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BIOSTRATIGRAPHIC SUBDIVISION OF PLEISTOCENE DEPOSITS IN THE SEILOVICHI-49 SEQUENCE (BELARUS)

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ABSTRACT. The results of palaeobotanical investigations (pollen and diatom analyses) of ancient lacustrine deposits removed from borehole 49 near the village of Seilovichi (Nesvizh district, Minsk region, Belarus) at a depth of 71.8–85 m show that they were laid down at the end of the Berezina (Elster 2) Glaciation, throughout the Alexandrian (Holsteinian) Interglacial and into the Early Dnieper (Early Saale s.str.) periods. The last includes two stadials and two interstadials.

KEY WORDS: pollen analysis, diatom method, biostratigraphy, zone, Middle Pleistocene

SITE AND LITHOLOGY

The sequence of borehole 49 near Seilovichi village in the Nesvizh district, Minsk region, is situated on the northern slope of the Kopyl morainic ridge (Fig. 1). The modern relief of this ridge essentially retains the form of the Bobovnja inlier of crystalline basement. Deposits of at least three glaciations are represented in the Pleistocene strata of the Kopyl ridge (Sanko *et al*. 1989). According to Astapova and Sanko the deposits removed from a sequence of borehole 49 near Seilovichi village are sequentially as follows (from top to bottom):

0–0.2 m	soil layer
0.2–8.0 m	morainic sandy loam ranging from brownish red to brown, with up to 20% gravel and pebbles
8.0–20.0 m	grey heavy morainic sandy loam with gravel and pebble inclusions
20.0–28.2 m	yellowish-grey assorted sand
28.2–29.6 m	thinly laminated grey loam, sometimes replaced by sandy loam with appreciable amounts of fine sand
29.6–35.2 m	thin dust and grey loamy sand with 5 to 10% of gravel and pebbles
35.2–42.0 m	fine grey clayey sand
42.0–71.8 m	greenish-grey and at the upper levels variegated (dark grey, brownish-grey), laminated lacustrine loamy sand without visible organic remains
71.8–85.0 m	light grey, horizontally bedded light loamy sand with black gyttja interlayers, gradually replaced by fine sand
85.0–87.6 m	light grey fine homogeneous sand with varved clay interlayers
87.6–108.0 m	morainic greenish-grey sandy loam with as much as 20% gravel of crystalline and sedimentary rocks
108.0–118.0 m	fine homogeneous heavy clay
118.0–118.8 m	grey sand
118.8–121.0 m	sand
121.0–121.8 m	weathered crust over chalk

94 samples collected in the depth range 85.0 to 71.8 m were studied by pollen and diatom analyses. However, diatom valves were determined only in the depth interval between 84.6 and 72.15 m.

METHODS

Samples collected for pollen analysis were treated with HCl, washed with water to obtain a neutral reaction, then brought to the boil in 10% KOH. After washing with water, samples were treated with heavy liquid (KJ and CdJ_2) following the standard procedure which separates pollen from mineral sediment by centrifuging. The pollen was then treated further using Erdtman's acetolysis method.

The percentages of tree, shrub and terrestrial herb pollen were calculated from their total sum (=basic). The percentage values for aquatics, local reed-and-rush swamp vegetation, as well as of spores were counted in relation to the basic sum increased by the respective taxon. The results obtained are presented in a pollen diagram (Fig. 2), which was constructed using thre TILIA computer program (Grimm 1992).

With the exception of acetolysis, the same chemical treatment of the rock was used to the separate diatom valves which were counted in each sample up to 500 specimens. This total was then used to determine the percentages of dominant and characteristic species and intraspecific taxa. The results of this research are presented in a diatom diagram (Fig. 3).

RESULTS

Palaeobotanical studies of the ancient lacustrine deposits occurring within a depth range of from 85.0 to 71.8 m in the Seilovichi-49 section, and the separation of two glacial complexes of different age from the Middle

