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A UNIQUE CLAY RATTLE FROM KOZIARNIA CAVE IN SOUTHERN POLAND

Clay rattles are a group of extraordinary artefacts, discovered mostly in settlement contexts starting from the Neolithic up to the Middle Ages (Kulczycka-Leciejewiczowa 1979, 151; Malinowski 1999, figs 1-2; Jankowska 1975, 149). They become more abundant only in the Early Iron Age in the so-called Lusatian culture, when they can be found in funerary contexts, especially accompanying children's burials (Ćwirko-Godycki/Wrzosek 1936-1937, 171-172; Gedl 2002a, 107; 2002b, fig. 21; Krukiewicz 2002, 123-125; Nowiński 2000). Extremely scarce in later Prehistory (the Roman and Migration Periods), they become more popular in the 11th-13th centuries when a significant number of both glazed and unglazed clay rattles appear in Poland (see recently: Kontny 2018). These medieval finds are usually considered to have been produced in Kievan Rus' (Siemianowska 2008, 70; cf. Dzik 2016).

The general definition of a clay rattle refers to an object closed inside a kind of vacuum in the burnt clay. Their function is usually affiliated either to religious or musical practices, or children's games (Koch 2003, 149-150). Due to their build, the analysis of the inner structure of the rattle and the detailed examination of the object closed inside are strictly limited. Additionally, the artefacts themselves can barely be dated with direct methods.

All these features make the clay rattle found in Koziarnia Cave (Kraków, woj. małopolskie/PL) located in the Polish Jura in southern Poland an extraordinary artefact. It was discovered during trial fieldwork led by Stefan Krukowski in 1919 in a Holocene layer in the entrance zone of the cave. The artefact has no clear context since the layer contained traces of multiple settlement events starting in the Neolithic and up to the Post-medieval Period. For this reason, the chronological affiliation of the rattle could only be estimated, based on possible analogies, which could not be found due to its very unusual shape (Kot/Szeliga/Wojenka 2019).

This paper presents the results of interdisciplinary analyses of the artefact, which led us to the final determination of its surprisingly late chronology and the reconstruction of its shaping technique, as well as – through typological analyses – to its possible cultural affinity.

KOZIARNIA CAVE

Koziarnia Cave is located at the mouth of the Koziarnia Gorge located in the Sąspów Valley in the southern part of the Polish Jura (**fig. 1**). The cave has a big entrance located 10 m above the bottom to the valley, and a 60 m-long corridor, narrowing toward its end. A small terrace is located in front of the entrance. The cave was in use almost continuously up to World War I. In the second half of the 19th century, the owners exploited the cave sediments on a large scale, to sell them as field fertilizer. At the beginning of the 20th century, a bowling alley was installed inside the cave. A few years later, a dancing hall was built in the main chamber. At that time, the cave served as an amusement place for the guests of the nearby hotel »Szwajcaria«. The terrace in front of the cave was used as a resting place. A small kiosk was located in front of the cave.

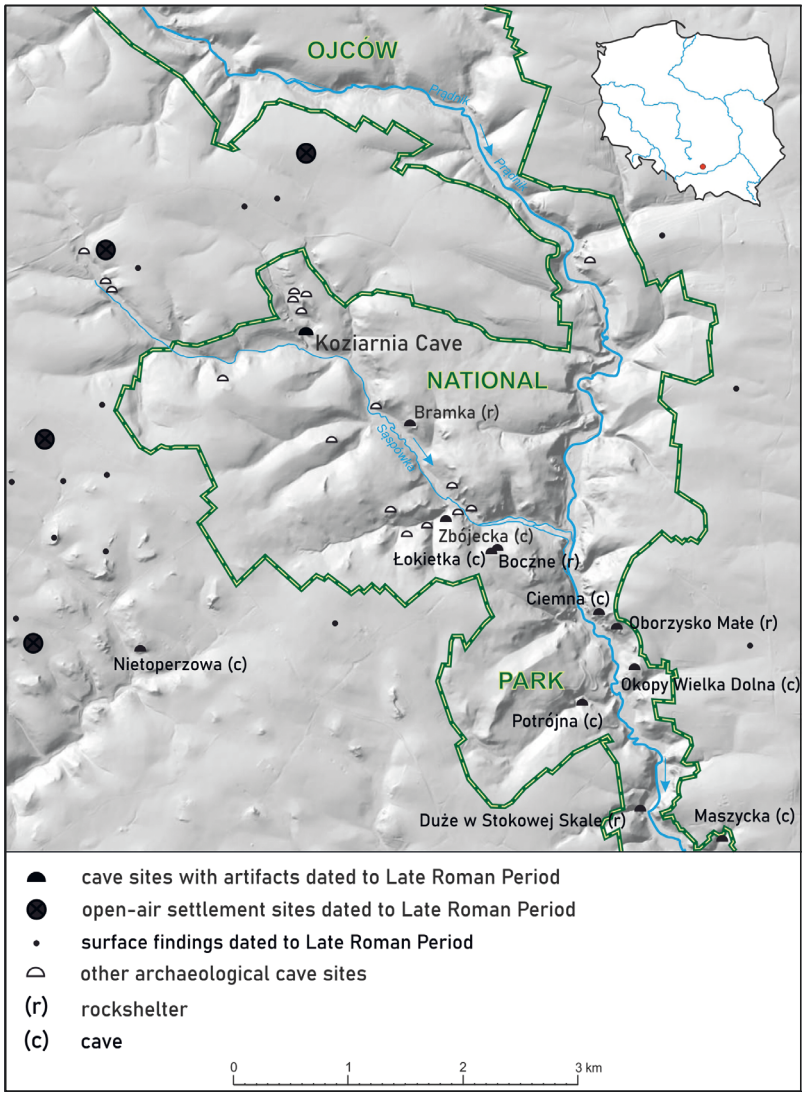

Fig. 1 Location of Koziarnia Cave (woj. małopolskie/PL) and other archaeological sites dated to the Late Roman Period in the Prądnik and Sąspów Valleys. – (Map M. Kot).

Fig. 2 Koziarnia Cave: **1** the entrance to Koziarnia Cave at the late 19th-century postcard. – **2** recent view on the entrance zone of the cave. – (2 photo M. Bogacki).

