

# *Rheobaetis*: a New Genus from Georgia (Ephemeroptera: Baetidae)<sup>1,2</sup>

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## ABSTRACT

A new genus of the family Baetidae, *Rheobaetis*, from Georgia is established and 3 new species are described. The type-species, *Rheobaetis petersi* n. sp., is described from reared nymphs and imagos. *R. traversae* n. sp. is

described from nymphs and imagos collected at the same locality and date. *R. berneri* n. sp. is described from the nymphs only. Illustrated keys to the nymphs and imagos and notes on the ecology of the species are given.

During my stay at the Laboratory of Aquatic Entomology, Florida A & M University, Tallahassee, in 1970, Dr. L. Berner gave to me material of 2 species of Baetidae (3 male imagos, female imagos and sub-imagos, and nymphs) for study. The material was collected in 1954–56 in the Etowah River and several other rivers in Georgia. At first glance the nymphs of both species seemed very similar, but one of them had conspicuous ventral protuberances on the mesothorax, metathorax, and first 2 abdominal segments (Fig. 14 C). In June, 1971, Dr. Berner and Dr. W. L. Peters and his co-workers made an excursion to the Etowah River to collect and rear more material of these species. All material collected on that excursion was given to me for study.

The new material contained 3 species which were very similar to each other, but so different from nymphs of all known genera of Baetidae (Needham et al. 1935) that it is necessary to establish a new genus, *Rheobaetis*. All 3 species are found in small to large fast running waters with sandy and gravel bottoms.

### *Rheobaetis* Müller-Liebenau n. gen.

*Type-species*.—*Rheobaetis petersi* Müller-Liebenau n. sp.

*Imago*.—Length of male: body 5.0–6.5 mm, fore wings 4.5–6.9 mm. Length of female: body 5.0–7.4 mm, fore wings 4.1–8.0 mm. Fore wings with 2 intercalaries. Hind wings extremely minute; length of hind wings of male and female 0.2–0.3 mm; no longitudinal veins nor costal projection (Fig. 2 E, 25 B, C). Last forceps segment of male genitalia 2–2½ as long as broad (Fig. 3, 4).

*Mature Nymph*.—Short thread-like thoracic gills attached ventrally near base of prothoracic legs (Fig. 13 F). Small hind wing pads (Fig. 2 C, 14 D, 25 A). Outer margin of maxillae with several bristles near apex (Fig. 1 F). Terminal filament reduced to 1 segment as in Fig. 24 H, cerci with bristles on inner margin (Fig. 24 H). Legs stout; femora of prothoracic legs relatively shorter and broader than remaining femora (Fig. 2 A, 14 A, 24 F); tarsal claws with 2 dissimilar rows of teeth and fine sub-apical bristles (Fig. 2 B, 14 B, 24 G). Abdominal gills 1–7 with more or less darkly pigmented median area; gill margins without teeth, with only a few very fine bristles (Fig. 6, 8, 10).

Imagos of *Rheobaetis* can be differentiated from all

other genera of Baetidae by the following combination of characters: (1) extremely minute hind wings without longitudinal veins, and (2) hind wings without a costal projection. Nymphs can be differentiated from all other genera of Baetidae by the following combination of characters: (1) short thread-like thoracic gills attached ventrally near base of prothoracic legs [such gills also occur in some species of the genera *Baetodes* and *Dactylobaetis* (Traver and Edmunds 1968)]; (2) small hind wing pads; (3) terminal filament reduced to 1 segment; (4) tarsal claws with 2 dissimilar rows of teeth and 2 fine sub-apical bristles; and (5) abdominal gills with a more or less enlarged darkly pigmented median area; gill margins without teeth, with only a few very fine bristles.

### *Rheobaetis petersi* Müller-Liebenau n. sp.

*Male Imago*.—Length: body 6.5 mm, fore wings ca. 6.9 mm, hind wings ca. 0.3 mm, cerci ca. 14 mm. Turbinate eyes orange-brown. Fore wings (Fig. 2 D) transparent, apex and subcostal field milky; hind wings very small (Fig. 2 E). Thorax and abdominal segment 1 dark chestnut-brown; abdominal segments 2–6 translucent milky, hind margins of terga with a small dark brown border; abdominal segments 7–10 brown, nearly chestnut-brown as thorax. Prothoracic legs brownish; mesothoracic and metathoracic legs milky; tarsal claws dark brown. Forceps and cerci milky, basal 10–20 segments of cerci with brownish rings at articulations. Forceps (Fig. 3): segment 3 relatively short and broad.

*Female Imago*.—Length: body 7.4 mm, fore wings ca. 8 mm, hind wings ca. 0.3 mm, cerci broken off and missing. Thorax light brown with lighter and darker markings on pronotum and mesonotum. Abdomen light brown, segments 7–10 a little darker. All legs translucent yellowish-brown, femora of prothoracic legs with darker brownish shadow. Cerci translucent whitish at base with darker rings similar to male.

*Mature Nymph*.—Length of male: body 7–8 mm, cerci 5–6 mm. Length of female: body 8–10 mm, cerci 6–7 mm. Color pattern (Fig. 6): yellow-brown, without any well defined pattern; muscle insertions on dorsum of abdomen almost indistinguishable from their surroundings; pronotum without any well defined pattern. Abdominal gills (Fig. 6): shaded grey to greyish-brown over most of surface with only a small whitish border; tracheae sometime clearly vis-

<sup>1</sup> Received for publication Feb. 15, 1974.

<sup>2</sup> Endorsed and communicated by William L. Peters.

