MATERIAŁY DODATKOWE
SUPPLEMENTARY MATERIALS

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CATALOGUE OF METAL CASTING MOULDS FROM THE BRONZE AGE AND EARLY IRON AGE FROM PRESENT-DAY POLAND

KATALOG METALOWYCH FORM ODLEWNICZYCH Z EPOKI BRĄZU I WCZESNEJ EPOKI ŻELAZA Z TERENU POLSKI

In recent years, the number of metal casting moulds from Poland attributed to the Bronze Age and Early Iron Age has increased, accompanied by an improvement in our understanding of their discovery contexts. Below, a review of casting moulds from Poland is presented.

BIESZKÓW, ŻARY DISTRICT, LUBUSZ VOIVODESHIP (**FIG. S1**)[1]

Two sets of casting moulds and an additional fragment were discovered in 2011 within a large metal hoard comprising over 300 objects with a combined weight of approximately 10 kg. The deposit was found accidentally in sand just below the forest litter (Orlicka-Jasnoch 2013) and is housed in the Archaeological Museum of the Middle Odra River Area in Świdnica near Zielona Góra. Dating: Ha D.

The hoard contained two similar three-part mould sets (inv. nos. MAŚN 2012:248 and 2012:247) used for producing buttons with loops. One mould (**Fig. S1:a**) produced three buttons with head diameters of 1.2 cm; the other (**Fig. S1:b**) produced four slightly smaller buttons (0.9 cm diameter). Each set comprises two parts containing the negatives and feeding channels, and a third part that closed the system from below, shaping the button discs. The upper two mould parts include a system of connecting pegs and hollows (two on each), as well as a common pouring basin leading into individual channels for each cavity. The third, bottom-closing part lacks pegs and has sharply triangular projections. The entire mould assembly required clamping during use to ensure tight sealing.

Also present in the hoard was a partial casting mould for a disc-shaped pin head (cat. no. MAŚN 2012:246; **Fig. S1:c**), consistent with one of the pins found in the deposit (Orlicka-Jasnoch 2013, p. 494, fig. 22:2). This mould likely represents one of two bronze components used in a cast-on (German: *Überfangguss*) technique (Stachowiak 2013, p. 541). Given the

[1] All figure references correspond to this Catalogue (Supplementary materials), not the main manuscript.

fragmentary nature of the find, the full construction remains hypothetical, but it may have formed part of a three-piece mould set enclosing the shaft and head during casting.

