

Standing upright to all eternity – The Mesolithic burial site at Groß Fredenwalde, Brandenburg (NE Germany)

Aufrecht in die Ewigkeit – Der mesolithische Bestattungsplatz von Groß Fredenwalde, Brandenburg (Nordostdeutschland)

Thomas TERBERGER^{1*}, Andreas KOTULA², Sebastian LORENZ³, Manuela SCHULT³, Joachim BURGER⁴ & Bettina JUNGKLAUS⁵

¹ Niedersächsisches Landesamt für Denkmalpflege, Scharnhorststr. 1, D - 30175 Hannover; thomas.terberger@NLD.Niedersachsen.de

² Gerberstr. 4, D-99089 Erfurt; andreas.kotula@posteo.de

³ Institute of Geography and Geology, University of Greifswald, Friedrich-Ludwig-Jahn-Straße 16, D-17487 Greifswald

⁴ Institute of Anthropology, University of Mainz, Anselm-Franz-von-Bentzel-Weg 7, D - 55128 Mainz

⁵ Anthropologie Büro Dr. B. Jungklaus, Weißwasserweg 4, D - 12205 Berlin

ABSTRACT - This article presents results of new research on the Mesolithic burial site at Groß Fredenwalde in northeastern Germany, where a multiple burial was first discovered by accident in 1962. Anthropological analyses identified one female with a child and two males with two children within this material. According to systematic AMS dating and ¹⁵N/¹³C-isotope analyses the individuals are typical Mesolithic hunter-fisher-gatherers of the Atlantic period (c. 6 000 calBC). During re-excavation of the site in 2012-2014 three new burials including a disturbed child burial and a baby burial were recognised. There is also an outstanding burial: a young man was interred standing upright and then furnished in stages. The burial is without any parallel in Central Europe, although there are possible parallels at Olenij Ostrov in Karelia. Altogether nine individuals from at least four graves are now known; they probably belong to an early cemetery located at a prominent position in the landscape. AMS-dates assign the burials to the period from c. 6 400 to 4 900 calBC, and thus the site was in use when the first Linear Band Pottery farmers established the agricultural way of life in the region c. 5 200 calBC. Two successfully analysed individuals belong to the haplogroup U of mitochondrial lineages fitting well into the model of highly differentiated forager and farmer populations.

ZUSAMMENFASSUNG - Mit dem Beitrag werden neue Forschungen zum Bestattungsplatz von Groß Fredenwalde in Nordostdeutschland präsentiert, wo schon 1962 ein Mehrfachgrab bei Bauarbeiten entdeckt wurde. Anthropologische Analysen konnten eine Frau mit einem Kind und zwei Männer mit zwei Kindern in dem Skelettmaterial identifizieren. AMS-Daten sprechen für eine Datierung der Individuen in das Atlanikum (ca. 6 000 calBC), und ¹⁵N/¹³C-Isotopenanalysen der Individuen zeigen typische Werte von mesolithischen Sammler-Jäger-Fischern. Während einer Nachgrabung am Fundplatz in den Jahren 2012-2014 konnten drei neue Bestattungen einschließlich eines gestörten Kinder- und eines Kleinkindgrabes entdeckt werden. Höchst bemerkenswert ist das Grab eines jungen Mannes, der allem Anschein nach in aufrechter Haltung und in einem gestuften Ritus beigesetzt wurde. Die ungewöhnliche Bestattungsweise ist ohne Parallelen in Mitteleuropa, wobei mögliche Einflüsse aus dem Osten zu diskutieren sind (Gräberfeld Olenij Ostrov, Karelien). Insgesamt liegen nun von Groß Fredenwalde neun Individuen aus mindestens vier Gräbern vor, die wohl zu einem frühen Bestattungsplatz auf der markanten Anhöhe gehören. AMS-Datierungen weisen die Gräber dem Zeitraum von ca. 6 400 bis 4 900 calBC zu, und der Begräbnisplatz wurde somit während der Neolithisierungsphase des unteren Odergebietes durch die Linienbandkeramiker um ca. 5 200 calBC genutzt. Zwei erfolgreich paläogenetisch analysierte Individuen gehören zur Haplogruppe U der mitochondrialen Verwandtschaftslinien und bestätigen das Modell hoch differenzierter Populationen der Sammler-Jäger einerseits und der frühen Bauern andererseits.

KEYWORDS - Mesolithic burial, early cemetery, Neolithisation
Mesolithische Bestattung, frühes Gräberfeld, Neolithisierung

Introduction

In 1962 several human bones were accidentally detected during construction works at Groß Fredenwalde in

Brandenburg, NE-Germany. The site is located on top of the Weinberg (111 m a.s.l.) which has a prominent position in the region (Fig. 1-2). The hilly landscape was formed as a push moraine belt during the last Glacial c. 16 ka BP (Rinterknecht et al. 2014) and is

*corresponding author

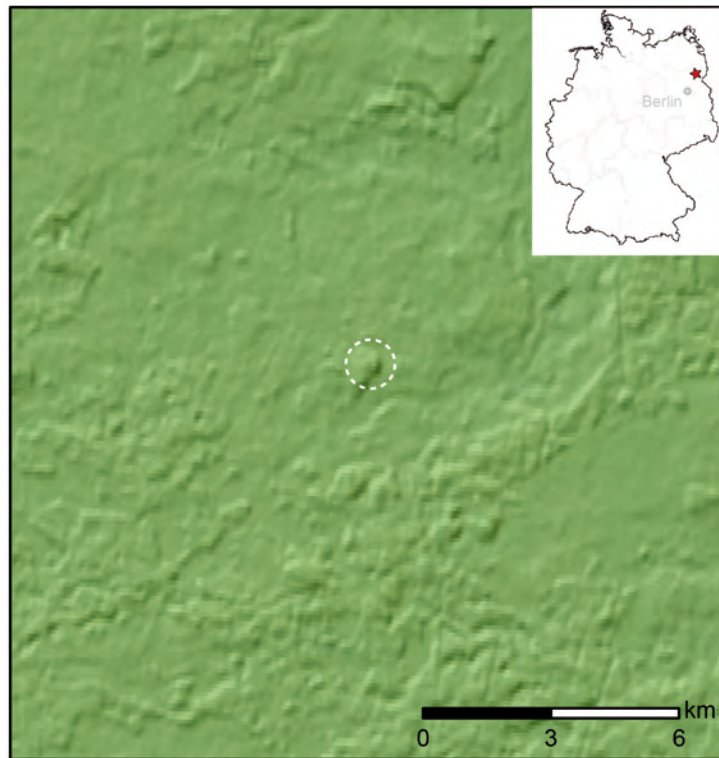


Fig. 1. Location of the burial site of Grob Fredenwalde (white circle). Elevation model based on 1" digital elevation data: <http://viewfinderpanoramas.org/dem1.html>. Map: A. Kotula.

Abb. 1. Lage des Bestattungsortes Grob Fredenwalde (weißer Kreis). Das Höhenmodell basiert auf 1" digitalen Höhendaten: <http://viewfinderpanoramas.org/dem1.html>. Karte: A. Kotula.

characterised by a water-rich environment. The subsequent rescue excavations were started by an amateur and unfortunately only very few photos are available showing bones of different individuals

(Fig. 3; complex I). On the second day field work was taken over by the archaeologist U. Schoknecht, who then observed an inhumation grave of an adult with a child (Fig. 4; complex II).



Fig. 2. Grob Fredenwalde. Aerial photo of the Weinberg. Red star: location of the site (photo: J. Wacker).

Abb. 2. Grob Fredenwalde. Luftbild des Weinbergs. Roter Stern: Lage des Fundplatzes (Foto: J. Wacker).



Fig. 3. Groß Fredenwalde. Photo of 1962 burial after detection on the first day (complex I; after Gramsch/Schoknecht 2003).

Abb. 3. Groß Fredenwalde. Foto der Bestattung von 1962 nach der Entdeckung am ersten Tag (Komplex I; nach Gramsch/Schoknecht 2003).

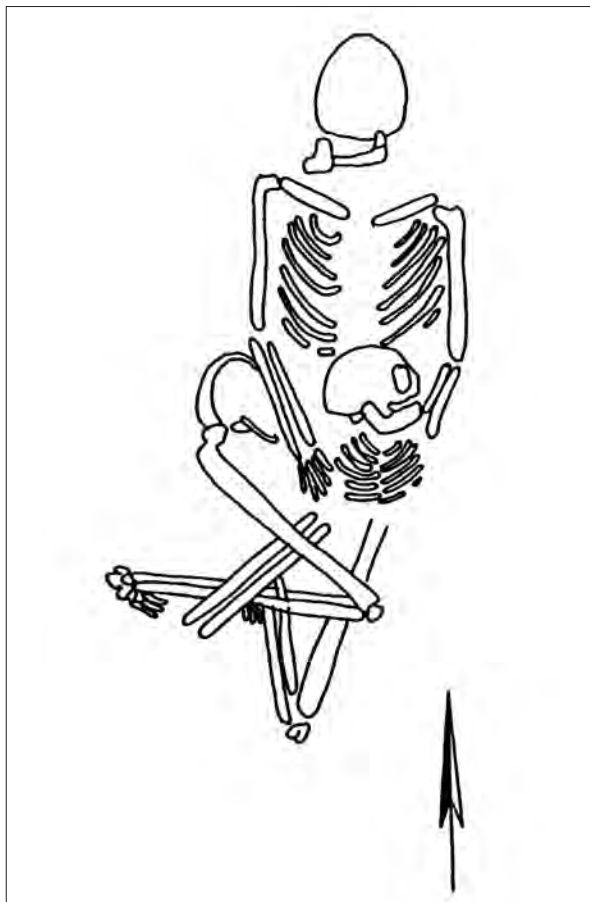


Fig. 4. Groß Fredenwalde, drawing of complex II (woman and child; after Gramsch/Schoknecht 2003).