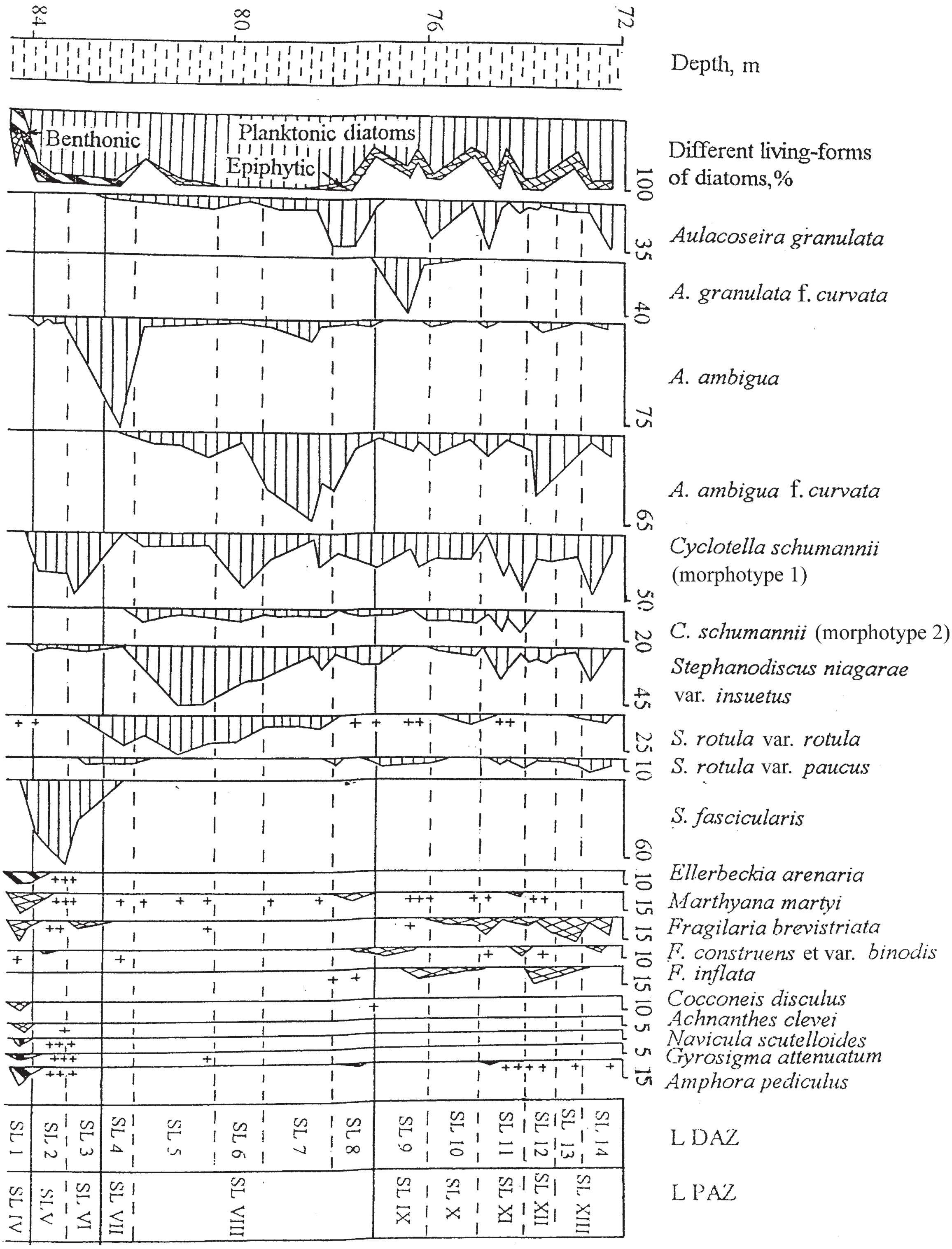

Fig. 1. Location of Seilovichi and other sites discussed in the text

Pleistocene enabled the authors to subdivide these deposits into 13 local pollen assemblage zones (L PAZ SL I – SL XIII) and 14 local diatom assemblage zones (L DAZ SL 1 – SL 14). The L PAZ-s and L DAZ-s distinguished correspond to definite phases in the development of both the local terrestial vegetation and the palaeobasin itself during sedimentation. They reflect the sedimentation conditions at the end of the Berezina Glaciation (L PAZ SL I and SL II), the beginning of the Alexandrian Interglacial (SL III and SL IV/ L DAZ SL I), during its climatic optimum (SL V/SL 2 and SL VI/SL 3), the end of the interglacial ((SLVII, SL VIII)/(SL 4-SL 8)), and the early Dniepr period ((SL IX-SL XIII)/(SL 9-SL 14)).

SL I *Hippophaë – Selaginella selaginoides* PAZ (85.0–84.9 m) is characterized by the rather abundant pollen of herbaceous plants (17%), among which *Artemi-*