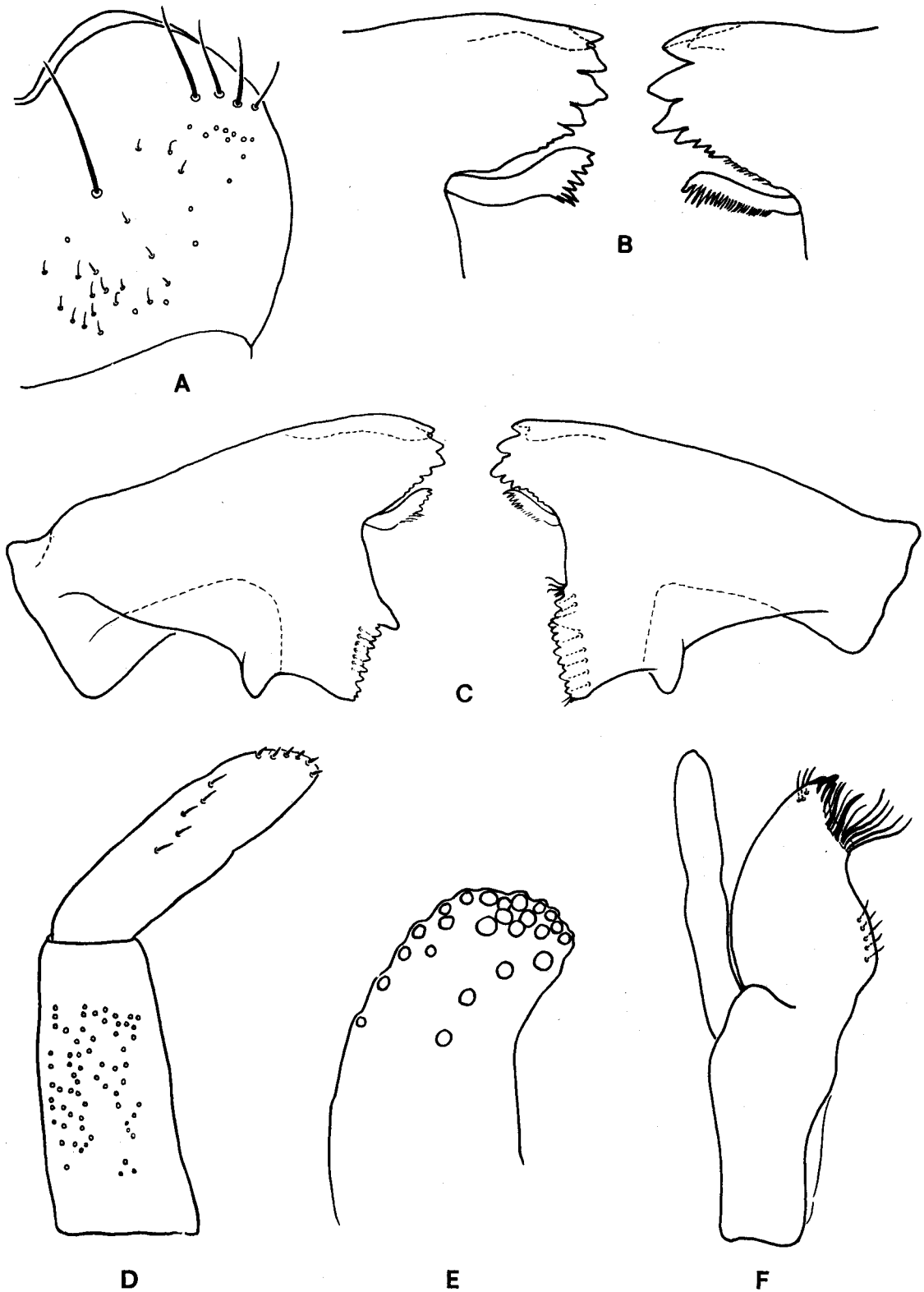


FIG. 1.—Nymph of *Rheobaetis petersi* n. sp. A, right half of labrum; B, canini area of mandibles; C, left and right mandibles; D, labial palpus; E, apex of glossa of labium; F, maxilla.

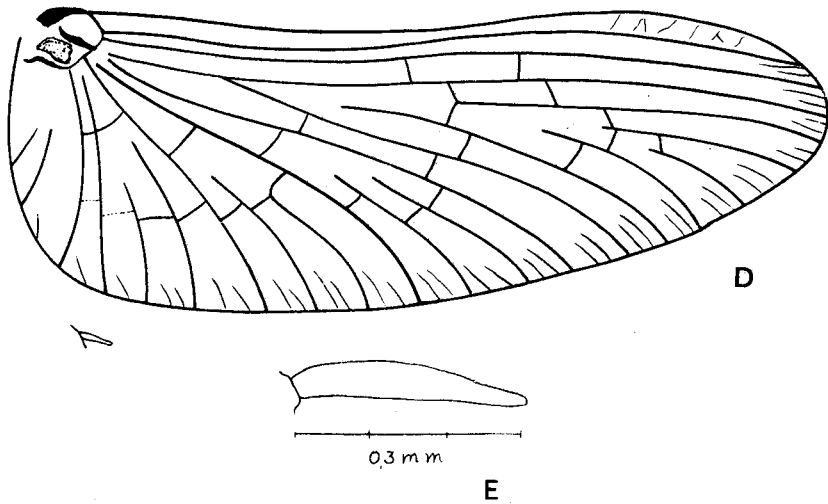
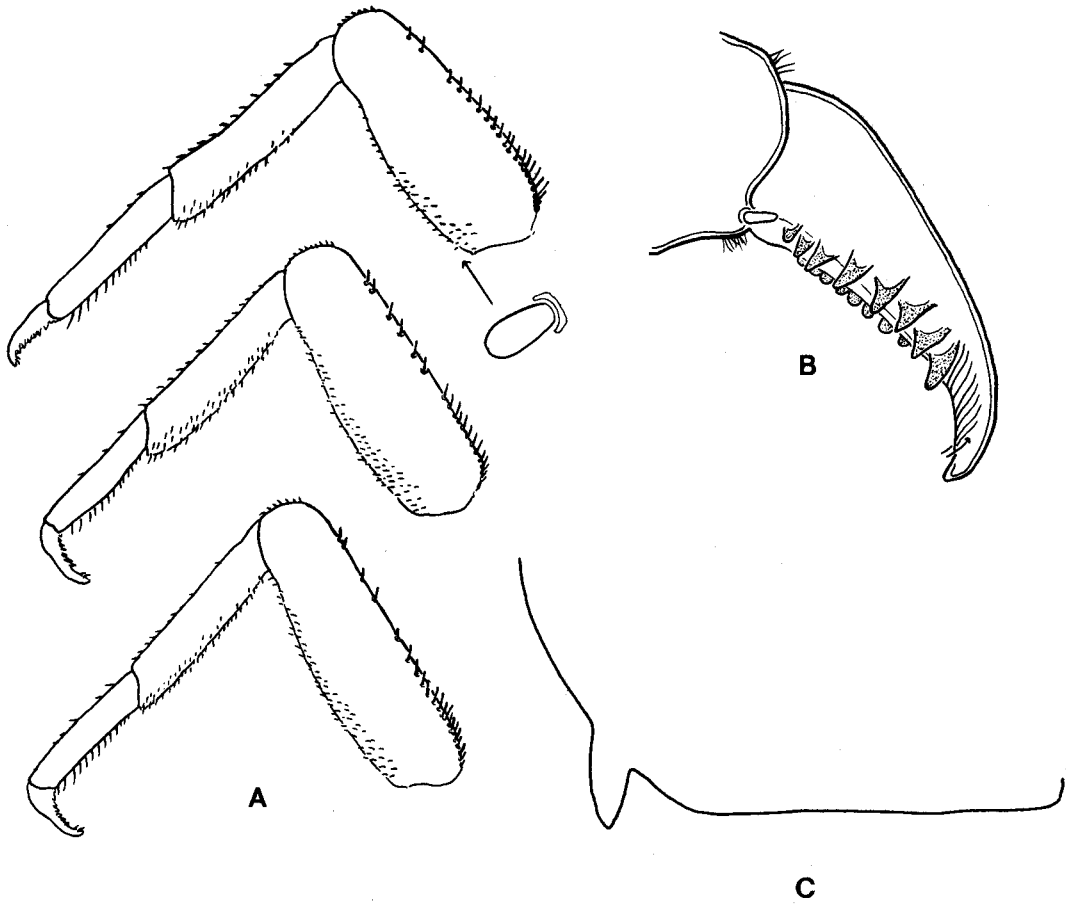


FIG. 2.—*Rheobaetis petersi* n. sp. A, pro-, meso-, and metathoracic legs of nymph; B, tarsal claw of nymph; C, left half of nymphal metatergum with hind wing pad; D, wings of male imago (fore and hind wings at same magnification); E, hind wing of male imago (at higher magnification).

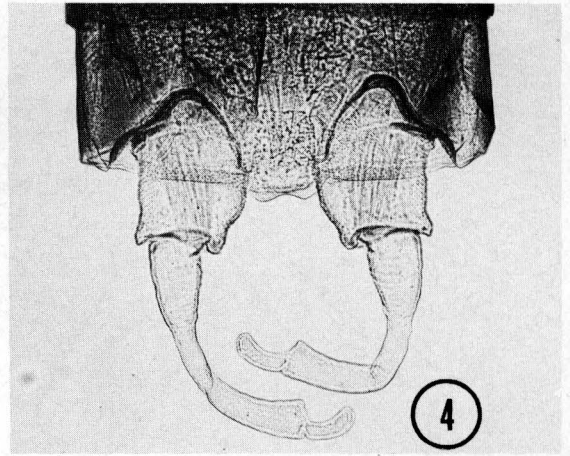
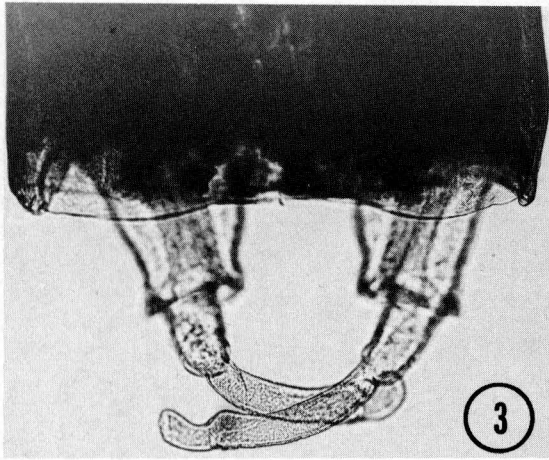


FIG. 3.—Forceps of male imago of *Rheobaetis petersi* n. sp.  
FIG. 4.—Forceps of male imago of *Rheobaetis traveræ* n. sp.

ible, sometimes not. Prothoracic legs with a short thread-like thoracic gill attached ventrally near base (as in Fig. 13 F).

