

DOROTA NALEPKA

PALYNOLOGICAL INVESTIGATIONS OF AN ARCHAEOLOGICAL SITE AT DUDKA (PROFILE D1-26)

The site at Dudka is located in the Mazurian District in northeastern Poland (Fig.1). The prehistoric settlement was situated in the southeastern part of the mineral elevation adjoining the mire called Łąki Staświńskie. Since 1985 this site has been systematically excavated by archaeologists. The heterogeneous archaeological materials, radiocarbon determinations and interpretation of the stratigraphic sequence at the site indicate that the island had been penetrated repeatedly from the early Holocene to the late Stone Age times. The reachest traces of settlement were connected with the early para-Neolithic settlement, the Zedmar culture, dated to the 4th and first half of the 3rd millenium b.c in the eastern and southern Baltic zone (Gumiński, Fiedorczuk 1988; 1990; Fiedorczuk 1995; Gumiński 1995).

KEY WORDS: palynological samples, Mesolithic, Zedmar culture

MATERIAL AND METHODS

Twelve palynological samples from Dudka, from the profile D1-26 dated by radiocarbon, were analysed in 1988 and 1994. This profile comes from an outcrop cut in the plateau and down the margin to the mire (Fig. 2). Material was taken directly from the exposure into glass tubes. The samples were acetolysed by Erdtman's method (Faegri & Iversen 1975). Mineral parts were removed by decanting and treatment with hydrofluoric acid. Percentage calculations of trees, shrubs and herbs were based on the sum of arboreal (AP) and herbaceous (NAP) pollen, excluding aquatics, reedswamps and

spores. Poorly preserved sporomorphs, with distinct traces of pollen exine deterioration were counted as corroded or degraded, as it was impossible to determine them. Spectra from the bottom and central parts were characterized by high frequency. The topmost spectra were not suitable for statistical calculations, as they contained completely corroded sporomorphs; only some of the most resistant sporomorphs had the main features of exine still preserved (*Alnus*, *Betula*, *Tilia*, *Poly-podiaceae*, *Liguliflorae*).

DESCRIPTION OF THE POLLEN DIAGRAM

The pollen diagram (Fig. 3) allowed suggestions concerning the age of the investigated material.

Two bottom pollen spectra (118 cm and 132 cm) are characterized by well preserved sporomorphs. These spectra include pollen of pine (*Pinus*) and birch (*Betula*) as dominants. Juniper (*Juniperus*) is present in smaller amount, aspen (*Populus*), larch (*Larix*), willows (*Salix*) and *Ephedra distachya* are represented by single pollen grains. These spectra may represent the decline of the late glacial or the beginning of Holocene. Radiocarbon date 9 610 ± 70 BP (7 660 bc) from the level L.14a above the calculated pollen spectra, indi-

cates the Preboreal age and is in agreement with palynological dating.

In central levels of the profile sporomorphs are well preserved (57 cm, 66 cm, 77 cm and 97 cm), except for the two topmost spectra (37 cm and 50 cm) in which the degree of destruction is distinctly higher (17.2% and 8.3% corroded grains respectively).

This part of the diagram shows first the successive decrease of birch and pine pollen curvrs and then, the increase in the highest sample. The large number of pollen grains of elm, oak, lime (*Tilia*), ash (*Fraxinus*), alder (*Alnus*) and hazel (*Corylus*) and spruce (*Picea*) is



