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THE PRESUMED EARLY BRONZE AGE GRAVE FROM THE RADOM PLAIN

ABSTRACT

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In the area of Mokrzec village, human bones were accidentally discovered, along with the following accompanying artefacts: a small cup, products made of copper – a bracelet, the blade of a dagger, five chapes, a bone awl, flint tools and flakes. It is probably a grave from the beginning of the Bronze Age, which can be related to the early phase of the Mierzanowice culture. The inventory of the grave indicates the importance and status of the buried man.

Keywords: grave, Mierzanowice culture, ceramic cup, bronze bracelet, bronze dagger, bone awl, flint tools

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PLACE AND CIRCUMSTANCES OF THE DISCOVERY, HISTORY OF RESEARCH

The discovery of archaeological artefacts was made in 1994 on a gravel-sandy hill, located south of the western border of Mokrzec village, Przysucha district, Masovian province. The hill has been fallow for many years, with numerous traces of sand and gravel exploitation in the form of quarries. This is the highest elevation in the area, about 9 m above the surroundings. The hill is bordered by meadows to the west and south, growing in the valley of an unnamed stream, a right-bank tributary of the Wiązownica River, flowing from west to east, to the south of the site. In the southeastern direction, the slope falls gently towards the Wiązownica Valley.

While excavating the layer of sand, human bones were revealed. They were located in the western section of the excavation, at a depth of about 1,0-1,2 m from the surface, in the layers of coarse sand and gravel. The discovery was reported to the police station in Potworów on March 31, 1994. The next day, at the recommendation of the District Prosecutor's Office in Przysucha, the place of discovery was inspected. The sand dump where the human bones were found was searched. Large fragments of the skull, small fragments of the mandible, long bones, fragments of the sacrum, pelvis, vertebral bodies, bones of the shoulders, collarbone, wrist bones and tarsus, small bones of the hands and feet and fragments of the ribs were found. In addition to the bones, metal objects were collected as material evidence: an oval-rolled metal rod, four arched plates and a blade with four rivets at the base. The objects were covered with a greenish patina and green discolouration was recorded on the bones.

After collecting the material evidence, the District Public Prosecutor's Office in Przysucha issued a decision to appoint an expert to investigate the human remains discovered in Mokrzec. Roman Fundowicz, a medical doctor and specialist in pathomorphology from the Department of Pathomorphology of the Radom Health Care Centre took charge of this matter. As a result of the inspection, it was established that the bones and metal objects were archaeological findings. With the consent of the District Public Prosecutor's Office in Przysucha, artefacts and human remains were transferred to the archaeological department of the Radom District Museum.

Further work at the site of discovery was carried out by museum employees. The excavation was meticulously searched, and the rubble within a few meters from the place indicated by the discoverers was explored. Further flint products and blanks, as well as fragments of the vessel, bone and metal objects were obtained. Surface surveys were carried out in the vicinity of the site, which revealed mainly the relics of a Funnel Beaker culture settlement. However, no traces of settlement contemporary to the burial in question were recorded.

Human bones and artefacts obtained from the quarry section are stored in the collection of the Jacek Malczewski Museum in Radom (inv. no. MOR/A/1444). The discovery

has not been included in the wider scientific circulation so far, because it is mentioned only in local publications (Twardowski 2000, Cieślak-Kopyt *et al.* 2004, 96-97). Authors describing the discovery had no doubts that a grave was uncovered in Mokrzec. It was considered that in the richly equipped grave, a warrior – a person of great importance and rank, was buried at the turn of the Neolithic and Early Bronze Age. This episode was related to “the Chłopice-Veselé culture from the south” (Cieślak-Kopyt *et al.* 2004, 96-97).

PRESENTATION AND INITIAL INTERPRETATION OF SOURCES

The full inventory of artefacts made of various materials, alleged as burial equipment from Mokrzec, is as follows: clay – a vessel; metal – a bracelet, a dagger, 5 band chapes; bone – an awl; flint: 2 scrapers, an arrowhead, 9 flakes including one retouched piece. The material composition analysis of metal objects was made by Marcin Biborski.

1. Cup – small, wholly intact, with no visible curves. A conical neck with a thickened lip, slightly leaned out with a kind of “overlap”. A bulbous body with the greatest convexity placed below half the height of the vessel. The bottom is poorly defined. Quite solid, banded, non-decorated handle connects the lip with the body at the area of greatest convexity. The surface of the vessel is decorated by cord imprint: the neck with three groups of triple, horizontal imprints, and the body with four groups of double, vertical imprints, 2-2.5 cm long. The thread of which the cord used for decoration was made was about 1 mm thick. Dimensions: height – 8 cm, diameter of the mouth – 10 cm, diameter of greatest convexity on the body – 12 cm, bottom diameter – about 5 cm. Walls in grey-brown colour. Both surfaces are smooth, but with no traces of polishing. In the ceramic material, a temper of sand and small amount of white, crushed stone is visible (Fig. 1; 2).

2. Bracelet – made of a thick rod, with an oval cross-section in the body portion and a round cross-section at the tapering ends. The end parts are overlapping and straight. The artefact is not ornamented. In several places on the surface, mechanical damages of post-depositional nature are visible. Within these damages, a dark green (noble) or bright green (malicious) patina accumulated. The majority of the bracelet surface (undamaged parts) is not covered by patina at all. Dimensions: external diameter 9.2 × 8 cm, internal (light) – 6,8 × 6,3 cm. Rod thickness: within the body 1.5 × 1.2 cm, at the end – 0.9 cm; weight 2550 g (Fig. 3; 4).

3. Dagger blade with a semi-circular plate at the handle. The handle, which did not preserve, was fastened to the blade with five rivets, of which four were preserved. The rivets, in the form of short rods, 0.8-1.0 cm long, have a circular cross-section (diameter of 1,5 mm) and are not hammered at the ends. On the short blade, the fuller is poorly visible. The artefact bears the traces of numerous damages, especially within the converging point and lateral edges. These damages could have occurred during the use of the dagger, or the time of post-depositional processes. The entire artefact is covered with a noble patina.



