

The nymph of *Hagenulodes* Ulmer (Ephemeroptera: Leptophlebiidae)*

By WILLIAM L. PETERS AND GEORGE F. EDMUNDS, JR.

Department of Zoology and Entomology,
University of Utah, Salt Lake City

SYNOPSIS

The previously unknown nymph of *Hagenulodes braueri* Ulmer is described, and the relationships and probable origin of the monotypic genus *Hagenulodes* are discussed.

ULMER (1919) described *Hagenulodes* from adult males for a peculiar species, *H. braueri*, from Mahé Island, Seychelles. Recently, Peters & Edmunds (1964) republished the description of the adult of *Hagenulodes* in their revision of the generic classification of the Ethiopian Leptophlebiidae. The nymph, however, remained unknown. Dr. M. T. Gillies has presented us with nymphs of *H. braueri*, which he collected on Praslin Island, Seychelles, in 1962, and has encouraged us to describe them. Although these nymphs are not associated with adults, the characteristic colour markings, venation of the fore wing pads, and the lack of hind wing pads are similar to those characters of the adults of *H. braueri*.

Genus *Hagenulodes* Ulmer, 1919 (figs. 1-8)

Ulmer, 1919, *Arch. Naturgesch.* **85** : 37.

Ulmer, 1920, *Stettin ent. Ztg.* **81** : 114, 117.

Ulmer, 1932, *Peking nat. Hist. Bull.* **7** : 204.

Peters & Edmunds, 1964, *Trans. R. ent. Soc. Lond.* **116** : 245.

Mature nymph

Head prognathous. Antennae one and one-third times as long as maximum length of head. Mouthparts (figs. 1-5): dorsal hair on labrum as in figure 5; submedian and anterolateral areas of hair ventrally; labrum greatly expanded laterally as in figure 5. Left mandible as in figure 1. Lingua of hypopharynx with well developed lateral processes (fig. 4), anterior margin deeply cleft; superlingua of hypopharynx as in figure 4, with a row of hair along anterior margin. Segment 2 of maxillary palpi a little longer in length than segment 1; segment 3 a little shorter than segment 2, triangular; hair on maxillae as in figure 2. Labium as in figure 3; segment 2 of palpi three-fourths length of segment 1; segment 3 a little shorter than segment 2, triangular; glossae ventral to paraglossae. Legs (figs. 6-7): claws apically hooked, denticles on claws progressively larger apically (fig. 7). Gills (fig. 8): gills on segments 1-7 alike; dorsal and ventral lamellae slender, tracheae unbranched. Small posterolateral spines on abdominal segment 9. Terminal filament slightly longer than cerci.

Hagenulodes braueri Ulmer (figs. 1-8)

Hagenulodes braueri Ulmer, 1919, *Arch. Naturgesch.* **85** : 38.

Mature nymph (in alcohol)

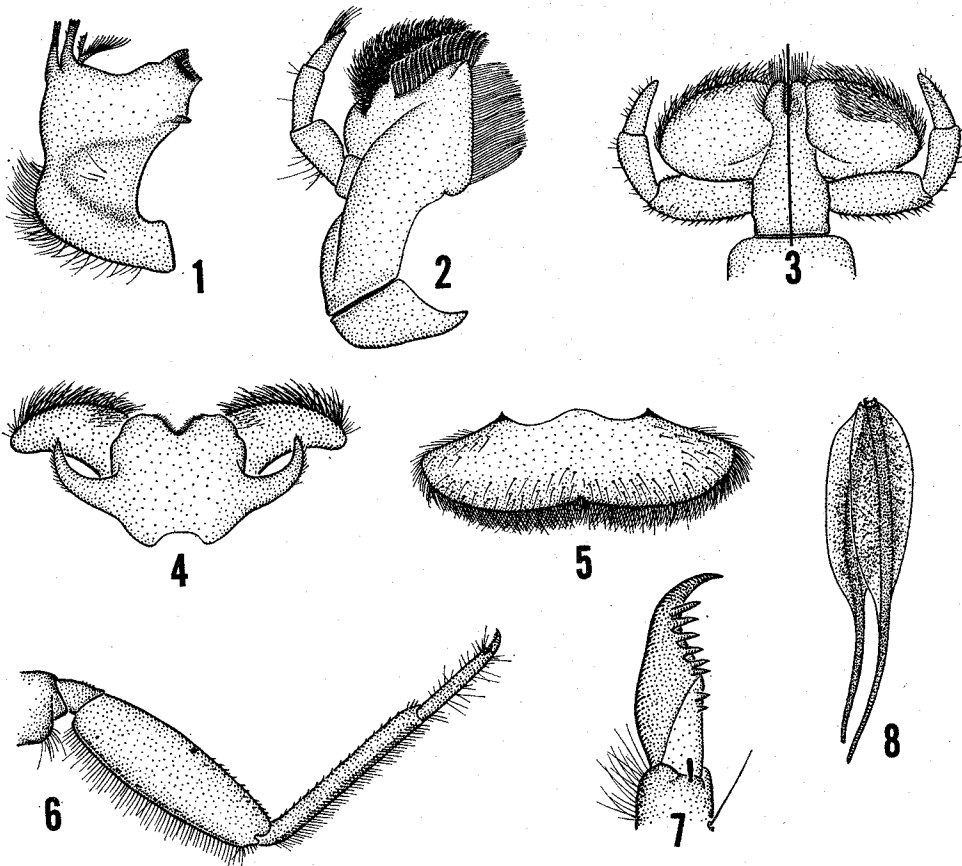
Head capsule, sterna of thorax and abdomen fuscous; mouthparts, terga of thorax and abdomen light brown; abdominal terga 2-8 with pale submedian wide longitudinal bands, anterior and posterior margins of terga 2-8 with a dark brown narrow transverse band, anterior to the posterior transverse bands a pale narrow transverse band; sterna 2-9 with fuscous sublateral wide longitudinal bands. Legs and caudal filaments brown. Gills greyish-blue.

