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The Discovery of a Possible 'Meat Cache'. Recent Excavations at the Upper Palaeolithic Open-air Site in Kammern-Grubgraben 2015–2020

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Abstract

The Lower Austrian site of Kammern-Grubgraben is one of the few stratigraphically recorded sites from the Last Glacial Maximum (LGM) that allows detailed insights into the life of glacial hunter-gatherer societies. Extensive and planned archaeological excavations took place for the first time between 1985 and 1994 under the direction of Friedrich Brandtner in cooperation with Anta Montet-White (1985–1990) and Bohuslav Klíma (1993–1994), following earlier smaller, isolated findings and unqualified, largely undocumented excavations. After Brandtner's death in 2000, the exceptionally rich find material remained largely unprocessed and barely published. It was not until 2011 to 2015 that the Institute for Oriental and European Archaeology (OREA, now: the Austrian Archaeological Institute – OeAI) of the Austrian Academy of Sciences (OeAW) succeeded in completely recording and inventorying the material in the course of a cooperation project with the Institutes for Prehistory and Early History of the University of Cologne and the Friedrich Alexander University Erlangen-Nuremberg, funded by the legal owner of the finds, the State of Lower Austria. Field research was resumed in 2015, when it became known that land consolidation and the relocation of an access road had begun in the area of the site without prior notification of the authorities. After initial prospections (profiles and percussion cores) by the Quaternary Archaeology research group (OREA/OeAI, OeAW) initiated and funded by the Federal Office for the Protection of Monuments (BDA), regular research activities subsidised by the State of Lower Austria were started in the form of annual one- to two-month excavation campaigns. Once again, an exceptionally extensive inventory of finds including bones, knapped lithics and jewellery was documented and recovered, as well as stone finds unique for this period. This article presents the latest excavations and discusses the finding of a possible meat cache.

Keywords

Lower Austria, Kammern-Grubgraben, open-air site, Last Glacial Maximum (LGM), subsistence, meat cache.

Zusammenfassung – *Der Befund eines möglichen „meat cache". Die neueren Ausgrabungen an der jungpaläolithischen Freilandfundstelle in Kammern-Grubgraben 2015–2020*

Die niederösterreichische Freilandfundstelle Kammern-Grubgraben ist eine der wenigen stratigrafisch erfassten Fundstellen aus dem Letzten Glazialen Maximum (LGM), die einen detaillierten Einblick in das Leben eiszeitlicher Jäger- und Sammlergesellschaften erlaubt. Nach vereinzelten kleineren Fundbergungen und unqualifizierten, weitgehend undokumentierten Grabungen fanden zwischen 1985 und 1994 erstmals umfangreichere und planmäßige archäologische Ausgrabungen unter Friedrich Brandtner in Zusammenarbeit mit Anta Montet-White (1985–1990) und Bohuslav Klíma (1993–1994) statt. Nach dem Tod Brandtner's im Jahre 2000 verblieb das außergewöhnlich reichhaltige Fundmaterial weitgehend unbearbeitet, unaufbereitet und kaum publiziert. Erst in den Jahren 2011 bis 2015 gelang es im Zuge eines vom gesetzlichen Fundeigentümer, dem Land Niederösterreich, geförderten Kooperationsprojektes des Instituts für Orientalische und Europäische Archäologie (OREA, jetzt: Österreichisches Archäologisches Institut – ÖAI) der Österreichischen Akademie der Wissenschaften (ÖAW) mit den Instituten für Ur- und Frühgeschichte der Universität zu Köln und der Friedrich-Alexander-Universität Erlangen-Nürnberg, das Material vollständig zu erfassen und zu inventarisieren. Als im Jahr 2015 bekannt wurde, dass im Bereich der Fundstelle Grundzusammenlegungen sowie die Verlegung eines Güterweges ohne vorherige Bekanntgabe begonnen wurden, kam es zur Wiederaufnahme von Feldforschungen. Nach ersten, seitens des Bundesdenkmalamtes (BDA) initiierten und geförderten Prospektionen (Profile und Rammkernsondagen) der Forschungsgruppe Quartärarchäologie (OREA/ÖAI, ÖAW) wurde eine regelmäßig stattfindende, vom Land Niederösterreich subventionierte Forschungstätigkeit in Form jährlicher ein- bis zweimonatiger Grabungskampagnen aufgenommen. Erneut gelang es, ein außergewöhnlich umfangreiches Fundinventar, darunter Knochen, Silices und Schmuck, aber auch für diese Zeit einzigartige Steinbefunde zu dokumentieren bzw. zu bergen. In diesem Beitrag werden die neuesten Grabungen vorgestellt und der Befund eines möglichen *„meat cache"* diskutiert.

Schlüsselbegriffe

Niederösterreich, Kammern-Grubgraben, Freilandfundstelle, Letztes Glaziales Maximum (LGM), Subsistenz, Fleischdepot.

1. Site and Topography

The Lower Austrian open-air site Kammern-Grubgraben is located in the cadastral municipality of Kammern, which in

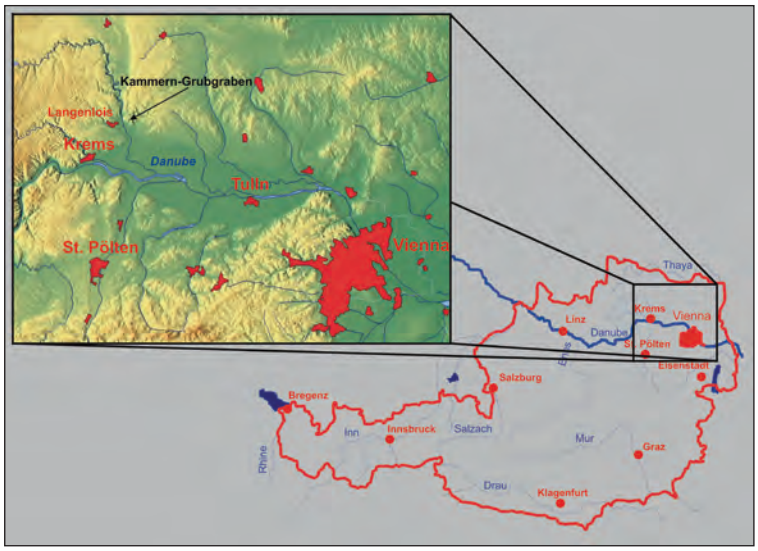

Fig. 1. Kammern-Grubgraben, location of the site (graphic: T. Einwögerer, OeAI, OeAW).

turn belongs to the municipality of Hadersdorf-Kammern in the district Krems/Land (Fig. 1). The site itself is situated in an elevated position in a small, basin-like area opening towards the southwest (Fig. 2) between the Heiligenstein, a southern foothill of the Manhartsberg at 360 m, and the Geißberg at 336 m. Today, the site lies 65 m above and about 1600 m from the river Kamp, which flows from north to south towards the Danube. This area has been intensively used for viticulture for several hundred years. Almost all the slopes of the Heiligenstein and the Geißberg are heavily terraced. Only the summit plateau of the Heiligenstein is forested. A hollow way, partly very deeply cut, leads from the cadastral municipality of Kammern into the so-called 'Grub', a long ravine running from southwest to northeast. This hollow way, often wrongly referred to as the 'Grubgraben', also cuts through the Upper Palaeolithic cultural layers shortly before it reaches the basin of 500 m in length and 130 m in width. The actual 'Grubgraben' lies on the southeastern side of the long narrow basin and designates a section of the 'Diendorf fault', a prominent geological feature in the eastern area of the Bohemian Massif between Wieselburg and Retz.[1] Following the fault zone towards the northeast, one arrives at a gentle saddle that has been heavily altered by terracing and that leads into the Strassertal running north-south (Fig. 3). In the heavily altered terrain, the old drainage systems can still be seen very clearly today under the massive anthropogenic surface interventions (terracing). The Josephinian Land Survey (1773–1781) shows the original drainage systems even more clearly. Two Y-shaped ravines are significant for the area of the Palaeolithic site. One channel ran from the northeast from the area of the saddle along the 'Diendorf fault' down to the Kamp in a southwesterly direction. Another channel ran from Heiligenstein in the north towards the south, where it flowed into the ravine described above. The Palaeolithic site is located exactly in the wedge between the two drainage channels in a spur-like location (Fig. 4). Today, the area of the basin has been heavily altered by large-scale levelling. Material has been extracted mainly from the northeastern part of the elongated basin and filled in at the southwestern end. This has created two large plots of land (originally 430/1 and 430/2), which were separated by a central access road (430/3). Both parcels (430/1 and 430/2) were used as vineyards for a long time. The owner of the parcels is the Zwettl Monastery. In 1990, the old vines were uprooted and new ones were planted. It was agreed with the landowner that part of the area, the central area of the Palaeolithic site, should not be planted but remain available for research. Archaeological excavations finally took place in 1993 and 1994. Due to a lack of funding, no further field research was carried out at the meanwhile world-famous site after the excavation work was completed in 1994. It was not until the old vineyards were cleared and an attempt was made to merge land parcels 430/1 and 430/2, to plant new vines and to move the access road (parcel 430/3) farther south, exactly onto the area of the site, causing massive intervention in the soil, that the site came back into the focus of research in December 2014.

1 Matura 2006, 35.

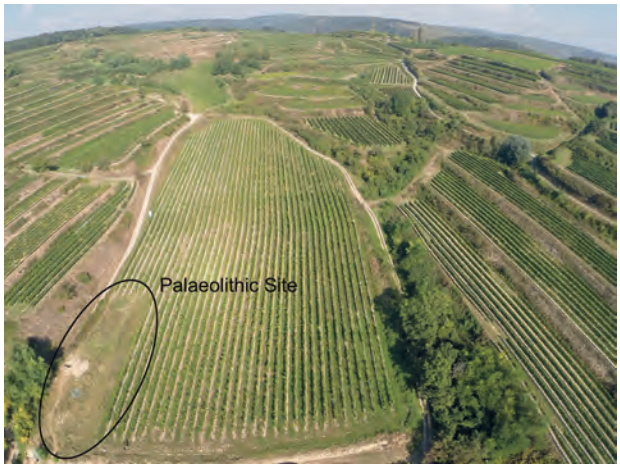

Fig. 2. Kammern-Grubgraben, view from the south of the site in a high basin-like position between Heiligenstein (left) and Geißberg (right) (photo: OeAI, OeAW).

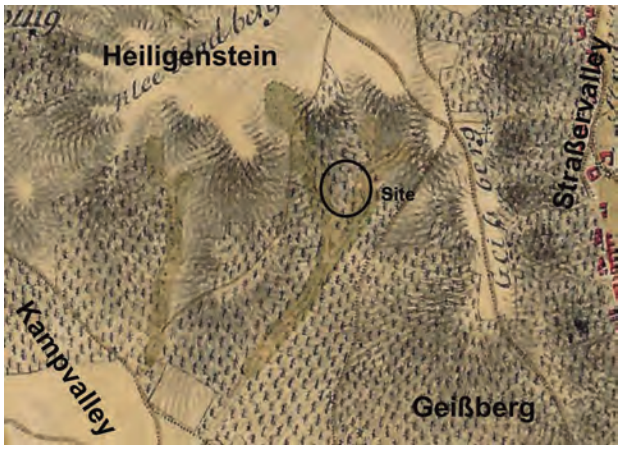

Fig. 4. Kammern-Grubgraben, location of the site on the Josephinian Land Survey (*Josephinische Landesaufnahme*, 1773–1781) (graphic: T. Einwögerer, OeAI, OeAW).

