GROS CAP — Series XXXI — ALEXANDER ID. Series XXXII

	1	2	3	4	5	1	2	3	4	Totals
Dredging	1	2	3	4	5	1	2	3	4	..
Depth (in feet)	3	9	15	24	30	1	4	6	9	..
Character of Bottom	Mud	Mud	Mud	Mud	Mud	Mud	Sand	Sand	Sand	..
Distance from shore (yds.)	10	35	60	110	210	10	25	50	100	..
Mollusca	38	38	5	5	..	3	50	52	20	211
Chironomidae	18	38	121	24	5	15	40	44	26	331
Trichoptera	1	3	3	..	..	..	..	2	..	9
Ephemeridae	6	1	1	2	1	..	2	3	3	19
Amphipoda	1	7	10	..	2	..	..	10	6	36
Ostracoda	1	..	6	..	..	..	..	2	2	11
Oligochaeta	3	3	5	3	1	2	4	21	5	47
Nematoda	..	..	..	..	..	..	6	..	..	6
Hydracarina	..	..	..	..	..	..	..	2	1	3
Hirudinea	..	..	..	..	..	..	..	..	1	1
Neuroptera	..	..	..	..	..	..	..	1	..	1
Cladocera	..	..	..	..	..	..	1	..	..	1
Coleoptera	2	..	..	..	..	..	..	..	..	2
Totals	70	90	151	34	9	20	103	137	64	678

UNIVERSITY OF TORONTO STUDIES

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No. 16

THE FOOD OF LAKE NIPIGON FISHES

BY

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THE FOOD OF LAKE NIPIGON FISHES

In conjunction with the various studies dealing with the food supply of fish in Lake Nipigon as well as with the studies of the distribution and rates of growth of the fish themselves, examinations of the contents of a considerable number of alimentary tracts of several species of fish have been made. The results, as far as it has been possible to bring them together at the present time, are given in the following tables. In the cases of the larger predaceous fish (lake trout, yellow pike perch, and ling), the numbers in the columns give the actual number of fish eaten and a + sign indicates material disintegrated beyond identification and no attempt made to count individuals. In the tables dealing with the other species an attempt has been made to estimate the percentages of the most abundant organisms found, and the numbers in the tables give these estimates. A + sign in these tables indicates occurrence in amounts not estimated, usually representing less than one per cent. The results of the examination of 455 fish are given, distributed as follows:—sturgeon 12, northern sucker 16, common sucker 33, minnows 27, round whitefish 29, common whitefish 65, ciscoes 89, lake trout 42, trout perch 23, small mouth black bass 6, yellow pike perch 20, yellow perch 14, ling 79.

STURGEON. *Acipenser rubicundus*

No.	Date 1921	Length in cm.	*Ephemeridae* nymphs	*Chironomidae* larvae	*Mollusca*	Fish remains	Miscellaneous
1	July 12	44.0	+	+	..	98	Misc. 2 (*Ephemeridae* nymph, *Trichoptera* larva, Dytiscid larva, *Chironomidae* larvae and pupae, Tabanid larva).
1	June 24	44.0	24[1]	+	+	75	Misc. 1 (*Trichoptera* larva, *Chironomidae* larvae, *Mollusca*, *Cladophora*).
1	June 24	54.0	..	65	1	1	*Pontoporeia hoyi* 30; misc. 3 (*Hydracarina*, *Corixa*, *Trichoptera* larvae and pupa, *Coleoptera*).
1	June 23	large	..	..	100	..	
1	" 23	"	2[2]	2	85	3	Misc. 8 (*Pectinatella* statoblast, *Amphipoda*, *Odonata* nymph, *Corixa*, *Trichoptera* larvae, *Chironomidae* adult, *Nostoc*, *Ulothrix*, *Cladophora*, *Chara*, *Bryophyta*, higher plant tissues).
1	" 23	"	5	40	50	..	Misc. 5 (*Amphipoda*, *Trichoptera* larvae).
1	" 23	"	...	+	70	30	*Cyclops*.
1	July 9	"	4	1	75	20	
1	Aug. 26	"	98[3]	+	2	..	
1	" 26	"	99	+	+	..	*Cladophora*.
1	" 26	"	95	4	..	..	*Cladophora*.
1	" 26	"	99	+	..	..	*Bosmina longirostris*, *Diatoms*, *Ulothrix*, *Cladophora*.

