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The Middle Bronze Age Lowland Settlement of Müllendorf, Gewerbegebiet Breitensee. Bronze Artefacts and Building Types

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Abstract
During a rescue excavation in the industrial area of Müllendorf (Burgenland, Austria), the southeastern part of an extensive settlement was investigated over an area of about 2.8 ha. Among the features were several storage pits, 55 reconstructed buildings and a ditch that partially enclosed the settlement. The bronze artefacts, which were recovered from the settlement area date from the early to the late Tumulus period (Bz B1–C2). The distribution of the bronze objects and the almost uniform northwest-southeast orientation of the buildings led to the assumption that most of the settlement structures date to the Middle Bronze Age. Comparison of the buildings from Müllendorf to those of other Bronze Age settlements shows that the building types follow the Bronze Age constructional traditions. There are connections to the Březno type, which has been present since the Early Bronze Age, as well as to the compact rectangular and more variable building types of the Urnfield period.

Keywords
Middle Bronze Age, Austria, Müllendorf, settlement, building types, bronze artefacts

Zusammenfassung – *Die mittelbronzezeitliche Siedlung von Müllendorf, Gewerbegebiet Breitensee. Das Buntmetallinventar und die Gebäudetypen*

Bei einer Rettungsgrabung im Industriegebiet von Müllendorf (Burgenland) wurde auf einer Fläche von etwa 2,8 ha der südöstliche Teil eines weitläufigen Siedlungsareals untersucht. Unter den Befunden sind mehrere Speichergruben, 55 rekonstruierte Gebäudegrundrisse und ein die Siedlung teilweise einfassender Graben hervorzuheben. Das vorgelegte Buntmetallinventar des Siedlungsareals hat eine Laufzeit von der älteren bis zur jüngeren Hügelgräberzeit (Bz B1–C2) und verteilt sich über die gesamte bebaute Fläche. Das restliche Fundmaterial wartet noch auf eine Bearbeitung. Die Verteilung der Buntmetallobjekte und die fast einheitliche Nordwest-Südost-Orientierung der Gebäude könnten für eine mittelbronzezeitliche Datierung der meisten Siedlungsstrukturen sprechen. Aus dem Vergleich der Gebäudegrundrisse mit jenen von anderen bronzezeitlichen Siedlungen geht hervor, dass sich die Gebäudetypen von Müllendorf gut in die bronzezeitliche Bautradition einfügen. Es zeigen sich sowohl Verbindungen zu dem seit der Frühbronzezeit vorkommenden Gebäudetyp Březno als auch zu den gedrungen rechteckigen und typenreicheren Gebäuden der Urnenfelderzeit.

Schlüsselbegriffe
Mittelbronzezeit, Österreich, Müllendorf, Siedlung, Gebäudetypen, Bronzeobjekte

1. Introduction

In preparation for the construction of a logistics hall on Plot 5348/2 in the industrial area of Müllendorf, Burgenland, a rescue excavation (MNr. 30013.21.01) was carried out by PannArch GmbH in 2021. In addition to the remains of a Roman road, the southeastern part of an extensive Middle Bronze Age lowland settlement was discovered over an area of around 2.8 ha (Fig. 1). The features include several storage pits, over 50 reconstructed building layouts and a ditch, which partially enclosed the settlement. The finds from the settlement include various bronze artefacts, in particular a dagger, arrowheads, pins, bracelets, sickles, awls, rivets, plano-convex ingot fragments and several other objects, most of which are highly fragmented and cannot be identified in more detail.[1]

As a result of rescue excavations following large-scale construction projects in recent decades, several Middle Bronze Age lowland settlements in Austria and its

1 Neubauer, Schönpflug, Putz 2024.

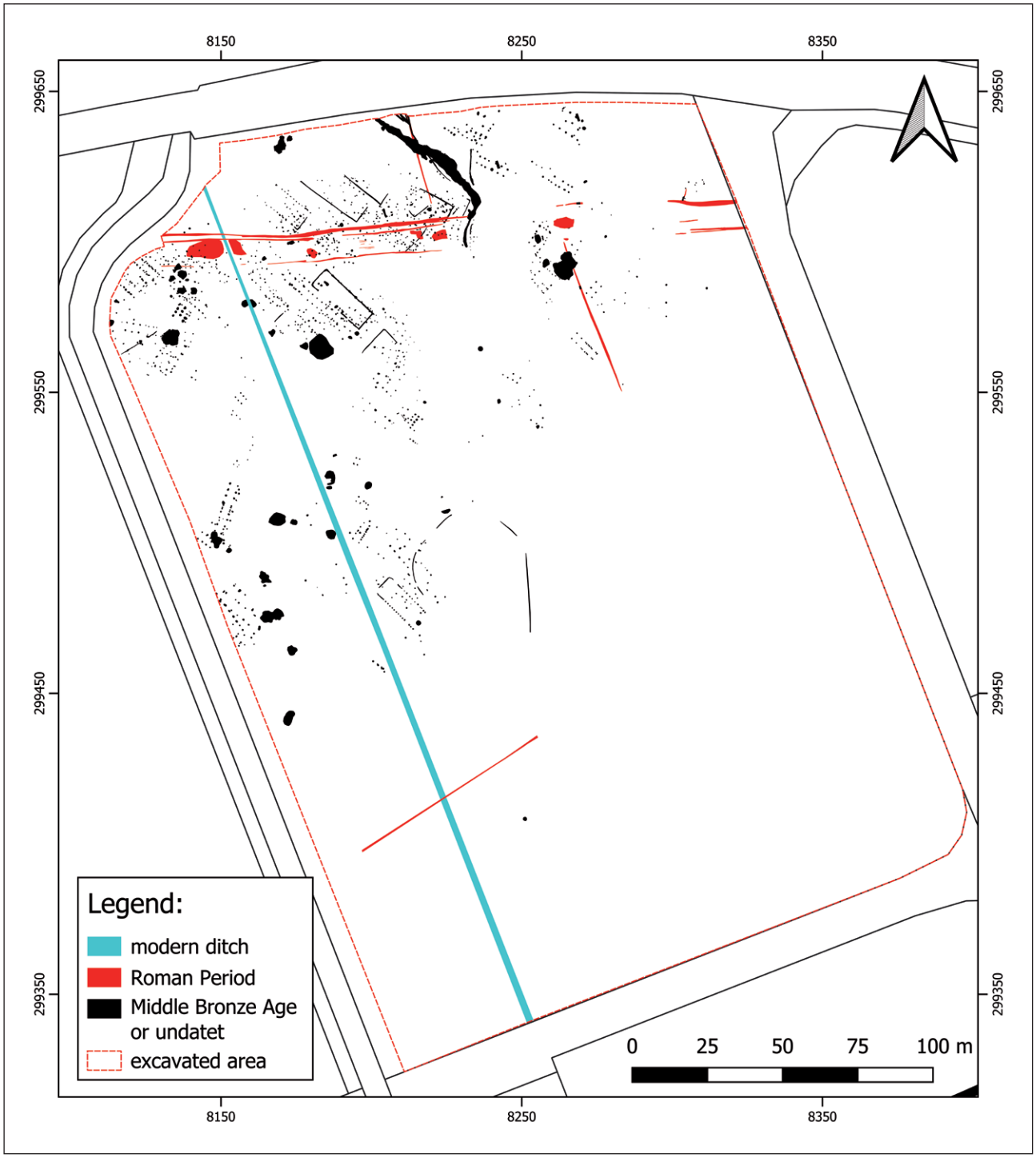

Fig. 1. Interpreted plan of the Müllendorf, Gewerbegebiet Breitensee excavation (M. Piniel).

neighbouring countries have now been extensively excavated.[2] However, the settlement of Müllendorf stands out from these due to its size, the large number of reconstructable building layouts and their diversity. A detailed presentation and evaluation of the site is therefore of great importance for the research on the Middle Bronze Age. This paper attempts to provide an initial overview of the range of bronze artefacts and the features of the Middle Bronze Age settlement. The settlement will be chronologically categorised based on

2 E.g. Kavur 2007. – Fuchs 2011. – Kiss 2011.

Fig. 2. Left: Kiln/hearth base (Feature 501). – Right: Well (Feature 345) (PannArch GmbH).

the selected finds. These include all bronze objects found during the excavation, excluding those artefacts associated with the Roman road.

2. Settlement Features

As expected for prehistoric lowland settlements, only the sunken features of the settlement (pits, ditches etc.) were preserved. Pits were by far the most common group of features. Based on their size and shape, the pits can be roughly categorised into three groups. Round to oval-shaped pits with diameters of around 20 cm to 1 m are the most common group, encompassing approximately 1300 features, and are generally interpreted as postholes. Very few of these were deeper than 20 cm, and many were only preserved in the single-digit centimetre range. It can therefore be assumed that features with less depth had already completely disappeared over the entire area due to erosion and agricultural activity. In addition to the postholes, there are also regular, round to oval-shaped pits with diameters of 1 to 2 m. The depth of these objects ranged between 0.5 and 1 metre and they are interpreted as the remains of storage pits. However, there were no storage pits with the typical bell-shaped or hourglass-shaped profiles. The third group consists of some large, irregularly shaped pits with diameters of up to 9 m and depths of up to 1.3 m. These were probably created by clay extraction.

