

The last refugia of the ‘Young Europe’ defenders: Untermassfeld (Thuringia, Germany)

Abstract

We reject in this paper the criticism of hominin presence at the late Early Pleistocene site of Untermassfeld (Germany), a site which preserves lithic industry and bones butchered by hominins, published newly by Roebroeks et al.¹ Here we document the origin and authenticity of the analyzed sample and provide further evidence of the anthropogenic character of lithic material, which unequivocally proves hominin activity at Untermassfeld site 1.07 Myr ago.

Keywords: ‘Young Europe’ hypothesis, hominin butchery, bipolar knapping, fluvial archaeological site, earliest European settlements

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Introduction

Scientific disagreements and a healthy scientific debate about causal relationships and how to decipher ephemeral residues of past realities is one of the main columns to reach convergence on a solution. Here, we reply to the unfair serious insinuations and criticism made by Roebroeks et al.¹ to maintain the “paleontological” status of Untermassfeld and the obsolete “Young Europe” paradigm. The previous criticism made by Baales² in 2013 and now Roebroeks et al.¹ do not only reject evidence of hominin activities at Untermassfeld without providing any scientific arguments,^{3–6} but contain serious and undemonstrated insinuations, mere opinions and attacks. A first reply paper responding to the criticisms of Baales was published by Landeck and Garcia.⁷ Regarding the first manuscript draft of Roebroeks et al.⁸ which was rejected by the journal, all the information was already provided in numerous communications with the Editor of Journal of Human Evolution. In this respect, authors refused to enter into discussion with us. A new draft of this paper was also recently rejected by the journal PLOS ONE.⁹ Moreover, in their new attempt,¹ neither their primary paper was changed or modified, nor their insinuations and accusations. Thus, we believe that this is the genuine intention of the responsible paleontologists to publish the same paper without including counterstatements or rectifications.

Baales² and now Roebroeks et al.¹ do not include any analysis of bone surface alterations or taphonomic features in their appraisal of site formation to defend their hypothesis. These papers are not characterized by a scientific basis or methodology and/or analysis, but mere opinions, insinuations and criticisms against the papers demonstrating hominin occupation at Untermassfeld.^{3–6} The authors of this article also reject hominin occupation at sites older than 1 Myr in Europe, which is accepted by the rest of the scientific community and propose a return to the old “short chronology” paradigm. Roebroeks has been one of the main defenders of this obsolete paradigm since the 1990s and it seems that he intends to continue defending their old paradigm. His co-authors Baales and Gaudzinski (Paleolithic researchers linked to the Senckenberg Research Station of

Quaternary Paleontology) support this “Young Europe” paradigm and thus systematically deny hominin occupation of Europe in the Early Pleistocene before 1 Myr.

The methodology of excavation applied by the paleontological teams at Early Pleistocene sites is one of the main factors limiting the possibilities of discovering possible hominin activities or occupation preserved at the sites, which is the case also at Untermassfeld. As paleontology is interested in faunal remains and their chronology, no considerations are given to hominin interferences at old sites. Furthermore, the excavation practice used is not based on an extensive archaeological methodology, but on trenching around large fossils or bones disposed in anatomical connection, which contributes to the possible destruction of information regarding spatial associations of archaeological material. Medium bone specimens are collected by digging a hole and isolated specimens or fragments of bones are extracted together with the adhered sediments, losing their orientation information and the horizontal plane information. During sieving of dry or washed fossil-bearing sediments in order to find the smallest specimens, such as micro-mammal remains and small fragments of herbivore remains, possible debris and small fragments of stone tools are frequently overlooked. In archaeological terms, all these procedures hinder detection of hominin intervention along with destruction of possible archaeological associations at a site. Additionally, possible anthropogenic marks can be destroyed in restoration processes during the excavation or at the laboratory. Consolidants are chosen based on desired properties like strength, glass transition temperature, re-solubility, solvent availability and matrix properties, but not on the preservation requirements of the possible anthropogenic marks.

This inability to recognize evidence of hominin occupations (i.e. lithic industry and faunal remains modified by hominins) by some paleontological teams who worked at large sites of this time period (Early Pleistocene), supported by archaeologists belonging to the old school (i.e. proponents of the “short chronology”) has resulted in a notable drawback in the study of this historical key issue. Moreover, most Mode 1 industries in the Early Pleistocene are scarcely elaborated,

worsening the situation. The absence of taphonomic studies on bone material discovered at Early Pleistocene paleontological sites, which were driven mostly by the a priori assumption that hominins were not involved in site formation, contributes to the loss of recognition of anthropogenic activity and also hinders research. The persistence of the old static paradigms supported by old school archaeologists^{1,2} hampers any progress, even when the discoveries are long and well dated. Obviously, scientific goals, scientific interests, academic formation and also the methodology used by paleontologists at some sites do not facilitate the recovery of data demonstrating hominin presence. The difficulty in achieving sufficient collaboration between paleontological and archaeological teams and bridging their different objectives is another reason responsible for lost insights.

The bone and lithic collection

Research has been undertaken on Early Paleolithic occurrences in the valleys of the Weser River system (Werra, Fulda and Weser) since the 1950s.^{11–13} During this research not only numerous Paleolithic but also Mesolithic sites were discovered. After drawing up a frontier that lasted 28 years between both German States in 1961, systematic surveys and observations of Pleistocene fluvial deposits were intensified and led to the discovery of several Lower Paleolithic occurrences in the middle course of the Hessian and Thuringian Werra Valley; mostly surface finds, but also some *in-situ* artifacts from river terrace deposits.^{3,14,15} In the context of archaeological investigations carried out in the middle and upper Werra Valley regions (Thuringia) several Upper Paleolithic and Mesolithic find sites but also Lower Paleolithic lithic artifacts associated with fossil bones originating from river deposits opened in the old Untermassfeld sand pit were discovered almost 40 years ago. The bone (N=419; NISP=297) and lithic (N=256) collections we have analyzed were received between 2007 and 2012 from private collections, which were made in the late 1970s/early 1980s in the former German Democratic Republic during commercial mining activities in the Untermassfeld sand pit at the time it was much larger than today (Figure 1). Most of the bone specimens were retrieved from the Lower Fluvial Sands (LFS) and Upper Fluvial Sands (UFS) north of the excavation area, but some were found in the discarded sediments (backdirt) and on the quarry surface (northern part) belonging to the late Early Pleistocene sandy deposits. These remains are therefore clearly associated with the fossiliferous layers (containing Epivillafranchian fauna) of the excavation area described by Kahlke,^{16–20} as evidenced by typical surface features, adhered sediment and taxonomic attribution. The finders of the private collections contacted one of the authors (GL) personally, taking note of ongoing research activities on the first traces of hominin settlement in the Weser river valley and its large tributaries by members of North Hessian Society of Prehistory and Archaeology of the Medieval (NVUFM) and Hessian Working Committee on the Paleolithic. Some years before in 2003 after an academic visit to the sand quarry with two German experts in Paleoarchaeology (University of Marburg and Federal State Office of Historic Monuments in Lower Saxony), during ongoing excavation two bone pieces and four lithic specimens showing intentional modifications were identified and correlated with the Lower Pleistocene sands. They were handed over in January 2004 to the director (Prof. Kahlke) of the Senckenberg Research Institute of Paleontology (Weimar, Germany).