[1] *Ephemera simulans*.
[2] *Hexagenia bilineata*, *Ephemera simulans*, *Heptagenia tripunctata*.
[3] *Ephemera simulans*.

NORTHERN SUCKER. *Catostomus catostomus*

No.	Date 1921	Length in cm.	*Pontoporeia hoyi*	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	*Mollusca*	Miscellaneous
6	July 28	12–16	..	10	50	5	10	Misc. 25 (*Bryozoa*, *Canthocamptus*, *Bosmina longirostris*, *Camptocercus*, *Acroperus harpae*, *Alona affinis*, *A. quadrangularis*, *Chydorus sphaericus*, *Alonella nana*, *A. rostrata*, *Ostracoda*, *Hyallela knickerbockerii*, *Hydracarina*, *Thysanura*).
1	July 15	17.0	15	..	70	10	1	Misc. 4 (*Difflugia*, *Plumatella*, *Canthocamptus hiemalis*, *Alona affinis*, *Chydorus sphaericus*, *Ostracoda*, *Hydracarina*, *Diatoms*).
1	June 14	22.5	90	..	9	..	1	
1	" 28	24.5	96	..	1	..	2	Misc. 1 (*Bosmina*, etc.).
1	" 24	27.0	90	10	..	..	..	*Diatoms*.
1	" 28	29.0	..	..	..	..	..	Filamentous *Algae* 60; *Diatoms* 30; Insecta fragments 10.
1	July 4	34.2	30	..	5	5	+	*Hyallella knickerbockerii* 10; other forms 50 (*Arcella*, *Centropyxis*, *Cyclops*, *Ostracoda*, *Hydracarina*, filamentous *Algae*, *Diatoms*).
1	July 21	40.5	15	..	85	+	..	
1	June 24	42.2	80	..	18	..	+	Misc. 2 (*Hydracarina*, two *Plecoptera* nymphs, *Chironomidae* adult, *Diatoms*).
2	July 15	?	..	+	70	+	20	Misc. 10 *Rhizopoda*, *Cyclops*, *Chydorus sphaericus*, *Ostracoda*, *Corixa*, *Ulothrix*, *Cladophora*, *Diatoms*).

COMMON SUCKER, *Catostomus commersonii*

No.	Date 1921	Length in cm.	*Pontoporeia hoyi*	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	*Mollusca*	Miscellaneous
1	June 11	13.2	..	45	35	5	1	*Ostracoda* 2; *Hydracarina* 5; other forms 7 (*Cyclops, Canthocamptus, Alona affinis, Chydorus sphaericus, Hyallela knickerbockerii, Diatoms*).
2	July 12	13.0-13.5	..	..	82	2	10	Misc. 6 (*Canthocamptus, Eurycercus lamellatus, Acroperus harpae, Alona affinis, Chydorus sphaericus, Ostracoda, Hydracarina, Corixa, Ulothrix, Bulbochaete, Diatoms*).
1	July 21	15.0	..	45	20	..	30	Misc. 5 (*Centropyxis, Canthocamptus, Alona quadrangularis, Chydorus sphaericus, Ostracoda, Hydracarina, Diatoms*).
5	June 11	25-30	..	5	40	3	12	*Hyallela knickerbockerii* 35; other forms 5 (*Cyclops, Canthocamptus, Plecoptera* nymphs, *Ephemeridae* nymphs, *Corixa, Diatoms*).
1	July 12	26.0	1	55	35	+	5	Misc. 4 (*Canthocamptus, Bosmina, Eurycercus lamellatus, Alona affinis, Ostracoda, Hydracarina, Corixa, Chironomidae* pupae, *Ulothrix, Diatoms*).
8	July 28	26.0 app.	50	1	30	10	5	*Hydracarina* 4; *Ephemeridae* nymph (*Caenis*).
2	Aug. 4	37-41	90	..	5	+	4	Misc. 1 (*Hydracarina, Chironomus* pupa).

