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DIATOMS IN THE SEDIMENTS FROM THE REGION OF DĄBKI VILLAGE NEAR DARŁOWO

Sediments from two archeological sites in Dąbki have been subjected to a diatom analysis. Basing on the composition and the quantity ratio of the ecologic groups of diatoms some stratigraphic units of a biofacies character have been distinguished. The diatom facies distinguished have enabled a paleoecologic characteristics of the sites under investigation. The flora of diatoms preserved in the deposits from the Atlantic period and, especially, the prevailing of oligohalobous epiphytic diatoms indicate their development to have taken place in the bank zone of a fresh water reservoir. The increased quantities of the epiphytic oligohalobous halophilous diatoms is connected with ecologic conditions having changed in the reservoir due to the inflow of saline water.

The investigation results presented in the work make a part of a complex elaboration the target of which is to reconstruct the oldest settlement in the zone of seaside planes between Bukowo lake and the Wieprza river.

During the archeological investigations carried on in Dąbki village near Darłowo in 1977 a complex of mesolithic and neolithic sites was discovered (Dębowska 1978) which may became of the key importance to recognize the genesis and to reconstruct the oldest settlement in Pomerania. The sites are concentrated on two uplands – on the trough converted into a peat-bog eastwards from Bukowo lake and south-eastwards from Dąbki village. The trough is filled with brown peats, sedge-reed peats and sedge-wood peats as well as with coarse-detritus and calcareous gytia, with the culture stratum determined by wood coals.

Complex archeological, paleobotanic and paleoecologic investigations (Ilkiewicz 1989; Alexandrowicz 1992) have been carried on the material from two sites (9 and 10) situated on the slope of a moraine hump lowering down toward the peat-bog. They are situated 800 m away from the bank of Bukowo lake and 1.5 km away from the contemporary coast in a straight line. The peat-bog has a form of a postlake trough underspread with a peat layer about 0.5–1 m thick. Systematic archeological investigations carried out in the region since 1978 by J. Ilkiewicz have proved the layer to contain flint material, ceramics, animal bones, tools made of stone, bone and horn, botanic remains, wood and wood coals. According to the conventional chronology they are dated as the early Neolithic period – the fourth millennium B.C. Basing on the results of palynological analyses made by K. Tobolski the culture stratum described has assumed to represent the settlements from the fall of the old and new Atlantic periods. The results of diatom analysis of the sediments from Dąbki region enable to better reconstruct the paleoecologic conditions of the area under investigation.

The samples of sediments for the diatiom analysis came from two cores: Dąbki/83 and Dąbki/81, and were taken from the peat-bog. The cores were 190 cm and 200 cm long respectively. The sediments present in them were detritus gytia and peats.

The sediments samples of the volume of 1 cm^3, calcium having been dissolved in 10% HCl, were boiled in 15% and 30% H_2O_2 in water bath at 60° to 90°C. In the case of samples sanded up the flotation method was applied using cadmium liquid of the specific gravity of 2.5. Microscope preparations were made using naphrax (1.72). In the samples there were counted up to 1000 diatoms and then the percentage of particular taxons was calculated.

In the diatom flora the following habitat groups were distinguished: planktonic, epiphytic and benthic forms. The life forms characteristics of the diatoms was made basing on the works by Hustedt (1930–1966), Simonsen (1962), Round (1961; 1964), Cholnoky (1968), Foged (1978; 1981), Battarbee (1978), Koivo (1978). The division of diatom flora into halobous groups was made basing on the halobian system by Kolbe (1927) who distinguishes:

1. Euhalobous – typically marine species the optimum development of which takes place in water reservoirs of 20–40‰ salinity.

2. Mesohalobous - species living in desalted seas, sea bays, river mouths, saltish-water continental reservoirs of 5–20‰ salinity.

3. Oligohalobous - species living in fresh water, among which there are distinguished: a) halophilous - species living in fresh water, the development of which is stimulated by small amounts of salt (up to ca 5‰); b) indifferent - fresh water species the euryhalinic forms of which can also live in salted waters where, however, their development is never considerable; c) halophobous - stenohalinic extreme species which are destroyed even by the smallest amount of salt.

The data concerning the diatoms request for sodium chloride was established basing on the works by Kolbe (1927), Foged (1948), Brockmann (1954), Simonsen (1962), Cholnoky (1968).

The division of diatoms into ecologic groups, taking into account requests of particular species in relation to pH of the site was carried in accordance with Hustedt (1939) classification where the following forms are distinguished: 1 - alkalibiontic, occurring when pH is greater than 7; 2 - alkaliphilous, occurring when pH is about 7, the development of which, however, is better with the water reaction a bit higher; 3 - indifferent, with steady development at pH equal to 7; 4 - acidophilous, occurring when pH is equal to 7, but developing better with the water reaction a bit higher; 5 - acidobiontic, occurring when pH is smaller than 7, with the optimum development conditions at pH equal to 5.5 or lower.

