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THE HOLOCENE ENVIRONMENT AND PREHISTORIC SETTLEMENT IN THE NORTHEASTERN BALTIC AREA

Abstract

Three major environmental factors have greatly influenced the settlement of prehistoric foraging groups in the northeastern Baltic area: 1) the evolution of the Baltic Sea; 2) the evolution of inland waterways; 3) the Post-Glacial change of climate and vegetation.

The initial settlement of the Karelian Isthmus and southeastern Finland was closely related to the development of the Vuoksi system, via which the waters of Lake Ladoga were channelled to the Gulf of Finland. The oldest site in the area (Antrea-Korpilahti, 9230±210 BP uncal.) was found in the off-shore deposits of the Vuoksi system.

The beginning of large-scale production of pottery in the entire north boreal Europe occurred during the Alt-2 cool phase (c. 6200 BP uncal.), which predated the maximum transgression of the Lake Saimaa system.

The fluctuations of the Litorina Sea had a considerable bearing on the sub-Neolithic settlement in the coastal area. The stratigraphic and geochronological observations in the Vyborg (Viipuri) area have revealed the occurrence of a Late Litorina transgression, the final stage of which was radiocarbon dated to 4610±150 BP uncal.

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Three major environmental processes have greatly influenced the settlement of groups of population in the northeastern Baltic area in the course of prehistoric and early historic times:
1) Post-Glacial climatic changes and the corresponding modifications in the vegetation and animal world;
2) Evolution of the Baltic Sea resulting from the combined effects of the eustatic transgression of the ocean and the isostatic uplift of the earth's crust;
3) Evolution of the inland lakes and waterways mostly resulting from the isostatic land uplift.

There is no indication of human presence in the northeastern Baltic area in the course of Late Glacial times. At that time, the greater part of the Karelian Isthmus was covered by the waters of the Baltic Ice Lake which formed a large gulf in the place of the present-day Lake Ladoga.

On the other hand, the southern shore of Lake Ladoga, as the sequence of the Ust'Tosna peat-bog shows (Kvasov 1975; Lapin 1939), was freed of water since the Allerød.

In the sequence of the Lahta peat-bog, north of St.Petersburg, the deposits of the Baltic Ice Lake were discovered at a depth of 25–18 m below s.l. (Džinoridze & Kleimenova 1965). The same authors have identified the Baltic Ice Age deposits in the area of Pesočnaja (12 km to the north) at a height ranging from 2.5 to 10.4 m a.s.l.

Based on this evidence of the altimetric position of the Baltic Ice Lake deposits in the area of St.Petersburg, a suggestion was made (Dolukhanov 1979) that a transgression of over 20 m occurred at about 11 000 years BP, prior to the drainage in Billingen. Later, this suggestion was confirmed by similar data obtained in other parts of the Baltic area (Donner 1982).

The varved deposits which were up to 12 m thick and contained the Younger Dryas pollen spectra were discovered at the bottom of the Holocene lacustrine deposits at a number of sites in the northern part of the Karelian Isthmus (Višnevskaja & Džinoridze 1977).

Following the drainage in Billingen, the Yoldia Sea became established. Since that time Lake

Ladoga exists as a separate lake. It was connected with the Yoldia Sea through a system of straits in the north of the Karelian Isthmus. The Preboreal and Boreal deposits of these straits contain a freshwater diatom flora which is basically similar to that of the present-day Ladoga (Arslanov et al. 1992; Kvasov 1975).

The initial settlement of the northeastern Baltic area had occurred at that time. The oldest site known in the area is Antrea-Korpilahti, northeast of Vyborg. The organic implements from this site were radiocarbon dated to 9230±210 BP (uncal.). The age agrees with the previously obtained pollen data which indicate that the site dates back to the beginning of the Boreal period (Siiriäinen 1973).

In 1970–1971 I had opportunities to visit the locality of the site. The inspection of the area suggests that the site was located in a small bay of a strait which connected Ladoga with the sea. The samples of the clay which had filled the bay contained typical Boreal pollen spectra.