The stomach contents of a large number of small suckers have been examined. The following list of organisms found in 13 specimens, averaging 2.8 cm. in length, taken July 27 in a seine, will illustrate the type of food and the variety of forms found:

Algae—Oscillatoria, Melosira, Pinnularia, Navicula, Stauroneis, Amphora, Cocconema, Achnanthes, Surirella, Epithemia, Desmidium, Closterium, Docidium, Staurastrum, Micrasterias, Euastrum, Cosmarium, Oöcystis.

Protozoa—Arcella, Centropyxis, Lecquereusia, Difflugia, Cyphoderia, Sphenoderia, Euglypha.

Rotatoria—Keratella cochlearis, Euchlanis, Lecane luna, Lecane leontina, Lecane sp., *Monostyla lunaris, Trichocera, Gastropus stylifer.*

Oligochaeta—podal spines.

Copepoda—Cyclops.

Cladocera—Latona setifera, Daphnia, Bosmina longirostris, Eurycercus lamellatus, Kurzia latissima, Acroperus harpae, Alona guttata, A. affinis, Graptoleberis testudinaria, Rynchotalona falcata, Pleuroxus denticulatus, Chydorus sphaericus, Alonella nana, A. excisa, A. exigua, Monospilus dispar.

Ostracoda—several species.

Hydracarina—

Insecta—Ephemeridae nymph, *Chironomidae* larvae, dipterous pupae.

MINNOWS—(*Cyprinidae*)

Spot-tail minnow, *Notropis hudsonius*

Twelve individuals, 5 to 7 cm. in length, were taken, on July 20, in a seine close to the dock at the village of Macdiarmid.

Bryozoa—one statoblast, probably of *Pectinatella.*

Cladocera—a few *Bosmina longirostris, Acroperus harpae, Alona* sp., many *Chydorus sphaericus*, a few *Polyphemus pediculus.*

Ostracoda—fragments.

Arachnida—one water-mite and two spiders.

Insecta—one mayfly nymph, one mayfly subimago, a few *Corixa* nymphs, several chironomid pupae and adults.

Mollusca—Snail shell fragments.

Couesius plumbeus

Fifteen individuals, 4.2 to 7.4 cm. in length, were taken on July 20, in a seine close to the dock at the village of Macdiarmid.

Cladocera—considerable numbers of *Chydorus sphaericus*.

Insecta—one ephemerid or plecopteran nymph, corixids, one beetle, one chironomid larva, one chironomid adult, one *Lucillia caesar*, several ants.

ROUND WHITEFISH. *Coregonus quadrilateralis*

No.	Date 1921	Length in cm.	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	*Mollusca*	Miscellaneous
2	Aug. 4	5.0–5.3	1	1	95	..	*Corixa* nymphs 1; *Ephemeridae* nymphs 1.
1	June 28	16.0	..	20	10	5	*Mysis relicta* 30; *Pontoporeia hoyi* 10; *Corixa* 15; other forms 10 (*Ostracoda*, *Hydracarina*, small beetle, filamentous *Algae*).
1	July 15	16.5	35	20	20	20	*Chironomidae* adults 5; *Ostracoda*.
1	June 14	17.5	4	30	65	1	
1	" 24	18.0	..	35	65	..	
1	July 15	18.3	85	..	7	8	
3	Aug. 5	18.0 app.	10	80	5	..	*Ostracoda* 5; small *Homoptera; Algae*.
18	" 8	17–19	95	1	+	1	Other forms 3 (*Cyclops*, *Daphnia pulex*, *Bosmina*, *Drepanothrix*, *Alona affinis*, *A. quadrangularis*, *A. costata*, *Eurycercus lamellatus*, *Acroperus harpae*, *Chydorus sphaericus*, *Ostracoda*, *Hydracarina*, *Trichoptera* pupa, filamentous *Algae*, *Diatoms*).
1	June 24	21.1	65	11	..	20	*Ephemeridae* nymphs (*Ephemerella*) 2; *Odonata* nymph 1; *Hemiptera* 1.

