

Workshop pottery from the early phases of the early Middle Ages in the Middle Odra basin in the light of specialist analyses

Bartłomiej Gruszka^a, Piotr Gunia^b, Michał Kara^c

Recent specialist analyses of the early medieval pottery from the area of south-western Wielkopolska and the south-eastern part of Ziemia Lubuska have revealed the presence of traits typical of workshop production, including temper selection by fraction and type, slip application, and use of a pottery wheel. The research used the results of petrographic analyses of selected vessels from the sites in Bonikowo (Wielkopolska Province), Połupin and Stożne (Lubuskie Province), whereas age determination of the assemblages was based on thermoluminescence dating of potsherds (Stożne) and results of ¹⁴C dating of bone and charcoal (Bonikowo, Połupin, Stożne). There is a marked contrast between the older phases (*c.* 6th/7th–9th century) and the younger phases (10th–mid-13th century) of the Early Middle Ages in terms of the occurrence of workshop pottery, which is absent in the latter period.

KEY WORDS: Poland, Wielkopolska (Great Poland), Ziemia Lubuska, Bonikowo, Połupin, Stożne, earlier phases of Early Middle Ages, workshop pottery, petrographic analyses of pottery, slip, absolute dating

The paper presents both ‘archival’ and new finds of vessels displaying traits typical of workshop pottery, dated by archaeological means to the earlier phases of the early Middle Ages, i.e., the period before about the 9th/10th century, coming from selected archaeological sites in south-western Wielkopolska (Bonikowo, site 1, Kościan District, Wielkopolska Province) and south-eastern Ziemia Lubuska (Połupin, site 2, Krosno Odrzańskie District, Lubuskie Province; Stożne, site 2, Zielona Góra District, Lubuskie Province) (Fig. 1). Specialist studies refined the chronology of the finds and pointed to possible sources of inspiration for the potters. They also corroborated the results of

^a Institute of Archaeology and Ethnology, Polish Academy of Sciences, 46 Rubież St., 61-612 Poznań, Poland; bartekgruszka@poczta.onet.pl

^b Institute of Geological Sciences, University of Wrocław, 9 Maka Borna Sq., 50-205 Wrocław, Poland; piotr.gunia@uwr.edu.pl

^c Institute of Archaeology and Ethnology of the Polish Academy of Sciences, 46 Rubież St., 61-612 Poznań, Poland; michał.kara@iaepan.poznan.pl

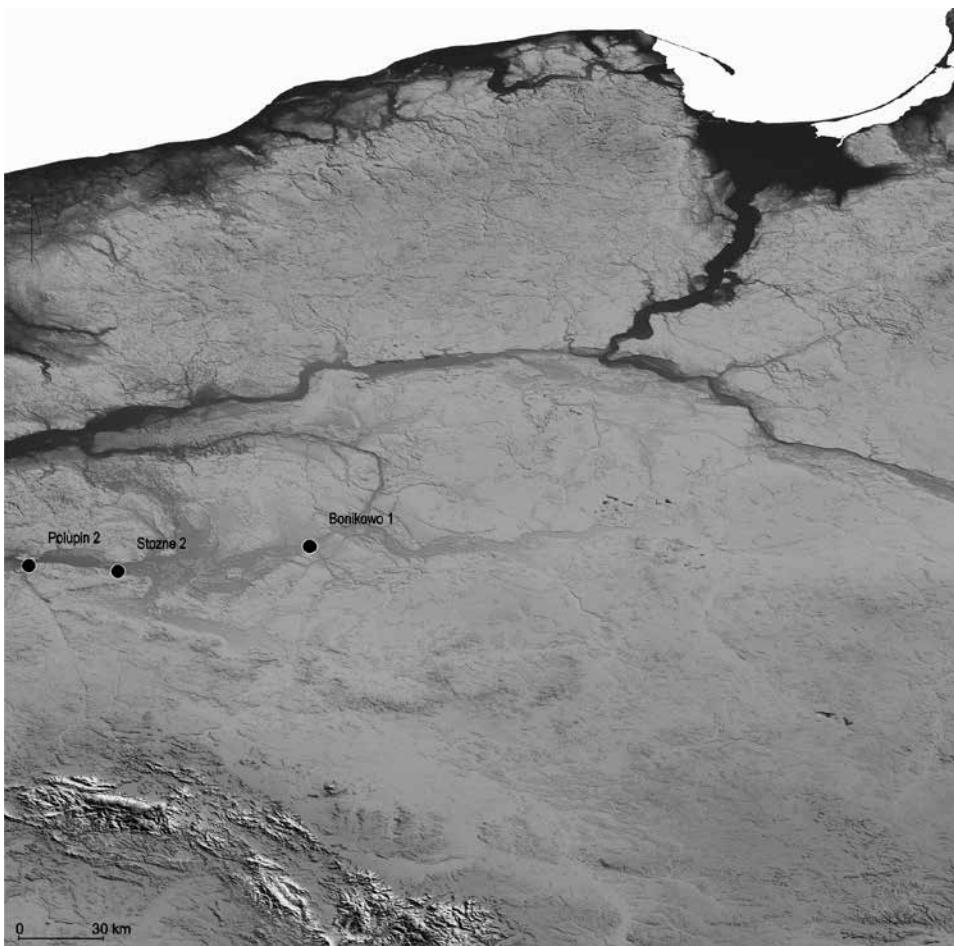


Fig. 1. Location of Bonikowo (Wielkopolska Province), Połupin and Stożne (Lubuskie Province).
Prepared by A. Łuczak

a macroscopic examination of the vessels that had identified them as a specialised form of pottery production.

Let us first discuss the findings for the pottery from site 2 in Stożne near Zielona Góra, then follow up with the material from the strongholds in Bonikowo and Połupin.

Stożne is located in the floodplain of the Oder (about 3 km from the river bed), on the left bank, near a small watercourse called Zimny Potok, which is a left tributary of the Oder. The settlement site is situated on a small elevation, which is the highest local point (51–52 m a.s.l.) (Figs 2; 3). Vessel sherds were found in feature 9 (Figs 4; 5), believed to have been associated functionally with the aqua-palustrine sacrificial site. Radiocarbon (Gruszka 2010: 249) and thermoluminescence dating of the sherds



Fig. 2. Stożne, site 2, Zielona Góra District. Site area based on soil marks and pottery distribution.
Photo by B. Gruszka

(Gruszka *et al.* 2013) gave a date for the functioning of this feature in the second half of the 6th through about the mid-7th century.

The several hundred potsherds from the feature (Gruszka 2010: Pls III–IV) were recorded in distinct clusters concentrated on the level of the wooden structures (Fig. 6). The clusters evidently represented a few different vessels, judging by the varied formal, stylistic and technological features. In some cases, the workmanship is evidently skilled. One vessel is remarkable for the use of a rotating wheel and excellent body surface treatment resulting in a characteristic ‘goose bumps’ texture that obliterated all traces of production. Petrographic analyses of this vessel designed to ascertain its workshop origin (Gunia and Gruszka 2010) established the use of tempered clay, the temper selected intentionally in terms of the mineral composition (preferred pink feldspar) and fraction. Very likely the temper was sifted to obtain more or less uniform granulation (very fine grain sifted out). The use of the rotating wheel, perhaps in the final stages of the vessel’s production, was confirmed by petrographic analyses¹. The distinctly structured texture of grains of temper observed in thin section demonstrates

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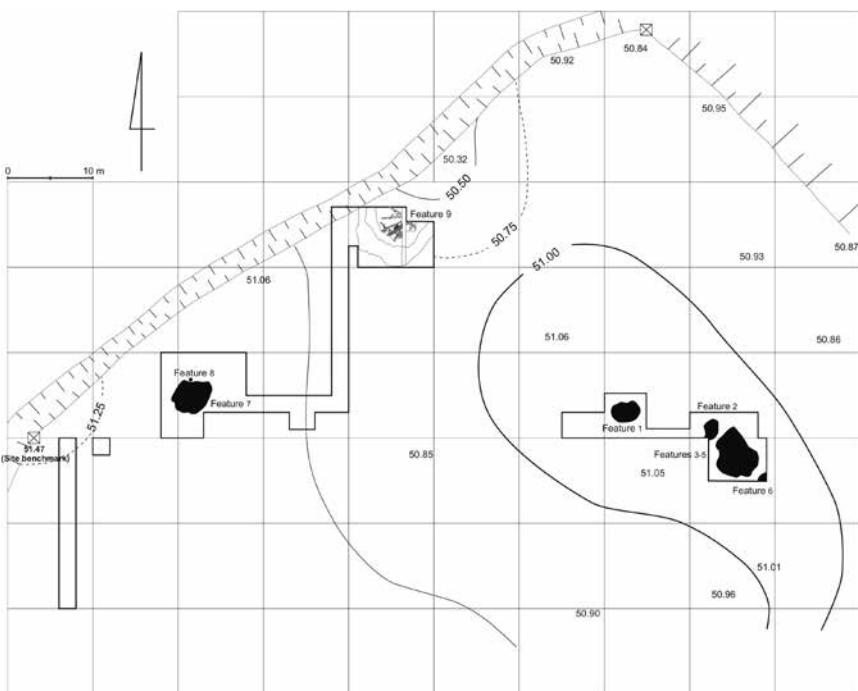


Fig. 3. Stożne, site 2, Zielona Góra District. Plan of the site showing location of excavated features.
Drawn by S. Kałagatę; prepared by B. Gruszka

that the vessel walls were subject to considerable directional pressure. The most likely time of its production was determined by thermoluminescence dating of a sherd as being in the first half of the 7th century (AD 633±96), which is concurrent with the ¹⁴C dating of the wooden structure (feature 9), on top of which the vessel was found.

The concomitance of vessel fragments showing evidence of being formed both with and without the use of a fast-rotating potter's wheel has been documented in the Middle Oder basin in the early Middle Ages at Buków, site 1, Lubuskie Province (Dąbrowski 2001: 146–147, fig. 5:3), Kalsk, site 1, Lubuskie Province (Dąbrowski 1997: 130; Gruszka 2011) and Połupin, site 2, Lubuskie Province (Dąbrowski 1965: 68–71; 1997: 124–127) among others.

Furthermore, surface body slipping was found to be characteristic of the oldest early medieval pottery and was practiced at least until the late 10th/early 11th century; it was particularly common in the earliest assemblages².

² Examples of vessels with body slipping are known from: two features at Kalsk, site 1, Zielona Góra District, Lubuskie Province, which yielded pottery dated by the thermoluminescent method to AD 570±86

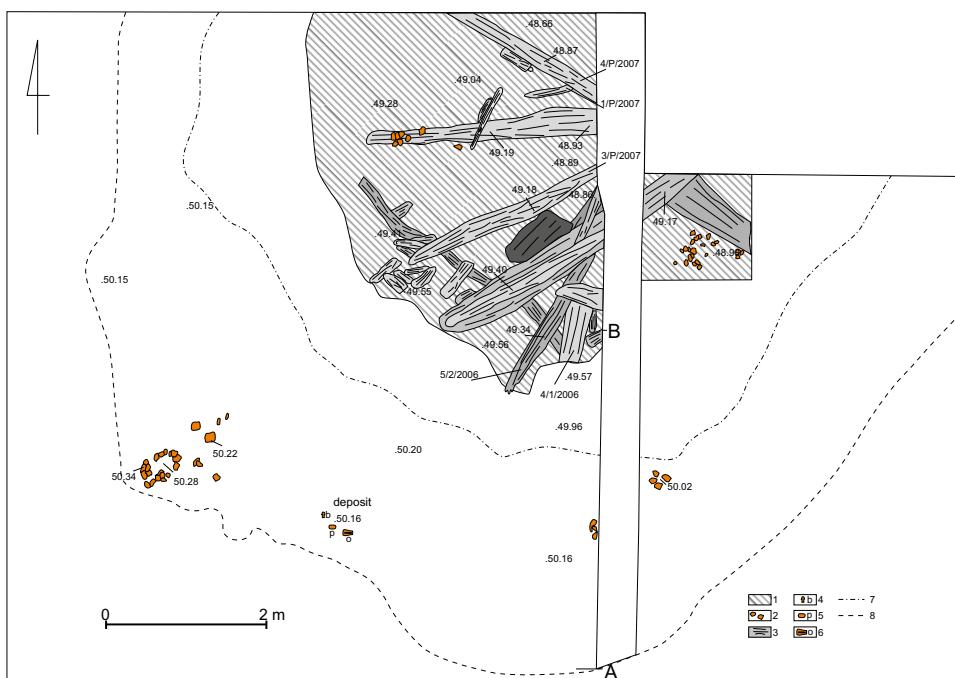


Fig. 4. Stożne, site 2, Zielona Góra District. Mapped remains of the roof of wooden structures from feature 9 with location of clusters of potsherds, the deposit and places of sampling for absolute dating. 1 – layer of peat, rich in organic debris (twigs, oak leaves); 2 – clusters of pottery; 3 – parts of a wooden structure; 4 – lump of amber from the deposit; 5 – spinning whorl from the deposit; 6 – whetstone in a deposit; 7 – extent of stratigraphic unit 3; 8 – extent of stratigraphic unit 9. Drawn by B. Gruszka

Excavation of the early medieval stronghold in **Bonikowo** (Fig. 7) in the 1950s yielded an assemblage of vessel-type ceramics, including potsherds resembling finds from the Merovingian cultural circle from the area of the Lower Danube basin. The assemblage was found in cultural layer IV (of considerable thickness) and a fragmentarily registered pit (possibly a ditch) dug into primary humus deposited above undisturbed subsoil and stratigraphically related to layer IV. The layer was deposited directly under the rampart of the second phase of the stronghold, dated to the second half of the 9th–first half of the 10th century (Fig. 8), and the floor thereof produced a fragment

and 574±93; a settlement site from the second half of the 7th–early 8th century in Mozów, site 23, Zielona Góra District, Lubuskie Province (Gruszka *et al.* 2013: Table 1); a 7th-century settlement at Jordanowo, site 7, Świebodzin District, Lubuskie Province; a settlement at site 10 in Sulechów, Zielona Góra District, Lubuskie Province, where the older phase is dated to about the mid-8th century (Gruszka *et al.* 2013: Table 1).

