SPRAWOZDANIA ARCHEOLOGICZNE 77/1, 2025
PL ISSN 0081-3834
DOI: 10.23858/SA77.2025.1.4181

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BURYING IRON AT TYNIEC, MASZKOWICE, AND ELSEWHERE: DISTINCT REGIONAL PATTERNS OF METAL DEPOSITION IN THE EARLY IRON AGE OF SOUTHERN POLAND

ABSTRACT

Dzięgielewski K., Markiewicz J. A., Przybyła M. S., Brzeska-Zastawna A., Zastawny A. and Rąpała J. 2025. Burying iron at Tyniec, Maszkowice, and elsewhere: distinct regional patterns of metal deposition in the Early Iron Age of Southern Poland. *Sprawozdania Archeologiczne* 77/1, 101-139.

Recent discoveries of hoards composed of iron objects in Lesser Poland suggest the existence of a specific cultural norm of deposition and a high valorisation of this metal at the onset of the Early Iron Age (750-550 BC). By broadening the scope of analysis to include single finds of 'large irons' and comparing them with burial assemblages, a contrasting picture of regional dichotomy emerges. It is manifested in differing practices of iron deposition among related communities of the period. Those inhabiting the mountainous zone (extending as far as the Vistula valley) buried iron as single depositions or in hoards placed in selected locations within the landscape. Those living in the upland areas to the north of the Vistula, on the other hand, deposited iron exclusively in graves. After presenting two hoards from Kraków-Tyniec and a group of artefacts from Maszkowice, we examine the broader context of these finds along with patterns in the distribution of hoards within the landscape.

Keywords: hoards, iron, Hallstatt C-D1, Lusatian culture, Lesser Poland, fragmentation
Received: 30.06.2025; Revised: 20.07.2025; Accepted: 22.09.2025

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INTRODUCTION, MATERIALS AND METHODS

According to the 'pendulum model' presented by K. Kristiansen (1998), the pattern of exclusion of goods from circulation, mainly metal items, in Bronze Age and Early Iron Age Europe (2300-450 BC) can be characterized in general outline as an alternating dominance of their deposition in the ground as grave furnishings or as so-called hoards, *i.e.*, mass deposits of metal objects outside the sepulchral context. In this model, the Early Iron Age (800-450 BC), especially in Central Europe, where the Hallstatt culture was either present or significantly influenced local cultures, is a period of a distinct shift towards the deposition of metals in the form of personal grave goods. In the Circum-Alpine Region, Bohemia, and southern Moravia, this tendency sometimes manifested itself in lavish furnishings in barrow burials. It was undoubtedly related to changes in the social structure towards a higher degree of hierarchy compared to the Urnfield societies of the Late Bronze Age. In many regions, especially within the Western Hallstatt culture, the practice of hoard deposition largely disappeared, but at the same time, in the peripheries of this cultural

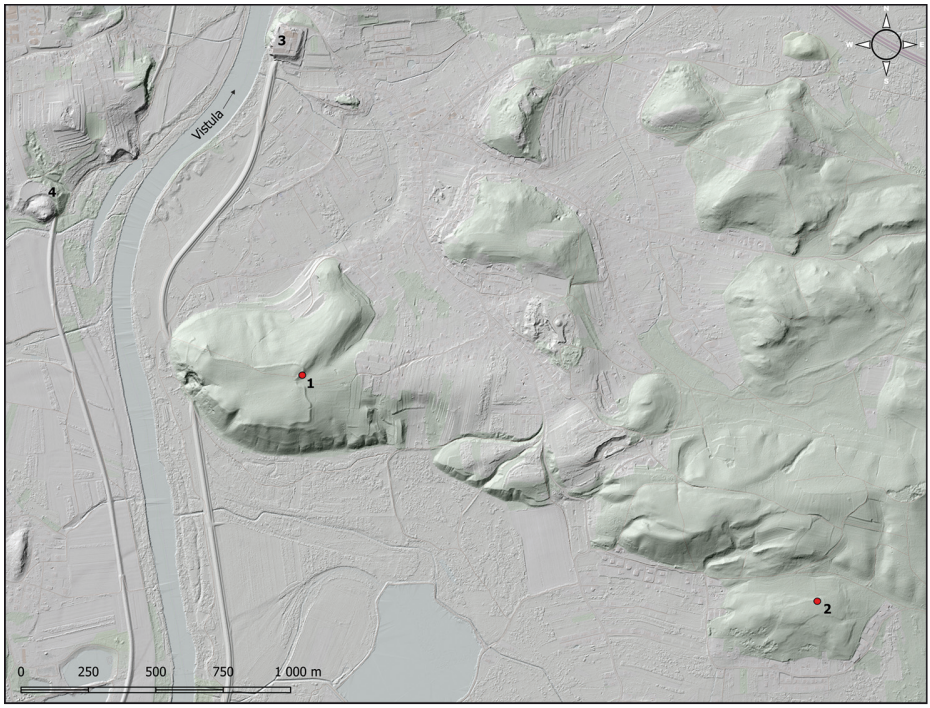


Fig. 1. Location of the hoards of iron ring ornaments from Kraków-Tyniec (red dots). 1 – Kraków-Tyniec 'Grodzisko', Site 1 (Early Iron Age hillfort), 2 – Kraków-Tyniec 'Wielogóra', Site 10. For orientation purposes, and also due to the presence of open hilltop settlements from the Early Iron Age, two distinctive points of the cultural landscape have been marked: the Benedictine abbey in Tyniec (3) and the medieval motte-and-bailey fort in Piekary (4). Developed by K. Dzięgielewski

circle, the custom continued (Westhausen 2019; Golec *et al.* 2023, 16). This was noted for the territory of Poland, where the 'Hallstatt norm' (rich grave furnishings, disappearance of hoards) was evident in the areas of Silesia and southern Greater Poland, covered by strong Hallstatt influences (Gedl 1991; Blajer 1992; 2001), or – according to some approaches – even representing a regional variety of this cultural circle (Gediga 2011). Outside this area, *e.g.*, in Lesser Poland (Małopolska), where local communities preserved the Urnfield traditions to a greater extent, the practice of depositing hoards continued. At the same time, the standard of richer burials with metal items (so-called 'large bronzes' and especially 'large irons') was adopted to varying degrees (Dzięgielewski *et al.* 2020). In recent years, the growing number of discoveries of single iron objects and deposits in Lesser Poland, especially in the Polish Western Carpathians, has allowed us to notice regional differences in the reception of both the discussed deposition patterns and the new metal – iron – itself.

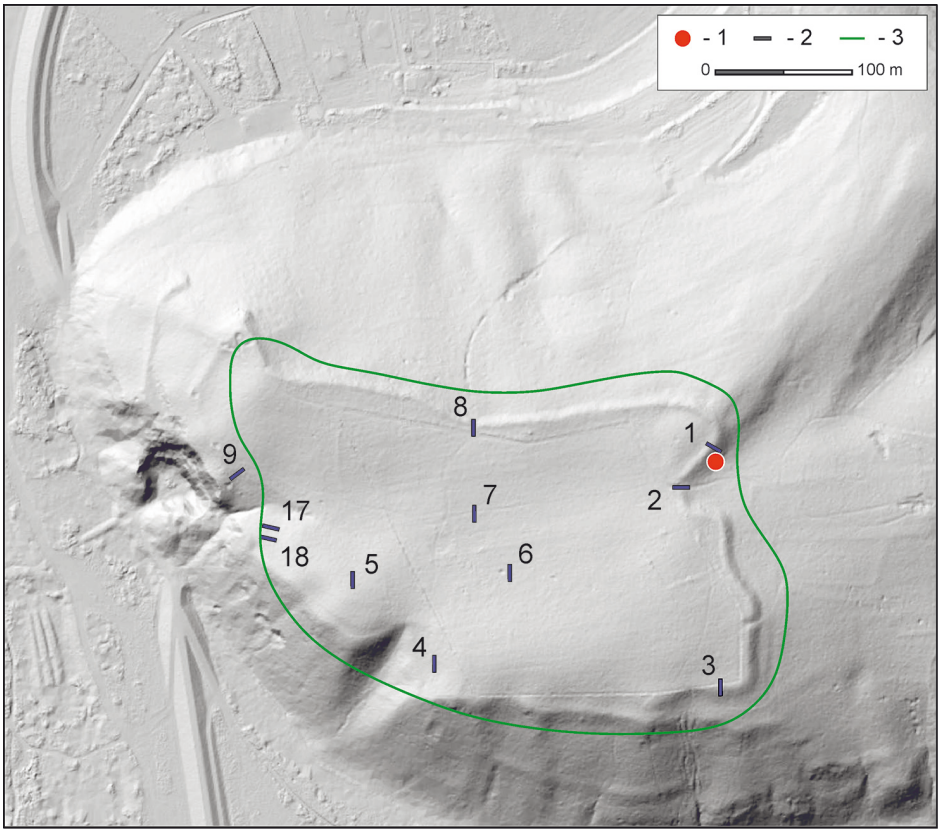


Fig. 2. Kraków-Tyniec 'Grodzisko' with prehistoric defensive ramparts visible from the north and east. Indicated: 1 – findspot of the iron hoard, 2 – test trenches from 1948 and 1951, 3 – extent of archaeological site no. 1 according to the Polish Archaeological Record (AZP). Developed by A. Brzeska-Zastawna and A. Zastawny

Starting from the presentation of two new hoards from Kraków-Tyniec (Fig. 1) and a group of artefacts from Zyndram's Hill in Maszkowice (partly known from the literature but never presented in a contextual approach; *cf.*, Cabalska 1970), we would like to draw attention to the presence of a regional cultural dichotomy, manifested in the different ways of depositing massive iron objects by culturally related communities of the period between 750 and 550 BC. The presentation of the sources is followed by an analysis of the artefacts using the typological method and dating based on the comparative method. Two recently published groups of 'purely' iron deposits, from the Kraków area (Dzięgielewski *et al.* 2020) and the Bielsko-Biała area (Chorąży and Chorąży 2022), constitute a special reference group at the regional scale. However, due to the supra-local typological nature of the metal items, the areas of reference are primarily Silesia and Greater Poland and the early Hallstatt (Ha C-D1) cemeteries of these regions, richly furnished with such objects – including mainly Świbie, Gliwice District, for which a relative periodisation was developed (Michnik and Dzięgielewski 2022). Next, we will examine the regional context of these finds, paying attention to the aforementioned dichotomy in the manner of deposition of 'large irons,' as well as to trends in the location of hoards within the settlement network and landscape. In the context of the finds from Maszkowice, we will also consider the previously rarely described phenomenon of intentional fragmentation of iron objects.

NEW OR VERIFIED SOURCES

Kraków-Tyniec 'Grodzisko', Site 1

In 2025, in the area of Grodzisko Hill in Kraków-Tyniec, a hilly and forested south-western district of Kraków (Figs 1 and 2), an iron hoard was accidentally discovered, consisting of five ring ornaments of varying sizes (Figs 3 and 4). The items were abandoned by metal detectorists who were illegally searching the area. They probably considered the iron finds uninteresting and left them at the discovery site, hiding them under a rotten tree root (Fig. 3: a). According to the accounts of the finders of the hoard – Beata Grabowska and Wiesława Kruczek – the rings were lying next to each other in a loose arrangement. Agnieszka Brzeska-Zastawna from the Institute of Archaeology of the Jagiellonian University and Albert Zastawny from the Archaeological Museum in Kraków were informed about the discovery, and the artefacts were transferred to them. Archaeologists, along with the finders, conducted field verification, during which the discovery site was identified and marked on a map. It is situated on the main forest path, crossing the Grodzisko Hill on the east-west axis, at 272 m a.s.l., where the remains of an earthen rampart are clearly visible. The iron objects were discovered on the external slope of the eastern section of the rampart, slightly below its crown (Fig. 2). During the on-site inspection, it was found that this area bears traces of repeated searches by metal detectorists. Numerous pits disturbed not only areas covered with humus but also stone structures, as evidenced by limestone scattered on the surface.

