



Archaeology:
Just Add Water

volume II

2019

ŚWIATOWIT Supplement Series U: Underwater Archaeology, vol. II

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Archaeology: Just Add Water

Underwater Research at the University of Warsaw



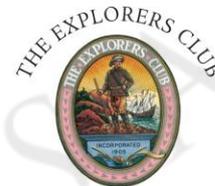
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POLISH CHAPTER
ODDZIAŁ POLSKI

WARSZAWA 2019

Preface

Dear Colleagues,

It is our great pleasure to present to you the second volume of the U Supplement Series of the “Światowit” periodical. To a large extent it is based on the papers presented during the 3rd *Warsaw Seminar on Underwater Archaeology*, which took place at the University of Warsaw on the 17th and 18th of January 2019.

An efficient and prompt process of editing we owe to the funding from the Ministry of Science and Higher Education, grant no. 959/P-DUN/2018.

Organization of the Seminar and publication of the hereby volume was possible thanks to the co-operation with the Polish Chapter of the Explorers Club, in particular its President, Professor Mariusz Ziółkowski, and the Vice-President, Marcin Jamkowski, to whom we are deeply grateful.

We would also like to acknowledge and appreciate the support of the University of Warsaw, namely the Vice-Rector Ph.D. habil. Maciej Duszczyk, the Dean of the Faculty of History, Ph.D. habil. Małgorzata Karpińska, Professor UW, as well as the Director’s Board of the Institute of Archaeology: Ph.D. habil. Krzysztof Jakubiak, Ph.D. Michał Starski, and Ph.D. Marta Żuchowska.

The special thank you we traditionally owe to the Diving Museum by the Warsaw Diving Club, especially the Museum’s Curator, Karina Kowalska, and the Club’s President, D.Sc. Grzegorz Kowalski, who have been supporting our activities for many years, and constantly guide and help us in numerous enterprises.

We would like to extend our gratitude to all the Authors and Reviewers, who have been extremely diligent and punctual to keep up with our strict deadlines.

During the editing of the volume we have received invaluable consultations in the matter of ancient languages by Tomasz Płóciennik and Ph.D. Joanna Wegner, who we would also like to thank with all our hearts. The post-editing process was successful due to the the kind assistance of Ph.D. Rafał Dmowski, who we owe enormous gratitude.

The whole book was once again skilfully supervised and managed by the one and only irreplaceable Ph.D. habil. Bartosz Kontny, Professor UW. Him we would like to thank for all the advice and help with difficult choices, as well as the dedication to the organizational matters, even though the really tight schedule.

Last but not least, we would like to thank all the Readers who have reached for the hereby volume. We sincerely hope you will enjoy the outcome of our efforts and wish you pleasant reading!

Aleksandra Chołuj

Małgorzata Mileszczyk

Magdalena Nowakowska

3rd Warsaw Seminar on Underwater Archaeology



3rd Warsaw Seminar on Underwater Archaeology held on 17th-18th of January 2019
at the University of Warsaw
(photos by: M. Sugalska)

Foreword

The volume, which we hereby present to our esteemed Readers, is the vivid proof that underwater archaeology at the University of Warsaw is doing more than well. It is the second publication in the “*Światowit*” *Supplement Series U: Underwater Archaeology*, issued for now (and we hope this pace will be sustained!) with a frequency of a periodical. Within the book one might find i.a. the texts being an outcome of the international 3rd *Warsaw Seminar on Underwater Archaeology*, organized in the Institute of Archaeology, University of Warsaw. The Readers will discover here the articles presenting broad chronological and geographical range of issues: from the Prehistory until the Second World War, from Guatemala and Peru to Poland and Slovakia. We are trying to reflect this diversified character also by the choice of photographs on the cover.

The leitmotif of all this vast range of archaeological issues is **water**: realm bearing a magnificent symbolic character. Changing its colour (even during the day – from the blackness, through greyness, then blue, until the bloody-red at the sunset, turning again into black) and visibility, it has manifested also other features, which can be contemplated as signs of its animation, such as movement: horizontal (currents, waves, tides) and vertical (fluctuations of the surface). It was also the source of life quite literally, providing food and dihydrogen monoxide, essential for living.

Along with its whole mystery and dangerousness, water may also serve as a refuge (lake settlements from the early Iron Age) and a trade route, at the end of which there is a (hopefully) safe harbour. That is how underwater archaeology marches onto the land... Although, it is neither place nor time for the deliberation about the definitions of archaeology related to water environment; the discussion in this matter has lasted for many years, abound in more and more new terminological propositions, still being far from any resolutions. Whichever position we assume in the aforementioned debate, it is impossible not to notice that the symbolism, the rituals, and everyday casual activities essential for life and connected with water pass through each other, which is well-exemplified by the hereby volume. Objects lost during transportation and other kinds of exploitation of water basins, items put in the water as a matter of rituals, military aspects connected with watery environment, lake settlements, harbours, and trade – all of that and even more you can discover in *Just Add Water 2*. To all the Readers, who are going to immerse themselves into this topic, I wish a pleasant intellectual adventure and... good dives!

Bartosz Kontny

Axes from Lake Lubanowo (Pomerania, Poland) and Their Possible Function on the Background of Watery Finds of the Roman Period and Middle Ages

Bartosz Kontny*

Abstract:

In the small lake at Lubanowo (Pomerania, Poland) numerous interesting items have been discovered, both by chance and during regular surveys. Apart from weapons and tools dated to the Roman period some medieval specimens have also been found here, i.a. axes. Together with the Roman period axes and adzes they create a collection of specimens which may be treated as carpenters' utensils. But is that interpretation correct? The paper discusses possible answers to the question of the plausible function of the items but also analyses the phenomenon of similar finds from lakes dated to the Roman period and Middle Ages. The Roman period ones are interpreted in the same way as north European parallels, i.e. as sacrificial deposits; further sites of the same character with finds of axes from the territory of Poland are mentioned, i.e. Krępsk (Pomerania, Poland), Piła (Greater Poland), Żarnowiec (Pomerania, linked plausibly with the Wielbark culture), and Łężany (Warmia, Poland; the Bogaczewo culture). Much bigger scope of possible explanations is discussed in case of items from the Middle Ages. Chosen parallels from Pomerania and Greater Poland are taken into account, including elaborate dispute referring to weapons from Ostrów Lednicki (Greater Poland). The latter have been treated, i.a., as the losses connected with building of the bridges or with the battle which had hypothetically taken place on both bridges; however, the article underlines certain sacral acts to explain finds from Lake Lednica but also certain other medieval watery finds of tools and weapons. The position of the Lubanowo finds allows falsifying some of original interpretations and in conclusion it is assumed that most probably the said axes from Lake Lubanowo had been deposited sacrificially.

Keywords:

axe, adze, Lubanowo, Roman period, Middle Ages, sacrifice, weapon, underwater archaeology

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In the small lake at Lubanowo (Banie comm., ex-*Liebenow* in West Pomerania, NW Poland) numerous interesting items have been discovered, both by chance and during regular surveys. From 2014 until 2018 the team of scholars and students from the Institute of Archaeology, University of Warsaw, featuring the Institute of Archaeology and Ethnology, Polish Academy of Sciences, has conducted underwater survey in the former *Herrn-See* in Lubanowo (Nowakiewicz 2016: 17–20; Brzóska and Kontny 2016). During underwater research weapons, potsherds, tools, and horse harness elements (including chain reins) have been found (Kontny *et al.* 2016a). They are dated mainly to the Roman period but also to the Middle Ages (Kontny *et al.* 2016b). Some of the Roman period items bear traces of ritual destruction (Kontny 2016: 286). The parallels to Roman period weapons may be indicated in the Przeworsk culture and, to some extent, also in Scandinavia (the ones from the younger Roman period).

Among the items dated to the Roman period there is the Oder-Elbe-type axe (Kontny *et al.* 2016a: 133; **Fig. 1:1**), typical of the Younger and Late Roman period (Kieferling 1994: 339, fig. 4),¹ which has been discovered by unprofessional explorers. Such form is characteristic for the interfluvium of the Elbe and Oder Rivers, i.e. Elbian cultural circle, Luboszyce culture, and the Bohemian Basin (Kieferling 1994: fig. 4) but their distribution should be broadened into the Jutland Peninsula (Kontny *et al.* 2016b: 245–246) and Pomerania (Kontny *et al.* 2016b: 244–245; Kontny 2019: 84–85, fig. 15:3).² Another axe (**Fig. 1:2**) may be attributed to Żarnowiec type (Kontny *et al.* 2016b: 132–133) and dated similarly to the aforementioned one, although they are proved already in the B_{2b} phase. Such scarce forms appear in the entire territory of Poland, but close parallels may be found in adjoining area of the West Balt circle, southern Scandinavia, and even as far as the Pontic zone (Kieferling 1994: 341–343, fig. 6; Kontny *et al.* 2016b: 246–247). One may also add to the list a few adzes (**Fig. 1:3–7**), three of them quite small (below 10 cm in length) and asymmetric, with rectangular cross sections of sockets (Kontny *et al.* 2016a: 142–143; 2016b: 257–259). Two were slightly bigger; one of them had a circular sleeve (Kontny *et al.* 2016a: 141–142). Both forms have Roman period parallels, e.g. for the larger items – the specimen from possible sacrificial bog find from Żarnowiec (Pomerania, Poland; Kontny 2006: 150, figs. 1:E, 2–3) – and for the smaller – numerous Roman period finds from the West Balt circle, but documented also i.a. in northern Europe

¹Adopting the classification of the Luboszyce culture axes, it should be classified as type A according to Grzegorz Domański (1979: 51) or type 2 after Walter Matthes (1931: 43, pl. 27). Such slender forms possess triangular projections, i.e. indistinct lugs just beneath the eye and asymmetrical blade, frequently with slightly distinct beard and barely pronounced butt.

² See also the Pomeranian find from Lake Krępsko, described further.

(Kontny 2016: 38–41, fig. 2) and Dębczyno group (Pomerania) in the younger Roman period (Kokowski 2006: 133, figs. 1, 3:b).