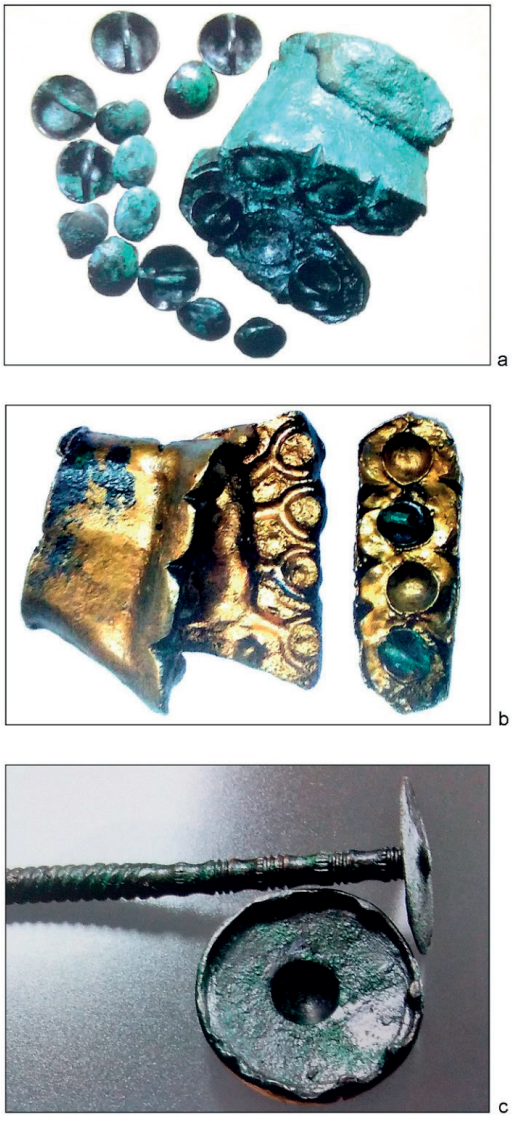

Fig. S1. Metal casting moulds from Bieszków hoard: a – for three buttons; b – for four buttons; c – for a pin head. Photo by P. Wolanin, A. Jaszewska; according to Jaszewska, Kałagate (eds) 2013, p. 582, photo 6–7; p. 587, photo 20, without scale.

Ryc. S1. Metalowe formy odlewnicze ze skarbu z Bieszkowa: a – do trzech guzików; b – do czterech guzików; c – do główek szpil. Fot. P. Wolanian, A. Jaszewska; wg Jaszewska, Kałagate (red.) 2013, s. 582, fot. 6–7; s. 587, fot. 20, bez skali.

BRZEG GŁOGOWSKI, GŁOGÓW DISTRICT, LOWER SILESIAN VOIVODESHIP (BRIEG, KR. GLOGAU) (**FIG. S2**)

This casting mould was discovered in October 1921 along the road between *Brieger Fähre* and *Odervorwerk* (as it has been described) and given to the "Glogauer Heimatmuseum" by *Gutsbesitzer* Schulz. Another source states that Schulz gave the museum the casting mould and the axe, which had been ploughed out to a depth of 30 cm in the field (Seger 1936, p. 150). Seger also noted the presence of a nearby urnfield cemetery, suggesting the possibility that the mould and axe originated from a disturbed burial context. A copy of the mould was produced and deposited in the "Breslauer Provinzialmuseum", while the original remained in the "Glogauer Heimatmuseum". The artefact is now part of the collection of the Archaeological Museum in Wrocław (inv. no. 1307:1986; former inv. no. 1112:25).

The mould comprises two halves joined by five pegs on one half and corresponding hollows on the other. The all-around hollow in the upper part allowed for the attachment of a casting core. The absence of a feeding channel indicates that molten metal was introduced through a hole in the core itself. The mould was used for casting Lusatian-type socketed axes, and was discovered together with an axe that corresponds precisely to the negative.

Dating: Late Bronze Age, period V/Ha B2–B3 (ca. 900–700 BCE).

Fig. S2. Metal casting mould from Brzeg Głogowski. Photo by K. Nowak.

Ryc. S2. Forma metalowa z Brzegu Głogowskiego. Fot. K. Nowak.

ELGISZEWO, GOLUB-DOBRZYŃ DISTRICT, KUYAVIAN-POMERANIAN VOIVODESHIP (**FIG. S3**)

A bivalve metal casting mould was discovered in 2013 during unauthorised metal detector activity on the southwestern, peaty shoreline of Lake Okonin (Gackowski 2016; Kowalski *et al*. 2019; Gackowski *et al.* 2024). The object was part of a hoard consisting of 34 metal artefacts and a stone item identified as a *Kannelurenstein* (fluted stone). The assemblage was located at a depth of several dozen centimetres below the surface.

The casting mould was used for the production of Lusatian-type socketed axes. It comprises two halves, one bearing five pegs and the other five corresponding hollows. Both outer surfaces retain remnants of loops (two knobs with visible break marks), comparable to those observed on the half-mould from Gaj Oławski (Baron *et al*. 2014; Kowalski *et al*. 2019). One half is damaged in the upper section, with torn metal suggestive of intentional breakage to facilitate the removal of a casting. Above the mould cavity of the axe, lateral hollows were modelled to stabilise the casting core. Additionally, feeding channels are preserved in the internal walls of both halves.

Chronological attribution: Ha B2–Ha B3 (ca. 900–700 BCE).

Fig. S3. Metal casting mould from Elgiszewo. According to Kowalski *et al.* 2019, p. 46, fig. 1.

