

For some reason the species does not reach a very large size, the largest specimen secured being six inches in length.

The only species of darter taken was the Tessellated Darter, *Boleosoma nigrum* (Rafinesque.) It was commonly taken in the seine in shallow water.

A number of specimens of the Miller's Thumb, *Cottus ictalops* (Rafinesque), and of *Uranidea gracilis* (Heckel), were taken about the middle of June in a specially constructed bag net set in a stream a short distance from where it enters the lake. Partly digested specimens, too fragmentary for definite determination, taken from the stomachs of ling may represent a third species of the family *Cottidae*.

The Ling, *Lota maculosa* (Le Sueur), is very common in deep water, and large numbers are taken in gill nets set for Whitefish.

Although this list is not extensive, it includes the principal commercial species characteristic of the Great Lakes. Its deficiency is mainly in *Cyprinidae* and other small forms. To what extent this deficiency limits the productivity of the lake by curtailing the food of the larger predaceous species cannot be estimated until other bodies of water, rich in the smaller species, have been investigated.

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THE PLANKTON OF LAKE NIPIGON AND ENVIRONS

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THE PLANKTON OF LAKE NIPIGON AND ENVIRONS

The following preliminary record of the more minute fauna and flora of Lake Nipigon and vicinity is the result of extensive collections made during the summer of 1921. The material studied was obtained from four sources:—

(1) By means of a vertical closing net, plankton samples were taken from the open waters at all depths. Three stations were established, and visited regularly. Station I was located off the mouth of the Nipigon River; Station II, in the deep water of Pijitawabik Bay (Orient Bay), directly opposite the village of Macdiarmid; Station III, in the open waters opposite the mouth of Sandy River. The usual type of closing net was used, made of bolting silk, size No. 20, and vertical tows were made through five and ten yard intervals. The quantitative results will be presented in a later paper.

(2) Surface tows were made in many places in the lake and in the lower portions of some of the larger streams.

(3) Many interesting forms were secured by sweeping with a small, conical net among aquatic vegetation in streams, bayous, ponds, pools, cold springs, etc.

(4) The stomach contents of many species of fish yielded much valuable data. Young fish, particularly the young of the common sucker (*Catostomus commersonii*) were found to be excellent collectors of small organisms. Several hundred small suckers were examined, and their digestive tracts were found each to contain from 30 to 50 or more different species of microscopic animals and plants. When from two to four centimetres in length, they were found to have subsisted almost entirely upon plankton. Slightly larger specimens taken a little later in the season were found to have fed upon the surface of the bottom ooze, where myriads of *Rotatoria*, *Cladocera*, *Diatoms*, etc., occurred.

In the lists of organisms mentioned in this paper the following designations are used: A.=abundant; V.C.=very common; C.=common; F.=fairly common; I.=infrequent; R.=rare.

An asterisk after the name of an organism denotes that the species had been taken as food by the young suckers previously mentioned.

ALGAE

CLASS MYXOPHYCEAE

The abundance of blue green *Algae* in Lake Nipigon and its vicinity was found to be insignificant in comparison with that of the diatoms; nevertheless, a considerable number of species were found to occur. The only genera found in the open-water plankton were *Microcystis*, *Anabaena*, and *Aphanizomenon*. The other genera occurred in creeks, bayous, ponds, and pools.

ORDER COCCOGONEALES

FAMILY CHROOCOCCACEAE

Chroococcus limneticus Lemmermann I.

Chroococcus turgidus Nägeli * F.

Coelosphaerium sp. I.

Merismopedia elegans Braun * F.

Microcystis aeruginosa Kützing * A. Although this species was not present in sufficient numbers to be the direct cause of lake bloom, it contributed to this formation by mingling with the more abundant *Anabaena*.

Microcystis flos-aquae Kirchner * V.C.

Aphanocapsa sp. * I.

Aphanothece sp. I.

Gloeothece sp. I.

Dactylococcopsis sp. * I.

ORDER HORMOGONEALES

FAMILY OSCILLATORIACEAE

Lyngbya birgei Smith * I.

Oscillatoria sp. F. Myxophytes of this genus were found only in small pools.

FAMILY NOSTOCACEAE

Nostoc sp. Pale green colonies of a species of this alga were found attached to weeds in a sluggish creek near Orient Bay. The colonies were spherical, but only about 8 mm. in diameter.

Anabaena circinalis Rabenhorst A.

Anabaena lemmermanni Richter * A. Long strips of lake bloom in the latter part of July and in August were found, on microscopic examination, to be masses of spores of this species, from which the surrounding filaments had disintegrated. Masses of the same kind of spores were found occasionally in the digestive tracts of young suckers.

Aphanizomenon flos-aquae Ralfs. R.

FAMILY RIVULARIACEAE

Rivularia sp. F.

CLASS BACILLARIACEAE

Of all the minute organisms found in Lake Nipigon diatoms were by far the most numerous. They occurred in prodigious numbers in the plankton, being often so very numerous that other organisms had to be specially searched for. They were also very abundant in the ooze and among aquatic vegetation. A large percentage of the food of bottom-feeding fish was found to be diatomaceous. The genera of diatoms found in open-water plankton in order of greatest abundance were *Melosira*, *Asterionella*, *Tabellaria*, *Synedra*, *Stephanodiscus*, and *Fragillaria*.