Fig. 1. Mokrzec, Przysucha district. Clay mug. Photo by M. Piotrowski

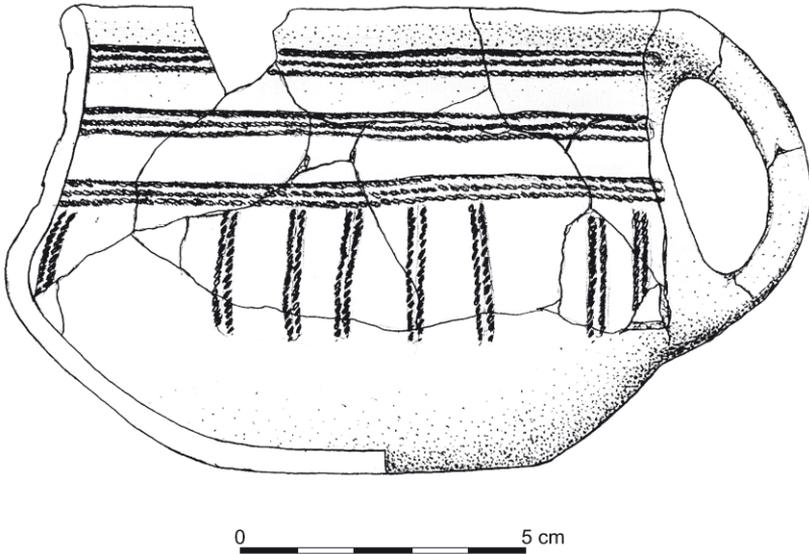


Fig. 2. Mokrzec, Przysucha district. Clay mug. Drawn by W. Zieliński



Fig. 3. Mokrzec, Przysucha district. Copper bracelet. Photo by M. Piotrowski

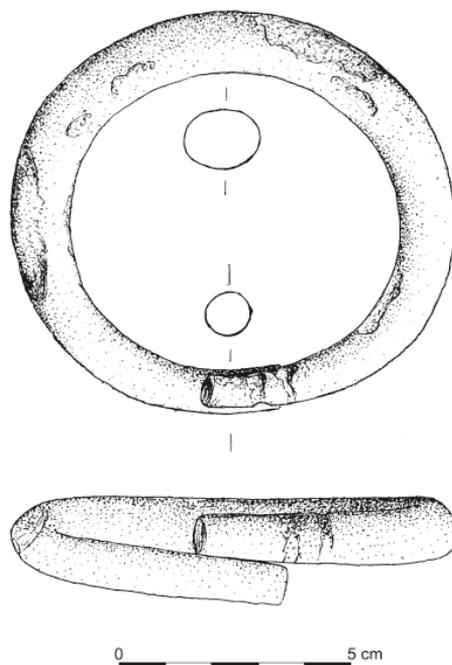


Fig. 4. Mokrzec, Przysucha district. Copper bracelet. Drawn by W. Zieliński



Fig. 5. Mokrzec, Przysucha district.
Copper dagger blade. Photo by M. Piotrowski

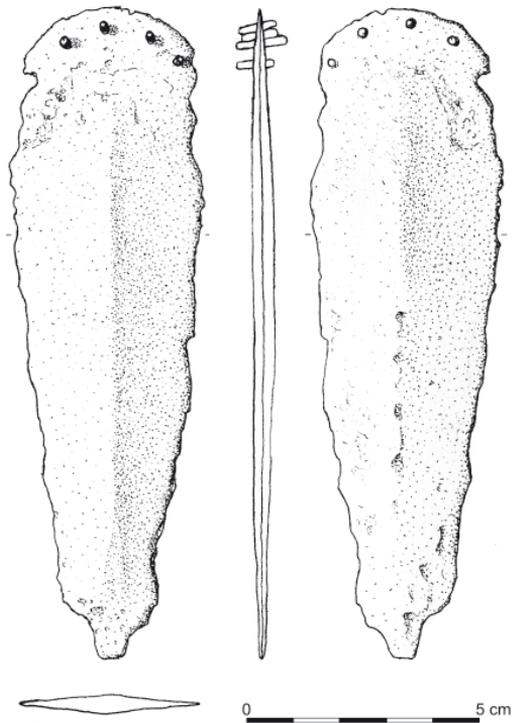


Fig. 6. Mokrzec, Przysucha district.
Copper dagger blade. Drawn by W. Zieliński

Preserved dimensions: length 13,8 cm, width of the handle base 3.5 cm; weight 43.1 g (Fig. 5; 6).

4. Five arched chape bands – with folded ends covered by dark green noble patina. All bear traces of damage. Originally they had similar dimensions: the length of the arch about 10 cm, the “string” length from 5.3 to 7 cm, width about 0,5 cm, thickness about 0.1 cm; weight of particular elements: 1.3-2.1-8.8-2.6-1.9 g (Fig. 7: 1a-5a; 7: 1b-5b).

5. Awl – longitudinal, flat-convex, with a hole in one end (round in plan, hourglass-shaped in cross-section). The opposite end is rounded. The bone is from an indeterminate species in a grey-yellow colour. On one of the front surfaces, just below the hole, traces of green copper salts have been preserved. Dimensions: length 14,8 cm, width under the hole 1.5 cm, at the opposite end – 0.8 cm, thickness from 0.5 to 0.8 cm; hole diameter 0.4 cm; weight 14.3 g (Fig. 8; 9).

6. Scraper – longitudinal concave/convex, topped with a rounded narrow distal end, formed by a single-serial, semi-abrupt inverse retouch, with a narrow base formed by obverse abrupt retouch. Both the distal end and the base were intensively used, which in both cases resulted in gaps recorded on the positive side and “rounding” on some sections. On both edges a segmented truncation is visible (use-wear traces?). The scraper was made of a massive scar blade-flake, slightly twisted and raised in the apical part. It is almost entirely covered with a whitish patina on both sides. The surfaces without patina are similar to Volhynian flint. On the upper side, micro-layers of clay are visible. Dimensions: length 84 mm, width 36 mm, thickness 9 mm; weight 41,7 g (Fig. 10: 1; 11: 1).

7. Scraper – longitudinal, doubly convex, topped with a wide and rounded distal end, formed by a single-serial, semi-abrupt retouch on the top side, with a narrow, oblique base formed by semi-abrupt retouch on the positive side. On both sides, gaps (use-wear traces?) are visible. The scraper was made of a twisted cortex blade-flake, slightly raised in the middle section. Macroscopic micro-traces were not recorded. It is made of Volhynian flint, and only the underside is covered by patina. Dimensions: length 87 mm, width 30 mm, thickness 8 mm; weight 37.1 g (Fig. 10: 2; 11: 2).

8. Arrowhead – slim, triangle, formed by a bifacial retouch, with an arched base with slightly asymmetrical wings. Made of erratic flint (?) with patina on one side. Dimensions: length 23 mm, width 13 mm, thickness 3 mm; weight 5 g (Fig. 10: 3; 11: 3).

9 – Retouched flake – scared, with partially preserved cortex. Its rhomboid shape was obtained by breaking off the opposite edges. The converging two edges were partially retouched by low-angle retouch (in the image of handle); the opposite, slightly arched edges were micro-retouched (distal end?). Made of Volhynian (?) flint, no patina. Dimensions: length 33 mm, width 20 mm, thickness 3 mm; weight 2.2 g (Fig. 12: 7; 13: 7).

10 – Six flakes – scared, small and medium ones (preserved fragmentarily), originating from flake cores with altered orientation (multidirectional scars, including opposite ones) – not forming refittings. Four of them are slightly bent in the middle section, the remaining ones are straight. Butts of four specimens were formed, in two cases faceted, in