Fig. S3. Metalowa forma odlewnicza z Elgiszewa. Wg Kowalski i in. 2019, s. 46, ryc. 1.

"FROM SIENIOCHA RIVER AREA", TOMASZÓW DISTRICT, LUBLIN VOIVODESHIP (**FIG. S4**)

Half of a casting mould was found alongside four additional metal objects, all wrapped in fur and secured with string, traces of which were preserved on the artefacts. The objects were discovered in 2016 using a metal detector and later deposited at the Institute of Archaeology of Maria Curie-Skłodowska University in Lublin. The precise location of the find is uncertain, but it most likely originated between the villages of Przewale and Zamłynie, near the village of Wojciechówka, Tomaszów district (Kłosińska, Sadowski 2014; Kłosińska, Sadowski 2017).

The mould was used to cast *Akozino-Mälar* type axes. The preserved half includes three pegs along its edge for alignment with a now-missing counterpart, with the lower peg being distinctly elongated. No feeding channel is evident.

Chronological attribution: Late Bronze Age/Early Iron Age.

Fig. S4. Metal casting mould "from Sieniocha River area". Photo by S. Sadowski; according to Kłosińska, Sadowski 2017, p. 394, fig. 5:5.

Ryc. S4. Metalowa forma odlewnicza „z Sieniochy". Fot. S. Sadowski; wg Kłosińska, Sadowski 2017, s. 394, ryc. 5:5.

GAJ OŁAWSKI, OŁAWA DISTRICT, LOWER SILESIAN VOIVODESHIP (**FIG. S5**)

A fragmentary metal casting mould was discovered in the spring of 2012 on arable land in the village of Gaj Oławski (plot no. 182). The object was recovered from the surface and subsequently transferred to the Institute of Archaeology, University of Wrocław, in the autumn of the same year (Baron *et al.* 2013). It is now part of the Institute's collection.

The artefact represents one half of a bivalve mould designed for casting undecorated socketed axes of the Lusatian type. Four pegs are present along the side edges, presumably used to align and secure it with the missing half. A pouring channel is modelled in the upper part of the mould. Two small knobs on the outer surface likely represent the remnants of a loop. Residues of beeswax were detected within the mould cavity, potentially indicating its use in wax model production or prehistoric conservation practices (Baron *et al.* 2014; Baron *et al.* 2015).

The mould is dated to the Late Bronze Age, specifically Bronze Age IV or IV/V (Ha B1 or Ha B1/B2).

Fig. S5. Metal casting mould from Gaj Oławski. Photo by Ł. Kapa; according to Baron *et al.* 2014, p. 329, fig. 2, with author's modifications.

Ryc. S5. Metalowa forma odlewnicza z Gaju Oławskiego. Fot. Ł. Kapa; wg Baron i in. 2014, s. 329, ryc. 2, z modyfikacjami autora.

KIEŁPINO, GRYFICE DISTRICT, WEST POMERANIAN VOIVODESHIP (KÖLPIN, KR. COLBERG-CÖRLIN) (**FIG. S6**)

Two complete metal casting moulds (the National Museum in Szczecin, inv. nos A/13342 and MNS/A/22106/16, formerly inv. no. 2092; the Stralsund Museum, inv. no. 1962:201) were part of a hoard discovered in 1884 at a depth of approximately 1.5 meters (5 feet) in a swamp near the village of Kiełpino (German: Kölpin, Kr. Kolberg-Körlin). The find has been published several times (Olshausen 1885, pp. 394–401, tabl. 5; Ebert 1926, pp. 14–15, tabl. 10; Gedl 2004, p. 112; Baron *et al.* 2014, fig. 4:e, g). Earlier suggestions (Baron *et al.* 2014, p. 328) that the hoard included socketed axes matching the mould cavities are incorrect; these axes were cast using the moulds at the end of the 19th century (Olshausen 1885, p. 394).

