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C. Thomas Wiltshire

Donald H. Hazelwood

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Phyllopods of Missouri

C. THOMAS WILTSHIRE
and
DONALD H. HAZELWOOD

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SYNOPSIS. Collections of phyllopods from Missouri have been reviewed and a key to those species has been constructed. Species collected in Missouri include *Eubbranchipus serratus*, *Thamnocephalus platyurus*, *Streptocephalus seali*, *Streptocephalus texanus*,

Eulimnadia texana, *Cyzicus morsei*, *Caenestheriella belfragei*, and *Caenestheriella gynecia*.

INDEX DESCRIPTORS: Phyllopods, Missouri, *Eubbranchipus serratus*, *Thamnocephalus platyurus*, *Streptocephalus seali*, *S. texanus*, *Eulimnadia texana*, *Cyzicus morsei*, *Caenestheriella belfragei*, *C. gynecia*.

Phyllopods are crustaceans with flat, leaf-like appendages which characterize the orders Anostraca (fairy shrimp), Notostroaca (tadpole shrimp), and Conchostraca (clam shrimp). Phyllopods are poor swimmers and make easy prey for fish; therefore their occurrence is restricted to temporary pools, roadside ditches, and other lentic habitats unsuitable for maintaining a fish population. The eggs hatch after rains have filled their ephemeral habitats, and as the water evaporates, tremendous concentrations of animals are sometimes found. The appearance of phyllopods is somewhat unpredictable, although with the exception of *Eubbranchipus serratus*, they are generally found in the flood plains of major river systems. The conditions for successful completion of the life cycle may only last a week during an entire year, or even several years may pass between appearances. As a result of their inaccessibility, little ecological work has been done, with the study by Broch (1965) on *Chirocephalus bundyi* a noteworthy exception.

There are published accounts of the phyllopods occurring in Illinois (Mattox, 1939), Oklahoma (Mackin, 1939; Prophet, 1963), Kansas (Leonard and Ponder, 1949), and Nebraska (McCarragher, 1970), but no account of the phyllopods in Missouri has been published. Collections of phyllopods made by members of the Zoology Department and the Entomology Department at the University of Missouri-Columbia have been reviewed, and it is the purpose of this account to record the species collected in Missouri with a key to those species.

Higher taxonomic groupings of the phyllopods are somewhat unsettled. Pennak (1953) included Anostraca, Notostroaca, and Conchostraca as orders under the subclass Branchiopoda, division Eubranchiopoda with the order Cladocera separated into a second division, the Oligobranchiopoda. Dexter (1959) includes all four orders under the subclass Branchiopoda. Waterman and Chace (1960) include three orders under the subclass Branchiopoda: Anostraca, Notostroaca, and Diplostraca, with Conchostraca and Cladocera as suborders of the Diplostraca. The arguments for including Cladocera and Conchostraca as suborders of the order Diplostraca are not overwhelming, so they are considered as separate orders in this paper.

The species included in the key have all been collected in Missouri, but most of the collections have been restricted to the central part of the state. More extensive collections in other parts of the state will undoubtedly increase the number of species known to occur in Missouri. One species, *Cyzicus*

mexicanus, has been included in the key since it is known to occur in Illinois, Kansas, Nebraska, and Oklahoma. It is likely that the distribution of this species includes Missouri.

Only one species of *Eulimnadia* is included in the key, but several collections have yielded members of this genus which have not been identified to species. Perhaps subsequent collections will enable clarification of the taxonomic status of these specimens. The best single source of keys for identification of phyllopods not included in this key is Edmondson (1959).

ANNOTATIONS

Triops longicaudatus LeConte 1846 is the only species of Notostraca which occurs in Missouri. It is found in Boone and Howard Counties from June through October, and the water is usually quite turbid due to the burrowing habit of these animals. They can be seen breaking the surface film where they occur in heavy concentrations. For a complete taxonomic treatment of the group, see Linder (1952).

Eubbranchipus serratus Forbes 1874 is the only species of the family Chirocephalidae which occurs in Missouri. It is a vernal species found from February through May. It has been collected in Boone County and probably has a state-wide distribution. Dexter and Ferguson (1943) discuss the distribution and life history of this species.

Thamnocephalus platyurus Packard 1879 is the only species of the genus which occurs in Missouri. This species occurs in Boone and Howard Counties from May through October. See Moore (1964) for a complete discussion of the genus.

Streptocephalus seali Ryder 1879 is one of two members of this genus which has been collected in Boone and Howard Counties from late May through October. The male *S. seali* is easily distinguished from the male *Streptocephalus texanus* by the form of the cercopods (see Fig. 3, 4). The second antennae of the two species are also different, but this distinction is less easily made.

