

A New Species of *Ameletus* (Ephemeroptera: Siphonuridae)  
from Western Virginia<sup>1</sup>

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ABSTRACT

Nymphal and adult stages of a new species of *Ameletus* from western Virginia are described. Useful characteristics for determining the new species are summarized.

Species of Ephemeroptera collected with the new species are reported in addition to the known ecology and distribution of the new species.

The genus *Ameletus* was established by Eaton [1885(1883-1888)] and now includes 32 species from North America. Of the 6 *Ameletus* species known to occur in eastern North America, only *A. ludens* Needham and *A. lineatus* Traver are reported from the United States. Both species are believed to reproduce parthenogenetically; the author has not yet found a male nymph of either species. *Ameletus cryptostimulus* n. sp. is apparently a nonparthenogenetic species with its known distribution limited to very small streams at high elevations in western Virginia.

The male penes and forceps were drawn by suspending them in a depression slide and projecting the image with a microslide projector. I follow Knox's (1935) interpretation of thoracic sclerites.

*Ameletus cryptostimulus* n. sp.

*Male Imago*.—Body length 9.5 mm, fore wings 9.5 mm, caudal filaments 11 mm.

*Head*.—Upper portion of compound eyes light green, lower portion brown with transverse beige band, compound eyes separated dorsally by less than width of flagellar base; ocellar elevations dark brown, ocelli hyaline; vertex tan, dark brown toward compound eyes; clypeus predominately dark brown, whitish near base and lateral to antennae; annular antennal sclerites and scapes tan, pedicels brown, flagella smoky brown; posterior surface of head predominately dark brown.

*Thorax*.—Prothorax dark brown with membranes yellowish tan, anterior margin of pronotum white. Mesoscutum light brown, reddish brown on lateral faces, prescutum and mesoscutellum dark brown; membrane below prescutum and also mesothoracic spiracles yellowish white; subalar sclerites reddish brown; remainder of mesothorax dark brown with yellowish tan as follows: all membranes, longitudinal areas below subalar sclerites, and large areas surrounding mesocoxae which extend anteriorly and posteriorly. Metathorax mostly dark brown, lighter near base of metacoxae; base of hind wings, metathoracic spiracles and interlying area white.

*Legs*.—Coxae dark brown each with external light area, trochanters pale with brown shading; fore legs smoky brown, 1st tarsal segment ca. 0.5 the length of 2nd (fore tarsal ratio 2.0-2.2); middle and hind

legs pale with dark brown at extreme base, tarsi smoky brown.

*Wings*.—Hyaline with costal area of fore wings very faintly tinged with brown, stigmatic areas whitish; longitudinal veins tan, crossveins faintly tan.

*Abdomen*.—Abdominal tergum 1 dark brown with pale areas at anterior lateral angles, terga 2-8 dorsally bright yellow with paired submedian diffuse brown areas, terga 2-8 translucent greenish yellow laterally, shaded light brown at posterior lateral portions; terga 2-9 each with dark brown band at posterior margin, this band covering ca.  $\frac{1}{3}$  of each tergum; tergum 10 brown dorsally becoming white laterally. Sternum 1 brown, sterna 2-7 pale to tan with paired submedian spots, spots on sterna 2 and 3 distinct, spots on 4-7 obscure, sterna 8-10 white; caudal filaments tan with brown articulations.

*Genitalia*.—Styler plate pale shaded with brown and 0.6 as long at midline as wide (Fig. 1), posterior processes about as long as the 1st segment of forceps, penes receiver dome shaped with membrane white; forceps light tan, segment 2 gently curved, segments 2-4 slightly dilated at apex; penis lobes, ca. 0.5 dorsal length of penes with apices blunt and separated by about the length of a penis lobe, penes slightly constricted at base, stimuli well developed but not visible dorsally, stimuli ca. 0.25 dorsal length of penes with apices pointed directly posteriorly.

*Female Imago*.—Body length 9.5 mm, fore wings 10.2 mm.