Pit 501 (5.3 × 3 m, 40 cm deep) was a unique feature among the pits. After it had lost its original purpose, it was filled in about halfway. A hearth or kiln was built on the resulting surface, the base of which, with a diameter of about one metre, was still largely preserved (Fig. 2). The base was made of flat sandstones arranged in a circle and covered with clay. No kiln wall remains were found. The entire construction showed heavy traces of heat exposure. A comparable construction is known from House 01 of the hilltop settlement Thunau am Kamp.[3] Due to its deeper position in the semi-filled pit, this feature is the only surviving evidence of a kiln or fireplace in Müllendorf. Similar features that were not built in a pit were probably destroyed by erosion and agricultural activities.

Feature 345, another unique structure in Müllendorf, was situated in an almost featureless area of the settlement (Fig. 2). In the centre of this circular dark layer with a diameter of 1.7 m, a rectangular structure of lighter material was visible. The rectangular structure was filled with grey-brown sediment. The outer dimensions of the rectangle were approximately 120 × 100 cm, the inner dimensions 85 × 75 cm. As the maximum depth for the construction project had already been reached in this area, the feature was only documented on the surface and not excavated. However, the documented details allow the feature to be interpreted as a timber-lined well. Other Bronze Age wells that can be compared to the feature from Müllendorf have been excavated in Dunakeszi[4] and Pusztataskony-Ledence[5] in Hungary and in Wohlsdorf[6] in Austria, for example.

The largest structure in the settlement area is the ditch, Feature 422. The ditch, which enters the excavated area from the north, first runs in a NW–SE direction for about 45 m. It then turns in a NNE–SSW direction and ends after 15 m. The width of the ditch varies a lot, with a maximum of five

3 Lochner 2013, 311–314.
4 Horváth et al. 2001, 122–123 and Fig. 124.
5 Fülöp 2017, 314 and Fig. 315.
6 Fuchs 2011, 129 and Fig. 114.

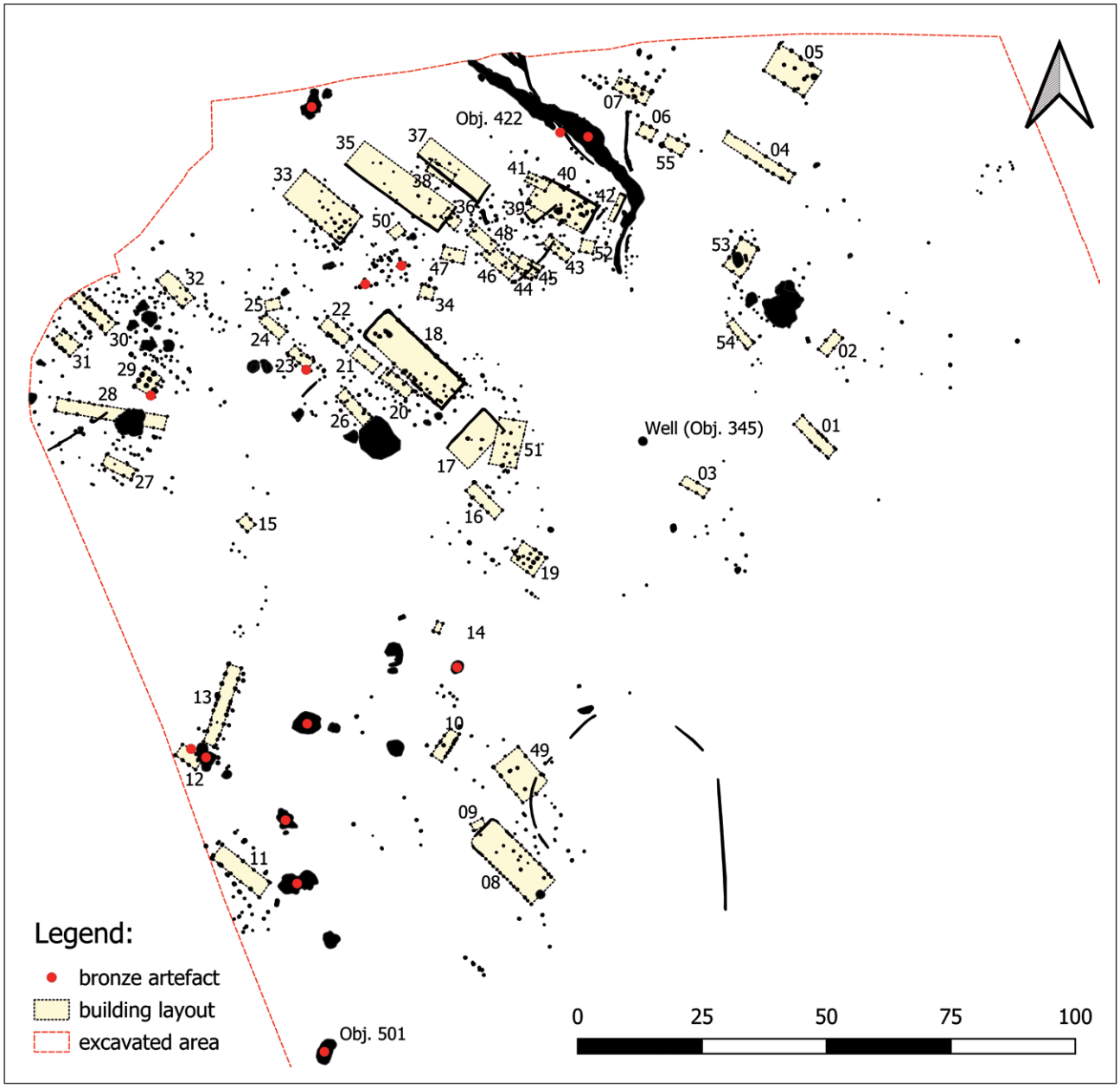

Fig. 3. Plan of the settlement area with the reconstructed building layouts (M. Piniel).

metres. The filling layer of the ditch is characterised by an exceptionally high number of finds, numerous stones in various sizes and large quantities of daub pieces. To the south of the ditch, large quantities of displaced finds and stones were found in the topsoil over a length of several metres. This indicates that the ditch originally extended further to the south. The ditch is about 40 cm deep in the north and becomes shallower towards the south. The large quantities of artefacts, stones and daub in the filling of the ditch indicate that the ditch was intentionally backfilled. The large amount of daub and, above all, the many bronze artefacts (pins, bracelets, arrowheads, etc.), which were probably not intentionally placed in the ditch, also suggest that at least some of the fill was dumped in the ditch as fire debris after a destructive fire.

An attempt was made to reconstruct building layouts for the postholes and small foundation trenches discovered throughout the settlement. As the fill of the postholes generally did not contain any datable artefacts, it was not possible to establish any chronological correlations between the features. For this reason, only characteristics of the arrangement of the features in relation to each other were