During the regular survey, a few specimens dated to the Middle Ages have also been found in Lubanowo; among them the early medieval axe of type 5, variant IB.5.4 according to Kotowicz (**Fig. 2:1**), i.e. a local form typical in particular of northern Poland and used primarily in the 10th and 11th century (2018: 88–89, pl. VII:5). Additionally, two stamped late medieval axes along with their wooden hafts have been surfaced (**Fig. 2:2–3**); these ones should be assigned to the popular type IX according to Głosek and dated to the wide time span from the late 13th until 16th century (1996: 40–43, 80, pl. XVII–XXIII; see also remarks of Piotr Kotowicz who noticed the thirteenth-century roots of the aforementioned types, cf. early medieval types IIB.7.3 and IIIB.7.3 [Kotowicz 2018: 121–122]). The hafts were made of branches: the first of them of diffuse-porous wood (maybe birch) and the second of black oak.³ Medieval items were generally spotted at the larger depths (ca. 2–4 m) than the Roman period ones (up to 2 m), which may be a result of changes of the lakeshore outline (**Fig. 3**).⁴ Axes from the Roman Iron Age unfortunately come from accidental finds, so one may only generally place them in the north-western and western part of the reservoir, in the area of a stony lakebed or close to the north-eastern shore.

Together with the Roman period axes and adzes the collection consists of ten specimens, which may be treated as carpenters' utensils. To answer the question, one has to analyse the size and form of each axe. For the Roman period items there are no well-established traits which allow distinguishing weapons from tools in a definite way; one may rather assume that most frequently the considered items are multifunctional, however, with the predominant military function (Kontny 2018: 80–85). Such studies of early medieval items have been done lately by Piotr Kotowicz (2013: 78–81; 2018: 155–165), who has linked the smallest forms (below 10 cm in length, weighting less than 100 g, frequently having short hafts, up to 40 cm) with specialized carpenters' tools. He ascribed the biggest and heaviest ones (over 500 g) to the same functional group; the specimens with asymmetrical blades in top view (distinguished and sharpened one-sidedly) have

³ The analysis was done by Ph.D. habil. Paweł Kozakiewicz from the Warsaw University of Life Sciences (Polish: *Szkoła Główna Gospodarstwa Wiejskiego w Warszawie*) to whom I would like to express my gratefulness.

⁴ One cannot be sure how significant were the alterations of the lake area without further studies, however, examples from other lakes show that it cannot be neglected; in case of Lake Żółte in West Pomerania prominent surface elevation differed the Early Middle Ages from the late Atlantic stage, counting ca. 3 m, and the medieval water level was close to the contemporaneous one (*vide*: Chudziak *et al.* 2014: 60–64, fig. 3.30). As far as the lakeshore is concerned, it might have been situated even several dozen metres outside from today's shoreline. Naturally, to prove it one would need to carry detailed palaeoenvironmental analyses. However, it seems impossible that the surface was significantly lower, so the deposited items were originally located in the water.

also been attributed therein. Kotowicz has quoted the idea that one of the elements which may indicate the function of an object is the angular cross-section of an eye hole preventing from twisting the haft while performing repeatable cuts. These criteria do not have to be adequate for the Roman period axes. The ones from Lubanowo weight respectively 119 g and 227 g. If one takes into consideration the fact that haft from these times had length from 60 to 90 cm, i.e. their range was comparable to the one of the swords (Kontny 2018: 80–81, fig. 12), it could be assumed that they generally served as weapons, which were also used for woodworking, but only occasionally; the more so that they were found mostly in the weapon graves (*cf.* Domański 1979: 51–52; Bemmman 2007: 76–77; Kontny 2018: 81, 83). The adzes were used in the household instead and are rarely found in the lakes/bogs.⁵ The axes were spotted (but rather rarely) in Scandinavian sacrificial bog sites (e.g. Nørbach 2009: 261), where household tools were unique,⁶ i.e. the places in which weapons (most probably won on the invaders) were deposited, sometimes in their masses, sometimes only in selected number. They have been dedicated to the gods of war and frequently destroyed (to make them harmless to the living?); maybe their aim was also to commemorate the victors. It is believed that they were thrown from the lakeshore or drowned with the use of boats.⁷ Only a few bog/lake sites of the same character are known so far to the south of the Baltic Sea, and axes were found there too.⁸ In Żarnowiec, known from archive sources (*cf.* Kontny 2006), both an axe (similar to the symmetrical one from Lubanowo) and adze (comparable to the bigger one from Lubanowo) have been documented; the site may be assigned to the Wielbark culture (**Fig. 4:1–2**). But this is not the only bog site in Pomerania where weapons, including axes, have been discovered. Deducing from an archive source (a letter of Georg A. Crüger to Wilhelm Schwartz (1875), after: Kaczmarek 1998: 341) one may assume that another Wielbark culture bog site has been situated in Piła (Greater Poland, *ex-Schneidemühl*); the axe, probably of Elbe-Oder type⁹ has been located there (**Fig. 4:3**; Kontny 2019: 84, fig. 15:3). Subsequent axe (**Fig. 4:4**) was pulled out of the waters of Lake Krępsko in Krajeńskie Lakeland (Pomerania), close to the peninsula at Krępsk,

⁵Apart from Lubanowo and Żarnowiec one may mention only a single find from Nętno, site 38, which was located ca. 50 m from the bridge remains (Chudziak *et al.* 2016: 152, fig. 157 160:i). Taking into account the accompanying specimens, one may assume it can be dated to the Middle Ages.

⁶ With the exception of Vimose (Christensen 2005), where numerous agricultural and handicraft utensils were excavated; possibly they may be linked in their significant part with the Balts participating in raids aimed at southern Scandinavia (Kontny 2017: 34–40).

⁷ There are also other explanations of the weapon finds, i.a. that the items dealt with are the local arms or arms seized by indigenous warriors during military expeditions, but these ideas do not seem convincing enough. For the discussion concerning the interpretation of bog sites *vide*: e.g. Ilkjær 2003: 60–63; Rau 2016; Kontny 2019: 13–14.

⁸ Except for the bog site at Wólka (Masuria, Poland), *ex-Wolka-See* (Kontny 2015).

⁹ The drawing of the find is sketchy but shows the shape well enough (the letter of Georg A. Crüger to Wilhelm Schwartz [26th January 1875], after: Kaczmarek 1998: 341).

during the archaeological survey executed by the scholars from the Nicolaus Copernicus University in Toruń (Chudziak *et al.* 2016: 72, fig. 56:c). It has been found next to two spearheads (one of them most probably dated to the turn of the early and younger Roman period) and an early medieval sword (Chudziak *et al.* 2016: 72–75, fig. 56:a–b, 57).¹⁰ The axe has erroneously been linked with the Middle Ages (Chudziak *et al.* 2016: 72, 75) whereas it is a typical Roman period form (Oder-Elbe type).¹¹ Cultural affiliation is not utterly clear: it may be linked with the Wielbark culture, as in case of spearheads (the settlement of that cultural unit – Krępsk, site 13 – has been registered at the opposite side of the lake (ca. 500 m north-west as the crow flies – *vide*: Chudziak *et al.* 2016: fig. 51).¹² However, the area was abandoned by the peoples of the Wielbark culture at the beginning of the younger Roman period, and a new phenomenon, i.e. Dębczyno group, appeared at the turn of C_{1a} and C_{1b} subphases (Machajewski 1992: 165); therefore one cannot exclude the connection with the latter – taking into account quite long chronology of the type, embracing the whole younger and late Roman period.¹³

There are further bog sites with weapons from Pomerania which may be dated to the proto-historical period, but they are known exclusively from imprecise mentions, not including their exact character, content, completeness, and chronology.¹⁴ Only in case of wetland depots of iron items (carpenters', blacksmiths', and agricultural tools as well as axes) from Czarnkowo, i.e. ex-Zarnekow (file *Czarnkowo*, archive of H.-J. Eggers, National Museum in Szczecin)¹⁵ as well as Stare Dłusko in Lubusz Land (Rembecki 2019) one may assume their dating to the turn of the early and younger Roman period. Single pre-Roman, Roman, and Migration Period weapons are known also from the Noteć River, in southern Pomerania (Makiewicz 1992).

¹⁰ At least one of spearheads (Chudziak *et al.* 2016: fig. 56:a), though resembling early medieval specimens should rather be attributed to Kaczanowski XV type, known from B_{2b} phase until C_{1b}, but most popular in C_{1a} (*vide*: Kaczanowski 1995: 23, pl. XII:3); its pseudo-medieval form may be suggested by a non precise drawing ignoring the socket with facets and profiled blade (*vide*: Chudziak *et al.* 2016: fig. 232). Classification of the Przeworsk culture shafted weapons' heads (to which one may attribute the spearheads) is adequate here, as in case of the Wielbark culture the armament types of the Przeworsk culture prevailed in the early Roman period until C_{1a} subphase (Kontny 2019: 89–90).

¹¹ See the specimens from Lubanowo and Piła. Theoretically, one may try to link it with variant IB.3.27 (Kotowicz 2018: 69) but while compared to the Elbe-Oder-type items with lower widenings at the shaft-hole (Kieferling 1994: fig. 4), the Roman period origin seems more probable.

¹² Another phenomenon typical of the Wielbark culture comes from Krępsk, i.e. the cemetery with stone circular constructions (Kokowski 2012).

¹³ There is another Roman period axe, found in Lake Lednica (*vide*: Kotowicz 2014: 224, no. 73, with further literature); however, it should be attributed to the Przeworsk culture.

¹⁴ Dargikowo, ex-Darkow (Pomerania, Poland) – skull, amber ornaments, glass beads, and iron spearheads acquired during peat digging (Lissauer 1887: 162; Blume 1912: 179; Mączyńska 2000: 277); Starzyn, ex-*Altes Vorwerk b. Sellin* (Pomerania, Poland) – bronze cauldron, blue bead of a Roman origin, and oaken 'spearheads' (Leube 1971: 101; Mączyńska 2000: 279).

¹⁵ I would like to thank Krzysztof Kowalski and Bartłomiej Rogalski, Ph.D. from the museum for the above data.

Another Roman period specimen (**Fig. 4:5**) was found in Lake Legińskie in north-eastern Poland in the Bogaczewo culture Leginy, site 11 (Warmia, Poland) nearby the island with traces of habitation lasting from the Bronze Age and Early Iron Age, through pre-Roman and Roman period until the Middle Ages.¹⁶ It has been attributed to type II.1.1 according to Kontny (2018: 85), discovered ca. 25 m from the lakeshore and picked up by colleagues from Toruń during the underwater survey (Chudziak *et al.* 2016: 100–102, fig. 75, 76:a). The only accompanying element was another axe (Chudziak *et al.* 2011: 102, fig. 76:b), but this time late medieval one, i.e. type IX according to Głosek (1996). The team of underwater archaeologists from the Institute of Archaeology, University of Warsaw has surveyed the area to the west and north-west of the island very thoroughly with metal detectors during courses of underwater archaeology in the 2010s. Unfortunately, no corresponding items have been found, despite the fact that the lakebed is quite consistent and hard there, so – if present – they should be traceable; one may also exclude the presence of any bridge remains.