The two moulds are structurally similar and thin-walled. Each half contains a negative cavity for casting small socketed axes and features ribbon-like loops on the exterior. The halves were joined together during the casting process, but lack conventional pegs or alignment hollows. Instead, one half is shaped so that its edges fit into the other. Channels above the axe cavity served as metal feed systems. Fig. S6 presents photographs from the publication of Otto Olshausen (Olshausen 1885); a high-quality image of one mould (inv. no. MNS/A/22106/16) is available on the web page of the National Museum in Szczecin (MNS 2025).

Dating: Ha C.

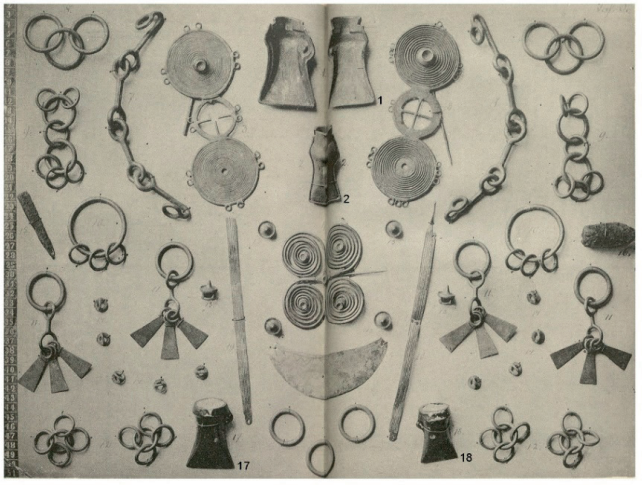

Fig. S6. First publication of the Kiełpino (Kölpin) hoard. In the center (nos 1–2) are two casting moulds. Below (nos 17–18) are axes cast in the 19th century using casting moulds from the hoard. According to Olshausen 1885, p. 422, pl. 5.

Ryc. S6. Pierwsza publikacja skarbu z Kiełpina (Kölpin). W środku (nry 1–2) dwie formy odlewnicze. Na dole (nry 17–18) – siekierki odlane w XIX w. przy użyciu form odlewniczych ze skarbu. Wg Olshausen 1885, s. 422, tabl. 5.

NOWE KRAMSKO, ZIELONA GÓRA DISTRICT, LUBUSZ VOIVODESHIP (**FIG. S7**)

A large hoard of approximately 400 metal objects, weighing 14 kg, was discovered in November 2015 in a ploughed field south of Nowe Kramsko. The hoard, which included artefacts linked to metallurgical practices, was donated by the finder to the Archaeological Museum of the Middle Odra River Area in Świdnica (Orlicka-Jasnoch 2019). Among the finds was a complete bivalve casting mould (Cat. no. MAŚN-2015:18) intended for the production of socketed axes of the Lusatian type (**Fig. S7:a**). The halves exhibit four pegs and corresponding hollows for alignment. The modelled loops are on the exterior; however, one loop remains uncast. Notably, none of the axes recovered from the hoard match the negative within this mould.

Based on typological analysis of the negative, the mould is dated to Bronze Age IV/Ha B1 or Ha B1/B2, whereas the hoard as a whole is dated to Ha B2/B3 (Orlicka-Jasnoch 2019).

Another item from the hoard, designated as a possible sickle mould (Cat. no. MAŚN-2015:20; **Fig. S7:b**), consists of a flat plate with a shallow negative of a sickle. Given the absence of a ridge and the flat nature of the negative, it is likely that this object functioned as a cover or lid for a bivalve mould, rather than as a casting mould in itself. Alternatively, it may have served a non-metallurgical purpose. Also interesting is a metal plate with a convex knobbed sickle (Cat. no. MAŚN-2015:19; **Fig S7:c**), most likely used for pressing into plastic material and producing casting moulds.

Fig. S7. Casting moulds and other artefacts probably related to metallurgy from the hoard from Nowe Kramsko: a – casting mould for socketed axes; b – metal plate with a concave negative of a flat sickle; c – metal plate with a convex model of a sickle. Photo by M. Kusztelak; according to Orlicka-Jasnoch 2019, pp. 44–45, figs 14–16.

