

Proceedings of the Iowa Academy of Science

Volume 3 | Annual Issue

Article 35

1895

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Recommended Citation

Ross, L. S. (1895) "Preliminary Notes on the Iowa Entomostraca," *Proceedings of the Iowa Academy of Science*, 3(1), 170-173.

Available at: <https://scholarworks.uni.edu/pias/vol3/iss1/35>

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PRELIMINARY NOTES ON THE IOWA ENTOMOSTRACA.

BY L. S. ROSS.

The careful work done by a few investigators has shown the relation existing between our common fresh water fish and the minute crustacea of the streams and lakes. The results of these investigations prove the importance of the Entanostraca as a source of food supply for the young fry of many species, and even for the adults of some. The most extensive work upon this subject is that done by Dr. S. A. Forbes of the University of Illinois. An account of the methods pursued and of the results obtained is given in the bulletins of the Illinois State Laboratory of Natural history; Bulletins Nos. 2, 3 and 6, and articles VII and VIII, Vol. II.

Since the young fish depend for subsistence, to such an extent, upon the relative abundance or scarcity of the Entomostraca, it becomes a question not only of scientific interest, but of economic importance to learn concerning the distribution and abundance of the various species of this group of our fresh water fauna. The knowledge of the vertical distribution of different species in the lakes is of importance because some species of fish feed at one level and some at another. Some have their favorite haunts among the weeds of the shallows, others in the clearer, deeper waters.

Consideration of these facts induced me to begin work upon the occurrence and distribution of Entomostraca in the state of Iowa. The paper presented is a report of work begun, rather than work completed.

In order to combine pleasure with business, I decided to make a bicycle journey to the lake region of Iowa. In the first part of August of the past year, Mr. McCormack of Drake University, and myself started across country en route for Lake Okoboji. We carried vials of alcohol and a coarse and a fine net; the latter being of bolting cloth. The streams did not

offer good collecting ground at that season of the year, as they were nearly all dry. As we did not wish to overburden ourselves, we did not collect dried mud from the ponds and water courses.

Collections were made in a few places from the streams, but principally from West and East Okoboji and Spirit Lake, ranging from the surface to a depth of twenty feet. With the limited apparatus and short time at our disposal, not all the species of the lake were taken, very probably only a minority. To make a thorough investigation the apparatus should be such that hauls could be made among the weeds and along the bottom of the lake, as well as in the clear surface water. Not only should the nets be such as are needed to collect from places of all kinds, but such should be used as are necessary to determine the quantity of life in the water. For collecting in open water or where there is some rubbish, the ordinary fine-meshed net protected by two coarser nets, one outside and the other inside may be used. The inner coarse net should not be as deep as the fine one; it serves to catch and hold back the rubbish. The net or cone-dredge devised by Dr. E. A. Birge of Wisconsin, is the best for collecting among weeds. For quantitative work the plankton apparatus should be used. This is so arranged that the net can be drawn through the water at a definite rate of speed, the speed being regulated so there will be no overflow of water from the mouth of the net. The contents of the net are determined quantitatively as compared with the known amount of water that passed through.

As yet I have determined no species outside the order Cladocera. Of this order probably twenty-five species and varieties have been noted but no new ones have been described, nor have any new to America been found. Undoubtedly, with better apparatus and with more literature upon the subject, many more species may be collected and determined.

The following families are represented in the collections:

Sididae.—By the genera, *Sida* and *Daphnella*.

Daphniidae.—By the genera, *Simocephalus*, *Ceriodaphnia*, *Scapholeberis* and *Daphnia*.

Macrothricidae.—By the genera, *Macrothrix* and *Iliocryptus*.

Lynceidae.—By the genera, *Eurycercus*, *Alona*, *Dunhevedia*, *Pleuroxus*, *Chydorus*, *Camptocercus* and *Leydigia*.

Leptodoridae.—By the genus *Leptodora*

The species found are as follows:

Family <i>Sididae</i>	{	<i>Sida crystallina</i> O. F. M. <i>Daphnella brachyura</i> Liev.
	{	<i>Simocephalus vetulus</i> O. F. M. <i>Simocephalus serrulatus</i> Koch. <i>Ceriodaphnia reticulata</i> Jur. <i>Ceriodaphnia consors</i> Birge. <i>Ceriodaphnia lacustris</i> Birge.
Family <i>Daphniidae</i>	{	<i>Scapholeberis mucronata</i> O. F. M. <i>Scapholeberis obtusa</i> Schdl. <i>Daphnia hyalina</i> Leydig. <i>Daphnia kalbergensis</i> Schoedler. <i>Daphnia kal.</i> var., <i>retrocurva</i> Forbes <i>Daphnia</i> sp?
Family <i>Macrothricidae</i>	{	<i>Macrothrix laticornis</i> Jur. <i>Iliocryptus sordidus</i> Lieven.
	{	<i>Eurycercus lamellatus</i> O. F. M. <i>Alona</i> sp? <i>Dunhevedia setiger</i> Birge. <i>Pleuroxus denticulatus</i> Birge.
Family <i>Lynceidae</i>	{	<i>Pleuroxus procurvatus</i> Birge. <i>Chydorus sphaericus</i> O. F. M. <i>Chydorus globosus</i> Baird. <i>Leydigia quadrangularis</i> Leyd. <i>Camptocercus rectirostris</i> Schdl.
Family <i>Leptodoridae</i>	{	<i>Leptodora hyalina</i> Lillj.

The distribution of the species is given in the table:

West Okoboji, open lake, from six to eight feet below surface.	{	<i>Daphnella brachyura.</i> <i>Daphnia kalbergensis.</i> <i>Daphnia kal.</i> , variety <i>retrocurva.</i> <i>Daphnia hyalina.</i> <i>Ceriodaphnia lacustris.</i> <i>Chydorus sphaericus.</i> <i>Chydorus globosus.</i> <i>Leptodora hyalina.</i>
West Okoboji, among weeds near shore	{	<i>Sida crystallina.</i> <i>Ceriodaphnia consors.</i> <i>Simocephalus serrulatus.</i> <i>Chydorus</i> sp? <i>Pleuroxus denticulatus.</i> <i>Pleuroxus procurvatus.</i>
Streams near Newell, Iowa	{	<i>Ceriodaphnia reticulata.</i> <i>Simocephalus serrulatus.</i> <i>Simocephalus vetulus.</i> <i>Scapholeberis mucronata.</i> <i>Pleuroxus denticulatus.</i> <i>Chydorus sphaericus.</i>

West Okoboji, fifteen to twenty feet below surface -----	{	<p><i>Daphnella brachyura.</i> <i>Daphnia kal.</i>, variety <i>retrocurva.</i> <i>Simocephalus serrulatus.</i> <i>Ceriodaphnia consors.</i> <i>Eurycerus lamellatus.</i> <i>Dunhevedia setiger.</i> <i>Chydorus sphaericus.</i> <i>Chydorus globosus.</i> <i>Camptocercus rectirostris.</i></p>
East Okoboji, surface -----	{	<p><i>Sida crystallina.</i> <i>Ceriodaphnia reticulata.</i> <i>Ceriodaphnia consors.</i> <i>Daphnia kal.</i>, variety <i>retrocurva.</i> <i>Daphnia hyalina</i> <i>Macrothrix laticornis.</i> <i>Eurycerus lamellatus.</i> <i>Chydorus sphaericus.</i> <i>Leydigia quadrangularis.</i></p>
Spirit Lake, ten to fifteen feet below surface -----	{	<p><i>Daphnella brachyura.</i> <i>Daphnia kal.</i>, variety <i>retrocurva.</i> <i>Chydorus sphaericus.</i></p>
Raccoon River, Adel, Iowa -----	{	<p><i>Ceriodaphnia reticulata.</i> <i>Scapholeberis mucronata.</i> <i>Iliocryptus sordidus.</i> <i>Pleuroxus denticulata.</i></p>
Raccoon River at Sac City -----	{	<p><i>Scapholeberis mucronata.</i> <i>Simocephalus serrulatus.</i> <i>Chydorus sphaericus.</i> <i>Pleuroxus denticulatus.</i> <i>Alona sp?</i></p>

THE ANATOMY OF SPHÆRIUM SULCATUM LAM.

BY GILMAN A DREW.

For a number of years the embryology of the Cyrenidæ has been attracting considerable attention, but little has been added to our knowledge of the general anatomy since Dr. Franz Leydig's publication in 1855 (No. 5), who recorded such anatomy as could be made out from young and rather transparent specimens.*

It is my present intention to continue the work here begun on Sphærium to a comparative anatomy of the Cyrenidæ, but in

*I find a reference to a paper by Temple Prime, entitled: Notes on the Anatomy of the Corbiculidæ and Translation from the Danish of an article on the Anatomy of Cyclas by Jacobson. Bul. Museum Comp. Zool., Cambridge, Vol. V. This volume unfortunately is not to be found in the reference libraries of Baltimore.