Przegląd Archeologiczny
Vol. 41, 1993, pp. 87-99
ISSN 0079-7138

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THE RADIOCARBON DATING OF THE THREE OBJECTS FROM THE SETTLEMENT OF LUSATIAN CULTURE AT MACIEJOWICE, SIEDLCE VOIVODESHIP

The material for the radiocarbon analyses presented here comes from three pits, discovered in 1992 on the settlement (site 2) of Lusatian Culture at Maciejowice, Siedlce Voivodeship. This settlement is a part of the settlement complex of the population of this culture, together with a cemetery on site 1. The necropolis is partly overlapping a settlement located in the northern part of this site. This complex is dated to III – V Periods of the Bronze Age and the Hallstatt Period, while the data obtained so far do not enable us to determine chronology of settlements later than to V Period of the Bronze Age. The area occupied by the settlements (one settlement?) can be estimated at ca. 6 ha. Coals were collected from objects 82, 85, and 101. Pit 82 occured in the western part of the settlement at site 2, and pits 85 and 101 were located ca. 30 m north of that place. In the case of the last two, there has been noted a distinct layer of grey-brown sand with fragments of ceramics of Lusatian Culture overlapping the pits. The inventories of the pits comprised mostly ceramics, animal bones, flints, lumbs of baked daub, and burnt stones. In object 85 at the lowest depths there has been found a bronze spearhead. The radiocarbon dates obtained for the particular objects are as follows: object 82 – 2900±80 BP; object 85 – 2840±50 BP; object 101 – 2600±90 BP.

The material for the radiocarbon analyses presented in this article was collected in the course of the 12th season of the excavation of the settlement complex of Lusatian Culture at Maciejowice, Siedlce voivodeship (Dąbrowski, Mogielnicka-Urban 1987, 167 ff.; Mogielnicka-Urban 1989, 17 ff.)[1]. Presently this complex is situated in the winding of Okrzejka rivulet. Primarily, it was probably located close to the place where this rivulet flowed into the Vistula river. The complex is placed on a terrace above the floodplain, on a minor sandy hill greatly devastated and levelled due to agricultural activities. It comprises two sites: site 1 covers the central and northern parts of the discussed area, and site 2 – the western part.

At site 1, in its central part, there is a cemetery discovered by accident in 1958, partly overlapping a settlement on the northern periphery of the site.

Table 1. Conventional dates.

Object	Lab. No.	Age BP
85	Gd-6724	2900±80
85	Gd-7193	2840±50
101	Gd-6725	2600±90

This settlement was uncovered in the course of the excavations in 1986. Site 2 constitutes a settlement discovered in 1982. The necropolis has been excavated continuously since 1981, while the settlements irregularly: the first one over four seasons, and the other over eight seasons (Informator 1982 and the following editions).

The settlement complex comprising the cemetery and located between the cemetery and the river settlements (one settlement?), is dated to III – V Period of the Bronze Age and Early Iron Age. As yet, the settlements did not provide materials from the times following V Period of the Bronze Age.

The area of the necropolis is estimated ca. 40 ares. Less than a half of this area has been already investigated (1823,25 m^2), and the number of the objects discovered totals 1065, including 930 urn graves, 52 pit graves, 62 vessels with no bones inside and their assemblages, as well as 21 others (concen-

[1] We offer grateful acknowledgment to doc. dr hab. E. Stupnicka for her geological expertise; Prof. dr hab. A. Lasota-Moskalewska for the animal bones analysis; mgr M. Michniewicz for examining the contents of the spearhead socket; Prof. dr hab. M. F. Pazdur for radiocarbon dating and doc. dr hab. J. Lech and Prof. dr hab. J. Kruk for conducting its calibration and the publication of the results through their courtesy.

trations of stones or ceramics, post holes). It is a flat cemetery with single-urn graves, often multi-burial ones, forming more or less numerous, usually circular concentrations. The graves are situated on several levels, and often overlap other graves. The boundary points recognized in different places allow us to reconstruct the range of the cemetery; this combined with the graves' density in areas already excavated allows us to approximate the number of objects primarily located in the area of the necropolis at 3500–4000. Part of them were undoubtedly vessels with no bones inside, which at the present moment amount to 6% of all objects on this cemetery, and are remains of some specific ritualistic activities (Mogielnicka-Urban 1992, 101 ff.).

In the area north of the cemetery there were discovered 12 pits and 17 post holes (inc. 12 connected with a rectangular construction, slightly embedded in the ground), the remains of cultural layer and two graves most probably of Trzciniec Culture. The traces of settlement have been registered on the area of ca. 2 ha.

The settlement located west to the necropolis covers ca. 4 ha. The area of 5 ares was excavated here and 66 settlement objects were discovered (41 pits, 20 post holes, 2 hearths, 1 semi-pitdwelling, 1 vessel in situ in layer, and 1 concentration of stones), and two partly preserved inhumation graves, probably of Trzciniec Culture.

The mutual relations between the two parts of the settlement or settlements have not been studied thoroughly since it is impossible to investigate a relatively big part of the area of interest to us using the excavation method. Neither the analysis of the phosphorus content in deeper layers of soil provided an explicit answer, although it makes possible to mark out areas most intensively exploited. To some extent it is caused by the still too loose network of drilling sites. It has been planned to condense it in the course of further studies.

The extent of the settlements (one settlement?) was determined using two procedures. First, through establishing trenches in different places, sometimes considerably distant from one another, which made introductory penetration possible on the whole area. Second, through analysing the phosphorus content in the soil, which gave us some information on areas archaeologically not yet investigated. The data obtained in this way was verified by the excavation method.

The stratigraphical sequence of the layers and objects discovered in some sections of both sites allow us to assume that the area under discussion was inhabited several times, although it is still too early for more precise statements. Probably the settlement arrangement was loose and different in particular parts of the exploited area. Most probably previously there existed a cemetery of Trzciniec Culture, and an even older settlement is certified by materials from the Early Bronze Age scattered about both sides.

As it was mentioned before, the settlement had been established on a sandy hill. This resulted in the fact that despite a big number of objects not until 1992 were discovered pits containing the quantity of charcoal sufficient for performing analysis. These are objects 82, 85, and 101.

Object 82 is situated in the western part of the settlement on site 2, on the right bank of the minor, presently non-existent tributary. In this area (are 373 W/ 403 W) under arable humus containing few archaeological materials there was recognized a layer of brown sand of thickness 4–20 cm, vanishing in the southern part of the trench. Fragments of ceramic from the 16–17th c. AD outnumber vessel fragments of Lusatian Culture. Bellow lay yellow and light-yellow sand interspersed with levels of hardpan, as well as with small, sometimes slanted layers of loam and clay. At the bottom there were horizontal and slanted layers of sand. Pit 82 was situated directly beneath the layer of brown sand, and cut in yellow and light-yellow straticulated sand.

Object 82 (Fig. 1, 2). Are 373 W/403 W
The object occured at the depth of 32 cm; oval-shaped, 1,1 × 1,5 m in size. Its northern and south-eastern boundaries are underlined by small layers of accumulated hardpan. In section it has flat bottom and arch-formed sides. The infilling comprised brown sand, in the central and bottom parts black, interspersed weith hardpan. The inventory was composed of numerous fragments of ceramics, lumps of baked daub, flints, burnt stones, charcoals, and animal bones. The latter occured more abundantly by the north-eastern side of the pit, and at the bottom lay a big fragment of a jaw. Thickness 50 cm. The inventory of the pit comprises:

1. Four small flints: a flake of chocolate flint of "Zele" type, a flake and a flake of scaled piece of chocolate flint, and a flake of scaled piece of baltic erratic flint.

