STUDIES ON ALGONQUIN PARK


PARASITES OF FISH OF ALGONQUIN PARK LAKES

II. DISTRIBUTION STUDIES

ABSTRACT

The present report contains results of a study of distribution of fish parasites of Algonquin Park lakes. A large proportion of the fish examined for parasites were obtained from lakes where fish had not been examined in the previous report by Bangham (1941). The 676 fish reported here belong to 22 species and 530 or 75.8 per cent carried at least one species of parasite. Of the 374 fish belonging to the family Cyprinidae only 217 or 58 per cent were infected. Parasites are listed under the name of each species of fish according to their frequency of occurrence. A check-list of the 75 species found during the survey is included.

In 1939 a preliminary survey was conducted on the parasitism of fish from lakes in the vicinity of the Ontario Fisheries Research Laboratory located on Opeongo lake. During the latter part of August, 1940, it was again possible to visit the laboratory and 183 fish were examined. These fish were obtained from Opeongo, Costello, Galeairy, Sproule, Amikus, Sunday, and Eucaliu lakes, all of which are in the Madawaska river drainage. A few specimens were examined from Smoke lake which flows into the Muskoka river. Many of these fish were obtained by workers in the physiology laboratory and were studied for parasites after the experiments in physiology were completed.

In July and August of 1942, 493 fish were examined for parasites, chiefly from lakes in the Petawawa river drainage. Most of the lakes visited were a considerable distance from the laboratory. Travel was by canoe and the amount of equipment carried was small due to several portages in the areas visited. Most of the dissections for internal parasites were made without the aid of a dissecting microscope. After the viscera were opened any large parasites were picked out and all the viscera from a fish were shaken vigorously in a container with an approximately 0.7 per cent solution of sodium bicarbonate. Then the viscera were removed, the solution poured

1 This paper is a joint contribution from the Ontario Fisheries Research Laboratory, the Department of Biology, College of Wooster, and the Department of Zoology and Entomology, Ohio State University.
of P. parallacticus which was described by MacLulich (1943 a) from lake and speckled trout of this area. All the lake trout except two of the three examined from Chickaree carried E. salvelini. Integumental cysts, Apophallus sp., were found in small numbers on one trout from Happyisle lake. One of three hosts from Chickaree and one of the two lake trout from Blue carried the intestinal fluke C. farionis. Thorny-headed worms were restricted to a single host from White Trout lake.

2. Speckled trout. *Salvelinus fontinalis* (Mitchill) *(Examined 5; infected 5)*

<table>
<thead>
<tr>
<th>parasite</th>
<th>infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eubothrium salvelini</td>
<td>4</td>
</tr>
<tr>
<td>Proteocephalus parallacticus</td>
<td>1</td>
</tr>
<tr>
<td>Leptorhynchoides thecatus</td>
<td>1</td>
</tr>
<tr>
<td>Crepidostomum farionis</td>
<td>1</td>
</tr>
<tr>
<td>Hepaticola bakeri</td>
<td>1</td>
</tr>
<tr>
<td><em>Apophallus</em> sp</td>
<td>1</td>
</tr>
<tr>
<td>Contracaecum brachyurum</td>
<td>1</td>
</tr>
</tbody>
</table>

Four speckled trout were secured from a small lake off the upper bay of Happyisle lake. These fish measured 41 to 52.5 cm. in length and all had light infections of *E. salvelini*. One fish harboured an adult *L. thecatus*. All the other parasites listed were from a single host from Redrock lake.

The parasites of lake and speckled trout were similar. MacLulich (1943 b) examined 177 lake trout and 18 speckled trout and his list of parasites includes several species found by us. He did not report *H. bakeri* and *C. brachyurum.* A comparison of the lists above with those of Lyster (1940) for the same species of fish in Quebec reveals a number of differences.