Abb. 4. Groß Fredenwalde, Skizze der Lage der Skelette von Komplex II (Frau und Kind; nach Gramsch/Schoknecht 2003).

Schoknecht (1963) assigned the multiple burial to the Neolithic. It was not until 1992 that two AMS-dates measured in the Oxford laboratory proved a Mesolithic context (c. 6 500 to 6 300 calBC; Fig. 5) and Groß Fredenwalde was recognised as a major Mesolithic burial site (Hedges et al. 1995; Grünberg 2000). 17 flint blades/ bladelets (incl. fragments), 41 red deer tooth pendants, four pointed bones/ awls and a slotted bone dagger attest a well equipped burial (Gramsch/Schoknecht 2003), but only some deer tooth pendants could be associated with a specific individual. The pendants discovered on the skull of a child (Fig. 6) probably belonged to the decoration of a cap. The decorated slotted bone dagger (Fig. 7) finds parallels in the Kongemose culture of southern Scandinavia and a truncated blade represents another typical late Mesolithic funerary object (Gramsch/Schoknecht 2003).

In 2012 systematic investigations were started which provided new information on the known burial and also led to the discovery of new burials of outstanding character. The results suggest that Groß Fredenwalde might be one of the earliest cemeteries in Central Europe.

Examination of the 1962 burial

Anthropological analyses

New systematic anthropological analyses identified three adult individuals (2 males, 1 female) and three children (Fig. 8; Jungklaus et al. in press), which is in accordance with results obtained by W. Blume on the basis of the finger bones (Grimm/Blume 2003). Many

Lab-number	Context	material	collagen yield	C/N	date in BP	calibrated date	$\delta^{13}\text{C}$ (AMS)	$\delta^{15}\text{N}$
MAMS 21437	Feature 1/4 (young man burial)	human bone	0.1	3.1	6137 ± 22 BP	1σ 5205 - 5167 BC (25.3 %) 5076 - 5007 BC (42.9 %) 2σ 5208 - 5145 BC (33.6 %) 5139 - 5092 BC (13.4 %) 5083 - 5001 BC (48.5 %)	-20.1	
SID-23897	Feature 1/4 (young man burial; only isotopes)	human bone		2.7			-19.9	11.3
Poz-67909	Feature 1/4 (hearth on top of burial)	charcoal			6030 ± 40 BP	1σ 4987 - 4896 BC (58.3 %) 4867 - 4851 BC (9.9 %) 2σ 5034 - 4829 BC (94.3 %) 4815 - 4806 BC (1.1 %)		
Poz-67910	Feature 1/4 (hearth on top of burial)	charcoal			6010 ± 40 BP	1σ 4950 - 4841 BC 2σ 5000 - 4796 BC		
AAR 21380.1	Feature 9 (disturbed child burial; no ultrafiltration)	human bone	0.1		7040 ± 28 BP	1σ 5982 - 5941 BC (39.9 %) 5929 - 5901 BC (28.3 %) 2σ 5996 - 5876 BC (93.8 %) 5859 - 5849 BC (1.6 %)	-19.47 ± 0.05	
AAR 21380.2	Feature 9 (disturbed child burial; ultrafiltration >30 kDa molecule fraction)	human bone	0.0		7067 ± 28 BP	1σ 5994 - 5973 BC (23.2 %) 5953 - 5915 BC (45.0 %) 2σ 6007 - 5896 BC (95.4 %)	-20.82 ± 0.57 (Preliminary result)	
AAR 21380.3 (UF)	Feature 9 (disturbed child burial; ultrafiltration <30 kDa molecule fraction)	human bone			7108 ± 31 BP	1σ 6019 - 5982 BC (56.8 %) 5942 - 5929 BC (11.4 %) 2σ 6052 - 5972 BC (72.2 %) 5954 - 5913 BC (23.2 %)	-20.92 ± 0.64 (Preliminary result)	
AAR 21095	Feature 8 (baby burial)	human bone	0.0	2.7	7569 ± 37 BP	1σ 6458 - 6417 BC 2σ 6475 - 6384 BC	-21.75 ± 0.61	12.3
AAR 18021	Multiple burial, Individual 1 (excavation 1962)	human bone	0.0	3.21 ± 0.18	6944 ± 37 BP	1σ 5877 - 5856 BC (12.0 %) 5850 - 5767 BC (56.2 %) 2σ 5966 - 5956 BC (1.4 %) 5904 - 5733 BC (94.0 %)	-19.58 ± 0.14	11.37 ± 0.29
AAR 18022	Multiple burial, Individual 2 (excavation 1962)	human bone	0.0	3.19 ± 0.32	7177 ± 40 BP	1σ 6066 - 6011 BC (68.2 %) 2σ 6204 - 6192 BC (1.0 %) 6182 - 6172 BC (0.7 %) 6160 - 6142 BC (1.5 %) 6108 - 5983 BC (92.1 %)	-20.48 ± 0.1	11.25 ± 0.17
AAR 18023	Multiple burial, Individual 3 (excavation 1962)	Bone (human)	0.0	3.25 ± 0.22	7187 ± 35 BP (Small sample: 0.386 mg C)	1σ 6068 - 6017 BC (68.2 %) 2σ 6202 - 6194 BC (0.8 %) 6159 - 6144 BC (1.5 %) 6106 - 5989 BC (93.1 %)	-19.73 ± 0.14	11.37 ± 0.29
AAR 18024	Multiple burial, Individual 4 (excavation 1962)	Bone (human)	0.0	3.2 ± 0.22	7051 ± 45 BP	1σ 5988 - 5898 BC (68.2 %) 2σ 6017 - 5841 BC (95.4 %)	-19.33 ± 0.14	11.62 ± 0.29
AAR 18025	Multiple burial, Individual 5 (excavation 1962)	human bone	0.0	3.18 ± 0.23	7161 ± 44 BP	1σ 6062 - 6002 BC (68.2 %) 2σ 6199 - 6196 BC (0.2 %) 6156 - 6146 BC (0.6 %) 6103 - 5977 BC (90.7 %) 5948 - 5921 BC (3.9 %)	-19.42 ± 0.14	11.25 ± 0.29
AAR 18026	Multiple burial, Individual 6 (excavation 1962)	human bone	0.0	3.18 ± 0.16	7272 ± 42 BP	1σ 6211 - 6137 BC (46.3 %) 6113 - 6076 BC (21.9 %) 2σ 6227 - 6057 BC (95.4 %)	-20.02 ± 0.1	11.74 ± 0.17
AAR 18343	Feature 3 (multiple burial re-excavation)	deer tooth pendant	0.0	3.19 ± 0.17	7085 ± 32 BP	1σ 6007 - 5978 BC (36.2 %) 5948 - 5921 BC (32.0 %) 2σ 6021 - 5897 BC (95.4 %)	-22.5 ± 0.1 (Fra EA)	6.11 ± 0.17
AAR 18344	Feature 3 (multiple burial re-excavation)	deer tooth pendant	0.0	3.19 ± 0.14	7094 ± 28 BP	1σ 6009 - 5981 BC (45.3 %) 5943 - 5926 BC (22.9 %) 2σ 6026 - 5967 BC (57.7 %) 5957 - 5902 BC (37.7 %)	-20.76 ± 0.1 (Fra EA)	5.05 ± 0.17
OxA-3697	Multiple burial, complex I (excavation 1962)	human bone			7660 ± 80 BP	1σ 6589 - 6579 BC (4.5 %) 6574 - 6449 BC (63.7 %) 2σ 6651 - 6391 BC (95.4 %)		
OxA-3698	Multiple burial, complex II (excavation 1962)	human bone			7390 ± 80 BP	1σ 6386 - 6211 BC (64.8 %) 6135 - 6121 BC (3.4 %) 2σ 6416 - 6081 BC (95.4 %)		

Fig. 5. Groß Fredenwalde. AMS-dates and $^{13}\text{C}/^{15}\text{N}$ -isotope values.Abb. 5. Groß Fredenwalde. AMS-Daten und $^{13}\text{C}/^{15}\text{N}$ -Isotopenwerte.



Fig. 6. Groß Fredenwalde. Photo of child skull (no. 6) with tooth pendants still attached (complex I; after Gramsch/Schoknecht 2003).

Abb. 6. Groß Fredenwalde. Foto des Kinderschädels (Nr. 6) mit noch anhaftenden Tierzahnanhängern (Komplex I; nach Gramsch/Schoknecht 2003).

bones were red colored indicating the use of ochre in the funerary rite. According to the site plan made on the second day of excavation in 1962 it is possible to connect the woman (individual no. 3) to a child lying on her belly (probably ind. no. 4; Fig. 4; 9), while on the first day of excavation two males, child no. 6 and probably child no. 5 were found together. Anthropological analyses did not provide conclusive information concerning whether we are dealing with one or two separate graves.

