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THE EARTHWORKS AT ALTHEIM

ABSTRACT

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In 2012, fieldwork recommenced at the Altheim earthwork, discovered more than a century ago. The investigation in its immediate environs revealed a second ditched enclosure from the Altheim period, south-east of the previously known structure. The two enclosures are spatially related to one another. It was found that several decimetres of soil have been eroded during the last hundred years in the area of the north earthwork; the very substance of both monuments is acutely threatened. The first radiocarbon datings, carried out on samples of domestic animal bone, allow both enclosures to be dated to the 37th/36th century BC and suggest a temporal sequence of the ditches. Certain earlier observations, namely the high proportion of arrowheads among the flaked stone tools and the very low proportion of bones from wild animals, were confirmed by the new excavation. The southwest-northeast orientation of the structures' long axes permits an archaeoastronomical interpretation: knowledge obtained from the observation of natural phenomena was transferred to architecture. The new investigation sheds further doubt on the interpretation of the enclosures as fortifications.

Keywords: Later Neolithic, Altheim culture, causewayed enclosure, magnetometer survey, archaeo-astronomy, soil erosion, Bavaria

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INTRODUCTION

Earthworks are among the most impressive monuments of the 4th millennium BC. The Altheim earthwork discovered in 1911 (referred to as Altheim I) is a classic site of the Neolithic in Central Europe. The carefully considered layout of the structure continues to impress, because of its aesthetic proportions rather than monumental size (Fig. 1). The enclosure, oriented northwest–southeast, has outer dimensions of approximately 120 x 90 m. The enclosed internal area, about 35 m wide and 60 m long, is surrounded by three ring ditches, spaced 7–10 m apart. Whereas the course of the inner ditch on the south side seems to respect some unknown structure, the two outer ditches are linked by short connecting ditches, creating two double semicircles that enclose an oval area with a width of 60 m and a length of 90 m. The ratio of the enclosed space to the area covered by the ditches is about 1:4.

Earthworks have been identified at about 20 out of the approximately 600 known sites belonging to the Altheim Culture, distributed in an area of *ca* 15,000 km² (Eibl, Raßhofer 2015, 19). The creation of small ditched enclosures distinguishes Altheim from the neighbouring groups to the west, and also from the late Michelsberg and Funnel Beaker cultures, with their imposing, monumental earthworks.

Because of the intensity of land-use in the agrarian landscape of Lower Bavaria, after a century of research on Altheim the questions relating to the state of preservation of the enclosure are becoming increasingly focussed on the issue of protecting the monument. From the perspective of cultural history, the motives behind the construction of the earthwork remain of central interest.

MAGNETOMETRY

In August 2012, the magnetic survey of the long-known enclosure of Altheim I recommenced, along with the wider surrounding area (cf. Faßbinder 2010). So far, an area of about 8 ha has been covered (Fig. 2). Two observations were made that have a bearing on the earthwork itself. Contrary to previous assumption, its outer ditch shows no causeways on the northwestern side. Also, in this area the short connecting ditches that joined the outer and middle ditch segments to form two double semicircles were weakly expressed. This contrasts with the situation on the southeastern side.

Also significant is the discovery of a second enclosure – Altheim II – about 60 m away, opposite the south-eastern approach to the previously known earthwork. This rectangular enclosure measuring about 40 x 40 m has two opposed entrances in the form of causeways. The absence of magnetic anomalies in the area where we would expect the south-western ditch indicates major soil erosion. The two enclosures are spatially related to one another.

Intensive prehistoric and early historical settlement activity at the Eichelbach is indicated by numerous archaeological features spread across the investigated area, including

Fig. 1. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. View of the upper Eichelbach valley from the southeast, showing the position of the two earthworks, Altheim I and II; in the background is Holzen. Aerial photo taken 26.05.1977 by Otto Braasch (Bavarian State Department for Historical Monuments, aerial photography documentation, Archive No. 7338/039)