2. Two fragments of a cup with a weakly curved body, short neck, and strap handle. Colour brown, surfaces burnished, temper fine grained. Orifice diameter ca. 11 cm (Fig 3, 11).

3. Three fragments of a plate, in its central part ornamented with small holes made on one side. Colour brown-grey, surfaces burnished, small amount of fine grained temper. Diameter 25 cm (Fig. 3, 7).

4. A fragment of a plate, colour brown, surfaces

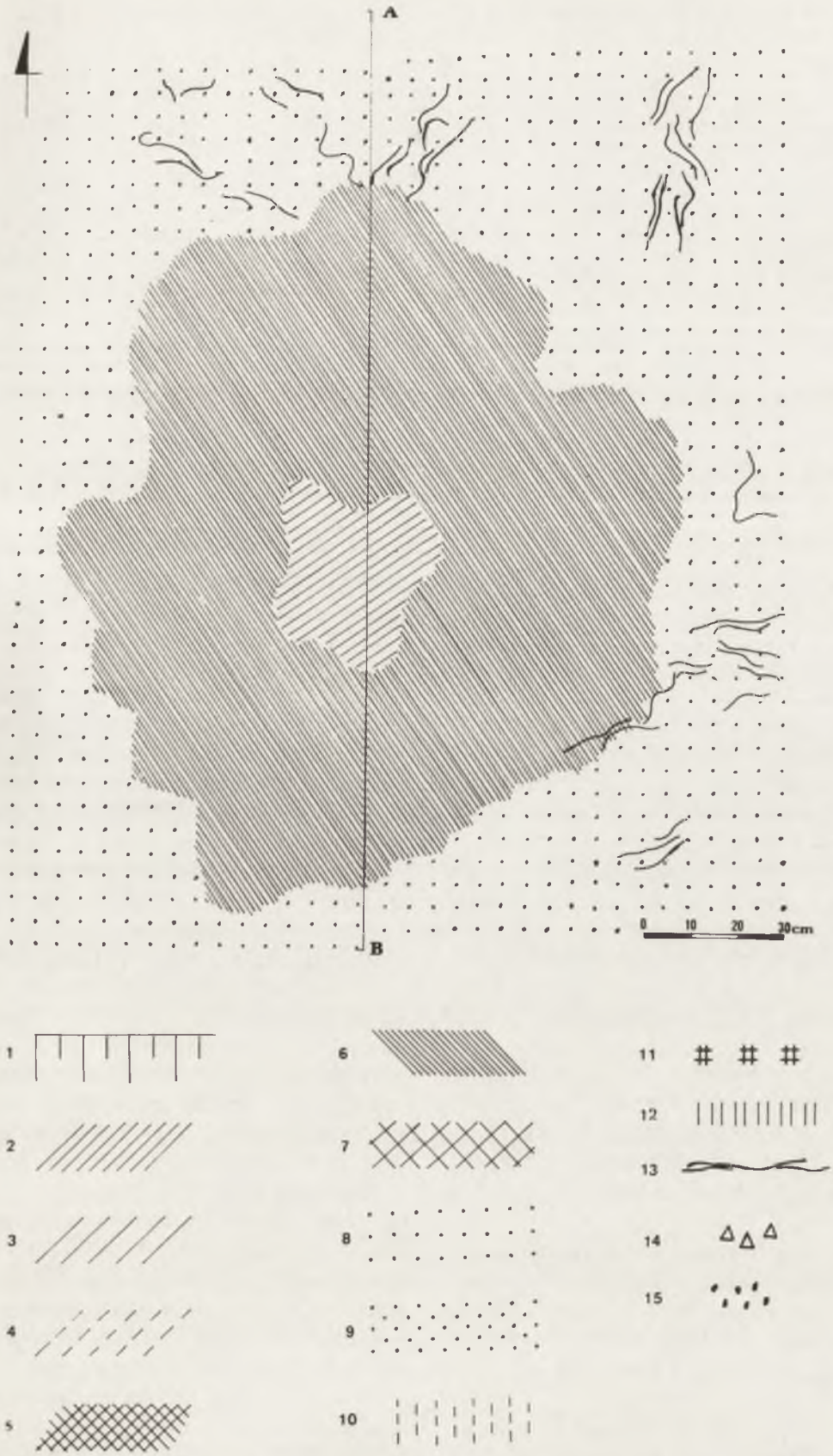

Fig. 1. Maciejowice, Siedlce voivodeship. Site 2. The plan of object 82. Drawn by L. Kobylińska. The specification refers to other plans and profiles.

1 — arable humus; 2 — black sand; 3 — dark-grey sand; 4 — light-grey sand; 5 — grey-brown sand; 6 — brown sand; 7 — brown-grey sand; 8 — yellow sand; 9 — light-yellow sand; 10 — white sand; 11 — animal bones; 12 — clay; 13 — hardpan; 14 — fragments of ceramics; 15 — charcoals. The legend concerns all the plans published here.

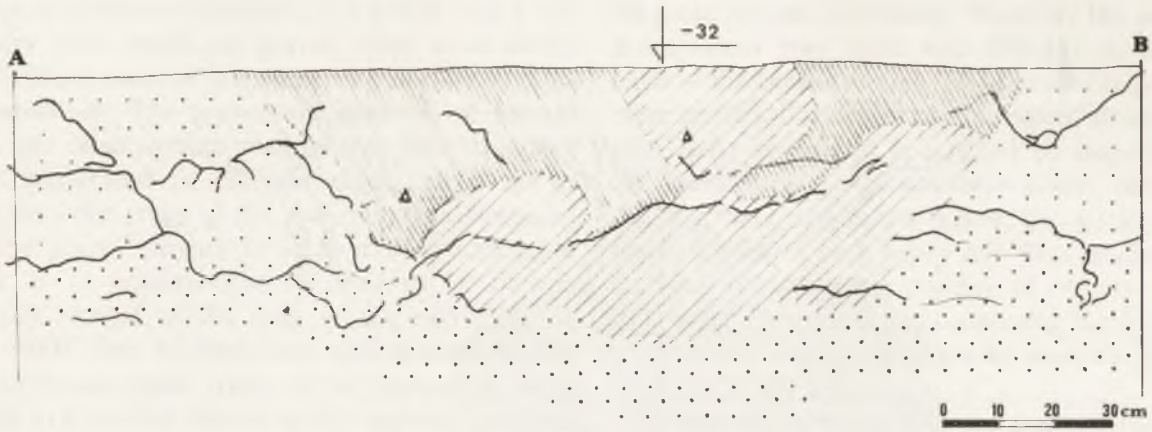

Fig. 2. Maciejowice, Siedlce voivodeship. Site 2. The cross-section of object 82. Drawn by L. Kobylinska.

burnished, temper medium grained. Diameter 26 cm (Fig. 3, 8).

5. A fragment of a plate, colour brown, surfaces burnished, temper fine grained. Diameter 30 cm (Fig. 3, 9).

6. Fragments of five plates, inc. one ornamented with incised crossing lines of different depth and thickness (Fig. 3, 10), one ornamented with finger impressions, and one ornamented with small holes made on one side and fingernail ornament. Colour brown, or brown-grey; they are tempered with medium and fine grained temper.

