

# AMERICAN MUSEUM *Novitates*

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY  
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024  
Number 2736, pp. 1–13, figs. 1–8  
June 29, 1982

## Description of Three Unusual Species of the Black Fly Subgenus *Simulium* (*Ectemnaspis*) from the Andes of Colombia (Diptera, Simuliidae)

PEDRO WYGODZINSKY<sup>1</sup> AND SIXTO COSCARÓN<sup>2</sup>

### ABSTRACT

Three new species of the genus *Simulium*—*S. bicornutum*, *S. furcillatum*, and *S. simplex*—collected near and above 3000 m. in the Andes of Colombia are described. These three species agree closely in their color pattern and overall structure with the species of the subgenus *Simulium* (*Ectemnaspis*) in which they are included. The three Colombian species differ from all other known members of the subgenus by the modified gills of their pupae. In the species of *Simulium* (*Ectem-*

*naspis*) previously described, pupal gills consist of bundles of simple filiform elements. In one of the new species (*S. bicornutum*) the gills are halfmoon-shaped; in the second (*S. furcillatum*) the gills are still vaguely halfmoon-shaped, but the upper arm of each gill bears three filiform appendages. In the third species (*S. simplex*) the gills consist of five tubular structures arising at different levels from a common stalk.

### INTRODUCTION

Although the genus *Gigantodax* Enderlein contributes heavily to the black fly fauna of the Andes, certain additional assemblages of Simuliidae occur at high altitudes. In the area of Bogotá, in Colombia, *Simulium* (*Hemicnetha*) *muiscorum* Bueno, Moncada and Muñoz de Hoyos, is locally common but has not been found above 2700 m. *Simulium* (*Psaroniocompsa*) *schmidtummi* Wygodzinsky attains 3700 m. This species is the only high mountain representative of its sub-

genus, which is otherwise restricted to tropical lowlands not above 1000 m. *Simulium* (*Ectemnaspis*) is another group found in the Andes near Bogotá. *Simulium* (*Ectemnaspis*) *bicoloratum* Malloch, the type species of the subgenus *Ectemnaspis*, was found to be widespread in the Colombian Andes at elevations between 2250 and 3000 m. Several other possibly undescribed *Ectemnaspis* occur in the Andes of Bogotá; they are phenetically close to *bicoloratum*. There is, furthermore, in the

<sup>1</sup> Curator, Department of Entomology, American Museum of Natural History.

<sup>2</sup> Research Associate, Department of Entomology, American Museum of Natural History. Professor of Zoology, Universidad de La Plata, La Plata, Argentina.

Colombian Andes a peculiar high altitude assemblage of *Simulium* consisting of three species all described here as new, viz., *Simulium bicornutum*, *Simulium furcillatum*, and *Simulium simplex*. These species are characterized by the highly modified structure of the pupal gills, not consisting of bundles of filiform elements as in the more conventional species of the subgenus, but of bizarre shape (figs. 3A–C, 5L–N, 8B, E, H). In one of the new species, *bicornutum*, the gills are transformed into saclike, halfmoon or U-shaped structures (fig. 3A–C). In the second new species (*S. furcillatum*) the gill again possesses a roughly U-shaped body but the apical portion of the dorsal arm is transformed into three tinelike appendages (fig. 5N). The above gills resemble superficially those of certain *Simulium* (*Hearlea*) and *Simulium* (*Simulium*) from Mexico and Central America (see Vargas and Díaz Nájera, 1957), but an examination of the genitalia shows that those of *bicornutum* and *furcillatum* agree fully with those of *Simulium* (*Ectemnaspis*) and not with those of *Simulium* (*Simulium*) or *Simulium* (*Hearlea*). We therefore place *bicornutum* and *furcillatum* in the subgenus *Ectemnaspis*. The third species now studied (*Simulium simplex*) also has modified pupal gills, but they are very different from those of the foregoing two species; they consist of five rigid, tubular elements arising at different levels from a common stalk. It is safe to assume that *bicornutum* and *furcillatum* share a recent common ancestor, but there is no synapomorphy shared by *bicornutum* and *furcillatum* and by *simplex*.

#### ACKNOWLEDGMENTS

The travel and research that led to this paper were generously supported by the American Museum of Natural History and by the National Science Foundation (grants GB-5852 and GB-8783). The illustrations were prepared by Nérida Caligaris and by the authors. Tanya Clement competently typed the manuscript. Assistance in the field was provided by Dr. E. W. Schmidt-Mumm, of Bogotá, Colombia, and Ms. Bona Wygodzin-

sky. Dr. D. Montgomery Wood provided much constructive criticism. We thank all of the above. All specimens were collected by Bona and Pedro Wygodzinsky.

#### SYSTEMATICS

##### *Simulium* (*Ectemnaspis*) *bicornutum*, new species Figures 1–3

**DIAGNOSIS:** Differs from all known species of the subgenus by the halfmoon-shaped pupal gills.

**DESCRIPTION:** Pharate female (preserved in alcohol): Head black. Scutum and scutellum pale yellow; metanotum light brown. Color pattern of scutum faintly discernible, seemingly similar to that of *S. (Ectemnaspis) bicoloratum* (see Wygodzinsky, 1971, fig. 9I). Abdomen with first to fourth tergites grayish yellow, fifth to ninth dark grayish brown.

Frons wide (fig. 1C), frontal angle 100°. Fronto-ocular triangle (fig. 1A) approximately as deep as wide. Terminal article of maxillary palp about twice as long as penultimate. Sensory vesicle of second segment of maxillary palp slightly less than half the width of segment. Mandible and maxilla serrated on both edges. Maxilla with approximately 28–30, mandible with approximately 30 denticles on one and 7–9 on the other edge. Cibarium (fig. 1D) without denticles and with large, heavily pigmented cornuae.

Color and exact shape of legs not examined. Setae of legs simple. Calcipala (fig. 1F) well developed, about as long as wide. Claw with small but distinct pointed subbasal tooth (fig. 1B).