The individuals show typical Mesolithic body height (males: c. 1.61 m; female: 1.52 m) and they all exhibit wormian bones of varying size along the sutura lambdoidea. These variations were also present in individuals from the Skateholm sites (Sweden) and might indicate a relationship between the different Groß Fredenwalde individuals (Grünberg 2000, 188). The general health status is good and only two minor signs of potential malnutrition (scurvy and rickets) can be observed. The absence of caries indicates a diet rich in protein and/or low in carbohydrate. No signs of violence can be identified and the cause of death of the individuals remains unknown.

The re-excavation

Field work in 2012-2013 was headed by A. Kotula and excavation was performed in quarters of square meters in layers of 20 cm. Finds >3 cm were three-dimensionally recorded and sediments were systematically sieved. During this excavation the borders of the trench dug in 1962 were clearly visible. Sediments at the bottom of the pit with intense red color indicate the former location of the grave (Fig. 10-11). The irregular extension in the NE-part of



Fig. 7. Groß Fredenwalde, slotted decorated dagger (after Gramsch/Schoknecht 2003), $\frac{2}{3}$ natural size.

Abb. 7. Groß Fredenwalde, verzierter Flintschneidendolch (nach Gramsch/Schoknecht 2003), $\frac{2}{3}$ natürliche Größe.

1962/ individual 1	Bones strong red discolouration, male, 30-39 years old, 161.0 ± 4.0 cm (Pearson 1899)/166.9 ± 5.0 cm (Trotter & Gleser 1952), no evidence of disease
1962/ individual 2	Bones slight reddish discolouration, male, 40-49 years old, 161.8 ± 4.0 cm (Pearson 1899)/168.1 ± 5.0 cm (Trotter & Gleser 1952), femur and shafts of radius and ulna bent outwards (suspected Osteomalacia)
1962/ individual 3	Bones slight red discolouration, female, 40-49 years old, 152.0 ± 4.0 cm (Pearson 1899)/156.4 ± 4.3 cm (Trotter & Gleser 1952), medium severe arthritis of the right elbow, severe tooth attrition, parodontosis
1962/ individual 4	Bones slight red discolouration, probably male, 4-5 years old, height not determinable, no evidence of disease
1962/ individual 5	Bones strong red discolouration, probably female, 7-8 years old, height not determinable, no evidence of disease
1962/ individual 6	Bones strong red discolouration, probably male, 3-4 years old, height not determinable, porosity of teeth at gum edge, and some evidence of cribra orbitalia (suspected scurvy)
2014/ feature 1/4	male, 24-27 years old, 156,6 ± 3,5 cm (Pearson 1899)/159,9 ± 4,1 cm (Trotter & Gleser 1952), dentacalculus, weak parodontosis, tooth no 48 is a microtooth, marked muscle attachments at the inner side of the jaw, tooth abrasion of the upper incisors, open bite, minor damages of tooth enamel on first left upper molar, probably infection on the front surface of 2 nd breast vertebra, cut mark on right metatarsus III, gnawing marks at right humerus (proximal), left humerus (proximal and distal), left metacarpus IV and V (proximal)
2014/ feature 8	skeleton not yet analysed, child under 6 month
2014/ feature 9	child, 7-10 years old, gender unknown, body height not identifiable

Fig. 8. Groß Fredenwalde. List of Mesolithic human remains.

Abb. 8. Groß Fredenwalde. Liste der Menschenreste.



Fig. 9. Groß Fredenwalde. Individual 3. Frontal view of the skull (photo: B. Jungklaus).

Abb. 9. Groß Fredenwalde. Individuum 3. Frontale Ansicht des Schädels (Foto: B. Jungklaus).

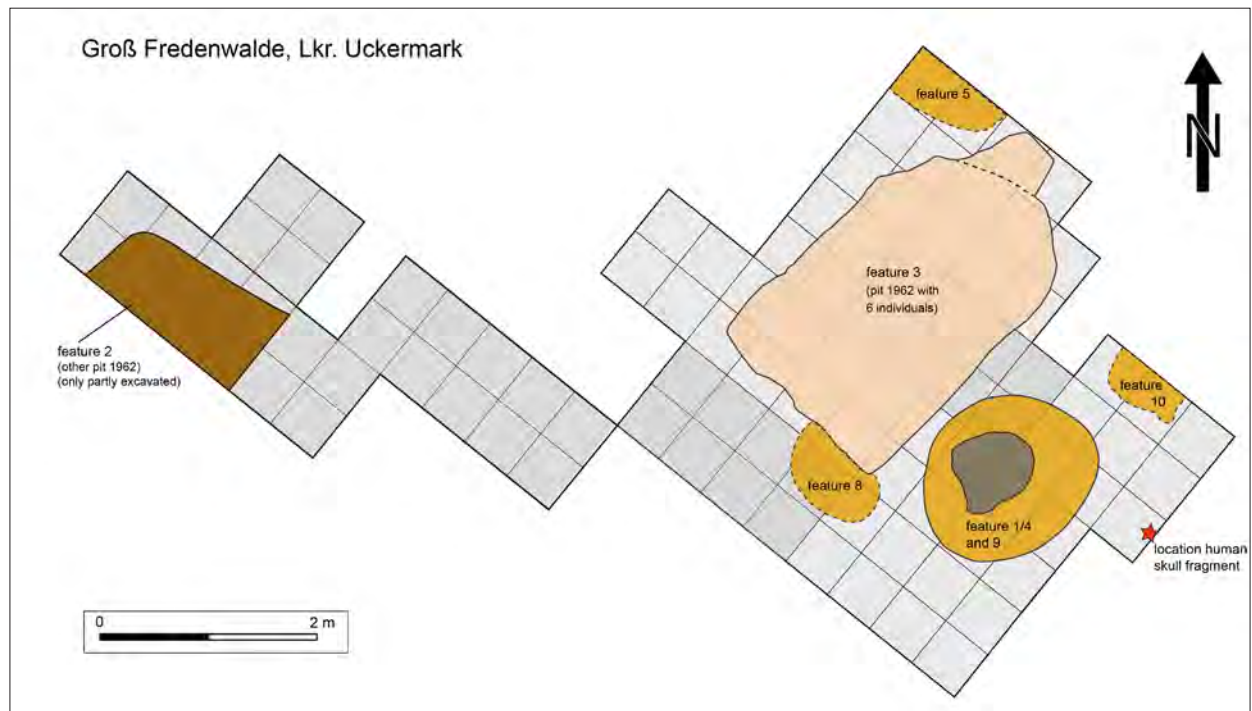


Fig. 10. Groß Fredenwalde. Map of features (graph: A. Kotula/ T. Terberger).

Abb. 10. Groß Fredenwalde. Karte der Befunde (Grafik: A. Kotula/ T. Terberger).

the excavation (c. 3.4 x 2.2 m) looks like a burial pit and this part might be related to the woman's burial with the child (complex II). If this hypothesis is correct it is likely that we are dealing with two separate burials within the material from 1962.

Many small human bone fragments were collected from the back filling of the former excavation and the re-excitation also doubled the number of grave goods: 43 tooth pendants as well as 22 flakes, blades

and bladelets were found this time (Fig. 12). Two trapeze arrow heads correspond well with the Atlantic Mesolithic context.

AMS-dating and ^{13}C -/ ^{15}N -isotope analyses

All human individuals and two animal tooth pendants recovered in 1962 were sampled for AMS-dating. The results for the humans (no. 1-6) vary between c. 6 150



Fig. 11. Groß Fredenwalde. Re-excavation of 1962 burial pit with red colored sands (photo: A. Kotula).

Abb. 11. Groß Fredenwalde. Nachgrabung an der Mehrfachbestattung von 1962 mit rot gefärbten Sanden (Foto: A. Kotula).

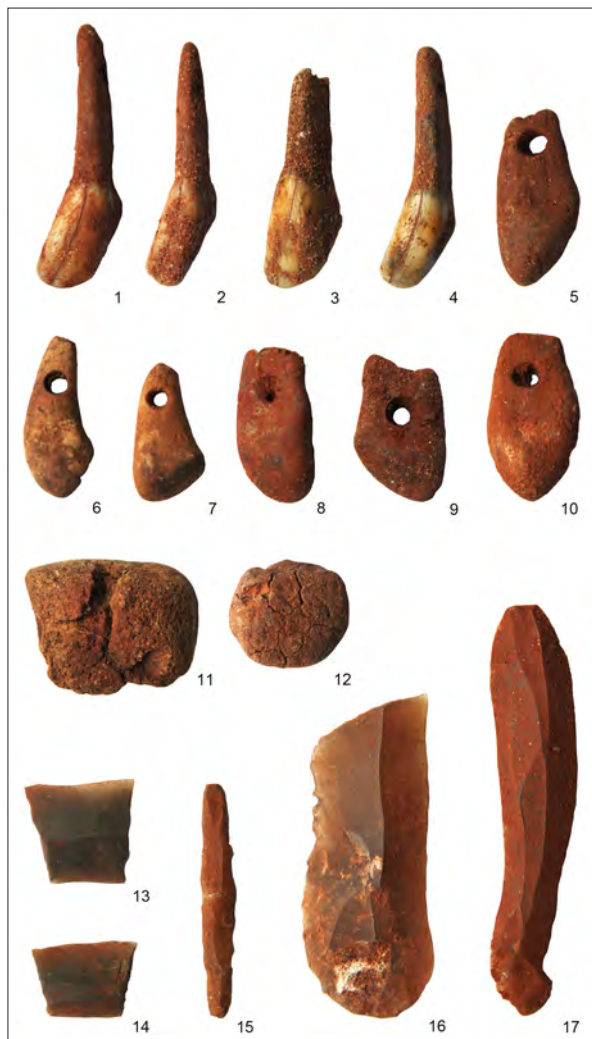


Fig. 12. Groß Fredenwalde. New found grave goods belonging to the 1962 burial (photos/graph: A. Kotula). Scale 1:1.

