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LOOM WEIGHTS – A GENERAL TYPOLOGY OF FINDS FROM POLAND

This article presents a proposal for the general classification of loom weights used as elements of the warp-weighted loom, which is the oldest and longest used tool for the production of fabrics. Loom weights entail that loom's only archaeologically perceptible remains. Despite this, they do not enjoy the particular interest of Polish researchers, which is reflected in their lack of typological systematization. This article aims to correct this state of affairs.

KEY WORDS: Loom weights, warp-weighted loom, typology, Poland, Neolithic, Bronze Age, Iron Age, Roman Period, Early Middle Ages

During their excavations archaeologists quite often encounter tools related to textile production. They are found frequently not only in settlements, but also in burial grounds. Finds are dominated by items used in spinning, such as spindle whorls and spindles (Chudziak 2013, 171-184; Dominiczak-Głowacka 2008, 243-270; Bukowska-Gedigowa and Gediga 1986). Weaving tools and workshops are much less frequently discovered. Despite the limited number of sources, it is known that from the Neolithic to the Early Middle Ages on Polish territory, a warp-weighted loom was used for textile production (Antosik and Słomska 2018, 115). This fact was determined based on discoveries of loom weights, which are practically the only construction element of workshops to have survived to the present day[1]. The other parts, made of wood, have been destroyed due to the effect of soil acids with the participation of saprophyte microorganisms.

The level of recognition of these artefacts in Polish archaeological literature is nonetheless minimal. No general classification of loom weights has been developed to date, one accounting for finds

[1] The remnants of a vertical loom frame of a warp-weighted loom were discovered in Poland, at the settlement Kamień, site 2, Bełchatów district (Skowron 2010, 429-430) and in the Lower Saxony region at the settlement in Wüstung Dalem, located near Cuxhaven (Zimmermann 1982, 110-113). At the first one, the remains of wooden elements of the loom were fragments of burned laths and discolorations in the ground. Probably they are remnants of horizontal construction elements, about dimensions 3 m by 20 cm (Skowron 2010, 429-430, tabl. XII). In northern Germany in hut 10 was discovered a discoloration of 4 m by 15 cm. It was a remnant of the upper beam of a vertical loom. In close vicinity to the discoloration were also more than ten loom weights of type 3a arranged in two rows (Zimmermann 1982, 110-113, Abb. 2).

from all the periods in which they were used. The consequence of this includes the terminological liberty occurring in publications that causes information chaos. Terms such as domed, conical, pyramidal, plate-shaped and discoidal often define the same loom weight model. It is also common practice to include subjective descriptions of artefacts, without measurements[2], photographs, or drawings – and this prevents the readers from identifying them.

This paper deals with these problems and presents a proposal for classification. The source material constituting its basis was collected over four years[3]. Information about the finds of loom weights was sought in libraries, storage facilities, and archives of Polish scientific and research institutions, such as universities, museums, and centres of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences. The information obtained from the Voivodeship Heritage Protection offices also allowed me to access artefacts in the temporary possession of private archaeological companies. As a result of these efforts, loom weights were located in the collections of over 60 research institutions throughout the country[4]. This means that in the prepared classification more than 1,400 loom weights were considered, not including smaller fragments. Despite the extensive research work, it remains certain that these are not all the artefacts which have been discovered to date in Poland. In the future, further work will be carried out to create a full catalogue.

PREVIOUS CLASSIFICATION ATTEMPTS

The first attempts to systematize knowledge concerning loom weights were made in 1991 by K. Macewicz and S. Wuszkan for the needs of a study of a large collection of them found in the settlement in Gadzowice-Kwiatonowo, site F, Głubczyce district (Macewicz and Wuszkan 1991, 25-54). In the article describing the material, a typology of loom weights was presented, taking into account such features as: shape, the manner of forming the walls, the top and the base, as well as the presence of depressions or hollows at the top. Based on this system, the material was divided into types and groups, in which each single specimen of loom weight was described in detail. In total, five types of loom weights varying in terms of shape, the manner of forming the walls, the top, the base, and individual features were designated. Due to the homogeneous nature of the assemblage in question, the classification is of ordinal character, as the authors themselves state. However, it should be noted that this article is one of the best and most accurate studies on loom weights from Poland.