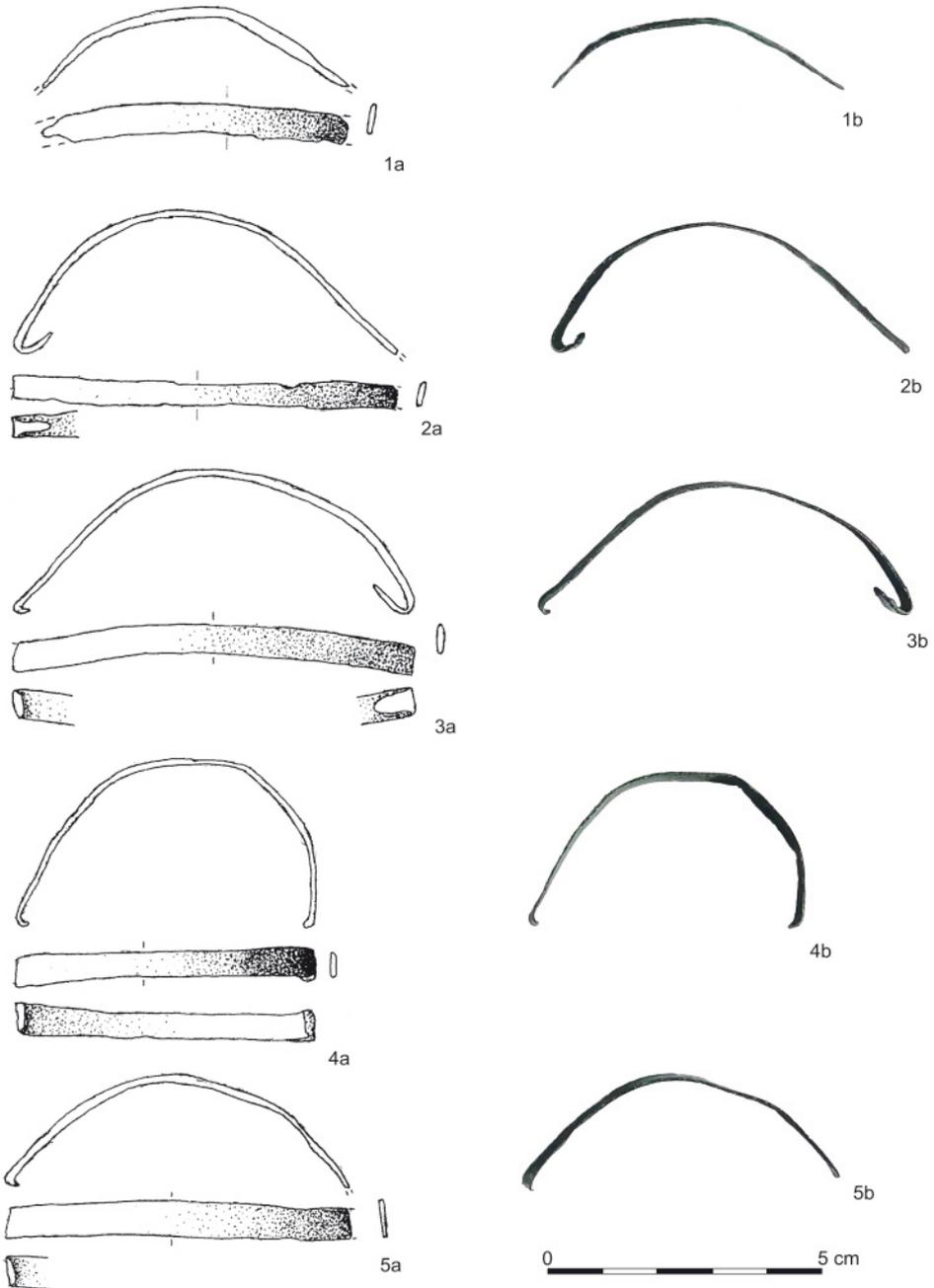


Fig. 7. Mokrzec, Przysucha district. Copper bands: 1-5
 Drawn by W. Zieliński, photo by M. Piotrowski



Fig. 8. Mokrzec, Przysucha district.
Bone awl-fabricator: Photo by M. Piotrowski



Fig. 9. Mokrzec, Przysucha district.
Bone awl-fabricator: Drawn by W. Zieliński



Fig. 10. Mokrzec, Przysucha district. Flint products: sidescrapers – 1, 2; arrowhead – 3. Photo by M. Piotrowski

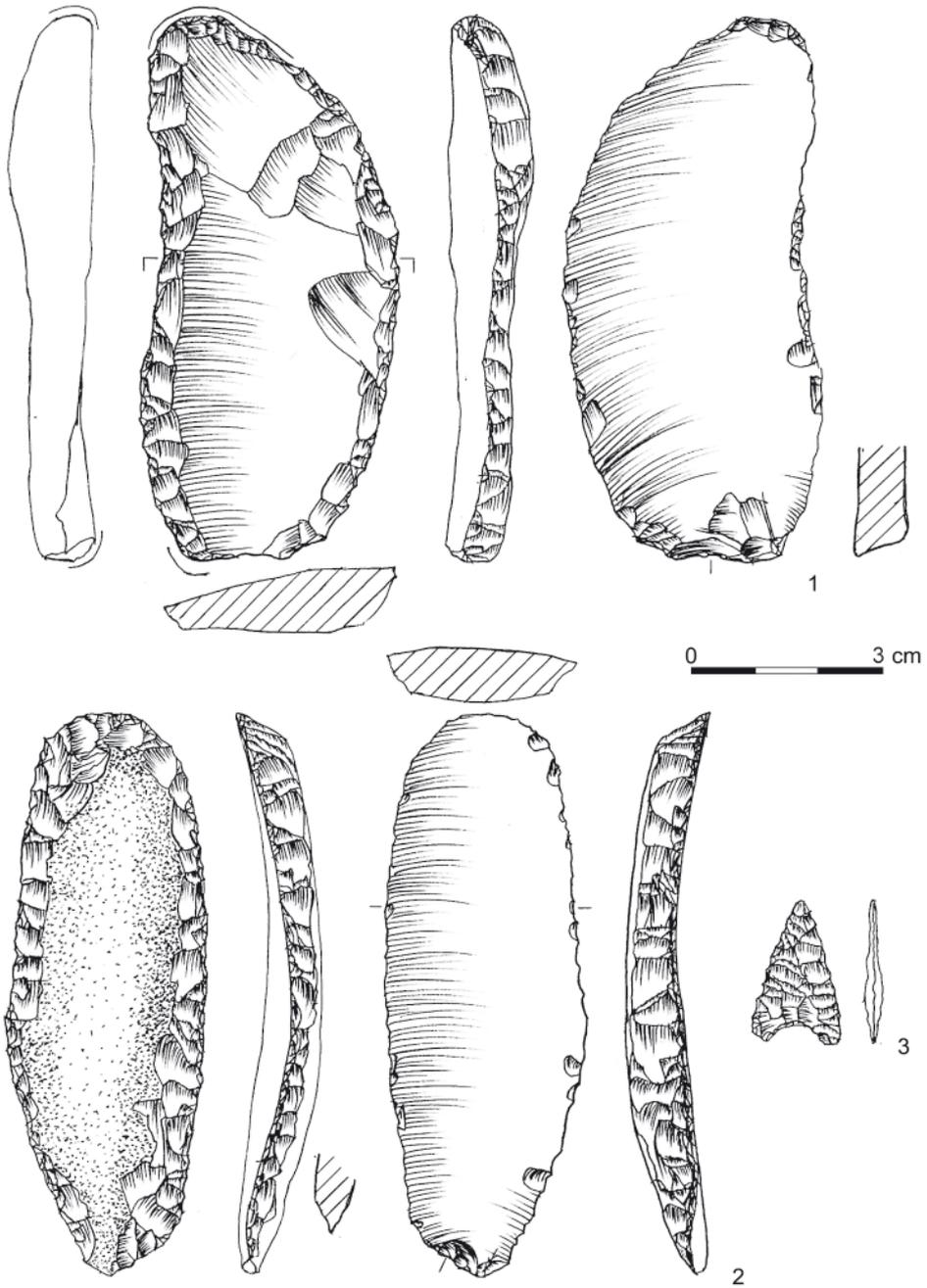


Fig. 11. Mokrzec, Przysucha district. Flint products: sidescrapers – 1, 2; arrowhead – 3. Drawn by J. Libera