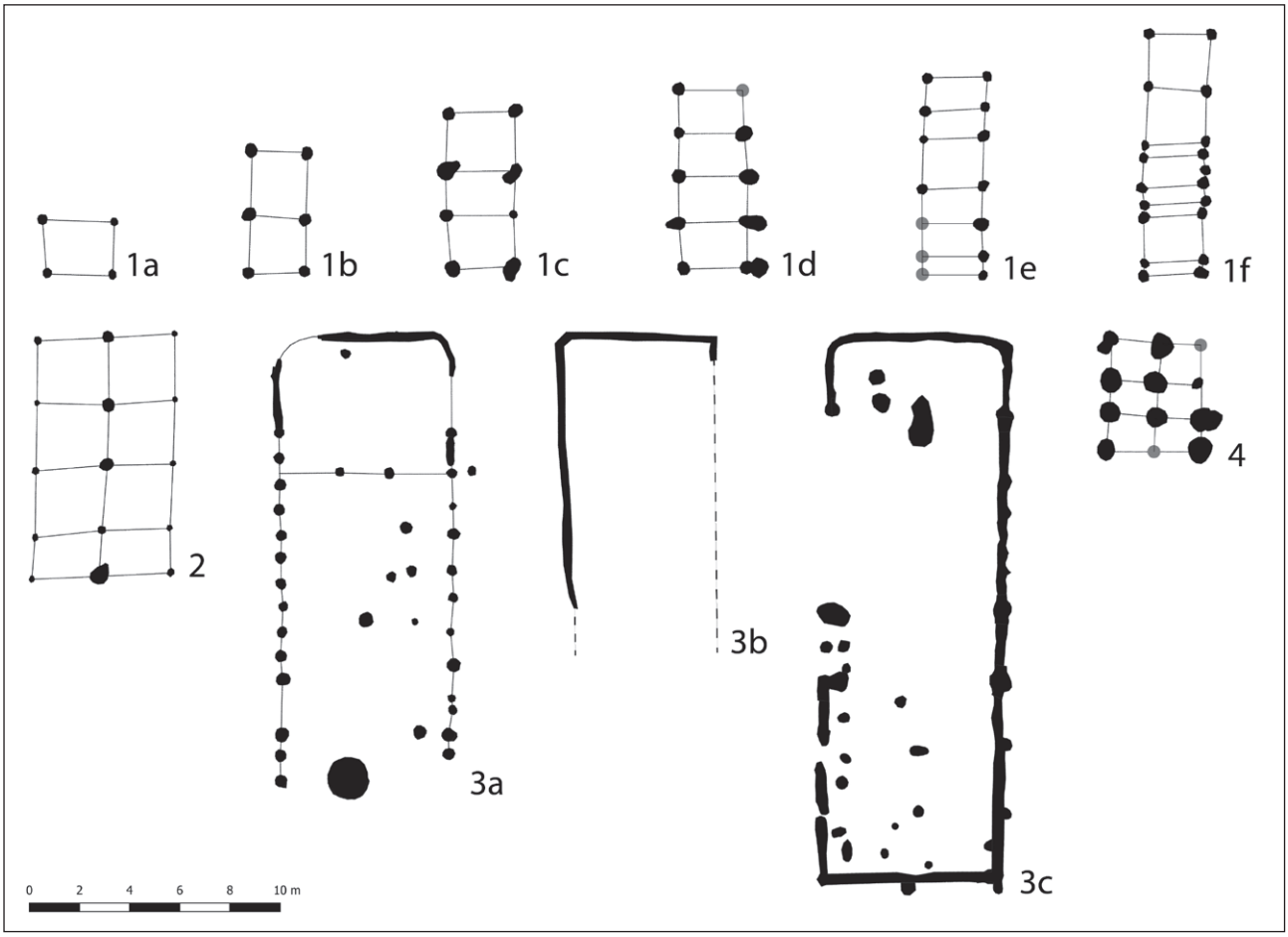

Fig. 4. The building types of the settlement area of Müllendorf, Gewerbegebiet Breitensee (M. Piniel).

used. Initially, several building types could be defined based on individual buildings (e.g. 1–6, 8, 12, 13, 55), which did not overlap with older or younger features. Based on this, the areas with a higher density of features were interpreted. The interpretation was facilitated by the similar orientation (approximately NW–SE) of most of the buildings. To avoid circular reasoning, the first interpretation of the excavation plan was followed by a targeted search for differently orientated and/or constructed structures. A total of 55 building layouts were identified using this method (Fig. 3). Some other postholes merely form rows, suggesting the original presence of other almost completely eroded buildings. The identified building layouts can be categorised into several clearly distinguishable building types (Fig. 4). For a more detailed interpretation, the centres of related postholes were connected with lines. All measurements given refer to the diagrams consisting of these lines.

Type 1 buildings essentially consist of two parallel rows of posts, with postholes usually 35 to 50 cm in diameter. The preserved depths of the postholes are usually between 10 and 25 cm, very occasionally reaching 45 cm. They vary widely even within the same building. The distance between the parallel rows of posts of the individual buildings ranges from 1.2 to 3.4 m. The lengths of the buildings vary widely between 2.1 and 22.2 m (Tab. 1). With a few exceptions, the buildings of Type 1 are orientated with their longitudinal axis NW–SE or at right angles to it. Type 1 buildings can be further subdivided according to their construction method.

The subgroups of Type 1 are characterised by almost regular distances between the postholes of the individual longitudinal rows. The postholes usually occur in pairs in the two longitudinal rows (missing postholes are probably due to poor preservation rather than structural details). A classification of 4-post structures (Type 1a), 6-post structures (Type 1b), 8-post structures (Type 1c), 10-post structures (Type 1d) and structures with 12 or more pairs of posts (Type 1e) can be made according to the number of pairs of posts. With a total of 36 representatives, these subgroups are the most common building types at the site. The subgroup Type 1f differs from types 1a to 1e due to the

Building Type	Quantity	Area (m²)	Length (m)	Width (m)
Type 1a	4	2.6–6.8	2.1–2.9	1.2–2.5
Type 1b	8	6.2–11.8	2.7–4.9	2.1–2.5
Type 1c	14	9–23.6	3.8–7.5	2–3.4
Type 1d	5	13.4–21.8	4.6–8.2	2.3–3
Type 1e	5	11.1–43.2	6.4–15.5	1.7–3.4
Type 1f	4	22.9–59.4	9.6–22.2	2.4–2.7
Type 2	4	28.1–61.7	6.6–9.5	4.3–6.5
Type 3a	2	103.1–120.8	14.5–17.7	6.9–7
Type 3b	6	15.5–141.2	6–23	2.7–6.1
Type 3c	1	150.8	21.6	7
Type 4	2	16.4–26.5	4.5–5.7	3.7–4.5

Tab. 1. Quantity and dimensions of the building types.

different construction of the middle section of the building. The buildings of this type are also considerably longer than most of the other buildings of Type 1, with lengths of 9.6 to 22.2 m. With almost square segments, both ends of the buildings of Type 1f have the same layout as the other variants of Type 1. In the middle section of the longitudinal rows, however, the postholes are located at short intervals of usually 0.5 to 1 m. The regular occurrence of this type indicates an intentional, more solid foundation in the middle sections of these buildings. Building 13 (Fig. 5) additionally has an irregular, parallel row of posts along its eastern long side at a distance of about 1 m from the building, a detail that could only be observed in this building.

The buildings of Type 2 are wider, two-aisled structures. Three (buildings 5, 49, 51) of the four examples of this type have very similar dimensions with lengths of 9.3 to 9.5 m and widths between 5.9 and 6.5 m. Only Building 53 is smaller, at 6.6 × 4.3 m, but has a similar length-to-width ratio. The side walls of the buildings consist of rows of five posts, which are placed approximately 2.5 m apart. This interval also corresponds to Type 1 buildings. Building 53 is also an exception in this respect. The length of the two middle segments only measures 1 and 1.3 m, which results in a shorter overall length with the same number of posts. The middle post row of the buildings, which divides the building into two aisles, is only completely preserved in Building 51. Larger posthole diameters can also be observed (around 50 cm for the middle row compared to around 35 cm for the long side walls) in the middle post row of this building. This indicates stronger ridge posts that carried the roof. This only partially applies to the other three buildings. For Building 5 it should be noted that comparatively large posthole diameters of up to 80 cm are also documented for the side walls. With the exception of Building 5, which has a NNE–SSW orientation, the buildings of Type 2 are, however, orientated NW–SE.

The nine buildings of Type 3 are up to 23 m long and 7 m wide. Their dimensions alone clearly distinguish them from the other building types in the settlement. They are also the only buildings in which small foundation trenches were observed alongside the postholes. The cross-section of the U-shaped ditches is usually approximately 35 cm wide. The absence of (ridge) post rows inside the buildings is striking. Although there are occasional postholes in a possible ridge post axis, they are not sufficient to support the required construction of the large roof surfaces. This indicates a building method that results in only minor interventions in the ground. Only one example (Building 18) of Type 3 could be recorded in its full extent. Five examples are only documented by L-shaped foundation trenches and therefore only allow minimum measurements for their length and width. The remaining three buildings allow at least a prediction of the absolute width due to a complete gable wall and the connected side walls. The buildings of Type 3 are also orientated approximately NW–SE or turned by 90°. Only the remains of Building 39 show a NNW–SSE orientation. Based on the design of the exterior walls of the Type 3 buildings, three subgroups can be defined.

The building layouts of subgroup Type 3a (8, 33) are characterised by rows of posts and small foundation trenches. In both cases, one gable wall and parts of the connected side walls are made of small ditches. The corners of the ditches are rounded. The ditches extend 2.5 m into the side wall of Building 33 and 5 m into the side wall of Building 8 and are then replaced by a relatively dense row of posts with post hole intervals of 80 cm for Building 8 and 1.3 m for

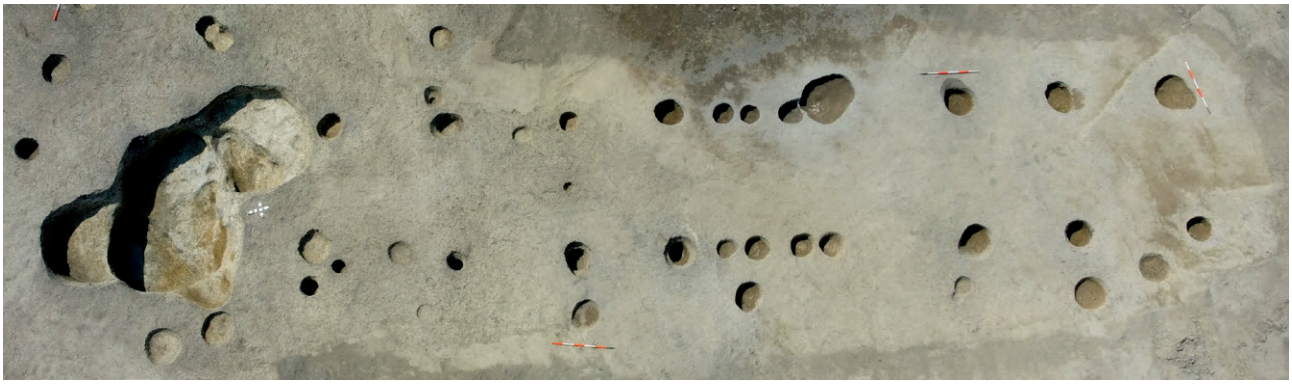

Fig. 5. Building 13 (PannArch GmbH).

