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REPRESENTATIVE *CLADOCERA* OF
SOUTH-WESTERN ONTARIO

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REPRESENTATIVE CLADOCERA OF SOUTH-WESTERN ONTARIO

During the past two years the author of this paper has made a special study of the *Cladocera* in various parts of the Province of Ontario. In view of their common occurrence in practically all bodies of water and their fundamental economic importance, it is surprising that but little attention has heretofore been given to this interesting group in our province. Sars (1916) lists nine species found in samples of surface plankton collected during the summer of 1907 in the Go Home Bay region of Georgian Bay and submitted to him for examination by Professor E. M. Walker. The *Cladocera* of that list are as follows:—

Holopedium gibberum Zaddack

Sida crystallina (Müll.)

Daphniella brachyura Liéven = (*Diaphanasoma brachyurum*)

Daphnia hyalina var. *oxycephala* Sars = (*Daphnia longispina* var. *hyalina*)

Hyalodaphnia retrocurva var. *intexta* Forbes (*Hyalodaphnia* = *Daphnia*)

Ceriodaphnia scitula Forbes (probably = *C. quadrangula* Müll.)

Bosmina longirostris (Müll.)

Polyphemus pediculus (L.)

Leptodora hyalina Lilljeb. = (*L. kindtii* Focke)

Birge (1918) mentions *Chydorus latus* Sars as "rare, Canada, near Lake Erie". Birge (1894) lists a number of *Cladocera* taken in the American waters of Lake St. Clair, Detroit River and the western end of Lake Erie. No doubt

these species also occur in the Canadian waters of these regions.*

In the present paper the occurrence of forty-nine species of *Cladocera* is recorded. The classification and arrangement of these is based on Birge (1918). The material studied came from the following localities, which are indicated on the accompanying map (Fig. 1).

1. Georgian Bay. Several hundred samples of plankton collected during the years 1903, 1905 and 1907 from eight stations in the Go Home Bay region in the south-eastern part of Georgian Bay under the direction of Professor B. A. Bensley and Professor E. M. Walker were kindly placed at the writer's disposal for examination. Also the stomach contents of 19 ciscoes (*Leucichthys harengus*) taken in the south-western part of Georgian Bay have been examined. These were obtained in November 1920 from Wiarton by Professor W. A. Clemens. In the locality records in the following part of the paper, Georgian Bay, unless otherwise stated, refers to the Go Home Bay region.

2. Port Sydney. This small village is situated on Lake Mary about 15 miles from the town of Huntsville in the Muskoka District. In the summer of 1919 plankton collections were made in various small lakes, ponds and pools within a radius of four miles of this village and also in the north branch of the Muskoka River.

3. Toronto. Plankton collections were made in Grenadier Pond, in the lagoons on Toronto Island and in various small ponds and pools in the immediate vicinity of this city. These collections were made mostly in the spring and autumn of 1919 and the spring of 1920.

4. Lake Ontario. The stomach contents of seven ciscoes (*L. ontariensis*) obtained by Professor W. A. Clemens at Port Credit in November, 1920, have been examined.

*Since the above was written an article has appeared entitled "Notes on Canadian Entomostraca," by A. Brooker Klugh, in the Canadian Field Naturalist, vol. XXXV, No. 4, pp. 72-73, 1921. In this paper twelve species of *Cladocera* are recorded from four localities in Ontario, all of which localities are other than those mentioned in the present paper.

5. Bond Lake and Wilcox Lake. These two small lakes are situated about 20 miles north of Toronto. During the spring and autumn of 1919 and the spring of 1920 plankton hauls were made in these lakes as well as in several small ponds and pools in their immediate vicinity.

6. Lake Erie. The alimentary tracts of approximately 200 ciscoes from Lake Erie have been examined. Four species were represented, namely *L. eriensis*, *L. artedi*, *L. sisco huronius* and *L. prognathus*, and were obtained by Professor W. A. Clemens from various points along the north shore of Lake Erie in the spring of 1919 and the summer and autumn of 1920. Since ciscoes are pre-eminently plankton feeders, much interesting information concerning the distribution of *Cladocera* was gained from this source.

7. Point Pelee. Samples of plankton were taken during the summer of 1920 from various types of permanent and temporary ponds and pools on this point of land, the southernmost point of Canadian soil.

The drawings with which this paper is illustrated were all made from specimens collected in the various localities mentioned above.