FAMILY MELOSIRACEAE

Melosira granulata Ehr. * A. During the month of June this diatom was so abundant that, if the net were towed behind a motor-boat at Station I or Station II for five minutes, it would contain at least half-a-pint of greenish-coloured plankton, which was found to be composed of about 95% of this particular organism. Quantitative methods of counting sometimes showed as many as 145,000 filaments

per cubic centimetre. By the middle of July, *Asterionella* was much commoner on the surface, but *Melosira* was still quite common in the deeper water. In the latter part of August, *Melosira* had become a rather uncommon species.

FAMILY COSCINODISCACEAE

Stephanodiscus sp. * C.

FAMILY RHIZOLENIDACEAE

Rhizolenia sp. F. A diatom of this genus was fairly common in the plankton of Station II during the month of June. The species was very slender, and possessed very long indistinct terminal spines. In all probability it was a much commoner organism than appearances would indicate as its extreme transparency rendered it difficult to see.

FAMILY NAVICULACEAE

Pleurosigma sp. * I.
Pinnularia sp. * V.C.
Navicula sp. * V.C.
Stauroneis sp. * F.

FAMILY CYMBELLACEAE

Amphora sp. * I.
Cymbella sp. * C.
Cocconema sp. * V.C.
Encyonema sp. * R.

FAMILY GOMPHONEMIACEAE

Gomphonema sp. * C

FAMILY ACHNANTHACEAE

Achnanthes sp. * C.

FAMILY NITZSCHIACEAE

Nitzschia sp. F.

FAMILY AMPHIPRORACEAE

Amphiprora sp. * I.

FAMILY SURIRELLACEAE

Campylodiscus sp. * I.
Cymatopleura sp. * C.
Surirella sp. * V.C.

FAMILY DIATOMACEAE

Denticula sp. R.

FAMILY MERIDIONACEAE

Meridion circulare (Gren) C. Large brown masses of this species were found in a cold spring near Fairlock.

FAMILY FRAGILLARIACEAE

Synedra sp. * V.C.
Fragillaria sp. * C.

Asterionella formosa Hass. A. Next to *Melosira* this was the most abundant organism of the open-water plankton. It appeared to be commonest after *Melosira* had declined in numbers, but this may have been due, somewhat, to the fact that the thinning out of the latter rendered it more conspicuous. Plankton composed of *Asterionella* is very white in contrast to the green *Melosira*.

FAMILY TABELLARIACEAE

Tabellaria fenestrata Kützing * A. This was the third commonest diatom. It reached its culminating numbers in late summer, when *Asterionella* had greatly decreased and *Melosira* was scarce. Plankton composed of this species was white, but not so purely white as that composed of *Asterionella*. At the end of August the base of the stems of rushes standing in shallow water near the head of Orient Bay were found to be encased in a coating of whitish, slimy material which was found to be entirely composed of this *Tabellaria*. Apparently the long zigzag filaments had become tangled together and, being washed by the waves, had collected around the stems of the rushes. Several young suckers taken near this locality at this time had been feeding almost entirely upon this material as the contents of their

alimentary tracts averaged from 95% to 98% *T. fenestrata*.
Tabellaria flocculosa Kützing * V.C.

FAMILY EPITHEMIACEAE

Epithemia sp. * V.C.

Ceratoneis arcus Kützing F. One plankton tow from Sandy Bay early in June contained fair numbers of this species; otherwise it was scarce.

CLASS HETEROKONTEAE

ORDER HETEROCOCCALES

FAMILY OPHIOCYTIACEAE

Ophiocytium capitatum Wolle C. Masses of filamentous algae in a sluggish creek near the head of Orient Bay were found to contain numbers of this species.

Ophiocytium arbuscula (Braun) C. This species was found at the same time and place as the preceding.

FAMILY BOTRYOCOCCACEAE

Botryococcus braunii Kützing * A. The only other organism responsible for lake bloom besides *Anabaena lemmermanni* was this *Botryococcus*. It produced long strips of reddish colour in the latter part of July on the surface of the lake.

ORDER HETEROTRICHAELES

FAMILY TRIBONEMACEAE

Tribonema minor (Wille) V.C. This alga was found only in tiny pools along the railway in June.

CLASS CHLOROPHYCEAE

ORDER VOLVOCALES

FAMILY VOLVOCACEAE

Pandorina morum Bory F.

Eudorina elegans Ehr. C.

Volvox aureus Ehr. C.

ORDER PROTOCOCCALES

FAMILY PALMELLACEAE

Sphaerocystis sp. F.

Tetraspora lacustris Lemmermann I.

Tetraspora sp. F. Long cylindrical masses of an alga of this genus occurred in pools along the railway near Macdiarmid in the month of June. These colonies were about 2 centimetres in length by 1/5 as wide.

FAMILY DICTYOSPHAERIACEAE

Dictyosphaerium sp.