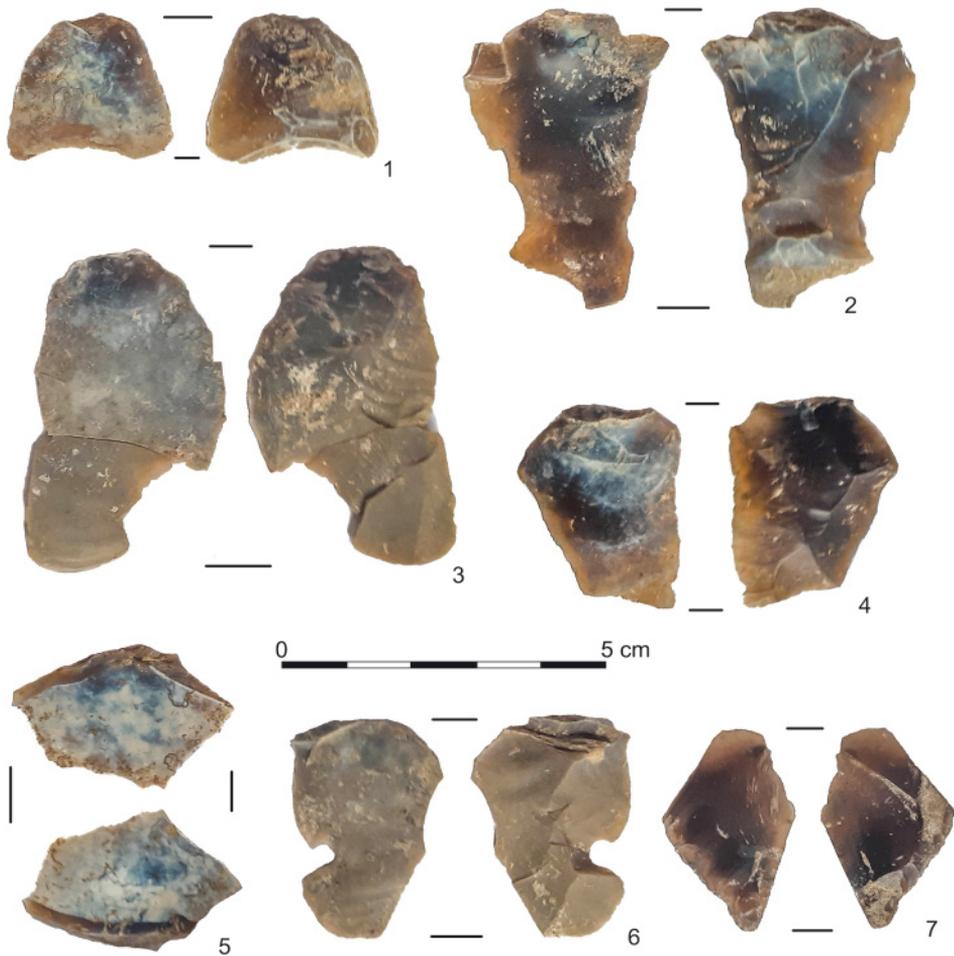


Fig. 12. Mokrzec, Przysucha district. Flint flakes: 1-7. Photo by M. Piotrowski

two other – edged. Some of them bear traces of platform edge trimming. Polygonal in cross-section. Three specimens have broken sides. Three preserved fragmentarily. Cretaceous flint (Volhynian?) – on one or both sides covered by white-blue patina. Dimensions (6 specimens): length 20-48 mm, width 23-34 mm, thickness 4-5 mm; weight: 2.9-2.5-3.4-4.6-5.7 g (Fig. 12: 1-6; 13: 1-6).

There is no question that, from the formal point of view, the vessel from Mokrzec corresponds to certain cups assigned by Sławomir Kadrow and Jan Machnik to the proto-Mierzanowice phase, type A and in particular type B, occurring in two varieties (1997, fig. 5). The cup described above can be related with two findings. The first one originates from

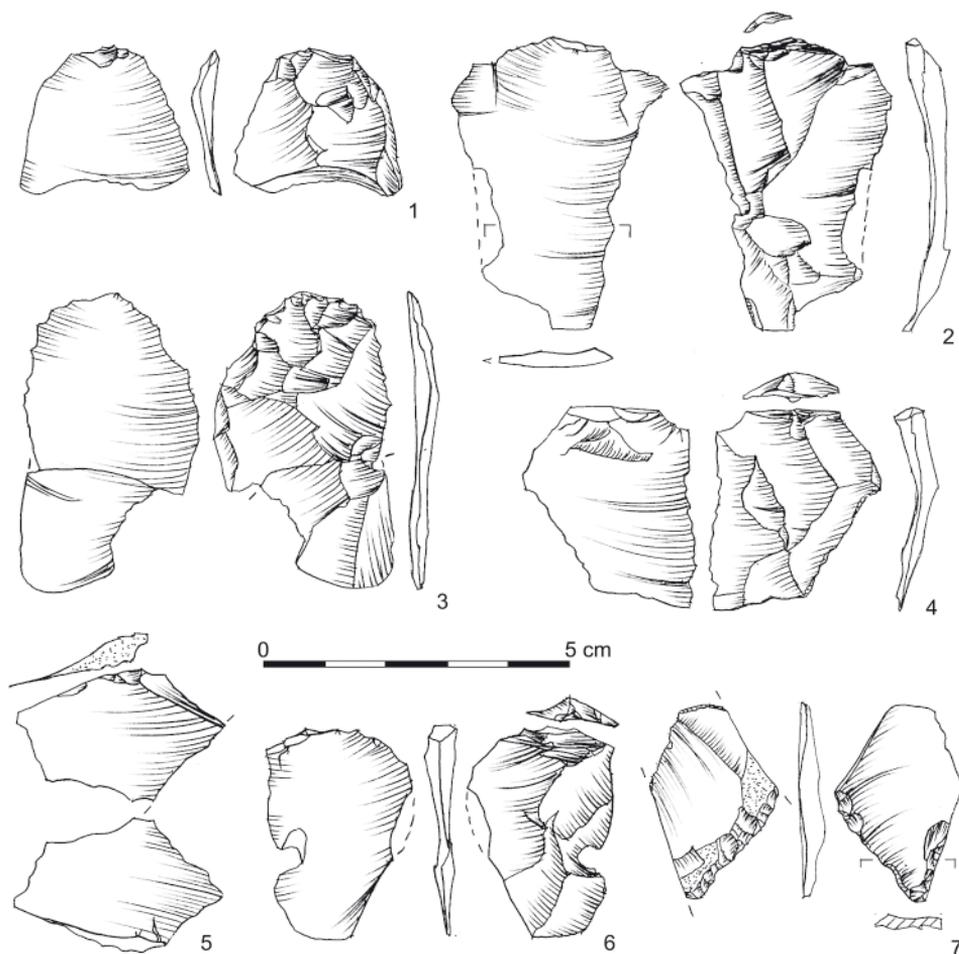


Fig. 13. Mokrzec, Przysucha district. Flint flakes: 1-7. Drawn by J. Libera

grave no. 59 in Żerniki Górne (Kempisty 1978, 138, fig. 179: 1), the second from the grave from Starachowice-Wierzbik (Sawicka 1925, 296, fig. 1). Cups from Mokrzec, Żerniki Górne and Starachowice-Wierzbik are characterized by their similarity in certain morphology features, such as: a conical neck, topped with a slightly thickened edge (“overlap”), a bulbous body with a low-formed area of greatest convexity. The cups in question, while similar in shape, differ in decoration. The specimen from Mokrzec does not have exact equivalents in Polish lands, but cups from the upper Dniester area are similar to it, e.g. a vessel from Kryłos (Sveshnikov 1974, 49, fig. 1: 1; Machnik 1987, fig. 27: 31) and Torczyn (Kadrow and Machnik 1997, fig. 59: 9). Analogies with regard to ornamentation

can also be found in the find from grave no. 4769 at site 5 in Modlnica (Włodarczak *et al.* 2011, 405, fig. 56: 1). Triple, horizontal cord imprints should be related with the proto- and early-Mierzanowice phases. They occur mainly on cups and jugs (Kadrow and Machnik 1997, 16–18, fig. 2, 3). In the case of vertical imprints on Mierzanowice ceramics, it is considered that they are “not diagnostic” (Górski 2011, 467).

