

CONCLUSIONS

1. The results are largely confirmatory of the work done in 1921.

2. The number of samples secured was less than that obtained in the previous year since many of the areas examined were considerably removed from the base of operations and extended trips were necessary in order to secure them. The total number of organisms obtained was, however, considerably greater, indicating that many of the regions studied were exceedingly productive.

3. One of the outstanding facts brought out by this investigation is that the most productive parts of the lake are, in general, within a limit of 30 feet in depth. This conclusion is amply supported by the curves illustrating distribution of various organisms according to depth. A few animals, such as *Pontoporeia hoyi*, are most abundant in deep water, and form a plentiful source of food for deep-water fish such as the common whitefish.

4. The well-protected bays, such as Humboldt Bay (Series XIX), are very highly productive of food organisms in comparison with more open water (Series XVII). In some of these smaller bays, moreover, certain associations of organisms occur which are not found elsewhere in the lake.

5. The character of the bottom influences the productivity of the lake very decidedly as can be seen in the contrast between Ombabika Bay (Series XXI) and Humboldt Bay (Series XIX and XX).

UNIVERSITY OF TORONTO STUDIES

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No. 20

FURTHER STUDIES OF THE PLANKTON OF LAKE NIPIGON

BY

N. K. BIGELOW

OF THE DEPARTMENT OF BIOLOGY
UNIVERSITY OF TORONTO

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FURTHER STUDIES OF THE PLANKTON OF LAKE NIPIGON

The study of the minute animals and plants of Lake Nipigon was continued during the summer of 1922. Material was collected in much the same way as in the preceding year, and samples of plankton were obtained from many of the localities visited previously, as well as from many additional and widely separated regions. Additions to the fauna and flora of the regions are here listed along with a few notes on occurrence, distribution, ecology, etc.

ALGAE

CLASS *Myxophyceae*

ORDER *Coccogoneales*

FAMILY *Chroococcaceae*

Coelosphaerium naegelianum Unger. Colonies were common during the latter part of July in Black Sturgeon Bay.

Gomphosphaeria aponina Kützing. On July 5 and 14 colonies of this species were found to be common in a large shallow, weedy pond near the head of Orient Bay.

ORDER *Homogoneales*

FAMILY *Oscillatoriaceae*

Spirulina sp. A few filaments were found in the small lake near Macdiarmid station.

FAMILY *Scytonemaceae*

Tolypothrix sp. This alga was found to be widely distributed, but not very common. It was found more frequently in small neighbouring lakes than in Lake Nipigon.

CLASS *Chlorophyceae*

ORDER *Protococcales*

FAMILY *Palmellaceae*

Sphaerocystis schroeter Chodat. This alga was taken on July 14 at the head of Orient Bay.

FAMILY *Autosporaceae*

Gloeocystopsis limneticus Smith. A few colonies were collected along with preceding species.

Nephrocytium sp. One coenobium was found in plankton collected on July 21 at Chief Bay.

Tetraedron trigonum (Nägeli). A few colonies were found on July 20 in Black Sturgeon Bay.

Tetraedron minimum (A. Braun). On August 8 a small depression in a large granite rock on an island in Humboldt Bay was found to be filled with water coloured green by the presence of this alga in company with *Scenedesmus bijuga* and a species of *Ankistrodesmus*.

Quadrigula lacustris (Chodat). Coenobia of this species were found occasionally in plankton from near the head of Orient Bay.

Selenastrum bibraianum Reinsch. A few colonies were found in Black Sturgeon Bay.

Selenastrum gracile Reinsch. This species also was taken in Black Sturgeon Bay.

Crucigenia rectangularis (Nägeli). A single colony was found in plankton from Sturgeon River near its mouth.

Scenedesmus obliquus (Turpin). This species was found a few times in Orient Bay plankton.

Scenedesmus quadricauda (Turpin). Colonies were found in small numbers in plankton from most bays and sluggish creeks.

Coelastrum microporum Nägeli. Coenobia were found on July 20 and 21 both in Chief Bay and in Black Sturgeon Bay.

ORDER *Siphonocladiales*FAMILY *Oedogoniaceae*

Oedogonium sp. One or more species of this plant was very common in a small pond near the village of Fairloch in the latter part of August. Otherwise only an occasional filament was found in plankton from bays and creeks.

Bulbochaete sp. Large brown colonies were attached to aquatic plants in small ponds and sluggish creeks near Orient Bay. Occasional fragments of it were found in the food of young suckers.

FAMILY *Chaetophoraceae*

Herpoteiron confervicola Nägeli. Colonies of this species were found attached to filaments of *Mougeotia* in the small lake near Macdiarmid station.