In order to verify the stratigraphic origin of the specimens of the old collections an *in situ*-visit was arranged at the find location. At that time the sand quarry was named “ZBO-Sandgrube” and was much larger than today as it is now part of the central garbage dump in the county (Figure 1). After being assured during a visit with the finders to the location points where material was found that none of the bones come from the excavation area of the site but from stratigraphically correlated levels of the fossil-bearing sands nearby, it was stipulated that after the delivery of the material to the bureau of NVUFM and completing the analysis, the entire collection had to be submitted to the Museum of Natural History in Schleusingen (Thuringia, Germany) by the finders. We accepted this material to carry out a study with the purpose of making the scientific community aware of a collection whose existence was not known until that moment. The study was carried out after the finders accepted the imposed conditions and we were assured that they represent old material from the surrounding area stratigraphically correlated with the late Early Pleistocene deposits and that therefore no legal and/or research problems would occur.

The entire material was termed “Schleusingen collection” because its storage was provided by the Museum of Natural History at Schleusingen. Specimens which are important for zooarchaeological or taphonomic questions were documented by photos (Figure 2). Further analyses of bone surfaces were conducted at the Max Planck Institute (MPI) in Mainz (with collaboration of Dr. J Huth and Dr. C Humburg) with light microscope and scanning electron microscope (SEM).⁴ In 2014, after analysis was completed, this old bone collection was given back to the finder who had already agreed to transfer it to the Museum of Natural History at Schleusingen for future storage (donation). Similarly, at the turn of 2013/14 we handed over the lithic collection to its finder with the same obligation. After returning the collections to the finders, it was not checked if they were transmitted de facto to the museum. Because of the questions posed about these materials, we have directly contacted the director of the museum (Schleusingen Museum of Natural History) to verify if the finders finally submitted the entire collection as they had agreed after the study of the materials. He has informed by e-mail that in 2014 ca. 64 bone specimens from Untermassfeld site were transferred to the museum and that this material had been submitted in the meantime to Senckenberg Research Station of Quaternary Paleontology at Weimar. We assume that this sample is part of the collection we have analyzed because we can identify some of these bones in the paper by Roebroeks et al.^{1,8,9} Thus, we have to state that the bone collection has been donated incompletely to the museum by the finders. We also sent a formal petition to the director of Senckenberg Research Station to request permission to analyze and identify the material. However, clearance was refused and this arouses suspicion if the data given by Roebroeks et al. is authentic. It should also be added that collaboration between archaeologists and paleontologists was offered to Prof. Kahlke by one of us (GL) in 2004 following recommendations by two German experts in Paleoarchaeology from University of Marburg and Federal State Office of Historic Monuments in Lower Saxony. Prof. Kahlke rejected this collaboration because the paleontological team did not recognize any hominin presence at the site. Unfortunately, our new request of collaboration established in March 2017 to share information enriching research and its results has been neither accepted nor considered meaningful.

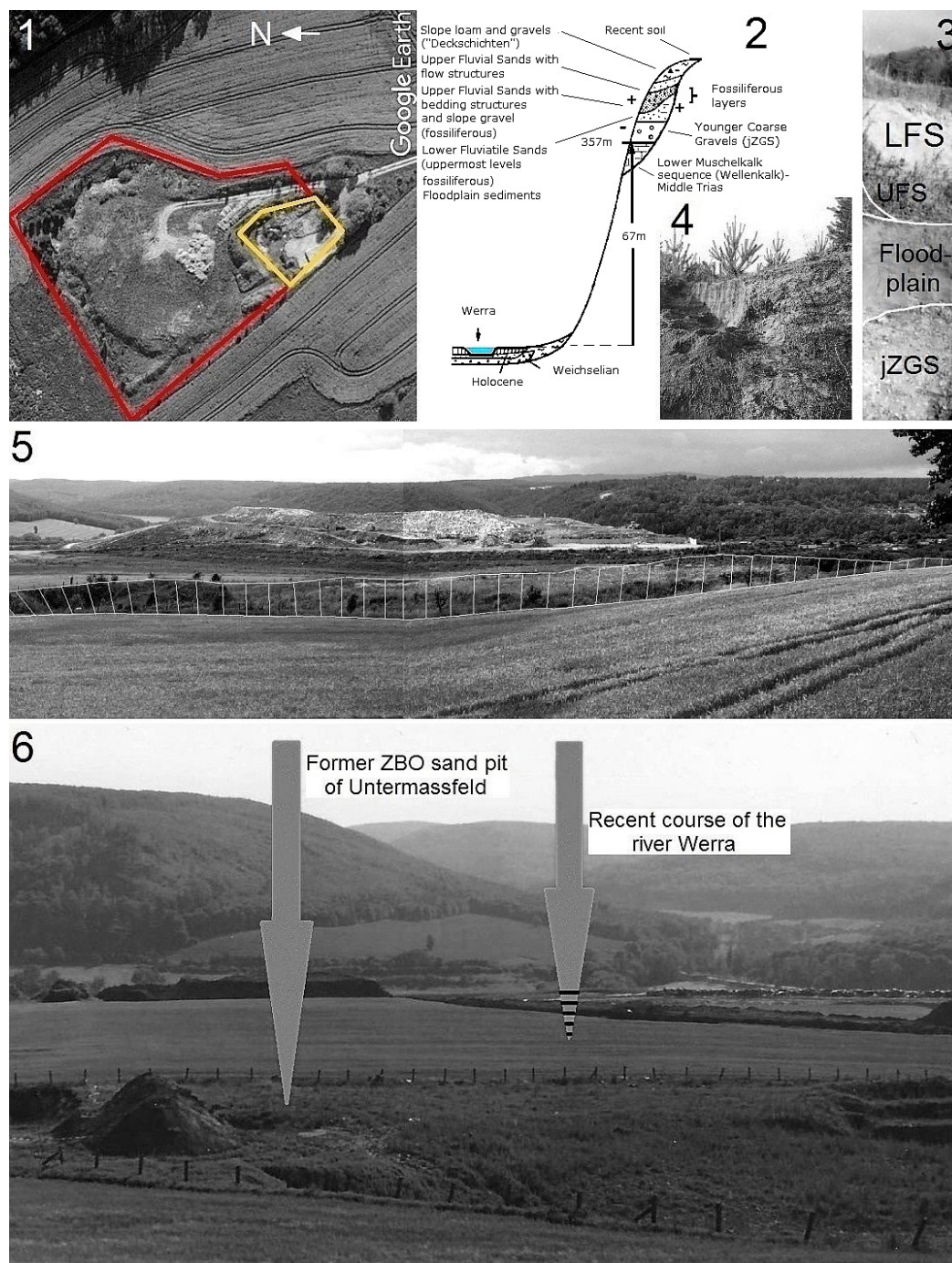


Figure 1 Untermassfeld site.

1. Sand pit (yellow outline: excavation area; red outline: former northern part of the pit). The northern part was filled one after another during the accumulation of a big garbage dump and is no longer passable today.
2. Geomorphology of the upper Werra Valley near Untermassfeld.¹⁴¹
3. Stratigraphic layers of late Lower Pleistocene deposits in the sand pit showing from bottom to top: terrace gravels (jZGS), loamy floodplain sediments ("Auesediment"), sandy infill of the river channel (UFS=Upper Fluviatile Sands; in this picture not visible because already removed), floodplain sediments (LFS=Lower Fluviatile Sands).
4. Uncovered floodplain sediments (LFS) at the northern edge of the former large sand pit.
5. Partly filled up sand pit (hatched lines, view from the east). The excavation area is situated in the southern part of the pit and not visible in this picture.
6. Northern part of the old sand quarry showing exposed Lower Fluviatile Sands (LFS) at the right margin in the middle of the picture (already partly filled).