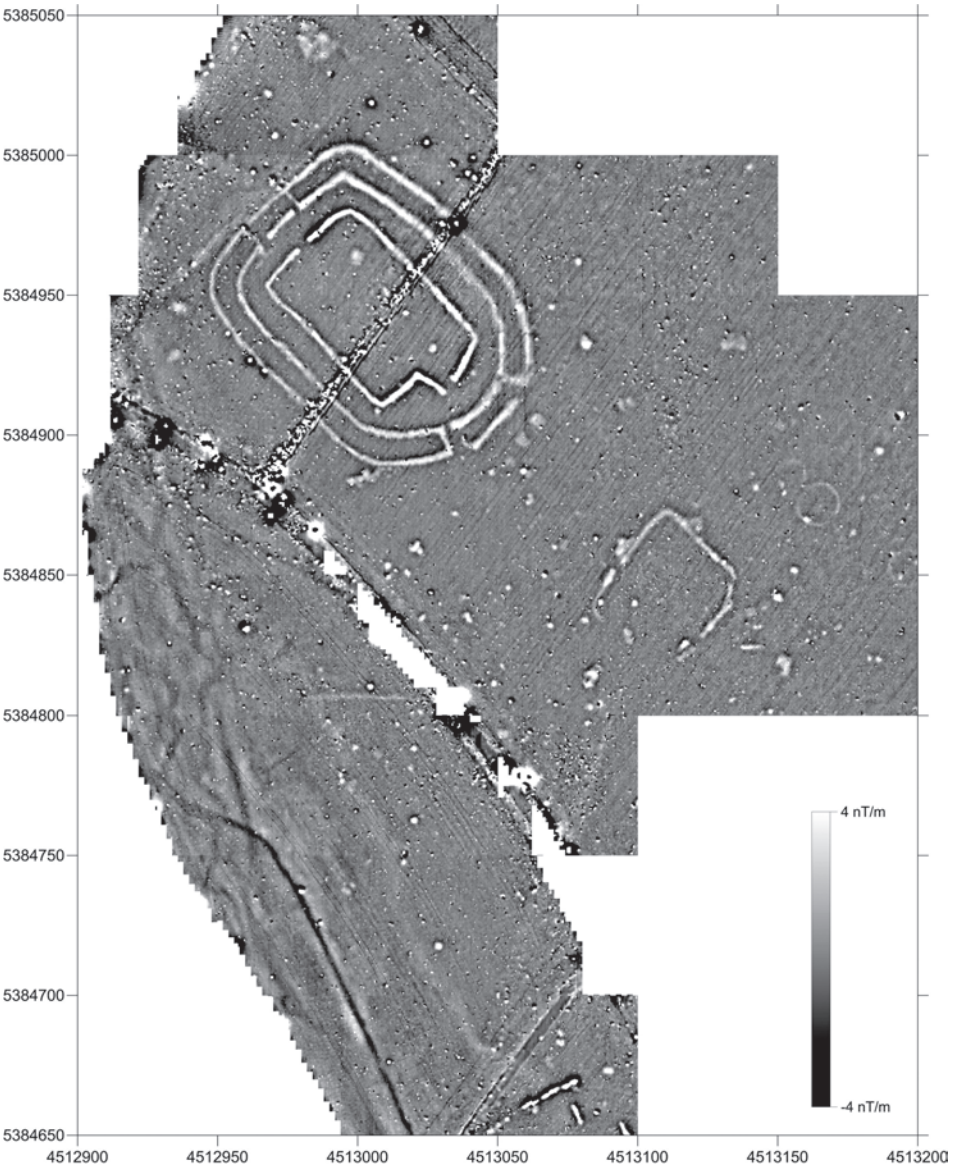
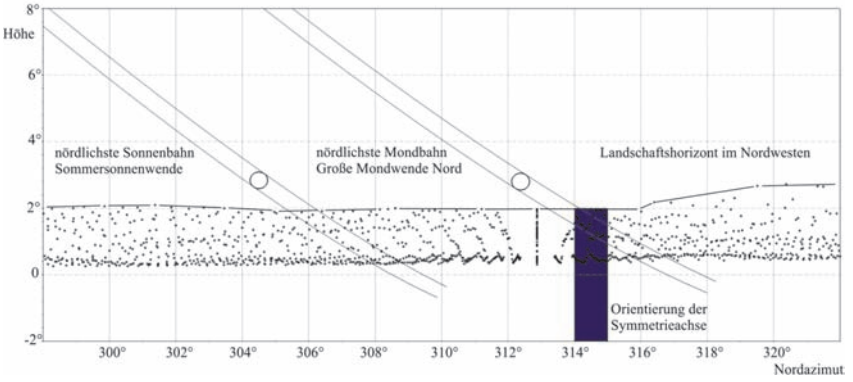


Fig. 2. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. Magnetogram of the environs of earthworks I and II at Altheim. Recorded in 2012–2014. Fluxgate-Gradiometre Förster Ferex 4.032 DLG 4-fold CON650, resolution: 0.5 x 0.2 m; range of measured values: -4/+4 nT/m, scale: 256 linear greyscale



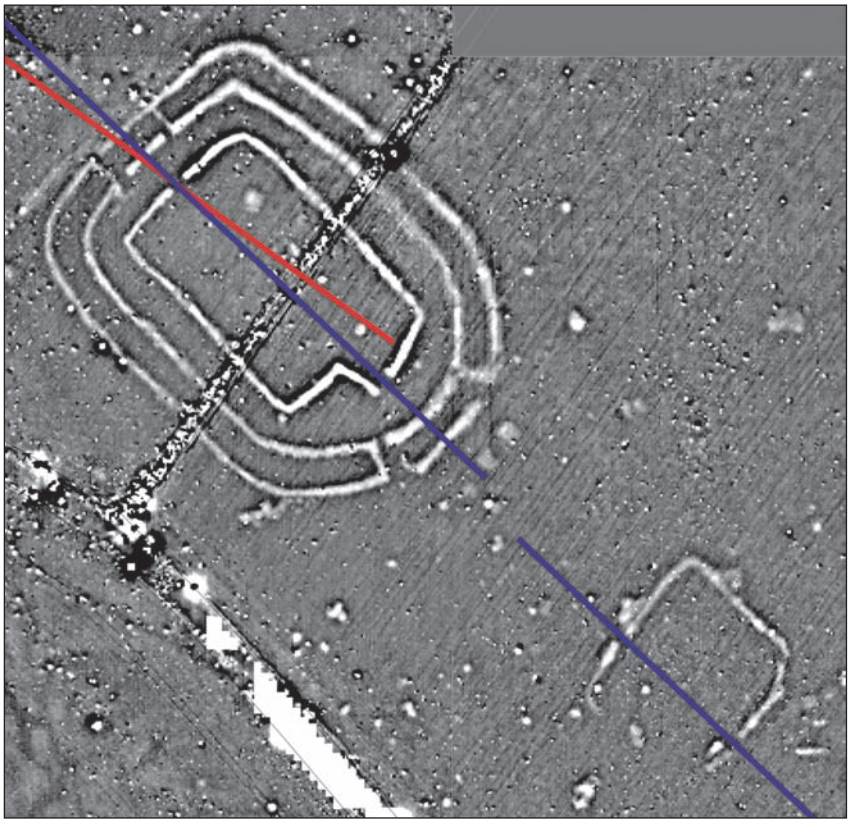


Fig. 3. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. – Bottom: The blue lines aligned with the northernmost lunar standstill (azimuth 313.5°) pass through the causeways of the inner ditch of Altheim I and through the entrances to Altheim II. On the day of the summer solstice the setting Sun shines along the red line through the northwest opening in the inner ditch of Altheim I. – Top: Simulation of the most northerly sunset (left) and the most northerly moonset (right) at 3600 BC, as seen on the visible horizon, without forest cover, from the Altheim I earthwork