COMMON WHITEFISH, *Coregonus clupeaformis*

No.	Date 1921	Length in cm.	*Ostracoda*	*Pontoporeia hoyi*	*Hydracarina*	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	*Mollusca*	Miscellaneous
2	Aug. 4	4.8-5.8	..	..	25	10	5	..	..	*Chironomidae* adults 50; other forms 15 (*Cyclops*, *Bosmina longirostris*, *Acroperus harpae*, *Arachnida*, *Hemiptera Coleoptera*, *Formicina*).
1	July 6	14.0	+	..	+	..	80	10	6	Misc. 4 (*Bosmina longirostris Corixa*).
1	" 15	14.3	..	..	7	..	80	3	5	Misc. 5 (*Plumatella*, *Amphipoda*, *Plecoptera* nymph, *Melosira*).
3	" 28	15.0 app.	..	..	10	..	20	20	20	*Hemiptera* 5; *Ephemeridae* nymphs (*Caenis*) 5; *Chironomidae* adults 20.
3	Aug. 27	15.0 app.	1	..	3	..	2	2	1	*Mysis relicta* 90; other forms 1 (*Diaptomus*, *Cyclops*, *Canthocamptus*, *Latona setifera*, *Bosmina longirostris*).
1	June 14	16.0	98	..	+	..	..	2	+	
1	Aug. 5	16.0 app.	+	..	2	..	95	+	2	Misc. 1 (*Hemiptera*, dipterous adult).
4	Aug. 8	16.2 app.	..	..	4	1	1	1	93	*Bosmina longirostris*.
1	July 4	16.5	100	..	..	..	..	..	..	
1	" 15	17.5	+	..	30	..	45	..	25	
18	" 21	15-18	+	+	+	15	10	5	10	*Ephemeridae* nymphs (*Hexagenia*, *Caenis*) 45; *Corixa* 5; *Trichoptera* pupae 5; other forms 5 (*Cyclops*, *Bosmina*, *Insecta* fragments, *Cladophora*, *Diatoms*).
1	" 4	25.7	..	15	..	..	80	..	5	

COMMON WHITEFISH—*Cont.*

No.	Date 1921	Length in cm.	*Ostracoda*	*Pontoporeia hoyi*	*Hydracarina*	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	*Mollusca*	Miscellaneous
6	July 28	25-27	..	2	+	..	2	50	+	One *Leucichthys* (cisco) 45; Misc. 1 (*Canthocamptus; Corixa*).
1	June 30	28.0	..	30	..	..	70	..	..	*Coleoptera* adult, *Chironomidae* adult.
10	July 26	34.0 app.	..	35	+	..	60	..	1	Misc. 4 (*Mysis relicta, Formicina*).
1	June 14	35.3	..	..	1	2	2	..	15	One *Pygosteus pungitius* (nine-spined stickleback) and other fish remains 75; other forms 5 (*Plumatella, Ephemeridae* nymph, *Corixa, Cladophora, Diatoms*).
1	" 24	36.5	..	80	1	..	4	..	15	*Canthocamptus hiemalis, Diaptomus sicilis.*
1	July 12	36.5	..	52	1	..	5	..	40	*Algae* and higher plants 2.
1	June 20	37.2	..	50	..	..	40	..	10	
1	July 12	38.5	..	25	3	..	25	3	40	*Ephemeridae* nymphs (*Heptagenia*) 4.
1	Aug. 12	39.3	..	..	..	..	..	..	5	Four *Pygosteus pungitius* (nine-spined sticklebacks) and other fish remains 95.
1	Aug. 4	40.0	..	..	..	..	+	..	+	Two Miller's Thumbs and one other fish unident. 98; *Ephemeridae* nymphs 1.
1	June 20	42.0	..	..	..	..	..	..	17	*Hemiptera* 4; *Coleoptera* 45; *Diptera* 4; *Formicina* 30.
1	July 15	45.0	..	..	+	..	..	..	99	Misc. 1 (*Rotatoria, Bosmina longirostris, Plecoptera* nymph, *Ephemeridae* nymphs (*Heptagenia*) *Corixa*, dipterous adult, *Diatoms*).
1	July 15	?	..	..	+	..	+	..	99	*Diatoms.*
1	Aug. 6	?	..	4	..	..	92	..	..	*Coleoptera* 4.