Fig. 3. Kraków-Tyniec 'Grodzisko': a – moment of re-discovery of the finds discarded by metal detector users, b – iron rings immediately after recovery. Photos: A. Zastawny

Fig. 4. Kraków-Tyniec 'Grodzisko'. Iron rings after preliminary cleaning (collection of the Archaeological Museum in Kraków). Photo: A. Susuł

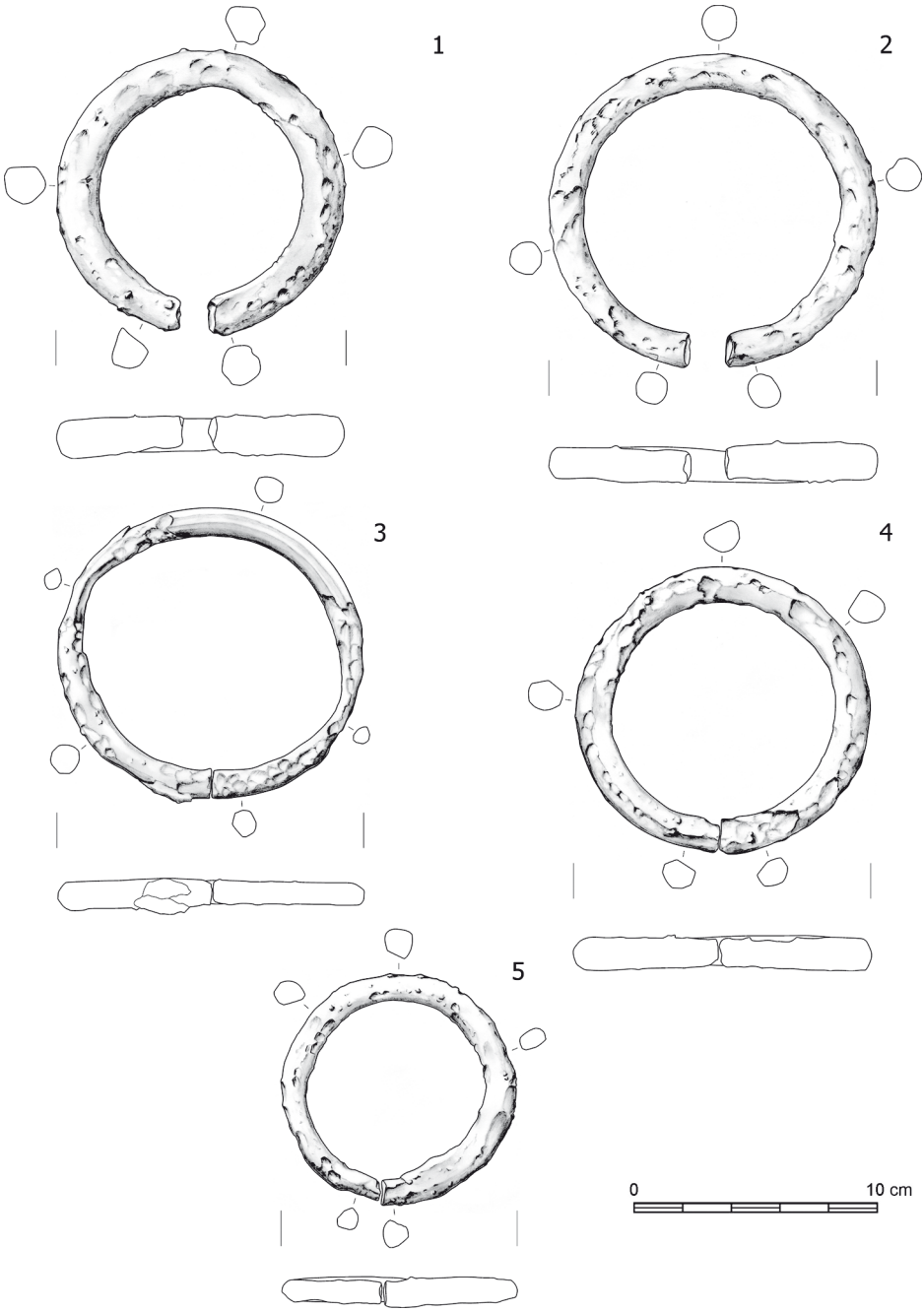


Fig. 5. Kraków-Tyniec 'Grodzisko'. Hoard of iron rings.
Drawing: A. Zastawny

It was determined that the place of discovery is located in the eastern, peripheral part of the archaeological site 1 in Kraków-Tyniec (AZP 103-55/17), entered into the register of archaeological monuments in 1968 under no. 1058. It is a multicultural site with traces of settlement from the Neolithic to the early Middle Ages, known primarily for the relics of an Early Iron Age defensive settlement of the Lusatian culture. In 1948 and 1951, excavations were carried out here by Gabriel Leńczyk from the Archaeological Museum in Kraków, who opened 18 test trenches on the ramparts and the courtyard of the hillfort (Leńczyk 1955). The place where the iron hoard was found is located between Trench 1 (rampart) and Trench 2 (gate) from 1948 (Fig. 2).

Hoard composition (Fig. 4):

1. Iron ankle ring – open, with straight-cut, almost touching ends, circular in shape, made of a massive bar of circular cross-section, partly hammered flat from the 'lower' side. At one end, there is a defect, resembling flaking, caused by chiselling; on the opposite side, from the inside, there is a similar thinning of the bar, caused by hammering. Dimensions: diameter 11.5 cm, bar diameter 1.6-1.7 cm, distance between ends 1.2 cm, weight 424 g (Fig. 5: 1).

2. Iron ankle ring – open, with straight-cut, almost touching ends, oval (originally circular?) in shape, made of a massive bar of circular cross-section. Dimensions: diameter 12.6-13.1 m, bar diameter 1.3-1.4 cm, distance between ends 1.5 cm, weight 355 g (Fig. 5: 2).

3. Iron ankle ring – open, with straight-cut, touching ends, oval in shape, made of a bar of circular/oval cross-section (originally of partly polygonal cross-section – well-preserved fragments of the ring show traces of 'faceting' – *cf.*, Fig. 13: b). In two opposite parts of the ring, there is a pronounced narrowing of the cross-section, made by hammering mainly from the inner side (*cf.*, Fig. 13: a). Dimensions: diameter 11.7-12.2 cm, bar diameter 1.0-1.1 cm (at the narrowings 0.6-0.9 cm), weight 198 g (Fig. 5: 3).

4. Iron ankle ring – open, with straight-cut, touching ends, almost circular in shape, made of a massive bar of circular cross-section, diagonally hammered from the 'lower' side towards the inside of the ring along the entire circumference. Dimensions: diameter 11.6-11.8 cm, bar diameter 1.2-1.3 cm, weight 299 g (Fig. 5: 4).

5. Iron bracelet/ankle ring – open, with straight-cut, touching ends, almost circular in shape, made of a massive bar of semicircular cross-section, diagonally hammered from the 'lower' side towards the outside of the ring along the entire circumference. Dimensions: diameter 9.1-9.4 cm, bar diameter 0.9-1.1 cm, weight 126 g (Fig. 5: 5).

Kraków-Tyniec 'Wielogóra', Site 10

A hoard of two iron ring ornaments was found in 2023 on a small hill called Wielogóra (257 m a.s.l.), located in the southern part of the Tyniec Forests (Fig. 1). The discovery was made by Jakub Rąpała and Lucjan Michalik during searches with a metal detector, carried out under permit no. 164/23, issued by the Municipal Conservator of Monuments in

Kraków. The hoard was deposited in the northern part of the flattened top of the hill, near a wide pass separating the elevation from the neighbouring hills. Two iron ring ornaments were discovered in a small trench. They were located at a depth of about 35 cm below ground level, in a light brown sandy layer containing small stones up to 10 cm in size. The rings lay horizontally, one on top of the other, with a slight shift. In both cases, their ends point west, which may indicate a deliberate arrangement of the objects (Fig. 6). No other metal or ceramic artefacts were found in the trench. The place where the iron rings were discovered is about 2 km away from the hillfort at Kraków-Tyniec, Site 1 (see above). Pottery fragments of the Lusatian culture were also found near the western slopes of the Wielogóra hill, within the settlement at Kraków-Tyniec, Site 10 (Fraś and Olszowski 1971, 89).

Hoard composition (Fig. 7):

1. Iron ankle ring – open, with tapering, pointed ends, overlapping by ¼ of the circumference; circular in shape, made of a bar of circular cross-section. Dimensions: diameter 11.2-11.4 cm, bar diameter in the central part 1 cm, at the ends 0.4 cm, the ends overlap by 8 cm, running exactly parallel at a distance of approx. 0.15 cm, weight 139 g (Fig. 8: 1).

2. Iron ankle ring – open, with bluntly rounded, touching ends, circular in shape, made of a bar of circular cross-section. The ends are not on the same plane (they could partially overlap), but they show no signs of secondary damage (unbending or flexing). Dimensions: diameter 11.3-11.5 cm, bar diameter 0.7-0.8 cm, weight 95 g (Fig. 8: 2).

Maszkowice 'Góra Zyndrama', Site 1

From the area of the hillfort on Zyndram's Hill in Maszkowice, Nowy Sącz District, comes a collection of iron objects, including 20 rings of various sizes, three bars or fragments, two axes, and a sickle. Most of these artefacts were found at shallow depth (usually 20-25 cm) in the upper layers of the younger settlement phase of this site, dating to the Early Iron Age (Przybyła 2024a). Due to the homogeneity of the Iron Age layer, the high degree of erosion of its upper parts, and the methodological shortcomings of the excavations in the 1960s and 1970s, it is not possible to determine the chronology of the iron objects from Maszkowice solely based on context. The typological dating of this group of artefacts from southern Poland adopted in this article, however, allows for their confident assignment to the building phase V-VI of the site on Zyndram's Hill, which, based on a large collection of pottery and radiocarbon dates, can be synchronised with the Ha C-D1 phases (Markiewicz 2024, 573).

The locations of all iron artefacts, both those recovered during old excavations (1959-1975) and those discovered during new fieldwork (2010-2024), were precisely measured within the trenches. This made it possible to trace their distribution against the background of documented layers (Fig. 9) and the density map of the Early Iron Age pottery (Ha C-D periods) (Fig. 10). This procedure allows several observations regarding the circumstances of deposition of the analysed objects:

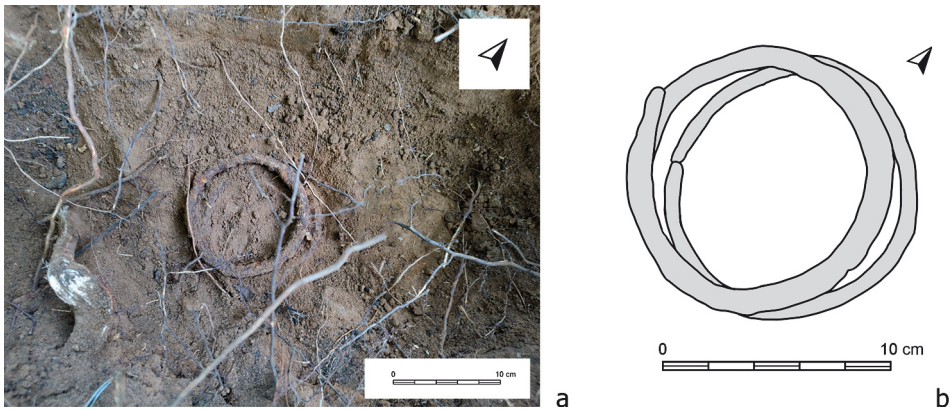


Fig. 6. Kraków-Tyniec 'Wielogóra': a – hoard of iron objects in situ, b – arrangement of the rings. Photo and drawing: J. Rąpała

Fig. 7. Kraków-Tyniec 'Wielogóra'. Iron rings after conservation (collection of the Institute of Archaeology and Ethnology, Polish Academy of Sciences, Kraków branch, Igołomia Archaeological Laboratory). Photo: K. Dzięgielewski