FAMILY AUTOSPORACEAE

Oocystis sp. * V.C.

Tetraedron limneticum Birge R.

Ankistrodesmus falcatus Ralfs. R.

Quadrigula sp. R.

Kirchneriella lunaris Mobius * I.

Scenedesmus bijuga Lagerheim * I.

Coelastrum cambricum Archer * I.

Coelastrum proboscidium Bohlin R.

Sorastrum americanum Bohlin I.

Sorastrum spinulosum Nägeli I.

Actinastrum hantzschii Lagerheim F.

FAMILY HYDRODICTYACEAE

Pediastrum duplex Meyen * V.C.

Pediastrum boryanum Turpin * V.C.

Pediastrum tetras Ehr. I.

Pediastrum biradiatum Meyen R.

None of the *Algae* belonging to the orders *Volvocales* or *Protococcales* were very abundant members of the flora of the Nipigon region. The only plankton in which they were found was that of bays and creeks.

ORDER ULOTRICHAELES

FAMILY ULOTRICHACEAE

Ulothrix zonata Kützing C. Stones in shallow water near the margin of the lake were covered with a brown matting composed of this alga.

FAMILY CHAETOPHORACEAE

Chaetophora pisiformis Ag. C. Beautiful green masses of this species were attached to sticks and stones in a sluggish creek.

Coleochaete sp. F. The flattened colonies of this alga were found on the under surface of water-lily leaves.

ORDER SIPHONOCADIALES

FAMILY CLADOPHORACEAE

Cladophora sp. A. The bottom of the lake for some distance from the margin was found often carpeted with a species of this plant. It is rather important as food for sturgeon, whitefish, and other bottom-feeding fish.

ORDER CONJUGALES

FAMILY ZYGNEMACEAE

Spirogyra sp. V.C. Several species of this alga occurred in ponds, creeks, and along the margin of the lake.

Zygaema stellinum Ag. C. This species was common in sluggish creeks near Orient Bay.

Mougeotia viridis (Kützing) * A. This was the commonest species of the *Conjugales*, and was found in ponds, streams, and creeks, as well as at the margin of the lake.

FAMILY DESMIDIACEAE

Desmids occurred in considerable numbers in plankton swept from among weeds in sluggish creeks and bayous of the lake. They were especially numerous near the head of Orient Bay where the water is rather shallow. Weedy bayous occur along the bank and several sluggish creeks flow into the lake at this point, forming ideal conditions for their growth. Although many species of desmids were found they were never abundant enough to be an important constituent of the plankton. The following list contains only the recognized forms, besides which a great number of others occurred:

Penium sp. * I.

Closterium lunula Ehr. * I.

Closterium lineatum Ehr. C.
Closterium rostratum Ehr. V.C.
Docidium baculum (Breb.) * C.
Staurastrum coronulatum Wolle * I.
Staurastrum orbiculare Ralfs I.
Micrasterias rotata Ralfs * V.C.
Micrasterias furcata Ralfs F.
Micrasterias truncata Ralfs F.
Micrasterias americana Kutz F.
Cosmarium othodes Nord. * V.C.
Sphaeroszoma pulcrum Bailey I.
Hyalotheca sp. * F.
Desmidium swartzii Ag. * V.C.
Aptogonum baileyi Ralfs * R.
Gymnozyga sp. R.

PROTOZOA

CLASS RHIZOPODA

As might be expected these organisms were found mainly in the ooze and in the digestive tracts of bottom-haunting fish which had fed upon this material. With one or two exceptions none were found in open-water plankton except an occasional adventitive individual

ORDER GYMNAMEBIDA

FAMILY AMOEBIIDAE

Amoeba proteus Leidy F.

ORDER TESTACEA

FAMILY ARCELLIDAE

Arcella vulgaris Ehr. * F.

Arcella dentata Ehr. * R.

Centropyxis aculeata Stein * V.C.

Lecquereusia modesta Rhumbler * C.

Diffugia corona Wallich * V.C.

Diffugia lobostoma Leidy * V.C. Although *Diffugia* is usually considered to be a bottom-haunting organism, one small round form, answering in every way the description of

D. lobostoma, appeared in such numbers in the open-water plankton as to preclude the possibility of its being adventitious there. It was found most commonly on the surface, but occurred at all depths.

Diffugia pyriformis Perty * V.C.

Diffugia acuminata Ehr. * V.C.

Nebela sp. * R.

ORDER TESTACEA

FAMILY EUGLYPHIDAE

Campascus? * F. The test of an undetermined Sarcodinid protozoan was occasionally taken as food by small suckers. This rhizopod resembles *Campascus*, but the processes of the shell are closer together and more terminal than in *Campascus cornutus*.

Cyphoderia ampulla Ehr. * V.C.

Cyphoderia ampulla var. *papillata* Wailes * I.

Assulina seminulum Ehr. * F.

Euglypha alveolata Dujardin * C.

In all probability several species of *Euglypha* occurred.

The list of rhizopods would probably be greatly extended if sphagnum bogs and other likely spots had been specially searched for them.

