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Dating of the Mierzanowice culture settlement in Jarosław, site 158, Podkarpackie province, based on the results of radiocarbon analyses

Abstract

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For the Mierzanowice culture from western Lesser Poland, the settlement in Iwanowice, Babia Góra site, is a chronological benchmark. A large number of datings obtained for objects from Jarosław, site 158, Podkarpackie province, provides grounds for treating that settlement as a model one in the eastern range of the Mierzanowice culture. The radiocarbon dating and ceramic design features allow them to be placed in a wide chronological frame of 2200–2000 BC.

Keywords: radiocarbon dating, Mierzanowice culture, Rzeszów Foothills

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Introduction

Only a few years ago, based on the published information, it could be assumed that the communities of the Mierzanowice culture did not intensively inhabit the Rzeszów–Przemyśl loess areas, especially during its earlier stages (Kadrow and Machnik 1997). The remains of a settlement in Chłopice, Jarosław district, connected by J. Machnik (1960; 2011) with the proto- and early phase of the Mierzanowice culture, were considered an exceptional discovery. In addition, there was a very small pool of radiocarbon dating related to the materials of the Mierzanowice culture at that time (Madej 1998; Calderoni *et al.* 2000). The results of analyses presented by S. Kadrow (1991) for Iwanowice, Babia Góra site were the benchmark for the description of changes in the style of ceramics of the Mierzanowice culture from the Rzeszów–Przemyśl loess areas.

In recent years, however, the situation has changed significantly due to extensive research conducted along the A4 motorway in 2008–2012 by the Institute of Archaeology in Rzeszów. As a result, a number of settlements (Kadrow and Poradyło 2016) were recognized, as well as the Mierzanowice culture cemeteries of di-

versified size and chronology (Machnik 2011; Rybicka *et al.* 2017). The following may be mentioned here as examples: the site in Skołoszów, site no. 7, Podkarpackie province (Rybicka *et al.* 2017) and the settlement in Jarosław, site 158, Podkarpackie province (Pelisiak and Rybicka 2013).

These discoveries showed that the communities of the Mierzanowice culture intensively inhabited Rzeszów Foothills throughout the entire duration of this culture (Madej 1998; Rybicka *et al.* 2017). To place the functioning of the Mierzanowice communities in the Rzeszów–Przemyśl loess areas in time, a number of radiocarbon datings were made for both sediment features from Jarosław, site 158 (Pelisiak and Rybicka 2013), as well as graves discovered in, among others, Skołoszów, site 7, Podkarpackie province (Rybicka *et al.* 2017).

The entirely excavated and investigated site 158 in Jarosław, Podkarpackie province, is particularly significant for the assessment of the beginning of the Mierzanowice culture communities' settlement in the region, as well as for determining the size and duration of their settlements (Pelisiak and Rybicka 2013). The Mierzanowice culture materials from this site and the results of radiocarbon analysis obtained for



Fig. 1. Jarosław, Site 158, Podkarpackie province. Location of the site in the context of other sites excavated on the route of prospective motorway A4 in the Podkarpackie province.

them have already been published. In the context of a number of new datings obtained for tombs from Rzeszów–Przemyśl loess areas, it is worth taking a closer look at them again. It is particularly important to assess whether, in light of the results of radiocarbon dating and analysis of the style of ceramics, the remains of the settlement of the Mierzanowice culture from Jarosław, site 158, represent different phases of the culture settlement in this place.

Location and arrangement of trapeze-shaped features in Jarosław, site 158, Podkarpackie province

Site 158 in Jarosław was located on the flattened loess spur of the upper terrace of the San River (Fig. 1). The relative heights between the bottom of the valley and the surface occupied by settlement are several meters. The settlement covered an area of over 2 ha (Fig. 2). In Jarosław, site 158, 45 trapeze-shaped pits representing the Mierzanowice culture (Fig. 2), most of them with layered fillings (Rybicka 2013, Figs. 16–20) and several hollow-shaped pits were found. They formed clusters consisting of several closely spaced features (e.g. 529–531; Fig. 2). These concentrations were relatively regularly distributed on the outer part of an

oval area, while the centre of the settlement was characterized by a lower number of features.

If we assume after Sławomir Kadrow (1991) that the trapeze-shaped pit marks the place where a farmstead was situated, then the presence of such small clusters of them may suggest that individual features included in their composition were created at different times. As in many trapeze-shaped pits there were neither ceramics nor distinctive ceramic elements (e.g. features number 131, 231B, 248, 261, 264, 321, 326, 437, 437, 470 480, 482, 528, 531, 1255), it was difficult to assess the time of their creation. Therefore, an attempt was made to perform radiocarbon dating for features representing individual clusters located in different zones of the settlement (Fig. 2). Radiocarbon dating of all the identified clusters of features in Jarosław, site 158, was impossible due to a lack of the appropriate materials necessary for such analyses.

Ceramics

In the published study on the Mierzanowice culture ceramics from Jarosław, site 158, it was stated that it seems to be a rather typologically and stylistically homogeneous collection and that it generally fits entirely within the two stages of the early phase of the Mierzanowice culture (Rybicka 2013, figs. 29–56) distinguished by

Kadrow (1991) and also that it has numerous counterparts in similarly dated sites practically throughout the culture's entire range (Kadrow and Machnik 1997).

In the collection of fragments of vessels from Jarosław, site 158, however, one can distinguish some deviations from the early-Mierzanowice culture canon, presented by Kadrow (1991). In several features numbered 13, 243, 250, 290, 336, 397, 455, 529 (Fig. 2), more or less explicit references to both the proto- and early Mierzanowice phase (Rybicka 2013, 110–111) or / and the classic Mierzanowice phase (Rybicka 2013, 112) were noted. Ceramics from some of them, with stylistics reminiscent of proto-Mierzanowice, were found in the secondary deposit, sometimes with vessels with early Mierzanowice features and a style predicting the classic Mierzanowice (e.g. feature 336; Rybicka 2013, fig. 35). The full set of ceramic characteristics corresponding, in the view of S. Kadrow and J. Machnik (1997), to the proto- and classic Mierzanowice phases was not registered in Jarosław, site 158, there were only some characteristics signalling the last aforementioned stage of the Mierzanowice culture stylistics development (Rybicka

2013, 110–113). The results of stylistic assessments, as well as the cluster distribution of features, may suggest the non-homogeneity of the remains of the settlement from Jarosław, site 158.