CISCOES, *Leucichthys*

No.	Date 1921	Length in cm.	*Limnocalanus macrurus*	*Leptodora kindtii*	*Mysis relicta*	*Chironomidae* larvae	*Chironomidae* pupae	Miscellaneous
12	July 6	12-17	..	..	55	25	10	Misc. 10 (*Cyclops, Amphipoda, Hydracarina, Ephemeridae* (*Ephemerella* nymphs, *Heptagenia* subimago), *Corixa, Trichoptera* adult, dipterous adult.
1	" 6	14.5	..	..	99	1	..	
1	Aug. 12	14.5	..	55	1	..	..	*Diaptomus* 10; *Cyclops* 30; other forms 4 (*Daphnia longispina, Bosmina longirostris, Chydorus sphaericus, Hydracarina*, dipterous adults).
1	June 11	14.8	..	..	..	..	97	Misc. 3 (*Hydracarina*, Chalcid, *Formicina*).
1	" 30	14.8	..	..	95	..	..	Misc. 5 (*Bryozoa, Hymenoptera, Mollusca, Diatoms*).
1	" 11	15.2	..	..	..	..	100	
1	" 30	15.2	..	..	100	..	..	
14	July 26	16.0 app.	..	..	100	..	..	
2	Aug. 4	16.0 app.	..	90	..	5	5	*Cyclops.*
1	June 20	16.1	5	..	95	..	..	
1	July 4	16.5	..	..	99	1	..	
5	" 21	15-21	..	..	85	15	..	*Cyclops.*
20	" 20	16-25	..	..	99	1	..	*Mollusca.*
1	June 30	19.8	..	..	99	..	..	*Ostracoda* 1.
1	July 15	20.7	..	..	..	..	..	Fragments winged terrestrial insects 100 (*Ephemeridae, Hemiptera, Trichoptera, Lepidoptera, Coleoptera, Diptera, Hymenoptera*).
1	June 30	25.0	..	..	100	..	..	
1	" 30	26.0	..	..	100	..	..	
3	Aug. 21	28.5 app.	50	..	50	..	..	*Diaptomus.*
1	June 30	29.8	5	..	95	..	..	One small caterpillar.
4	July 4	28-31	98	..	2	+	..	
2	" 21	29.3-30.5	90	..	5	5	..	
1	June 30	30.0	75	..	25	..	..	
1	July 4	31.0	50	..	50	..	..	
11	" 26	31.0 app.	5	..	95	..	..	
1	June 30	45.0	10	..	90	..	..	

LAKE TROUT, *Cristovomer namaycush*

No.	Date 1921	Length in cm.	Ciscoes	Nine-spined stickle-backs	Trout perch	Miller's Thumbs	Ling	Fish remains
1	June 14	20.0	1 (6.5 cm.)	..	..	..	..	..
1	"	22.0	4 (6.5 cm.)	..	..	..	..	..
1	"	23.0	1 (6.5 cm.)	..	..	..	..	..
1	" 28	31.2	..	..	..	..	..	+
1	July 4	36.0	6 (6-10 cm.)	..	..	..	..	..
1	June 14	36.5	..	4	..	..	..	..
1	" 24	48.5	3 (7-10 cm.)	..	..	..	..	..
1	July 4	50.0(?)	1 (10 cm.)	..	..	..	..	..
1	Aug. 12	53.0	..	1	..	..	..	..
1	" 10	60-80	1 (37 cm.)	..	..	..	..	..
1	"	"	2	1	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	1	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1 (23 cm.)	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	..	..	..	2	..	..
1	"	"	2	..	..	..	..	..
1	"	"	1 (13 cm.)	..	..	..	..	..
1	"	"	1 (30 cm.)	..	..	..	..	..
1	"	"	1 (30 cm.)	..	..	..	..	..
1	"	"	3	..	..	..	..	..
1	"	"	..	..	..	..	1	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	2	..	..	..	..	..
1	"	"	1 ..	1	..	..	..	..
1	"	"	..	..	1	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1 (23 cm.)	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
1	"	"	1	..	..	..	..	..
2	"	"	..	..	..	..	..	+
1	Aug. 22	90.0	..	..	..	..	1(37cm)	..
1	" 10	100.0	..	..	..	..	1(42cm)	..