Abdomen without scales. Tergal plates well developed. Eighth sternite as illustrated (fig. 1G), posteriorly with two fields of approximately 30 setae each. Gonapophysis (fig. 1G) small, subtriangular, glabrous, with a few bands of heavier sclerotization. Setae or microtrichia absent. Cercus and paraproct as illustrated (fig. 1E); the latter large, as long as wide, rounded apically. Genital fork (fig. 1H) with stem slender, heavily pigmented. Spermatheca globular.

Male. Wing length 3.0 mm.

Head, eyes, antenna and palpus from dark

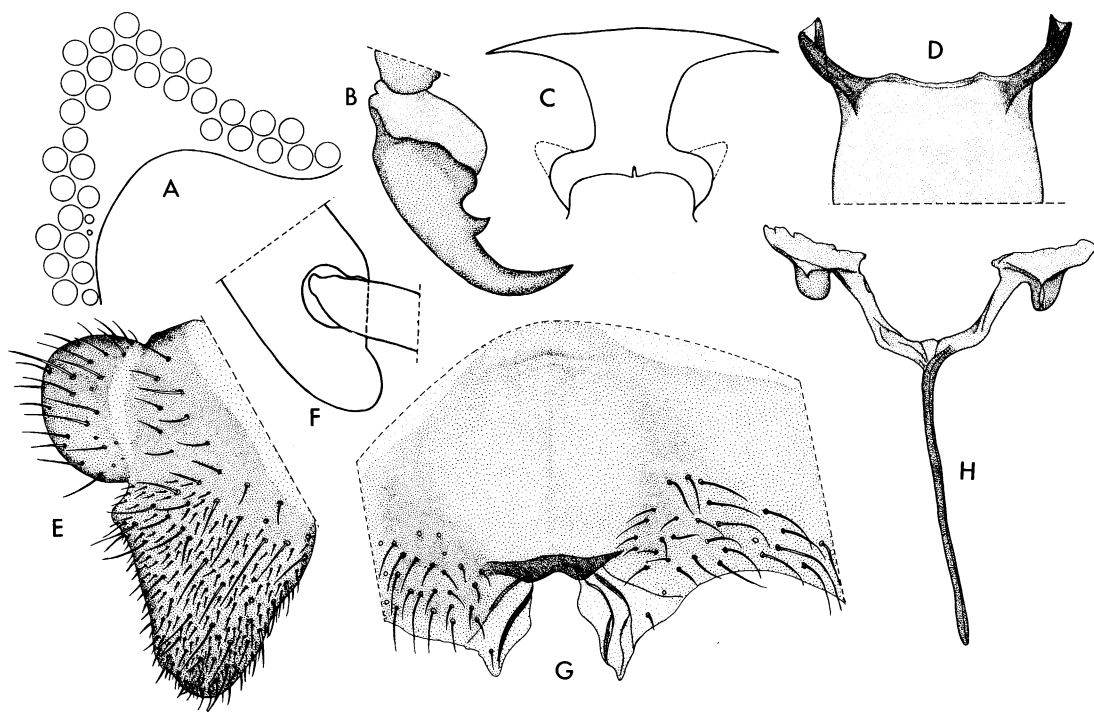


FIG. 1. *Simulium bicornutum*, female. A. Fronto-ocular triangle. B. Claw. C. Frons. D. Cibarium. E. Cercus and paraproct. F. Calcipala. G. Eighth sternite with gonapophyses. H. Genital fork.

brown to black. Scutum (fig. 2B) orange on dorsum, sublateral pattern elements from dark brown to black, lateral margins pale yellow. Scutellum yellow, metanotum black. Pigmentation of legs as shown in figure 2C, E. Abdomen (fig. 2D) wide with first segment brown, second and third segments pale greenish yellow, fourth brown dorsally, greenish yellow laterally, fifth to ninth velvety black. Sixth segment with a pair of large silvery spots laterally.

Holoptic. Shape and proportions of antennal segments as shown in figure 2A. Apical segment of maxillary palp (fig. 2H) slightly less than half the length of preceding article. Sensory vesicle (fig. 2H) suboval, its length subequal to that of width of respective article of maxillary palp. Wing with Sc bearing approximately six simple setae; basal portion of R glabrous;  $R_1$  with spiniform setae interspersed with simple hairs. Legs as shown in figure 2C, E. Posterior basitarsus three and

one-half times as long as wide (fig. 2C). Calcipala slightly wider than long (fig. 2F).

Genitalia as shown in figure 2G, I–M. Paramere as shown in figure 2I, J. Basimere as long as wide. Distimere as long as basimere, elongate subconical, apical portion somewhat curved. Apical spinule single. Basal plate (fig. 2C, K, L) subtriangular, its sides almost straight; basal plate arm short, more strongly pigmented than remainder of sclerite. Median sclerite (fig. 2M) flask-shaped. Endoparamere (fig. 2M) with large plate and numerous spines.

Pupa. Cocoon (fig. 3A, B) shaped like a wall-pocket, with a broad median projection dorsally. Walls of cocoon thick, individual threads difficult to discern, body of pupa barely perceptible. Length of cocoon along dorsal surface (projection included) 4.0 mm; along ventral surface 3.7 mm.