CLASS ACTINOPODA

ORDER APHROTHORACIDA

Actinophrys sol Ehr. F.

ORDER CHALATHORACA

Pompholyxophrys punicea Archer I.

CLASS ZOOMASTIGOPHORA

ORDER EUGLENIDA

FAMILY EUGLENIDAE

Trachelomonas hispida Stein I.

Phacus longicaudus Ehr. I.

CLASS PHYTOMASTIGOPHORA

ORDER CHRYSOFLAGELLIDA

Mallomonas sp. F. These organisms were commonest in a plankton tow, not on the surface, but at a depth of about 8 metres, near North Bay on July 19.

Spongomonas sp. F. Long, slender, yellowish-brown colonies, often twisted and irregular, were found among weeds in a sluggish creek near Orient Bay during the latter part of August.

Rhipidodendron splendidum Stein F. Small masses of the tubules of this flagellate were found at the same time and place as the colonies of the preceding species.

Synura uvella Ehr. F. Colonies of these protozoa were fairly common in ponds and pools.

Dinobryon sertularia Ehr. A. This species was sometimes abundant during the month of June in plankton from bays and creeks.

Dinobryon bavaricum Imhof. F. Very typical example of this species occurred during the latter part of June in plankton from Station II. It was always found with the preceding species, but never was so abundant.

Peridinium sp. F.

Ceratium hirundinella Müller A. This species was occasionally abundant during the month of July in plankton from bays and creeks.

CLASS CILIATA

The ciliates included in the following list were mostly found in ponds and pools. *Codonella* is a typical open-water plankton and was found at all depths. *Vorticellae* were attached to colonies of *Anabaena* in the lake.

ORDER HOLOTRICHA

Coleps hirtus Ehr. C.

Didinium nasutum Müller F.

Nassula ornata Ehr. R.

Trachelius ovum Ehr. F.

Urocentrum turbo Müller C.
Ophryoglena atra Ehr. I.
Colpidium sp. F.
Cyclidium sp. F.
Paramoecium caudatum Ehr. C.

ORDER HETEROTRICHA

Stentor coeruleus Ehr. C.
Halteria grandinella Müller C.
Codonella sp. V.C.

ORDER HYPOTRICHA

Oxytricha sp. C.

ORDER PEROTRICHA

Vorticella sp. V.C. A number of species occurred.
Ophrydium eichhornii Ehr. I. Two beautiful green colonies of this ciliate were found attached to vegetation in a creek.
Pyxicola sp. I.

CLASS SUCTORIA

Podophrya sp. F. A pear-shaped species of this genus, with a long stalk, was often found attached to the legs and antennae of *Limnocalanus macrurus* and *Mysis relicta*. The crustaceans were often taken from a depth of 60 metres or more.

ROTATORIA

Although a great many species of the wheel animalcules were found, no one species was conspicuously abundant. Forming, as they do, a large percentage of the first food of young fishes, their economic importance is considerable.

ORDER PLOIMA

FAMILY NOTOMATIDAE

Eosphora sp. F. In pools along the railroad track.
Notomata aurita Müller I. In weedy creeks.
Diaschiza I. Several sp. In weedy creeks.
Cephalodella forficula Ehr. I. In weedy creeks.
Monommata orbis Ehr. I. In weedy creeks.

FAMILY BRACHIONIDAE

Brachionus capsiflorus Pallas R. Only one specimen of this species and genus was found during the season. It was a typical example of the form previously known as *Brachionus bakeri* with long, gracefully curved cephalic and posterior spines. It was found in a small pond close to Macdiarmid village.

FAMILY BRACHIONIDAE

Platyias quadricornis Ehr. C. This rotifer was found throughout the summer among weeds and algae in small pools and sluggish creeks, but never in the lake. *Keratella cochlearis* Gosse * V.C. This proved to be the most widely distributed species in the region under discussion, and was found in all bodies of water examined except in temporary pools. In the lake it occurred at all depths from the surface down to a hundred metres throughout the season.

Keratella quadrata Müller F. This was an open-water form and was found from the surface down to a depth of 100 metres. It was by no means as common as the preceding species, three individuals being the greatest number noted in any one plankton haul. The rotifer was taken from the latter part of July until the end of August. The individuals had very large posterior spines, broad at their bases, and widely divergent.

Keratella serrulata Ehr. * I. This species was found only in creeks and bays. The specimens showed the typical, prominent hexagons on the lorica and roughened projections on the egg carried, as well as on the lorica.

Anuraeopsis fissa Gosse F. During the month of June this species occurred in a small pond close to Macdiarmid village.

Notholca longispina Kellicott * V.C. Next to *Keratella cochlearis*, this was the commonest rotifer. It occurred throughout the summer at all depths from the surface down to 100 metres. It was also found in creeks and some of the larger ponds.

Notholca striata Müller * C. Although found occasionally in open-water plankton this species was commonest in bays and creeks. Nearly all small suckers taken during July and August near Orient Bay had eaten it. Besides typical *Notholca striata*, the forms of this species which were previously designated as *Notholca thalassia* and *Notholca acuminata* were frequently found.