Ryc. S7. Formy odlewnicze i inne znaleziska prawdopodobnie związane z metalurgią, pochodzące ze skarbu z Nowego Kramska: a – forma odlewnicza do siekier z tulejką; b – metalowa płytka z negatywem płaskiego sierpa; c – metalowa płytka z wypukłym modelem sierpa. Fot. M. Kuszelak; wg Orlicka-Jasnoch 2019, s. 44–45, ryc. 14–16.

"OBORNIKI", GREATER POLAND VOIVODESHIP (**FIG. S8**)

Half of a casting mould for two socketed arrowheads was reported on 27 November 2016 via the Facebook profile of the Historical and Archaeological Research Workshop "Pomost" (Polish: Pracownia Badań Historycznych i Archeologicznych "Pomost"). According to the account, the artefact was donated by a local resident during a WWII-related search near Nieszawa, Poznań district, and was originally found "some time ago" near Oborniki. It was transferred to the Archaeological Museum in Poznań on 25 November 2016 (inv. no. MAP DEP 2017), and formally published by Aldona Garbacz-Klempka (Garbacz-Kempka 2018, pp. 51–52, fig. 5.25).

The half of the mould contains negatives of two arrowheads connected *via* a system of feeding channels. During casting, molten metal was delivered from a primary central channel through two subsidiary channels into the mould cavities. This solution is the norm for double-negative stone casting moulds for arrowheads (see Baron *et al.* 2020, p. 17, fig. 12). Additionally, holes for inserting casting cores, used to create the sockets of the arrowheads, were modelled along the mid-edge. Hollows in the centre, on both sides at the edge and in the lower sections of the mould served to stabilise the two halves during casting. A loop is preserved on the outer face. The casting mould was coated with a black substance, most likely applied by the finder. Greenish discoloration is visible in places beneath the coating. These observations are based on a photograph from 2016; the current state of preservation of the artefact is unknown to the author.

Chronological attribution: Urnfield culture.

Fig. S8. Metal casting mould for two arrowheads found near Oborniki. Photo by M. Frąckowiak, provided by M. Michalski, the Historical and Archaeological Research Workshop „Pomost".

Ryc. S8. Metalowa forma odlewnicza do dwóch grotów strzał znaleziona w pobliżu Obornik. Fot. M. Frąckowiak, udostępnione przez M. Michalskiego, Pracownia Badań Historycznych i Archeologicznych „Pomost".

PAWŁOWICZKI, KOŹLE DISTRICT, OPOLE VOIVODESHIP (GNADENFELD, KR. COSEL) (**FIG. S9**)

The circumstances surrounding the discovery of this casting mould remain uncertain (Seger 1909, p. 24; Kostrzewski 1953, p. 193). The artefact was either found or transferred in 1869 (Nessel 2013, p. 472) and was subsequently housed in the collections of the "Königliches Museum für Völkerkunde" (the Royal Museum for Ethnology) in Berlin (Cat. no. II 6477) until 1945. Hans Seger (Seger 1922, p. 48) noted the presence of a copy (*Abguß der Bronzegußform* – "cast of the bronze mould") in local collections in Breslau (nowadays Wrocław), while the original remained in the Berlin museum. Following the Second World War, the mould, along with other artefacts, was seized by Soviet forces and transferred to St. Petersburg. It is currently held in the Hermitage Museum (inv. no. 1203; Nessel 2013, p. 472). An item referred to in the literature as the "Pawłowiczki casting mould" (e.g. Gedl 2004, p. 113), now in Polish museum collections (the Archaeological Museum in Wrocław, Inv. no. 352:10; MAW/II/66, on deposit at the Museum of Opole Silesia in Opole), has been convincingly identified, based on the findings of Bianka Nessel (Nessel 2013, p. 472), as a high-quality replica likely produced in the late 19th or early 20th century. Marek Gedl appears to have mistakenly classified the original Berlin specimen as a copy ("II.6477a.b [Copies]"; Gedl 2004, p. 113).