SIDIDAE

Sida crystallina (Müller)

Georgian Bay, Lake Erie, Point Pelee. This species appears to seek the shallower water close to shore especially in the vicinity of aquatic plants and was not found in small ponds or pools unless they were immediately adjacent to larger bodies of water. It is a rather important form from the standpoint of fish food since it ranked third in the list of organisms most commonly found in cisco stomachs, *Daphnia* and *Leptodora* respectively exceeding it in frequency. Forty-eight jumbo ciscoes taken from June 1 to August 2, 1920, at Merlin chiefly, but also at Rondeau, Lake Erie, had eaten it in considerable numbers.

Latonopsis occidentalis Birge

Point Pelee. Fairly common June 18, 1920, in a small weedy pond near Lake Pond.

Latona setifera (Müller)

Georgian Bay, Point Pelee (Lake Pond). Apparently uncommon in Georgian Bay since only a single specimen was taken. Five specimens were found in July and August in plankton swept from aquatic vegetation in Lake Pond (Point Pelee).

Diaphanosoma brachyurum (Liéven)

Georgian Bay, Lake Erie, Point Pelee. In some samples of plankton this species was fairly common and a few specimens were observed in two cisco stomachs (*L. eriensis*) from Merlin in July and August 1920.

Diaphanosoma leuchtenbergianum Fischer

Georgian Bay, Point Pelee. Less common than the preceding species.

HOLOPEDIDAE

Holopedium gibberum Zaddach

Georgian Bay, Lake Erie. This species occurred very abundantly in most of the open water plankton from Go Home Bay and a few were taken from a cisco stomach (*L. eriensis*) from Lake Erie, July 1920.

DAPHNIDAE

Of the members of this family the genus *Daphnia* is the most widely distributed and the most abundant in point of individuals. Their immense numbers, their great economic importance as fish food and their amazing variations among individuals of the same species can only be fully appreciated by those who have made a study of fresh water plankton and the contents of fish stomachs. In a great many ciscoes

examined the entire alimentary tracts were found to be literally crammed with the remains of countless thousands of *Daphnia*. Of 205 of these fish examined 160 had eaten *Daphnia* to a greater or less extent. In the majority, *Daphnia* were by far the most abundant food organisms present and in 26 formed the entire food material. The only ciscoes which had not fed largely on *Daphnia* were some taken in the spring of 1919 when *Ephemeridae* formed the bulk of the food material, and a few others taken in the deep open waters where *Mysis relicta* and *Limnocalanus macrurus* were the dominant crustaceans.

Daphnia pulex (de Geer)

Port Sydney, Toronto, Lake Ontario, Bond Lake, Lake Erie, Point Pelee. Generally common everywhere in bodies of water of all sizes from large lakes to small temporary pools. However it was not found in the Georgian Bay plankton which is surprising in view of the large numbers of samples taken. Neither was it found in any of the cisco stomachs from the eastern portion of Lake Erie. It appears to be the commonest species in the western part of this lake, however, and apparently forms the bulk of the food of the ciscoes there during summer and autumn at least. The majority of the jumbo ciscoes (*L. eriensis*) taken during the summer and autumn of 1920 had eaten this species together with some *Daphnia retrocurva* which may be only a form of *D. pulex*, and all the individuals of this species taken during November 1920 had eaten *D. pulex* only.

Daphnia retrocurva Forbes

Georgian Bay, Lake Ontario, Lake Erie. Abundant in the plankton from Georgian Bay and very abundant in the cisco stomachs from Lake Erie. It appears to be a summer form in Lake Erie as ciscoes taken at Rondeau in June 1919 had eaten almost as many individuals of this species as of *D. pulex*. Many of these specimens showed astonishing variations in the shape and extent of the cephalic crest as shown in Figs. 1-4. One individual with a pronounced

retrocurva crest had the same type of pecten on the claws of the post abdomen as is found in typical *D. pulex*. Forms approaching the *D. arcuata* type were also found. In spite of the amazing differences between typical specimens of *D. retrocurva* and *D. pulex* the indications point strongly to the conclusion that the two forms may be extreme variations of one species. It is not improbable that a careful study of these forms at Rondeau during the month of June might establish their identity.