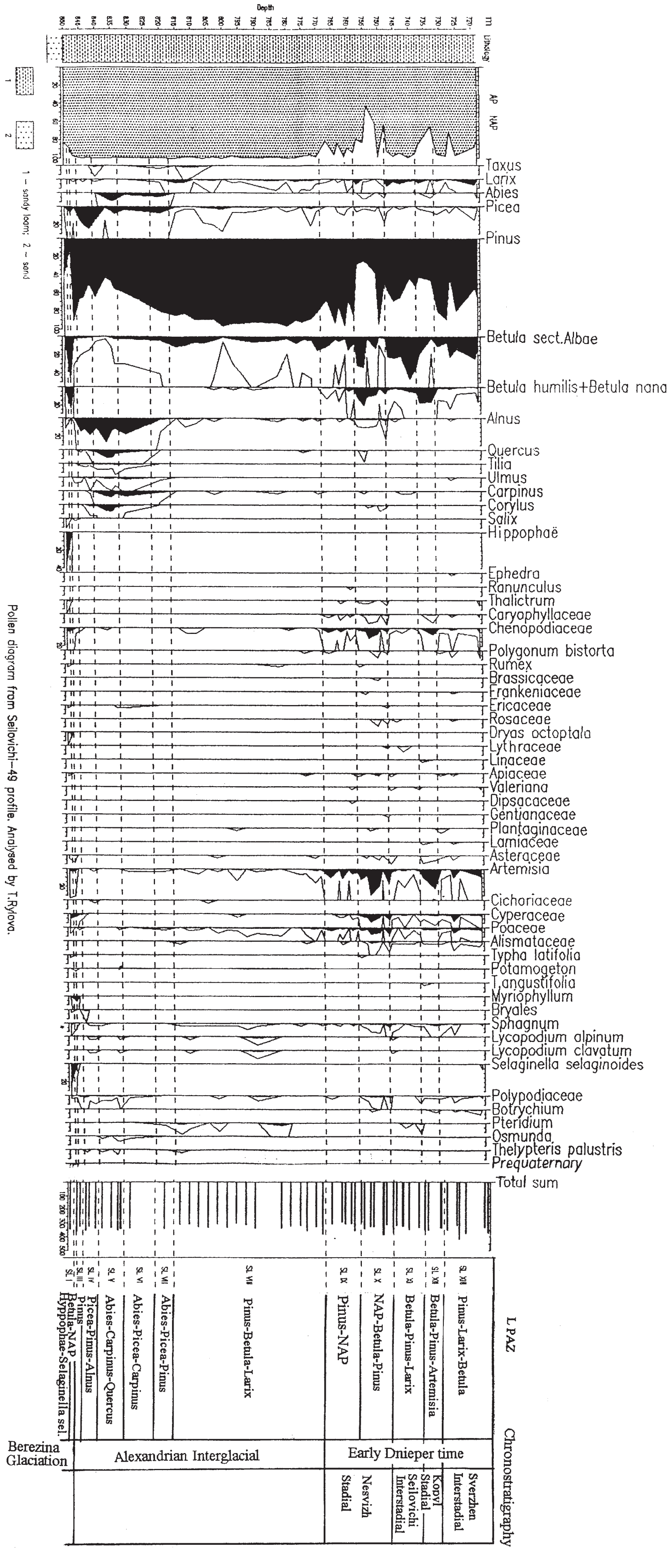

Fig. 2. Pollen diagram from Seilovichi-49 profile. Analysed by T. Rylova

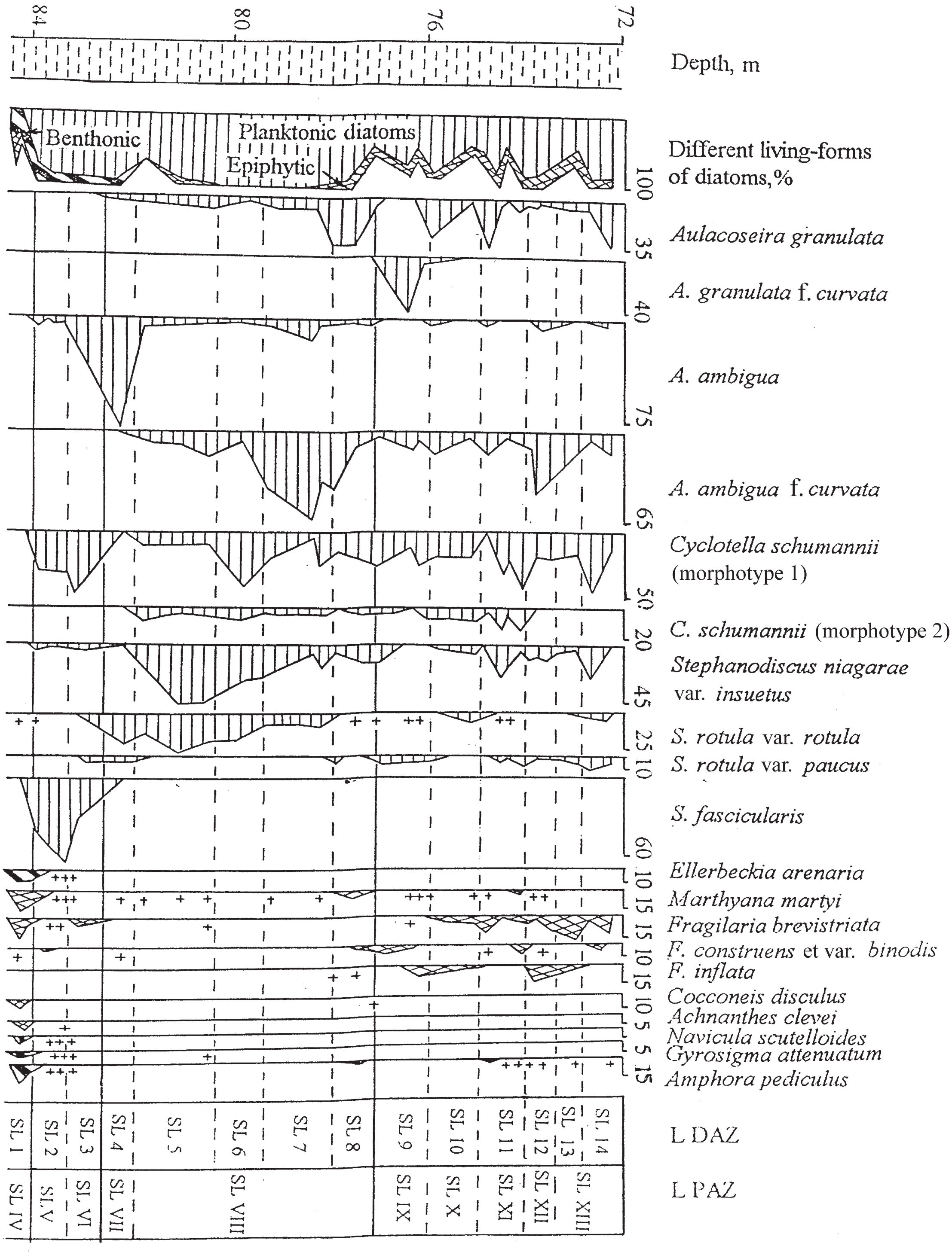

Fig. 3. Diatom diagram from Seilovichi-49 profile. Analysed by G. Khursevich

sia, Cyperaceae, Chenopodiaceae, Ranunculaceae *(Thalictrum)* are of the primary importance. *Dryas octopetala* L. pollen forms about 1.5%. The most important feature of this pollen zone is the considerable incidence of *Hippophaë* pollen (33.8%) and the spores of *Selaginella selaginoides* (L.) P.Beauv. ex Schrank et Mart. (21.8%). The presence of *Betula* pollen (3.3%) should be noted, *B. nana* L. and *B. humilis* Schrank making up 1.1%. *Salix* pollen comprises 1.1%. *Pinus* pollen contributes considerably (40.7%). The pollen of Neogene plants is also present totalling 2.5%, but this had been almost certainly redeposited, as, apparently, had some part of the *Pinus* pollen. It is possible that some *Pinus* pollen could have been deposited as a result of long-distance transport.

The pollen found in SLI suggests that tundra vegetation existed within the study area at that time. Forest-free areas were widespread and covered by shrub and herbaceous vegetation with heliophytes dominant. Shrubby birches and willows, sedges, grasses, etc. occupied wet and swampy areas; a few birch trees appeared in the uplands. The climate of that time was apparently subarctic. This suggests that the deposits corresponding to SLI were laid down in the Late Glacial of the Berezina Glaciation.

SLII *Betula* – NAP PAZ (84.9–84.75 m) is characterized by a rather high content of NAP (17%) and the absolute domination of *Betula* pollen among the arboreal species. *Betula nana* and *B. humilis* form up to 23%. *Pinus* pollen comprises 12.3%, and that of *Picea* 6.4%. Chenopodiaceae, *Artemisia* and Cyperaceae pollen dominates among the herbaceous plants. *Selaginella selaginoides* (1.5%) and single specimens of *Sphagnum* and Polypodiaceae were found among the spores.

The analysis of the spectra suggests that tree and shrub birches were of primary importance in the plant communities and thin birch forests existed. However, there was no continuous forest cover; open areas of terrestrial herb vegetation were widespread. It may be supposed that the pollen zone SL II deposits were accumulated during the final stage of the Berezina Glaciation.