The Mesolithic settlements in the lagoons of the Yoldia Sea in Estonia appeared roughly at the same time. The cultural deposits at the site of Pulli, near the town of Pärnu, were found under the stratified sediments of the Yoldia Sea and were dated to 9600±120 and 9285±80 BP uncal. (Il'ves et al. 1974, 171–172).

The intensive settlement of the area by groups of food-gatherers occurred in the course of the Atlantic period. Due to an increase in temperature, the productivity of the local lake ecosystems increased markedly, as evidenced by the rise in the content of organic matter and biogenic elements in the lacustrine deposits (Arslanov et al. 1992, 51). This made the lacustrine landscapes particularly attractive for groups of foragers.

The Atlantic period was contemporaneous with the transgression of the Litorina Sea in the Baltic area. It becomes increasingly clear that this transgression, caused by the eustatic rise in the ocean level, manifested itself in the northeastern Baltic area in the form of a series of minor fluctuations.

This was first proved in the areas of slow land uplift. Based on the stratigraphy of lagoon sediments and on diatom facies Iversen has identified four Litorina transgressions in Denmark (Iversen 1937). Later, Berglund has distinguished six Litorina transgressions in southern Sweden (Berglund 1964).

Based on the observation of ancient shorelines and diatom facies in the area of intensive post-glacial land uplift in southern Finland, Hyyppä has identified four Litorina transgressions (Hyyppä 1935).

In more recent times doubts have been expressed as to the identity of separate Litorina transgressions in this area. Eronen (1974) portrays the Litorina transgression as a single broad temporal zone with short-term fluctuations of no importance. Glückert (1976) mentions the separate Litorina phases and stresses that they cannot be proved stratigraphically.

In this sense, the recently obtained data from the area of Vyborg are of considerable significance, especially the data from the Häyrynsuo bog, east of Vyborg. The peat-bog lies at an altitude of 17.2 m a.b.s. The bog is situated in the immediate vicinity of an esker (Häyrynmäki) on which a group of Stone Age sites were found at an altitude of 20–17 m a.s.l., including finds of the Comb Ware styles 1–2 (Early Neolithic) (Hyyppä 1935; Siiriäinen 1969).

The coring of the peat-bog has established the following stratigraphy:

0.0 – 0.40 m	Sphagnum peat
0.40 – 1.60 m	fine-detritus gyttja
1.60 – 2.80 m	yellowish plastic silt

As the pollen analysis shows (Appendix 1) the lower part of the silt (3.0–1.95 m) reflects the domination of pine (45–55%) and alder (14–20%) with the participation of broad-leaved species such as elm, oak, and lime (3–4.5%), and of hazel (2–4%). The upper part of the silt (1.95–1.55 m) corresponds to a marked increase in the percentage of pine (60–70%) and to a decrease in the participation of alder (6–10%) and the broad-leaved species (1.3–3.0%). The fine-detritus gyttja and the bottom layer of the peat correspond to a new increase in the participation of alder (20–25%), the broad-leaved species (5–12.5%) and hazel (5–6%).

Even more significant evidence was provided by the diatom analysis (Appendix 2). The lower part of the sequence is dominated by freshwater plankton species and contains a typical Litorina assemblage including *Diploneis smithii f. rhombica* (Mer.), *Navicula peregrina* (Ehr.) Küntz and *Campylodiscus clypeus* (Ehr.). The middle part of the sequence shows a significant decrease in the participation of halophytes and brackish water species with the absolute dominance of freshwater forms. The upper part of the sequence reflects a new rise in the percentage of halophytes (up to 14%) and brackish water species (11%).