Streptocephalus texanus Packard 1871 has been collected in Boone and Howard Counties from late May through October. *S. texanus* and *S. seali* have frequently been collected from the same locations. See Moore (1966) for a discussion of the species of this genus.

Eulimnadia texana Packard 1871 is the only species of the genus definitely known from Missouri. It has been collected from June through October in Boone County. For a description of the species of *Eulimnadia* in North America, see Mattox (1954).

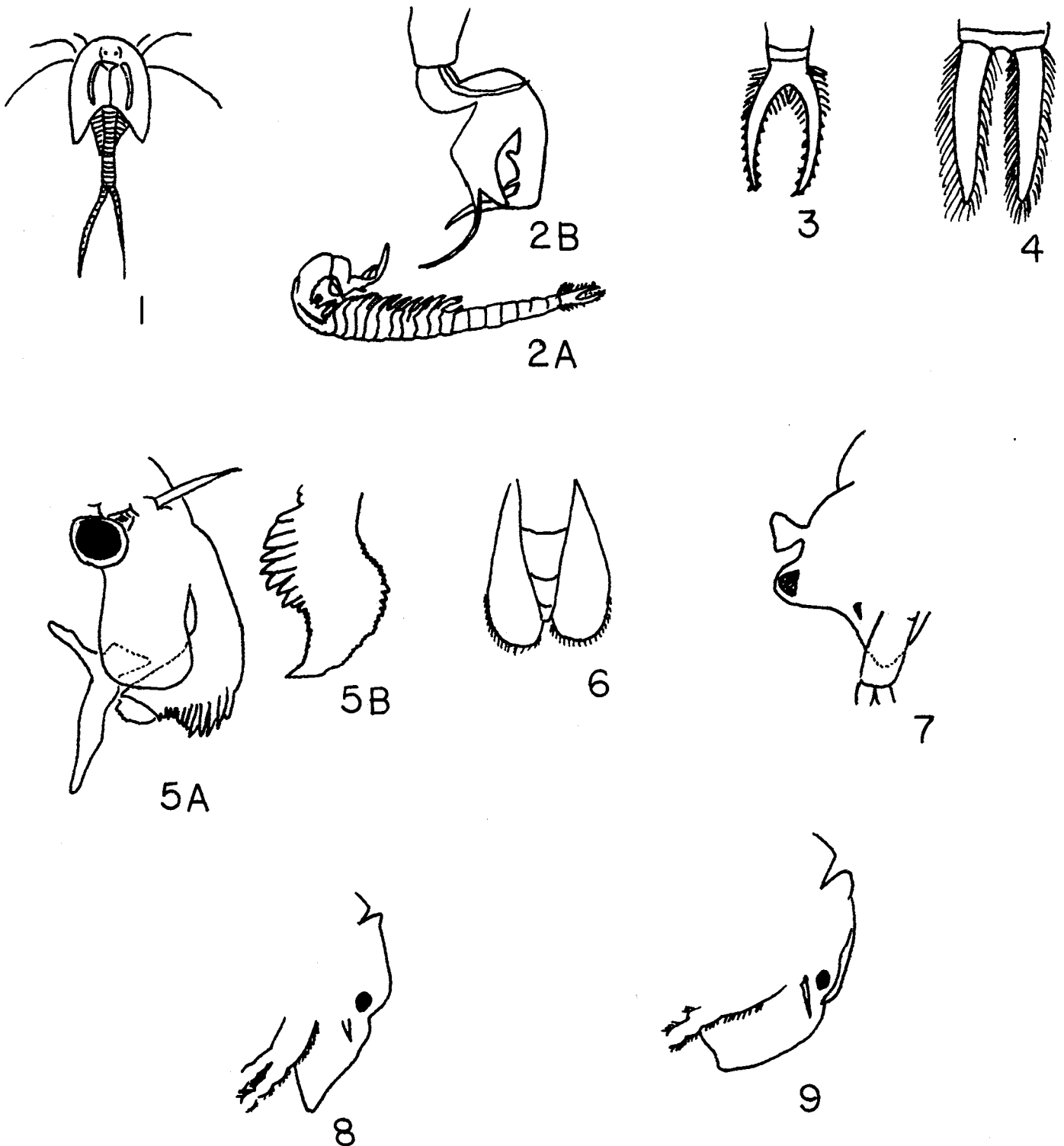


Fig. 1. *Triops longicaudatus* (from Packard after Linder). Fig. 2A. Side view of *Streptocephalus seali* (from Creaser after Dexter); 2B. Second antenna of *S. seali*. Fig. 3. Cercopods of *Streptocephalus seali*. Fig. 4. Cercopods of *Streptocephalus texanus*. Fig. 5A. Lateral view of head of *Eubbranchipus serratus* (from Mattox after Pennak); 5B. Frontal view of antennal appendage (from Pearse after Dexter). Fig. 6. Caudal end of *Thamnocephalus platyurus*. Fig. 7. Head of *Eulimnadia texana* showing frontal appendage. Fig. 8. Head of male *Caenestheriella belfragei*. Fig. 9. Head of male *Cyzicus morsei*.