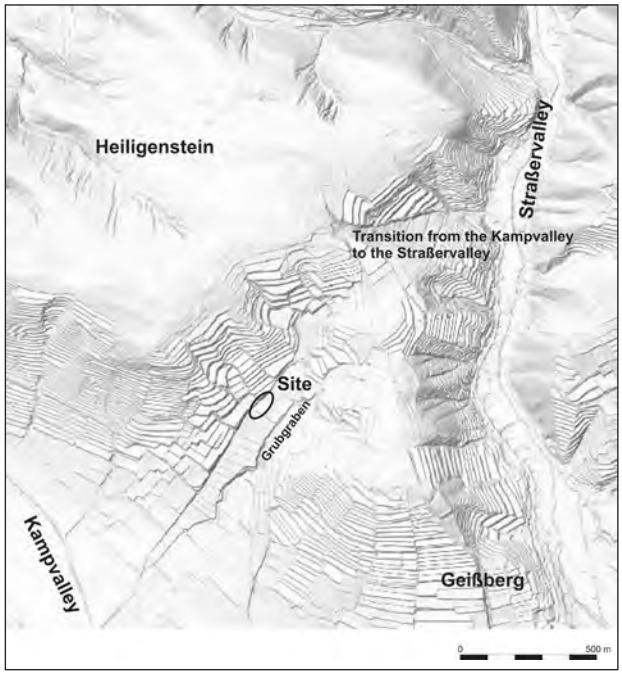

Fig. 3. Kammern-Grubgraben, surface relief around the site (graphic: based on the Lower Austrian Atlas, T. Einwögerer, OeAI, OeAW).

2. Research History

The cultural layers of Kammern-Grubgraben, exposed by the hollow way, have been known since 1870 and were published as early as 1879 by the interested amateur researcher Gundacker Graf Wurmbrand-Stuppach.[2] In addition to local researchers such as Franz Kießling,[3] who carried out collections there, renowned scientists such as Hugo Obermaier[4] became interested in the site. Josef Szombathy[5] also paid a visit. In 1922, Josef Bayer[6] carried out a small excavation in the hollow of the Grubgraben. In the following years, several undocumented excavations exposed cultural layers on both sides of the hollow way. After a fireplace on the western side of the hollow way was excavated and partially cleared by looters, Erwin Lucius[7] carried out a small archaeological excavation in 1962 in order to document at least the few remaining remnants of the fireplace. In 1985, Brandtner initiated the first large-scale excavations. He first worked together with Montet-White (1985–1990) and later with Klíma (1993–1994). During the archaeological campaigns between 1985 and 1990, about 86 m² were exposed.[8] In addition, extensive coring was carried out by Paul Haesaerts around the excavation area.[9] During the excavations, the coordinates of the finds were recorded digitally right on site. However, the excavation trenches and core locations were measured using a wooden peg as point zero and followed the direction of the rows of vines. Neither the wooden stake nor the rows of vines were still present when the new archaeological investigations were resumed in 2015. The

2 Wurmbrand 1979, Tab. 1.
3 Kiessling 1919.
4 Obermaier 1908, 76–83.
5 Neugebauer-Maresch et al. 2016, 227.
6 Bayer 1909.
7 Lucius 1974. – Urbanek 1990. – Frank, Rabeder 1998, 16.
8 Neugebauer-Maresch et al. 2016, 229.
9 Haesaerts 1990.

excavations revealed several cultural layers, referred to as 'Archaeological Layers' (AL) and numbered consecutively from top to bottom (AL 1 to AL 4(5)). In addition to a very extensive inventory of finds with many unusual objects, features in the form of extensive stone pavements, hearths and pits were also found.

After disagreements with Montet-White, Brandtner continued the archaeological excavations at the site in 1993 and 1994 with Klíma as the local excavation director. In doing so, he slightly changed the designations and the orientation of the square metres. Furthermore, he discontinued the digital recording of the find coordinates initiated by Montet-White and omitted recording of find location data altogether. In addition to newly opened areas, excavation units ('units' each corresponding to four square metres) which Montet-White had begun years earlier but had not completed were also reopened. During the excavations in the 1990s, large quantities of finds were recovered and various features were observed, including the barely recorded 'yurt' established in the literature[10], which in all probability never existed in this form. The best-known finds from the old excavations between 1985 and 1994 include Austria's oldest musical instrument, a bone flute with three finger holes made from the shinbone of a reindeer;[11] a *bâton percé*;[12] a large number of bone sewing needles with eye; and a large amount of jewellery in the form of perforated stone discs, pierced animal teeth, but also fossil snail, worm and scaphopod shells.[13] In addition, a rich inventory of knapped lithics and a large number of mostly crushed animal bones were recovered. Unfortunately, the documentation of the exceptional and well-preserved features as well as the very complex stratigraphy fell far short of what was found during the work between 1985 and 1994. Apart from a few smaller excavation reports, only selected parts of the find material and an inconsistent overview plan were published. One of the biggest problems with regard to the old excavations is the loss of the former 'point zero', the starting point of the entire survey. The reconstruction of the exact location of the trenches of the old excavations is further complicated by the changes made by Brandtner in the alignment and the renaming of the square-metre system. Despite several attempts between 2015 and 2020, it has not yet been possible to precisely locate the boundaries of the excavation trenches from 1985 to 1994 and to link them into the national survey system.

Brandtner, who had stored almost all of the find material as well as a large part of the documentation from 1993 and 1994 in his house and the associated garage in Gars am Kamp, passed away in 2000. On behalf of the legal owner, the State of Lower Austria, all the archaeological remains of the Kammern-Grubgraben site were collected from Brandtner's property and temporarily stored in the depot of the Krahuletz Museum in Eggenburg. However, some of the finds and documentation had already been exported to the United States of America (University of Kansas) by Montet-White without official permission. After several years of intensive correspondence, with the assistance of the Federal Office for the Protection of Monuments (BDA), several boxes were returned from the USA by the year 2000. Up until 2007, Margit Bachner attempted to sift through and sort the documents. She initiated a first inventory of the finds, which, however, failed due to data-related problems. In 2008, almost the entire find material was packed into 307 standard boxes of approximately 34 × 28 × 12 cm and moved to a depot belonging to the State of Lower Austria (former Hainburg tobacco factory). Single finds of special significance remained in Asparn/Zaya (MAMUZ Museum), in the Krahuletz Museum in Eggenburg, in the Lower Austrian State Museum in St. Pölten and in the community centre in Hadersdorf. Brandtner's entire surviving excavation documentation was digitised and secured by the Prehistoric Commission of the Austrian Academy of Sciences (now part of the OeAI of the OeAW). Between 2011 and 2015, the Quaternary Archaeology Research Group (OREA, now part of the OeAI of the OeAW) led by Christine Neugebauer-Maresch succeeded in sifting through and inventorying the find material from the old excavations to the greatest possible extent in cooperation with the Institutes of Prehistory and Early History of the University of Cologne (Jürgen Richter) and the Friedrich Alexander University of Erlangen-Nuremberg (Andreas Maier), with the financial support of the State of Lower Austria. The work was carried out in the form of three- to four-week practical courses with students from the universities of Vienna, Erlangen-Nuremberg and Cologne. In the process, a total of 24,000 data sets were recorded in about 6000 working hours. A first report on the work on the inventory was presented in 2016.[14]

In 2020, it turned out that large quantities of finds had still not been returned. In 2021, with the help of the Quaternary Archaeology Research Group, it was finally possible to return four larger consignments from the USA to the collection of the State of Lower Austria.

10 Brandtner, Klíma 1995.

11 Einwögerer, Käfer 1998.

12 Neugebauer-Maresch et al. 2016, Pl. 8.

13 Neugebauer-Maresch et al. 2016, Pl. 7.

14 Neugebauer-Maresch et al. 2016.

Fig. 5. Kammern-Grubgraben 2014, excavator at the site in December 2014 (photo: C. Neugebauer-Maresch, OeAI, OeAW).

Fig. 6. Kammern-Grubgraben 2015, extensive earthworks to remove the irrigation system northwest of the site on land parcel 430/3 (photo: T. Einwögerer, OeAI, OeAW).

After Brandtner stopped fieldwork at Grubgraben in 1995, the area around the site remained largely untouched. This changed in December 2014, when the Quaternary Archaeology Research Group was informed that massive earthworks were being carried out at the site (in the immediate vicinity of a sign indicating the significance of this Palaeolithic site) (Fig. 5). A site inspection was immediately carried out by a representative of the research group (Christine Neugebauer-Maresch) and the officer of the Federal Monuments Authority responsible for this (Martin Krenn) and revealed the full extent of the intervention in the soil. The vines on plots 430/1 and 430/2 having already been dug up by the current leaseholder on the land, the Schloss Gobelsburg winery (hereafter referred to as the tenant), an excavator was about to tear out the access road (plot 430/3) between the plots. Subsequent research revealed that the two vineyards were to be merged for easier cultivation. In the course of this, the old road was to be moved further south between parcels 430/1 and 431. This also required the construction of a new 'funnel-shaped' driveway from the hollow way, which was cut to a depth of almost 5 m in this area. However, it would not have been possible to rule out the destruction of areas with possibly preserved cultural layers during the planned work. Following the immediate suspension of the construction work and discussions with the tenant, the Quaternary Archaeology Research Group was commissioned by the Federal Monuments Authority to carry out initial prospections in the area of the planned driveway.

3. The 2015–2020 Fieldwork Campaigns

The prospections initiated and financed by the Federal Monuments Authority began in January 2015 under the direction of the author.[15] In a first step, the irrigation system in the area of the old access road, which was partially buried up to 80 cm deep, was removed under archaeological supervision (Fig. 6). In the area of the road (parcel 430/3) as well as just south and north of it, the entire sediment was already heavily disturbed to a depth of just over 80 cm, so that no remains of cultural layers were preserved here. Since it was also planned to 'loosen' the entire sediment on the northern vineyard plot (plot 430/2) to a depth of 80 cm with a 20 t excavator, several small machine excavation trenches were made in this area. In the process, well-preserved bones were documented in the underlying clay below a 20 to 40 cm-thick layer of humus. As a result, the plan of 'loosening the soil' was abandoned and the bone-bearing clay layer was not disturbed any further. Moreover, two profiles of about 5 m in height were made at the eastern edge of the hollow way, one to the north (parcel 430/1) and one to the south (parcel 431) of the planned funnel-shaped driveway to the newly planned access road. In the upper section of the southern profile (Profile 1), a sequence of different rapid erosion processes could be documented. In the lower area, the erosion horizons were followed by an articulated loess sequence and finally a loamy zone (Fig. 7). These are obviously alluvial horizons of a large, older drainage channel (Fig. 4). It is highly probable that the channel shown in the Josephinian Land Survey of 1773 to 1781, which drained the flank of the Heiligenstein from the north, was exposed here. A cultural layer was not found during the work in 2015. In the northern profile (Profile 2), remains of the erosion channel could only be observed in the uppermost part. Below this, after several strata of loess and loess loams, the loamy zone

15 Einwögerer 2017a. – Einwögerer 2017b.

Fig. 7. Kammern-Grubgraben 2015, 'Profile 1' at the eastern edge of the hollow way; the erosion layers in the upper part of the profile are clearly visible (photo: T. Einwögerer, OeAI, OeAW).

appeared again, this time with clear bioturbation. Once again, no cultural layers were detected.

In a further step, five percussion cores were driven into the soil in the vicinity of the planned access road using a hand-held impact device. The majority of these were probed down to the clay zone, which was about 5 m deep. Once again, no evidence of cultural layers was found.

As no clear cultural layer was observed in either the profiles or the percussion cores, the Federal Monuments Authority ordered that the access road be lowered carefully, layer by layer, under archaeological supervision. Only a few metres beyond the edge of the hollow way, the first stone slabs appeared, the distribution of which resembled the upper layer of stones of the stone paving uncovered between 1985 and 1994. The machine building work was then stopped immediately. The Federal Monuments Authority nevertheless insisted on mechanically removing the entire access road down to the upper surface of the supposed Palaeolithic cultural layer. During further soil removal, it was possible to trace the upper edge of a clear Palaeolithic cultural layer until it had collapsed so far in an easterly direction that it was no longer affected by the construction work on the new access road. In the process, we documented an archaeological horizon of an area of 120 m² with finds of stone slabs, knapped lithics, bones and dyes (Fig. 8). In addition, a triple, presumably Neolithic ditch system could also be documented. All surface finds were spatially recorded and recovered, but the stone slabs were left in situ and covered with an 80 cm-thick layer of humus for frost protection. Archaeological work was stopped for the time being at the end of January 2015 to await further negotiations between the tenant and the Federal Monuments Authority. Since the original access road (at that time parcel 430/3) was no longer usable due to the earthworks that had begun, a temporary replacement road was constructed to the north around parcel 430/2 in order to make the vineyards to the east and south of the site accessible for agricultural machines.