The data of the Häyrynsuo bog clearly indicate the occurrence of two stages involving an increase in the content of brackish water and halophyte diatoms. They were separated by a stage dominated

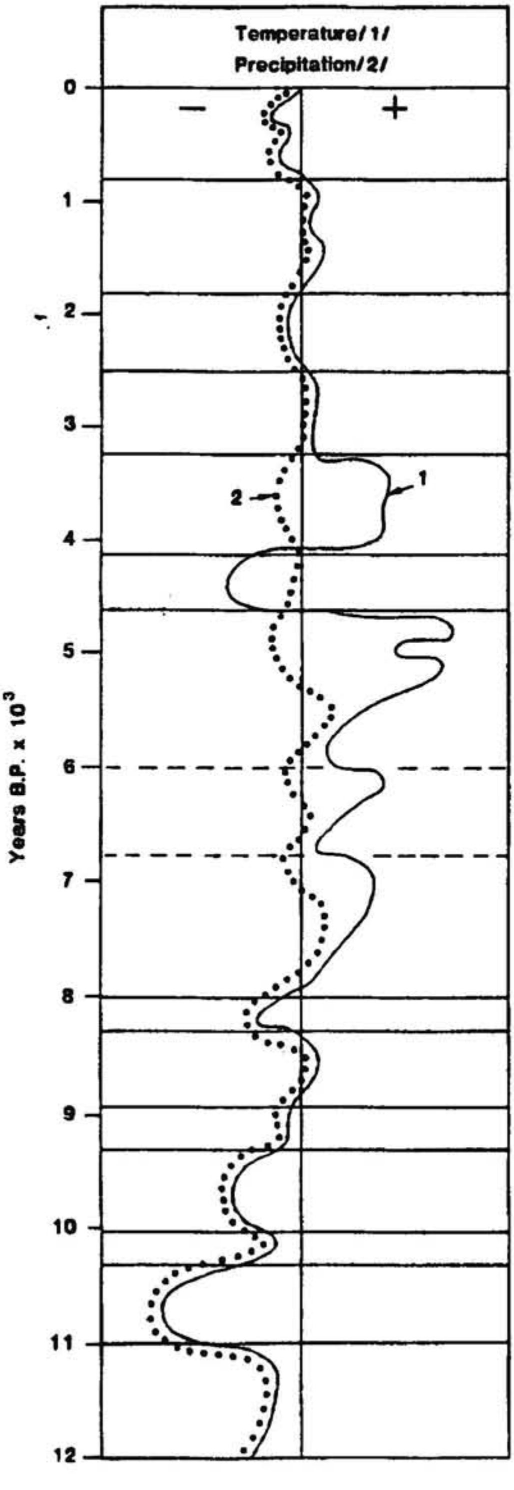

Fig. 1. Climatic change in European Russia in the Post-Glacial period (Hotinskij 1986).

by freshwater species. This may be interpreted as two Litorina transgressions intervened by a pronounced fall in the sea level. The radiocarbon dated sample taken from the lower level of the Sphagnum peat postdates the peak of the late Litorina transgression: 4610±150 BP uncal. (LE-4610) (Kleimenova et al. 1988).

At the same time, the intensive isostatic land uplift in central Scandinavia resulted in a sequence of transgressions of inland lakes which followed the northwest-southeast direction (Päijänne — Saimaa — Ladoga). The culmination of the Saimaa transgression in c. 5000 BP resulted in the disruption of its connection with the Gulf of Bothnia via Lake Päijänne. At the same time, the connection of Lake Saimaa with Lake Ladoga was created through the newly established Vuoksi system (Saarnisto 1970).

The simultaneously occurring transgression of Lake Ladoga resulted mainly in the submergence of its southern shore. Due to the intensive isostatic uplift there was only an insignificant change in the position of its northern shore (Saarnisto & Siiriäinen 1970).

The beginning and large-scale proliferation of pottery making marked an important stage in the intensification of the foraging strategies of prehistoric groups in the area. It becomes increasingly clear that the beginning of pottery making occurred almost simultaneously throughout the boreal Europe.

One of the earliest sites with remains of pottery in the northwestern Russia is Rudnja Serteja in the Upper West Dvina (Dolukhanov et al. 1989). The site was located in the off-shore area of a small lake. Several radiocarbon dates indicate that the earliest pottery-bearing layer was deposited ca. 6200 BP uncal. The pollen analysis shows a considerable reduction in the percentage of the elements of mixed oak forest (oak, elm, lime), comparable with the AT-2 cool interval.