Stratigraphical provenience

Lithic and bone finds do not proceed directly from the excavation itself as Roebroeks et al.¹ state, but from the same layers of Upper Fluvialite Sands (channel infill, UFS) and Lower Fluvialite Sands (floodplain deposits, LFS) in the surrounding area (Figure 1(3–6)). These fossiliferous sands are lying on extremely weathered terrace gravels, which were deposited by the river Werra as early as in Eburonian times but at the latest during the Menapian cold stages.^{20,21} The two sandy deposits can be clearly distinguished from each other by their typical facies throughout the whole quarry (ca. 32,000m²). The channel infill and the upper layers of the floodplain deposits have shown normal polarity in contrast with the lower layers of the floodplain deposits and terrace gravels which are reversely magnetized. Thus, despite the recovery of the analyzed material from an adjacent area of the fieldwork in the 1970s and 1980s, there is no doubt about the correlation of both lithics and bones bearing butchering marks (Figure 2) with the fossiliferous layers, which belong to the onset of a normally magnetized Chron.

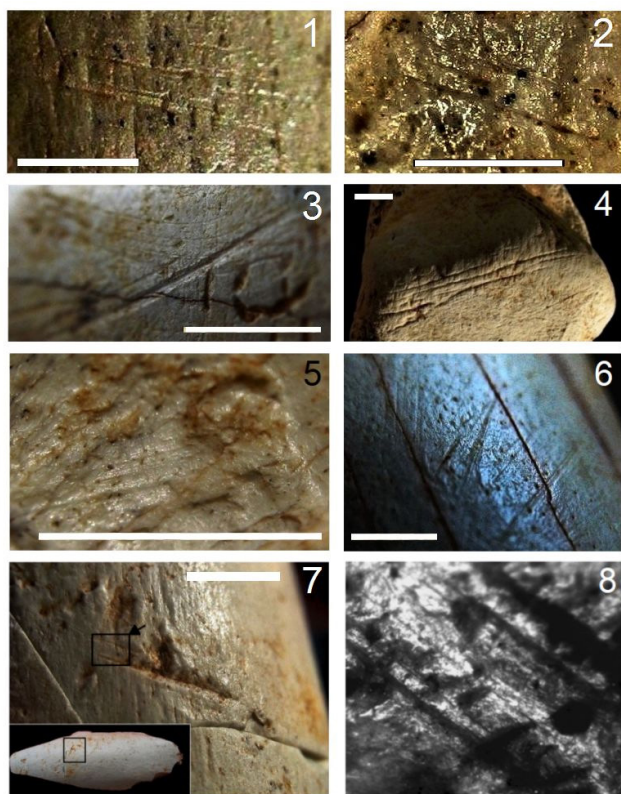


Figure 2 Cut marks on bones from Untermassfeld. Scale bars 1 cm.

1. Upper limb bone fragment of a small-sized mammal.
2. Dorsal face of a cervical vertebra fragment from a cervid.
3. Deep V-shaped mark on an impacted upper limb bone of a medium-sized mammal overlapped by percussion pit with emanating *striae*.
4. *Tuber calcanei* of rhinoceros.
5. Upper limb-bone fragment of a medium-sized mammal showing V-shaped marks overlapped by tooth marks.
6. Intermediate limb bone shaft fragment of medium-sized mammal.
7. Upper limb bone shaft fragment from a medium to large-sized animal with deep V-shaped mark overlapped by (tooth) pits.
8. Magnified view of inset in subfigure 7 depicting internal parallel *striae*.

The stratigraphical provenience of the bone and lithic material (i.e. coming from the same layers which were excavated not far away containing Epivillafranchian fauna) is unequivocally evidenced by:

- a. The surface status of bones exhibiting the same surface features (color and chemical erosion features).
- b. The exact identical taxonomic status and metric data of skeletal elements described by the paleontological team.^{16–20}
- c. Description and demonstration of the stratigraphic position (layer and height) of archaeological finds with photo documentation of the old sand quarry and fossiliferous layers.
- d. The fact that chert artifacts are solely incorporated in the Lower and Upper Fluvialite Sands which are exposed in the sand quarry and which contain fossil faunal remains.

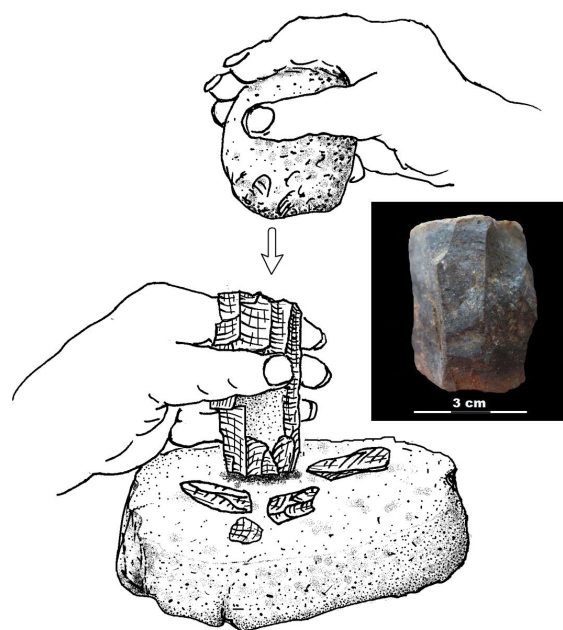


Figure 3 Bipolar on anvil technique applied to platy raw material similar to a chert specimen from Untermassfeld (Figure 5e),⁴ and (Figure 8).¹ (Drawing by L. Fiedler).

No lithic artifacts or chert occur in other layers of the quarry or on the surface of the surrounding terrain surface. Other clues of stratigraphic origin were already detailed in Landeck,³ Garcia et al.⁴ and Landeck and Garcia Garriga.^{5,6} Regarding the allegation of an “admixture” of the old bone assemblage with a specimen from the excavation in 2009 we have to state that none of the specimens studied is known to originate from a different origin other than its retrieval some decades ago and collected from the surroundings of the current excavation in stratigraphic levels which can be correlated with the fossiliferous sediments.