All metal artefacts were made of copper. In the Circum-Carpathian Epi-Corded Ware culture circle, it was the basic material used primarily to make jewellery, and less frequently weapons and tools (see: Kempisty 1982, 69–75). The occurrence of copper bracelets in graves from the early phase of the Mierzanowice culture is a unique phenomenon. A massive bracelet with overlapping ends, found in Mokrzec, has no counterpart in this environment. It is a bit similar to some bracelets from the western part of Poland, which was under the influence of the Únětice metallurgical centre (see: Blajer 1990, Tab. VIII: 4, XLIV: 2); where, however, the dominant material used was bronze. Among the copper bracelets found in the post-Corded Ware *milieu* north of the Carpathians, massive specimens made of round or square rods are known. Examples are found among materials from outside Poland, such as an open bracelet made of a round rod with thinning ends from the cemetery of the Nitra group in Branč, Slovakia (Machnik 1982, fig. 7: 38), and a specimen made of a rectangular rod from the Slatinice cemetery near Olomouc (Šmíd 2006, 25, tab. VII: 10/1). A bracelet was also discovered in burial mound no. VII in Balice, western Ukraine, which was made of a round copper rod, tapered at the ends (Sveshnikov 1974, 50). It is also possible that it was an Early Bronze Age grave deposit, dug into the prior Corded Ware culture barrow (see: Jarosz and Machnik 2000, *passim*, fig. 4: c).

The copper dagger blade from Mokrzec does not have too many counterparts in the formations developing at the beginning of the Bronze Age. In the Polish lands, only one similar artefact was found, but without context or a specified location (Gedl 1980, 43, tab. 12: 84). In Slovakia, a similar copper and bronze specimen with five rivets were recorded in the Košťany and Hurbanovo groups (see: Vladár 1974, 30, 33, tab. 3:50, tab. 4: 79; Machnik 1982, fig. 8: 19). A destroyed dagger with a fuller formed analogically to the Mokrzec exemplar originates from the above-mentioned burial mound no. VII in Balice (see: Jarosz and Machnik 2000, fig. 4: d). A small specimen with three rivet holes (without a fuller) was also recorded in burial mound no. I in Sarniki. This item has been described as made of bronze (Sulimirski 1968, fig. 19: 23) or copper (Sveshnikov 1974, 46, fig. 10: 9). The proto-Mierzanowice phase in the southern part of Poland is represented by a highly damaged specimen with no visible rivet holes, discovered in grave no. 13 in Kraków-Nowa Huta, near Wanda Mound (Hachulska-Ledwos 1967, tab. II: 3; Kadrow and Machnik 1997, 25).

No single equivalent of five bands with bent, sharpened ends, dated back to the Early Bronze Age was found. Three artefacts, similar in appearance and made of a simple band, were found in grave no. 1 in Borek. These artifacts, displaced during post-depositional processes, could be belt chapes (Kłosińska 1997, 86, tab. XI: 1). Based on co-occurring

artefacts, these objects were dated to the turn of the older and middle period of the Bronze Age (ibid. 55).

The bone artefact described above has parallels among “awls” known also in the late Neolithic period, both in the terms of shape and dimensions. A dozen or so exemplars originate from the graves of Corded Ware culture (Włodarczak 2016, 37-38 and next – examples there). A single specimen was discovered among the inventories of Bell Beaker culture objects at Beradz – grave no. 5 – and Samborzec – grave no. III (Budziszewski and Włodarczak 2010, 61, tab. VI: 5-9, XIV: III7). Their presence was also recorded in the Early Bronze Age graves of the “Chłopice-Veselé group” – Veselé, grave no. 19 (Budinský-Krička 1965, tab. VI: 5) – and the early phase of the Nitra culture – Ludanice, grave no. 262/87 (Batora 1991, fig. 32: 30). Irrespective of their typological classification (as “fabricators-awls”), they could be designed to retouch flake and/or blade tools. Such an interpretation is supported by the typical context in which they are found – in men’s graves that are often equipped with arrowheads and small flake debitage – probably blanks for further arrowhead production. This corresponds well with the flint inventory from Mokrzec, although similar collections have not yet been found in burials of the Mierzanowice culture.

All flint objects originating from Mokrzec are among the forms recorded within the burial equipment of the late Neolithic and Early Bronze Age taxonomic units. Undoubtedly, the most numerous and most frequently recorded are arrowheads. Their various shapes and manners of production – edge, bifacial or mixed retouch – are often elements of one deposit. Their largest series for the Mierzanowice culture were published from three cemeteries of the Sandomierz Upland: Mierzanowice, Wojciechowice and Złota; they were recorded in 89 graves, which is more than 40% of all sepulchral features discovered there (Bąbel 2013, 111, tab. 42). Generally, they are triangular or of similar shape, formed by bifacial or edge retouch. The specimen recorded in the Mokrzec inventory – type II in the systematics of Wojciech Borkowski (1987, fig. 20) – often co-occurs with other “types/varieties” of burial equipment. Although the vast majority of burials analysed by Tomasz J. Bąbel (2013 – numerous examples there) originate from the late phase of the Mierzanowice culture, arrowheads similar to the specimen from Mokrzec were also found within features from the proto-Mierzanowice phase (see: Kadrow and Machnik 1997, fig 2-4). The dimensions of the analysed arrowhead are average in length (from 12 to 43 mm), width (from 8 to 27 mm) and thickness (from 2 to 4 mm) values, calculated for the aforementioned cemeteries (Bąbel 2013, 111, 114). Flakes or scaled flake blanks, usually thin and straight in profile, were used for production. In the four graves from Mierzanowice, seven blanks and initial forms of arrowheads have been preserved. Their metric parameters correspond to fully prepared products and are close to the flake obtained in Mokrzec.

Similarly to arrowheads, sidescrapers are also frequently part of the late Neolithic and Early Bronze Age burial equipment. They are of various sizes and shapes, made on medium-massive scar- or cortex-flakes, formed by one- or two-sided, regular, low-angle or abrupt retouch methods, sometimes occurring within one feature. Retouch often covers the distal

part of the artefact, as well, forming a rounded or straight outline. In the analysed inventory, there are two morphologically similar sidescrapers with arched distal ends. Both of them bear a micro-retouch of unknown genesis on their positive sides. The state of preservation of their negatives is comparable to the regular retouching of the upper side, which indicates the absence of accidental, contemporary striking. Regarding the negative specimen, we deal with a form that is partially rounded (as a result of an undefined operation) on the edges of the distal end and the body. No other macro-traces were observed on either exemplar. The dead of the Mierzanowice culture were equipped with this type of tool from the early to late stages of this culture development (i.a. Bąbel 2013 – numerous examples there).