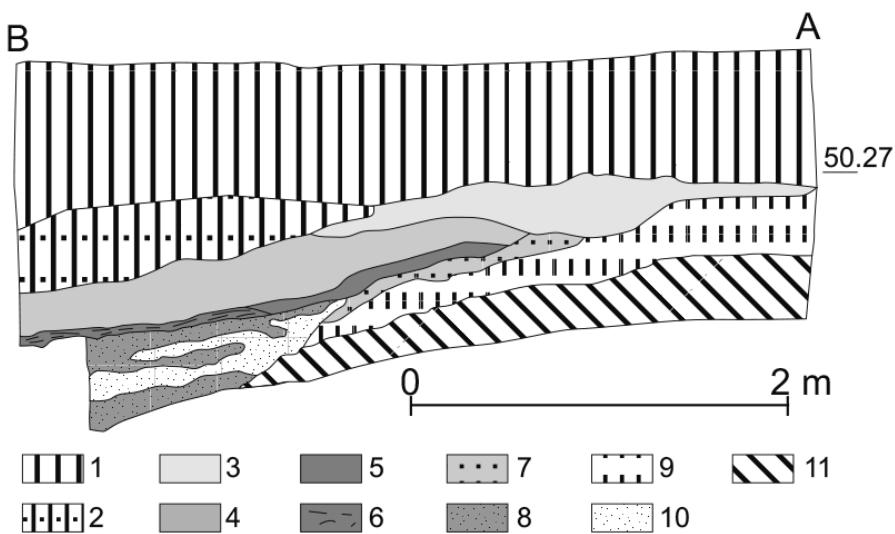


Fig. 5. Stożne, site 2, Zielona Góra District. Section through feature 9 looking east. 1 – tan brown, heavily sanded humus (humus = stratigraphic unit 1); 2 – tan brown humus, slightly loamy, with rust-coloured lenses of clay (stratigraphic unit 1a); 3 – dark grey-brown humus, slightly sanded, with small lumps of charcoal and burnt layer (stratigraphic unit 9); 4 – dark grey, very oily alluvium rich in organic debris and numerous small lumps of charcoal (stratigraphic unit 2); 5 – grey brown, loamy sand (stratigraphic unit 4); 6 – parts of a wooden structure; 7 – dark yellow sand; 8 – bright yellow sand with twigs (stratigraphic unit 10); 9 – light grey, fine-grained sand (stratigraphic unit 8); 10 – twigs and turf; 11 – yellow, fine-grained undisturbed sand. Drawn by E. Dąbrowski; prepared by B. Gruszka

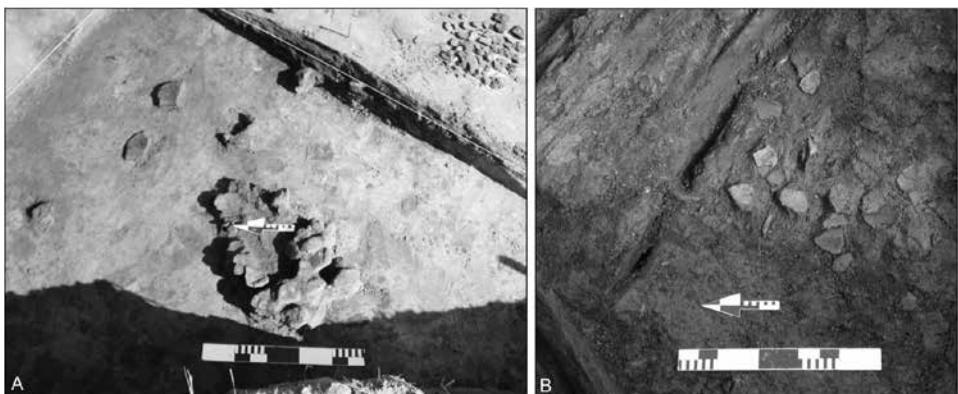


Fig. 6. Stożne, site 2, Zielona Góra District. Cluster of potsherds in stratigraphic unit 9 next to the south-western side of feature 9 (A) and at the level of the wooden structure in the south-eastern sector (B). Photo by B. Gruszka

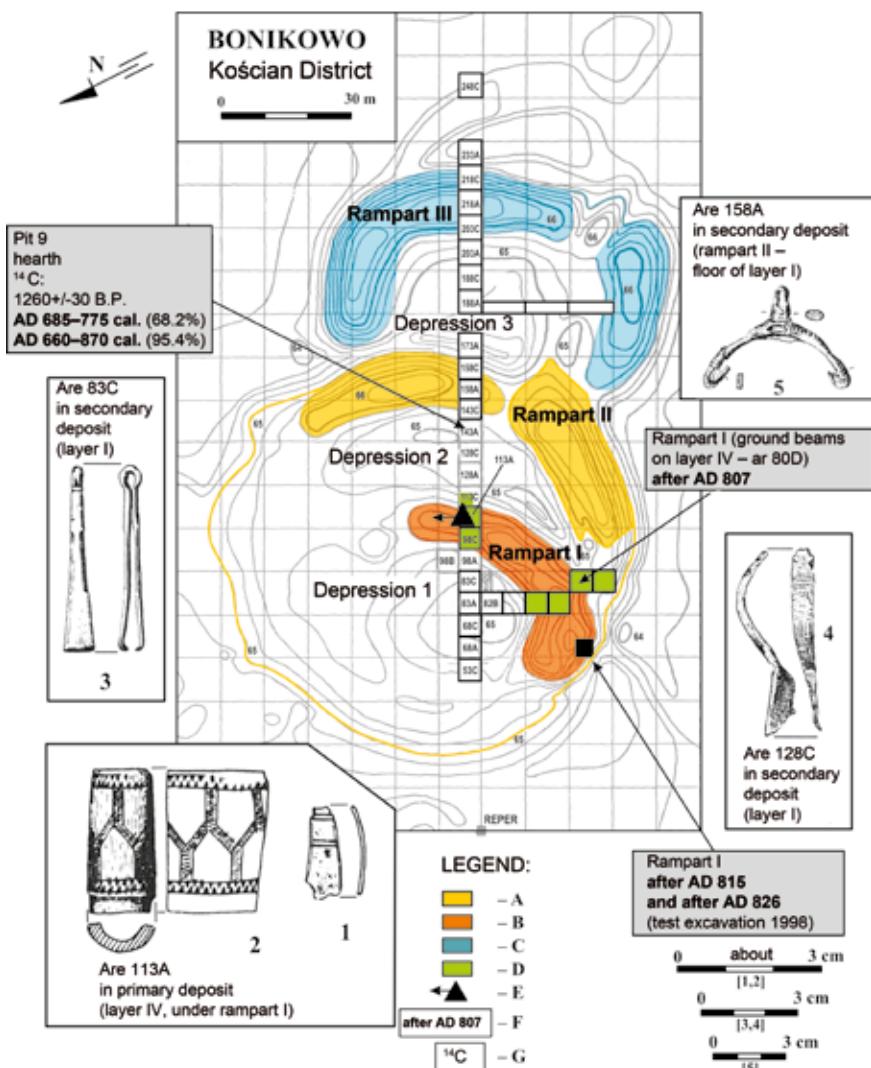


Fig. 7. Bonikowo, site 1, Kościan District. Contour map of the early medieval stronghold showing the location of excavation trenches, barrow-like stone mound and the extent of the unearthed fragment of cultural layer IV related to the said mound. Marked location of sampling points for absolute dating and findspots of luxury items from either late antiquity (1, 3, 4) or the earlier phases of the early Middle Ages (2, 5): 1, 4 – fragments of bronze fibulae; 2 – antler mounting; 3 – bronze pincers; 5 – bronze-coated iron spur. A – stronghold phase I; B – extensions in phase II; C – extensions in phase II or III; D – excavated section of cultural layer IV; E – location of mound (arrow marks the direction in which it continues); F – dendrochronological dating of the oak used in the construction of the rampart (estimated calendar *Anno Domini* date indicates when the tree was cut down); G – intervals of calibrated calendar years (*Anno Domini*) for the charcoal from a hearth dated using the AMS radiocarbon method, together with the percentage probability of the result. After Kara 2009: fig. 11

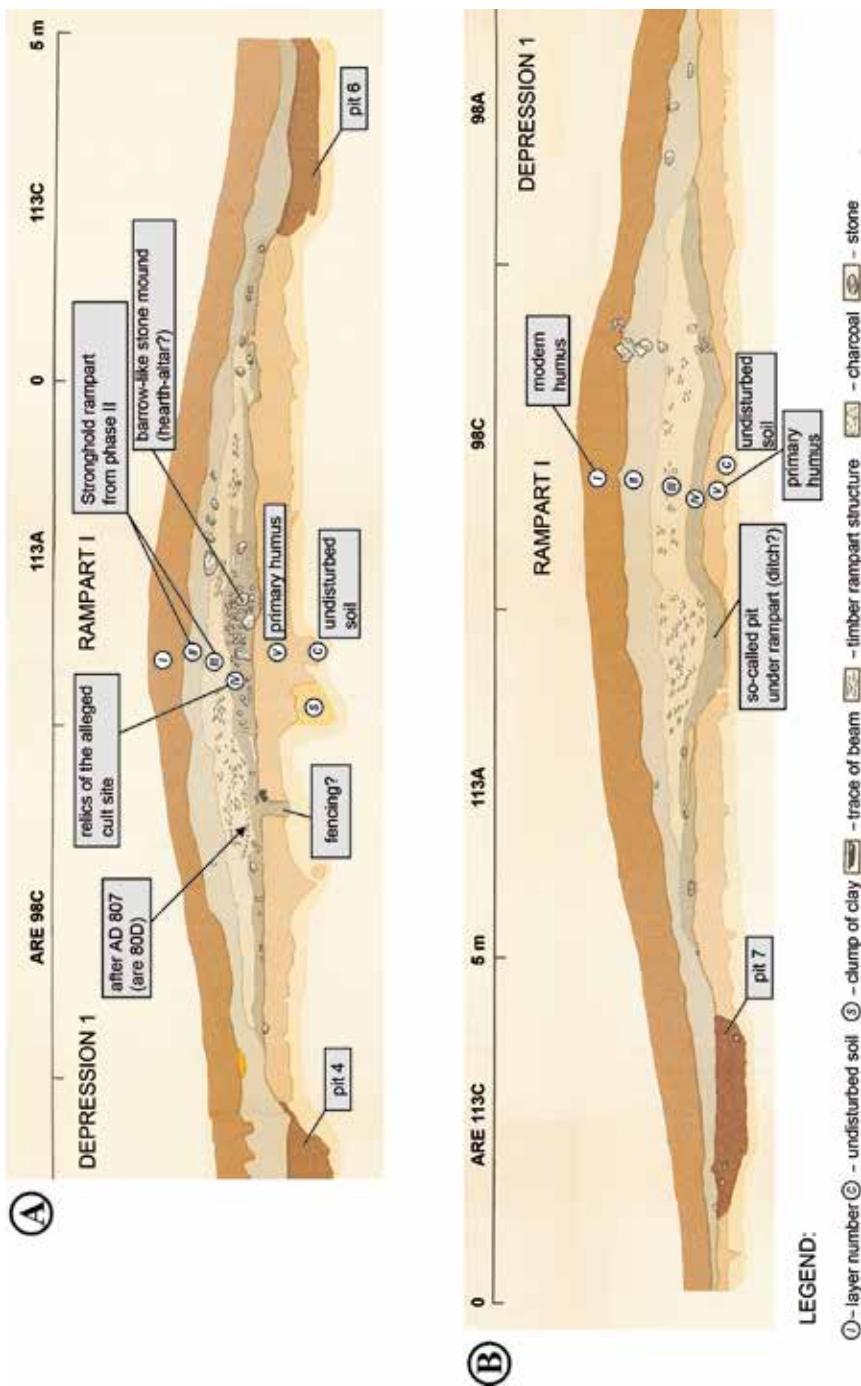


Fig. 8. Bonkowo, site I, Kościan District. Sections of stronghold rampart I: A – fragment of the north section of the trench: visible relics of the alleged cult site (layer IV, primary humus), overlaid by remains of the rampart of stronghold phase II (layers II–III); ground beams of the wooden structure of the rampart core, in layer IV, dendrochronologic date after AD 807; B – fragment of the south section of the trench with layers as above.

After Kara 2009: fig. 12

of a fibula of Niemberg type chronologically related to Late Antiquity (Figs 9: 7). The layer is believed to have formed at the site before the stronghold was erected and during the functioning of the oldest stronghold; the age of the earliest relics was determined as the second half of the 8th and first half of the 9th century³.

Fragments of high quality vessels, the upper parts of which were modelled extensively as the pot was being turned on a wheel, merit close attention. Classified by Zofia Hilczerówna as ceramic group A, they include biconical, relatively squat pots and similarly fashioned wide-mouthed vases, as well as slender S-profiled pots, covered with a motif of applied bands of clay or alternately deep grooves, which were applied using a template or a broad graver-type tool (with horizontally cut-off end) during a fast rotation of a potter's wheel (Hołowińska 1956: 29–35, fig. 25A, C; 30B; Hilczerówna 1967a: 62–78, fig. 9i, j, l, p) (Fig. 10).

Other pots were of distinctly inferior technological and utilitarian quality, completely hand-modelled, or possibly with parts near the pot mouths finished on the wheel. Occasionally decorated, pottery of this kind fits the southern Wielkopolska type of local pottery production dated to the earliest phases of the early Middle Ages (ceramic groups A and B after Hilczerówna 1967a: 53–86, particularly 63–64). No differences in the levels of deposition of both categories of vessels were registered.