Building 33. As the opposite gable wall is missing in both buildings, it is unclear whether this pattern is repeated there. In the interior of Building 8 there are two postholes that create a possible cross-row. This seems to indicate a spatial separation of the part of the construction with small foundation trenches from the rest of the building. In the southern part of the west wall of Building 8, a missing post in the otherwise regular wall also suggests an entrance situation.

The buildings of Type 3b are only characterised by small foundation trenches. In contrast to the examples of Type 3a, both the gable walls and the side walls are made completely of these ditches. Due to their shallow depth, this type of building is most affected by the poor preservation conditions. Examples of this type could only be recorded in the form of L-shaped ditches. The foundation trenches differ from those of Type 3a due to their sharp, right-angled corners. In the case of Building 35, the side wall is about 5 cm deeper than the gable wall. This creates a small step in the corners of the building.

Within Type 3, Building 18 represents a special case and is therefore highlighted as Type 3c. Apart from a gap of about 10 m in the side wall, the entire extent of this building has been recorded. Similar to Type 3b, the entire building layout is made up of small foundation trenches. In addition, round thickenings of about 70 cm in diameter are integrated into the side walls at intervals of about 2.2 m. The gable walls do not have these thickenings. It is worth mentioning that the round thickenings have a significantly lower depth than the small ditches. The northern corners of the building have rounded corners, analogous to those of Type 3a. The southern corners, however, are sharply right-angled, similar to those of Type 3b. The situation of the different depths of the foundation trenches was already described for Building 35 but is even more evident in this case.

The two buildings 19 and 29 differ completely from all other buildings in the settlement and were therefore grouped together as Type 4. Building 29 is better preserved and therefore presented as an example of this type. This building has three rows of massive postholes (up to 1 metre in diameter), which are placed very close to each other. With distances of 1.3 to 1.8 m between the centres of the postholes, there are only gaps of around 80 cm between them. Four postholes are preserved in the northwestern row and three in the other two rows. The depths of the postholes vary widely and can reach over 40 cm, which is very deep compared to the other building types in the settlement. In comparison to the estimated roof load to be carried, the posts appear oversized for a building measuring 4.5 × 3.7 m. It is therefore possible that the examples of Type 4 were buildings that stood on pillars.

3. Settlement Layout

South of the L102 road, the southeastern edge of the settlement area was discovered during the excavation. Based on the distribution of features, it can be assumed that the settlement area extends further to the north and west. The area to the west was already destroyed in the course of the construction of a logistics hall in the 2000s.

At 2.8 ha, the settlement area covers the entire northwestern half of the construction site. Within this area, there are zones with very different densities of features. In addition to very densely covered areas, which also show a multiphase occupation, there are also completely feature-free areas. In some cases, the feature-free zones correspond to depressions in the subsoil with a more structured relief over the entire area than the modern surface of the area. The lack of features in these depressions could be related to the fact that features were dug into old sediment layers that were removed with the excavator along with the humus due to their dark colour. However, feature-free areas can also be found in higher areas. Zones with a small number of scattered pits also suggest that many features in these areas have already been destroyed by erosion and agricultural activity.

When looking at the overall plan, the most striking aspect is the uniform NW–SE or WNW–ESE orientation of most of the buildings. Overlapping buildings also generally have the same orientation. This uniform orientation indicates a connection between the buildings. The orientation might however also be related to the predominant wind direction, for example. The overlapping buildings are evidence of a multi-phase occupation of the area. Based on the overlap of buildings 39, 40 and 41, there are at least three phases visible in the archaeological record. A few buildings (e.g. 13, 51) clearly deviate from the general orientation pattern. The orientations indicate that these buildings were constructed and used during another period.

The buildings of Type 3 stand out due to their spatial distribution. With one exception (Building 8), they are all located in a central area of the investigated settlement area and even overlap partially. This should not be over-interpreted, as the chances of preserving the very shallowly dug foundation trenches are usually low. The other building types are distributed across the entire settlement area, and no patterns can be recognised regarding their distribution.

In our opinion, it is not possible to interpret the different building types as main and outbuildings or residential and economic buildings based on the available data. There is no evidence (finds or features) supporting such an interpretation. None of the building types can be clearly identified as communal buildings, for example due to their size, structure or uniqueness. It should be noted that the stated dimensions of the buildings are only minimum sizes. With the existing posts and skilled craftsmanship, the actual sizes of the buildings could have been significantly larger.

Despite several overlapping buildings (the many relatable postholes indicate even more overlaps), the different elements of the buildings, i.e. the postholes and foundation trenches, only rarely overlap. Even when overlaps were present, the stratigraphic sequence could not always be clearly determined due to the very similar fill in the shallow postholes. The superposition could only be determined in two cases. The sequence of the associated buildings was clarified: Feature 470 is younger than Feature 677, therefore Building 35 is younger than Building 36. Feature 164 is younger than Feature 148, therefore Building 9 is younger than Building 8.

The intentionally filled ditch (Feature 422) should also be discussed in this context. The ditch seems to surround an area located to the west of it, which is very densely covered with features. If the ditch was an enclosure or even a fortification, the buildings to the east and southeast of it would lie outside the enclosure. This could either be a separation of two settlement areas or an expansion of the settlement after the ditch was abandoned. However, the ditch is not completely preserved, and its function cannot be clearly defined. Only an evaluation of all the finds from the settlement area will provide clarity.

3.1. The Buildings in Comparison

Since Helmut Luley's work on prehistoric house construction in central Europe,[7] the state of research on Middle Bronze Age building types has improved significantly thanks to the large-scale rescue excavations of recent decades and the various regional studies. However, larger overviews, such as that by Georg Tiefengraber for Styria and northern Slovenia,[8] are still the exception. Tiefengraber was able to define six building types (A–F). Types A to D are aisleless buildings with four to 18 or more posts. Type E comprises aisled buildings, and Type F includes those buildings that cannot be assigned to any of the other types. Due to the rescue excavations during the construction of the Koralm Railway, several Bronze Age settlements were recently excavated on a large scale.[9] Among these, the settlement of Grub, preliminarily dated to the Middle Bronze Age, is especially promising, with its numerous building layouts visible in the excavation plan.[10] However, a comprehensive presentation of the finds and an analysis of the excavation plan is still required. For eastern Slovenia, the regional studies by Boris Kavur, Janez Dular et al. and Biba Teržan are to be mentioned as examples.[11] The reconstructed building layouts are generally aisleless buildings with four, six, eight or more posts. Aisled buildings are the exception.

In his work about Mitterretzbach, Peter Trebsche[12] summarised the known Middle Bronze Age building layouts for eastern Austria and, through comparison with Michael Schefzik's work on southern Germany,[13] showed the clear differences in the building types of these two areas. In southern Germany a hybrid of the Early Bronze Age Eching-Öberau and Poing types is the characteristic building type.[14] In Middle Bronze Age Lower Austria the Early Bronze Age building tradition continues almost

7 Luley 1992.

8 Tiefengraber 2007, 91–95 and Fig. 13. – Tiefengraber 2015, 346–349.

9 Fuchs 2011.

10 Fuchs 2011, 135 and Fig. 123.

11 Teržan 2001. – Dular, Šavei, Tecco Hvala 2002. – Kavur 2007.

12 Trebsche 2017.

13 Schefzik 2001. – Schefzik 2010.

14 Long, narrow, two-aisled building layouts, some with widely placed and offset ridge posts.

unchanged with the Březno[15] building type.[16] In addition to the two-aisled Březno type, there are also aisleless building layouts with four or more posts, for example from Mitterretzbach.[17] Trebsche also highlighted, with reference to the research results of Schefzik for southern Germany,[18] the intermediate position of the Middle Bronze Age for the development of the Early Bronze Age longhouses into the compact rectangular and more variable building types of the Urnfield period.[19]

Klára Šabatová selected the settlements of Olomouc-Slavonín[20] and Přáslavice[21] as examples to illustrate the spectrum of Middle Bronze Age lowland settlements in Moravia.[22] In contrast to the Austrian and Slovenian areas already presented, aisleless buildings appear to be rarer in Moravia during the Middle Bronze Age. Long, narrow, two-aisled building layouts with ridge posts and straight walls made of closely set posts or small foundation trenches are much more common. These correspond to the Březno type, while those with small foundation trenches correspond to a variation of this type.