SL III *Pinus* PAZ (84.75–84.6 m) is distinguished by a sharp increase in the tree pollen content forming 98% of the total. *Pinus sylvestris* L. (91%) dominates among tree pollen, with small amounts of *Betula* (*B.* sect. *Albae*) (3.1%), *Picea* (1.9%), *Alnu*s (0.6%), *Larix* (0.3%) and *Salix* (0.3%). Chenopodiaceae, *Artemisia,* Cyperaceae were often found in the not very abundant herbaceous plant pollen. Polypodiaceae (1.2%) was noted among the spores.

Pollen spectra indicate the widespread occurrence of mixed forest, where pine was of primary importance, birch was scarse, and spruce, larch and alder present as a small admixture. These deposits were laid down at the beginning of the interglacial period.

SL IV *Picea* – *Pinus* – *Alnus* PAZ (84.6–84.1 m) is characterized by sharp increases in *Picea* (max. 24.5%) and *Alnus* (up to 18.5%). The proportion of *Pinus* pollen remains rather high (up to 66.6%), and *Betula* pollen comprises 2.1%. The pollen of thermophilous plants appears: *Quercus* (up to 1%), *Tilia* (up to 0.3%), *Ulmus* (1.5%), *Carpinus* (0.3%), *Corylus* (1.2%). The quantities of herbaceous pollen are insignificant; only single grains of Chenopodiaceae, Cichoriaceae, *Artemisia,* Cyperaceae and Poaceae were noted. Among the spores Polypodiaceae, *Lycopodium clavatum* L. and *Sphagnum* occurred rarely.

Pollen spectra suggest the domination of boreal forest communities. Oak, lime, elm, hazel and, somewhat later hornbeam, appeared in the more favourable habitats. Low-lying places were occupied by alder carr.

The diatom flora of the palaeobasin which existed near Seilovichi village at that time was dominated by benthonic species (their valves comprising as much as 37% of the total) and epiphytes species (43%). It was thus possible to distinguish L DAZ SL 1 in the studied strata of lacustrine sediments. This zone is represented by *Amphora pediculus* Kutz. (8–15%), *Martyana martyi* (Herib.) Round (up to 15%), *Fragilaria brevistriata* Grun. (up to 13%), *Ellerbeckia arenaria* (Ralfs et Moore) Crawford (6–11%), *Gyrosigma attenuatum* (Kutz.) Rabenh. (4–5%), *Cocconeis disculus* (Schum.) Cl. (2–5%), and some other species which suggest that the ancient lake was initially oligotrophic and shallow.

