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An Analytical Study of Diatom Shells in the Bottom Deposits of Lake Yogo-ko*

By

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ABSTRACT An analytical study of diatom shells in the bottom deposits of Lake Yogo-ko, north of Lake Biwa-ko, has been carried out by the author, based on a new core-material of about 10 m length taken by Dr. Shoji Horie. The author's figure of zonal fluctuation of relative quantity of diatom shells coincides fairly well with Dr. Horie's fluctuation-graph of nitrogen amount in that core.

Lake Yogo-ko is a small lake of 1.63 sq. km in superficies, which lies only 1.5 km distant from the northern shore of Lake Biwa-ko, and has a maximum depth of 13.5 m. It occupies the northernmost part of the same depression as Lake Biwa-ko, from which it is isolated by a low range called Mt. Shizu-ga-dake (422 m above sea level). Its water-surface, which is 134 m high above the sea, is 48 m higher than that of Lake Biwa-ko. The outlet, the River Yogo-gawa, starts at the north-eastern corner of the lake and flows into Lake Biwa-ko, after ca. 15 km running down along the eastern side of Mt. Shizu-ga-dake.

The plankton of Lake Yogo-ko is very similar to that of Lake Biwa-ko, having many plankters in common with the latter. But in some respects the two are fundamentally different. It seems to me probable that this fact will be due to the same origin and to the different limnological types of the two lakes. Lake Biwa-ko is a typical oligotrophic water, while lake Yogo-ko is in a state of progressive eutrophication. In summer, Lake Biwa-ko shows dissolved oxygen of about 70 per cent in hypolimnion, even just above the bottom of 70-90 m depth, while Lake Yogo-ko has a thick layer of entire deoxygenation below about 5-7 m (D. Miyadi and N. Hazama, 1932).

I have already published a paper concerning on the same study as that of the present report (K. Negoro, 1956). But the material used in that study was

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a core of only 13 cm length, which was taken up by Prof. Dr. Masuzo Uéno and Prof. Dr. Ken Sugawara in the deepest part of the lake. In July of 1961, Dr. Shoji Horie of our Hydrobiological Station succeeded in obtaining a long core of about 10 m from the bottom of the northern part (off Kawanami, 5 m depth) and kindly offered it for my study. The present paper deals with the results of analytical study of diatom shells based on this new material, which are summerized in the table 1.

Table 1. The diatom shells in the bottom deposits of Lake Yogo--ko.

Sample-number	Distance from the mud-surface	Relative quantity of shells	Number of species	Dominant form	Sub-dominant form	Additional notes
No. 1	0.07 m	*	7	*Mel. ital.*	*Cycl. comt.*	Gyttja
2	0.27	*	6	*St. carc.*	〃	〃
3	0.47	* *	11	〃		〃
4	0.55	* * * *	13	〃		〃
5	0.75	* * * *	17	〃	*Mel. ital.*	〃
6	0.95	* * *	13	〃		〃
7	1.15	* * * *	8	〃	*Mel. ital.*	〃
8	1.27	* * * *	9	〃		〃
9	1.47	* * *	10	〃		〃
10	1.67	* * * *	17	〃		〃
11	1.77	* *	10	〃		〃
12	1.86	*	9	〃		〃
13	2.06	*	1	〃		〃
14	2.26	* * * *	11	〃		〃
15	2.36	* *	8	〃		〃
16	2.54	* * *	8	*Mel. ital.*	*Cycl. comt.*	〃
17	2.74	* * *	12	〃	〃	〃
18	2.94	* * *	10	〃	〃	〃
19	3.11	*	4	*Cycl. comt.*		〃
20	3.31	* *	8	*Mel. ital.*	*Cycl. comt.*	〃
21	3.51	*	6	*Cycl. comt.*		〃
22	3.61	* *	9	*St. carc.*	*Cycl. comt.*	〃
23	3.73	* *	10	*Cycl. comt.*		〃
24	3.93	* *	9	*Mel. ital.*	*Cycl. comt.*	〃
25	4.13	* *	15	*Cycl. comt.*	*Mel. ital.*	〃
26	4.33	*	4			〃
27	4.47	*	2			〃
28	4.67	*	7			〃
29	4.87	*	7			〃
30	5.01	*	7	*Cycl. comt.*		〃
31	5.21	*	3			〃
32	5.41	——	——			〃
33	5.61	*	3	*St. carc.*		〃
34	5.76	——	——			〃
35	5.88	——	——			〃