The second classification is presented in a monograph by T. Chmielewski from 2009 (Chmielewski 2009, 172-195). It contains a catalogue of artefacts and a detailed description of all weaving tools from the Neolithic discovered to date in Central Europe. It is based on the typology by Scandinavian researcher K.H. Stærmose-Nielsen (Stærmose-Nielsen 1999, 45, Fig. 25A), constituting its variation. The number of types has been reduced from nine to four, without consideration of intermediate models. However, given the narrow archaeological period included in the monograph, the proposed typology still has no standard features for the whole collection of loom weights. In younger periods, new models of loom weights appeared, ones unknown in the Stone Age.

[2] It seems that the most effective way to present this group of artefacts is to analyze each single loom weight (whole or fragment), which can be assigned a specific model, and to reconstruct the original size (including the dimensions of the preserved fragment, but also of the original loom weight when possible). It is necessary to provide data such as: hole diameter, colour, presence of special marks such as finger holes, abrasions from threads, cuts, stamp impressions etc. Each loom weight should be weighed. The percentage degree of its surviving portion should also be specified. These data should be given for each artefact separately, along with an attempt to determine its original weight, but only for specimens preserved in 50% or more. The remaining small, unidentified fragments should be grouped in one position, counted, weighed and an attempt to estimate from how many loom weights they come from should be undertaken. A similar system was used by the *Centre for Textile Research* team – CTR), which prepared a database of weaving artefacts, in which 3,896 loom weights were included (Andersson Strand, Nosch 2015, 146, Fig. 5.1.1).

[3] Numerous trips were financed by the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, through the *Adulescentia est Tempus Discendi* scholarship.

[4] I wish to thank all those who helped me in the realization of this task.

TYPOLOGY OF LOOM WEIGHTS

The typology proposed in this article (Fig. 1) takes into account the form and functional features of individual specimens. The types were determined according to the shape of the artefact, which directly translates into the way of fixing it on the warp-weighted loom. These assumptions of division were borrowed from the classification proposed by the Danish CTR research centre, which is carrying out a range of projects focusing on old textile production (Andersson Strand, Nosch 2015, 145-150).

Type 1

This includes loom weights , ones usually having a single hole perpendicular to their long side, placed in the upper part, always above the centre of mass of the given artefact. In the literature they are referred to as cones, pyramids, truncated pyramids, domes, pears, or plates. They may significantly differ from each other in both size and width. Some may have a more squat lower part, the others may be narrower, still others may be wider or flattened on one side. For this reason, the most important qualifying feature in their case is the presence of the hole above the centre of mass, and only in the further division the shape of the base. Due to the last of these features, the division into three subtypes a, b, and c is proposed. They take into account the shape of the base, which may be similar to a circle (a), a rectangle (b) or elongated in respect to one axis oval or rectangle (c)[5].

In the Neolithic period, these loom weights occurred with varying intensity in individual regions of Central Europe. Their presence was noticed in several settlements between the Rhine River

[5] However, one should bear in mind that it is often difficult to clearly identify a particular subtype. The suggested solution in this case is the record indicating the possible subtypes, for example: a/b, a/c, etc.

