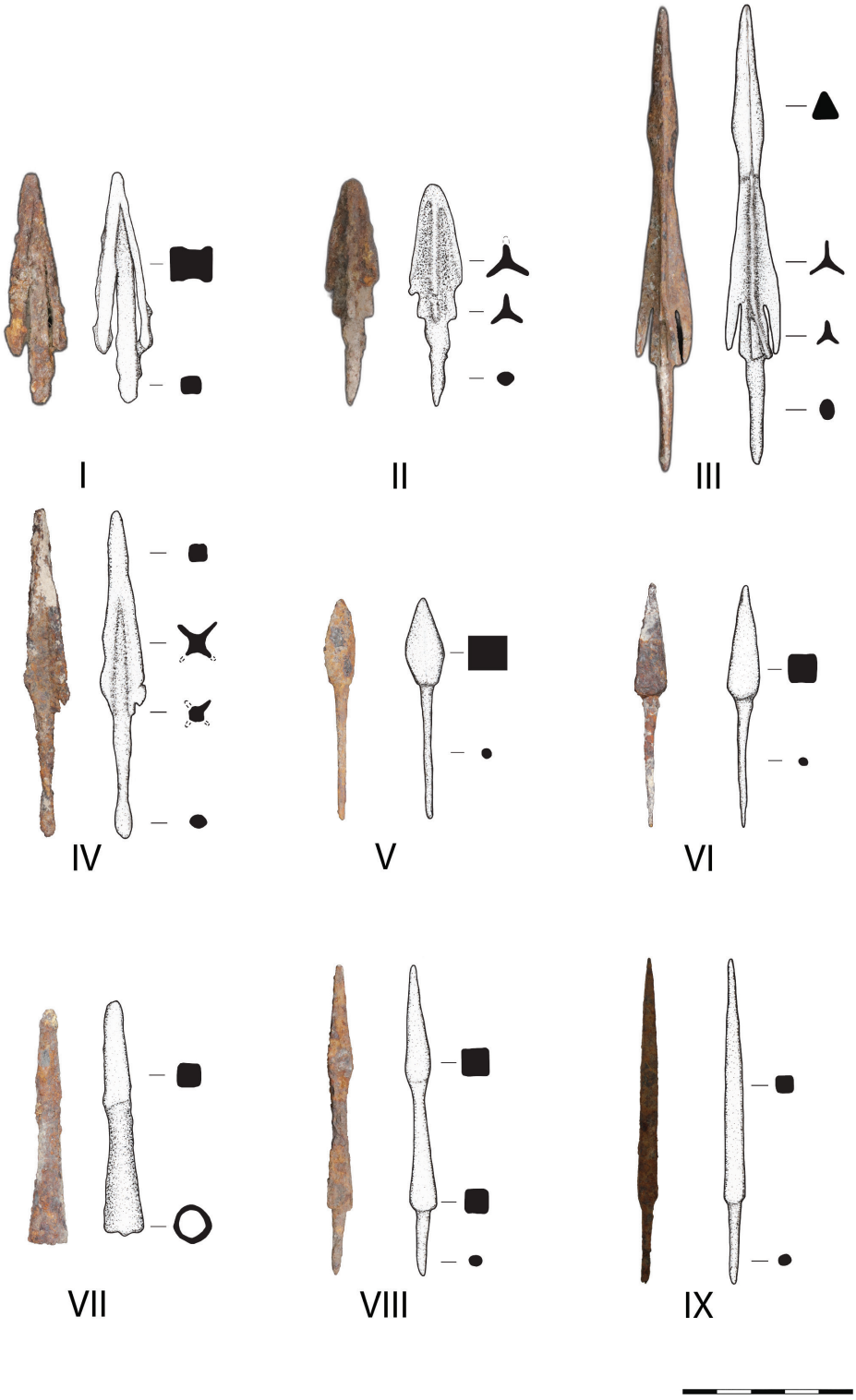


Fig. 1 – Typology of arrowheads from Barikot Hill: BKG 6, BKG 14, BKG 15, BKG 20, BKG 23, BKG 24 (NM)

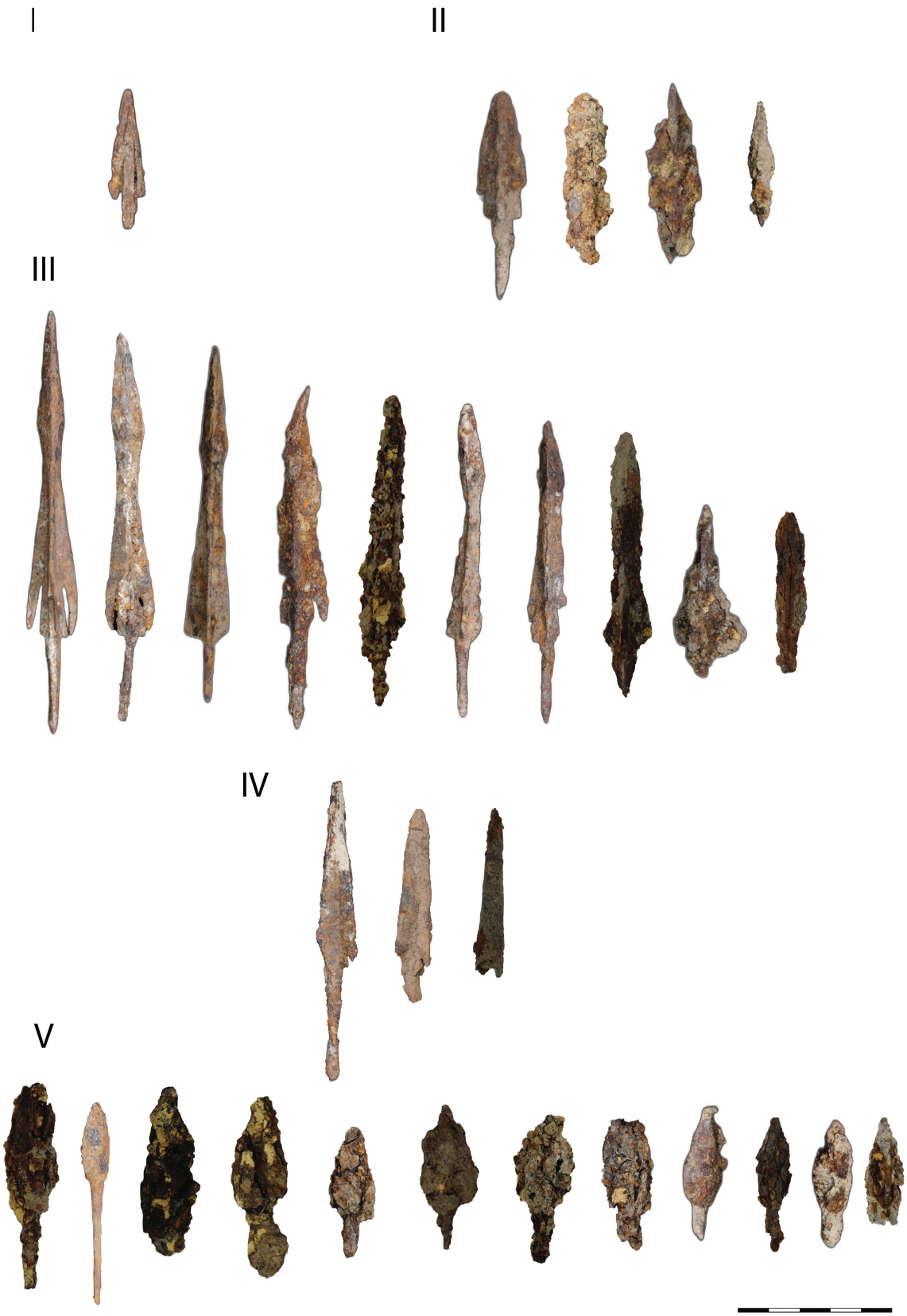


Fig. 2 – Type.I, II, III, IV, V of arrowheads from Barikot Hill: BKG 6, BKG 14, BKG 15, BKG 20, BKG 23, BKG 24 (NM)



Fig. 3 – Type.VI, VII, VIII of arrowheads from Barikot Hill: BKG 6, BKG 14, BKG 15, BKG 20, BKG 23, BKG 24 (NM)

IX



Fig. 4 – Type.IX of arrowheads from Barikot Hill: BKG 6, BKG 14, BKG 15, BKG 20, BKG 23, BKG 24 (NM)