Notholca foliacea Ehr. * I. This species was taken a few times in plankton from Station II. A few were eaten by suckers in July and August.

FAMILY MYTILINIDAE

Mytilina mucronata Müller * C. This species was found in weedy creeks throughout the season.

FAMILY EUCHLANIDAE

Euchlanis deflexa Gosse * F.

Euchlanis dilatata Ehr. I.

Diplois propatula Gosse F.

Lecane ohioensis (Herrick) * C.

Lecane sulcata Gosse * C.

Lecane luna (Müller) * V.C.

Lecane leontina (Turner) I.

Monostyla bulla Gosse * C.

Monostyla lunaris Ehr. * F.

Monostyla quadridentata Ehr. R.

Members of this family and the next are found in bays and creeks among weeds and are frequently fed upon by young fish.

FAMILY LEPADELLIDAE

Lepadella ovalis Müller * F.

Lepadella acuminata Ehr. * F.

Lepadella ehrenbergii (Perte) R. A single individual was taken from the digestive tract of a young sucker.

Colurella adriatica Ehr. * F.

Colurella uncinatus (Müller) * I.

Squatinella longispinatum Tatem I. This species was found in plankton swept from among weeds in the Pustagone

River on August 23. A peculiar *Squatinella* was also found in this material which resembled a typical *S. longispinatum* except that it had a second long dorsal spine on the lorica some distance back of the first. This may be only a variation, as several quite normal individuals of this species occurred in the same material.

FAMILY TRICHOTRIIDAE

Trichotria pocillum Müller * F.

Macrochaetus collinsii (Gosse) I. Eight or nine individuals of this strange rotifer were taken from creeks and one from some plankton in the bay near Orient Bay village. The only other examples of this rotifer ever seen by the writer were from an entirely different environment, namely, in a small muddy pond in a cow-pasture near Cedar Rapids, Iowa.

Scaridium longicaudum (Müller) F. This rotifer was found among weeds in creeks.

Scaridium eudactylosum Gosse R. This rare rotifer was found but once in plankton from among weeds near the mouth of the Pustagone River.

Diurella tenuior (Gosse) * C.

Diurella stylata Eyferth * I.

Trichocerca cristata Herring F.

Trichocerca cylindrica (Imhof) I.

Trichocerca lata Jennings * C.

Trichocerca longiseta Schrank F.

Trichocerca multirinis (Kellicott) I.

Several rotifers of this family not satisfactorily determined are not listed.

FAMILY CHROMOGASTRIDAE

Chromogaster ovalis (Bergendae) C. In middle and late summer this rotifer was rather common in open-water plankton, but was never found at any great depth.

FAMILY GASTROPODIDAE

Gastropus stylifer Imhof * V.C. This was a very common surface form in all parts of the lake throughout the season. It was also found in creeks and large ponds.

Ascomorpha eucadis Perty R. One rotifer of this species was taken from weeds growing on the bottom of a pond.

FAMILY SYNCHAETIDAE

Synchaeta stylata Wierzejski V.C. Throughout the season this species was very common in the lake. It was occasionally taken at considerable depths, but was much commoner near the surface. When this species was numerous its spiny resting eggs were sometimes common in the plankton.

FAMILY POLYARTHRIDAE

Polyarthra trigla Ehr. * V.C. In creeks, ponds, and bayous as well as in the open waters of the lake, this species was common throughout the season. It was commonest in the latter part of summer. It is mainly a surface form and was rarely taken in deep water.

FAMILY PLOESOMIDAE

Ploesoma lenticulare (Herrick) * V.C. This also was a surface form occurring throughout the summer in all parts of the lake.

Ploesoma hudsoni Imhof I. This species was found in similar conditions to the preceding, but was only seen about a dozen times.

FAMILY ASPLANCHNIDAE

Asplanchna sp. I. A large rotifer of this genus was occasionally found in open-water plankton. The specimens were in too poor a condition when examined to permit of specific determination.

FAMILY TESTUDINELLIDAE

Testudinella patina Hermann C. This beautiful discoid rotifer was common throughout the summer in weedy ponds and creeks. It was frequently attacked by some parasitic organism which filled its lorica with short cylindrical spores. Often the rotifer would be still alive when its shell had

become so filled with these spores as to hide its internal organs completely from view.

ORDER FLOSCULARIACEAE

FAMILY FLOSCULARIDAE

Floscularia ringens (Linn.) I. On August 3 this species was found attached to weeds in South Bay.

Limnias melicerta Weisse I. The beautiful annulated tubes of this rotifer were swept from among weeds in a small creek near Orient Bay the latter part of August.

FAMILY CONOCHILIDAE

Conochilus unicornis Rousselet I. Occasionally clusters of this rotifer were taken in open-water plankton.

Lacinularia sp. I. Masses of an undetermined species of this genus were attached to weeds in South and Orient Bays.

ORDER COLLOTHECACEA

FAMILY COLLOTHECIDAE

Collotheca algicola (Hudson) I. This rotifer was found in colonies of *Rivularia* attached to weeds in a creek near Orient Bay.