Petrographic analyses were performed on a fragment of one of the vessels from layer IV (Fig. 10: 5). The potsherd (unearthed in layer IV_{, are 113C}) came from a slender vessel decorated in the upper part with broad, well-worked applied bands of clay. The pot was made of ferruginous sandy clay of poor plasticity, tempered with fine well sorted crushed rock probably of erratic origin. With regard to grain size, nonplastic components can be divided into two categories: sized from 0.1–0.25 mm, with quartz as the dominant inclusion, and 0.4 to 1 mm with a substantial share of sharp-edged quartz and potassium feldspars (see Appendix 1). The clay body was fairly poorly prepared, as evinced by sections completely devoid of temper and others containing nodules of unworked clay. Once the vessel had been formed, a slip, that is, a thin layer of temper-free clay, was applied to its surface. The container was fired at temperatures below 600°C under reducing conditions⁴.

The discussed vessels – products of specialised pottery production and luxury items at the same time – have been widely discussed. The early dating of the Bonikowo

³ For an analysis and chronology of stratigraphic units see Kara 2009: 87–114. Therein layer IV is regarded as a relics of an alleged cult site, a long-functioning natural sanctuary.

⁴ The potter's proficiency in his craft may have been much better than suggested by the results of specialist analysis. Since the analysed container was unearthed among the relics of the so called cult site (cf. footnote 4), its production quality may have been symbolically conditioned. Vessels of poorer quality (including exclusive pieces, such as aforementioned ceramic containers from Bonikowo) with intentionally flawed form, decoration and/or production techniques, which differentiated them from the high quality utilitarian ceramics, tended to have been used as containers for offerings (cf. Kara 2009: 106, 113).

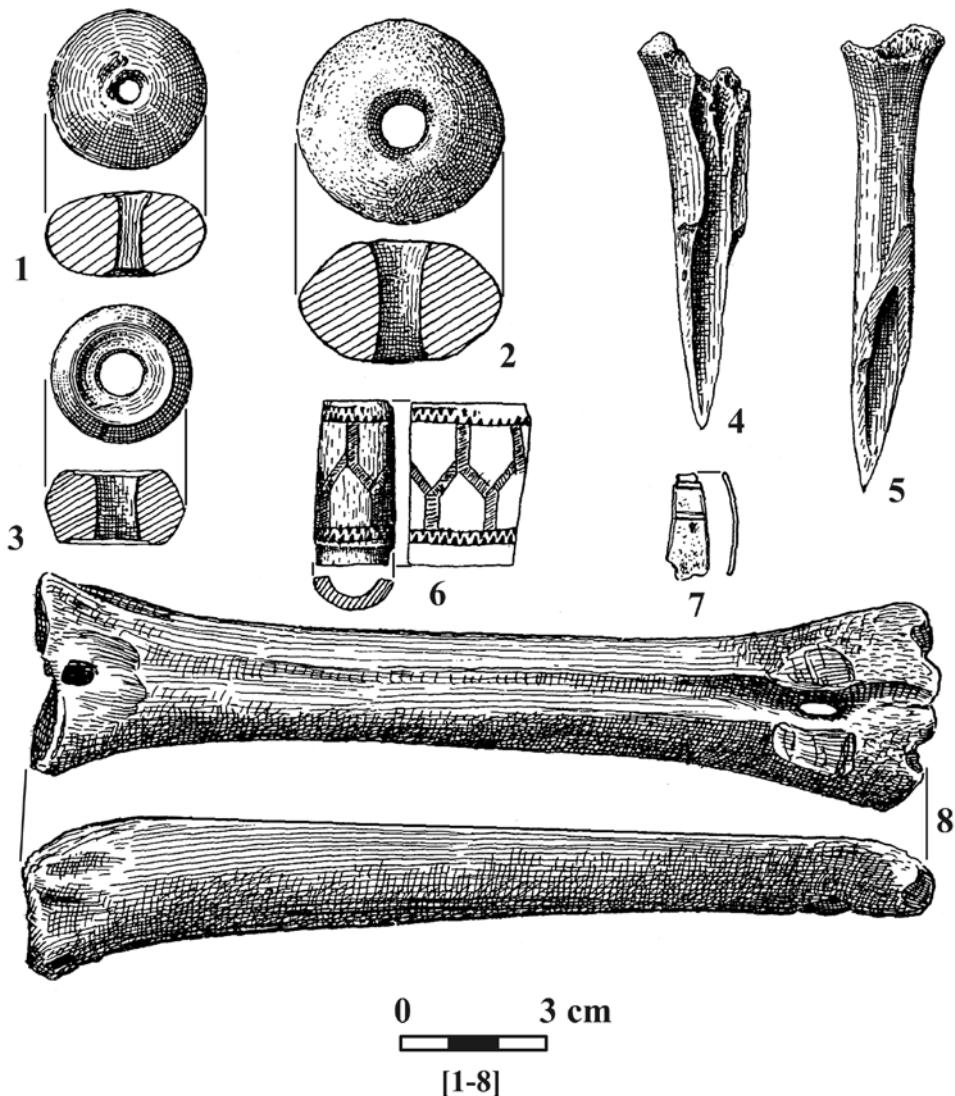


Fig. 9. Bonikowo, site 1, Kościan District. Assemblage of small finds from cultural layer IV:
1–3 – clay spindle whorls; 4–5 – so-called bone spikes; 6 – damaged antler mounting;
7 – fragment of the bow of a bronze fibula; 8 – bone skate or ski. After Hołowińska 1956: fig. 27

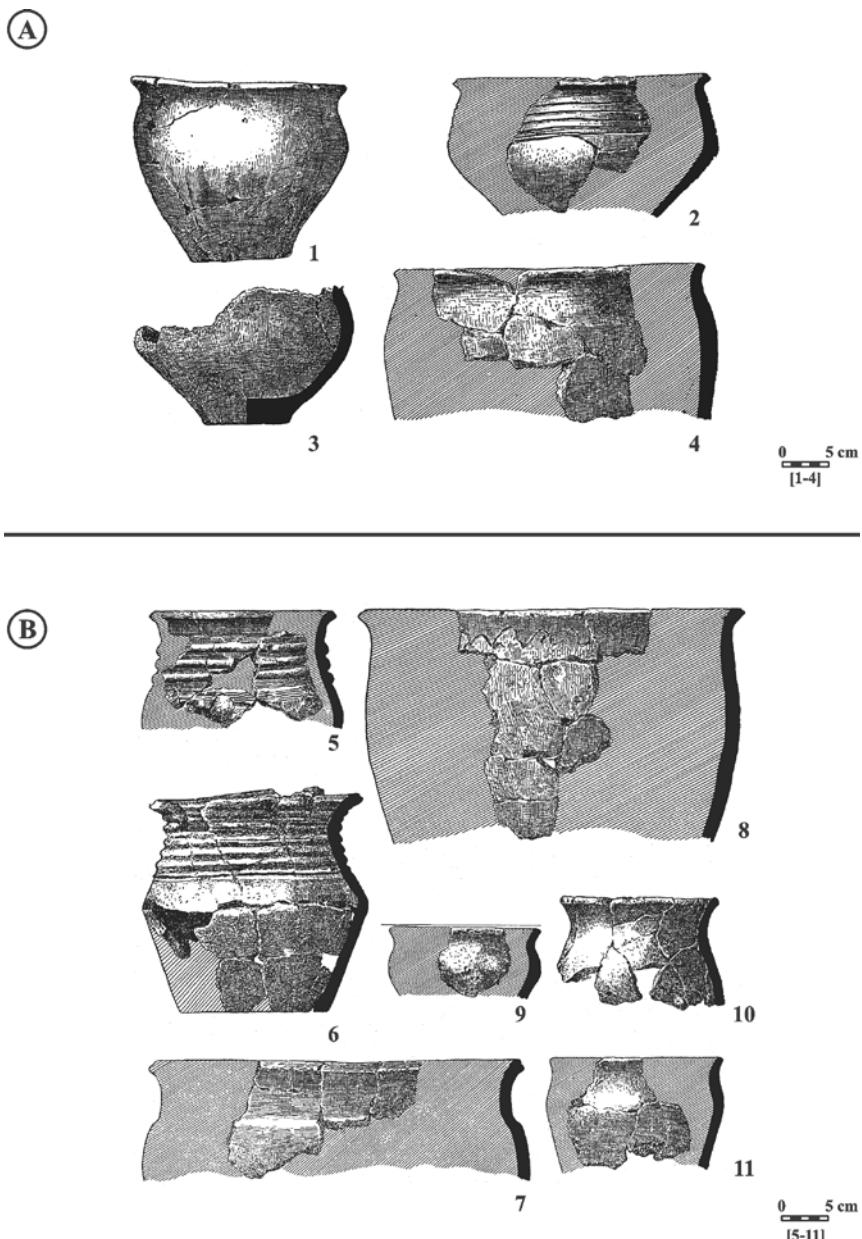


Fig. 10. Bonikowo, site 1, Kościan District. Selection of pottery (2, 4, 5-11, vessels wheel-finished in the upper parts), coming from the alleged cult site: A – from a so-called pit dug in the primary humus under stronghold rampart I; B – from cultural layer IV, deposited on top of primary humus and overlaid by the rampart structure. After Holowińska 1956, figs 25; 30

assemblage (5th/6th–7th century) proposed by Hilczerówna⁵, has been questioned by other authors, who argue for a late chronology, i.e., 9th century at the earliest, as attested presumably by the presence of ‘vessels of undoubtedly Tornow-type’ (Dulinicz 1994: 39, fig. 2b) among the workshop pottery in this assemblage. In our view, the argument is spurious, inasmuch as the discussed vessels of the Bonikowo group A_i find close analogies in the Merovingian circle, mostly in the Middle and Upper Danube basin (including the lands of the Alemanni, cf. *Die Germanen* 1986: fig. 75c; 81g) or the Rhine basin (territory of the Franks, cf. *Die Germanen* 1986: fig. 102: 11, 23, 24; *Die Franken* 1996: Cat. no. VIII.5.8j, fig. 215; 576) (Fig. 11), as well as sites dated to the 6th–first half of the 7th century, situated at the mouth of the Danube, in the territory of present-day Moldova (Harhoiu 2005: 182–183, fig. 23A2: 16). Vessels similar to group A_i containers from the Obra basin, i.e., biconical or S-shaped pots, showing a tendency towards a biconical form are found there in enclaves, just as in the oldest Bonikowo, the only functional-settlement complex of that type in Poland (Fig. 12). It is noteworthy that archaeologists tend to interpret the said vessels either as Byzantine ‘imports’ or locally fashioned products of highly skilled potters who for some reason forsook the Eastern Roman Empire (Harhoiu 2005: 183).

Specialised production of wide-mouthing biconical vases or squat biconical pots (so called *Knickwandtöpfe*), akin to the Tornow or Bonikowo ware, by the Franks or the Alemanni is believed to have been influenced by products of the Roman provincial workshops (mostly from Raetia and Noricum). These vase-shaped or cup-shaped ceramic vessels decorated with a band of broad grooves, for example, fashioned on the potter’s wheel or wheel-thrown, were produced before AD 500, at least in some Alemanni centres (Müller 1976: 62–63, 70–71, Pl. 9B:1; 10C: 1; *Die Germanen* 1986: fig. 75, Pl. 47, there the fourth-century *terra nigra*-type ware). Such containers, dated fairly firmly to the 6th century (including the first half of the 6th century) have been registered in the Danube zone at sites attributed to Germanic cultures (*Die Langobarden* 1988: 190). At the same time, luxury *Knickwandtöpfe* forms (Fig. 11: 8), also shaped on the wheel, were produced primarily in East Francia: forms resembling early medieval Slavic Tornow A ware probably not earlier than the second quarter of the 6th century and forms similar to ceramic containers of Tornow B type not later than the first half of the 7th century (cf. *Die Germanen* 1986: fig. 102: 11, 23, 24; *Die Franken* 1996: Cat. no. VII.1.17; VIII.5.8, fig. 215; for the Tornow-type ware see Herrmann 1966). Note that the registered similarities to the vessels from Bonikowo regard not only the form

⁵ Hilczerówna 1960; 1967a: 78, Table XI: 2, therein the dating of the settlement site preceding the stronghold; XV: 2, therein the dating of the stronghold. Cf. Hilczer-Kurnatowska 1986: 506; Kurnatowska and Łosińska 1990: p. 135, no. 11, p. 137, no. 6. Furthermore, Z. Hołowińska (1956: 77) and Z. Woźnicka (1961: fig. 1:1) dated the relics of the so-called open settlement site preceding the stronghold to the period between the 6th and 8th century.