III.F.1 - MACROPHASE 1: A PREHISTORIC SLAB (M. Minardi, L.M. Olivieri, M. Vidale)



Figs 1 – Protohistoric phyllite stele (BKG 5838)



Figs 2 – Protohistoric phyllite stele (BKG 5838)

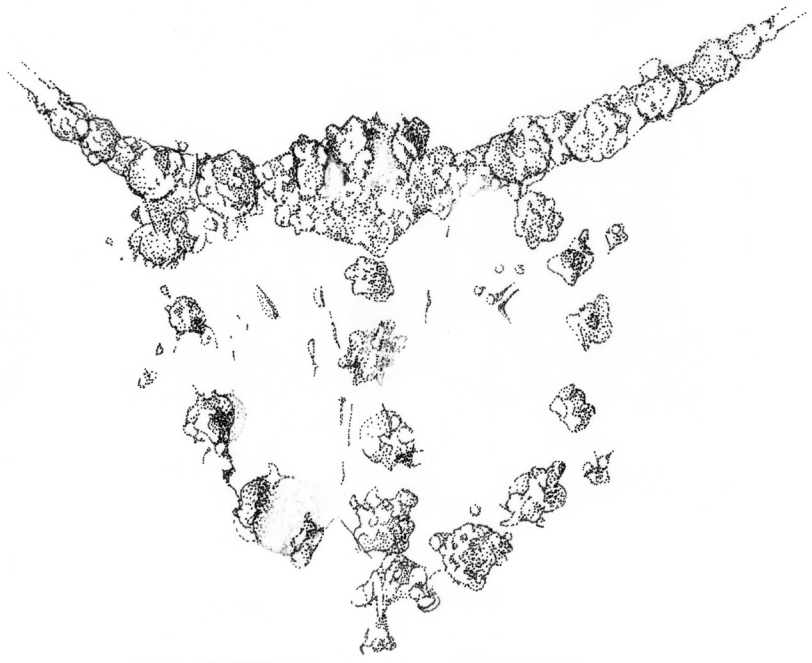


Fig. 3 – Graphic interpretation of the carving in Figs 1-2. The diameter, along the vertical line of dots, measures about 14 cm. Drawing by MV