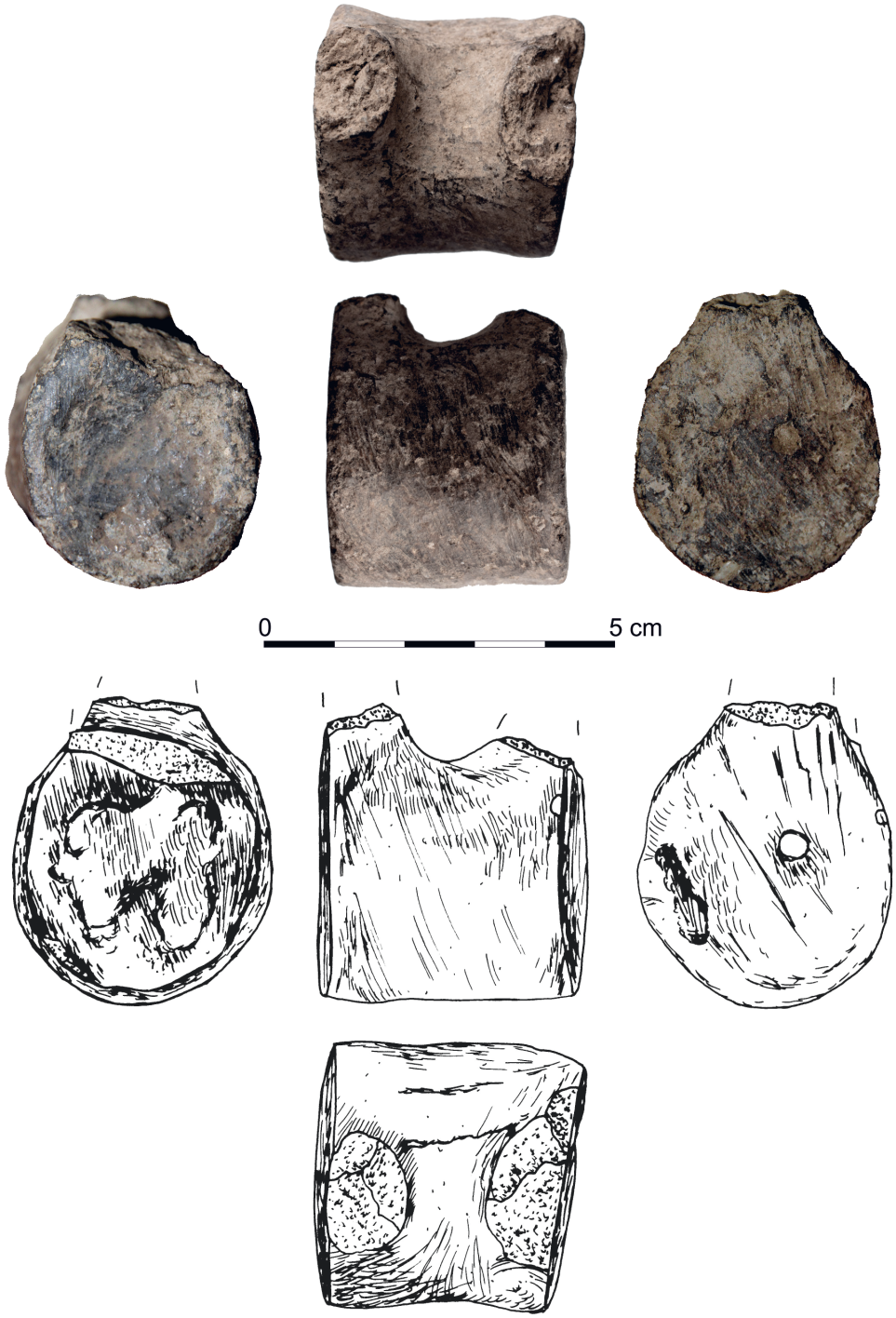

Fig. 3 The clay rattle from Koziarnia Cave. – (Photos M. Kot / M. Bogacki; drawings M. Szeliga). – Scale 1:1.

The site is well known for traces of human settlement dated to the Middle-Upper Palaeolithic transition. The cave was excavated for the first time in 1879 by Oscar Grube. The fieldwork there was conducted under the supervision of Ferdinand Römer, a German geologist and palaeontologist, who focused mostly on studying the faunal remains discovered during the industrial exploitation of the cave sediments. F. Römer also managed to find some archaeological artefacts belonging to various periods (Römer 1883; 1884), especially a bifacial leaf point belonging to the Middle-Upper Palaeolithic transitional technocomplex called Jerzmanowician. All the later archaeological fieldwork focused on studying Palaeolithic settlement traces in the cave (Chmielewski et al. 1967; Kot/Szeliga/Wojenka 2019).

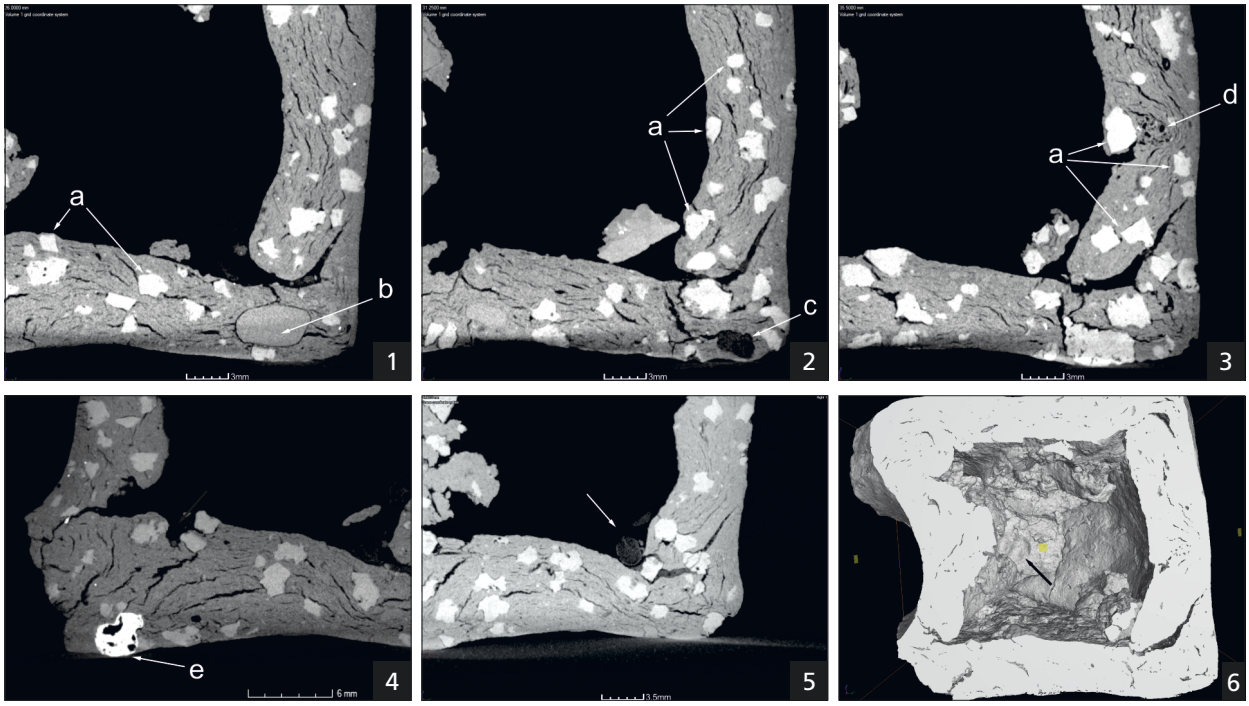

Fig. 4 Koziarnia Cave: **1-4** admixture thinning the clay (**a** mineral admixture [limestone]; **b** probably gravel grains; **c** undefined organic admixture; **d** bone grains; **e**-metal). – **5** pea seeds inside the rattle's chamber. – **6** impression of a pea seed formed accidentally in the rattle's bottom. – (Photos T. Kosiński).

In 1919, testing trenches located in the entrance zone of the cave (**fig. 2**) were opened by S. Krukowski, who was at the same time exploring the famous Ciemna Cave (Kraków, woj. małopolskie/PL; Krukowski 1939-1948). As he failed to find any Palaeolithic artefacts in the cave, he did not extend his research in Koziarnia and left the discovered artefacts unpublished. Since S. Krukowski never mentioned his fieldwork in Koziarnia, the information remained unknown, even to W. Chmielewski, who started his wide-trench excavations in 1958, aimed at finding the Jerzmanowician settlement in the cave. W. Chmielewski opened two trenches in the entrance zone and located them in the same place as S. Krukowski, but he was sure that the observed old trenches were rather remnants of the excavations done by O. Grube. It was only in 2015 that the State Archaeological Museum in Warsaw digitalized all the documents belonging to S. Krukowski's archives. As a result, it became possible to gain access to the hand-made cross-section drawing of the Koziarnia Cave trench made in 1919 (Kot/Szeliga/Wojenka 2019), as well as to the diaries written by S. Krukowski in 1919. Based on detailed archive work, we discovered that S. Krukowski did in fact collect some artefacts in Koziarnia. In 2018, the objects from Krukowski's fieldwork were rediscovered and restudied by the authors. The small collection consists of a small number of Neolithic stone artefacts, Younger and Late Roman-period pottery sherds and a clay rattle.

The rattle was equipped with a label referencing the findspot of the artefacts as coming from Krukowski's layer 2, which was a Holocene humus layer.

METHODS AND MATERIALS

The rattle is small in size (39 mm × 38 mm × 44 mm) and its state of preservation is incomplete. It consists of a cylindrical corpus, performing the function of a resonance chamber, with flattened lateral walls, probably

originally equipped with an arched handle that had an oval, slightly flattened profile and was c. 17 mm × 12 mm thick (**fig. 3**). The surface of the rattle's corpus was meticulously levelled by being rubbed down (illustrated by the groupings of monodirectional, closely spaced linear traces) and smoothened, leading in some spots to the surface becoming glossy (**fig. 3**). The uniform dark grey-black colour of the item's external surface indicates that it was burnt in a reductive atmosphere (**fig. 3**). After the rediscovery of the rattle, the artefact was covered with original humus sediment. At the time of cleaning, a small (4 mm in diameter) round hole was found in the upper part of the rattle. The hole was opened only during cleaning, and round black charred items fell out through the hole. The presence of charred carpological remains enables their general botanical identification and radiocarbon dating without the necessity of destroying the rattle.