Uneven data quality and the earliest occupation of Europe – the case of Untermassfeld

Hominin butchered bones

The publications of Gaudzinski-Windheuser,²² Kahlke & Gaudzinski²³ and Kahlke²⁰ lack a complete analysis of biotic bone

surface alterations and breakage patterns. Associated lithic finds are not mentioned at all. Roebroeks et al.¹ state that analyses by a wide range of specialists have not yielded any indication of hominin modifications of faunal remains. Apparently, they have overlooked Musil's²⁴ analysis of equid bones which draws attention to a humerus fragment (IQW 1980/15900) exhibiting a surface modification adjacent to the fracture outline, which may originate from an impact possibly imparted by a tool to break the bone. The focus on a few taphonomic parameters made by the aforementioned authors is solely interpreted in the way how they may fit the priori-assumption of drowned animals and attritional carcass remains on the floodplain. There are no alternative interpretations. Similarly, the publication of Baales² neither includes any analysis of lithic specimens nor bone surface alterations and taphonomic features in his appraisal of site formation at Untermassfeld. Baales' comments against the archaeological evidences from Untermassfeld,^{3,4} do not provide any scientific evidence. He also rejects hominin presence at the rest of the European ancient sites, proposing the return to the old "short chronology" paradigm. The outlandish argumentation used by Baales lacks scientific basis and is exclusively based on his own non-scientific opinion. We have already published a contrasting adjustment.⁷ Four bone specimens out of 419 analyzed specimens which were analyzed by us some years ago and which were part of a sample we termed "Schleusingen collection" are demonstrated by Roebroeks et al.¹ in their published paper. These four bones are said to be part of a sample (N=64) delivered originally to Schleusingen Museum of Natural History and are now stored at the Senckenberg Research Station of Quaternary Paleontology at Weimar. The published paper by Roebroeks et al. contains the assessment of a few bone specimens negating hominin butchery traces. Here we give rectifications for each

specimen in order to demonstrate fallacious conclusions which fit the picture mentioned above:

- a. Figure 4 Roebroeks et al. state: "This fragment, according to Landeck and Garcia Garriga⁵ part of an assemblage recovered in the late 1970s and early 1980s, was still in the ground decades later and stolen as an incomplete fragment from a 2009 excavation area (Figure 3). Figure 4 shows the regained distal metapodial fragment refitted to the proximal portion of the same skeletal element, recovered by the Senckenberg excavators. The whereabouts of the freshly broken, but still missing, portions of the bone remain unknown. The packages delivered to the Museum of Natural History at Schleusingen were transferred to the Senckenberg Research Station at Weimar. In these packages, further bone fragments published by Landeck and Garcia Garriga⁵ were identified, in total 10 out of the 36 illustrated in their *Journal of Human Evolution* paper". As we have mentioned before, we have studied only the mentioned old collection. Roebroeks et al. cannot assert that this bone specimen was part of the sample we have studied because adhering sediment which was present during analysis is not visible and as the authors describe there are "still missing portions". Roebroeks et al. alleged that this specimen is published in our article. In the case that this specimen corresponds to the bone fragment depicted by Roebroeks et al., we would have identified and refitted the missing portions during analysis. In the meantime, we have applied to Senckenberg Research Station where this specimen is said to be housed now in order to further clarify this issue and to identify which bones may have been presented to us some years ago for analysis originating from the Lower Pleistocene sediments. The director of the institute (Prof. Kahlke) did not give any permission.

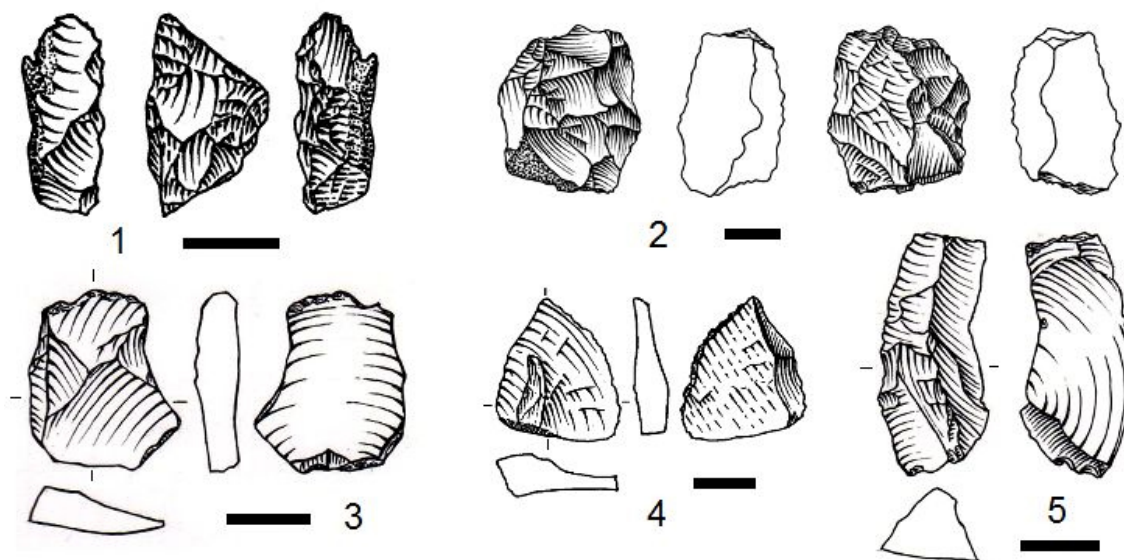


Figure 4 Drawings of lithic pieces from Untermassfeld shown by photographs in Roebroeks et al. (Figure 9-13) exhibiting features of intentional rock breakage/cleavage. (Drawings by B. Kaletsch and L. Fiedler). Scale bars 1 cm.

1. Exhausted small chert core.
2. Multifacial silicified limestone core.
3. Bipolar silicified limestone flake.
4. Bipolar chert flake.
5. Bipolar chert flake.

- b. Figure 5 Roebroeks et al. stated in the figure caption: "The modification (i.e. incision; comment made by the authors) starts as very shallow striation in a modern break and is interrupted by a modern planar removal of the bone surface." This bone piece was evidently broken in modern times and refitted by glue. The purported shallow striations which are clearly incisions characterized by shouldering are accompanied by a set of subparallel striations on the other site of the modern break. These modifications are unrelated to the modern break or a very small modern bone surface removal, which developed very recently as the bone breaks in two pieces because they exhibit moderate smoothing from abrasion like the other set of grooves. The

main groove of the second set is very deep, showing a V-shape section and proceeds laterally by two grooves characterized by shouldering and internal microstriae.⁵ Both characteristics are strongly suggestive of an incision generated by a sharp stone edge. This surface region is not disturbed by erosional processes, which are described by Roebroeks et al. by "blunt, undefined shoulders that merge into the surrounding bone surface", caption of Figure 5 and have removed the outer lamellae of the bone in some other areas of the specimen. Roebroeks et al. recognize red sediment filled in a "deeper section of the modification" (i.e. incision; comment made by the authors) which attests to its ancient development and origin from Untermassfeld sands.

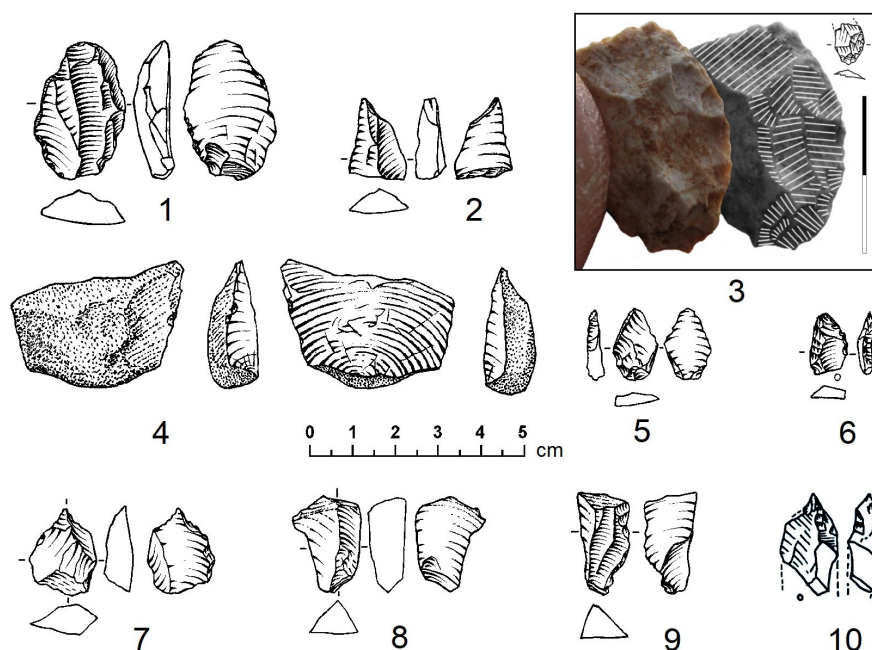


Figure 5 Flakes and retouched pieces from Untermassfeld. (Drawings by B. Kaletsch and L. Fiedler).