Daphnia longispina (Müller)

Georgian Bay, Toronto, Lake Ontario, Bond Lake, Lake Erie. Very abundant, ranking next to *D. pulex* in numbers. It is an exceedingly polymorphic species. In the smaller lakes and larger ponds var. *hyalina* form *typica* was the most common phase. Form *typica* was found in Bond Lake and Grenadier Pond (Toronto), but in the latter body of water two remarkable variations occurred in May 14, 1920, as shown in Figs. 5 and 6. One had a protuberance over the region of the heart as is found in *D. pulex* var. *minnehaha*, while the other had a minute downward projecting crest on the head. In any large collection of *Daphnia longispina* it has been found that variations in form are not uncommon.

In the larger lakes form *galeata* seems to be the prevailing form of this species. In his list of the *Entomostraca* of Georgian Bay, Sars mentions the *Daphnia* from Go Home Bay region as *D. hyalina* var. *oxycephala* although at first inclined to consider it as *D. galeata*. The results of the present studies would indicate that the form he was dealing with was *D. longispina* var. *hyalina* form *galeata* according to the generally accepted nomenclature of the present time. It is much the commonest species in the southern part of Georgian Bay in the plankton and cisco stomachs examined. It occurred in nearly all of the plankton samples in varying numbers and abundantly in all of the stomachs of the nineteen Georgian Bay ciscoes (*L. harengus*) examined, along with *Diaptomus* and *Epischura*. Five out of seven Lake Ontario ciscoes (*L. ontariensis*) taken at Port

Credit in November 1920 had eaten this species almost entirely. In Lake Erie form *galeata* of *D. longispina* is the prevailing form but is much less abundant than either *D. pulex* or *D. retrocurva*. Jumbo ciscoes from Merlin, Ontario, taken during July and early August 1920 had eaten this species almost entirely.

In Figs. 7, 8 and 9 are shown some extreme variations such as are occasionally found scattered among ordinary specimens of this species.

Simocephalus vetulus (Müller)

Toronto (Grenadier Pond), Bond Lake, Point Pelee. Fairly common in the above mentioned localities among aquatic vegetation and doubtless widely distributed.

Scapholeberis mucronata (Müller)

Toronto, Lake Wilcox, Port Sydney. Commonest in small pools in these localities but also found in shallow water along the margins of lakes.

Scapholeberis aurita (Fischer)

Point Pelee. Found only about the middle of July 1920 in a small muddy pool in a pasture where it occurred sparingly in a plankton composed mostly of *Ceriodaphnia reticulata* and *Moina affinis* (Fig. 10).

Ceriodaphnia reticulata (Jurine)

Toronto, Bond Lake, Point Pelee. Only found in small pools or ponds but very abundant when found (Fig. 11).

Ceriodaphnia lacustris Birge

Georgian Bay, Toronto (Lagoon on Toronto Island). Not common.

Ceriodaphnia quadrangula (Müller)

Georgian Bay, Point Pelee (Lake Pond). This is probably the *Ceriodaphnia scitula* mentioned by Sars in his list of *Entomostraca* from Georgian Bay.

Ceriodaphnia pulchella Sars

Point Pelee. Taken during the months of July and August 1920 in some rather large ponds.

Moina affinis Birge

Point Pelee. This cladoceran was very common during the month of July 1920 in a small muddy pool in a pasture, along with *Ceriodaphnia reticulata* and a few *Scapholeberis aurita*. Most of the specimens were covered with a minute unicellular organism, a few of which are shown attached to the post abdomen in Fig. 12. This species also occurred in a few temporary rain pools along a roadway.

BOSMINIDAE

Bosmina longirostris (Müller)

Georgian Bay, Toronto (Grenadier Pond), Bond Lake, Wilcox Lake, Lake Erie, Point Pelee. This is one of the most widely distributed of all our *Cladocera*. Some specimens from Go Home Bay appear to have the spine on the posterior ventral extremity of the valves longer than is usual in this species. This fact was noted also by Professor G. O. Sars in his examination of Go Home plankton collected in 1907.

Bosmina longispina Leydig

Port Sydney. The only specimens identified with certainty as belonging to this species were two taken June 18, 1919, from the north branch of the Muskoka River. Eventually this species may prove to be but an extreme variation of the preceding one as some specimens of *Bosmina* from Go Home Bay have been found to be intermediate in many respects between the two.

MACROTHRICIDAE

Macrothrix rosea (Jurine)

Point Pelee (Lake Pond). A few specimens were taken in plankton swept from among weeds, August 22, 1920.

Illiocryptus spinifer Herrick

Toronto. Two brilliant red specimens of this species were found in December, 1918, creeping about among a thick growth of *Chara* in a small stream near Grenadier Pond, Toronto.