Abb. 12. Groß Fredenwalde. Neu entdeckte Grabbeigaben der Bestattung von 1962 (Fotos/Grafik: A. Kotula). Maßstab 1:1.

and 5 800 calBC and are younger than the two former measurements mentioned above (Fig. 13). The dates for individuals 2, 3 and 5 agree well with each other and suggest a dating at the end of the 7th millennium calBC. It is possible that the older dates are influenced by reservoir effects because of fresh water fish consumption and the earliest date indeed comes with the highest ^{15}N -value (11.74‰; Fig. 14). However, in this case (no. 6, 3-4 years old) breast feeding may also explain the elevated ^{15}N -value (Grupe/Peters 2009, 278).

The AMS-dates of two red deer tooth pendants of c. 5 970 calBC are therefore more reliable (Fig. 13). These new dating results correspond well with the Kongemose culture/"trapeze-Mesolithic" horizon, which probably started around the 6.2 ka calBC cooling event (Crombé et al. 2012; Robinson et al. 2013; Bokelmann 1999).

In order to obtain information on the diet ^{13}C - and ^{15}N -isotopes were measured. The red deer tooth pendants display typical terrestrial ^{15}N -values (5 to 6; Fig. 14). The human remains provide homo-genous ^{13}C -values of c. -20 ‰ and 11.25 to 11.74 ‰ for ^{15}N . While a fully reliable reconstruction of the individuals' diet is only feasible on the basis of data from the local fauna, these values probably indicate moderate fresh water fish consumption (see Olsen et al. 2010).

Standing upright into eternity – features 1/4 and 9 from the recent excavations

Feature 1/4 - an unusual grave

In 2012 a black feature (no. 1) within a larger brown-colored pit (no. 4) was found under the plough soil south of the 1962 excavation (feature 1/4; Fig. 10; 15): The pit had an **irregular oval form with a maximum extension of c. 1.45 m** and dark charcoal-stained sands indicated a **hearth in the center** (diameter c. **1 m**). The hearth was c. **0.2 m deep** and contained some small **burnt bones and a few burnt flint artefacts**; a few small unburnt objects were also found in the filling. The dark sandy layer below the fire place was affected by **washed out charcoal** (see below). In a depth of **0.75 m** below ground surface **two connected human vertebrae** were found and below them a **human rib and skull came to light** (Fig. 15).

In the next layers **parts of the spine were found still lying in anatomical order while most other bones of what appeared to be one individual were mixed up** (Fig. 16-18). The **arm bones together with some ribs were found in a vertical position, but not with the same orientation**. The pelvis was lying at about the same level, only some centimeters distant from the skull. Bones from the pelvis to the skull were intermingled and deposited together with a number of grave goods. The mixed deposition of bones together with the fire place on top led to the idea that the situation might represent a secondary burial. Gnawing marks at the epiphyses of the humeri seemed to corroborate this hypothesis at first (Fig. 22).

This preliminary interpretation was soon shown to be wrong: after the removal of the mingled bones the femoral heads appeared underneath and bones of legs and feet were excavated in a position still showing anatomical connection (Fig. 19-20). Interestingly these were found in a more vertical position.

The findings suggest the following interpretation: The individual was put – probably dead – into a pit c. 1.6 m deep in a standing, slightly slanting posture. The body leaning with its back to the pit wall was fixed in this position by filling in sands to a level above the knees (c. 0.6 m). The bottom sands contained a single flint blade, which was probably a first grave good. The pit was then left open or was preliminarily covered and subsequently carnivores were able to get at the corpse and gnaw on some of the arm bones.

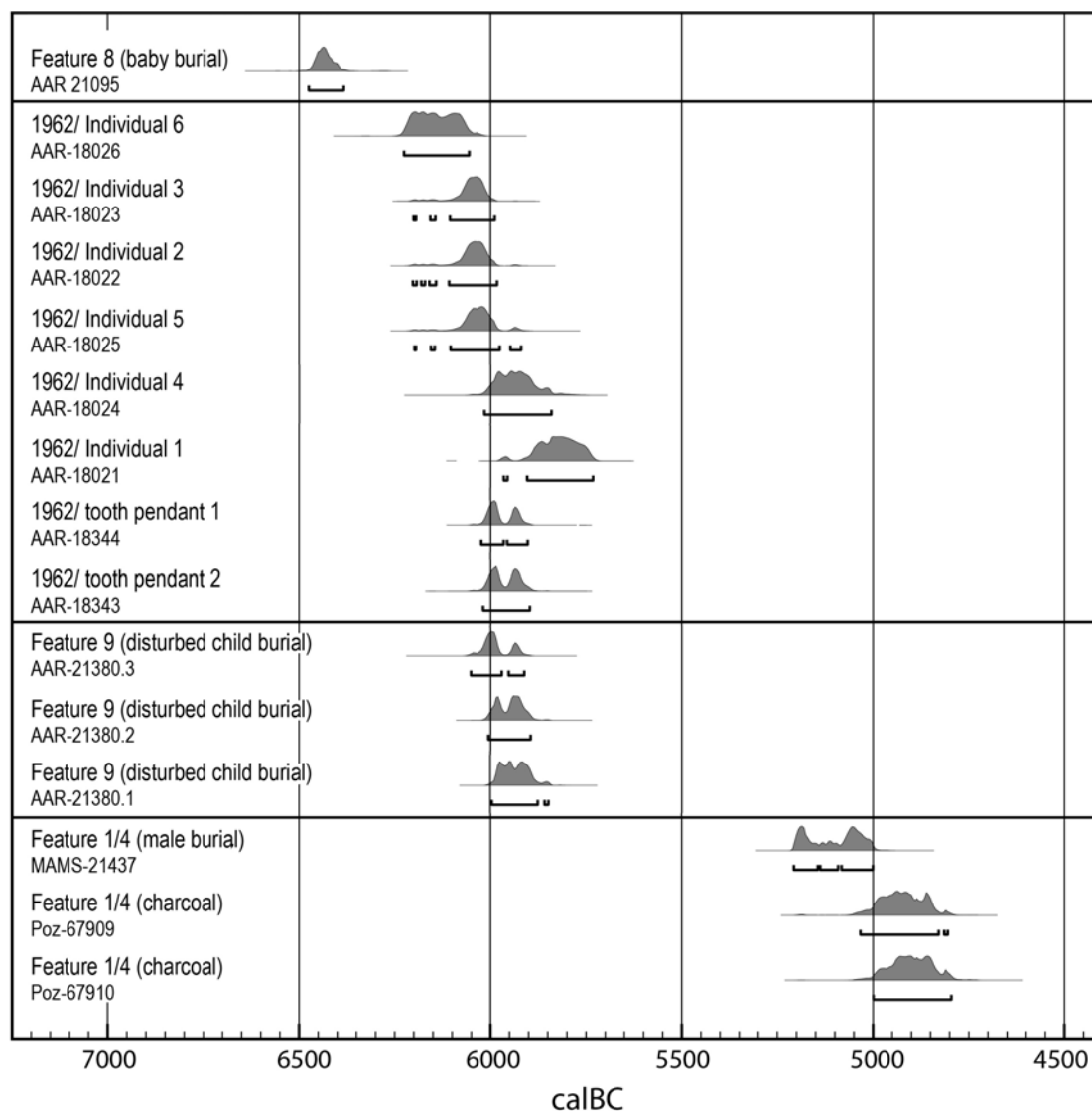


Fig. 13. Groß Fredenwalde, AMS-dating results (excluding earlier dates from the Oxford laboratory, see Fig. 5). Calibration with Oxcal 4.2.3 by C. Bronk Ramsey (see www.c14.arch.ox.ac.uk/oxcal.html; graph: A. Kotula/T. Terberger).

Abb. 13. Groß Fredenwalde, AMS-Datierungsergebnisse (ohne frühere Oxford-Daten, siehe Abb. 5). Kalibration mit Oxcal 4.2.3 von C. Bronk Ramsey (siehe www.c14.arch.ox.ac.uk/oxcal.html; Grafik: A. Kotula/T. Terberger).

Carnivores are probably also responsible for the missing left ulna and radius. After decomposition of the soft tissue the torso fell to the front wall, what caused the unnatural position of the leg bones. Some time later the skull and the upper body part collapsed (Hunger 1978), and the bones fell down uncontrolled. Because the decomposition of a dead body shows considerable variation depending on climatic and environmental conditions it is difficult to define this period more precisely. Afterwards, the skull might have been re-arranged together with some flint artefacts. Finally the pit was filled with sands and sealed with a fire lit on top of the burial. No ochre was used in this funeral ritual. Later the grave probably caved in somewhat and other sediments eroded into the fire pit.

Anthropological analyses

The buried individual can be identified as an adult male 24-27 years of age (Fig. 8). With a body height of c. 1.56 m he was rather small and there are no signs of physical strain. The well preserved skeleton was found almost completely. The skull shape is short, tall and medium large (Fig. 21); its overall shape resembles Mesolithic individuals from southern Scandinavia (Grünberg 2000, 176pp.). In terms of a general skeletal morphology, the individual is more robust than Neolithic individuals from Central Europe (Bach 1993, 21ff).