1. Quartzite flake with a reduced angle (distal left side) and dorsal removals of opposite directions originating from a core with two opposite striking platforms.
 2. Chert flake exhibiting the residual of a prepared striking platform, supposedly representing waste of bifacial knapping.
 3. Retouched bone fragment: flake scars (complete or truncated) are illustrated by white lines that point out their dimensions and direction of detachment (edge retouches are left blank).
 4. Cortical chert flake with dorsal negative on its right side within the cortex.
 5. Chert flake with proximal (intentional) modification.
 6. Chert flake with left-sided shallow scraper retouch and dorsal removals of opposite directions.
 7. Chert flakes with remnants of striking platform, supposedly generated by bipolar-on-anvil technique.
 8. Chert flakes with remnants of striking platform, supposedly generated by bipolar-on-anvil technique.
 9. Flake resulting from bipolar-on-anvil technique with right-sided retouches.
 10. Pointed chert flake.
- c. Figure 6 The description by Roebroeks et al. is incorrect: "A left calcaneus of *Stephanorhinus hundsheimensis* Figure 6 with modern striae serves as a further example". The subparallel and deep *striae* are not modern but unequivocally fossil because of their slightly rounded edges in many parts where erosional processes did not alter their original morphology. In some sections erosion has not altered the incision and its original morphology with smooth V-shaped walls is observed. Their deep

and subparallel character is very suggestive of an anthropogenic origin. For example, no carnivore can produce such a pattern of deep incisions with its teeth at this anatomical location because the anatomy of the specimen allows neither the required counter pressure nor its subparallel arrangement. The assumption of the mentioned authors that inferred exploitation of muscle meat "does not make sense" is unsubstantiated. Observations of living hunter-gatherers and experimental butchering data indicate also

cutting of distal tendons, which are associated with an exclusively proximal location of the muscle flesh within the muscle-tendon unit.^{25,26}

- d. Figure 7 The specimen published by Landeck and Garcia Garriga⁵ shows one incision (left lower subimage) with a barb, which is indicative of an anthropogenic incision with a stone tool²⁷ and another modification exhibiting shouldering of deep subparallel incisions, which is experimentally observed when different strokes are inflicted with a stone tool characterized by a retouched edge.^{27,28}

Lithic industry

Roebroeks et al.¹ state that 11 (six chert fragments and five limestone pieces) are momentarily stored at the Senckenberg Research Station of Quaternary Paleontology at Weimar, formerly delivered to Schleusingen Museum of Natural History. In their article¹ they have depicted 6 lithic specimens which were obviously part of the analyzed sample (N=256) because they are published in Garcia et al.⁴

- a. Figure 8 in the paper of Roebroeks et al.¹ images a broken chert core (formerly platy chert blank) exhibiting several concave longish fracture planes separated by clear longitudinal rims inflicted by unidirectional orthogonal blows of a hard percussion instrument (hammerstone) on the striking platform, while lying with its flat surface on an anvil (Figure 3). The procedure is further evidenced by battering of the flaked plane ridges of the striking/resting platform (very small localized detachment negatives)²⁹ and accompanied only by the following comment by Roebroeks et al.¹ "Our Figures 8 to 10 show objects interpreted as cores knapped on an anvil" and in the figure caption "Chert fragment, published as a tabular chert core knapped on an anvil". Roebroeks et al.¹ only reiterate our designation by negative semantics. Neither the Results section nor the figure caption contains any detailed descriptions made by the authors.
- b. The same unscientific description and assessment of lithic specimens applies to the "piece" (Figure 9) imaged in Roebroeks et al. (and by the way all the other depicted specimens), which bears doubtless concave or conchoidal flake scars, because of a very fine and homogen texture of chert as for example is also the case of the core imaged in Garcia et al.⁴ which represents an exhausted small core of unquestionable anthropogenic reduction technique using a tabular chert blank (Figure 4(1)).
- c. The specimen shown in Figure 10, which was simply commented on by Roebroeks et al. "...another inferred core", is not easy to approach according to its characteristics (i.e. breakage marks) due to raw material constraints (silicified limestone) but it displays clear flake scars formed during the reduction process which allow the diagnosis of a multifacial core (Figure 4(2)).
- d. Figure 11 is described by Roebroeks et al. as a shattered limestone piece lacking bulb, platform and retouches showing irregularly crushed edges. Platforms on flakes struck off by bipolar knapping are usually very narrow. The piece also displays dorsal flake removals (Figure 4(3)). We must state that the authors are possibly not trained in the bipolar on anvil technique with different raw materials.
- e. Figures 12 and 13 are both described by Roebroeks et al. with the same term: "Chert fragment, interpreted as a flake produced

in a bipolar on an anvil technique" (figure caption) and "...have been published as chert flakes produced in a bipolar on an anvil technique. Not one of the eleven pieces has a clearly visible bulb of percussion, while a co-occurrence of a definable striking platform with scars of previous removals is also absent". Firstly, not all pieces are flakes, which make this statement *per primam* invalid, secondly this statement denies *ex cathedra* visible features (bulbs originating from bipolar on anvil technique, conchoidal flake scars, hackle lines, striking platforms and overlapping dorsal removals). Returning to Figures 12 and 13, both specimens show features of flakes characterized by striking platforms and bulbs. The specimen in Figure 12 displays fan-shaped hackle lines. Dorsal negatives are present in Figure 13 on a specimen of inhomogen rock structure containing void spaces and impurities (Figure 4(4,5)).

Roebroeks et al.¹ state that all lithic specimens delivered to the Museum of Natural History at Schleusingen (N=11) have been published by us.⁴ We cannot confirm if the allegedly remaining 5 specimens were part of our analysis or vice versa were part of the lithic sample delivered to the museum, because neither are all specimens depicted in their article, nor did we get the opportunity to study the mentioned 5 pieces. Moreover, Roebroeks et al. seems to deliberately ignore the bifacial centripetal core knapped by hand held method from very fine homogenous chert⁴ which also exhibits unquestionably intentional features. Regarding Figure 14 in the paper of Roebroeks et al. what do these boxes represent? Are they trying to invalidate the stone tools with these boxes? Moreover, the way of presenting the lithic assemblage should especially focus on the technological features they may present, as is usual in analyzing these kinds of Mode 1 assemblages. In order to invalidate the evidence of lithic artifacts coming from the Early Pleistocene sands surrounding the excavation area in its immediate vicinity, Roebroeks et al. state "Triassic limestone and chert are frequently found in Early Pleistocene gravels cut by the fossiliferous layers of the site, as well as in all other Pleistocene fluvial deposits of the middle Werra". This is not what has been observed by the geologists. Ellenberg³⁰ has shown that clastic material of chert (chunks, pebbles and cobbles) occur only in the Pliocene and Early Pleistocene deposits of the River Werra, having very low frequencies in the latter, which is later confirmed by Ellenberg and Kahlke.²¹ This means that their relatively high occurrence in the Early Pleistocene sediments found in the immediate vicinity of the excavated area is not natural and points possibly to an anthropogenic origin.