Collotheca ambigua (Hudson) F. This rotifer was found attached to weeds in sluggish streams.

Collotheca cornuta (Dobie) I. This species occurred under conditions similar to the above mentioned form.

Collotheca mutabilis (Hudson) F. This is a typical open-water plankton, free floating and never attached to weeds. It occurred in many parts of the lake, but always close to the surface.

ORDER BDELLOIDA

FAMILY ADINETIDAE

Adineta sp. F. A species of this genus occurred in creeks and ponds and a similar, if not identical, one was taken from water contained in the leaves of pitcher plants.

FAMILY PHILONINIDAE

- Rotaria rotatoria* (Pallas) C.
Rotaria citrina Ehr. F.
Rotaria neptunia Ehr. R.
Philodina roseola Ehr. I.
Dissotrocha aculeata Ehr. I.

ARTHROPODA

CLASS CRUSTACEA

ORDER COPEPODA

FAMILY CENTROPAGIDAE

Epischura lacustris Forbes C. This large copepod was found near the surface in the open water of the lake and in creeks and bays. Although not frequently found in the plankton, its abundance is attested by the numbers found to have been eaten by small fishes. The stomach of a young small-mouth black bass (*Micropterus dolomieu*) contained 82 of these copepods, while 67 were found in another individual. These two fishes were 2.6 centimetres in length and were taken on July 19 at Orient Bay.

Diaptomus sicilis Forbes V.C. This was probably the commonest species of *Diaptomus* in Lake Nipigon. It was found in all parts of the lake, often at considerable depths but not in the deepest water.

Diaptomus minutus Lilljeborg C. This *Diaptomus* was not quite so common as the preceding form. It was not found until the middle of July, whereas *D. sicilis* occurred from the first of June. *D. minutus* was first found in creeks and shallow water, but as the season advanced it was taken in the surface waters of the more open parts of the lake. Quite often while making a series of vertical plankton hauls through various intervals from the bottom to the surface, *D. minutus* was found to occur in the first few metres below the surface after which *D. sicilis* would extend for a few metres more to be succeeded by *Limnocalanus*. Rather infrequently, late in the summer, both species of *Diaptomus* occurred together.

Limnocalanus macrurus Sars V.C. This copepod was found in numbers in the deeper, cooler waters of the lake. It was common from 40 to 50 metres below the surface. Sometimes over 200 individuals would be taken in a 5-metre haul at these depths. Probably this gives a very erroneous idea of its actual numbers as it is a large active creature which would swim away from the net and not be caught in the same way as the smaller constituents of the plankton, such as diatoms and rotifers. Its numbers must be enormous indeed, judging from the stomach contents of whitefish and ciscoes. Four ciscoes were found to have their alimentary tracts packed with fragments of countless thousands of this crustacean.

FAMILY CYCLOPIDAE

Cyclops * V.C. Specific identifications in this genus were not attempted, although several species doubtless occur. Although often eaten by many kinds of fishes, it never was found in great numbers in any of the stomachs examined. A peculiar dark-coloured, opaque cyclops was taken on August 30 from a small pond near Fairlock.

FAMILY HARPACTICIDAE

- Canthocamptus stapylinus* (Jurine) * C.
Canthocamptus hiemalis (Pearse) * I.
Canthocamptus minutus (Claus.) * F.

FAMILY ERGASILIDAE

Ergasilus sp. I. A species of this copepod was found in the stomach of a ling which had been feeding upon the nine-spined stickleback (*Pygosteus pungitius*). Doubtless the parasite came from the latter fish.

ORDER OSTRACODA

Ostracods were of very great importance indeed as food for bottom feeding fish, as nearly all examined had eaten at least some of these crustaceans. A very few of the numerous species were identified.

Cypria sp. C. A species of this genus was taken from the stomach of a trout perch (*Percopsis omiscomaycus*) from the Pustagone River.

Candona sp. V.C. This genus is fed upon by whitefish whenever it can be found. One whitefish's stomach was packed with fragments of the shells and appendages of thousands of these ostracods.

Spirocypris tuberculata Sharpe F. This species was found in weedy ponds.

Limnocythere reticulata Sharpe F. Although this is supposed to be a pond form, an ostracod answering the description of this species was found in a young sucker taken the latter part of summer near Macdiarmid.

Illyodromus pectinatus Sharpe R. One individual was found in the stomach of a common sucker, 26 cm. in length, on July 12.

ORDER CLADOCERA

At least 42 species and several varieties of these crustaceans were found in Lake Nipigon and its vicinity. They were found to be of great economic importance, as the food of fishes was sometimes very largely composed of them. Some outstanding points of interest concerning this group in the area under consideration are the absence of *Holopedium* and the frequency of species such as *Rhynchotalona falcata*, *Alonella nana*, *Pleuroxus hastatus*, and other Cladocera not supposed to be particularly common.

FAMILY SIDIDAE

Sida crystallina (Müller) * V.C. This entomostracan was not found in the more open parts of the lake, but was common in bays and creeks. Its frequency is shown by the fact that 40 out of 57 small suckers had eaten it, and in many instances over half of their food consisted of this crustacean. It was also eaten by the young of the small-mouth black bass (*Micropterus dolomieu*) and other fishes.