*Head*.—Upper portion of compound eyes light green, lower portion brown with transverse beige band, compound eyes separated dorsally by ca. 2.4 times the width of a lateral ocellus; ocellar elevations dark brown, ocelli hyaline; vertex tan yellowish white toward compound eyes and with 2 submedian spots and posterior margin brown; a large area lateral to antennae white, remainder of head mostly brown as in male.

*Thorax*.—Prothorax colored as in male but with light areas more extensive. Mesoscutum beige with lateral faces light brown, prescutum and mesoscutellum brown; area below fore wing bases and prescutum including the mesothoracic spiracles white. The remainder of thorax colored as in male with light areas more extensive.

*Legs*.—Legs colored as in male.

<sup>1</sup> Received for publication Jan. 6, 1978.

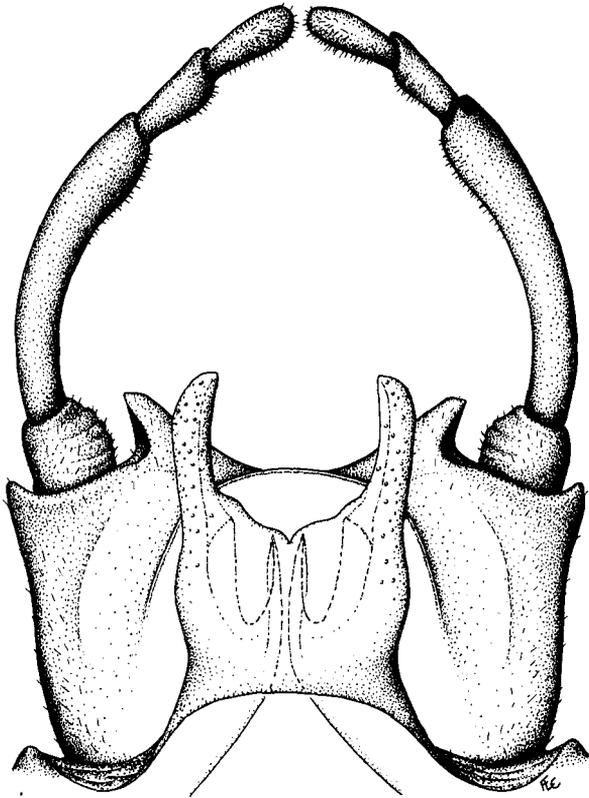


FIG. 1.—*Ameletus cryptostimulus*—dorsal view of male genitalia.

**Wings.**—Wings with similar venation and color as in male.

**Abdomen.**—Tergum 1 dark brown, lighter laterally, terga 2–7 light brown darker at posterior lateral portions, terga 2–7 or 8 each with a dark brown band at posterior margin as in male terga 8–10 brown, lighter laterally. Sternum 1 light brown, sterna 2–6 beige, sterna 7–9 light brown, white anteriorly. Posterior margin of sternum 9 sinuate laterally and with a notch at the apex which is ca. the same size and shape as either of the paired posterior lobes (Fig. 2).

**Nymph.**—Body length male 10–12 mm, female 11.5–13.5 mm, caudal filaments male 4–5 mm, female 5–6 mm.

**Head.**—Head brown with pale areas as follows: fine line along coronal suture; triangular area with base between antennae, and apex at anterior median margin of frons; area lateral to compound eyes; paired lateral stripes just above mandible bases that extend anteriorly along lateral margin of clypeus and are often confluent across clypeus; scapes, base of pedicels and flagella; and distal  $\frac{1}{2}$ – $\frac{3}{4}$  of mandibles. Maxillae with external dark area at base and another anterior to base of palpi, apical segment of palpi also brown; distal segment of palpi more than half the length of 3rd segment. Crown of each maxilla with 30–35 (male), 33–38 (female) setae; lateral maxillary

setae 12–13 with single apical setae much shorter and pectinate.