On the other hand, the archaeological origin of the Mode 1 lithic assemblage from Untermassfeld is reinforced by the fact that it has features in common with the coeval European Early Pleistocene, such as:

1. local raw material selection,
2. one rock type preferred for knapping,
3. small-sized assemblage,
4. knapping technology dominated by orthogonal on an anvil and/or hand held reduction processes,
5. a low percentage of unifacial and bifacial centripetal cores,
6. a few or absence of cobble tools such as choppers or chopping-tools, and
7. the retouching of denticulates and notches.^{10,31-38}

Roebroeks et al. further state: "The redeposition of Triassic material took place by means of high-energy processes that caused mechanical splintering and breakage of the corresponding rocks", which is aimed at explaining the breakage of our published lithic specimens by a natural cause. We must ask why these powerful hydraulic forces^{20,21} which were presumably able to split stones did not fragment the accompanying fragile bones (ca. 65% of all large mammal bones are not found in anatomical position or were associated finds implying fluvial transport without protection of soft tissue)²⁰ Moreover, they allege that "limestone and chert rocks transported into the bone bearing sands" originating "from the upper reaches of the Werra River and eroded subsoil of the river, from adjacent slopes of the valley, (and) from the mudflow fan within the site itself" (Figure 2), would *per se* exclude anthropogenic modification of specimens. However, the occurrence of cleavable stone material in river sediments only documents that early hominins would have had potential access to sources of raw material which can be converted to sharp tools. A myriad of Paleolithic archaeological sites located riverside are characterized by finds of tools and the rocks from which they were struck within the river or lake shore deposits.^{32,39–41}

Finally, we have serious doubts according to declarations of Roebroeks et al.¹ which relate to the whereabouts of delivered finds. The authors wrote "Landeck states that 'Objects are handed over to the excavator Dr. R.D. Kahlke (Forschungsstation für Quartärpaläontologie, Senckenberg-Institut, Weimar) and are stored at the Thüringer Landesamt für Denkmalpflege (Weimar)' and 'According to a later publication,³ 'a small selection of specimens is preserved at the Thüringer Landesamt für Denkmalpflege (Weimar)'".³ "The Thüringer Landesamt für Denkmalpflege does not hold lithics from Untermassfeld... and no lithics were handed over to the Senckenberg Research Station of Quaternary Paleontology". This is completely incorrect, because four lithics³ and two bone pieces were handed to Prof. Dr. Kahlke in the presence of the preparatory JA Keiler, on 30th of January 2004, 14.00 p.m. at Forschungsstation für Quartärpaläontologie, Steubenstr. 19a at Weimar (Research Station of Quaternary Paleontology), which was a former to Senckenberg Research Station of Quaternary Paleontology (Weimar). Prof. Kahlke mentioned that he was member/collaborator of the Thüringer Landesamt für Denkmalpflege (Thuringian State Office of Antiquities and Monuments) and the declaration was included in a protocol. One of the bone pieces (Figure 5(3)) has been interpreted as a retouched bone piece³ and the possible loss of this specimen would be momentous for the cultural interpretation of the site.

Technological traits of lithic artifacts from Untermassfeld

The Untermassfeld site is located apart from the region of the extension of the Nordic ice sheet with its vast occurrences of Nordic flint specimens. In the upper Werra valley, especially in the Hessian region, good examples of numerous Middle Paleolithic and Mesolithic artifacts manufactured from quartzite, lydite and flint exist. The occurrence of flint artifacts is caused only exceptionally as imports. In Hessian, many Lower Paleolithic sites contain/are characterized by handaxes, cores and flakes, which are frequently made out of quartzite and to a lower proportion manufactured out of quartz, lydite and phonolite. Neanderthals and their ancestors have traditionally used local raw materials to produce stone tools. This is also the case at Untermassfeld. In its surroundings chert occurs in small chunks which are often smaller than 5 cm and characterized by void spaces. Because of its hardness, the material is nonetheless feasible for manufacturing

light duty tools. It is unproblematic to demonstrate that normally used free hand knapping leads as an exception to results which are comparable to flint (Figure 5(1,2,4–6,10)). Many retouched specimens are unequivocally produced from detached pieces, which are inferable from a bipolar vertically performed technique of knapping (Figure 3, Figure 4(3–5) and Figure 5(7–9)); specimens stored at Senckenberg Research Station of Quaternary Paleontology). Of course it must be held in mind that flint nodules wedged in deposited river gravels which are broken by sedimentary forcing can resemble a specimen crafted by intentional bipolar-on-anvil technique. But pitching of large boulders has not been observed at Untermassfeld site. It is therefore expected that, by reason of their small size, the sediment force of chert nodules would have been pressed in the sandy-loamy ground, but without being split. To be cautious, only cleavage products with additional presence of edge modifications have been assessed as intentional artifacts.

The equivalent knapping technique has especially been known from quartz artifacts in Zhoukoudian Cave near Peking in China for almost 100 years.^{42–44} Its products were also found at the East African Olduvai site.⁴⁵ This is described extensively by P.R. Jones⁴⁶ regarding Bed I–III. He studied splintered pieces from Bed I–IV of Olduvai Gorge in detail and demonstrated that the frequent presence of pitted anvils is evidence of the cleavage technique on quartz and quartzite boulders. Gurtov and Eren⁴⁷ explain the close technology–toolstone association between quartz and bipolar reduction at Olduvai sites by recognizing differences in the physical properties of different types of raw material. Bulbs emerge on materials produced by this way as an exception. Hackle lines appear in a parallel arrangement but not fan-shaped as in the usual stone flaking technique (i.e. hand held). Similarly, striking platforms are less frequent because of the sharp-edged character of both flake sides. These characters are considered by Roebroeks et al.¹ to represent natural debris. This reductive view is comprehensible but eliminates knapping of brittle raw materials a priori from Paleolithic contexts and is fanciful. The adoption of bipolar flaking technique for hard rock for the production of tools has been described by several authors, such as R Feustel⁴⁸ or F Le Brun Ricalens.⁴⁹ Remarks stem from ethnographic observations in the lowlands of the River Amazon, South America and Oceania (to split the only usable raw material of amethyst crystals) and the northern Baltic region finds, as well as from analyses of Paleolithic finds in China. The knapping method in question came operational during Paleolithic times, when suitable raw materials in the form of small nodules, angular debris, rough flakes and tough flint (i.e. mountain crystal, amethyst, or Paleozoic chert) had to be reduced. Because of the required high-energy blows, the materials could not be held in the hand. Thus, it was placed on a stone worktop (anvil), retained by one hand and split from above by vertical blows (Figure 3).