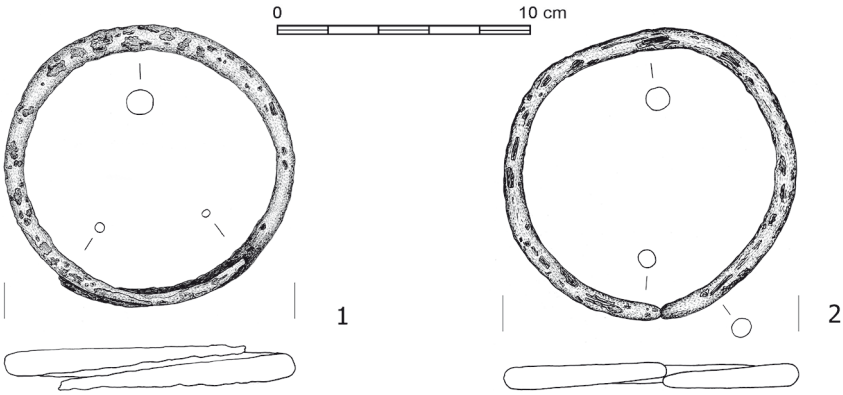


Fig. 8. Kraków-Tyniec 'Wielogóra'. Hoard of iron rings. Drawing: J. Rąpała

Fig. 9. Maszkowice 'Góra Zyndrama'. Distribution of iron objects against the background of documented structures associated with Iron Age settlements. a – fragment of a ring, b – complete ring, c – axe, d – bipyramidal bar, e – sickle; 1 – undocumented, 2 – range of pebble pavements, 3 – pavements displaced by slope erosion, 4 – area devoid of Iron Age layers, 5 – Iron Age cultural layer, 6 – cultural layer displaced by slope erosion, 7 – pits, 8 – certain and presumed postholes, 9 – certain and presumed course of the rampart from the Early La Tène period (drawn by J. A. Markiewicz and M. S. Przybyła)

Fig. 10. Maszkowice 'Góra Zyndrama'. Distribution of iron objects against the background of the density map of the Early Iron Age pottery (Ha C-D). a – fragment of a ring, b – complete ring, c – axe, d – bipyramidal bar, e – sickle (drawn by J. A. Markiewicz and M. S. Przybyła)

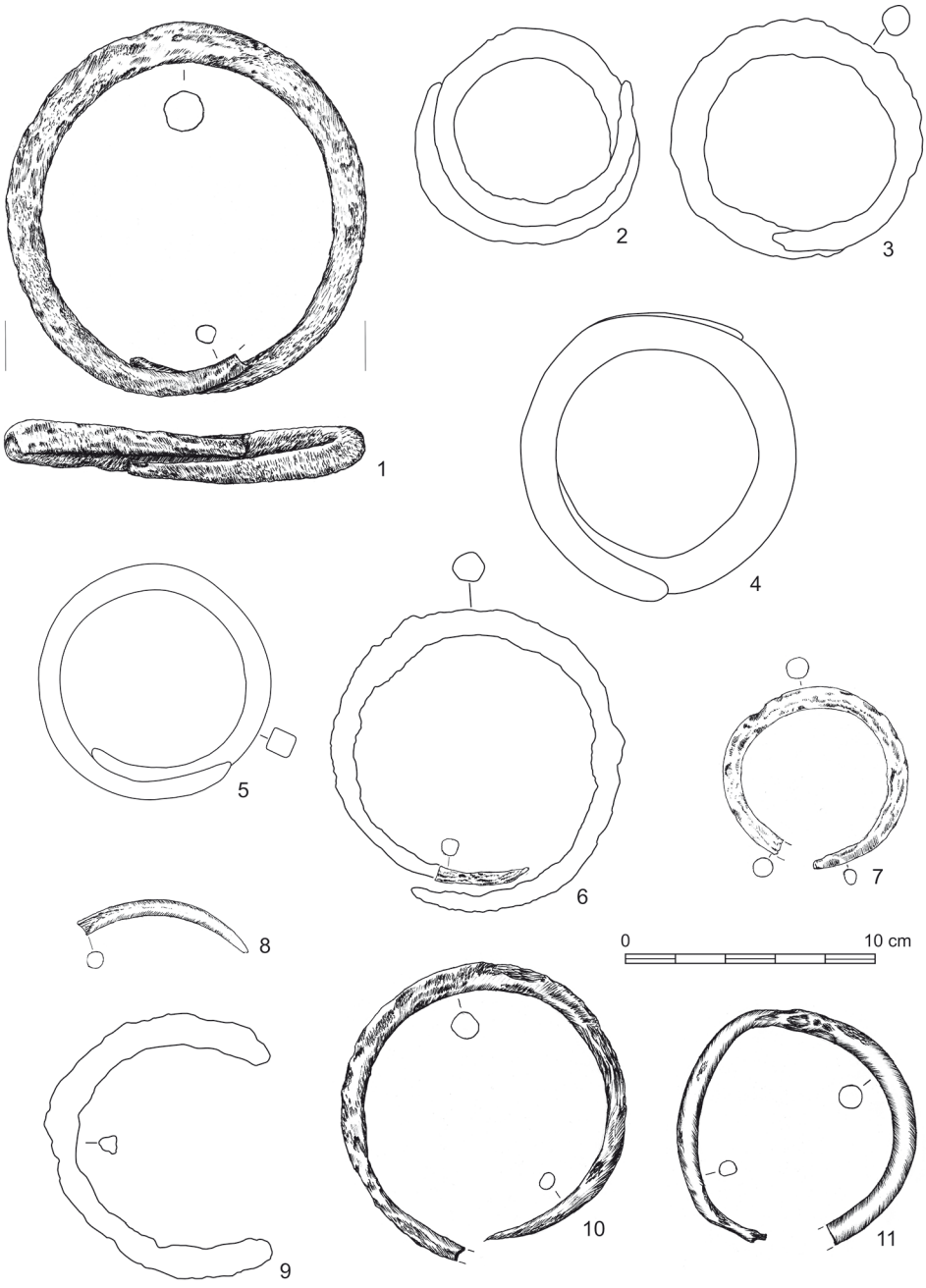


Fig. 11. Maszkowice 'Góra Zyndrama'. 1-7, 9-10 – iron rings, 8 – fragment of an iron ring (1, 7-8, 10-11 – drawn by J. A. Markiewicz and M. S. Przybyła; 2-5, 9 – based on field documentation from the 1960s and 1970s; 6 – drawn by M. S. Przybyła, partially redrawn based on field documentation from 1968)

(1) The distribution of iron artefacts is not uniform at the site. On the contrary, they show a general tendency to group in the northern part of the examined area, in the highest part of the top plateau, creating several smaller concentrations there. These clusters do not coincide with places where pottery fragments are concentrated. This means that the more frequent occurrence of iron objects is not related to the intensity of settlement processes or the scale of post-depositional processes (erosion and layer accumulation).

(2) In the zone with the highest density of iron rings, within the trenches from 1968, two rings were found less than 20 cm apart, while two further pairs were found less than 2 m apart. It can be stated that the iron rings closest together were located along the north-south axis. Considering the shallow depth at which these artefacts were deposited, it can be assumed that this is the result of some of them being displaced during agricultural work. Although the hillfort area was used as a meadow at the beginning of the research (1959), it is known to have been ploughed earlier. A German aerial photograph from 1944 shows that the ploughing furrows were arranged roughly along a north-south line (kind information from D. Golik).

(3) The above observations allow us to formulate a hypothesis that at least some of the iron artefacts from the hillfort on Zyndram's Hill originally formed deposits (possibly small, numbering up to two rings), which were disturbed by ploughing before the mid-20th century. These objects were deposited outside the zone of the greatest settlement intensity (Fig. 10). The two subsequent Iron Age settlements on Zyndram's Hill essentially replicated the spatial layout developed during the Early Bronze Age (ca. 1725-1500 BC). That is, the buildings were densely arranged along the edge of the promontory plateau, where the Bronze Age fortifications were partially preserved, surrounding an open space in the centre (Przybyła 2024a, 270-279; 2024b, 903, 904). Most of the iron objects are located on the approximate boundary between these two zones – the built-up and the open.

Hoard composition (the items 20 cm apart):

1. Fragment of an iron ring – open, made of a bar of circular cross-section. A tapered end with a pointed tip has been preserved; at the other end, a visible mark from cutting during metallurgical analysis in the second half of the 20th century is visible (in the drawing in the field documentation, the artefact is 2 cm longer). Dimensions: preserved length 7.5 cm, original diameter about 11 cm, bar diameter 0.3-0.5 cm, weight 12 g (Fig. 11: 8).

2. Iron ring – open, with tapering ends, initially overlapping; circular in shape, made of a bar of circular cross-section. One end is pointed, the other was cut off during metallurgical analysis in the second half of the 20th century. Dimensions: diameter 9.5 cm, bar diameter in the central part 0.9 cm, weight: 89 g (Fig. 11: 11).

Other objects:

3. Iron (ankle) ring – open, with tapering, overlapping ends, circular in shape, made of a bar of circular cross-section. One end is preserved, straight-cut; the other was cut off

during metallurgical analysis in the second half of the 20th century. Dimensions: diameter 14.5-15 cm, bar diameter in the central part 1.6 cm, at the ends 0.6-0.7 cm; the ends are poorly fitted, overlapping by approx. 5 cm; weight 428 g (Fig. 11: 1).

4. Iron ring – open, with tapering, pointed ends, overlapping by ½ of the circumference; circular in shape. Dimensions: diameter 8.5-9 cm, bar thickness in the central part approx. 1.2 cm, at the ends approx. 0.7 cm. The artefact was lost (redrawn here, based on field documentation from 1972: Fig. 11: 2).

5. Iron ring – open, with slightly tapering, overlapping ends, circular in shape, made of a bar of circular cross-section. Dimensions: diameter 9.5-10 cm, bar diameter 1.1-1.2 cm. The artefact was lost (redrawn from field documentation from 1975; Fig. 11: 3).

6. Iron ring – open, with bluntly rounded ends, overlapping by ½ of the circumference; circular in shape. Dimensions: diameter 11-11.5 cm, bar thickness approx. 1.3 cm. The artefact was lost (redrawn here, based on field documentation from 1962: Fig. 11: 4).

7. Iron ring – open, with bluntly rounded, overlapping ends, circular in shape, made of a bar of rectangular (?) cross-section. Dimensions: diameter 9.3 cm, bar thickness approx. 1 cm. The artefact was lost (redrawn here, based on field documentation from 1963: Fig. 11: 5).

8. Iron (ankle) ring – open, with tapering, overlapping ends, circular in shape, made of a bar of circular cross-section. Originally complete, cut during metallurgical analysis in the second half of the 20th century – one pointed end was preserved, the rest was lost. Dimensions of the preserved part: length 3.5 cm, maximum bar diameter 0.6 cm, weight 4 g. Original dimensions (according to the drawing in the field documentation from 1968): diameter 11.6-12 cm, bar diameter in the central part 1.1-1.2 cm (Fig. 11: 6).

9. Iron ring – open, with tapering, initially touching or slightly overlapping ends, circular in shape, made of a bar of circular cross-section. One end was cut off during metallurgical analysis in the second half of the 20th century. Dimensions: diameter 7.3-7.5 cm, bar diameter in the central part 0.9 cm, at the ends 0.5-0.6 cm, weight 41 g (Fig. 11: 7).

10. Iron ring – open, with bluntly rounded ends (?), circular in shape (according to the drawing in the field documentation preserved in ¾ of the circumference), made of a bar of triangular (?) cross-section. Dimensions: diameter approx. 10.5 cm, minimum bar thickness 0.7 cm, distance between ends (?): 7 cm. The artefact was lost (redrawn from field documentation from 1963; Fig. 11: 9).

11. Iron ring – open, with tapering, initially overlapping ends, circular in shape, made of a bar of circular cross-section. One end is pointed, the other was cut off during metallurgical analysis in the second half of the 20th century. Dimensions: diameter 11.4-12 cm, bar diameter in the central part 1-1.1 cm, weight 107 g (Fig. 11: 10).

12. Fragment of an iron neck-ring of the Maszków type – made of a twisted bar of rectangular cross-section, with one end preserved, hammered flat and rolled up into an eye (looped). The state of preservation hardly allows for determining whether the twisting direction has changed. Secondarily reworked into a bracelet, circular in shape, with unevenly

overlapping ends. Dimensions: diameter 8.2-8.4 cm, bar cross-section 0.3 × 0.4 cm, ends overlapping by 3.5 cm, weight 32 g (Fig. 12: 1).

13. Fragment of an iron neck-ring (?) – made of a twisted bar of rectangular cross-section, with unpreserved ends. There is no change in the twisting direction on the preserved section. Secondarily reworked into a bracelet, circular in shape, with overlapping ends. Dimensions: diameter 6.5 cm, bar cross-section 0.4 × 0.5 cm, ends overlapping by 3 cm, weight 21 g (Fig. 12: 2).