3.1. The Stratigraphic Context

Due to the long excavation activities at the site and the changing directors, a complex and partly inconsistent stratigraphic picture emerges. This is due not only to the multi-layered structure, but also to the changing designations of the archaeological horizons in the course of the various excavation campaigns between 1985 and 2020. The first stratigraphic classifications were already made by P. Haesaerts in the 1980s/1990s.[16] These designations of the strata were used as a basis in the excavation campaigns of Montet-White and Brandtner from 1985 to 1990.[17] A sequence of up to five

16 Haesaerts 1990.

17 Montet-White 1988. – Montet-White 1990.

Fig. 8. Kammern-Grubgraben 2015, machine excavation to just above the cultural layer in the area of the newly planned access road (photo: T. Einwögerer, OeAI, OeAW).

consecutive archaeological horizons was divided into so-called 'Archaeological Layers' (AL 1, 2a, 2b, 3a, 3b, 4, 4a and 5), whereby the unit AL 1 represents the latest occupation phase, layers AL 2–4 form the main package of cultural layers and AL 5 could only be recorded in a small part in the northeast of the excavation area. Brandtner and Klíma slightly modified the previously used designation of the layers during the excavation campaigns of 1993–1994. From then on, Brandtner referred to the so-called 'Archaeological Layers' (AL 1–5) as 'Cultural Layers' (*Kulturschichten*, KS 1–5). He considered KS 3 to be the main cultural layer. During the first excavation by the Quaternary Archaeology Research Group in 2015, only a few areas about 50 m south of the old excavations of 1985–1994 were opened. Following the old designations, the uppermost layer found was named 'Archaeological Horizon' AH 101, as it was suspected from the outset that it correlated to the 'Archaeological Layer' AL 1 or the 'Cultural Layer' KS 1. The underlying main cultural layer with a pronounced stone slab setting was named 'Archaeological Horizon' AH 102 and corresponds to the 'Archaeological Layers' AL 2–4 or the 'Cultural Layers' KS 2–4. In the archaeological research excavations by the Quaternary Archaeology Research Group from 2016 onwards, on the other hand, the layer that can be equated with the 'Archaeological Layer' AL 1 or the 'Cultural Layer' KS 1 or the 'Archaeological Horizon' AH 101 was named 'Archaeological Horizon' AH 1. The separation by name between AH 101 and AH 1 was necessary for excavation reasons, as the excavation work from 2016 onwards did not directly follow the excavation areas of 2015. The layer following AH 1 (the main cultural layer) with its clear stone features (stone pavements, rising structures) was excavated from 2016 as 'Archaeological Horizon' AH 2. This layer corresponds to the old designations 'Archaeological Layer' AL 2–4 or 'Cultural Layers' KS 2–4 as well as the 'Archaeological Horizon' AH 102. A further subdivision of the 'Archaeological Horizon' AH 102 or AH 2, as defined in the layer packages AL 2–4, could not be made in the same form in the new excavations from 2016. Although the layer package was clearly multiphase, it could not be associated with the old layer designations. Therefore, a new subdivision was made based on different sedimentary units. The 'Archaeological Layer' AL 5 or the 'Cultural Layer' KS 5 could not be recorded in the more recent research work from 2015.[18] A comparison of the different cultural layer designations of the various excavation campaigns is shown in Tab. 1.

A considerable amount of ^{14}C data from the different archaeological layers is now available from the Kammern-Grubgraben site and dates this site to a period between about 20,000 and 23,000 years calBP (Tab. 2). According

18 Händel et al. 2021.

Excavation campaigns	P. Haesaerts (A. Montet-White / F. Brandtner / B. Klíma) 1985–1994	A. Montet-White / F. Brandtner (P. Haesaerts) 1985–1990	F. Brandtner / B. Klíma (P. Haesaerts) 1993–1994	Pilot excavation OREA/OeAW 2015	Research excavations OREA/OeAW 2016–2020
Layer designations	AL 1	AL 1	KS 1	AH 101	AH 1
	AL 2a, 2b	AL 2a, 2b	KS 2	AH 102	AH 2
	AL 3a, 3b	AL 3	KS 3		
	AL 4, 4a	AL 4	KS 4		
	AL 5	AL 5	KS 5	–	–

Tab. 1. Kammern-Grubgraben, comparison of the various cultural layer designations of the different excavation campaigns from 1985 to 2020.

Laboratory No.	**^{14}C Age BP**	**+/- (1σ)**	**Layer**	**cal BP**	**+/- (1σ)**	**Reference**
Lv-1825	16800	280	AL 1	20280	343	Gilot 1997
GrN-21902	18380	130	KS 1	22254	161	Haesaerts et al. 2016
MAMS-32966	18590	60	AH 1	22451	64	Händel et al. 2020
Lv-1821	17350	190	AL 2b	20939	265	Gilot 1997
Lv-1822	18620	220	AL 2b	22525	252	Gilot 1997
Lv-1823	18070	270	AL 2a	21921	340	Gilot 1997
GrN-21529	18890	180	KS 2	22741	207	Haesaerts et al. 2016
MAMS-25868	19320	60	AL 2	23267	139	Haesaerts et al. 2016
MAMS-25869	19330	70	AL 2	23278	146	Haesaerts et al. 2016
MAMS-26430	18300	70	AH 102	22185	130	Händel et al. 2020
MAMS-30165	19250	70	AH 2	23188	144	Händel et al. 2020
MAMS-40115	18860	60	AH 2	22708	118	Händel et al. 2020
MAMS-40116	19230	60	AH 2	23163	139	Händel et al. 2020
Lv-1660	18170	300	AL 3–4	22031	347	Haesaerts 1990
Lv-1810	18030	270	AL 3	21870	349	Gilot 1997
GrN-21530	18920	90	KS 3	22775	140	Haesaerts et al. 2016
MAMS-25870	19170	60	AL 3	23078	134	Haesaerts et al. 2016
MAMS-25871	19070	70	AL 3	22960	125	Haesaerts et al. 2016
AA-1746	18960	290	AL 4?	22828	333	Haesaerts 1990
Lv-1680	18400	330	AL 4	22222	370	Haesaerts 1990
GrN-21531	19380	90	KS 4	23337	161	Haesaerts et al. 2016
GrN-21790	19270	80	AL 4	23212	151	Haesaerts et al. 2016
GrN-21893	18820	160	AL 4	22678	179	Haesaerts et al. 2016
MAMS-25872	19290	70	AL 4	23234	144	Haesaerts et al. 2016
MAMS-25873	19210	70	AL 4	23139	145	Haesaerts et al. 2016

Tab. 2. Kammern-Grubgraben, radiocarbon dates, using OxCal 4.3 (simplified after Händel et al. 2021, Tab. 7).

to the data, the top layer (AL 1/KS 1/AH 101/AH 1) is probably about 700 years younger than the following cultural layer package (AL 2–4/KS 2–4/AH 102/AH 2).[19]

3.2. Pilot Excavations in 2015

After intensive discussions with the tenant, the Federal Monuments Authority and the Quaternary Archaeology Research Group, the research group was once again commissioned to carry out a small-scale excavation in the area of the planned access road.[20] The work was carried out from 01.09.2015 in collaboration with the University of Erlangen-Nuremberg (Andreas Maier) with financial support from the Federal Monuments Authority and the State of Lower Austria. Two trenches were prepared in a local measurement network adapted to the orientation of the trenches. One trench (Trench B–E/3) was prepared in the west of the road transverse to the direction of travel, and one (Trench C/12–13) in the central area of the road in the direction of travel. In Trench B–E/3, after the mechanical removal of the winter protection, a coherent stone pavement was found only a few centimetres below the surface that had been removed by a machine excavator. As already suspected during the excavation work in January, the excavated stone slabs and individual finds were lying only slightly higher and were already slightly displaced. The actual stone slab layer with many finds was not damaged by the mechanical excavation. Thus, in autumn 2015, it was possible to document an *in situ* stone pavement with stones up to a size of almost 50 × 50 cm (Fig. 9) in an area of 3 m², as well as a rich find material, including not only lithics and bones but also ornamental objects such as the fossil shell of a cone snail of the genus *Conus* (Fig. 10 right) and a belemnite broken into several pieces with an incorporated ring notch for attachment (Fig. 10 left).[21] In square metre E/3, where the stone layer was very sparse, the cultural layer was dug through and a 2.5 m-deep trench was made. A number of sample series (sediment, molluscs, pollen) were taken in cooperation with the University of Würzburg (Birgit Terhorst) as well as several samples for OSL dating in cooperation with the University of Bayreuth (Ulrich Hambach).[22] Due to limited resources, the stone slab layer in square metres B–D/3 was only documented but not recovered. After completion of the work, it was covered with geotextile and backfilled.

In comparison to Trench B-E/3, there was only a loose scatter of stone slabs in Trench C/12–13, but with a

Fig. 9. Kammern-Grubgraben 2015, pilot excavation, square metre B–D/3, stone layer in AH 102 (photo: T. Einwögerer, OeAI, OeAW).

Fig. 10. left: Kammern-Grubgraben 2015, pilot excavation, square metre B–D/3, AH 102, part of a thunderbolt fossil (belemnite) with ring notch in situ; right: Kammern-Grubgraben 2015, pilot excavation, square metre B–D/3, AH 102, fossil shell of a snail of the genus Conus in situ (photos: T. Einwögerer, OeAI, OeAW).

19 Händel et al. 2021, Fig. 14.
20 Einwögerer 2017a. – Einwögerer 2017b.
21 Einwögerer 2017b, D2430.
22 Händel et al. 2021, Fig. 4.

much higher number of finds. Above all, it was possible to document poorly preserved faunal remains, that were found in close proximity to one another, such as pieces of the jaws and teeth of reindeer. In this trench, too, a profile about 1 m high was created on the embankment wall and sampled.

In order to establish a relationship between the newly uncovered layers and the old excavations from 1985 to 1994 in terms of absolute heights, the northern area of the old excavation was examined more closely on plot 430/1. For this purpose, the humus was removed over a large area with a small excavator in order to record the old excavation boundaries, and a northern profile was reopened. It was found that the previously published old excavation boundaries did not correspond to the actual excavation boundaries. A particular stroke of luck was the discovery of carved contour lines and square metre boundaries in the old north profile, which were still clearly recognisable even after more than 25 years. This made it possible, after the loss of the excavation zero point, to classify the old excavations at least in terms of height. The profile was redocumented and also sampled. OSL samples were taken again in the process.

3.3. The Start of Systematic Research Excavations

Since the summer of 2016, fieldwork at the site has been continued by the Quaternary Archaeology Research Group through annual one- to two-month excavation campaigns with financial support from the State of Lower Austria.[23] Trench B–D(E)/3, begun in 2015, was extended by the square metres B–D/2 and Z–A/3 towards the west and south, and several test trenches (Trenches 1, 2, 3 and 4) as well as Trench 'Paul' were created (Fig. 11). Parallel to the excavation work, percussion core soundings were carried out continuously in order to record the extent of the still preserved cultural layer remains as precisely as possible. In 2020, soundings were also made to the west of the hollow way in the cadastral municipality of Zöbing. In addition, geophysical measurements were carried out several times using georadar (Volker Lindinger, ARDIG) to record the extent of the site. The calculated data were then checked by means of percussion cores and a test trench (Trench 4). Furthermore, attempts were made to record the old excavation boundaries, which could not be clearly determined, in large-scale mechanical excavations, and to redocument at least two old profiles at right angles to each other. Since the exact position of the old excavation is not clear from the existing literature, attempts were made during the excavation work from 2015 to 2017 to record the exact position of the old excavation boundaries in the Gauss-Krüger coordinate system by means of several excavator trenches. The trench boundaries documented in the process, as well as the location of several percussion core soundings carried out by Haesaerts in the 1980s and 1990s, could not be assigned to the excavation boundaries documented and published in extracts at the time. Furthermore, it was possible to uncover areas of the cultural layer that were considered to have been excavated, but had, in fact, only been superficially excavated and then covered with geotextile. Parts of the covered cultural layer were not even 70 cm below the present surface in the plough zone. The find layer itself was not touched. The investigated area was backfilled after the survey. During the 2020 campaign, work began on completely opening larger sections of the old excavation trenches and documenting the surface of the lower edge of the excavation in detail. Unexpectedly, a very pronounced relief with strips of lower bottom surfaces was revealed, which could indicate that an attempt had been made to record features that penetrated deeper into the subsoil at this location. The recording of the bottom surface of the old excavation is to be continued in the coming years.

