

These are the basic problems of salt tolerance in plants. Of course the actual mechanisms are much more complex than I have indicated — plant ecologists and physiologists are still trying to understand them fully. Think about the problems of salt tolerance again when you eat your glasswort salad or munch your samphire pickles.

Recipe for Samphire (Glasswort) Pickles¹

Wash freshly picked glasswort. Pack in pint jars with stems straight and vertical.

Make a pickle of: 1 qt. vinegar, 1/2 cup sugar, 3 tablespoons mixed pickling spices, 1 slice onion and 6 bayberry leaves.

Boil together for 10 min. Pour boiling hot over glasswort until jars are full. Seal and store 3 weeks before broaching.

¹Euell Gibbons, *Stalking the Blue-Eyed Scallop*, David McKay Co., Publ., N.Y. 1964.



TADPOLE SHRIMPS IN BEAVER CREEK, SASKATCHEWAN

by JOHN R. LAWRENCE*

Tadpole shrimps (Class Crustacea, Division Eubranchipoda, Order Notostraca) are characteristic inhabitants of temporary ponds and pools. They are not considered to occur in large water bodies and flowing systems. Two specimens of *Lepidurus ouesi* (Packard), were found in a flowing stream, Beaver Creek, Saskatchewan, about 10 miles south of Saskatoon, on June 28, 1974. (Figs. 1 and 2) This observation is noted and the life history of the Eubranchipods — tadpole shrimps, fairy or brine shrimps and clam shrimps are discussed, based on Pennak except where noted otherwise.⁶

Tadpole shrimps get their name from their resemblance to tadpoles when swimming. According to Pennak, they may be gray, blue, green, and orange or reddish. Green and reddish tones predominated in the collected specimens. Colour is largely dependent on the food ingested.

Notostraca have sessile, compound eyes, a large shield-like carapace covering most of the body, and 35 to 71 pairs of legs (Fig. 3). Neither the number of legs nor the number of segments is constant within a species.⁴ The head forms a well defined body region; the trunk however, is not clearly divisible into thorax and abdomen. So difficult is it to define segments in these shrimps that they are referred to as to body rings.⁴

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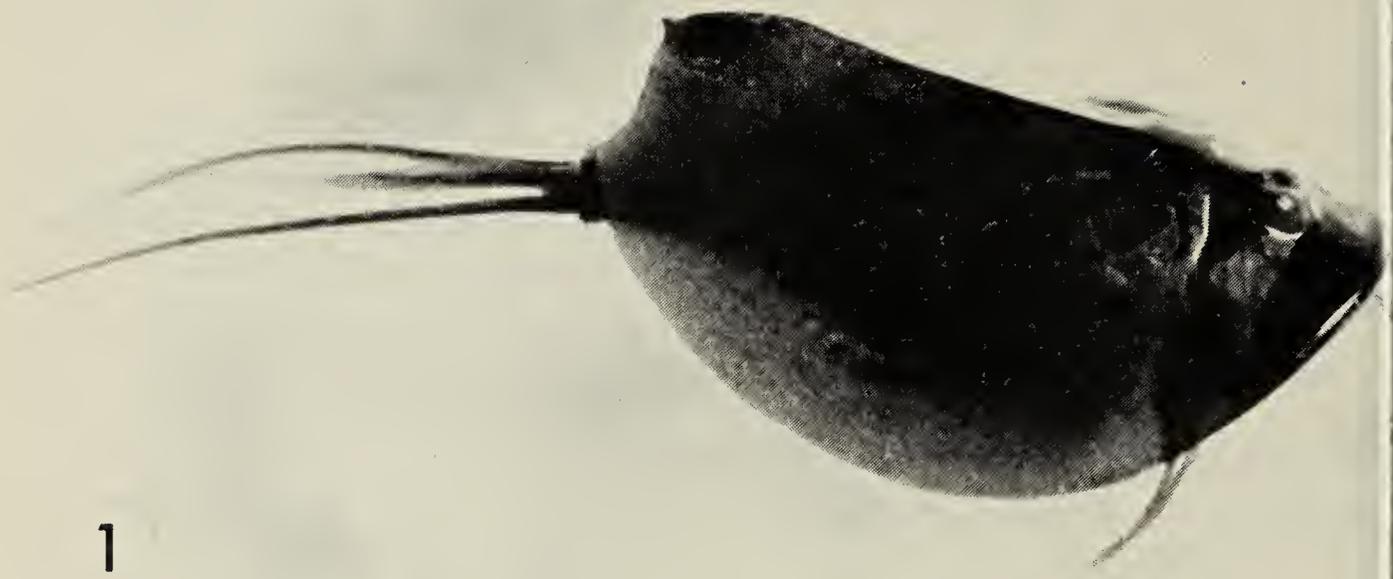