14. Fragment of an iron neck-ring (?) – made of a twisted bar of rectangular cross-section, with unpreserved ends; one end was cut off during metallurgical analysis in the second half of the 20th century. There is no change in the twisting direction on the preserved section. Secondarily reworked into a bracelet or ankle ring, circular in shape, with an incomplete circumference. Dimensions: diameter 8.5 cm, bar cross-section 0.7 × 0.7 cm, distance between ends approx. 6 cm, weight 53 g (Fig. 12: 3).

15. Fragment of an iron ring (less than ½ of the circumference). Dimensions: original diameter approx. 10 cm, bar thickness approx. 1.1 cm. The artefact was lost (redrawn here, based on field documentation from 1961: Fig. 12: 4).

16. Fragment of an iron ring (approx. ½ of the circumference). Dimensions: original diameter approx. 7.5 cm, bar thickness approx. 0.9 cm. The artefact was lost (redrawn here, based on field documentation from 1965: Fig. 12: 5).

17. Fragment of an iron ring – made of a bar of circular cross-section. Dimensions: preserved length 8.5 cm, original diameter approx. 11 cm, bar thickness approx. 1.4 cm. The artefact was lost (redrawn here, based on field documentation from 1972: Fig. 12: 6).

18. Fragment of an iron ring – made of a bar of circular cross-section. Dimensions: preserved length 11 cm, original diameter approx. 12 cm, bar thickness approx. 1.7 cm. The artefact was lost (redrawn here, based on field documentation from 1975: Fig. 12: 7).

19. Fragment of an iron ring – made of a bar of circular cross-section. Both ends show traces of having been secondary cut off in prehistoric times (*cf.*, Fig. 14: 1). Dimensions: preserved length 7.5 cm, original diameter approx. 11 cm, bar diameter 0.9-1 cm, weight 28 g (Fig. 12: 8).

20. Fragment of an iron ring – made of a bar of circular cross-section. Both ends show traces of having been secondary cut off in prehistoric times; one of them was additionally cut during metallurgical analysis in the second half of the 20th century (*cf.*, Fig. 14: 2). Dimensions: preserved length 7.5 cm, original diameter approx. 11 cm, bar diameter 1.1-1.3 cm, weight 55 g (Fig. 12: 9).

21. Fragment of an iron socketed axe with a socket of rectangular cross-section – preserved socket with a part narrowing towards the blade. Dimensions: preserved length 7 cm, socket cross-section 3.5 × 4.5 cm. The artefact was lost (Fig. 12: 10 after Gedl 2004).

22. Fragment of an iron socketed axe with a socket of rectangular cross-section – preserved blade with a part of the socket. Dimensions: preserved length 8.4 cm, blade width 5.5 cm. The artefact was lost (Fig. 12: 12 after Gedl 2004).

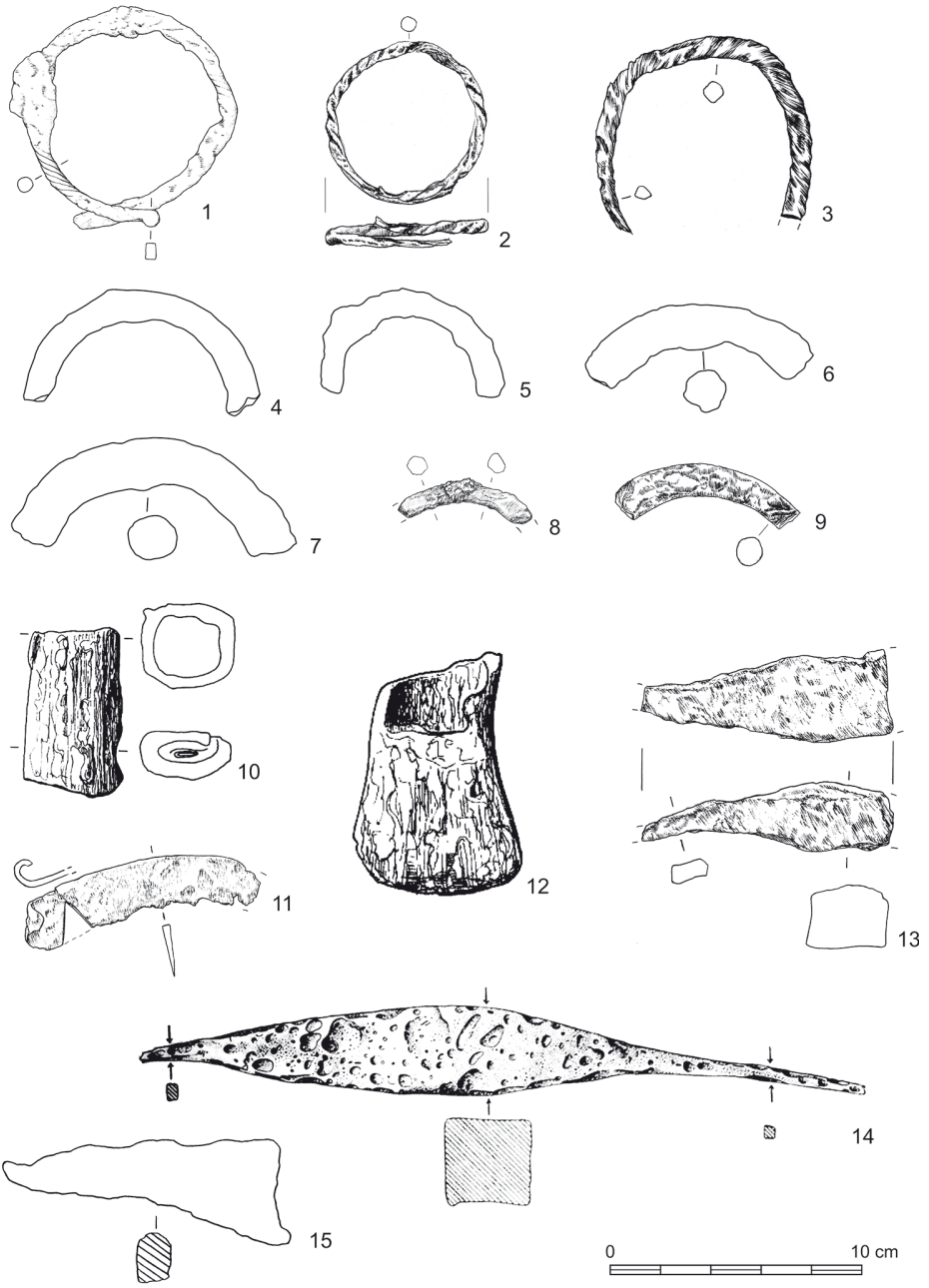


Fig. 12. Maszkowice 'Góra Zyndrama'. 1-3 – fragments of neck-rings made of twisted iron bar; 4-9 – fragments of iron rings; 10, 12 – iron socketed axes; 11 – iron sickle; 13-15 – iron bipyramidal bars (1-3, 8-9, 11, 13 – drawn by J. A. Markiewicz, M. S. Przybyła and E. Rydzewska; 10, 12 – after Gedl 2004; 14 – after Cabalska 1964; 4-7, 15 – based on field documentation from the 1960s and 1970s)

23. Fragment of an iron sickle with a perpendicular projection at the base – designed for left-handed people; slightly arched blade, heavily corroded in the tip part and with traces of modern cutting. A sample was cut out from part of the blade at the base for metallurgical analysis in the second half of the 20th century. Dimensions: preserved length 9.5 cm, maximum blade width 2.1 cm, thickness 0.2 cm, weight 20 g (Fig. 12: 11).

24. Fragment of an iron bipyramidal bar – the wider part shows traces of being cut off in prehistoric times (*cf.*, Fig. 16), the narrower part was cut off during metallurgical analysis in the second half of the 20th century. Dimensions: preserved length 9.7 cm, cross-section of the broadest part 3.2 × 2.3 cm, the narrowest part 1 × 0.5 cm; weight 227 g (Fig. 12: 13).

25. Iron bipyramidal bar. Dimensions: length approx. 30 cm, cross-section of the broadest part approx. 3.6 × 3.6 cm, the ends approx. 0.6 × 0.8 cm, weight: 875.5 g. The artefact was lost (data and Fig. 12: 14 after Cabalska 1964).

26. Fragment of an iron bipyramidal bar. Dimensions: preserved length 11 cm, thickness at the widest part 4 cm. The artefact was lost (redrawn here, based on field documentation from 1975; Fig. 12: 15).

TYPOLOGICAL AND CHRONOLOGICAL ANALYSIS

Bracelets and ankle rings

The massive arm and leg ornaments from the analysed deposits represent two types. The first of them is distinguished by tapered, overlapping ends, which can be pointed (Tyniec 'Wielogóra', Fig. 7: 1), bluntly rounded (Tyniec 'Wielogóra', Fig. 7: 2) or straight 'cut' (Maszkowice, Fig. 11: 1). They can be referred to as Świbie type rings due to their most numerous occurrence in Poland in this Upper Silesian cemetery (114 items; Michnik, Dzięgielewski 2022, 101). The specimens from the discussed hoards that were preserved in their entirety and not secondarily unbent allow us to conclude that they were usually spirals of 1.2-1.25 coils (Fig. 7: 1), but there are also examples (perhaps secondarily reduced to the size of a bracelet?) reaching over 1.5 coils (Maszkowice, Fig. 11: 2). The specimens from the deposits were made of a massive, usually circular in cross-section, iron bar up to a maximum thickness of 16 mm. The diameters of the ornaments allow us to distinguish among them rings the size of both an ankle ring and a bracelet. However, as shown by research in inhumation cemeteries (*e.g.*, in Gliwice-Łabędy 'Przyszówka', Częstochowa-Raków or Świbie – Dobrzańska-Szydłowska and Gedl 1962; Błaszczyk 1965; Michnik and Dzięgielewski 2022), rings of the same size could have been both arm and leg ornaments. In particular, small specimens (the size of a bracelet) could have been ankle rings in children's graves. The reverse is rare, so here we refer to all rings over 11 cm in diameter as ankle rings. In Świbie, the discussed type of iron rings is indicative of the middle and, mainly, the late phase of the necropolis, dated to Ha C2 and C2-D1, respectively (Michnik and Dzięgielewski 2022, 122-123, table 4.1). A similar chronology (Ha C2) is indicated by

the results of a seriation of hoards, including those from Małopolska (Maszków, Kraków District), containing this type of ornament (Dzięgielewski *et al.* 2020, 234, fig. 20). Interestingly, the massive bronze spirals the size of ankle rings, classified as the Stary Sącz, Kujawy and Masovia varieties (Andrzejowska 2016; Maciejewski 2019), are younger (Ha D) than the iron specimens (Dzięgielewski *et al.* 2020, 234). On the other hand, it is hard not to notice the formal similarity of the latter to the bronze ankle rings of the Górny Śląsk type (Michnik 2022, pl. 15: 14, 15, 169: 7, 8), which at the Świbie necropolis are a form typical of the early phase (Ha C1b) (Michnik and Dzięgielewski 2022, 99-100). Both the Stary Sącz-type bronze ankle rings and the Świbie-type iron specimens are therefore most likely to be later, younger morphotypes derived from Górny Śląsk-type bronze ankle rings.

The second type of iron rings – open, made of a massive bar, with straight-cut, touching ends – also occurs in various sizes/functional variants in Early Iron Age assemblages. The hoard from Kraków-Tyniec 'Grodzisko' included two pairs of massive rings, the size of an ankle ornament, and one smaller ring, the size of a bracelet (Fig. 5). This collection resembles the set known from the nearby hoard from Młodziejowice on the Dłubnia River (Dzięgielewski *et al.* 2020). All of the rings were made of a bar of circular cross-section but hammered flat from the 'lower' side. This feature distinguishes the artefacts of the 'Grodzisko' and Młodziejowice hoards from other fairly numerous specimens from Poland, which are usually made of a bar of circular cross-section, though not always regular (some examples are flattened from the inside). It seems that the rings from Grave 549 from Domasław, Wrocław District, may have had similar cross-sections (Gediga and Józefowska 2018, pl. 72: 4, 5). The only probable specimen from Maszkowice can be classified as this type based on diameter (Fig. 12: 7). This simple type of ring ornament, referring to the analogical bronze rings dated to the end of the Bronze Age and the beginning of the Iron Age, appears sporadically in the older phase of the Hallstatt period in hoards (Brzesko, Pyrzyce District;

Fig. 13. Details of ankle ring no. 3 from Kraków-Tyniec 'Grodzisko': a – hammer-forged constriction of the rod, b – faceting of the surface into a polygonal cross-section. Photo: A. Susuł

Blajer 2001, fig. 27) and in greater numbers in cemeteries (*e.g.*, Chojno-Golejewko, Rawicz District; Nadziejewo, Środa Wielkopolska District) (Dzięgielewski *et al.* 2020, 228).