TROUT PERCH, *Percopsis omisco maycus*

Food of 23 individuals 6.0-9.5 cm. in length were taken July 20 in a trap net set in the Pustagone river.

No.	*Ostracoda*	*Amphipoda*	*Ephemeridae* nymphs	*Trichoptera* larvae	*Chironomidae* larvae	*Chironomidae* pupae	Miscellaneous
1	..	..	1	45	45	..	*Corixidae* 9.
1	..	..	95	..	..	5	
1	..	..	95	5	..	..	
1	..	1	50	48	1	..	
1	..	..	100	..	..	..	
1	1	..	65	3	25	..	*Cladocera* (*Ophryoxus gracilis, Chydorus sphaericus*) Gyrinid larvae 1; Haliplid beetles 5.
1	..	..	100	..	..	..	
1	5	..	80	..	15	..	Algal filaments.
1	..	4	25	..	35	35	1 Dipterous larva.
1	..	..	75	..	25	..	
1	..	10	50	..	25	10	Algal filaments; *Cladocera* (*Alona* sp.?).
1	..	..	60	..	40	..	
1	..	..	60	..	5	..	*Plecoptera* nymphs 35.
1	..	..	50	..	50	..	
1	..	5	60	..	35	..	
1	..	..	50	50 (pupae)	..	..	
1	25	..	25	..	25	25	*Diatoms* (*Surirella, Navicula*).
1	..	..	45	..	45	10	*Diatoms* (*Surirella, Epithemia*).
1	10	..	30	30	15	15	
1	..	..	75	..	25	..	
1	..	..	75	..	..	25	
1	..	..	50	..	50	..	
1	..	..	50	..	50	..	
6 App.	+	+	+	+	+	+	*Cladocera* (*Eurycercus lamellatus*).

Two genera of *Ostracoda* were represented, namely, *Cypria* and *Candona*. Three genera of *Ephemeridae* were represented, namely *Ephemera*, *Heptagenia* snd *Tricorythus*. All small dipterous pupae have been considered as *Chironomidae*, although in some cases the fragmentary state made identification uncertain.

SMALL MOUTH BLACK BASS, *Micropterus dolomieu*

No.	Date 1921	Length in cm.	*Copepoda*	*Cladocera*		*Insecta*				Fish remains
			Epischura lacustris	*Sida crystallina*	*Eurycercus lamellatus*	*Ephemeridae* nymphs	*Corixidae*	*Chironomidae* larvae	*Chironomidae* pupae	
1	July 19	2.6	95	..	5	..	..	..	..	..
1	"	2.6	66	2	..	..	16	8	8	..
1	"	2.8	2	2	..	15	65	16	..	..
3	" 27	3.3	..	80	..	3	10	..	1	6

YELLOW PIKE PERCH, *Stizostedion vitreum*

No.	Date 1921	Length in cm.	Ciscoes	Nine-spined sticklebacks	Miller's Thumbs	Fish remains
1	Aug. 4	5.3	..	..	..	+
1	July 20	5.6	..	..	..	+
1	" 20	6.8	..	..	..	+
1	" 28	14.0	..	..	..	+
1	" 12	15.0	..	4	..	..
8	" 28	17.0	..	6	..	+
1	" 12	18.0	..	5	..	+
1	" 12	29.5	..	1	1	..
1	Aug. 8	43.7	..	2	..	+
1	" 12	44.0	..	1	..	..
1	July 28	47.3	..	3	..	..
2	" 15	50.0 (?)	1(7.0 cm.)	1	..	+