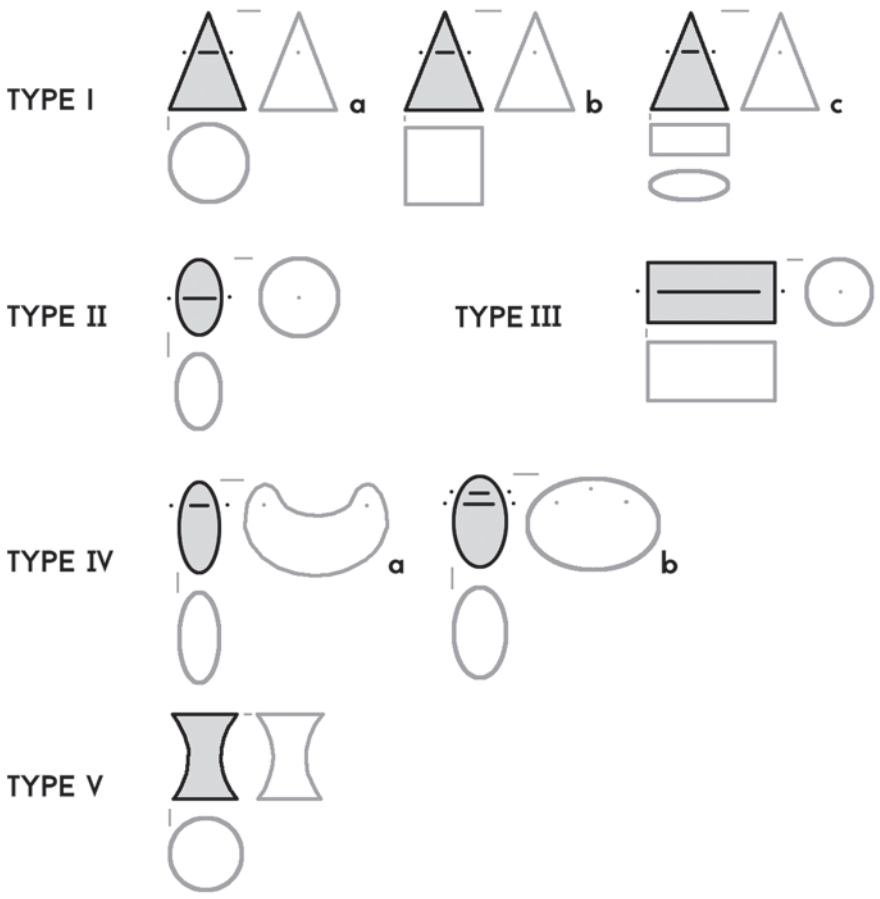


Fig. 1. General typology of loom weights from Poland

and the Dniester River, which contrasts strongly with the Balkan-Carpathian area, where they appeared in great number as early as Neolithic period (Chmielewski 2009, 178). In Poland, their participation in the archaeological material was directly related to the settlement of the Linear Pottery culture and the Funnel Beaker culture. This is evidenced for instance by finds from settlements in Boguszewo, site 41 (Kirkowski 1994, Fig. 3: 2), Raków, site 9, Głubczyce district (from the collection of the Opole Silesia Museum in Opole), and in Gwoździec, site 2, Tarnów district (Kukułka 2001, 21, Fig. 10a-e). The vast majority of loom weights discovered there belong to subtype 1a. Subtype 1c loom weights constitute a minority. Their presence has been observed to date only at a few archaeological sites. The oldest specimen comes from the Neolithic settlement in Falborz, site 1, Włocławek district (Grygiel 2004, 344, Fig. 266: 1). A particularly interesting eight-piece assemblage of this group of artefacts was discovered, which is extremely rare, in the inhumation grave in the burial ground in Nowa Cerekwia, Głubczyce district (Plate 1.C) (Kunawicz 1978, 298-301, Fig. 18: d-k). All loom weights have similar dimensions: 11-12 cm high and 2.5 cm x 7-9.5 cm wide at the base. Their weight was from 224 g to 312 g. The burial dated to the V period of the Bronze Age is a trace of the existence of a population of Lusatian culture.

Turning to more general assessments of type 1 loom weights, it can be safely stated that these products, in variants 1a and 1b, belong to the most numerous forms in the archaeological material (Fig. 2). They are observed from the Neolithic to the Early Middle Ages. A special increase in their numbers is dated to the Early Iron Age and the Roman period. At that time, they were the basic model used in the warp-weighted loom. During excavations in settlements they are frequently found in clusters, evidencing the place of storage or the occurrence of a weaving workshop. Serving as an example is pit 2059 located inside a log construction hut, from the settlement in Wojnicz, site 48, Tarnów district (Plate 1.B) (Dzięgielewski 2010, 65-70, 83-85). In its fill 10-12 loom weights of types 1a and 1b were found. Very likely this feature functioned as a storage space for occasionally used objects. In the settlement in Samborowice, site 13, Racibórz district, remains of a warp-weighted loom instead were found in the form of a set of loom weights in