An interesting and hitherto unrecorded feature in iron rings is a kind of faceting of the rod, evident on a well-preserved surface fragment of a specimen from Tyniec 'Grodzisko',

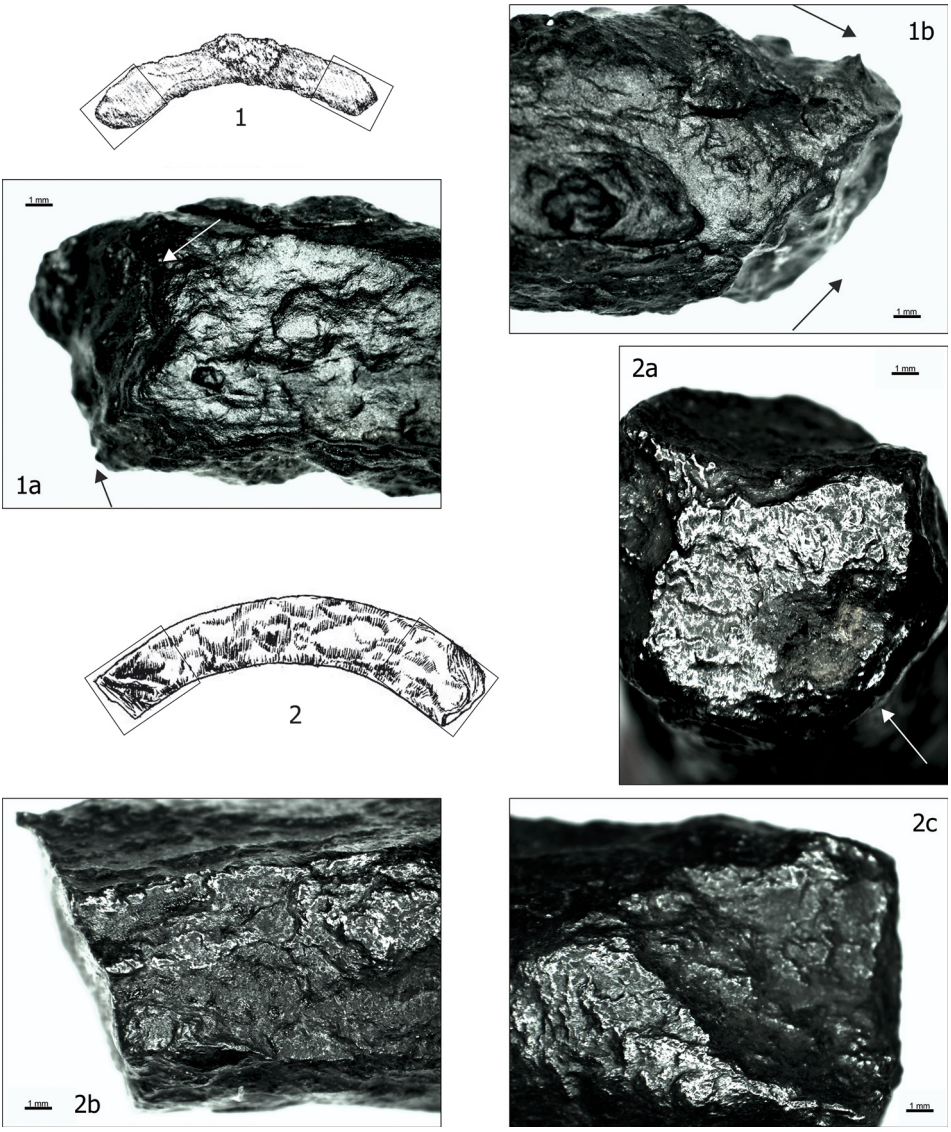


Fig. 14. Traces of intentional fragmentation on iron rings from Maszkowice 'Góra Zyndrama': 1 – ring no. 19, 2 – ring no. 20 (2b – end cut for metallurgical analysis in the second half of the 20th century). Arrows indicate the direction of chisel blows. Photo: K. Dzięgielewski

which makes its cross-section polygonal (Fig. 5: 3; 13: b). The same specimen was also, probably secondarily, hammered differently: on its perimeter, in two opposite places (not at the ends), a distinct narrowing can be seen, most probably made from the centre (Fig. 13: a). This element was not yet known from iron specimens, but still widely described in bronze ankle rings, especially of the Stary Sącz and Masovia types (Maciejewski 2019, 51, fig. 15: c; Michnik 2022, pl. 355: 7, 8). It has recently been shown that narrowings of this type could not have arisen as a result of wear or abrasion, but are the result of intentional hammering and polishing, presumably for a purpose related to some way of use of the ornament (Garbacz-Klempka *et al.* 2022, 300, 301, fig. 15: 6). Observing this phenomenon on an iron specimen, otherwise with an exquisitely preserved (faceted) surface, is further confirmation of this observation. Another interesting feature of some of the analysed ring ornaments from Maszkowice is their intentional fragmentation (Fig. 14), which is discussed later.

The iron rings from the Tyniec deposits, as well as all preserved objects from Maszkowice, were analysed using a portable Spectro xSORT spectrometer (model XHH03) to assess the possibility that they were made from meteoritic iron. This was undertaken because they are roughly contemporary with the specimens from Częstochowa-Raków, which were made entirely or partially from such material (Błaszczyk 1965; Jambon *et al.* 2025). However, none of the examined items exhibited nickel concentrations exceeding 1% in any of the at least three analytical points per object, which rules out the use of meteoritic iron. The detailed measurement results will be incorporated into the project's database on the chemistry and provenance of early iron in Poland (*cf.*, Jambon *et al.* 2025, 4).

Neck-rings

In the analysed set, unlike the previously mentioned hoards from Maszków and Młodziejowice near Kraków, no functional neck-rings were found. Only a fragment of a twisted ornament from Maszkowice (Fig. 12: 1), reused as a bracelet, can be surely classified as a piece of a neck-ring. Observations under an optical microscope of this heavily corroded object may suggest that it was a *Wendelring*, *i.e.*, a twisted ring with a change in the twisting direction (*cf.*, Fig. 15: b, c). This assumption could not be confirmed by X-ray imaging (performed by M. Goryl from Cracow University of Technology) due to the absence of a metal core and the object's support solely by a corrosion layer. However, it does not seem likely that the twisting was unidirectional – in almost all the fully preserved neck-rings, an alternating direction of twisting is visible (Derrix 2001, 119-122; possible exception: Łubnice, Wieruszów District – Kaszewski 1969, 99, fig. 2: 3). Due to the presence of an eyelet (Fig. 15: a), the specimen can be classified as a Maszków type neck-ring (Dzięgielewski *et al.* 2020, 225, fig. 10: 2). This type differs in one detail from the most numerous type of iron *Wendelringe* – the Gorszewice type according to R. Heynowski (2000, 15, 16, pl. 78: 1): the form of the terminals, which are hammered flat and rolled up into loops, similarly to Late Bronze Age bronze neck-rings made of a thin bar, known as the Kaliszanki type in Heynowski's

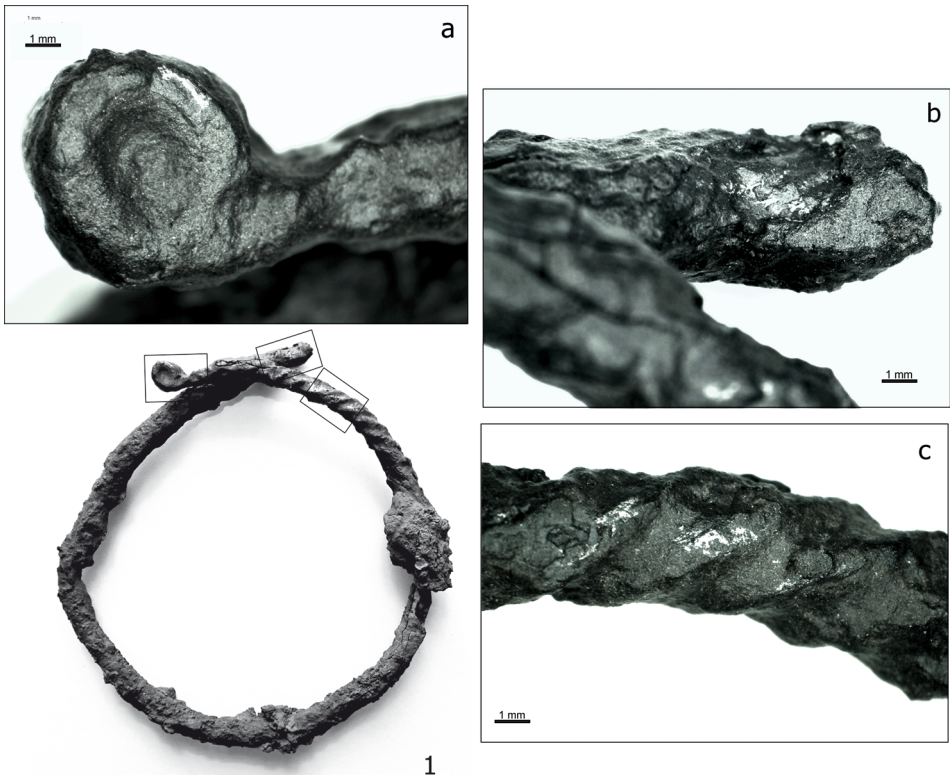


Fig. 15. Details visible on a fragment of a neck-ring from Maszkowice 'Góra Zyndrama', secondarily coiled into a bracelet (no. 12): a – loop made from a flat, hammered rod, b – presumably rectangular cross-section of the rod (a non-twisted segment possibly indicating a change in the twisting direction), c – twisted section. Photo: K. Dzięgielewski

classification. Another specimen of this kind was discovered in recent years in a hoard of bronze and iron objects from the early Hallstatt period from Grabionna, Piła District (Garbacz-Klempka *et al.* 2024b, 174, fig. 1). The dating of the hoards from Maszków and Grabionna should not be later than the Ha C2 phase (Dzięgielewski *et al.* 2020, fig. 232). The remaining two secondarily reduced twisted rings from Maszkowice (one to the size of a bracelet – Fig. 12: 2; the other most probably an ankle ring – Fig. 12: 3), may also be made from *Wendelringe* neck-rings. However, the length of their circumferences and state of preservation do not allow for an ascertainment of this fact.

Tools: knife, sickles and axes

The three deposits presented here (Tyniec 'Grodzisko', Tyniec 'Wielogóra', Maszkowice 'Góra Zyndrama') did not include tools. However, based on the composition of the hoard from Młodziejowice, it can be stated that the deliberate deposition of this category of iron

objects was not unknown in Małopolska at the beginning of the Iron Age. For this reason, we treat individual finds of large tools from settlements or distinctive terrain forms as possible intentional depositions. This assumption is supported by loose finds of sickles and axes from Porąbka and Kobiernice, Bielsko-Biała District, discovered at a distance from settlement sites in a high landscape zone (Chorąży and Chorąży 2022, 21, 22). Multi-element iron deposits also come from the exact locations.

The iron sickle from Maszkowice (Fig. 12: 11) represents the group of iron sickles with a perpendicular projection at the base – the most popular sickle type in the Early Iron Age in the Odra and Vistula rivers basins (Gedl 1995, 94-99, pls 33-35, 46B; Derrix 2001, 80-82, fig. 38). Sickles of this type are among the tools in which bronze was most quickly replaced by iron. Alongside the less numerous tanged sickles, they were widespread in Poland from the beginning of the Hallstatt period (Dzięgielewski *et al.* 2020, 229).