In western Slovakia, aisleless buildings with six or more posts were common in the Middle Bronze Age.[23] Examples of the Březno type with closely set posts, but also those with small foundation trenches, can be found in western Slovakia and are known, for example, from Lozorno-Široké diely.[24]

For Hungary, Gábor Sánta summarised the state of research on the Middle Bronze Age building layouts in his study on the settlements of the Tumulus Culture in Hungary.[25] Sánta points out that the buildings of the Tumulus Culture hardly differ from those of the preceding Koszider period. They are generally aisleless or two-aisled buildings with different numbers and sizes of posts. Only at the transition to the early Urnfield period does Sánta notice a clear change with the appearance of larger, two-aisled longhouses, some of which have an apsidal gable wall. Several layouts of this building type were documented during excavations in the Late Bronze Age settlement of the Tumulus Culture in Dunakeszi.[26] Sánta did not make a connection with the Březno type in his study. However, this cannot be dismissed. The excavation plans of Dunakeszi and Németbánya[27] show that the smaller buildings continue to occur alongside these new longhouses.

The different building types from Müllendorf have numerous parallels in the sites of the countries discussed. The aisleless 4-, 6-, 8- and 10-post buildings (types 1a to 1d) are regularly found in settlements in Austria,[28] Hungary,[29] Slovenia,[30] Slovakia[31] and the Czech Republic[32] in the Middle Bronze Age and beyond. In Mitterretzbach,[33] Rannersdorf,[34] Hörbing,[35] Unterradlberg,[36] Grub[37] and Dunakeszi[38] there are also long, narrow, aisleless buildings consisting of 12 or more posts, which correspond to Type 1e from Müllendorf. Buildings in which the middle part of the building is characterised by more closely placed posts (Type 1f) are only known from Müllendorf.

The wider, two-aisled post constructions from Müllendorf (Type 2) have parallels in houses 2, 7 and 21 of the early phase (Bz D–Ha A1) of Unterradlberg.[39] However, they differ in the number of posts. While the rows of posts in Müllendorf consist of five posts, there are only four in Unterradlberg. There is also a two-aisled building layout from Sodolek (Slovenia).[40]

Type 3a, which is defined by a mixed construction of rows of dense posts and small foundation trenches, has clear links to the Březno building type, which has been present since the Early Bronze Age. This type is characterised by a long narrow building layout (length up to 56 m),

15 Long, narrow, two-aisled building layouts with ridge posts and straight walls of closely placed posts.
16 Trebsche 2017, 179–180.
17 Trebsche 2017, 174 and Fig. 173.
18 Schefzik 2001. – Schefzik 2010.
19 Trebsche 2017, 178.
20 Peška 2006.
21 Šabatová 2007.
22 Šabatová 2020, 140–141 and Fig. 141.
23 Bartík 2004, Fig. 15.
24 Bartík, Elschek, Varsik 2013, 80–81 and Figs. 9–11.
25 Sánta 2010.
26 Horváth, Szilas, Endrődi 2003, 15 and Fig. 12.
27 Ilon 2005, Figs. 4–5.
28 Hebert 1996, map insert. – Neugebauer 2002, 223 and Fig. 220. – Sauer 2006, map insert. – Adametz 2009, 10 and Fig. 14. – Fuchs 2011, 135 and Fig. 123. – Trebsche 2017, Fig. 3.
29 Figler 1996, 14 and Fig. 12. – Horváth 2001, 40 and Fig. 42. – Horváth et al. 2001, 120. – Horváth, Szilas, Endrődi 2003, 14 and Fig. 12. – Ilon 2005, 138 and Fig. 134. – Kiss 2011, 104 and Fig. 103.
30 Dular, Šavei, Tecco Hvala 2002, Supplement 5. – Teržan 2001, 129 and Fig. 125. – Kavur 2007, 55 and Fig. 52.
31 Bartík 2004, 82 and Fig. 88. – Bartík, Elschek, Varsik 2013, Figs. 9–14.
32 Peška 2006. – Šabatová 2007, 63 and Fig. 14. – Šabatová 2020, 140–141 and Fig. 141.
33 Trebsche 2017, Fig. 3.
34 Sauer 2006, map insert.
35 Hebert 1996, map insert.
36 Adametz 2009, 10 and Fig. 14.
37 Fuchs 2011, 135 and Fig. 123.
38 Horváth et al. 2001, 120. – Horváth, Szilas, Endrődi 2003, 14 and Fig. 12.
39 Adametz 2009, 33 and Fig. 24.
40 Kavur 2007, 55 and Fig. 52.

a two-aisled construction with ridge posts and straight walls made of closely placed posts.[41] Examples of this type are known from the Bronze Age settlements of Franzhausen-Kokoron,[42] Baumgarten an der March,[43] Reichersdorf,[44] Rannersdorf,[45] Grub[46] and Dunakeszi.[47] In a building from Reichersdorf, similar to Type 3 from Müllendorf, the NW corner and parts of the western wall are partially preserved as small foundation trenches. The buildings of the Březno type in the sites mentioned generally have a NW–SE orientation, are between 16 and 25 m long and between 5 and 10 m wide. The examples of Type 3a from Müllendorf are also oriented NW–SE and have comparable dimensions with lengths of up to 17.7 m and widths of up to 7 m. The building layouts consisting of shallow foundation trenches, which can be classified as types 3b and 3c, are much more difficult to interpret due to their partially incomplete preservation. With recorded maximum lengths of 23 m and maximum widths of 7 m, they also fall within the size range of the Lower Austrian examples of the Březno type. This might indicate that types 3b and 3c are related to the Březno type, especially since an Early Bronze Age building layout consisting of small foundation trenches from Pavlov-Horní pole (Czech Republic) is also referred to as the Březno type.[48] There are also building layouts from Middle Bronze Age settlements in the Czech Republic and Slovakia that consist of small foundation trenches. Examples include the settlements of Olomouc-Slavonín and Přáslavice[49] as well as Lozorno-Široké diely.[50] A similar building layout is also known from the Early Bronze Age settlement of Drasenhofen (Austria).[51] The building, known as the northern house, is east-west oriented and approximately 8 m wide. The total length of the building could not be recorded due to modern disturbance.

There are no known Middle Bronze Age parallels for Type 4, which consists of large, closely spaced postholes.

4. Bronze Artefacts

The finds from the settlement area, consisting mainly of ceramic fragments, also include several bronze artefacts. These were found in the fills of postholes, larger pits and the ditch and ended up in the fills of the features as lost items or as part of the settlement waste. As illustrated on the settlement plan (Fig. 3), the bronze artefacts are distributed over almost the entire settlement area.

Among the bronze artefacts, the pendant (FNo. 735-05, Plate 2) with a low central knob and two concentric ribs should be mentioned first. Such disc pendants are the precursors of spiked discs[52] and can be found from the early Tumulus period onwards.[53] A comparable artefact was found, for example, in Grave 24 in Pitten.[54]

The finds from the settlement include three pins of different types. The first type is a pin with a globe head and a thickened neck (FNo. 110-01, Plate 1). The thickened neck is decorated with horizontal lines under which the remains of a zigzag line can be seen. The globe-headed pins with thickened necks are commonly known as the Deinsdorf type and are a characteristic pin type of the later Tumulus period and early Urnfield period.[55] Comparable pins are known, for example, from Hradisko and Milonice[56] as well as from graves 75, 105, 109 and 192 in Pitten.[57]

The second type is a pin with a perforated shaft (FNo. 1995-02, Plate 3), a symmetrical neck thickening and mushroom-shaped head with a poorly preserved engraved pattern of concentric circles. The pin is probably related to the Wetzleinsdorf type. Jiří Říhovský considers pins with such mushroom- or hat-shaped disc heads to be Carpathian variants of pins with hat-shaped domed disc heads.[58] They date back to the Middle Bronze Age and continue into the Urnfield period. Pins with a perforated shaft, symmetrically swollen neck and round shaft cross-section, however, are typical examples of the older Tumulus period.[59] Two comparable examples, which, in contrast to the pin from Müllendorf, have a different shaft design, are known from Grave 153b and as a stray find from Pitten[60] and are dated by

41 Schefzik 2010, 338–340 and Fig. 337.
42 Blesl 1996, 145 and Fig. 144.
43 Mayer, Egger 1996, 14–15. – Mayer, Egger 1997, 14 and Fig. 15.
44 Neugebauer 1998, Figs. 50–51. – Neugebauer 2002, 223 and Fig. 220.
45 Sauer 2006, map insert.
46 Fuchs 2011, 135 and Fig. 123.
47 Horváth et al. 2001, 120–121 and Fig. 122.
48 Peška 1994, 153 and Figs. 152, 154. – Schefzik 2010, 339.
49 Šabatová 2020, 141 and Fig. 141.
50 Bartík, Elschek, Varsik 2013, Fig. 9.
51 Botond, Fiebig 2020, D3158 and Fig. 3151.
52 Willvonseder 1937, 144.
53 Wels-Weyrauch 1978, 39–41. – Benkovsky-Pivovarová 1985, 72.
54 Hampl, Kerchler 1981, Pl. 201/16.
55 Říhovský 1979, 80–83. – Benkovsky-Pivovarová 1985, 54–55. – Innerhofer 2000, 168.
56 Říhovský 1979, Pl. 18/326; 19/336.
57 Hampl, Kerchler 1981, Pl. 210/6; 214/8; 216/11; 234/1.
58 Říhovský 1979, 38–39.
59 Říhovský 1979, 28–29.
60 Hampl, Kerchler 1981, Pl. 225/6; 238/7.