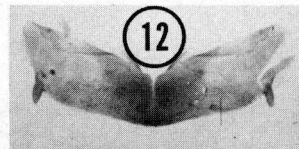
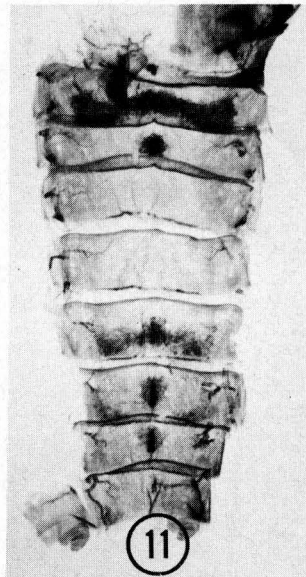
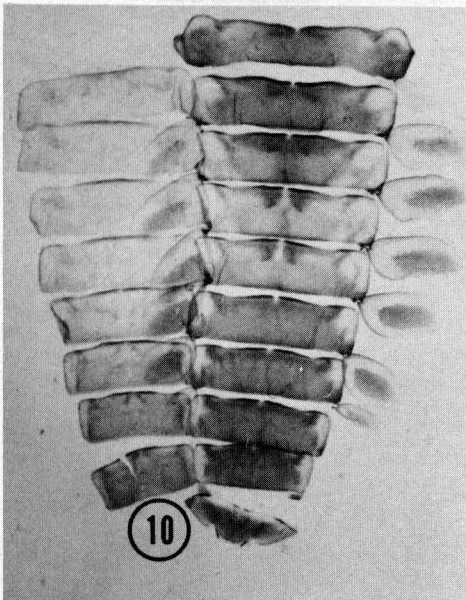
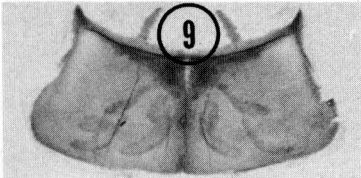
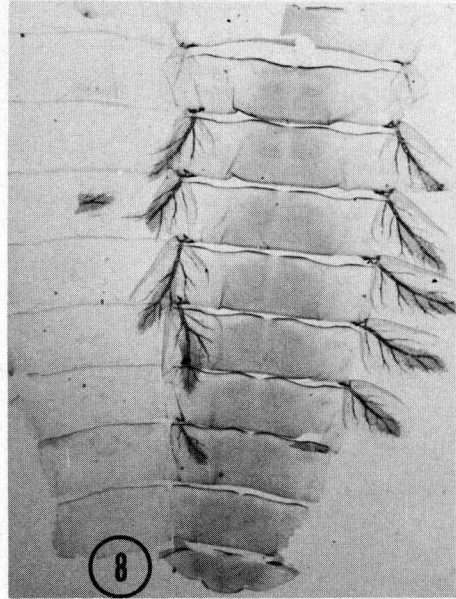
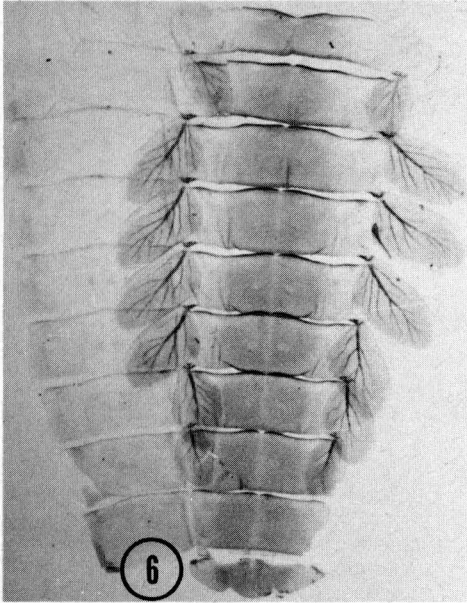
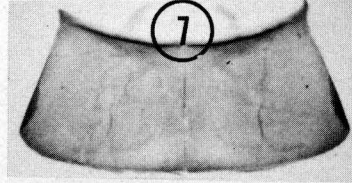
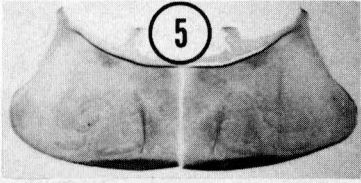
Spination.—*a*) Mouthparts: labrum (Fig. 1 A) with 1 + 3–5 submedian submarginal bristles and many fine bristles on surface. Mandibles (Fig. 1 B, C) stout with heavy teeth, outer margin at apex ventrally bowed so 2 outermost teeth ventral, venter of molar area with several bristles. Maxillary palpi (Fig. 1 F) 2-segmented, stout, about as long as galealacinia or a little shorter; maxillae with several bristles on outer apical margin. Segment 3 of labial palpi (Fig. 1 D) longer than broad, inner margin nearly straight, inner apical lobe of segment 2 very weakly indicated; paraglossae (Fig. 1 E) narrow with 3 ventral rows of bristles inserted tightly together, bristles most frequent on inner apical margin. *b*) Surface of pronotum (Fig. 5): with small bristles and tiny pores smaller than bases of bristles, a few larger scattered pores. *c*) Abdominal terga (Fig. 15, 16): similar to pronotum with semicircular light areas caudad to bristle insertions; hind margins with semicircular chitinous notches in 3 or 4 pantile-like rows; sterna with fine bristles and fine pores. *d*) Hind wing pads (Fig. 2 C): very small, corresponding to small size of hind wings. *e*) Paraprocts (Fig. 21): with regular blunt teeth slightly beyond middle of inner margin, short blunt submarginal teeth at inner margin, upper surface with chloride cells (Wichard et al. 1972) and fine bristles. *f*) Cerci: with many fine hairs at inner margin (as in Fig. 24 H). *g*) Abdominal gills (Fig. 6): broad, margin nearly straight with only a few fine bristles; surface with fine bristles and

chloride cells. *h*) Legs (Fig. 2 A): dorsum of femora, tibiae, and tarsi with fine small bristles. Outer margin of femora with a row of bristles, short strong bristles on apical curvation interspaced with fine bristles; venter of femora with strong, mostly blunt, bristles in a broader field, basally more or less tufted, apically decreasing in number and size. Outer margin of tibiae with a tight row of short stout bristles, inner margin with bigger bristles increasing apically in size. Outer margin of tarsi with scattered bristles, inner margin with an even row of stronger bristles apically increasing in size. Tarsal claws (Fig. 2 B): 5–7 long pointed teeth at outer margin; about 7–8 short rounded subequal teeth at inner margin; 2 fine bristles below apex of claws, 1 on each side (apex often worn and fine subapical spines sometimes hard to recognize).

This species is named for one of the collectors of the material, Dr. W. L. Peters.

**Holotype:** Imago (male) (with nymphal exuvium and subimaginal skin): Georgia: Cherokee Co., Etowah River at junction of State Road S861, 6½ mi. ESE of Ball Ground, 22-25-VI-1971, W. L. & J. G. Peters, L. Berner, W. M. Beck, P. T. P. Tsui and M. L. Pescador. **Paratypes:** 2 males with nymphal exuvia, 15 subimago males with nymphal exuvia, 1 female with nymphal exuvium, 6 females with nymphal exuvia and subimaginal skin, 15 subimaginal females with exuvia, 303 nymphs, all same data as holotype; 10 nymphs, Georgia: Cherokee Co., Etowah River at dirt road SE of Gober, 23-VI-1955, C. D. Hynes and L. Berner; 3 nymphs, Georgia: Cherokee Co., Etowah River at road SE of Gober,

FIG. 5–6.—Nymphal exuvium of *Rheobaetis petersi* n. sp. (pronotum, Fig. 5, at higher magnification).  
FIG. 7–8.—Nymphal exuvium of *Rheobaetis berneri* n. sp. (pronotum, Fig. 7, at higher magnification).  
FIG. 9–10.—Nymphal exuvium of *Rheobaetis traveræ* n. sp. (pronotum, Fig. 9, at higher magnification).  
FIG. 11.—Abdominal segments 2–9 of *Rheobaetis traveræ* n. sp. (nymphal body removed just before molting).  
FIG. 12.—Nymphal metanotum of *Rheobaetis traveræ* n. sp. with small hind wing pads visible.