CT scan

The CT scan of the clay rattle was conducted with courtesy of ImagineRT Ltd. It was taken with an X-ray tube set to 210 kV and 70 µA. 1570 projections (1000 × 1000 pixels) were made, each averaged from two 354 ms images. The used geometrical magnification was 6.9 which resulted in 60 µm voxel size in the reconstructed volume.

^{14}C dating

Carbonised seed fragments, identified as similar to peas (cf. *Pisum sativum* L.), were dated with the AMS radiocarbon method in the Poznań Radiocarbon Laboratory (Poland). The dating followed a widely accepted methodology (Goslar / Czernik / Goslar 2004; Brock et al. 2010).

Archaeobotany

The charred remains were analysed with the use of a Nikon SMZ800 stereoscopic microscope applying a 1-63× magnification rate and a reflected light microscope with a maximum magnification of 500×. The material was compared with a modern reference collection and archaeobotanical samples accessible in the Władysław Szafer Institute of Botany (Kraków). The morphological character of the shape and sculpture was observed, as was the anatomy of the sections visible in the fragmented material.

RESULTS

Technology

The analysis of the CT scan slices indicates that the rattle was made from thinned clay with a high mineral admixture in the form of very fragmented crushed limestone (**fig. 4, 1a. 2a**), with the grain diameter usually oscillating between 1 and 2 mm (**fig. 4, 1-3**). In addition, there is a residual admixture of a fine (up to 2 mm in diameter) undefined organic fraction (**fig. 4, 2c**), but also very scant amounts of fine bone fragments (**fig. 4, 3d**) and most probably gravel grains (**fig. 4, 1b**) as well as single pieces of unspecified metal (**fig. 4, 4e**). The incidental frequency of the above-mentioned components makes it possible to exclude their intentionality.

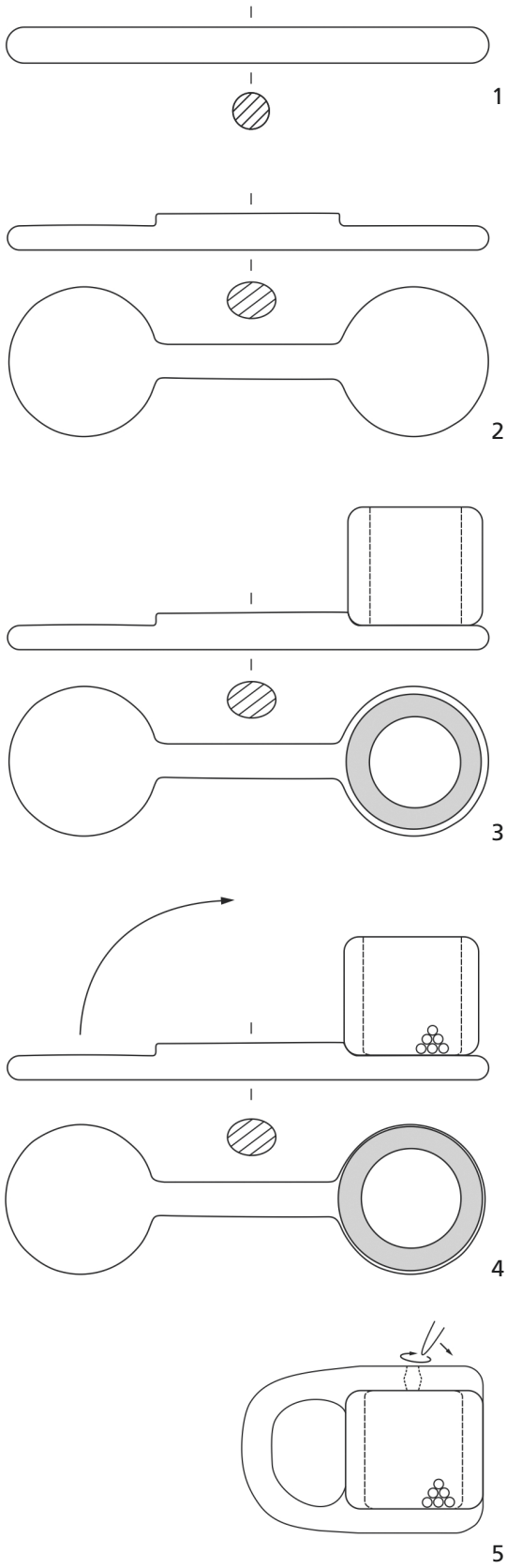

Fig. 5 Koziarnia Cave. Reconstruction of the subsequent stages of making the rattle (**1-5**). – (Illustration M. Szeliga).

The predominant fine mineral fraction in the thinning admixture and its regular deployment within the rattle walls reflect the careful preparation and mixing of the clay used for its formation. The results of the conducted CT scan make it possible to reconstruct subsequent production stages. The process began with the formation of a clay roller with a diameter that probably did not exceed 10 mm (**fig. 5, 1**), which was the base of a structure made up of the rattle's two most important elements, i. e. the resonance chamber and the handle. Such an interpretation is indicated – despite the artefact's incomplete state of preservation – by the uniform structure of the transition zone between the rattle's lateral walls and its handgrip and by the lack of any traces indicating the joining of the handle with the rattle corpus at a later (final) stage of making the item (**fig. 6, 1-2**).

The presented reconstruction of the subsequent stages of the rattle formation is based on the most probable assumption that the item was originally equipped with only one resonance chamber. However, the analysis of the CT scan results does not enable the complete exclusion of the hypothetical possibility that the rattle had been equipped with two resonance chambers placed opposite each other, connected via a double handle. Such a possibility – despite the current lack of any analogies – can be indirectly indicated by vessels made from a few (two or even three) identical containers known from Roman-period sites.

Next, the middle part of the cylinder (the handle of the future rattle) was flattened slightly, both its ends squashed and formed into two similarly-sized discs (**fig. 5, 1-2**), i. e. c. 30 mm in diameter and c. 6-7 mm thick (**fig. 6**).

The subsequent stage involved the preparation of the rattle's resonance chamber, through the formation of a cylindrical corpus within one of the discoidal planes by attaching a tape-like piece of clay c. 25 mm wide and 10 mm thick (**fig. 5, 3**). The cylinder formed in this way had a slightly smaller diameter than the base. This difference was levelled out through bending the edges of the disc and linking them to the cylinder, after which the contact surfaces of both elements were carefully evened out and smoothened. The order and course of these activities are very clearly indicated by the CT scan results (**fig. 6, 1-3**).