Zoja Benkovsky-Pivovarová to the early Tumulus period.[61] It can therefore be assumed that the Müllendorf example also dates to this period.

The third pin from Müllendorf has a nail/trumpet head (FNo. 110-21, Plate 2). On the neck of the pin there is a zone of ribs under vertical lines. Below the ribbed zone, several horizontal lines are framed by zigzag lines. Again, two comparable pieces were found in the Pitten cemetery.[62] Benkovsky-Pivovarová assumes that this type dates to the late Tumulus period.[63] This corresponds with the observation of Bernhard Hänsel, who considers the nail-headed pins to be a characteristic type of the developed to later Middle Bronze Age in the Carpathian Basin and central Europe.[64] Florian Innerhofer also describes this type as a typical example of the developed Tumulus period.[65]

The finds also include two bracelets with a lenticular cross-section. Such pieces can be found from the second half of the Early Bronze Age onwards.[66] The bracelet FNo. 736-05 (Plate 2) with a diameter of 4 cm is most likely to be interpreted as children's jewellery. The ends of the second bracelet (FNo. 110-04, Plate 1) are deformed to such an extent that it is not possible to determine its diameter.

The conical bronze sheet tube fragment (FNo. 110-09, Plate 1) with overlapping edges is unique in the material from Müllendorf. In Pitten similar artefacts were found in graves 57, 98 and 149.[67] Due to their combination with pins with a perforated shaft, Benkovsky-Pivovarová dates them to the middle Tumulus period.[68]

Also unique in the material is a ring (FNo. 110-30, Plate 2) with a round cross-section and a diameter of 1.7 cm. In Pitten, such rings could be found around the skull (graves 29a, 111a, 181e) and were therefore interpreted as ear- or lockenrings.[69]

An outstanding artefact is a dagger (FNo. 1969-04, Plate 3) with a trapezoidal handle plate and two rivet holes. The dagger has a curved, roof-like cross-section and is 16.6 cm long. It corresponds to the Riedenburg-Emmerthal type defined for Bavaria, which is dated to Bz C1 by Ulrike Wels-Weyrauch.[70] In Pitten daggers with trapezoidal handle plates and two rivet holes were found in graves 55 and 181b.[71] Three examples of rivets (FNo. 110-08, Plate 1) are also known from Müllendorf. Two have a square and one a round cross-section.

The two arrowheads (FNo. 110-02, Plate 1; FNo. 110-03, Plate 1) from Müllendorf are double-winged socketed arrowheads with triangular wings and barbs. This type of arrowhead appears in the archaeological material from the Middle Bronze Age onwards and has a long lifespan.[72]

The two sickle fragments (FNo. 736-06, Plate 2) with a slightly curved blade and thickened back are parts of the same harvesting tool, which tapers towards the tip. It should be highlighted that plant remains preserved by corrosion were found on the fragments. The remains are probably straw or grasses.[73] The sickle from Müllendorf can be classified as a button sickle of the Rebmesser type. This type is represented in the archaeological material in Bz B–C.[74]

Two blade fragments (FNo. 1888-01, Plate 3) with a flat rectangular cross-section and perforation (diameter 0.5 cm) belong to the same artefact. Another blade fragment is a celt or adze blade fragment with a flat rectangular cross-section (FNo. 642-04, Plate 2). However, a more precise identification of the artefact is not possible due to their state of preservation.

The spectrum of bronze artefacts is supplemented by the tip of a double-bladed object (FNo. 340-04, Plate 1), a ball-headed nail (FNo. 1995-01, Plate 3), three awls (FNo. 110-05, Plate 1; FNo. 110-20, Plate 2), a chisel (FNo. 1790-01, Plate 3), several plano-convex ingot fragments (FNo. 110-6, Plate 1; FNo. 110-10, Plate 1), wire (FNo. 110-07, Plate 1; FNo. 1551-01, Plate 3) and sheet fragments (FNo. 110-6, Plate 1; FNo. 110-11, Plate 1).

5. Conclusion

The bronze artefacts from Müllendorf, which were interpreted as lost items or part of the settlement waste, date from the early to the late Tumulus period (Bz B1–C2) and therefore cover the entire Middle Bronze Age. The distribution of the bronze artefacts across the entire settlement area (see Fig. 3), the rare overlapping of building layouts and the uniform NW–SE orientation of the buildings, with a few exceptions, suggest that most of the settlement structures date to the Middle Bronze Age. However, at least the two NNE–SSW oriented buildings (13 and 51) indicate a further occupation phase in the settlement area. Future investigations

61 Benkovsky-Pivovarová 1985, 30.
62 Hampl, Kerchler 1981, Pl. 200/1; 222/2.
63 Benkovsky-Pivovarová 1985, 50–51.
64 Hänsel 1968, 90.
65 Innerhofer 2000, 139.
66 Laux 2015, 135–137.
67 Hampl, Kerchler 1981, Pls. 209/3–8; 213/9–11; 223/1–5.
68 Benkovsky-Pivovarová 1985, 73.
69 Benkovsky-Pivovarová 1985, 70.
70 Wels-Weyrauch 2015, 7.
71 Hampl, Kerchler 1981, Pl. 207/15; 230/8.
72 Říhovský 1996, 125–127.
73 Neubauer, Schönpflug, Putz 2024.
74 Weller, Heynowski 2022, 125.

should include a detailed analysis of the large quantity of ceramic finds to gain an even better understanding of the temporal situation within the settlement. In addition, the development of the settlement could be reconstructed by contextualising the ceramic finds with the features.

In comparison with the other currently known settlements from the Middle Bronze Age, Müllendorf should be highlighted for both the large number of reconstructed building layouts and the diversity of building types. Based on the state of research at the site, it is not clear whether the size of the settlement also represents a special case for the Middle Bronze Age. The recorded settlement traces cover an area of around 2.8 ha and represent the southeastern part of an extensive settlement area. However, the distribution of features indicates that the settlement area spread out to the north and west – areas which were not investigated. The settlement may have been much larger, as the distribution of features indicates.

The regional and supraregional comparison of the building layouts proves that the majority of the known Middle Bronze Age building types for the study area[75] can be found in Müllendorf. In Müllendorf, but also in the entire study area, aisleless building layouts with four to 10 posts (Müllendorf types 1a–d, Tiefengraber types A–C) are the most common types. Moravia, where aisleless buildings are less common, seems to be an exception. The aisleless buildings with 12 or more posts (Müllendorf Type 1e, Tiefengraber Type D) are not as common as those with fewer posts and are mainly known from eastern Austria and Hungary. We know of no parallels from the Middle Bronze Age for the aisleless buildings from Müllendorf, in which the middle part of the building is characterised by closely placed posts (Müllendorf Type 1f) and for the building layouts constructed from large, closely placed postholes (Müllendorf Type 4). Buildings with two or more aisles (Müllendorf Type 2, Tiefengraber Type E) occur occasionally at the sites in the study area. An interesting distribution pattern can be seen for the long, narrow, two-aisled buildings with ridge posts and straight walls made of closely placed posts and/or small foundation trenches (Müllendorf types 3a–c, type Březno). They belong to the Březno building type, which has been present since the Early Bronze Age, and are proof of the almost unchanged continuity of the Early Bronze Age building tradition in the Middle Bronze Age. Examples of this type or its variations can be found in almost the entire study area. There are no such building layouts known from Styria and northern Slovenia. In western Hungary they only appear from the transition to the early Urnfield period onwards, according to Sánta.[76] The absence of the Březno type in these areas can be correlated with the different cultural influence in the Early Bronze Age, in which this area belonged to the 'southeast Alpine-northwest Balkan-southwest Transdanubian cultural koiné'.[77]

In conclusion, it should be highlighted that the Middle Bronze Age lowland settlement of Müllendorf is unique in the study area in terms of the diversity of building types. This diversity in the buildings indicates various functions of the different types, which however, cannot be identified due to the lack of available data. To identify such functions, it would be necessary to have a better preservation of the features or to carry out various analyses (e.g. phosphate analyses). Nevertheless, this diversity of building types in Müllendorf demonstrates the complex inner structure of Middle Bronze Age settlements.

