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## ***HARPAGOBÆTIS GULOSUS* GEN. NOV., SPEC. NOV., A NEW MAYFLY FROM SURINAME (EPHEMEROPTERA: BÆTIDAE)**

by

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Mol, A.W.M.: *Harpagobaetis gulosus* gen. nov., spec. nov., a new mayfly from Suriname (Ephemeroptera: Baetidae).

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Key words: Ephemeroptera; *Harpagobaetis* gen. nov.; *H. gulosus* sp. nov.; Suriname.

The new genus *Harpagobaetis* is established for the new species *H. gulosus* from Suriname. *Harpagobaetis* is only known in the larval stage and differs from other genera of Baetidae mainly in the shape of the mouthparts. Gut contents revealed that the species feeds on larvae of Diptera.

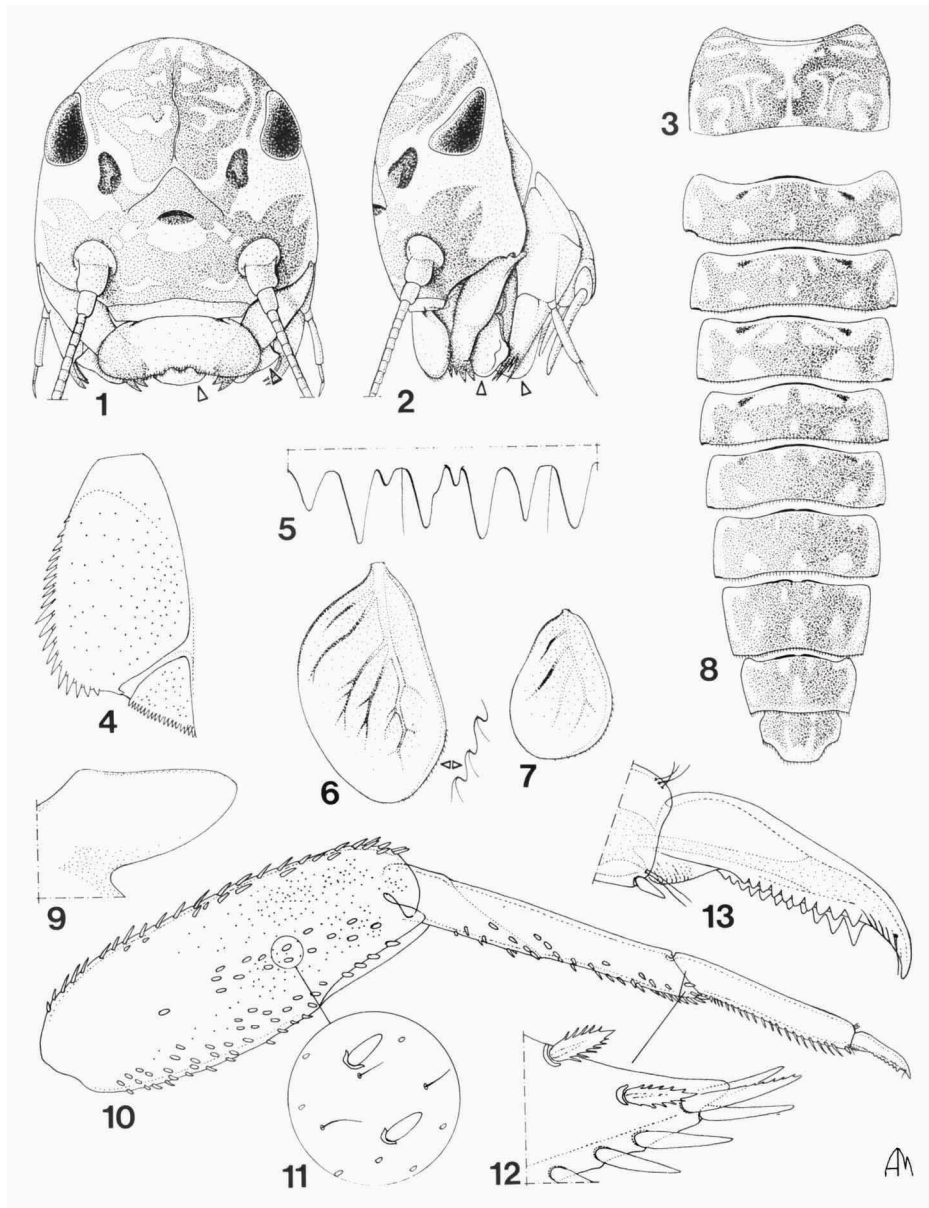
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Among material of Ephemeroptera, collected extensively in Suriname by the late Dr. D.C. Geijskes over a large number of years, some larvae of Baetidae were found that could not be placed in one of the known genera properly. The specimens represent a new genus that is described herein.