Not every chip generated in this way would be suitable to be used as a tool, but in every such working process plenty of usable, sharp-edged pieces are produced. Residual cores are often characterized by prismatic or discoid specimens, which are well known as splintered pieces (*pièces esquillées*). Resulting flakes are frequently flat and prismatic. Platform remnants are usually not preserved or appear as sharp-edged lines. Bulbs are virtually not developed or accomplished, but cleavage planes are frequently covered by a multitude of fissures which run in the direction of applied blows. Ripple lines⁵⁰ may occur; sometimes from both sides of the applied force, but always with one dominant direction. Pieces detached in this way sometimes resemble naturally crushed flint pieces in Pleistocene moraines in Denmark and

northern Germany, which in the first instance are not infrequently misinterpreted to represent intentional produced blades. The diagnosis of intentionally generated lithics and artifacts depends on the specific geomorphologic processes which possibly acted at a find site. Single stone fragments or cobbles showing extractions from Pleistocene river deposits may correspond to lithic artifacts, while sometimes they could have been generated by natural causes when rocks collide and shatter. Discriminating the origin of this Mode 1 lithic assemblage depends on how many of these products are aggregated together and whether dynamic processes in the formation of geological sediments may have contributed to artifact-like forms or not.

Nordic glaciations/glaciers never reached Untermassfeld. All the lithic finds originate from fluvial sediments deposited by the late Lower Pleistocene Werra River, which represent silty and fine- to medium-grained sands developed without significant relief energy. In this substratum, no significant breakage of transported stones could have occurred. Similarly, drifting chunks of ice had no meaning in this region, as evidenced explicitly by the good preservation status of the animal bones. Among the lithic artifacts, those pieces generated by the bipolar on an anvil technique prevail, but also numerous pieces attest to the freehand knapping method carried out at the site (Figure 3(1,2,4-6,10)). The fundamental skepticism towards every flake originating from fluvial deposits by Roebroeks and Baales already noted elsewhere⁵¹ totally prevents detection of anthropogenic activities in these Pleistocene river archives. Investigating cultural traces associated with river deposits is not meaningless as proved by myriads of Middle and Upper Pleistocene archaeological fluvial sites, which are easier to recognize than Lower Paleolithic artifacts, because artifacts of this age are usually more elaborate. Early artifacts are predominantly manufactured by simple techniques which follow physical splitting properties of stones and therefore are not easily to distinguish from nature products. But in the case of local accumulation and their co-occurrence with cut-marks on bones, as demonstrated at Untermassfeld site, every quick criticism should be reserved and instead very careful examinations are needed to avoid operating with spurious arguments *ex cathedra*. We must therefore question if authors have excelled in processing Lower Paleolithic artifact series to achieve substantial experience in this issue.

Demonstrating technological features of Lower Paleolithic artifacts needs an additional comment, which argues against increasing European claims reporting archaeological material only by photographs. A systematic manufactured handaxe is simply recognizable in fact by photograph. In contrast, small Lower Paleolithic tools are hardly imaged by a camera so that it is possible to recognize all necessary features. The changing rock colors hamper the identification of hackles and Wallner lines. Drawing procedures facilitate the appropriate autopsy of pivotal characters, which develop during intentional rock splitting caused by dynamic loading under changing light incidence. Photographs do not offer such possibilities. Thus, the decision is allocated to the observer if he trusts the publishing authors to conduct accurate analyses and conclusions. In the case at hand, it was easy for the critics to deny the expertise of the authors. Therefore, we recommend that journals or reviewers should demand additional professional drawings of lithic artifacts. If Mary Leakey⁴⁵ had published the stone artifacts from Bed I at Olduvai Gorge by photographs, it would have been easy for the proponents of the short chronology to label the stone artifacts natural tephrofacts and reject evidence of early hominins.

We express a general criticism of the irrelevant writing of some text passages. Roebroeks et al.¹ suggest that some well skilled scholars investigating Europe are novices and lack the ability to distinguish between ecofacts and artifacts at early European sites. This is enforced by using terms like "data base hygiene", which is used to suggest that some data per primam are "toxic" or "infectious", that is to say no one should tackle them or make further analyses. The attack against our work using the peer review system is outrageous. Roebroeks et al.¹ state "The case of Untermassfeld presented in extenso here underlines that peer review is an imperfect shield and that flawed claims do make their way into the scientific literature." They continue with their first draft submitted to Journal of Human Evolution because they did not agree with the reviewing process of the journal! Peer review systems, editorial teams, scientific journals and reviewers which give help and support deserve respect. Paradigmatic statements like "The absence of any hominin traces whatsoever at the Untermassfeld site and the problematic character of the claims made for sites such as Vallparadis and Le Vallonnet imply that at the scale of Europe, solid undisputed evidence for a hominin presence in the Early Pleistocene is indeed rare...", or the apodictic text passage at the end of the article "Untermassfeld is not an archaeological site. Which site is next?" deny the occurrence of clear discernible intentional modified lithics and bones and do not respect recent scientific results.^{10,52} Moreover, it disqualifies future investigations *ex cathedra* by arrogant and cynical accusations. Regarding the Vallonnet criticism, it is not very convincing to refer to an investigation of which the proof of argumentation is based on the depiction of one pebble with a single removal⁵³ and arouses suspicion that the authors have never seen the artifacts.

Discussion

For three decades the research of the earliest European settlers has been divided into two research groups. The "Old Europe" supporters are confident with the increasing archaeological data from European sites and are represented by the majority of the scientific community, defending a presence of the first inhabitants of Europe before 1 Myr. Contrastingly, the proponents of a "Young Europe" defend a much younger occupation after 0.8–0.5 Myr of the continent.^{2,51,54–58} Since the mid-1990s, new discoveries have been made with evidences of great explanatory power and informative value at such sites as Atapuerca, Dmanisi, Fuente Nueva-3 and Barranco León.^{38,60–63} Successive investigations at the beginning of the new millennium were able to confirm the "(very) Old Europe hypothesis" at Orce sites, Atapuerca and Vallparadis in Spain; Pirro Nord/Italy; Pakefield and Happisburgh 3 in England; Dursunlu, Gediz River and Kocabas in Turkey; Kozarnika cave/Bulgaria; Lezignan, Vallonnet cave, and Loire sites in France.^{36,52,64–73,76–84,88} Further investigations have shown that the purported age of some sites has to be corrected. For instance, it was demonstrated that Ceprano site in Italy must be younger than formerly proposed,^{85,86} but vice versa new dating of the Vallonnet cave site recently shows that its old age has even been underestimated.⁵² Otherwise, the dating of the oldest archeological layers in Kozarnika cave in Bulgaria (ca. 1.6–1.2 Myr) has recently been questioned by new paleomagnetic results placing them into the early Brunhes Chron, but showing significant disagreement between mammal biostratigraphy (MNQ zones 19–17) and magnetostratigraphy.⁸⁷

Looking further north, the oldest known sites in the center of France⁸⁸ are dated currently around 1.1 Myr and two sites further

north in England to 0.85 Myr^{69,89} and 0.7 Myr.⁶⁸ East European sites of Sinyaya Balka, Rodniki and Kermek (Russia)^{74,75,90} are well beyond the west-east high mountain chain of (southern) Eurasia. The find site of Mauer in western central Europe yielding a hominin mandible recovered from river sands in 1907 along with numerous faunal remains and lithic artifacts dated to 0.6 Myr,^{91–93} has long been taken as the paradigm, representing the oldest evidence of hominin presence in northern Europe supported by other sites like Boxgrove, Westbury-sub-Mendip, Warren Hill and Waverley Wood in England,^{94–99} and the German Miesenheim 1 and Kärlich G sites.¹⁰⁰ Artefact finds from the late Early Pleistocene faunal site of Dorn-Dürkheim 3 in Germany^{101,102} and Červený kopec in Czech Republic^{103,104} have indicated that hominin presence in western Central Europe could be significantly earlier than previous thought. New dating of Rhine river terraces in the middle Rhine section¹⁰⁵ suggests a significantly older age (1.3 Myr) of stone tools found in the deposits of the main terrace ("Jüngere Hauptterrasse") of the river Rhine and its large tributaries Moselle and Nahe near their confluences.^{106–108} Thus, hominin presence at around 1.0 Myr at Untermassfeld is reinforced by these new investigations.