The information concerning the diatoms request for calcium was obtained among other from the works by Hustedt (1939), Foged (1948), Cleve-Euler (1951–1955), Cholnoky (1968), Schoeman (1973).

The division of diatoms flora into saprobes groups was made basing on the saprobes system by Kolkwitz and Marsson (1908) modified by G. Breitig (see Kalbe 1973). In the system the following groups of organisms are distinguished: 1) xenosaprobes - saproxenic organisms avoiding waters polluted with decaying organic matter, which develop well in clear waters and when in polluted waters they are represented by single specimens; 2) oligosaprobes - indicator organisms of clear waters almost totally deprived of decaying organic matter; 3) beta-mesosaprobes - indicator organisms of waters slightly polluted with decaying organic matter; 4) alfa-mesosaprobes - indicator organisms of waters moderately polluted with decaying organic matter; 5) polysaprobes - indicator organisms of waters strongly polluted with decaying organic matter.

The indicator value for individual taxons of diatoms was determined making use of the works by Kolkwitz and Marsson (1908), Fjerdingstad (1964; 1965), Kalbe (1973), Turoboyski (1973). The composition, ecologic properties of diatoms and their percentage content in sediments are presented in Table 1 and 2. The taxons' percentage contents exceeding 1% of the general number of specimens in the samples are presented in Figs. 1 and 3. The percentages of ecologic groups of diatoms are presented in Figs. 2 and 4.

The diatom analysis has been carried on 50 samples of sediments. Only in 11 of them were the diatoms present. In the core Dąbki/83 the diatoms occurred in two sediment layers: in the lower one (at the depth of 164–114 cm) and in the roof part of the core (at the depth of 17–3 cm). In the core Dąbki/81 the diatoms were found only in the roof layer of sediments (at the depth of 25–5 cm). In the sediments investigated 89 taxons of diatoms were found and marked (Tables 1 and 2). Most of them are widely spread species that at present occur in inland reservoirs of fresh water.

Fresh-water epiphytic diatoms, occurring in water reservoirs enriched with calcium compounds and slightly polluted with decaying organic matter, turned out the group most abounding with species. The detailed analysis of the composition and quantity ratios of ecologic groups of diatoms was the basis to distinguish four diatom levels in the core Dąbki/83 (Figs. 1 and 2).

The first level corresponds to the sediment layer at the depth of 164–150 cm. For the sediment sample from the depth of 160–155 cm the date obtained was 6230±60 years BP (Gd-1703, Pazdur1992). The element dominating in the flora was fresh-water epiphytic diatoms of the genus *Epithemia*, mainly *E. turgida*, *E. turgida* v. *granulata*, *E. zebra*, *Fragilaria brevistriata*, *F. construens* v. *binodis*, *F. construens* v. *triundulata*, *Cocconeis placentula*. There was also a considerable quantity of benthic forms such as *Melosira arenaria*, *Rhopalodia gibba*, *R. gibba* v. *ventricosa*, *Pinnularia gibba*, *Gyrosigma attenuatum*, *Navicula oblonga*. They are mainly alkaliphilous and alkalibiontic species belonging also to the groups of beta-mesosaprobes and oligo/beta-mesosaprobes. The complex of diatoms mentioned above constituted the basis to distinguish the diatom level *Epithemia turgida–Melosira arenaria* D83 - 1.

The second level corresponds to the layer at the depth of 150–130 cm. For the sediment sample from the depth of 135–130 cm there was obtained the date 5700±80 years BP (Gd-2162, Pazdur 1992). In the diatom flora the content of benthic forms lowers down and epiphytic diatoms become prevailing. They constitute about 96% of the general number of specimens in the sample. There still prevail *Epithemia turgida*, *E. turgida* v. *granulata*, *E. zebra*, *Melosira arenaria*, *Cocconeis placentula*, *Rhopalodia gibba* v. *ventricosa*. There is also a great percentage of *Synedra ulna* with its variants, *Synedra capitata*, *Rhoicosphaenia curvata*.

In the layer there was also observed a small increase

Table 1. Composition, ecologic conditions of diatoms and their percentage content in sediments of the core Dąbki/83