THE CLIMATIC OPTIMUM OF THE INTERGLACIAL

SL V *Abies* – *Carpinus* – *Quercus* PAZ (84.1–83.3 m) is distinguished by the maximum incidence of pollen of thermophilous deciduous tree species such as *Quercus* (up to 8.7%), *Tilia* (up to 1.2%), *Ulmu*s (up to 1.5%), *Carpinus* (up to 6.7%), as well as *Corylus* (up to 7%) and *Alnus* (up to 26%). *Abies* pollen appears in this zone and reaches its maximum (as high as 8.4%). The amount of *Picea* pollen decreases drastically (1.5–15.1%), while that of *Pinus* remains rather high (up to 64.4%). *Betula* pollen decreases to a minimum and its values does not exceed 1–3%. Pollen grains of *Taxus* constitute up to 1.2%. Among terrestrial herb pollen there are single grains of Chenopodiaceae, Cichoriaceae and *Artemisia.* The presence of *Osmunda, Pteridium,* Polypodiaceae and, in smaller quantities, *Thelypteris palustris* Schott spores were consistently noted.

Pollen assemblage SL V is indicative of the widespread occurrence of fir-spruce-pine forest and mixed coniferous-deciduous forest of fir and hornbeam, sometimes containing oak, elm and occasionally lime. Alder carr occupied the lower and damper sites.

L DAZ SL 2 is synchronous with L PAZ SL V and was identified from an essential increase in frequency of planktonic diatoms (72 to 92%) in the general flora composition. *Stephanodiscus fascicularis* Khurs. reached its peak values (34–61%) in this sequence. This species is absent from the modern diatom flora of Belarus. The above data clearly show that during the Alexandrian Interglacial the palaeobasin became deeper, and the water level in it was high, under the rather humid climate of the thermal optimum.

SL VI *Abies* – *Picea* – *Carpinus* PAZ (83.3–82.3 m) is characterized by the continuous presence of *Abies* (2.5%) and *Picea* (4%) pollen and the domination of *Carpinus* pollen (6%) among the deciduous species, which display a general decrease. *Pinus* pollen constitutes 60%, *Betula* 3% and *Alnus* 18%. Terrestrial herb pollen is present in insignificant amounts; the spores of *Osmunda* and Polypodiaceae are very few in number too. The spectra of this zone are typical for coniferous (spruce – fir – pine) and coniferous – deciduous (fir – hornbeam) forest with a small admixture of oak, lime, hazel and birch. Alder played a major part in the forest composition of damp sites, or formed independent stands.

The vegetation pattern indicates an appreciable decrease in temperature in comparison with the optimum phase, in agreement with the results of the diatom analysis. L DAZ SL 3 (correlated with L PAZ SL VI) is distinguished by the domination (up to 47%) in the diatom community of the planktonic species *Cyclotella schumannii* Hakansson (morphotype 1) of rather cold waters. This suggests a mesotrophic regime in the fossil lake.

SL VII *Abies – Picea – Pinus* PAZ (82.3–81.7 m) is identified by the absolute domination of conifer pollen. The *Pinus* pollen values increased to as much as 80.4%; *Abies* (4.4%) and *Picea* (7%), were also somewhat increased while *Larix* (0.3%) and *Taxus* (0.3%) were detected. In addition to coniferous pollen, pollen grains of *Betula* (4%) sometimes occured but were very few in number. Thermophilous plant pollen was essentially absent although a few grains of *Carpinus* (1.2%) and *Ulmus* (0.3%) were noted. Among terrestrial herbs whose pollen was present in insignificant amounts, *Artemisia,* Poaceae and Cyperaceae were detected.

The composition of the pollen spectra indicates that in the studied region coniferous (fir – spruce – pine) forest with a little birch were widespread. It is possible that hornbeam occurred very rarely. Changes in the composition of the vegetation clearly show that the temperature within the studied territory had become even lower by the end of the interglacial climatic optimum.

A distinctive feature of L DAZ SL 4, which corresponds to L PAZ SL VII, was the abundance of the moderately warm – water planktonic species *Aulacoseira ambigua* (Grun.) Sim. (up to 75%) which preferred eutrophic conditions.

SL VIII *Pinus – Betula – Larix* PAZ (81.7–76.85 m) is characterized by the overwhelming domination of *Pinus* pollen (up to 96.6%). The values of *Betula* increase to as much as 15%. *Larix* (up to 3.3%) and *Picea* (up to 2.7%) were regularly noted; single pollen grains of *Taxus* were found in the lower part of the interval. The pollen of thermophilous species was absent. Among terrestrial herb plants, representatives of the Poaceae*,* Chenopodiaceae, etc. were frequently detected. *Artemisia* was encountered less often. Every sample contained single spores of *Sphagnum*; those of *Pteridium* (up to 3%), *Lycopodium clavatum* (up to 1%) and sporadic Polypodiaceae were found.

The composition of the pollen spectra suggests the widespread occurrence of mixed pine-birch forest with some incidence of spruce and larch. Changes in the forest composition are indicative of a further fall in temperature and the increasingly dry climate which were features of the final stage of the interglacial interval.

Lacustrine deposits synchronous to those of L PAZ SL VIII have been subdivided into L DAZ SL 5–8 on the basis of both qualitative and quantitative changes observed in the diatom composition within the interval. L DAZ SL 5, the lowest, is distinguished by the maximum percentage of planktonic species of the genus *Stephanodiscus (S. niagarae* var. *insuetus* Khurs. et Log. up to 42% and *S. rotula* (Kutz.) Hendey up to 25%). L DAZ SL 6 is defined by a new peak of *Cyclotella schumannii* (morphotype 1) increased in number to a high of 40%; L DAZ SL 7 shows the first peak of *Aulacoseira ambigua* f. *curvata* Skabitsch. (up to 64%), and L DAZ SL 8, the uppermost, the frequent occurrence of *Aulacoseira granulata* (Ehr.) Sim. (up to 33%). Changes noted in the composition of the diatom communities suggest that the eutrophication process in the ancient lake had continued throughout the whole time interval corresponding to L DAZ SL 5, and that, later on (L DAZ SL 6–8), the eutrophic regime of palaeobasin had given way to a mesotrophic one with the domination of *Aulacoseira* valves curved along their longitudinal axes. The palaeobasin remained deep-water up to the end of the studied time interval.