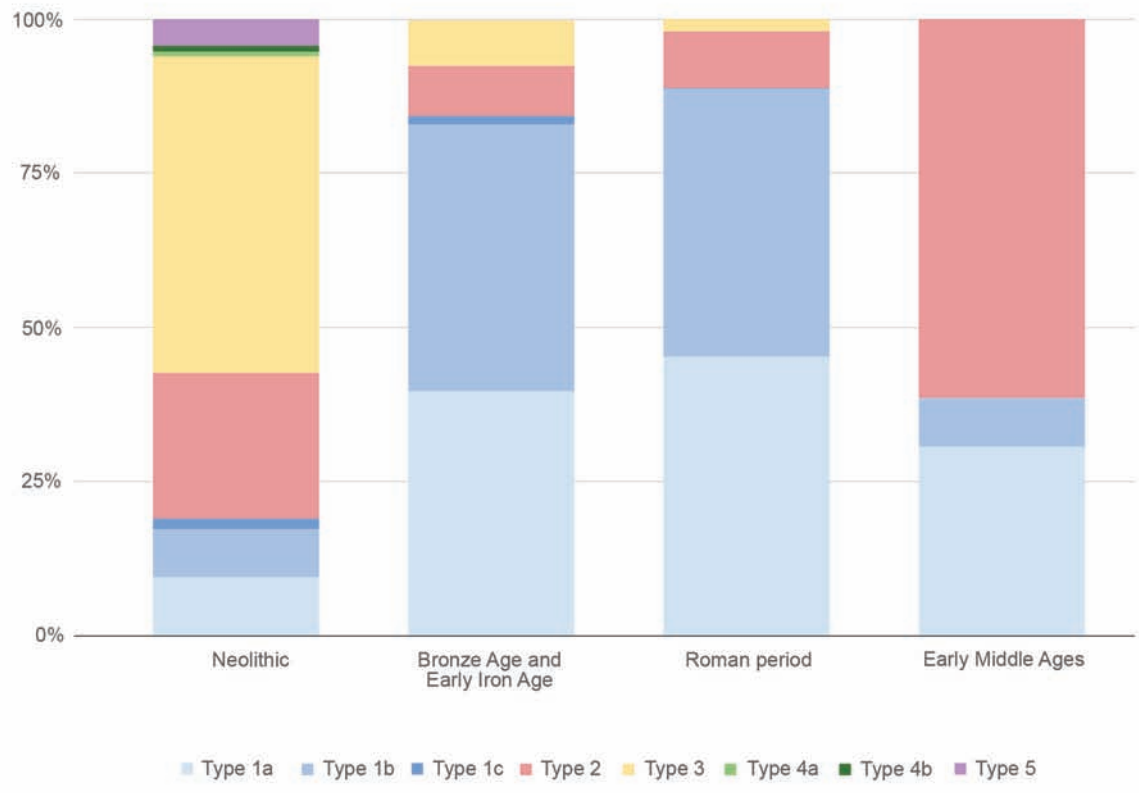


Fig. 2. Percentage of individual types of loom weights in different historical periods

in situ arrangement (Dulęba et al. 2019 in press). In feature 113, which is a relic of a house of a La Tène culture population, 12 loom weights of both types were found. Most of them were arranged in two rows, just like material from Ożarów Mazowiecki, site 23, Warszawa district, which is dated to the Roman period (Barska 2001, 69-73; Barska 2004, 45-54).

The Early Middle Ages should be considered the end of the period of manufacturing type 1 loom weights. To this period is dated a cluster found in the 7th-century settlement in Kraków Nowa Huta-Pleszów, site 18, Kraków district (Antosik and Słomska 2018, 116; Kaczanowska 1976, 243-255). In feature 74, interpreted as a house, two complete loom weights and 162 fragments of other specimens were found under one of the walls. Based on the re-evaluation of the collection, it is held that there were originally eight specimens of type 1a. On site in Czeladź Wielka in layer II, six complete loom weights and six surviving in fragments of the same subtype were discovered. The material is dated to the 5th/6th and 7th centuries (Lodowski 1972, 192-193). Single specimens are also known from several settlements, amongst others from Kraków Mogiła, Kraków district (Hachulska-Ledwos 1971, 146) or Zielkowo, Iława district (11th century) (Skrobot 1988, 183).

Finally, it is worth noting the significant weight difference of this group of artefacts. This is the clearest amongst the all types of loom weights. The weight of the lightest specimens is only 30-40 g (Wicina, site 1, Żary district) (Kałagate 2013, 183-194), while the heaviest reach up to 5.5-6 kg (Wierzchosławice, site 15, Tarnów district) (Oleszczak and Miraś 2012; Korczyńska and Mazur 2018, 171-198).