The jaw displays interesting patterns: The upper incisors show an abrasion, which led to a malocclusion with an open bite. Such patterns are produced when teeth are used as tools and this observation

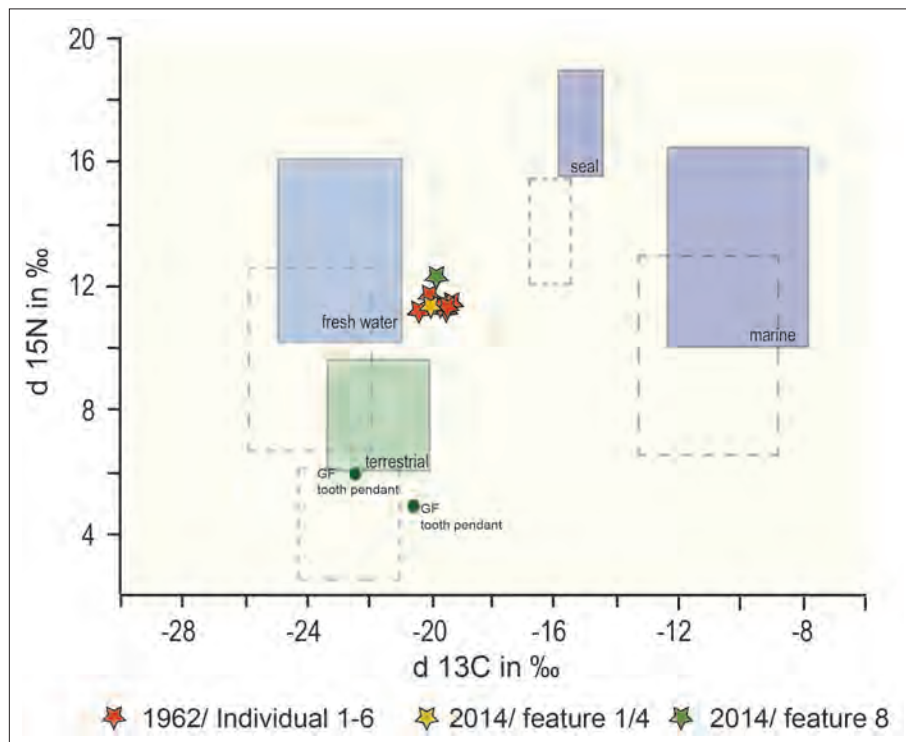


Fig. 14. Groß Fredenwalde, ^{13}C - and ^{15}N -results of human individuals with frame of reference on fauna data from northern Germany and southern Scandinavia (see text). Dotted line frame: value range of animal species; solid line frame: value range of consumers (graph: T. Terberger).

Abb. 14. Groß Fredenwalde, ^{13}C - und ^{15}N -Isotopenergebnisse der menschlichen Individuen mit Bezugsrahmen von Faunendaten aus Norddeutschland und Südschweden (siehe Text). Gestrichelter Rahmen: Wertebereich der Tierarten; durchgezogener Rahmen: Wertebereich der Konsumenten (Grafik: T. Terberger).

corresponds to strong muscle attachments of the anterior part of the *musculus digastricus* below the chin. This muscle opens the mouth; it is an antagonist for the chewing muscles. Two small enamel chips on

the inner side of the lower first molar indicate biting of solid materials such as nuts or bones.

A few bones (right humerus proximal, left humerus proximal and distal, left metacarpus IV and V proximal)



Fig. 15. Groß Fredenwalde. Feature 1/4 with first human remains (photo: A. Kotula).

Abb. 15. Groß Fredenwalde. Befund 1/4 mit ersten Menschenresten (Foto: A. Kotula).



Fig. 16. Groß Fredenwalde. Feature 1/4 with mixed bones and parts of the spine in correct anatomical position. Two arm bones left of the spine show gnawing marks and are situated in different directions. The large truncated blade (L: 8.4 cm) is typical for the late Mesolithic (photo: A. Kotula).

Abb. 16. Groß Fredenwalde. Befund 1/4 mit vermischten Knochen und Teilen der Wirbelsäule in korrektem anatomischen Zusammenhang. Zwei Armknochen links von der Wirbelsäule weisen Verbissspuren auf und zeigen in unterschiedliche Richtungen. Die große endretuschierte Klinge (L: 8.4 cm) ist typisch für das Spätmesolithikum (Foto: A. Kotula).



Fig. 17. Groß Fredenwalde. Feature 1/4 with mixed bones (photo: A. Kotula).

Abb. 17. Groß Fredenwalde. Befund 1/4 mit vermischten Knochen (photo: A. Kotula).



Fig. 18. Groß Fredenwalde. Feature 1/4 with bones of the upper body part (photo: A. Kotula).

Abb. 18. Groß Fredenwalde. Befund 1/4 mit Knochen des oberen Körperbereichs (Foto: A. Kotula).



display gnawing marks (Fig. 22), probably caused by a carnivore of fox size (Murmann et al. 2006). Finally there is an unhealed cut mark 0.8 cm long at the proximal end of the right metatarsus III which was caused either shortly before death or in the course of the funeral rite.

The disturbed burial (feature 9)

During excavation the irregular shape of the burial pit was noticed with the skeletal remains not being located in the very center of the feature. It became clear that the burial had been cut into a former pit, as in ochre colored sands in the northern part of the pit (ca. 0.7 x 0.3 m; layer 6 and 7) a few human bones were observed in situ (Fig. 23-24). The bones belong to the right foot of a 7-10 year old child and they can be interpreted as the last remains of a disturbed burial. Probably this child burial had originally been lying in NE-SW direction with the head in the SW, but the skeleton was almost completely removed by digging out the later burial pit (Fig. 23). This interpretation is



Fig. 19. Groß Fredenwalde. Position of the leg bones in feature 1/4 (photo: T. Terberger).

Abb. 19. Groß Fredenwalde. Position der Beinknochen in Befund 1/4 (Foto: T. Terberger).

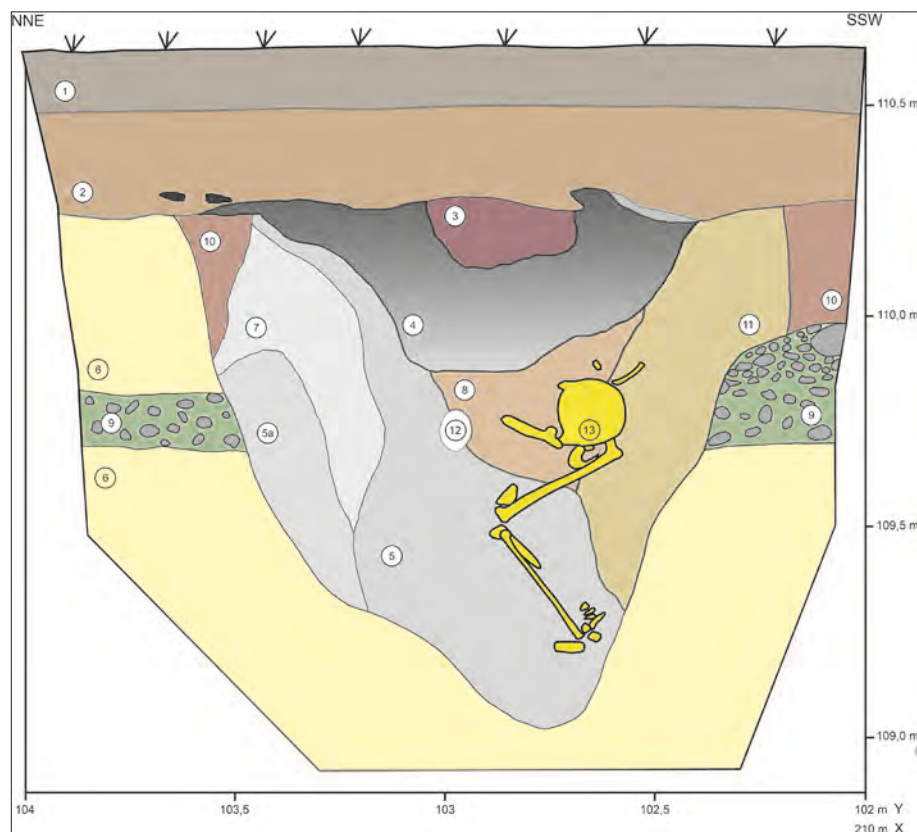


Fig. 20. Groß Fredenwalde. Profile of the male burial (feature 1/4; drawing: B. Jungklaus; graph: T. Terberger). The horizons can be described as following: 1 – humic topsoil, fine to medium sand, slightly calcareous; 2 – plough horizon, medium to coarse sand with gravels, calcareous; 3 – cambic horizon, slightly loamy, medium to coarse sand with gravels; 4 – filling, charred horizon rich in charcoals and gravels, medium to coarse sand, slightly calcareous; 5 – filling, medium to coarse sand with gravels, calcareous, dark stained due to charring or humic content; 5a – filling, medium to coarse sand with gravels, calcareous, dark stained due to charring or humic content with charcoal glitter; 6 – undisturbed and interbedded medium sand, calcareous; 7 – filling, medium to coarse sand with gravels, calcareous; 8 – filling, slightly loamy and humic, medium to coarse sand, slightly calcareous; 9 – gravel bed with calcareous concretions; 10 – cambic horizon, strongly weathered medium to coarse sand, lower part of eroded cambisol; 11 – filling, medium to coarse sand with gravels, calcareous, dark stained due to charring or humic content.