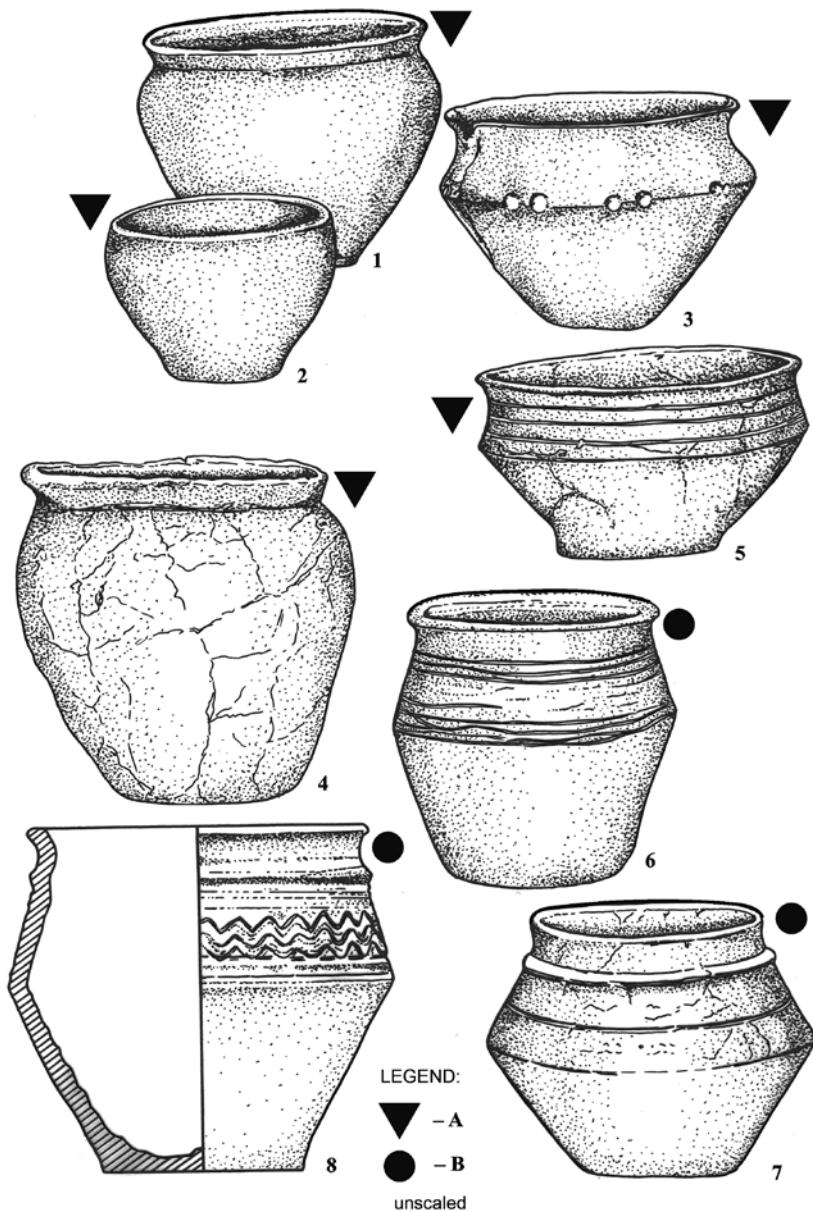


Fig. 11. Pottery from the eastern territories of the Frankish cultural milieu: 1–3, 5 – vessels from cremation burials dated to the 4th–5th century; 4, 6–7 – vessels from an inhumation grave dated to about the mid-7th century; 8 – *Knickwandtopf*-type vessel (from an inhumation grave), typical of the middle and late Merovingian period (mid-6th century). A – handmade; B – wheel-made. After Kara 2009: fig. 14

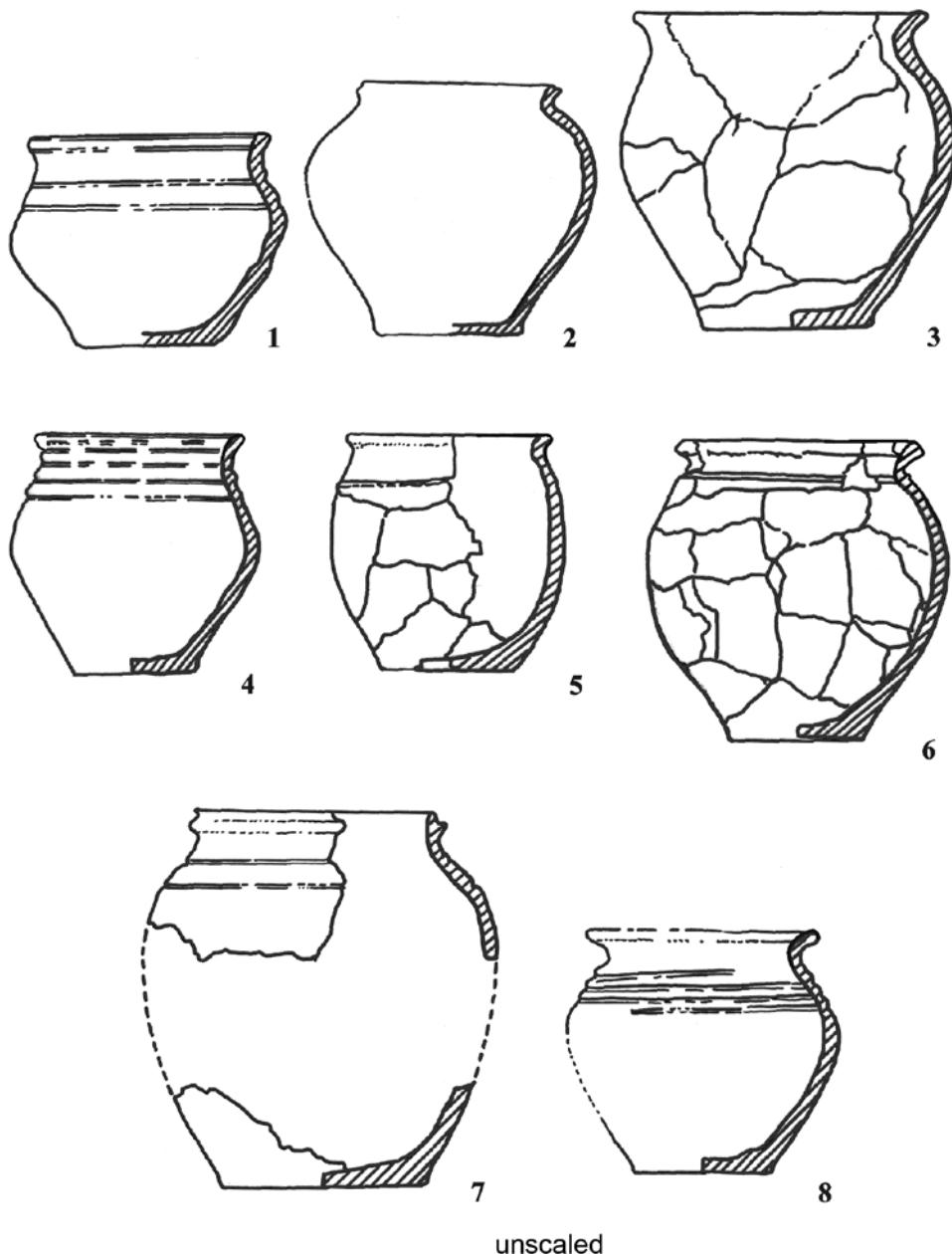


Fig. 12. Wheel-modelled vessels, from the Lower Danube basin (Moldavian territory), dated to the 6th through first half of the 7th century. After Harhoiu 2005; redrawn by M. Śniedziewska-Lerczak

(biconical) and decoration (grooves or broad flutes all around the vessel) or production techniques (pots substantially modelled on the wheel), but also seemingly minor features, such as firing colour, composition of the ceramic mass or surface treatment (all reflecting the poster's mastery in his craft). One likely explanation is that the luxury forms of A_i vessels deposited in layer IV at the stronghold in Bonikowo were fashioned by a remarkably skilled expert potter, who had originally worked in the Middle and Upper Danube basin or, more likely, on the East Francia border, although this is not the sole possibility. Tadeusz Makiewicz recently confirmed (2005a; 2005b; 2006) the validity of the views proposed already by some researchers that ancient, strictly workshop pottery production techniques, including throwing pots on a potter's wheel and modelling ceramics on the wheel, survived in the Odra and Vistula basins until the early Middle Ages (Hensel 1956; Hilczerówna 1963; 1967a; 1967b; Dąbrowski 1968; 1970; 1971). Significant departures from archetypes, most notably in decoration, suggest that even though the pottery production was based on foreign patterns, it was nevertheless already adapted to the needs of a local elite culture.

Given the chronology of parallels, most notably Merovingian ones, and to a lesser extent Byzantine examples from the area of present-day Moldova, we are inclined to date the Bonikowo pottery assemblage, which is remarkably like the specialised pottery production of the Danube and the Rhine zones in techno-stylistic terms, to generally between the mid-sixth and end of the eighth century. In our view, an approximate *terminus post* is provided by the chronology of the incipient 'mass' production of *Knickwandtöpfe* in the Merovingian circle (approximately mid-sixth century): forms typical of Frankish culture, which we consider to have been genetically related to biconical pots from Bonikowo, decorated with applied bands of clay. We also believe that the gradual deposition of layer IV occurred approximately in the said time interval, albeit, admittedly, its sixth-century origin is unlikely. Evidence pointing to the seventh-century provenance of the said layer is more persuasive, most notably chronological and functional *iunctum* between the pottery from layer IV and artifacts of late Antique and Merovingian provenance uncovered at the stronghold in Bonikowo and the nearby site 2 (so-called open settlement site; see Kara 2009: 87–114). All things considered, it is conceivable that these 'imports', meaning in this case an expert potter or potters (perhaps prisoners of war), did not arrive in the area of present-day Bonikowo earlier than after AD 626 A.D., that is, after the failure of the Avar–Slavic siege of Constantinople, the outcome of which was instrumental in establishing Samo's empire (cf. Labuda 1975 and the references cited therein). These specialist potters may have reached the territory on the Middle Odra slightly later, after the mid-7th century, that is, during a period of political instability in the lands on the central Danube unleashed by the disintegration of Samo's kingdom. In both cases, groups of Slavic warriors heading back home could have acted as the 'carriers' of these artifacts of evidently prestigious nature (e.g., luxury ceramics), as well as new experiences or ideas.

The political *status quo* that prevailed at the point of contact of the middle and upper Danube Basin and the central and upper Rhine Basin, definitely favoured the revival of contacts between the well-established Merovingian state, the Byzantine Empire, the emerging Avar khaganate, which solidified its position at the time, and the Slavic communities and the Slavic communities on the northern side of the Danube which either paid tribute to the khaganate or constituted its political clientele (including, in our view, communities from present-day Silesia, Ziemia Lubuska as well as southern and western Wielkopolska).

In Bonikowo, radiocarbon dating of two artifacts (so-called bone spike 1295+/-30 B.P.; bone skate or ski 1250+/-30 B.P.) (Fig. 9: 4, 8) from layer IV, which was sealed between undisturbed soil and the relics of the stronghold (both rampart II from the older phase of the structure and rampart I from the younger phase), produced similar intervals of calibrated calendar age, estimated at AD 662/676–774/870 and 670/688–767/800 with 95.4% and 68.2% confidence respectively (see Appendix 2). According to Hilczerówna (1967a), pots of group A, with the upper parts fashioned on the wheel (so-called proto-Tornow pottery), which are products of pottery craftsmanship in a Late Antique tradition and which were concomitant in the said layer with a fragment of a fibula dated to the late Period of Roman Influence and typical undecorated and hand-built Slavic-type ceramics, evinced an early dating of the relics on the one hand and indicated the persistence of certain currents of ancient culture among the early medieval populations of the Warta River basin on the other hand. With this in mind, the finds from layer IV are considered, among others, in the context of the issue of the so-called second zone of crystallisation of the West Slavonic culture, which is believed to have been located in north-western Poland (Kara 2009: 63–201 and the references cited therein). Absolute dates indicate that the said layer is related to (the second half of) the 7th century, 8th century, and even the first half of the 9th century, albeit the chronology of the incipient deposition of that layer remains an open question. Archaeological findings (Kara 2009: 91–114) suggest that layer IV could have accumulated over a long period of time, which can perhaps furnish an explanation for the differences in age of the two radiocarbon dated bone artifacts produced by the said layer (1295+/-30 BP and 1250+/-30 BP), considering that the ‘older’ item came from the lower levels of the accumulation. Nonetheless, the observed differences may result from imperfections of the method, which does not reflect the actual age of a sample but merely a probabilistic value.

Likewise, the stronghold in **Pohupin** near Krosno Odrzańskie (Fig. 13) gives the impression of being a seventh- (?) or eighth-century investment. Radiocarbon dating of two animal bones from consumption waste (pig molar 1200+/-30 BP; fragment of a cattle humerus 1170+/-35 BP) from layer III, lying in the part adjacent to the ramparts and stratigraphically related to the younger (!) settlement level of the structure, yielded similar intervals of calibrated calendar age, i.e., AD 710/770–949/980 (95.4%) and AD 770/775–940 (68.2%). The probability density distribution of the results narrows these

