

THE PREDACEOUS MAYFLY NYMPHS OF NORTH AMERICA

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THE occurrence of predatory types of nymphs in the predominantly herbivorous order Ephemeroptera is of considerable interest. Although no food-habit studies have been made, the presence of fanglike maxillae and mandibles, and the absence of molar areas on the mandibles are convincing evidence of the predatory habits.

Four North American mayfly genera appear to be carnivorous in the nymphal stage. These are the nymphs of *Pseudiron* (See Spieth 1938:3 and Burks 1953:149), the nymph provisionally and probably correctly assigned by Burks (*op. cit.*:198) to *Anepeorus*, the nymph of *Metreturus*² (Burks *op. cit.*: 146) and an undescribed genus apparently related to *Metreturus*.

Accounts of the biology of these forms are scanty, but apparently all are found only in large warm-water rivers and their adaptations indicate that they occupy sandy bottoms within such streams. All of the genera are exceedingly rare in collections, and probably quite rare in nature. In the Green River where it cuts through the Uinta Mountains in Utah, three of the four carnivorous genera occur (all except *Metreturus*), but each is known to be present only through collection of a single specimen.

The four North American genera all fall within the superfamily Heptagenioidea, but beyond this there is little agreement on the classification. *Anepeorus* is placed by all workers in the family Heptageniidae, but has several distinctive features of its own. *Pseudiron* was placed in the Metretopinae by Traver (1935), in the Ametropedidae by Burks (*op. cit.*) and in the Heptageniidae (as a separate subfamily, Pseudironinae) by Edmunds and Traver (1954). The genus *Metreturus* was described in the Ametropodidae by Burks (*op. cit.*) but placed in the Siphonuridae by Edmunds and

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²While this paper was in press, the genus *Metreturus* has been declared a synonym of *Acanthametropus* Tshernova (1948. Dokladi Akadamii Nauk SSSR, n. s., 40(8): 1953) by Edmunds and Allen (1957. Ann. Ent. Soc. Amer., 50:318).

Traver (*op. cit.*), and again in the Ametropodidae by Demoulin (1955).

The fourth carnivorous genus is known from a part of a nymph which the writer collected in the Green River at Hideout Canyon, Utah, in 1947. Repeated attempts to collect additional specimens have failed. The mouthparts of this nymph are much like those of *Metreturus*, but the nymph has no spines on the dorsal surface of the head, thorax, or first abdominal segment. The one leg on the specimen has no claw to compare with those of *Metreturus*, and there are no gills on the specimen. I have always considered this nymph as belonging to the Siphonuridae because the general facies of the nymph appear siphonurid, and because the wing venation as seen in the developing wingpads is siphonurid.

The systematic position of this unnamed genus and the probably related genus *Metreturus* will remain in doubt until the adults are known, but examination of the developing wing pads of nymphs of *Metreturus* also reveals a siphonurid-type venation. I believe both will prove to belong in the Siphonuridae.

The carnivorous type habit and its accompanying adaptive changes appear to have had at least three separate origins among the four genera of North American mayflies, and other carnivorous mayfly nymphs not found in North America appear to represent one or more additional independent origins.

LITERATURE CITED

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