ANTHROPOLOGICAL ANATOMICAL ANALYSIS

The purpose of analysing skeletal materials is to reconstruct and identify factors that determine living conditions (Buikstra and Ubelaker 1994; Kwiatkowska 2005). Archaeological methods enable us to reconstruct social, cultural and ecological environments – from customs and beliefs, through social hierarchy to management and interaction with the environment. On the other hand, anthropological anatomical analyses constitute the primary source of information about economic (type of diet, labour conditions), social (position of the deceased in the group's hierarchy) and sanitary (prevalence of contagious diseases) conditions (Staniowski *et al.* 2008). In order to determine the living and biological conditions of prehistoric populations, we use data pertaining to the lesions that appear on the bone material due to illness, as well as the results of macroscopic examinations of teeth and skeletal markers of physiological stress.

This paper presents an analysis of a single skeleton (MOR/A/1444) found in the town of Mokrzec, in the Równina Radomska mesoregion. The first stage of the analysis consisted of cleaning the skeleton and reconstructing its anthropological parameters. The sex of the individual was determined based on the morphology of the cranium and the pelvis in line with generally accepted and applied standards. The age at the moment of death was determined based on the advancement of cranial suture obliteration and the degree of tooth-crown abrasion (Piontek 1985; Buikstra and Ubelaker 1994; Steckel *et al.* 2006).

Description of the cranium

The cranium is not well preserved and shows extensive damage (Fig. 14). The only fully preserved part of the cranium is the calvaria. The temporal bone, occipital bone and parietal bone show characteristic discolouration resulting from contact with copper jewellery. The preserved bones of the viscerocranium include partially damaged zygomatic bones, nasal bones, maxillary bones (right and left bones broken off at M1) and the mandible.



Fig. 14. Mokrzec, Przysucha district. Cranium (left-side view). Photo by K. Szostek

The state of preservation of the cranium can thus be described as calva with the mandible (Ca+m).

The neurocranium is characterised by massive bones, of great definition and length (cranial index: 71.1). In *norma verticalis*, the cranium has an oval shape (*ovoides*). The wide forehead (forehead-width index: 72.2) is strongly sloped in the upper part of the temporal squama, only slightly arched. The glabella is pronounced and the brow ridges are strongly developed. The sutures do not show obliteration on the outside surface of the cranium, however inside the skull the initial phase of closure was observed in section S_3 of the sagittal suture.

The preserved fragments of the viscerocranium attest to weak prognathism and a rather massive face. The zygomatic arches are characterised by substantial massiveness. The nose was relatively narrow and highly protruding. The mandible is characterised by a massive structure; it is well defined with a high body.

The dentition is almost complete and the teeth are very well preserved. The material included some loose teeth: the right maxillary cuspid and the right mandibular lateral incisor as well as the left mandibular second molar. The dentition is moderately abraded ($1-2^\circ$), first molars slightly more abraded ($2+^\circ$), although with the age of the subject determined at around 30 years, the abrasion may be deemed pronounced and most probably resulting from the consumption of food with high enamel abrasion properties (chewing hard foods).

The dentition shows enamel hypoplasia lines resulting from a non-specific stressor affecting the body. Linear enamel hypoplasia is visible on both maxillary incisors and both maxillary first bicuspid. Due to the fact that the occlusal surface of the teeth is abraded, the age at which the hypoplasia lines appeared was reconstructed based on regression equations applied in order to calculate the duration of the stressor's influence on the body, which ultimately resulted in hypoplasia. In the case of both incisors, the onset of LEH (Goodman and Rose 1990; Ritzman *et al.* 2008) was determined at 2.75 years ($-(0.625 \times 5.2) + 6.0$), and in the case of the bicuspid, the onset of LEH was determined at 3.6 years ($-(0.494 \times 4.8) + 6.0$). This indicates that stressors, such as a disease or weaning, occurred when the subject was around 3 years old and probably lasted for nearly 150 days.

Description of postcrania

The incomplete postcranial skeleton is characterised by a massive build and great definition. The preserved vertebrae include: a fragment of the atlas, remains of 3 thoracic vertebrae (fragments of vertebral bodies, superior and inferior articular processes), remains of 4 lumbar vertebrae, 2 unidentified vertebral bodies and numerous bone shards. The sacrum had sustained great damage (the posterior was relatively better preserved). The material includes 2 of the left and 7 of the right ribs. The well-defined clavicles are characterised by lateral ends with pronounced conoid tubercles.

The left humerus is greatly damaged (fragment of the shaft and head of the humerus); however, the shaft and inferior epiphysis (pronounced trochlea and massive medial condyle) of the right humerus are preserved. The superior epiphysis, shaft and inferior epiphysis of the right ulna are relatively well preserved, but only the shaft and superior epiphysis of the left ulna are preserved. The proximal end of the left radius is damaged, but the right radius is completely preserved. The preserved bones of the hand include both capitate, lunate and scaphoid bones, the left triquetral bone, the left hamate bone, 7 metacarpals, 5 proximal phalanges and 1 distal phalanx. The shafts and epiphyses of the long bones of the upper limb (also hand bones) feature characteristic greenish colouration, resulting from contact with copper jewellery.

The pelvis is partly damaged. However, the preserved fragments allow us to conclude that it was narrow and long, the wings were positioned more vertically and the acetabulum was large (diameter: 56 mm). The greater sciatic notch is relatively deep and narrow, with a lack of *sulcus preauricularis*, and the iliac crest is only slightly curved.

The long bones of the lower limbs are well preserved. The right femur and the better-preserved left femur have pronounced trochanters, a pronounced intertrochanteric crest, and moderately marked gluteal tuberosities.

The material includes only the right patella. The tibiae are massive and well defined, with distinctly marked tuberosities and pronounced anterior borders. The fibulae are damaged; only the shaft of the left fibula is well preserved (the head and lateral malleolus

are missing), and the only preserved parts of the right fibula are the shaft and inferior epiphysis. The bones of the feet include both calcanei, talus bones and navicular bones, as well as 7 metatarsal bones, 5 proximal phalanges and 1 distal phalanx.

Non-metric traits of the cranium

The epigenetic traits of the subject were analysed. These are hereditary traits, which can be modified by the environment. They are useful in the determination of the mechanics governing the genetic and evolutionary changes of the human species. They occur in the course of normal development and should not be attributed to the effects of a disease on the human body (Berry and Berry 1967; Czarnetzky 1972; Hauser and De Stefano 1989).

The craniological material was determined to include: bilaterally – *Ossa intersuturarum suturae lambdoideae*, *Foramen mentale*; on the right side – *Sulcus supraorbitalis* (supra-orbital notches), *Foramen mastoideum extrasuturale* (foramen of the mastoid process positioned extrasuturally); and on the left side – *Foramen zygomaticofaciale absens* (lack of the zygomaticofacial foramen).

Living height of the body

The results included in Table 1 were obtained based on the measurements of individual sections of the humerus, the tibia and the femur (Steele and McKern 1969). With the application of regression equations, the obtained values allowed us to reconstruct the height of the body in relation to individual bones. The arithmetical mean was then calculated, which determined the final estimated height of the individual's body.

