

FRESH WATER CLADOCERA AND COPEPODA FROM
NEW BRUNSWICK AND NOVA SCOTIA¹.

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ABSTRACT.

Planktonic Cladocera and Copepoda from several fresh waters in New Brunswick and Nova Scotia are listed. Characteristic species of the limno-plankton are the cladocerans; *Diaphanosoma leuchtenbergianum*, *Holopedium gibberum*, *Daphnia pulex pulicaria*, *Daphnia longispina hyalina*, *Bosmina longirostris*, *Leptodora kindtii*, and the copepods; *Epischura lacustris*, *Diaptomus minutus*, *Mesocyclops obsoletus*.

In recent years the author has had occasion to visit several lakes and ponds in New Brunswick and Nova Scotia in connection with various aquicultural problems. Plankton samples have been usually secured during each visit, and in this manner considerable data upon the species of Cladocera and Copepoda associated together in these waters have accumulated.

From an examination of the literature, it is found that comparatively little has been published concerning the fresh water plankton of the Maritime Provinces. This is particularly true of the limnetic plankton. Juday², Klugh³ and Willey⁴ have reported several species of Cladocera and Copepoda from samples collected at various points in the region. Klugh⁵ gives lists of the forms associated with each other in a number of small ponds in Charlotte county, New Brunswick, and Smith⁶ indicates certain species occurring in experimental ponds at the Atlantic Biological Station. Therefore, in view of this situation, it is considered worthwhile to present our data in this short paper.

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² Juday. *Canad. Field-Nat.* 40, 99-100 (1926).

³ Klugh. *Canad. Field-Nat.* 40, 133-135 (1926).

⁴ Willey. *Contr. Canad. Biol. Fish.*, N. S. 1, 305-334 (1923).

⁵ Klugh. *Trans. Roy. Canad. Inst.* 16, 15-98 (1927).

⁶ M. W. Smith. *Trans. Amer. Fish. Soc.* 62, 317-322 (1932); *J. Biol. Bd. Can.* 1, 67-93 (1934).

THE WATERS.

Samples were secured from four lakes and one pond in New Brunswick, and from four lakes and one slow-flowing stream in Nova Scotia. A short description of these bodies of water follows.

NEW BRUNSWICK.

1. Chiputneticook lakes⁷, York county. (July 19, 1931). These lakes form a chain at the head-waters of the St. Croix river, and also form part of the international boundary between Canada and the United States. Only the first lake was visited, in which a maximum depth of 8.0 metres was found. The pH value of the water was 7.0 to 7.1.

2. Crecy lake, Charlotte county. (September 28, 1931). Crecy lake is a small body of water tributary to the Bocebec river. A maximum depth of 4.2 metres was sounded.

3. Lochs Lomond, St. John county. (August 30, 1932). These form a series of three lakes at the head of the Miskep river. Samples were secured from the first and third lakes. First Loch Lomond is the largest and deepest (40.5 metres), while third Loch Lomond is comparatively small and shallow (8.5 metres).

4. Stephenson's pond, St. John county. (June 28, July 19, October 5 and November 2, 1934). This pond has been formed artificially by damming a small brook flowing into first Loch Lomond. It was not filled to capacity during 1934 until October, at which time a depth of 1.7 metres was found at the dam. The pH value of the water varied from 5.8 to 6.0.

NOVA SCOTIA.

1. Lake George, Yarmouth county. (September 11, 1932). Lake George has an area of approximately 8 square miles. A maximum depth of 12.5 metres has been sounded and the mean depth estimated at about 5.5 metres. The surface water had a pH value of 6.5.

⁷ This survey was made in co-operation with Dr. R. H. M'Gonigle. *Atl. Biol. Sta., Biol. Bd. Can. Ms. Rep. 57.*

2. Hectanooga lake, Digby county. (October 3, 1934). This is a small lake (approximate area of 60 acres) tributary to the Salmon river, Digby county. A maximum depth of 5.5 metres was found. The mean depth approximates 3.5 metres. The pH value of the water was 6.6 to 6.7.

3. Lake Jesse, Yarmouth county. (July 31 to August 8, October 3, 1934). This lake covers an area of 45 acres and has a maximum depth of 6.0 metres, with a mean depth of 2.5 metres. It is tributary to Salmon river, Yarmouth county. The water had a pH value of 6.3 to 6.5.