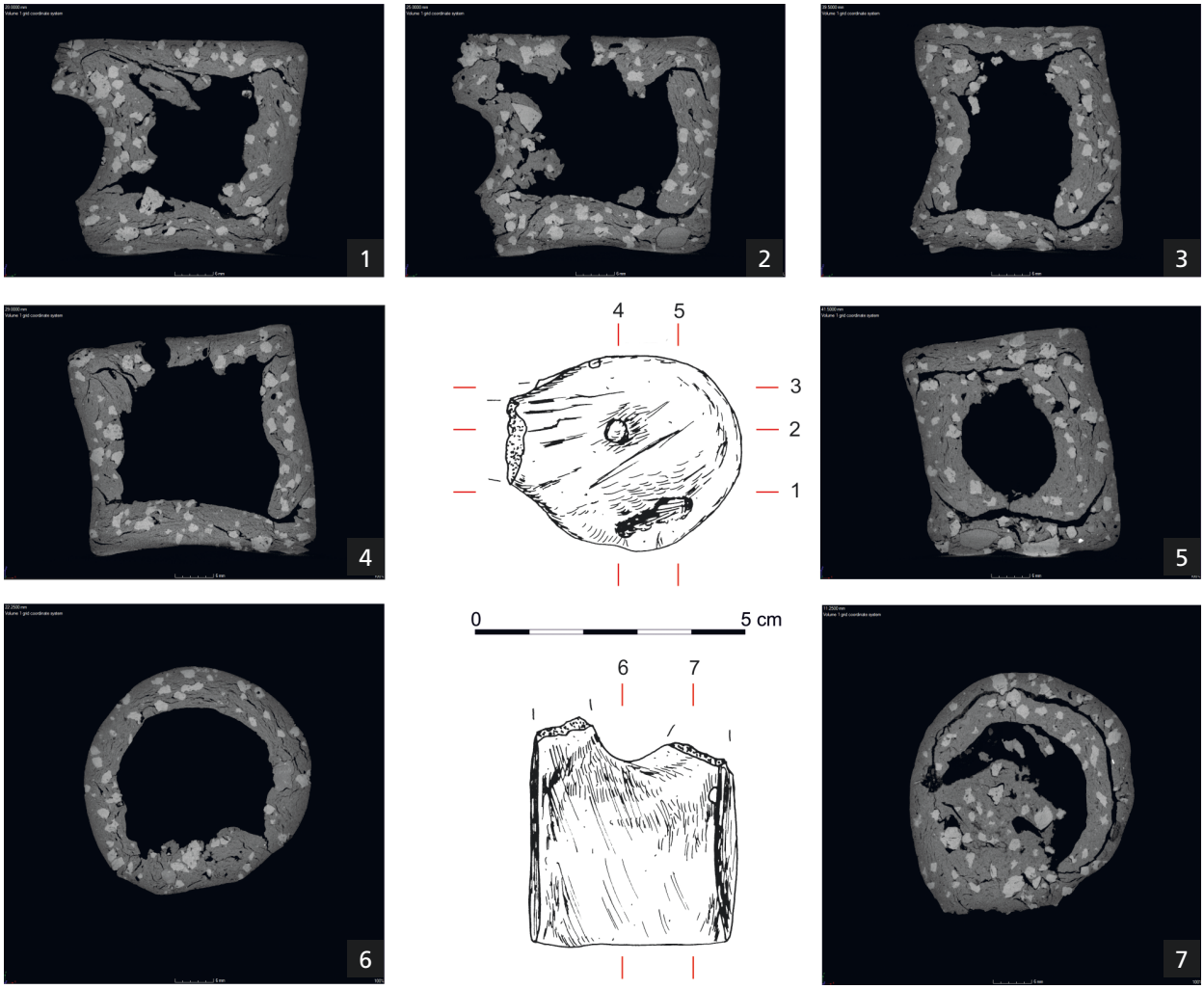

Fig. 6 Koziarnia Cave. Sequence of select longitudinal and transversal cross-sections of the rattle, using CT scan slices (**1-7**). – (CT scans T. Kosiński).

After forming the cylinder, a few pea seeds, probably dried ones, were placed inside along with some small stones (**fig. 4, 5**). The evidence of this comes in the form of a very clear impression of one of the seeds, preserved in the cylinder bottom (**fig. 4, 6**), accidentally pressed into the still wet and soft clay. After the cylinder was filled with the rattling material, the rattle's corpus was sealed up with the second discoidal plane (**fig. 5, 4**), while the connecting point was carefully evened out.

The last but most difficult stage involved making a small hole (4 mm in diameter) in one of the flat lateral surfaces of the box. The hole was meant to ensure unrestrained air circulation during the firing of the item, and thus – to secure it from being destroyed. The hole was made using an undefined, thin and probably sharp-tipped tool, by gradually drilling/boring into the surface of the walls, most probably by applying delicate circular motions (**fig. 5, 5**). Midway through the wall, the angle of the tool concerning the worked surface became distinctly larger, which led to the diameter of the formed hole being much wider (**fig. 6, 2. 4**). This procedure can most probably be explained as resulting from the care taken to drill through the wall as delicately as possible, while simultaneously minimising the risk of accidentally pushing it inside the resonance chamber. This makes it possible to assume that the making of the hole took place a short time after the rattle was formed, i. e. before the item dried completely. This is also indicated by the jagged inverted fragments of the drilled-through wall, preserved near the exit hole, very clearly visible in the CT scan

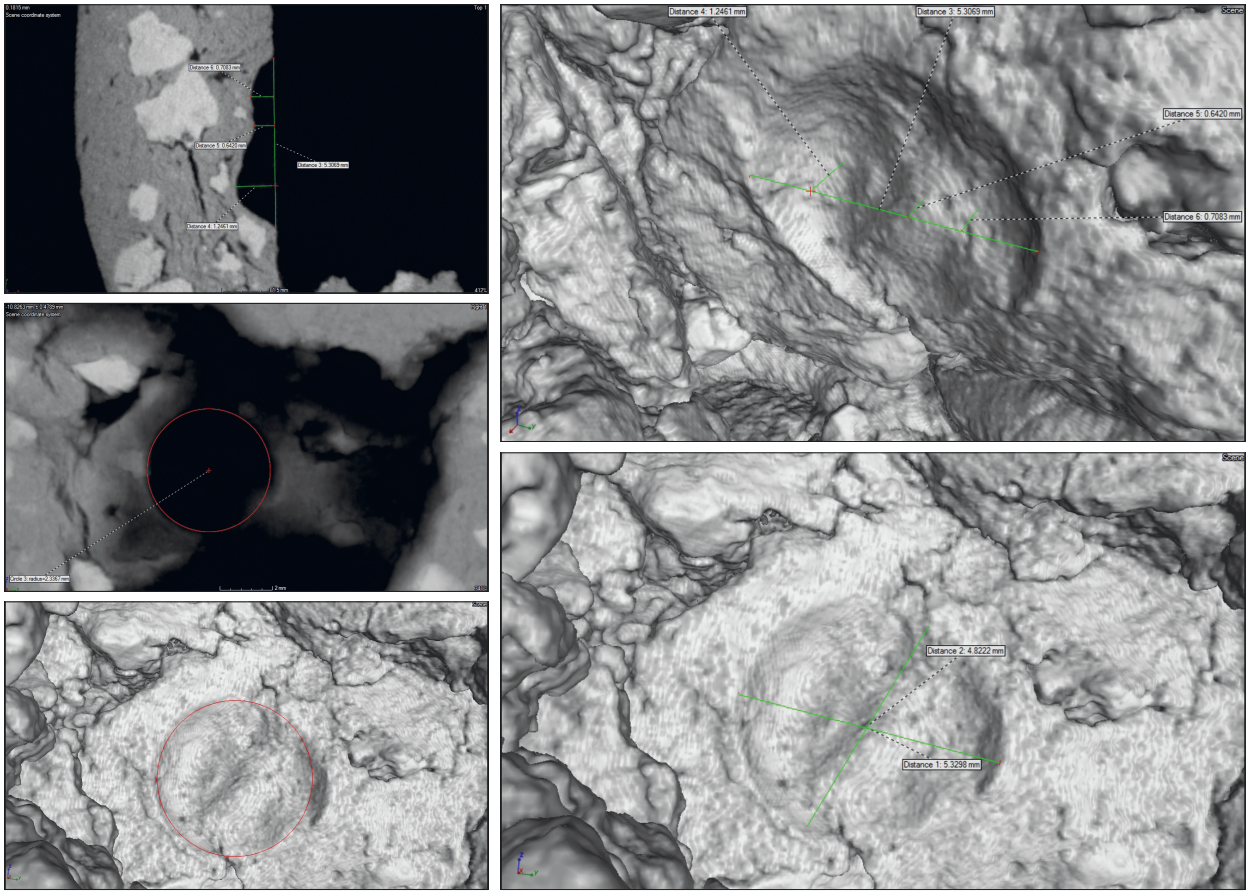

Fig. 7 Koziarnia Cave. Measurements of the pea seed impression taken on the CT scan model. – (CT scans T. Kosiński).

slices (**fig. 6, 2**). During the final stage of making the hole, the initial angle of the tool was reverted to, which led to another modification (reduction) of its diameter (**fig. 6, 2. 4**). This resulted from the necessity of maintaining special care while forming the highly sensitive exit part of the hole, with an appropriately small diameter (similar to that of the entrance hole) and a regular outline.

After making the hole, the rattle's surface was wiped and smoothened. After drying, it was burnt in a reductive atmosphere. The last observable technical procedure involved covering the hole with raw clay to ensure that the rattle's contents would not escape.

Archaeobotany

About 20 fragments of seeds of the same morphological type were identified with a high degree of probability as peas. The exact number of seeds is unknown, but the fragments could have originated from at least two to three whole seeds. Their rounded, convex surfaces and reconstructed shape indicate large Fabaceae, but no remains of testa and hilum, characteristic for *Pisum sativum*, have been preserved, a common phenomenon in archaeobotanical material. Based on seed sections, other groups of plants can be excluded with high probability. However, within the frame of the Fabaceae family, other large-seeded species cannot be excluded (e. g. *Vicia sativa*, *Vicia faba*, *Lathyrus* sp.).