### ***Harpagobaetis* gen. nov.**

(figs. 1-27)

Larva. — Head hypognate and wide (figs. 1, 2). Labrum with lateral margins convex and ventral margin concave, with two submedian incisions (figs. 18, 19). Mandibulae long and narrow, molar regions protruded and tooth-like, incisor regions with four stout teeth (figs. 14-17). Maxillae with four large pointed teeth, three smaller teeth and four spine-like setae (figs. 21, 22). Hypopharynx large, superlinguae with triangular lateral projections (figs. 23-25). Labial palps three-segmented, second segment with parallel sides and slightly curved (fig. 26). Glossae and paraglossae similar in shape, narrow (fig. 27). Legs with short setae only (figs. 10-12), tarsal claws with two rows of teeth and with two fine bristles near apex. Hind wing pads present (fig. 9).



Figs. 1-13. *Harpagobaetis gulosus* gen. nov., spec. nov., larva. 1, head, frontal view; 2, head, lateral view; 3, pronotum; 4, paraproct plate; 5, posterior margin of tergites; 6, gill 2; 7, gill 7; 8, tergites 2-10; 9, hind wing pad; 10, fore leg; 11, detail of setae on femur; 12, detail of distal setae on tibia; 13, claw.

All tracheal gills simple (figs. 6, 7). Terminal filament nearly as long as cerci.

Imago and subimago. — Unknown.

Etymology. — Combination of harpazô (Gr.) meaning to snatch away, to seize (because of the predatory habits of the larvae) and *Baetis*.

Type-species. — *Harpagobaetis gulosus* sp. nov.

Species included. — *Harpagobaetis gulosus* sp. nov.

***Harpagobaetis gulosus* spec. nov.**

(figs. 1-28)

Material. — Holotype: Larva ♀, SURINAME, Kabalebo river at Double Steps Falls (4°02'30''N-57°26'40''W), 12.VIII.1973, leg. D.C. Geijskes. Paratypes: 3 larvae, locality and date as holotype. All specimens are preserved in alcohol and are kept in the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