In 2017, due to pressure from several landowners in the area of the excavation site, a replacement for the temporary bypass had to be found. Despite massive objections, presented in a report by the Quaternary Archaeology Research Group, a new access road, running right over the Palaeolithic site, was approved by the Federal Monuments Authority in spring 2018 and was also built immediately. As a condition, a maximum depth of intervention of up to 40 cm in the subsoil was specified. The construction of the path was carried out under the supervision of the Quaternary Archaeology Research Group, which ensured that no Palaeolithic layers were destroyed.[24] However, large parts of the key Kammern-Grubgraben site are no longer accessible for future research due to the newly constructed road.[25] After the construction of the road, land consolidation and the renaming of parcels took place in the area of the site. For example, the old road parcel 430/3 was deleted from the cadastral register and the new section of the road in the area of the excavation was unfortunately again designated parcel 430/3. A small part of the originally planned driveway ramp was given the parcel number 430/4.

23 Einwögerer 2018a. – Einwögerer 2018b. – Einwögerer 2019a. – Einwögerer 2019b. – Einwögerer 2019c. – Einwögerer 2020a. – Einwögerer 2020b. – Einwögerer 2020c. – Einwögerer 2021a. – Einwögerer 2021b. – Einwögerer in press c. – Einwögerer in press d.

24 Einwögerer 2020c.

25 Einwögerer 2020c.

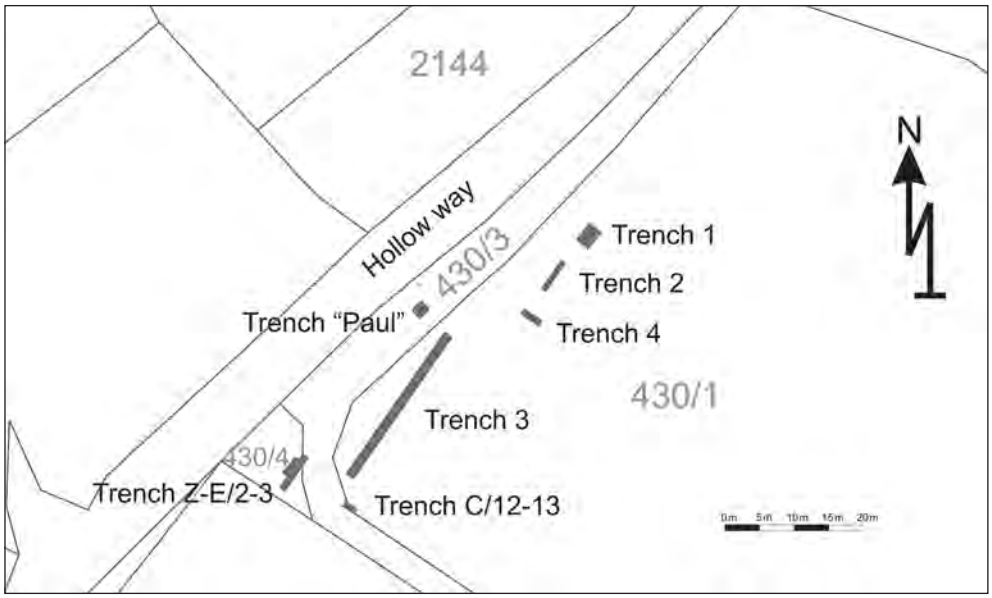

Fig. 11. Kammern-Grubgraben 2015–2020, overview of the excavation trenches (graphic: T. Einwögerer, OeAI, OeAW).

3.3.1. Trench 'Paul'

In the course of the repeated failed attempts to determine the old excavation boundaries, a sondage ('Trench 86') uncovered by Haesaerts in 1986 was searched for and reopened in 2016 by means of a long narrow trench.[26] The trench was designated as Trench 'Paul' (Fig. 11) and, although it was not oriented according to the local survey grid established in 2015, it was nevertheless documented according to this grid. Only the ¼-square metre division for wet sieving the finds was adjusted to the actual trench boundaries. During the work, it became apparent that the sondage, which was published as measuring 2 × 2 m, actually measured only 1.8 × 1.55 m. It was also not found exactly where it was marked on a published general plan.[27] A multi-layered plastic foil was found at the base of 'Paul', already mostly dissolved as a result of being stored in the damp sediment, which covered a culture layer, presumably the culture layer package AL 2–4. Large parts of the layer package appeared untouched. Individual areas, especially heavily weathered bones, were additionally covered with aluminium foil. Due to time constraints, only the northern half of Trench 'Paul' could be excavated in 2016. In addition to several animal burrows and depressions that may be associated with periglacial frost phenomena, it was also possible to document several intentional pits, possibly postholes. In order to clarify a possible connection between the documented stone layers in Trench Z–D(E)/2–3 documented in 2015 and 2016 and in Trench 'Paul', 13 percussion cores were sunk on a line between the two trenches, but also further to the east. An initial evaluation of the percussion core profiles revealed that the cultural layer (AH 2) excavated in Trench 'Paul' and the cultural layer AH 102 in Trench Z–D(E)/2–3 are very probably the cultural layer package designated AL 2–4 during the old excavation from 1985 to 1994. In August 2017, work continued on the southern part of Trench 'Paul'.[28] It became apparent that, in contrast to the northern trench, the cultural layer here had remained almost untouched by the work in 1986. Consequently, a dense find layer (AH 2) was uncovered over an area of slightly more than 1.5 m². At the base of the find layer, another layer of stone slabs was documented (Fig. 12). As with the layer of slabs from Trench B–D(E)/2–3 (2015–2016), the stones are local rocks that were brought to the site from the nearby slopes of the Heiligenstein and the Geißberg.[29] A deep sounding allowed documentation of the sedimentary sequences beneath the cultural layer. Large-scale sampling in Trench 'Paul', which had been postponed to 2018 due to time constraints, could no longer be carried out because, following protests from local residents who were dissatisfied with the provisional access road solution, a new final road was built exactly over

26 Einwögerer 2018a. – Einwögerer 2018b, D2647–D2648.
27 Haesaerts, Damblon 2016, Fig. 2.
28 Einwögerer 2019a. – Einwögerer 2019b, D1765–D1767.
29 Einwögerer 2018a, 215.

Fig. 12. Kammern-Grubgraben 2017, Trench 'Paul', AH 2, upper surface of the stone layer with associated finds (bones and lithics) (photo and graphic: T. Einwögerer, OeAI, OeAW).

the site along the edge of the hollow way. The new road has made Trench 'Paul' in particular, but also large parts of the site in general, inaccessible to research.

3.3.2. Trench B–D(E)/2–3

In September 2016, the stone slab layer (AH 102) exposed in 2015 in square metres B–D(E)/3 was extended both to the west and to the south (Fig. 11).[30] The stone slab layer was also exposed in square metres B–D/2 and Z–A/3. To the west, towards the hollow way, the cultural layer AH 102 could no longer be traced after 1 m. A slightly decreasing density of finds as well as the thinning out of the stone slab layer suggest that the find layer ended approximately in the area of the edge of the hollow way. To the south, on the other hand, no significant decrease in the density of finds could be observed.

3.3.3. Trench 1

In 2017, Trench 1 was created on the northeastern edge of Brandtner's old excavation corner, which had already been confirmed by an excavation trench in 2016 (Fig. 11).[31] The trench adjoined the old excavation area of 1993–1994 with three square metres directly to the east, which is why, as with trench 'Paul', the location did not correspond to the local measurement grid established in 2015. Here, too, the ¼-square metre division for wet sieving the sediment was adapted to the alignment of the trench. The features and finds were nevertheless measured in the local grid created in 2015. In the area of Trench 1, an old profile documentation promised not only the presence of the last remains of layer AL 1, but also a multi-layered slab layer in the layer package AL 2–4. The primary goal of the 2017 work in Trench 1 was to recover datable material from layer AH 1. The main focus here was on finding tooth remains, as it was known that the bones from the site could not be ^{14}C dated due to their low collagen content. Only a few centimetres below AH 1, another cultural layer (AH 2) was encountered, in which a large accumulation of stones was found ('Object 8', *Steinhaufen*) (Fig. 13). Between 2017 and 2019, the cultural layers AH 1 and AH 2 were completely excavated over an

30 Einwögerer 2018a. – Einwögerer 2018b, D2644–D2647.

31 Einwögerer 2019a. – Einwögerer 2019b, D1768–D1769.

Fig. 13. Kammern-Grubgraben 2018, Trench 1, 'Object 8', AH 2, upper surface of the stone layer exposed by students from the Institute of Prehistory and Historical Archaeology of the University of Vienna (photo: T. Einwögerer, OeAI, OeAW).

area of 3 × 1 m.[32] Only the two northern square metres were completely untouched. The southern square metre, on the other hand, had already been excavated down to AH 2 and covered with geotextile. This is presumably an area in which Montet-White excavated layer AL 1 in 1989–1990, but left layers AL 2–4 largely untouched. In 2019 and 2020, Trench 1 was extended 1 m to the east. Once again, the two northern square metres appeared untouched, while the southern one was again excavated to the top of AH 2. By the end of the 2020 season, the eastern square metre row could be exposed down to the upper surface of 'Object 8' and the uppermost stone layer was documented. 'Object 8' was encountered in all six excavated square metres. Within 'Object 8', up to six layers of intentionally superimposed stones as well as roof tile-shaped superimposed stone slabs, which were the result of collapsed rising stone structures, could be documented. In addition, two latent hearths were detected in different stratigraphic positions within 'Object 8'. In terms of finds, a large number of mostly crushed animal bones, lithics and fossil jewellery were recovered, including a number of fossil *Scaphopoda* and *Protula* as well as several perforated fossil snail shells.

3.3.4. Trench 2

Trench 2 is a small trench dug in 2017, 0.5 m wide and 5 m long (Fig. 11).[33] The purpose of this trench was to clarify the extent of an area within the published old excavation boundaries that had been uncovered in 2015 in the course of the search for the old excavation edges, but which had not been fully excavated and covered with geotextile. During the investigations, it turned out that the area with remains of AL 2–4 that had not been completely excavated was only 1 × 1 m. The preserved stone layer was not further exposed, but its extent was documented and the trench was backfilled.

3.3.5. Trench 3

Trench 3 was also created during fieldwork in 2018 (Fig. 11).[34] In order to record the archaeological horizon AH 1 in terms of its shape and slope, a 1 m-wide and 10 m-long trench was made from the assumed southern edge of the old excavations towards the south, towards Trench C/12–13 documented in 2015 (square metres V–AE/10). In 2019[35] and 2020,[36] this trench was first extended by a further 10 m (square metres L–U/10) and then again by a further 5 m (G–K/10). The aim of creating Trench 3 was to record the cultural layers AH 1 and AH 2 in terms of extension, slope gradient and absolute depth below the present surface. It was possible to detect horizon AH 2 along the entire length of the trench. For the most part, the excavation only reached the upper surface of AH 2; AH 2 was completely excavated only in a few square metres and sloped continuously towards the south. In general, the cultural layer package documented between 1985 and 1994 (AL 2–4), now excavated as AH 2, thinned out slightly towards the south, only to significantly increase in thickness again. A continuous layer of stone slabs could not be detected. However, the number of stone slabs increased significantly towards the south. These observations, in conjunction with the features of a stone pavement in section B–D(E)/2–3 documented in 2014 and 2015 and the results of the percussion core soundings, indicate, contrary to earlier assumptions, a further dense find zone with extensive stone pavements and very many finds to the south of the old excavations. Especially in the square metres uncovered in 2020, a very dense stone pavement layer was detected in AH 2. In the southernmost square metre (G/10), it was possible to uncover similar stacked and recollapsed stone structures as already documented in Trench 1 at 'Object 8' in cultural layer AH 2. Several 'roof tile-shaped' stone slabs which had slipped on top of each other indicate a direction of collapse to the east (Fig. 14). The stone features themselves were only documented, but not removed. The layer AL 1 described in the old excavations could not be clearly verified in the profiles of Trench 3. Only a faint sand band might indicate its

32 Einwögerer 2019a. – Einwögerer 2019b, D1768–D1769. – Einwögerer 2020a. – Einwögerer 2020b, D1895–D1901. – Einwögerer 2021a. – Einwögerer 2021b.