Abb. 20. Groß Fredenwalde. Profil der Bestattung (Befund 1/4; Zeichnung: B. Jungklaus; Grafik: T. Terberger). Die Schichten können wie folgt beschrieben werden: 1 – humoser Oberboden, feiner bis mittlerer Sand, etwas kalkangereichert; 2 – Pflughorizont, Mittel- bis Grobsand mit Kies, kalkreich; 3 – Verbraunungshorizont, schwach lehmig, Mittel- bis Grobsand mit Kies; 4 – verbrannte Schicht mit viel Holzkohle und mit Kies, Mittel- bis Grobsand, schwach kalkhaltig; 5 – Verfüllung, Mittel- bis Grobsand mit Kies, kalkreich, dunkel gefärbt durch Feuereinwirkung oder Humusanreicherung; 5a – Verfüllung, Mittel- bis Grobsand mit Kies, kalkreich, dunkel gefärbt durch Feuereinwirkung oder Humusanreicherung mit Holzkohleflittern; 6 – ungestörter eingeschalteter Sand, kalkreich; 7 – Füllung, Mittel- bis Grobsand mit Kies, kalkreich; 8 – Füllung, leicht lehmig und humos, Mittel- bis Grobsand, schwach kalkhaltig; 9 – Kiesbett mit Kalkkonkretionen; 10 – Verwitterungshorizont, Unterseite des eingerumpften Verbraunungshorizontes, Mittel- bis Grobsand; 11 – Füllung, Mittel- bis Grobsand mit Kies, kalkreich, dunkel gefärbt in Folge von Feuereinwirkung oder Humusanreicherung.

supported by some re-deposited child bones found scattered between the bones of the young man.

Grave goods

About 30 flint artefacts and two bone tools were found in the burial pit (a few chips and small flakes are not counted here). One pointed bone is 5.1 cm long; the second specimen is a slender, c. 14.5 cm long point. They are interpreted as awls and might have been related to leather working. Most of the flint artefacts represent blades and their fragments, which are rather uniform. Two large truncated blades differ considerably by their size and resemble typical knives of the Ertebølle culture (Lübke 2001). Finally there is a small bladelet core, which was used as a hammer stone.

These grave goods probably identify the young man as a skillful flint knapper and craftsman. This is in accordance with results from the osteological analysis demonstrating a strong use of the chewing muscles and the front teeth as tools and revealing little signs of physical training.

Most of the objects were found in the upper burial part and only one blade was deposited at the bottom of the pit filling. Some flint artefacts were found close to the skull among them the large truncated blade (Fig. 16-17). This is a possible indication of the purposeful arrangement of the grave goods in a later stage of the funeral rite, although it is possible that the association of these objects was unintentional.



Fig. 21. Groß Fredenwalde. Feature 1/4. Skull of the male individual about 25 years old (photo: B. Jungklaus).

Abb. 21. Groß Fredenwalde. Befund 1/4. Schädel des männlichen, ca. 25 Jahre alten Individuums (Foto: B. Jungklaus).

Dating and ^{13}C -/ ^{15}N -isotopes

AMS-samples were selected from the young man's burial (1 human bone sample), the hearth on top of the burial (2 charcoal samples) and from the disturbed

child burial (1 human bone sample, Fig. 5). The results confirm the proposed sequence: The disturbed child burial (feature 9) dates to about 5950 calBC, while the



Fig. 22. Groß Fredenwalde. Humerus of the male individual (feature 1/4) with gnawing marks (photo: B. Jungklaus).

Abb. 22. Groß Fredenwalde. Humerus des männlichen Individuums (Befund 1/4) mit Verbißspuren (Foto: B. Jungklaus).



Fig. 23. Groß Fredenwalde. Male burial (feature 1/4) and disturbed child burial (feature 9; photo: A. Kotula).

Abb. 23. Groß Fredenwalde. Männliche Bestattung (Befund 1/4) und gestörte Kinderbestattung (Befund 9; Foto: A. Kotula).

young man (feature 1/4) was buried **about 1 000 years later**, according to the younger charcoal date (feature 1; c. **4 900 calBC**). The results of the charcoal dates are seen as more reliable here, because a reservoir effect cannot be excluded for the human bone and in fact the AMS-date of the man's skeleton tends to be 100 to 200 years earlier (Fig. 5). The ^{15}N -value of 11.3 ‰ is in accordance with the assumption that the man **consumed some fresh water fish** (Fig. 13-14).

Geoscientific and palaeobotanical results

Due to erosional processes by deforestation and ploughing during the last centuries the profile on the hill top position does not provide a fully developed Holocene soil. The plough horizon on top (Fig. 20, 1) shows typical properties of a **cambisol**. Underneath **strongly weathered gravelly sands with high iron contents form 'concretions' of ochre colored sands**.

Feature 1/4 was studied with nine sediment samples, which were analysed for standard parameters including grain size distribution for fractions <2 mm, carbon content (TC, TOC, TIC) and pH values. The entire profile consists of **glacio-fluvial sands and gravels, which are poorly sorted (mean grain sizes 0.48-0.61 mm)**. A glacio-fluvial stratification is recognised only for the undisturbed sediments surrounding the burial pits. **Layers no. 4, 5 and 5a show increased fractions of coarse sand and gravel**. The pH values range from 6.1 to 7.3 and show neutral (layer no. 5, 5a,

6 to 8) to very slightly acid conditions (layer no. 1 to 4), while the TIC contents are less than 1 % (TIC >0.7 in layer no. 5a, 6 and 7). **So the burial pit is characterised by slightly higher pH values than the surrounding sediments**. According to darker soil colors layers 4, 3 and 8 bear the highest TOC values, but these remain on a very low level (1.29 - 2.16 %) even for the dark charcoal stained sands (no. 4).

From the sedimentologic point of view the backfill of the burial pit only differs to a small extent from the surrounding geogenic sediments. The **backfill is unstratified and shows only slightly increased organic contents**, which could origin from **primary top soil sediments used for backfilling** or from **decomposition of human tissue**. A typical increase by depth can be noted for the pH values, where the values are stabilised by primary chalk grains. The **variety of colors** is caused by **postsedimentary processes like weathering, infiltration of humic acids and charcoal**.

Seven charcoal samples from the hearth (feature 1) were used for wood identification and ^{14}C dating (Fig. 5). For identification under a 50-400x reflecting microscope the charcoal fragments were dried first, then cut crosswise, tangentially and radially. All charcoal fragments originate from *Pinus silvestris*/*Pinus mugo*. Both species cannot be distinguished by wood anatomy (Schweingruber 1974), but only *Pinus silvestris* – pine – is and has been common in the investigation area since the Weichselian late glacial.

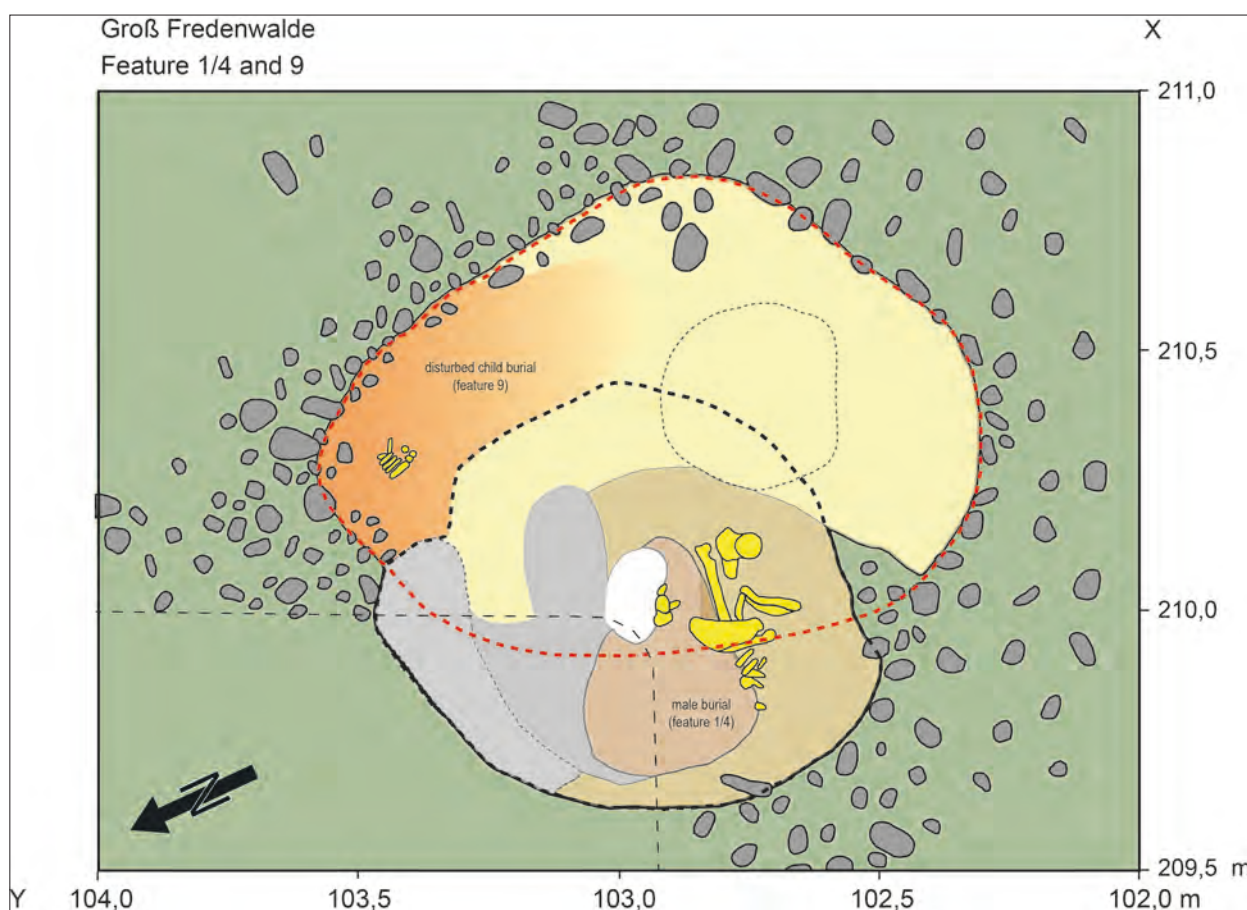


Fig. 24. Groß Fredenwalde. Plan of the male burial (feature 1/4) and the disturbed child burial with only foot bones left in red colored sands (feature 9) in the northern part (left side; level c. 110,2 m a.s.l.; drawing: B. Jungklaus; graph: T. Terberger). For level and identification of the layers see Fig. 20. Please notice that the lower left part was excavated during test excavations. This part of the map had to be adjusted from a different level and is less reliable.