Diatoms	Ecology				Depth (cm)							
	Habit.	Halob.	pH	Sapr.	3	17	114	124	134	144	154	164
1	2	3	4	5	6	7	8	9	10	11	12	13
Achnanthes clevei Grun.	Ep-Be	I	Alf	x	–	0,8	–	–	–	–	–	–
" exigua Grun.	Ep	I	Alf	x	–	+	–	–	–	–	–	–
" lanceolata (Bréb.) Grun.	Ep-Be	I	Alf	o/b	13,7	3,2	–	–	–	3,0	–	1,3
Amphora ovalis Kütz.	Be	I	Alf	b	0,7	+	–	–	–	–	+	0,2
" ovalis v. pediculus Kütz.	Be-Ep	I	Alf	?	–	–	–	–	–	–	–	+
Caloneis schumanniana (Grun.) Cl.	Be	I	Alf	o/b	–	–	–	–	–	–	–	0,2
Campylodiscus noricus Ehr.	Be	I	Alb	x	–	+	–	–	0,3	–	–	–
Cocconeis diminuta Pant.	Ep	I	Alb	o	16,0	22,4	–	–	–	–	–	+
" placentula Ehr.	Ep	I	Alf	o/b	0,7	2,9	6,4	16,5	17,5	6,6	11,3	5,1
Cyclostephanos dubins (Fricke) Round	Pl	I	Alf	?	–	–	–	+	–	–	–	–
Cyclotella comta (Ehr.) Kütz.	Pl	I	Alf	o	–	–	–	–	–	+	+	–
" kützingiana Ther.	Pl	I	Ind	b	–	–	–	–	0,3	–	–	–
Cymatopleura elliptica (Bréb.) W. Sm.	Be	I	Alf	b	–	–	–	–	+	–	–	–
" solea (Bréb.) W. Sm.	Be	I	Alf	b	–	–	–	–	+	+	+	–
Cymbella affinis Kütz.	Ep	I	Alf	o	–	–	–	–	–	+	–	–
" cistula (Hemp.) Grun.	Ep	I	Alf	o	–	–	3,2	1,8	+	+	–	+
" helvetica Kütz.	Ep	I	Alf	o	–	–	–	3,7	–	+	0,5	–
" lanceolata (Ehr.) V. H.	Ep	I	Alf	b	–	–	–	–	2,5	+	+	–
Diatoma elongatum (Lyngb.) Ag.	Pl	H	Ind	b	–	–	–	–	–	–	–	+
Diploneis ovalis (Hilse) Cl.	Be	I	Alf	x	–	+	–	–	–	–	–	–
Epithemia argus Kütz.	Ep	I	Alf	o	–	–	–	–	5,7	0,6	0,7	–
" intermedia Fricke	Ep	I	Alf	?	–	–	3,2	5,4	2,7	1,5	1,8	2,5
" sorex Kütz.	Ep	I	Alf	b	0,3	–	1,6	3,7	1,2	4,5	2,2	+
" turgida + v. granulata (Ehr.) Grun.	Ep	H	Alb	b	3,0	–	19,2	21,6	35,0	24,0	21,7	18,2
" zebra (Ehr.) Kütz.	Ep	I	Alb	o/b	–	–	6,4	14,4	11,8	12,0	12,5	12,0
Eunotia gracilis (Ehr.) Rabh.	Ep	Hb	Acf	o	–	–	–	–	+	–	–	1,3
" lunaris (Ehr.) Grun.	Be-Ep	Hb	Acf	x-o	–	+	–	–	+	–	–	–
Fragilaria brevistriata Grun.	Ep-Pl	I	Alf	o	13,3	17,0	12,0	+	–	–	+	13,3
" capucina Desm.	Ep-Pl	I	Alf	b	–	–	–	+	–	–	–	–
" construens + v. binodis (Ehr.) Grun. + v. triundulata Reich.	Ep-Pl	I	Alf	b	6,4	13,3	14,4	+	–	–	+	11,1
" lapponica Grun.	Ep-Pl	I	Alf	?	–	–	–	+	–	–	+	–
" pinnata Ehr.	Ep-Pl	I	Alf	b	–	0,5	–	–	–	–	–	–
" virescens v. mesolepta V. Schönf.	Ep-Pl	Hb	Acf	o/b	–	–	–	–	–	–	–	+
Gomphonema acuminatum Ehr.	Ep	I	Alf	b	–	–	0,3	+	–	0,5	0,7	–
" augur Ehr.	Ep	I	Alf	x	–	–	–	+	–	–	–	–
Gomphonema constrictum Ehr.	Ep	I	Alf	b	–	–	0,5	+	–	–	+	0,1
" intricatum Kütz.	Ep	I	Alf	x	–	+	–	–	–	–	+	2,5
" longiceps Ehr.	Ep	I	Alf	o	–	–	–	–	–	0,1	–	+
" olivaceum (Lyngb.) Kütz.	Ep	I	Alb	o/b	–	–	–	–	–	–	+	+
Gyrosigma attenuatum (Kütz.) Rabh.	Be	I	Alb	o/b	+	+	0,3	–	+	+	3,9	0,4
Hantzschia amphioxis (Ehr.) Grun.	Be	I	Alf	b/a	–	+	–	–	–	–	–	–
Melosira arenaria Moore	Pl-Be	I	Alf	b	17,0	5,7	4,4	4,4	5,5	10,3	18,9	11,1
" italica (Ehr.) Kütz.	Pl-Be	I	Alf	o/b	–	–	6,4	–	–	–	–	+
" varians Ag.	Pl-Be	I	Alf	b	–	–	3,2	–	0,5	4,5	2,2	0,2
Meridion circulare Ag.	Be	I	Alf	o/x	–	+	–	–	–	–	–	+
Navicula dicephala (Ehr.) W. Sm.	Be	I	Alf	o	–	–	–	–	–	+	–	–
" gracilis Ehr.	Be	I	Alf	o/b	–	–	–	–	–	+	–	–
" oblonga Kütz.	Be	I	Alf	x	–	–	1,6	5,4	–	+	4,2	0,7
" placentula (Ehr.) Grun.	Be	I	Alf	?	–	–	–	–	–	+	–	–
" pupula Kütz.	Be	I	Ind	b	–	–	–	–	–	1,5	–	–
" tuscula (Ehr.) Grun.	Be	I	Alb	x	–	+	–	–	–	–	–	–
Neidium iridis (Ehr.) Cl.	Be	I	Ind	?	–	–	–	–	–	–	–	0,3
Nitzschia angustata (W. Sm.) Grun.	Be	I	Alf	b	–	+	–	–	–	–	–	–
Opephora martyi Herib.	Ep	I	Alf	x	28,8	30,5	–	–	–	+	+	1,7
Pinnularia gibba Ehr.	Be-Ep	I	Ind	o	–	–	–	–	–	–	–	4,9
" maior (Kütz.) Cl.	Be	I	Ind	o	–	–	–	–	–	–	+	–
" microstauron (Ehr.) Cl.	Be	I	Acf	?	–	+	–	–	–	–	–	–
" subcapitata Greg.	Be-Ep	Hb	Acf	o	–	–	–	–	0,3	–	–	–
" viridis (Nitzsch.) Ehr.	Be	I	Ind	b	–	–	–	0,4	–	–	0,5	+