Type 2

This type consists of artefacts with a form similar to ring bodies, to geometrical tori. Their form resembles ellipsoidal spindle whorls. They have a circular shape, and they are oval in cross section. The hole runs centrally along their short axis of symmetry. The variation within the type is small, therefore no subtypes have been designated.

The presence of type 2 amongst archaeological finds is recorded throughout the period of using the warp-weighted loom (Fig. 2). Most specimens, however, come from the Neolithic and the Bronze Ages. This period includes finds from Pietrowice Wielkie, site 8, Racibórz district (from the collection of the Opole Silesia Museum in Opole), where seven of them were discovered, and from Tomice, Dzierżoniów district, where a cluster of them was found (Romanow 1969, 57-100). In the subsequent periods, the share of type 2 loom weights was systematically decreasing, in favour of the increasingly common type 1 loom weights. Nevertheless, settlements on which this form was still used are known. The most numerous assemblage of type 2 loom weights was found in Gawrony, Lubin district (from the collection of the Museum of Archaeology – branch of the City Museum of Wrocław) in a settlement from the Bronze Age, founded by a population of Lusatian culture. There were 19 specimens found there. They were all of type 2. Their height was 3.5-5 cm, and the width was 5-9 cm. In terms of weight they only slightly differed from each other: the lightest were 200 g, while the heaviest 350 g. Slightly more massive specimens, weighing 350-450 g were found at the settlement in Janów Pomorski, Elbląg district (the 8th to mid-10th century) (Auch et al. 2012, 99-100). This is the youngest find of this type of loom weights from Polish territory. They were discovered both in the residential and harbour zones of the settlement. There is therefore a supposition that some of them might also have been used as net sinkers (Antosik and Słomska 2018, 117; Auch et al. 2012, 99-100). This view is supported only by the data regarding the location of the material within the settlement, not by the firing quality of individual specimens.

Type 3

These are called cylindrical loom weights. They have a shape similar to a simple geometric cylinder whose proportions of height to diameter are in the range of 1:4 to 2:4 (Chmielewski 2009, 192). A single hole runs along the long axis of symmetry. Similarly to type 2, they occur in one variant, which nonetheless differs in terms of length, diameter and manner of forming the side walls of artefacts. The latter can be cut straight or slightly convex.

Products of this type are numerous in the archaeological material from the Neolithic to the Roman period (Fig. 2). Most specimens, often discovered in clusters, come from the oldest periods – the Neolithic and the Bronze Ages. Seven specimens,

measuring from 13 to 19 cm in length and 6-9.5 cm in width, were excavated from feature 8 in the settlement of the Úňetice culture in Kostomłoty, site 27, Środa Śląska district (Furmanek and Masojć 2011, 225-240). Similar assemblages were discovered in Gubin, site 32, Krosno Odrzańskie district (Przechszta 1996), in Trzepnica Kolonia, site 1, Piotrków Trybunalski district (Szukała and Niesiołowska-Śreniowska, 1997) or in Biskupin, site 2a, Żnin district (in a hearth) (Gardawski et al. 1957, 189-208, Plate XXVII). Type 3 loom weights are less frequent in the material from the Roman period. Dominate single finds, not forming compact groups. The only exception is the assemblage from the settlement of Przeworsk culture in Ślęza, site 13, Wrocław district (from the collection of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, the Centre for Research on the Culture of Late Antiquity and the Early Middle Ages). In feature 556 occurred three complete specimens and fragments of several other loom weights of type 3.

This model is characterized by relatively small weight differences between individual artefacts. The smallest and lightest specimens, ones weighing about 200-300 g, were discovered in Pietrowice Wielkie, site 8, Racibórz district (from the collection of the Opole Silesia Museum in Opole). The heaviest specimens come from Chrząstów Folwarczny, site 1, Zgierz district (Plate 1.E) (Kurasiński et al. 2002, 41, Fig. 18.2) and from Mierczyce, Jawor district (from the collection of the Museum of Archaeology – branch of the City Museum of Wrocław). Their weight was 1600 g and 1650 g, respectively.

Type 4

In contrast to the previous types of loom weights, this one is equipped with two or three holes for fixing the warp threads. There are two subtypes; one is in the form of a kidney with two holes at the ends (4a), and the other in the shape of a disc with three holes (4b).