33 Einwögerer 2019a. – Einwögerer 2019b, D1767–D1768.

34 Einwögerer 2020a. – Einwögerer 2020b, D1894–D1895.

35 Einwögerer 2021a. – Einwögerer 2021b.

36 Einwögerer in press c. – Einwögerer in press d.

Fig. 14. Kammern-Grubgraben 2020, Trench 3, square metre G–I/10, AH 102, stone structure with roof tile-shaped areas of collapse (photo: T. Einwögerer, OeAI, OeAW).

location. In terms of finds, it was possible to recover heavily crushed animal bones, but also whole pieces of jaw (mostly from reindeer), knapped lithics and pieces of jewellery in the form of fossil shells of marine animals, especially in the spaces between the stones.

In order to analyse the sedimentary structure at the site, several series of samples were taken from Trench 3 for further detailed sedimentological investigations, including a continuous row of undisturbed samples taken from the western profile of square W/10 by Christoph Mayr and Lilian Reiss (Friedrich Alexander University Erlangen-Nuremberg, Institute of Geography). In addition, a total of 42 disturbed (loose) sediment samples were taken at a distance of 3 cm from the 1/4-square metre W/11 c and transported to the Institute of Geography at the Friedrich-Alexander University Erlangen-Nuremberg for fine wet sieving and analysis after the end of the excavation.

3.3.6. Georadar Surveys, Verification of the Results by Percussion Core Soundings and Trench 4

Already in the run-up to the 2019 excavation campaign,[37] a prospection by means of georadar was carried out in an area of about 700 m² (parcel 430/1). The measurements were made with a GSSI SIR 4000 ground penetrating radar (350 MHz HS antenna) and were kindly carried out by V. Lindinger (ARDIG). The aim of the prospection was to test whether georadar can detect stone slab layers as well as rising stone structures at depths of between 0.8 m and 2 m. Another aspect was the possible detection of the main cultural layer (AH 2) with its massive stone features in its entire extent. It was possible to detect several clear anomalies. In order to check the measured anomalies, three of them were cored with percussion core soundings. Unfortunately, the results of the radar measurements could not be verified. For this reason, ground penetrating radar measurements were carried out again in 2020 before the excavation season.[38] This time, V. Lindinger used a GSSI SIR 4000 ground penetrating radar with a 200 MHz HS antenna. At this time, several anomalies were detected during the measurements at depths of approx. 1.2 to 1.6 m. During the 2020 excavation campaign, an initial check of the results by means of percussion core soundings was forgone and a trench (Trench 4) was dug immediately above the most obvious anomaly (square metre AO/18–20). The 1 m-wide and 3 m-long trench was meant to record the centre of the anomaly and thus provide information about a possible limited stone structure. After the humus and ploughzone layer had been removed using machines, deeper excavations were carried out by hand in layers. Below a very compact layer with numerous carbonite precipitates it was possible to document a strongly displaced extension of AH 2 with many finds but without clear stone structures towards the southeast. In the eastern square metre of AO/20, AH 2 was dug through in order to record the sediment course below the cultural layer. Just below

37 Einwögerer 2021b.

38 Einwögerer in press d.

Fig. 15. Kammern-Grubgraben 2015, eastern profile of the old excavation by F. Brandtner 1994–1995 with superimposed stones (photo: T. Einwögerer, OeAI, OeAW).

AH 2, a layer with few finds was observed. Two reindeer teeth were taken from this layer for ^{14}C dating, with results still pending. The very compact and calcareous layer just above AH 2 is currently assumed to be the possible cause of the anomalies recorded by the ground penetrating radar. Further geophysical investigations planned for the next few years should shed light on this.

3.3.7. Percussion Core Soundings on Land Parcel 2144

In parallel to the excavation work in 2020, several percussion core soundings were also made on the opposite (western) side of the hollow way on parcel 2144 in the cadastral municipality of Zöbing.[39] The aim of these up to 11 m-deep soundings was, on the one hand, to record the sediment structure above the known find layers (AH 1 and AH 2), which, in the area of the excavation, had already been largely destroyed by terracing work, presumably around 1800, and, on the other hand, to obtain samples for a more precise classification of the upper sediment layers. For this purpose, a total of three percussion core soundings (RKS-KG7-2020-1 to RKS-KG7-2020-3) were sunk. Primarily, one core (RKS-KG7-2020-1) was drilled 'open' approximately in the extension of the northern profile of Trench 1 of the 2020 archaeological excavations and documented accordingly. In the course of the work, a 4.35 m-high overburden of the in situ sediments due to terracing works was detected. This was shown, among other things, by recent snails, charcoal and pottery shards in the uppermost layers of the cores. Only then could the original surface be identified in the form of a compact humus layer. Only at a depth of 6.3 m was an aeolian loess encountered under several layers of loess clay interspersed with sand and small stones. At a depth range of 10 m to 10.5 m, indications of a tundra gley could be observed and from 10.7 m, the remains of a palaeosoil. A cultural layer could not be clearly identified. However, two faint, brownish, patchy bands at a depth of 8.3 m could be directly related to AH 2 of the 2020 excavations. In order to obtain continuous, undisturbed samples, further 'closed' cores were sunk to 11 m (RKS-KG7-2020-2) and 12 m in depth (RKS-KG7-2020-3), 1 m to the south and 1 m to the north respectively. The analyses of these cores are currently still in progress.[40]

4. 'Object 8', a Meat Cache?

'Object 8' (cairn, *Steinhaufen*) in Trench 1 was partially exposed in the years 2018–2020.[41] The starting point was an old northeast profile of the old excavation areas. After cleaning the re-exposed profiles in 2015, several layers of stones on top of each other as well as areas of fire-affected sediment could be detected (Fig. 15). Following the uncovering of archaeological horizon AH 1, the first large stones lying close together were observed immediately below.[42] This stone

39 Einwögerer in press d.

40 Einwögerer in press c. – Einwögerer in press d.

41 Einwögerer 2019a. – Einwögerer 2019b, D1768–D1769. – Einwögerer 2020a. – Einwögerer 2020b, D1895–D1901. – Einwögerer 2021a. – Einwögerer 2021b.

42 Einwögerer 2019a. – Einwögerer 2019b.

Fig. 16. Kammern-Grubgraben 2018, Trench 1, 'Object 8', AH 2, overview of the stone finds, stones stacked in the shape of roof tiles can clearly be observed in the western area (photo: T. Einwögerer, OeAI, OeAW).

Fig. 17. Kammern-Grubgraben 2018, Trench 1, 'Object 8', AH 2, detail in the eastern profile with six superimposed stones; the lowest slabs have clearly pressed into the subsoil; the geotextile with which A. Montet-White covered the bottom of the excavation trench in 1989 can also be seen in the right profile (photo: T. Einwögerer, OeAI, OeAW).

layer was investigated in more detail from 2018 on.[43] Soon after work began, it became apparent that the stone structure was not, as assumed by Brandtner, several layers of stone slabs lying on top of each other and separated in time, but a rising stone structure. Therefore, the feature 'Object 8' was also allocated the neutral verbal designation 'cairn'. The documented stones of 'Object 8', mostly slabs, ranged in size from a few cm to 65 cm (Fig. 16). In several places, up to six stones stacked on top of each other were documented. In one case, the weight of the rising stone construction even caused the stone slabs to press into the ground, which had presumably softened due to thawing (Fig. 17). In other areas, stone slabs lying on top of each other in the shape of 'roof tiles' were visible, indicating areas where rising structures had collapsed (Fig. 16 and Fig. 18). The entire 'Object 8' excavated in 2018 looked like an intentionally destroyed stone structure of hitherto unknown extent (Fig. 18).[44]

Towards the west, the site had already been completely excavated down to the bottom surface of AH 2 by Brandtner. However, there is no detailed documentation of the excavation work carried out in 1994 and 1995. Only the top layer of stones was recorded analogously on several plans. Not only stones, but also larger pieces of antler, needles and individual bones were marked. In the case of larger stones, the directions of falls were also marked by means of signatures (Fig. 19). In the south, areas of 'Object 8' had already been superficially excavated in 1989 by Montet-White. The situation here was presumably recorded by Brandtner by

43 Einwögerer 2020a. – Einwögerer 2020b, D1895–D1901.

44 Einwögerer 2020a. – Einwögerer 2020b.

Fig. 18. Kammern-Grubgraben 2018–2020, Trench 1, 'Object 8', AH 2, graphical composition of several photos of the upper surface of the stone structure; clearly visible are the larger stones in the north and northeast of the stone structure, respectively; stones lying on top of each other like roof tiles can be clearly observed in the west (photo and graphic: T. Einwögerer, OeAI, OeAW).

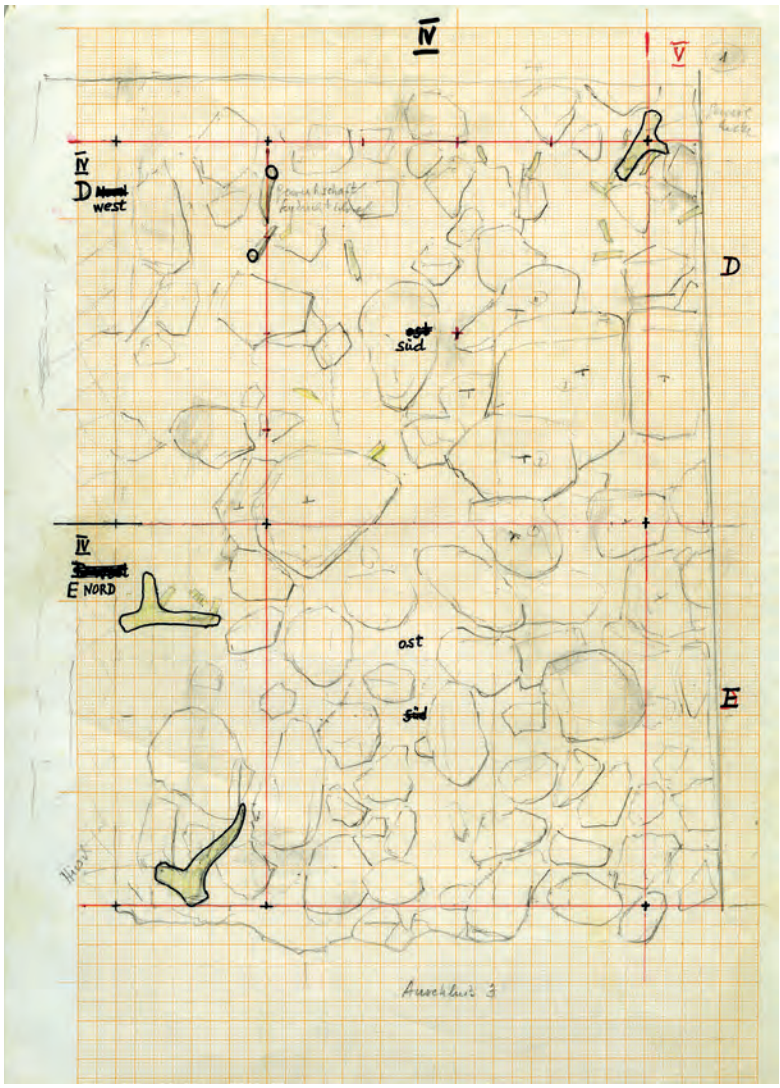

Fig. 19. Kammern-Grubgraben 1994–1995, original documentation of the area adjoining 'Object 8' to the west; drawing presumably by B. Klíma, 1994–1995 (plan: F. Brandtner's estate, State of Lower Austria).