**Thorax.**—Prothorax brown with pale line along meson that widens abruptly at anterior margin; 2 pale submedian crescent-shaped stripes, lower stripe often broken posteriorly; and wide diffuse pale stripe laterally often reduced to anterior pale area. Mesonotum brown with fine pale mesal line and suggestion of “M” shaped posterior pale area, anterior portions of “M” shaped area often giving rise to narrow submedian pale streaks; mesonotum near base of wings with wavy dark brown and pale stripes. Metanotum brown with wide median band and large submedian pale bars. Thorax laterally mostly brown, thoracic sternum mostly pale.

**Legs.**—Legs covered with numerous minute spine-like setae, these setae reduced in number or entirely absent on pale areas; coxae and trochanters brown

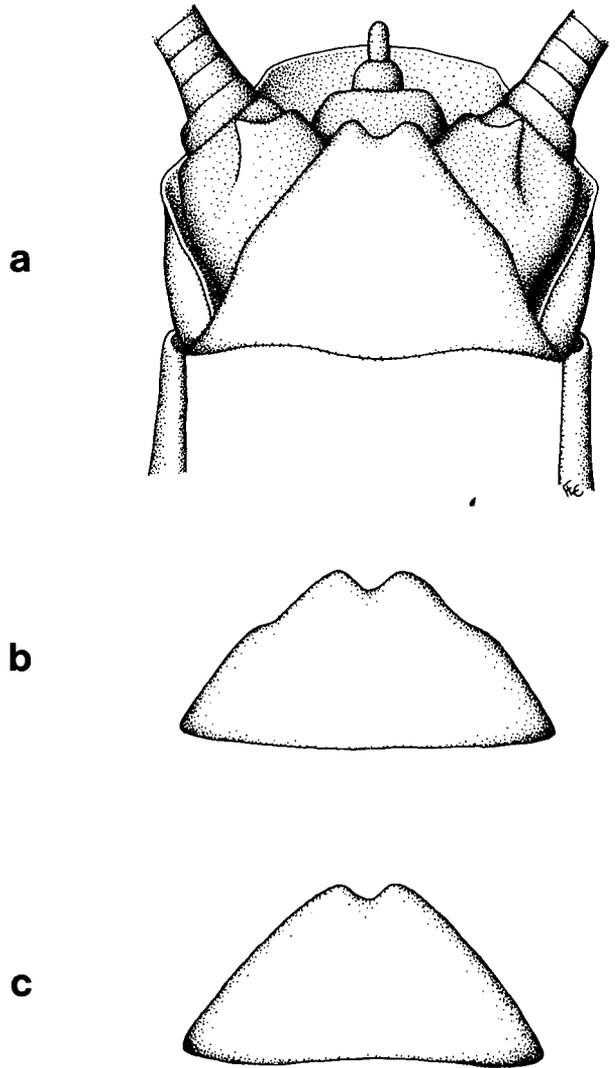


FIG. 2.—Ventral view of female apical sternite, a) *Ameletus cryptostimulus*, b) *Ameletus lineatus*, c) *Ameletus ludens*.

externally, femora brownish, pale at bases and each with elongate pale area at apex; apices of femora with row of stout spine-like setae: fore, middle, and hind femora with 5-6, 3, and 2 stout setae at apices, respectively. Tibiae and tarsi yellowish brown, tarsi dark brown at apex; tarsal claws without pectinations.

