THE IDENTITY OF *HAGENULOPSIS MINUTA* SPIETH (LEPTOPHLEBIIDAE: ATALOPHLEBIINAE)

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ABSTRACT

Additional characters of the male imago of *Hagenulopsis minuta* Spieth are described from material collected in Northern South America and the nymph is described based on reared specimens. Distributional limits are given for the species. The original species epithet *minutus* is changed to *minuta as* "-opsis" is feminine (Article 30a, Code). The subgenus Borinquena (Australphlebia) Peters known from Dominica and St. Lucia is synonymized with *Hagenulopsis* and the type species becomes *Hagenulopsis traverae comb. n.*

INTRODUCTION

Ulmer (1920) established *Hagenulopsis* for *H. diptera* based on male imagos and subimagos and female subimagos collected in Isabella region, Humboldt District, Santa Catarina State, Brazil. Later Spieth (1943) described a second species *H. minutus* based on 1 female imago collected from the Marowijne River in Surinam.

While studying the original material of *Choroterpes emersoni* Needham and Murphy (all collected at a single locality in Guyana), Traver (1946) indicated that the female description of *C. emersoni* by Needham and Murphy (1924) was in reality the female description of *H. minutus*. Further, the original material labeled *C. emersoni* contained 2 male imagos of *H. minutus* which Traver described in 1946. The species *emersoni* was later transferred to *Miroculitus* by Savage and Peters (1983).

Traver (1944) described the probable nymph of *Hagenulopsis* as "*Hagenulopsis*-ally" based on 2 nymphs from Minas Gerais State, Brazil. Peters (1969) confirmed the identity of these nymphs as *Hagenulopsis* based on unpublished reared material. The 2 nymphs described by Traver (1944) are probably the nymphs of *H. diptera* based on their distribution in southern Brazil and the clouded cross veins in the developing wing pads.

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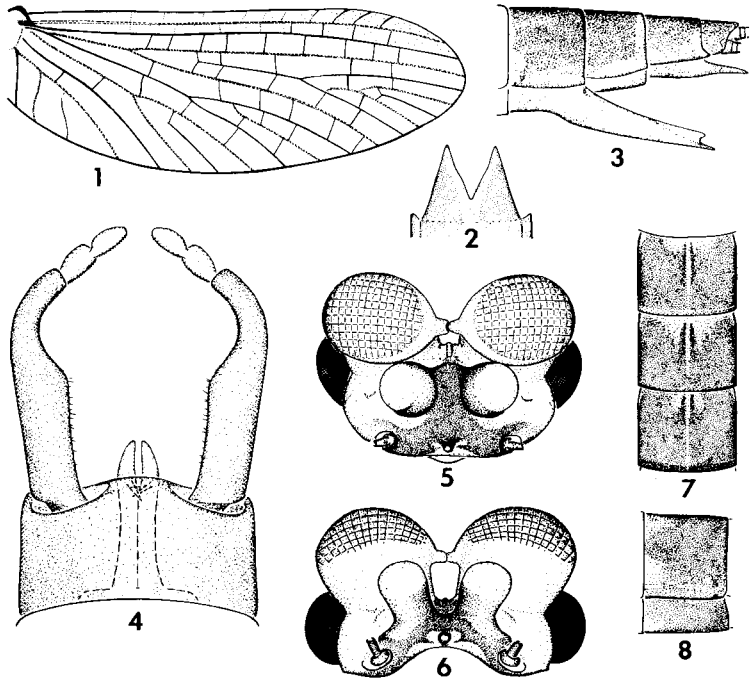

Fig. 1-8. *Hagenulopsis minuta* imagos: 1, ♂ fore wing; 2, 9th sternum of ♀; 3, lateral view of abdominal segments 6-10 of ♀; 4, ♂ genitalia, ventral view; 5-6, head of ♂ (5 dorsal, 6 frontal, without flagellum); 7, abdominal terga 5-7; 8, lateral view of abdominal segment 6.

In this paper the species epithet *minutus* is changed to *minuta* as "-opsis" is feminine (Article 30a, Code), additional characters of the male imagos of *H. minuta* are described, and the nymph of *H. minuta* is described based on reared material. The subgenus *Borinquena (Australphlebia)* Peters known from Dominica and St. Lucia is synonymized with *Hagenulopsis*.