According to Kadrow and Jan Machnik (1997, 31) “There are still no clear phase indicators. Therefore, it is the set of features that should constitute the assignment of a given artefact to a given phase.” Thus, the observed deviations from the early Mierzanowice canon do not necessarily indicate the multiphase nature of the described settlement.

Radiocarbon dating of Mierzanowice culture features in the context of ceramic style

For materials and trapeze-shaped features of the Mierzanowice culture, 15 radiocarbon datings were obtained with the AMS method at the Poznań Radiocarbon Laboratory (Rybicka 2013, 114). What is more, two samples from backfill hollows of hollow-shaped pits were dated (Table 1; Rybicka 2013, 121).

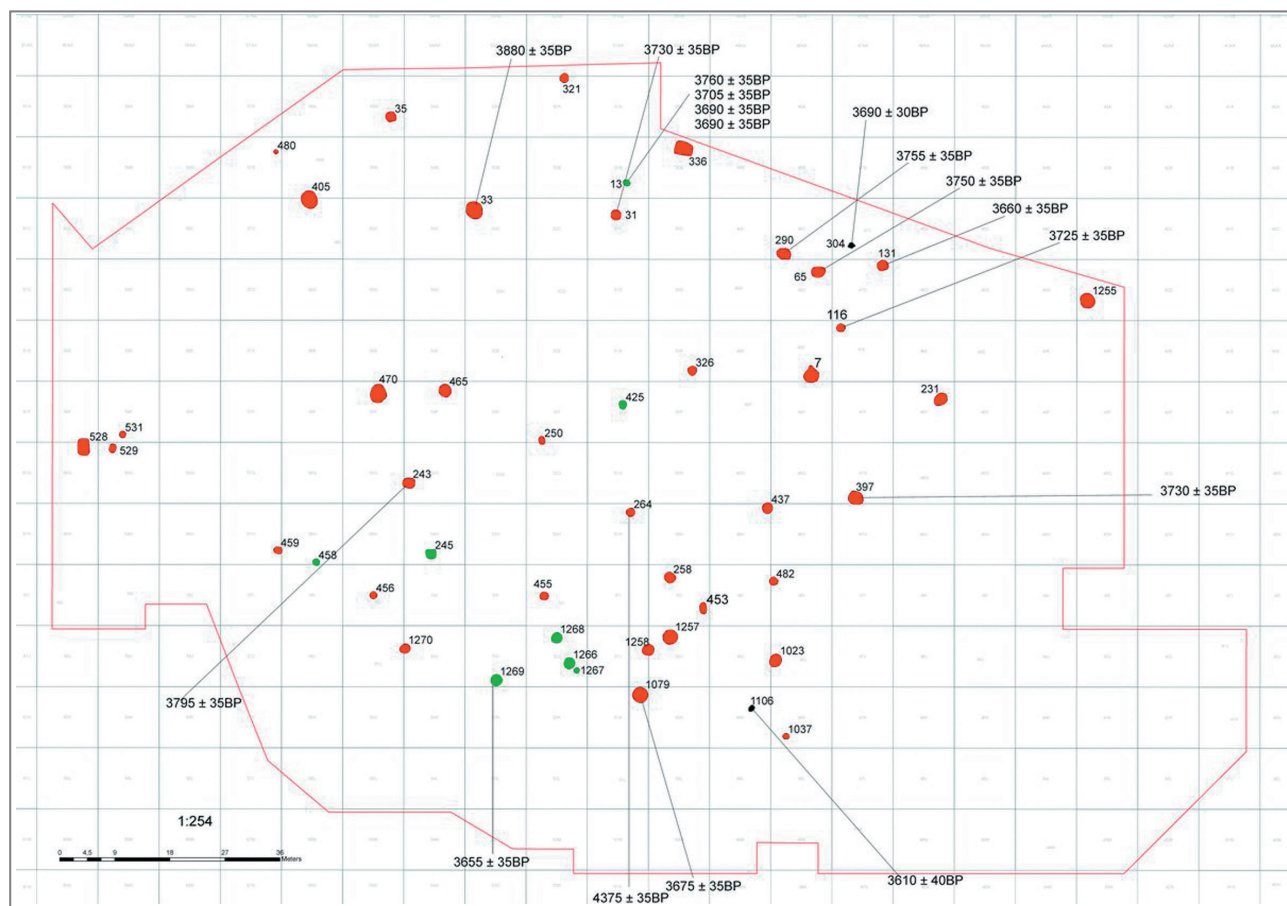


Fig. 2. Jarosław, Site 158, Podkarpackie province. Distribution of stratified and non-stratified trapeze-shaped features and hollow-shaped pits with ^{14}C dates. 1 – non-stratified trapeze-shaped features; 2 – stratified trapeze-shaped features; 3 – hollow-shaped pits.

In five features there were no distinctive artefacts (e.g. trapeze-shaped features: 1079, 1269, 131; hollow-shaped features: 304, 1106; Fig. 2). In addition, one of the datings received is neither related to the Mierzanowice culture, nor to the earlier, short-term stage of the use of this place by the Malice culture communities (Pelisiak and Rybicka 2013), because the result obtained for the trapeze-shaped pit base 264 is Poz-31745: 4375 ± 35 BP. It is probably the effect of redeposited charcoal dating.

Very young datings, which are the result of the analysis of samples from backfill hollows of hollow-shaped

pits nos. 304 (Poz-31736: 3690 ± 35 BP) and 1106 (Poz-31750: 3610 ± 35 BP), in which movable artefacts were not discovered, suggest their relationship with the Mierzanowice culture.