7. A fragment of a rounded body of a medium-size vessel, ornamented with narrow, shallow oblique channels. Colour grey-black, temper fine grained (Fig. 3, 6).

8. A fragment of a vessel with a neck demarcated by a shallow channel above a weakly curved body. Colour black, surface polished on the outside, burnished on the inside, temper fine grained.

9. Two fragments of bands in a form of an angle; one curved from a grey-black vessel, the other in a form of an acute angle from a grey-brown vessel.

10. A small fragment of a semicircular bowl (?), colour brown-black, surfaces burnished, temper fine grained.

11. A fragment of a rim of a small vessel, colour brown-black, surfaces burnished, temper fine grained.

12. Fragments of rims of three rusticated vessels (techniques of strong rustication and rustication with striation marks), inc. fragments of one big, barrel-shaped vessel.

13. Two fragments of a big strap handle of a vessel.

14. Fragments of bases of three vessels, inc. one black-coloured with the outer surface polished, and the others burnished. Diameters: 4; 7, and 11 cm.

15. Two hundred small fragments of vessels, inc. 80 rusticated, 35 abraded, and 1 secondary burnt.

16. One medium-size lump of baked daub and 117 small ones.

17. At the bottom of the pit there were found 21 fragments of animal bones, inc. 14 fragments of sheep/goat teeth, 7 fragments of cattle teeth and a jaw, and 1 fragment of a pig tooth.

Pits 85 and 101 are located ca. 30 m north of pit 82 within a markedly distinctive concentration of different types of objects, situated on the north-western edge of the settlement. In this area its boundaries are compatible with the Okrzejka terrace above the floodplain. The discussed objects occured on are 493 C and the adjacent one 492 D/462 B, where under arable humus abounding with archaeological finds lies grey-brown sand of thickness 10–38 cm with numerous fragments of vessels of Lusatian Culture, lumps of baked daub, flints and fractions of stones. Below lies light-yellow sand interspersed with levels of hardpan. Ceramic material occured there up to the depth of 70 cm. Below lay white sand with clay and fine straticulated sands beneath. The objects appeared in the grey-brown layer while bottoms were cut in lower levels reaching white and layered sands.

Object 85 (Fig. 4, 5). Are 493 C

The object occured at the depth of 25 cm. The upper part is approx. square, $1{,}2 \times 1{,}3$ m in size; below round-shaped, ca. 60 cm in diameter. In section it has slanting sides and a flat bottom; at the northern end it is stepped. The deeper part of the pit disturbed the hardpan layers. The infilling comprised dark-grey sand, occuring mainly in the southern part, and black sand. At the bottom of the deeper part there occured brown-grey layer of sand mixed with clay, enclosed by layers of clay. The inventory comprised numerous fragments of ceramics, lumps of baked daub, charcoals, and animal bones scattered about the whole infilling. At the bottom of the pit, between black and

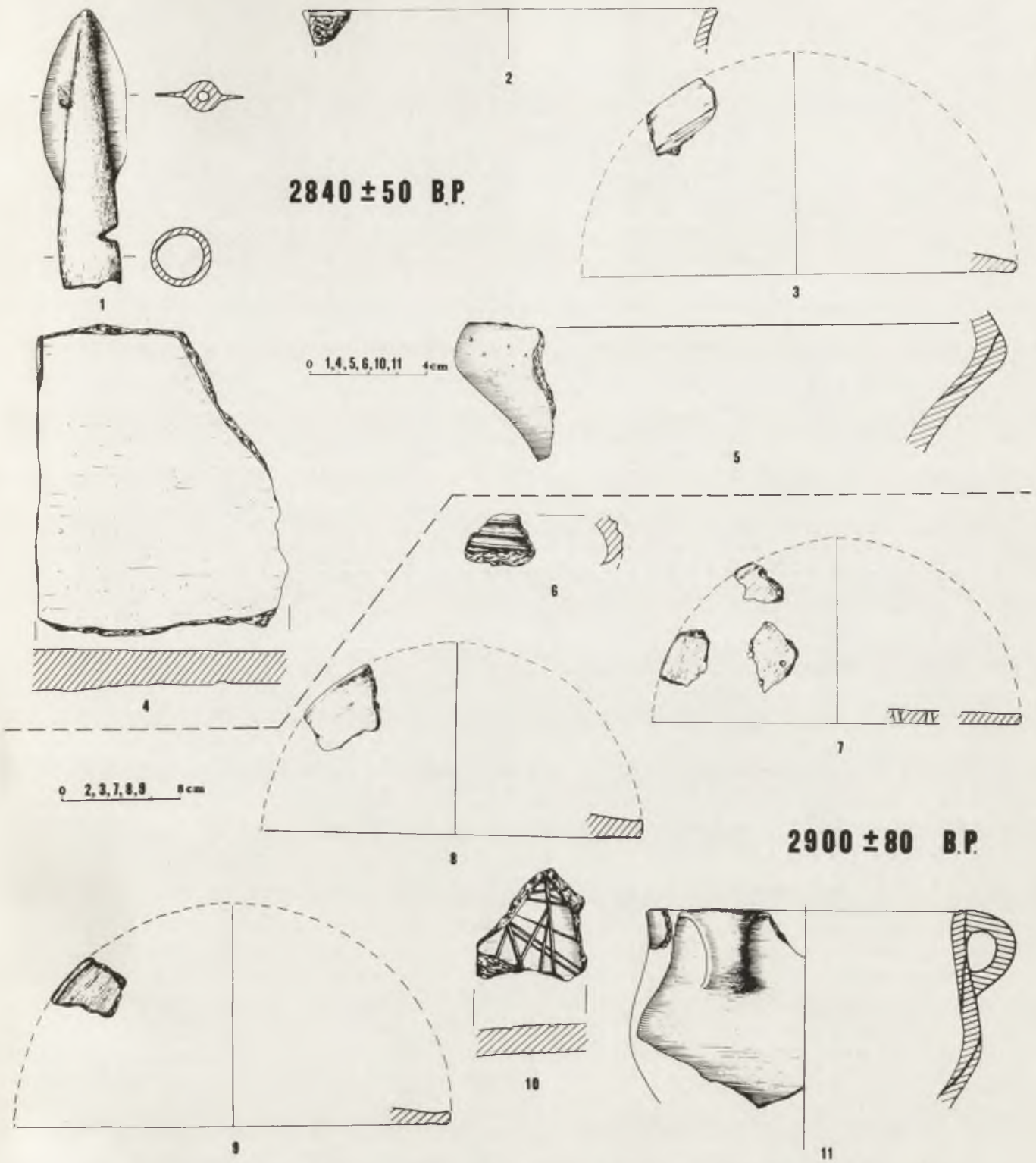

Fig. 3. Maciejowice, Siedlce voivodeship. Site 2. The inventories of objects 82 and 85. Drawn by L. Kobylinska.

brown-grey sand (the depth 99 – 100 cm) lay a bronze spearhead pointed toward the west, with the remains of a spearshaft within a socket (inventory no. 11/92). Thickness of the object 84 cm.

From the infilling of the pit/layers reaching up to 99 cm at depth come:

1. Three fragments of a polisher stone with rounded rims, made of red quartzitic Yotnick sandstone. The biggest fragment was 10,7 × 8,6 × 1,4 cm in size, but its thickness exceeded 2,6 cm (max. size for rim fragments). Surface smooth (Fig. 3, 4).