The new locality for this species is SEYCHELLES: Praslin Island, Vallée de Mai, 17. viii. 62 (*M. T. Gillies*), 5 nymphs. All specimens are in alcohol. One specimen is deposited in the collections of the British Museum (Natural History), and the remaining specimens at the University of Utah.

* The research on which this report is based was supported by grants from the National Science Foundation, U.S.A., George F. Edmunds, Jr., Principal Investigator.

Proc. R. ent. Soc. Lond. (B) **35** (1-2). Pp. 26-28, 8 figs. 1966.

The nymph of *Hagenulodes* may be differentiated from the nymphs of all other genera of Leptophlebiidae in the Eastern Hemisphere by the following combination of characters: (1) both lamellae of abdominal gills 1-7 are slender, and the tracheae are unbranched (fig. 8); (2) the labrum is greatly expanded laterally, as in figure 5; (3) the outer margin of the mandibles is extremely angular, as in figure 1; and (4) the claws are apically hooked, with the denticles on the claws progressively larger apically (fig. 7).



FIGS. 1-8.—*Hagenulodes braueri* Ulmer: (1) left mandible; (2) left maxilla; (3) labium; (4) hypopharynx; (5) labrum; (6) nymphal fore leg; (7) nymphal fore claw; (8) abdominal gill 4.

The labrum and mandibles of the nymphs of *Hagenulodes* are specialised; however, the remaining mouthparts suggest the relationship of *Hagenulodes* with *Masharikella* Peters, Gillies & Edmunds and related genera. The abdominal gills of *Hagenulodes* are similar to those of *Maheathraulus* Peters, Gillies & Edmunds, which is also endemic to the Seychelles and is the only other mayfly genus known to occur there. The mouthparts of *Maheathraulus* also indicate a close relationship with *Masharikella* and related genera.

The wings and genital forceps of the adults of *Hagenulodes* are specialised, but the tubular and divided penes are similar to those of *Masharikella* and related genera. The shape and venation of the fore wings and the shape of the genital forceps of *Hagenulodes* are similar to those of *Nesophlebia* Peters & Edmunds, which is known from Madagascar. However, adult males of *Hagenulodes* and *Nesophlebia* differ in

several characters (unfortunately the adult females of both genera are unknown). Hind wings are lacking in *Hagenulodes*, and those of *Nesophlebia* are greatly reduced. The fore wings of *Hagenulodes* are narrower than those of *Nesophlebia*. Genital forceps of *Hagenulodes* have one long terminal segment, whereas those of *Nesophlebia* have two long terminal segments. The tubular and divided penes of *Nesophlebia* are also similar to those of *Masharikella* and related genera. The shape and venation of the fore and hind wings and the tubular and divided penes of *Maheathraulus* are also similar to those of *Masharikella* and related genera. [For illustrations of the adult structures discussed; see Peters & Edmunds (1964).] *Hagenulodes* and *Maheathraulus* have apparently evolved from an ancestral *Masharikella* type in the Seychelles.

We extend our appreciation and sincere thanks to Dr. M. T. Gillies for the gift of nymphs of *Hagenulodes braueri* and for encouragement to make this study. Thanks are expressed to Mr. Steve L. Jensen, University of Utah, for the preparation of the illustrations under our supervision.

REFERENCES

- PETERS, W. L. & EDMUNDS, G. F., Jr., 1964, A revision of the generic classification of the Ethiopian Leptophlebiidae (Ephemeroptera). *Trans. R. ent. Soc. Lond.* **116** : 225-53, 141 figs.
ULMER, G., 1919, Neue Ephemeropteren. *Arch. Naturgesch.* **85** : 1-80, 56 figs.
——— 1920, Übersicht über die Gattungen der Ephemeropteren, nebst bemerkungen über einzelne arten. *Stettin ent. Ztg.* **81** : 97-144.
——— 1932, Bemerkungen über die seit 1920 neu aufgestellten Gattungen der Ephemeropteren. *Ibid.* **93** : 204-19.

FROM
**THE PROCEEDINGS OF THE
ROYAL ENTOMOLOGICAL
SOCIETY OF LONDON**

**The Royal Entomological Society of London,
41, Queen's Gate, S.W.7**