Hagenulopsis minuta Spieth, 1943 (Fig. 1-20)

Hagenulopsis minutus Spieth, 1943, 1233:10; Traver, 1946, 17:427-428.

Hagenulopsis sp., Edmunds *et al.*, 1976, fig. 212-213, 376.

Hagenulopsis (in discussion of *Choroterpes emersoni*), Savage and Peters, 1983, 108:569.

Male imago (in alcohol): Length: body 3.5-3.8 mm; fore wings 3.9-4.0 mm. Eyes (Fig. 5-6): upper portion separated basally, meeting medially with well developed eye bridge on inner margin of upper portion; facets of turbinate portion large, 14-16 complete facets in longest row, reddish-brown; facets of lower portion black, small. Head reddish-brown, carinae darker. Scape and pedicel darker, washed with blackish-brown, flagellum paler. Lateral ocelli enlarged (Fig. 6). Abdomen (Fig. 7-8): translucent, reddish-brown, terga and sterna heavily washed with blackish-brown as in Fig. 7-8. Genitalia (Fig. 4): styliger plate and forceps segment 1 heavily washed with blackish-brown, forceps segment 2 and 3 paler; penes pale. Caudal filaments pale, articulations of basal 3 segments darker.

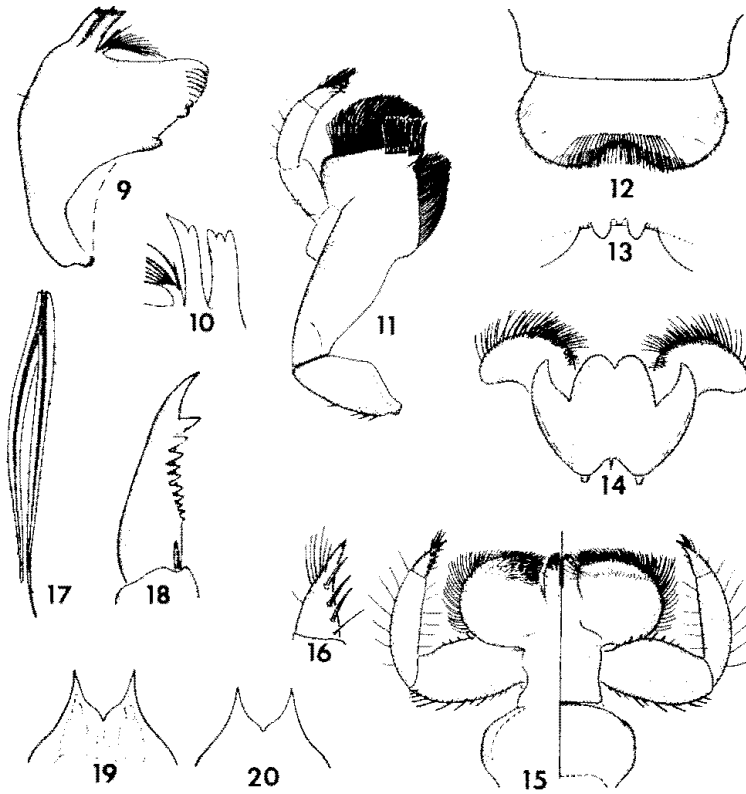

Fig. 9-20. *Hagenulopsis minuta*, nymph: 9, left mandible; 10, detail of incisors of right mandible; 11, maxilla (ventral); 12, labrum and clypeus; 13, ventral detail of margin of labrum; 14, hypopharynx; 15, labium (dorsum on left, venter on right); 16, detail of 3rd segment of labial palp; 17, gill 4; 18, fore claw; 19-20, apex of sternum 9 (19 mature ♂, 20 partially grown ♀).

Legs (description from Savage and Peters 1983 and additional material from Cerro de Neblina): ratios of segments in prothoracic legs, 0.46-0.50: 1.00 (1.57-1.59 mm): 0.03: 0.30-0.35: 0.21-0.27: 0.15-0.17: 0.06-0.07. Legs pale, except coxae, trochanters and prothoracic femora heavily washed with blackish-brown, apex of prothoracic tibiae blackish-brown, mesothoracic femora with an indistinct, subbasal and apical blackish-brown band, metathoracic femora darker with wide dark blackish-brown subbasal and apical bands; claws of a pair dissimilar, one apically hooked, other obtuse, pad-like.