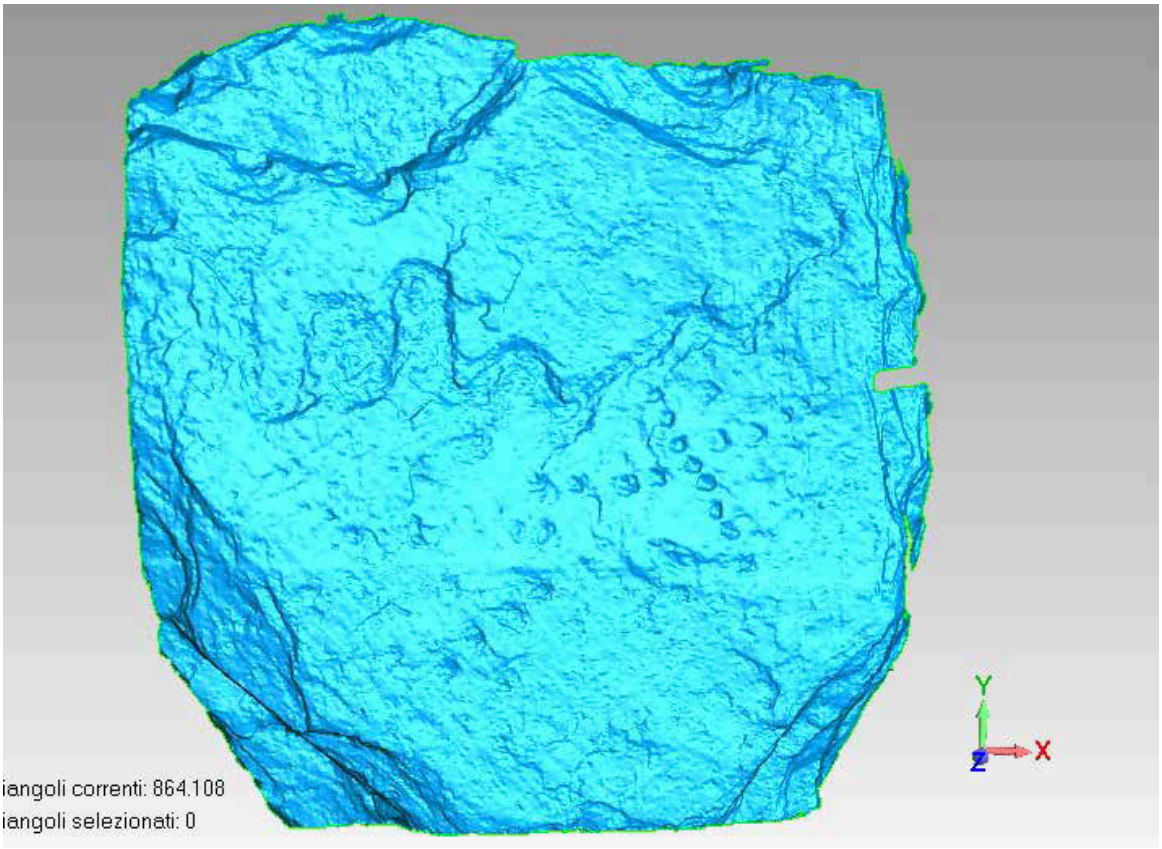


Fig. 4 – b) Grave 19, basal slab

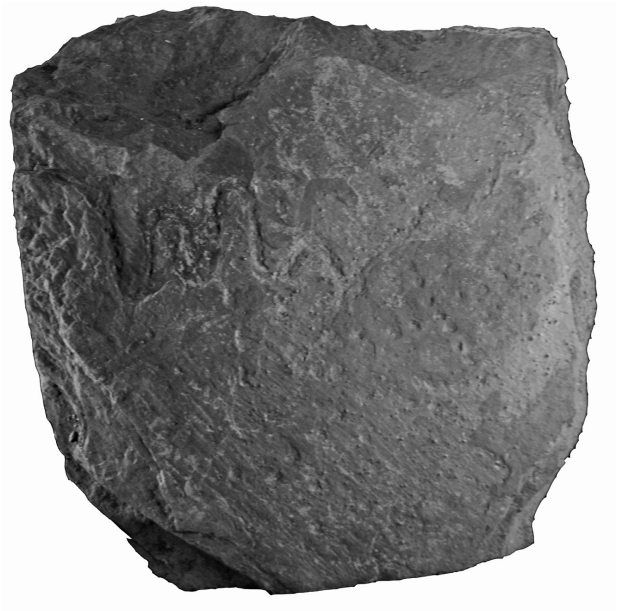


Fig. 4 – a) Grave 10, basal slab. 3D restitution by GS, University of Padua

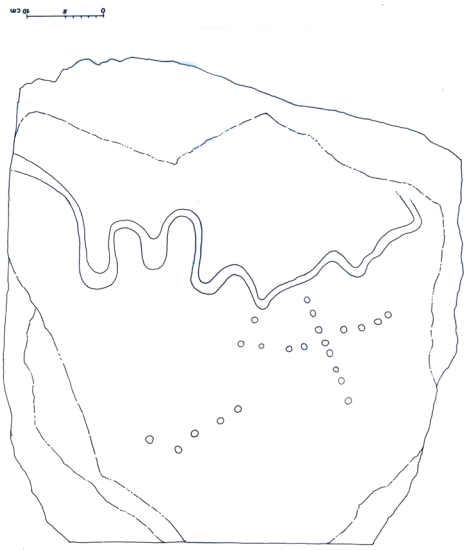


Fig. 4 –c) Grave 19, basal slab. Drawing by FM†

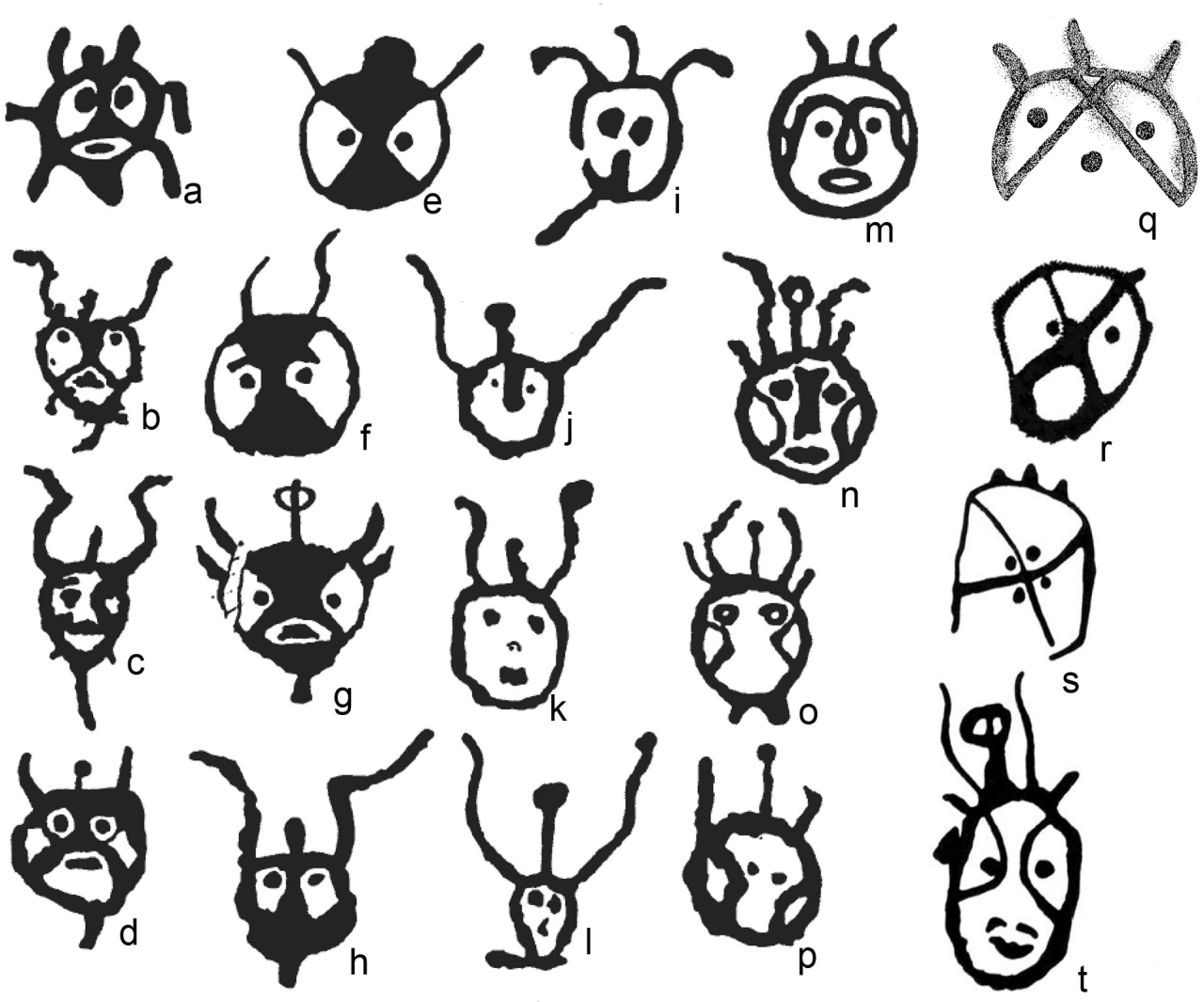


Fig. 5 – Bronze age maskoids from various regions of Central, Inner and Southern Asia. a, Mountain Geram, Siberia; b-d, Ienisseï Canyon; e, Upper Indus (northern Pakistan); f-h, Ienisseï Canyon; i, Inner Mongolia Yinshan; j-l, Ienisseï Canyon; m, Lower Amur, Sakachi-Aljan; n-p, Ienisseï Canyon; q-s, Upper Indus; t, Mugur-Sargol, Siberia (a-p modified from Francfort 2015, Fig. 4b; q, from Hautptmann 1997, 53, 1; r and s, from Jettmar, Thewalt 1987: 12; cf. Francfort et al. 1992)



Fig. 6 – Barikot acropolis: interconnected basins and permutations of cup-marks (cf. Olivieri 2003a: feature 174, pl. XXXVIIa = {1}, Arcuri, this volume)



Fig. 1 – BKG 4960 (photo by MP)



Fig. 1 – BKG 5599, front side



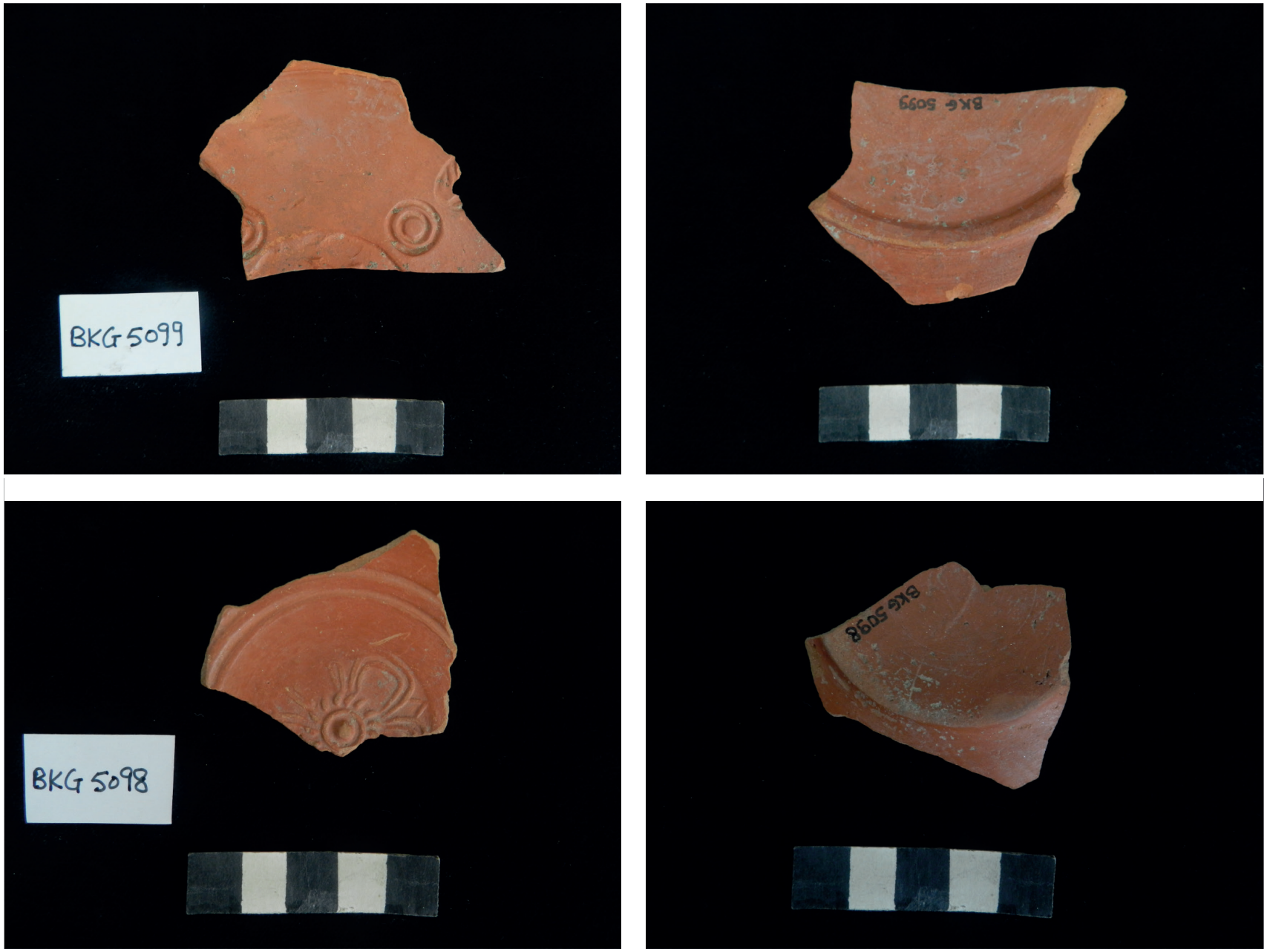
Fig. 2 – BKG 5599, back side



Fig. 3 – BKG 5599, front side with a different angle of light



Fig. 1 – BKG 5111



Figs 2 – Ceramics from Trench BKG 13: BKG 5099, BKG 5098

III.F.5 - MACROPHASE 8A: THE BARIKOT ŚĀRADĀ INSCRIPTION: PRELIMINARY NOTES

(S. Baums, L.M. Olivieri, I. Strauch)



Fig. 1 – BKG 1264 (Swat Museum). Photo by MP.