In Sobolów, Bochnia District, an iron knife (Wardas-Lasoń *et al.* 2025, fig. 2 – here mistakenly referred to as a sickle) appeared in a deposit for the first time in Lesser Poland – a tool commonly found in grave inventories from the Early Iron Age (Gedl 1973, 53; Gediga *et al.* 2020, 73, figs. 119, 122; Szczurek 2021, 191). Due to its state of preservation, it is probable, but not sure, that it represents the group of large knives with an angled, roof-shaped back, which in the cemetery in Świbie usually occurred in the middle and late phases (Ha C2-D1) (Michnik and Dzięgielewski 2022, 105). Outside Lesser Poland, the presence of a knife in an early Hallstatt hoard was noted only in Kiełpino, in the Gryfice District (Kozłowska-Skoczka 2012, 179-181), and perhaps in Biskupin, Hoard II (Durczewski 1961, 10). This category of tools appears in greater numbers only in deposits from the late Hallstatt period (*e.g.*, Bąków Dolny, Łowicz District; Michalski 2000; Myštěves, Hradec Králové District; Mangel *et al.* 2025, fig. 4).

A recurring element of the discussed hoards and among single finds are axes, representing only a few types: trunnion axes (flat hatchets with lateral projections, *Ärmchenbeile*) and simple, loopless socketed axes. The first type is represented by an axe from the settlement in Biskupice, Wieliczka District (Gedl 2004, 91, pl. 10: 91; Dzięgielewski 2024a, fig. 1.2.41: 13). Its intentional deposition, perhaps together with other large iron objects (a sickle, less likely also a bracelet – Dzięgielewski 2024a, fig. 1.2.41: 11), and not a loose settlement find, is supported by the fact that such tools, sometimes also interpreted as weapons, in Polish lands come in the vast majority from grave inventories (Gedl 2004, 56) or hoards and single item deposits (Blajer *et al.* 2021, 526; Půlpán *et al.* 2022, fig. 25). Slightly more finds from settlement contexts are recorded in Slovakia, but even there they are usually part of multi-element hoards (Půlpán *et al.* 2022, 41, 42). In Świbie, as well as in Domasław, trunnion axes occur throughout the older period of the functioning of these necropolises (Ha C1-C2) (Gediga *et al.* 2020, 75, 76; Michnik and Dzięgielewski 2022, 105, 106).

The second type of iron axes found in Lesser Poland in hoards (Młodziejowice) or as single finds (Maszkowice – Fig. 12: 10, 12; Kobiernice-Wołek, Bielsko-Biała District – Chorąży and Chorąży 2022, 14) are socketed axes. Two simple varieties, without a loop or

decoration, can be distinguished by the socket's circular or rectangular cross-section (Gedl 2004). For the early Hallstatt assemblages (Ha C-D1), specimens with a socket of circular cross-section seem to be more typical, as indicated by several well-dated grave inventories and hoards from the Polish Lowlands (Gedl 2004; Gediga *et al.* 2020; Michnik and Dzięgielewski 2022; Garbacz-Klempka *et al.* 2024b) or Slovakia (Čambal and Makarová 2020, fig. 6). In turn, axes with rectangular-sectioned sockets seem to be slightly more common in the late Hallstatt period (Ha D). Their earlier chronology – within the Ha C phase, or at least its younger part – is confirmed by only a few well-dated assemblages, *e.g.*, graves from Żukowice, Głogów District (Gedl 2004, pl. 75), or Domasław (Gediga and Józefowska 2018). The hoard from Młodziejowice also seems to represent the younger Ha C period (Dzięgielewski *et al.* 2020). Most of the remaining axes of this type from Poland, including a large series from the stronghold in Wicina, Żary District (Michalak and Jaszewska 2011), should be linked mostly with the Ha D phase. This date is also confirmed by some closed assemblages from Bohemia (Mangel *et al.* 2025, 138, fig. 4). Both specimens from Maszkowice have a rectangular cross-section (Fig. 12: 10, 12). They are generally linked to the V-VI phase of this settlement, and therefore it is possible to date them to both the end of the Ha C and Ha D1 phases.

Bipyramidal bars

Seventeen whole or fragmented bars of iron in the form of two slender pyramids joined at the base (so-called bipyramidal bars, double-pointed bars, *Doppelspitzbarren*), present in the hoards and finds from the Małopolska region, almost exhaust the list of such forms of iron semi-product identified to date in Poland. In addition to three separately found specimens from Maszkowice (Fig. 12: 13-15; 16), there are three securely documented hoards containing seven (Porąbka I), two (Porąbka II) (Chorąży and Chorąży 2022), and five bars (Witów III) (Dzięgielewski *et al.* 2024b, fig. 2.3.15). Apart from these, only two other bipyramidal iron bars are known from Poland – from Biskupin, Hoard II (Durczewski 1961, 10, figs 1 and 2), and from Wicina (Michalak and Jaszewska 2011, 189). Except for the bars from Biskupin, these objects were long considered to possibly have originated from later periods of the Iron Age (pre-Roman or Roman) (Bukowski 1982, 373, fig. 27), due to their rare occurrence in multi-element assemblages or other well-dated contexts outside of Poland. A later chronology was suggested by non-representative and, as it turned out, uncertain finds from the North Alpine region, where such items are generally much more numerous (Pleiner 2006, fig. 13; Senn *et al.* 2014, 147; Bauvais *et al.* 2018, fig. 1). In recent years, thanks to direct radiocarbon dating of carbon trapped in steely zones of iron (Bauvais *et al.* 2018; Berranger *et al.* 2021), contextual studies (*e.g.*, Dzięgielewski *et al.* 2020, table 1), and new finds accompanied by other artefacts (Berranger and Fluzin 2012; Chorąży and Chorąży 2022, 21-22 – Porąbka II), it is increasingly safe to attribute an (early) Hallstatt date to this form of semi-product (Berranger *et al.* 2021, figs 11 and 12). In the case of Poland, these are relatively small specimens, rarely exceeding 1 kg in weight

(min. 599 g in Witów, max. 1650 g in Biskupin), usually with elongated, pointed ends (altogether comprising up to two-thirds of the bar's length), one of which is sometimes flattened at the tip in a shape reminiscent of a fish tail – a feature known from Neo-Assyrian examples (Khorsabad), as well as from the Delphi deposit and isolated finds from Hungary (Dunapentele-Dunaújváros) and southern Germany (*e.g.*, Aubstadt; Pleiner 2006, fig. 6: 9). All of them fit the BLD1-2 (asymmetric, long bipyramidal) types in M. Berranger's classification (Berranger and Fluzin 2012, fig. 4). The objects from Biskupin (and one from Porąbka) had a hole in the main body, which is also a characteristic found in bipyramidal

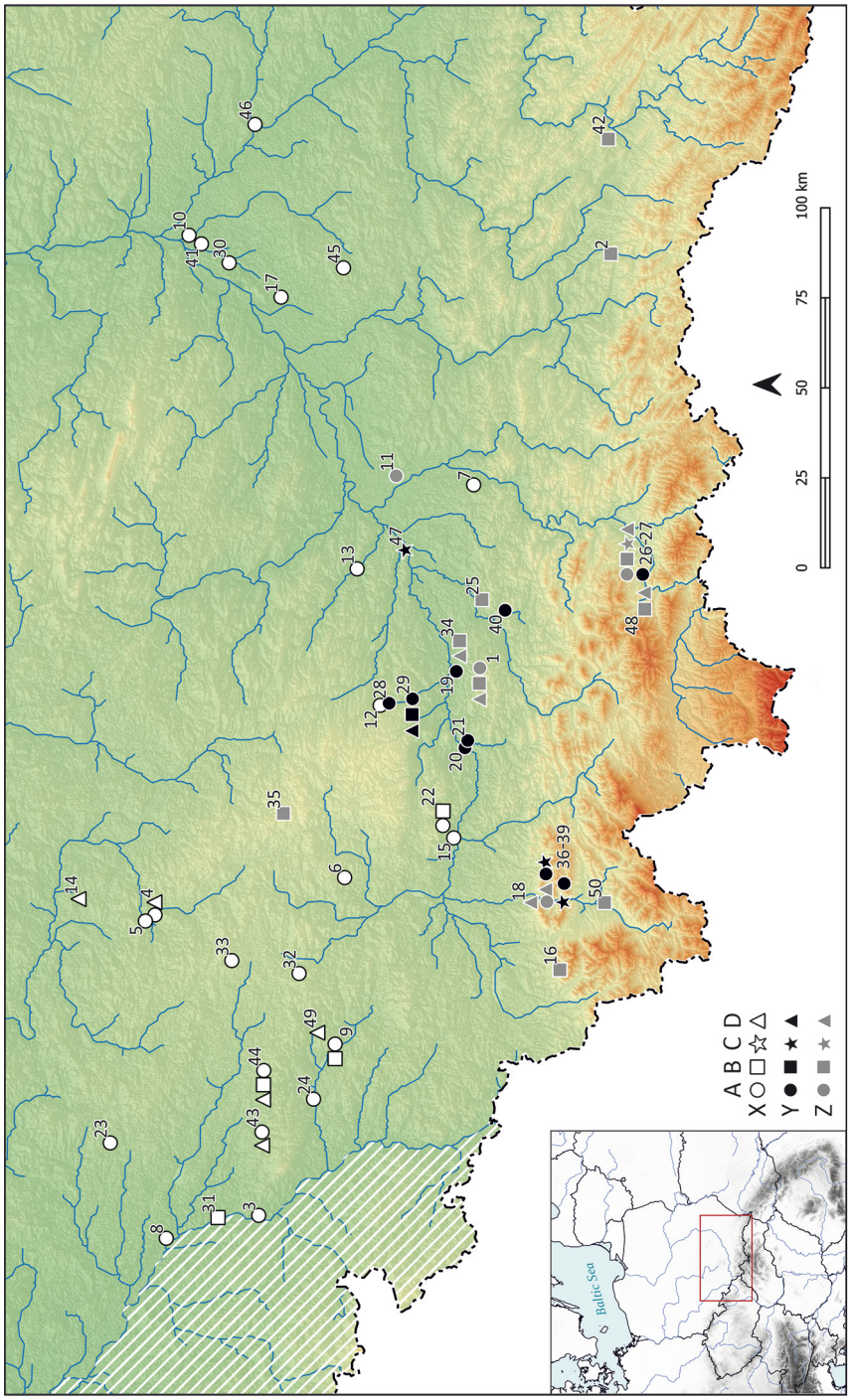
Fig. 16. Traces of intentional fragmentation on a bipyramidal bar from Maszkowice 'Góra Zyndrama' (no. 24): a, d – straight edge indicating a marked or scored line prior to breakage, b-d – irregular marks from one (or two?) chisel or hammer blows (c: note the modern sawing mark, probably from an examination in the second half of the 20th century). Arrows indicate the direction of chisel blows. Photo: K. Dzięgielewski

bars from the aforementioned eastern regions (Pleiner 2006, 23-28, fig. 13). Thus, the Polish assemblage differs slightly from the semi-products most commonly encountered in the late Hallstatt and early La Tène periods in the North Alpine zone, *i.e.*, the symmetrically shaped, short bipyramidal bars (Berranger *et al.* 2021, fig. 12; Ballmer *et al.* 2022, 119-123). This may also point to their earlier dating.

In summary, the analysis of the contexts of the new or verified iron finds from western Lesser Poland presented here does not allow for the formulation of new postulates regarding their chronology. This results from the relatively homogeneous character of most new assemblages, *i.e.*, the co-occurrence of only functionally and typologically similar artefacts. In this situation, referring to the knowledge provided by earlier studies on materials of this type from necropolises and hoards mainly from Silesia, Greater Poland and Lesser Poland (Pieczyński 1954; Gedl 1973; 1991; Heynowski 2000; Derrix 2001; Gediga *et al.* 2020; Dzięgielewski *et al.* 2020; Michnik and Dzięgielewski 2022), it should be stated that the most probable period of deposition of the discussed objects in Lesser Poland are the Ha C1b-C2 phases, and perhaps also Ha D1 (750-550 BC).