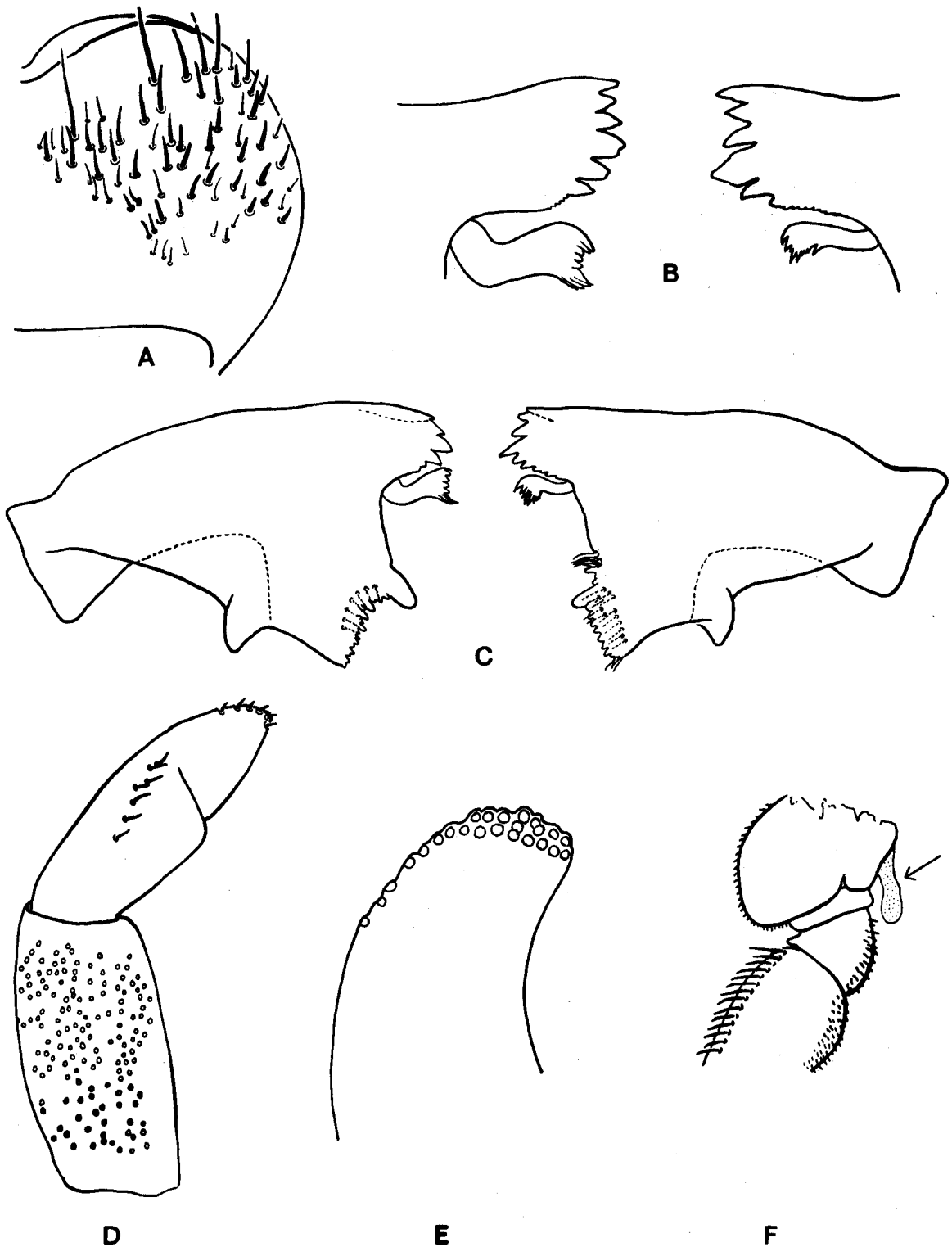


FIG. 13.—Nymph of *Rheobaetis berneri* n. sp. A, right half of labrum; B, canini area of mandibles (seen in sloping position from above); C, left and right mandibles; D, labial palpus; E, apex of glossa of labium; F, thoracic gill attached ventrally near the base of prothoracic leg.

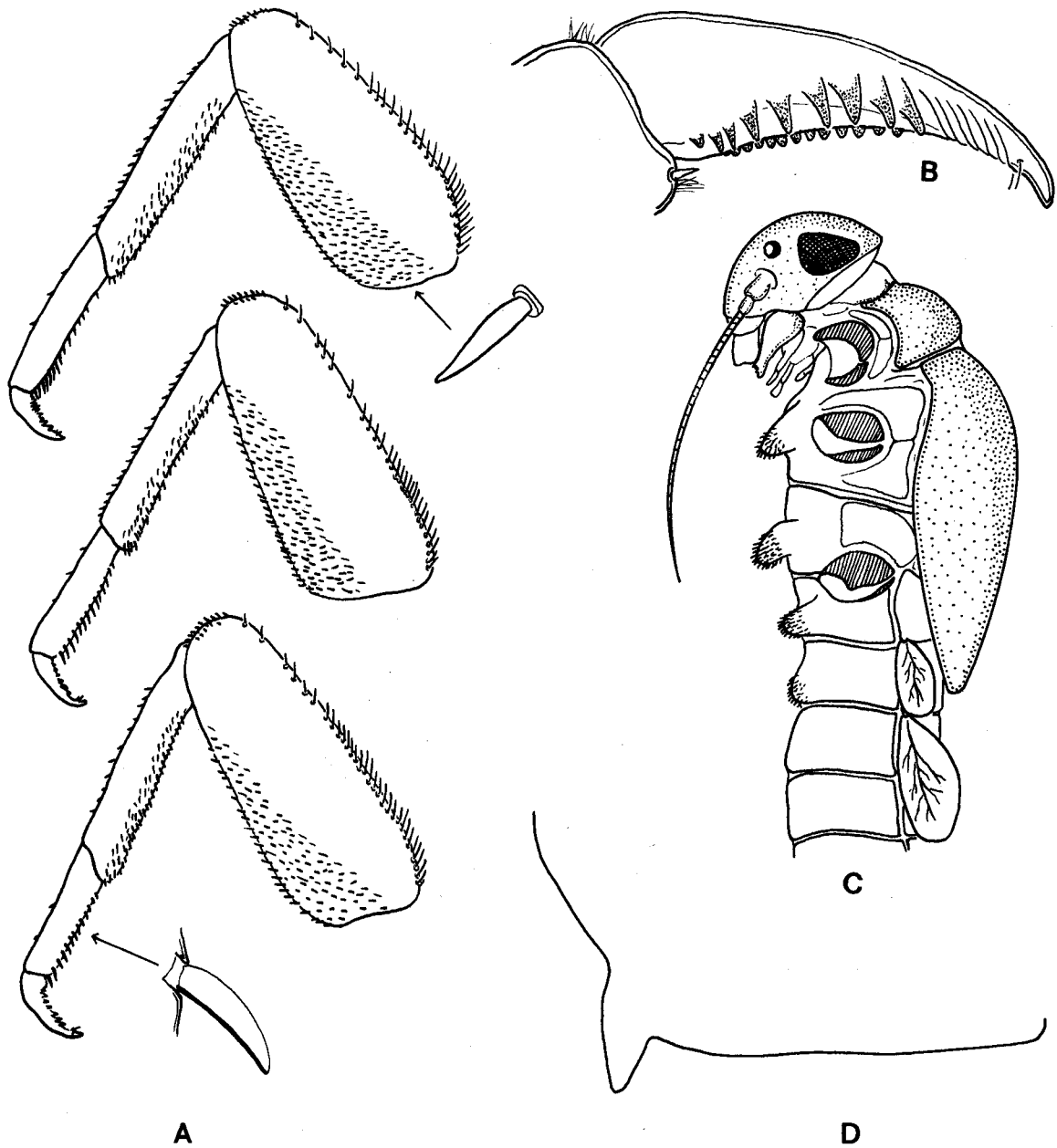


FIG. 14.—Nymph of *Rheobaetis berneri* n. sp. A, pro-, meso-, and metathoracic legs; B, tarsal claw; C, protuberances on the venter (lateral view); D, left half of metatergum with hind wing pad.