Fig. 1 – The roundel from Barikot (BKG 1519)

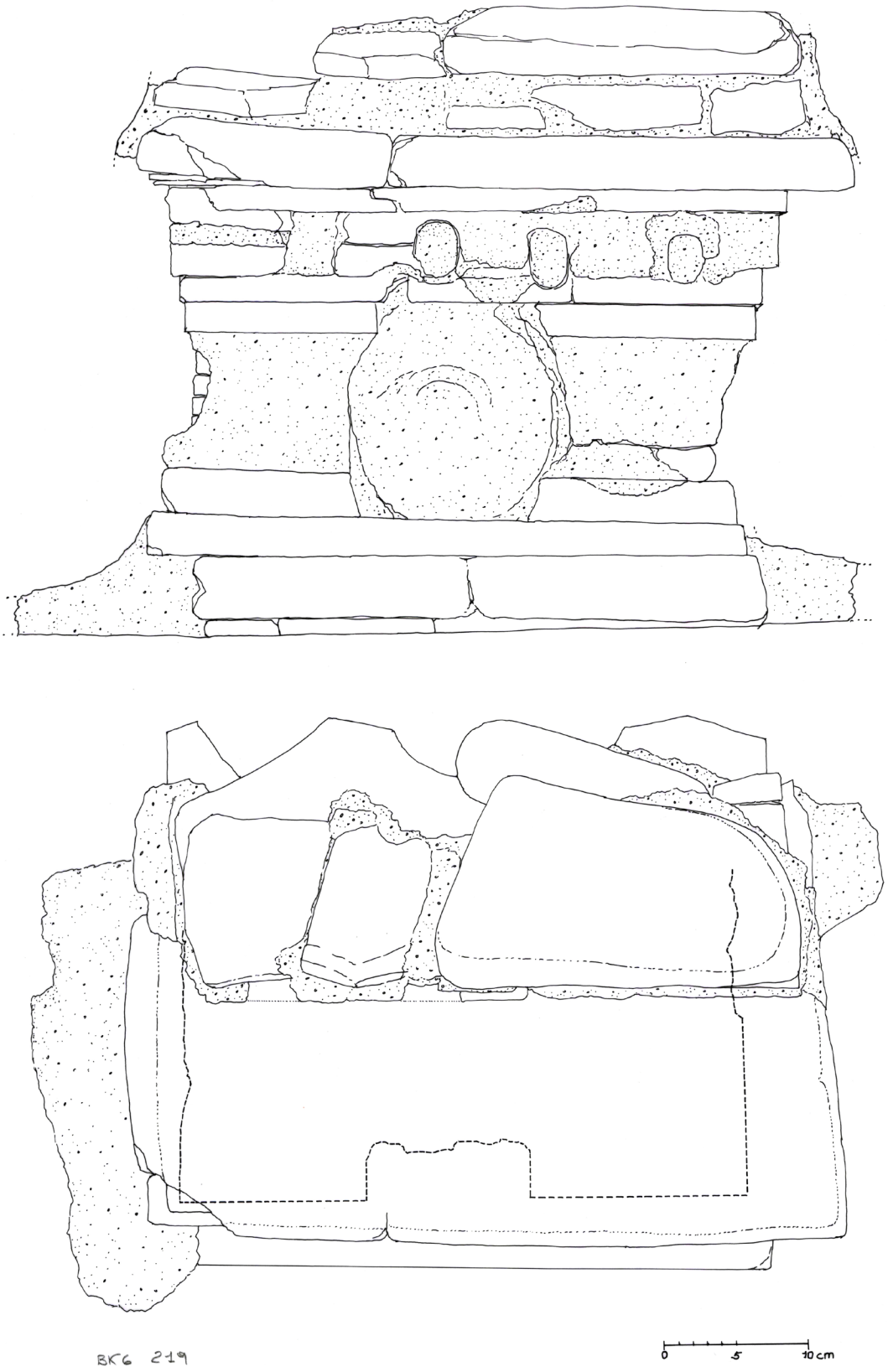


Fig. 2 – The small altar in BKG 2 (BKG 2537). Drawing bt FM†.

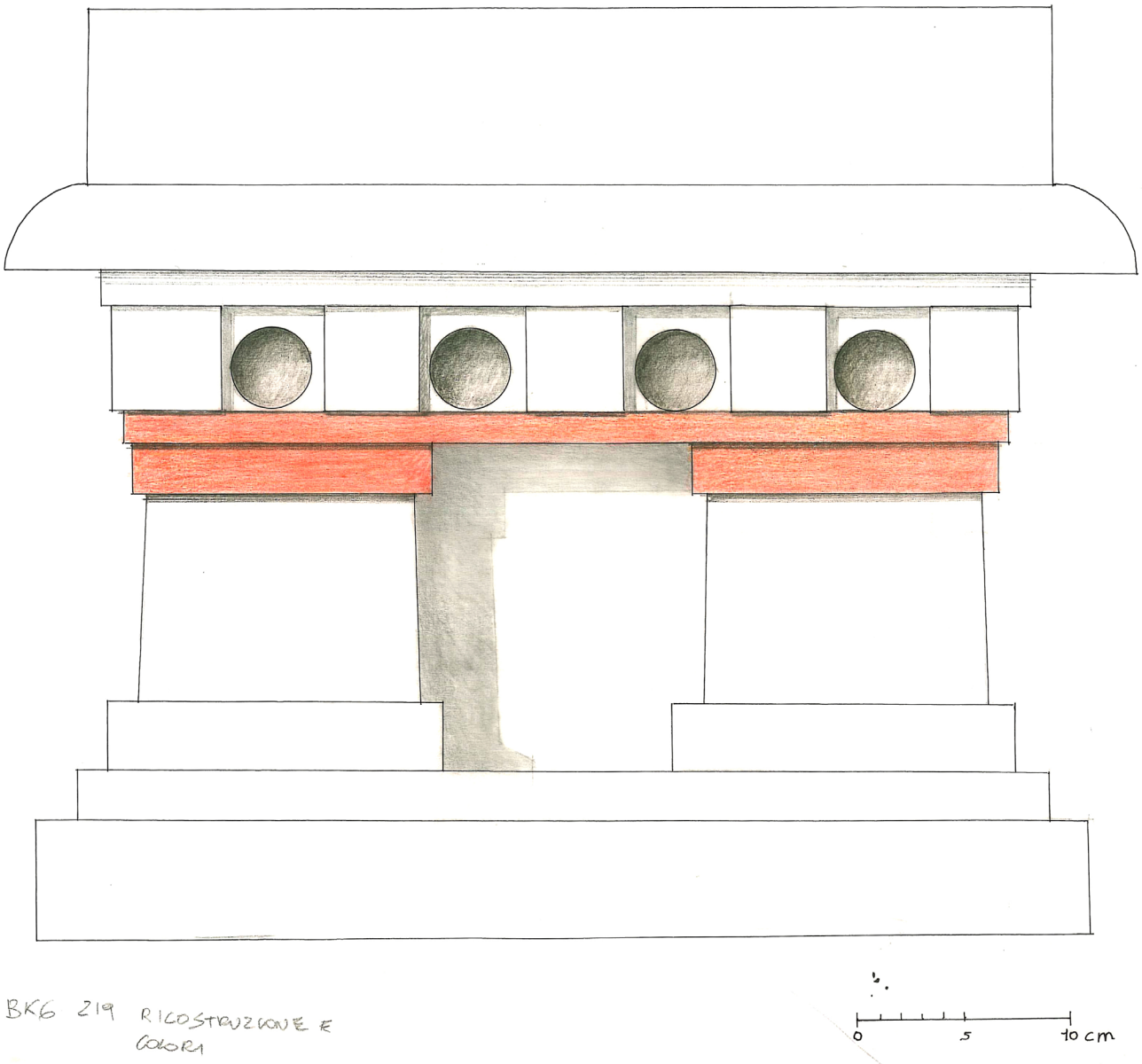


Fig. 2 – The small altar in BKG 2 (BKG 2537). Drawing bt FM†.



Fig. 3 – Jug. Red Ware. From Yotkan (4th Turfan Expedition). Fifth-sixth c. CE. h. 45 × w. 35 × l. 35 cm. Museum für Asiatische Kunst, III 7665. © Staatliche Museen zu Berlin, Museum für Asiatische Kunst / Birgit Angelika Schmidt. CC BY-SA 4.0.