Illiocryptus sordidus (Liéven)

Point Pelee (Lake Pond). Common in August, 1920, in plankton swept from aquatic vegetation. The post abdomen of one of these specimens is shown in Fig. 13. Some individuals were very light yellow in colour and others were quite transparent.

Acantholeberis curvirostris (Müller)

Georgian Bay, Port Sydney. Occurred sparingly in plankton collected from the shallower parts of Go Home Bay, but very abundantly in a small pond in the middle of a sphagnum bog situated about four miles south of Port Sydney.

Drepanothrix dentata (Eurén)

Georgian Bay. Apparently rare since it occurred in only a few of the many samples (Figs. 15-16).

Streblocerus serricaudatus (Fischer)

Bond Lake. Only one small specimen taken in plankton, November 9, 1919.

Ophryoxus gracilis Sars

Georgian Bay. Not uncommon in plankton collected from shallow waters (Fig. 14).

CHYDORIDAE

Eurycercus lamellatus (Müller)

Georgian Bay, Toronto (Grenadier Pond), Bond Lake, Lake Erie, Point Pelee. Common in the weedy parts of ponds and lakes.

Camptocercus rectirostris Schoedler

Georgian Bay, Bond Lake, Point Pelee (Lake Pond).
Very common, November, 1919, in Bond Lake.

Kurzia latissima (Kurz)

Georgian Bay, Toronto (Grenadier Pond), Point Pelee.
Only a few specimens were taken in each of these localities.

Acroperus harpae Baird

Bond Lake, Point Pelee. Especially common in November, 1919, in Bond Lake.

Acroperus angustatus Sars

Bond Lake. Apparently this species is only a form of the preceding species since many forms intermediate between the two were taken on November 9 and 15, 1919, in Bond Lake.

Leydigia quadrangularis (Leydig)

Georgian Bay, Toronto (Grenadier Pond), Point Pelee.
Only one or two specimens were found in each of these localities (Fig. 17).

Alona guttata Sars

Toronto (Grenadier Pond and also in smaller ponds and pools), Bond Lake, Point Pelee. Very abundant.

Alona affinis (Leydig)

Georgian Bay, Bond Lake, Point Pelee (Lake Pond).
Occurred most abundantly in the plankton from the shallow weedy parts of Go Home Bay.

Graptoleberis testudinaria (Fischer)

Georgian Bay, Toronto (Grenadier Pond), Bond Lake, Point Pelee. Only a few specimens were found in each of these places.

Pleuroxus denticulatus Birge

Port Sydney, Toronto, Bond Lake, Point Pelee. Never found in open water plankton.

Pleuroxus trigonellus (Müller)

Port Sydney, Toronto (Grenadier Pond), Bond Lake, Point Pelee (Lake Pond). Several specimens were taken in November, 1919, in Bond Lake, but only one or two in each of the other localities. It appears to be an uncommon though widely distributed species (Figs. 18-19).

Pleuroxus striatus Schoedler

Point Pelee. Not uncommon during the summer of 1920 in certain ponds.

Pleuroxus procurvatus Birge

Toronto (Grenadier Pond and also smaller ponds and pools), Bond Lake, Wilcox Lake, Point Pelee. The only plankton in which this species was abundant was swept on June 1, 1919, from very shallow water along the margin of Wilcox Lake.

Chydorus globosus Baird

Georgian Bay, Toronto (Lagoon on Island), Point Pelee (Lake Pond). Only a single specimen was found in each of these localities (Figs. 20-21).

Chydorus sphaericus (Müller)

Georgian Bay, Port Sydney, Toronto, Bond Lake, Wilcox Lake, Point Pelee. Most numerous in small weedy pools near Toronto. Variety *punctatus* was the only form of this species present in some plankton taken April 17, 1920, in Bond Lake.

Chydorus faviformis Birge

Georgian Bay, Bond Lake, Point Pelee (Lake Pond).
Most abundant at Point Pelee, but only a few specimens were found in any of these localities (Fig. 22).

Chydorus barroisi ? (Richard)

Toronto. Although this is supposed to be a southern species, a *Chydorus* which must be either this or an undescribed species closely related was taken on October 19, 1919, in a small weedy pool near Bloor Street and Clendenan Avenue, Toronto. It showed the sharp teeth on the keel of the labrum distinctly but apparently lacked the spine on the postero-ventral margin of the shell. It appeared in company with a great many typical *Chydorus sphaericus* and a careful search not only through this sample of plankton but through collections made from the same pool many times since has failed to disclose another individual (Fig. 27).