Three groups were distinguished in the series of other datings. The first of them includes the questionable dating obtained for feature 33, which is Poz-31696: 3880 ± 35 years BP (Table 1), and corresponds to the proto-Mierzanowice stage. In the said pit there were no ceramics with such features but only a few fragments with stylistics referring to the early Mierzanowice phase (Rybicka 2013).

Table 1. Jarosław, Site 158, Podkarpackie province. List of radiocarbon datings for the Mierzanowice culture features.

No.	Sample location	Dated material	Sample number	BP	BC(68,2%) Oxcal	BC(95,4%) Oxcal
1.	Jarosław, site 158, feat. 33, depth 80–100 cm	charcoal	Poz-31696	3880 ± 35	2456 BC (20.7%) 2416 BC 2410 BC (38.7%) 2334 BC 2324 BC (8.8%) 2306 BC	2469 BC (91.0%) 2279 BC 2250 BC (3.4%) 2230 BC 2220 BC (1.0%) 2212 BC
2	Jarosław, site 158, feat. 243, depth 100–120 cm	charcoal	Poz-31697	3795 ± 35	2286 BC (59.1%) 2198 BC 2166 BC (9.1%) 2150 BC	2397 BC (0.7%) 2385 BC 2346 BC (93.4%) 2133 BC 2080 BC (1.3%) 2061 BC
3	Jarosław, site 158, feat. 13, depth 100–120 cm	organic material from a vessel	Poz-31751	3760 ± 35	2274 BC (8.9%) 2256 BC 2209 BC (54.7%) 2134 BC 2076 BC (4.6%) 2064 BC	2288 BC (80.4%) 2120 BC 2094 BC (15.0%) 2041 BC
4	Jarosław, site 158, feat. 290, depth 120–140 cm	charcoal	Poz-31704	3755 ± 35	2271 BC (5.1%) 2259 BC 2206 BC (54.1%) 2133 BC 2081 BC (8.9%) 2060 BC	2286 BC (76.7%) 2116 BC 2098 BC (18.7%) 2038 BC
5	Jarosław, site 158, feat. 65, depth 120–140 cm	charcoal	Poz-31695	3750 ± 35	2266 BC (1.8%) 2261 BC 2206 BC (51.9%) 2131 BC 2085 BC (14.5%) 2052 BC	2284 BC (9.7%) 2247 BC 2234 BC (62.7%) 2111 BC 2104 BC (23.1%) 2036 BC
6	Jarosław, site 158, feat. 397, depth 100–120 cm	charcoal	Poz-31742	3730 ± 35	2198 BC (22.7%) 2162 BC 2152 BC (16.3%) 2126 BC 2090 BC (29.2%) 2044 BC	2276 BC (2.9%) 2254 BC 2210 BC (92.5%) 2028 BC
7	Jarosław, site 158, feat. 31, depth 120–140 cm	charcoal	Poz-31743	3730 ± 35	2198 BC (22.7%) 2162 BC 2152 BC (16.3%) 2126 BC 2090 BC (29.2%) 2044 BC	2276 BC (2.9%) 2254 BC 2210 BC (92.5%) 2028 BC
8	Jarosław, site 158, feat. 116, depth 140 cm – base	charcoal	Poz-31739	3725 ± 35	2197 BC (17.7%) 2168 BC 2149 BC (16.8%) 2121 BC 2094 BC (33.6%) 2042 BC	2274 BC (2.0%) 2256 BC 2209 BC (93.4%) 2024 BC
9	Jarosław, site 158, feat. 13, depth 100–120 cm	organic material from a vessel	Poz-31752	3705 ± 35	2140 BC (68.2%) 2036 BC	2201 BC (92.9%) 2016 BC 1996 BC (2.5%) 1980 BC
10	Jarosław, site 158, feat. 13, depth 80–100 cm	organic material from a vessel	Poz-31753	3690 ± 35	2136 BC (68.2%) 2031 BC	2198 BC (6.6%) 2166 BC 2150 BC (88.8%) 1966 BC
11	Jarosław, site 158, feat. 13, depth 100–120 cm	charcoal	Poz-31741	3690 ± 35	2136 BC (68.2%) 2031 BC	2198 BC (6.6%) 2166 BC 2150 BC (88.8%) 1966 BC
12	Jarosław, site 158, feat. 304	charcoal	Poz-31736	3690 ± 30	2134 BC (45.3%) 2070 BC 2064 BC (22.9%) 2032 BC	2196 BC (4.6%) 2170 BC 2146 BC (85.6%) 2010 BC 2001 BC (5.1%) 1977 BC
13	Jarosław, site 158, feat. 1079, depth 90–110 cm	charcoal	Poz-31734	3675 ± 35	2134 BC (36.2%) 2078 BC 2063 BC (26.3%) 2019 BC 1994 BC (5.6%) 1982 BC	2192 BC (1.7%) 2180 BC 2142 BC (93.7%) 1952 BC
14	Jarosław, site 158, feat. 131, depth 80–100 cm	charcoal	Poz-31698	3660 ± 35	2130 BC (24.4%) 2087 BC 2049 BC (43.8%) 1972 BC	2140 BC (95.4%) 1939 BC
15	Jarosław, site 158, feat. 1269, depth 150–170 cm	charcoal	Poz-31735	3655 ± 35	2124 BC (19.3%) 2091 BC 2043 BC (48.9%) 1964 BC	2138 BC (95.4%) 1938 BC
16	Jarosław, site 158, feat. 1106, depth 50–70 cm	charcoal	Poz-31750	3610 ± 40	2025 BC (68.2%) 1921 BC	2131 BC (6.7%) 2086 BC 2050 BC (88.7%) 1881 BC

The second group includes 6 datings made for charcoal from the base parts of features numbered: 243 (Poz-31697: 3795 ± 35 BP; depth 100–120 cm), 290 (Poz-31704: 3755 ± 35 BP; depth 120–140 cm), 65 (Poz-31695: 3750 ± 35 BP; depth 120–140 cm), 31 (Poz-31743: 3730 ± 35 BP; depth 120–140 cm), 397 (Poz-31742: 3730 ± 35 BP; depth 100–120 cm), 116 (Poz-31739: 3725 ± 35 BP; depth below 140 cm). These features are located in various zones of the Mierzanowice culture settlement (Table 1; Fig. 2).

