

**V. STUDIES ON THE CRUSTACEA OF OKLAHOMA:  
NOTES ON THE CLADOCERAN FAUNA**

**J. G. MACKIN**

East Central State Teachers College

Several years ago I began studies on the plankton fauna of the southeastern part of the state in connection with life history studies on certain helminth parasites in which I was then interested. This led to a direct interest in the Crustacean fauna, at first only in the Entomostraca, but later to the malacostracan group as well.

It was soon evident that any forays into the crustacean field in Oklahoma would necessarily have to be of a pioneering nature, since very few references to the group are found in the literature, and these are very fragmentary in nature. Not even a single reference to the Cladocera has been found, although it is very probable that many of the forms are known in an informal way.

Even the most meager of taxonomic studies on the Crustacea has brought to light numerous important problems. It is planned to take up these problems in this and subsequent papers, with a view to the eventual recording of all forms, with such facts of distribution and life history as may be pertinent.

Up to this time about 85 species of Crustacea have been collected by the author in the state, including at least 4 new species. Forty-four of the 85 belong to the Cladocera, and are listed below. One of these has already been described as new (Mackin, 1930).

The following list is not to be taken as final or complete in any sense. Due to lack of time as well as funds for travel, most of the state has been untouched; large areas which can hardly fall to be productive of interesting observations have not been studied.

#### List of the Cladocera and Their Locality

##### Species—Daphnidae

- Daphnia magna* Straus 1820. Fish hatchery ponds, Armstrong.\*  
*D. pulex* var. *typica* (deGreer) 1778. Various temporary ponds, Johnston and Pontotoc counties; common.  
*D. pulex* var. *obtusa* Kurz, 1874. Ada Lake, Beggs Lake; widely distributed.  
*D. longispina* var. *typica* (O. F. Mueller) 1785. Devils Den Pond (Permanent), various other permanent ponds and lakes.  
*D. longispina* var. *hyalina* Leydig 1860. (Including forms *mendotae*, *typica*, and *galeata*), various permanent ponds and lakes, Johnston and Pontotoc counties.  
*Simocephalus vetulus* (O. F. Mueller) 1776. Ada Lake, not common.  
*S. exspinosus* var. *congener* (Koch) 1841. Devils Den Pond, various other ponds in the southeastern counties; common.  
*S. serrulatus* (Koch) 1841. Permanent pond, Johnston county, various lakes and ponds.  
*Scapholeberis mucronata* (O. F. Mueller) 1785. Ada Lake, various ponds.  
*Ceriodaphnia reticulata* var. *dubia* (Jurine) 1820. Devils Den Pond, Ada Lake.  
*Lacustris* Birge 1893. Beggs Lake, Ada Lake; common.  
*C. pulchella* Sars 1862. (?) Temporary pond, Murray county.  
*C. quadrangula* (O. F. Mueller) 1785. Ada Lake.  
*C. laticaudata* P. E. Mueller 1867. Temporary pond, Pontotoc county.  
*Moina brachiata* (Jurine) 1820. Temporary pond, Pontotoc county.  
*M. affinis* Birge 1893. Temporary pond, Johnston county, Pontotoc and Murray counties.

##### Species—Sididae

- Pseudosida bidentata* Herrick 1884. Temporary pond, Murray county.  
*Diaphanosoma brachyurum* (Lieven) 1848. Devils Den Pond, various lakes and ponds.  
*D. brachyurum* var. *leuchtenbergianum* Fisher 1850. Oxbow Lake, Bryan county.

##### Species B—Bosminidae

- Bosmina longirostris* (O. F. Mueller) 1785. Ada Lake.  
*B. longirostris* var. *cornuta* (Jurine) 1820. Ada Lake; common.  
*B. obtusirostris* Sars 1861. Devils Den Pond, various ponds; common.  
*B. longispina* Leydig 1860. Pond at Jay; rare.

##### Species—Macrothricidae

- Macrothrix laticornis* (Jurine) 1820. Temporary pond, Murray county, various lakes and ponds.

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\*The first locality given is the place from which the species was first collected.

*Hyocryptus sordidus* (Lieven) 1848. Ada Lake, various ponds

Species—Chydoridae

*Camptocerus rectirostris* Schoedler 1862. Ada Lake.

*C. oklahomensis* Mackin 1930. Temporary pond, Murray county, various ponds in Johnston and Pontotoc counties.

*Kurzia latissima* (Kurz) 1874. Temporary pond, Murray county, various ponds.

*Oxyurella tenuicaudis* (Sars) 1862. Ada Lake; rare.

*Leydigia quadrangularis* (Leydig) 1860. Ada Lake, various ponds.

*L. acanthocercoides* (Fisher) 1854. Ada Lake.

*Alona guttata* Sars 1862. Ada Lake, various lakes.

*A. costata* Sars 1862. Ada Lake.

*A. affinis* (Leydig) 1860. Ada Lake, Beggs Lake.