The Pawłowiczki mould was designed for casting Lusatian-type socketed axes and consists of two halves joined by three pegs on one side and corresponding hollows on the other. The metal was introduced through a channel located on the upper edge of one half, near the loop. This solution is unusual for the production of axes stylistically typical of the Polish territory.

The mould is dated to the Late Bronze Age, specifically period V/Ha B2–B3 (ca. 900–700 BCE).

Fig. S9. Bi-valve casting mould (replica) from Pawłowiczki (Gnadenfeld). Photo by K. Nowak.

Ryc. S9. Dwuczęściowa forma odlewnicza (replika) z Pawłowiczek (Gnadenfeld). Fot. K. Nowak.

ROSKO, CZARNKÓW-TRZCIANKA DISTRICT, GREATER POLAND VOIVODESHIP (**FIG. S10**)

Two sets of casting moulds were found as part of a large hoard of metal artefacts, primarily socketed axes, discovered during drainage work in 1985. The objects were initially appropriated by the finders, and no formal record of the discovery was made at the time. Subsequent archaeological investigations were conducted in 2001 and 2002, during which additional artefacts were recovered, and a stone-earth structure associated with the deposit was identified. The hoard had been placed beneath large stones at the edge of, or beneath, a stone-earth mound. It remains unclear whether the mound and the hoard are contemporary. In total, 71 artefacts were recovered, although this likely does not represent the entirety of the original deposit (Machajewski, Maciejewski 2006; Maciejewski 2019).

The two mould sets are nearly identical and were used for casting socketed axes. Each pair features five pegs along one half, aligning with corresponding hollows on the other. The upper parts of the moulds include the all-around hollow for positioning the casting core, similar to the Brzeg Głogowski specimen. Like that example, no feeding channels were modelled into the mould walls, indicating the use of core-based pouring. The outer lower surfaces of the moulds are heavily worn, likely from repeated usage, including placement in soil or hot sand during casting. Notably, textile impressions were preserved on one of the moulds, suggesting that it was wrapped before deposition (Sikorski 2006). Preliminary analyses indicate that none of the axes from the hoard were produced using these moulds.

Dating: Ha B2–Ha B3 (ca. 900–700 BCE).

Fig. S10. One of the bi-valve casting moulds from the hoard from Rosko. Photo by M. Maciejewski.

Ryc. S10. Jedna dwuczęściowa forma odlewnicza ze skarbu z Roska. Fot. M. Maciejewski.

STARA ŁUBIANKA, PIŁA DISTRICT, GREATER POLAND VOIVODESHIP (**FIG. S11**)

Half of a metal casting mould for producing buttons, similar in function to the example from Wicina, is held by the Archaeological Department of the District Museum in Piła (inv. no. MOP 2015/51).

The mould was discovered around 2015 as an accidental find and has not been published. Though it shares the same negative shape as the Wicina specimen, it is noticeably more massive, possibly suggesting an earlier date.

Dating: Late Bronze Age/Early Iron Age.

Fig. S11. One half of the casting mould for buttons from Stara Łubianka. Photo by K. Nowak.

Ryc. S11. Połówka formy odlewniczej do guzików ze Starej Łubianki. Fot. K. Nowak.

WICINA, ŻARY DISTRICT, LUBUSZ VOIVODESHIP (**FIG. S12**)

Half of a casting mould for producing buttons was found at the fortified settlement in Wicina (Area 110, Plot A, Layer II; Michalak 2011, p. 45; Michalak, Jaszewska 2011, p. 177, fig. 59:3). The object is housed in the Archaeological Museum of the Middle Odra River Area in Świdnica near Zielona Góra (inv. no. MAŚN 1996:701, formerly inv. no. 65/1996).

The preserved half contains the negative cavity of the object, the pouring basin, and the feeding channel. Near the central edges are two hollows designed to accommodate alignment pegs from the opposite half. Visible overflow near the pouring area suggests thermal deformation during use (Michalak, Jaszewska 2011, fig. 59:3).

Dating: Ha D.