Gill (fig. 3A, B, C) not stalked, arising directly from thorax of pupa, roughly half-

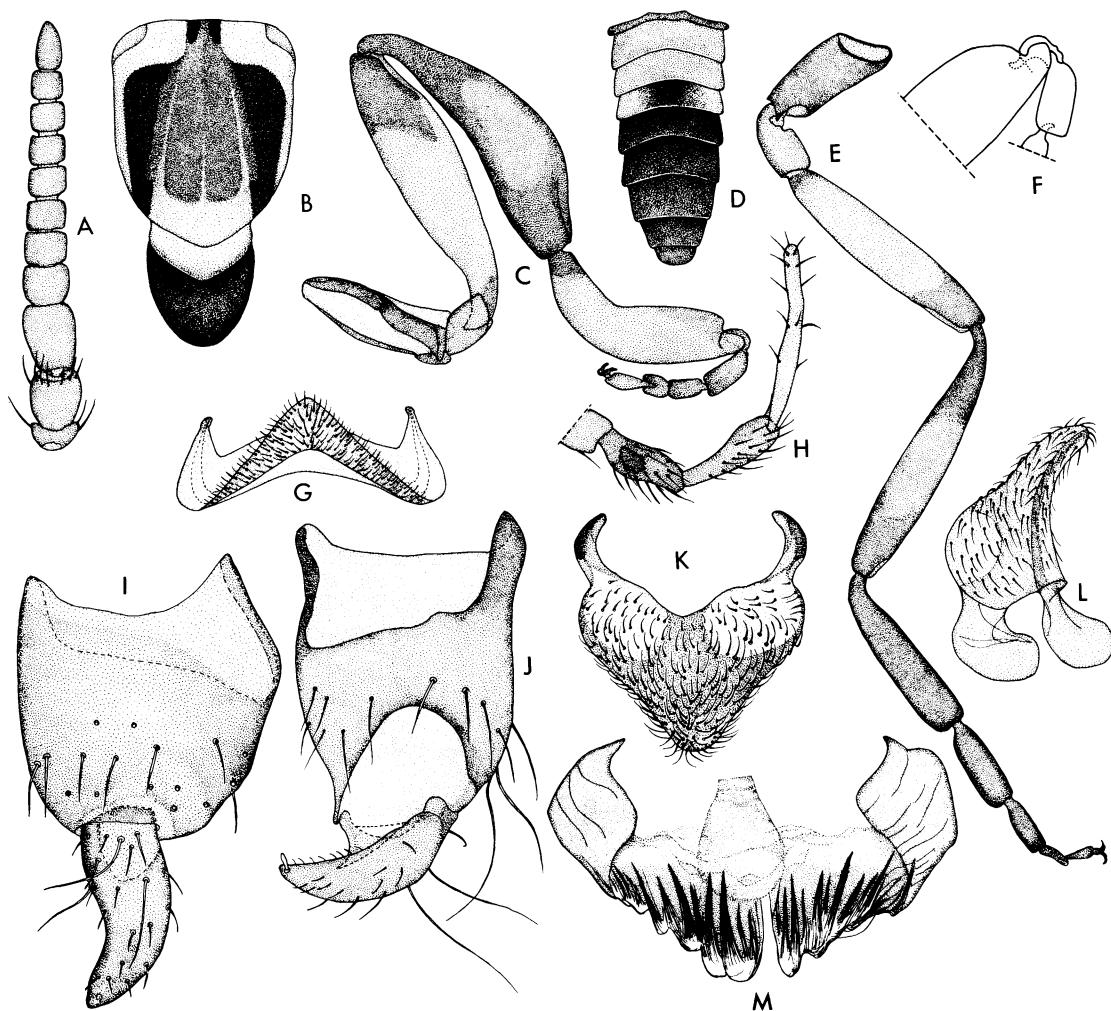


FIG. 2. *Simulium bicornutum*, male. A. Antenna. B. Scutum, scutellum and metanotum. C. Hind leg. D. Abdomen, dorsal view. E. Foreleg. F. Calcipala and second tarsal article of hind leg. G. Ventral plate, front view. H. Maxillary palp. I. Basimere and distimere, ventral view. J. *Idem*, upper view. K. Ventral plate. L. Ventral plate, semilateral view. M. Median sclerite, endoparamere and membrane of aedeagus.

moon-shaped in lateral view. Arms pointed apically, each with small toothlike process on inner surface. Gills membranous, pale brown, their surface minutely wrinkled. Head and exposed portion of thorax glabrous or with very few platelets.

Head of pupa with two pairs of frontal and one pair of facial trichomes. Frontal trichomes each with six to eight and facial trichomes with four to five branches. Thorax

with six to seven trichomes with from two to six branches. Onchotaxy of abdomen as in *Simulium (Ectemnaspis) furcillatum* described and illustrated below (fig. 6A) but with trichomes of first tergite simple, not branched.

Larva. Length of mature larva 5.8 mm., maximum width of head 6.0 mm. General body shape as in figure 3F, I. Color of body yellowish brown tinged with pale green; dark-