The radiocarbon dating obtained for the sample from feature no. 243 (3795 ± 35 BP; Table 1) requires discussion, after calibration for 95.4% probability the result is 2397–2061 BC. In the dated layer (Fig. 3), a vessel was discovered – probably in situ – with technological features referring (Rybicka 2013, 111), in Kadrow's view (1991), to those distinguishing the classic phase of the Mierzanowice culture, in the literature dated to 2050 BC – 1850 BC (Kadrow, Machnik 1997), i.e., generally speaking, with younger chronology than the ^{14}C result obtained for the sample from pit 243. It can be assumed that the mentioned vessel is connected with the period of functioning of this feature. A vessel (Fig. 4) made with a technology close to the

features of the classic phase of the Mierzanowice culture (Kadrow 1991) was discovered in the base of feature no. 397. The dating obtained for this pit is, after calibration for 95.4% probability, 2276–2028 BC, i.e. it is similar to the result from feature no. 243 (Table 1). In this context, the dating obtained for the charcoal from pit base no. 290 (Table 1) is also interesting. It is 3755 ± 35 BP, which is after calibration for a 95.4% probability, 2286–2038 BC. In the dated layer of object no. 290 there were vessels with features that, according to Kadrow (1991), generally correspond to the early phase of the Mierzanowice culture as well as with features characterising the classical phase (Rybicka, 2013, 116; cf. Fig. 5; 6: 1, 3). As for feature no. 31, in the radiocarbon-dated layer (3730 ± 35 BP; after calibration for 95.4%: 2276–2030 BC) vessels with features of the early Mierzanowice phase were distinguished (Rybicka, 2013, fig. 42: 9). The obtained result goes well with the archaeological artefacts found there, as in the case of features no. 65 and 116 (Table 1; Rybicka, 2013, 120). Summing up, all the results presented allow the described features to be placed in a time interval of about 2280–2020 BC. They are also connected in terms of the features of ornamentation and ceramic technology that distinguish

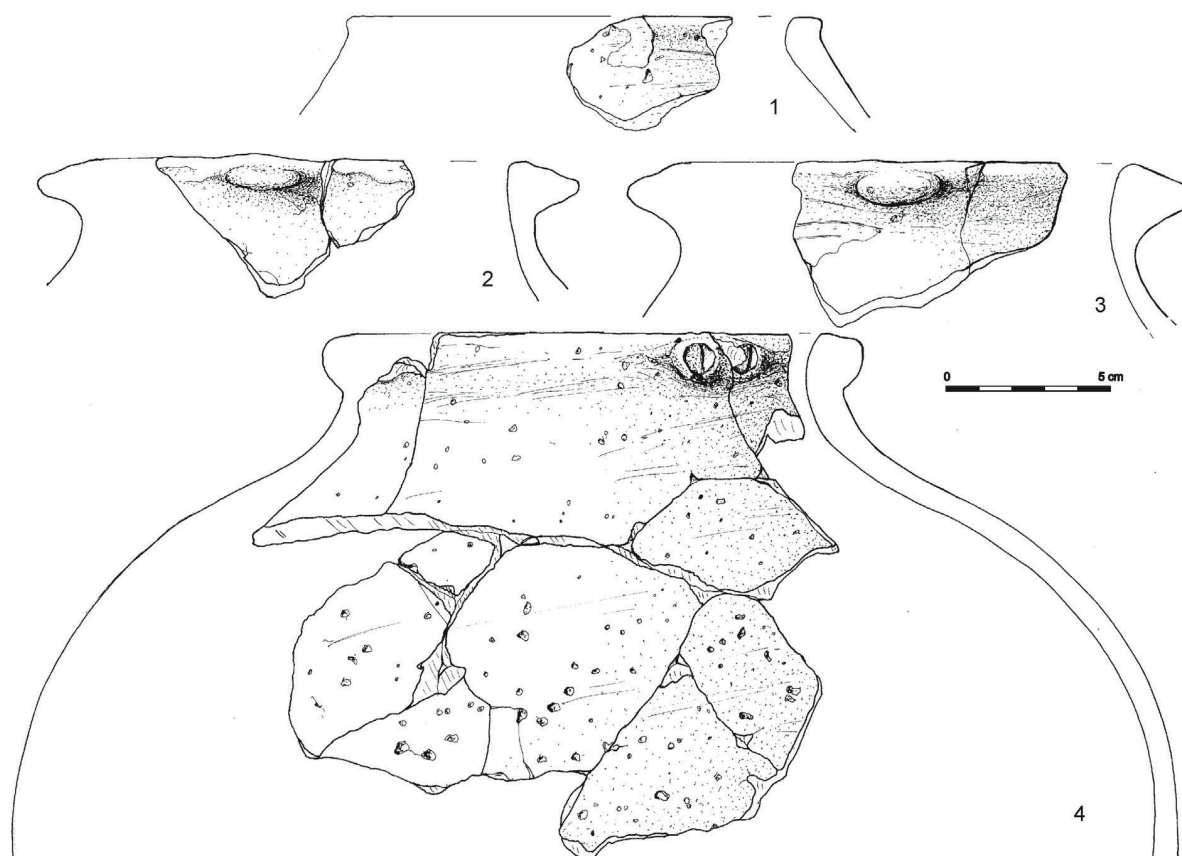


Fig. 3. Jarosław, Site 158, Podkarpackie province. Pottery of Mierzanowice culture from pit 243. 1–4: depth 100–120 cm.