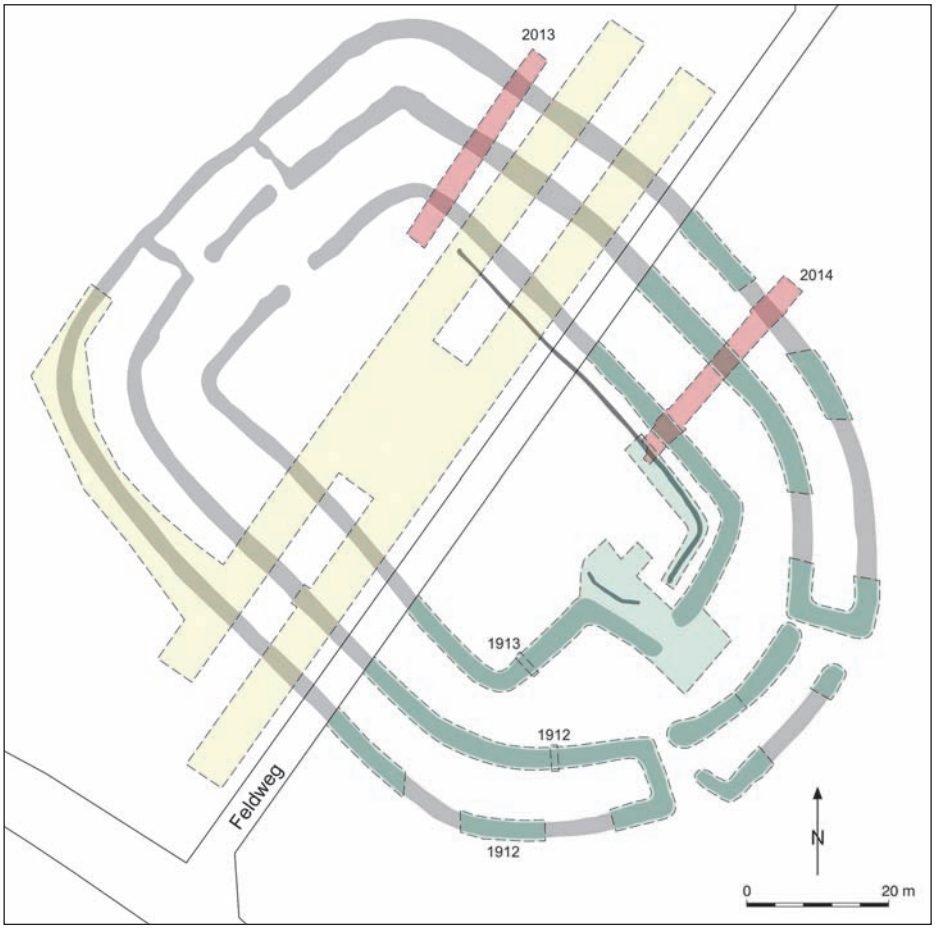


Fig. 4. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. General plan of earthwork I, showing the ditch segments southeast of the path, excavated in 1912–1914, the area excavated in 1938 northwest of the path, and the test trenches of 2013 and 2014

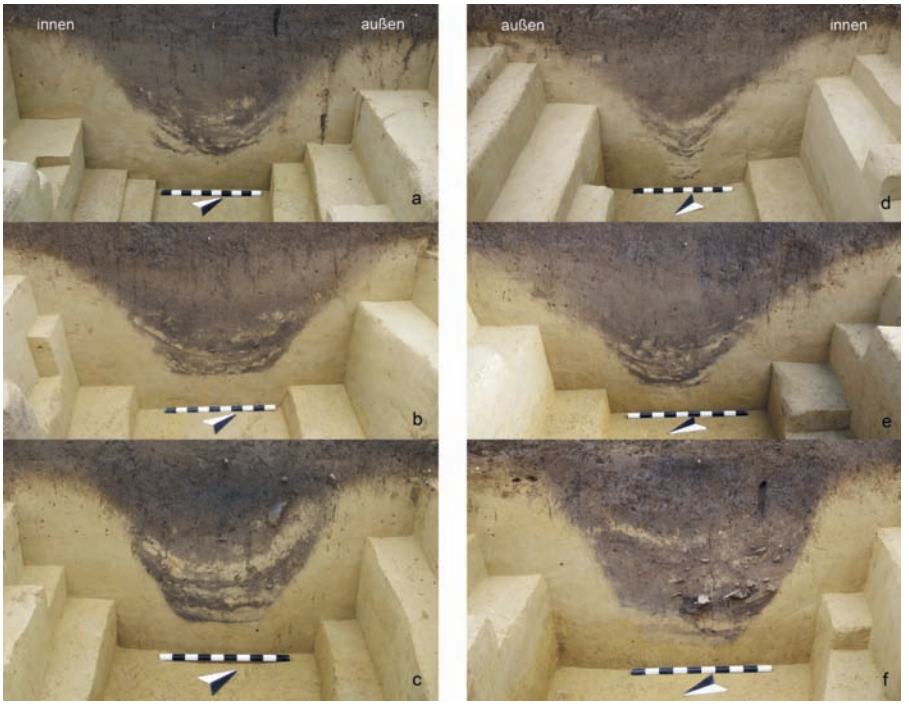


Fig. 5. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. Ditch sections, 2013. Left: cross-sections of the outer (a), middle (b) and inner (c) ditch from the southeast. Right: cross-sections of the outer (d), middle (e) and inner (f) ditch from northwest

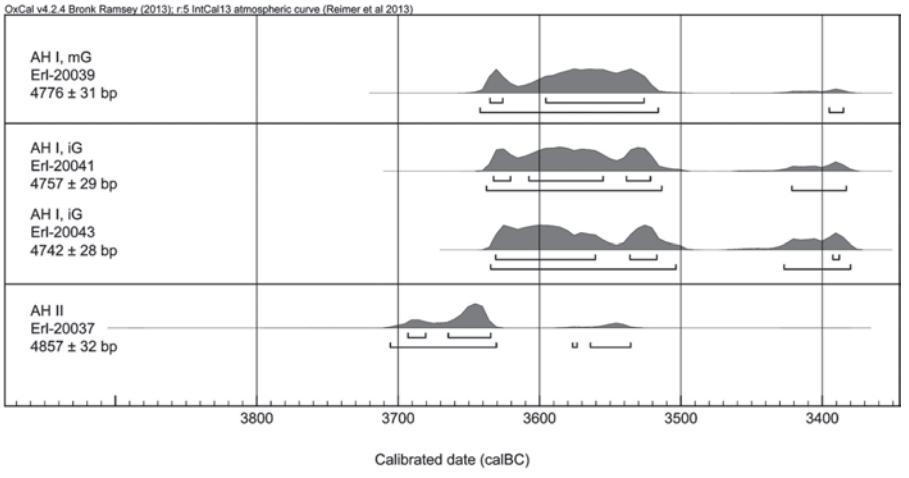


Fig. 6. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. AMS dates obtained for domestic animal bone samples from both earthworks