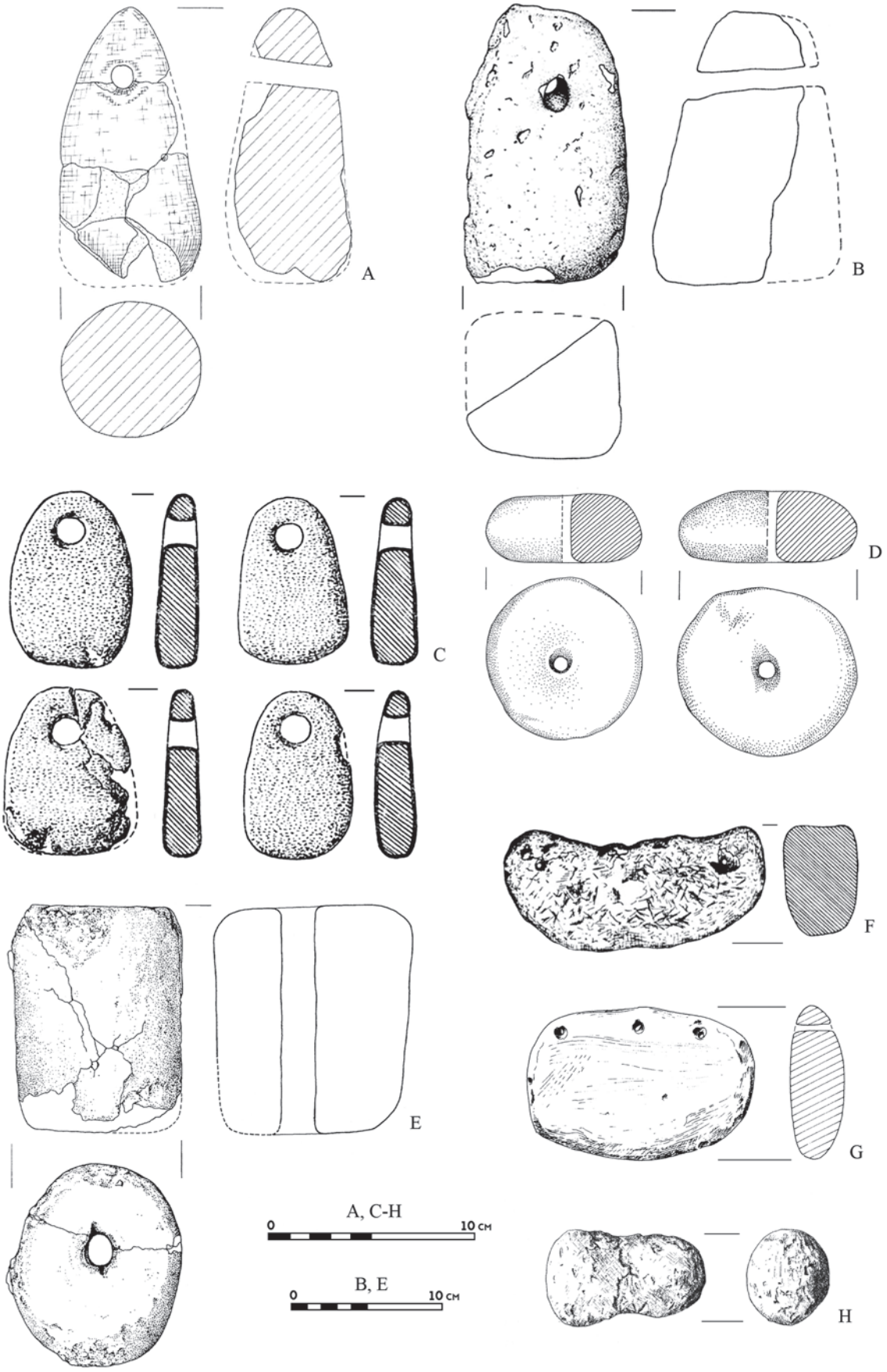
The first of the subtypes was discovered in a settlement of the Funnel Beaker culture population in Gródek[6], site 1C, Hrubieszów district (Plate 1.F) (Poklewski 1958, 326, Plate XIV: 8). Loom weights of a similar shape are known from Central Europe (Feldtkeller 2003, 16; Chmielewski 2009, 186-187; Grömer 2018, 118-119, Fig. 11.1) and the Mediterranean basin (Rahmstorf et al. 2015, 27, Fig. 6.9.15). They were included both in the classification by K.-H. Stærmose-Nielsen (Stærmose-Nielsen 2002, 11-12) and by T. Chmielewski (Chmielewski 2009, 174, Fig. 99) as well as in the study by CTR (Andersson Strand, Nosch 2015, 147, Fig. 5.1.4). Its shape resembles a saddle, kidney, banana, or crescent. They are distinguished by an elongated body, in some cases in the middle part bent or tapered downwards. They have holes parallel to each other, perpendicular to the long side of the loom weight. The shape of the loom weight enables simultaneous fastening to the front and rear warp threads. Only one specimen similar in terms of form to such loom weights is currently known from Poland. Its weight is unknown.