Fig. 20. Kammern-Grubgraben 1989, F/III–IV northern profile; the stone layers in the right part of the picture are the western edge of 'Object 8' (photo: F. Brandtner's estate, State of Lower Austria).

Fig. 21. Kammern-Grubgraben 1989, F/III–V north profile with the southern parts of 'Object 8'; the larger stones at the edge of the stone feature are clearly recognisable; this area was not completely excavated by A. Montet-White and was later covered with geotextile (photo: F. Brandtner's estate, State of Lower Austria).

means of two photos, a profile photo (Fig. 20) and an overview photo (Fig. 21).

Unfortunately, the original documentation by Montet-White is not available at present. However, there is justified hope that large parts of the original documentation, which were presumably exported to the United States together with larger quantities of Montet-White's find material, will be returned. After large quantities of finds having already been brought back to Austria in 1992, 1993 and 2000 following protracted negotiations,[45] in 2020 it was possible, through the mediation of the Quaternary Archaeology Research Group, to return three boxes of finds from the Biodiversity Institute and Museum of Natural History of the University of Kansas to the State of Lower Austria. It was also discovered that documentation material is still stored at the University of Kansas. After the review of this material during a teaching course at the University of Kansas in the summer semester of 2021, these documents will finally be returned to the State of Lower Austria, at least in digital form. That there were original plans made by Montet-White's team is also shown by the black and white photocopy of a northern profile (E/J–K) documented on 26.07.1991 in the estate of Brandtner. The original is not available and is probably currently located in the USA.

In Trench 1, the stone structure 'Object 8' thinned out to the north. Here, the layer documented underneath 'Object 8' also sloped towards the north. The slumping of the base of 'Object 8' both to the north and to the south clearly shows that the stone structure had been piled up in an elevated position (Fig. 16). This observation corresponds very well with the erosion ravines depicted on the Josephinian Land Survey (1773–1781), at the junction of which the camp

45 Neugebauer-Maresch et al. 2016, 228.

Fig. 22. Kammern-Grubgraben 2018, Trench 1, 'Object 8', AH 2, eastern profile with several, column-like stone layers still in situ (photo: T. Einwögerer, OeAI, OeAW).

was built (Fig. 4). Throughout Trench 1, larger and heavier stones were observed in the north, presumably deliberately rolled to the side, including a 65 cm-long stone slab with burn marks at one end. A very similar picture is shown by the graphic documentation of the square metres of the 1993–1994 excavations by Brandtner adjoining Trench 1 to the west. Here too, larger stones can clearly be seen in the north (E/IV east). Signatures here indicate collapse both to the north and to the south. A profile photo from 1989 shows how high the stone stratification was in the west of the object, where at least three layers of larger stones can be observed on top of each other (Fig. 20). The same stone stratification and the exposed uppermost stone layer of 'Object 8' in the south are also shown in an overview photo from 1989 (Fig. 21). In this black-and-white image, one can very clearly see how the stone structure ('Object 8') gradually thins out towards the south after about 1 m. In the peripheral area, larger stones are again clearly visible. Towards the east, larger stones can be observed before the structure thins out here as well. Those southern areas, which Montet-White had superficially excavated in 1989, were covered with geotextile and backfilled. During the 2018–2020 campaign, two square metres that had already been opened up in 1989 were uncovered again. Whether stones had also been removed during the 1989 excavations cannot be clearly determined at present. However, the newly uncovered areas suggest that this only affected a few stones at most. 'Object 8' is therefore likely largely preserved in the southern areas as well.

In the eastern profile of the 2018 and 2019 campaigns, stone accumulations up to over 25 cm in height could be detected in the central area of 'Object 8'. In at least four areas, stones were stacked on top of each other and formed structures that appeared to be arranged like columns (Fig. 22).

Isolated, mostly fragmented pieces of bone and lithics were documented between the collapsed stones of 'Object 8'. Within 'Object 8' as well as in the underlying layer, several finds of fossil barnacle shells (*dentalia*) came to light, which may be described as jewellery. These are presumably jewellery elements that were lost during the manipulation of the stone structure and were originally sewn onto clothing or worn as necklaces.

Furthermore, two stratigraphically different fire locations were documented within 'Object 8' between 2018 and 2020.[46] One fire-affected area with blurred boundaries was observed at the northern edge of the feature at the base of 'Object 8' (Hearth 1). Several thin stone slabs placed next to each other served as a base for the fireplace, which was about 50 cm in size. A stone lining could not be found. Both between and underneath the stone slabs, the sediment was discoloured red by the effect of the heat. Neither charcoal remains nor burnt bones were observed (Fig. 23). The second fireplace, which was also not sharply defined, was stratigraphically located somewhat higher up in the stone structure in the presumed centre of 'Object 8', in the same

46 Einwögerer 2020a. – Einwögerer 2020b, D1897–D1998.

Fig. 23. Kammern-Grubgraben 2018, Trench 1, 'Object 8', AH 2, 'Hearth 1' at the base of 'Object 8' above the bone layer; parts of the thin stone slabs that protruded from the profile are supported with a blue box; top: an overview; below: the hearth in detail (photos: T. Einwögerer, OeAI, OeAW).

area that Montet-White had already exposed to the upper surface in 1989 and then covered up again with geotextile. No stone slabs functioning as a base were found in this area. A stone lining was not found either. However, the structure comprising several stones next to each other had been severely damaged or completely destroyed by the heat. The sediment between the stones again showed a distinct red colouration. An exact outline of the fire site could not be determined (Hearth 2).

A continuous layer of small crushed bones and teeth, mostly from reindeer and more rarely from horse, was recorded underneath the stone structure 'Object 8'. Over an area of only 3 m², more than 2000 mostly small crushed faunal remains (long bones, jaws and teeth) were documented here in 2019 (Fig. 24). Of particular interest is also a worked fragment of a cast antler with pedicle and brow tine, most likely from a red deer. Brandtner also repeatedly mentioned antler tines. Some of the pieces still stuck vertically in the ground were interpreted by him to reconstruct a yurt-like dwelling.[47] Brandtner also drew several pieces of antler in his 1993 and 1994 plans to the east of Trench 1 in the immediate vicinity of 'Object 8' (Fig. 19). The faunal remains from the 2015–2020 excavations are still being analysed.

47 Brandtner, Klíma 1995.

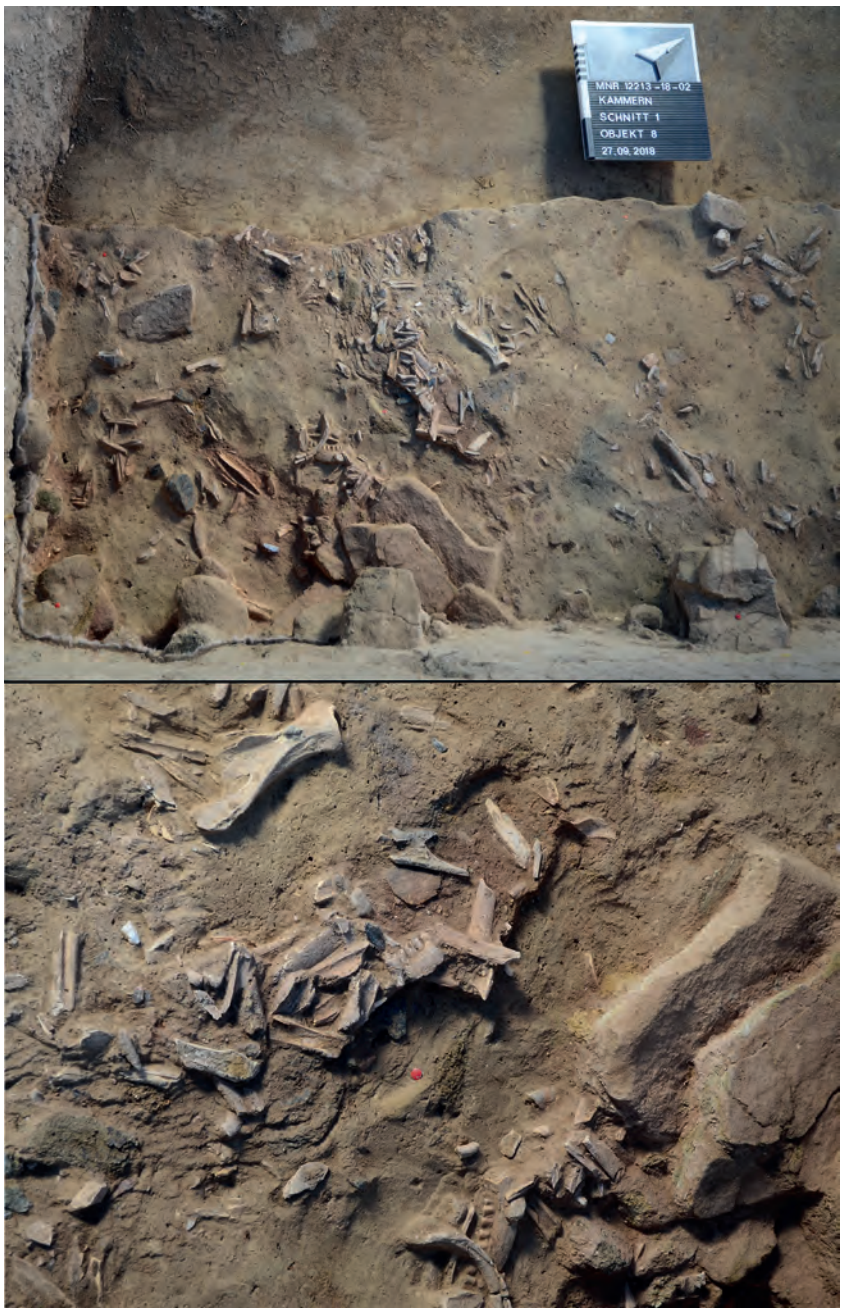

Fig. 24. Kammern-Grubgraben 2018, Trench 1, AH 2, dense bone layer under 'Object 8'; above: an overview; below: shattered long bones and pieces of jaw in detail (photos: T. Einwögerer, OeAI, OeAW).

After the complete removal of the stone packing and the bone layer, a clear elevation of the natural subsoil could be documented directly under 'Object 8'. The stone structure itself had therefore not only been built between the two erosion ravines already mentioned, but also on a small natural elevation.

In the whole of 'Object 8' a large number of finds were discovered between the stones, including bones and bone splinters, jaw fragments and teeth, as well as lithics and a considerable number of fossil jewellery pieces (*Scaphopoda* and a *Protula*).