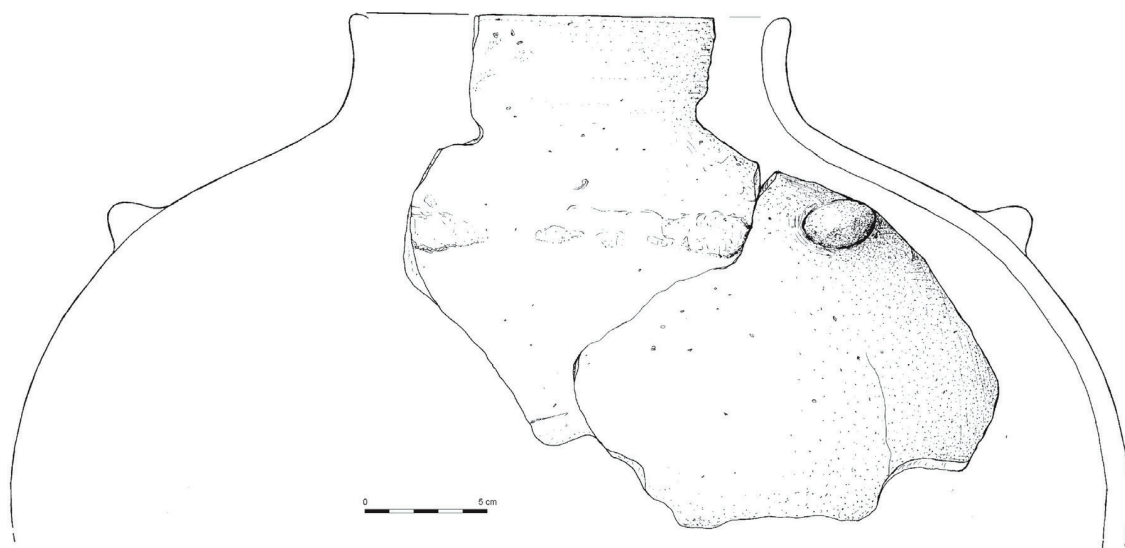


Fig. 4. Jarosław, Site 158, Podkarpackie province. Pottery of Mierzanowice culture from pit 397 (depth 80–100 cm).

the early Mierzanowice phase and signal the new quality of the classic Mierzanowice phase (see Rybicka, 2013, 110–121).

Four radiocarbon datings were obtained for charcoal and organic material deposited on the inner part of the vessel from feature no. 13. They are Poz-31751: 3760 ± 35 , Poz-31752: 3705 ± 35 , Poz-31753: 3690 ± 35 and Poz-31741: 3690 ± 35 BP (Table 1). The results are slightly different (Fig. 7; table 1). According to Adam Walanus and Tomasz Goslar (2004, 80) “...two measurement results of the same object will practically always be different, this is due to the inevitable random factor in the measurement...”. The probability range for the dating made for the charcoal is 2298–1966 BC, while for the organic matter it is 2201–1980 BC, 2198–1966 BC and 2288–2041 BC. Generally, they fall within the younger stages of the early phase of the Mierzanowice culture and / or the beginnings of the classical phase.

In the context of the published time frames for the early Mierzanowice phases, that is 2200–2050 BC, and for the classic Mierzanowice phase, 2050–1900 BC (Kadrow and Machnik 1997), the dating obtained for features 243, 397 and 290, in which, among others, the culture’s 3rd stage technology characteristics were found, could be considered too early. This could result from, as Kadrow (1991) explained in the case of radiocarbon datings from Iwanowice, Babia Góra site, which referred to the proto-Mierzanowice phase, dating redeposited coal. The results of radiocarbon dating obtained for the base of feature no. 13 (Fig. 7) and organic material registered on ceramics from this pit are partly similar to the dates obtained for ceramic

assemblage from features 243, 290 and 397 (Table 1). Taking into account the earlier time intervals for the latter and the later time intervals for the previously described features, one can connect the trapeze-shaped features from Jarosław, site 158 with the younger stages of the early phase of the Mierzanowice culture (Fig. 8). Accepting the described 14C dating, it can be assumed that some characteristics related to the classic phase of the Mierzanowice culture might have appeared earlier than assumed by Kadrow and Machnik (1997).

The results obtained for the samples from the bases of trapeze-shaped pits numbered 1079 (Poz-31734: 3675 ± 35 BP; depth 90–110 cm) and 1269 (Poz-31735: 3655 ± 35 years BP; depth 150–170 cm) and located along the southern border of the settlement, in which few, non-distinctive fragments of ceramics were discovered, are difficult to assess in the context of the previously described pool of datings. As for the dating obtained for the backfill hollow of feature 131, which is Poz-31698: 3660 ± 35 years BP (Table 1), the situation is different. It can be assumed that the dating does not refer to the time of its functioning and creation, but it determines the time of the backfilling process within the feature.

As the presented data shows, trapeze-shaped features generally representing the early Mierzanowice phase can be directly connected with the time of the functioning of the Mierzanowice culture settlement. A few later dates, obtained for samples from the backfill hollows of trapeze-shaped and hollow-shaped features, are not related to the time of the Mierzanowice communities settlement in the place (features: 131, 304, and 1106).