Similar dates were obtained for the earliest ceramic levels in Zvidze in Lubana, Latvia: 6315±60; 6260±60 (Loze 1988). Practically the same age (ca. 6000 BP) is given by Siiriäinen (1970) for the earliest Comb Ware style (I:1) in Finland. According to Siiriäinen, the beginning of the Comb ceramic tradition corresponded to the maximum transgression of Lake Päijänne and predated that of the Lake Saimaa system (Siiriäinen 1970).

It is noteworthy that the beginning of pottery production in the Baltic area coincided with the cool interval (AT-2) which interrupted the Climatic optimum. This interval which is dated to 6200–6000 BP has been recognized in a number of radi-

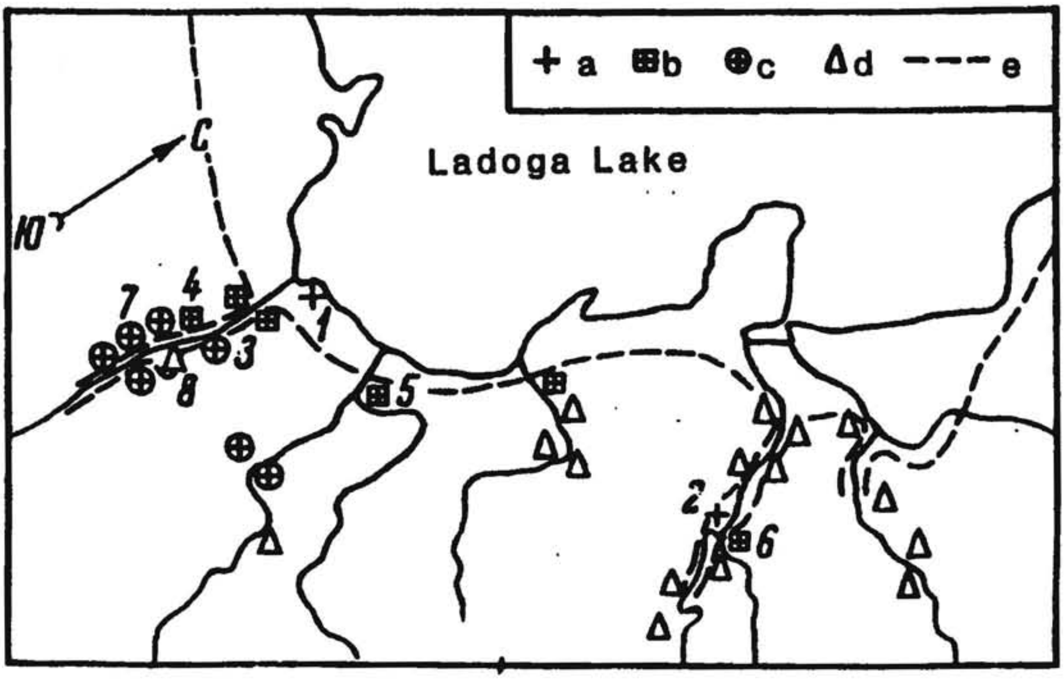

Fig. 2. The maximum extent of the Ladoga transgression (Kvasov 1975). *Key*: a - Neolithic sites; b - sites of the 1st millennium BC; c - sites of the 7th–8th centuries AD; d - sites of the 9th - 10th centuries; e - the maximum limit of the Ladoga transgression. *1* - Ladoga Canal Neolithic sites; *2* - Ust'-Rybežna 1; *3* - Izsady; *4* - Pod Sopkoi; *5* - Valgoma; *6* - Ust'-Rybežna 2; *7* - Staraja Ladoga; *8* - Plakun (Viking) Barrows.

ocarbon dated pollen sequences of European Russia (Fig. 1) (Hotinskij 1986).

The mechanism of interaction between the cultural process and the environmental change is far from clear, but it may be suggested that the disbalance in the ecosystem which resulted from the cooling may have intensified the diffusion of cultural and technological innovations from one social unit to another.

In view of the new evidence, the radiocarbon date obtained earlier for the site of Ust'-Rybežna 1 on the southern shore of Lake Ladoga (6390±220 BP uncal.) which has generally been considered too old seems to be much more realistic.