Fig. 7. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. Aerial photo of the southern part of Altheim I. Because of erosion, the Al and Bht horizons of the former Luvisol (para-brown earth) are absent. Currently there are para-rendzinas, and the humus-rich ditch fills are clearly visible in the light-coloured, calcareous loess immediately underlying the plough layer. As a result of cultivation, humus-rich material from the fill has been dragged in the direction of ploughing. Aerial photo taken 27.10.1987 by Otto Braasch (Bavarian State Department of Historical Monuments, aerial photography documentation, Archive No. 7338/039, Dia 5081-6)

Fig. 8. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. View to the northwest from the middle ditch I North, excavated in June 1914 in the eastern part of earthwork I. Clearly identifiable in the outer side of the ditch, from top to bottom, are: the dark Ap horizon, the lighter Al horizon and the dark Bt horizon, which have developed from the loess. Distinction of the soil horizons, showing the Munsell colour notation, by R. Schmidt

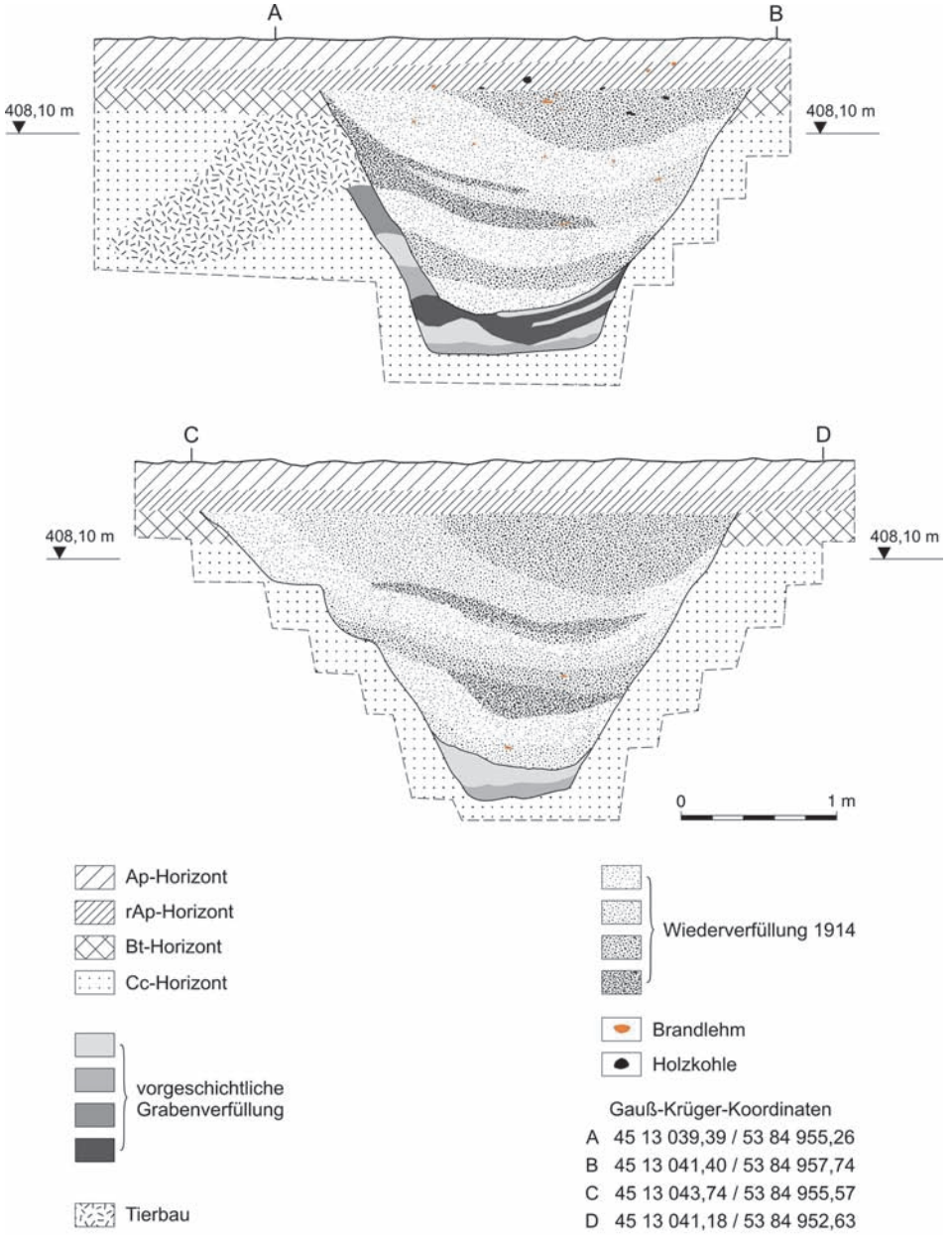


Fig. 9. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. The ditch profile in 2014 in the area of the middle ditch I North that had been excavated in 1914