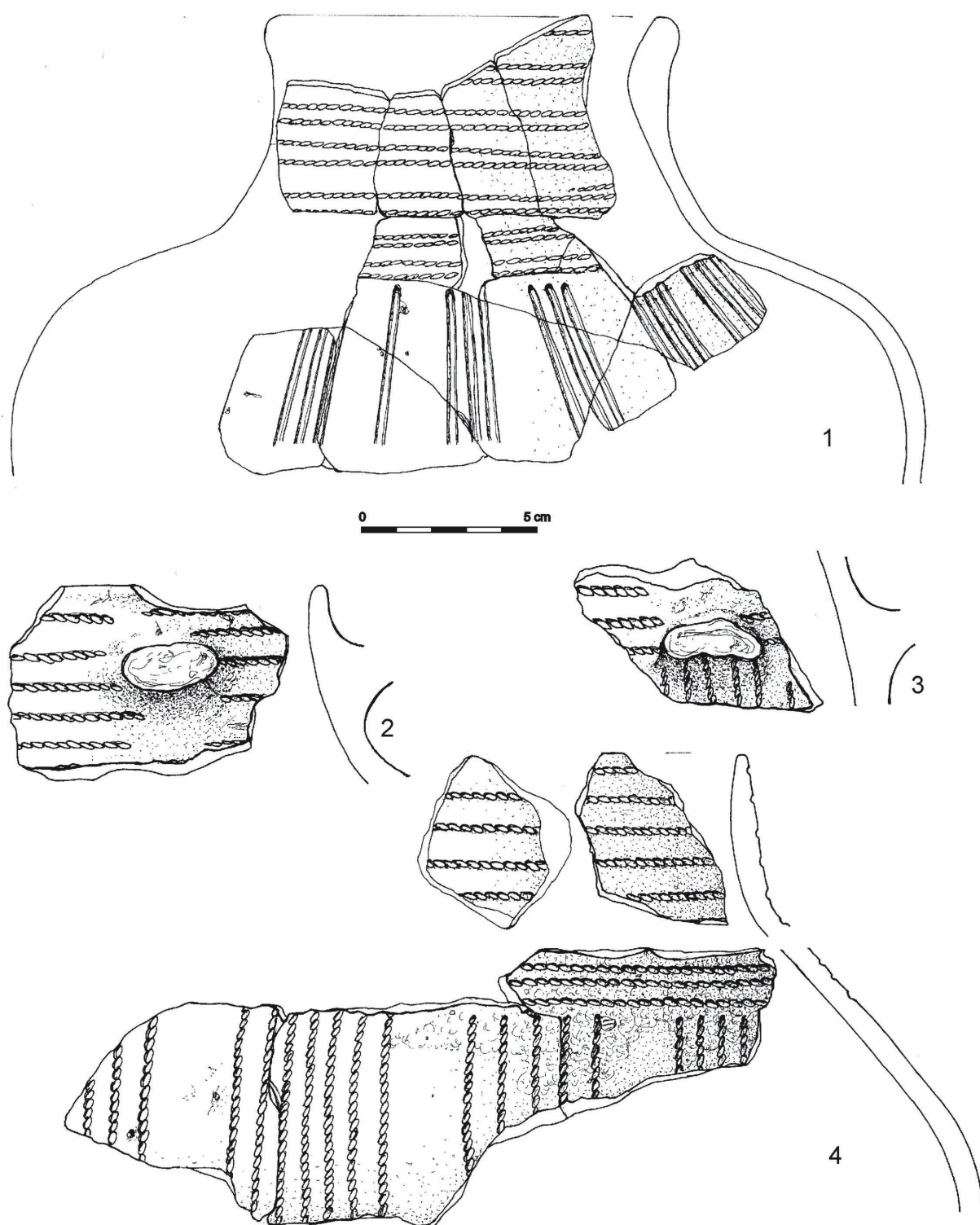


Fig. 5. Jarosław, Site 158, Podkarpackie province. Pottery of Mierzanowice culture from pit 290. 1-2: depth 120-140 cm; 3: depth 20-40 cm; 4: depth 140-160 cm.

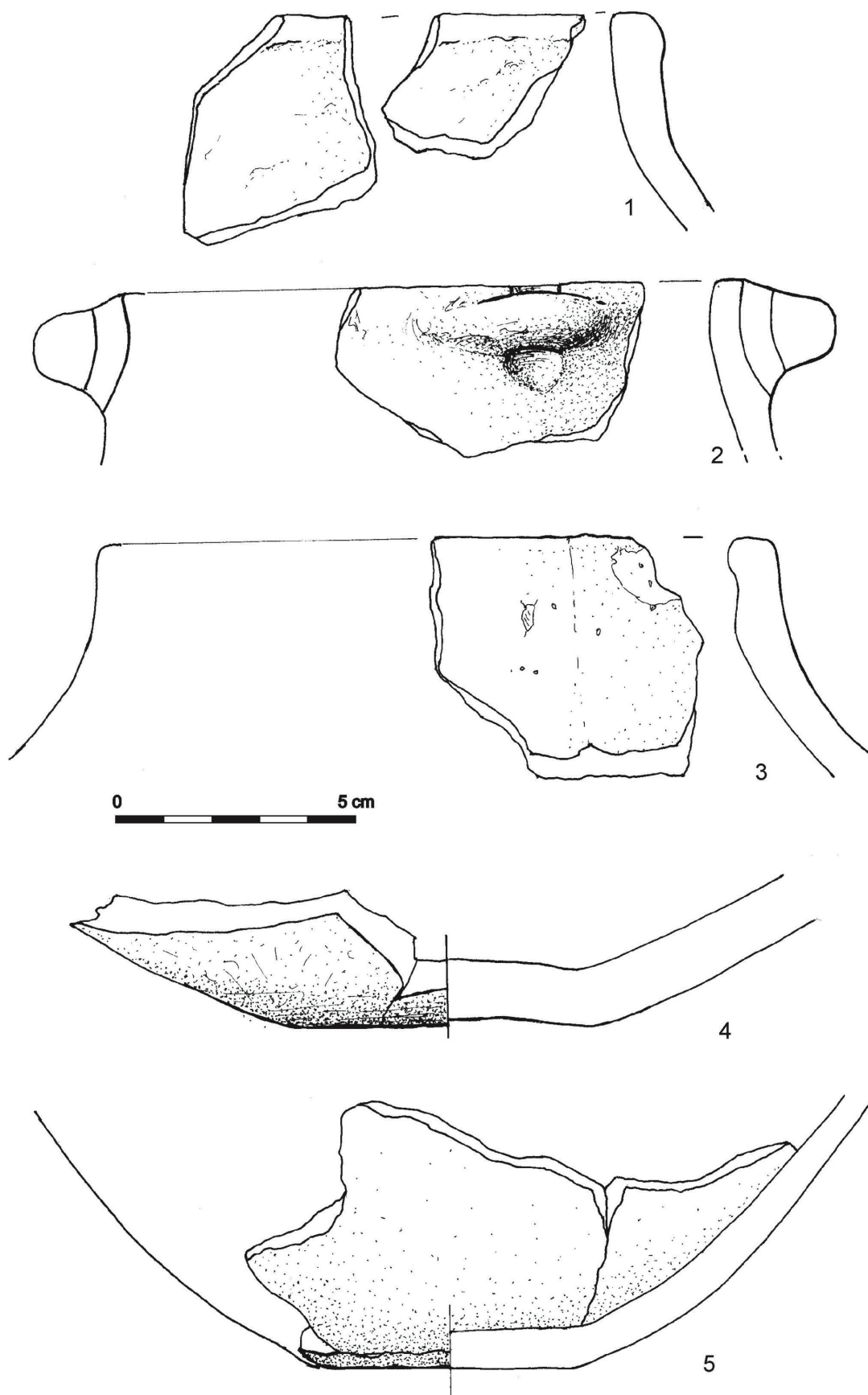


Fig. 6. Jarosław, Site 158, Podkarpackie province. Pottery of Mierzanowice culture from pit 290.
1: depth 120–140 cm; 2–5: 140–160 cm.