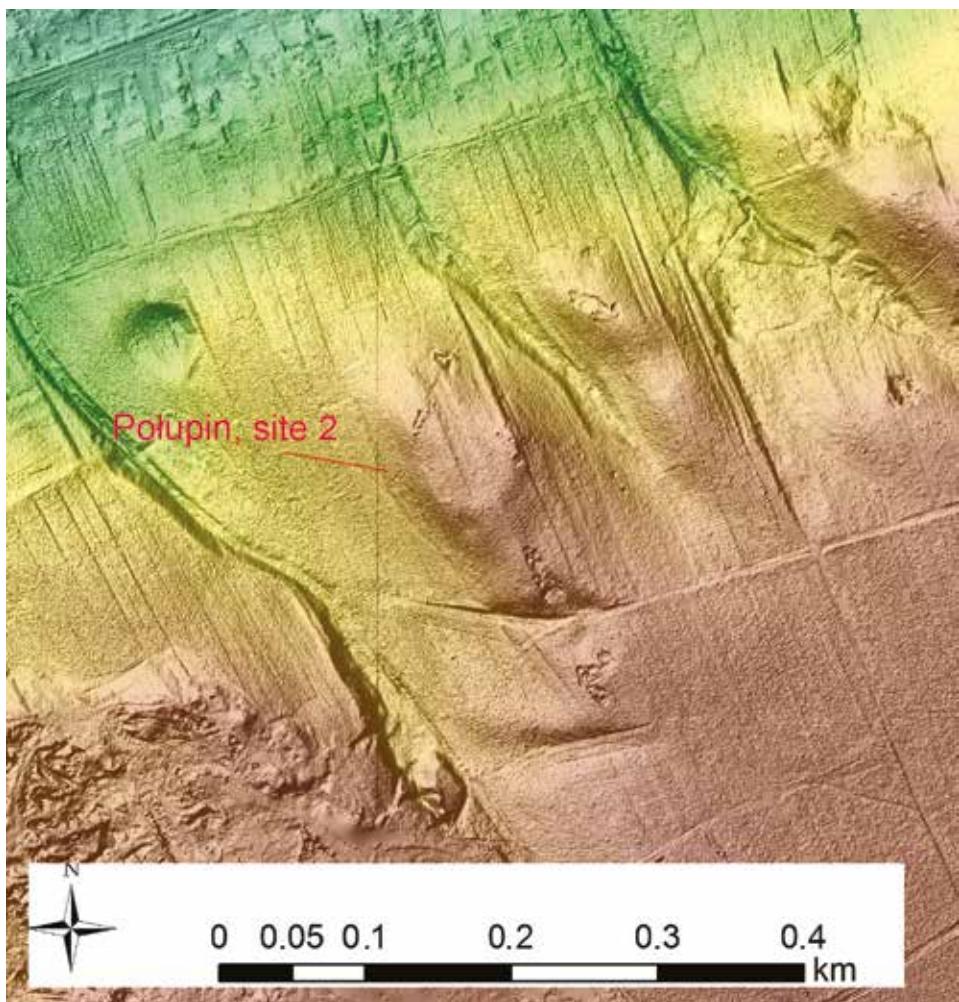


Fig. 13. Połupin, site 2, Krosno Odrzańskie District. Digital Elevation Model of the early medieval stronghold. Prepared by A. Łuczak

time intervals to the end of the 8th and the 9th century. A charcoal sample from a hearth discovered under the debris of the rampart's stone elements (the older phase of the stronghold or the so-called open settlement from the phase pre-dating the stronghold) was also radiocarbon-dated to 1250+/-30 BP, which after calibration gave probabilistic calendar year ranges of AD 687–775 (68.2%) and AD 676–870 (95.4%); in the latter case, the probability density distribution of the result at 74.8% narrowed the span of the examined sample to an interval of AD 676–779. On this basis, taking into account the said results of radiocarbon dating of the younger samples obtained from the

stronghold in Połupin, we are inclined to synchronise the said hearth (although cautiously, given the potential difficulties in evaluating archaeological age of charcoal on the basis of radiocarbon measurements, see Walanus and Goslar 2004) with the period from the second half of the seventh century to the eight century (see Appendix 2).

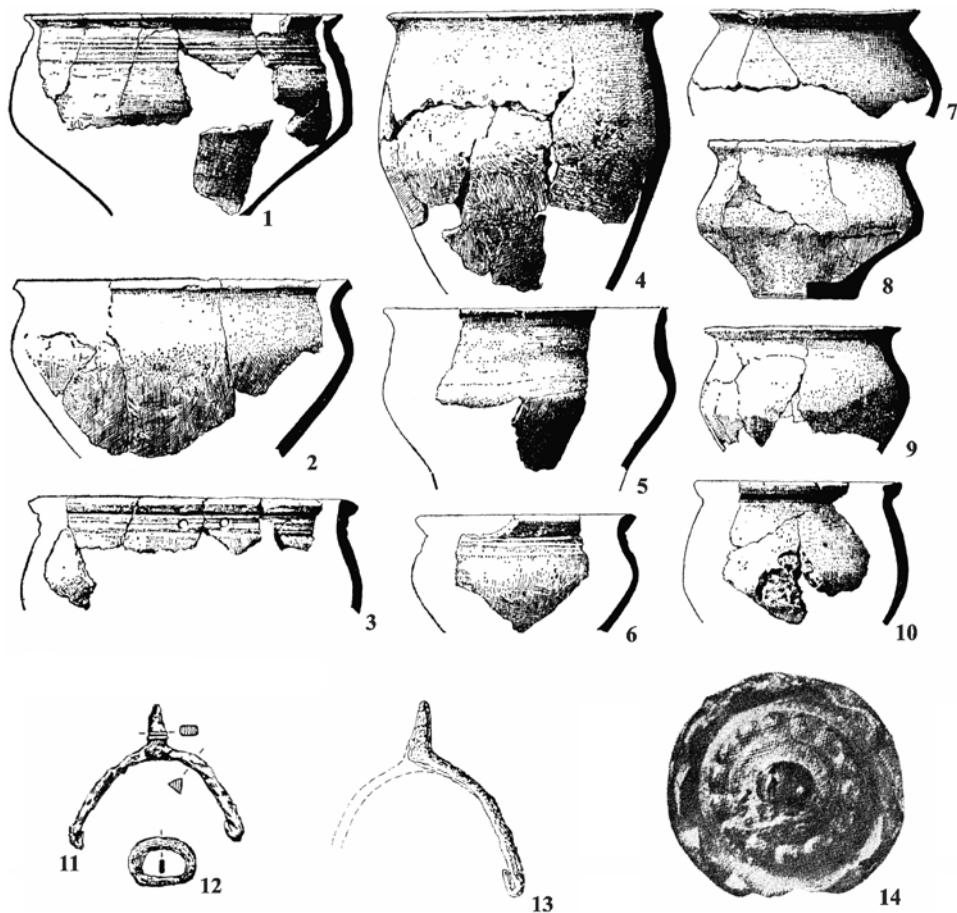
This absolute dating is not at variance with the results of recent chronological findings regarding artifacts from the younger phase of the stronghold in Połupin. *Terminus ante quem* for the older phase⁶ can be roughly determined at c. 800 AD (Kara 2009: 225–228) or the third quarter of the 8th century (Gruszka ed. 2016: 243). According to Edward Dąbrowski (1970; 2006), who excavated the stronghold, the fortified settlement was erected about AD 550 and lasted through the mid-7th century. The proposed chronology was not corroborated by the results of recent pottery analysis (Kara 2009; Gruszka ed. 2016), which has suggested that in the early Middle Ages, the site in Połupin was first occupied in the second half of the 7th century, possibly even the 8th century. The younger settlement level, unquestionably stronghold-related (relics of that horizon produced two hook-shaped spurs representing variants A and B after Jacek Żak and L. Maćkowiak-Kotkowska (1988), and a decorated bronze plate with an amethyst, possibly of Avar or late Merovingian origin, dated to the 7th–7th/8th century⁷) is considered as having formed not earlier (!) than in the late 7th/early 8th century (Kara 2009: 225), probably in the fourth quarter of the 8th century (Gruszka ed. 2016: 243).

The younger settlement level at the stronghold in Połupin is believed to encompass cultural layers excavated in 1960 in the part of the stronghold adjacent to the ramparts (in the upper part of the so-called residential basin-shaped depression), deposited above groups of large stones tumbled from the rampart. The depression was uncovered in two trenches (NE and SW⁸) located axially on the opposite sides of the courtyard of the stronghold about 80 m apart (Dąbrowski 2006: 27–30). The variant A hook-shaped spur mentioned above came from the former trench, B variant and the amethyst-studded plate from the same level in the latter trench (Fig. 14). A vestigial settlement layer

⁶ Initially interpreted as related to the stronghold, the relics attributed to that phase should perhaps be seen as the remains of the so-called open settlement preceding the stronghold (see Gruszka ed. 2016).

⁷ In the quoted collective monograph on the early medieval stronghold in Połupin (Gruszka ed. 2016), the said amethyst-studded plate is no longer included in the list of artefacts of Avar origin found in Poland. It is suggested that it should be attributed either to the modern period or to the early Middle Ages. In the latter case, this means that the plate could have been produced within the broadly defined Avar-Frankish zone of cultural contacts (Gruszka ed. 2016: 131–140). Noteworthy is also the similarity (albeit not very close) between the Połupin plate and some ornamented circular disc-shaped fibulae produced by the population of the Olsztyń group of the Western Baltic cultural circle in the late 6th–7th century under the influence of West European (Merovingian) and South European (Germanic/Avar) patterns (see Grzegorczyk 2015: 34–35, fig. 17). Although this similarity is by no means decisive for the determination of the origin of the Połupin specimen, it nevertheless suggests the possibility of the existence of some specific pre-patterns for the mentioned artifacts.

⁸ It was not clear which of the trench numbers given were assigned to these two trenches.



1-13 – unscaled, reduced

14 – unscaled, enlarged

Fig. 14. Połupin, site 2, Krosno Odrzańskie District. Selected finds from the ruins of the younger phase of the stronghold (NE and SW trenches): 1–10 – vessel-type ceramics; 11, 13 – iron, hook-shaped spurs variant A (11) and B (13); 12 – iron buckle or loop of a spur (?); 14 – repoussé-decorated bronze plate with an amethyst. After Kara 2009: fig. 69

at the southern end of the courtyard, in the vicinity of the aforementioned ‘residential’ depression, observed on undisturbed soil in the form of a few lenses and correspondingly regarded as remains of the younger settlement horizon, produced i.e. a small iron buckle or a loop, perhaps for attaching a thong used to tie on the spur. The relics of

the younger settlement horizon yielded a rich assemblage of pottery, consisting first of all of fragments of vessels (mostly strongly) modelled on the wheel and a few potsherds of completely hand-built vessels. A similar share of decorated forms came from the assemblage from this layer as from the one from the older level. The most numerous are vase-shaped or pot-shaped (spherical) vessels with a narrow band of grooves or possibly flattened bands of clay below the rim, which correspond to specimens of Hilczerówna's A_i group (1967a) in techno-stylistic terms, albeit (given their inferior quality) only to a certain extent. Likewise, they can be regarded as 'Tornow-like' forms (Fig. 14: 1). A special form of vase-shaped vessels, the rims of which resemble in shape the rims of the Feldberg group according to E. Schuldt (1956) (Fig. 14: 3, 6, 10), was also registered. Compared to the assemblage from the earlier horizon (shown in Fig. 15), the discussed collection is characterised by a much higher technical level, most notably in the case of the aforementioned vase-shaped vessels.

A fragment of a vessel decorated with bands of clay below the rim (Fig. 14: 3) from the younger settlement phase of the stronghold was revealed by petrographic analysis to be made of fat, ferruginous clay of high plasticity, tempered with crushed stone and containing feldspars (alkaline or plagioclases), quartz and rock fragments resembling granites and orthoamphibolites (including common hornblende) in composition. Intentionally added fluvial sand was also observed in the clay body. Nonplastic components were mostly fine- and medium-grained, whereas the class of grains above 1.5 mm was less common. The walls of the vessel were carefully treated and the outer surface was covered by a thin film of less dense clay with fine-grained quartz fragments (slip). The vessel was probably fired under reducing conditions, at temperatures of about 650°C (see Appendix 1).

The presence of amphibole fragments (including common hornblende) in the composition of the temper may evince the foreign origin of the vessel, given the non-erratic nature of the mineral with outcrops in the Bohemian Massif. Pending in-depth chemical analysis of clay composition, the provenance of the vessel cannot be determined unequivocally.

Notwithstanding the limited number of analysed sources, the results of specialist examination enable reasonable conclusions to be formulated regarding the said category of early medieval vessels. It is worth stating that vessels displaying evident workshop features, such as heavy modelling on the wheel, application of a slip, sophisticated form and stylistics, are present already in assemblages dated to the beginning of the early Middle Ages within the study area (i.e., the Middle Odra river basin). Given the absolute chronology of the finds, the earliest ones date back at the latest (!) to the first half of the 57th–third quarter of the 7th century (Stożne). Vessels with workshop features have been registered also in assemblages of later chronology (*vide* Połupin Phase II), dated approximately to the end of the 8th–9th century. None of the analysed vessels are related to the period after AD 900 (see Gruszka, Pankiewicz 2016). It should be noted

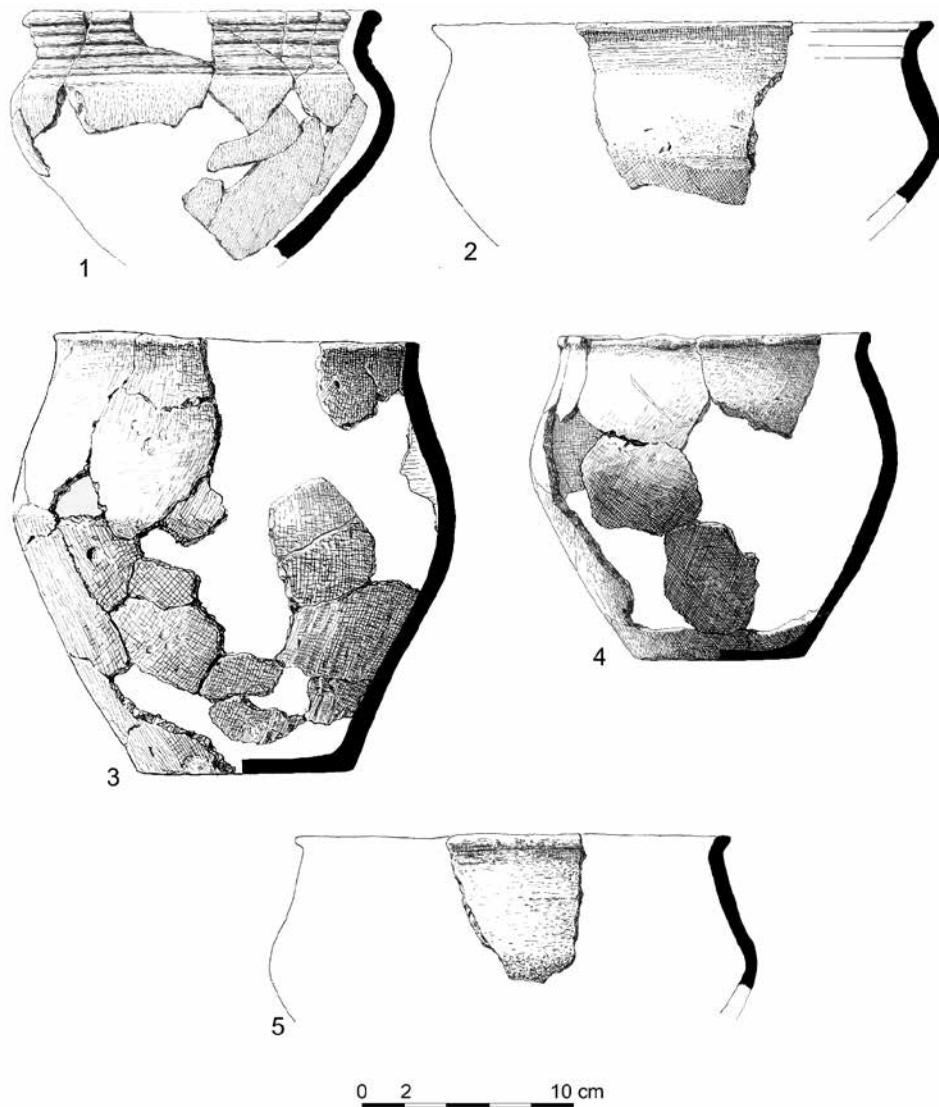


Fig. 15. Połupin, site 2, Krosno Odrzańskie District. Selection of pottery from the older phase of the stronghold (NE and SW trenches). Drawn by E. Dąbrowski

that finds of workshop-type pottery from layer IV at Bonikowo, which have been interpreted as a relic of the alleged cult site that had functioned before the stronghold was erected and within the confines of the stronghold of the earlier phase and were

recently regarded by some authors as related to the cultural-settlement Tornow-Klenica horizon of the second half of the 9th–10th century, can be dated actually to the second half of the 7th century as well as the 8th century. Such a time interval is implied by the results of radiocarbon dating of bone artifacts deposited in the said cultural layer.