But there are bridges known from the proto-historical period, specifically among the Celts, with the most famous La Tène site where the bridges over the Thielle River entering Lake Neuchâtel (Romandy, Switzerland) have been located (**Fig. 5**). They served not exclusively as a trackway, but also as a sacrificial place where weapons had been hanged and thrown in the waters from the 3rd century B.C. with the peak in sacrificial use ca. 200 B.C. (e.g. Vouga 1923; Betschard 2007). The axes and adzes (sawing knives as well) are also known from here, but the former weighted almost 1 kg each, too heavy for military purposes, so most probably they served as tools lost during construction works.¹⁷ In Pomerania there are the bridges known from the Early Iron Age, e.g. the Lusatian culture wooden remains from Nętno, site 38 (Pomerania, Poland) south-west of the island on Lake Gągnowskie in Drawsko Lakeland (**Fig. 6**), dated to the 7th century B.C. or Hallstatt C period (Rembisz 2009a: 102–104; Chudziak *et al.* 2011: 134–136, figs 108, 112, 113; Chudziak *et al.* 2016: 147–149, figs 151, 158, 159). Here also an early medieval construction, parallel to the former one, has been spotted. In both cases not only axes but also precious weapons have been found, like Hallstatt period iron sword with copper alloy cross-guard, together with bronze personal ornaments, clay pots, and antler axe from the first site (Rembisz 2009a: figs 3–12) and decorated medieval spearhead next to agricultural tools,

¹⁶ Results of the excavations carried by the Institute of Archaeology, University of Warsaw and ‘Dajna’ Foundation – personal communication with Magdalena Nowakowska (Institute of Archaeology, University of Warsaw) and Agnieszka Jaremek (‘Dajna’).

¹⁷ I had an opportunity to study the axes from the La Tène culture collected in the *Museum für Vor- und Frühgeschichte* in Berlin.

pottery, and horseshoe from the latter (Chudziak *et al.* 2011: figs 109–111). As refers to the Early Iron Age finds they are treated as ritual deposits aimed to provide favour of protective deities and ancestors; feminine jewellery suggests that female gods have been worshiped there, and sword may be interpreted as a contribution of an individual warrior, a kind of ‘substitute offering’, replacing grave furnishing in case of cremation, or a visual element of *rites de passage* (Blajer 1992: 103–104; Rembisz 2009a: 109–110). Such phenomenon was especially popular in the Late Bronze Age in Pomerania, with momentous role of weapons which diminished in the Early Iron Age (Rembisz 2009b: 19–20).¹⁸ But is that also the case of medieval axes?

The axes may be theoretically connected with construction work losses just like in case of the eleventh–twelfth-century bridge in Bobięcino on Lake Bobięcińskie Wielkie (**Fig. 7**; Chudziak *et al.* 2011: 43–52, figs 23–25)¹⁹ and Świeszyno in Lake Głębokie with a single small axe (Chudziak *et al.* 2011: 218–222, fig. 194, 195), both in Bytów Lakeland in West Pomerania, but also Lubniewice on Lake Lubiąż in Łagowskie Lakeland (part of Lubuskie Lakeland), site 9 (Chudziak *et al.* 2016: 81–95, figs 69–80)²⁰ and site 10 (Chudziak *et al.* 2016: 96–113, figs 90–100)²¹ as well as Mikorzyn, site 17 on Lake Mikorzyńskie, Kujawskie Lakeland (Chudziak *et al.* 2016: 133–144, figs 138–146).²² Nevertheless, such obvious ‘functional’ explanation may not always be adequate.

A non-Pomeranian lake site from Lake Lednica in Greater Poland should also be discussed here, where in the vicinity of one of the islands, Ostrów Lednicki (with the stronghold – a seat of Polish rulers of the late 10th–early 11th century) an assemblage of items, dominated by weapons, has been revealed. Almost 170 axes have been found in that body of water,

¹⁸ For interpretations of Bronze Age and Iron Age deposits *vide*: Kontny 2019: 8–14, with further literature.

¹⁹ Axes are the most numerous category of finds there, including 16 items; they have been found together with a fishing lures and clay pots. One may reasonably consider that they were lost during the building or repairing process of the wooden constructions, which had been lasting for at least 150 years, so the axe drowned every ten years on average seems probable. Moreover, the losses could have been even rarer, as a few specimens have been found far from the bridge construction (Chudziak *et al.* 2011: fig. 22), which not only changes the proportion but also means that some of the axes cannot be explained in the aforementioned manner.

²⁰ The bridge existed as early as second half of the 8th century, but most probably it was used even in the late medieval times. In the close vicinity there were found i.a. nine axes, an iron dusack, crossbow trigger, sword, stirrup, six horse bits, 10 knives, three sickles, two keys, some clay vessels, and animal bones. Some axes, a dusack, stirrup and pewter jug, crossbow element, and Gothic key link the construction with the Late Middle Ages.

²¹ I.a. seven axes, five spearheads, a battle knife, bucket bow, knives, a spur, bits, a clay fishing sinker, quern stone, and numerous clay pots; the bridge existed here in the 11th century, but one of the axes is definitely late medieval; another, dated to the Early Middle Ages, was discovered several metres from the bridge remains.

²² Two axes are known from the site, as well as a spearhead, sickle, spur, sword, three bolt heads, clay vessels, and a skeleton of a horse. Late medieval chronology of the finds is proven by the analyses of the wood samples taken from the bridge constructions.

with the great majority dated to the Early Middle Ages (Tokarski 2000: 78–84, 92–95, pl. I–V; Kotowicz and Sankiewicz 2013; Kotowicz 2013; Głosek 2014: 81–90, pl. II–V). Greater part of the collection has been detected in the vicinity of two bridges, leading from the ruler's seat (with the palace, church, and stronghold): the eastern one directed to Gniezno and western to Poznań; the bridges existed for quite short period, i.e. ca. 70 years, from 963/4 until 1038 A.D. (Wilke 2000: 64–66; 2014a: 64–65). The finds have been explained by accidental dropping during building/repairing of the bridge (in reference to tools) but generally they are connected with the battle (Kola, Wilke 2000: 56–57; Tokarski 2000: 89; Sankiewicz 2013: 28; Wilke 2014b: 111–113; 2018: 73–76) which probably took place in 1038 or 1039 A.D. during the military raid of Bretislaus I, the Prince of Bohemia (**Fig. 8**). It is assumed that the attackers clashed with defenders on both bridges, forfeiting their military equipment. Additionally, there are two skeletons of adult males aged 25–30 buried in medieval layers of the sediments, close to the bridge – possible victims of the encounter (Wrzesińska 2014). Such hypothesis is deeply rooted in medieval archaeology, however, there are also particular doubts as to its consistency,²³ e.g. a small number of human remains makes such hypothesis uncertain (one should rather assume dozens of bodies especially if considers quite heavy infantry as the most plausible clashing unit; the burden of knights' equipment should descend them quickly); naturally, it may be a matter of state of research but still the number seems definitely too tiny.²⁴ Great number of the axes also makes one wonder: they are ca. three times more frequent than spearheads (*cf.* Tokarski 2000: 78, 84; Głosek 2014: 81; Wilke 2014b: 98), i.e. the most popular weapon in the Middle Ages (*vide*: Nadolski 1954: 51–52; Nowakowski 2005: 72–75).²⁵ It cannot be accounted for construction losses, especially if compared with the bridge from Lake Bobięcińskie Wielkie. However, it may be assumed that smaller underrepresentation of spearheads results from them having floated together with shafts (heads were not heavy enough to outweigh the buoyancy of wooden shafts), thus later

²³ One of the first having expressed that this widely accepted explanation may not be that certain was Leszek P. Słupecki who, pondering over the large number of weapons being discovered there, proposed that some part of them (including axes) could have been deposited into water as sacrifices (Słupecki 2006: 67–68). Such possibility is taken into account by Piotr Kotowicz, too (Kotowicz 2018: 172–173). One cannot omit Jacek Wrzesiński, M.A., from the Museum of the First Piasts (*Muzeum Pierwszych Piastów*) in Lednica, who has presented his doubts in the lecture *Bitwa na mostach lednickich – militaria Ostrowa Lednickiego (Battle on the Lednica's Bridges – Militaria of Ostrów Lednicki)* delivered during the 23rd Archaeological Festival in Biskupin (*Festyn Archeologiczny w Biskupinie*), on the 24th of September 2017.

²⁴ The animal bones found close to the bridge are generally post-consumption ones. Only the horses' skeletons excavated in the area of one of the bridgeheads may be connected with the military aspect of the site: most probably being warhorses; nonetheless, one cannot ascertain whether they were victims of a battle or a ritual (*vide*: Makowiecki, Makowiecka 2014: 266–268).

²⁵ Proportions may be different (with appreciation of swords) for the other areas, e.g. Scandinavia, but still the variation should not be that big (*vide*: Wilke 2014b: 95, 97).

on it was easy to collect them, whereas axes have sunk immediately. The shields' shortage might derive from the same reason. Another challenge lays in a fact that numerous militaria, including axes (**Fig. 9**), have been found far from the bridges; inasmuch in the part east to the island they have been encountered close to the bridge, in the western they appeared in the elongated, several-dozen-metre-wide zone, reaching over 150 m to the south and north from the bridgehead; additionally, there is a small area with militaria adjoining to Ostrów Lednicki from the south (Wilke 2014b: fig. 14). Axes have appeared in all abovementioned parts (Sankiewicz 2013: fig. 4).