13-VIII-1955, C. D. Hynes and L. Berner. All specimens are preserved in alcohol. The holotype is deposited at Zoologisches Staatsinstitut und Zoologisches Museum, Abteilung Entomologie, Hamburg, West Germany. One male paratype, 1 subimago male paratype, 1 female paratype, 2 subimago female paratypes, and 20 nymphal paratypes are in my collection in Plön. Thirteen nymphal paratypes are in the Berner Collection, Gainesville, Fla. All remaining types are deposited at Florida A & M University. Association of nymphs and male and female adults from the same locality is by rearing.

The tracheae of the abdominal gills are variable among the nymphs. In some specimens the tracheae are clearly visible; in other specimens they are not.

*R. petersi* can be distinguished from *R. berneri* and *R. traversae* by the following combination of characters. In the imago, (1) forceps segment 3 of the male genitalia is short and broad (Fig. 3), (2) abdominal segments 2-6 are translucent milky, with the posterior margins darker, and (3) the female abdominal segments are light brown with segments 7-10 a little darker. In the nymphs, (1) abdominal gills are shaded uniformly grey with only a small

white border (Fig. 6), (2) no ventral protuberances occur on the mesothorax, metathorax, or first 2 abdominal segments, and (3) short blunt submarginal teeth occur on the paraprocts (Fig. 21).

*Rheobaetis bernerii* Müller-Liebenau n. sp.

*Male and Female Imagos.*—Unknown.

*Male Subimago.*—Length: body 7 mm, fore wings ca. 6.5 mm (not completely unfolded), hind wings extremely small, cerci partly broken. Turbinate eyes light orange-brown. Fore wings translucent light greyish-brown, hind wings greyish-brown. Abdomen light yellowish-brown dorsally, lighter ventrally; thorax a little darker than dorsum of abdomen; legs

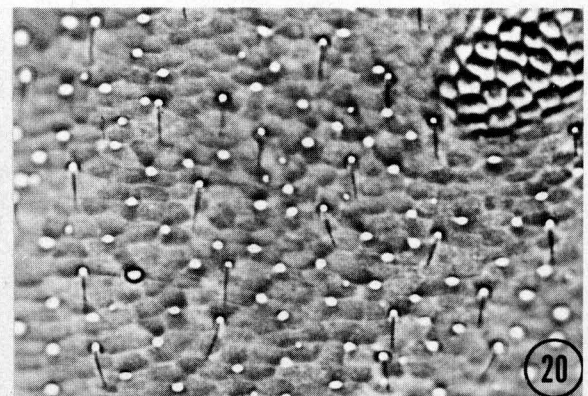
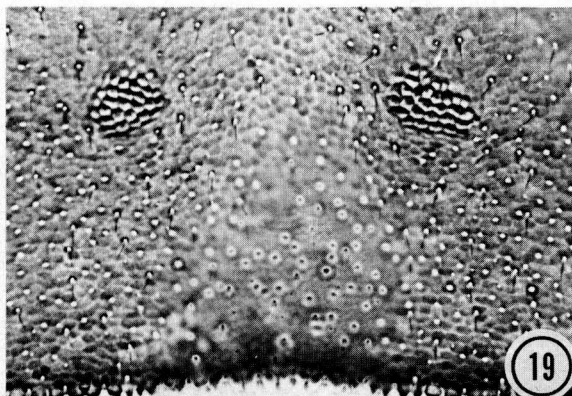
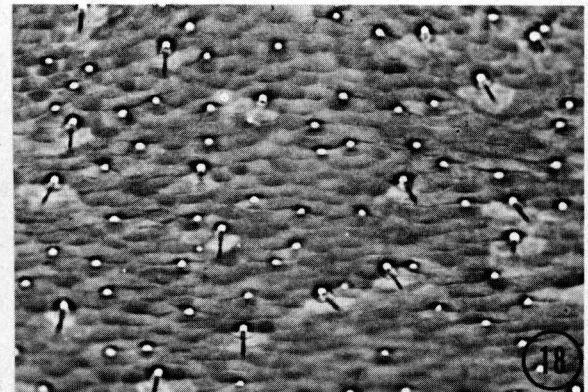
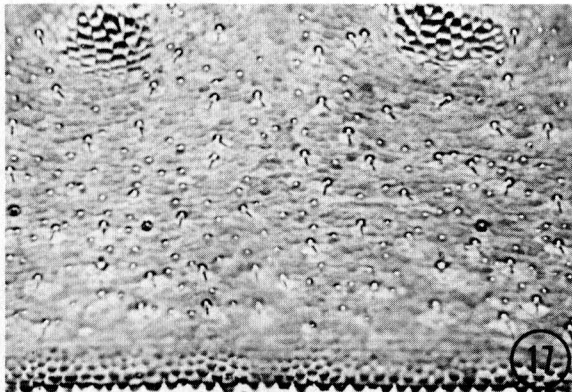
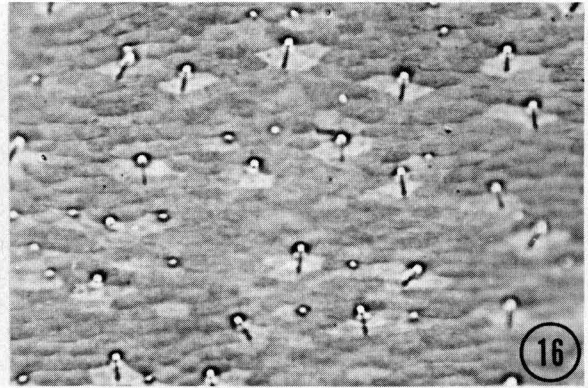
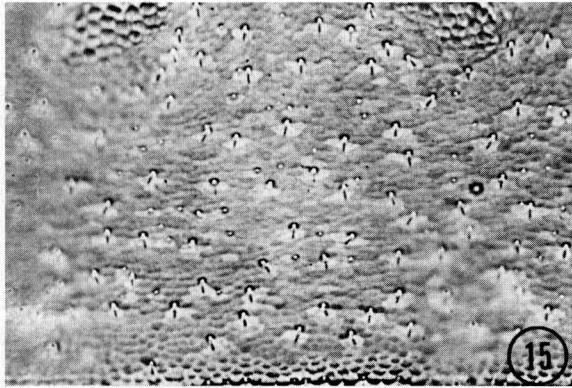


FIG. 15-16.—Surface and hind margin of nymphal tergum of *Rheobaetis petersi* n. sp. (Fig. 16 at higher magnification).

FIG. 17-18.—Surface and hind margin of nymphal tergum of *Rheobaetis bernerii* n. sp. (Fig. 18 at higher magnification).

FIG. 19-20.—Surface and hind margin of nymphal tergum of *Rheobaetis traveræ* n. sp. (Fig. 20 at higher magnification).