ORDER *Conjugales*FAMILY *Desmidiaceae*

Sphaerosoma filiforme Rab.

Closterium moniliferum Ehr.

Spirotaenia sp.

Netrium lamellosum Brébisson.

Staurostrum megacanthum Lund.

Arthrodesmus convergens Ehr.

Euastrum oblongatum (Grev.).

Euastrum verrucosum Ehr.

Cosmarium crenatum Ralfs.

Cosmarium ornatum Ralfs.

Cosmarium tetraphthalmum (Kützing).

Cosmarium broomei Thwaites.

Most of these species are from weed-filled indentations of Black Sturgeon Bay.

PROTOZOA

CLASS *Rhizopoda*ORDER *Testacea*FAMILY *Arcellidae*

Lecquereusia epistomium Penard. A few specimens were collected on July 5 from the small lake near Macdiarmid station.

Diffugia constricta Ehr. This species was common among vegetation at the head of Orient Bay, and was frequently eaten by young suckers.

Diffugia cratera Leidy. A common sucker (*Catostomus commersonii*), fourteen centimetres in length, from Ombabika Bay had eaten so many of these rhizopods that it was estimated they formed at least one per cent. of the food. This species was also found in other suckers from the same region and from Humboldt Bay.

Pontigulasia spectabilis Penard. A few specimens occurred in small suckers taken from various parts of the lake.

Nebela dentistoma Penard. This species was eaten by a few small suckers at the head of Orient Bay.

Nebela collaris Leidy. This species occurred with the above, but was even less common.

Sphenoderia lenta Schlumberger. The tests were occasionally found in the food of young suckers.

ORDER Testacea

FAMILY Euglyphidae

Campascus sp. The tests of a rhizopod belonging to this genus were found in many parts of the lake.

CLASS Zoomastigophora

ORDER Euglenida

FAMILY Euglenidae

Euglena viridis Ehr.

Euglena acus Ehr.

Trachelamonas crebea Kellikott.

Phacus pleuronectes (Müller).

These four species were found on June 23 among weeds in a shallow creek near Orient Bay. Apparently euglenoid flagellates are not very common in Lake Nipigon.

CLASS Ciliata

ORDER Holotricha

Loxodes rostrum Müller. On July 5 a few large specimens were taken from among weeds in the small lake near Macdiarmid station.

Mesodinium sp. A large ciliate with a constriction of its body, surrounded by a circle of long very prominent cilia, was found in plankton taken in water polluted by decomposing fish viscera. This infusorian was nearly visible to the naked eye. Its protoplasm contained numerous green granules.

ROTATORIA

ORDER Ploima

FAMILY Asplanchnidae

Asplanchna priodonta Gosse. The large *Asplanchna* found occasionally in open water plankton was determined to be this species.

FAMILY Microcodonidae

Microcodon clavus Ehr. A single specimen was collected on June 5 from the small lake near Macdiarmid station.

ARTHROPODA

CLASS Crustacea

ORDER Copepoda

FAMILY Centropagidae

Diaptomus oregonensis Lilljeborg. This species occurred more plentifully in small surrounding lakes than in Lake Nipigon. It was taken from Black Sturgeon Lake, from a small lake just east of Macdiarmid station and from another small lake on a hill top across the bay from this village. In these lakes it was the only species of *Diaptomus* found. It was taken from Lake Nipigon on two occasions, namely, in Humboldt Bay August 18 and in a night surface tow in the bay near Macdiarmid village in the latter part of the same month.

Diaptomus ashlandi Marsh. During the latter part of the summer this species was taken a few times in Orient Bay. It was much less common than either *Diaptomus sicilis* or *D. minutus*.

FAMILY Cyclopidae

Cyclops bicuspidatus Claus. Open water plankton from all parts of the lake was found to contain this species.

Cyclops viridis Jurine. A variety of this species occurred commonly in sluggish creeks and pools near Orient Bay village.

Cyclops ater Herrick. The only place where this species was found was a small pond containing quantities of *Oedo-*

gonium near Fairloch. Several specimens were found in this pond.

Cyclops prasinus Fischer. A few specimens were found in plankton from Lake Nipigon near the mouth of the Blackwater River.

FAMILY Harpacticidae

Canthocamptus staphylinoides Pearse. This species and *C. minutus* were found commonly in the food taken by young suckers.

ORDER Cladocera

FAMILY Holopedidae

Holopedium gibberum Zaddach. Two specimens of this cladoceran were found in plankton taken near the head of Orient Bay in June, 1922. Each specimen was from a different plankton collection. As no other individuals were found in plankton from any part of the lake, either in the summer of 1921 or 1922, it would appear that this entomostracan is very rare in Lake Nipigon.