Some scholars try to explain weapons' position distant from the western bridge by the fact that the battle could have been waged on the ice cover or the rafts and boats might have been used, possibly during landing of invading troops in various parts of the island (Kola and Wilke 2000: 57; Wilke 2006: 446–448; 2014b: 113; 2018: 76–77). The first possibility seems unreasonable here as in such case one should expect no skeletons in the lake and the same should refer to the more valuable weapons: this is even easier to collect the spoils of war from the icy battlefield than from 'normal' one, i.e. a grassland. Another explanation does not seem trustful too: the logboats are the only watercrafts known from the lake, some of them possibly from the times when bridges have existed (Ossowski 2014). Waldemar Ossowski has observed that some were made of poplar and lime, i.e. light, locally accessible wood, and presumes that the traces of the logistic operation, having included preparation of the logboats fleet for the attacking forces, could be visible there (Ossowski 2014: 253–254). However, in the author's opinion unstable logboats with curved bottoms (the flattened ones are typical of the later times – *vide*: Ossowski 2014: 252, 254) were the means of transport or fishing and did not serve the military purpose. Too shaky even to stand inside, they seem very dangerous to transport fully equipped attackers not to mention their engagement in fighting. Even if troops were light armoured, they would need a space for long spears and shields and with the vessel's width of 40–90 cm (Ossowski 2014: 252) it seems rather improbable. Moreover, such craft would require propulsion, so the place for paddlers should be provided as well. All in all, it seems hardly imaginable that such boats were used for transport of more than scouts, although the opposite opinions are acknowledged by the author of the hereby paper (*vide*: Ossowski 2014: 253, 257). Possible use of rafts, although proven for the fifteenth- and sixteenth- century Switzerland (Wilke 2018: 77, fig. 19), is excluded too, as – driven by a pole – they were useless in deep waters of Lake Lednica (Ossowski 2014: 254). Additionally, the distance between certain weapons and the western

shore of the island seems too big (even over 50 m) to be in a range of an axe's or spear's throw, considering the imaginable defenders' counterattack.

If the concept of a battle situated on both bridges was right, one should probably assume an abrupt attack, not including landing forces; information concerning medieval encounters situated on bridges have been collected by Gerard Wilke (2006: 451–453). Otherwise, i.e. in the situation including the visible preparation for landing, the defenders would surely destroy the bridgeheads to prevent the easiest way of an assault.²⁶

Some of military equipment found far from the bridges cannot be explained by a battlefield concept, also because of some additional contextual elements, i.e. the ring-mail without its 'human content' (Kola 2014; Sankiewicz 2018a: 142–143; 2018b: 222, Cat. No. 1); it seems hardly imaginable that it has not been worn by the landing troops. In this matter it is worth recollecting the story about the Pomeranian raid of Bolesław II the Generous and his knights presented by Gallus Anonymus; some of them drowned while crossing a river because of the ring-mails and arms burden, which has resulted in eliminating armour from the Polish armament (*Cronica et gesta...*, after 2003: I, 25). It seems to be just a curiosity without significance for the real weaponry. The concept that the ring-mail from the vicinity of Ostrów Lednicki has been quickly removed and dropped right after a warrior has fallen into the water (Wilke 2006: 448) seems purely theoretical as one cannot dispose of heavy armour (ca. 10 kg) in a very dense surrounding without any help and in time short enough to avoid drowning.

One should also remark that in the elongated zone adjoining to the island from the west not only weapons, but also household and agricultural tools have been discovered (Radka 2014: 153). As far as the author is concerned, it should not be treated as garbage (Wilke 2006: 449), as the assemblage included a great number of iron tools, which might have been re-used (forged once again). Therefore, the interpretation opted for in hereby paper is the sacrificial one, at least of that part of the site.²⁷ It is sometimes assumed that the sacrificial deposits preceded the official Christianization of Poland (Słupecki 2006: 68) which may be proven by the fact that singular axes from Lake Lednica are dated generally to the 9th–10th century

²⁶ Although traces of burnt wooden logs have been found at the bridgeheads, they rather seem to suggest an aborted activity; they may as well be a result of a battle or retreat. Another proof for the fire on the bridge are the partly burnt hafts of certain axes (Wilke 2014b: 113), which would let one link at least part of militaria directly with a battle. However, this must not be so obvious, as there are no mentions concerning scorched hafts in further detailed studies (*vide*: Stępnik 2013; Kotowicz 2013: 74–78) and the burnt fragments were not visible after the conservation process (personal communication: Piotr Kotowicz, Ph.D., to whom the author is grateful for the information). One should mention that decomposition of the waterlogged wood may result in burnt-like surfaces having actually nothing to do with fire treatment (*vide*: Ossowski 1999: 57).

²⁷ It seems not utterly clear whether it was a place of an encounter or rather/also offerings, but further studies are essential to solve the problem, including elaboration of the plan showing the detailed distribution of artefacts.

(Kotowicz 2018: 172). However, the phenomenon must not be narrowed to pre-Christian times. Surely, not all warriors living in Ostrów Lednicki have been deeply devout Christians and even then traditional rites, i.e. watery offerings, probably survived, at least partially.²⁸ Long-lasting pagan ceremonial activity associated with water, mentioned several times in the written sources (*vide*: e.g. Wilke 2018: 73, 75, with further literature; Słupecki 2006: 67), is confirmed by complaints of priests as late as in the 14th and 15th century (Bylina 2009: 96, 116, here collection of adequate mentions taken from written sources). These practices have survived in folklore, often changing over time into Christian customs (e.g. divination on the St. John's Eve and Refreshment Sunday).

One should pay attention also to another phenomenon observed in Lake Lednica: there are a few weapons (**Fig. 10**, *cf.* **Fig. 9**) from the Late Medieval Period (axes and a sword) found far from both bridges and close to them (Sankiewicz 2013: fig. 4; Kotowicz and Sankiewicz 2013: 130, 172, 198, 224, 234, 238, 254, pl. XIV:2, XXXV:2, XLVIII:2, LXI:2, LXVI:1, LXVIII:2, LXXVI:2; Pudło and Żabiński 2011: 30–31, pl. IX). They are linked with the 7th settlement layer in Ostrów Lednicki stronghold and the existence of the manor situated on the small hill-fort on Ledniczka Island, i.e. the late 14th and early 15th century (Kotowicz 2013: 82; therein further literature). It probably means that the pagan rituals have been cultivated here, although on a small scale. The most astounding is the fact that some axes have sunk close to the ruins of the bridges. Dendrochronological studies have proven that the constructions have not been rebuilt after the Bretislaus' calamity (Krapiec 2000). One may assume that their ruins had still been recognizable in the late 14th century and the offerings situated here make one ponder over the possibility that even earlier the bridges had served their sacrificial purpose (*vide*: fn. 27)! Great number of weapons and preference for the axes may be explained by multiple episodes resulting in weapons casting, but – taking into account all abovementioned coincidences – not necessarily as military activities but ritual ones as well.

The fact that ritual activity connected with water basins has taken place in medieval Pomerania was proven very well by the finds from Żółte on Lake Zarańskie in Drawskie Lakeland, where axes were one of the most popular sacrificed items, definitely outnumbering spearheads. They have been discovered in line with a stronghold and adjacent settlement situated on the peninsula (**Fig. 11**) – in the shallow bay – as well as around the small island

²⁸ Gerard Wilke believes that it cannot be true in case of the ruler's seat (*sedes principales*), due to the close proximity of the representatives of the Christian state and religious elites (2018: 46); however, it seems that the pagan rites have survived in case of at least vast numbers of soldiers (i.a. mercenaries), even if covered with Christian patina. Moreover, the rites might not have been performed overtly, as in a provocative way. See also remarks of Arkadiusz Michalak (2015: 300) and the whole paper, although dealing specifically with swords.

next to the aforementioned peninsula (Kaźmierczak 2014: 243–251, fig. 6.117); one has to underline that the water level during the times of medieval sacrificial activity (late 9th–11th/12th century – *vide*: Chudziak, Kaźmierczak 2014: 25) was slightly higher than it is today (Chudziak *et al.* 2014: 62–64, fig. 3.30–31).

There are also other contexts for medieval axes found in lakes.²⁹ In case of finds close to quay's construction (**Fig. 12**), one may think of inadvertent losses resulting from construction works or normal activity situated on the piers like possibly in case of Niedźwiedź, site 5 on Lake Steklińskie (Steklin, Dobrzyńskie Lakeland), where seven axes, a spear (together with a shaft), half-scythe, sickle, bronze bowl, bone skate, and pottery (Chudziak *et al.* 2011: 141–147, figs 116–120) have been discovered close to the wooden constructions; another example is Pszczew, site 2 on Lake Miejskie (officially: Kochele, traditionally: Pszczewskie) in Lubuskie Lakeland with early medieval swords, a spur, dagger, half-scythe, punch, bowl, quern stone, fishing lures, antler fragments, and pottery (Chudziak *et al.* 2011: 178–185, figs 149–154). In a similar way one may explain finds stretched along the lake shore and adjoining to the reed bed in the vicinity of medieval strongholds or settlements, e.g. Łoniewo, site 1 on Lake Łoniewskie (called also Osiecznica) in Krzywińskie Lakeland (Chudziak *et al.* 2011: 107–115, figs 83–89) – apart from axes and spearheads also the knives, iron keys, buckets mounts, an agricultural tool, bone skate, clay weight, pottery, and antler pieces have been documented here – or Raduń, site 16 on Lake Raduń in Choszczeńskie Lakeland – with an iron strike-a-light, axe, knife, two sickles, and a potsherd (Chudziak *et al.* 2011: 193–195, figs 193–194). Similar interpretation may be applied in case of Bnin, site 1 on Lake Bnińskie in Greater Poland where a bone skate, spearhead, early medieval axe, quern stone, medieval pottery, and a bronze socketed axe (dated to Early Iron Age) have been found (Chudziak *et al.* 2011: 37–42, figs 13–15), and maybe also Danków, site 9 on Lake Wielgie in Myśliborskie Lakeland (Chudziak *et al.* 2011: 60–64, figs 35–36) with, i.a. three late medieval axes, a spearhead, two iron padlocks, a pot-shaped tile, and clay vessels. On some occasions the discussed items have been found among wooden remains of former stronghold walls or shore reinforcements, as in case of Gwieździn, site 54 on Lake Szczytno in Krajeńskie Lakeland – two axes (early and late medieval), a sickle, and potsherds from the Early Middle Ages (Chudziak *et al.* 2011: 69–73, figs 43–47). However, even then one should theoretically consider the possible sacrificial purpose of certain finds, especially in case of the discoveries in significant distance from the lakeshore. Some categories of items are understandable as casual losses, i.e. bows of buckets and clay pots (connected with water

²⁹ Chosen examples come mostly from Pomerania but also Greater Poland.