CONTEXTUAL ANALYSIS

The phenomenon of 'pure' iron hoards identified in recent years in the broadly understood Western Carpathian zone (including the Vistula River valley near present-day Kraków) is part of a broader trend, manifested in the continuation of the practice of mass deposition of goods, mainly metals, at the beginning of the Early Iron Age on the margins of the Hallstatt cultural circle (Blajer 1992; Westhausen 2018; 2019; Dzięgielewski *et al.* 2020; Mangel *et al.* 2025). It seems that we should now broaden the conceptual scope of this phenomenon. So-called single finds, *i.e.*, single-element deposits, could have similar semantics to hoards, *i.e.*, deposits of at least two objects. This is increasingly suggested by studies on the deposition of metals in the Bronze Age, indicating, among other things, that they are selective, that their spatial distribution may sometimes be similar, and that the functional structure is complementary to multi-element hoards (Becker 2013; Maciejewski 2016; Fontijn 2020; Půlpán *et al.* 2022). A systematic analysis of this issue for the Polish lands was carried out by Wojciech Blajer, who noted the similarity in the distribution patterns of hoards and single finds in some periods of the Bronze Age (Blajer 2001, 259-298). The unequivocal inclusion of single finds in the category of intentional deposits is documented in the literature on the Lusatian culture, usually in relation to large bronze items, especially swords (Kostrzewski 1964; Blajer 2001, 125; Dzięgielewski *et al.* 2024b, 615). Contexts of discoveries of other categories of metal objects from the Bronze and Early Iron Ages, such as axes, sickles, spearheads, or especially small bronzes such as pins or bracelets, do not allow us to rule out that a certain percentage of these finds are elements of destroyed grave inventories, accidental losses or relics of economic activity in settlements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and their surroundings. Nevertheless, most of these objects must also be intentional single-element deposits or remains of multi-element hoards, as evidenced by the small number and narrow typological spectrum of finds from well-studied cemeteries and settlements. In other words, the low average number of large metal objects in graves and on settlement areas, especially in the Late Bronze Age, does not indicate that most of the so-called single finds originally came from destroyed necropolises or settlements. The above-mentioned correlation between the general distribution of hoards and single finds (Blajer 2001, maps 4 vs 119, 5 vs 121) also leads to the conclusion that most of the latter represent intentional deposits. The situation changed to some extent at the beginning of the Early Iron Age (Ha C), when, especially in Silesia and southern Greater Poland (southwestern Poland in the Odra River basin), cemeteries were routinely equipped with much richer sets of metal objects than before, including large bronze and iron items (*e.g.*, Gedl 1973; Gediga *et al.* 2020; Michnik and Dzięgielewski 2022; Purowski 2024), while the custom of depositing hoards almost completely disappeared (Blajer 2001, 290-291, maps 7 and 124). This was apparently mirroring the situation in the 'core' Hallstatt culture areas. As already mentioned, outside this area (in Lesser Poland, Central Poland, northern Greater Poland and Pomerania), the deposition of hoards continued throughout the Ha C phase (Blajer 2001; Dzięgielewski *et al.* 2020), which clearly indicates that both phenomena – grave furnishings and hoards – were a manifestation of the same need to selectively exclude items from metal circulation (*cf.*, Kubach 1985; Becker 2013; Fontijn 2020, 24).

Our observation regarding the differentiation of the deposition pattern of 'large irons' in the Early Iron Age on the Silesian-Lesser Poland border and in the Western Carpathian zone (Fig. 17) fits into the same line of interpretation. The lack of finds of the analysed objects in graves in the mountain zone is, of course, a derivative of the very modest source base, *i.e.*, the number of cemeteries and graves. Among the certain discoveries, only one larger cemetery can be indicated there. This includes a cemetery made of more than 100 graves in Příbor 'Vodojem'/'Pod Šibeňákem', Nový Jičín District in the Moravian-Silesian Foothills (Stabrava 2011) and several graves from Mucharz 'Za Górą', site 24, Wadowice District, with pottery in the style typical of the Upper Silesian-Lesser Poland group (Kraszewska *et al.*, in print). The

Fig. 17. Distribution of the analyzed categories of iron objects in southern Poland. The uncharted area, where Ha C graves were routinely furnished with iron objects, is marked with hatching. A – rings, B – axes, C – bipyramidal bars, D – sickles; X – grave, Y – iron hoard, Z – single find, including a single find in a settlement. 1 – Biskupice, 2 – Bóbrka, 3 – Chorula, 4 – Częstochowa-Raków, 5 – Częstochowa-Stare Miasto, 6 – Dąbrowa Górnicza-Strzemieszyce Wielkie, 7 – Dębina Zakrzowska, 8 – Dobrzeń Mały, 9 – Gliwice-Łabędy Przyszówka, 10 – Gorzyce (Tarnobrzeg dist.), 11 – Gorzyce (Tarnów dist.), 12 – Iwanowice Włościańskie, 13 – Jakuszowice, 14 – Jamno, 15 – Jankowice, 16 – Jaworze-Ostry, 17 – Knapy, 18 – Kobiernice, 19 – Kokotów, 20 – Kraków-Tyniec 'Grodzisko', 21 – Kraków-Tyniec 'Wielogóra', 22 – Kwaczała-Łozek, 23 – Lasowice Małe, 24 – Łany, 25 – Łapczyca Górna, 26-27 – Maszkowice 'Góra Zyndrama' (26 – hoard, 27 – single finds in the settlement), 28 – Maszków, 29 – Młodziejowice, 30 – Mokrzyszów, 31 – Opole-Groszowice, 32 – Orzech, 33 – Piasek, 34 – Podłęże, 35 – Podzamcze-Góra Birów, 36-39 – Porąbka (36 – single finds, 37-39 – hoards), 40 – Sobolów, 41 – Sokolniki, 42 – Srogów Górny, 43 – Strzelce Opolskie-Adamowice, 44 – Świbie, 45 – Trzęsówka, 46 – Ulanów, 47 – Witów, 48 – Zabrzeż 'Babia Góra', 49 – Ziemięcice, 50 – Żywiec 'Grojec' (drawn by K. Dzięgielewski, J. A. Markiewicz and M. S. Przybyła)

Dunajec River valley stands out in this respect (*cf.*, Dzięgielewski *et al.* 2024b, fig. 2.3.4), where, among others, the cemetery in Chełmiec, Nowy Sącz district (Abłamowicz and Abłamowicz 1989), and the cemetery in Janowice, Site 44 (Korczyńska 2014; 2021), are located. Single sepulchral sites from the Early Iron Age have also been identified in the upper San River basin (Sanok-Olchowce – Zielińska 2005; Zasław – Zielińska-Durda 1973; Gedl 1998, 246). These sites did not yield the category of objects of interest to us, apart from the cemetery in Příbor, representing the Silesian variant of the Lusatian culture from the Hallstatt period, *i.e.*, a community that regularly equipped the deceased with iron objects, in this case ring ornaments, knives and a short bladed scythe (Stabrava 2011, fig. 6). However, the key in this case is the situation noted in the zone north of the Carpathian foothills, *i.e.*, on the lowland and upland border of Silesia and northern Lesser Poland, where there are virtually no hoards and single finds in the form of 'large irons' (Fig. 17). The state of archaeological recognition cannot explain this observation, since most deposits are everywhere discovered accidentally and also because several bronze hoards from earlier and later periods (Ha B, Ha D) are known from the interfluve of the upper Odra and the upper Vistula (Blajer 2001, maps 6, 8). As for the discussed period (Ha C-D1), only the areas around Kraków stand out in this regard, with a particular, perhaps apparent at this point, concentration of iron hoards (Fig. 17). This 'wedge' of the Carpathian deposition pattern on the border of the Polish Jura and the Western Lesser Poland loess upland, coincides with the range of infiltration of people of the Częstochowa-Gliwice subgroup of the Upper Silesian-Lesser Poland group of the Lusatian culture in the Early Iron Age, which is visible, among other things, in the appearance of inhumation graves near today's Kraków (Dzięgielewski *et al.* 2024b, 626, fig. 2.3.12: 4, 2.3.21). Such locating of hoards on a cultural borderland (east of the Dłubnia and Raba rivers, there was a zone covered by late Tarnobrzeg group influences – *cf.*, Dzięgielewski, Godlewski 2009; Markiewicz 2024) resembles the regularity of depositing metal objects in liminal zones and on the borders of ecumenes, noticed by M. Maciejewski (2016a; 2016b; *cf.*, Mangel *et al.* 2023, 144).

A distinctive feature of deposits in the uplands and mountains is their association with exposed parts of the landscape, which may or may not be the dominant elevations in the area (Fig. 18). It could even be said that the higher slopes of such hills were preferred, but not the tops. This applies to both hoards deposited within hilltop settlements or in their immediate vicinity (*e.g.*, Maszkowice 'Góra Zyndrama', Tyniec 'Grodzisko', Młodziejowice), as well as those spatially unrelated to settlement sites (*e.g.*, Kobiernice and Porąbka). In the case of the latter, special attention is paid to zones where depositions were repeatedly made over a relatively short period (*e.g.*, Porąbka – Chorąży and Chorąży 2022; Sobolów – Wardas-Lasoń *et al.* 2025) or at different periods of prehistory (*e.g.*, Mount Wroczeń – Maciejewski 2022, 209). In the Polish Carpathians (Blajer 2023, 98), at least 26 of 62 particular and presumed hoards from the Early Bronze Age to the Middle La Tène period were deposited on exposed terrain forms (slopes or peaks of mountains or hills, promontories, high terraces). In turn, on the scale of the entire area of Poland, deposits made on

exposed elevations constitute only 3-8% of all hoards from the Bronze Age and Early Iron Age (Blajer 2001, 254, fig. 41). These proportions seem to be a natural consequence of the diversified landscape relief, but it is worth noting that within the analysed group of hoards and single finds of iron objects from southern Poland, sites located on slopes or peaks of hills constitute the vast majority (the exception here are the settlements located on the Carpathian Foothills marginal zone – Kokotów, Podłęże, Łapczyca Górna, Gorzyce in Tarnów district). It cannot, therefore, be ruled out that the observed tendency is at least partly conditioned by cultural factors and stems from the actual preferences of prehistoric

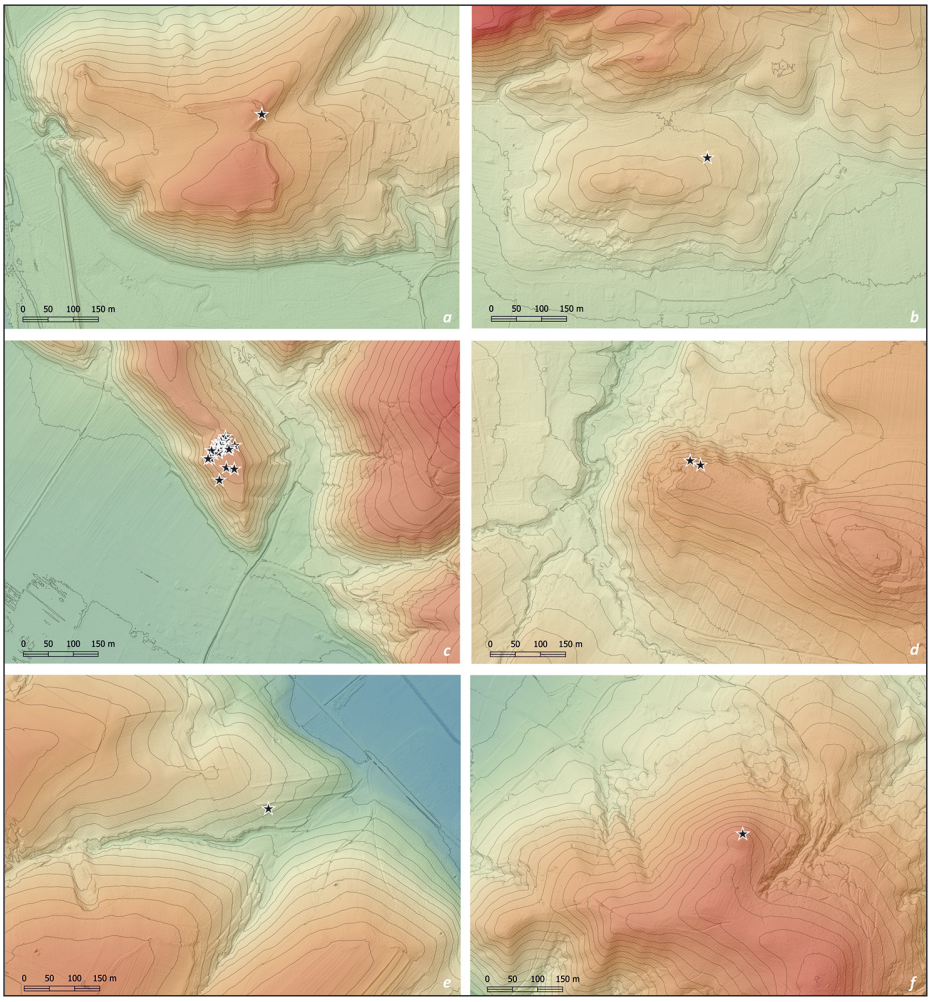

Fig. 18. Examples of locations of hoards and single finds of iron objects on exposed terrain forms. a – Kraków-Tyniec 'Grodzisko', b – Kraków-Tyniec 'Wielogóra', c – Maszkowice 'Góra Zyndrama', d – Biskupice, e – Młodziejowice, f – Sobolów (drawn by M. S. Przybyła)

communities in the sphere of ritual behaviours. A similar analysis recently performed for East Bohemia showed various patterns of Early Iron Age hoard location (including purely iron ones): from deposition in open lowland landscape, through the predominant slopes of hills, to their summits (Mangel *et al.* 2025, 140, figs 8-10).