Fig. 1. Dorsolateral view of *Lepidurus couesii*. Note characteristic extended telson of the genus. True length 4.5 cm.

Fig. 2. Ventral view of *L. couesii* showing swimming legs and tactile structures. True length 4.5 cm.

The legs are all basically similar, being forked (biramous), flat, translucent, lobed and bristly. The first one or two pairs of legs are modified to serve as tactile structures, probably used to locate food. The 11th pair of legs in the female is modified to form a brood-chamber in which the eggs are

carried. The legs of tadpole shrimp are reduced in size from front to back.

The legs are used to swim or glide by means of complex beating movements which pass from anterior to posterior.⁸ Tadpole shrimps often creep or burrow on and in soft substrates.⁶

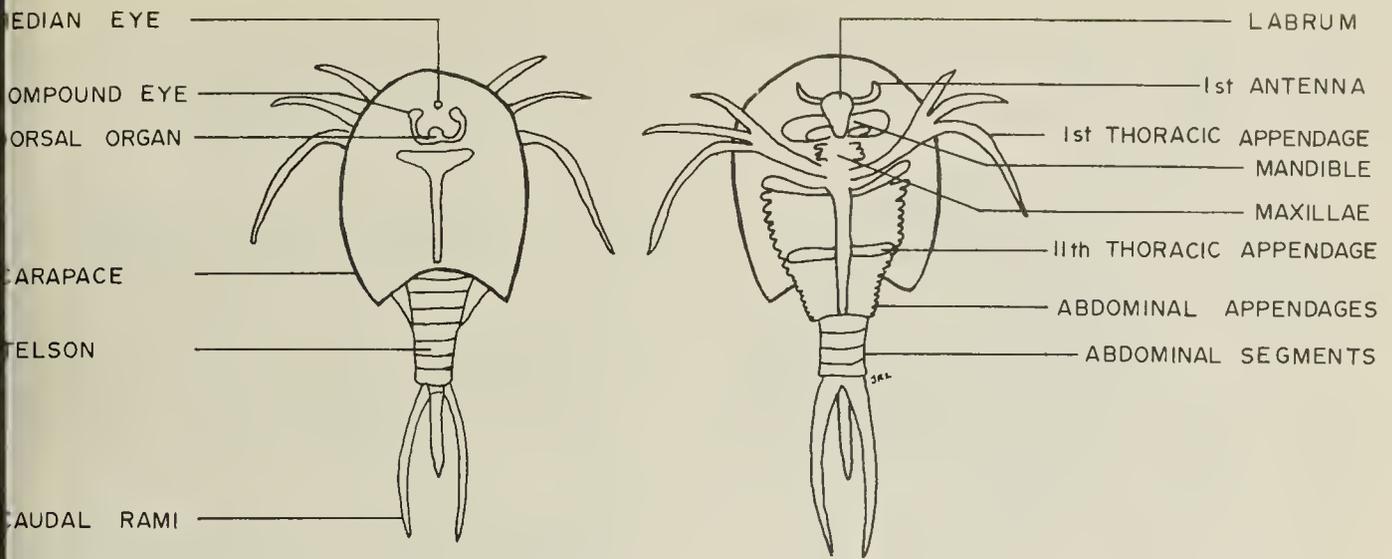


Fig. 3. Ventral and dorsal diagrams showing basic structures of Notostraca (after Weiz 1966).