Fig. 1. Localization of archaeological site at Dudka

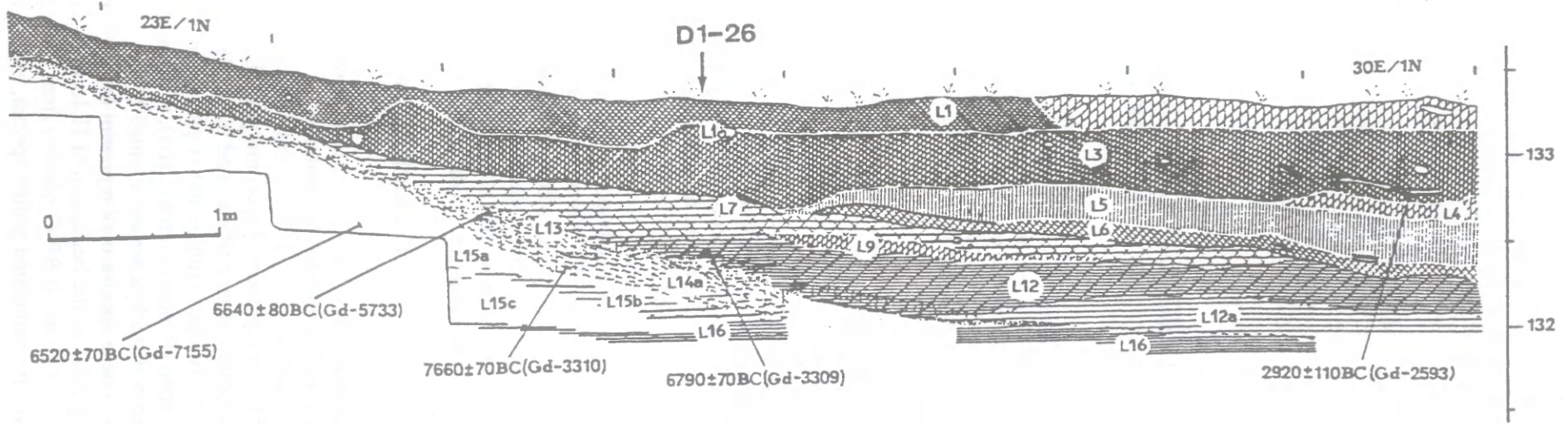


Fig. 2. Dudka 1. Profile of excavation area II. Legend: L1- black peat soil; L1a- clay lenses; L3- black lumpy peat; L4- black-brown coherent peat; L5- brown indecomposed peat; L6- dark livid-brown peat; L7- dark livid-brown spropel; L9- dark brown detritus; L12- brown peaty detritus; L12a- livid gyttja; L13- gravel&brown peat; L14a- brown peat:a-cones; L15a- fine yellow sand; L15b- sandy shell gyttja; L15c- fine sand; L16- shell grey gyttja.

distinctive. They built thermophilous mixed deciduous forest characteristic for climatic optimum. That picture of forest, together with the absence of anthropogenic indicators, dates these levels to the Boreal and the older part of the Atlantic.

The ^{14}C date 8 740 m 70 BP (6790 b.c.) from the level L.12 between pollen samples from 77 cm and 97 cm indicates the beginning of the Boreal and is in agreement with palynological age estimation.

Sporomorphs which, with no doubt, indicate human influence on vegetation in the close vicinity of the excavated site, are absent in all examined pollen spectra. However, there occur single sporomorphs of plants, which can indicate small clearings in the forest cover, namely *Plantago lanceolata*, *Plantago major*, *Pteridium aquilinum*, *Rumex acetosella*. The number of corroded sporomorphs is high too. All these taxa are often con-

sidered as connected with the activity of Mesolithic tribes (Latałowa 1992). In the diagram from Dudka they may or may not be connected with their presence; this question requires more investigations.

Radiocarbon date 4 870 m 110 BP (2 920 b.c.) from the bottom of the level L.3, above pollen sample 50 cm shows the beginning of the Subboreal and this date does not agree with palynological dating. This level includes Zedmar culture (early Neolithic = para-Neolithic) archaeological artefacts. Material for radiocarbon dating was taken 4 m north of the pollen profile (Fig. 2) and this may be the reason for the difference in age.

Topmost pollen spectra (9 cm, 14 cm, 19 cm and 22 cm) included almost only corroded sporomorphs and were not suitable to paleoecological interpretation. They were derived from the level L.1 which included archaeological artefacts dated to the younger Neolithic

DESCRIPTION OF VEGETATION

Mikołajki Lake (Ralska-Jasiewiczowa 1966) is the closest to Dudka, site palynologically analysed site. Mikołajki pollen diagram shows the picture of regional vegetational changes in the late glacial and the Holocene in the Mazurian Lake District. Comparison of pollen spectra D1-26 from Dudka with the pollen diagram from Mikołajki Lake made an attempt possible the characterization of past vegetation in the surrounding in the investigated site. Special attention was paid to the beginning of the Holocene, in connection with prehistoric settlement. Archaeological investigations at Dudka (Gumiński, Fiedorczuk 1988, 1990) have discovered traces of frequent occupation of this territory by hunters and gatherers tribes here were in Dudka from the Preboreal (early Mesolithic and maybe even the decline of Palaeolithic) until the middle of Subboreal (decline of Neolithic). The most intensive traces of settlement are connected with the para-Neolithic Zedmar culture. As the archaeologists suppose, this culture was a continuation of a lokal Mesolithic settlement and economy with very little amount of animal husbandry (ca. 0.5% bones).

The lowermost sample (132 cm) suggests, that pine-birch (*Pinus-Betula*) forests developed in the vicinity of the investigated site. Aspen (*Populus*) grew on their edges. Heliophilous communities with shrubs of juniper (*Juniperus*) and heliophilous herbs, e.g. *Artemisia*, *Chenopodiaceae* and *Gypsophila fastigiata*, developed in the open, unforested areas. This spectrum is similar to spectra from the Mikołajki Lake, described as younger part of the allerød (Ralska-Jasiewiczowa 1966, 1989).

The spectrum from 118 cm is similar to younger dryas spectra (Ralska-Jasiewiczowa 1966, 1989). It

shows a landscape covered by more open pine and birch forest probably, in comparison with the allerød. Larch (*Larix*) was present. In the open areas, bushes of juniper and heliophilous shrubs of *Ephedra distachya* developed. Among herbaceous plants very characteristic and important role was played by communities with *Artemisia*, *Chenopodiaceae* and *Helianthemum*. Single pollen grains in both late glacial spectra represent various families of herbaceous plants (e.g. *Caryophyllaceae*, *Asteroidae*, *Cichorioideae*, *Rubiaceae*, *Umbelliferae*, *Rosaceae*) which cover open areas, too.