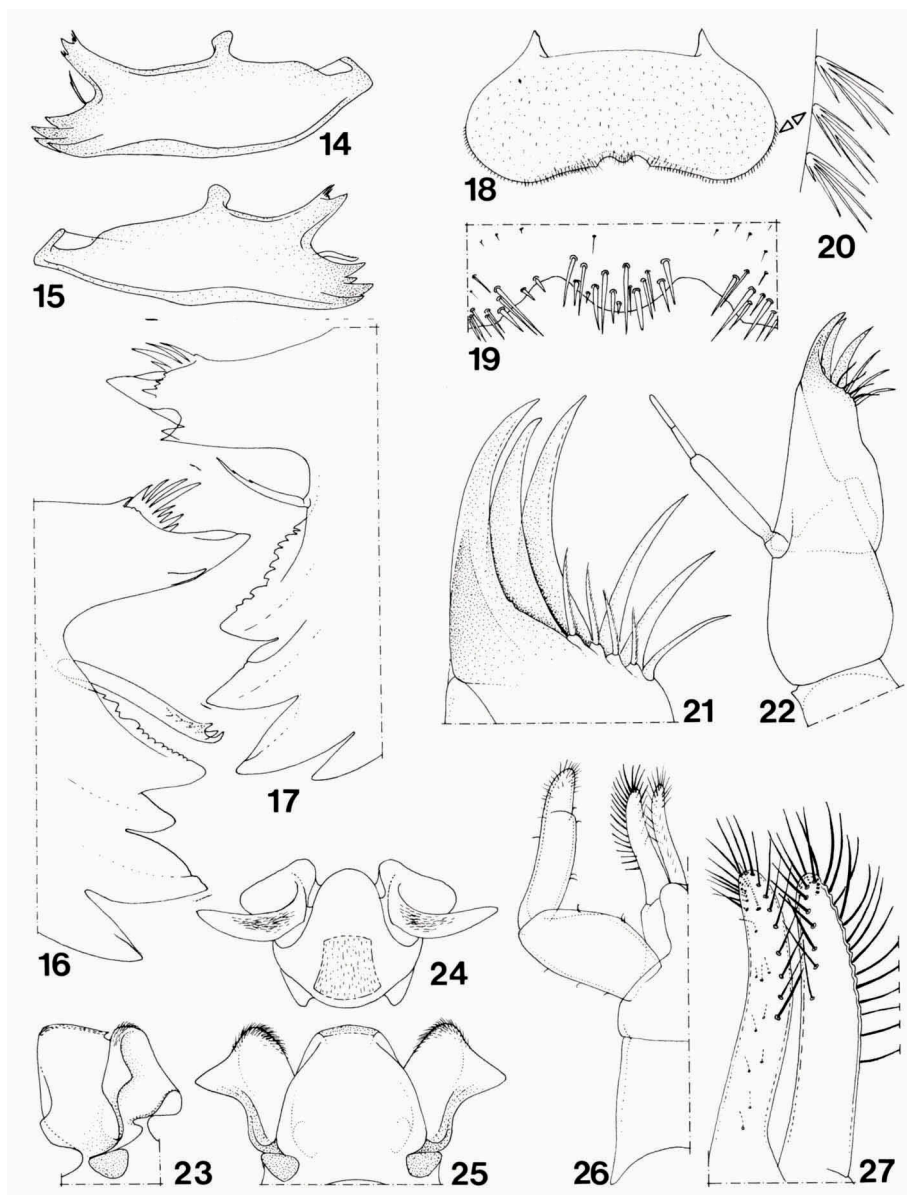
Larva ♀ (in alcohol). — Lengths (full grown specimen): Body 7.2 mm; cerci 3.1 mm; terminal filament 2.8 mm.

Head hypognate and wide (figs. 1, 2), pale yellow with light brown pigmentation extending over epicranium, frons, vertex and genae. Eyes black, triangular; ocelli grey, lateral ocelli kidney-shaped. Antennae pale yellow; scapus about as long as wide, with lateral margins concave and median margins slightly convex; pedicellus subcylindrical, almost as long as scapus and 0.6 times as wide; flagellum 1.6 times largest width of head. Clypeus narrow, 8-9 times wider than high. Labrum (fig. 18) pale yellow, about 2.5 times wider than high; lateral margins strongly convex, ventral margin concave with two submedian incisions and a median, rounded projection (fig. 19); surface with numerous short soft hairs; compound spines along lateral margins (fig. 20), gradually replaced by entire spines along ventral margin. Mandibulae long and narrow (figs. 14, 15), outer surface with short soft hairs in basal half; incisors fused to groups of four large flat teeth, inner margin of innermost teeth with row of small denticles (figs. 16, 17); molar regions strongly protruded, apex with one large triangular tooth and a series of smaller spine-like teeth; right prosthema narrow, sharply ending; left prosthema with ca. 7 teeth in apical part. Maxillae with 11 teeth or setae at apex of galeolacinea: Four stout teeth, the second one of which is about half as long as the others, three spine-like teeth and four short spine-like setae, each finely fringed (figs. 21, 22). Maxillary palps four-segmented: Basal segment about as long as wide, second segment about half as long as the entire palp and as wide as segment 1, segments 3 and 4 of about equal size and half as wide as segments 1 and 2. Hypopharynx large (figs. 23-25), tips of superlinguae reaching between man-