The results of petrographic studies of selected ceramic containers, including grain size and modal analysis of nonplastic components of temper together with its distribution in the vessel wall, confirmed the hypothesis about the workshop provenance of the studied specimens. As for single finds (Stożne, Połupin Phase I), they may reflect the activity of an itinerant potter working in a given district. As regards numerous finds (Bonikowo, Połupin Phase II), the results of research suggest that local pottery production (the form and style of the vessels speak in favour of an adaptation of foreign models, including a possibly barbarised technique of production), or, alternately, ‘imports’ (*vide* the presence of accessory minerals in the temper, notably common hornblende). Of particular significance in the context of the two latter observations are the results of a comparative analysis of vessels from Bonikowo, which suggested early medieval, highly specialised potmaking from the Danube and/or the Rhine basin, crafted in a tradition inherited from the late antique workshops of the Roman Empire in the vicinity of the *limes*, as a possible parallel⁹. Such a widely-defined civilizational and cultural zone could have furnished a broad range of inspirations for potters working in the Middle Odra basin in the earlier phases of the early Middle Ages.

APPENDIX I

RESULTS OF PETROGRAPHIC STUDIES OF EARLY MEDIEVAL POTTERY FROM BONIKOWO, SITE 1 (WIELKOPOLSKA PROVINCE) AND POŁUPIN, SITE 2 (LUBUSKIE PROVINCE)

Introduction: Two potsherds from two early medieval archaeological sites: Bonikowo, site 1 and Połupin, site 2, were selected for detailed petrographic analysis. Petrographic thin-sections were made from samples of the upper parts of the vessel

⁹ When this paper had already been completed, we came across a publication which allowed us to include some finds from Moravia into the list of analogies to the Bonikowo pottery from the Danube area (see Tejral 2009: 140, fig. 29: 5–8, 12–13). Dated to the Migration Period, these finds are believed to continue the tradition of pottery workshops functioning in the Roman provinces in Late Antiquity. We believe that this confirms the accuracy of the above-presented conclusions. It is noteworthy that the range of parallelism of the features of both groups of vessels excludes the replication of patterns; the Bonikowo pottery bears merely a specific resemblance to the vessels from Moravia.

body. This was preceded by a macroscopic examination of the sherd, observing characteristics regarding the surface, colour, presence (or absence) of decoration, and weathering. The studied sections of the fracture surface were about 1×2.5 cm in size. To prepare thin sections for microscopic examination, five rectangular billets 1×2.5 cm in size, and 0.5 cm thick were excised with a diamond saw. Friable samples with low cohesiveness were stabilised with Canadian balsam. The ceramic thin sections were scanned using a Canon PIXMA MP 150 scanner of 1600×1600 pixel resolution to examine the internal features of the clay matrix, most notably size and shape of crushed stone (temper components), quantity of sand and clay fractions, remnants of organic matter and appearance of glassy products of firing (Stoltmann 1989; Garrison 2003).

A detailed petrographic examination of the thin sections was made on a polarizing Nikon 200 Pol microscope. The results were documented photographically using a Canon 450D camera. The samples were inspected in order to determine the morphology and optical characteristics of minerals as well structural characteristics of crushed rock fragments. All petrographic analyses of ceramics from Bonikowo and Połupin were performed by Prof. Piotr Gunia at the Department of Gemmology and Archeometry, Institute of Geological Sciences, University of Wrocław (Poland).

A mineral composition analysis was conducted using the planimetric method under a Leitz microscope equipped with a set of micrometer screws. Point count analysis was employed, for 300 points of thin section surface, whereby the microscope stage was moved in increments equal to the mean grain size of crushed stone in the sample (Stoltmann 1989; Garrison 2003). The counts were then summed to determine overall percentages of different grain types, such as clay minerals, quartz, potassium feldspars (including perthite, antiperthite, myrmekite and micropegmatite), plagioclases, rock fragments (including granites, quartzite or metasandstone, gabbro and amphibolites), mica (light and dark coloured), accessory and heavy minerals (e.g. pyroxene, amphibole, garnets etc.) and others (e.g. loamy rollings, grog, hematite, organic residues). Grain size analysis was conducted for nonplastic components. In order to evaluate the proportions of particular inclusions, five classes of grain size were identified, i.e. 1) < 0.1 mm (including glass-bearing veins produced in the course of firing); 2) 0.1–0.5 mm; 3) 0.5–1 mm; 4) 1–2 mm and 5) >2 mm. Grain sizes of crushed stone were measured based on scanned thin sections using computer software for image analysis ImageJ (freeware version), every time counting about 1000 grains for each examined sample.

The produced results enabled a detailed analysis of the petrographic characteristics of the tested samples, including the identification of specific minerals in the clay matrix, as well as fragments of crushed rock, sand grain fraction and vitreous firing products. These findings provided a basis for the reconstruction of the processes of clay body formation, temperature and firing conditions, as well as transformation of ceramic body components during firing.

BONIKOWO, site 1 (Fig. 16; 17)

Kościan Commune

Kościan District

Wielkopolska Province

Multi-part stronghold

Sample N°: BO/Pc1

Are 113C (NW baulk), layer IV, depth 2.05–2.15 m

Field inventory N°: 306/1952

Discovery: Excavated by Zofia Hołowińska and Zofia Hilczerówna on behalf of the Directorate of Research on the Beginnings of the Polish State in 1952.

Collection: Institute of Archaeology and Ethnology, Polish Academy of Sciences, Poznań Branch

Macroscopic features: Sherd (8×6×0.8 cm) from the upper part of a vessel. External surface light brown, smooth, with thick applied horizontal bands of clay. Internal surface smooth, light brown-grey in colour. Colour zoning seen in the break, light brown thin layers being visible in the peripheral parts of the section. These layers contain locally very thin and wavy twisted veins of silty brown material. A brown groundmass with tiny grains of sand or crushed stone and numerous pores and holes predominates in the central part of the break.

Petrography: The clay matrix surface has a fine-grained texture with grains of different size and non-directional structure. The identified nonplastic components can be divided into two categories in terms of size: larger, sized from 0.4 to 1 mm, and smaller, usually 0.1–0.25 mm in size.

The larger components include first of all: sharp-edged quartz, sometimes showing wavy extinction of light, sharp-edged (sometimes rectangular) fragments of potassium feldspars (orthoclase and microcline) with clearly visible mixed-in structures (perthite) and sometimes with well-developed lattice twins; subhedral table-shaped plagioclases locally with albite polysynthetic twinning. Some of them have signs of intensive weathering changes (kaolinisation) visible as efflorescence built of fine flaky-shaped aggregates showing yellowish interference colours. In addition, these components are accompanied by single, rounded fragments of granite of medium-grained biotite granites and fine-grained plagiogranites. Single rounded fragments of quartzite (of granoblastic and heteroblastic structure) and parallel oriented sets of biotite platelets have occasionally been identified in the sherd. Most of the biotites have distinct and perfect cleavage planes.

The smaller size components are represented primarily by fine-grained quartz, which forms sharp-edged fragments of polygonal outlines or, more rarely, well-rounded grains. Feldspar fragments that could not be optically determined with greater precision are relatively rare.

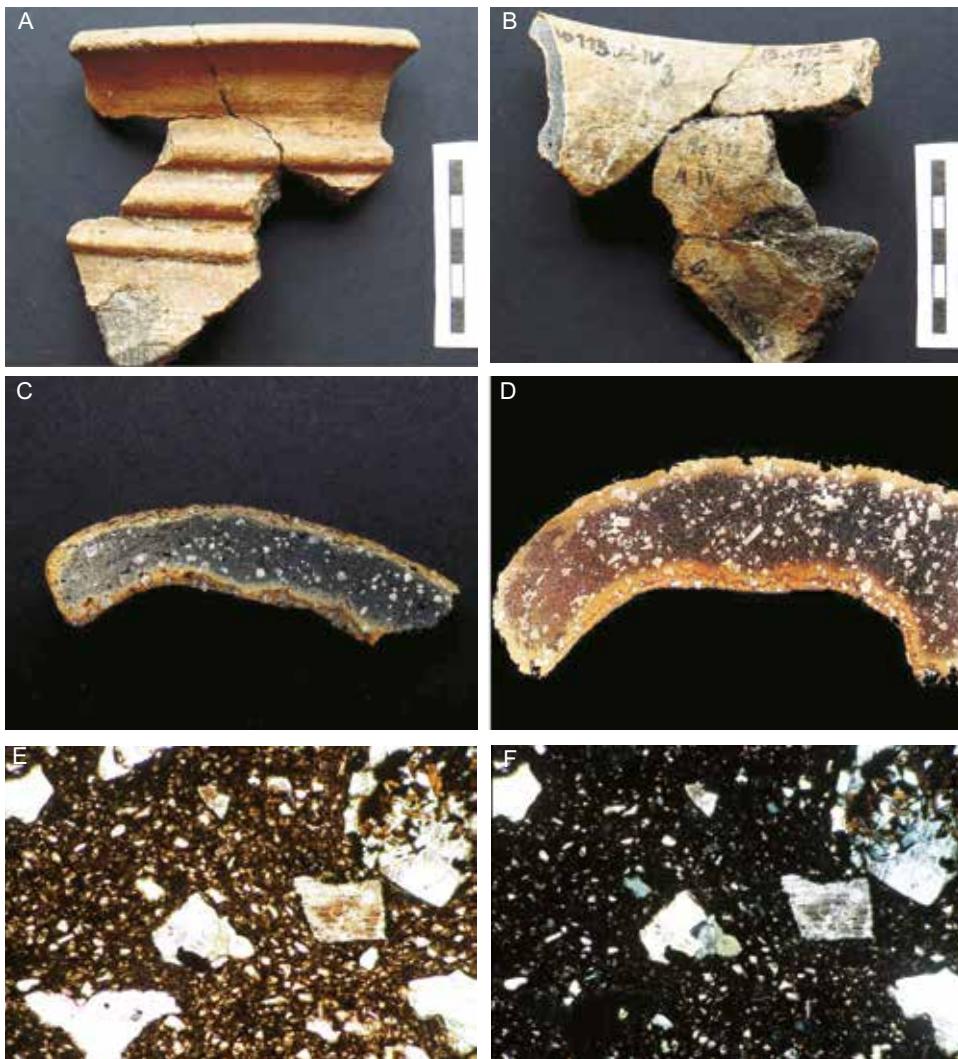


Fig. 16. Bonikowo, site 1, Kościan District – vessel sherd (sample BO/Pcr). A – external view; B – interbal view; C – section view; D – thin section scanned view (1600x1600 pixel resolution, about 4x magnification); E – sharp-edged fragments of quartz and feldspar in the micromass (about 40x magnification, parallel nicols); F – sharp-edged fragments of quartz and feldspar in the clay matrix (about 40x magnification, crossed nicols). Photo by P. Gunia