Fig. S12. One part of the casting mould for buttons from the settlement in Wicina. According to Michalak, Jaszewska 2011, p. 197, fig. 59.3.

Ryc. S12. Część formy odlewniczej do guzików z osady w Wicinie. Wg Michalak, Jaszewska 2011, s. 197, ryc. 59.3.

BIBLIOGRAPHY

Baron J., Konczewski P., Nowak K. 2013. *Brązowa forma odlewnicza z Gaju Oławskiego, pow. oławski*, „Śląskie Sprawozdania Archeologiczne", 55, pp. 161–167.

Baron J., Miazga B., Nowak K. 2014. *Functions and contexts of Bronze Age metal casting moulds from Poland*, „Bulletin de la Société préhistorique française", 111(2), pp. 325–338.

Baron J., Miazga B., Ntaflos T., Puziewicz J., Miazga B. 2015. *Beeswax remnants, phase and major element chemical composition of the bronze age mould from Gaj Oławski (SW Poland)*, „Archaeological and Anthropological Sciences", 8(1), pp. 187–196, https://doi.org/10.1007/s12520-014-0225-0

Baron J., Puziewicz J., Nowak K., Sych D., Miazga B., Ziobro M. 2020. *Same but different. Composition, production and use of bronze arrowheads from the Late Bronze Age deposit from Wrocław-Widawa in SW Poland*, „Journal of Archaeological Science: Reports", 32, e102459, https://doi.org/10.1016/j.jasrep.2020.102459

Ebert M. 1926. *Reallexikon der Vorgeschichte*, 7, Berlin.

Gackowski J. 2016. *The Younger Bronze Age and the beginning of the Iron Age in Chełmno Land in the light of the evaluation of selected finds of metal products*, „Analecta Archaeologica Ressoviensia", 11, pp. 165–190, https://doi.org/10.15584/anarres.2016.11.8

Gackowski J., Kowalski Ł., Kowalski A.P., Garbacz-Klempka A., Osipowicz G., Sokół A., Ćwiek M., Bosiak M., Kołyszko M., Krzyszowski A., Markiewicz M., Molewski P., Noryśkiewicz A.M., Perek-Nowak M., Rembisz-Lubiejewska A., Skorupka T., Sosnowski M. 2024. *A Late Bronze Age hoard from Elgiszewo reflects the complex interplay between bronzesmithing, metal hoarding and local identity*, „Praehistorische Zeitschrift", 99, pp. 1–49, https://doi.org/10.1515/pz-2024-2049

Garbacz-Klempka A. 2018. *Synteza badań archeometalurgicznych artefaktów z epoki brazu. Eksperymentalna rekonstrukcja stopów miedzi i technologii*, Kraków.

Gedl M. 2004. *Die Beile in Polen IV. Metallaxte, Eisenbeile, Hämmer, Ambosse, Meißel, Pfrieme,* Prähistorische Bronzefunde, 9(24), Stuttgart.

Jaszewska A., Kałagate S. (eds.), 2013. *Wicina. Badania archeologiczne w latach 2008–2012 oraz skarb przedmiotów pochodzących z Wiciny*, Zielona Góra.

Kłosińska E.M., Sadowski S. 2014. *Kultura łużycka w dolinie Sieniochy – dalekosiężne powiązania niewielkiego regionu osadniczego Lubelszczyzny w epoce brązu i wczesnej epoce żelaza*, [in:] J. Juchelka (ed.), *Doba popelnicových polí a doba halštatská ve střední Evropě. Materiál z XIII. mezinárodní konference „Popelnicová pole a doba halštatská"*, Opava, pp. 26–53.

Kłosińska E.M., Sadowski S. 2017. *Long-distance connections of the south-eastern peripheries of the Lublin region at the time of the Lusatian Culture in the light of archival and newly discovered materials*, „Sprawozdania Archeologiczne", 69, pp. 391–408, https://doi.org/10.23858/SA69.2017.016

Kostrzewski J. 1953. *Wytwórczość metalurgiczna w Polsce od neolitu do wczesnego okresu żelaznego*, „Przegląd Archeologiczny", 9, pp. 177–211.