drawing), as well as clay sinkers, and fishing lures (fishing) or broken elements impossible to repair (quern stones or small metal elements). But in case of well-preserved weapons and agricultural tools (scythes and sickles mostly) as well as keys/padlocks, one should speculate why these particular categories of items appear here repeatedly and whether they might bear any ritual meaning. Over-representation of axes generates the reflection too.³⁰ One can assume that at least some finds may be interpreted as sacrificial ones, linked probably with the military sphere (maybe associated with the warfare³¹) and agricultural one (fertility rituals?).³² But also keys have a vast potential symbolic meaning, connected with the opening and closing, so, therefore, with controlling, sheltering, and giving. They were symbols of ancient chthonic deities, an attribute of Greek goddess Hekate (controlling of magic or the nature) or Celtic Epona (opening the door to the netherworld); in Roman world the key was given to ladies of the house with wishes of fortunate childbirth; it used to be also a symbol of the power over household, known in the Merovingian period etc. The same symbolism refers to the padlocks (Czarnecka 2010: 20–26). One may also consider the bridal offerings (women's ornaments found in bogs are interpreted in that way – Bluijienė 2010: 156–157). The phenomenon definitely requires further studies. Moreover, the riverine finds of medieval axes have been reported as well, and these are usually numerous.³³ Their original context is difficult to reconstruct precisely.³⁴

³⁰ One should consider also utensils lost while preparing ice holes. There are different tools useable here and an axe is one of them. Though it seems to be a very rare accident to lose the axe as its butt is much wider than the blade so it jams in the break of ice cover. Afterwards it is not the case of ice picks which one may frequently find in lakes: obviously the modern ones but possibly they occurred also in medieval times. One should consider, e.g. the find from Ostrowite Trzemeszeńskie, site 13 on Lake Ostrowickie in Gnieźnieńskie Lakeland (Chudziak *et al.* 2011: 168, fig. 135:h), interpreted as a late medieval javelin head or missile inspired by Frankish forms (*ango*); the latter possibility is improbable as such forms quit as early as the 6th century (Siegmund 1996: 702–703) and elements dated this way are lacking at the site; moreover, they are unknown from the territory of Poland until now.

³¹ Such idea was suggested for the Roman and Migration periods as well as the medieval bog offerings of weapons from Neman-Daugava interfluvium area (Bluijienė 2010: 144–156, table 1) and medieval axes from Prussian territory (Nowakiewicz 2017: 96). One should remember symbolic value of medieval weapon depositions in waters as expressed in the Arthurian legends, i.a. Excalibur given to Arthur by the Lady of the Lake and brought back to the lake, or Excalibur's scabbard which was said to have powers of its own sheltering its bearer, stolen from Arthur by his half-sister Morgan and thrown into a lake, never to be found again (Bradley 1990: 1–4).

³² Taking into account the character of offerings left in and close to waters it is assumed that sickles and half-scythes might have performed alternative social functions as apotropaic devices deposited to advert demonic influence thanks or votive offerings symbolizing the fruits of the earth and abundant harvest; tools' effectiveness was to be strengthened by the material (iron), sharp blade, and crescent shape (*vide*: Chudziak 2005: 201–202, 213–214, 218). There is also a tantalizing symbolic connection of sickles with the military sphere, i.e. it served as a weapon or tool during military expeditions, e.g. to acquire the fodder for warhorses (Janowski and Kurasiński 2010: 91–92; here also different interpretations of such finds from funerary contexts like denominators of the position or anti-vampire treatment – Janowski, Kurasiński 2010: 90–94). It may be valid also for the earlier times, i.e. La Tène Period sacrificial bog site at Llyn Cerrig Bach (Cae Ifan Farm, Anglesey, Wales; Fox 1946: fig. 65, 144).

³³ In case of Pomerania, these are mainly finds from the rivers bordering the country, i.e. Odra and Noteć (Kotowicz 2014: 83, 84, 168, 169). For weapon deposits in liminal zones *vide*: Kontny 2019: 9–11.

³⁴ These are sets composed of axes exclusively.

Watery finds of medieval axes are dated mostly to the 11th century (basing on the catalogue by Piotr Kotowicz – Kotowicz 2014). Could this issue be correlated with the military crisis and cultic activity resulting from the warlike tendencies comparable to the Roman period votive deposits in northern Europe? Internal problems and military activities of Poland in the 11th century resulted in the independence of Pomerania. This created a field for the undisturbed implementation of the pagan beliefs. The manifestation of them sustained a sense of political separateness and inner unity. However, those are also the times of internal struggles resulting from consolidation attempts (Piskorski 2002: 49). Contact with the Christian world has transformed some pagan practices. This fact may result from the intensification of iconic deposits. Pomeranians' attachment to pre-Christian beliefs has been confirmed by the missionary operation of St. Otto of Bamberg in the early 12th century (*Dialogus de Vita Ottonis Episcopi Babenbergensis*, after: Bojar-Fijałkowski 1986). Symbolic value of axes is known from the Bronze Age in the Nordic cultural circle, specifically their connection with lunar sphere and divine twins – rescuers of sailors, protectors of travellers, helpers in battle, healers of illness, master musicians and dancers (Kristiansen 2013: 85–87). But myths of various nations lets one attribute them to thunder gods and also pay attention to their link with *rites de passage* (also childbearing and weddings) and apotropaic power – in the Slavonic and Balt milieu they were put under beds or cradles, edge upwards, or situated outside houses during tempests – to secure a sleeping person against demons or to drive away storms (Moszyński 1934: 310). They were used also in rituals aimed at securing the fertility of plants and animals (Pelka 1987: 56, 58). Sometimes they were situated under the bench on which the coffin rested as a mean of protection against the deceased and another connection with burial ceremonies is waving an axe which was meant to clean the room in which the dead body had lain to get rid of the death itself and evil spirits too (Kotowicz 2018: 171, with further literature). One may be sure that they had their symbolic meaning also in the Middle Ages, as the axes-amulets or items of possible ritual purpose inferred from their decoration (Kotowicz 2018: 171–172). Additionally, it was the attribute of certain saints but also executioners and symbol of authority, power, war, martyrdom etc.; it was frequently used in coat of arms as well (Wyrwa 2013: 13–18, 20–22).

Summing up, it is assumed that the axes deposited in Lake Lubanowo have been the offerings. There is no place for queys in at least a few spots where they have been found: great boulders densely covering the bottom in the western part of the lake exclude such possibility. If one was to assume that the items sank haphazardly in connection with

household activities, how could the fact that some of them have been found more than 20 m from the lakeshore be explained? Air-hole losses should rather be rejected as well. Moreover, there are also further Roman period artefacts (mostly weapons and horse harness) and medieval specimens (i.a. spearheads, padlocks' keys, and horseshoes) found here. All in all, the lake in Lubanowo seems to attract the attention of weapons' keepers both in the Roman period and medieval times, but also in 20th century, as the post-war battlegrounds in the region (i.a. battles of Banie, while failed German armoured offensive *Sonnenwelle* in February 1945) were cleansed of junk and the place in which it was drowned was... Lake Lubanowo. *Genius loci*?

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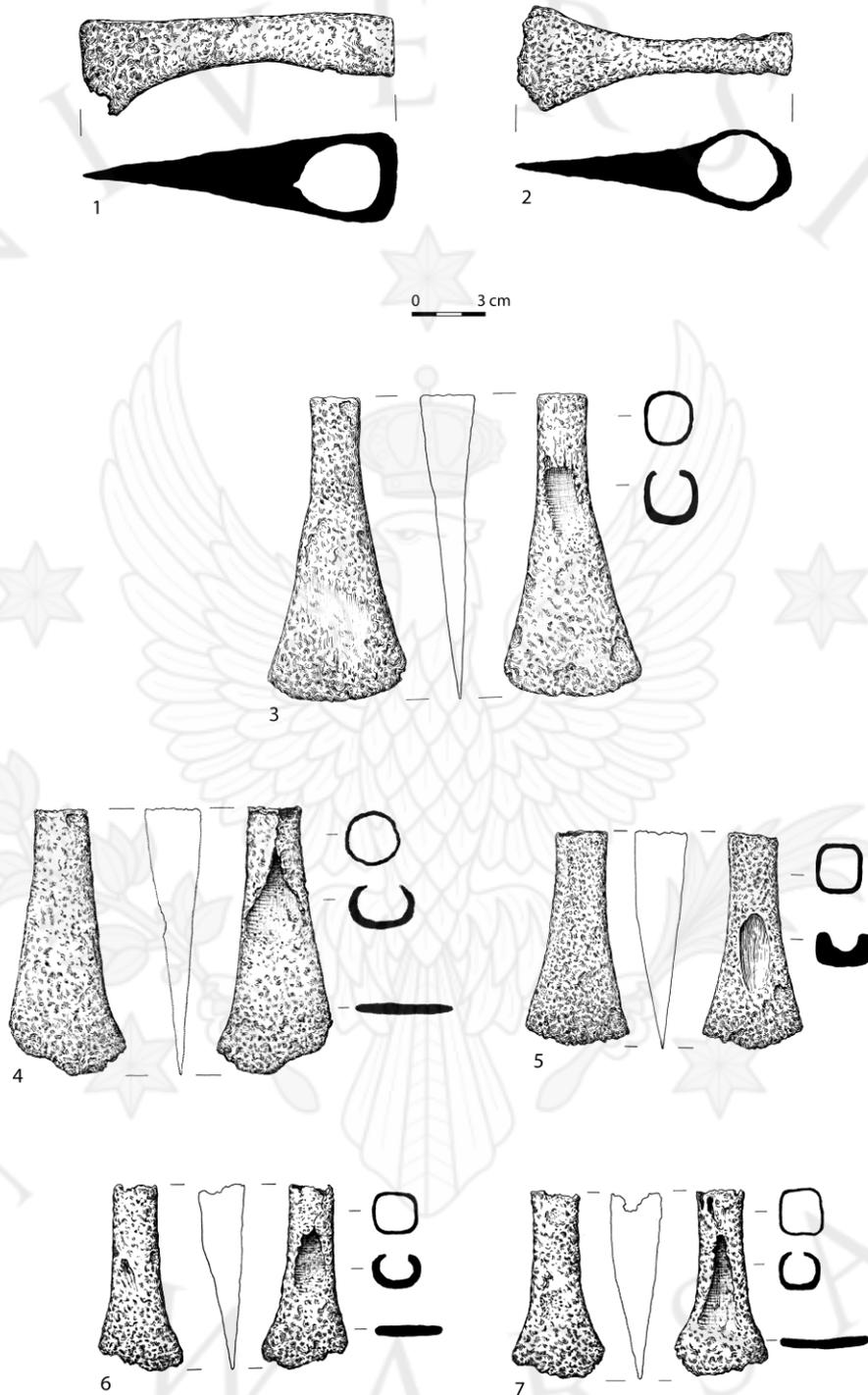


Fig. 1 – Roman period axe heads (1–2) and adzes (3–7) from Lubanowo Lake (after: Kontny *et al.* 2016a)



Fig. 2 – Early (1) and late medieval (2–3) axes from Lubanowo Lake (1 – photo by: J. Strobin; 2–3 – photo by: M. Osiadacz; 2a – photo by: T. Nowakiewicz; 3a – photo by: B. Kontny)

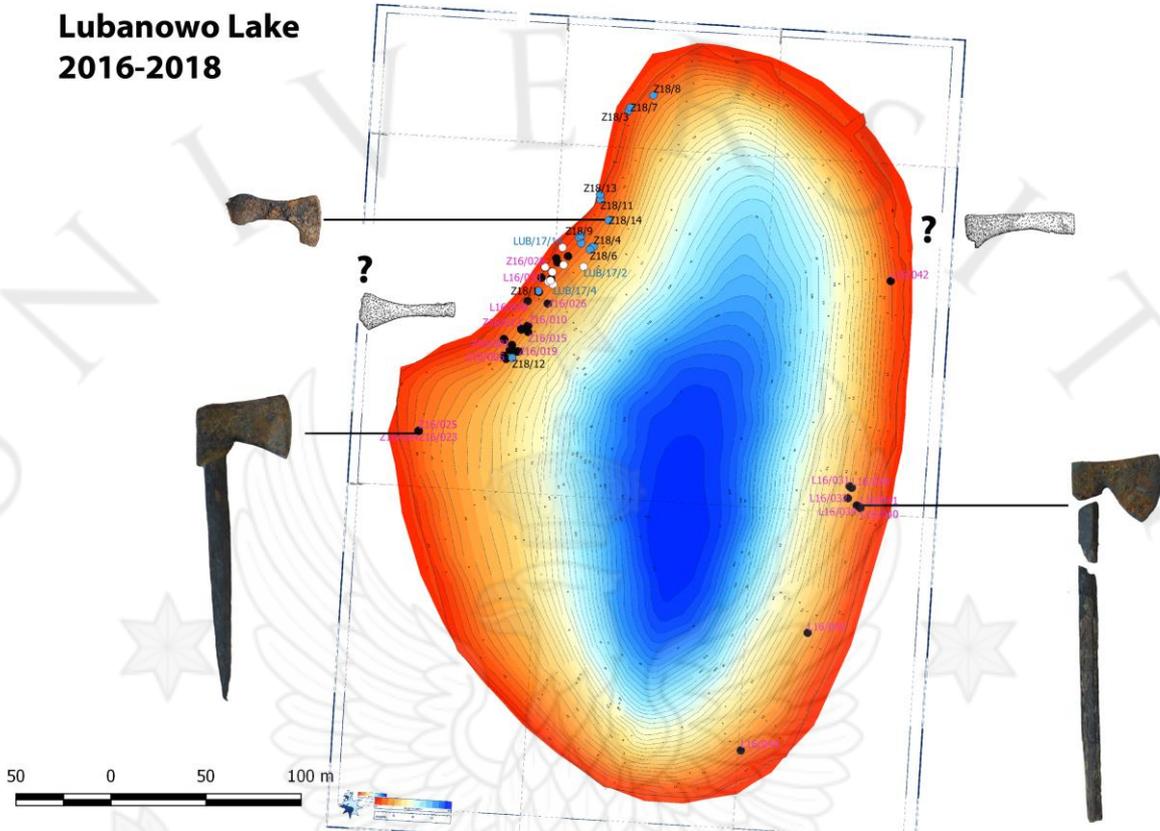


Fig. 3 – Bathymetric plan of the Lake Lubanowo with marked findings of relics (years 2016–2016; with inventory nos), including axes (elaborated by: P. Prejs, B. Kontny)

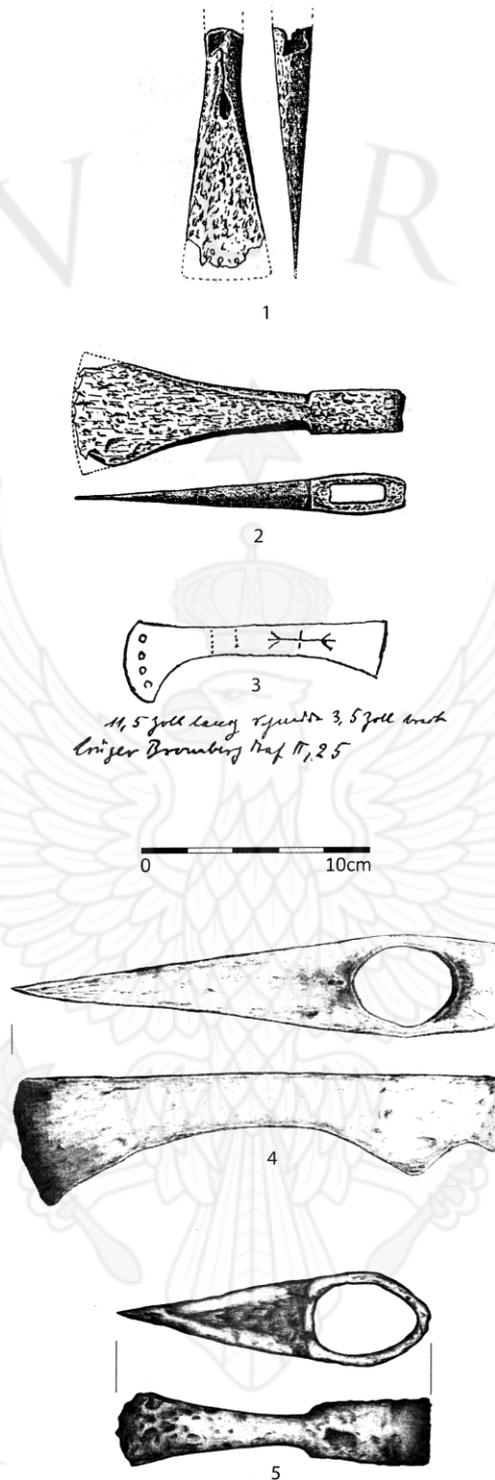


Fig. 4 – Roman period adze and axe heads from bogs/lakes in Poland,
1–2 – Żarnowiec (after: La Baume 1940), 3 – Piła (after: Kontny 2019),
4 – Krępsk (according to Chudziak *et al.* 2016), 5 – Leginy (after: Chudziak *et al.* 2011)



Fig. 5 – Reconstruction of sacrificial place at La Tène by André Houot (after: *La Tène...* 2009)

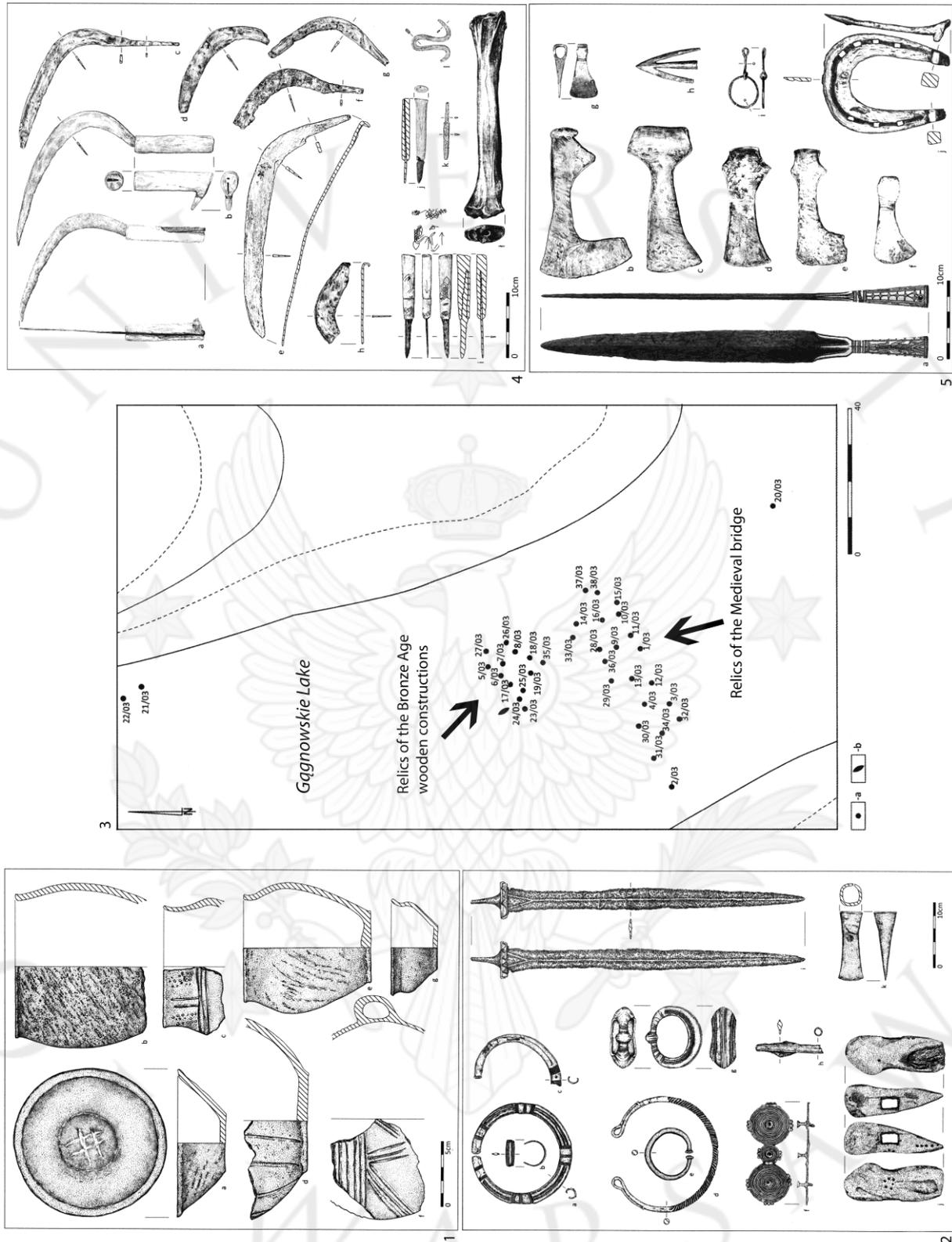


Fig. 6 – Nętno, site 38. Location of archaeological objects excavated during exploration in 2003 (3) and Early Iron Age (1–2) or medieval (4–5) finds. 3a: historic objects, b – dugout boat (after: Chudziak *et al.* 2011)

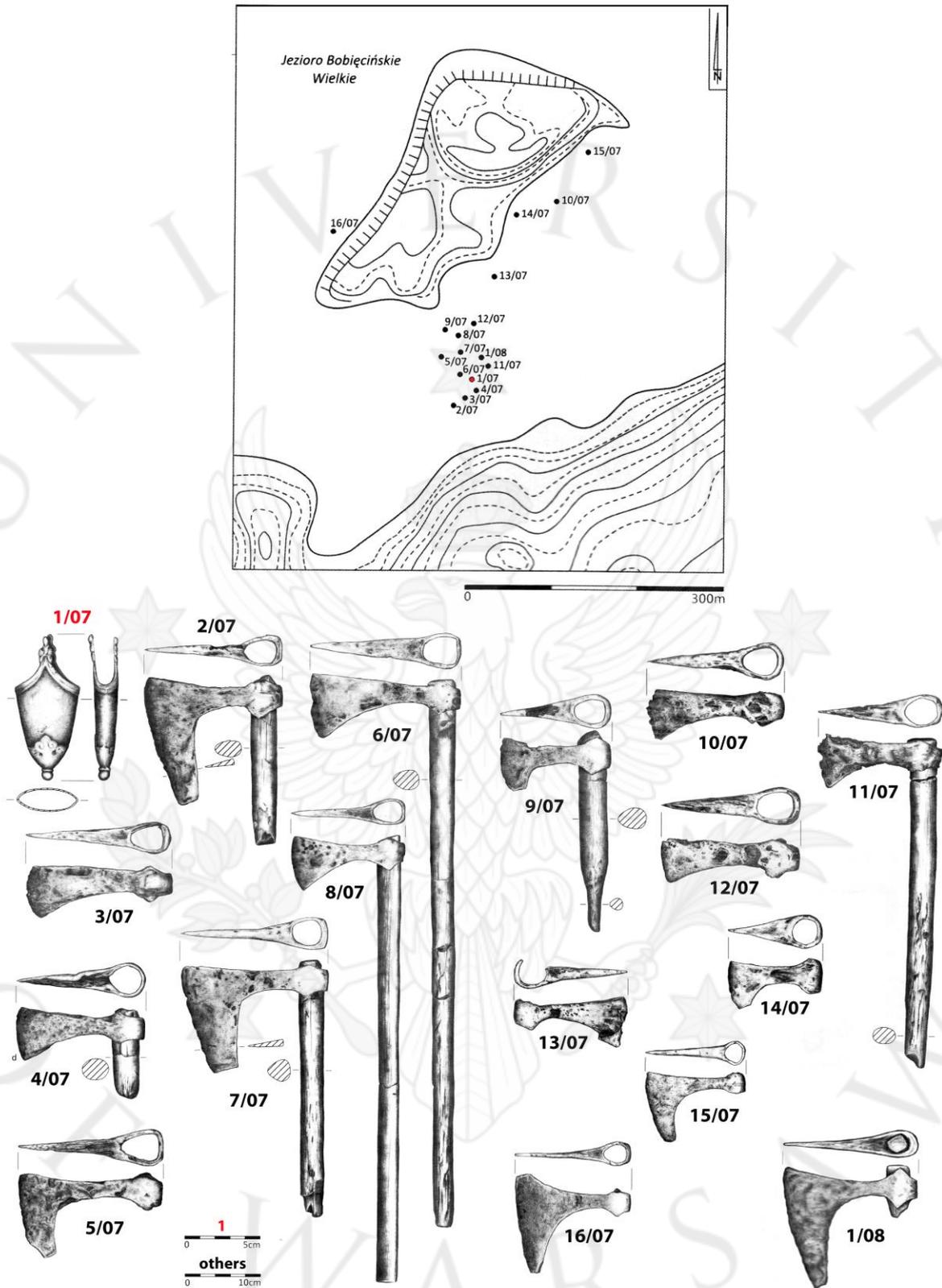


Fig. 7 – Bobięcino, site 3 and selection of the finds excavated during exploration in 2007 with inventory nos (elaborated by: B. Kontny, after: Chudziak *et al.* 2011)

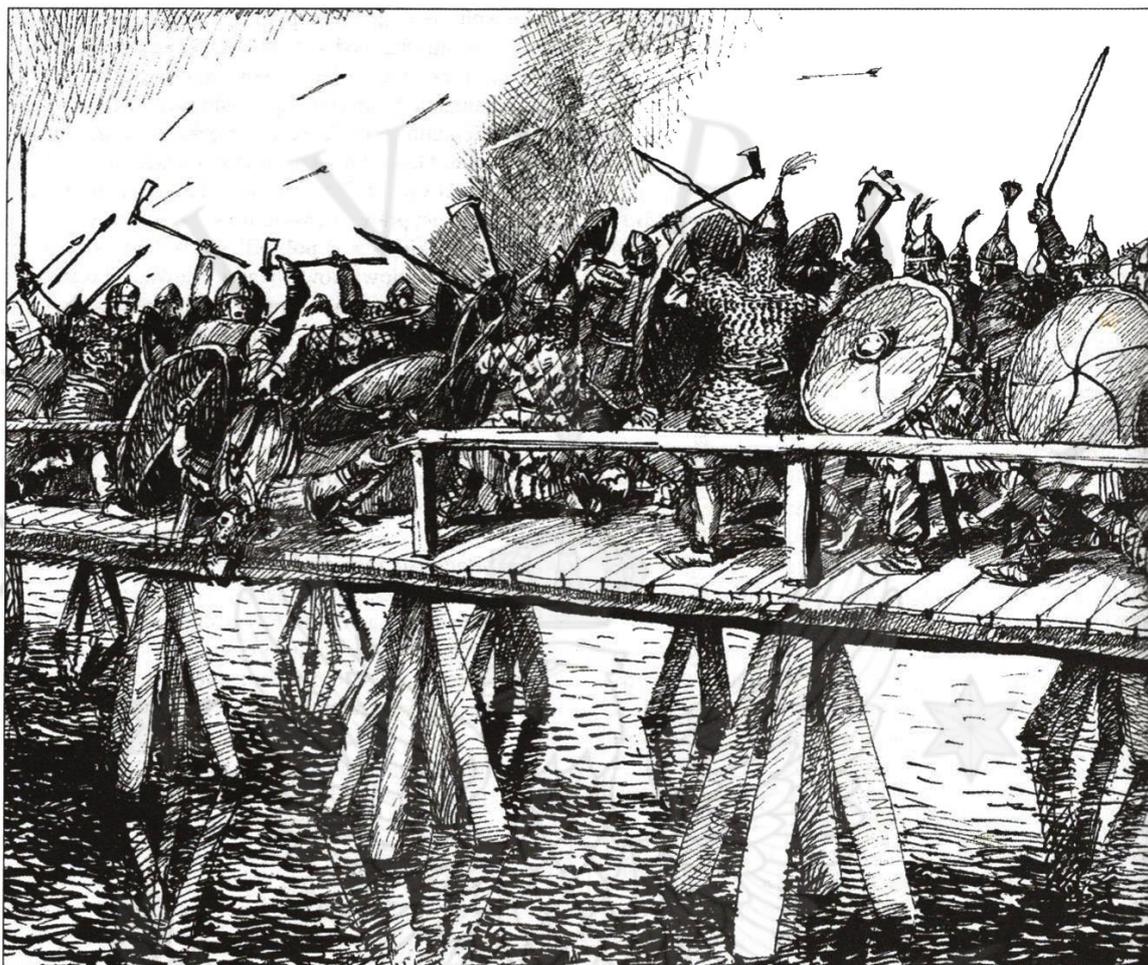


Fig. 8 – Present representation of the fights on the Ostrów Lednicki bridge in 1038
by A. Zaręba (after: Wilke 2014b)