Anchistropus minor Birge

Georgian Bay. Four specimens of this peculiar Cladoceran were found in some plankton taken in August, 1905, in weedy shallow water (Figs. 23-24).

Monospilus dispar Sars

Georgian Bay, Point Pelee (Lake Pond). Occurred only in plankton swept from among weeds and not very abundantly (Figs. 25-26).

Alonella excisa (Fischer)

Port Sydney, Bond Lake, Point Pelee. Not very common.

Alonella nana (Baird)

Port Sydney, Bond Lake, Point Pelee. This beautiful striated species was even less common than the preceding one.

POLYPHEMIDAE

Polyphemus pediculus (L.)

Georgian Bay, Port Sydney (Muskoka River), Point Pelee. Fairly common. The specimens taken in June, 1919, from the north branch of the Muskoka River had a peculiar coloration. The tips of the last two pairs of legs as well as the ventral side of the caudal process were of a deep brilliant blue which contrasted strongly with the extreme transparency of the rest of the body.

LEPTODORIDAE

Leptodora kindtii Focke

Georgian Bay, Lake Erie. Common enough in Lake Erie to constitute a most important item of food of ciscoes. Forty-three jumbo ciscoes (*L. eriensis*) taken from July 6 to August 2, 1920, had eaten *Leptodora* very largely along with a few *Daphnia* and *Sida*. In Georgian Bay *Leptodora* occurred in plankton from the deep open water. Some specimens taken September 12, 1905, contained the immature stages of some Trematode. In each case the parasites were quite conspicuous as they were in the very transparent part of the creature's body lying alongside of the digestive tract where they contrasted strongly with their surroundings. It may well be that they were the early stages of a cisco parasite.

The table that follows summarizes the distribution of the Cladocera as given in the preceding pages.

It is evident from this table that the Cladoceran fauna as herein recorded is far from exhaustive for any of the localities studied but taken as a whole it may be considered representative of the south-western portion of Ontario. It is seen to be identical or nearly so with that of the northern portion of the United States as might be expected from the similarity of conditions in the two regions.

During the course of these studies many puzzling forms were encountered especially in the family Chydoridae. For example, forms related to *Chydorus*, *Alona*, *Alonella* and *Pleuroxus* combining characters found in the anatomy of two or more of these genera were occasionally seen and the writer feels convinced that many surprises await the future student of these *Cladocera*.

	Georg- ian Bay	Port Sydney	Toronto	L. Ontario	Bond L. Wilcox L.	L. Erie	Point Pelee
<i>Sida crystallina</i>	+					+	+
<i>Latonopsis occidentalis</i>							+
<i>Latona setifera</i>	+						+
<i>Diaphanosoma brachyurum</i> ..	+					+	+
<i>leuchtenbergianum</i>	+						+
<i>Holopedium gibberum</i>	+					+	
<i>Daphnia pulex</i>		+	+	+	+	+	+
<i>retrocurva</i>	+			+		+	
<i>longispina</i>	+		+	+	+	+	
<i>Simocephalus vetulus</i>			+		+		+
<i>Scapholeberis mucronata</i>		+	+		+		
<i>Scapholeberis aurita</i>							+
<i>Ceriodaphnia reticulata</i>			+		+		+
<i>lacustris</i>	+		+				+
<i>quadrangula</i>	+						+
<i>pulchella</i>							+
<i>Moina affinis</i>							+
<i>Bosmina longirostris</i>	+		+		+	+	+
<i>longispina</i>		+					+
<i>Macrothrix rosea</i>			+				+
<i>Illicryptus spinifer</i>							+
<i>sordidus</i>							+
<i>Acantholeberis curvirostris</i> ...	+	+					
<i>Drepanothrix dentata</i>	+						
<i>Streblocerus serricaudatus</i>					+		
<i>Ophryoxus gracilis</i>	+						+
<i>Eurycercus lamellatus</i>	+		+		+	+	+
<i>Camptocercus rectirostris</i>	+				+		+
<i>Kurzia latissima</i>	+		+				+
<i>Acroperus harpae</i>					+		+
<i>angustatus</i>					+		
<i>Leydigea quadrangularis</i>	+		+				+
<i>Alona guttata</i>			+		+		+
<i>affinis</i>	+				+		+
<i>Graptoleberis testudinaria</i>	+		+		+		+
<i>Pleuroxus denticulatus</i>		+	+		+		+
<i>trigonellus</i>		+	+		+		+
<i>striatus</i>							+
<i>procurvatus</i>			+		+		+
<i>Chydorus globosus</i>	+		+				+
<i>sphaericus</i>	+	+	+		+		+
<i>faciformis</i>	+				+		+
<i>latus</i> *.....							
<i>barroisi</i> ?			+				
<i>Anchistropus minor</i>	+						
<i>Monospilus dispar</i>	+						+
<i>Alonella excisa</i>		+			+		+
<i>nana</i>		+			+		+
<i>Polyphemus pediculus</i>	+	+					+
<i>Leptodora kindtii</i>	+					+	