*A. rectangula* var. *pulchra* Sars 1861. Ada lake.

*Dunhevedia setigera* (Birge) 1877. Temporary pond, Murray county, various ponds.

*Pleuroxus denticulatus* Birge 1877. Ada Lake, various lakes and ponds; common.

*P. hamulatus* Birge 1910. Pond, Murray county; rare.

*Chydorus sphaericus* (O. F. Mueller) 1785. Ada Lake, various lakes and ponds; widely distributed and very common.

*C. latus* Sars 1862. (?) Temporary pond, Murray county.

*C. ovalis* Kurz 1874. Ada Lake; rare.

*C. globosus* Baird 1850. Beggs Lake; rare.

*Alonella karua* (King) 1853. Ada Lake.

*A. diaphana* (King) 1853. Pontotoc county, various ponds.

Remarks

A study of the above list brings out several points of interest which may be briefly mentioned here. First, there seems to be a general mixture of "northern" and "southern" species. This may be due to the position of the state, but it is more likely that most of the species are more widely distributed than has generally been supposed. This view is strengthened when a further study shows that the Cladoceran fauna of the state probably has more resemblance to that of certain South American regions, than to North American. Indeed, the best references to the Oklahoma fauna are found in the South American literature.

The second observation deals with the local distribution and habitat. Certain species, like the Euphylopoidea, appear to be confined to temporary ponds (*Daphnia pulex* var. *typica*, *Ceriodaphnia laticaudata*, all species of *Moina*, *Camptocerus oklahomensis*, and *kurzia latissima*). Others are as rigidly confined to lakes or at least permanent bodies of water. *Daphnia pulex* var. *obtusa*, and others. Some few appear to be adapted to either type of habitat (*Pleuroxus denticulatus*).

The Genus *Simocephalus*

Oklahoma is well represented in this genus with three species, namely *S. vetulus*, *S. serrulatus*, and *S. exspinosus* var. *congener*, which latter occasioned so much trouble in definite classification that a rather thorough study of the genus with all American species and subspecies or varieties was undertaken in an effort to straighten out the taxonomy of the group.

Several North American species and varieties were found to have fallen as synonyms of already established European species. Others are so poorly described and figured that they are unrecognizable at the present time.

Five species in North and South America may be considered as valid. In addition, several varieties appear to be constant enough in structure as to be separable. These are listed in the key below.

*Simocephalus excipinesus* var. *congener* is barely mentioned by Herrick (1895). I am acquainted with no description in North American annals. Since it is met with more often than any of the other Oklahoma species, I take space here to give a means of separation in the following key:

#### KEY TO THE SPECIES OF AMERICAN SIMOCEPHALIDS

- 1 (6) Claw with a pecten..... 2
- 2 (3) Valves of shell with a sharp posterior spine, with bifid point; anal spines, about 13; length (female) up to 2.3 mm.  
..... *S. iberingi* Richard, 1897
- 3 (2) Posterior spine of shell absent or represented only by a blunt projection; anal spines 12 to 20; length (female) to 3.8 mm..... 4
- 4 (5) Pecten with 9 to 12 teeth; anal spines up to 12; length (female) to 3.8 mm.....  
..... *S. excipinesus* (Koch) 1841
- 5 (4) Pecten with 17 to 20 teeth; anal spines more than 15; length to 2.8 mm.....  
..... *S. excipinesus* var. *congenger* Schoedler 1868
- 6 (1) Claws without a pecten..... 7
- 7 (10) Vertex evenly rounded about the eye and without serrations or spines; head not much depressed..... 8
- 8 (9) Rostrum long and flaring; venter of head with a very deep concavity; shell with sharp posterior spine..... *S. latirostris* Stingelin, 1906
- 9 (8) Rostrum inconspicuous; head of ordinary form; spine of the shell no more than a blunt posterior projection  
..... *S. vetulus* (O. F. Mueller) 1776
- 10 (7) Head with serrations or spines in front of or below the eye; vertex more or less angulated; head much depressed  
..... *S. serrulatus* (Koch) 1841

*S. serrulatus* is the most variable of the species of the genus, and at least five varieties have been described:

Variety *nudifrons* Delachaux, 1919, which is described as lacking the spinulation of the head.

Variety *capensis* Sars, 1895, in which the posterior shell borders are smooth and unspined. (Submarginal spines are present.)

Variety *semserratus* Sars, 1901, has spines on the posterior border of the shell, but covering only a short distance (about one-fourth) of the area below the posterior spine of the shell.

In variety *inflatus* Yavre, 1900, the whole, or at least most of the whole of the posterior border, is strongly spined.

Variety *cacatus* Monies, 1880, has no spines on any part of the border of the carapace. Like variety *nudifrons* it apparently has no spines on the vertex of the head; although the author does not mention the point, his drawing shows no spines.