4. Lake Annis, Yarmouth county, (August 3, 1934). Lake Annis is tributary to Salmon river, Yarmouth county. It receives the overflow from Lake Jesse.

5. Sullivan's flowage, Digby county. (August 8, 1934). Sullivan's flowage in part constitutes a slow-flowing stream on the headwaters of the Carleton branch of the Tusket river. A striking feature of the water was its very deep brown colour ("bog water"). A pH value of 5.3 was determined. Part of this flowage is dammed during the fall, winter and spring.

The phytoplankton of the above lakes, as far as it has been examined, is characterized by an abundance of desmids. On this basis, the lakes can be classified as belonging to the Caledonian type, in distinction from the Baltic type, in which the phytoplankton is dominated by Chlorococcales and Myxophyceae.

THE CLADOCERA AND COPEPODA.

In Table 1 a list of the species found in the plankton samples is given. From this list it may be seen that, in the open-water plankton, or limnoplankton, of the lakes, the cladocerans, *Diaphanosoma leuchtenbergianum*, *Holopedium gibberum*, the two species of *Daphnia*, their subspecies and forms, *Bosmina longirostris*, and *Leptodora kindtii*, and the copepods, *Epischura lacustris*, *Diaptomus minutus* and *Mesocyclops obsoletus*, are the most characteristic. The species of Cladocera are usually common, and often abundant, depending upon the season, except the predaceous *Leptodora*, which, although customarily present, never becomes numerous,

TABLE 1. LIST OF SPECIES OF CLADOCERA AND COPEPODA

SPECIES	Chiputneticook	Crecy	Loch Lomond 1	Loch Lomond 3	Stephenson's	George	Hectanooga	Jesse	Annis	Sullivan's
<i>Diaphanosoma brachyurum</i> (Liéven)	x	..	x	..	..	x	x	x	x	..
<i>Diaphanosoma leuchtenbergianum</i> Fischer	..	x	x	x	..	x	..	..	..	..
<i>Holopedium gibberum</i> Zaddach	x	..	..	..	..	x	x	x	x	..
<i>Holopedium</i> sp	..	..	..	x	..	..	..	..	..	..
<i>Daphnia pulex pulicaria</i> Forbes	x	..	..	..	..	x	x	x	x	..
<i>Daphnia retrocurva</i> Forbes	..	..	..	x	..	..	..	..	..	..
<i>Daphnia longispina hyalina</i> Leydig	x	x	x	x	..	x	..	..	..	..
<i>Daphnia longispina hyalina</i> Leydig forma <i>galeata</i>	..	..	..	..	..	..	..	x	x	..
<i>Simocephalus serrulatus</i> (Koch)	..	..	..	..	x	..	..	..	..	..
<i>Scapholeberis mucronata</i> (O. F. Müller)	..	..	..	..	x	..	..	..	..	x
<i>Bosmina longirostris</i> (O. F. Müller)	..	x	..	x	x	x	x	x	x	x
<i>Bosmina longispina</i> Leydig	x	..	x	..	..	..	..	..	..	..
<i>Eurycercus lamellatus</i> (O. F. Müller)	..	..	..	..	x	..	..	..	..	..
<i>Acroperus harpae</i> Baird	..	..	..	..	x	..	..	..	..	..
<i>Alona affinis</i> (Leydig)	..	..	..	..	..	..	..	x	..	x
<i>Graptoleberis testudinaria</i> (Fischer)	..	..	..	..	..	..	..	..	..	x
<i>Rhynchotalona falcata</i> (Sars)	..	..	..	..	..	..	..	x	..	..
<i>Pleuroxus provurcatus</i> Birge	..	..	..	..	x	..	..	..	..	..
<i>Chydorus bicornutus</i> Doolittle	..	..	..	..	..	..	..	..	..	x
<i>Chydorus sphaericus</i> (O. F. Müller)	..	..	..	..	x	..	..	..	..	..
<i>Alonella nana</i> (Baird)	..	..	..	..	..	..	..	x	..	..
<i>Polyphemus pediculus</i> (Linné)	x	..	..	..	x	x	..	x	..	..
<i>Leptodora kindtii</i> (Focke)	x	x	x	x	..	x	x	..	..	..
<i>Epischura lacustris</i> Forbes	x	x	x	x	..	x	x	x	x	..
<i>Diaptomus minutus</i> Lilljeborg	x	x	x	x	..	x	x	x	x	..
<i>Diaptomus spatulocrenatus</i> Pearse	x	..	..	..	..	..	..	..	..	..
<i>Cyclops viridis americanus</i> Marsh	..	..	..	..	x	..	..	..	..	..
<i>Cyclops viridis brevispinosus</i> Herrick	..	..	..	..	..	x	..	..	..	..
<i>Mesocyclops obsoletus</i> (Koch)	x	x	x	x	..	x	x	x	x	x
<i>Eucyclops agilis</i> (Koch)	..	..	..	..	x	..	..	x	..	x
<i>Eucyclops prasinus</i> (Fischer)	..	..	..	..	x	..	..	..	x	..
<i>Ectocyclops phaleratus</i> (Koch)	..	..	..	..	..	..	..	x	..	..