Abdomen.—Base color of abdominal terga variable, terga 1-9 generally grayish brown but terga 1 and 2, and 7-9 often mostly pale (Fig. 3), abdominal terga 1-9 with small mesal spear-shaped pale areas at bases of terga 1-7 to 9, these areas smallest on terga 4 and 5, largest on terga 2 and 7-9; submedian pale spots on terga 1-9 located just below and slightly posterior to paired dark brown spots that become kidney-shaped on terga 5-6 and crescent-like on terga 7-9; anterior lateral portion of terga 1-9 with dark brown "C"-shaped area partially surrounding pale spot, posterior lateral margins and anterior edge of terga 1-9 dark grayish brown, tergum 10 pale with pair of grayish brown streaks based on anterior margin; *posterior margins of terga 5 or 6-10 with spinules*, tergum 4 occasionally with weak spinules on submedian portion of posterior margin, small lobe near end of spinule row on terga 6-9 brown; gills on segments 1 and 2 ca. 0.45 as long as gills on segment 3, dorsal and ventral margins of gills sclerotized and with minute setae, gills 3-5 narrowly light at dorsal edge, trachea faintly brownish; lateral margins of segments 1-9 produced, those on 3-9 spine-like, relative lengths (1-2, 4, 6, 7, 8, 9, 9, 10, 10), respectively. Sterna pale with narrow dark lines along anterior margin of sterna and along pleural suture, small brown spot at anterior lateral angles of each sternum. Caudal filaments alternating pale and black in about proportions (0.28, 0.28, 0.28, 0.16), inner hair setae of cerci black proximally, white distally.

*Types*.—Holotype, male—Little Stony Creek, Giles County, Va.; reared Apr. 10, 1977; F. Carle; nymphal and subimaginal exuviae and adult in alcohol; deposited in U.S. National Museum of Natural History.

Allotype, female—Virginia: Data same as for holotype.

Paratypes—Virginia: Data same as for holotype, 2 males, 4 females, 28 male nymphs, 32 female nymphs, paratypes deposited in U.S. National Museum of Natural History, Florida A&M University Collection, and in the Virginia Polytechnic Institute and State University Collection.

*Remarks*.—The dome-shaped penes receiver of the male styliger plate separates *A. cryptostimulus* from all other *Ameletus*\* (Fig. 1). The penes are most similar to those of *A. vernalis*, which differs by having the stimulator spines located beneath each penis lobe; and *A. cooki*, which differs by lacking the basal constriction of the penes. The sinuate lateral border of the female apical abdominal sternite will separate *A. cryptostimulus* from *A. ludens*. The lateral border of the apical sternite is concave basally in *A. cryptostimulus* and convex in *A. lineatus* (Fig.