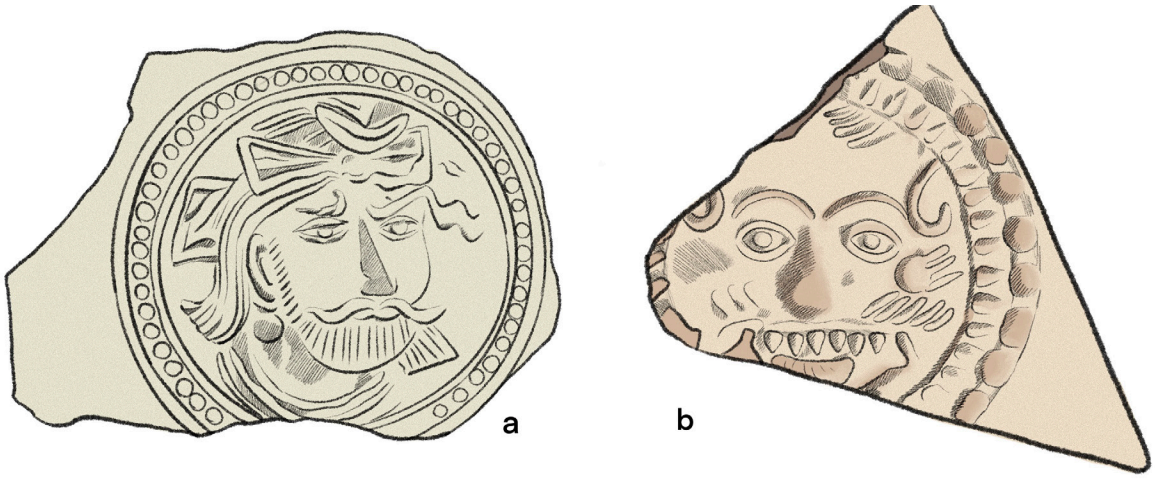


Fig. 4 - Vessels (fragments). Terracotta. From Yotkan. a) Fifth-Sixth c. CE. h. max. 6 × l. max. 8 × t. 1 cm. Ashmolean Museum EA 1984.26. b) Third c. CE (?). h. max. 7.4 × l. max. 6 cm. British Museum, MAS.103. Drawings by AC.



Fig. 5 – Funeral banner of Lady Dai (detail). Silk. Second c. BCE. h 205 × w 92 × w 47.7 cm. The grey areas represent the lacunae in the original banner. Drawing by AC.



Fig. 6 – Disc, perhaps part of a horse harness. Gilded silver. From Takht-i-Kwad (?). Fourth c. BCE (?). D. 9.8 × t. 0.5 cm. British Museum, 123925. Drawing by AC.

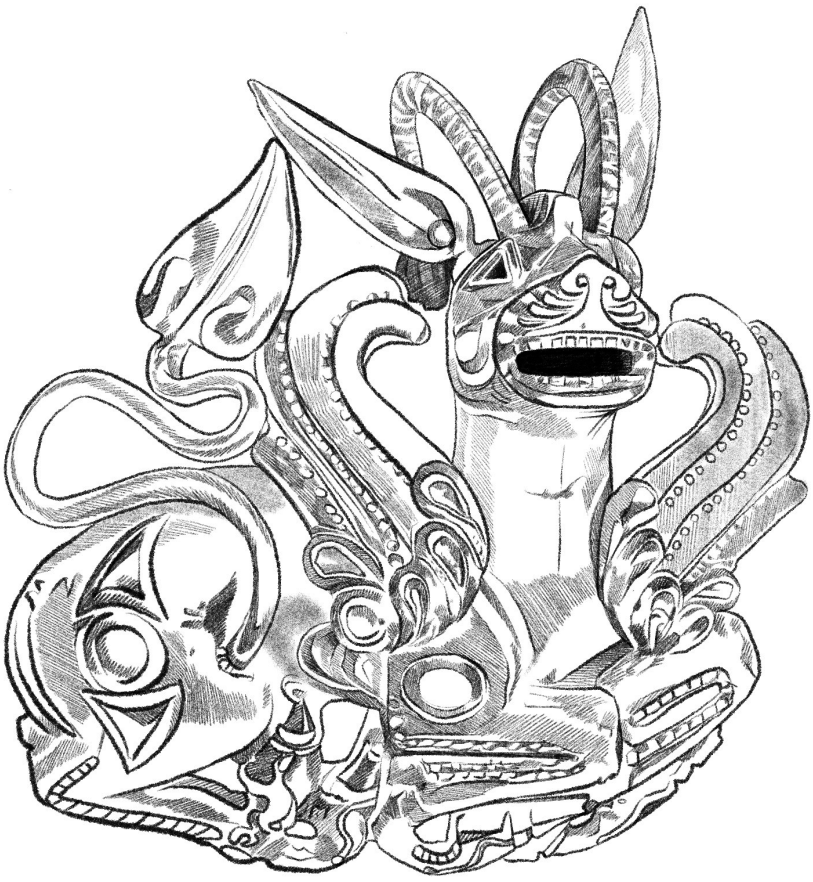


Fig. 7 – Aigrette. Gold. From Takht-i-Kwad (?). Fifth-fourth c. BCE. h. 6.15 cm. British Museum, 123924. Drawing by AC.



Fig. 8 – Patera (detail). Gold. From Ugarit. 1400-1200 BCE. D. 18.8 × h. 3.1 cm. Musée du Louvre, AO 17208. Drawing by AC.



Fig. 1 – BKG 2023 Photo by Luca Colliva.

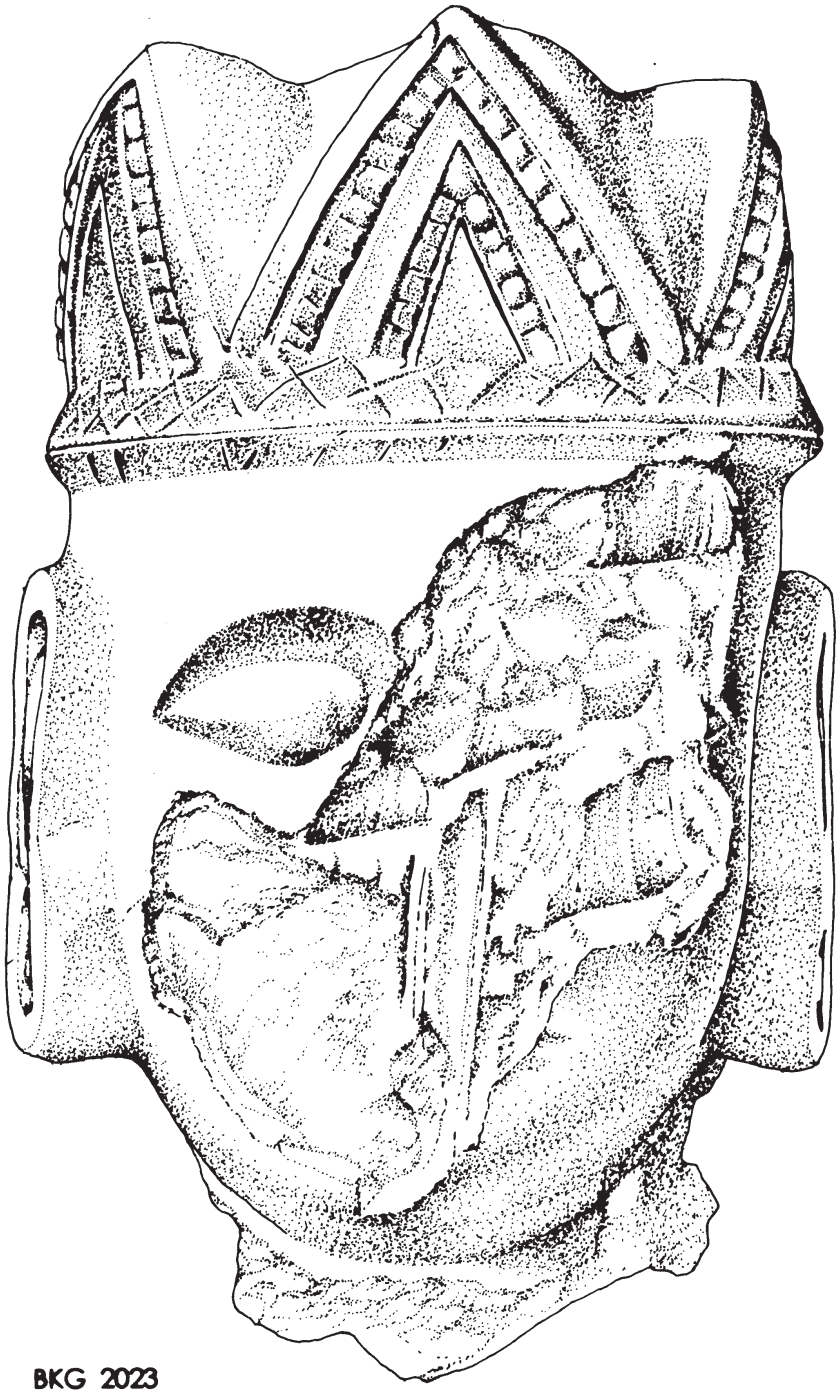


Fig. 2 – BKG 2023. Drawing by FM†.