1	2	3	4	5	6	7	8	9	10	11	12	13
Rhoicosphaenia curvata (Kütz.) Grun.	Ep	I	Alf	b	–	–	1,9	0,5	2,7	6,0	0,7	0,4
Rhopalodia gibba + v. ventricosa (Ehr.) Grun.	Ep	I	Alf	o	–	–	1,6	10,9	5,0	4,5	0,5	9,9
Stauroneis acuta W. Sm.	Be	I	Ind	?	–	–	–	0,4	–	–	–	–
" anceps Ehr.	Be	I	Ind	b	–	–	–	–	0,3	–	–	–
" phoenicentron Ehr.	Be	I	Ind	b	–	–	–	0,2	–	–	–	–
Stephanodiscus astraea (Ehr.) Grun.	Pl	I	Alb	x	–	–	–	–	+	1,7	–	1,2
" hantzschii Grun.	Pl	I	Alf	b!(a)	–	–	–	–	–	–	–	0,3
Surirella biseriata Bréb.	Be	I	Alf	b	–	–	–	0,2	+	+	4,6	+
Synedra acus Kütz.	Pl	I	Alf	b	–	–	–	–	–	0,5	–	–
" capitata Ehr.	Ep	I	Alf	?	–	–	1,6	5,4	7,5	7,5	0,2	+
" ulna (Nitzsch.) Ehr. + var.	Ep	I	Alf	b/a	–	1,0	8,0	3,6	7,5	10,5	+	0,4
Tabellaria fenestrata (Lyngb.) Kütz.	Ep-Pl	Hb	Acf	b	–	–	–	–	–	–	–	0,2
" flacculosa (Roth.) Kütz.	Ep-Pl	Hb	Acf	b/o	–	–	–	–	–	–	2,2	0,1

LEGEND OF ECOLOGICAL ABBREVIATIONS
in Tables 1, 2 and Figs. 2, 4

Habit. – habitat groups (life forms)
Pl – planktonic
Ep – epiphytic
Be – benthic

Halob. – halobous groups (halobian system)
H – halophilous
I – oligohalobous indifferent
Hb – halophobous

pH – pH groups
Acf – acidophilous
Ind – indifferent
Alf – alkaliphilous
Alb – alkalibiontic

Sapr. – saprobes groups
x – xenosaprobes
o – oligosaprobes
b – beta-mesosaprobes
a – alfa-mesosaprobes