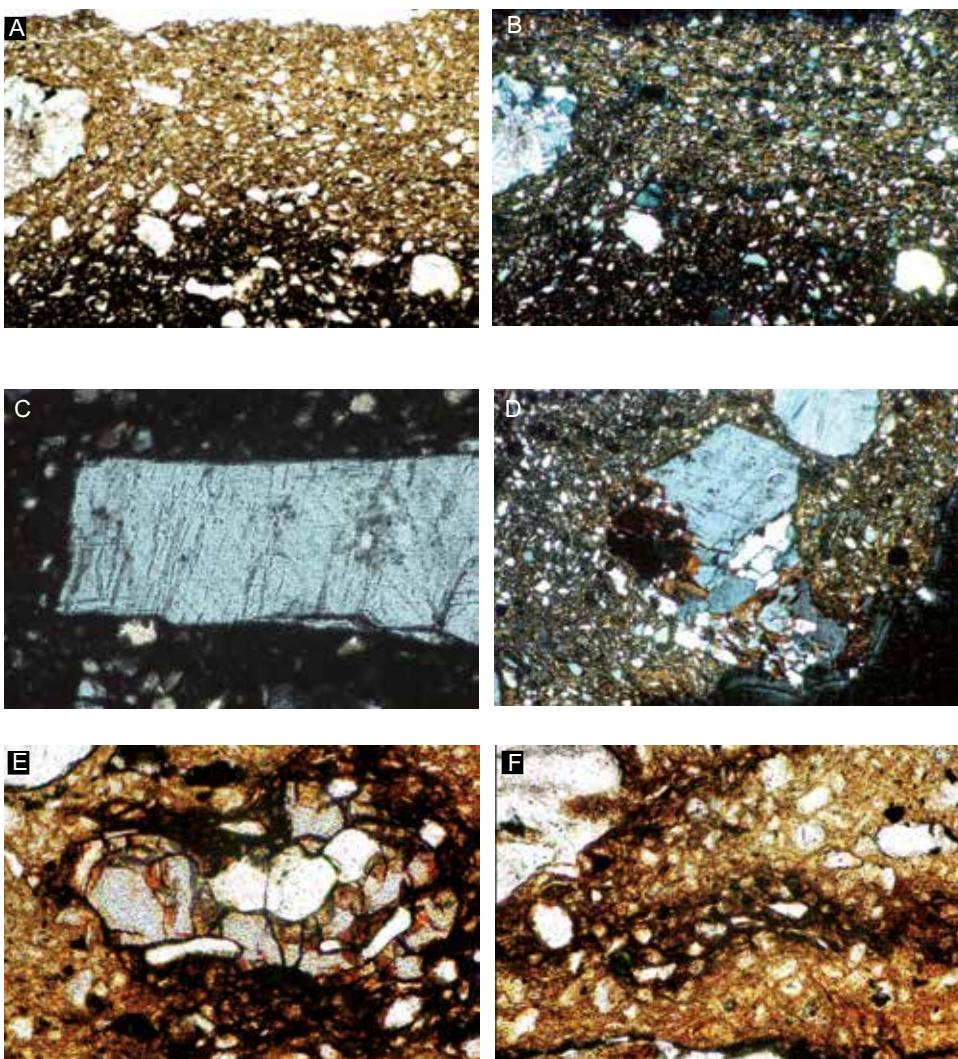


Fig. 17. Bonikowo, site 1, Kościan District – vessel sherd (sample BO/Pc1). A – clay matrix from outer part of sherd (about 40 \times magnification, parallel nicols); B – clay matrix from outer part of sherd (about 40 \times magnification, crossed nicols); C – alkali feldspar in the clay matrix (about 60 \times magnification, crossed nicols); D – crushed biotite granite fragment in the clay matrix (about 60 \times magnification, crossed nicols); E – crushed quartzite fragment in the clay matrix (about 60 \times magnification, parallel nicols); F – flattened lump of unworked clay in the clay matrix (about 40 \times magnification, parallel nicols). Photo by P. Gunia

In the central part of the break, the clay mass is brown, slightly translucent, evincing a compact structure with a relatively large quantity of fine-grained sand (55–60% by volume). Some places in the mass are devoid of crushed stone. There are occasional clumps of unworked ceramic mass surrounded by veins or rings built of darker, ferruginous silty material. The groundmass present in the peripheral parts of the break is light brown, translucent, and its structure is felted or compact depending on the location. Virtually devoid of larger components of crushed stone, the slip zone consists of a matrix with single spots or strips of opaque, ferruginous pigment concentration. A glassy substance occurs at relatively low frequency in larger oval or irregular pores or slits in the clay matrix. Occasionally, single round gas bubbles were also noted.

Results: The described vessel is made of ferruginous sandy clay characterised by poor plasticity, tempered with fine, well sorted crushed rock (or a weathered equivalent) probably of erratic origin. Given the poorly mixed components of the clay matrix and insufficient drying before firing, the container was made without much care. The outer surface of the vessel was covered with a thin film of less dense clay (slip), and then fired under reducing conditions in a low temperature, below 600°C.

POŁUPIN, site 2 (Fig. 15; 18; 19)

Dąbie Commune

Krosno Odrzańskie District

Lubuskie Province

Ring-shaped stronghold

Sample №: PN₂/Pc₁

Younger settlement phase

Field inventory №: 10/1961

Discovery: Excavated by Edward Dąbrowski from the Museum in Zielona Góra in 1961

Collection: Archaeological Museum of the Middle Odra Basin in Świdnica near Zielona Góra

Macroscopic features: Two vessel fragments, sized 10×3×0.6 cm, including the rim with an applied band of clay and the upper part of the body (with a small pierced hole, about 8 mm in diameter). The outer surface is light grey-brown in colour, smooth, with two wide grooves in the upper part of the body. Originally smooth, now rough, the inner part is light grey in colour and undecorated. In the break there is a thin layer, dark cherry red in colour in the part adjacent to the outer side of the vessel, whereas the rest of the break is striped in various shades of brown, with visible light brown and grey fragments of crushed stone, sand grains and glass-bearing veins.

Petrography: The clay groundmass is generally medium-grained with fine-grained parts or areas where the grains (or fragments) differ in size, while the structure is

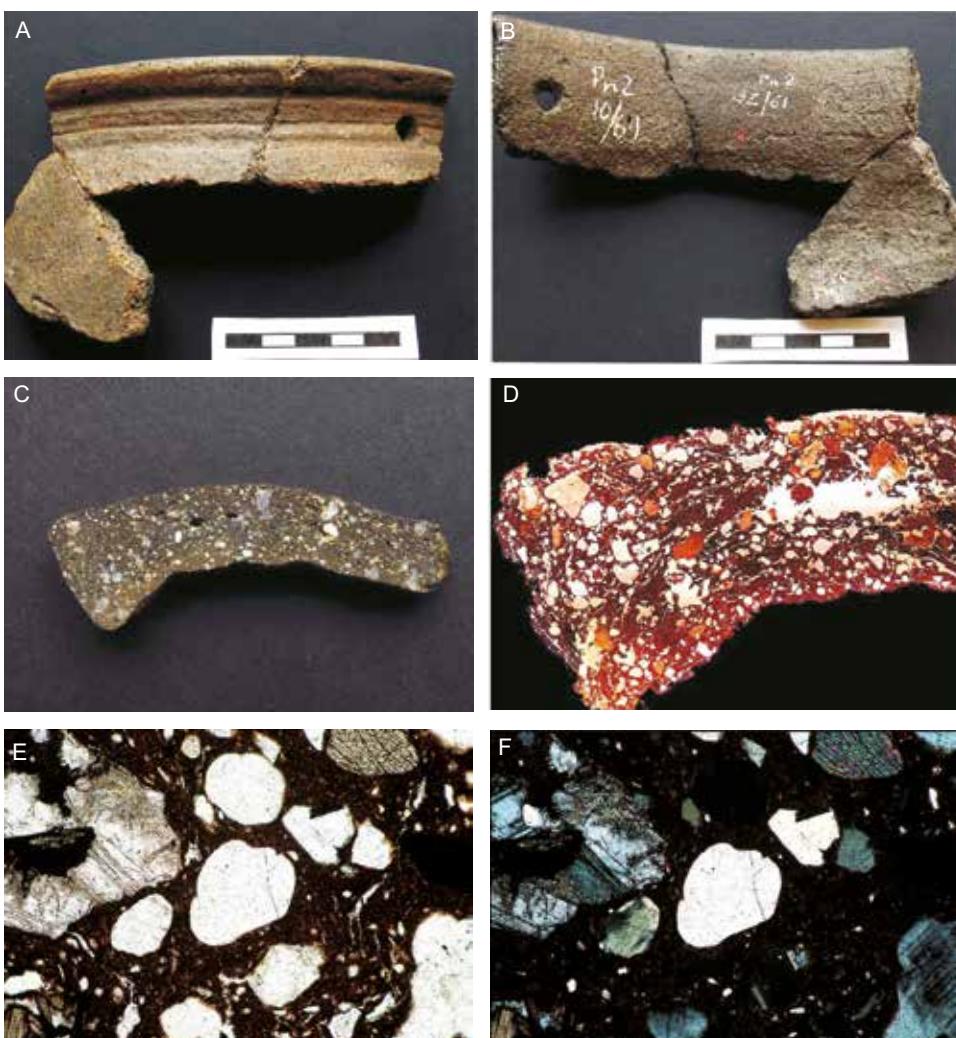


Fig. 18. Połupin, site 2, Krosno Odrzańskie District – vessel sherd (sample PN/Pci).
A – external view; B – internal view; C – section view; D – thin section (about 4x magnification); E – single, rounded grains of sand, crushed stone fragment and glass-bearing veins in the clay matrix (about 40x magnification, parallel nicols); F – single grains of sand, crushed stone fragments and glass-bearing veins in the clay matrix (about 40x magnification, crossed nicols). Photo by P. Gunia

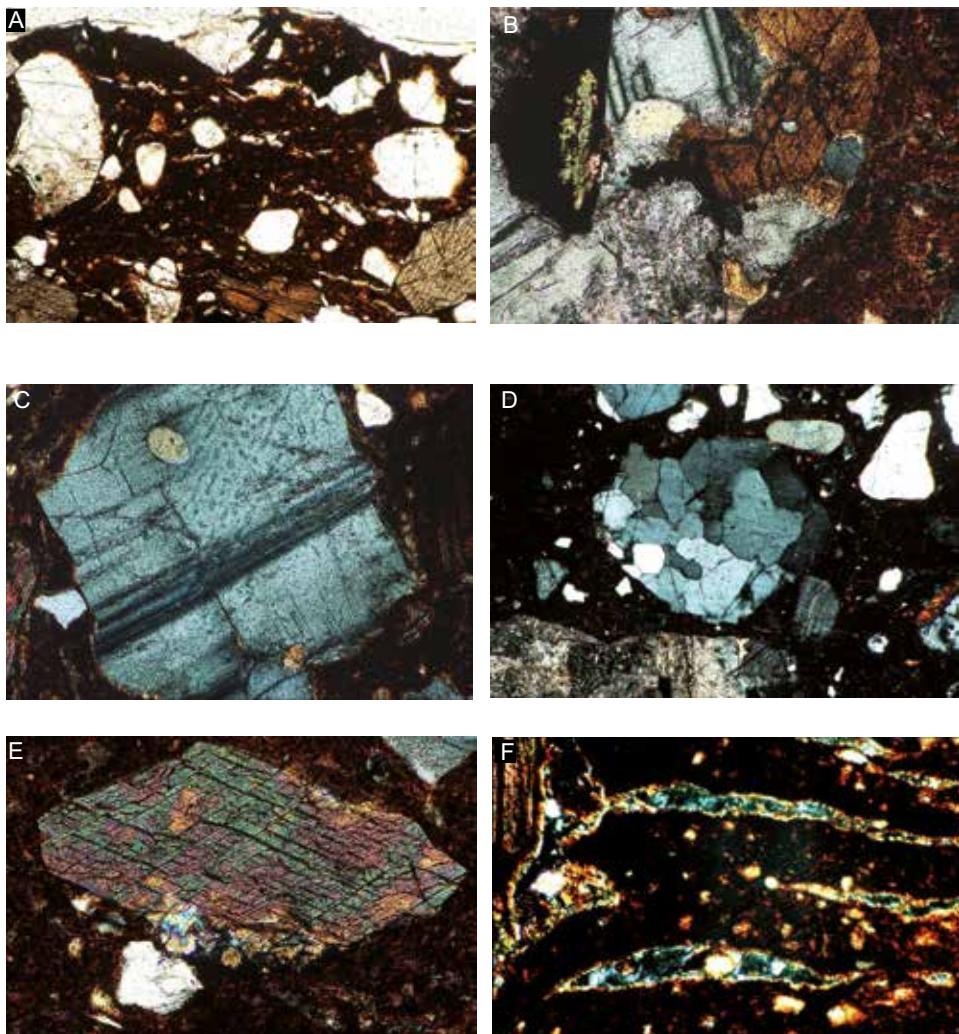


Fig. 19. Połupin, site 2, Krosno Odrzańskie District – vessel sherd (sample PN/Pci).
A – clay matrix from outer part of sherd (about 40× magnification, parallel nicols);
B – crushed fragment of gabbro (?) in the clay matrix (about 40× magnification, crossed nicols);
C – part of orthoclase as a component of crushed granite in the clay matrix (about 40× magnification, crossed nicols); D – fragment of quartzite as a nonplastic component of the clay matrix (about 40× magnification, crossed nicols); E – idiomorphic prismatic crystal of common hornblende in the clay matrix (about 40× magnification, crossed nicols); F – glass-bearing veins with distinctive reaction rims in the clay matrix (about 40× magnification, crossed nicols). Photo by P. Gunia

unoriented. Nonplastic compounds belong to several classes of grains (fragments). Less common are larger components measuring up to 1.5 mm, which were identified as: sharp-edged quartz fragments sometimes showing wavy extinction of light, fragments of plagioclase table-shaped crystals, often with traces of albite twinning and heavy weathering changes. In some places, larger potassium feldspars occur. Some of them have a well-developed admixture of perthitic intergrowths. Quite common are also idiomorphic or panxenomorphic amphibole prisms representing a common horn-blende variety. Many of these prisms display strong pleochroism and exhibit well-defined bi-directional cleavage planes intersecting at an angle close to 120°. Two slightly rounded fragments of plagioclase-bearing orthoamphibolites with granonematoblastic texture were also found. In the clay matrix, temper sized from 0.2 to 0.6 mm includes the same components as described above, commonly represented by sharp-edged fragments of quartz and feldspars. Significant amounts of well-rounded quartz grains, individual or sets of biotite platelets and single needle-shaped muscovite flakes have also been registered.