Pollen spectrum from 97 cm illustrates vegetation dominated by pine forest with an admixture of birch, bushes of hazel (*Corylus*) and first elm (*Ulmus*) trees. This spectrum is similar to the younger part of the Preboreal in Mikołajki (Ralska-Jasiewiczowa 1966, 1989). According to Ralska-Jasiewiczowa elm and hazel expanded in the Mazurian Lake District about 9 400 years ago; open pine forest with rich hazel bushes were dominating vegetational formation about 8 600 BP, here.

Higher spectra from 57, 67 and 77 cm show the picture of mixed deciduous forest, characteristic for climatic optimum, with oak (*Quercus*) lime (*Tilia*), ash (*Fraxinus*), elm and hazel. Mixed deciduous forests reached their maximum development in the Mazurian Lake District between 6 600 and 5 000 years ago (Ralska-Jasiewiczowa 1966, 1989).

Pollen grains of *Plantago* and *Rumex acetosella* type appeared already in the spectra from the central part of the D1-26 diagram and the amount of heliophilous herbs pollen, like *Artemisia*, *Chenopodiaceae*, *Rumex acetosella/acetosella* type, *Urtica* and the other herbs increased again in the upper spectra. Pollen grains of al-

most all these plants were present in late glacial spectra but now appeared in higher numbers. Curves of *Pteridium aquilinum* and the other fern spores (Polypodiaceae) and corroded sporomorphs increased, too. All these pollen grains and spores may evidence clearings caused by human presence, as they indicate nitrogen rich habitats (*Urtica*, *Chenopodiaceae*), soil impoverishment (*Rumex acetosella* type) and forest burning (*Pteridium aquilinum*). Corroded sporomorphs give evidence of and sediment degradation. That type of pollen picture is often connected with the presence of Mesolithic tribes, and is explained as reflecting their pressure on the environment (Latałowa 1992).

Two spectra from 37 and 50cm reflect the vegetation of climatic optimum too, when forest composition did not changed, but with some forest clearings. They may be referred to the Atlantic; they resemble a little more the picture constructed for 6000, then 5 000 years BP according to izopollen maps (Ralska-Jasiewiczowa 1983). These samples belong to the level L.3, which contains ceramics and other artefacts of the Zedmar culture, which left the most intensive settlement traces in this area, but in the diagram they were not reflected clearly.

The date 4 870 m 110 BP from the bottom part of the level L.3 indicates the older part of Subboreal, but samples for radiocarbon datings and for pollen analysis were taken from the two different sections of the excavation. Pollen profile was situated between 25 and 26 N meter, and C-14 sample between 29 and 30 N meter. This may explain the disagreement of the two types of dating.

From palynological point of view, which is in agreement with the radiocarbon datings, it appears that D1-26 profile from Dudka site (taken in 26E/1N) includes the section of deposit contemporaneous with the early Neolithic settlement, but this profile is not suitable for more detailed paleobotanical investigations. Investigations of the next profile, taken at the edge of the mineral island, in the meter 20E/70N should will give better possibility for palynological elaboration of sediment contemporaneous with the para-Neolithic archaeological material. Then, maybe we will be able to answer the question if the impact of para-Neolithic tribes is reflected in vegetation in the same way as that of the Mesolithic tribes.

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DUDKA D1-26

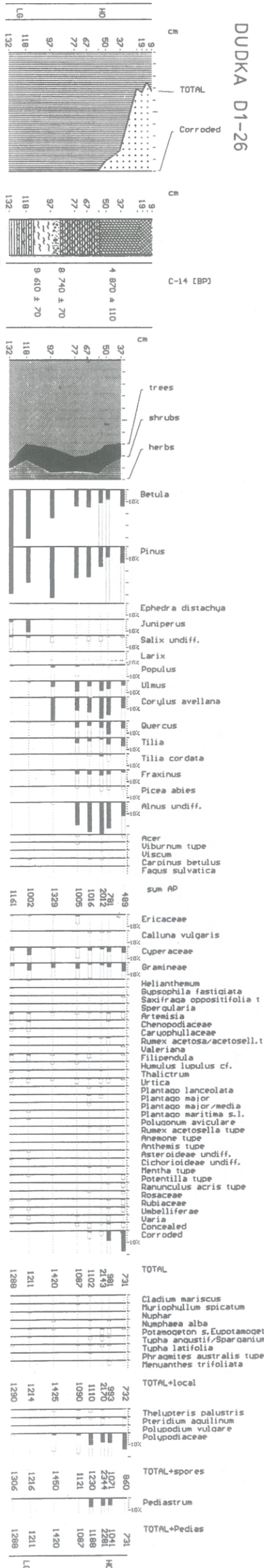


Fig. 3. Percentage pollen diagram from the D1-26 profile from Dudka site