YELLOW PERCH, *Perca flavescens*

No.	Date 1921	Length in cm.	*Copepoda*			*Cladocera*					*Insecta*						
			Epischura	*Diaptomus*	*Cyclops*	*Daphnia*	*Bosmina*	*Chydorus*	*Lepiodora*	*Ostracoda*	*Ephemeridae* nymphs	*Corixidae*	*Chironomidae* larvae	*Chironomidae* pupae	*Chironomidae* adults	Dipterous pupae	Fish
1	Aug. 15	3.0	..	..	15	..	50	..	..	..	..	..	..	..	..	35	..
5	June 27	3.4	10	75	1	1	1	..	2	..	..	..	..	..	10	..	..
7	July 30	4.7-5.6	..	..	..	..	..	..	..	..	62[1]	37	..	1	..	..	..
1	" 20	7.8	..	+	+	..	..	+	..	+	..	..	+	+	..	..	99[2]

[1]The *Ephemeridae* nymphs were *Callibaetis* sp.?
[2]The fish were the nine-spined stickleback (*Pygosteus pungitius*).

LING, *Lota maculosa*

No.	Date 1921	Length in cm.	Suckers	Ciscoes	Nine-spined sticklebacks	Trout Perch	Miller's Thumbs	Fish remains	*Mysis relicta*	*Pontoporeia hoyi*	*Chironomidae* larvae
1	July 26	20.0	..	..	1	1	..	..	..	..	..
1	" 4	35.5	..	..	1	..	..	..	..	..	..
1	" 4	35.5	..	..	..	..	..	3%	95%	+	2%
1	Aug. 8	35-42	..	..	1	..	..	..	..	..	..
1	" 8	"	..	..	..	..	1	..	..	..	..
1	" 23	35-42	..	..	1	..	..	..	..	..	..
1	" 23	"	..	..	2	..	..	..	..	..	..
1	" 10	35-55	..	2	..	..	1	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	..	1	..	5	..	..	.	.
1	"	"	..	1	..	..	1	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	2	..	..	1	+	..	..	..
1	"	"	..	8	..	..	..	..	..	..	..
1	"	"	..	9 (one 30.5 cm.)	..	..	..	..	..	..	..
1	"	"	..	4	..	..	..	..	..	..	..
1	"	"	..	2 (10 and 30 cm.)	..	..	..	..	..	..	..
1	"	"	..	2	..	..	..	..	..	..	..
1	"	"	..	2	..	..	1	..	..	..	..
1	"	"	..	1 (25 cm.)	..	..	..	..	..	..	..
1	"	"	..	5	..	..	..	..	..	..	..
1	"	"	..	5	..	..	..	..	..	..	..
1	"	"	..	2	2	..	1	..	..	..	..
1	"	"	..	3	..	..	..	..	..	..	..
1	"	"	..	1 (30 cm.)	..	..	..	..	..	..	..
1	"	"	..	..	..	..	1	+	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	2 (30 and 40 cm.)	..	..	..	..	..	..	..
1	"	"	..	4	..	..	..	..	..	..	..
1	"	"	..	2	..	..	..	+	..	..	..
2	"	"	..	..	..	..	..	+	..	..	..