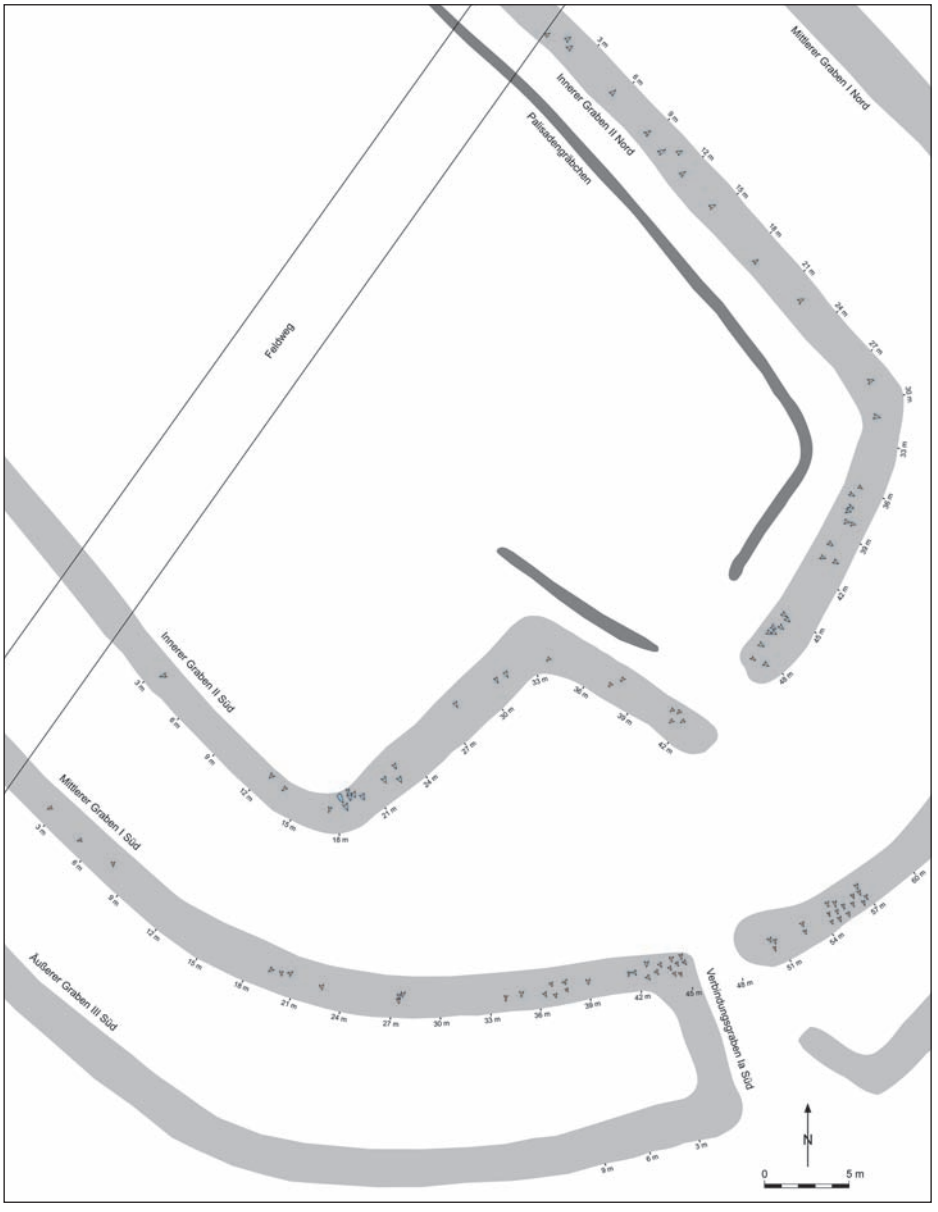


Fig.10. Altheim, Markt Essenbach, Landshut District, Lower Bavaria. Distribution of arrowheads in the stretches of the ditches excavated in 1914 (after sketch plans by J. Maurer)

pits, pit-houses and sections of other ditches (cf. Thar 2015). In the south of the prospected area a third earthwork may be identified, and in the eastern part there are some circular shapes of burial mounds, with a diameter of 11–16 m. Apart from this, clearly visible in the southwest are the meandering former channels of the Eichelbach, as is the margin of the floodplain, densely settled in certain areas.

ALIGNMENT

The two Altheim earthworks display a spatial relationship to one another. Thus, the long axis of Altheim I is aligned almost exactly northwest–southeast, as is a line passing through the two causeways of Altheim II. In both cases, this might be fortuitous but the alignment of the structures probably followed a carefully considered scheme, involving the application in the architecture of knowledge obtained through the observation of natural phenomena. It appears likely that in the later Neolithic the determination of cardinal directions not indicated by any basic astronomical phenomena was common practice, probably being achieved by such methods as the "Indian Circle".

It is possible, however, that the layout of the enclosures was determined by topocentric observations of the path of the Moon. Thus, the axis of symmetry of the Altheim I earthwork corresponds to the furthest northerly azimuth of moonset. This occurs only in certain successive months at the major lunar standstill. *Figure 3* shows a simulation by Burkhard Steinrücken of this observed situation. Northwest of the earthwork the visible horizon lies 2° above the geometrical horizon, which influences the azimuth of moonset. The orientation of the axis of symmetry is represented by a blue rectangle corresponding to the azimuth interval 314°–315°. The northernmost path of the Moon intercepts the horizon at an azimuth of about 315.5°, corresponding with a precision of a degree to the point on the horizon to which the axis of symmetry of the earthwork is oriented. The figure also shows the northernmost path of the Sun, which at the summer solstice sets at an azimuth of about 306°. Because of its wider range of declination, in certain periods the Moon reaches parts of the horizon that the Sun never does – indicated in *Figure 3* by the strip between the azimuths 306° and 314°. This stretch of the horizon may be surveyed from Altheim I if one moves into the area within the projecting part of the inner ditch on the south-eastern side and observes through the opening on the north-western side of the palisade.

The observation of lunar standstills occurring in a cycle of 18–19 years offers a phenomenonologically based opportunity to predict the full moons on which lunar eclipses may occur (Steinrücken 2011). In various regions of the British Isles stone circles and rows are aligned in accordance with the major lunar standstill (Ruggles 1999, 91 ff.); on the Continent, too, some enclosures and megalithic tombs may be interpreted as being oriented according to the lunar standstills (Pavúk and Karlovský 2010). At the same time, it seems obvious that the observation of the high Moon had no direct practical or calendrical use for the peasant societies of the Neolithic.