The observed imprint, with a diameter of c. 4.7-5 mm (**fig. 7**), confirms the identification of the Fabaceae seed, most probably peas. A large number of charred pea seeds were found among other numerous re-

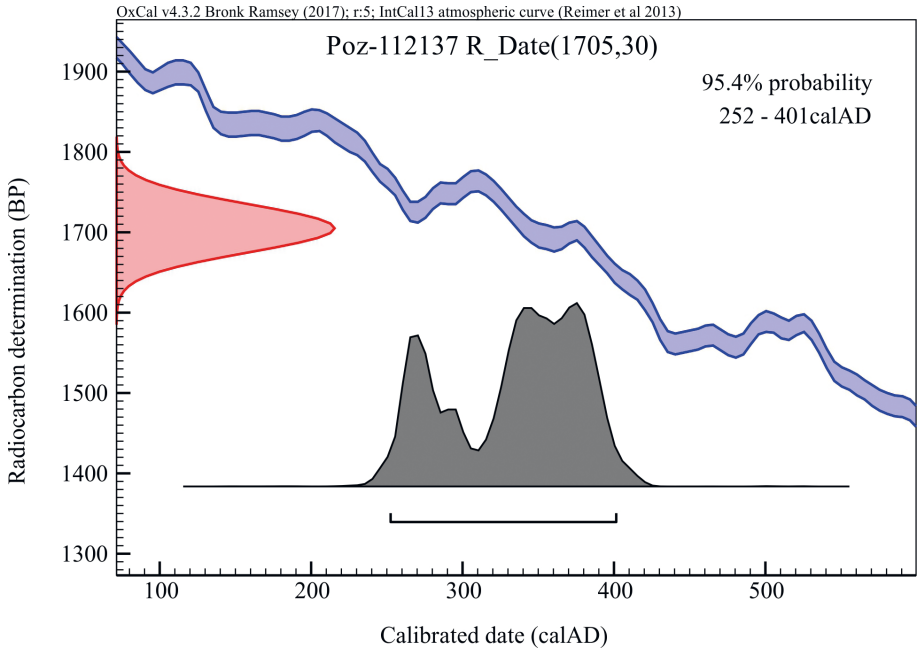

Fig. 8 Koziarnia Cave. Calibration curve of radiocarbon date made on pea seeds found inside the clay rattle. – (OxCal v4.3.2 based on IntCal13).

mains in pit 17 from Wąsosz Górny near Kłobuck (pow. kłobucki, woj. śląskie/PL), archaeologically dated to the Late Roman Period (Bieniek 1999). The seeds were relatively small, from 2.9 to 4.5 mm, with an average for 50 seeds of 3.77 mm, meaning that they were smaller than the observed imprint left by an uncharred seed, probably even if it had swollen as a result of the effects of water coming from the clay.

Radiocarbon dating

The charred fragment of a pea seed found inside the rattle was radiocarbon dated to 1705 ± 30 BP (Poz-112137). After calibration, the age of the artefacts can be estimated to AD 252-401 (95.4 %). **Figure 8** presents the calibration curve. What is more, the imprint of a pea was found inside the rattle in the clay. Additionally, due to the small size of the hole, which enabled obtaining charred fragments from inside the item, it can be assumed that they were the original infilling of the artefact. Therefore, the obtained radiocarbon date can be used for determining the chronology of the whole object.

DISCUSSION

The obtained radiocarbon dates enable the synchronisation with the C2-D1 phases in relative chronology. Settlement during this period is confirmed by Przeworsk cultural material gathered at the site[1]. Such precise dating items include a copper alloy buckle (Chmielewski et al. 1967, 54 fig. 25, 12) of the H15 type (Madyda-Legutko 1986, 65 pl. 19, 15), especially well documented in the Liswarta River basin (Madyda-Legutko 1986, 65 pl. 7).

More precise chronological data is provided by an analysis of iron spearheads. According to F. Römer, they were supposed to have been typical for the Middle Ages, with a drawing of one such »spearhead« – from Koziarnia – included in his publication (Römer 1884, 40 pl. VI, 8). It has been possible to identify this item among the surviving artefacts (inv. no. 236, 94) and categorize it as type XXV.2 according to P. Kaczanowski

(1995, 27-28 pl. 1), typical for the Przeworsk culture and dated in most cases to phases C1b-C2, though present until the end of the Roman Period (Kaczanowski 1995, 28 pl. XX).
Much less precise dating is provided by an Antoninus Pius denarius (Römer 1884, 39-40 pl. VI, 7; cf. Kunisz 1985, 154 cat. no. 171; Godłowski 1995, 131; Tabula Imperii Romani 2002, 224-225; Dymowski 2007, 73; 2011, 92), minted in AD 139, which only gives a *terminus post quem*, while the date of it being deposited in the ground might have been quite distant from when it was issued, as denarii from the 1st-2nd century remained in continuous use in Poland at least until the turn of the 5th and 6th century, while they had become obsolete in the Empire already in the first half of the 3rd century (Bursche 2005, 203-205).
Among the finds from Koziarnia, F. Römer listed two glass beads with surfaces indicating long-term deposition in the ground (Römer 1884, 37 pl. V, 1-2). These artefacts have been lost, but based on the published data they can be categorised as belonging to group XXII according to M. Tempelmann-Mączyńska, most similar to types 266-271 (Tempelmann-Mączyńska 1985, 21), decorated with a horizontal pattern of threads arranged into the digit 8 shape or a wavy zigzag pattern. This type of beads was present throughout the whole of Central European Barbaricum, and their period of prevalence falls especially during phases C1-D (Tempelmann-Mączyńska 1985, 53. 58 tabs 6. 48).
F. Römer also mentioned dark-grey or black clay spindle whorls, carefully crafted, found in the Zbójecka (Kraków, woj. małopolskie/PL) and Koziarnia caves, as well as in one of the caves located in the Czajowice area (Kraków, woj. małopolskie/PL). The drawings of three examples have been published, attributed in the table descriptions – in the relevant order – to Jerzmanowice (Kraków, woj. małopolskie/PL), Czajowice and Koziarnia; thus, there is some inconsistency in the description (Römer 1884, 39 pl. I, 10-12). The only thing certain is that the dark brown specimen depicted on table I, 12 originates from Koziarnia, but probably at least three spindle whorls were found there. None of them was decorated, which is normal within this group of artefacts from the Roman Period (Andrzejowski 1998, 79), while all of them represent the biconical form, categorized to type P-2 according to M. Stasiak (1994, list 1, 2). However, these are the most popular spindle whorl types in the Przeworsk culture, insensitive in chronological terms, also frequently encountered in other cultures, e. g. the Wielbark and Chernyakhov cultures (Magomedov 2015, fig. 1). The datings are also not made any more specific by the fact that – in terms of its colour – the clay is a reminiscent of vessels from the Younger and Late Roman Periods.
One other ceramic vessel originates from the site, unfortunately unpreserved: a clay cup with one handle/ladle (Römer 1884, 39 pl. VI, 2). This is a hand-made one-handle cup from group VII according to T. Liana (1970, pl. I, 10-14), and thus a form exceptionally long-lived, i. e. prevalent in the Przeworsk culture from the Late Pre-Roman Period, throughout the entire Early Roman Period (Liana 1970, 440), and still encountered in the Younger Roman Period (cf. Dobrzańska 1990, 59-60 tabs XVI, 9; XLVI, 11; LXVIII, 15; Rodzińska-Nowak 2006, 150 pl. XXI, 11).
According to Römer's information, a few whetstones were found in the Koziarnia and Zbójecka caves. The assemblage consisted of specimens made from fine-grained sandstone and black shale (Römer 1884, 36-37 pl. V, 10). The sandstone ones could have been from the protohistoric period; they were prevalent in the Przeworsk culture from the Pre-Roman Period throughout the Younger Roman Period (cf. Godłowski/Wichman 1998, 66; Andrzejowski 1998, 81; Czarnecka 2007, 90-91), but it cannot be excluded that they were in use also in the final phase of this cultural unit's existence.
The above-cited data (especially the dating of the buckle, the pole arm weapon and wheel-made vessels) confirm that the cave was used by the population of the Przeworsk culture in the Younger and Late Roman Periods and the beginnings of the Migration Period. This makes the radiocarbon date established for the rattle more probable.