Latona setifera (Müller) I. One specimen of this clado-

ceran was found in ooze near Orient Bay, and three or four others in the stomachs of suckers, larger, with one exception, than those previously mentioned.

Diaphanosoma brachyurum (Liéven) * C. The fact that this species was not often found in fish stomachs is probably due to the fact that it is very perishable and its post-abdomen small and easily overlooked.

Diaphanosoma leuchtenbergianum Fischer * C.

FAMILY DAPHNIDAE

Daphnia pulex (de Geer) * V.C. The contrast in numbers between *Daphnia pulex* in Lake Nipigon and in Lake Erie was very noticeable. In the latter lake the ciscoes taken during the summer were found to have fed throughout the season upon countless thousands of this species. In Lake Nipigon only 13 out of 57 small suckers had eaten it during the latter part of July at Orient Bay. In fact, this cladoceran occurred more commonly in ponds and pools than in the lake. It was found to be very common, for example, in barrels of water on the railway bridge near Macdiarmid.

Daphnia pulex var. *minnehaha* Herrick F. This variety was found only in one small pond near Macdiarmid.

Daphnia retrocurva Forbes * F.

Daphnia longispina var. *hyalina* Leydig form *galeata* * C.

Simocephalus vetulus (Müller) I.

Scapholeberis mucronata (Müller) * C.

Ceriodaphnia reticulata (Jurine) C.

Ceriodaphnia lacustris Birge * I.

Ceriodaphnia quadrangula (Müller) F.

FAMILY BOSMINIDAE

Bosmina longirostris (Müller) * V.C.

Bosmina longispina Leydig I.

FAMILY MACROTHRICIDAE

Ophryoxus gracilis Sars * I.

Drepanothrix dentata (Eurén) * V.C.

Acantholeberis curvirostris (Müller) * V.C.

Illyocryptus spinifer Herrick * F.

FAMILY CHYDORIDAE

Eurycercus lamellatus (Müller) * F. This species was commonest among weeds in the Pustagone River. Only occasional specimens were taken elsewhere.

Camptocercus rectirostris Schoedler F. This cladoceran, like the species previously mentioned, was local in distribution. A great many specimens were found in a sucker taken at Sandy Bay.

Kurzia latissima (Kurz) * I.

Acroperus harpae Baird * V.C.

Alona guttata Sars * F.

Alona guttata var. *tuberculata* Kurz * I.

Alona affinis (Leydig) * C.

Alona quadrangularis (Müller) * C.

Alona costata Sars * C.

Graptoleberis testudinaria (Fischer) * F. This cladoceran was commonest among weeds in the Pustagone River. Only 2 specimens were taken from the young suckers.

Rhynchotalona falcata (Sars) * V.C. That this is no uncommon species is shown by the fact that 33 out of 56 small suckers had eaten it. The only part of Lake Nipigon in which it was taken was the head of Orient Bay.

Pleuroxus procurvatus Birge * C. This cladoceran was found in the greatest numbers in plankton taken from a small pond near Fairlock on August 31. Elsewhere its occurrence was only occasional.

Pleuroxus denticulatus Birge * V.C.

Pleuroxus hastatus Sars * V.C. This was the species of *Pleuroxus* found most commonly in the stomachs of small suckers.

Chydorus globosus Baird I.

Chydorus sphaericus (Müller) * V.C.

Chydorus javiformis Birge * R. Only 2 individuals of this *Chydorus* were found. One was from a small lake close to the fire ranger tower near Fairlock. The other had been eaten by a young sucker.

Alonella rostrata (Koch) R. One individual was found in a sucker from Sandy Bay.

Alonella nana (Baird) * V.C. This species was of common occurrence both in plankton from among weeds and in suckers from Orient Bay in July and August.

Alonella exigua (Lilljeborg) * C. Numbers of this *Alonella* were found among weeds in a sluggish creek but only one was eaten by the suckers examined.

Monospilus dispar Sars * F. The finding of ten specimens in one sucker would indicate that this species was not particularly rare.

FAMILY POLYPHEMIDAE

Polyphemus pediculus (Linn.) * V.C. This cladoceran was found in small pools and ponds as well as in creeks and bays. Its importance economically is shown by the fact that it had been fed upon by 48 out of 57 small suckers, taken at Orient Bay on July 19. In several instances it was the only species found, and formed the entire contents of the fishes' alimentary tracts.

FAMILY LEPTODORIDAE

Leptodora kindtii (Focke) * V.C. Locally abundant as shown by the examination of cisco stomachs.

In order to give some idea of the abundance of different species of *Cladocera* near the head of Orient Bay the following list of those species taken from three different lots of young suckers may prove useful. Lot A was taken on July 19, and the fishes averaged 2.3 centimetres in length. Lot B was taken on July 27, and the fishes averaged 3.2 centimetres in length. Lot C was taken on August 13, and the fishes averaged 3.8 centimetres in length. The number after the name of each cladoceran listed indicates how many of the fishes out of each lot had eaten that particular species.