The cultural deposits of the Ust'-Rybežna site were found in the layers of peat which were overlaid with sand in the course of the Ladoga transgression. The sample of sand taken from the upper contact of peat in the same area has yielded the age of 4000 BP uncal. The measurement of the age of the organic deposits buried under the sand which are thought to correspond to the time immediately following the peak of the Ladoga transgression near Pitkäranta (Karelia) has yielded the dates 2300–2100 BP uncal. (Kvasov 1975).

The earliest archaeological sites which appeared on the lower terrace of the southern Ladoga in the aftermath of the transgression date back to the early 9th century AD. Thus the interval of 2300–1100 BP delimits the maximum extent of the Ladoga transgression (Fig. 2).

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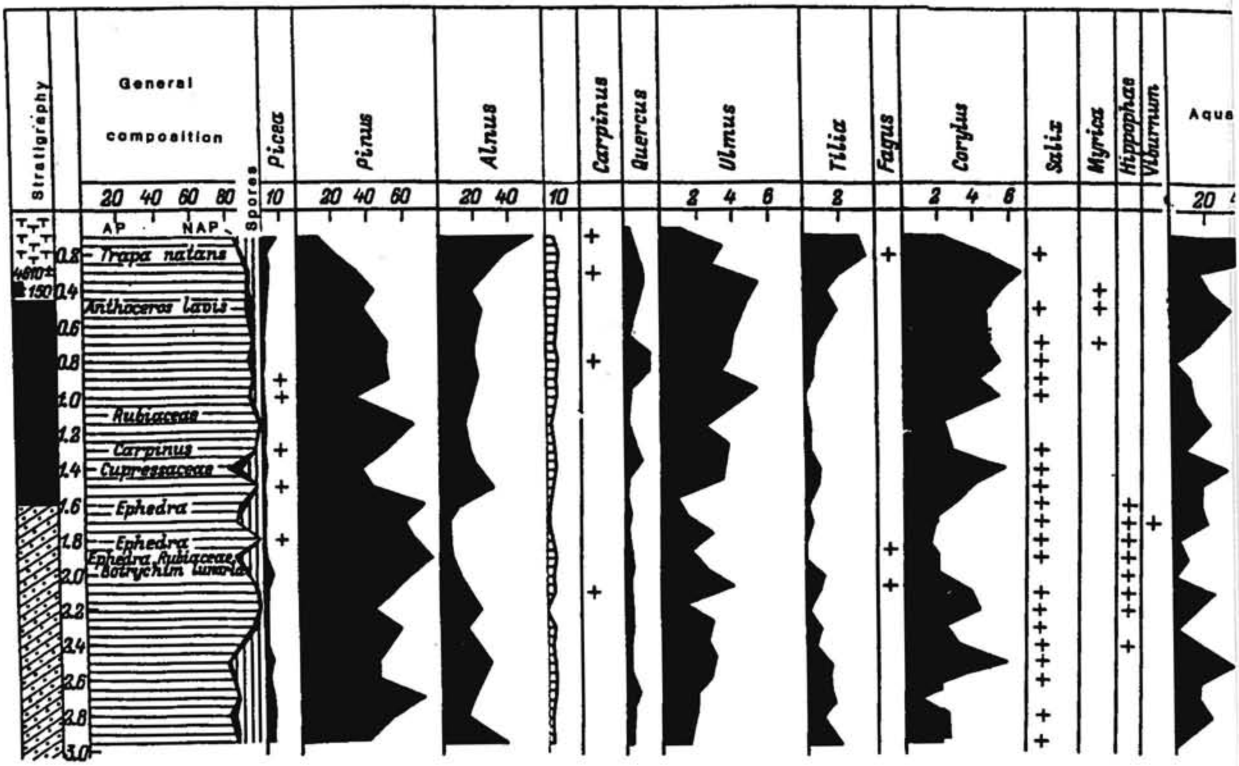
Appendix 1. Häyrynsuo bog. Pollen analysis. Analysts: G.I. Kleimenova and N.M. Latyševa.