A 4b type loom weight was discovered in the settlement in Bodzia, site 1, Włocławek district (Plate 1.G) (Sobkowiak-Tabaka 2012, 336, Fig. 6b). Its shape resembles a flat, elliptical disc, which in the upper part has three holes for threads. Its weight is 286 g. According to the description in the aforementioned study, the sidewalls of the loom weight were gently profiled, and on their surface traces of smoothing were observed (Sobkowiak-Tabaka 2012, 336). An indirect analogy for this artefact

[6] Functioning mistakenly in the literature is the site name ‘Gródek Nadbużny’.

On the next page:

Plate 1. Examples of loom weight finds of each type.
A. Myszęcin, site 19, Świebodzin district (after Fabiszek and Sip 2010, 88, Fig. 28); B. Wojnicz, site 48, Tarnów district (after Dzięgielewski 2010, 111, Plate VIa); C. Nowa Cerekwia, Głubczyce district (after Kunawicz 1978, 299, Fig. 18d-k); D. Skrzypnik, site 8, Oława district (from the collection of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, the Centre for Research on the Culture of Late Antiquity and the Early Middle Ages in Wrocław); E. Chrząstów Folwarczny, site 1, Zgierz district (after Kurasiński, Herman, Strzyż 2002, 41, Fig. 18.2); F. Gródek Nadbużny, site 1c, Hrubieszów district (after Chmielewski 2009, 191, Fig. 105.4); G. Bodzia, site 1, Włocławek district (after Kabaciński et al. 2014, 40, Fig. 9.b); H. Ćmielów, Opatów district (after Chmielewski 2009, 191, Fig. 105.2)


A
B
C
D
E
F
G
H
A, C-H
0
10 CM
B, E
0
10 CM

are the loom weights known from the Mediterranean basin (Andersson Strand, Nosch 2015, 147, Fig. 5.1.4). For in most cases they have regular shape in which the height of the loom weight equals its width. In addition, the vast majority of them have one or two holes for threads[7].

As one can see, none of the two subtypes, represented in Poland by single specimens, finds a perfect counterpart in other regions of Europe. Nevertheless, when analyzing their shape and location context, one can conclude that these artefacts were used in warp-weighted loom.

Type 5

The last type consists of loom weights which do not have holes for threads. In the literature they are referred to as bobbin-shaped, eight-shaped or dumb-bell-shaped. Their shape is similar to cylinders with a narrowing in the central part.

These forms appear only in the Neolithic in Poland (Fig. 2). They are known mainly from Greater Poland, Lesser Poland, and Silesia. Two specimens were discovered in Mrowino, site 3, Poznań district (Tetzlaff 1981, Fig. 4: 3) and other two in Ćmielów, Opatów district (Plate 1.H) (Podkowińska 1950, 122, Plate XXXV: 4; Podkowińska 1952, 219, Plate XX: 4). They were also found in Nosocice, Głogów district, Dankowice, Dzierżoniów district and Janówek, Dzierżoniów district (all from the collection of the Museum of Archaeology in Wrocław). The most numerous assemblage, consisting of four specimens, was found in a settlement of the Funnel Beaker culture population in Książnica Wielka, Proszowice district (after Chmielewski 2009, 175). In younger periods, these forms have not been distinguished in the archaeological material to date.