Table 1. Mokrzec, Przysucha district. Reconstructed height (cm)

Grave	Mokrzec				
Sex	M				
Bone	Right humerus	Tibia		Femur	
		Right	Left	Right	Left
Measurement	S3: 17.3 S4: 2.4 S5: 2.6	S1: 4.6 S2: 7.8 S3: 17.4 S4: 10.2 S5: 1.9	S1: 4.8 S2: 7.7 S3: 17.5 S4: 10.1 S5: 1.9	S1: 8.5 S2: 26.9 S3: 9.4 S4: 3.7	S1: 8.4 S2: 27.1 S3: 9.0 S4: 3.8
Estimated height based on the measurement of individual bones	176	183	184	173	173
Reconstructed living height of the individual	177.8				

Functional and pathological changes of the skeleton

The markers of physiological stress discovered on the bone material proved to be helpful in the evaluation of the individual's living conditions. One such marker observed in the analysed material is the occurrence of pathological changes in the upper part of the orbit (*cribra orbitalia*). The prevalence of this type of change is found in conjunction with various types of anaemia that are caused by iron deficiency as well as deficiency of other micronutrients, such as magnesium or chlorine. Perhaps the *cribra orbitalia* is connected to deficiency of folic acid, parasitological infection, malaria or inherited anaemia, such as thalassemia (Gleń-Haduch *et al.* 1997; Bergman 1988). Low-level *cribra orbitalia* (2° – Hengen 1971; Steckel *et al.* 2006) occurred in the roof of the right and left orbit of a warrior discovered in the village of Mokrzec (Fig. 15). Moreover, porous lesions were also recorded in the analysed material on the humerus and femur. These are located near the transition of the neck of the bone into the head. The character and origin of the lesions is similar to *cribra orbitalia* (Lewis 2017).

Skeletal indicators of physical activity are indicators of the stress put on the musculoskeletal system by everyday physical activities (Myszka 2007). They occur when a strenuous physical activity is often or moderately repeated, and they may be pathological depending on the level of stress. The degree of these indicators depends not only on the frequency and



Fig. 15. Mokrzec, Przysucha district. Right orbit (*cribra orbitalia*).
Photo by K. Szostek



Fig. 16. Mokrzec, Przysucha district. Left calcaneus (enthesophytes).
Photo by K. Szostek

force of the stressor, but also on the concurrence of other pathologies and ailments. The lesions intensify with age, and manifest different specificity depending on the sex of the individual (Haduch *et al.* 2010). Enthesophytes – ossification on the calcaneal tuberosity – were detected in the analysed material at the attachment of the calcaneal tendon (Fig. 16).

Excessive and prolonged mechanical stress on the spine, as well as overlapping micro-injuries, may cause degenerative lesions. Schmorl's nodes, which appear due to damage to the intervertebral disc resulting in a so-called intravertebral disc herniation, constitute one of the most common manifestations of such stress (Gładkowska-Rzeczycka 1989; Aufderheide and Rodriguez-Martin 1998; Ortner 2003). The remains of the examined subject contained a Schmorl's node on the superior surface of the preserved fragment of the body of the 12th thoracic vertebra (Th 12).

The anthropological analysis of the sex and age of the individual indicates that the remains belonged to a man, approximately 30 years of age (*adultus*), of a massive built, with a considerable body height of nearly 180 cm.

DISCUSSION

The described artefacts can be related to the beginnings of the Bronze Age. Due to the circumstances of the discovery, there is some uncertainty as to whether all of them belonged to the equipment of a single burial. However, there is some evidence to suggest that it could have been a burial complex. The authors of the study, introducing the discoveries from Mokrzec into scientific circulation, count on an open discussion on that issue. Among not the few, so-called model grave complexes recorded in southern Poland, Moravia and Western Ukraine from the beginning of the Bronze Age (see: Kadrow and Machnik 1997, 15-17, fig. 1), it is difficult to find any equivalent to the alleged tomb of Mokrzec. The latter stands out with regard to its special wealth, especially when it comes to metal grave equipment.

The place of discovery has been studied extremely accurately on two occasions: first, to gather any evidence of a crime, and then to save as many artefacts as possible. The inspection, as well as the exploration of the site, was carried out by Wojciech Twardowski, an employee of the Radom Museum, known for his meticulousness and archaeological passion. Traces of copper salts on the bones were recorded, which allowed us to connect the discovered metals with burial relics. These stains, which were the most intense on the wrists, the right arm and the right side of the skull (Fig. 17), allowed us to recreate the burial

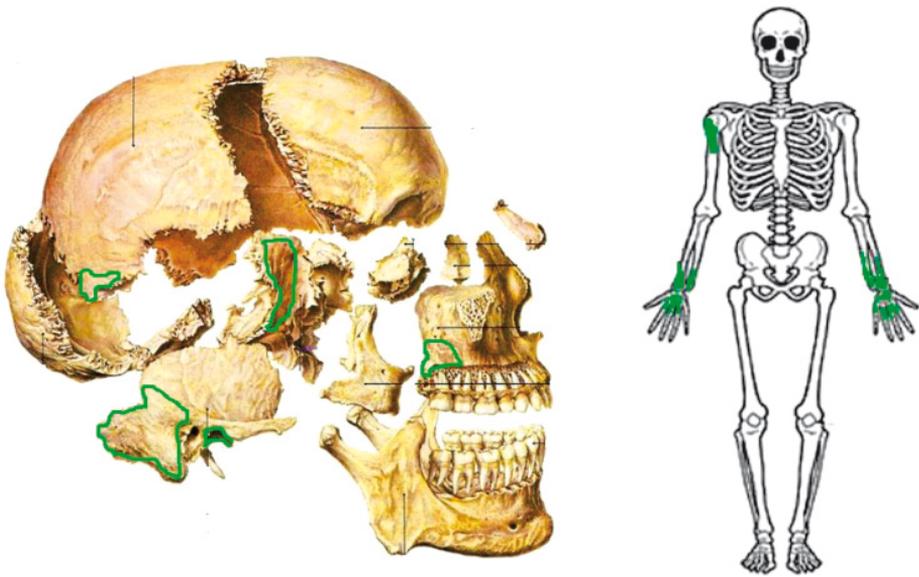


Fig. 17. Traces of copper salts identified on the skull and on the post-cranial skeleton from Mokrzec.
Drawn by K. Szostek

arrangement to some extent. It seems that there was a bracelet on one of the wrists. The copper salts stained the other wrist, the right arm, and the right side of the facial skeleton. This means that the hands were folded and placed near the shoulder and skull. The man from Mokrzec probably lay on his right side (according to the canon prevailing in the Mierzanowice *milieu* – Kadrow 2001, 120). The other artefacts were probably placed with the dead: the vessel, dagger, bone fabricator-awl, and the flint products and blanks. Traces of copper salts preserved on the bone item were probably a result of contact with the dagger or chape bands.

Inspection of some of the metal artefacts allowed the following conclusions. On the surface of the semicircular plate of the dagger handle from Mokrzec, the noble patina preserved the outline of the handle's shape. The small length of the preserved rivets suggests that the thickness of the handle could not be great. It was probably made of some organic material. It could be wooden or bone (antler), with a semicircular cut-out at the place of attachment.