2. Flint scaled piece made of baltic erratic flint.

3. Seven fragments of a big vessel (pits 85, 99 and arable humus on are 492 D — one fragment each;

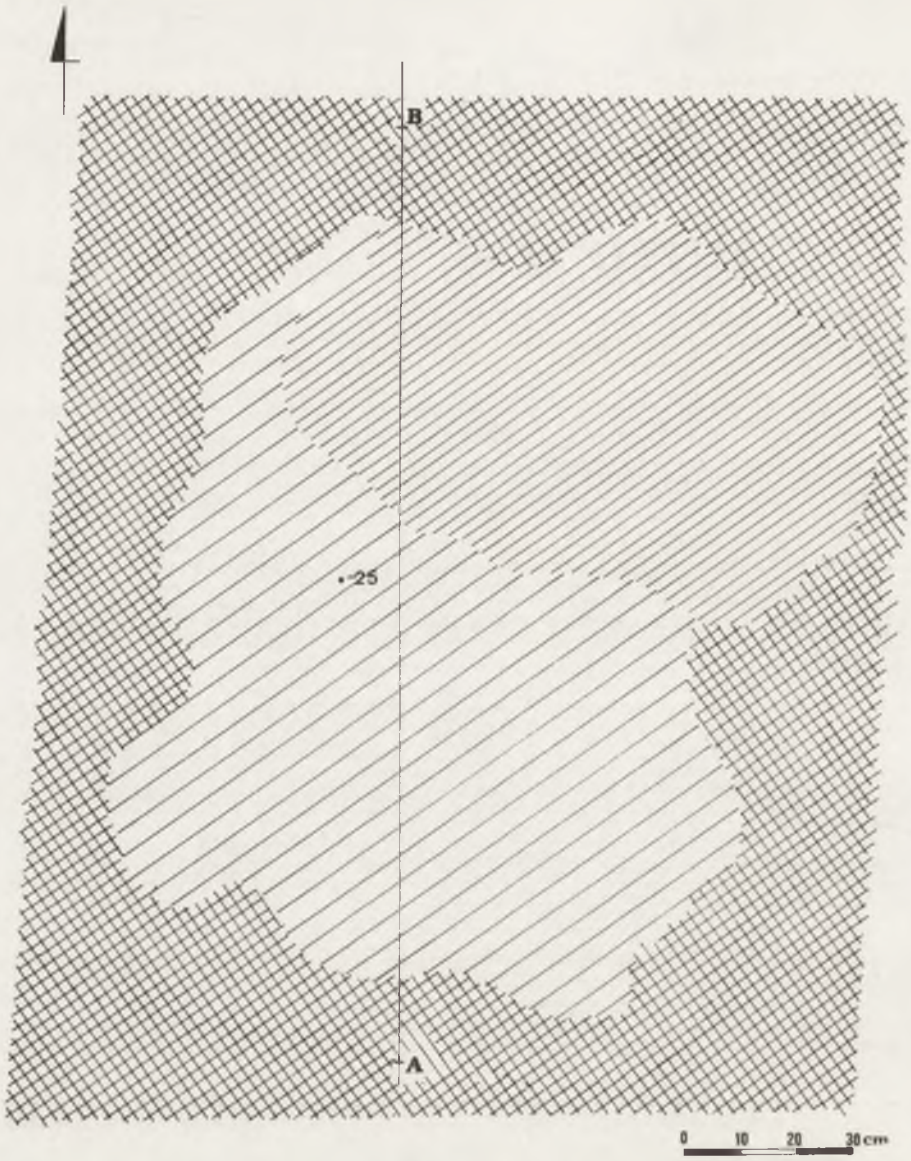

Fig. 4. Maciejowice, Siedlce voivodeship. Site 2. The plan of object 85. Drawn by L. Kobylińska.

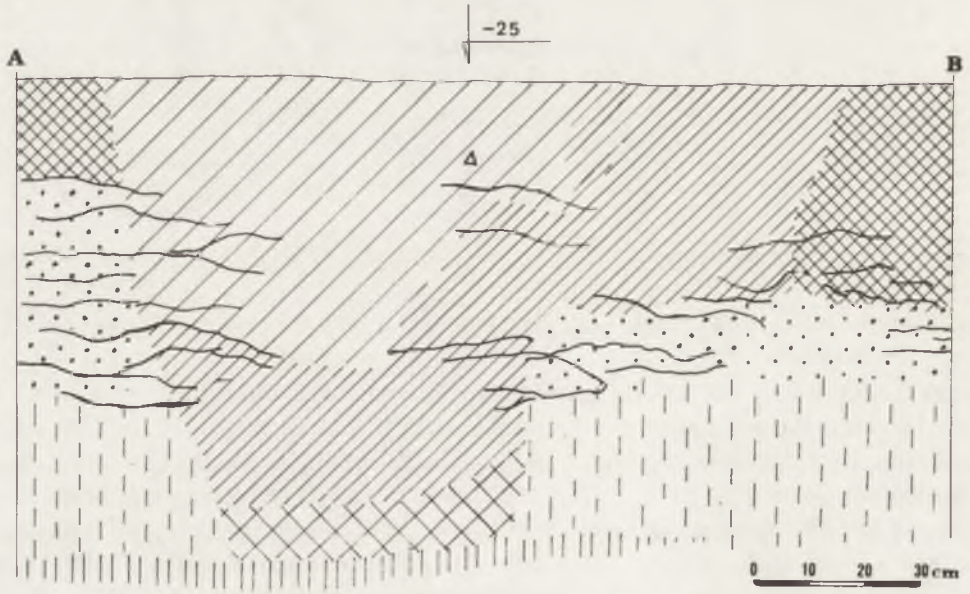

Fig. 5. Maciejowice, Siedlce voivodeship. Site 2. The cross-sections of object 85. Drawn by L. Kobylińska.