FAMILY Daphnidae

Simocephalus serrulatus (Koch). This species was taken along with *S. vetulus* among vegetation in sluggish creeks and ponds near the head of Orient Bay.

FAMILY Macrothricidae

Streblocerus serricaudatus (Fischer). A large shallow pond near the head of Orient Bay was the only place in which this cladoceran was found. The pond was not surrounded by trees and, as the bottom was of sand, its water was very warm. In one end of the pond was a rather thick growth of bladder worts, pond weeds, and yellow water lilies. Among this vegetation numbers of this entomostracan were found in August 5 and 14.

Ilyocryptus sordidus (Liéven). A single specimen was taken from a sucker from near the head of Orient Bay on August 3.

Ilyocryptus acutifrons Sars. This was found to be the commonest and most widely distributed species of this genus in Lake Nipigon. Eight small suckers taken on August 3 near the head of Orient Bay contained this cladoceran. It may be of interest to note here that the commonest species of *Ilyocryptus* taken by the small suckers in this same locality in the summer of 1921 was *I. spinifer* Herrick, no specimens of which were found in 1922.

Macrothrix laticornis (Jurine). Two small suckers taken near Shakespeare Island, one taken at Gull Bay and one from Ombabika Bay, had each eaten a specimen of this cladoceran. It seems probable that this is a rare but widely distributed form in Lake Nipigon.

Lathonura rectirostris (O. F. Müller). Two specimens of this Macrothricid were taken among vegetation in the same pond with *Streblocerus serricaudatus* on August 5.

FAMILY Chydoridae

Leydigia quadrangularis (Leydig). A sucker from Shakespeare Island had eaten a number of specimens of this cladoceran, which is probably common locally.

Alonella excisa Fischer. This species was recorded as *Pleuroxus hastatus* in 1921, owing to the fact that some specimens had more than ten marginal denticles on the post abdomen, and were in other respects considerably different from the usual appearance of this species. A more critical study of a long series, however, shows conclusively that the cladoceran is *Alonella excisa*.

Alona rectangula Sars. Only a few specimens have been taken, and these in widely separated localities.

Camptocercus rectirostris? Specimens of a species of *Camptocercus* having 18 and 19 denticles on the post abdomen were frequently found in Lake Nipigon. As in this case the number of marginal denticles is intermediate between *Camptocercus rectirostris* and *C. macrurus*, it would appear that this is an unreliable character for the purpose of separating the two forms which are probably merely varieties.

A few notes respecting some of the *Cladocera* previously recorded may be of interest. *Daphnia retrocurva* was found to be much commoner than was indicated by the plankton collected during the summer of 1921. Several spot-tailed minnows (*Notropis hudsonius*) taken near the head of Orient Bay had eaten a high percentage of this *Daphnia*, which shows that it must be locally quite abundant. In some instances it formed as high as 95% of the food. The same is true with regard to *Daphnia longispina* var. *hyalina*, as specimens of the yellow perch (*Perca flavescens*) from the same part of the lake had eaten a great number of the latter entomostracan.

With regard to the *Chydoridae* it seems probable that *Alonella nana* and *Monospilus dispar* are more numerous in Lake Nipigon than in other bodies of water. The same is true of *Rhynchotalona falcata*, which is so common and widely distributed that it must be valuable as a food organism for fishes which feed close to the bottom. A single specimen with tuberculated shell valves similar to those of *Alona guttata* var. *tuberculata* was found. Small suckers taken at Sturgeon River were found to have eaten a considerable number of specimens of *Alonella rostrata*, which was otherwise very infrequent. These specimens did not have the long incurved beak so prominent as is sometimes the case with this species, but much resembled the figure 211 on page 89 of *Die Süßwasserfauna Deutschlands*. Only one specimen of this cladoceran was found in the summer of 1921, and it was a more typical individual with a long curved rostrum. *Alona costata* was found to be the commonest of this genus and one of the most widely distributed Cladocera in Lake Nipigon. A single specimen was found with tuberculate valves as in *Alona guttata* var. *tuberculata*.

Notwithstanding the fact that certain important organisms were found to be quite abundant locally, the investigations of the second summer tend to confirm the statements of the first year's studies, namely, that Lake Nipigon is relatively a plankton poor body of water with the exception of its enormous diatomaceous flora.

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No. 21

THE FOOD OF YOUNG SUCKERS (*CATOSTOMUS* *COMMERSONI*) IN LAKE NIPIGON

BY

N. K. BIGELOW

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UNIVERSITY OF TORONTO

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