Abb. 24. Groß Fredenwalde. Plan der männlichen Bestattung (Befund 1/4) und der gestörten Kinderbestattung im Nordteil (linke Seite), von der nur wenige Fußknochen in rötlich gefärbtem Sand erhalten sind (Befund 9; Höhe: ca. 110,2 m über NHN; Zeichnung: B. Jungklaus; Grafik: T. Terberger). Für die Höhe und die Ansprache der Schichten vgl. Abb. 20. Es ist zu beachten, dass der untere linke Teil im Rahmen einer Sondierung untersucht wurde. Dieser Teil des Plans musste daher von einer etwas abweichenden Höhe interpoliert werden und ist daher weniger verlässlich.

Feature 8 (baby burial)

About 0.5 m west of feature 1/4 a further pit (feature 8) was observed under the plough soil (Fig. 10). The pit (c. 0.8 x 0.6 m) was filled with light brown- to red-colored sediment and during digging a fragile skull fragment was detected. In order to better identify the character of the feature some sediment was removed, which allowed the identification of a small inhumation burial in ochre colored sediment. After the upper body part had been carefully excavated the excavation was stopped and in autumn 2014 a team of the High School for Technology and Economy Berlin transported this burial to the laboratory as a block, where excavation under laboratory conditions is ongoing. First inspection of the bones in the field identified the bones to be of a baby less than 6 months old. An AMS-sample of the skull assigns the baby burial to c. 6420 calBC (Fig. 5).

Groß Fredenwalde – a regional burial site?

During re-excavation of the site of Groß Fredenwalde three new burials could be detected in the immediate vicinity of the original burial(s) discovered in 1962: 1) the burial of a young man (feature 1/4), which disturbed 2) an earlier burial of a child 7-10 years old (feature 9) and 3) the burial of a baby (feature 8). Altogether nine individuals from at least four burials are now attested. In the light of the new evidence we can imagine that 1962 in fact two separate burials were found.

If this is correct we are dealing with five burials within an area of about 21 sqm and there is reason to assume that more burials are located on top of the Weinberg: In the north of the excavation area two features (no. 5 and 10) were observed under the plough soil, which have been investigated only partly until now. In feature 5 (Fig. 10, c. 1.3 x 0.5 m) a few human bones were uncovered in the upper filling and red colored sediment also suggest feature 5 to be a

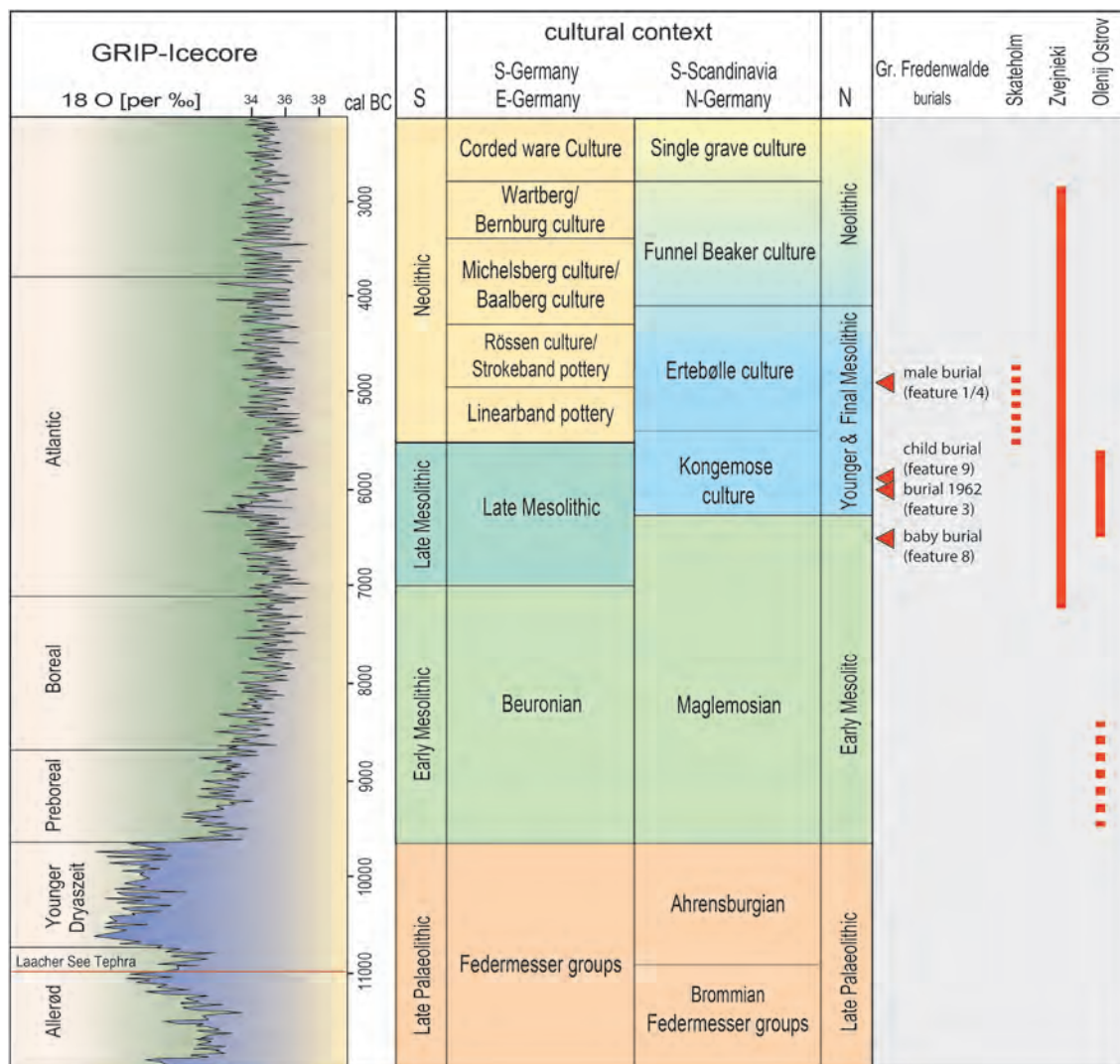


Fig. 25. Chronology of the Mesolithic-Neolithic in northern Central Europe with dating of Groß Fredenwalde and other burial sites (after Grünberg 2000; Zagorska 2006; Frydendal Nielsen 2012). Solid line: dated by a series of radiocarbon dates; dotted line: estimated period by isolated radiocarbon dates or other evidence.

Abb. 25. Chronologietabelle der Zeit des Mesolithikum-Neolithikums im nördlichen Mitteleuropa mit Datierung von Groß Fredenwalde und weiteren ausgewählten Bestattungsplätzen (nach Grünberg 2000; Zagorska 2006; Frydendal Nielsen 2012). Durchgezogene Linie: Serien von Radiokarbondaten; gestrichelte Linie: angenommene Laufzeit aufgrund einzelner Radiokarbondaten oder anderer Hinweise.

further burial. The same interpretation might be possible for feature 10 with its light-brown filling, which became partly visible under the top soil. In a distance of about 1.5 m to this feature a human skull fragment was found below the top soil (Fig. 10), which might belong to another unknown burial.

In conclusion the cemetery at Groß Fredenwalde probably contains more than six burials, and it is entirely possible that further features are waiting for detection. AMS dating suggests the location on top of the Weinberg to have been a burial place for up to 1500 years during the Atlantic period. Until now there is no evidence for a (large) camp site on the hill. We expect that Mesolithic settlements of this period were located at the lake shores in the area. If this is correct, the burial place was separated from the site(s) of the living and the Weinberg might have been a central funeral site of a Mesolithic regional group. Five of the

nine individuals recorded up to now are children and babies which make the site unusual in the record of Central European Mesolithic burial sites.