Arguing against archaeological traces at Untermassfeld, Roebroeks et al.¹ state that this site would represent geographically an outlier among early European sites located in southern mainlands or southwestern coastal regions. This is no scientific reasoning. Untermassfeld may represent one tiny mosaic fragment of the whole still hidden larger picture of the past. Data from several sites suggest that the first Europeans adapted to different environments. Full interglacial conditions with dense deciduous vegetation are evidenced at the French archaeological site of Pont-de-Lavaud, dated to ca. 1.1 Myr in the central part of the country.^{109,110} Similar among pre-Elsterian archaeological sites in western central Europe, Mauer (i.e. Lower Mauer Sands) and Miesenheim 1 can be clearly assigned to a warm climate period or interglacial conditions. The same applies to data from the European inland (Untermassfeld), which indicate full interglacial conditions with faunal elements adapted to large forested areas, but also open landscapes.²⁰ On the other hand, the sites of Happisburgh 3 (MIS 25 or 21) and Dorn-Dürkheim 3 (MIS 21 or 19) are characterized by botanical and/or faunal elements which correspond to a cool and forested environment and may represent an interglacial-glacial transitional phase.^{69,101,111,112} The faunal and pollen records available at the earliest archaeological sites in northwestern Europe suggest that hominins in the course of the late Lower and early Middle Pleistocene (Mid Pleistocene Transition) were increasingly able to settle in different environments and probably also different periods of the glacial-interglacial cycle (with the exception of significant cold stages and glacials).

Zagwijn¹¹³ has argued, based on the distribution of *Abies* in the Holsteinian and Eemian interglacials, that maritime climate (high precipitation, relatively warm winters) in warm interglacials can reach northeastern lowlands up to latitude of 54–58°, extending as far as the western parts of the Russian plain. Biostratigraphic and magnetostratigraphic evidence at Untermassfeld points to the Bavelian interglacial (MIS 31) at the base of the Jaramillo event.²⁰ MIS 31 was characterized by an exceptional warmth and was one of the "super-interglacials" in the Pleistocene^{114–117} with an estimated eustatic rise of 20 m.¹¹⁸ Thus, sea level rise and change of the coast line could explain that in this time period the climate even in more distant inland regions of northern Europe (maritime) was at least warm enough to enable the survival of species like *Hippopotamus*. The presence of this animal at Untermassfeld which is adapted to a warm climate

with mild winter temperatures indicates that the habitats of the first hominin settlements in western central Europe were not only restricted to coastal landscapes.¹²⁵ The same is valid for the regional interglacial archaeological occurrences of Kärlich A, (probably MIS 31, 29, or 27) and Mosbach and Mauer (both probably MIS 15)^{91–93,119–124} each with evidence of *Hippopotamus* attesting to climate conditions favorable for *Homo* to survive at least several thousands of years.

In pre-Elsterian periods, neither geographic barriers like the high mountain chains of the Alps and Carpathians nor bio-geographic or climatic frontiers seem to have prevented hominins entering central or western parts of the continent from South or East Europe. The northern expansion of hominins possibly coincided with an approximation of European fauna associated with the beginning of a faunal turnover, leading to Galerian faunal communities and reduction of differences in ecological structures between southern and northern habitats.¹²⁶ Why do Roebroeks et al.¹ avoid mentioning in their article sites which are aged >1.0 Myr like Pont de Lavaud, Bois de Riquet (France), Kozarnika (Bulgaria) and southern Russia sites? Are they captured by a rigid "40° latitude-limitation"? For example, Early Pleistocene archaeological sites in the Nihewan Basin (China) which are included in their argumentation are localized further north of Beijing and are similarly characterized by a cool climate in winter.^{127–130}

Conclusion

Adaptations which would have enabled the survival of hominins in seasonal habitats concern the subsistence behavior of these first European pioneers. The large terrestrial assemblage at Untermassfeld includes cervids, horse, bison, rhinoceros and hippopotamus, all of which show conclusive evidence of anthropogenic predation, including meat removal, disarticulation and bone breakage.^{5,6} Analysis suggests that this bone assemblage consists of animal remains with different taphonomic origins which died of natural causes or were killed by predators and accumulated as a result of flood action. Nevertheless, the primary predatory behavior of hominins probably documented at the site is considered a key adaptation pattern in the early colonization of mid- and low latitudes in Europe and is in agreement with the other European late Early Pleistocene sites, suggesting that hominins acted as generalistic predators.^{64,131–138} We, are certainly of the opinion that the freedom of research includes publishing reasonable critique. Of course, this may also be done in the case of missing/absent expertise. However, then it must be accepted that nonsense, polemics or mental aversion after all the demonstration of patience should now be strongly rejected. That is to say, there is no reason to hinder other persons entering uncharted scientific territory and in such a way torpedoing the progress of research, although it should happen in public space and not by anonymous peer review. At the same time, we hope to close this distressing situation in the course of our rejection. Self-evidently, we know that in the early period of hominin culture the physical splitting of rocks for the purpose of generating tools by all means may also have its natural equivalents. This problem occurs likewise in the inspection of singular and isolated rocks/stones in geological strata and artificially crushed rocks. But if this is an intention to hamper research in order to ignore archaic find samples, this research would have come to an end.

If large flint nodules, large quartzite blocks or vulcanites with fine grained matrix would have been available in the vicinity of Untermassfeld, then early hominins would have been able to produce larger stone tools made by conventional flaking technique. This was not the case and they were dependent on small-sized chert chunks

with maximal dimensions of 5 cm. This raw material was usually reduced by free hand technique. In many cases, this was not possible and bipolar-on-anvil technique was used. Regarding well-known "Old World" Lower Paleolithic sites this technique was described extensively from East Africa at Olduvai sites⁴⁶ but was known even earlier from Zhoukoudian cave in China^{43,139} and also belonged to the commonest knapping technique in the European Early Pleistocene sites.^{31–38} If only products of this technique appear at Untermassfeld, it would be understandable that excavators did in fact recover them but would not necessarily recognize them to represent artifacts. Otherwise, there exist small-sized "normal" flakes and cores of common reduction sequences.

Regarding the criticism of anthropogenic traces at Untermassfeld by Roebroeks et al.¹ we must state that a systematic approach investigating biotic bone surface modifications and associated lithic material has never been undertaken to date by the responsible paleontologists or "involved" archaeologists, which makes the assumption of these differing results unsubstantiated. It is clear that our data do not correspond with the paleontological results, as Prof. Kahlke argues, because we presented^{5,6} for the first time data of archaeological material recovered from levels exposed adjacent to the fossiliferous levels excavated by paleontological fieldwork, which are confidently synchronous. The stratigraphic continuity of levels at the site and region makes this correlation possible. Rejecting these last non-scientific criticisms of Roebroeks et al.¹ by using scientific argumentation makes knowledge of the first hominin settlement of Europe possible.

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Conflict of interest

Authors declares that there is no conflict of interest.

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