3. Lake whitefish. *Coregonus clupeaformis* (Mitchill) *(Examined 17; infected 16)*

<table>
<thead>
<tr>
<th>parasite</th>
<th>infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteocephalus laruei</td>
<td>16</td>
</tr>
<tr>
<td>Spininctecus gracilis</td>
<td>4</td>
</tr>
<tr>
<td>Crepidostomum cooperi</td>
<td>4</td>
</tr>
<tr>
<td>Eubothrium salvelini</td>
<td>3</td>
</tr>
<tr>
<td>Leptorhynchoides thecatus</td>
<td>2</td>
</tr>
<tr>
<td>Crepidostomum farionis</td>
<td>1</td>
</tr>
</tbody>
</table>
Rhabdochona sp. ........................................... 1
Ergasilus caeruleus .......................................... 1
*Bothriocephalus sp. ......................................... 1

Six of these fish were from Opeongo, six from Longer, and five from White Trout. *P. laruei* was carried by all infected whitefish. All other parasites listed were encountered in the Opeongo hosts except for the copepods and cysts of *Bothriocephalus sp.*

4. Menominee whitefish. *Prosopium quadrilaterale* (Richardson) (Examined 8: infected 8)

*Crepidostomum farionis* ................................ 8
Ergasilus caeruleus .......................................... 1
*Spinitectus gracilis* ...................................... 1

All these fish were from Opeongo lake.

5. American eel. *Anguilla rostrate* (LeSueur) (Examined 1: infected 1)

*Bothriocephalus claviceps* ................................ 1
*Azygia longa* .................................................. 1
*Contracaecum brachyurum* .................................. 1
*Haplonema aditum* .......................................... 1
*Proteocephalus macrocephalus* ............................. 1

This host, 103 cm. in length, was taken from Opeongo lake.

6. Common sucker. *Catastomus commersonii* (Lacépède) (Examined 53: infected 52)

*Glaridacris laruei* .......................................... 32
*Acinobdella triannulata* .................................... 20
*Pomphorynchus bulbocelli* .................................. 19
*Triganodistomum attenuatum* ............................... 11
*Octospinifer macilentus* .................................... 11
*Octomacrum lanceatum* ...................................... 3
*Eustrongylides sp.* ........................................... 3
*Posthodiplostomum minimum* ............................... 3
*Rhabdochona sp.* ........................................... 3

These dace were from Lake Chickamee, Longer, and White Trout.

7. Northern red-bellied dace. *Chrosomus eos* Cope (Examined 88: infected 14)

*Neascus* ....................................................... 6
*Posthodiplostomum minimum* ............................... 6
*Rhabdochona cascadilla* .................................... 6
*Agyonema* ..................................................... 1
*Liguia intestinalis* ........................................... 1

These dace were from lakes Chickamee, Longer, and White Trout.

8. Golden shiner. *Notemigonus crysoleucas* (Mitchill) (Examined 7: infected 0)

No parasites were found in any of these fish from Smoke, Eucalia, and Longer lakes.


*Neascus* ....................................................... 27
Octomacrum sp. ........................................... 9
Rhabdochona cascadilla ..................................... 2
**Crepidostomum sp. ....................................... 1
Three of ten dace examined from Chickaree carried cysts of Neascus. The other parasites listed above were obtained from twenty-five dace examined in 1940 from Costello lake. The gill flukes Octomacrum sp. appear to belong to an undescribed species and have been submitted to Dr. E. W. Price for study.

10. Fallfish. *Leucosoma corporalis* (Mitchill)
(Examined 67: infected 47)
Rhabdochona cascadilla ...................................... 32
Allocreadium lobatum ....................................... 24
*Posthodiplostomum minimum .............................. 10
*Ergasilus caeruleus .......................................... 4
*Neascus .......................................................... 2
*Clinostomum marginatum .................................... 2
*Ligula intestinalis ............................................ 2
One fallfish was obtained from Smoke lake in 1940. Of the remainder six were from White Pine creek, and sixty were from below the dam where water flows from White Trout into Longer lake.

11. Northern Creek Chub. *Semotilus atromaculatus atromaculatus* (Mitchill)
(Examined 64: infected 51)
Rhabdochona cascadilla ...................................... 19
*Posthodiplostomum minimum .............................. 18
*Neascus .......................................................... 13
*Clinostomum marginatum .................................... 9
Allocreadium lobatum ....................................... 8
Neoechinorhynchus sp. ....................................... 5
*Proteocephalus ambloplatis ................................ 3
Octomacrum sp. ................................................ 2
Triganodistomum attenuatum .............................. 1
**Proteocephalus sp. ........................................... 1
The creek chub were from twelve lakes: Blue 2, Redrock 11, Longer 7, Happyisle 8, Chickaree 9, Eucalia 2, Costello 4, Opeong 1.