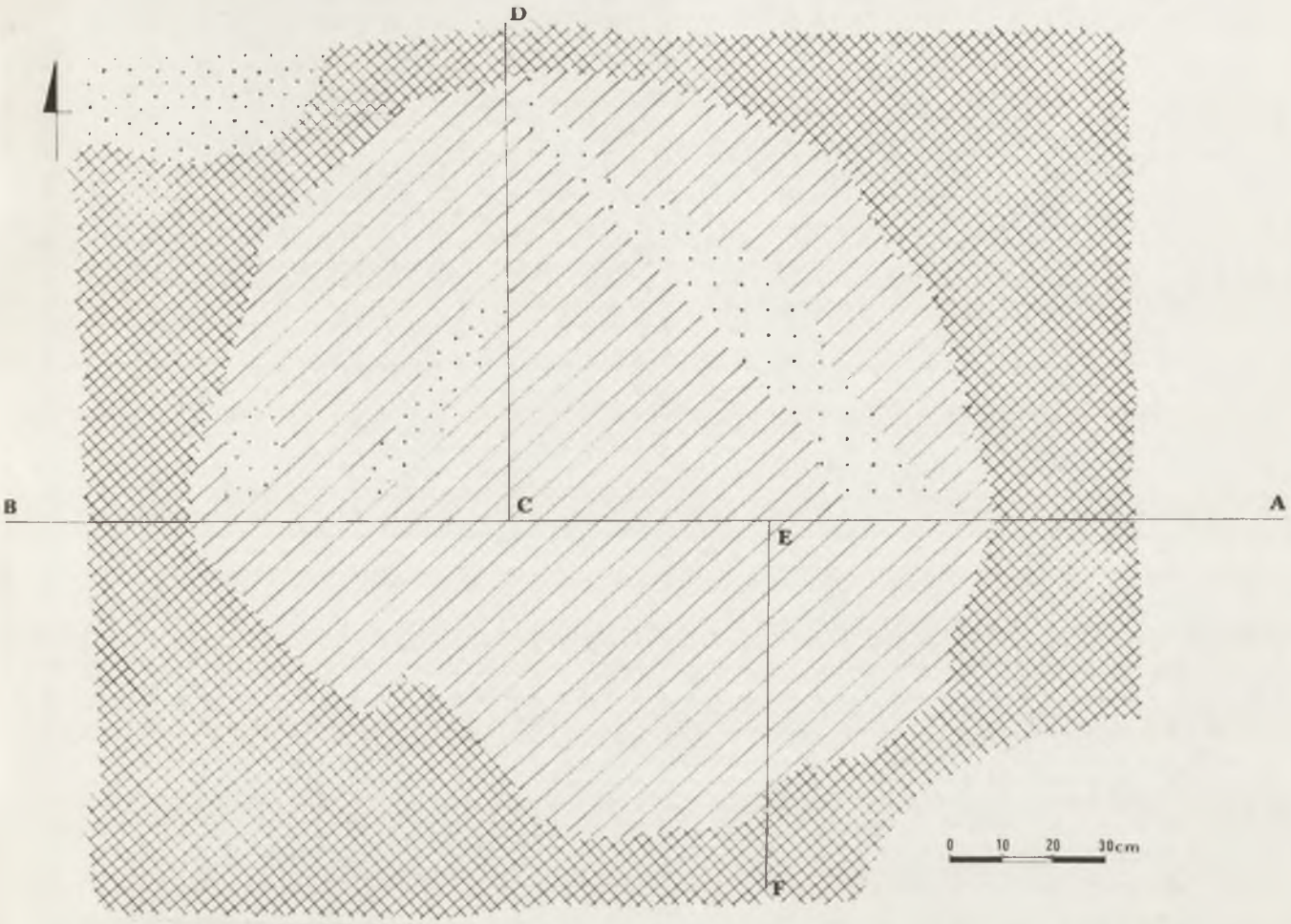

Fig. 6. Maciejowice, Siedlce voivodeship. Site 2. The plan of object 101 on the level I. Drawn by L. Kobylińska.

from the arable humus and the layer of grey-brown sand on are 493 C — two fragments each). The only fragment of a rim has a hole pierced from the outside, placed immediately below the edge. The body of the vessel was rounded. Colour grey-brown with brick-red spots, the outer surface very strongly rusticated, the inner one burnished, temper coarse grained.

4. A fragment of a plate, colour dark-brown. The outer surface at the rim burnished, further slightly rusticated with striation marks, visible straw impressions (?), inner surface burnished. Small amount of fine grained temper. Diameter approx. 30 cm (Fig. 3, 3).

5. A fragment of a grey-brown vessel. The outer surface strongly rusticated, the inner one burnished, temper medium grained. The orifice diameter ca 28 cm (Fig. 3, 2).

6. A fragment of a body of a vessel with sharp, slightly cambered band in the form of an angle. Surfaces burnished, colour grey-black, temper fine grained. Diameter ca 19 cm (Fig. 3, 5).

7. Fragments of three plates, inc. one ornamented with fingers impressions. Surfaces burnished, temper fine and medium grained.

8. Fragments of rims of five rusticated vessels (mostly strongly rusticated), funnel-necked, and in one case also with a slantwise cut rim. Colour brown in different tinges, temper mostly medium grained.

9. A small fragment of a vessel's strap handle.

10. A fragment of a vessel's base, colour grey with surfaces burnished and fine grained temper.

11. Eighty seven small fragments of vessels, inc. 33 rusticated, 21 abraded, and 2 secondary burnt.

12. Eleven small lumps of baked daub.

13. Five fragments of animal bone, inc. 2 recognized as of cattle and one of sheep/goat.

In the layer lying immediately above the bottom (the depth 99—109 cm) there were found:

14. A slightly damaged bronze spearhead with a socket widening towards an uneven mouth and short simple plain wings. Castings fins removed. From one side of the socket there is a rivet hole, extended by a subsequent distinct elongated incision. , Patina dark-green with few knobs. 9,8 cm at length, max. width of the wing 2,9 cm, max. socket diameter 2,2 cm (Fig. 3, 1). Inside the socket there were found small, decayed, green-coloured fragments of wood from