The use of the five bands with bent and sharpened ends is difficult to evaluate unequivocally. It seems that they could have been used to give structure and support to some useful object, e.g. to strengthen the scabbard of the dagger (they "fit" to the width of the dagger). It cannot be ruled out that they were part of a container for storing a dagger, bone tool and flint products. At the same time, the characteristic sharpened ends stand out, which could be hooks fastening the bands on an organic material, reflecting its shape.

All metal items were made of copper. The analysis of the material composition reveals considerable similarity, which suggests with caution that the artefacts were made of raw material originating from a single source or were produced in one metallurgical workshop. It was an arsenic copper: bracelet – 96.24% Cu / 1.478% As; dagger blade – 96.55% Cu / 0.8489% As; bands – 96.42% Cu / 0.4434% As, with some share of phosphorus (0.8514%, 0.7237%, 1.2750% respectively) and small share of other elements (Tab. 2). Their compositions differ from products discovered in the Mierzanowice culture settlements at sites in Iwanowice "Babia Góra II", Mierzanowice II and Strzyżów (see: Hensel 1992). Arsenic copper was widely used in large areas of Eastern and Central Europe (Kadrow 2001, 104). Copper products from Mokrzec were not durable, as evidenced by their damage. Copper contamination with arsenic (above 0.3%) significantly reduced the strength index of this metal (see: Hensel 1982, 157).

The findings from Mokrzec can be related with the early phase of the Mierzanowice culture. The presence of the clay mug and the copper dagger blade in the inventory has parallels in some complexes from the Circum-Carpathian Epi-Corded Ware culture circle. In southern Poland, they are related to the proto-Mierzanowice phase (see: Kadrow and Machnik 1997, 13-28). On the other hand, the sidescrapers, arrowhead and flakes present in the flint inventory are forms with a much longer chronology, used up to the late phase of this taxonomic unit (see: Bąbel 2013 – numerous examples there). Radiocarbon dating of bone material from Mokrzec tightens the above observations, and with a probability of

Table 2. Mokrzec, Przysucha district. Metallographic analysis of the copper raw material used in production of the bracelet, dagger and bands from Mokrzec (by M. Biborski from the Institute of Archaeology, Jagiellonian University)

Z	Symbol	Element	Concentration / Abs. Error			band
			bracelet	dagger blade	band	
13	Al	Aluminum	0.0510%	0.0340%	0.2790%	0.1570%
14	Si	Silicon	0.2720%	0.0180%	0.4330%	0.5770%
15	P	Phosphorus	>0.8514%	0.0091%	>0.7237%	>1.2750%
16	S	Sulfur	0.02056%	0.00025%	0.0250%	0.02685%
22	Ti	Titanium	<0.0020%	(0.0)%	<0.0020%	<0.0020%
23	V	Vanadium	<0.0015%	(0.0)%	<0.0015%	<0.0015%
24	Cr	Chromium	<0.0015%	(0.0)%	<0.0015%	<0.0015%
25	Mn	Manganese	<0.0010%	(0.0)%	<0.0010%	<0.0010%
26	Fe	Iron	0.0135%	0.0039%	0.0121%	0.0099%
27	Co	Cobalt	<0.0003%	(0.0)%	<0.0003%	<0.0003%
28	Ni	Nickel	<0.0001%	(0.0)%	<0.0001%	<0.0001%
29	Cu	Copper	>96.24%	0.1200%	>96.55%	>96.42%
30	Zn	Zinc	<0.0001%	(0.0)%	<0.0001%	<0.0001%
33	As	Arsenic	>1.4780%	0.0070%	>0.8489%	>0.4434%
41	Nb	Niobium	<0.0001%	(0.0)%	0.0034%	0.0015%
42	Mo	Molybdenum	0.0106%	0.0043%	0.0212%	0.0077%
47	Ag	Silver	0.0112%	0.0010%	0.0403%	0.0134%
48	Cd	Cadmium	<0.00007%	(0.0)%	0.00022%	<0.00007%
50	Sn	Tin	<0.0001%	(0.0)%	<0.0001%	<0.0001%
51	Sb	Antimony	0.00234%	0.00071%	0.00504%	0.00182%
74	W	Tungsten	<0.0002%	(0.0)%	<0.0002%	<0.0002%
79	Au	Gold	0.0000%	0.0000%	0.0000%	0.0000%
82	Pb	Lead	<0.0002%	(0.0)%	<0.0002%	<0.0002%
Sum of concentration			99.00%	99.99%	99.00%	99.00%

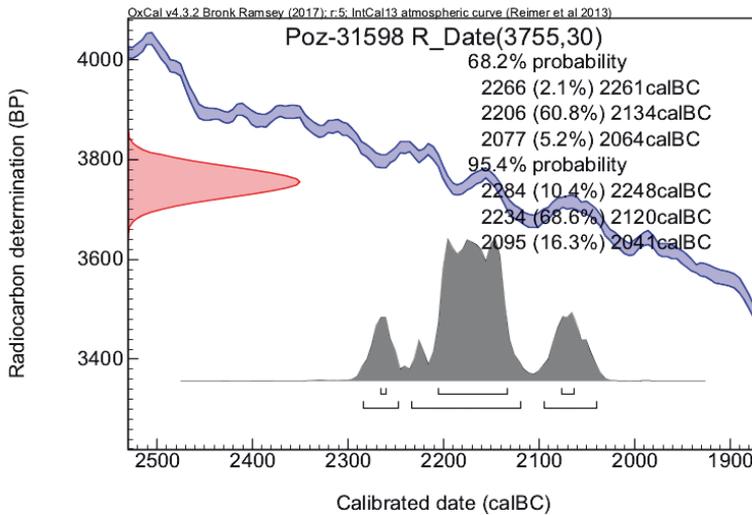


Fig. 18. Radiocarbon dating of the sample obtained from human bone from Mokrzec and the graphical probability distribution of the radiocarbon marking (calibrated with the use of OxCal v3.10 Bronk Ramsey 2005 software)

60.8% indicates the range of years between 2206 and 2134 BC (31598: 3755±55 BP) (Fig. 18). This corresponds to the first half of the early phase of the Mierzanowice culture (Kadrow and Machnik 1997, 29).

This burial undoubtedly stands out due to the presence of metal objects among the grave equipment. Based on the “point system”, which is used to assess the wealth of grave equipment, this grave, with a value of 27 points, belongs in the category of rich graves (see: Kadrow and Machnikowie 1992, 66-67, 69). Undoubtedly, this speaks for the special position of the buried man. It is possible that in the Early Bronze Age, adult men buried in richly equipped graves enjoyed authority and held leadership positions during their lifetimes (Kadrow and Machnikowie 1992, 89; Kadrow 1995, 99-101).

Finally, it is worth noting that the tomb from Mokrzec is currently the northernmost grave of the proto-Mierzanowice phase. The nearest contemporary sepulchral objects are Starachowice-Wierzbnik, located about 50 km away – a grave containing a cremation burial, a mug, 9 arrowheads and a stone axe (Sawicka 1925; Kadrow and Machnik 1997, 17) – and another, destroyed object from Radom-Malczów, containing only flint artefacts – a Czerniczyn-Torczyn type leaf-point, a bilateral sidescraper and a flake-firestriker (Twardowski 1977, 109; Bargiel and Libera 2006, fig. 11). The described sites open a new perspective for research on the presence of early post-Corded Ware elements north of the Świętokrzyskie Mountains.

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