#### The Genus *Daphnia*

As usual in faunistic studies on the Cladocera, the separation of the varieties of *Daphnia* has presented the most difficult problem of the entire group. This is occasioned by a degree of seasonal polymorphism in the

species. However there seems to be a growing conviction that the two species *D. lyongispina* and *D. pulex* are not species at all, but groups; and that the identification of varieties is of more importance than that of species in other genera. This opinion is concurred by the author.

The *D. pulex* group in Oklahoma is the only one which will be considered at this time. Varieties of this species are very often the numerical dominants in their particular habitats. This fact makes it doubly desirable that accurate identification be possible when any sort of limnological investigation is made. Two easily separable varieties are common in Oklahoma. These are each discussed and diagnosed below.

#### *Daphnia pulex* var. *obtusa*

This variety finds its optimum habitat in small lakes. It has occurred in many collections from Ada Lake, and has been taken from Beggs Lake, Prices Falls Lake, and Oxbow near Armstrong (Bryan county), Lake Lawtonka, etc. It apparently never occurs in small ponds of either the permanent or temporary type. It probably is widespread in the southern states, although few references are made to it in North American literature. On the other hand, it forms an almost constant member of practically all South American collections. This is one of the species which contributes to a very marked similarity between Oklahoman and South American cladoceran faunal lists.

**Diagnosis:** (Fig. 2) Female. The total body length rarely exceed 1.0 mm, not counting the spine. The valves are without spines on the dorsal edge; the ventral margin possesses weak spines on the posterior half. Reticulations of the valves are almost invisible. Head is large, not helmeted; it is concave ventrally. Eyes are large with large lenses. The ocellus is small and insignificant; often invisible, and perhaps lacking in most specimens. Rostrum is short and blunt.

Anal spines number 8 to 10, are curved, decreasing in size proximally. Sides of the postabdomen are smooth. The pectens of the claw is made up of very minute spines, sometimes difficult to distinguish from the distal denticulations. The proximal pecten consists of 5 to 7 teeth; the distal pecten 8 to 10 (Fig. 1).

The name of the variety is derived from the very short posterior spine of the shell, which actually decreases in length from the time the young larvae leave the brood pouch until the time of maturity. This is not only a proportionate decrease to the length of the shell but an actual decrease.

The parthenogenetic eggs vary in number from 1 to 7. The usual number is 1 to 3, and the maximum number is rarely observed. In shape they are always definitely oval. The ehippial eggs are nearly spherical and two in number (Fig. 3).

**Male.** The value of the characters of the male in the separation of the varieties of *Daphnia* may prove to be considerable. I have noticed very clear differences in the antennules of males in the different varieties of *D. pulex*. In the variety *obtusa* the terminal filament is short and usually hooked, being not much longer than the terminal sense hairs of the basal segment. The anterior sense hair of the basal segment is situated near the extremity. (See Fig. 5.)

#### *Daphnia pulex* var. *typica*

This variety occurs, so far as I know at present, in temporary ponds only. It probably comes nearer being typical of the species *pulex* than any other variety, thus the caption *typica*. Closely related if not identical varieties occur in permanent bodies of water farther north.

**Diagnosis: Female.** Length up to 2.9 mm. Note that this is considerably larger than in most published descriptions, where the maximum is usually given as 2.5 mm. The spine length is variable, decreasing in proportionate length to the shell as the individual grows in size. The actual length increases with age. The margins of the shell are usually heavily spined. The head is not helmeted or only slightly so, but is otherwise variable in shape. It is usually as in Fig. 7.

The summer (parthenogenetic) eggs are nearly spherical in shape, and may number as many as 35 in a large female. Note that the shape and size of the eggs is apparently nearly constant (Fig. 6); also that there is a marked contrast in shape and size to the eggs of *D. pulex* var. *obtusa*. The ephippial eggs are oval, and placed vertically in the ephippium.

The postabdomen bears 12 to 16 anal teeth, decreasing in size proximally. The sides are thickly pubescent. The claw bears a proximal pecten of 5 to 8 teeth, while the distal pecten contains 6 to 9 (Fig. 8).

The male antennule differs from the *D. pulex obtusa* in the possession of a relatively longer flagellum, a different shape of the basal segment (Fig. 4).

#### References

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#### Explanation of the Plate

- Fig. 1. *Daphnia pulex* var. *obtusa*. Postabdomen.  
 Fig. 2. *D. pulex* var. *obtusa*. Mature female.  
 Fig. 3. *D. pulex* var. *obtusa*. Parthenogenetic egg.  
 Fig. 4. *D. pulex* var. *typica*. Antennule of the male.  
 Fig. 5. *D. pulex* var. *obtusa*. Antennule of the male.  
 Fig. 6. *D. pulex* var. *typica*. Parthenogenetic egg.  
 Fig. 7. *D. pulex* var. *typica*. Mature female.  
 Fig. 8. *D. pulex* var. *typica*. Postabdomen.

All drawings with the aid of camera lucida.