THE EARLY DNIEPER PERIOD

SL IX – *Pinus* - NAP PAZ (76.85–75.8 m) is distinguished by an appreciable decrease in the values of tree pollen in the total composition of the spectra and a concurrent increase in herbaceous and dwarf shrub pollen (up to 20%). *Pinus* pollen (up to 95.5%) was dominant among that of trees; *Betula* pollen was less abundant, being represented by both tree and shrub forms (*Betula nana* and *B. humilis* combined, up to 4.8%). *Larix* and *Picea* pollen was present in small amounts. The incidence of *Artemisia* (up to 10%), Chenopodiaceae (up to 5%) and Poaceae (up to 3%) increased appreciably among the herbaceous plants in comparison with their quantities in the previous pollen zone.

Pollen assemblage SL IX shows that, during the accumulation of deposits in the studied interval, forest communities gradually gave way to open areas covered by dwarf shrub and herbaceous vegetation. Birch and pine were dominant in the forest communities with larch and spruce less common. The changes in the vegetation were due to the cold and dry climate prevailing at the beginning of the Early Dnieper period.

The quantities of diatoms found in those deposits correlated with L PAZ SL IX changed repeatedly (either increasing, or decreasing considerably). The composition of the diatom flora was marked by the increased incidence of epiphytes (as high as 12%). All of this suggests variations in the water level in the palaeobasin and the expansion of the macrophyte zone in it. In L DAZ SL 9 *Aulacoseira granulata* f. *curvata* (Hust.) Dav. (up to

40%) was at first dominant among the planktonic species before giving way to *A. granulata* (28%). The cold-water species *Fragilaria inflata* (Heid.) Hust. (up to 7%) prevailed among the periphiton representatives, providing evidence of the oligotrophic nature of the waters of the ancient lake and giving support to the conclusion from palynological investigations that the climate of the initial phase of the Early Dnieper period was rather cold.

SL X NAP – *Betula – Pinus* PAZ (75.8–74.8 m) is characterized by a further decrease in the tree pollen values and a considerable increase in non-tree pollen (up to 60% of the total pollen content). Among tree pollen *Betula* increased sharply with the proportion of *B. nana* and *B. humilis* as high as 20%. The incidence of *Pinus* decreased appreciably. *Larix* (up to 6%) and *Picea* pollen (up to 1%) were also present. Among herbaceous plants *Artemisia* (29%), Chenopodiaceae (11.5%), Cyperaceae (8%) and Poaceae (7%) reached their peak values, while the pollen of Caryophyllaceae, Polygonaceae, Apiaceae, Plantaginaceae, Gentianaceae, *Dryas octopetala,* Brassicaceae, *Thalictrum* and other genera and families were sometimes found. Spores were not abundant in the spectra. *Sphagnum was* the most often found; *Lycopodium alpinum* L., *Botrychium* and *Polypodiaceae* were very few in number.

It may be inferreed that during this period open areas of tundra type were widespread and overgrown with dwarf shrubs and herbaceous vegetation. Forest communities were obviously of little importance.

L DAZ SL 10, synchronous with L PAZ SL X, is distinguished by the low number of diatoms. Among them only *Cyclotella schumannii* was rather abundant (both as morphotype 1 – up to 20%, and morphotype 2 – up to 8%. It preferred mesotrophic and even oligotrophic lake water at low temperatures.

The results of the pollen and diatom analyses of deposits from the studied sequence at depths between 76.8 and 74.8 m (L PAZ SL IX, and X, L DAZ SL 9 and 10) clearly suggest that these deposits accumulated during the first stadial of the Early Dnieper time interval – the Nesvizh Stadial.

SL XI *Betula – Pinus – Larix* PAZ (74.8–73.8 m) is distinguished by a considerable increase in the incidence of tree pollen in the general composition of the spectra (as high as 99%) and a decrease in the proportion of that of herbaceous plants and dwarf shrubs (1 to 8%). Among trees *Betula* pollen (up to 47%) and *Pinus* (up to 69%) were dominant, the incidence of *Betula nana* and *B. humilis* decreasing to as low as 8%. *Larix* (up to 8.3%) was found regularly and abundantly, *Picea* (up to 1.7%) was noted occasionally. The number of pollen grains of herbaceous plants was very small. Among spores some findings of *Pteridium* were noted. The composition of the spectra is indicative of the widespread occurrence of boreal forest where birch, pine and larch were the main constituents.

L DAZ SL 11 corresponding to L PAZ SL XI, is distinguished by the qualitative diversity of the diatom community where *Cyclotella schumannii* was the dominant species (morphotype 1 – 35–47% and morphotype 2 – up to 17%). Additionally high percentages of the planktonic taxa *Aulacoseira granulata* (up to 33%) and *Stephanodiscus niagarae* var. *insuetus* (up to 27%) were noted. Epiphytes were represented by *Fragilaria* species (*F. brevistriata* Grun. and *F. construens* (Ehr.) Grun.).