When native hunter-gatherers met immigrant early farmers

The elevated ^{15}N -values of the Groß Fredenwalde individuals (Fig. 14) demonstrate that we are dealing with typical Mesolithic people whose way of life was based on gathering, hunting and some fishing. Ongoing isotope studies on the diet of Stone Age people in northern Central Europe demonstrate that fresh water resources played a frequent and more important role during the Mesolithic than hitherto expected (Terberger et al. 2012); further isotope results for Mesolithic human remains for sites such as



Fig. 26. Map of important Mesolithic burial sites separated by dating before and after start of Linear Band Pottery culture (LBK) in Central Europe at c. 5500 calBC (graph: A. Kotula). Mapping after Terberger 2009; Ahlström/Sjögren 2009; Brinch Petersen/Meiklejohn 2009; Brzozowski/Siemaszko 2003; Butrimas 2012; Gramsch 2009; Gumiński 2003; Gumiński/Bugajska oral presentation 2013 in Halle; Hallgren 2011; Molin/Gummeson oral presentation 2013 in Halle; Frydendal Nielsen 2012; Pesonen et al. 2014; Richter et al. 2015; Simponen 2014; Sørensen 2014; Sulgostowska 2006.

Abb. 26. Karte wichtiger mesolithischer Bestattungsplätze getrennt nach Datierung vor und nach dem Beginn der Linienbandkeramik (LBK) um ca. 5500 calBC (Grafik: A. Kotula). Kartierung nach: Terberger 2009; Ahlström/Sjögren 2009; Brinch Petersen/Meiklejohn 2009; Brzozowski/Siemaszko 2003; Butrimas 2012; Gramsch 2009; Gumiński 2003; Gumiński/Bugajska oral presentation 2013 in Halle; Hallgren 2011; Molin/Gummeson oral presentation 2013 in Halle; Frydendal Nielsen 2012; Pesonen et al. 2014; Richter et al. 2015; Simponen 2014; Sørensen 2014; Sulgostowska 2006.

Friesack 4, Criewen (Brandenburg), Steinhagen (Mecklenburg-Vorpommern) and Grube-Rosenhof (Schleswig-Holstein) will be published soon. The earliest burial – that of the baby – can be connected to the younger Maglemose period (Fig. 25). The multiple burial(s) found in 1962 seem to be about 400 years younger (c. 6000 calBC) and date to about the same period as the disturbed child burial (feature 9; c. 5950 calBC). They can both be assigned to the trapeze-Mesolithic with similarities to the Kongemose culture (c. 6200 to 5400 calBC; see above). These burials date about 700 years earlier than the first farming communities of the Linear Band Pottery culture, which are attested in the lower Oder region

about 5300 calBC (e.g. Terberger/Kabaciński 2010; Ciesla 2008). The male burial with the funeral ritual in stages (feature 1/4) is dated to c. 4900 calBC and can be associated with the Late Mesolithic Ertebølle period, which is not well documented this far inland. Recent investigations of late hunter-gatherer finds in Brandenburg suggest connections with the site of Hamburg-Boberg and the Swifterbant culture in the west (Kotula et al. 2015; Wetzel 2015).

The dating results make the Groß Fredenwalde individuals extremely interesting for the characterisation of the native population of northern Central Europe before and after the neolithisation by the Linear Band Pottery culture. The young man (feature

1/4) was a contemporary to late Linear Band Pottery people and he probably had personal contacts with early farmers living c. 10 km distant to the north in the Prenzlau region during his life-time.

A couple of years ago, population continuity between native Mesolithic populations and the early Linear Band Pottery communities was rejected on the basis of aDNA-studies and demographic modeling (Bramanti et al. 2009). This evidence is consistent with a migration model for the neolithisation of Central Europe. At the time of the study the data base was small, particularly the number of individuals dating to the periods shortly before and after the arrival of the first farmers was limited. The haplotypes of two individuals from Groß Fredenwalde (1962/ individual 1 and 3) belong to the haplogroup U of mitochondrial lineages, precisely U5b with mutations at 12308G and 16270T in both. This is consistent with the observation that most ancient Central and Northern European hunter-gatherers carried lineages belonging to the U-group (Bollongino et al. 2013). Accordingly, individuals from Mesolithic burials of Steinhagen, district of Rostock, dating to c. 5 500 calBC (OxA 2921: 6 550 ± 90 BP; Schacht 1993; Terberger/Piek 1997) as well as two individuals from two Mesolithic type burials from Criewen, located at the River Oder close to the city of Schwedt, which date to the 5th millennium calBC (Geisler/Wetzel 1999) also carry U-lineages. The genetic diversity within this U-cluster in Northern Europe seems to be pointing to a relatively large population size or a highly structured meta-population.

The existing data underline the model of different genetic origins of native Mesolithic people and colonising Linear Band Pottery farmers and point to a scenario where Mesolithic life continued in water rich environments in northern Central Europe parallel to (early) farming communities for hundreds of years (Olsen et al. 2010; Bollongino et al. 2013). This model also includes admixture between the two groups, but the rate was initially very low and only rose towards the later phases of the Neolithic. The Groß Fredenwalde area provides an outstanding opportunity to study co-existence and interaction of the two different societies in a long term perspective during the 6th and 5th millennium calBC on a genomic level.

Groß Fredenwalde in context

The Groß Fredenwalde burials show some uncommon characteristics. The multiple grave excavated in 1962 – or even multiple graves, if we are dealing here with two burials of four and two individuals – is a rare phenomenon (c. 4 %; Grünberg 2000). A close parallel for Groß Fredenwalde is the burial of Strøby Egede (Zealand, Denmark) with eight individuals (Brinch Petersen 1988), which dates c. 500 years later. The burial of a woman with a child is another element not very common in the Mesolithic record, but this is also

known from southern Scandinavia (e.g. Vedbæk-Gøngehusvej; Brinch Petersen et al. 1993).

The most unusual element is represented by the burial in feature 1/4. No parallel for this type of rite including a hearth on top of the burial could be identified. There are some graves in Central Europe and southern Scandinavia where the dead were buried in a sitting position (Grünberg 2008; Louwe Kooijmans 2012). But the young male from Groß Fredenwalde is the only individual in Central and Northern Europe buried in standing posture. This specific rite, however, finds similarities in Olenij Ostrov at Lake Onega (Karelia, Russia; Fig. 26), where four individuals (graves no 68, 100, 123 and 125) were buried in oblique to upright position (Gurina 1956; Grünberg 2008; Louwe Kooijmans 2012); for example the individual in grave no. 123 was buried at an angle of 50-55 degrees. The similar unusual posture at Groß Fredenwalde might reflect eastern influences in the lower Oder region. Isolated imported bone points of eastern Baltic origin are already present in northern Germany in the Boreal Mesolithic (Götting: Gramsch 1973, 31; Döllertfeld: Dellbrügge 2002, 67). The microblade technology in the western Baltic seems to have been introduced from the east during the early Atlantic period (Hartz et al. 2010) and Gramsch and Schoknecht (2003) among others refer to the site of Olenij Ostrov (grave 100) as a possible parallel for the slotted bone dagger found in 1962. At the time of the young man's burial in the early 5th millennium calBC there is also evidence for influences from the east stimulating the introduction of pointed bottom pottery in the western Baltic at c. 4 800 to 4 600 calBC (e.g. Klassen 2004; Hartz et al. 2012; Piezonka 2015). In conclusion eastern influences for this special burial posture would correspond to more general evidence. However, we have only limited information on the precise dating of the burials in question from Olenij Ostrov. Grave 100 was dated to c. 9500 calBC and is seemingly related to the early Mesolithic (Grünberg 2000).

So far Mesolithic burial sites with only one or a very limited number of graves were identified in northern Germany (Bugajska 2014). A Mesolithic settlement site with four red colored pits was detected at Berlin-Schmöckwitz during large scale excavations in the 1920s. Unfortunately remains of human bone was only preserved in three pits, but based on the red colored sediments there is good reason for the identification of four burials (Grünberg 2000). Six graves were excavated on the site of Marienberg in the Netherlands (Louwe Kooijmans 2012). A larger number of burials is known from sites such as Henriksholm-Bøgebakken on Zealand /Denmark) and Skateholm (I and II) in southern Scania (Sweden) where most of the burials date to the Ertebølle culture (Fig. 25-26; Kannegard Nielsen/Brinch Petersen 1993; Grünberg 2000; Bugajska 2014; Brinch Petersen 2015). It is a matter of debate whether we are dealing with graves

randomly grouped at settlement sites or cemeteries as defined funeral areas (Meiklejohn et al. 1998: 205; Terberger 2006). In the cases of Skateholm I and II with altogether 77 human burials, Olenij Ostrov in Karelia with 177 burials and Zvejnieki in Latvia with more than 300 graves there is no doubt that these locations were used as cemeteries by regional groups for a longer period of time (Grünberg 2000; Zagorska 2006). Although available information on the extension of the Groß Fredenwalde site is still limited, we see the location on a prominent hill, the dense cluster of burials with many individuals and the use of the place for funerals for about 1500 years as outstanding characteristics, which give the site special importance in the Mesolithic record of Central Europe.

If our preliminary interpretation is correct then Groß Fredenwalde represents a new type of landscape use by Mesolithic people during the Atlantic period. Settlement structures had become more stable due to intensified use of aquatic resources and the dead were separated from the living. Land (and a claim to it) likely became more important, and the burial site demonstrated the group's presence in the territory by the memorial of and reference to the ancestors on top of the Weinberg well visible in the landscape. Groß Fredenwalde seems to be an early hunter-gatherer cemetery in Central Europe which was in use when early farmers colonised the region and ownership of land became more important. Further investigations are necessary to test these ideas of possible eastern influences and a new role of Mesolithic burial sites in the Atlantic period.

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