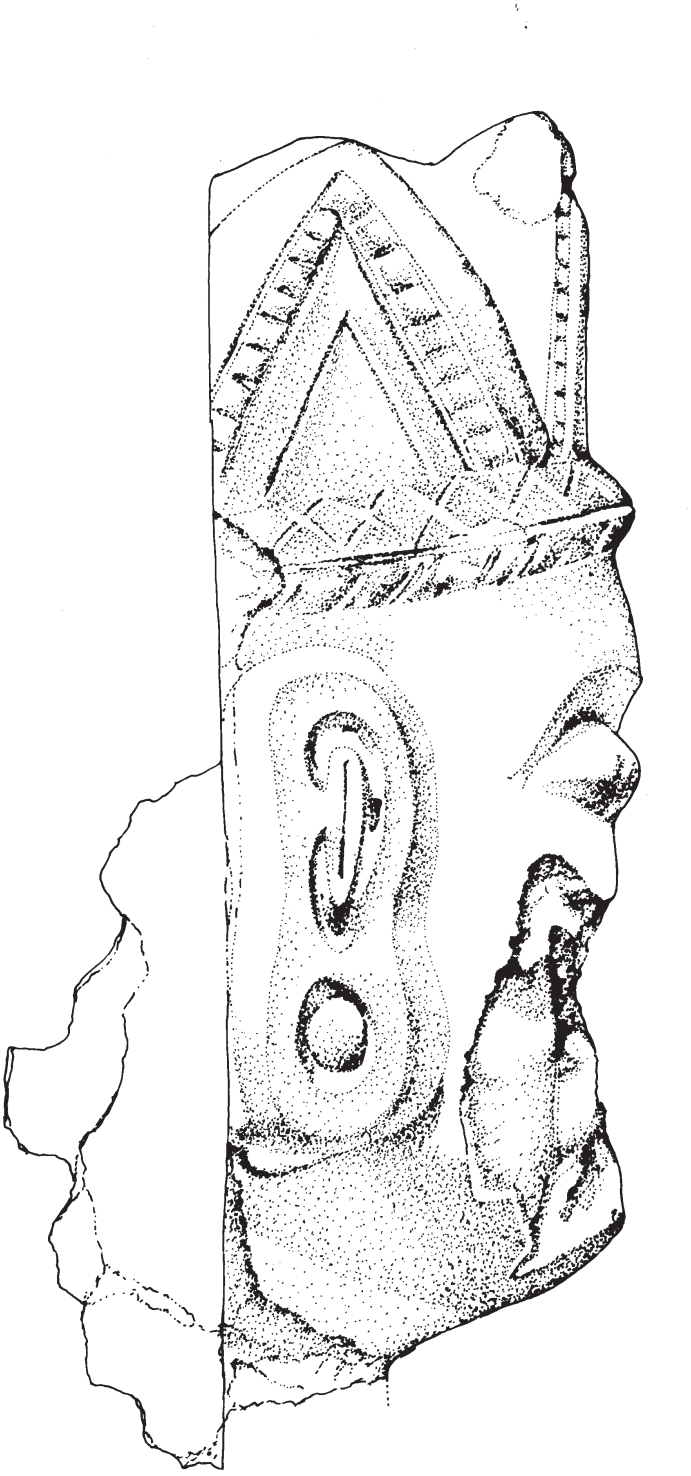


Fig. 2 – BKG 2023. Drawing by FM†.



Fig. 3 – Fragment of a bronze male figurine from Udegram castle (after Filigenzi 2010: fig. 21)



Fig. 4 – Bronze male figure from Jaghuri (after Verardi 1977: figs. 6-8)

III.F.8 - MACROPHASE 8B-9A: A LATE BUDDHIST VOTIVE TABLET
(N. Arcuri, A. Casalini, N. Cecchini)



Fig. 1 – Front side of votive tablet BKG 9649



Fig. 2 – Back side of the votive tablet BKG 9649



Fig. 3 – Avalokiteśvara-Padmapāṇi on a rock throne. Karachi National Museum, Karachi (Pakistan). After Filigenzi 2015: fig. 30a.

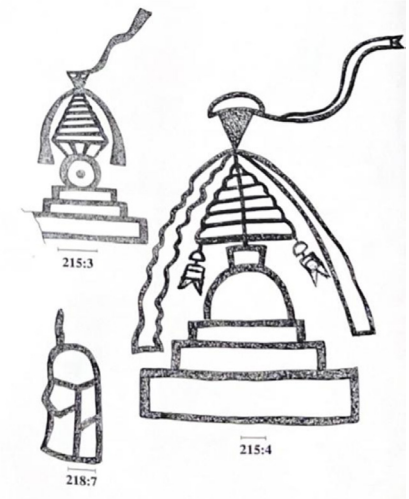


Fig. 4 –Shatial, Upper Hindus (Pakistan): stupa. After Fussmann, Bandini-König 1997: pl. 32.

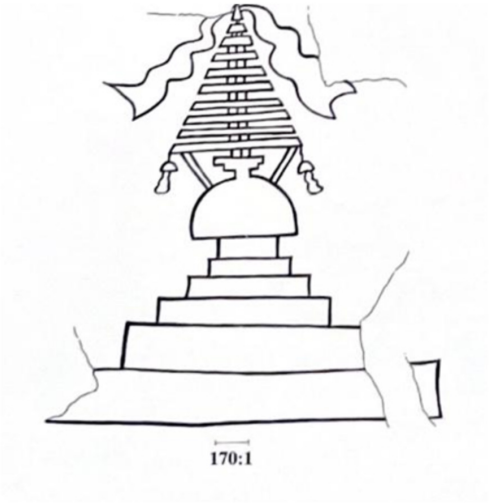


Fig. 5 –Shatial, Upper Hindus (Pakistan): stupa. After Fussmann, Bandini-König 1997: pl. 29.



Fig. 6 –Folādi, Bamyan (Afghanistan): small stupa painted in Cave F. After Bruneau 2007: fig. 13.



Fig. 7 – BI 3818 (plaster cast) (Photo by Claudia Primangeli)



Fig. 8 – Buddhist stelae in Ladakh. Photo courtesy of P. Dorjay.

III.F.9 – MACROPHASE 9A: LATE BUDDHIST THSA TSHAS
(S. Baums, M. Minardi, M. Prota)



Fig. 1 – Bhutan: *tsha tshas*. Photo by LMO.



Fig. 2 – Fragment of BKG 5667 from BKG 14



Fig. 3 – Fragment of BKG 5665



Fig. 4 – Tablet BKG 5666



Fig. 5 – BKG 5665 and 5666 at discovery.



Fig. 6 – BKG 5789



Fig. 7 – BKG 11700 from BKG 24.1

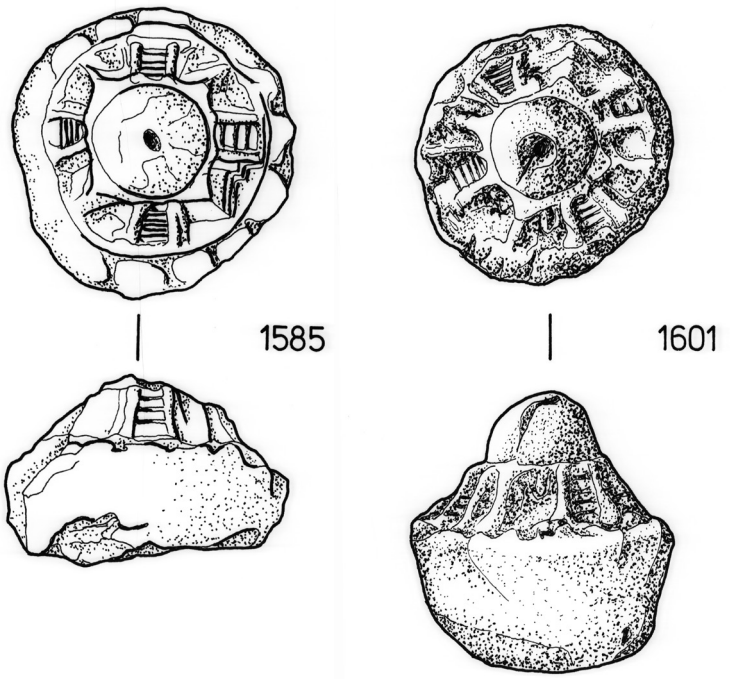


Fig. 8 – *Tsha tsha* from the Buddhist sacred area of Old Kandahar. D. max: 8.3 and 7.6 cm. © Old Kandahar Project – MM.