The palynological and diatom data clearly show that the described time interval corresponds to the first interstadial warming – the Seilovichi Interstadial.

SL XII *Betula – Pinus – Artemisia* PAZ (73.8–73.2 m) is characterized by a fresh decrease in the values of tree pollen (up to 66%) and a respective increase in the pollen values of herbaceous plants and dwarf shrubs (up to 34%). Trees were represented mainly by *Pinus* (up to 53%) and *Betula*, the share of *Betula* sect. *Albae* pollen being as high as 35%, with *Betula nana* and *B. humilis* up to 17.5%. *Larix* (up to 4.3%) and *Picea* pollen (up to 0.6%) occured from time to time. Among herbaceous plants *Artemisia* (up to 22%) and Chenopodiaceae (up to 8%) were dominant; pollen grains of Poaceae, Cyperaceae, *Artemisia,* etc. occurred much more rarely. Representatives of *Sphagnum, Botrychium* and Polypodiaceae weare noted among the spores.

The composition of the spectra suggests that at that time the forest cover was again reduced and that open areas occupied by dwarf shrubs and herbs were of widespread occurrence, a consequence of a considerable fall of temperature within the studied territory. Forest vegetation was represented by birch, which was of major importance, with some admixture of larch, pine and rarely spruce. In sites outside the forest shrub species of birch were noted, as well as *Artemisia,* Chenopodiaceae, Poaceae and other herbaceous and dwarf shrubby plants.

The time interval corresponding to the sediments deposited in the above-mentioned depth interval is correlated with the second stadial of the Early Dnieper period – the Kopyl Stadial. SL 12, synchronous with L PAZ SL XII, includes the cold-water species *Aulacoseira ambigua* f. *curvata* (as much as 45% – the second peak) and *Fragilaria inflata* (up to 14% – maximum frequency in the sequence) that are indicative of the second severe cold oscillation.

SL XIII *Pinus – Larix – Betula* PAZ (73.2–71.8 m) is marked the next increase in tree pollen and the decrease of non-arboreal pollen. Among the tree pollen *Pinus* is decidedly dominant (up to 89%) with *Betula* much less abundant (*B.* sect. *Albae* – up to 24%, *B. nana* + *B. humilis* – up to 2.5%). Pollen grains of *Larix* (as much as 6.7%) and *Picea* (up to 1.5%) were found. Among herbaceous plants the pollen of Poaceae, Cyperaceae*, Artemisia,* Chenopodiaceae, etc. occurred universally, but their contribution to the general composition of the spectra was less important than in the previous zone.

Mixed pine – larch – birch forest with, possibly, sparse mature trees, were probably of widespread occurrence. The forest areas expanded because of some amelioration of the climate. The rise of temperature revealed was of an interstadial character as is confirmed by the data from the diatom analysis. SL 13 shows a sharp decrease in the proportions of the aforementioned cold-water taxa compared with SL 12 and an increase in the epiphyte *Fragilaria brevistriata* (up to 15%) to its maximum amount. SL 14 is characterized by a fresh rise in the proportions of planktonic species (*Cyclotella schumannii* – up to 45%, *Aulacoseira granulata* – up to 35% and *Stephanodiscus niagarae* var. *insuetus* – up to 27%). This is indicative of an amelioration of the palaeoecological conditions in the ancient lake during the second Sverzhen Interstadial of the Early Dnieper period.

DISCUSSION

The ancient lacustrine sediments of the Seilovichi-49 sequence removed from the depth range 85.0–71.8 m represent a continuous chronicle of the land vegetation and climatic changes from the end of the Berezina Glaciation to the Early Dnieper period inclusive, a time interval which involved two stadials and two interstadials. Consequently the Seilovichi-49 sequence can reasonably be classified as one of the key Middle Pleistocene sections identified within Belarus. A comparison of the pollen diagram from the Seilovichi-49 sequence and those constructed from other adequately studied profiles of the Alexandrian Interglacial in Belarus (Matveev Rov, St. Staiki, Laperovichi, Priniemanskaya, Ruba, Gvoznitsa, etc) shows their obvious similarity to one another (Makhnach 1971, Gruzman *et al*. 1975, Makhnach & Yakubovskaya 1975, Putyevoditel ekskursii S-5 1981 (Excursion Guide C-5 1981), Shalaboda 1989, etc).

The main distinctive features of diagrams of the Alexandrian Interglacial are: the high proportions of *Picea* and *Alnus* pollen at the beginning of the interglacial; the considerable contribution of the pollen of coniferous trees throughout the interglacial, including the climatic optimum; the near simultaneous appearance of the pollen of thermophilous trees (oak, lime, elm, etc) and that of hazel; the subsequent almost simultaneous appearance of *Abies* and *Carpinus* pollen; the rather low proportions of the pollen of thermophilous trees and hazel in comparison with their amounts revealed in other interglacials; and the small, but regular presence of such exotic plants as *Pterocarya, Vitis, Buxus, Ligustrum* and the massulae of *Azolla interglacialis* Nikit. and *Salvinia natans*, etc.