(Examined 11: infected 7)
*Neascus .......................................................... 6
*Agamonema ...................................................... 1
All these fish were obtained from Amikeus lake in 1940.

(Examined 20: infected 15)
Rhabdochona cascadilla ...................................... 9
Bunodera sacculata ........................................... 7
Allocreadium lobatum ....................................... 7
*Posthodiplostomum minimum .............................. 6
*Clinostomum marginatum .................................... 3
*Bothriocephalus sp. ......................................... 2
*Ligula intestinalis ............................................ 2
*Ergasilus caeruleus .......................................... 1
*Neascus .......................................................... 1
The fish were taken as follows: one from Sunday, four from Eucalia, two from Smoke, eleven from White Trout, and two from White Pine creek. *B. sacculata* was found only in these fish from White Trout lake. *R. cascadilla* and *A. lobatum* were from White Trout and White Pine lakes.

(Examined 4: infected 1)
*Neascus .......................................................... 1
All these minnows were taken in 1940 from Amikeus lake.

15. Blunt-nosed minnow. *Hyborkynchus notatus* (Rafinesque)
(Examined 16: infected 12)
*Tetracotyle sp. ................................................ 9
*Posthodiplostomum minimum .............................. 7
Rhabdochona cascadilla ...................................... 3
*Ligula intestinalis ............................................ 1
The fish were from Smoke, Happyisle, and White Trout lakes.
(Examined 60: infected 46)

- *Posthodiplostomum minimum* ........................................ 45
- **Rhabdochona** sp. .............................................. 4
- *Clinostomum marginatum* ........................................... 1

All of forty-three fat-head minnows from Chickaree lake were infected with *P. minimum*. This is interesting because only three of ten northern dace and only one of sixty red-bellied dace from the same lake had this parasite. All the minnows were caught during an afternoon in a trap set at one location.

(Examined 11: infected 11)

- *Corallobothrium fimbriatum* ...................................... 8
- *Allocreadium icteriuri* ......................................... 2
- *Alloglossidium geminum* ......................................... 2
- *Pomphorhynchus bulbolocci* .................................... 2
- *Proteocephalus ambloplitis* .................................... 1
- *Ergasilus* sp. .................................................... 1
- *Vietosoma parvum* ................................................ 1

The bullheads were from Opeongo, Happyisle, and Merchants lakes. The *C. fimbriatum* are very small and appear different from those taken from places farther south, but a comparison of specimens from Tennessee, Ohio, and Canada does not reveal characters sufficiently different for the erection of a new species.

With the exception of *C. fimbriatum* all the parasites listed were obtained from seven bullheads in Opeongo lake.

18. Ling or burbot. *Lota maculosa* (Le Sueur)
(Examined 15: infected 15)

- *Abothrium crassum* ............................................. 15
- *Contracaecum brachyurum* ...................................... 6
- *Leptorhynchoides thecatus* ..................................... 5
- *Ergasilus caeruleus* ............................................ 5
- *Haplonema hammondianum* ...................................... 5
- *Hepaticola bakersi* ............................................. 5
- **Proteocephalus** sp. .......................................... 2
- *Ergasilus osburni* ............................................. 1

Ten fish were taken from Opeongo in 1940 and single specimens from Sproule, White Trout, Longer, Blue, and Chickaree lakes in 1942. *Ergasilus osburni* is a new species and a description of it by Tidd and Bangham will appear in the forthcoming issue of the Transactions of the American Microscopical Society.

19. Stickleback. *Eculia inconstans* (Kirtland)
(Examined 7: infected 0)

The sticklebacks were obtained in 1940 from a small lake, called Eucalia by the investigators at the laboratory, located by the park highway near the Opeongo lake road.