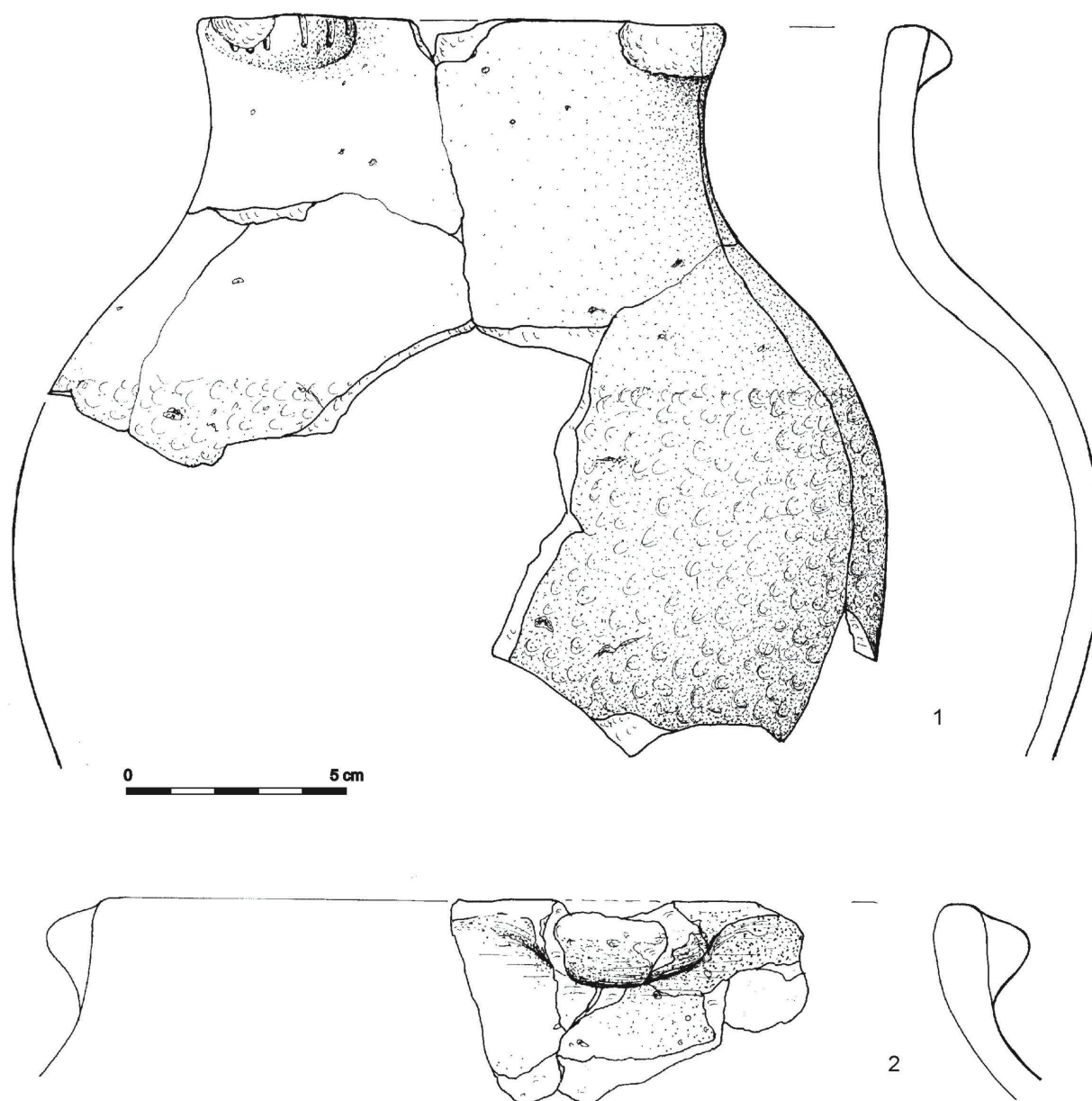


Fig. 7. Jarosław, Site 158, Podkarpackie province. Pottery of Mierzanowice culture from pit 13.
1: depth 80–100 I 100–120 cm; 2: depth 100–120 cm.

Is it possible to conclude, based on the assessments of the style of ceramics and radiocarbon dating, that the features of the Mierzanowice culture represent different stages of the settlement in this place?

Treating the received radiocarbon dating referring to the trapeze-shaped features of the Mierzanowice culture located in different zones of the settlement in Jarosław literally, site 158 can be connected with a relatively wide period of time, from about 2300 to 1900 BC (Fig. 8). Ceramics from many of the features generally correspond to the early Mierzanowice phase with elements signalling the classic stage of this culture (Rybicka 2013, 110–116). At the same time, in several

‘early Mierzanowice’ features, for one of which (object 290) 14C dating in the range of 2300–2050 BC (Table 1) was obtained, fragments of ceramics with proto-Mierzanowice features, which probably came from a secondary context, were distinguished (Rybicka 2013). The published study suggested that the beginning of the Mierzanowice culture settlement in Jarosław, site 158, might indicate the breakthrough in the transition from the proto- to early Mierzanowice phases and that this stage may be represented by trapeze-shaped pits with little material or no material at all (Rybicka 2013). Such assumption may also be supported by the result obtained for pit 33 (Table 1). Features with such

characteristics are included in some clusters (e.g. 528, 531; 131; 231; 482, 437; 480; 470). However, there are no clear arguments supporting this conclusion.