THE DITCHES

In the spring and summer of 1914, two excavation campaigns were undertaken in the south-eastern part of the Altheim I earthwork under the direction of Paul Reinecke (Fig. 4). The ditches were excavated, revealing their original form, in addition to which the small palisade trench was traced. In 1938 under the direction of K. H. Wagner two 6-m-wide and maximally 120-m-long trenches were opened up on the north-western side of a path that traverses the earthwork (Maier 1962). The approximate extent of the enclosure was ascertained from the course of the outer ditch.

In the late summer of 2013 an area of 31 x 3 m was opened up not far from the north corner of the earthwork. After the removal of the topsoil, the three ditches showed up clearly as soil discolorations. Each of these was cut by two cross-sections and one longitudinal section. The three ditches of the earthwork had been dug as flat-bottomed features extending into the undisturbed loess (Fig. 5). As recorded in the course of excavation, the inner, middle and outer ditch reached depths of 1.5 m, 1.8 m and 1.9 m, respectively, from the ground surface. The widths of the inner, middle and outer ditch under the plough layer are 2.1 m, 3.3 m and 3.2 m, respectively. Taking into consideration the observations indicative of soil erosion – namely, the presence of calcareous loess directly under the plough layer on the western part of the site – the ditches would probably have been up to 4 m wide and about 3 m deep when they were dug. The inner ditch is distinguished from the middle and outer ones by its smaller dimensions as well as its steeper sides. The width of the base of the middle ditch varies markedly (Fig. 5,b.e); stretches of the outer ditch seem to have been V-shaped (Fig. 5,d). These minor irregularities might indicate that the earthwork was created by several different groups of builders.

In all three ditches, the lower part of the fill is distinguished, first and foremost, by an alternation of more or less pronounced bands or lenses of loess, and bands or patches of dark, humus-rich soil material. In the inner ditch this heterogeneously structured set of layers has a thickness of about 1 m, making it almost twice as thick as it is in the middle and outer ditches. Particularly conspicuous in the inner ditch are the dark, banded fill layers with numerous finds, which seem to extend out from the inner side of the earthwork (Fig. 5,f). Overlying this is a zone enriched with humus, following the course of the older fill layers, and markedly darker in the inner ditch than in the middle and outer ditches. Finally, a very homogenous dark fill consisting of humus-rich, silty soil material may be distinguished, extending up to the plough layer. Because of the strongly calcareous loess, the archaeological sediments of the ditches have hardly been altered by soil formation. Only the superficial, carbonate-free parts of the fill show limited leaching of clay. By analogy with other ditch sediments, it may be assumed from this that the lowermost, banded deposits immediately above the bases of the ditches date from the time of construction of the earthwork. Further input of material occurred during the phase of use of the ditch system, up to the height of the humus-enriched zone, which belongs to the time when it

had been abandoned (cf. Seidel 2008, 377 f.). After a prolonged phase of abandonment, during which the ditches were still visible on the surface, the remaining hollows were filled by humus-rich earth in the course of intensive agriculture. It is significant that along certain stretches, the lower part of the inner ditch was deliberately infilled.

Excavation continued in 2014 with a test trench south of the path, in the area of the 1914 excavation. This was intended to provide an insight into the way in which the ditches had been excavated and immediately re-filled at that time. It also offered the possibility of establishing the quantity of archaeological material remaining in the backfilled earth. Finally, it was an opportunity to compare former and present soil conditions.

Once again, an initial area of 31 x 3 m was opened up. The two ditches investigated already in 1914 were revealed, along with the outer ditch, which had remained untouched at that time, as well as the long, narrow, re-filled structure considered to be a palisade trench. It showed a width of 0.4 m at level 1, and could only be traced to a depth of 0.1 m. The excavation of the inner and middle ditches in 1914 evidently took place very schematically. The depth and width of the ditches was not traced in detail; rather, the work proceeded in accordance with an idealised scheme of the ditch. This is understandable, if we take into account the considerable variation in the width of the bottom of the middle ditch. It is possible that the applied method of rapid "negative" scraping out of the ditches did not permit certain differences in colour and texture to be identified clearly enough. The depth of the inner, middle and outer ditch reached 1.4 m, 2.1 m and 2.2 m, respectively, from the ground surface. The width of the ditches under the plough layer was 2.2 m, 3.3 m and 3.3 m, respectively.

In 2014 the ditch of the Altheim II earthwork was cut in the north-eastern part of its course (Fig. 3). Here the magnetogram indicated a pit at the edge of the ditch, which seemed to offer an opportunity for stratigraphic observation. However, in the ditch profile the two features do not overlap. The trough-shaped remnant of the ditch has a width of 2.6 m under the plough layer, reaching a depth of 0.8 m below the ground surface.

RADIOCARBON DATING

The first ^{14}C datings of samples of domestic animal bones from the lower fill layers provide indications of the probable temporal relationship of the ring ditches (Fig. 6). The earliest date was obtained for a sample from the small test trench on the north-eastern side of Altheim II, indicating that the small rectangular enclosure had been created at around the middle of the 37th century BC. Two dates from the inner ditch of Altheim I indicate that it was dug at around the turn of the 36th century BC. The connected horseshoe-shaped semicircles may have been added after this. This kind of chronological sequence is also in agreement with the observation of a spatial relationship between the inner ditch of Altheim I and the Altheim II enclosure.

THE THREAT TO THE SITE

Already at the time when the excavation trenches were laid out, the serious impact of soil erosion was evident from the truncated profiles of the humus-rich Luvisol. Northwest of the test trench opened in 2013 a slope catena consisting of 12 Pürkhauer cores reaching a depth of up to 1.8 m was laid out under the direction of Christian Tinapp, extending from a low rise of the loess into the valley of the Eichelbach. Whereas at the top of the rise and on the upper slope Luvisols with a thickness of over a metre could be observed, on the middle of the slope – corresponding to the south-western part of the earthwork – the calcareous loess appeared directly under the plough layer. Here, the whole of the Luvisol has been eroded, and para-rendzinas have developed (Fig. 7). Even if we consider a changing micro-topography since the Neolithic, and a therefore varying depth of the lower boundary of the Bt horizon at the present day, then we may estimate that there has been erosion of up to a metre or more in the course of the past five thousand years. In particular, the part of the enclosure located closer to the Eichelbach has been very strongly affected by erosion.