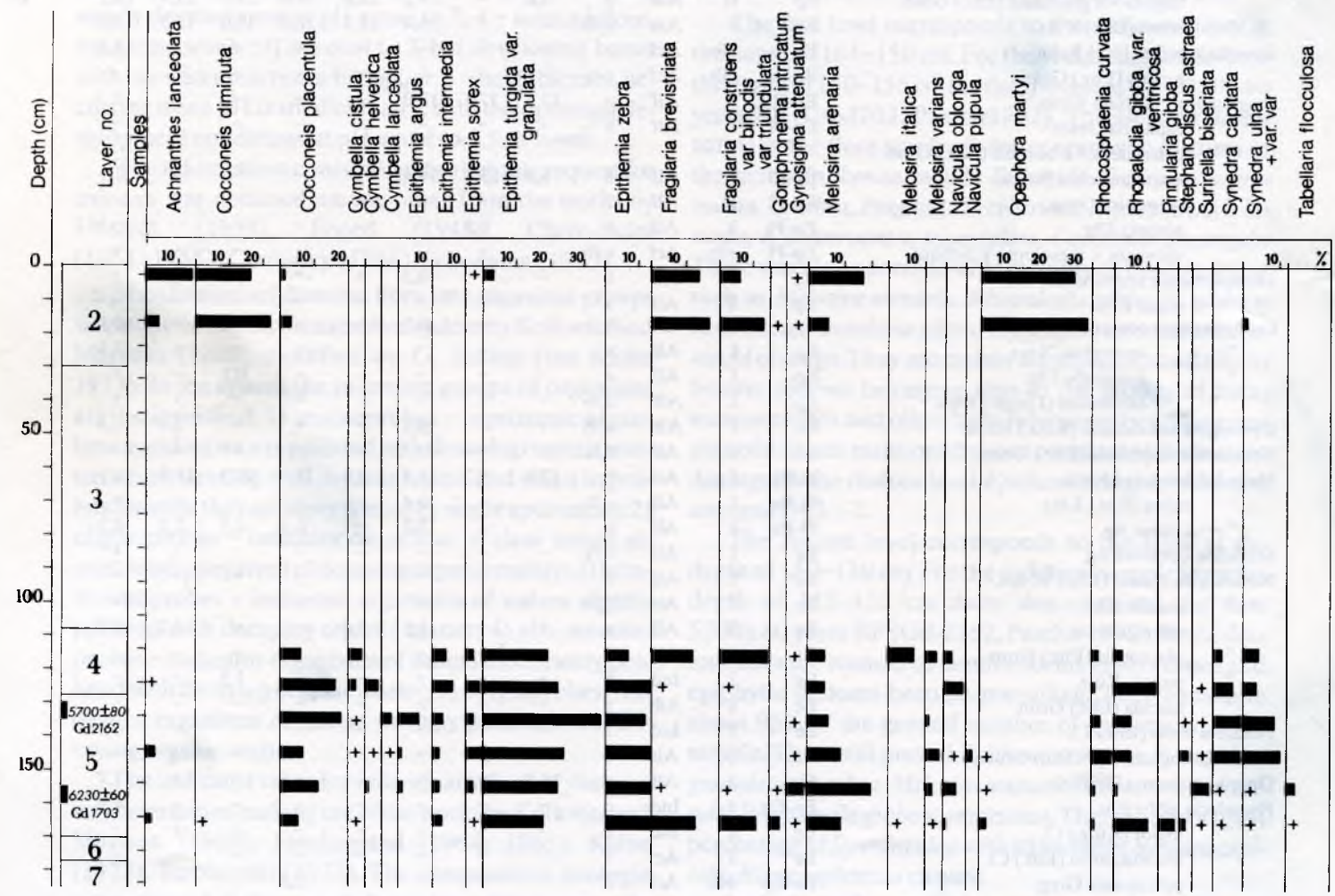

Fig. 1. Percentage (more than 1%) of diatoms in the sediments of the core Dąbki/83

Table 2. Composition, ecologic conditions of diatoms and their percentage content in sediments of the core Dąbki/81