Fig. 9 – *Tsha tsha* from Manyar, Swat (after Khan, Wahab 2012: 61-62, pls. 18a-b)

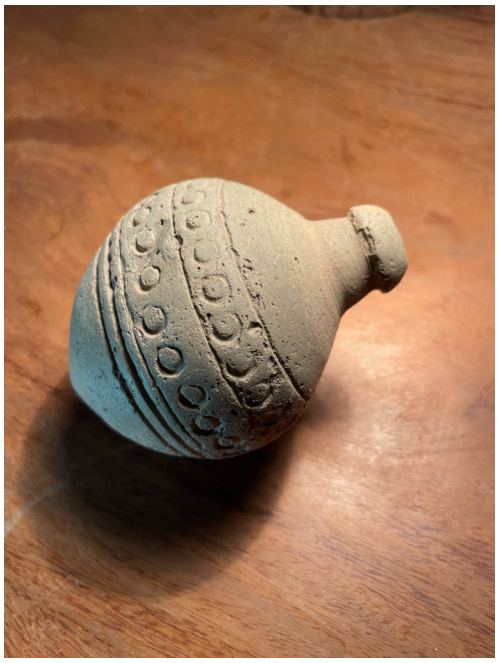


Fig. 1 – 'Sphero-conical' vessel (BKG 10167)

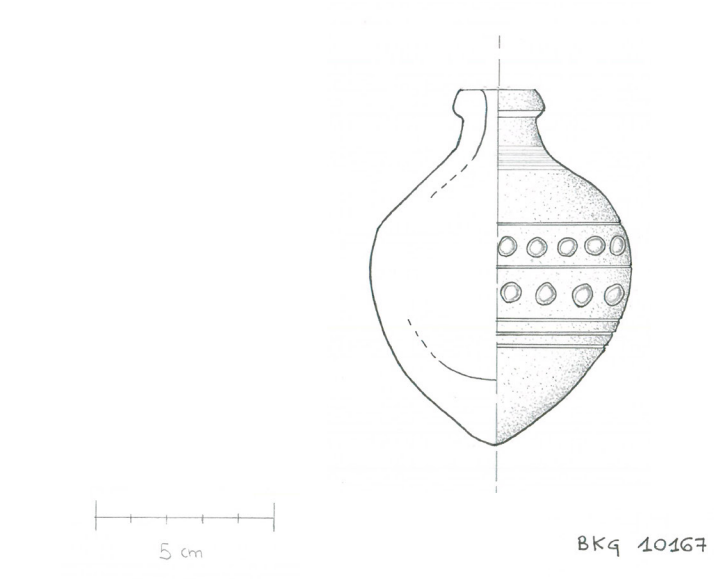


Fig. 2 – BKG 10167. Drawing by AC.



Fig. 3 – 'Sphero-conical' vessel (VSN 80)

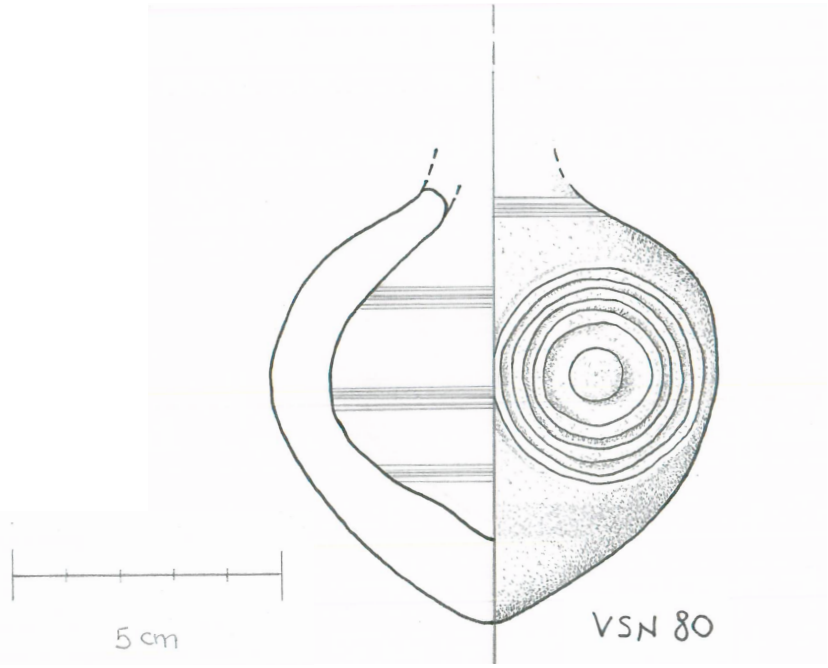


Fig. 4 – VSN 80. Drawing by AC.



Fig. 5 - Metropolitan Museum of Art, New York, No. 40.170.323 (Nishapur, earthenware, 9th-13th century); h. 9.8. Courtesy MMA.



Fig. 7 - Sphero-conical vessel from Iran (?) (glass, dark blue/black; 10th-14th century); h. 10.4; Barakat Gallery, No. LO.891.



Fig. 6 - Vessels from Schmidt's excavations at Ravy, Iran. After Ettinghausen 1951: pl. XLV.A.

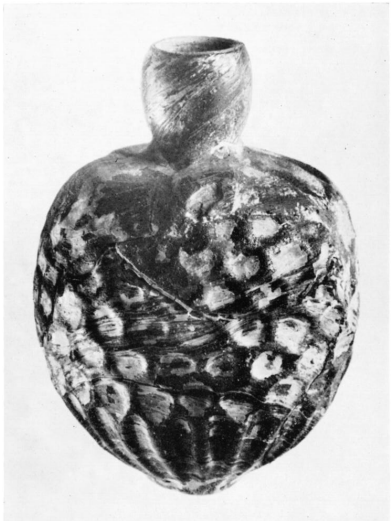


Fig. 8 - Sphero-conical vessel from Iran (glass, dark blue; c. sixth to ninth century); reconstructed h. 10-12. Teheran, Collection of Mohsen Moghadam. After Ettinghausen 1965: pl. XLVII.A

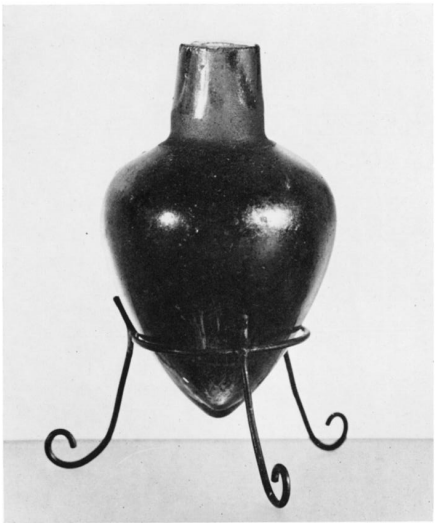


Fig. 9 - Conical vessel from Middle East (?) (glass, amber; c. 12th-13th century); h. 7.7; Corning Museum of Glass, No. 51.1.49 (Corning, New York). After Ettinghausen 1965: pl. XLVI.B.