20. Yellow perch. *Perca flavescens* (Mitchill)
(Examined 84: infected 81)

<table>
<thead>
<tr>
<th>Parasite Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Neascus</em></td>
<td>125</td>
</tr>
<tr>
<td><em>Proteocephalus pearsei</em></td>
<td>28</td>
</tr>
<tr>
<td>Buloera sacculata</td>
<td>20</td>
</tr>
<tr>
<td>Crepidostomum cooperi</td>
<td>19</td>
</tr>
<tr>
<td><em>Proteocephalus ambloplitis</em></td>
<td>16</td>
</tr>
<tr>
<td><em>Spinitectus gracilis</em></td>
<td>8</td>
</tr>
<tr>
<td><strong>Bothriocephalus</strong> sp.</td>
<td>4</td>
</tr>
<tr>
<td><em>Posthodiplostomum minimum</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Clinostomum marginatum</em></td>
<td>3</td>
</tr>
<tr>
<td><em>I licithelota</em> sp.</td>
<td>3</td>
</tr>
<tr>
<td><em>Legula intestinalis</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Leptorhynchoides thecatus</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Agamonema</em></td>
<td>1</td>
</tr>
<tr>
<td><strong>Asygia angusticauda</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

The perch were from White Pine creek (2) and the following lakes: Blue 6, Galey 3, Happyisle 10, Longer 4, Merchants 7, Opeongo 25, Redrock 3, Shiner 3, Sunday 1, and White Trout 20. Those from Longer and Blue lakes and from White Pine creek carried only cysts of *Neascus* and *P. pearsei*.

21. Small mouth black bass, *Micropterus dolomieu* Lacépède
(Examined 46: Infected 46)

<table>
<thead>
<tr>
<th>Parasite Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Proteocephalus ambloplitis</em></td>
<td>43</td>
</tr>
</tbody>
</table>
Proteocephalus fluviatilis .......................... 16
*Uvulifer ambloplitis ............................ 14
Spininctus carolini ................................ 12
*Clinostomum marginatum ......................... 11
Crepidostomum cornutum ......................... 7
Proteocephalus ambloplitis ..................... 6
Leptorhynchoides thecatus ..................... 6
Azgyia angusticauda .............................. 3
Rhabdochona cascadilla ......................... 2
Rhaphidocotyle papillosum .................... 2
Neoechinorhynchus cylindratus ............... 1
*Posthodiplostomum minimum .................. 1

The bass were from Galeairy 14, Happyisle 27, and Opeongo 5.
The amazing infections of Opeongo bass with larval P. ambloplitis have been pointed out (Bangham, 1941 a). The biology of this parasite in this area deserves special study. The bass from Galeairy and Happyisle were not nearly as heavily infected as the bass from Opeongo. P. fluviatilis, reported by Bangham (1941 a) for the first time from bass living in lakes, was found in all three lakes.

22. Common sunfish. Lepomis gibbosus (Linnaeus)
(Examined 35: infected 35)
*Posthodiplostomum minimum .................. 13
*Clinostomum marginatum ....................... 11
*Leptorhynchoides thecatus ................... 9
*Uvulifer ambloplitis .......................... 9
Crepidostomum cornutum ....................... 8
*Hymenolepis sp. ................................ 7
Crepidostomum cooperi ......................... 5
*Proteocephalus ambloplitis .................. 4
**Proteocephalus pearsei ....................... 4
Spininctus gracilis .............................. 4
Bothriocephalus claviceps ...................... 4
**Azgyia angusticauda ......................... 3
Rhabdochona sp. .................................. 3
*Agamonema ................................... 3
Spininctus carolini .............................. 2
Leptorhynchoides thecatus ................... 1

The sunfish were from seven lakes as follows: Galeairy 2, Happyisle 1, Longer 5, Merchants 5, Opeongo 8, Shiner 2, and White Trout 12.
The common sunfish from Longer carried only strigeid cysts.
Two fish from Opeongo, three from White Trout, and one from Shiner lake bore cysts which contained a cestode larva with invaginated rostellar hooks. A similar form was recorded and figured by Van Cleave and Mueller (1934). They found a single larva in the digestive tract of Microccerus salmoides.
A related or identical species was found by Bangham (1941 b) encysted in the long-nosed killifish, banded topminnow, golden topminnow, flagfish, and mosquito-fish of southern Florida.

CHECK-LIST OF PARASITES

The parasites are arranged in their systematic order. The list includes the monogenetic tremadodes which were identified by Mizelle and Donahue (1944). These authors described nine new species and made many comments on the distribution of gyrodactylids.

TREMATODA

* Cleidodiscus banghami (Mueller, 1936)
* Cleidodiscus pricei Mueller, 1936
* Cleidodiscus sp.
* Actinocleidus oculatus (Mueller, 1934)
* Actinocleidus cinus Mizelle and Donahue, 1944
* Actinocleidus recurvatus Mizelle and Donahue, 1944
* Actinocleidus gibbosus Mizelle and Donahue, 1944
* Actinocleidus scapularis Mizelle and Donahue, 1944
* Actinocleidus sigmoideus Mizelle and Donahue, 1944
* Urocleidus adspersus Mueller, 1936
* Urocleidus dispar (Mueller, 1936)
* Urocleidus ferox (Mueller, 1934)
* Urocleidus procas Mizelle and Donahue, 1944
* Dactylogyrus banghami Mizelle and Donahue, 1944
* Dactylogyrus bulbus Mueller, 1938
* Dactylogyrus bulbosus Mizelle and Donahue, 1944
* Dactylogyrus cornutus Mueller, 1938
* Dactylogyrus perlus Mueller, 1938


Dactylogyrus pollex Mizelle and Donahue, 1944
Octomacrum lanceatum Mueller, 1934
Octomacrum sp.
Rhizodiscus papillosus (Woodhead, 1929)
Vetosoma parsum Van Cleave and Mueller, 1932
Allocreadium italuri Pearse, 1924
Allocreadium lobatum Wallin, 1909
Crepidostomum cornutum (Osborn, 1903)
Crepidostomum cooperi Hopkins, 1931
Crepidostomum farionis (O. F. Müller, 1784)
Crepidostomum sp.
Bunodera sacculata Van Cleave and Mueller, 1932
Triganodistomum attenuatum Mueller and Van Cleave, 1932
Alloglossidium geminus (Mueller, 1930)
Apohallus sp.
Clistostomum marginatum (Rudolphi, 1819)
Tetracotyle sp.
Posthodiplostomum minimum (MacCallum, 1921)
Neascus Hughes, 1927
Uvulifer ambloplitis (Hughes, 1927)
Azygia longa (Leidy, 1851)
Azygia angusticauda (Stafford, 1904)

Cestoda

Glaridacris laruei (Lamont, 1921)
Ligula intestinalis (Linnaeus, 1758)
Bothriocephalus claviceps (Goeze, 1782)
Bothriocephalus sp.
Abothrium crassum (Bloch, 1779)
Eubothrium salvelini (Schrank, 1871)
Proteocephalus emboplitis (Leidy, 1887)
Proteocephalus flaviatilis Bangham, 1925
Proteocephalus laruei Faust, 1919
Proteocephalus macrocephalus (Creplin, 1825)
Proteocephalus parallacticus MacLulich, 1943
Proteocephalus pearsei La Rue, 1919
Proteocephalus sp.
Corallobothrium fimbriatum Essex, 1927
Hymenolepsis sp.

Nematoda

Agamonema Diesing, 1851
Hepaticola bakeri Mueller and Van Cleave, 1932
Contracaecum brachyurum (Ward and Magath, 1917)
Eustrongylides sp.
Spinitectes carolinii Holl, 1928
Spinitectes gracilis Ward and Magath, 1917
Rhabdochona cascadiella Wigdor, 1918
Rhabdochona sp.
Dichelyne cotylophora (Ward and Magath, 1917)
Haplonema aditum Mueller, 1934
Haplonema hamulatum Moulton, 1931

Acanthocephala

Neoechinorhynchus cylindratus (Van Cleave, 1913)
Neoechinorhynchus sp.
Octospinifer macilentus Van Cleave, 1919
Leptorhynchos thecatus (Linton, 1891)
Pomphorhynchus bulbocelli Linkins, in Van Cleave 1919

Copepoda

Ergasilus caeruleus Wilson, 1919
Ergasilus osburni Tidd and Bangham (manuscript)

Hirudinea

Actinobdella triannulata Moore, 1905
Illicinobdella sp.
Parasites of Fish of Algonquin Park Lakes

Literature Cited