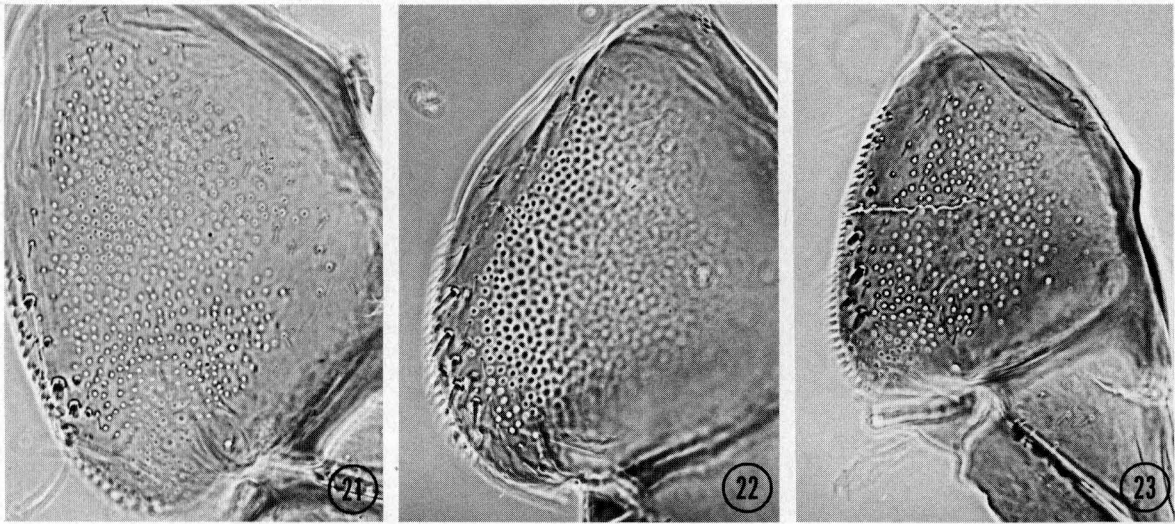


FIG. 21.—Nymphal paraproct of *Rheobaetis petersi* n. sp.  
 FIG. 22.—Nymphal paraproct of *Rheobaetis berneri* n. sp.  
 FIG. 23.—Nymphal paraproct of *Rheobaetis traversae* n. sp.

creamy, tarsal segments with darker brown articulations distally; cerci greyish-brown. Thoracic gills present.

*Female Subimago*.—Length: body 7 mm, fore wings ca. 6.5 mm (not completely unfolded), hind wings extremely small, cerci partly broken or completely lacking. Color generally as in male, but body a little darker, cerci a little lighter. Thoracic gills present, a little bigger than in male.

*Mature Nymph*.—Length of male: body ca. 7–8 mm, cerci 4.5 mm. Length of female: body 9–10 mm, cerci ca. 5 mm. Color pattern (Fig. 8): yellow-brown, without any well defined pattern; muscle insertions on head, pronotum, and abdominal terga often only a little darker than surroundings and not clearly recognizable. Abdominal gills (Fig. 8): a well defined, narrow, long, oval, dark field in middle of gills; dark pigmented border of gills broader at base than at apex; tracheae sometimes visible, sometimes not. Prothoracic legs with a short threadlike thoracic gill attached ventrally near base (Fig. 13 F). A large protuberance on the ventral side of mesothorax, metathorax, and abdominal segment 1, and a small protuberance on abdominal segment 2; all protuberances bearing many bristles (Fig. 14 C).

*Spination*.—*a*) Mouthparts: labrum (Fig. 13 A) without well defined submarginal row of bristles, whole surface with spines. Mandibles (Fig. 13 B, C) with strong teeth; venter near base of molar area with many bristles, dorsum with fine bristles and fine pores. Maxillary palpi 2-segmented, as long as galea-lacinia or a little longer; maxillae with several bristles on outer apical margin. Segment 3 of labial palpi (Fig. 13 D) relatively long, small inner apical lobe of segment 2 only a weak protuberance; paraglossae (Fig. 13 C) and glossae relatively short and broad; bristles on venter of paraglossae in 3 close subapical rows, single rows not well defined, bristles

most frequent at apex. *b*) Surface of pronotum (Fig. 7): with fine bristles and fine pores smaller than bases of bristles, some larger pores. *c*) Abdominal terga (Fig. 17, 18): similar to pronotum with fine bristles and small pores, posterior to these a light dot; hind margins with semicircular chitinous notches, anterior to them 3 or 4 rows of similar notches in pantile-like rows; sterna with several fine bristles and fine pores. *d*) Hind wing pads (Fig. 14 D): very small. *e*) Paraprocts (Fig. 22): with an even row of small, pointed submarginal spines near middle of inner margin; dorsum with a large median field of chloride cells. *f*) Cerci: with many fine hairs at inner margin (as in Fig. 24 H). *g*) Abdominal gills (Fig. 8): broad, rounded at apex; margin nearly straight with only a few fine bristles; dorsum with fine bristles and chloride cells. *h*) Legs (Fig. 14 A): dorsum of femora, tibiae, and tarsi with short, very fine bristles. Outer margin of femora with an even row of bristles, inner margin and remainder of dorsum and venter of legs with a large field of pointed bristles. Outer margin of tibiae with a row of short pointed bristles, inner margin with smaller pointed bristles increasing distally in number and size. Outer margin of tarsi with only single bristles, inner margin with large knife-like bristles. Tarsal claws (Fig. 14 B) with 2 dissimilar rows of teeth and 2 fine subapical bristles.

This species is named for Dr. L. Berner who first collected the nymph of this unusual species.

**Holotype:** 1 mature male nymph, Georgia: Lumpkin Co., Chestatee River at Highway 52, 13-VIII-1955, C. D. Hynes and L. Berner. **Paratypes:** 2 subimago males with exuvia, 3 subimago females with exuvia, 46 nymphs, Georgia: Cherokee Co., Etowah River at junction of State Road S861, 6½ mi. ESE of Ball Ground, 22-25-VI-1971, W. L. and J. G. Peters, L. Berner, W. M. Beck, P. T. P. Tsui, and