Male subimago (in alcohol): Eyes as in ♂ imago, except bridge only developed as a protuberance on inner margin of stalks and not meeting on vertex of head.

Mature nymph (in alcohol): Body length 3.8-4.2 mm. Eyes of ♀ black, upper portion of eyes of ♂ reddish-brown, lower portion black. Dorsum of head light brown, area between base of antennae to lateral ocelli washed heavily with blackish-brown. Scape and pedicel washed with blackish-brown, flagellum pale. Mouthparts (Fig. 9-16): anteromedian emargination of labrum cleft with 2 large denticles and remnants of 3 small denticles (fig. 12-13); left mandible as in Fig. 9; hypopharynx as in Fig. 14; maxillae as in Fig. 11, segment 1 of palpi 1-1/3 length of segment 2, segment 3 2/5-3/5 length of segment 2; labium as in Fig. 14, segment 1 of palpi a little shorter than segment 2, segment 3 a little less than 1/2 length of segment 2. Thorax: brown, pronotum and anterolateral areas of mesonotum uniformly

washed with blackish-brown. Legs: brown, blackish-brown marks as in ♂ and ♀ imagos, except all marks paler (especially on prothoracic femora). Abdomen: brown, terga 1-9 uniformly washed with dark blackish-brown, except for paler median longitudinal line as in ♂ imago; distinct posterolateral projections progressively larger posteriorly on terga 6-9 (may be weakly indicated on terga 3-5); sterna marked as in ♂ and ♀ imagos; apex of 9th sternum divided into pair of acute projections (Fig. 19-20). Gills (Fig. 17): membrane grayish, translucent; tracheae black, unbranched. Caudal filaments brown, basal articulations darker as in ♂ and ♀ imagos.

Type locality: SURINAM: Marowijne River, August, 1939, Geijskes coll.

Deposition of Type: Holotype ♀ imago, deposited in American Museum of Natural History (currently holotype can not be found in museum).

Specimens examined: SURINAM: Brokopondo Dist., Kreek on N. edge of Brokopondo, 90 m, 27-XII-1968, W.L. and J.G. Peters, nymphs; BRAZIL: Pará State: Akahe Creek nr. Tiriyos Mission, nr. Brazil-Surinam border, 15-27-III-1962, E.J. Fittkau, 2 ♂ imagos, 2 ♀ imagos, ♂ and ♀ subimagos, reared ♀ subimago, nymphs; Okueima Creek, nr. Brazil-Surinam border, 18-IV-1962, E.J. Fittkau, nymphs.

Additional material examined: BRAZIL: Amazonas State: Rio Maurauia, 3 day's trip above S. Antonio Mission, NW of Taparuquara, 24-25-I, 28-I-1963, E.J. Fittkau, ♂ imago, ♂ subimago, nymphs; mountain stream II, nr. Rio Maurauia, other data as given above, 27-I-1963, nymphs; VENEZUELA: T.F. Amazonas, Cerro de Neblina: Base Camp, 0°50'N, 66°10'W, rapids of Rio Baria, 12-II-1985, P.J. and P.M. Spangler, R. Faitoute, nymphs; same locality, 4-12-II-1984, D. Davis and T. McCabe, ♂ imagos; same locality, Camp VII, 1800 m, 0°50'N, 66°68'W, small stream, 30-I-10-II-1985, P.J. and P.M. Spangler, R. Faitoute, ♂ imago; Agua Blanca, 0°49'N, 66°08'W, 160 m, 20-21-III-1984, O. Flint and J. Louton, ♂ and ♀ subimagos.

Variations: Spieth (1943) noted the small size of *H. minuta* based on 1 ♀ imago. Both the body and wings of the holotype are 3.0 mm. Traver (1946) indicated that the body length of the ♂ imago is 3.5 mm and the wings are about 4.0 mm. Specimens we examined from Surinam and Pará State, Brazil, are all within the range of measurements given in the description, but specimens from Venezuela are larger. Traver (1946) noted that on some ♂ imagos the basal and middle terga possess a pale crescentic area on the anteromedian margin. Male specimens we examined have such a mark on terga 2-6. The mark on specimens from all sites in Brazil is indistinct, while the mark on specimens from Venezuela is very distinct. Dark marks are more extensive on specimens from Venezuela and the Amazonas localities. Number of facets in the dorsal portion of ♂ eyes differ somewhat by locality, the smallest (10 facets in longest row) being found on the single ♂ from Venezuela, Cerro de Neblina, at 1800 m.