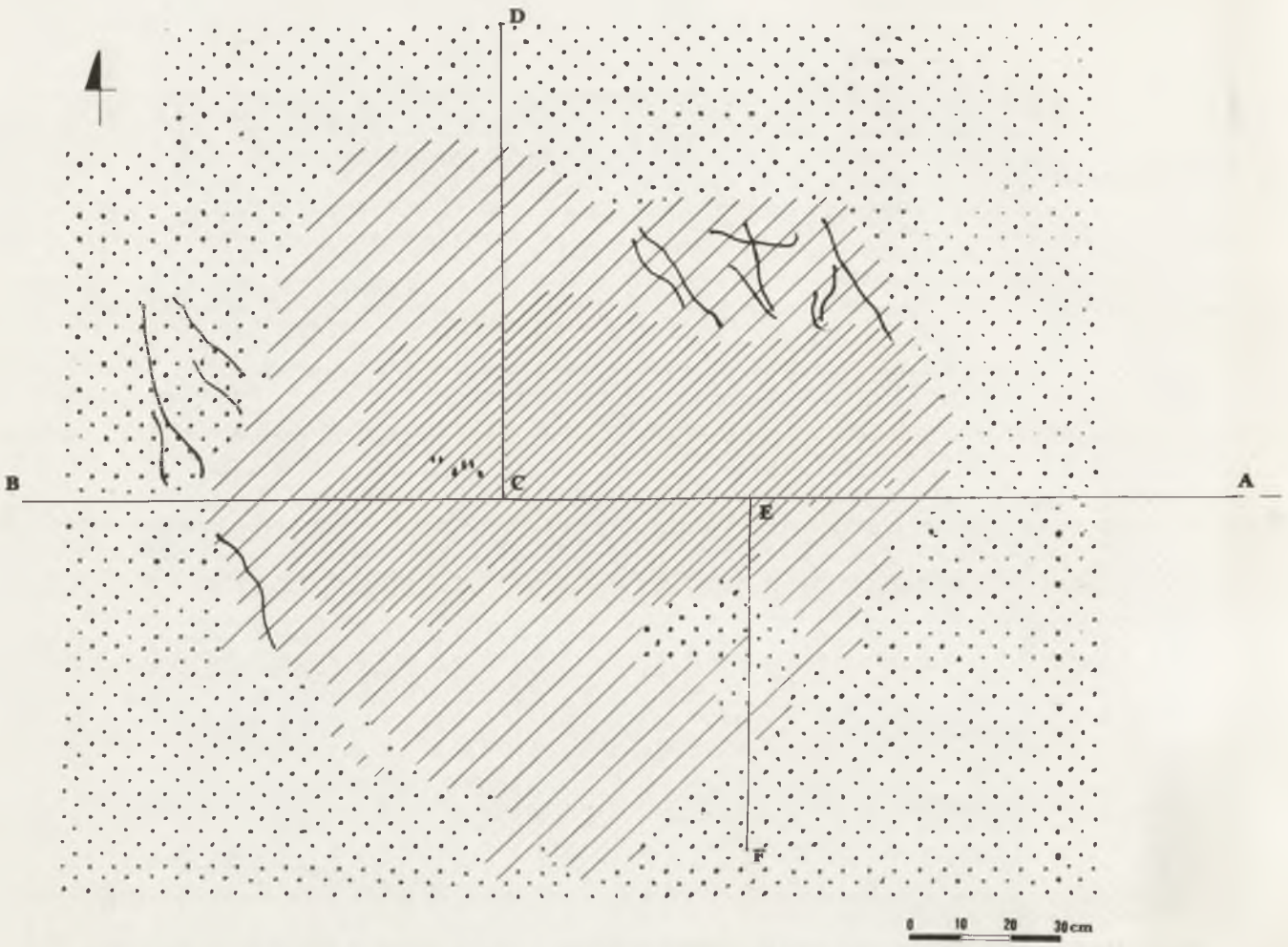

Fig. 7. Maciejowice, Siedlce voivodeship. Site 2. The plan of object 101 on the level II. Drawn by L. Kobylińska.

a conifer, probably a pine-tree, and also parts of contemporary plant roots.

15. A fragment of a body of a big, rusticated vessel.

16. Four fragments of cattle bones.

Object 101 (Fig. 6–8). Are 492 D/462 B

At the depth of 25 cm still faintly visible in the surrounding layer – below, i.e. on the level of 30–34 cm, was marked more clearly (level I). On the first level approx. rounded, 1,5 m in diameter; on the second level (78–89 cm at depth) it rather resembles a square. In section a flat bottom and almost vertical sides. The infilling comprised, starting from the top, dark-grey sand, slightly darker than a layer surrounding it, then black one interspersed with hardpan. Below there was a narrow streak of light-grey sand, dark-grey, and again light-grey. At the bottom lay brown-grey sand clayed. Numerous fragments of ceramics, lumps of baked daub and also bits of burnt and weathered stones were scattered about the whole infilling, and abundantly occuring animal bones were mostly situated in a layer of black and brown-grey sand. Therein were found most of charcoals from this pit. Thickness 96 cm.

The inventory of the pit comprises:

1. A fragment of a flint scaled piece made of baltic erratic flint.

2. A cylindrical, solid handle of a rattle (?), slightly asymmetric, broken at one end. Colour grey-black, surface burnished, temper fine grained. The present length 5,3 cm (Fig. 9, 5).

3. Twenty four fragments (inc. 2 from a layer of grey-brown sand on are 492 D) of a S-shaped vessel. Colour brown with grey spots, surfaces burnished, temper medium grained. Strongly over-fired. Orifice diameter 21 cm, the maximal 21,5 cm, and the base 9,5 cm. Height ca 24 cm (Fig. 9, 10).

4. A fragment of a plate, colour brown, surfaces burnished, temper medium grained. Diameter 24 cm (Fig. 9, 8).

5. A fragment of a plate, colour brown, surfaces burnished, temper medium grained. Diameter 20 cm (Fig. 9, 9).

6. A fragment of a vessel, colour brown-grey, surfaces burnished, temper fine grained. Orifice diameter approx. 15 cm (Fig. 9, 11).

7. A fragment of a big bowl, colour black, outer

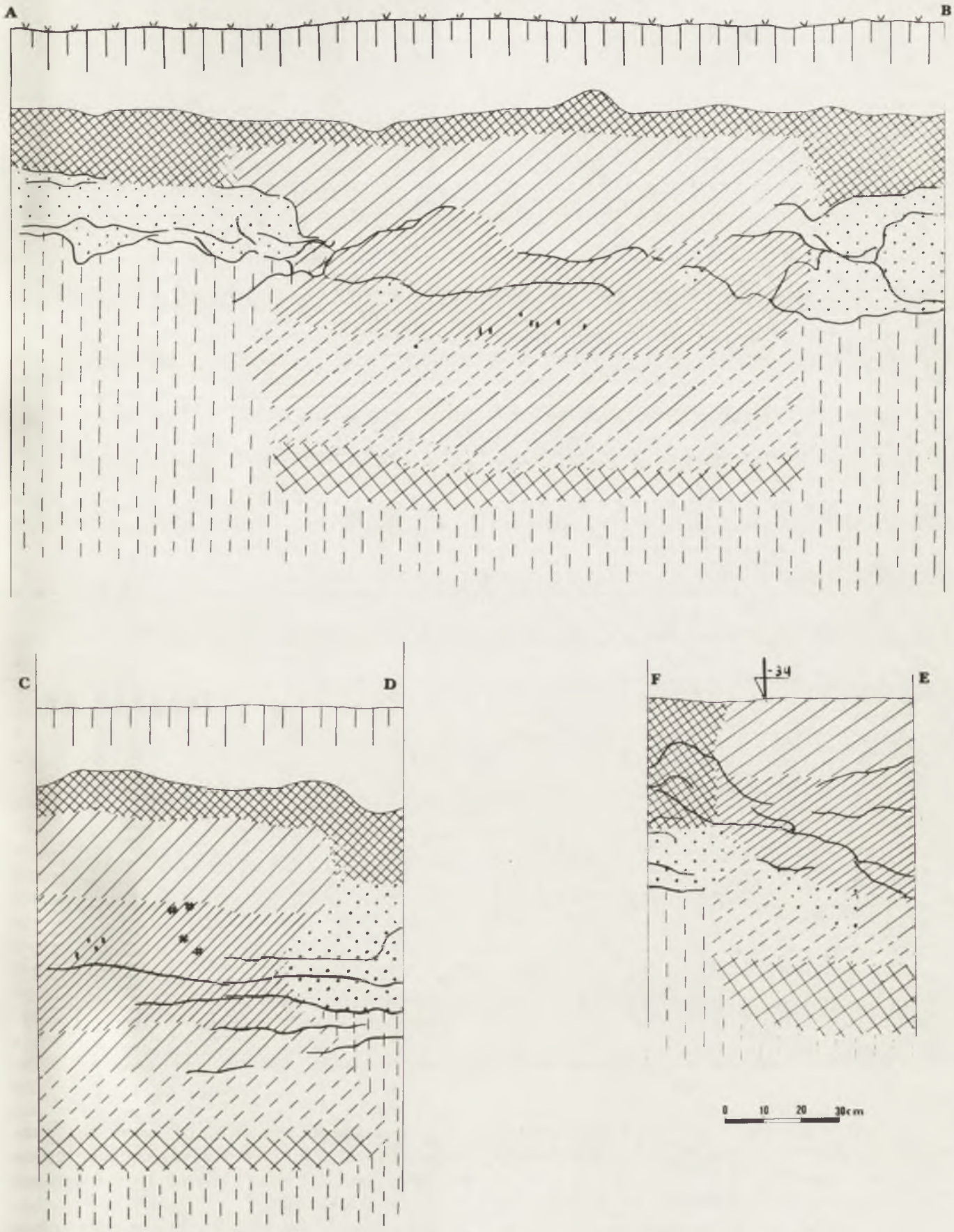

Fig. 8. Maciejowice, Siedlce voivodeship. Site 2. Cross section of object 101. Drawn by L. Kobylińska.