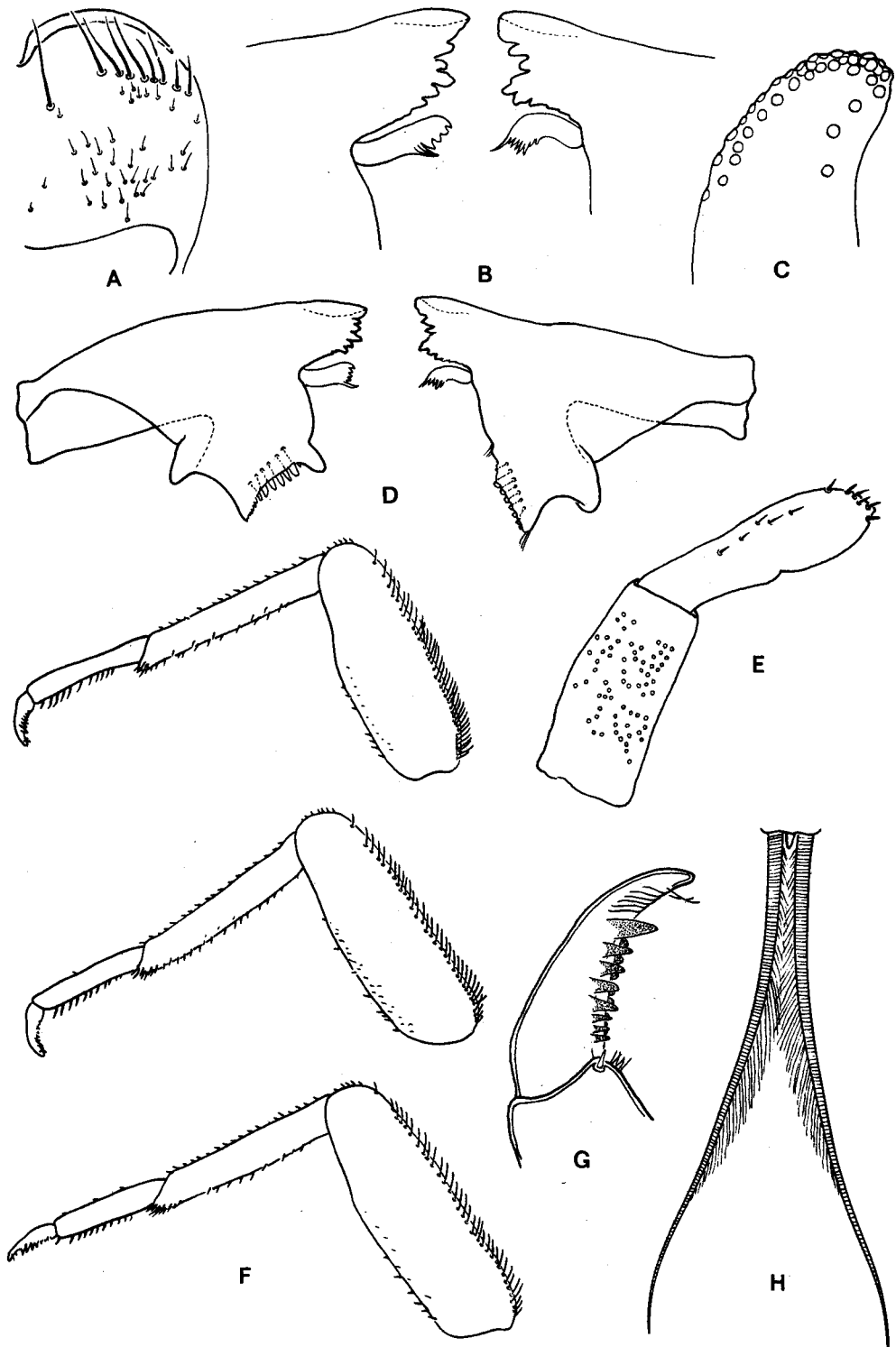


FIG. 24.—Nymph of *Rheobaetis traveræ* n. sp. A, right half of labrum; B, canini area of mandibles; C, apex of glossa of labium; D, left and right mandibles; E, labial palpus; F, pro-, meso-, and metathoracic legs; G, tarsal claw; H, cerci and reduced, one-segmented terminal filament.

M. L. Pescador; 1 nymph, Georgia: Cherokee Co., Etowah River near Canton, 8-X-1950, H. P. Nicholson; 7 nymphs, Georgia: Cherokee Co., Etowah River, dirt road SE of Gober, 23-VI-1955, C. D. Hynes and L. Berner; 1 nymph, Georgia: Lumpkin Co., Yahola Creek, ¼ mi. E of Dahlonega, 20-VII-1955, C. D. Hynes; 1 nymph, Georgia: Cherokee Co., Etowah River near Highway 5, N of Canton, 30-VII-1954, C. D. Hynes; 5 nymphs, Georgia: Lumpkin Co., Chestatee River at Highway 52, 13-VIII-1955, C. D. Hynes and L. Berner; 5 nymphs, Georgia: Cherokee Co., Etowah River at dirt road SE of Gober, 18-VIII-1956, C. D. Hynes and L. Berner; 2 nymphs, Georgia: Lumpkin Co., creek 1 mi. E of Dahlonega at Highway 52, 19-VIII-1956, C. D. Hynes and L. Berner. All specimens are preserved in alcohol. The holotype is deposited at Zoologisches Staatsinstitut und Zoologisches Museum, Abteilung Entomologie, Hamburg. One paratype subimago male, 1 paratype subimago female, 5 paratype nymphs are in my collection in Plön. One paratype subimago male with exuvium, 2 paratype subimago females, 42 paratype nymphs are in the collection of Florida A & M University. All remaining types are in Dr. Berner's collection.

The general color of the abdominal segments is variable among the nymphs. In some specimens the color is a little darker, especially on the anterior segments.

*R. berneri* can be distinguished from *R. petersi* and *R. traveræ* by the following combination of characters. In the nymphs, (1) a large, ventral protuberance occurs on the mesothorax, metathorax, and abdominal segment 1, and a small, ventral protuberance occurs on abdominal segment 2, (2) abdominal gills have a well defined, narrow, long, oval, dark field in middle (Fig. 8), and (3) small, pointed submarginal spines occur on the paraprotecs (Fig. 22).

#### *Rheobaetis traveræ* Müller-Liebenau n sp.

*Male Imago*.—Length: body 5 mm, fore wings ca. 4.9 mm, hind wings ca. 0.2 mm, cerci 9–10 mm. Turbinate eyes light yellow-brown. Wings transparent, costal and subcostal area at apex milky; fore wings with 2 intercalaries; hind wings (Fig. 25 B, C) without veins. Thorax and abdominal segment 1 light chestnut-brown, abdominal segments 2–6 translucent milky, abdominal segments 7–9 light brown, abdominal segment 10 milky; abdominal segment 1 with a small dark brown median dot, segment 2 with a dark brown median and a larger lighter brown dot on each side, segment 3 with a dark brown median dot, segments 4–5 completely translucent without any pattern, segment 6 pale in anterior half and light brown in posterior half; segments 6–9 with a small dark longitudinal stripe. Legs milky, only femora of prothoracic legs brownish as in thorax. Forceps and cerci milky. Forceps (Fig. 4): segment 3 long and narrow.

*Female Imago*.—Length: body ca. 5.0 mm, fore wings ca. 4.1 mm, hind wings ca. 0.2 mm, cerci ca. 7–8 mm. Thorax light brown with lighter and darker

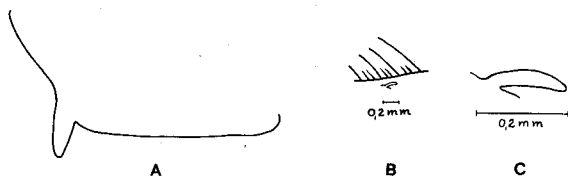


FIG. 25.—*Rheobaetis traveræ* n. sp. A, left half of nymphal metatergum with small hind wing pad; B, hind wing of male imago in relation to part of fore wing; C, hind wing of male imago (at higher magnification).

markings on pronotum and mesonotum. Abdomen light yellowish-brown; color pattern on dorsum of abdomen similar to male and nymphal bodies (Fig. 11).

*Mature Nymph*.—Length of male and female ca. 6–7 mm, cerci about equal length of abdomen. Color pattern (Fig. 9, 10): several small, paired, darker muscle insertions on head in 2 ill-defined longitudinal rows; muscle insertions on pronotum poorly defined, pronotum with a darker pigmented border; well defined color pattern on dorsum of abdomen. Legs light brown with dark markings; muscle insertions on femora an irregularly broken, dark line submarginal to outer margin; tarsi with distal portions darker than basal portions; tarsal claws dark. Cerci same color as body. Abdominal gills (Fig. 10): a short, rounded, dark-pigmented area in middle of lamellae, margins with a darker border near base; tracheae distinct. Coxae of prothoracic legs with a short thread-like thoracic gill attached ventrally near base (as in Fig. 13 F).

*Spination*.—a) Mouthparts: labrum (Fig. 24 H) with 1 + 8–10 submedian submarginal bristles, fine bristles scattered on surface. Mandibles (Fig. 24 B, D) with 2 well-defined groups of canini, outermost tooth broadest. Maxillary palpi 2-segmented, about as long as galea-lacinia; maxillae with several fine submarginal bristles at apex. Segment 3 of labial palpi (Fig. 24 E) relatively long and narrow, inner apical lobe of segment 2 weak; venter of paraglossae (Fig. 24 C) with 2 or 3 irregular subapical rows of bristles. b) Surface of pronotum: with fine bristles and small pores approximately the same size as bases of bristles; very small scale-like bristles sporadic, hyaline, bubble-like, ill-defined, and difficult to recognize; pores and bristles close together. c) Abdominal terga: spination on surface similar to that of pronotum with bubble-like scales scattered [terga in middle part of abdomen vaulted behind muscle insertions (recognizable in Fig. 19, out of focus)]; muscle insertions rounded; hind margins with a single row of notches; sterna with fine bristles and fine pores. d) Hind wing pads (Fig. 12, 25 A): very small. e) Paraproctcs (Fig. 23): with an even row of small teeth and several short, blunt submarginal bristles; surface with a wide field of chloride cells and fine bristles. f) Cerci: with many fine hairs at inner margin (Fig. 24 H). g) Abdominal gills (Fig. 10): broad, oval, rounded at apex; margin straight with only a few fine bristles, margin without



FIG. 26.—Etowah River, Ball Ground, Cherokee County, Georgia, Oct., 1970. Phot. Müller-Liebenau.