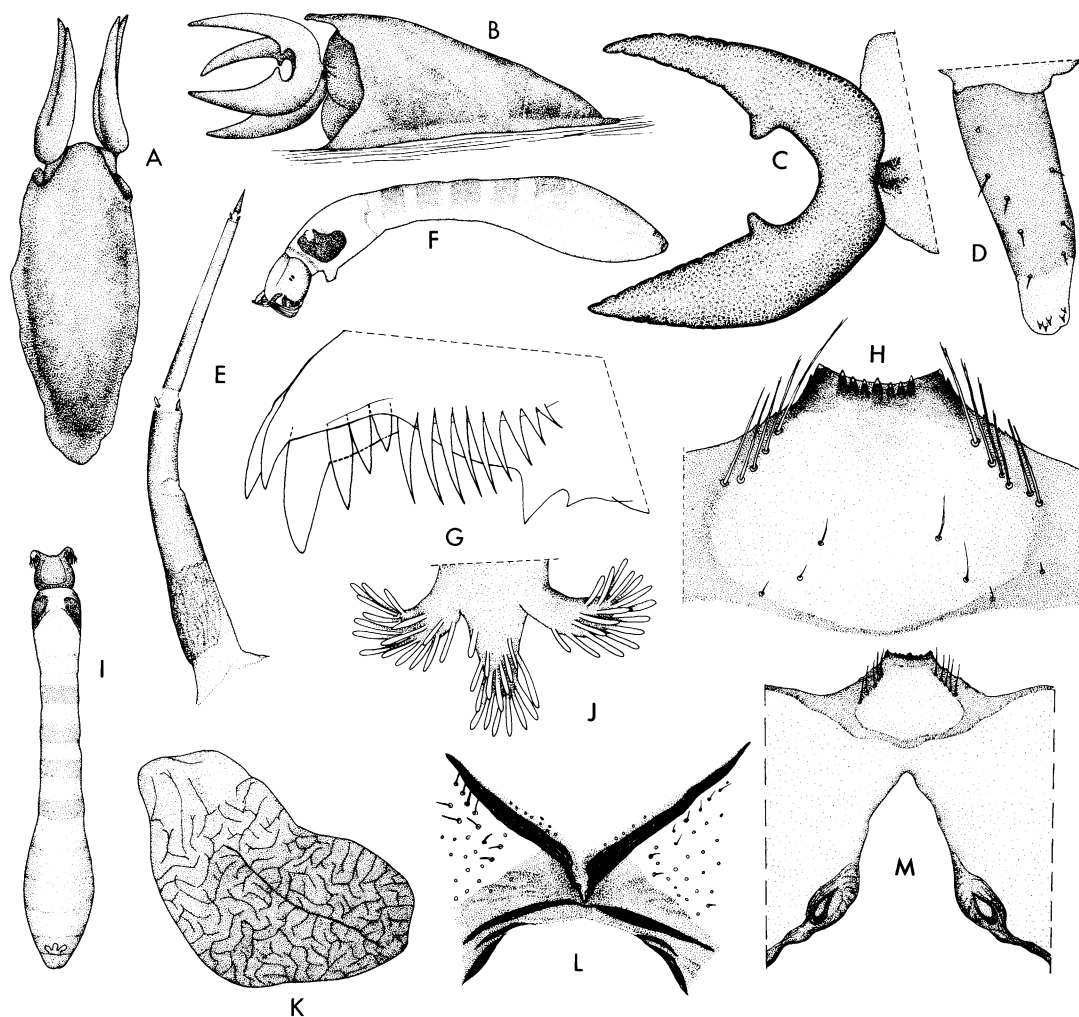


FIG. 3. *Simulium bicornutum*. A-C. Pupa. A. Pupa in cocoon, dorsal view. B. *Idem*, lateral aspect. C. Gill, side view. D-M. Larva. D. Maxillary palp. E. Antenna. F. Larva, lateral view. G. Apical portion of mandible. H. Hypostomium. I. Larva, dorsal aspect. J. Anal gills. K. Gill histoblast. L. Anal sclerite. M. Portion of head, seen from below.

est on dorsal surface of posterior widened portion of body. Head dark brown. Body integument glabrous except for perianal hairs. Cephalic apotome rather uniformly pigmented; somewhat darker at base. Shape and pigmentation of antennae shown in figure 3E. Apical sensillum (fig. 3E) short, about one-fifth the length of third antennal segment. Ratio of antennal segments I-III = 1/1.7/2.5. Outer labral fan with approximately 40 rays.

Teeth of rays as shown for *S. furcillatum* described in this paper (fig. 7M), toothing of mandibles as shown in figure 3G and as described for *Simulium bicoloratum* (see Wygodzinsky 1971, pp. 27, 30). Maxillary palp as shown in figure 3D. Hypostomium as illustrated (fig. 3H, M). Median and lateral teeth about equally prominent, intermediate teeth less prominent. Lateral serrations distinct. Hypostomial setae in 1+1 rows, each

row consisting of five or six setae. Disc of hypostomium with a few simple, small setae. Gular cleft (fig. 3M) narrowly subtriangular, deeper than wide, approaching but not attaining postgenal bridge. Cervical sclerites not observed.

Gill histoblast with brainlike convolutions (fig. 3K). Ventral papillae absent. Lateral sclerite of pseudopod much as in *S. furcillatum* (see fig. 7F). Anal sclerite as illustrated (fig. 3L); area between arms with minuscule sensory setae. Posterior circlet with approximately 85 rows with an average of 16 hooks each. Anal papillae consisting of three stalks, each bearing about 16 lobules (fig. 3J).

**MATERIAL EXAMINED:** COLOMBIA: Cundinamarca: Road from Usme to Páramo de Chisacá, 3200 m., July 27, 1967 (AMNH), one male, holotype, pinned with pupal exuvia; *ibid.*, 3300 m., June 30, 1965 (AMNH), one pupa; Páramo de Chisacá, 3500 m., July 2, 1965 (AMNH) three pupae; Páramo de Chisacá, 3700 m., July 2, 1965 (AMNH), one female, allotype, mounted on slide with part of pupal exuvia, one larva.

**ETYMOLOGY:** The species name is from the Latin *bi-*, two, double, for the number of arms of the pupal gill, and *cornutus*, bearing horns, for the hornlike pupal gills of the species.

**DISCUSSION:** The peculiar apomorphic structure of the thoracic gills of the pupa of this and the following species, *furcillatum*, is superficially similar to that found in many species of the predominantly Mesoamerican subgenus *Simulium* (*Hearlea*). A comparison of the genitalia shows, however, that *bicornutum* and the following species belong to *Simulium* (*Ectemnaspis*), and are not closely related to *Hearlea*. The apomorphic genitalic characters shared by typical *Ectemnaspis* and by *bicornutum* and *furcillatum* are the subtriangular ventral plate and the elongate-conical shape of the distimere, shorter than the basimere, in the male, and the large, elongate, apically rounded paraproct of the females. In *Hearlea*, the ventral plate of the male is transversely rectangular and not subtriangular, and the distimere is elongate subcylindrical, distinctly longer than the basimere. In the female, the paraproct of *Hearlea* is short, truncate, and frequently notched, very dif-

ferent indeed from conditions found in *Ectemnaspis*, where it is elongate.

**DISTRIBUTION:** *Simulium* (*Ectemnaspis*) *bicornutum* is known only from the paramo region south of Bogotá.

**BIOLOGY:** Pupae of this species occurred isolated on the upper surface of blades of grass trailing in the crystal clear waters of torrential streams from 1 to 3 m. wide. The temperature of the streams was 9°C.