DISCUSSION

Spieth (1943) differentiated *H. minuta* from *H. diptera* by the small size and the reduction of the cross veins in cells C and Sc of the fore wings; however, the 2 species can be differentiated by several other characteristics. In imagos of *H. minuta*: (1) well developed bridge between the stalks of the upper portion of the ♂ eyes (Fig. 5-6); (2) absence of blackish clouds (fringes) around cross veins in the fore wings of ♂ and ♀ imagos (Fig. 1); (3) indistinct subbasal and apical blackish-brown bands on the mesothoracic femora in ♂ and ♀ imagos; and (4) darker annulations at articulations of only the basal 3 caudal filaments of ♂ and ♀ imagos. Although the nymph of *H. diptera* is not known with certainty, it is clear that the color pattern of mature nymphs is the same as that of imagos, so that the lack of wing markings or apical markings on the caudal filaments should serve to distinguish the nymph of *H. minuta*.

We recognize the ♂ parts on the allotype slide of *Choroterpes emersoni as* those of *Hagenulopsis minuta* as suggested by Traver (1946) and Savage and Peters (1983) because of the color pattern of legs and caudal filaments and the fact that there is some evidence of a

protuberance between the eyes on the slide. For illustrations in Edmunds *et al.* (1976), 3 are definitely *H. minuta* (212-213, 376) and 2 are probably *H. minuta* (160, 218); other figures may represent other species except for Fig. 164, an atypical claw which is not characteristic of any known species of *Hagenulopsis*. All figures of imagos in this paper were drawn from the Akahe Creek locality (Pará, Brazil) and those of the nymph from the Brokopondo locality (Surinam), except that detail of the submentum and ventral detail of the labrum were added from Akahe Creek specimens because of better condition on the slides.

Based on collections of *Hagenulopsis* at Florida A&M University, the genus occurs from Rio Grande do Sul State, Brazil, to Surinam, across the Guiana Shield to Peru and Venezuela and north to Honduras. Savage (1987) listed *Hagenulopsis* as a representative of the "North Andean, Central American Genera"; however, based on the known distribution of the genus it is a member of the "Guiana and Brazilian Shields Associated Genera". This generic distribution includes 4 described and several undescribed species, and *Hagenulopsis* can be differentiated from other Neotropical genera of the Leptophlebiidae by the following combination of characters. In the imagos: (1) vein ICu_1 attached at base to vein CuP in the fore wings (Fig. 1); (2) hind wings absent (Fig. 1); and (3) inner angle of forceps segment 1 located about 1/2 distance from base (Fig. 4). In the nymph: (1) abdominal gills slender, deeply forked with tracheae unbranched (Fig. 17); (2) ninth sternum deeply forked with apices acute (Fig. 19-20); and (3) apical 1/2 of segment 3 of labial palpi constricted (Fig. 16).

Kluge (1994) suggested that the nymph of *Borinquena carmencita* redescribed by Peters (1971) could not be the true nymph of *B. carmencita* but must represent another species. Traver (1938) designated only imagos from the Luquillo Mountains in the type series, but cited nymphs from other areas in Puerto Rico. The nymphal description and illustrations in Peters (1971) were made from specimens collected at the Hicaco River, Rio Blanco, March 7, 1935, by J. Needham and J. Garcia-Diaz. It now appears that Traver (1938) was looking at more than 1 species, and the nymphal description of Peters (1971) is not *Borinquena*, but is *Hagenulopsis*. The nymph of *Borinquena* as described by Traver (1938) and Kluge (1994) can be differentiated from *Hagenulopsis* by the characters cited above.

Peters (1971) established *Borinquena* (*Australphlebia*) for *B.* (*A.*) *traverae* from Domínica and an undescribed species from St. Lucia. Based on the definition of *Hagenulopsis* given above, *Australphlebia* is a junior synonym of *Hagenulopsis* and the type species of *Australphlebia* becomes *Hagenulopsis traverae* comb. n. McCafferty (1985) noted 2 undescribed species of *Borinquena* (*Australphlebia*) from Costa Rica, which were recently described by Lugo-Ortiz and McCafferty (1996) as *Hagenulopsis ingens* and *H. ramosa* based upon nymphs.

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