On several excavation photos from 1914 fully-developed Luvisols can be identified in the sides of the middle ditch (Fig. 8). Even in the absence of a scale, the approximate thickness of the horizons and the depth of the ditch excavated at that time can be calculated from the stature of the excavation worker (roughly 1.7 m) and the shovel he is holding (1.5 m). The Ap horizon could have had a thickness of about 0.3 m; the Al horizon could have been about 0.2 m thick and the Bt horizon below it could have been about 0.5 m thick. Accordingly, the total thickness of the soil could have been about a metre. The depth of the excavated ditch can be reckoned as being about 2.3 m; we may add to this a further 0.2 m that was not excavated at the time (Fig. 9). A century later, the thickness of soil cover has been reduced to 0.6 m. The Ap horizon, 0.3 m thick, as before, is directly underlain by a Bt horizon that now has a maximum thickness of only 0.3 m. No Al horizon is present any longer and the depth of the ditch no longer reaches about 2.5 m, but only about 2.1 m. Thus, in the course of a century about 0.4 m of the ditch feature has been lost through soil erosion. In comparison with the total amount of erosion since the creation of the earthwork, the loss of soil material has dramatically accelerated during the past century. If current land-use continues at Altheim, less than a century more will pass before the Bt horizon, which makes good crops possible because of its nutrient-rich clay minerals, completely disappears. It is hardly conceivable that the lower boundary of the Bt horizon will shift deeper during this time period, especially considering that this is a calcareous environment. Thus, not only is the monument in danger; soil fertility is also under acute threat.

FINDS

The assemblage of finds from the 2013 excavation consists mainly of potsherds and animal bones; other materials include flint, fragments of burnt clay and a piece of copper sheet. The great majority of finds derive from the inner ditch. Here they were to some degree concentrated in small areas, evidently representing individual fill events. This applies not only to the pottery, but especially to the animal bones, which are conspicuously concentrated in a band extending from the inner side of the inner ditch towards its flat bottom (Fig. 5,f).

The comparatively small quantity of finds that came to light in 2014 indicates that a high proportion of material had been recovered in the course of the excavation a century earlier. In spite of the markedly variable distribution of the finds in the ditches, this observation provides significant confirmation of the information value of the plan sketches made in 1914.

In the course of the excavation in 2013 more than 1900 sherds with a total weight of just under 25 kg were recovered. They derive mainly from the inner ditch and represent approximately 90 vessels. In 2014 about 600 sherds, with a total weight of almost 4 kg were recovered from the stretches of the inner and middle ditches excavated and re-filled already a century before. The undecorated pottery is very fragmented, but only slightly rolled. A number of larger vessel fragments and rim sections with arcading were also represented; full vessel profiles were not identifiable on first inspection. This does not, however, contradict the observations made in 1914, since at that time almost half of the vessels inventoried in the State Archaeological Collection required significant or very extensive additions to complete them. The material recovered in 2013/14 resembles the previously known pottery finds, which are generally considered as representing the older, or classical, tradition of Altheim pottery (Stöckli 2009, 157 Tab. 92. Limmer 2014, 104 fig. 7. Eibl and Raß-hofer 2015, 47).

While copper objects are rare in the Altheim cultural milieu, nevertheless “the notion of Altheim is surrounded by an aura of copper” (Driehaus 1960, 75). Recovered in 2013 from the middle ditch, which had already produced the well-known Altheim copper axe (Pászthory and Mayer 1998, 25 ff. Nr. 17), was a flat piece of copper sheet 6.3 cm long and 3.7 cm wide, rolled up at both of the shorter sides (Zirngibl *et al*. 2014, 32 fig. 34). This object, probably a pendent, has parallels in the Lake Constance area and among the jewellery from Brześć Kujawski, Jordansmühl and Baalberge. Apart from the copper finds, two canine teeth of brown bear may also be included in the group of prestige items; one of the teeth was perforated, and probably served as jewellery or as an amulet. The well-known discoidal mace-heads also probably belong to the group of artefacts having high social value.

The ditches of the Altheim I earthwork contain human and animal bones, forming piles or in many cases chaotically scattered, along with cultural debris, a pattern that is rather

puzzling. The human bones that ended up in the ditches of the earthwork were in many cases no longer in anatomical order. Thus, the skeletal elements of particular individuals might be dispersed in different stretches of the ditches. Noteworthy is the irregular, clustered distribution of the 23 skulls that were found; fourteen of these come from the inner ditch. Evidently, the skulls were regarded as having particular significance (Orschiedt 2011).

A single human bone was found in the stretches of the ditches opened up in 2013/14; on the other hand, numerous animal bones were recovered. Out of 2216 bone fragments, 614 (28%) were taxonomically determinable; if calculated as a proportion of the total weight of almost 15 kg, this comes to 81%. The part of the inner ditch investigated in 2013 yielded a surprisingly large assemblage of finds. The broken ends are mostly sharp-angled; traces of animal gnawing are generally absent. The skeletal remains were evidently not exposed to extensive mechanical damage before deposition in the ditch, which evidently occurred rapidly. They are, nevertheless, all fragmented to some degree; this indicates that they represent food remains.

Only about 5%, by weight, of the animal bone remains come from wild species (aurochs, red deer, roe deer etc.). Evidently, hunting activities had only a minor role in the area around Altheim. Among domestic stock, cattle are most commonly represented (70%), followed by sheep/goat (16%) and pig (14%). The high proportion of cattle bone indicates that cattle breeding was very important in the area surrounding the earthwork. Accordingly, we may speak of a generally open landscape with extensive grassland. The assemblage recovered in 2013 displays a similar composition to that of the animal bone material from the excavation of 1938, investigated by Joachim Boessneck (1956, 8 ff.).

There were several tools made of animal bone. An animal rib shaped into a double point is probably a fragment of a clamp-like handle for a tool (cf. Driehaus 1960, 32 pl. 42,18 [awl] and Davies 1995, 118 fig. 83,13 [burin]). There is a scraper, smaller in size, made from the canine tooth of a wild boar. In addition to two needles and a small chisel-like tool, there is an awl, probably made from a roe deer metapodial.