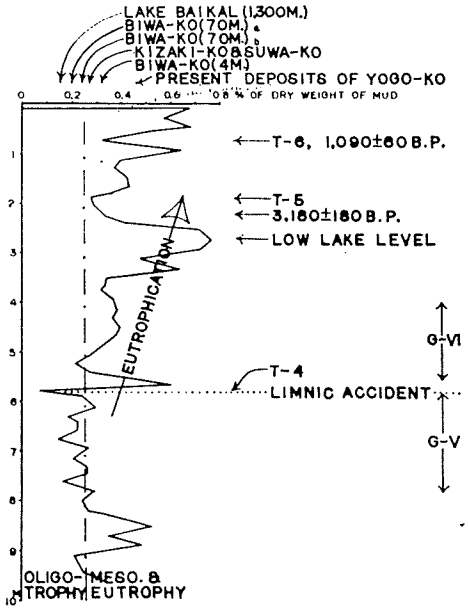
36	6.08	——	——		〃
37	6.28	——	——		〃
38	6.38	* *	3	*St. carc.*	〃
39	6.51	*	1	〃	〃
40	6.71	——	——		F. M.
41	6.91	*	1	*St. carc.*	〃
42	7.11	*	1		C. M.
43	7.25	* *	8	*St. carc.*	〃
44	7.36	*	4		F. M. & D.
45	7.56	*	3	*Cycl. comt.*	〃
46	7.76	*	2		Fe
47	7.96	*	3		F. M. & D.
48	8.16	* *	3	*Mel. isl.*?	〃
49	8.25	* *	6		〃
50	8.45	* *	3		D.
51	8.65	* *	5		〃
52	8.85	* *	4	*Cycl. comt.*	〃
53	9.05	*	1	*St. carc.*	C. M.
54	9.18	*	4		D.
55	9.38	*	4	*Mel. isl.*?	〃
56	9.58	* *	2		Fe

Key to signs and abbreviations: * * * * abundant, * * * somewhat abundant * * common, * rare; *Mel. ital.* = *Melosira italica*, perhaps together with *Melosira granulata*, *St. carc.* = *Stephanodiscus carconensis* and *St. carc.* var. *pusilla*, *Cycl. comt.* = *Cyclotella comta*, *Mel. isl.* = *Melosira islandica*; F. M. = Fine mineral grains, C. M. = Coarse mineral grains, D. = Organic detritus, Fe = Hydrated iron.

In the core-samples 54 species of diatoms belonging to the following genera were found: *Melosira*(5), *Cyclotella*(1), *Stephanodiscus*(1), *Fragilaria*(2), *Synedra*(2), *Eunotia*(2), *Cocconeis*(1), *Achnanthes*(2), *Gyrosigma*(1), *Caloneis*(4), *Diploneis*(3), *Stauroneis*(1), *Navicula*(6), *Pinnularia*(5), *Amphora*(2), *Cymbella* (5), *Gomphonema*(4), *Epithemia*(5), *Nitzschia*(1), *Surirella*(1). Of these species the dominant or subdominant forms are always restricted to the four species (*Cyclotella comta*, *Stephanodiscus carconensis*, *Melosira italica*, and *Melosira islandica*?), which appear respectively by turns in each layer of the bottom deposits. It is noteworthy that *Stephanodiscus carconensis* appears abundantly as in Lake Biwa-ko, but *Melosira solida*, which is one of the dominant diatoms in Lake Biwa-ko (K. Negoro, 1958), is here never found.

Dr. S. Horie has measured in each level of the core several physical and chemical natures, such as wet weight, dry weight, ignition loss, carcium carbonate, residue, nitrogen, and them graphically shown (S. Horie, 1966). His nitrogen-graph (Fig. 1) coincides fairly well with my figure of zonal fluctuations of relative quantity of diatom shells.

Fig. 1. Fluctuation of nitrogen amount in the core of Yogo--ko and connecting features to it. After S. Horie (1966).



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