It is much more difficult to indicate a good analogy for the rattle in the protohistoric period. Aside from the clay rattles from the Bronze Age and the Early Iron Age mentioned in the introduction (mainly bird-shaped, though egg forms have also been identified, as well as – in exceptional cases – barrel-shaped, spherical, pear-like vessel-shaped, or even cylindrical ones – Koch 2003, 150), but also painted eggs or nodular rattles from the Early Middle Ages (Kontny 2018, cf. therein for further literature), clay rattles are generally not well-represented finds. Only a very few examples can be indicated from the protohistoric period. A relatively large group is linked to the Celtic world. Individual examples of egg-shaped rattles from the La Tène Period can be indicated among the Treveri from the Moselle (e. g. Wederath [Lkr. Bernkastel-Wittlich/D], grave 281 – a smooth specimen from the La Tène Period [**fig. 9, 7-9**]: Haffner 1971, pl. 68, 3; Rheinisches Landesmuseum Trier), from Middle and Late La Tène cremation graves from the Rhine and Main river valleys (Seidel 2000, 93; Horváth 2010, 184), as well as from central Germany and Württemberg – mainly spherical and egg-shaped forms, as well as those with handles (Mandera 1969; Beusing 1996, 39; Lenz-Bernhard 2007, 110 fig. 74). Celtic rattles, an egg-shaped one (Nagyrécse [Zala megye/H], settlement find from phase LT C1 [**fig. 9, 4**]: cf. Horváth 2010) and a star-shaped one (Bucsu [Vas megye/H], a grave from phase LT C1 [**fig. 9, 6**]: cf. Ilon 2008; this was the burial of a young adult, probably a warrior, which is suggested by the military attribute, i. e. a chain belt but without accompanying weaponry, we deal with an exceptional situation since rattles, as a rule, do not co-occur with military equipment), were also found in Hungary, though there are also some other known examples from eastern Celtic areas, e. g. Novo mesto-Kapiteljska niva (SLO), grave 595 (Križ 2001, 65. 139), or Fântânele-Dâmbu Popii (Transylvania), grave 1 (**fig. 9, 3**; cf. Rustoiu/Berecki 2015, 260-262). Biconical, egg-shaped or spherical rattles, if in scant amounts, were documented almost across the entire Celtic world throughout the whole La Tène Period (Rustoiu/Berecki 2015, 265 fig. 5.1). Only a few specimens depart from the above-listed spectrum of forms. Alongside the above-mentioned star-shaped find from Bucsu, it is worth mentioning a pair of atypical rattles from Offenbach-Bieber (D) in the shape of irregular cylinders ending in conical protrusions (**fig. 9, 5**; cf. Heun 1999, 67 fig. 34), and from grave 7 in Dietzenbach (Lkr. Offenbach/D – bearing an animal head motif (Heun 1999, 67). We owe the typology of clay Celtic rattles to A. Rustoiu and S. Berecki (2015, 262-263); however, the find from Koziarnia does not have its equivalent within it.

Later examples of clay rattles come from central Germany: from a settlement in Bielen (Stadt Nordhausen/D) – a smooth, spherical-egg-shaped item found casually (dated to the Roman Period, but the La Tène D Period, and even the Early Migration Period, cannot be excluded – cf. Seidel 2006, 25. 53 pl. 20, 2) – and a fragment of an ornamental specimen from Steigerthal (Stadt Nordhausen/D; Seidel 2006, 25. 81 tab. 128, 3). They have also been attested in the Przeworsk culture area: the settlement find of a quasi-geometric form from Pasieka Otfinowska (pow. tarnowski, woj. małopolskie/PL), dated to phases A3-B1 (**fig. 9, 10**; Malinowski 1999, 45 fig. 1, 1, with further literature), in the settlement in Koszanowo (pow. kościański, woj. wielkopolskie/PL) – an egg-shaped specimen, smooth, from the Younger Roman Period (**fig. 9, 11**; Wróbel 1995, 60 fig. 5, 6; Malinowski 1999, 45 fig. 1, 2) – in the cemetery at Sobocisko (pow. oławski, woj. dolnośląskie/PL) – a biconical specimen from phase B1 (**fig. 9, 12**; Malinowski 1999, 45 fig. 1, 3, with further literature) – and similar examples were discovered in the child's grave in Kietrz (pow. głubczycki, woj. opolskie/PL), dating from phase B2 (**fig. 9, 14**; Malinowski 1999, fig. 1, 5, with further literature), and Kołacz (pow. miński, woj. mazowieckie/PL), grave 34 from the final stage of the Early Roman Period (Dąbrowska 2002, 226. 238 pl. X, 5). Barrel-shaped rattles come from the Late Pre-Roman and Early Roman-period settlement in Janików (pow. inowrocławski, woj. kujawsko-pomorskie/PL; Malinowski 1999, 46) as well as Tomasze (pow. ostrołęcki, woj. mazowieckie/PL; stray find, formerly in the collection of the State Archaeological Museum in Warsaw, courtesy of Radosław Prochowicz). Additionally, a ball-shaped rattle was found in Tkaczew (pow. zgierski, woj. łódzkie/PL; collection of the State Archaeo-