Archaeobotanical investigation of soil samples by Corinna Rößner resulted in finds of charred seeds and charcoal fragments, particularly in the fill of the find-rich inner ditch. The clear predominance of oak might be explained in terms of purposeful selection of timber for construction. The presence of numerous remains of spelt and emmer wheat suggests that food was being prepared in the vicinity.

The flint tool assemblage from Altheim I is characterised by the presence of just under 200 arrowheads (Richter 2014). Many of the arrowheads were made from tabular chert. They frequently show indications of damage; some have been repaired by retouch; others show traces of burning or remains of hafting material.

The high percentage of arrowheads among the flaked stone artefacts can be regarded as significant. These constitute 58% of the material from 1914 and as much as 65% of the material recovered in 2013/14. Evidently, there was in 1914 no selection in favour of this class of tool.

On the other hand, a lower density of arrowheads was observed in the areas opened in 1938 on the longitudinal sides of the earthwork. The spatial distribution recorded in 1914 also indicates variation in the frequency of arrowheads. They have been found in almost equal numbers in the inner and middle ditch, and concentrate at the southern ends of the ditches (Fig. 10). Just under 50 arrowheads have been drawn in a stretch of about 6 m on both sides of the causeway; about half of the arrowheads whose location could be determined come from one sixth of the correspondingly documented stretches of ditch. The remaining flint artefacts were found predominantly in the inner ditch; here they were discovered especially in sections of the ditch with a lower concentration of arrowheads, i. e. the longitudinal sides. While the inner ditch was filled with settlement debris, this was not the case in the middle ditch. Approximately 85% of all the finds were discovered in the inner ditch, but only half of the arrowheads!

At Altheim more than half of the tools may be classified as arrowheads. The proportion of this class of artefact at the site is approximately four times greater than at comparable site (Hoffstadt 2005, 111 fig. 95. – Cf. for Ergolding Uerpmann 1995, 134 tab. 34, Pestenacker and Unfriedshausen Underwood 2015, 169 tab. 14, Arbon Leuzinger 2002, 27 fig. 21, and Pfyn Leuzinger 2007, 45 fig. 44). The special distribution of the arrowheads does not correspond to that of the remaining flint artefacts. This, too, indicates that the Altheim site has a special character in the frame of the Late Neolithic sites in the zone north of the Alps.

INTERPRETATION

The interpretation of prehistoric earthworks presents archaeologists with a major challenge. The motives of the builders will ultimately remain unknown. At the time it was built, the structure would have been intended for the members of the community, and would have potentially served a variety of purposes. Nowadays, mental barriers exist that prevent us from a direct understanding of the nature and function of the enclosures: “The past is a foreign country” (Leslie P. Hartley). Thus, for example, the strict contemporary separation of the sacred from the profane is essentially the result of a long process of rationalisation that led to “disenchantment of the world” (Max Weber).

This site is at present unique within the area of distribution of the Altheim Culture. At the same time it appears that the two enclosures were significant in different spheres of life at that time. Indicating that there may previously have been a settlement on the site are the results of the magnetometry, the numerous fragments of pottery vessels, the cattle-dominated assemblage of domestic animal remains, the evidence of cereal cultivation and flint knapping as well as the numerous scrapers, sickles and fragments of saddle querns.

At the same time, construction of the earthworks served to distinguish the site as a locus of special significance within the Altheim settlement system. The work certainly represents a great community effort, especially when one considers the limited catchment areas

of the earthworks on the Landshut loess terrace, separated only by some kilometres (Engelhardt 1994). The collective efforts found their inspiration in the mental world of Late Neolithic society. A motivation to engage in joint activity on a place of more intensive communication may stem from the wish for greater security (Zimmermann 2012, 140). We may envisage a close relationship between joint labour and subsequent celebration. The staging of ritual acts strengthened group identity and maintained continuity in the transfer of group-specific knowledge held in the cultural memory of non-literate societies. It is possible that regularly repeated *rites de passage* also played a role. We may also surmise that the site was closely connected with burial and mourning, as well as with contests and celebrations. Striking, from this perspective, are the groups of human bones discovered, no longer in anatomical order and the special treatment of skulls apparently representing trophies or an ancestor cult.

Given the potential persistence of ditch features, in a long-term perspective there could have been a change in the role of the Altheim enclosure. Ditches can remain in use for a long time; certainly, they outlive wooden structures. However, even from a shorter-term perspective, for the small, dispersed groups of a segmentary lineage society of the Final Late Neolithic, the earthwork could have fulfilled a social or ritual function as a place of assembly only temporarily.

The traces of perimortal trauma resulting from violence on one of the skulls; the horizons of burning in the inner ditch; and the numerous arrowheads could be interpreted as indications of an outbreak of organised group violence. Altheim was certainly not intended primarily as a fortification; speaking not least against this is the location of the site, which was disadvantageous from a tactical point of view. On the other hand, the distribution of arrowheads is reminiscent of a discovery in Gloucestershire from the 35th century BC, referred to as the "Battle of Crickley Hill", where projectile points showed a conspicuous concentration in the area of the entrances (Whittle *et al.* 2011, 909). At Carn Brea in Cornwall, too, archers played a major role in a conflict (Mercer 1999, 153 f.) as in the case of the destruction of the Tripolye-B1-site of Druța in Moldova (Ryndina and Engovatova 1990). Under the chaotic conditions of acephalous societies, the enemy was generally not a population living on the other side of a wider border zone but rather the neighbouring village, the neighbouring clan (Wiessner 2006).

As a working hypothesis, we might suggest that we are dealing with a settlement site on which multi-phase earthworks were created; these certainly represented a major community effort. The enclosed area served as a place for celebrations and games, rituals and processions; over the course of several generations it represented a central, identity-forming place for the surrounding settlements. At this site a violent conflict developed, in which the bow and arrow played a major role. In the absence of central regulating authorities, there would always have been a variety of motives for uncontrolled aggression within and between tribal social groups of the developed Neolithic.

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