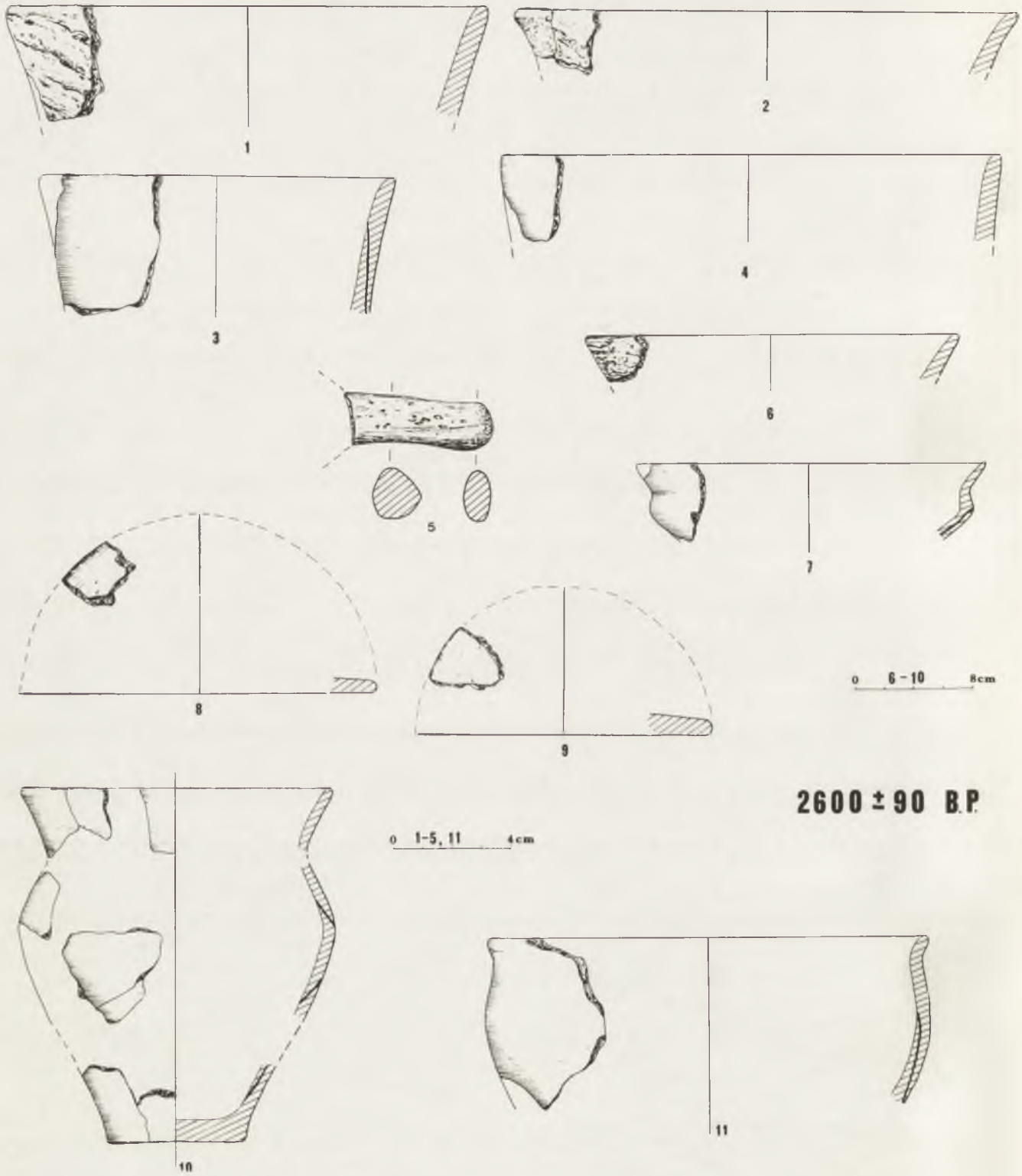

Fig. 9. Maciejowice, Siedlce voivodeship. Site 2. The inventory of object 101. Drawn by L. Kobylińska.

surface polished, inner surface burnished, temper medium grained. Strongly over-fired. Orifice diameter ca 24 cm (Fig. 9, 7).

8. A fragment of a vessel. Colour brown, outer surface diagonally rusticated with fingerstreak marks, inner surface burnished, temper medium grained. Strongly over-fired. Orifice diameter 16 cm (Fig. 9, 1).

9. Two fragments of a vessel, colour brown. Outer surface rusticated with striation marks, inner surface burnished, temper medium grained. Orifice diameter ca 17 cm (Fig. 9, 2).

10. A fragment of a vessel, colour brown, outer surface strongly rusticated, inner surface burnished and medium grained temper. Orifice diameter 25 cm (Fig. 9, 6).

11. A fragment of a cylindrical neck of a vessel, colour brown. Surfaces burnished, temper fine grained. Strongly over-fired. Orifice diameter 17 cm (Fig. 9, 4).
12. A fragment of a funnel neck of a vessel, differentiated from the body by an indistinct horizontal incised line. Colour grey, outer surface polished, inner surface burnished, temper fine grained. Strongly over-fired. Orifice diameter 12 cm (Fig. 9, 3).
13. A fragment of a small vessel with a broadly curved body and cylindrical (?) neck. Colour brick-red-brown, surfaces burnished, temper fine grained. Diameter of the body 7 cm.
14. A fragment of a body of a vessel with a double (?) knob stuck on it. Colour brown, surfaces burnished, temper fine grained. Strongly over-fired.
15. Fragments of rims of two rusticated vessels with medium grained temper.
16. Small fragments of rims of six vessels with burnished surfaces. Colour ranging from brown to black. Temper mostly fine grained.
17. Fragments of bases of three vessels inc. two with burnished surfaces, and one – with outer surface polished. Colour brown, temper fine grained. Diameters: 6 cm, 8 cm, and 8 cm.
18. Fragments of two strap handles, inc. from a blackened vessel.
19. One hundred eighty eight small fragments of vessels, inc. 94 rusticated and 21 abraded.
20. Twelve small lumps of baked daub.
21. Twenty four fragments of animal bones, inc. 7 of cattle, 6 of sheep/goat, 5 of a horse, 3 of a pig, and of a wild boar, a beaver, and some carnivorous animal the size of a fox or a small dog – one fragment each.

A complete interpretation of the objects under discussion will not be possible until all the finds from sites 1 and 2 at Maciejowice have been studied. At the moment we can only say that on account of the size and the depth, they are not likely to have been dwelling-houses. Most probably they served as storage pits (Michalski 1989, 156 ff.). Pit 101 conforms especially to the criteria for recognition of such objects, which have been presented in the quoted work. In the light of carbon dates, it is important to decide on the character of the objects since it has a bearing on the time of the formation of their infillings, which, in the case of storage pits, follows the time of their use especially as far as their upper parts are concerned.