Caenestheriella belfragei (Packard) 1871 has been collected in Boone County and has a spurious occurrence. The shell morphology is very similar to that of *Cyzicus morsei* so only mature males can be used in determining the species. The critical distinction between *Caenestheriella belfragei* and *Cyzicus morsei* is the shape of the rostrum of the male (see Fig. 8, 9). *Caenestheriella belfragei* has been collected in Boone County during the summer and early fall.

Caenestheriella gynecia Mattox 1950 is known from Missouri from a single collection in Wayne County near Piedmont, Mo. It was collected in April of 1955, and is unique among the Conchostraca in that no males are known. The only other records of *C. gynecia* known to us are from Ohio and Alabama.

Cyzicus morsei (Packard) 1871 has been collected in Boone County from June through October. The most characteristic feature of the mature specimens is a crowding of growth lines along the lower one-third to one-fourth of the margin of the shell. Some crowding is also found in larger specimens of *Caenestheriella belfragei*, but not to the extent found in the larger *Cyzicus morsei*.

Cyzicus mexicanus (Claus) 1860 has not been collected in Missouri, but it has been collected in Quincy, Illinois, Nebraska, Oklahoma, and Kansas. Future collections will undoubtedly confirm the presence of this species in Missouri. For a complete discussion of the taxonomy of the family Cyzicidae, see Mattox (1957).

Caenestheriella setosa (Pearse) 1912 was reported from Boone County by Kelly (1956) in an unpublished dissertation. Continued collections from the same area have failed to confirm this species. Several specimens collected by Kelly from this area and deposited in the Missouri Entomological Research Museum by others were examined, and they were all *Caenestheriella belfragei*. Young mature *C. belfragei* key to *C. setosa* in the key by Pennak (1953), and this was probably the source of error in this case. *Caenestheriella setosa* has not been included in the key.

KEY TO THE PHYLLOPODS OF MISSOURI

- 1 No carapace, eyes stalked Order Anostraca 3
- Carapace shield-like or folded like a bivalve 2
- 2(1) Shield-like carapace (Fig. 1) Order Notostraca
- One species in Missouri *Triops longicaudatus* LeConte
- Bivalve carapace completely enclosing body.
- Order Conchostraca 6
- 3(1) Male second antenna with complex cheliform second antenna . . . (Fig. 2) Family Streptocephalidae 4
- Male second antenna not cheliform 5
- 4(3) Cercopods of male bowed and spinose on distal half (Fig. 3) *Streptocephalus seali* Ryder
- Cercopods of male straight and setose along entire margin (Fig. 4) *Streptocephalus texanus* Packard
- 5(3) Male with paired ribbon-like antennal appendages; cercopods distinct (Fig. 5). Chirocephalidae:
- Eubbranchipus serratus* Forbes
- Male with median dendritic frontal appendage; anal end with flange on sides (Fig. 6)
- Thamnocephalidae: *Thamnocephalus platyurus* Packard
- 6(2) Head with frontal appendage; carapace with 2-10 lines of growth (Fig. 7)
- Limnadiidae: *Eulimnadia texana* Packard
- No frontal appendage; more than 10 lines of growth on carapace Family Cyzicidae 7

- 7(6) Shell somewhat compressed laterally; umbo 1/4-1/8 of distance from front; shell length/thickness ratio less than 2 8
- Shell globose with prominent umbo 1/2-1/3 of distance from front; shell length/thickness ratio greater than 2 . . . 9
- 8(7) Females only *Caenestheriella gynecia* Mattox
- Males with rostrum approximately forming a 90° angle, female rostrum acute (Figs 8, 9)
- Cyzicus mexicanus* (Claus)
- 9(7) Male second antenna with 14-15 segments on flagellae, rostrum of male and female acute (Fig. 8)
- Caenestheriella belfragei* (Packard)
- Male second antenna with 15-16 segments on flagellae, rostrum of male approximately forming a 90° angle, female rostrum acute (Fig. 9) *Cyzicus morsei* (Packard)

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