***Simulium* (*Ectemnaspis*) *furcillatum*,**  
new species  
Figures 4–7

**DIAGNOSIS:** Species characterized by the highly apomorphic, rigid gills of the pupa, swollen U-shaped at base, with one pointed ventral and one apically trifid dorsal arm.

**DESCRIPTION:** Female: Body length 1.9 mm.; wing length 2.4 mm. Head black. Eyes piceous, frons, clypeus and occiput black, frons and clypeus with silvery pruinosity. Antenna, palp, and rostrum piceous with black setae, the setae also on posterior margin of head. Scutum orange-brown, lateral borders and lateral incision, behind level of pronotal sclerites, greenish yellow. Scutellum greenish yellow. Metanotum grayish brown, with one pair of anterior grayish spots visible under certain illumination. Legs dark brown with color of setae fluctuating between brown and black. Wing translucent, veins grayish brown, with hairs and setae dark brown. First to fourth abdominal terga grayish yellow; fourth tergal plate light brown with brown hairs.

Frons without median sulcus, shape as shown in figure 4B; frontal angle 95°. Fronto-ocular triangle deep, approximately as deep as wide (fig. 4A). Maxillary palp not examined. Maxilla with 21 teeth. Mandible with 44 teeth arranged on both margins. Sensory vesicle of second segment of maxillary palp as shown in figure 4C. Cibarium (fig. 4D) without denticles and with large, heavily pigmented cornuae. Delicate median depression of cibarium distinctly pigmented. Wing without hairs on basal sector of R; R<sub>1</sub> with spines beginning approximately at level of basal fifth of vein, arranged in a single row, mixed with hairlike setae. Sc with two or three hairs.

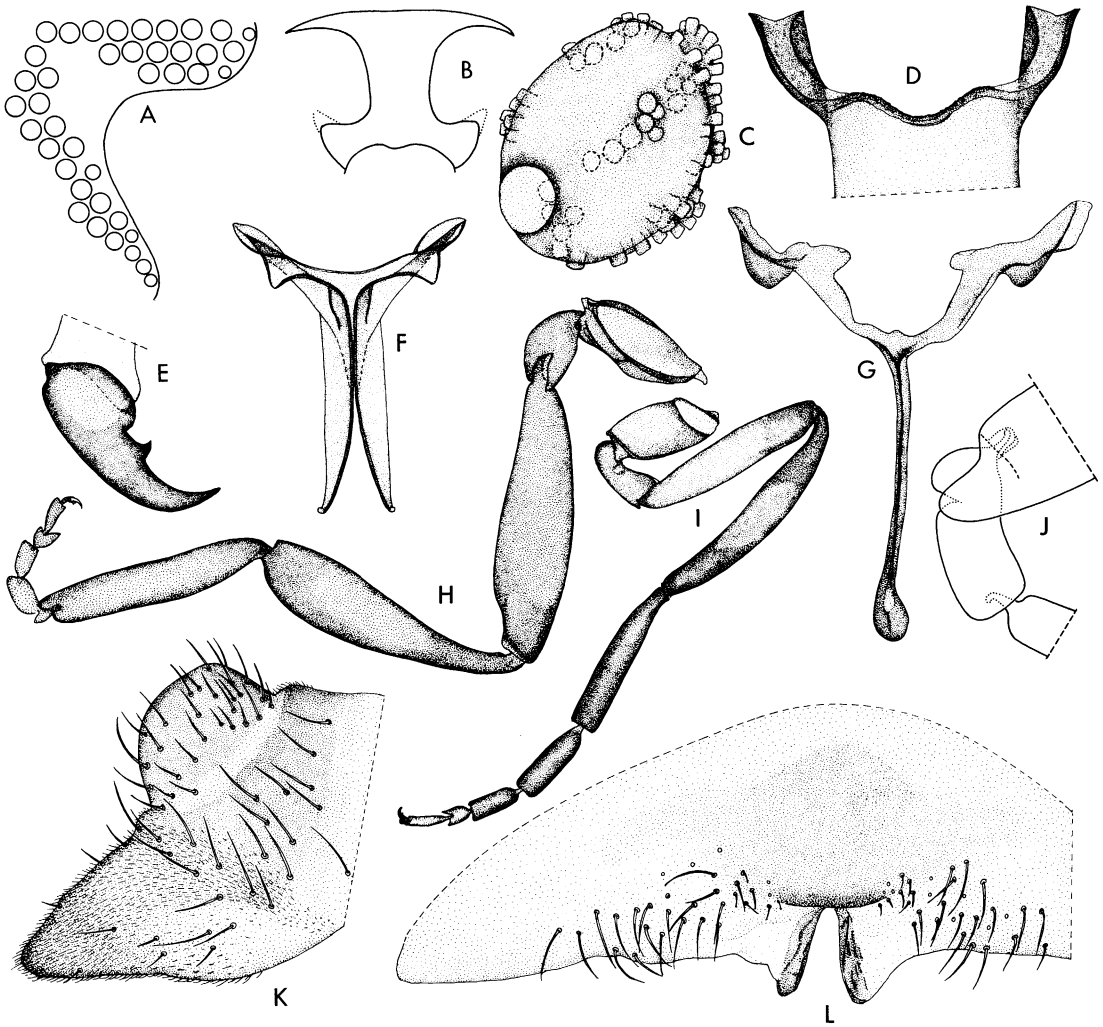


FIG. 4. *Simulium furcillatum*, female. A. Fronto-ocular triangle. B. Frons. C. Sensory vesicle of maxillary palp. D. Cibarium. E. Claw. F. Furcasternum. G. Genital fork. H. Hind leg. I. Foreleg. J. Calcipala and second tarsal segment. K. Cercus and paraproct. L. Eighth urosternite with gonapophyses.