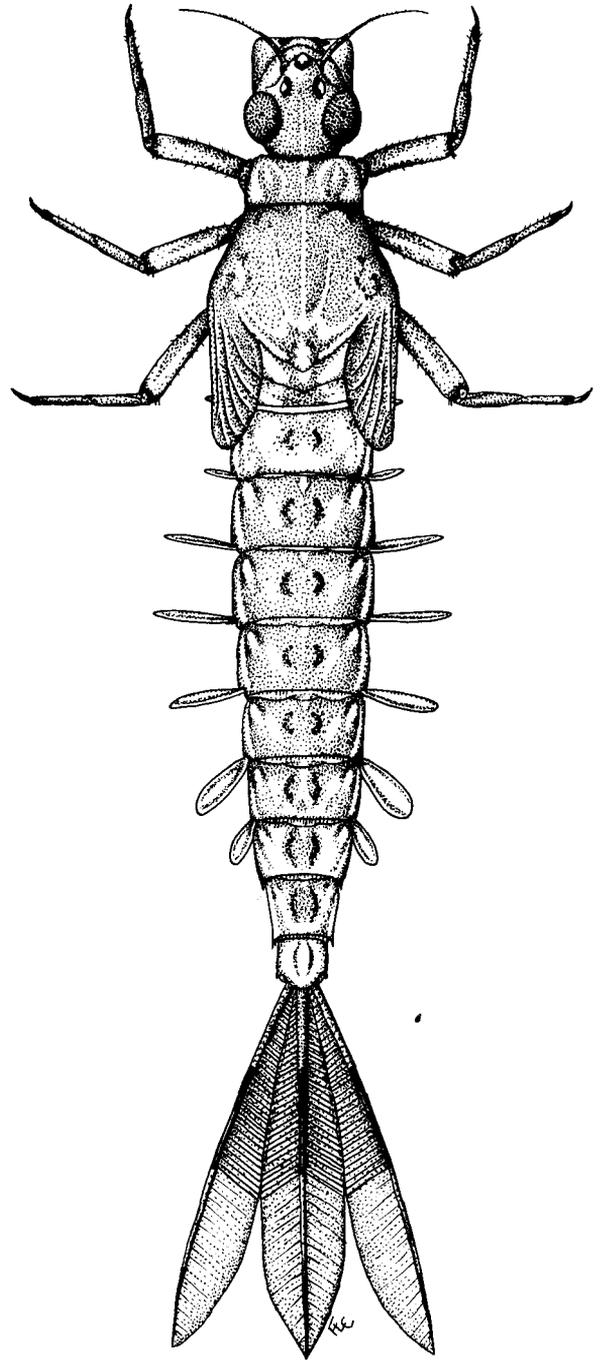


FIG. 3.—Dorsal view of *Ameletus cryptostimulus* nymph.

2). The brown markings of the vertex are spots in *A. cryptostimulus* and parallel bars in *A. lineatus*. Other useful adult characteristics include an absence of midventral abdominal ganglionic marks, and clear wings. The absence of posterior spinules on abdominal terga 1-4 or 5 (Fig. 3), will separate the nymphs from all described *Ameletus* (spinules are somewhat crenulate in *A. alticolis*). *Ameletus ludens*

and *A. lineatus* nymphs are additionally separated from *A. cryptostimulus* by the presence of brown stripes on the abdominal venter (occasionally not developed), and the sternal characteristics noted for adult females. Other useful nymphal characteristics include: distal segment of maxillary palpi more than one half as long as 3rd segment, indistinct gill tracheation, sclerotized band near the dorsal gill margins, black banded caudal filaments, and paired submedian brown spots of the abdominal terga.

Traver (1932) describes the nymphs of 2 unnamed "species?" from North Carolina. Her "sp? No. 1" differs by having ventral abdominal markings. "Species? No. 2" is similar in the relatively long distal segment of the maxillary palpi and is at least closely related to *A. cryptostimulus*, if not conspecific with it. I have not seen Traver's specimens.

*Etymology.*—*A. cryptostimulus* [cryp-to-sti-mu-lus] Gr. adj. *Cryptos* "hidden" and L. noun *Stimulus* "spur", referring to the inner spines of the male penes which are not visible dorsally.

*Ecology and Distribution.*—*Ameletus cryptostimulus* has been collected only from the head waters of Little Stony Creek, Va. The stream arises from a spruce bog and flows partially underground before reaching the collecting site at 1100 m. The stream may partially dry up in summer, but temperature varies only between 9° and 14°C. At 9:00 a.m. EST

on Apr. 29, a nymph was observed emerging at the type locality. The nymph crawled from the water and emerged at the water's edge. Several nymphal exuviae were subsequently collected from the downstream side of emergent rocks. Other Ephemeroptera species found with *A. cryptostimulus* are *Stenonema meririvulanum* Carle and Lewis and an occasional *Stenacron carolina* (Banks). Several collections of *Ameletus* from lower elevations in Virginia have contained female nymphs, which apparently represent strains of *A. lineatus* Traver.

#### ACKNOWLEDGMENT

I thank Dr. William L. Peters for helpful suggestions, and Boris C. Kondratieff for the loan of reared specimens of *Ameletus lineatus*. Special thanks is accorded to J. E. H. Martin for making available to the author McDunnough's material housed at the Canadian National Collection, Ontario.

#### REFERENCES CITED

- Eaton, A. E. 1883-88. A revisional monograph of recent Ephemeroptera or mayflies. Trans. Linn. Soc. London, 2nd Ser. Zool., No. 3.
- Knox, V. 1935. In J. G. Needham, J. R. Traver, and Y. C. Hsu. The Biology of Mayflies with a Systematic Account of North American Species. Comstock, Ithaca. 759 pp.
- Traver, J. R. 1932. Mayflies of North Carolina. Elisha Mitchell Sci. Soc. J. 47: 163-236.

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ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA