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## The Mesolithic settlement and economy in the Lake Gościąż area

### Abstract

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Lake Gościąż is located in a Gostinińskie Lake District (Central Poland). It contains long and good preserved continuous sequence of the annually laminated lake sediments spanning from the end of the last glaciation to contemporary times. They offer unique opportunities for investigating changes in the environment and human activity in the vicinity of the lakes. This paper is focused on correlation of palynological indicators of activity of the Mesolithic people with the picture of settlement in the region. Another problem discussed there question of reliability of palynological data, and therefore their usefulness for studies on settlement and economy.

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### Introduction

Annually laminated lake sediments offer unique opportunities for investigating changes in the environment and human activity in the vicinity of lakes. The Gostynin Lake District stands out in this respect, with two lake complexes in its northern part having well-preserved annually laminated bottom sediments. The first complex is known as Na Jazach, with Lake Gościąż being the largest. Sediments at its bottom form a continuous laminated sequence spanning from the end of the last glaciation to contemporary times. It should be emphasized that the absolute chronology diagram was developed on the basis of <sup>14</sup>C dates made for over 250 samples. The calendar age has been obtained by a calibration based on dendrochronological analyses of pine and oak wood (Ralska-Jasiewiczowa *et al.* 1998, Table A.1).

The sediments and the environment around Lake Gościąż were investigated by a large international and

interdisciplinary research team (Ralska-Jasiewiczowa and van Geel 1992; Ralska-Jasiewiczowa *et al.* 1998). The results provided inspiration for undertaking regular archaeological research in the vicinity of Gościąż (Pelisiak and Rybicka 1993; 1998a; 1998b; 1998c; 2005; 2006a; 2006b; 2008a; 2008b; Pelisiak *et al.* 1994; 2006; 2007; 2009). A second lake complex where annually laminated bottom sediments have survived comprises the Białe and Lucieńskie lakes. Here as well, bottom sediments were studied and archaeological research was carried out in the surroundings of the two lakes (Ralska-Jasiewiczowa 2012). The two complexes lie approx. 10 km from each other. The Na Jazach Lakes are surrounded by complexes of dunes and various sands, an environment that offered limited opportunities for early farming communities (Kruk 1980), while archaeological materials indicative of hunter-gatherer activity are relatively abundant there (Pelisiak *et al.* 2006; Pelisiak and Rybicka 2008b).

## Archaeological data in the context of palynological data

Among the objectives of the archaeological research undertaken around Lake Gościąż was the correlation of palynological indicators of prehistoric human activity with the picture of settlement in the region (Pelisiak *et al.* 2006). One issue that always emerges in any discussion on human activity recorded in palynological diagrams is the question of the reliability of palynological data, and therefore their usefulness for studies on settlement and economy. These problems have long been present and addressed in studies concerned with various spheres of human activity, primarily in the context of distances over which pollens are transported in different floristic and landscape conditions (Iversen 1941; Tauber 1965; Kruk 1980; 1994; Jochimsen 1986; Valde-Nowak 1995).

They have also been comprehensively described in discussions of settlement and economy of Neolithic communities around both lake complexes (Pelisiak and Rybicka, in print), so we will not go into a more detailed presentation of these issues here. What is worth emphasising, however, is that the lay of the land around the lakes from which the palynological samples were collected, and the fact that the Mesolithic sites – and therefore the areas economically exploited by the hunter-gatherers – were situated close to the lakes (up to 5 km), provide grounds for concluding that the picture and processes captured in the pollen diagrams from sediments at the bottoms of these lakes are relevant to local (in the vicinity of Gościąż) changes in vegetation caused by these communities (Pelisiak and Rybicka 2008b). It should be noted that the presence of charcoal dust in layers containing pollens of plants regarded as indicators of human activity provides important supplementation to the palynological record of the life of Mesolithic people (Pelisiak *et al.* 2006). According to Latałowa (1994, 144–146), apart from when hunting and in camps, Mesolithic communities also gradually learned to use fire to actively manage forests by creating more open spaces favourable for animals feeding on grass or leaves and the shoots of young trees. This kind of activity left traces in the environment and can be identified in palynological diagrams. Plant indicators in the diagrams not only make it possible to confirm the presence of Mesolithic people, but also to determine the nature of their activity. It is worth noting that although examples of interference of Mesolithic people in the environment have been recorded in Poland on the southern Baltic coast (Latałowa 1994) and in Miłkowskie Lake (Wac-

nik 2005), those from Lake Gościąż are particularly well-dated. Summing up, the high-resolution pollen diagrams from Gościąż should be seen as a fully credible source of information on environmental transformations caused by prehistoric communities.

## Gostynin Lake District. Palynological evidence

The earliest traces of human activity around Lake Gościąż were recorded in lamina dated to 7350–6400 BP (6100–5330 BC) and 6200–5770 BP (5145–4550 BC), described as phases 1 and 2 of the anthropogenic disturbances of the natural environment (Fig. 1; Ralska-Jasiewiczowa and van Geel 1998, 269–270; Pelisiak *et al.* 2006). Phase 1 manifests itself in pine forests by the increase in pollens of *Pteridium aquilinum*, *Calluna vulgaris*, and *Rumex acetosella*. In wet alder forests, the changes can be seen, among others, in the presence of *Humulus lupulus*, *Urtica dioica*, *Valeriana*, and *Filipendula*, and plants regarded as characteristic of wet meadows, like *Rumex acetosella*, *Lythrum*, and *Sanguisorba officinalis*. In addition, pollens of *Artemisia*, *Chenopodiaceae*, and *Sambucus nigra* were identified, which are ruderal plants. Maximum values of *Pteridium* pollens are indicative of regular forest fires, as this species grows best in ash-fertilised soils (Zarzycki *et al.* 2002).

Between phases 1 and 2, indicators of anthropological transformations become less evident or disappear. The beginning of phase 2 is marked by increases in the frequencies of pollens belonging to birch (*Betula*), aspen (*Populus tremula*), and alder (*Alnus*). In addition, pollens of several species marking human activity during phase 1 were also identified in phase 2. The diversity of bushes (*Taxus baccata*, *Cornus sanguinea*) increases, as do the shares of *Pteridium aquilinum* and *Urtica dioica*. Their presence, along with the presence of pollens of *Plantago media*, *Pulsatilla*, and *Anthericum*, points to openings in pine forests. The regularity of fires observed in that period testifies to their anthropogenic nature (Pelisiak *et al.* 2006, 15). The activity of hunter-gatherer populations is also responsible for the next phase of anthropogenic disturbances around Lake Gościąż, dated to 4460–4300 BC, which chronologically corresponds to the Brześć Kujawski group of the Lengyel culture (Czerniak 1994) from the Kuyavia region neighbouring the Gostynin Lake District to the west. Previously, that phase was correlated with Neolithic communities, but archaeological research has revealed no farming-herding communities of that age in the Gostynin Lake District (Pelisiak and Rybicka 1998b; Rybicka 2004). Changes in plant assemblages

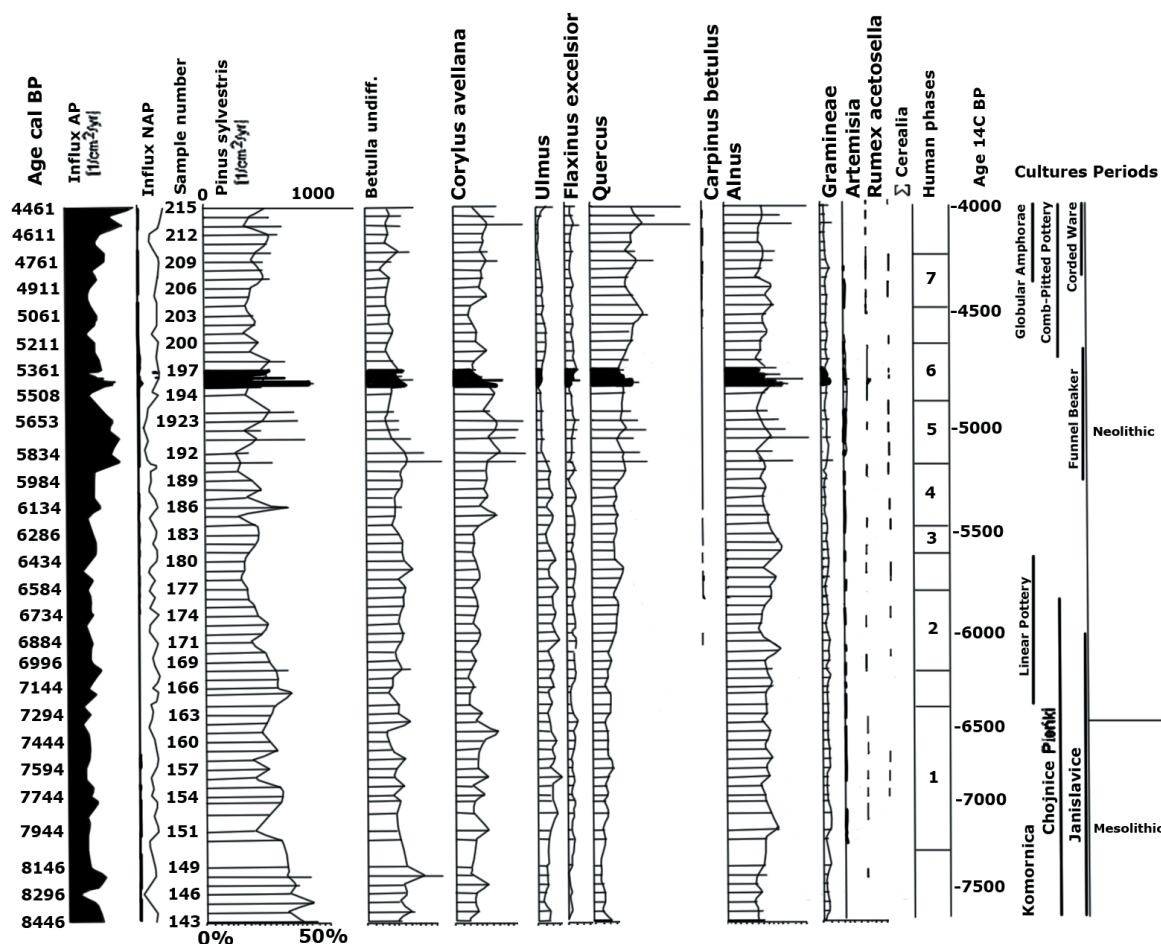


Fig. 1. Lake Gościąg, Kujawsko-Pomorskie voivodship. Pollen diagram referring to the period 7500–4000 BP (after Pelisiak *et al.* 2006, fig. 9)

are evidenced by pollens of *Pteridium aquilinum*, *Urtica dioica*, and the first appearance of *Plantago lanceolata*, indicative of more open forests.

With respect to Lake Białe (which also preserved laminated sediments) and the Gąsak peat-bog, the earliest traces of fires, manifesting themselves by the accumulation of charcoal dust, are not unambiguously parallel to those recorded in Gościąg (Pelisiak *et al.* 2006; Wacnik and Rybicka 2012). The first disturbances of plant assemblages in the diagram from Lake Białe can be dated to around 6059–4540 BC, while traces of fires appear around 6340 BC (Wacnik and Rybicka 2012, 172). During that phase, the proportion of *Quercus* increased in forests, with *Populus* and *Frangula alnus* also present. Around 5890/5790 drops in *Betula*, *Corylus*, and *Ulmus* were recorded, while *Pteridium*, *Artemisia*, and *Poaceae* appeared in deforested areas. *Pteridium* and *Calluna* develop well in recently burned sites (Wacnik and Rybicka 2012, 172). Between 4380 and 3930 BC, the disturbances became less marked, as reflected by the smaller concentra-

tions of charcoal dust and an increase in the proportion of hazel, which filled open spaces within forests. In the diagram from fossil Lake Gąsak, the first phase of human activity falls to a period of 7270–7140 BC, when the proportions of charcoal dust, *Calluna*, and photophilic plants (*Artemisia*, *Rumex acetosa*, *Valeriana*) all noted increases. At the early stages of phase 2, dated to 6520–5630 BC, short-term drops are observed in *Ulmus*, *Corylus*, and *Alnus*, accompanied by fluctuation of *Betula* and a considerable share of *Pinus sylvestris*. The share of herbaceous plants (*Chenopodiaceae*, *Urtica*, *Rumex acetosa*) increased in that period, as also did those of charcoal dust and *Pteridium*. This is interpreted as indicating the opening of forests as a result of the infiltration of the region by hunter-gatherers, causing short-term and small-size disturbances of the natural environment. The period of 5500–4740 BC saw the regeneration of forests, while in phase 3 (4600–4380 BC) the evidence for anthropogenic disturbances became more pronounced, including the indicators of fires (charcoal

dust, *Pteridium*, *Calluna*, *Melampyrum*) and meadow plants (*Rumex acetosa*, *Plantago media*, *Chenopodiaceae*). Until 3850 BC, changes in forest cover were localised and short-term.

### Archaeological evidence

The area around Lake Gościąż is covered with forest, which poses an obstacle to performing archaeological research. 14 sites linked with the Mesolithic period were discovered within a radius of 5 km (Fig. 2), many of them at the margin of the Na Jazach lake complex, like camps at Gościąż sites 8, 11–12 situated on the shore of Lake Gościąż. In the vicinity of Gościąż, of particular importance is a complex of camps at Wistka Szlachecka (Schild *et al.* 1975), representing two techno-typological inventories; one reflects exploitation of single-platform blade cores, and the other has less regular blades and is attributable to the Janisławice culture (Schild *et al.* 1975; Pelisiak and Rybicka 2008b, 26–28). Such characteristics were also recorded in assemblages retrieved from sites in the immediate vicinity of Lake Gościąż. Their chronology cannot be precisely determined, and they can only be placed within the broad chronological frameworks of cultural units they represent (Pelisiak and Rybicka 2008b, 26–28; Kozłowski and Nowak 2019, 261–262). This makes it impossible to identify the camps whose inhabitants were re-

sponsible for the particular disturbances in floral assemblages.

Numerous traces of Mesolithic occupation were identified around Lake Białe and fossil Lake Gąsak as well (Figs 3–4). At least 20 such traces were found in the vicinity of the palynological site of Białe (Rybicka 2012, 77), including at least nine camps. Materials from the excavated Neolithic settlements at Klusk Białe, site 7 and Lucień, site 12 (Gowin and Rybicka 2003), both within a radius of 1 km from the place where the profile was collected, included abundant collections of flint artefacts linkable with the Mesolithic. Eight traces of occupation of the same age were identified near fossil Lake Gąsak as well, including what were probably places of short-term economic activity at Krzywie (Rybicka 2012, 77). However, the chronology of Mesolithic camps uncovered in the vicinity of these palynological sites cannot be determined with more precision at the current stage of research.

### Conclusions

The high resolution of the annually laminated lake sediments offers unique opportunities for the precise dating of environmental disturbances recorded in the palynological material and in the sediment itself (Pelisiak *et al.* 2006). The dating precision of the order of one or a few years allows for phasing and identification of short periods of increased human activity, of periods when this activity was less intense, and finally periods for which no indicators of human activity are present in the palynological material.

Communities of the LBK and the Brześć Kujawski group did not settle in the immediate vicinity of Lake Gościąż (Rybicka 2004; Pelisiak *et al.* 2006). The local environment was not suitable for the economic model, and therefore the occupation, of these communities (Kruk 1980). The closest Early Neolithic settlements are known from Kuyavia, at a distance of approx. 30 km in a straight line (Czerniak 1994). This fact is important for the proper identification of anthropogenic disturbances of the natural environment before the middle of the 5th millennium BC. They cannot be linked with the activity of Neolithic populations, and they can instead be unambiguously attributed to hunting-gathering populations who left numerous traces in the immediate surroundings of Gościąż, and sometimes even near the lake shore (Pelisiak and Rybicka 2008a; 2008b; Rybicka 2012).

Mesolithic activity reflected by changes in the natural environment discernible in pollen diagrams has been identified in earlier research as well. It is

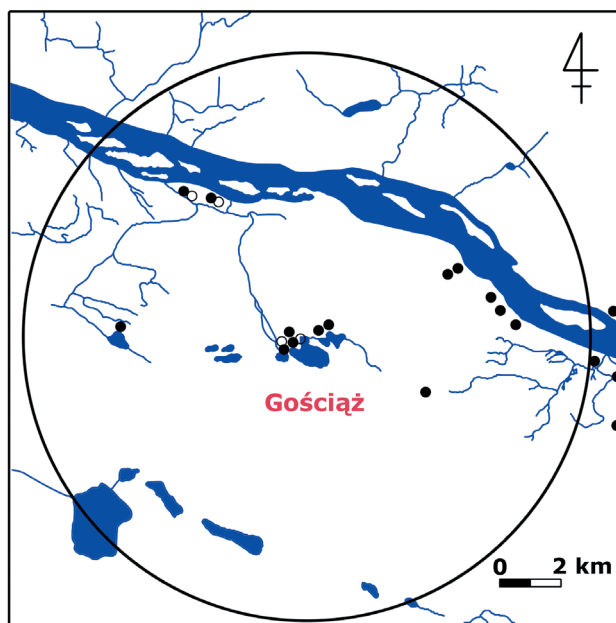


Fig. 2. Location of Mesolithic sites in the vicinity of Lake Gościąż (Pelisiak *et al.* 2006, fig. 5).

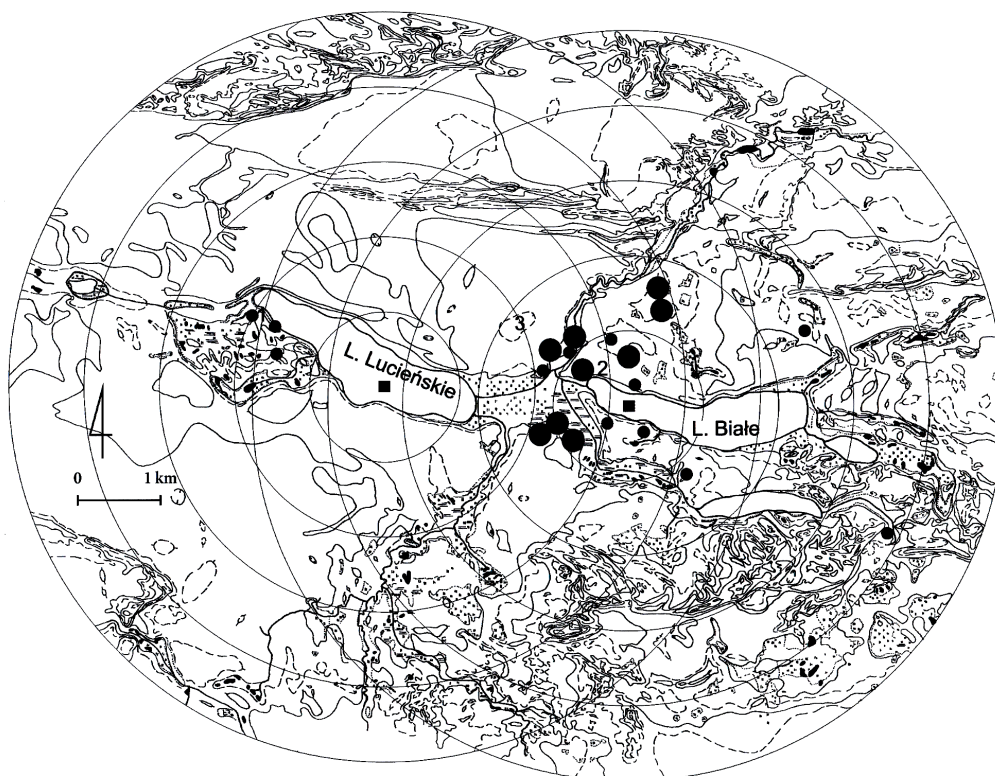


Fig 3. Location of Mesolithic sites in the vicinity of Lake Białe (after Rybicka 2012).

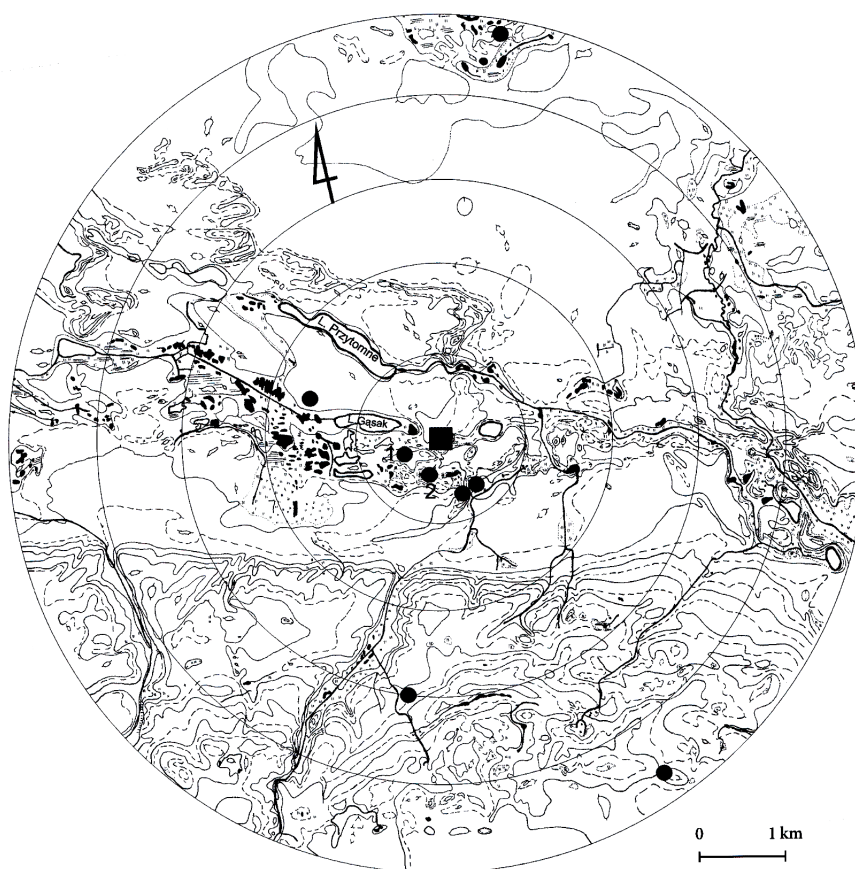


Fig 4. Location of Mesolithic sites in the vicinity of Lake Gąsak (after Rybicka 2012).

worth recalling important findings made in this respect in the British Isles (e.g. Hicks 1972; Innes and Simmons 1988), Germany (e.g. Kloss 1987; 1990), and Poland (Latałowa 1992a; 1992b; 1994). It needs to be emphasised, however, that in the diagrams from Wolin (Latałowa 1992a; 1992b) the earliest phases of anthropogenic disturbances could be caused by Neolithic people whose settlements were located at distances ranging from a few up to a dozen or so kilometres from places where the palynological samples were collected. Such a potential blurring of the picture by Early Neolithic populations is very unlikely in the case of Gościąż. This allows us to regard Gościąż as a model example of a palynological record of the activity of hunting-gathering populations in the lowlands.

Analogical information concerning the activity of Mesolithic communities resulting in disturbances in plant assemblages were identified in the diagrams from Lake Białe and the Gąsák peat bog (Wacnik and Rybicka 2012). Camps used by Mesolithic groups were discovered in the vicinity of all these palynological sites, although the economic activity of their inhabitants cannot be precisely dated.

What the research presented here shows is that the described disturbances reflect the impact of Mesolithic groups inhabiting the close surroundings of the palynological sites, who often caused short-term disturbances in the natural environment without causing its permanent transformation.

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