The basic problem with the dating of the described materials by archaeological method is that only few of them can be used for determining chronology and furthermore, that these finds do not occur in assemblages. In the infillings of the pits 85 and 101 we come across sherds of vessels, fragments of which lie also in cultural layer or in another pit, which indicates that we deal with apparent assemblages, i.e. the ones with their inventories having been deposited for a longer period of time. In the course of filling up a pit there got inside artefacts present for some time in a layer. This type of assemblages is called accumulated (compare: Gräslund 1976, 75 ff.). This means that dating their particular components does not determine chronology of the rest. The material from the discussed pits is culturally homogeneous, thus one should argue only the cultural origin of the abounding flint material. Flint artefacts and remains occur abundantly at Maciejowice both in the cemetery (over 20% of graves) and in materials from the settlement (Dąbrowski, Mogielnicka-Urban 1987, 174). At both sites there were also found fragments of ceramic of Trzciniec Culture, and (hardly ever) ceramic from I Period of the Bronze Age. However, both the quantity of the flint material from those sites, and its occurrence in urns indicates necessity of relating it mostly to Lusatian material. Serving as an additional, and very interesting argument is a flint flake from object 82, made of chocolate flint of "Zele" type, i.e. of the flint mined at the adjacent site, the shafts of which are also dated to the times of Lusatian Culture (Lech 1984, 198 ff.).

The chronology of object 85 is certainly determined by the spearhead (Fig. 3, 1) found immediately above the bottom of the pit (Fig. 5). It has clearly been repaired by incising the socket at a rivet hole – the Fogel's book does not mention any other specimen fixed in this way (Fogel 1979, 109 ff.). According to this work the recognition of a type of wood from the socket of the Maciejowice spearhead has been the first in Poland identification of material which a spearshaft had been made of. The choice of the type of the wood has not been the most appropriate, but certainly it does not undermine the actual recognition, unfortunately produced on the basis of minimal size remains. The discussed artefact (Fig. 3, 1) belongs to the E subtype XVI type after Fogel's classification (1979, 100 ff., table XI: 10, 11, 14). Unfortunately, to this subtype he included specimen much differentiated typologically – thus looking for dating analogies we could take into consideration only three assemblages which come from different parts of Poland. The earliest one should be assented a spearhead from the grave 11 from Sobótka, Wrocław voivodeship, which occurs in the beginning of IV Period of the Bronze Age (Gedl 1984, 47 ff., table 28 B4). The spearhead from a hoard at Kowalewko, Poznań voivodeship, is dated from this whole period (Szafrański 1955, 91 ff., fig. 117), whereas from the following period come spearheads from a hoard at Deszczno, Gorzów Wielkopolski voivodeship (Sprockhoff 1956, 18 ff., fig. 15: 3, 5). Hence, in general, we

can date the discussed spearhead (as well as the creation of pit 85) only jointly to IV and V Periods of the Bronze Age.

As it has been mentioned before, the associations analysis cannot be used for dating ceramic from pits; thus, we have to restrict ourselves only to some general remarks. Definitely this ceramic does not belong to the earliest one known from settlement at Maciejowice, which is dated to the Middle Bronze Age. To forms relatively early one can add a small fragment of a vessel ornamented with oblique channels (Fig. 3, 6) from pit 82, which is dated to the times prior to V Period of the Bronze Age. Other forms distinctly early typologically are missing. Pit 99, where a fragment of the vessel known to be from object 85 was found, did not, unfortunately, provide any dating materials. The small amount of known ceramic forms, which are preserved as poorly as the discussed material (Fig. 3 and 9), makes more detailed analysis impossible at the moment. For this, examination of the whole of the materials from the settlement and dating them by comparison to the assemblages from the cemetery is needed. Hence, we cannot go any further than stating that the discussed objects are dated to the late stages of Bronze Age.

Conventional ^{14}C dates obtained in the C-14 laboratory of the Departament of Physics at the Silesian Institute of Technology in Gliwice (register no. 1376; symbol of the work: F-32/92) under the leadership of Prof. dr hab. M. F. Pazdur for particular objects are presented in the table no. 1.

These dates, calibrated with the aid of the C. I. O. Groningen Calibration code computer program from 1988 according to the calibration curve Stuiver, Pearson (1986, 805 ff.) by doc. dr hab. J. Lech, appear as follows (table 2). The result of 68% of probability is taken from computer calculation, while the result of 95% of probability from the reading performed by a person conducting the calibration of the curve printed by a computer.

Table 2. Calibrated dates.

Object	68% probability (cal BC)	95% probability (cal BC)
82	1233–996	approx. 1340–940
85	1086–940	approx. 1210–900
101	843–564	approx. 965–450

Taking relative chronology into account, in the case of 68% of probability object 82 would occur at the end of Period III and IV, object 85 in Period IV, and object 101 in Period V of the Bronze Age and at the beginning of the Hallstatt Period. In this case there was accepted after M. Gedl (1980, 330 ff.) the dating of the periods the of Bronze Age: IV to 1100–900 BC, and V to 900–700 BC. Bigger caesuras (95% of probability) slightly relocate this dating, i.e. object 82 to the turn of Periods II and III and to Period IV of the Bronze Age, object 85 at the end of Periods III and IV, and object 101 at the end of Periods IV and V of the Bronze Age and the C and D Hallstatt Period.

Calibration according to the Radiocarbon Calibration Program 1987 Rev. 2. 0. University of Washington Quaternary Isotope Lab. based on the calibration curve Stuiver, Becker (1986, 863 ff.) elaborated by Prof. dr hab. J. Kruk gave the following results (table 3). They allow us to locate object 82 at the very beginning of Period IV, object 85 in the first half of this Period, and object 101 in Period V of the Bronze Age.

Table 3. Calibrated dates (the most probable dates underlined)*.

Object	Crossing points with calibration curve (cal BC)	Range of highest probability (cal BC)	Dates resulting from probability distribution on the level 68,3% (cal BC)	Range one Sigma (cal BC)
82	1188, 1184, 1127 1126, 1107, 1105 1083, 1059, 1054	1135–1003	<u>1083</u> <u>1059–1054</u>	1288–94
85	**1010**	1055–969	950	1187–929
101	**797**	824–755	831, 678	831–603

* Considering these dates the most probable one cannot exclude other crossings of a calibration curve or particularly high probability values, which, at the same time, are not curve crossings.

The above-stated results of different calibrations of radiocarbon dates do not exhibit any essential discrepancies. Although indefinite to some extent, what, after all, results from their particularity (Goslar, Michczyńska, Pazdur 1990, 191 ff.), they are basically compatibile to the dating based on archaeological indicators.

Taking account of the characteristics of the radiocarbon dates which result from the nature of the material itself, as well as from laboratory treatment (Pazdur 1980, 317 ff.; Pazdur A., Pazdur M. F. 1982, 5 ff.), and also considering the manner in which the pits' infillings were created (Pawlikowski 1992, 14 ff.), which usually is not a single event, we can assume that dating by ^{14}C method made the chronology of the pits more precise. Acceptance of the most probable dates allows us to locate the investigated objects within the spans of particular periods of the Bronze

Age and makes it possible to recognize their sequence. This could not be done on the basis of archaeological materials.

In conclusion, the earliest one, since dated at the beginnings of Period IV, would be object 82. This is, to some extent, confirmed by a fragment of a vessel, ornamented by oblique channels found therein. Object 85, being slightly more recent than the latter, would be dated from the first half of Period IV, and the most recent object, 101, would occur in Period V of the Bronze Age. This way it would be possible to date the spearhead from object 85 more precisely to Period IV of the Bronze Age.

The above-presented radiocarbon datings are the first ones for the Mazowian-Podlasie group of Lusatian Culture. Further studies could provide the basis for the discussion on chronology of materials found within its span.

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