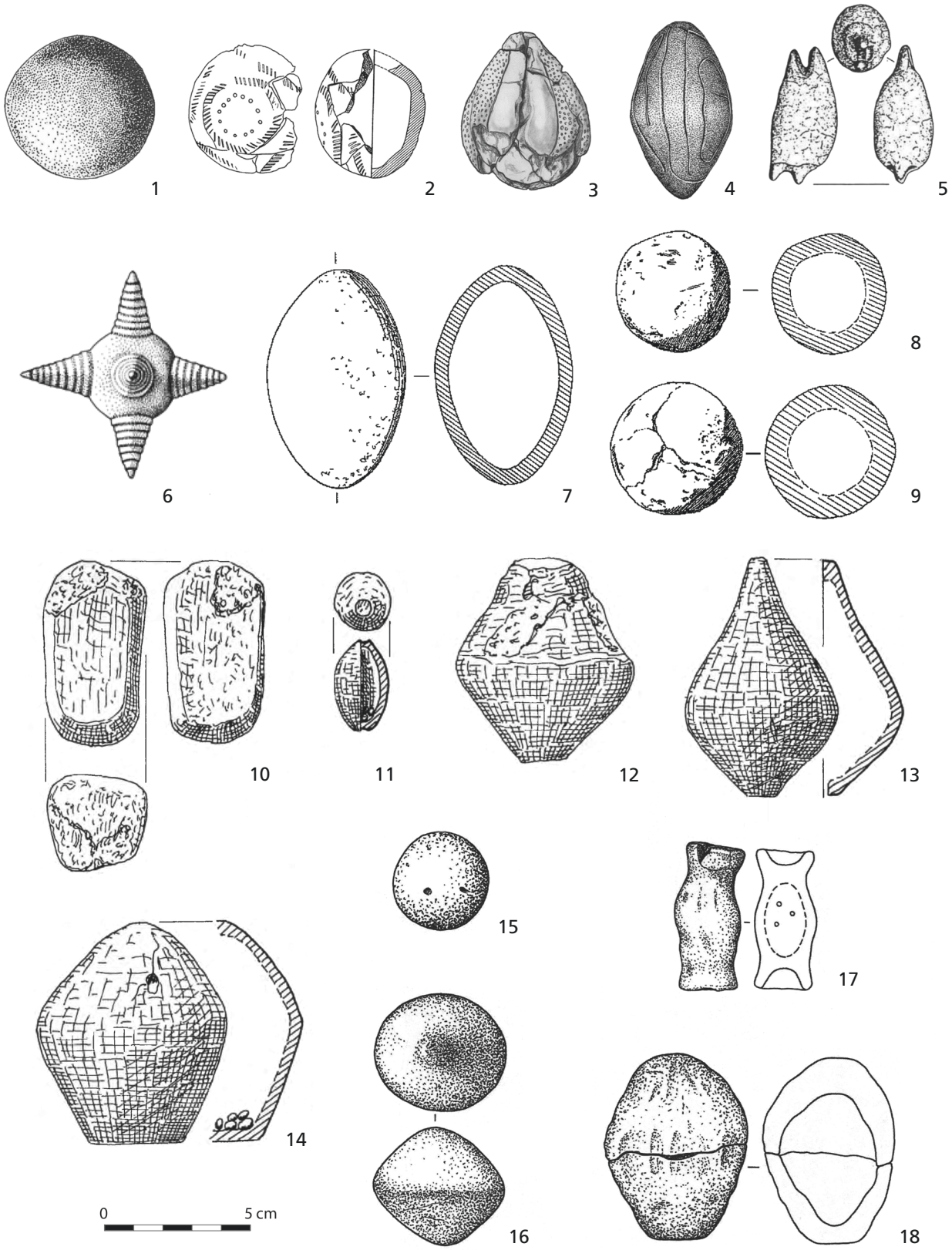

Fig. 9 Examples of clay rattles from the protohistoric period: **1** Wiesbaden-Igstadt. – **2** Münsingen. – **3** Fântânele-Dâmbu Popii. – **4** Nagyrécse. – **5** Offenbach-Bieber. – **6** Bucsu. – **7-9** Wederath, grave 281. – **10** Pasieka Otfinowska. – **11** Koszanowo. – **12** Sobocisko. – **13** Werbkowice-Kotorów. – **14** Kietrz. – **15-18** D'âkovo stronghold, upper layer. – (1-6 after Rustoiu/Berecki 2015, fig. 4, 1-6, with further literature; 7-9 after Haffner 1971, pl. 68, 3; 10-14 after Malinowski 1999, figs 1-5, with further literature; 15-18 after Krenke 2016, fig. 18, 7-10). – Scale 1:2.

logical Museum in Warsaw, inv. no. PMA IV/222:2, courtesy of Radosław Prochowicz) and the pear-like one was proved for the Masłomęcz group (Werbkowice-Kotorów [pow. hrubieszowski, woj. lubelskie/PL], Late Roman-Period grave of a 13 years-old girl [**fig. 9, 13**]: Malinowski 1999, 45 fig. 1, 4, with further literature) or in the Germanic region from the beginnings of the migrations in Slovakia: Dvory nad Žitavou (okr. Nové Zámky/SK) – a specimen in the shape of a chicken egg, richly decorated with stamps (Kolnik 1984, 196 fig. 169; collection: Ponitrianske Museum in Nitra). Clay rattles similar in form were also present in the Late Roman Period and Early Migration Period – in the Chernyakhov culture (Sedov 2005, 160) or the late D'âkovo culture (Krenke 2016, fig. 18, 7-10). One may mention also Roman-period vessels with doubled bottom forming a space with small stones or lumps of burnt clay in between, known from the Przeworsk and Wielbark cultures; they served both as vessels and rattles (Andrzejowski 1998, 91; Malinowski 1999, 46-48 fig. 2). In addition, terracotta rattles are well attested in Mediterranean civilisations, including Roman necropoleis, e. g. Neuss/Novaesium (Rhein-Kreis Neuss/D), grave 182 from the second half of the 1st century AD (Mirschenz 2013, 137). However, in this cultural area, a wide spectrum of forms was in use, including zoomorphic and anthropomorphic motifs (Haberey 1940; 1941; Pavel et al. 2014, 195 fig. 4).

One may also mention rare examples of bird-shaped clay rattles that originated from the Lusatian culture but found in later, i. e. Roman-period contexts. They are proved for the Thuringian site, at Ichstedt (Kyffhäuserkreis/D), graves 10 and 36 but most probably we deal with the antiques discovered by chance on former Lusatian-culture settlements and secondarily used; unexpected finds of stone axes in a similar context approve such an idea (Becker 1999, 37. 39 fig. 17 pl. 6, 22 note 59).

Nonetheless, the above-mentioned rattles constitute rare cases and in morphological terms very distant from the discussed specimen. The closest ones are barrel-shaped rattles from the Przeworsk culture, however, they do not possess a handle. The clay used is in no way similar to terracotta; therefore, the possibility should be excluded – highly unlikely at any rate – that we are dealing with a Mediterranean import. Even if we were to allow for the hypothesis that the shape of the rattle was supposed to imitate the morphology of a vessel, we are no closer to solving the mystery: in neither the Przeworsk culture nor in any of the neighbouring cultural units can we find vessels with such a geometricized form. In summary, at the current stage of research, the analysed item should be considered unique. The Roman-period distant parallels from Barbaricum do not allow also to pinpoint its chronology as they are frequently imprecisely dated.

The function of the exemplar from Koziarnia is puzzling. Attempts have been made to link Roman clay rattles with child burials (Mirschenz 2013, 137), and such a research approach also applies to La Tène graves, though it should be stated that only very few cremated bones have been subjected to anthropological analyses (Beusing 1996, 39). Aside from associations with a child's toy (supported by their relatively high frequency in children's graves), it has been claimed that they might have performed the function of amulets to repel evil powers (in the Celtic world, they are sometimes found in sets with other items with a magical purpose – cf. Rustoiu/Berecki 2015, 265. 272-273), a musical instrument or a ceremonial item, including ones used during funerary rites to ensure the deceased a safe passage to the afterlife (Horváth 2010, 185; Rustoiu/Berecki 2015, 265-271). The above-cited functions might have been complementary. It is worth noting that the research into resurrection egg-shaped rattles from the Early Middle Ages has led to the conclusion that the sounds they emit were barely perceptible for humans, while much more so for some animal species (Gruszczyńska-Ziółkowska 2020), which might have favoured the apotropaic perception of the instrument due to wild game reacting to its almost inaudible sound. In the case of the find from Koziarnia, the context of the discovery remains unknown; thus, establishing a potential link with child's remains is not possible. If we were to assume that we are dealing with an amulet or an item meant to repel evil powers, the presence of this artefact is in no way strange. The end of the Roman Period and the beginning of the Migration Period were times during which apotropaic activities are easily observable, manifesting in

atypical methods of laying the corpse (on its stomach or in a contracted position on its side), anti-vampiric acts (decapitation) or the presence of amulets in graves. We know of such examples also from Polish territories, especially Lower Silesian cemeteries, such as in Żerniki Wielkie (pow. wrocławski, woj. dolnośląskie/PL; Mączyńska 1993; Mączyńska/Jakubczyk 2017, pl. I), as well as in the Niemberg group situated in central Germany (Schmidt 1985, fig. 8, 11; Bemmann 2000, 79-81). This was explained as resulting from the intensification of superstitious behaviour in the face of threats, which became more emphasized towards the end of the Roman Period and in the Early Migration Period due to the ongoing migration of the Przeworsk population southward and the severance of trade routes with the Roman Empire (Mączyńska 1993). Even though recently, such atypical funerary behaviour has been explained as the outcome of south-eastern influences, resulting from ethnic relocation and the formation of a mixed cultural model with »Gothic«, Sarmatian, »Vandal«, »Suebian« and provincial Roman features (Mączyńska/Jakubczyk 2017, 294), this does not exclude the proposed interpretation, and one can assume the even larger reach of the phenomenon. It was precisely in the Late Roman Period that amulets appeared among the Goths in large numbers, which can be explained as resulting from Sarmatian influences (Kokowski 2001), seemingly falling on fertile soil!

CONCLUSIONS

The presented extraordinary rattle from Koziarnia Cave, found in 1919 after the recent restudy brings important direct information thanks to the use of new methods. Thanks to the CT scan technology it was possible to identify an imprint of pea which supported the originality of the dated charred remains. The CT scanning allowed to study the rattle in a non-destructive way. Seeing its sections helped also to reconstruct the subsequent stages of making the rattle. Direct radiocarbon dating of carbonised pea seeds, which were accessible after gentle cleaning of the artefact confirmed the chronology of the item, which style was exceptional for its time.

The clay rattle from Koziarnia presented in this article constitutes a very rare souvenir in central European Barbaricum of a rather mysterious moment in history, in which the cave became a place of human activities. In light of the collected data, this moment occurred during phases C2-D1, i.e. towards the end of the Roman Period or the Early Migration Period.