Food consists mainly of algae, bacteria, protozoa, rotifers and detritus. Notostracans have also been observed feeding on dead tadpoles, earthworms, molluscs and frog eggs. Food is removed from the water by movements of the legs; material is strained out unselectively by bristly appendages.⁸ This food is concentrated in a central groove between the legs and moved toward the mouth.^{6 8} At the mouth food selection and mastication occurs prior to ingestion.

Reproduction among Eubranchipods is not well understood. It may be either sexual or parthenogenic, i.e., reproduction occurring from unfertilized eggs, and it may occur both ways in the same population. In certain populations males are not abundant. Both types of eggs are retained in the receptacle between the female's 11th legs for one to several days, before being released and falling into the mud. Eggs may number from 10 to 250 per clutch.

Resting or winter eggs are also formed. These special thick-shelled eggs are produced at the end of the season

and are the only way that the population survives periods of unsuitable conditions. This is very important because these shrimps usually inhabit temporary ponds and are frequently subject to desiccation or freezing.

In small ponds only one generation of tadpole shrimps is usually produced per year. Eggs hatch early in the spring; the animals mature rapidly, producing eggs which will not hatch until the following spring.

Shrimps are a frequent part of the diets of amphibians, diving beetle and caddis fly larvae. Some other insects may use them as an occasional food source. Tadpole shrimps have been dried and used as food by Indians of the United States and Mexico.⁶ There is also one reported incidence of depredations by this group on California rice crops.⁷

The development of Eubranchipods in spring and their sudden disappearance in summer or early autumn is believed to be largely determined by water temperature and dissolved

oxygen concentration.^{3 5} They usually appear after water temperature exceeds 4°C and disappear after it exceeds 13° to 30°C.

Tadpole shrimps are perhaps most interesting for their sporadic occurrence, both in time and space. They are most numerous and most frequently observed in small prairie pools. Within the range of temporary ponds little habitat preference has been noted.

Their general distribution is documented by Linder, their Canadian distribution by Hartland-Rowe.^{4 2} Four species occur in Canada. In Saskatchewan only two species have been found, *Lepidurus couesii* and *L. lynchi*.² *Lepidurus couesii* has not been previously recorded in Beaver Creek, to my knowledge, nor in any other flowing system in Saskatchewan.

Photography by J. Waddington.

- ¹EDMONDSON, W. T. 1959. *Fresh-water biology*. John Wiley and Sons Inc. New York. 1248 p.
- ²HARTLAND-ROWE, R. 1965. *The Anostraca and Notostraca of Canada with some new distribution records*. The Can. Field-Nat. 79:185-189.
- ³HORNE, F. R. 1967. *Effects of physical-chemical factors on the distribution and occurrence of some southeastern Wyoming phyllopodids*. Ecology 48:474-477.
- ⁴LINDER, F. 1952. *Contributions to the morphology and taxonomy of the branchiopod Notostraca, with special reference to the North American species*. Proc. U.S. Nat'l. Mus. 102:1-69.
- ⁵MOORE, W. G. and A. BURN. 1968. *Lethal oxygen thresholds for certain temporary pond invertebrates and their application to field situations*. Ecology 49:349-351.
- ⁶PENNAK, R. W. 1953. *Fresh-water invertebrates of the United States*. Ronald Press Company New York 769 p.
- ⁷ROSENBERG, L. E. 1946. *Fairy shrimps in California rice fields*. Science 104:111-112.
- ⁸WEIZ, P. B. 1966. *The science of zoology*. McGraw-Hill Book Co. Toronto. 875 p.



ALDERFLIES

by D. M. LEHMKUHL*

This is the second in a series of articles on aquatic insects based on drawings by A. R. Brook and sponsored in part by the Student Encouragement Committee of the Entomological Society of Canada.

For everyone except fly fishermen, alderflies will be one of the less familiar groups of aquatic insects (Figs. A, B). They are in the Order Megaloptera, or Neuroptera, depen-

ding on which book you use, and comprise the Family Sialidae which is made up of the single genus *Sialis*. (Closely related are the Dobsonflies whose larvae are called hellgrammites by fishermen; they belong to the Family Corydalidae; I have no record of these from the Prairie Provinces).

Adult *Sialis* are blackish rotund in

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