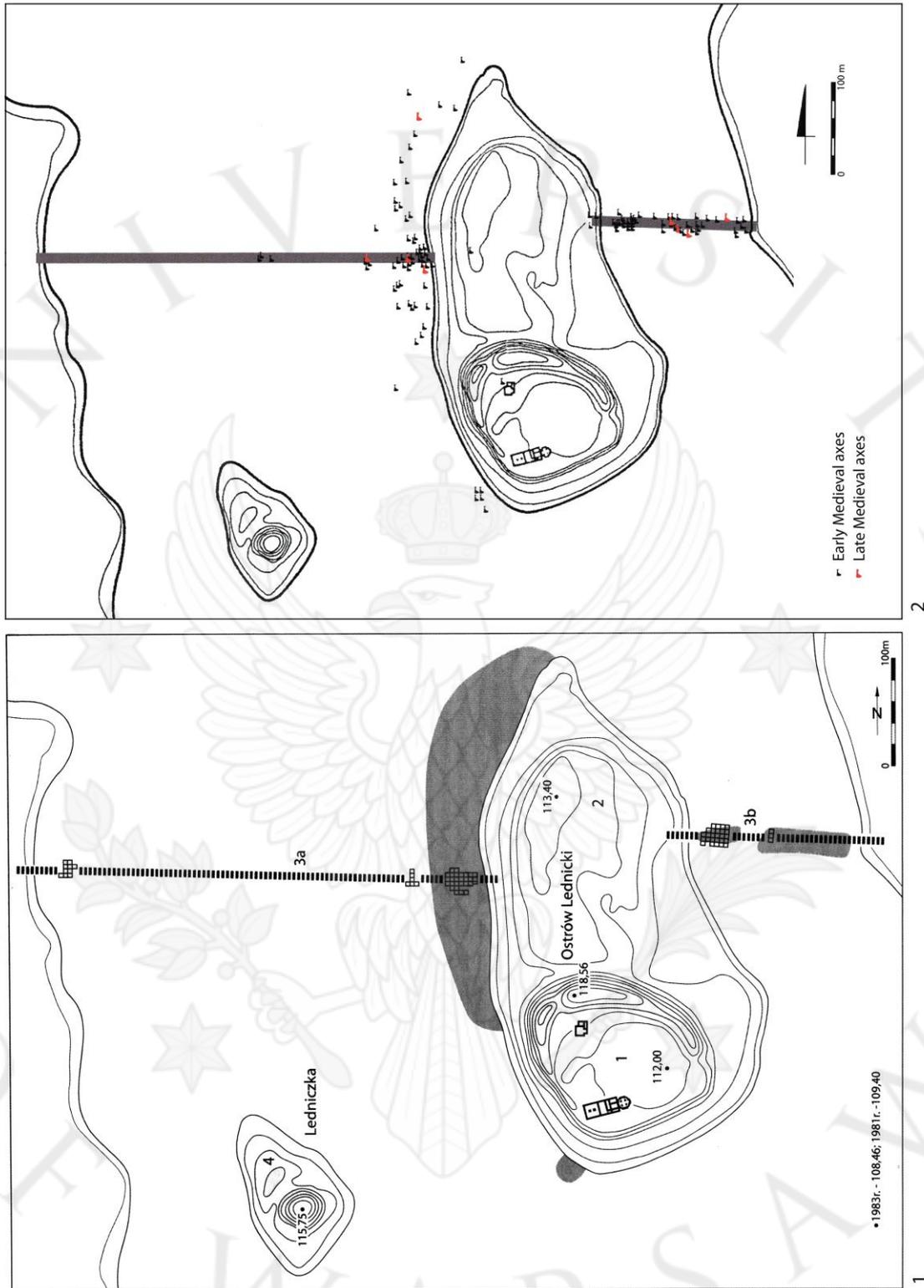


Fig. 9 – Distribution of militaria in the vicinity of Ostrów Ledniczki. 1 – bridges with sectors of excavating military accessories at the bottom of the lake marked in grey colour (1 – stronghold – the residence of the First Piasts, 2 – borough settlement, 3a – „Poznań bridge”, 3b – „Gniezno bridge”, 4 – Ledniczka – mote-and-bailey conical fortress; according to Wilke 2014b), 2 – the location of the axes (after: Sankiewicz 2013)

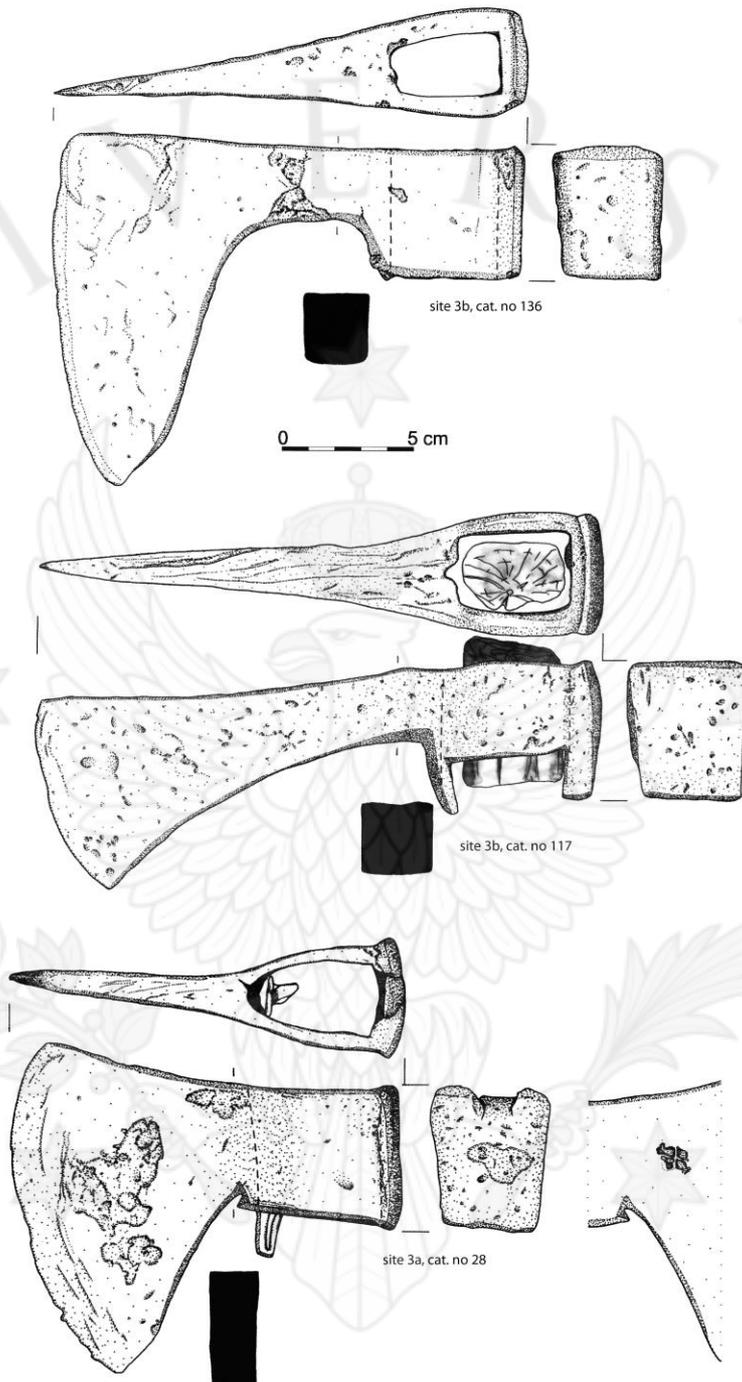


Fig. 10 – Selection of the late medieval axe-heads found nearby the remains the bridges at Ostrów Lednicki (after: Kotowicz, Sankiewicz 2013)

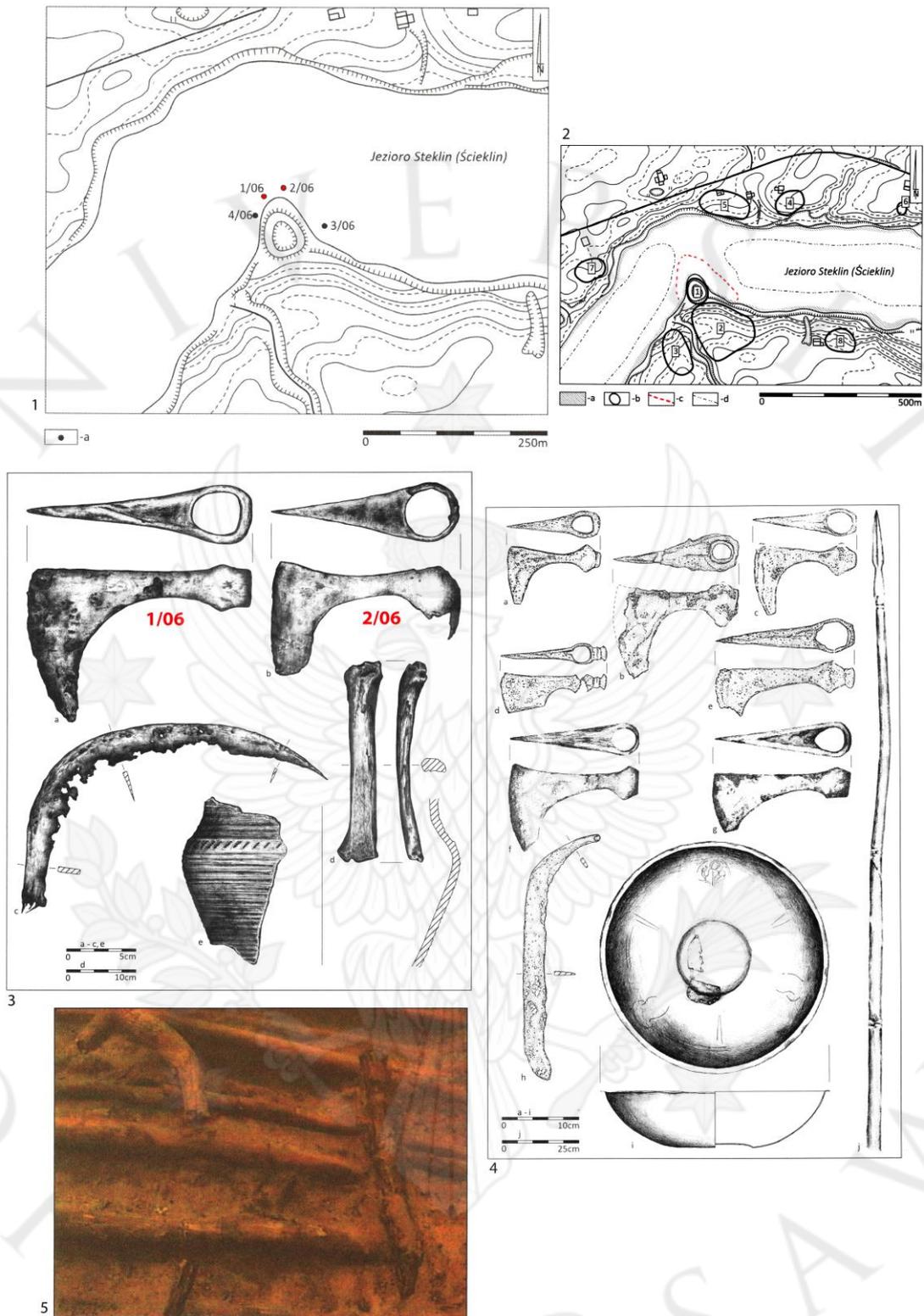


Fig. 12 – Niedźwiedź, Lake Steklin, site 5. 1 – location of items excavated during exploration in 2006, 2 – archaeological sites (1 – early medieval stronghold, 2 – settlement unit of Pomeranian culture and medieval settlement, 3 – medieval settlement unit, 4 – settlement unit of Pomeranian and Wielbark cultures, 5 – settlement unit of Trzciniec culture? and Early Middle Ages, 6 – settlement traces of Pomeranian culture, 7 – settlement signs of Lusatian culture and late medieval settlement unit, 8 – medieval settlement unit; a – range of reed bed, b – dry land archaeological site, c – range of appearance of historic material, d – range of underwater penetration), 3–4 – selection of archaeological finds, 5 – wooden construction excavated in underwater trench in 2001 (after: Chudziak *et al.* 2011)



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