The ceramic mass is dark brown in colour, opaque and has a compact cryptocrystalline texture. The content of the dipped matrix here is small and does not exceed 10% of the volume of the sherd. Locally, in areas adjacent to the outer surface of the pot, the cherry-brown clayey background is poorly translucent and has a felted structure. This zone, almost devoid of major components of crushed stone, is locally enriched with very fine-grained sharp-edged quartz fragments. Glass-bearing veins are most common here. Typically, they form various forms, from worm-like to toothed, branching, and then connecting with one another around the grains of the temper. Occasionally, smaller fragments of crushed stone are also found, either embedded in the glassy substance or as bent, narrow veins narrowed in both directions. Larger oval areas left after grains of primary sand are often filled with a glassy-like substance.

Results: The examined potsherd was made of fat, strongly ferruginous clay of high plasticity. The most common nonplastic compounds were feldspars (alkaline or plagioclases), quartz and rock fragments resembling in composition granites and orthoamphibolites. A significant amount of well-rounded quartz sand of fluvial origin was also added to the primary ceramic mass. The outer surface of the vessel was covered with a thin film of less dense clay with fine-grained quartz fragments (slip). The vessel was probably fired under reducing conditions, at a temperature of about 650°C.

Conclusions: Petrographic analyses of the pottery from the archaeological sites of Bonikowo and Połupin have shown the ceramics to be different. In the Bonikowo sample, quartzite and granite fragments predominate among the nonplastic ingredients in the clay matrix, while the sherd from Połupin contains an addition of granites and gabbro-like rocks, together with a large quantity of fluvial sand. These differences may have been caused by different pottery production technologies and might have arisen from the use of a local clay characterised by different petrographic features.

APPENDIX 2

RESULTS OF RADIOCARBON DATING OF ARCHAEOLOGICAL MATERIAL FROM BONIKOWO, SITE 1 (WIELKOPOLSKA PROVINCE) AND POŁUPIN, SITE 2 (LUBUSKIE PROVINCE)¹⁰

Radiocarbon analyses (^{14}C AMS) were conducted at the Poznań Radiocarbon Laboratory under the direction of Prof. Tomasz Goslar, in connection with the implementation of research task No. 8 of the Project N R 17 0014 06 in 2009–2012 ‘Multi-disciplinary research as a method of reconstruction of settlement-cultural transformations. Western Wielkopolska in prehistory and the Middle Ages’ (bone samples) and in within the frame of a PRELUDIUM grant from the National Center of Science (NCN) in Poland (UMO-2012/05/N/HS3/01425) ‘Interdisciplinary examination of the early medieval (seventh–tenth/eleventh c.) workshop pottery in the Middle Odra River basin’ (charcoal sample). The radiocarbon age of two bone samples from the stronghold in Bonikowo (order no. 5970/11), two bone samples (order no. 4065/10) and charcoal sample (order no. 8977/14) from the stronghold in Połupin was estimated. The bone samples met the criteria of the method (Walanus and Goslar 2004).

Sample name	Lab. no.	^{14}C age	Remarks
Bonikowo 1-1/2011	Poz-45908	1295 ± 30 BP	2.2%N 9.4%C
Bonikowo 1-2/2011	Poz-45909	1250 ± 30 BP	1.6%N 4.4%C
<hr/>			
Połupin 1(6)	Poz-33234	1200 ± 30 BP	0.9%N 4.5%C
Połupin 2(7)	Poz-33235	1170 ± 35 BP	1.2%N 5.9%C
Połupin 2/15/63	Poz-67862	1250 ± 30 BP	

Results of calibration of ^{14}C dates – order no. 4065/10.

Given are intervals of calendar age, encompassing the true age of the samples with a probability of ca. 68% and ca. 95%. The calibration was made with OxCal software.

INFORM: References – Atmospheric data from Reimer *et al* (2004); OxCal v3.10 Bronk Ramsey (2005); cub r:5 sd:12 prob usp[chron]

¹⁰ For the results of radiocarbon dating of archaeological samples from Stożne, site 2, Lubuskie Province, see Gruszka 2010.

Results of calibration of ^{14}C dates – order no. 5970/II.

Given are intervals of calendar age, encompassing the true age of the samples with a probability of ca. 68% and ca. 95%. The calibration was made with OxCal software. INFORM: References – OxCal v4.1.5 Bronk Ramsey (2010); r:5. Atmospheric data from Reimer *et al.* 2009.

Results of calibration of ^{14}C dates – order no. 8977/14.

Given are intervals of calendar age, encompassing the true age of the samples with a probability of ca. 68% and ca. 95%. The calibration was made with OxCal software. INFORM: References – OxCal v4.2.3 Bronk Ramsey (2013); r:5. IntCal13 atmospheric curve Reimer *et al.* 2013.

BONIKOWO, site 1 (Fig. 20)

Kościan Commune

Kościan District

Wielkopolska Province

Multi-part stronghold

Sample Bonikowo 1–1/2011: 1295 ± 30 BP

So-called bone spike (possibly damaged in the upper part, from the inner side, unburnt – Fig. 9: 4)

Sheep/goat, metacarpal bone, young individualⁱⁱ

Are 98C, layer IV₄₋₅, from NW 2.85 m, from NE 2.88 m, depth 2.38 m

Field inventory no.: 60/1952 (R)

Discovery: Excavated by Zofia Hołowińska and Zofia Hilczerówna on behalf of the Directorate of Research on the Beginnings of the Polish State in 1952.

Collection: Institute of Archaeology and Ethnology, Polish Academy of Sciences, Poznań Branch

68.2% probability

AD 670 (44.4%) AD 713

AD 745 (23.8%) AD 767

95.4% probability

AD 662 (95.4%) AD 774

Sample Bonikowo 1–2/2011: 1250 ± 30 BP

Skate or ski (damaged underside, used, unburnt – Fig. 9:8)

ⁱⁱ Archaeozoological identification of ^{14}C dated samples from Bonikowo and Połupin by Dr. Marta Osypińska from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Poznań Branch

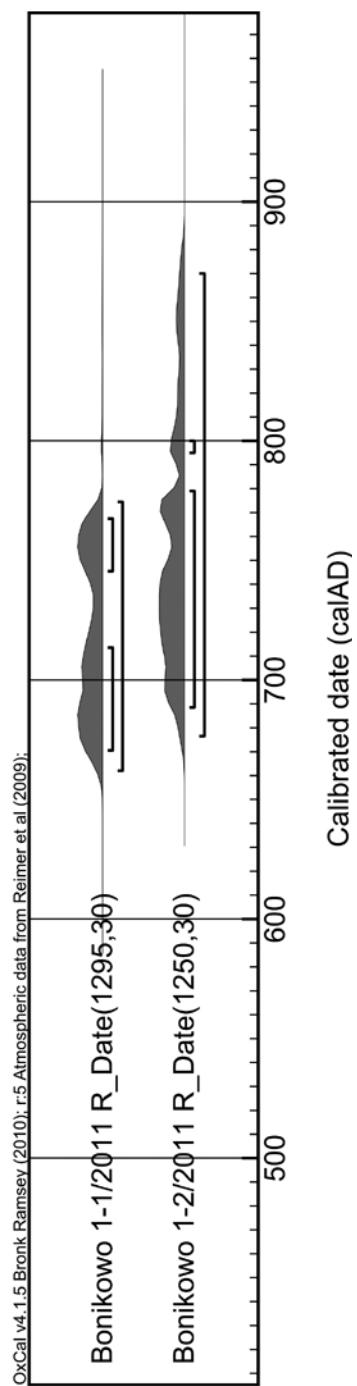


Fig. 20. Bonikowo, site 1, Kościan District. Probability density distribution of the calibrated age for AMS dated samples.
After the Poznań Radiocarbon Laboratory

Cattle metacarpal bone, distal extremity missing

Are 98C, layer IV, from NE 2.2 m, from NW 2.35 m, depth 2.29 m

Field inventory no.: 52/1952 (on the artefact erroneously no Bo 51/52)

Discovery: Excavated on behalf of the Directorate of Research on the Beginnings of the Polish State in 1952.

Collection: Institute of Archaeology and Ethnology, Polish Academy of Sciences, Poznań Branch

68.2% probability

AD 688 (65.7%) AD 779

AD 795 (2.5%) AD 800

95.4% probability

AD 676 (95.4%) AD 870

POŁUPIN, site 2 (Fig. 21)

Dąbie Commune

Krosno Odrzańskie District

Lubuskie Province

Ring-shaped stronghold

Sample Połupin 1(6): 1200 ± 30 BP

Pig molar, unburnt

Trench 1, quarter A, layer III (?), among stones (younger phase of stronghold)

Field inventory no.: 19/1961

Discovery: Excavated by Edward Dąbrowski from Museum in Zielona Góra in 1961

Collection: Archaeological Museum of the Middle Odra Basin in Świdnica near Zielona Góra

68.2% probability

AD 775 (68.2%) AD 875

95.4% probability

AD 710 (6.3%) AD 750

AD 760 (87.7%) AD 900

AD 920 (1.3%) AD 940

Sample Połupin 2(7): 1170 ± 35 BP

Fragment of a cattle humerus, unburnt

Trench 1, layer III, among stones which fell from the rampart structure, above clay (younger phase of the settlement)

Field inventory no.: 12/1963

Discovery: Excavated by Edward Dąbrowski from the Zielona Góra Museum in 1963.

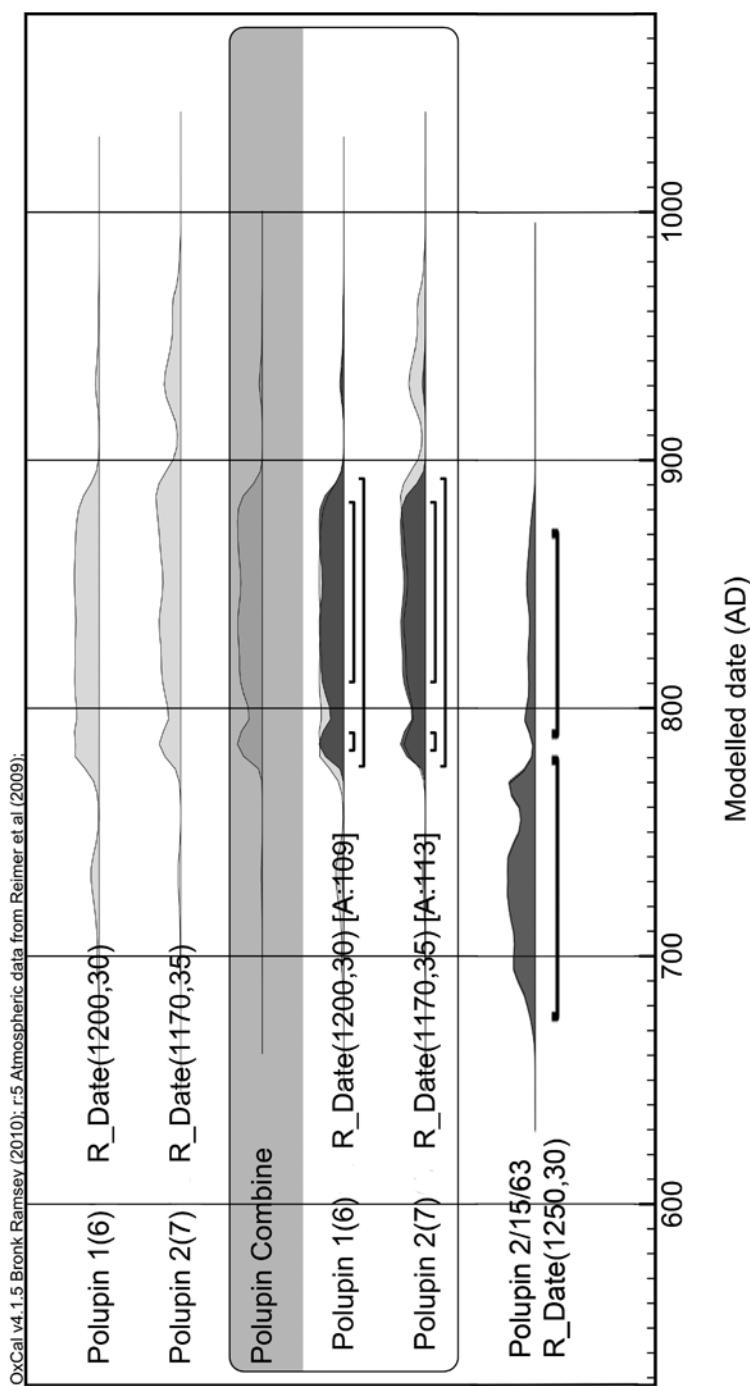


Fig. 21. Polupin, site 2, Krosno Odrzańskie District. Probability density distribution of the calibrated age for AMS dated samples.
After the Poznań Radiocarbon Laboratory

Collection: Archaeological Museum of the Middle Odra Basin in Świdnica near Zielona Góra

68.2% probability

AD 770 (65.4%) AD 900

AD 920 (2.8%) AD 940

95.4% probability

AD 770 (95.4%) AD 980

R_Combine Połupin 1–2: 1187 ± 23 BP

68.2% probability

AD 780 (6.0%) AD 790

AD 800 (62.2%) AD 890

95.4% probability

AD 770 (95.4%) AD 900

X₂-Test: df=1 T=0.4(5% 3.8)

Sample Połupin 2/15/63: 1250 ± 30 BP

Charcoal

Trench 1, quarter ?, layer IV, hearth discovered under the debris of the rampart's stone elements (older phase of the stronghold or the so-called open settlement from the phase pre-dating the stronghold).

Field inventory no.: 15/1963

Discovery: Excavated by Edward Dąbrowski from the Museum in Zielona Góra in 1963.

Collection: Archaeological Museum of the Middle Odra Basin in Świdnica near Zielona Góra

68.2% probability

AD 687 (68.2%) AD 775

95.4% probability

AD 676 (74.8%) AD 779

AD 790 (20.6%) AD 870

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