Diatoms	Ecology				Depth (cm)		
	Habit.	Halob.	pH	Sapr.	5	15	25
Achnanthes lanceolata (Bréb.) Grun.	Ep	I	Alf	o/b!	+	10,4	–
" lanceolata v. elliptica Cl.	Ep	I	Alf	o/b	+	–	–
" lanceolata v. rostrata (Ø str.) Hust.	Ep	I	Alf	o/b	+	–	–
Caloneis amphisbaena (Bory) Cl.	Be	H	Alf	b/a	6,3	+	–
" schumanniana (Grun.) Cl.	Be	I	Alf	o/b	–	0,6	–
Cocconeis placentula Ehr.	Ep	I	Alf	o/b	4,5	6,0	7,1
Cyclotella kützingiana Ther.	Pl	I	Ind	b	–	2,0	–
Cymbella aspera (Ehr.) Cl.	Ep	I	Alf	o/b	+	–	–
" helvetica Kütz.	Ep	I	Alf	o	3,0	–	–
Diploneis ovalis (Hilse) Cl.	Be	I	Alf	x	3,5	+	–
Epithemia turgida + v. granulata (Ehr.) Grun.	Ep	H	Alb	b	6,3	4,6	7,3
" zebra (Ehr.) Kütz.	Ep	I	Alb	o/b	9,3	14,4	11,5
Eunotia diodon Ehr.	Ep	I	Ind	?	0,6	–	0,3
" gracilis (Ehr.) Rabh.	Ep	Hb	Acf	o	0,2	–	–
Fragilaria brevistriata Grun.	Ep-Pl	I	Alf	o	+	+	4,6
" construens + v. binodis (Ehr.) Grun. + v. triundulata Reich.	Ep-Pl	I	Alf	b	4,5	+	+
" crotonensis Kitt.	Pl	I	Alf	b	–	+	6,0
" leptostauron (Ehr.) Hust.	Ep-Pl	I	Alf	?	–	+	–
" pinnata Ehr.	Ep-Pl	I	Alf	b	1,6	–	–
Gomphonema acuminatum Ehr.	Ep	I	Alf	b	0,5	+	1,1
" capitatum Ehr.	Ep	I	Alf	b	–	0,6	7,1
" intricatum Kütz.	Ep	I	Alf	x	10,5	20,6	15,2
Hantzschia amphioxis (Ehr.) Grun.	Be	I	Alf	b/a	1,5	+	6,7
Melosira arenaria Moore	Pl-Be	I	Alf	b	0,5	4,4	1,4
" distans (Ehr.) Kütz.	Pl-Be	Hb	Acf	x	–	0,8	+
" granulata (Ehr.) Ralfs	Pl	I	Alf	b	+	–	+
" italica (Ehr.) Kütz.	Pl-Be	I	Alf	o/b	+	2,2	+
" varians Ag.	Pl-Be	I	Alf	b	–	–	+
Meridion circulare Ag.	Be	I	Alf	o/x	9,3	12,6	15,7
Navicula dicephala (Ehr.) W. Sm.	Be	I	Alf	o	–	0,4	–
" hungarica Grun.	Be	I	Alf	b	–	0,8	–
" radiosa Kütz.	Be	I	Ind	b	–	2,0	–
" reinhardtii Grun.	Be	I	Alb	b/a	–	–	1,3
" scutelloides W. Sm.	Be	I	Alb	?	–	2,6	–
Nitzschia angustata (W. Sm.) Grun.	Be	I	Alf	b	4,8	+	4,2
Opephora martyi Herib.	Ep	I	Alf	x	1,5	4,4	2,8
Pinnularia microstauron (Ehr.) Cl.	Be	I	Acf	?	3,3	+	+
" interrupta W. Sm.	Be	I	Acf	x	4,5	+	–
" subcapitata Greg.	Be-Ep	Hb	Acf	o	1,5	–	0,2
" viridis (Nitzsch.) Ehr.	Be	I	Ind	b	15,5	+	0,4
Rhoicosphaenia curvata (Kütz.) Grun.	Ep	I	Alf	b	+	4,4	4,3
Rhopalodia gibba + v. ventricosa (Ehr.) Grun.	Ep	I	Alf	o	+	0,4	+
Stauroneis acuta W. Sm.	Be	I	Ind	b	+	+	0,6
" anceps Ehr.	Be	I	Ind	b	–	+	+
Surirella ovata Kütz.	Be	I	Alf	b/a	+	+	–
" ovata v. crumena (Bréb.) V. H.	Be	I	Alf	?	+	–	+

(up to about 4%) in the percentage of planktonic forms, mainly of *Stephanodiscus astraea*. Most of diatoms occurring in that sediment layer are oligohalobous halophilous, alkalibiontic species belonging to the group of beta-mesosaprobes and oligo/beta-mesosaprobes organisms. The diatom complex became the basis to distinguish the diatom level *Epithemia turgida–Synedra ulna* D83 – 2.

The third level comprises the sediment layer at the depth of 130–115 cm. In the sediments a decrease was observed in the presence of particular species. In the diatom flora the epiphytic species are of the decisive prevalence but a considerable increase of benthic forms can be noticed clearly. The species of the genus like *Epithemia*, *Fragilaria*, *Cocconeis*, *Rhopalodia* and *Navicula ob-*