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75 Eastern Austria including Styria, northern Slovenia, western Hungary, western Slovakia, Moravia.

76 Sánta 2010, 517.

77 Tiefengraber 2015, 228–304.

Catalogue

Feature 198, SE 340

FNo. 340-04: bronze tip of a double-bladed artefact, roof-shaped cross-section, l. 1.8 cm, w. 0.9 cm, h. 0.15 cm **(Plate 1)**.

Feature 219, SE 811

FNo. 811-09: bronze artefact, amorphous, l. 0.6 cm, w. 0.5 cm, h. 0.4 cm.

Feature 227, SE 809

FNo. 809-04: bronze artefact, amorphous, l. 1.3 cm, w. 1.1 cm, h. 1.1 cm.

Feature 421, SE 445

FNo. 445-02: bronze artefact, amorphous, l. 0.9 cm, w. 0.7 cm, h. 0.6 cm.

Feature 422, SE 110

FNo. 110-01: bronze pin with globe head, thickened neck with horizontal grooves, below traces of a zigzag line, shaft in cross-section round, curved shaft/tip **(Plate 1)**.

FNo. 110-02: bronze socket arrowhead fragment, double-winged, triangular wings with wing barbs, l. 3.3 cm, w. 1.2 cm, spout diam. 0.6 cm **(Plate 1)**.

FNo. 110-03: bronze socket arrowhead, double-winged, triangular wings with wing barbs, l. 3 cm, w. 1.2 cm, spout diam. 0.5 cm **(Plate 1)**.

FNo. 110-04: bronze bracelet with a lenticular cross-section and deformed ends **(Plate 1)**.

FNo. 110-05: bronze awl with square cross-section, round cross-section in the third with the pointed end, l. 6.5 cm, w. 0.2 cm **(Plate 1)**.

FNo. 110-06: twelve bronze artefacts, amorphous **(Plate 1)**.

FNo. 110-07: bronze wire fragment with square cross-section, l. 4.5 cm, w. 0.2 cm **(Plate 1)**.

FNo. 110-08: two bronze rivets with square cross-section and one bronze rivet with round cross-section, l. 1.9 cm, 1.2 cm and 1 cm, w. 0.3 cm, 0.2 cm and 0.3 cm **(Plate 1)**.

FNo. 110-09: conical bronze sheet tube fragment with overlapping sides, h. 1.5 cm, dm. 0.9–1.2 cm **(Plate 1)**.

FNo. 110-10: plano-convex ingot fragment, amorphous, l. 2.8 cm, w. 2.2 cm, h. 0.8 cm **(Plate 1)**.

FNo. 110-11: bronze sheet fragment, l. 1.6 cm, w. 0.8 cm, h. 0.15 cm **(Plate 1)**.

FNo. 110-20: two bronze awl fragments with square cross-section, l. 3.5 cm and 3.1 cm, w. 0.2 cm **(Plate 2)**.

FNo. 110-21: bronze pin with nail head, below vertical grooves on the neck zone with ribs, below horizontal lines framed by zigzag lines, round shaft in cross-section, curved shaft/tip, damaged tip **(Plate 2)**.

FNo. 110-23: nine bronze artefacts, amorphous.

FNo. 110-30: bronze ring with round cross-section, diam. 1.7 cm, w. 0.1 cm **(Plate 2)**.

Feature 476, SE 642

FNo. 642-04: bronze celt/adze blade fragment with flat rectangular cross-section, l. 4 cm, w. 2–2.6 cm, h. 0.2 cm **(Plate 2)**.

Feature 500, SE 735

FNo. 735-05: bronze pendant with two concentric ribs (w. 0.3 cm) and low central knob, edge hammered out and bent to eyelet, dm. 3 cm, h. 0.2 cm, spike h. 0.4 cm **(Plate 2)**.

Feature 501, SE 736

FNo. 736-05: bronze bracelet with lenticular cross-section, dm. 4 cm, w. 0.4 cm **(Plate 2)**.

FNo. 736-06: two bronze sickle fragments with slightly curved blade and thickened back, tapering to the tip, l. 13.5 cm, w. 2.5 cm, h. 0.5 cm **(Plate 2)**.

Feature 502, SE 737

FNo. 737-04: bronze artefact, amorphous, l. 1.2 cm, w. 1 cm, h. 0.6 cm.

Feature 956, SE 1551

FNo. 1551-01: bronze wire fragment with round cross-section, l. 1.9 cm, w. 0.15 cm **(Plate 3)**.

Feature 1185, SE 1790

FNo. 1790-01: bronze chisel with rectangular cross-section, bent, l. 9.6 cm, w. 0.6 cm, h. 0.2 cm **(Plate 3)**.

Feature 1276, SE 1888

FNo. 1888-01: bronze blade fragment with flat rectangular cross-section and perforation (diam. 0.5 cm), l. 6.5 cm, w. 1.9 cm, h. 0.4 cm **(Plate 3)**.

Feature 1357, SE 1969

FNo. 1969-04: bronze dagger with trapezoidal handle plate with two rivets, curved roof-shaped cross-section, l. 16.6 cm, w. 3 cm, h. 0.5 cm **(Plate 3)**.

Humus layer under Roman road, SE 1995

FNo. 1995-01: bronze nail with globular head and square cross-section, l. 2.9 cm, w. 0.15 cm **(Plate 3)**.

FNo. 1995-02: bronze pin with perforated shaft with symmetrical neck thickening, mushroom-shaped head with poorly preserved engraved pattern of concentric circles, round shaft in cross-section, curved shaft **(Plate 3)**.

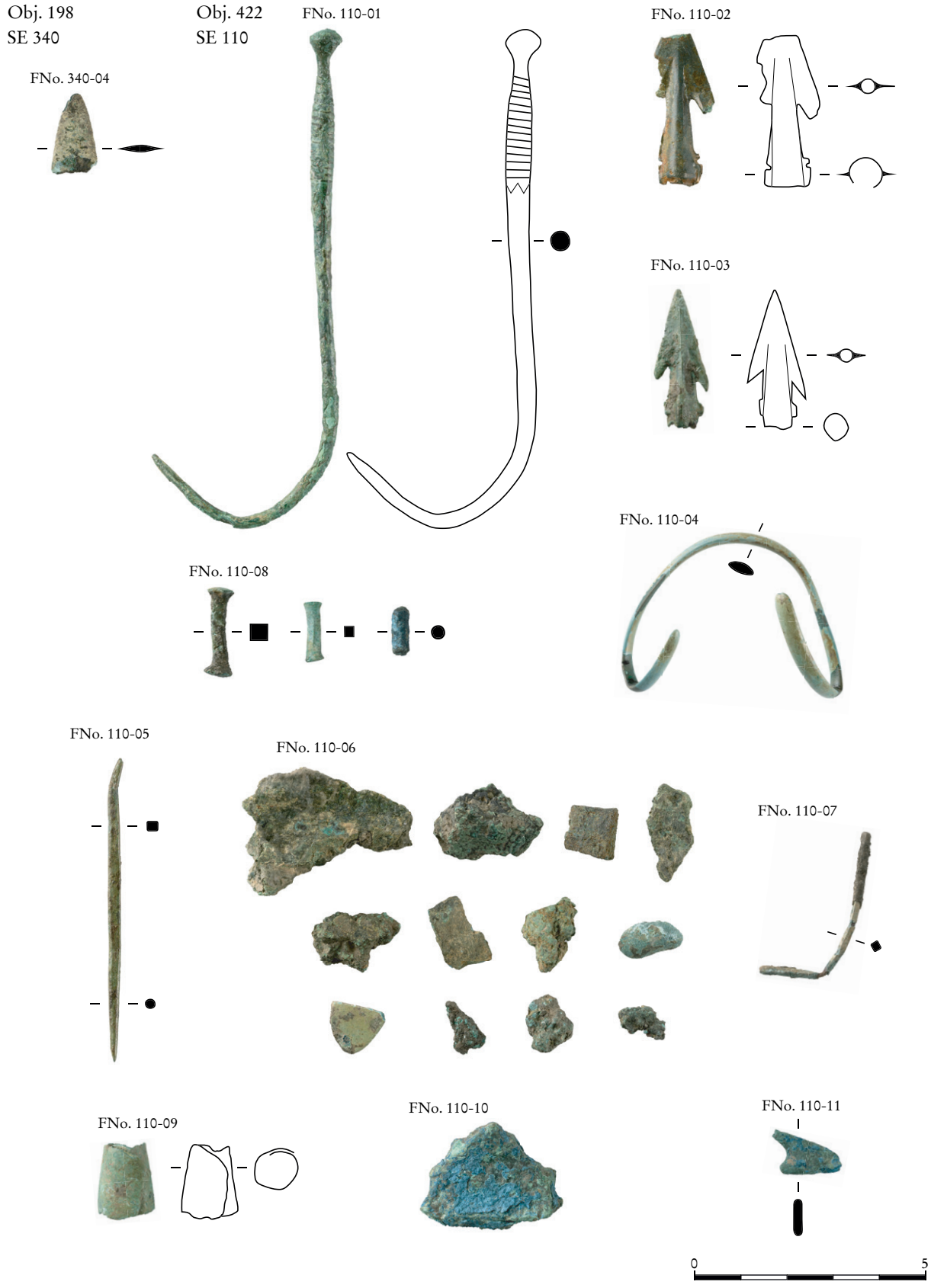

Plate 1. Bronze artefacts from Müllendorf, Gewerbegebiet Breitensee (M. Piniel, Pictures: G. Gattinger, Department of Prehistoric and Historical Archaeology, University of Vienna [IUHA]).