Little is known about the Ojców Jura during this period. In the heyday of the development of the Przeworsk culture, its territory was located on the outskirts of a concentration of settlements in Western Lesser Poland (Małopolska), as a result of which it has generally not garnered much interest from researchers (Dobrzańska 2006, 515). The open settlement model of the Przeworsk culture is only known from surface surveys, which do not make it possible to specify the chronology of the human habitation. As indicated by cartographic comparisons, at a distance of only a few kilometres from Koziarnia, one should assume the presence of small settlement clusters of this culture, located in the vicinity of Wola Kalinowska, Wielka Wieś, Wielmoża, Łazy, Jerzmanowice and Sąspów (Dobrzańska 2006, 517, cf. also fig. 2 on the insert on p. 508). Despite the low diagnosticity of the material collected during the surveys, there is a high probability that these enclaves functioned in the Late Roman Period, i.e. in the heyday of the stable development of southern Polish societies representing the Przeworsk culture. The period shows such characteristics as heightening the settlement density and their »internal expansion«. This time of uninterrupted prosperity ended abruptly towards the end of phase D, during the Migration Period (Godłowski 1985, 153; 1995, 132).

In contrast to the archaeological sources from the settlements, those originating from nearby caves have been studied to a much higher degree. In the vicinity of Ojców, almost 40 cave sites have been identified containing material dated to the period of interest (Godłowski 1961; 1995, 130-132; Dobrzańska

2006, 538)[2]. Aside from pottery vessels, the inventory contains adornments, clothing elements and coins (cf. Godłowski 1995, 131 fig. 45; Dobrzańska 2006, 520 fig. 5). While the majority of the mentioned items should be placed within fairly broad chronological frames from the Younger or Late Roman Period to the early phase of the Migration Period (Godłowski 1995, 130; cf. Rodzińska-Nowak/Nowak/Poleski 2002, 320; Dobrzańska 2006, 521), they also include some artefacts that can be dated more precisely. To mention only a few, this statement refers to the iron and bronze strap-ends from Na Łopiankach I Cave (Kraków, woj. małopolskie/PL), dated respectively to the C1a and C2 phases (Godłowski 1995, 131 fig. 45.2-3; Madyda-Legutko 2011, 34. 50), bronze tendril brooches dated to the C3/D1-D1 phases (discovered in caves: Zbójecka, Na Łopiankach I, Wierzchowska Górna and Ciemna [the so-called Ojców 3 type of brooches – see Jakubczyk 2014]), an antler comb from Na Łopiankach I Cave, dated to the C3-C3/D1-D1 phases (Godłowski 1961, 157; Cnotliwy 2010, 123. 140), as well as the already described copper alloy buckle of type H15 from Koziarnia Cave, which is typical to the D1 phase (Madyda-Legutko 1986, 72). Importantly, of particular value are rich assemblages from Ciemna Cave (Kraków, woj. małopolskie/PL), the large part of which may be dated to the 4th century to the first half of the 5th century AD (Mączyńska 1970, 208 pls I-II). Last but not least, the human bone remains – both from Koziarnia and from the other caves from the area. As indicated by the radiocarbon dates, these may be referred to the end of the Roman or Early Migrations Periods[3].

The interpretation of the circumstances in which the items dated to the Roman and Migration Periods came to be in the caves has encountered some objective difficulties. It should, however, be remembered that the fossil records of human activities in caves constitute a palimpsest that is difficult to read (Dowd 2015, 16). There is a high probability that some parts of the inventory made its way to the caves during times of unrest, when they functioned as shelters for local communities (cf. Branigan/Dearne 1992, 17) which is well documented for the Early Migration Period in the territory of Poland, specifically in the Kraków-Częstochowa Upland where, apart from the caves sites also rocky high points served as a refuge (Mączyńska 2020, 465). One could also feel tempted to make the almost certain assumption that some of the above-mentioned sources are not only contemporaneous to the human remains discovered in the caves but were also connected to them contextually.

The cultural situation is even more complicated: during phase D1 one should notice the appearance of the materials having parallels in the Chernyakhov culture (proved, e. g. by the newly discovered finds in Wisielca Cave in Kroczyce-Okupne Massif). A possible explanation of that phenomenon is the migration of small groups of elite individuals directing northward. They originated from the Carpathian Basin and Ukraine and passed also through the Jura (Bursche/Latałowa/Mączyńska 2020, 867). It cannot be excluded that the last above-made comment also applies to the discussed rattle – echoing the turbulent times during which human cave activities constitute one of the most interesting phenomena of the period.

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Notes

1) Human bone remains, the subject of a separate publication, are also radiocarbon dated to the same period.

2) It should be added that in some of the caves, laminae, which had been coloured black due to the presence of charcoal particles and had settled on speleothems due to burning fires, were subjected to radiocarbon dating. Some of them correspond to the Roman and the Migration Periods (cf. Gradziński et al. 1998, 12-14 pls 1-2).

3) This topic is the subject of a separate paper currently being prepared by the authors.

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Zusammenfassung / Summary / Résumé

Eine einzigartige Tonrassel aus der Koziarnia-Höhle in Südpolen

In diesem Beitrag werden die Ergebnisse interdisziplinärer Analysen der Tonrassel vorgestellt, die 1919 in der Koziarnia-Höhle im Sąspów-Tal (Krakau-Tschenstochauer Jura, Südpolen) gefunden wurde. Das Artefakt ist zylindrisch und besitzt einen abgebrochenen Griff. Auf einer Seite wies die Rassel ein kleines Loch auf, das durch Schmutz verschlossen war, der beim Reinigen versehentlich entfernt wurde. Dadurch fiel etwas rundes, organisches Material aus dem Inneren des Gegenstandes heraus. Es wurde als Erbsensamen (cf. *Pisum sativum* L.) identifiziert. Der CT-Scan der Rassel ermöglichte eine detaillierte Analyse ihres Herstellungsprozesses sowie die Identifizierung eines Abdrucks einer der Erbsen im Inneren. Das Saatgut lieferte einen ^{14}C-Wert von 1705 ± 30 uncal BP. Dies entspricht den Phasen C2-D1 in der relativen Chronologie der römischen und der frühen Völkerwanderungszeit. Die Ergebnisse der Untersuchung ebneten den Weg für eine Diskussion sowohl über die rätselhafte Funktion der Rassel als auch den komplexen kulturellen Hintergrund im Krakau-Tschenstochauer Jura zu dieser Zeit.

A Unique Clay Rattle from Koziarnia Cave in Southern Poland

The purpose of this paper is to present the results of multidisciplinary analyses of the clay rattle found in 1919 in Koziarnia Cave in the Sąspów Valley (Kraków-Częstochowa Upland, southern Poland). The artefact is cylindrical and holds a broken handle. On one side the rattle contained a small hole sealed by the dirt, which was accidentally removed while cleaning. This caused some rounded, organic material to fall out of the inside of the item. It was identified as pea seeds (cf. *Pisum sativum* L.). The CT scan of the rattle allowed a detailed analysis of its production process, as well as providing the identification of an imprint of one of the peas within. The seed was radiocarbon dated, giving the results of 1705 ± 30 uncal BP. This corresponds with the C2-D1 phases in the relative chronology of the Roman and the Early Migration Periods. The results of the investigation paved the way for a discussion on both the puzzling function of the rattle, as well as the complex cultural background in the Kraków-Częstochowa Upland at that time.

Un hochet en terre cuite tout à fait unique de la grotte de Koziarnia dans le Sud de la Pologne

Cet article veut présenter les résultats d'analyses pluridisciplinaires effectuées sur le hochet en terre cuite trouvé en 1919 dans la grotte de Koziarnia, vallée de Sąspów (région de Kraków-Częstochowa, Pologne méridionale). Cet objet est cylindrique et prolongé par un manche cassé. Un côté du hochet présentait un petit trou bouché par la saleté. Le nettoyage libéra accidentellement cette ouverture et il en tomba un élément organique rond qui se révéla être une graine de pois (cf. *Pisum sativum* L.). Le CT scan du hochet permit d'identifier en détail son mode de fabrication et la présence d'une empreinte du pois à l'intérieur de l'objet. La datation au radiocarbone de la graine a livré la date de 1705 ± 30 uncal BP. Ceci correspond aux phases C2-D1 de la chronologie relative de la période romaine et du début des Grandes Migrations. Les résultats des analyses ont ouvert la voie à une discussion sur la fonction du hochet et sur le contexte culturel de la région de Kraków-Częstochowa à cette époque. Traduction: Y. Gautier

Schlüsselwörter / Keywords / Mots clés

Polnischer Jura / römische Epoche / frühe Völkerwanderungszeit / Höhlenarchäologie / Bestattungssitten / Rassel
Polish Jura / Roman Period / Early Migration Period / cave archaeology / funerary practices / rattle
Jura polonais / période romaine / début des Grandes Migrations / archéologie des grottes / rites funéraires / hochet

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