dibulae and maxillae (as indicated in figs. 1 and 2); lingua as thick as wide and slightly higher than wide, sides tapering towards top; rounded sclerites near base and a slightly sclerotized quadrangular area on top of lingua, two low projections on posterior side near base; superlinguae with posterior parts flat and expanded laterally, anterior parts rounded, nearly as thick as wide, tops of posterior parts densely covered with short soft hairs; lateral margins near base of superlinguae sclerotized. Labial palps three-segmented (fig. 26), basal segment two times longer than wide, sides convex; second segment about 3.5 times longer than wide, slightly curved and parallel-sided; apical segment slightly longer than wide and nearly as wide as segment two; a number of soft hairs on top of apical segment, hardly any hairs on other segments. Glossae and paraglossae narrow and slightly curved inwards (figs. 26, 27), glossae nearly as wide as paraglossae; paraglossae with 15-17 setae along outer margin, a row of 8 setae at dorsal side and 3-5 setae near apex at ventral side; glossae with row of 11-12 setae at dorsal side near lateral margins, ca. 9 setae at apex of ventral side near median margins and a small number of soft hairs at ventral side.

Thorax pale yellow with light brown dorsal markings (pronotum fig. 3). Wing pads pale yellow; fore wing pads with major veins vaguely indicated by narrow brown lines; hind wing pads (fig. 9) about 0.25 times as long as fore wing pad. Legs pale yellow, femora with light brown transverse band and vague brown spot near apex; tibiae with narrow brown ring in apical parts. Length ratios (femora + tibiae + tarsi + claws) of legs I : legs II: legs III are 1.00 : 1.07 : 1.17. Length ratios of femora : tibiae : tarsi : claws equal on all legs, are 1.00 : 0.89-0.91 : 0.48-0.50 : 0.20-0.21. Femora I flat, 1.75 times wider than high, femora II 1.30 times wider than high and femora III with cross-section almost circular, 1.06 times wider than high. Shape and distribution of setae more or less equal on all legs (fig. 10): Trochanters with 8-10 short blunt setae; femora with row of short spine-like setae along dorsal margins (legs I ca 35, legs II and III ca. 30), short blunt peg-like setae on central parts and along ventral margins (fig. 11 - legs I ca. 60, legs II and III ca. 50), many soft hairs of about the same length as peg-like setae and a large number of very short blunt setae between the peg-like setae; tibiae with 33-36 short setae, both sharp and blunt, along ventral margins; legs I with two compound setae near apex of tibiae (fig. 12); tarsi with row of narrow setae along ventral margins (legs I ca. 19, legs II and III 12-13) and a single short thick apical seta together with some soft hairs (fig. 13); claws with two rows of teeth, inner row of all claws with 10 teeth, outer row with 11 (legs I), 12 (legs II) or 13 teeth (legs III), two subapical bristles (fig. 13).

Abdomen pale yellow with light brown dorsal areas (fig. 8), two reddish



Figs. 14-27. *Harpagobaetis gulosus* gen. nov., spec. nov., larval mouthparts. 14, right mandible; 15, left mandible; 16, detail of distal region of left mandible; 17, detail of distal region of right mandible; 18, labrum; 19, detail of medio-ventral part of labrum; 20, detail of lateral marginal spines of labrum; 21, detail of maxillary teeth; 22, maxilla; 23, hypopharynx, lateral view; 24, hypopharynx, ventral view; 25, hypopharynx, posterior view; 26, labium, right half, ventral view; 27, detail of glossa and paraglossa, dorsal view.