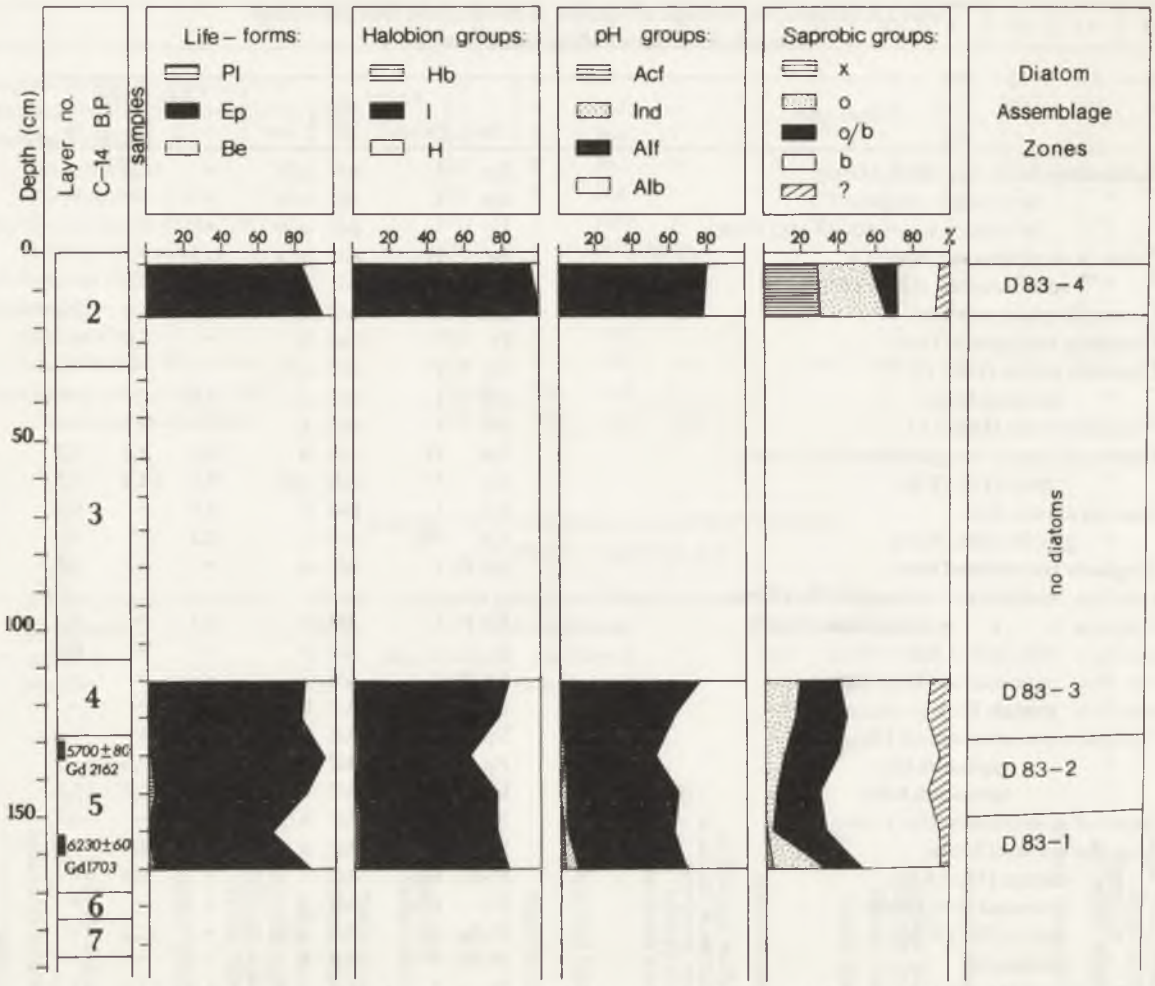

Fig. 2. Percentage (%) of ecologic groups of diatoms in the sediments of the core Dąbki/83

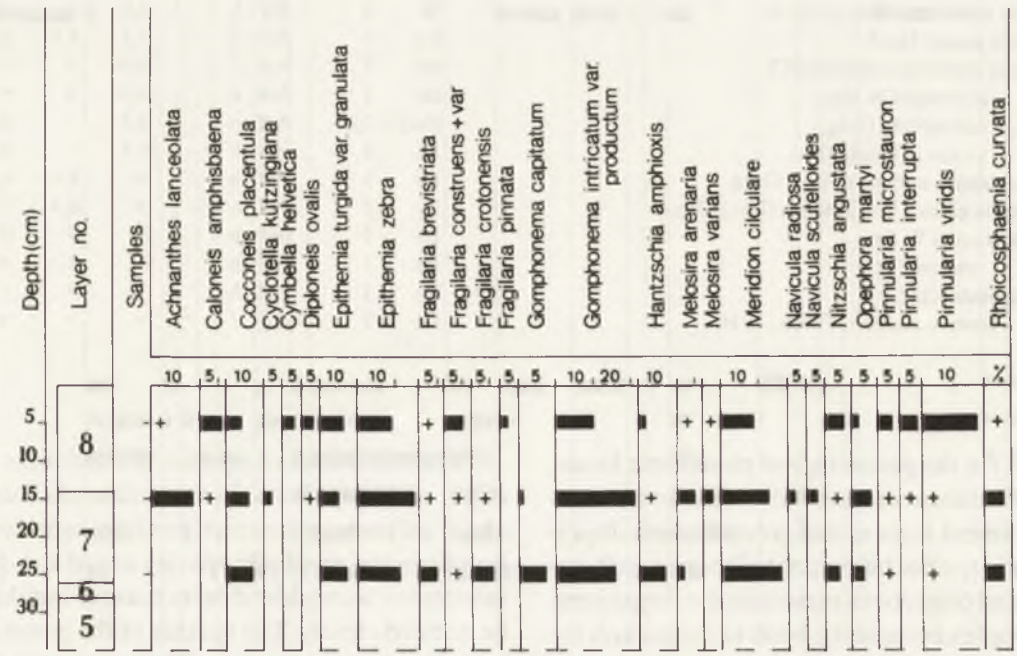

Fig. 3. Percentage (more than 1%) of diatoms in the sediments of the core Dąbki/81