LING, *Lota maculosa* (continued)

No.	Date 1921	Length in cm.	Suckers	Ciscoes	Nine-spined sticklebacks	Trout Perch	Miller's Thumbs	Fish remains	*Mysis relicta*	*Pontoporeia hoyi*	*Chironomidae* larvae
1	Aug. 22-23	35-55	..	1 (23 cm.)	..	..	..	..	..	..	..
1	"	"	..	1 (20 cm.)	..	..	..	..	..	..	..
1	"	"	..	2	..	..	..	..	..	..	..
1	"	"	..	5	..	..	..	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	1	..	..	..	..	..	..	..
1	"	"	..	3	..	..	1	..	..	..	..
1	"	"	1	3	..	..	1	..	..	..	..
1	"	"	..	2	..	..	..	+	..	..	..
1	"	"	..	4	..	..	..	..	..	..	..
1	"	"	..	4	..	..	..	+	..	..	..
1	"	"	..	3	..	..	5	..	..	..	..
1	"	"	..	1	..	..	..	+	..	..	..
1	"	"	..	1	..	..	..	+	..	..	..
1	"	"	..	1	..	..	1	+	..	..	..
1	"	"	..	6	..	..	..	+	..	..	..
1	"	"	..	2	1	..	..	+	..	..	..
1	"	"	..	..	..	..	3	+	..	..	..
1	"	"	..	..	5	..	1	+	..	..	..
1	"	"	..	..	..	..	1	+	..	..	..
1	"	"	..	..	..	..	1	+	..	..	..
1	"	"	..	..	..	..	1	+	..	..	..
28	"	"	..	..	..	..	..	+	..	..	..
3	"	"	..	..	..	..	..	..	100%	..	..
1	"	48.3	..	..	..	..	..	10%	75%	10%	3%
1	July 4	large	..	3 (11 cm.)	..	..	..	..	..	..	..

Little need be added in amplification of the data given in the tables, but mention may be made of a few outstanding points.

1. Gill net records show that the northern sucker inhabits deeper water than does the common sucker. The food studies substantiate this fact, in that, as a rule, higher percentages of *Pontoporeia* occurred in the northern sucker than in the common. It appears also that the older individuals of the common sucker feed at greater depths than do the younger.

2. Somewhat similar conclusions may be drawn respecting the whitefishes. According to the gill net records, the round whitefish does not extend to as great depths as does the common whitefish, and its food, according to the table, is obtained in comparatively shallow water. The data do not show definitely that the older individuals of the common whitefish feed altogether at greater depths than do the younger. This would be expected where the data is not extensive, because large individuals are often taken in shallow water. It is evident that the common whitefish has serious competitors for food in the suckers, since the latter are bottom feeders and are very abundant in the lake.

3. The ciscoes, although very abundant, come into very little competition with other fish as regards food, in that they are open water plankton feeders, subsisting largely upon *Mysis relicta* and *Limnocalanus*. On the other hand they are fed upon extensively by the lake trout.

4. The outstanding item of food of the lake trout is ciscoes. In Lake Nipigon, where the operation of gill nets of $4\frac{1}{2}$ inch mesh only is permitted, the number of ciscoes taken is relatively small, and those which are taken are at present sent to the market as whitefish. In view of this fact and since the lake trout is of such great commercial importance, the feeding of the latter upon the ciscoes is not to be deplored. It has been a matter of some surprise that no whitefish have as yet been found in the lake trout stomachs, and if further investigation substantiates this condition, a very fortunate state of affairs will be shown to exist.

5. The food of the trout perch was evidently obtained in the river.

6. The importance of the nine-spined stickleback (*Pygosteus pungitius*) in the food of the yellow pike perch is interesting and is possibly correlated with the small numbers of minnows occurring in the lake.

7. The chief competitor of the lake trout is no doubt the ling, since it apparently feeds largely upon ciscoes. The

absence of fish of commercial value in its diet is important. It is interesting to note that five individuals had fed upon *Mysis relicta*. The amounts of the latter were so large as to preclude the possibility of their having been contained in cisco stomachs and, in fact, in three cases no other material could be detected.

8. The fish examined fall more or less definitely into the following groups as regards food:—(1) predaceous—lake trout, yellow pike perch, ling; (2) bottom feeders—sturgeon, northern sucker, common sucker, round whitefish, common whitefish; (3) open water plankton feeders—ciscoes; (4) shallow water plankton and insect feeders—young common suckers, minnows, young small mouth black bass, young yellow perch; (5) insect feeders—trout perch.

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