Of the Copepoda, the dominants are *Diaptomus minutus* and *Mesocyclops obsoletus*. These two species are almost invariably abundant and form a striking feature of the plankton in these lakes. *Epischura lacustris* was found more plentiful in the late summer and fall samples.

The above species of cladocerans are widely distributed in the lakes of temperate North America, as are the copepods, *Epischura lacustris* and *Mesocyclops obsoletus*. *Diaptomus minutus* is restricted to the northeastern part of the continent. According to Marsh⁸ it is a cold-water form and, in its southern range, largely confined to the deeper lakes. However, in New Brunswick and Nova Scotia it is abundant in shallow lakes at the surface, where temperatures of 20-25°C. are reached during the summer.

On the whole the species of the genus *Diaptomus* tend to be limited in their distribution, but it is surprising that this genus is so poorly represented in the limnoplankton of the Maritime lakes. Besides *Diaptomus minutus*, *Diaptomus spatulocrenatus* was the only other species found, and then but sparingly in the first Chiputneticook lake. In central and western North America, on the other hand, several species of this genus may be taken in the same plankton sample, or in neighbouring lakes⁹.

ADDITIONAL REMARKS ON CERTAIN SPECIES.

Diaphanosoma brachyurum and *Diaphanosoma leuchtenbergianum*. These two species of cladocerans are usually differentiated by the length of antennae, size of eye and size of body. Birge¹⁰ says it is probable that the latter is only a limnetic variety of the former. Specimens from Lake George exhibited gradations from the characteristics of one to those of the other.

⁸ Marsh. *Proc. U. S. Nat. Mus.* 75, 1-27 (1929).

⁹ Bajkov. *Contr. Canad. Biol. Fish.*, N. S. 5, 383-422 (1930). Eddy. *Ill. Biol. Mon.* 12, 1-93 (1934).

¹⁰ Birge. Cladocera, in Ward and Whipple's "Fresh-water Biology." John. Wiley and Sons, New York. 1918, pp. 676-740.

Holopedium sp. A new species of *Holopedium* has been found in the third Loch Lomond and in the Chamcook lakes, Charlotte county, New Brunswick. A description of this species is being prepared.

Acroperus harpae. Specimens were secured from Stephenson's pond on October 5, 1934, which agreed with the description of *Acroperus harpae*, except that the post-abdomen was decidedly longer and narrower. This character is that of the closely related *Acroperus angustatus*. Birge¹⁰ notes that transition forms between these two species have been found.

Diaptomus spatulocrenatus. The specimens from the first Chiputneticook lake had the left endopodite of the male fifth foot one-segmented, agreeing with individuals secured by Marsh⁸ from Lake Sebago, Maine, but not in this particular with those originally described by Pearse¹¹ from Nantucket Island, in which specimens the endopodite was two-segmented.

The identification of *Eucyclops prasinus* from Stephenson's pond and of *Mesocyclops obsoletus* from Sullivan's flowage was kindly checked by Dr. Chas. B. Wilson.

¹⁰ Birge. Cladocera, in Ward and Whipple's "Fresh-water Biology. John Wiley and Sons, New York. 1918, pp. 676-740.

¹¹ Pearse. *Amer. Nat.* 40, 241-251 (1906).