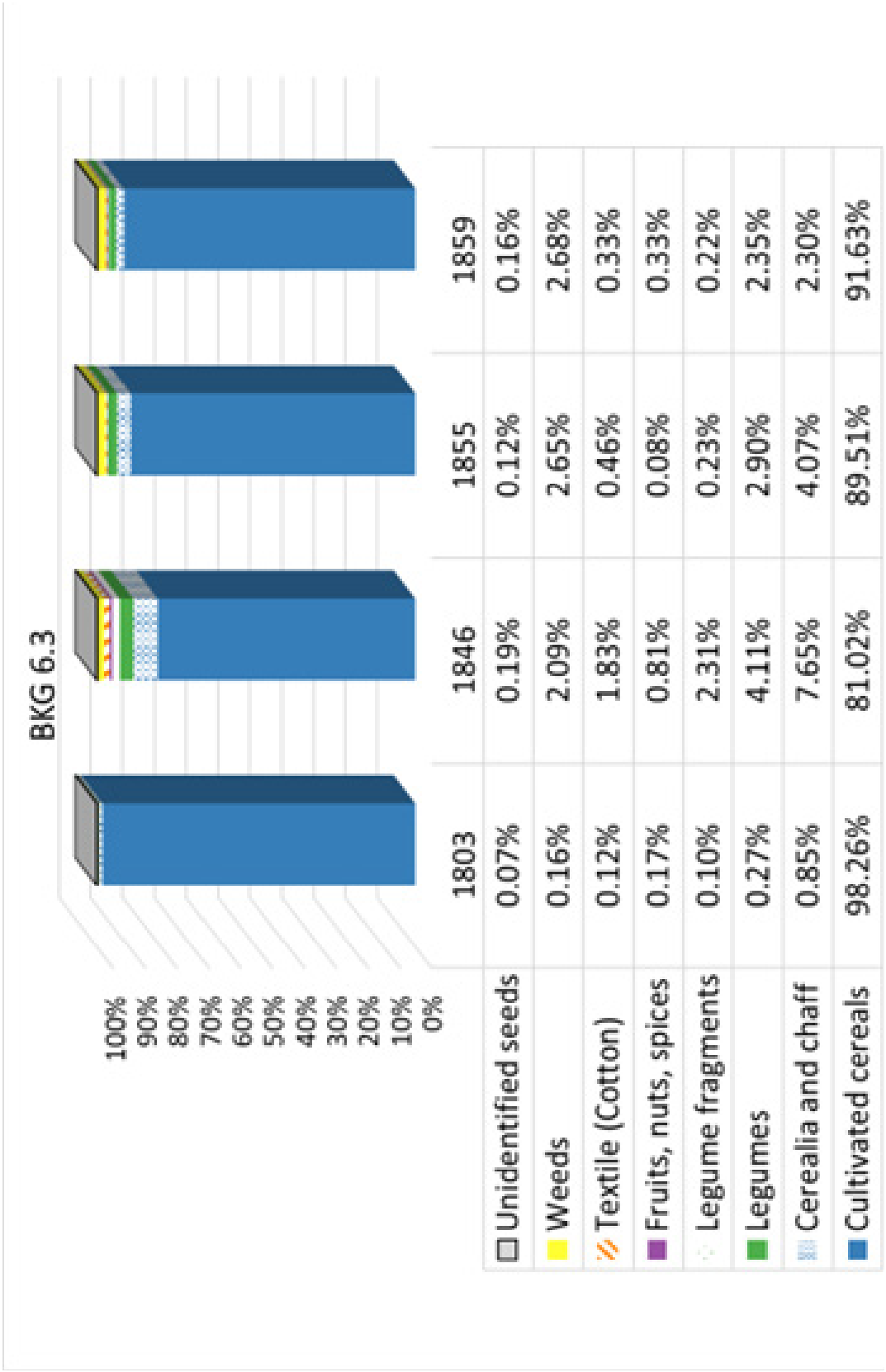


Fig. 1 – Relative ratios of plant categories in BKG 6.3 samples in relation to total count per each sample. Total counts per sample: (1803)= 5786.5; (1846)=3725: (1855)=2606.5; (1859)=1828.



Fig. 2. Rice remains from BKG 6.3. Top left: whole rice grains from BKG 6.3 (1846); top right: half grains from BKG 6.3 (1846): bottom left: one small grain lump from BKG 6.3 (1803); bottom right: rice spikelet bases from BKG 6.3 (1846).



Fig. 3 – Seeds of hulled barley – *Hordeum vulgare var. vulgare* (top row); free-threshing wheat – *Triticum aestivum/durum* (bottom left), and free-threshing wheat compact morphotype (bottom right). All seeds from sample BKG 6.3 (1846).



Fig. 4 – Seeds of sawa millet – *Echinochloa frumentacea*, BKG 6.3 (1846).



Fig. 5 – Seeds of 1. Cotton – *Gossypium arboreum/herbaceum*: 2. Lentil – *Lens culinaris*; 3. Pea – *Pisum sativum*; 4. Horsegram – *Macrotyloma uniflorum*; 5. *Vigna mugno* and 6. *Vigna radiata*. All seeds from BKG 6.3 (1846).

Chapter IV

CONCLUSIONS



Fig. 1a

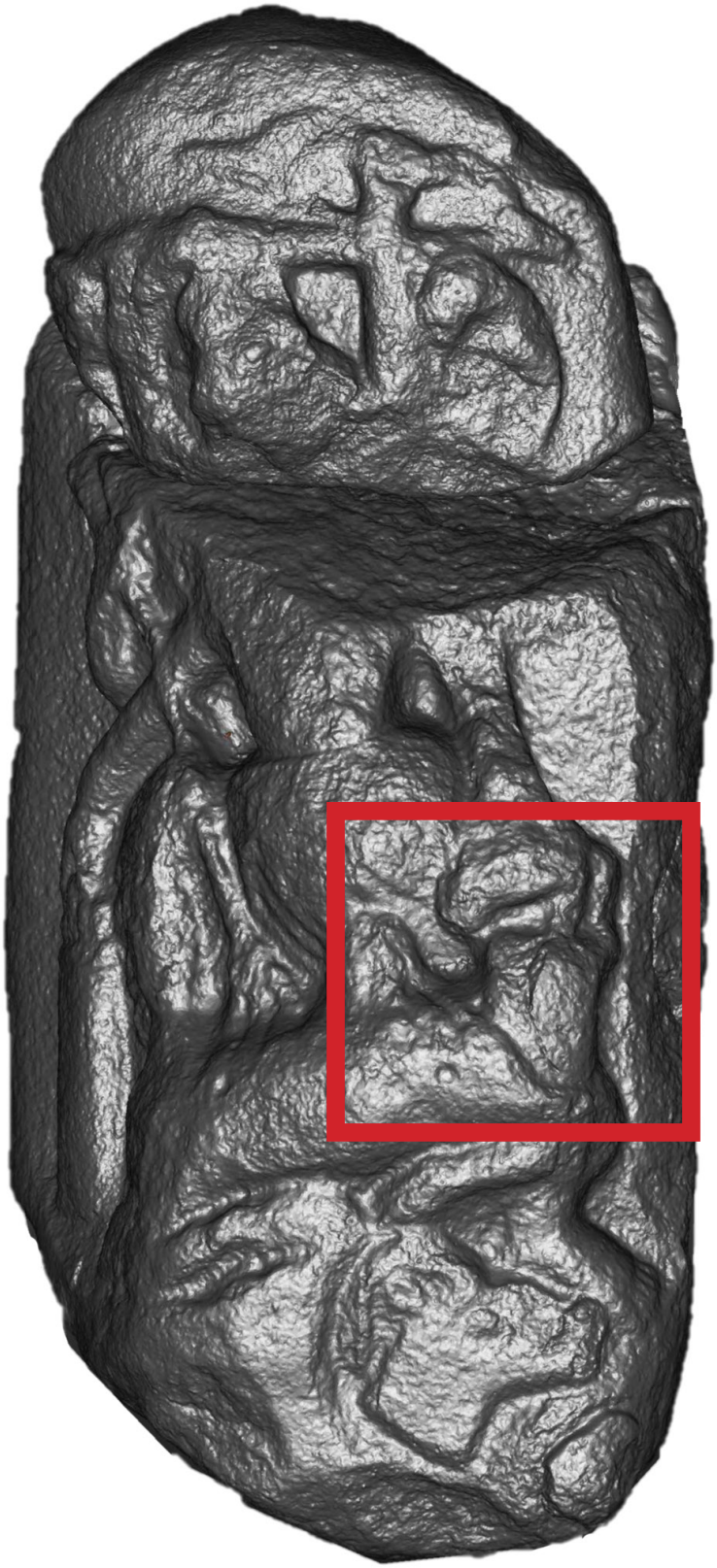


Fig. 1b (the box shows the close up in Fig. 1c).



Fig. 1c

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