*Recorded by Birge "near Lake Erie."

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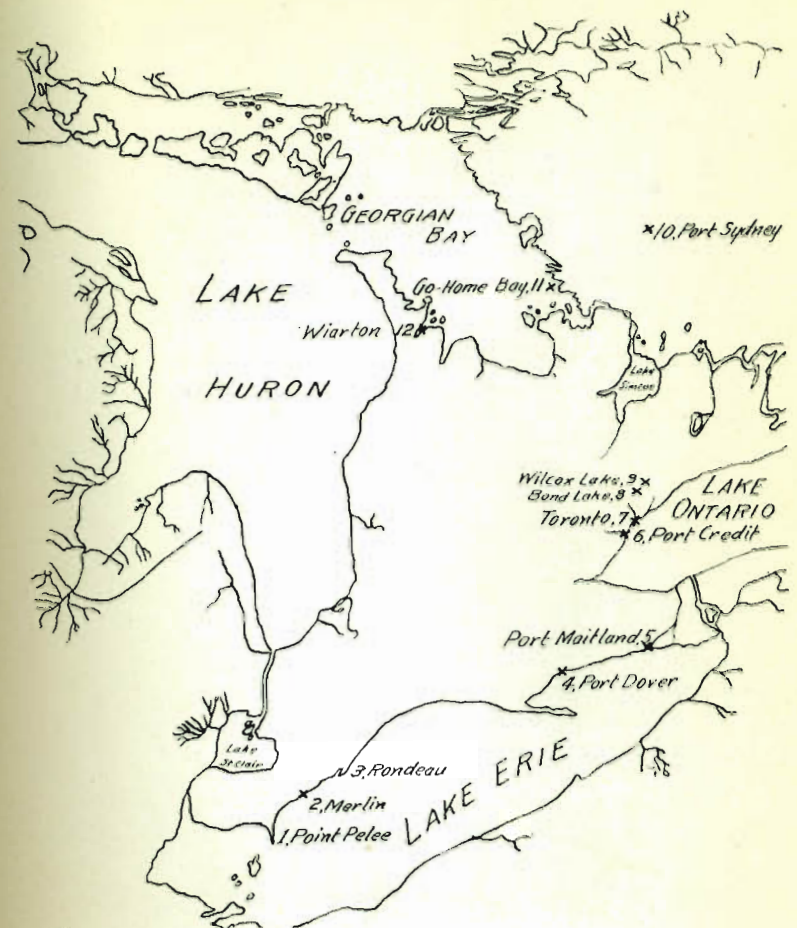


Fig. 1. Map of southwestern Ontario, showing localities from which Cladocera were obtained.