So far, only three square metres of 'Object 8' have been completely excavated (Fig. 18). Over another three square metres, the upper surface of the stone layer has already been exposed. In conjunction with the plans made by Brandtner in 1993 and 1994 and the photos of the excavations by Montet-White in 1989, a quite clear overall picture of 'Object 8' emerges (Fig. 25). The structure was located on a spur-like elevated area between two prominent drainage channels on a flat elevation above a layer of crushed bones. The stone structure, which is around 50 cm high, in places still has up to six superimposed stone layers in situ. Towards the outside,

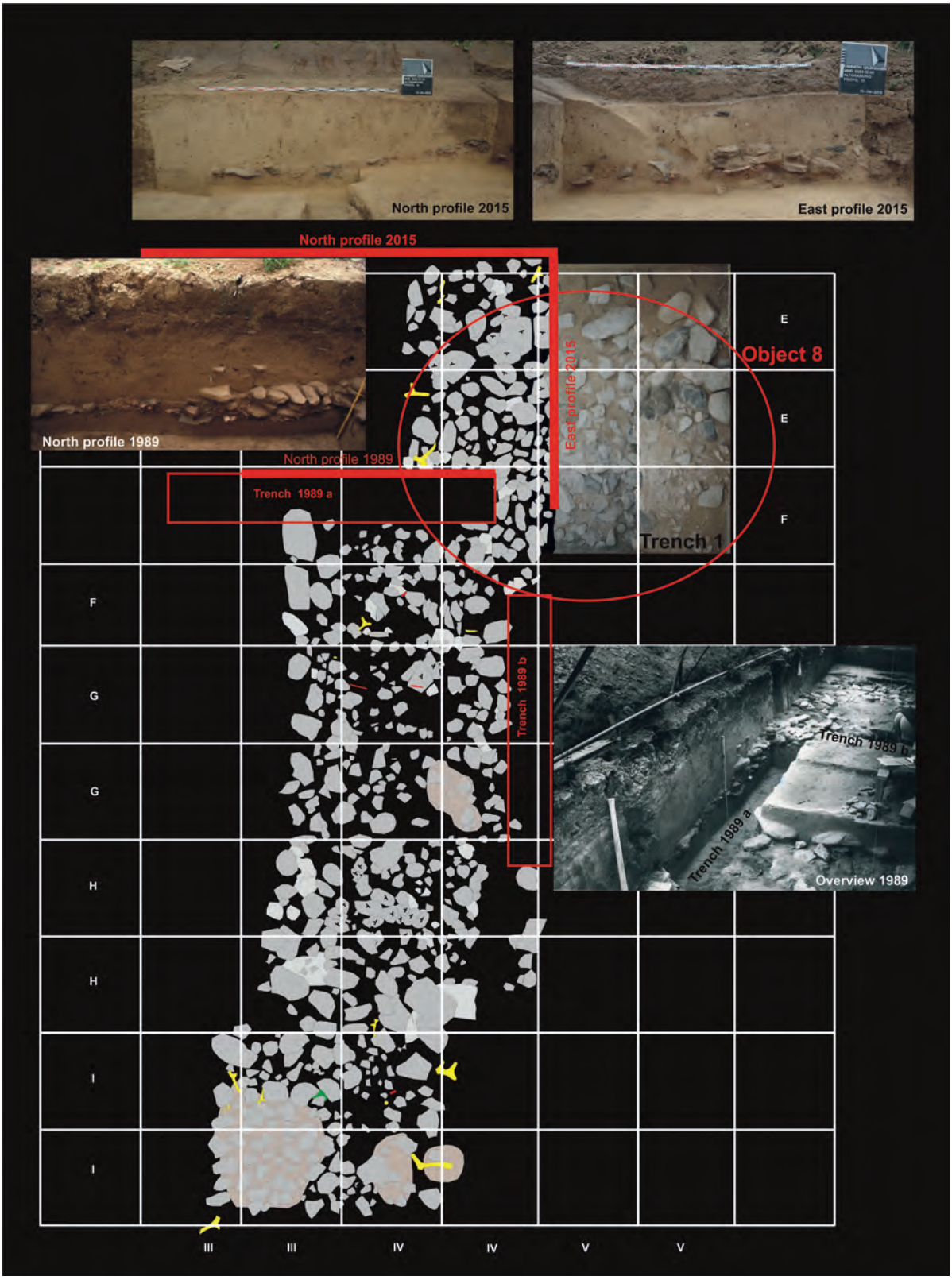

Fig. 25. Kammern-Grubgraben, reconstruction of 'Object 8' using the original plans from 1994–1995, original photos from 1989, photos from 2015, 2018 and 2020 (photos: T. Einwögerer, OeAI, OeAW and F. Brandtner's estate, State of Lower Austria; graphic: T. Einwögerer, OeAI, OeAW).

the stone complex thins out continuously. The round to slightly oval structure has a diameter of about 3.5 m. In the peripheral areas, larger stones tend to be observed, which subsequently appear to have been intentionally moved outwards. In the north and northeast, it was possible to confirm this through the excavation work of 2018–2020. In the west, this is also shown by the graphic documentation by Brandtner from 1994–1995. In the south, larger stones in the peripheral area are confirmed by a photo of the excavations by Montet-White dated to 1989 (Fig. 21). 'Object 8' must therefore have originally been at least a semicircular or circular stone structure, which was presumably intentionally destroyed by shifting mainly larger stones to the outside. Accordingly, the original stone structure may have been somewhat smaller (Fig. 25). That 'Object 8' was not the only rising stone structure at the site is shown not only by the documented stone pavements but also by both Brandtner's plans (1994 and 1995), which also document stone collapses at other sites, and observations by Montet-White, who observed rising stone structures in connection with a stone pavement in layer AL 2. The size of this main stone structure was about 8 × 4 m. In the northern area of this paving, zones with up to three stacked stones were observed.[48] Montet-White interpreted individual stone stacks as supports for posts at the end of what may have been low stone walls.[49]

Between 1986 and 1990, Montet-White also observed a rising stone structure in layer AL 1 near two hearths, the end of which was formed by a sandstone of about 70 cm in length. The structure contained neither artefacts nor faunal remains.[50] Interpreting the possible use of space in this area, she suggested that the stone structure was a meat storage.[51] This context lies between the excavation units L–M/e–f and is precisely the area where the layers AL 2–4 lying underneath AL 1 are particularly high due to an elevation of the terrain and also partially touch each other.[52] It is possible that Montet-White had already excavated the uppermost stones of the stone structure (AH 2), later called 'Object 8', and did not really recognise the stratigraphic context, which is very difficult to assess in this area. Further rising stone structures in the form of 'roof tile-shaped' collapsed stone slabs were documented in 2020 in the southern area of Trench 3 in AH 2.[53]

Assuming that such large quantities of local, unworked stones (e.g. arkose sandstones, mica schist, conglomerates) were brought into the camp from the flanks of the Heiligenstein and the Geißberg over a longer period of time, the construction of the stone structures, with their surprisingly large scale for the Palaeolithic, represented an extraordinarily high expenditure of time and energy for the hunter-gatherers of the last Ice Age.[54] It must therefore also be assumed that during the construction of the various stone structures (such as pavements and rising structures) at the multiphase site, building material was repeatedly taken from other older and no longer needed stone structures and reused. These circumstances would mean that the original structures would be very difficult to interpret. The question of the exact function of 'Object 8' at Kammern-Grubgraben, with its stone structures as unique features for the Upper Palaeolithic, now arises.

According to the current state of research, the features of 'Object 8' can be described as unique for its period. There are no directly comparable finds from archaeological excavations within a glacial context. Consequently, ethnographic comparisons must be brought to the fore in the interpretation.

The most probable hypothesis for the interpretation of 'Object 8' in Trench 1 (AH 2) is that the remains of the stone cairn are a meat cache.[55] Ethnographic comparisons show that similar stone structures were used to protect surplus meat (hunting prey) from smaller predators such as foxes and wolves in the short to medium term and to store it cooled by the permafrost.

5. The Cache in an Ethnographic Comparison

A cache, literally a 'hiding place', is basically a storage facility or depot. Depending on the media to be stored and the availability of the building material, the cache can have different shapes and sizes.[56] Particularly well known in forested areas are so-called 'stage or platform caches', where food is stored protected from bears and other carnivores on platforms between several trees, generally at a height of 5–8 m.[57] However, log structures rising from the ground are also known as storage structures.[58] If the ground is very dry, caches can be found dug into the ground and lined with freshly cut logs.[59]

Even today, hunters in Arctic regions sometimes build stone caches in the immediate vicinity of slaughter sites.

48 Montet-White 1990, Figs. V-8–V-10.
49 Montet-White 1990, 52.
50 Montet-White, Williams 1994, 129–131.
51 Montet-White, Williams 1994, Fig. 13.
52 Haeserts, Damblon 2016, Fig. 7.
53 Einwögerer in press c. – Einwögerer in press d.
54 Montet-White, Williams 1994, 128–129.
55 Einwögerer 2019d. – Einwögerer 2020a. – Einwögerer 2020b, D1900–D1901.
56 Rast 2010.
57 Gotthardt, Thomas 2007, 16–19.
58 Gotthardt, Thomas 2007, 22.
59 Gotthardt, Thomas 2007, 23.

These permanent structures have the character of a magazine and are often used by tribal members for a long time.[60] Arctic caches are usually located on elevated, well-drained slopes and are also made of boulders of sufficient size and weight to prevent bears from entering the cache as far as possible.[61] 'Boat caches' are also known from the Arctic, where entire kayaks made of animal skin were stored under stones for the winter, protected from dogs and small predators such as foxes. Depending on the need, caches are used to store food (such as fresh and dried meat), equipment and also weapons and ammunition.[62]

So-called 'food caches' or 'meat caches' were and are used for the short- or medium-term storage of fresh or dried meat for later consumption. Especially in the Arctic, meat that was captured in the hinterland and could not be transported immediately to the camps due to its quantity was (and still is) often covered with willow branches or grasses and layered with stones as protection against foxes, ravens and other animals, so that the meat can be transported further at a later date.[63]

A very effective method of preserving hunted meat over a longer period of time is 'underwater caching'. This procedure is not only assumed for the Paleoindians of the last Ice Age in the area of the Great Lakes in North America[64], but also, for example, explains the submerged reindeer carcasses in the Hamburg and Ahrensberg Cultures.[65] A more widespread method of storing hunting prey is the construction of stone meat caches (Fig. 26). These constructions create an environment that supports natural preservation processes such as freezing, drying or fermenting. In addition, the stone covers largely deter predatory animals of different sizes from eating the stored meat.[66] Depending on availability, the largest possible stones were used as protective cover. Observations show that arctic foxes can displace stones of up to 20 cm in diameter.[67] Under Arctic conditions, fresh meat can thus be frozen quickly in the cold seasons and stored for up to about half a year. In the warmer seasons, meat can only be stored effectively if it has been dried beforehand.[68] The storage time of meat is also influenced by the amount of rainfall. During longer periods of rain, the meat spoils much faster.[69]

60 Binford 1984, 128.
61 Gotthardt, Thomas 2007, 24.
62 Rast 2010.
63 Pasda 2019, 262, Fig. 4.
64 Fisher 1995.
65 Pohlhausen 1953.
66 Rast 2010.
67 Pasda 2019, 264.
68 Friesen 2001, 327–328.
69 Pasda 2019, 266.

Fig. 26. An Inuit meat cache on the Kanzan River, Keewation District, N.W.T. 1930 (photo: Library and Archives Canada, MIKAN ID 3380112).

Many Arctic caches were built by hunters, usually in the immediate vicinity of the kill sites, to store surplus meat. In coastal areas, seal, walrus and whale meat was (and still is) deposited. Some caches are also found near dwellings. Here they serve as a kind of freezer or pantry. In some Arctic cultures, caches were also built into the walls of dwellings, and appear as a stone setting at the edge of a house or a tent ring.[70] Arctic hunters distinguish three types of caches based on the stone structures. Simple, low cairns made of loosely stacked stones or boulders are usually derelict or open meat caches (*pirujaq*). More elaborate constructions are erected for storing dried meat (*hirluaq*). Another type resembles a tent ring, except that the stones are set very close together and the ring is very small in diameter. A skin is stretched over the objects to be protected and these are weighted down with stones (*uliqtauhiurvik* or *qimatulivvik*).[71]

An anthropogenic opening of a stone meat cache can be seen at Kangaamiut in West Greenland. Here, a stone structure with a diameter of 160 cm had been built from about 45–50 stones with sizes of 40–90 cm.[72] When the cache was opened, stones from the cover were discarded next to the structure. In the central area of the cache there was no sign of any stones displaced by the opening. Furthermore, no bones could be found, which can be attributed to a complete removal of the contents.[73] Comparable finds from other Arctic caches, however, do show evidence of bone accumulations or whole animal remains.[74] A connection of stone caches with dwellings can be observed, for example, in a winter camp among the Thule Inuits in Sanirajak at the site 'NeHd-1' north of the Foxe Basin coast in the northeast of