brown spots near anterior margins of tergites 2-6 (or 7) (younger specimens than the ones here described are pale yellow, hardly without light brown markings, but they do show the reddish brown spots on tergites 2-6 clearly). Posterior margins of abdominal segments with slender spines of subequal lengths and a small number of soft hairs (fig. 5). Surface of abdomen smooth with fine short setae, no scales or scale-bases observed. Tracheal gills flat and simple (figs. 6, 7), present on segments 1-7; lateral and median margins smooth, apical margins with row of very small denticles, alternating with short soft hairs (fig. 6); parts of tracheae in gills with dark pigmentation in some specimens, colorless in other specimens. Paraprocts with about 20 spines along inner margins (fig. 4), surface smooth, with short soft setae. Caudal filaments whitish with base pale yellow and pale yellowish brown band in apical half; lateral hairs 5-6 times longer than filamental segments in basal parts of filaments and 8-12 times near apex of filaments.

Imago and subimago. — Unknown. The shape of the larval hind wing pads (fig. 9) suggest that the adults of *Harpagobaetis* may resemble *Baetis* or *Dactylobaetis*.

Etymology. — From *gulosus* (Latin), meaning greedy, gluttonous (because of the large amount of prey found in the digestive tract of one specimen).

Biology. — *Harpagobaetis* feeds on larvae of Diptera. The digestive tract of one dissected paratype contained head capsules of about 55 larvae, mainly Simuliidae.

Larvae of *Harpagobaetis* have been collected between the leaves of Podostemaceae, growing in the currents of the Double Steps Falls. They were found together with ephemeropteran larvae of *Oligoneuria anomala* Pictet, *Camelobaetidius leentvaari* Demoulin, an unidentified species of *Baetis* and *Hermanella* sp. 2 (sensu Demoulin, 1966, fig. 7). Fig. 28 shows the type locality of *H. gulosus*.

Discussion. — Larvae of *Harpagobaetis* are readily distinguished from other genera of Baetidae by the combination of a wide labrum without long setae and with two submedian incisions and a median rounded projection, long and narrow mandibulae with strongly protruded molar region, a large hypopharynx with superlinguae extending laterally, slender labial palps and claws with double rows of teeth and two fine bristles near apex. Especially the shape of the hypopharynx is unique among the known genera of Baetidae.

Relationships between the known genera of Baetidae are still poorly understood. It is difficult, therefore, to find good evidence for relationships between *Harpagobaetis* and other genera. The shape of thorax and abdomen, including wing pads and caudal filaments, does not show any particularities in the new genus. The abdomen is subcylindrical, a character shared with



Fig. 28. Kabalebo river, Suriname. Lower part of Double Steps Falls; type locality of *Harpagobaetis gulosus* (photo by Dr. D.C. Geijskes).

many other genera and undoubtedly representing the ancestral character state within the Baetidae. Legs and especially claws of *Harpagobaetis* are rather similar to those of *Heterocloeon* (described and figured by Müller-Liebenau (1974) as *Rheobaetis*). But this may prove to be a symplesiomorphic character as well, as double rows of teeth on claws appear to be an ancestral character state in Baetidae, according to Morihara & McCafferty (1979). The mouthparts of *Harpagobaetis* are very distinctive and highly adapted for predacious habits. The resemblance in the shape of mandibulae and maxillae between *Harpagobaetis* and the carnivorous Eurasian genus *Raptobaetopus* (vide Müller-Liebenau, 1978) may be the result of convergent evolution as no other characters confirm a close relationship between both genera. Obviously the habit of feeding on prey has been developed independently more than once in Baetidae. Perhaps the nearest relatives of *Harpagobaetis* may be found in Africa. Demoulin (1970) described young larvae of *Centroptiloides bifasciata* (Esben-Petersen) that have a wide labrum without long setae and tracheal gills very similar to those of *Harpagobaetis*. *C. bifasciata* has predacious habits as well (Agnew, 1962). But as the African Baetidae are hardly better known than the Baetidae of South America the real value of similarities between both, as mentioned above, is still difficult to estimate.

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