Based on experimental investigations carried out at the CTR in Copenhagen within the framework of the Tools and Textiles – Texts and Contexts project (further: TTTC), it is known that they could have been successfully used as loom weights in warp-weighted looms. The most effective ones were those with a weight exceeding 50-100 g (Rahmstorf et al. 2015, 273). The results of these studies contrast with the view known from Polish literature, according to which specimens weighing less than 250 g could have been used only as actual spool (Chmielewski 2009, 173).

Apart from the charging function of the warp threads, the clay spool objects could have also performed other tasks in weaving. Small, very light soools, with a deeply concave central section were most likely used to hold, in proper order, a certain amount of wound threads for further use. Artefact from Wądroże, Wołów district dated to the Hallstatt period can be considered as such, as well as the one from Małkowice, Wrocław district (both from the collection of the Museum of Archaeology in Wrocław). As it results from calculations – using such spools it was possible to store an average of about 20-30 m of threads with a thickness of 1.5 mm. It should be mentioned, however, that this value depended on the strength with which the yarn was wound and the elasticity of the thread; in individual cases it could have been even two or three times higher (Siennicka and Ulanowska 2016, 30). Presumably, spools were also used as a kind of spears for threading weft between taut warp threads. This type of solution worked well in tests, but it did not equal its functionality with a wooden spear. Type 5 loom weights could also have been used to fasten and tie warp threads to the heddle bar in vertical warp-weighted loom (Siennicka and Ulanowska 2016, 32-33).

The analysis of spools causes many difficulties. There are several possible, parallel applications, which create a large scope of uncertainty when selecting and studying materials. In this situation, as a factor excluding the bobbin as a loom weight I myself recognise the presence of a large depression and elongation in the central part of given artefact, with the simultaneous occurrence of clearly profiled side walls. The remaining bobbins, regardless of their weight, should be considered as loom weights. I would like to point out, however, that this issue requires further, thorough studies.

CONCLUSIONS

The loom weight models presented above leave no doubt as to their link with the warp-weighted loom. As T. Chmielewski notes in his publication

[7] During the research conducted in Miletus and Phaistos, two artefacts were found which had three holes (Firth 2015, 167, Fig. 5.2.14), however their shape is more regular than that of the specimen from Poland.

'the strength of argumentation differs significantly depending on group' (Chmielewski 2009, 202). Skepticism is not justified in the case of type 1, 2, and 3 loom weights . These are artefacts which are most often discovered at settlement sites, in the interiors of houses or in fills of storage pits. Often, not only on Polish territory, they are observed in *in situ* arrangement, thus being a clear evidence of the presence of a weaving workshop. Serving as an example of this are loom weights from Samborowice, site 13, Racibórz district (Dulęba, Słomska, Soida in press), Ożarów Mazowiecki, site 23, Warszawa district (Barska 2001, 69-73; Barska 2004, 45-54), from Nové Košariská in Slovakia (Štolcová and Zajonc 2015, 295-267, Fig. 29.1), from the Danish island of Samsø (Stærmose-Nielsen 1999, 37, Fig. 23) or Krems-Hundssteig in Lower Austria (Grömer 2010, 115, Abb. 51). The custom of using these forms is also evidenced in prehistoric iconography (Stærmose-Nielsen 1999, 55-77), although caution should be exercised when interpreting it.

With regard to the other two types of loom weights – 4 and 5 – the situation is not as clear, however. Neither their number nor discovery contexts explicitly point to a connection with a weaving workshop. It seems that one of the reasons for this state of affairs may be very poor material recognition. These forms were not considered as loom weights by Polish archaeologists. However, analyzing archaeological material from the areas of southern and western Europe, one can often encounter analogies for the loom weights presented here. Consequently, it is difficult to find the basis for excluding these finds from the typology.

Summing up, the classification presented here provides a tool allowing us to organize the source material, both the archival as well as the newly acquired examples. If accepted by the archaeological community, this will contribute to elimination of the terminological and descriptive liberty which currently prevails in the literature. This article indicates the most important features which should be included in the descriptions of this group of artefacts. The consequence of the proposed changes may be the recognition of loom weights as a valuable archaeological source, bringing much more to the knowledge of archaeological cultures than statistical data. There are still many questions to ask. It is not known whether the occurrence of particular types is limited to specific areas, whether there are places in Poland where the loom weights do not appear in the archaeological material, etc. Although loom weights do not have dating features, their proper recognition will certainly allow for a fuller analysis of weaving production, which in turn influenced entire societies.

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