FIG. 27.—Chestatee River at Highway 52, Lumpkin County, Georgia, Aug. 13, 1955. Phot. Berner.

teeth; surface with chloride cells and fine bristles. *h*) Legs (Fig. 24 F): dorsum of femora, tibiae, and tarsi with fine bristles. Outer margin of femora with an even row of bristles, inner margin with small pointed bristles, submarginal border with blunt bristles. Outer and inner margins of tibiae with stout bristles. Outer margin of tarsi with 1 or 2 single bristles, inner margin with 7–10 bristles apically increasing in size. Tarsal claws (Fig. 24 G) with 2 dissimilar rows of teeth and 2 fine bristles below apex of claws, 1 on each side.

This species is named for Dr. Jay R. Traver, Amherst, Mass.

**Holotype:** 1 mature male nymph, Georgia: Cherokee Co., Etowah River at junction of State Road S861, 6½ mi. ESE of Ball Ground, 22-25-VI-1971, W. L. and J. G. Peters, L. Berner, W. M. Beck, P. T. P. Tsui, and M. L. Pescador. **Paratypes:** 41 nymphs, same data as holotype; 9 nymphs, Georgia: Cherokee Co., Etowah River at dirt road SE of Gober, 23-VI-1955, C. D. Hynes and L. Berner; 1 nymph, Georgia: Lumpkin Co., Chestatee River at Highway 52, 13-VIII-1955, C. D. Hynes and L. Berner; 3 males, 10 females, 3 subimago females, Georgia: Cherokee Co., Etowah River at road SE of Gober, 13-VIII-1955, C. D. Hynes and L. Berner; 5 subimago males, 2 subimago females, Georgia:

Cherokee Co., Etowah River at dirt road SE of Gober, 18-VIII-1955, C. D. Hynes and L. Berner. All specimens are preserved in alcohol. The holotype is deposited at Zoologisches Staatsinstitut und Zoologisches Museum, Abteilung Entomologie, Hamburg. One paratype male, 1 paratype female, 1 paratype subimago male, 1 paratype subimago female, and 4 paratype nymphs are in my collection in Plön. Thirty-six paratype nymphs are in the collection of Florida A & M University. All remaining types are in the Berner collection. Nymphs and male and female adults are associated from specimens collected at the same locality by similarities in color pattern. The color pattern on the dorsum of the nymphal abdomen is sometimes visible through the exuvium. In cases where the nymph is ready to molt, the exuvium can be removed in preparation (Fig. 11); then the color pattern is visible on the body of the next instar or subimago and is used to associate nymphs and subimagos.

The color pattern of the abdominal terga is variable among the male imagos. In some specimens the dots on tergum 2 are fused together into a transverse band with irregular margins.

*R. traverae* can be distinguished from *R. petersi* and *R. berneri* by the following combination of characters. In the imagos, (1) forceps segment 3 of the male genitalia is long and narrow (Fig. 4), (2) tergum of abdominal segment 2 has a small, dark brown, median dot and paired submedian lighter dots, and (3) the female abdominal segments are light yellowish-brown with tergal color pattern as in male imago. In the nymphs, (1) abdominal gills have a short, rounded, dark pigmented area in middle (Fig. 10), (2) no ventral protuberances occur on the mesothorax, metathorax, and first 2 abdominal segments, and (3) several short, blunt submarginal bristles occur on the paraprotecs (Fig. 23).

#### ECOLOGICAL NOTES

The 3 species of *Rheobaetis* are known only from Georgia and live in small to large fast running waters (Fig. 26, 27). The following ecological notes are extracted from Dr. Berner's field notes, which he has kindly given me.

1. Etowah River near Gober, Cherokee County (Fig. 26): "The river was rather shallow and swiftly flowing in this area. We were able to wade nearly half way across without going more than knee deep. The stream was about 150 ft wide at the point collected, which is just south of an old wooden bridge with a steel superstructure. The water was rather turbid, air temperature was about 75°F and the water was about the same. There were many rocks in the stream and just above the area where we were collecting there was a damlike cluster of rocks which caused the river to spill sidewise. The rocks were covered, for the most part, with *Podostemum ceratophyllum* Michaux, a very coarse plant, firmly attached to the rock surface and growing by what appeared to be a stolon wrapped around the rocks and attached very tightly



to prevent their being washed away by the swift current. The bottom of the stream was sandy, but was composed of pebbles and sand intermixed with silt in the quieter areas near shore."

2. Yahooola Creek, Lumpkin County: "This is a small stream just outside the city limits of Dahlonega. The stream is swiftly flowing and has a rocky bottom. A growth of the plant, *P. ceratophyllum*, covers the rocks. The water depth ranges from 10-24 in. and, although the water is flowing rapidly, the stream banks are not undercut. Rain was falling at the time we collected and the air temperature was reduced to about 68°F. The water had only a slight degree of turbidity."

3. Chestatee River, Lumpkin County (Fig. 27): "The river is about 30 ft wide and varies from 6-24 in. in depth. The water flows very swiftly over rock outcrops, so swiftly that it was difficult to stand in some places. The stream bed is mostly solid rock covered with a thin layer of silt and, in many areas, especially where the water is flowing most rapidly, the rocks are covered with a growth of *Podostemum*. Loose stones were scarce on the stream bed. The water was turbid, rather silty, but not colored. Mayfly nymphs were common in the vegetation, especially *Ephemerella* of which at least 3 species were taken. *Isonychia* nymphs and a few *Baetis* were also found. Nymphs of the large baetine species (now identified and herein described as *Rheobaetis bernerii*) were found in crevices in rocks where *Podostemum* was growing. The water temperature was about 75°F and air temperature about 95°F. The gorge through which the river runs at the point we collected is about 30-40 ft deep so that we had a steep climb down to the river."

At the time the 3 new species were collected they were not distinguishable, so very little is known about the life habits of the individual species. Since mature nymphs and imagoes were collected at the same time and at the same collecting sites it seems probable that each species is living in its special microhabitat. The ventral abdominal protuberances on nymphs of *R. bernerii* possibly serve as an adhesive organ for these nymphs which live in *Podostemum* on rocks in swift current.

KEYS TO THE SPECIES OF *Rheobaetis*

Male Imagoes

1. Length of body ca. 6.5 mm, length of hind wings ca. 0.3 mm; abdominal segments 2-6 translucent milky, hind margins of terga with a small dark border, segments 7-10 light brown; cerci milky, some basal segments with darker rings; segment 3 of genital forceps nearly as broad as segment 2, about twice as long as broad (Fig. 3) ..... *R. petersi* n. sp.
- Length of body ca. 5.0 mm, length of hind wings ca.

- 0.2 mm; abdominal segments 2-6 translucent, dorsum of abdomen clearly marked with dark dots and transverse bands, and with longitudinal stripes on segments 7-10; cerci milky without dark rings at base; segment 3 of genital forceps smaller than segment 2, about 2½ times as long as broad (Fig. 4) ..... *R. traverae* n. sp.

Female Imagoes

1. Length of body about 7.4 mm, hind wings ca. 0.3 mm; abdomen uniformly light brown, no darker markings; cerci with some darker basal rings ..... *R. petersi* n. sp.
- Length of body about 5.0 mm, hind wings ca. 0.2 mm; abdomen yellowish-brown; color pattern on dorsum of abdomen as in Fig. 11 ..... *R. traverae* n. sp.

Mature Nymphs

1. Thoracic sterna 2-3 and abdominal sternum 1 with protuberances bearing many bristles (Fig. 14 C) ..... *R. bernerii* n. sp.
- Sterna without any protuberances ..... 2
2. Dorsum of abdomen without any well defined pattern, uniformly light brownish; abdominal gills grey to greyish-brown with a very small light margin (Fig. 6); labrum with 1 + 3-5 submarginal bristles (Fig. 1 A); mandibles stout, canini not clearly separated into 2 groups (Fig. 1 B,C) ..... *R. petersi* n. sp.
- Dorsum of abdomen generally with a well defined pattern (Fig. 10, 11); abdominal gills transparent with a darkly pigmented median area (Fig. 10); labrum with 1 + 8-10 submarginal bristles (Fig. 24 A); mandibles slender, 2 separated groups of canini, the outermost tooth broadest (Fig. 24 B,D) ..... *R. traverae* n. sp.

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