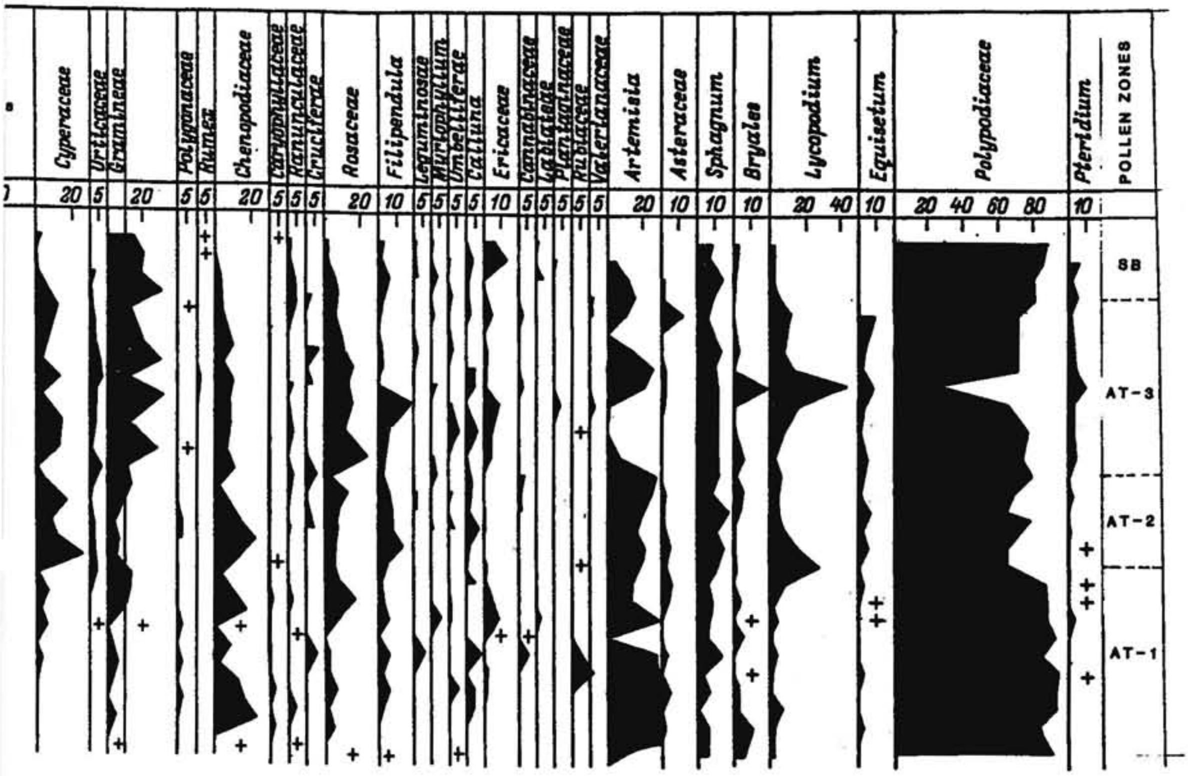


Key:

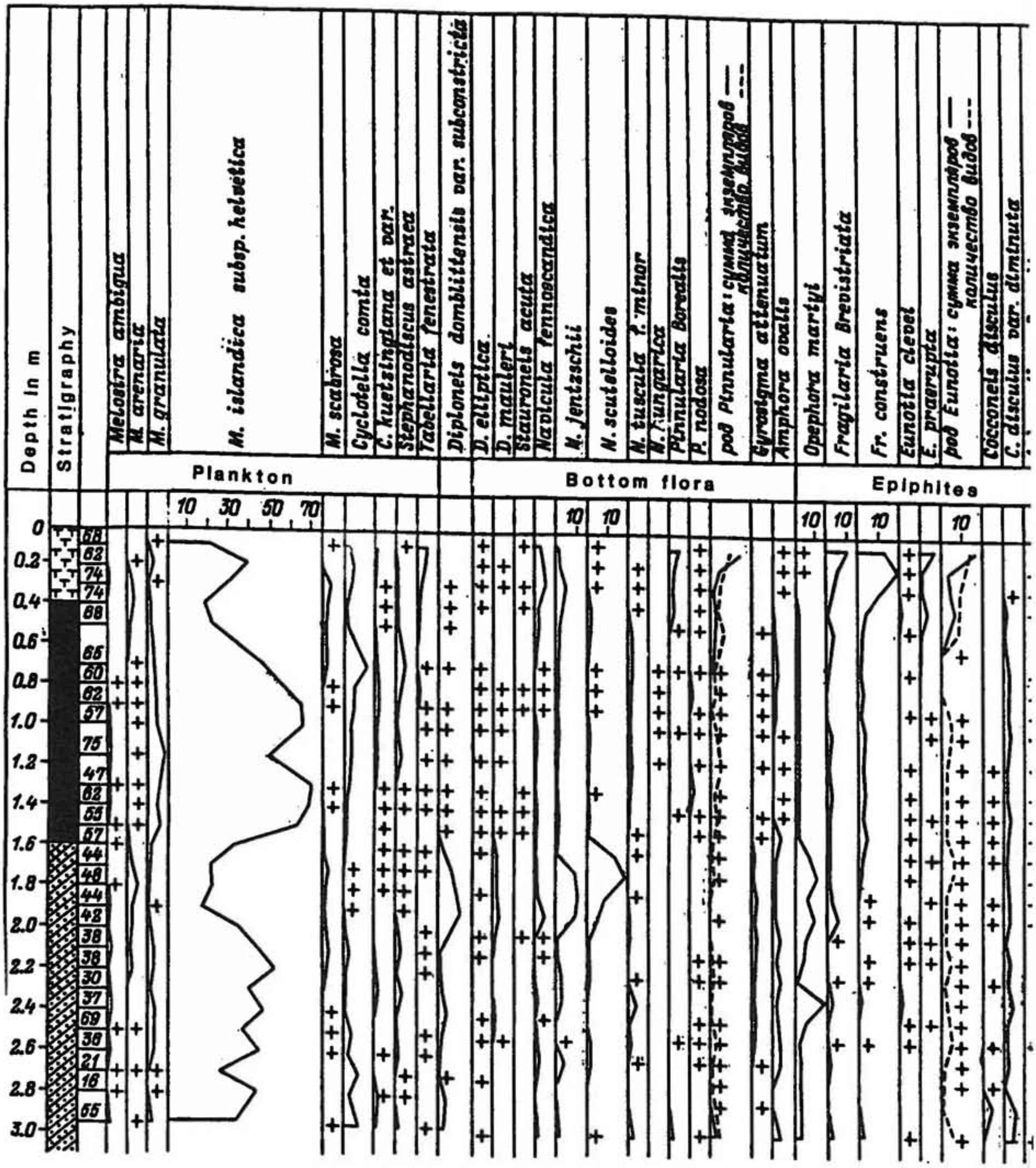
1 - Sphagnumpeat

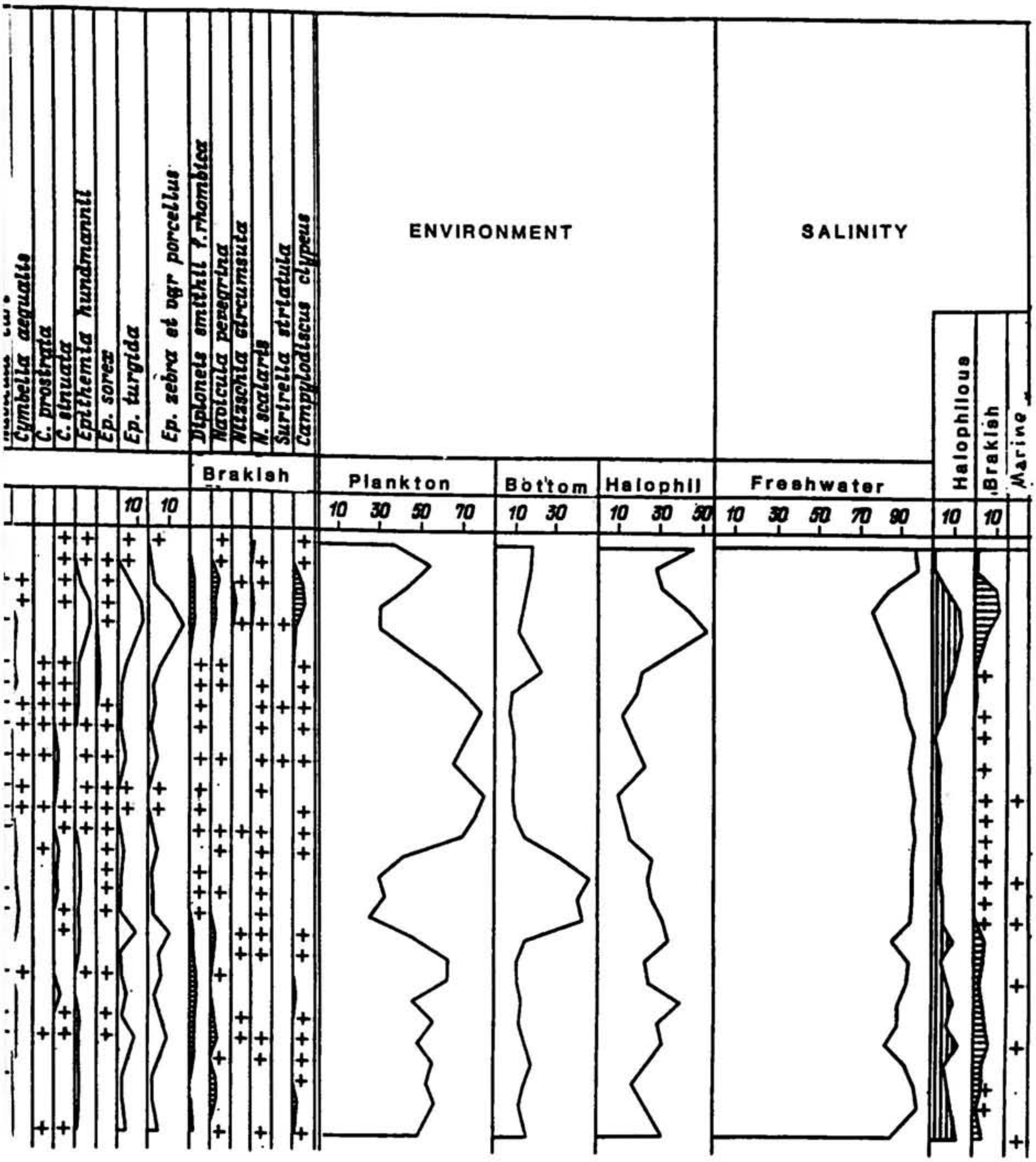
2 - fine-detritus gyttja

3 - silt


Cyperaceae
Urticaceae
Gramineae
Polygonaceae
Rumex
Chenopodiaceae
Caryophyllaceae
Ranunculaceae
Cruciferae
Rosaceae
Filipendula
Leguminosae
Myriophyllum
Umbelliferae
Calluna
Ericaceae
Cannabinaceae
Labiatae
Plantaginaceae
Rubiaceae
Valerianaceae
Artemisia
Asteraceae
Sphagnum
Bryales
Lycopodium
Equisetum
Polypodiaceae
Pteridium
POLLEN ZONES
SB
AT-3
AT-2
AT-1

Appendix 2. Häyrynsuo bog. Diatom analysis. Analyst: E.M. Višnevskaja.




Cymbella aequalis
C. prostrata
C. sinuata
Epithemia hundmannii
Ep. sorex
Ep. turgida
Ep. zebra et vgr porcellus
Diploneis smithii f. rhombica
Navicula peregrina
Nitzschia circumsuta
N. scalaris
Surirella striatula
Campylodiscus clypeus
ENVIRONMENT
SALINITY
Brakish
Plankton
Bottom
Halophil
Freshwater
Halophilous
Brakish
Marine