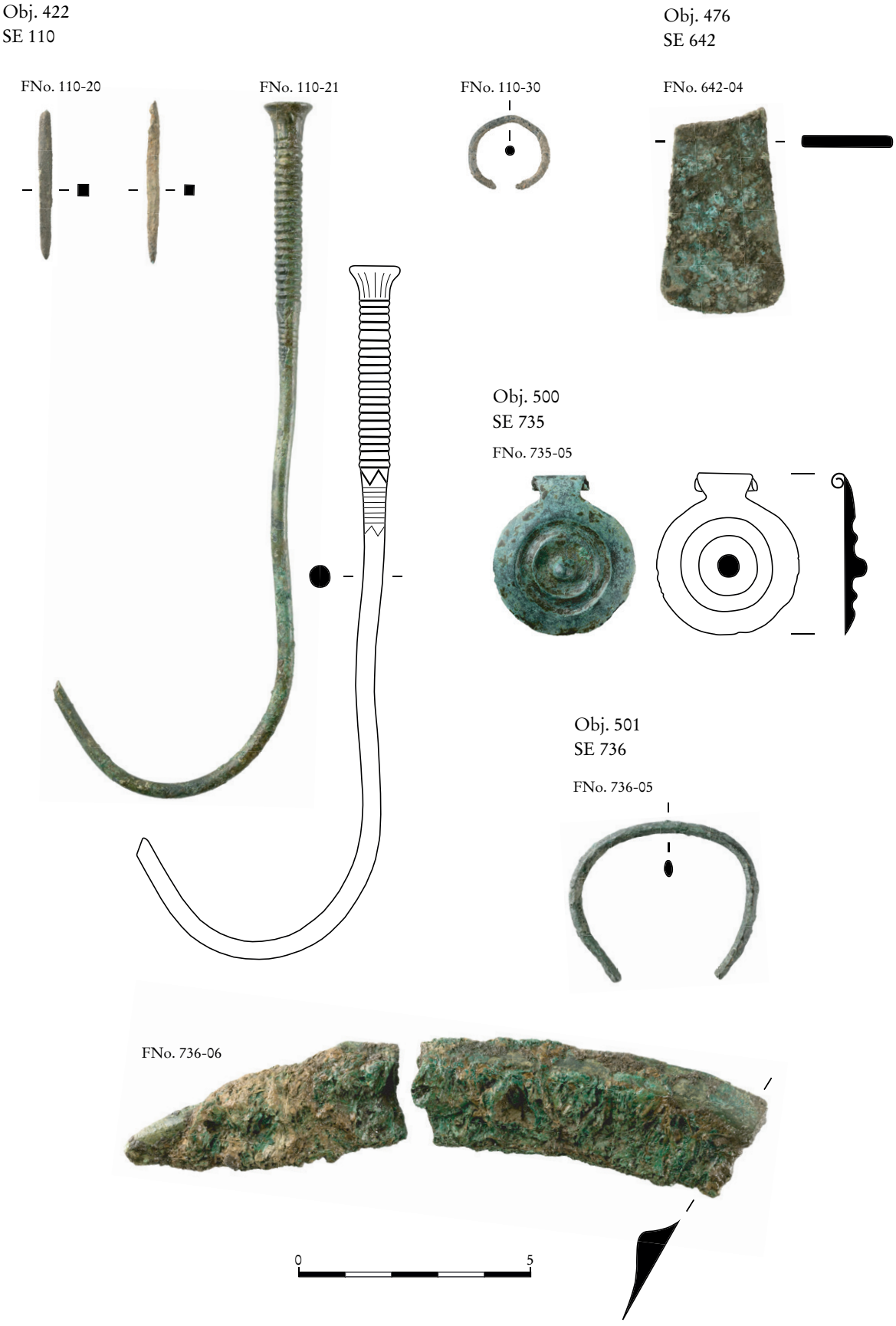

Plate 2. Bronze artefacts from Müllendorf, Gewerbegebiet Breitensee (M. Piniel, Pictures: G. Gattinger, IUHA).

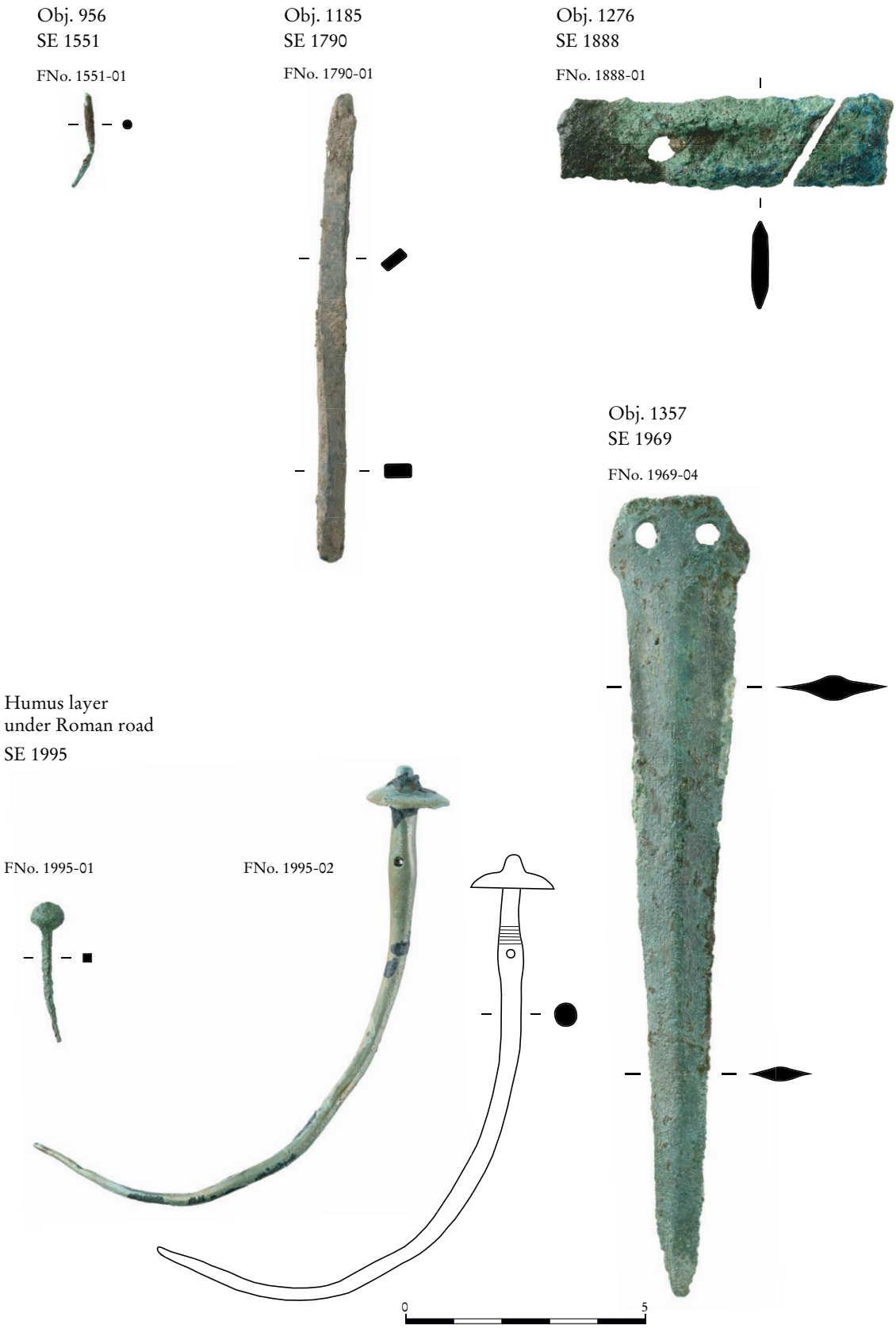

Plate 3. Bronze artefacts from Müllendorf, Gewerbegebiet Breitensee (M. Piniel, Pictures: G. Gattinger, IUHA).

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