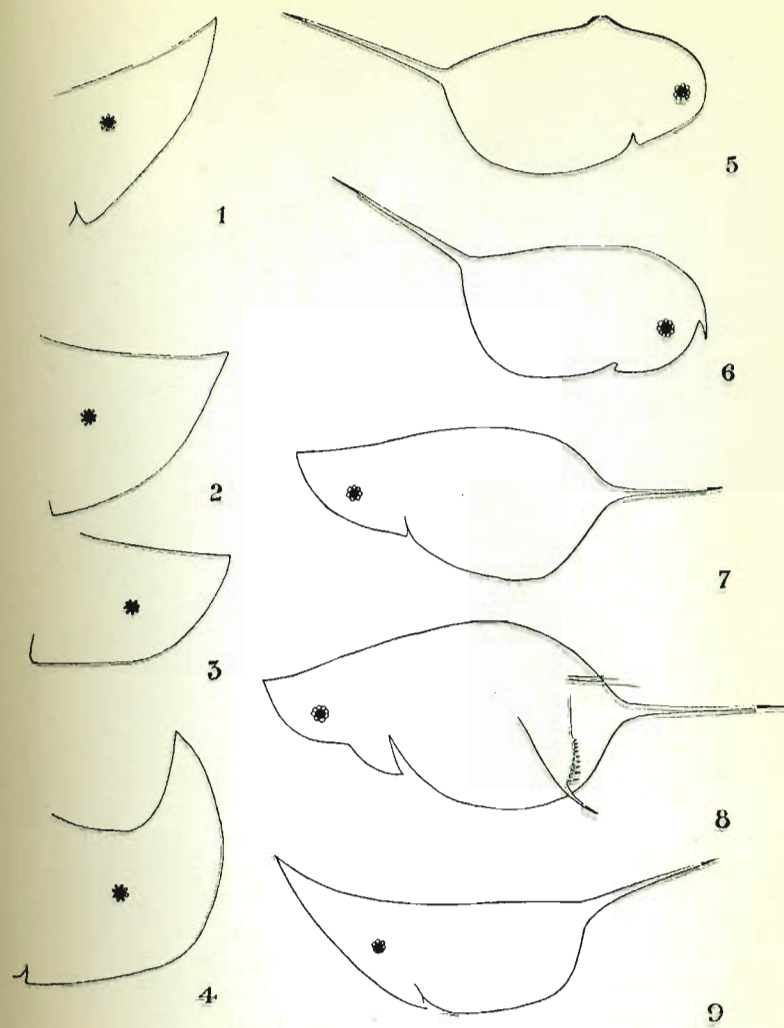


PLATE I. CLADOCERA, ONTARIO

Figs. 1-4. *Daphnia retrocurva*, Rondeau, Lake Erie, June, 1919; variations in cephalic crest.

Figs. 5-6. *D. longispina* var. *hyalina* form *typica*, Grenadier Pond, Toronto; peculiar variations.

Figs. 7-9. *D. longispina* var. *hyalina* form *galeata*, Georgian Bay; some extreme variations.