<i>Cladocera</i> species	Lot A	Lot B	Lot C
	No. of fish 57	No. of fish 31	No. of fish 25
<i>Sida crystallina</i>	40	3	1
<i>Diaphanosoma</i> sp.....	6	0	0
<i>Daphnia pulex</i>	13	0	0
<i>Daphnia retrocurva</i>	3	1	0
<i>Daphnia longispina</i>	8	0	1
<i>Scapholeberis mucronata</i>	20	0	0
<i>Ceriodaphnia lacustris</i>	3	0	0
<i>Bosmina longirostris</i>	20	0	20
<i>Ophryoxus gracilis</i>	0	2	0
<i>Drepanothrix dentata</i>	1	26	0
<i>Acantholeberis curvirostris</i>	1	20	0
<i>Illyocryptus spinifer</i>	0	1	11
<i>Eurycerus lamellatus</i>	2	4	1
<i>Kurzia latissima</i>	0	1	1
<i>Acroperus harpae</i>	27	8	0
<i>Alona guttata</i>	1	1	4
<i>Alona guttata tuberculata</i>	0	0	1
<i>Alona costata</i>	9	9	6
<i>Alona quadrangularis</i>	1	11	9
<i>Alona affinis</i>	6	9	13
<i>Graptoleberis testudinaria</i>	0	2	0
<i>Rhynchotalona falcata</i>	1	18	15
<i>Pleuroxus procurvatus</i>	4	0	0
<i>Pleuroxus hastatus</i>	2	23	12
<i>Pleuroxus denticulatus</i>	2	11	18
<i>Chydorus faviformis</i>	0	1	0
<i>Chydorus sphaericus</i>	9	21	18
<i>Alonella nana</i>	0	17	22
<i>Alonella exigua</i>	0	0	1
<i>Monospilus dispar</i>	0	2	10
<i>Polyphemus pediculus</i>	48	2	1
<i>Leptodora kindtii</i>	1	2	1

The greater number of open-water *Cladocera*, such as *Sida* and *Polyphemus*, in the first lot of fishes is due to the fact that, as the sucker gets larger, its mouth becomes more ventrally located and it feeds more upon the ooze and bottom forms of life. The greater numbers of some *Cladocera* in August may be due to an increase of these species in late summer. The average number of species of *Cladocera* taken

from each sucker was 5, but several had eaten 12 and even 13 different species. The greatest number of different species taken from one fish was 14. This was a sucker from Lot B, and the list is as follows:—

Sida crystallina
Drepanothrix dentata
Acantholeberis curvirostris
Ophryoxus gracilis
Bosmina longirostris
Acroperus harpae
Alona quadrangularis
Alona costata
Alona affinis
Pleuroxus hastatus
Pleuroxus denticulatus
Alonella nana
Rhynchotalona falcata
Chydorus sphaericus

The presence of species such as *Sida* and *Bosmina* in bottom feeding fish is probably due to the fish eating dead or disabled individuals which have sunk from the plankton above.

CLASS ARACHNIDA

ORDER HYDRACARINA

Water mites are of considerable importance from the standpoint of fish food, as nearly all of the bottom-feeding fish contained these creatures, although never in numbers comparable with *Cladocera*. The larvae, or six-legged nymphs, were more frequently found than the adults. Those of the genus *Hygrobatas* were probably most common, while the genera *Hydrachna* and *Arrhenurus* were found a few times. *Tardigrada* had been eaten by several of the young suckers.

CONCLUSION

This survey of the microscopic fauna and flora of Lake Nipigon formed a part of the larger study of the available

fish food supply in this lake. The general conclusion to be drawn from this qualitative investigation is that Lake Nipigon is a body of water relatively poor in plankton, with the exception of the diatomaceous flora. The number of species occurring in the lake itself was not large, and with a few exceptions the number of individuals of a species was not large. This was particularly true of the open-water plankton. Such important forms as the species of *Daphnia* were uncommon, and apparently *Holopedium* was absent. *Leptodora kindtii* was the only cladoceran which was common in the open water. The *Copepoda* were much better represented in point of numbers, especially in the cases of *Diaptomus* and *Limnocalanus*. In the shallow protected bays, where occurred considerable growths of the higher aquatic vegetation, there was a much better representation of species and larger numbers of individuals. This was especially true of the *Rotatoria* and the *Cladocera*. From the standpoint of food-supply for the young of many species of fish, this is important.

The diatoms were vastly more numerous than all the other organisms combined. They are not directly of much value as fish food, and if of importance as food for the animal planktonts should have supported a much larger population than was found to occur. They may, however, be of considerable importance as food for the macroscopic bottom population, especially *Pontoporeia hoyi*, the larvae of the *Chironomidae* and the *Mollusca*, which are of extreme importance as fish food. The interrelations in the food complex are so involved that it is difficult at the present time to judge accurately the significance of certain organisms or groups of organisms, and it is apparent that studies of the food habits of the lower animals which serve as food for fish must be made before satisfactory conclusions may be arrived at in regard to the evaluation of the various constituents of the plankton.

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