Almost all the above peculiarities appear in the diagram obtained by the authors from the Seilovichi-49 sequence, and the local pollen assemblage zones SL III – SL VIII revealed from the interglacial interval correspond well to the regional pollen assemblage zones (Rylova, in press).

This diagram is well correlated in general outline with those obtained from the Butenai Interglacial in Lithuania (Kondratene 1996) and the Likhvin Interglacial of the East European plain, and, primarily, as far as the principal climatic optimum is concerned, with a stratotype of the Likhvin Interglacial from the town of Chekalin, Tula region (the main climatic optimum is meant) (Bolikhovskaya & Sudakowa 1996, etc). It also compares well with the diagrams from several profiles of the Mazovian Interglacial in Poland (Krępiec, Syrniki, Olszewice, Poznań 1, Biała Podlaska, Komarno, Ossówka, Grabanów, etc) (Sobolewska 1956, Janczyk-Kopikowa 1981, Winter 1991, Krupiński 1995 etc) and Holsteinian Interglacial of Germany. Palynological diagrams obtained from profiles at Granzin, Pritzwalk, Wuthenow, Prellheide, Wildschütz, etc. (Erd 1969, 1973, 1978; Erd & Müller 1977, etc) indicate that they too represent very similar plant successions.

One essential difference between the diagrams of the Alexandrian Interglacial of Belarus and those from deposits of the same age in Poland and Germany lies in the fact that the important maximum of *Taxus* determined in the first half of the climatic optimum in Western European profiles is missing from Belarusian ones where the pollen of *Taxus* is either absent, or occurs in proportions not exceeding 2%. Furthermore, a considerable maximum of *Pterocarya* pollen has been noted in the second half of the fir-hornbeam zone, whereas the incidence of *Pterocarya* in Belarusian profiles of the Mazovian Interglacial is not high, and in the Alexandrian profiles *Pterocarya* pollen occurs, as a rule, as single grains, most often in the western parts of the country.

Within Poland the deposits from the glacial age which immediately succeeded the Mazovian Interglacial that have received the closest study are those comprising the Ossówka sequence. A detailed palynostratigraphy of these sediments, as well as a reconstruction of the climatic and floristic changes of this time interval of the Pleistocene, were performed by Krupiński (1995). A comparison of the pollen diagrams from the Seilovichi-49 and Ossówka sequences suggests the following correlations. The first Nesvizh Stadial (SL IX and SL X) revealed by the authors generally corresponds to the stadial associated with the pollen assemblage zones (PAZ) OS-K-NAP (*Pinus – Salix*), OS-L (*Juniperu*s) and OS-M (*Betula – Larix – NAP*); the first Seilovichi Interstadial (SL XI) mat ches the interstadial associated with the three zones PAZ – OS – N – *Pinus* - (*Pteridium*); the second Kopyl Stadial (SL XII) – corresponds to the stadial which PAZ – OS – O (*Betula – Artemisia – Salix*), PAZ – OS – P (*Juniperus* – (*Larix*)) and PAZ – OS – Q (– *Betula – Juniperus – Larix – Pteridium*) and the second Sverzhin Interstadial (SL XIII) matches the interstadial coresponding to PAZ – OS – R (*Pinus – Larix*).

The planktonic diatom complex represented by abundant and diverse species of *Aulacoseira, Cyclotella* and *Stephanodiscus* formed part of the diatom flora composition of the Seilovichi -49 sequence, except in L DAZ SL1. This complex includes Pliocene relicts (*Aulacoseira ambigua* f. *curvata* and *A. granulata* f. *curvata)* as well as typical and original species of the Alexandrian Interglacial of Belarus *Stephanodiscus fascicularis, S. niagarae* var. *insuetus* and *Cyclotella schumannii* (in particular, morphotype 2 characterized by a strong tangential undulation of the valves). The above diatom community is younger than the Belovezhian complex, because indicator species of the Belovezhian Interglacial such as *Cyclotella reczickiae* Khurs. et Log., *Stephanodiscus determinatus* Khurs., *S. peculiaris* Khurs., *S. styliferum* Khurs. and some others are absent from it (Khursevich & Loginova 1986, Khursevich 1990, 1998, Khursevich *et al*. 1990). The composition of the diatom flora of the Muravian Interglacial is modern and Pliocene relicts are found in very small quantities. The genera *Aulacoseira*, *Stephanodiscus* and *Cyclotella* are represented in the Muravian floras mainly by species of wide age and geographical range (Khursevich 1981, Loginova 1989). Therefore, the diatom complex found in the Seilovichi-49 sequence may be related to the Alexandrian Interglacial only, a conclusion consistent with both the geological conditions of the studied ancient lacustrine deposit bedding, and the palynological data.

In addition to its peculiar character, the diatom community from the Seilovichi-49 sequence shows a clear similarity with the famous diatom complex of the same age from the Sivitsa profile in Belarus (Rylova & Khursevich 1980). In both profiles deposits corresponding to the final phase of the Alexandrian Interglacial are characterized by abundant *Aulacoseira ambigua* f. *curvata*. As far as *Stephanodiscus niagarae* var. *insuetus* and *Cyclotella schumannii* (morphotype 2) are concerned, these taxa are usually present in the planktonic diatom flora of the Alexandrian Interglacial of Belarus (Loginova 1979, Khursevich & Loginova 1980, Khursevich & Fedenja in press) and the Mazovian Interglacial of Poland (Marciniak 1986).

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