Shape, proportions, and pigment distribution of legs as shown in figure 4H, I. Calcipala (fig. 4H, J) slightly longer than wide. Claw with small but distinct basal tooth (fig. 4E). Furcasternum as shown in figure 4F. Eighth sternite (fig. 4L) distinctly pigmented at center but less conspicuously so laterally, with approximately 25 setae on each side. Gonapophysis (fig. 4L) subtriangular, with inner border conspicuously sclerotized. Setae or microtrichia absent. Cercus and paraproct

as shown in figure 4K, paraproct subtriangular, about as long as wide at base. Genital fork (fig. 4C) well sclerotized, with median branch elongate. Spermatheca subovoidal, with neck and base membranous.

MALE: Length of body 2.5 mm., of wings 2.9 mm.

Head brown. Scutum (fig. 5C) pale greenish yellow, with wide median dark marking covering anterior three-fourths, and one pair of lateral wedge-shaped spots beginning at level

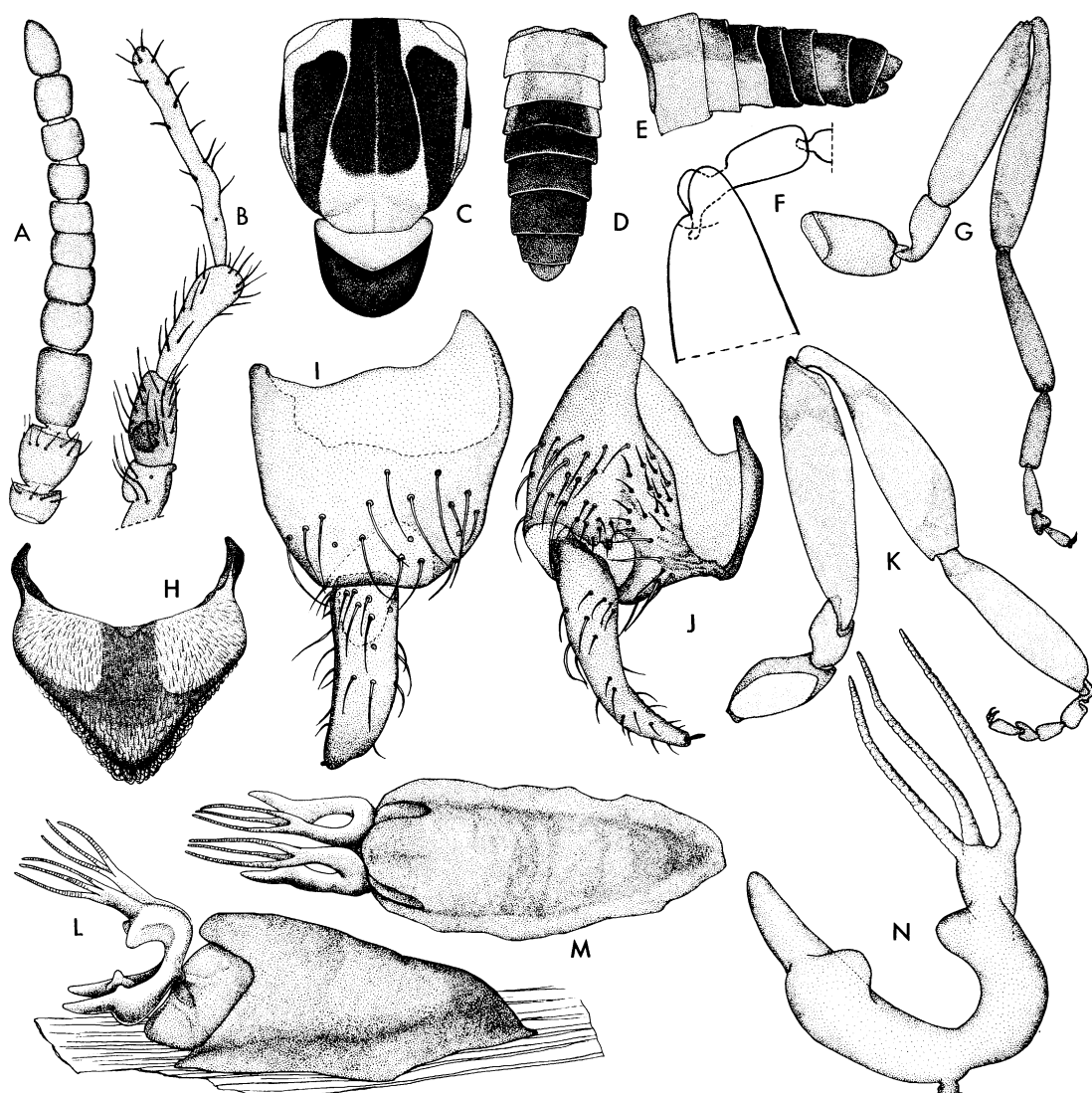


FIG. 5. *Simulium furcillatum*. A-K. Male. A. Antenna. B. Maxillary palp. C. Scutum, scutellum, and metanotum. D. Abdomen, dorsally. E. *Idem*, laterally. F. Calcipala and second tarsal segment. G. Foreleg. H. Ventral plate. I. Basimere and distimere, under surface. J. *Idem*, upper surface. K. Hind leg. L. Pupa in cocoon, lateral view. M. *Idem*, seen from above. N. Gill.

of anterior sixth of dark central marking. Metanotum dark grayish brown (fig. 5C). Pleuron and legs dark brown, hairs of legs from brown to black. Wing translucent, veins pale grayish brown, hairs and spinelike setae brown. Haltere pale yellow. First abdominal segment brown, second and third with tergal

plates pale grayish yellow, pleuron and sternum grayish white, sternal plate light grayish brown. Segments V-IX (fig. 5E) dark brown, eighth segment with one pair of lateral silvery spots.