Kowalski Ł., Garbacz-Klempka A., Gackowski J., Ścibior D., Perek-Nowak M., Adamczak K., Długosz P. 2019. *Towards direct casting: Archaeometallurgical insight into a bronze mould from Elgiszewo, Poland, 900–700 BC*, „Archeologické rozhledy", 71(1), pp. 45–66, https://doi.org/10.35686/AR.2019.3

Machajewski H., Maciejewski M. 2006. *Skarb ludności kultury łużyckiej z Roska nad Notecią*, [in:] H. Machajewski, J. Rola (eds), *Pradolina Noteci na tle pradziejowych i wczesnośredniowiecznych szlaków handlowych*, Poznań, pp. 127–146.

Maciejewski M. 2019. *The Rosko hoard - a road sign? Research and its perspectives: mass deposition of metal objects, Late Bronze and Early Iron Ages in Poland*, „Praehistorische Zeitschrift", 94(1), pp. 233–251, https://doi.org/10.1515/pz-2019-0012

Michalak A., Jaszewska A. 2011. *Katalog zabytków metalowych. VI. Przedmioty związane z metalurgią*, [in:] A. Jaszewska (ed.), *Wicina. Katalog zabytków metalowych*, Biblioteka Archeologii Środkowego Nadodrza, 5, Zielona Góra, pp. 177–199.

Nessel B. 2013. *Gussformen und Schmiedegeräte aus Mitteleuropa*, [in:] *Bronzezeit. Europa ohne Grenzen. 4.-1. Jahrtausend v. Chr. Ausstellungskatalog*, St. Petersburg, pp. 470–472.

Olshausen O. 1885. *Broncefund von Kölpin, Kreis Colberg-Cörlin*, „Baltische Studien", 35(4), pp. 394–401.

Orlicka-Jasnoch J. 2013. *Skarb przedmiotów brązowych i żelaznych z Bieszkowa, gm. Jasień*, [in:] A. Jaszewska, S. Kałagate (eds), *Wicina. Badania archeologiczne w latach 2008–2012 oraz skarb przedmiotów pochodzących z Wiciny*, Zielona Góra, pp. 491–537.

Orlicka-Jasnoch J. 2019. *Skarb ludności kultury łużyckiej z Nowego Kramska. Aspekt archeologiczny*, [in:] A. Michalak, J. Orlicka-Jasnoch (eds), *Skarb z Nowego Kramska. Analizy. Konteksty*, Zielona Góra, pp. 17–138.

Seger H. 1909. *Beiträge zur Vorgeschichte Schlesiens: 3. Gussformen*, „Schlesiens Vorzeit in Bild und Schrift, Neue Folge", 5, pp. 16–27.

Seger H. 1936. *Schlesische Hortfunde aus der Bronze- und frühen Eisenzeit*, „Altschlesien", 6(1), pp. 85–182.

Sikorski A. 2006. *Wyrób sprangowy na brązowej formie do odlewu siekierek z Roska*, [in:] H. Machajewski, J. Rola (eds), *Pradolina Noteci na tle pradziejowych i wczesnośredniowiecznych szlaków handlowych*, Poznań, pp. 153–156.

Stachowiak P. 2013. *Skarb z Bieszkowa – przyczynek do dyskusji nad poziomem metalurgii okresu halsztackiego*, [in:] A. Jaszewska, S. Kałagate (eds.), *Wicina. Badania archeologiczne w latach 2008–2012 oraz skarb przedmiotów pochodzących z Wiciny*, Zielona Góra, pp. 539–545.

ŹRÓDŁA INTERNETOWE

MNS. 2025. *Forma muszlowata. Forma odlewnicza*, [in:] *Muzeum Narodowe w Szczecinie. Archeologia*, https://e-zbiory.muzeum.szczecin.pl/kategorie/archeologia/epoka-brzu-i-wczesna-epoka-elaza-na-pomorzu/mns-a-22106-16-1377.html (access: 20.10.2025).

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