In the case of the north-eastern cluster of features, which includes pits 290, 65, 116, the datings obtained for them are similar, and they are, respectively, 3755 ± 35 BP (95.4% probability: 2286–2038 BC), 3750 ± 35 BP (95.4% probability: 2284–2036 BC) and 3725 ± 35 BP (95.4% probability: 2274–2024 BC). The distances between neighbouring features in this cluster are about 10 m. Kadrow (1991) assumed that trapeze-shaped pits mark the places where farmsteads functioned. It cannot be determined, however, whether only one trapeze-shaped pit could function around the farmstead within one period of time, or if there were more, and whether the duration of such features corresponded to the period of the functioning of the hut, as well as how large the area used by the inhabitants of the hut was. Therefore, it cannot be unequivocally determined whether the features included in the clusters are remains of, according to Kadrow (1991), various construction phases within one settlement phase of a given place, or whether they are the effect of a gradual use of the economic environment around the farmstead. The style of ceramics from the above-mentioned features indicates their functioning within, in Kadrow's (1991) view, one settlement phase with the dominant features of the early Mierzanowice, similarly to most of the trapeze-shaped pits of the Mierzanowice culture from this site (Pelisiak and Rybicka 2013). One can only suggest that the chrono-

logical frame in which they were used was not wide and refers to the period between 2200 and 2000 BC (Fig. 8).

Summary

In recent years, a number of radiocarbon datings for the Corded Ware culture from the Rzeszów Foothills, representing the second half of 3rd millennium BC, have been obtained (Hozer *et al.* 2017, 108; Rybicka *et al.* 2017, 128). On this basis, it can be suggested that in the period of about 2500–2200 BC communities of this culture functioned in this area. Probably, at that time the aforementioned region was not intensively inhabited by communities of the Mierzanowice culture. The dating made for the settlement in Jarosław, site 158, with the result of 2200–2000 BC, coincides with the dating obtained for some of the Mierzanowice graves from Skołoszów, site 7 (Rybicka *et al.* 2017).

The Iwanowice, Babia Góra site, can now be treated as a chronological benchmark for the Mierzanowice culture from western Lesser Poland. Jarosław, site 158, currently plays a similar role for the early stages of this culture from Rzeszów Foothills. This is supported by a large pool of datings verifying ceramics style assessments. This led to considering the Mierzanowice settlement in Jarosław, site 158, as a place settled for a relatively short period of time. Studies on the spatial development of the Funnel Beaker culture habitats show that settlements inhabited for a short period of time provide the best basis for determining the settlement

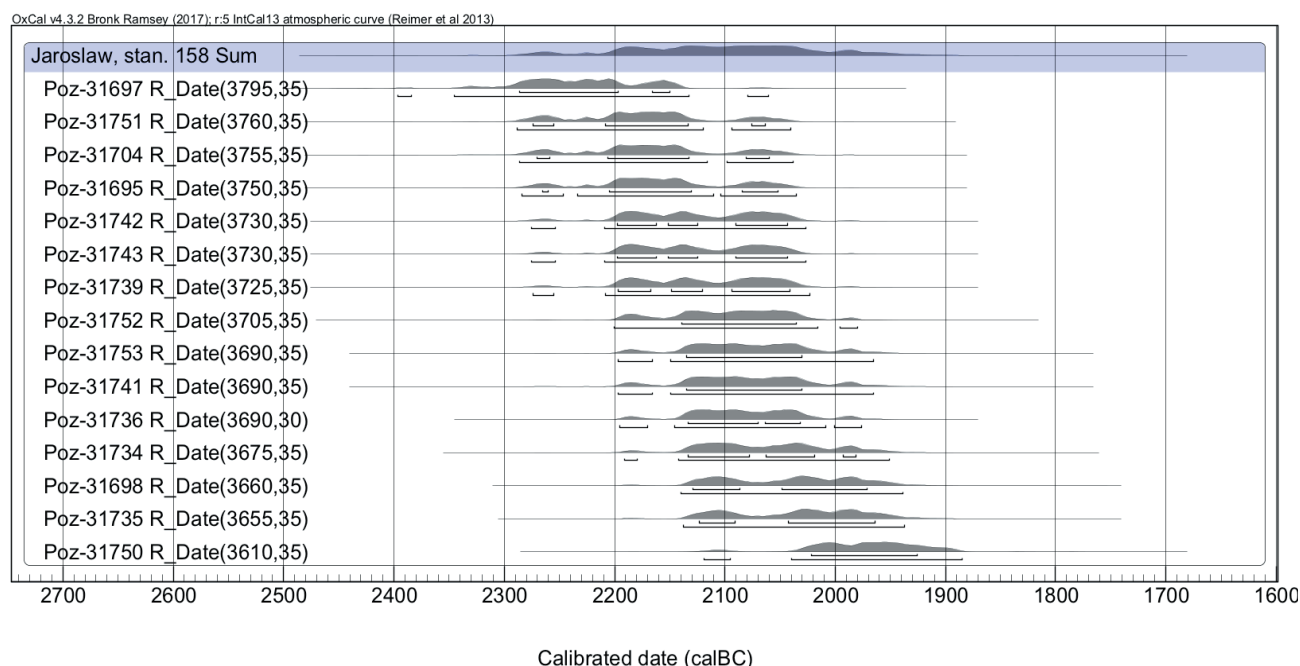


Fig. 8. Jarosław, Site 158, Podkarpackie province. Radiocarbon dates obtained for Mierzanowice culture features.

layout patterns functioning at a given time (Pelisiak 2003; Kulczycka-Leciejewiczowa 2002; Rybicka 2004; Rzepecki 2014). In this context, Jarosław, site 158, Podkarpackie province has a special place in research on the ways of occupation of space by the Mierzanowice culture communities.

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