As already mentioned, some deposits, such as the hoard from Tyniec 'Grodzisko', or from Kokotów, Wieliczka district (Dzięgielewski *et al.* 2020, 206-207, fig. 2), were located within functioning settlements or their immediate hinterland. The hoard of rings (items no. 1 and 2) from Maszkowice 'Góra Zyndrama' (Fig. 11: 8, 11) can be included in this category. The phenomenon of depositing metals, including those from scrap or ingots, is widely known from contemporary defensive settlements, *e.g.*, in Smolenice-Molpír, SW Slovakia (Čambal and Makarová 2020), although their character as intentional deposits, rather than simply household metal storage, sometimes leaves doubts (*cf.*, Dzięgielewski 2024b). The single finds of sickles and axes from the settlements we analyse do not provide certainty that these were intentional deposits. Some of them, especially from well-recognised settlements, such as Maszkowice or Podłęże (Dzięgielewski *et al.* 2024a, fig. 1.5.1.19; Dzięgielewski *et al.* 2024b, fig. 2.3.7), may be considered remnants of everyday economic activity.

FRAGMENTATION OF IRON

However, another observation leads us to conclude that some finds from settlements should be treated semantically differently from those in grave or hoard inventories. Namely, only among finds from settlements do we encounter examples of intentional fragmentation of metal objects. Although the phenomenon of fragments is widely described in the case of bronzes, mainly from the Bronze Age (Brück 2006; Fontijn 2020; Ialongo and Lago 2021), due to the smaller number of iron hoards in Europe, there is no systematic description of the phenomenon of iron fragmentation in the Early Iron Age. Moreover, in Poland, the phenomenon of fragmentation of bronze items never took on a mass character, neither in the Bronze Age nor in the Early Iron Age. At the turn of these ages, only about 10-15% of hoards contained fragments defined as 'scrap', *i.e.*, smaller than half of the original object (Blajer 2001, fig. 37). In the analysed group of artefacts, definitely intentionally fragmented iron objects were only found in Maszkowice. This applies to a series of ring fragments, preserved in half or 1/3 of the circumference (Fig. 12: 4-9), of which at least those preserved to this day can be assessed as broken as a result of intentional action in prehistory, and not as a result of depositional and post-depositional processes. This is evidenced by the sharp edges of the fractures perpendicular to the circumference (in the presence of well-preserved iron cores), and sometimes also traces of oblique or perpendicular flaking, resulting from a blow with a chisel or hammer (Fig. 14). Detailed observations of the ring fragments indicate that the bar was struck from two sides, to create a wedge-shaped narrowing, which was then the point where the piece was broken off.

The bipyramidal bar from Maszkowice (Fig. 12: 13) was split in half in the same way. It shows evident traces of two blows on one side of the wider surface (Fig. 16: b), and on the other side, probably marking the break line with a chisel (or sawing?), as indicated by the straight course of the edge (Fig. 16: a). Probably, the second specimen, now lost, had been broken in this manner too (Fig. 12: 15). A massive bipyramidal bar of the Colmar type (*cf.*, Senn *et al.* 2014, 150) from the defensive settlement in Wicina, Żary District, was broken similarly (Michalak and Jaszewska 2011, fig. 59: 4), leaving a piece still weighing more than 2,7 kg. An analogous pattern of fragmentation, perpendicularly at the thickest point, was also found among numerous *Doppelspitzbarren* from the Late Hallstatt defensive settlement in Mont Lassois in France (Ballmer *et al.* 2022, fig. 113a).

In the hoards of Lesser Poland, intentionally fragmented ring ornaments have not been found so far. Among the bars, also the whole specimens dominated (Chorąży and Chorąży 2022, 24; Dzięgielewski *et al.* 2024b, fig. 2.3.15), similarly to the assemblage of such objects from the settlement in Biskupin (Durczewski 1961, 10-11, figs. 1-2). A halved bipyramidal bar is known only from the hoard II from Porąbka (Chorąży and Chorąży 2022, 21). Outside Małopolska, the inclusion of fragments of a semi-finished iron product in a hoard was noted in Przybysław, Jarocin District (Durczewski 1961, 51-52, fig. 45: 1, 2). However, this relates to another form of semi-products, *i.e.*, quadrangular bars; moreover, the coherence of this assemblage is not certain – *cf.*, Durczewski and Śmigielski 1966, 130-131). Nevertheless, at least based on the find from Porąbka, the 'deposit' character of the fragmented bars from Maszkowice cannot be ruled out.

Two ring fragments from Maszkowice are about 7.5 cm long. However, due to the various thickness of the bar, their weight differs significantly: 28 g in the case of the fragment preserved 'in its entirety' (Fig. 12: 8) and 55 g in the case of the fragment cut off for metallurgical analysis (Fig. 12: 9). The second one probably originally was twice the mass of the first one. Both values should be supplemented by the mass of the loss resulting from corrosion and conservation treatments (2-4 g?). With such an assumption, they would represent approximate multiples (3× and 6×) of a unit recently identified in the weight structure of bronze fragments in European hoards, a derivative of the Middle Eastern shekel that weighs about 10.2 g (Ialongo and Lago 2021; Ialongo *et al.* 2021). The weight of the halved bipyramidal bar (227 g) would correspond to half a *mina* unit, which usually weighs 400-500 g (Ialongo and Lago 2021, 5). For comparison, whole bars from Witów and Porąbka weighed 600-1350 g and therefore exceeded the value of a *mina*. These facts could be consistent with the general observation that it is the fragments, not whole ingots, bars or finished items, that more closely reflect the weight system used in prehistoric transactions (Ialongo and Lago 2021, fig. 6). On the other hand, halved iron ingots of a different type (trapezoidal and rectangular) from the Smolenice-Molpír hoard weighed 426, 178, 174 and 197 g (Čambal and Makarová 2020, 208, fig. 6: 23-26), respectively, thus corresponding to a *mina* and half a *mina*. The significance of our remarks, made for two or three fragmented artefacts, is of course negligible, and we should refrain from drawing

further conclusions until the identification and statistical evaluation of the weight of larger series of fragmented iron objects. In this regard, the settlement in Wicina may raise hopes as it provided dozens of pieces (including intentional fragments?) of iron objects (Michalak and Jaszewska 2011), as well as traces of activity of metallurgical workshops and fragmentation of semi-products for their needs, at least ingots made of copper alloys (Garbacz-Klempka *et al.* 2024a). Also, the release of data on the weight of the fragments of the Mont Lassois bars would be valuable (*cf.*, Ballmer *et al.* 2022, 211).

CONCLUSIONS

After c. 750 BC, with the influx of the first significant quantities of the new metal, iron, into areas north of the Carpathians (Derrix 2001; Michnik and Dzięgielewski 2022) and with the stabilisation of new social structures modelled on the Hallstatt culture (Gedl 1991; Gediga 2011; Chochorowski *et al.* 2024, 37-38), the Oder River basin saw the abrupt abandonment of the centuries-old tradition of metal deposition in specific zones of the landscape. Instead, on an unprecedented scale (qualitatively and especially quantitatively, *i.e.*, in terms of the percentage of graves), metal deposition began to be associated with the furnishing of burials (Gedl 1973; Blajer 2001; Gediga *et al.* 2020). This phenomenon, however, did not reach the periphery of Silesia, *i.e.*, the zone subject to the most intensive Hallstatt influence (Dzięgielewski *et al.* 2020). This includes the upper Vistula basin, where single iron objects began to arrive as early as the turn of the 9th and 8th centuries (Blajer and Chochorowski 2015), and as late as the second half of the 8th to the first half of the 7th c. BC, the custom of depositing hoards, in this case virtually always purely of iron items, persisted (Maszków, Młodziejowice, Kokotów, Kraków-Tyniec, Sobolów). In the areas near Kraków, this method of excluding iron from circulation 'competed' in the Ha C period with its deposition in cemeteries, particularly strongly represented in biritual necropolises whose users probably came from areas of Upper Silesia (Gedl 1982; Dzięgielewski 2024a, 109).

Thanks to the observed dichotomy, we obtain regional-scale confirmation of the complementary nature of the deposition phenomenon, a pattern also noted elsewhere in Europe (*e.g.*, in Ireland; Becker 2013), often across various categories of items or across subsequent periods of the Bronze Age and Early Iron Age. In Małopolska, on the other hand, we have a completely different, spatially exclusive (given the current state of research) pattern of deposition of all categories of products made from a single raw material. Similar to grave goods (see *e.g.*, Błaszczyk 1965; Abłamowicz 1994; Michnik and Dzięgielewski 2022), the described hoards and single-item deposits exhibit a specific functional and typological range: these are primarily ornaments and tools, with weapons (trunnion axes) being rare. However, there are also notable differences – for example, the absence of pins in hoards, which, even in the Bronze Age, were among the types of objects rarely deposited in such

a manner. Conversely, iron semi-products are never found in graves. Bipyramidal bars were deposited exclusively as hoards or single finds, sometimes on the outskirts of settlements. It seems that, as valuable raw material and relatively large objects – even when halved – they were unlikely to have been lost accidentally. This category also illustrates the complementary character of deposition on yet another level: thanks to the enduring custom of depositing goods in the landscape in Małopolska, we gain insight into the nature of iron semi-products circulation – its forms, dimensions, quantities, and qualities – in neighbouring Silesia, which was almost certainly even better supplied. The absence of recorded semi-products in this region does not suggest their nonexistence; rather, it reflects the lack of a local tradition of metal hoarding and deposition.

The cultural norm, understood as 'the right way to act' (Fontijn 2020, 26), according to which the deposition of iron could not take place outside of funerary contexts, remained unchanged in the areas of Małopolska north of the Vistula until the very end of the hoarding tradition – that is, until the mid-6th century BC (Ha D1, possibly still D2; Westhausen 2019, figs 2-6 – note: maps 5 and 6 in this publication require correction, as the continuation of this phenomenon in Polish territories does not persist on a large scale beyond Ha D2). The observed resurgence in the popularity of bronze in hoards during Ha D (Blajer 2001) may reflect a shift in attitudes toward iron, which, although still imported, was now valued differently. The increase in the size and weight of semi-products during this period (Wicina, Przybysław), which now resemble those from the North-Alpine region in terms of weight, may indicate a growing scale of importation.

Acknowledgements

We would like to thank Beata Grabowska and Wiesława Kruczek, who discovered and donated the hoard from Kraków-Tyniec 'Grodzisko' to the Archaeological Museum in Kraków, as well as the students of the Institute of Archaeology, Jagiellonian University (Maja Jaśkiewicz, Agata Mroczkowska, Monika Mróz, Agnieszka Pasierbek, Adam Strzelecki), for their assistance with the XRF measurements. This research was supported by a grant from the Priority Research Area (Mare Nostrum Lab) under the Strategic Programme Excellence Initiative at the Jagiellonian University. We also extend our gratitude to the anonymous reviewers for their valuable comments and suggestions.

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