Holoptic. Shape and proportion of articles of antenna and palp as shown in figure 5A,



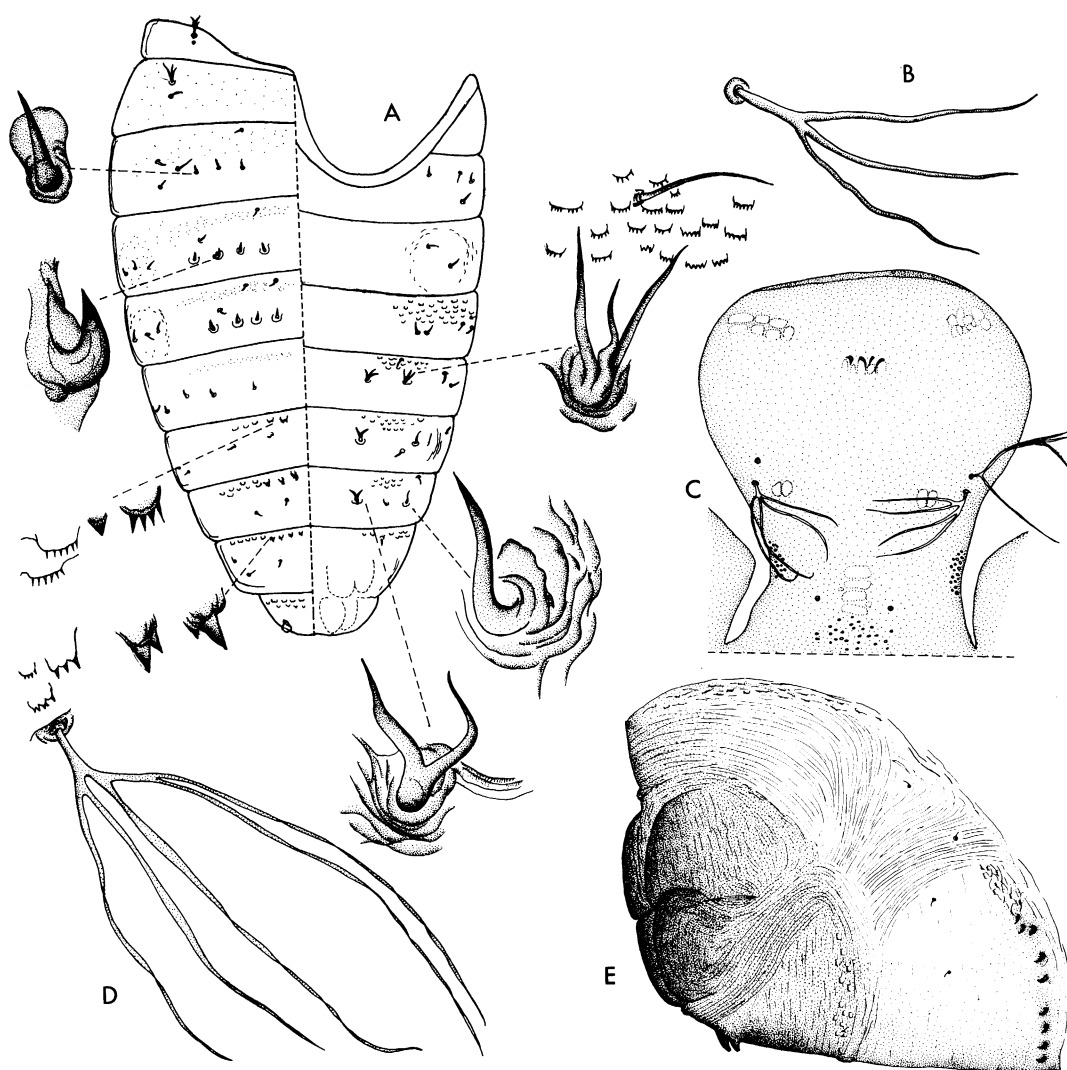


FIG. 6. *Simulium furcillatum*, pupa. A. Onchotaxy of abdomen. B. Trichome of first urotergite. C. Frontoclypeus. D. Frontal trichome of frontoclypeus. E. Apex of abdomen.

B. Terminal article of palp about twice as long as penultimate. Calcipala as long as wide at base. Posterior basitarsus (fig. 5F, K) four times as long as wide. Setae of legs simple. Wing with three or four hairs on Sc. Basimere (fig. 5I, J) subtrapezoidal, distimere as long as basimere, approximately 2.5 times as long as wide, with well-developed apical spine (fig. 5J). Ventral plate (fig. 5H) subtriangular. Median sclerite twice as long as wide, without

apical incision. Endoparamere as in *bicornutum* (see fig. 2M).

Pupa. Cocoon (fig. 5L, M) translucent, light brown, wall-pocket-shaped with flaplike projection dorsally at middle. Fabric of cocoon uniform, parchment-like, individual threads difficult to discern. Length of cocoon dorsally 3.7 mm., along ventral surface 3.2 mm. Cephalopterothecal length 2.2 mm. Gill (fig. 5L–N) light grayish brown, not stalked, con-