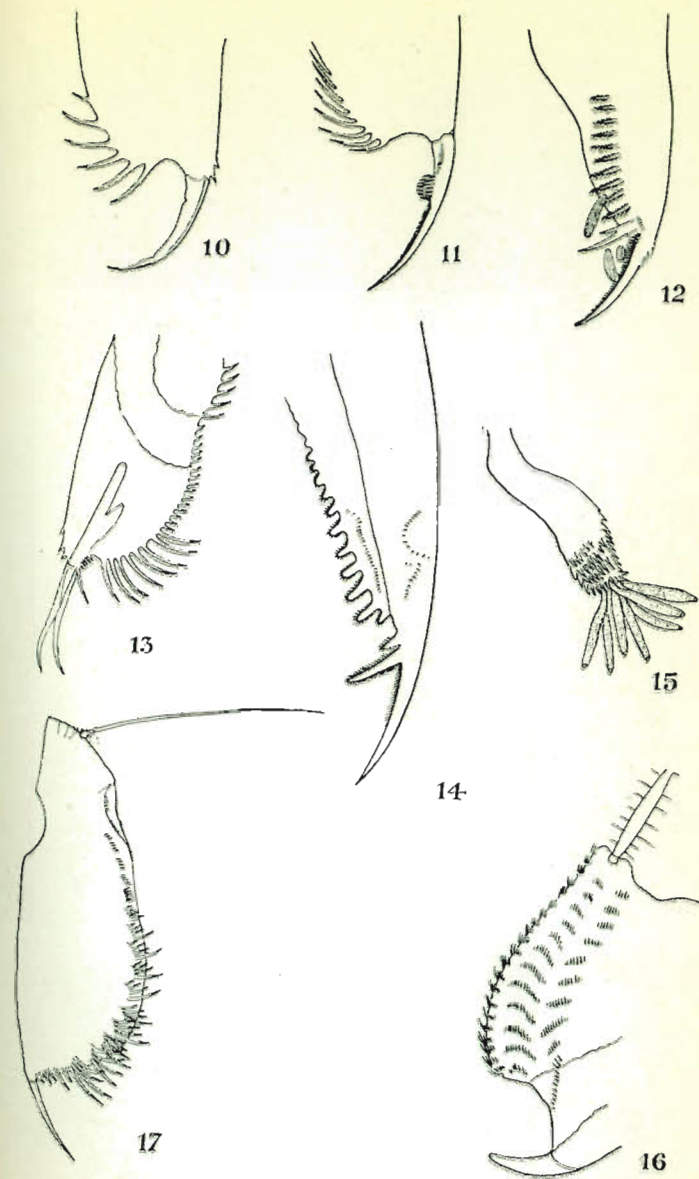


PLATE II. CLADOCERA, ONTARIO

Fig. 10. *Scapholeberis aurita*, end of post-abdomen; Fig. 11, *Ceriodaphnia reticulata*, end of post-abdomen; Fig. 12, *Moina affinis*, end of post-abdomen; Fig. 13, *Illiocryptus sordidus*, post-abdomen; Fig. 14, *Ophryoxus gracilis*, post-abdomen; Fig. 15, *Drepanothrix dentata*, antennule female; Fig. 16, *Drepanothrix dentata*, post-abdomen; Fig. 17, *Leydigea quadrangularis*, post-abdomen.

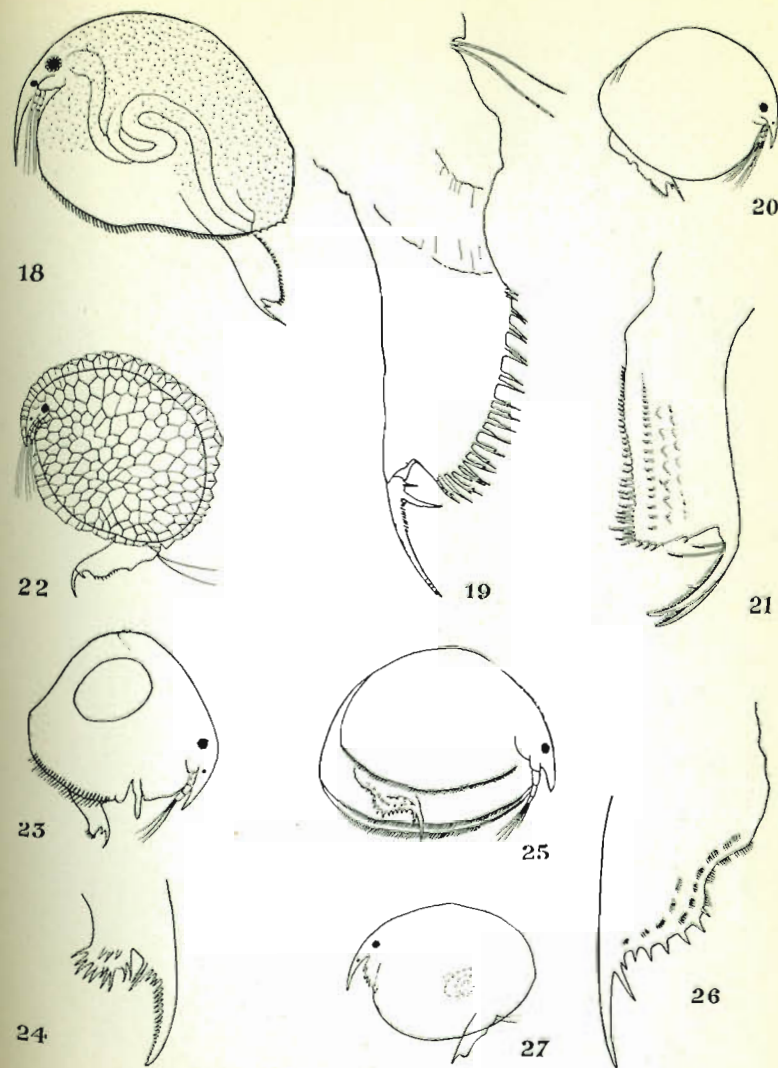


PLATE III. CLADOCERA, ONTARIO

Fig. 18, *Pleuroxus trigonellus*; Fig. 19, *Pleuroxus trigonellus*, post-abdomen; Fig. 20, *Chydorus globosus*; Fig. 21, *Chydorus globosus*, post-abdomen; Fig. 22, *Chydorus faviformis*; Fig. 23, *Anchistropus minor*; Fig. 24, *Anchistropus minor*, end of post-abdomen; Fig. 25, *Monospilus dispar*; Fig. 26, *Monospilus dispar*, end of post-abdomen; Fig. 27, *Chydorus barroisi*?