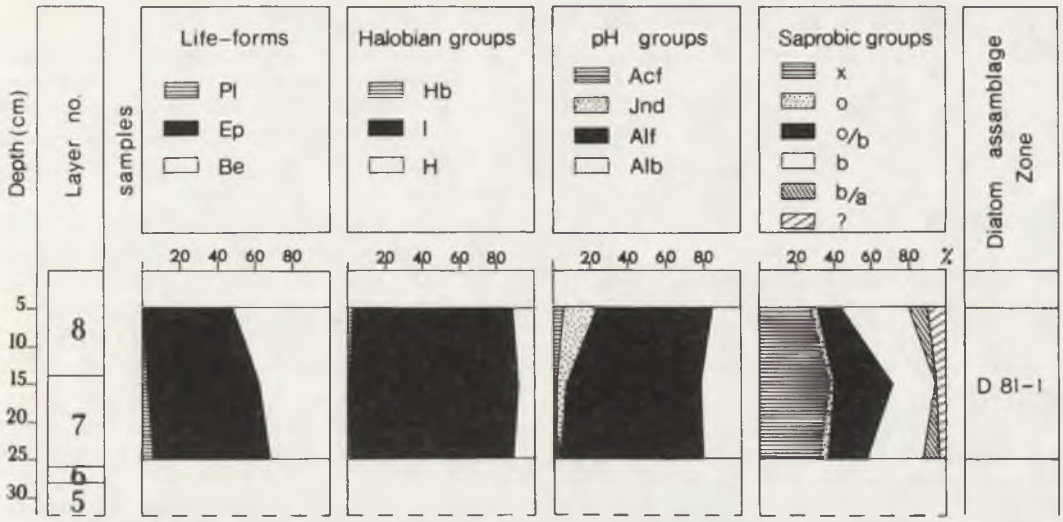

Fig. 4. Percentage (%) of ecologic groups of diatoms in the sediments of the core Dąbki/81

longa occur in considerable percentage. In the sediment investigated there occurred numerous teratologic forms and fragments of frustules of diatoms such as *Cymatopleura*, *Surirella*, *Synedra*, *Epithemia*, *Gyrosigma*. The diatom flora occurring in the layer constituted the basis to distinguish the diatom level *Epithemia turgida-Fragilaria construens* D83 - 3.

The fourth level covers the roof layer of sediments deposited at the depth of 17-3 cm. In the sediments a generally poor diatom flora was represented by fresh-water (oligohalobous indifferent) epiphytic species. There were prevailing *Opephora martyi*, *Cocconeis diminuta*, *Fragilaria brevistriata*, *F. construens*, *Achnanthes lanceolata* and *Melosira arenaria*. It is worth while to notice the presence of such species as *Achnanthes lanceolata*, *Gomphonema intricatum*, *Meridion circulare*, *Navicula dicephala*, *Rhoicosphaenia curvata* which are described in literature as oligosaprobes and xenosaprobes river species. The sediment layer distinguished as well as the flora occurring there have been assumed the diatom level *Opephora martyi-Cocconeis diminuta* D83 - 4.

In the sediments of the roof part of core Dąbki/81 the diatom flora was represented by a complex of fresh-water epiphytic and benthic diatoms (Figs. 3 and 4). A considerable percentage (up to ±50%) was the river species such as *Gomphonema intricatum* v. *productum*, *Meridion circulare*, *Achnanthes lanceolata* beside *Opephora martyi*, *Rhoicosphaenia curvata*. The species mentioned above belong to the group of xenosaprobes and oligo/beta-mesosaprobes and are indicator organisms of clear waters of good oxygen conditions. A great percentage of diatoms characteristic for running waters became the basis to distinguish in the sediments the diatom level *Gomphonema intricatum-Meridion circulare* D81 - 1.

The diatom levels distinguished on the basis of the analysis of fossil diatoms are biostratigraphic units of a characteristic biofacies. They give information about the site conditions present in the reservoir during the accumulation of a given sediment layer. They also constitute the basis to reconstruct the changes of ecologic conditions in a given area. The diatom flora preserved in the sediments from the Atlantic period and, especially, the decisive prevalence of oligohalobous indifferent epiphytic diatoms indicate their development to have taken place in the bank zone of a fresh-water reservoir. The increase of the percentage of alkalibiontic benthic species and beta-mesosaprobes proves a slight and short-term lowering of the waters in the reservoir to have taken place (D83 - 1). The development of epiphytic oligohalobous halophilous diatoms and the increase of planktonic forms in the flora were connected with the change of ecologic conditions in the reservoir due to the inflow of slightly salted waters (D83 - 2). The repeated increase of alkalibiontic benthic species in the flora, a generally bad state of the diatoms preserved in the sediment and the presence of numerous teratologic forms were caused by the increase of alkalinity and the lowering of the water level in the reservoir (D83 - 3).

The presence of numerous river diatoms in the roof part of the sediments indicates the accumulation of these layers to have taken place under the influence of running waters (D83 - 4 and D81 - 1).

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