70 Rast 2010.
71 Steward et al. 2000, 265.
72 Pasda 2019, Tab. 2.
73 Pasda 2019, 267.
74 Pasda 2019, 264.

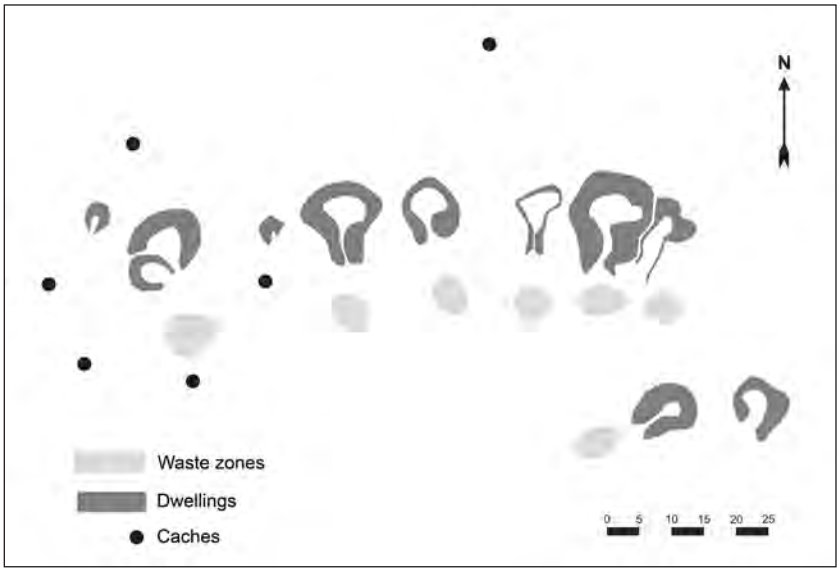

Fig. 27. Plan of a Thule Inuit winter camp ('NeHd-1') with semi-subterranean dwellings and several meat caches in the immediate vicinity north of the Foxe Basin coast in the northeast of the Melville Peninsula in the Territory of Nunavut, Canada; redrawn after Desjardins 2013 (graphic: T. Einwögerer, OeAI, OeAW).

the Melville Peninsula in the territory of Nunavut, Canada. Six caches made of boulders were documented to the west and north of the camp comprising nine semi-subterranean winter dwellings and two autumn dwellings with upstream waste sites. They were used to store meat after hunting marine mammals (Fig. 27).[75]

Another example of three caches associated with a tent ring is campsite 'LcLg-22' in the central Barren Grounds northwest of Hudson Bay near Baker Lake, Nunavut. This site, one of about 20 campsites located on the southwestern arm of Aberdeen Lake, is the remains of a short-term hunting camp from the mid-20th century. The caches (1, 2a and 2b) were erected in spring or summer in an easily visible position to enable them to be found even when covered with snow.[76] It is interesting to note that the hunters did not return to the caches, leaving the meat of 14 caribou in the stone structures. Thus, these findings represent a rare testimony that can be used to improve our understanding of the camp activities of the hunter societies. The three caches differ slightly in their construction. Cache 1, for example, was built less carefully and with smaller stones. The contents also differed significantly, as only low-quality meat, such as skulls, was stored here.[77] Caches 2a and 2b, by contrast, which were more elaborately constructed and had larger stones, contained higher-quality dried meat obtained from extremities. The differences in construction and storage may be due to differences in use. Thus, it is assumed that in the two more carefully constructed caches more valuable meat was stored, which is easier to dry, while lower-quality meat, which is harder to dry, was deposited in the less carefully constructed cache. All three caches were constructed in such a way that the hunting prey was first placed on a layer of stones to allow air to circulate and then covered with stones of different sizes. Presumably, the more massive stones were also intended to deter larger animals such as bears.[78]

A similar construction of a meat cache made of stones is also described by Lewis Roberts Binford, as observed by him among the Nunamiut Inuits.[79] The Nunamiut piled up the meat inside a cache in a star-shaped or radial pattern with intermediate layers of stone or wood. The different layers were intended to ensure good air circulation. Afterwards, the supplies were covered tightly with stones. Such stone structures could have a diameter of up to 4 m.

Several stone meat caches next to each other can also be seen in a photograph by Georg Lessard, which shows the filling of a cache after a successful walrus hunt in October

75 Desjardins 2013, 40–41.
76 Friesen 2001, 329.
77 Friesen 2001, 329.
78 Friesen 2001, 323.
79 Binford 1984, 128.

Fig. 28. Meat is temporarily stored in a stone meat cache after a successful walrus hunt in October 1981 near Salluit in the Nunavik region in the administrative district of Nord-du-Québec, Canada (photo: Georg Lessard, https://www.facebook.com/photo/?fbid=10153116101591697&set=a.10153116100976697).

1981 near Salluit in the Nunavik region in the administrative district of Nord-du-Québec, Canada. The walrus meat, which was captured in large quantities, was temporarily stored here until it could be transported to the settlement a few days later. The picture also shows a base layer of flat stones on which the meat was placed (Fig. 28).

In the Arctic, much smaller cairns built of around 10 to 20 stones of 10–20 cm in length and with a total diameter of around 50–80 cm, which reveal empty cavities when uncovered, can be observed time and again. Apparently, these stone structures have never been opened before. Due to their exposed location, these stone structures can be spotted from a distance.[80] The lack of animal remains in the cavities of the small cairns does not necessarily mean that no hunting prey was stored in them. It is possible that the fresh or dried meat had already decomposed. Interviews with hunters provided evidence that the stone structures documented in the study area were most likely not meat caches, but represented or contained some form of *tulpilaq* (spirit). They could therefore be evidence of a hunting religion that was intended to secure hunting resources.[81]

Stone meat caches have also been discovered on the South American continent, for example in the Argentinian volcanic region of Cerro Archibarca in the province of Catamarca. During surveys over an area of almost 2000 ha, a total of 373 sites were described and classified. Among them were 121 meat caches piled up from natural boulders. These stone structures with diameters of about 2 m and heights of up to 1.5 m, erected by vicuña hunters,[82] were often located close to each other in barren, treeless, dry plains or on gentle slopes. The raw flint nodules or flint waste found at the caches indicate that raw material for the production of stone tools, presumably for cutting up the hunting prey, was also hidden or processed on site.[83]

6. Discussion

So far, it has not been possible to interpret 'Object 8' (cairn) in AH 2 with certainty. However, there are some indications that the stone pile with a diameter of several metres could have been a meat cache. Arctic hunters in particular used to (and still do to some extent) build temporary stone 'meat storage structures' in the vicinity of slaughter sites. These often massive structures have the character of a magazine and are often used by tribal members for a long time. A meat depot of similar construction could also have been built by Palaeolithic hunters at the Grubgraben near Kammern about 23,000 years ago.

The following scenario could have taken place on the basis of the excavation features recorded and reconstructed within archaeological horizon AH 2:

A group of game hunters killed a large number of reindeer, but also other animals such as horses and ibexes, near the site between Heiligenstein and Geißberg in autumn or winter. More animals were killed than could be consumed immediately. In the immediate vicinity of the kill site, a camp was set up in a sheltered and reasonably dry position between two drainage channels, where the killed animals could be processed. Presumably, simple dwellings were also erected at the same time. Large, elaborately designed and resource-intensive yurt-like tent constructions, as reconstructed by Brandtner and Klíma, do not seem to have existed. The valuable hides of the captured animals were stripped and dried by spreading them out on prepared large-scale stone pavements. This would explain the large-scale stone pavements of over 100 m² found in Kammern-Grubgraben.

80 Pasda 2019, 264.

81 Pasda 2019, 265–266.

82 Like the alpaca, the vicuña is a member of the camelid family.

83 Haber 2009, 419–420.

It is possible that the skins to be dried were fixed to the ground with antler hooks or other pieces of bone driven into the ground between the stones. This would explain the antler hooks documented by Brandtner, some of which were still stuck vertically in the ground when they were found. The bones were immediately broken open and boiled to extract the marrow. For this purpose, fires were lit on the stone pavements and cooking pits were constructed. In the course of this work, 'Hearth 1' may have been built.

Such a scenario could be supported by the continuous layer of crushed long bones in combination with jaw fragments documented in Trench 1. The meat that could not be eaten immediately was possibly first cut into strips and then dried. For the surplus meat, at least one large stone meat cache was finally erected in the area of the highest and thus driest spot in the camp between the two drainage/erosion ravines. The necessary building material for the meat cache as well as for the extensive stone pavements for drying the hides was fetched from the nearby flanks of the Heiligenstein and the Geißberg. Finally, the stone layering of the cache was built directly over the 'bone chip layer' created during the slaughtering and extraction of bone marrow. This was done by first placing a stone layer on top of the crushed bones, then layering the meat to be deposited on top of the base stone layer, and finally covering the supplies completely with larger and heavier stones. Possibly, as is still known today from Arctic areas, intermediate layers of stone or branches were inserted. The permafrost floor ensured adequate cooling of the meat, while the large capstones facilitated good ventilation and protected against smaller carnivores such as foxes, wolverines and wolves, but also against birds. After completing the meat cache, the group moved on. Sometime later, the hunters returned to the site to draw on their food reserves. Based on ethnographic comparisons regarding the shelf-life of cached meat, this may have been up to half a year later during the cold months. Once again, a camp was set up and the cache was opened to remove the meat. The large, heavy capstones were rolled aside first; they then came to rest at the periphery of the structure. To prepare food, a simple fireplace (Hearth 2) was immediately set up on the stones, which had been carelessly pulled apart. The very complex stratigraphy of the site shows that this or similar scenarios could certainly have been repeated several times at the well-protected camp site.

Although the interpretation of 'Object 8' as a meat cache seems the most probable according to the current state of knowledge, other possible interpretations should nevertheless be mentioned. An interpretation of the rising stones of 'Object 8' as remains of a dwelling should also be considered. A windbreak in the form of a low, semicircular or circular stone wall might be possible. In any case, wall-like stone layers as windbreaks in the form of ramparts made of stone or peat are also known from the Arctic. For the most part, the low structures have oval or rectangular shapes. They are also called hunters' beds. Especially in the dry seasons, such simple windbreaks without roof constructions were sufficient.[84] Another possible interpretation for 'Object 8' could be a hunting hide, similar to so-called hunting blinds. Such stone structures can be observed in North America near ice fields. These horseshoe-shaped stone settings were used as hiding places to ambush reindeer seeking refuge from mosquitoes and warble flies on the ice fields.[85] Similar stone hiding places are also known from South America (Patagonia), where they were used to hunt guanacos.[86]

Montet-White also interpreted the larger stones of the Kammern-Grubgraben site as remains of dwellings. She also related the stones at the periphery of stone pavements to simple, wind-screen-like shelters, which may have been connected to organic parts such as wooden poles or tarpaulins.[87] The pieces of antler still stuck vertically in the ground in connection with stone paving, as found primarily in layer AL 3, were discussed as tent pegs for the ropes of a yurt-like dwelling by Brandtner and Klíma.[88]

7. Outlook

After the first monument protection measures ordered and financed by the Federal Monuments Authority in the form of profiles, percussion core soundings and rescue excavations, research excavations initiated by the Quaternary Archaeology Research Group and funded by the State of Lower Austria followed. A deadline for completion of 2019 was initially imposed on this work. After that, the leaseholder on the land, the Schloss Gobelsburg wine estate, wanted to plant new vines on the area kept free for research. Consequently, the questions were worked out in such a way that all the necessary work could be completed by 2019. After the uncovering of the sensational stone structure 'Object 8' in Trench 1 with a possible interpretation as the oldest known meat cache made of stone to date, negotiations were held with the tenant regarding planting the vines later and giving the research group sufficient time to fully uncover the findings. Finally, the tenant agreed to make the entire area on plot 430/1, which had not yet been planted, available for further research for an unlimited period of time. As a

84 Neubeck, Pasda 2015, 70.
85 Greer, Strand 2012, 146.
86 Belardi et al. 2017.
87 Montet-White, Williams 1994, 128–129.
88 Brandtner, Klíma 1995. – Neugebauer-Maresch et al. 2016, Pl. 6.

condition, however, it was stated that regular field research should continue to be carried out at the site. This pleasing agreement ultimately makes it possible to formulate new research questions. In the next few years, 'Object 8' in AH 2 in particular is to be exposed over a larger area in order to obtain a better overview of the context. To this end, the excavation area is to be extended both eastwards into the hitherto completely untouched area and southwards into the area that Montet-White had already excavated in 1989 up to the upper surface of the feature. In addition, the entire still accessible excavation area from 1985 to 1994 is to be gradually exposed again to document the profiles and the old excavation surfaces. In the longer term, a more extensive exploration of the collapsed stone features in the southern area of Trench 3 in AH 2 is also planned. Here it might be possible to investigate a feature similar to 'Object 8', which, in contrast to 'Object 8', is still completely untouched. Parallel to the ongoing excavation work, further geophysical prospections are planned to record the site boundaries and to check them, partly through percussion coring and partly by means of smaller excavation trenches.

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