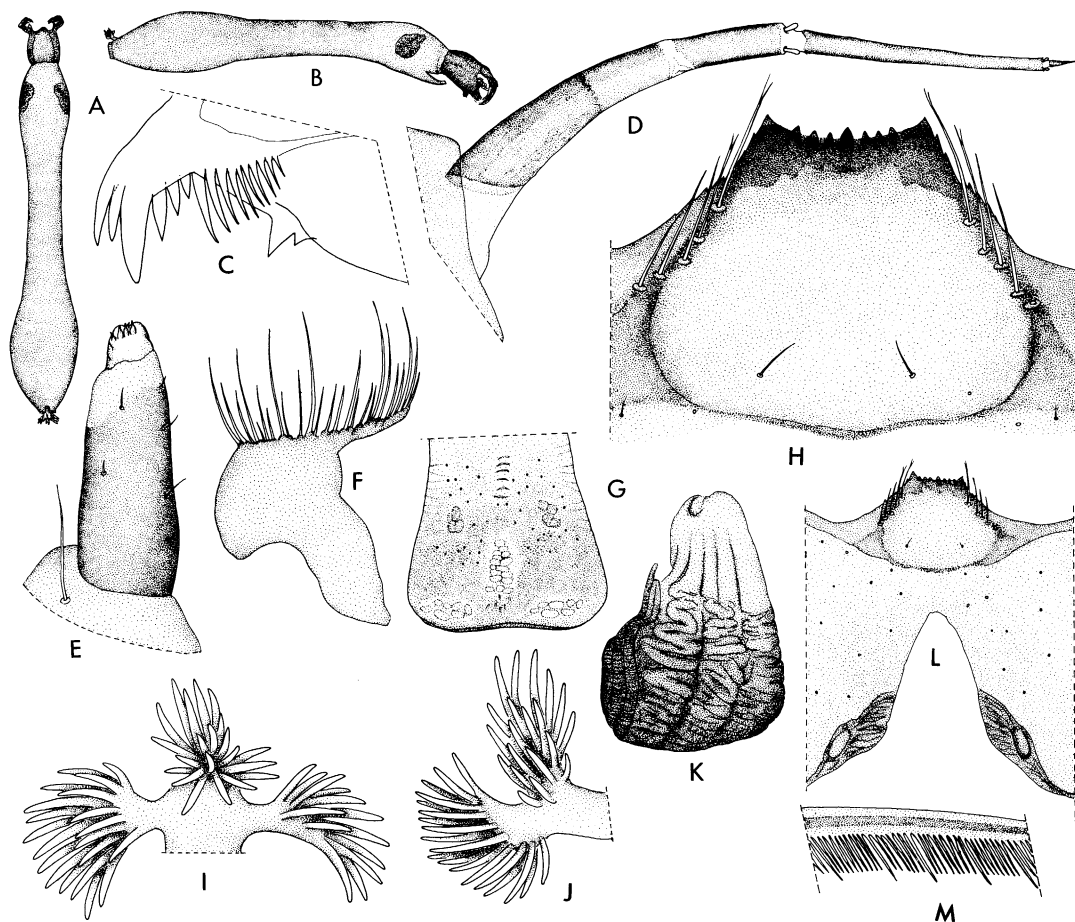


FIG. 7. *Simulium furcillatum*, larva. A. Dorsal view. B. Lateral aspect. C. Apex of mandible. D. Antenna. E. Maxillary palp. F. Lateral sclerite of proleg. G. Cephalic apotome. H. Hypostomium. I, J. Anal gills. I. Dorsal view. J. Lateral aspect. K. Gill histoblast. L. Portion of head, seen from below. M. Detail of ray of large fan of mouth brush.

sisting of two rigid U-shaped arms, these arms approaching each other at center with opposing central protuberances. Apical portion of lower arm of gill pointed, apical half of upper arm forklike, with three tinelike processes.

Head, thorax, and abdomen light brown. Head and thorax smooth, except small number of tubercles arranged in one group on each side between facial and frontal trichomes (fig. 6) and on small area on exposed portion of thorax. Frons as shown in figure 6C, with one pair of facial trichomes with

three to five branches each (fig. 6C). Thorax on each side with five to six trichomes, with four to six branches each. Onchotaxy of abdomen as shown in figure 6A. Abdominal tergites I and II with a few simple, bifid or trifid hairs. Tergites III and IV each with 4+4 simple hooks. Tergite V with simple short setae. Tergites VI-IX with transverse row of denticles along anterior margin and with minute scalelike cuticular processes. Abdominal sternite IV with 1+1 slender, simple spinelike hooks. Sternites V-VII with 2+2 hooks, closely approximated on V, more dis-

tant on VI and VII; hooks from simple to trifid. Sternites IV–VIII with anterolateral patches of minute scalelike processes. Apex of abdomen without specialized setae (fig. 6E).

Larva. Length of mature larva 5.7 mm., maximum width of head capsule 0.5 mm. Body shape as shown in figure 7A, B. Color of body greenish yellow brown, head dark brown. Cephalic apotome rather homogeneously pigmented, somewhat darker at base (fig. 7G). Shape and pigmentation of antenna as shown in figure 7D. Ratio of antennal segments I–III = 1/1.3/1.8. Apical sensillum (fig. 7D) short, about one-eighth the length of third antennal segment. Maxillary palp with about six apical sensillae (fig. 7E). Labral brush with approximately 35 rays, teeth of rays as shown in figure 7M. Toothing of mandibles as shown in figure 7C; 9–10 internal teeth. Maxillary palp as illustrated (fig. 7E). Hypostomium (fig. 7H) with anterior and lateral teeth the most prominent. Lateral serrations small but distinct. Hypostomial setae in 1+1 rows, each row with five or six setae. Disc of hypostomium with a few short setae (fig. 7H). Gular cleft (fig. 7L) deep, narrowly subtriangular, deeper than wide, approaching but not attaining postgenal bridge. Cervical sclerites not preserved. Gill histoblast with brainlike convolutions (fig. 7K). Larva without ventral papillae. Lateral sclerite of pseudopod as shown in figure 7F, with 24 teeth arranged in one row. Body integument glabrous, except scattered small setae at anal sclerite, the latter similar to that of preceding species (fig. 3L). Posterior circlet with approximately 84 rows with an average of 14–16 hooks. Anal papillae consisting of three stalks, each with about 16 lobules (fig. 7I, J).

MATERIAL EXAMINED: COLOMBIA: Boyacá: Páramo de Tota, 3400 m., July 8, 1967 (AMNH), one female, holotype, with pupal exuvia. Cundinamarca: Tunjaque, 2850 m., SE of La Calera, Aug. 20, 1969 (AMNH), two females with pupal exuviae; road from Zipaquirá to Pacho, 2900 m., July 22, 1967 (AMNH), one male allotype, with pupal exuvia; Bogotá D.E., Bajo Río San Francisco, 2750 m., July 17, 1967 (AMNH), one female

with pupal exuvia, six pupae; Road from Usme to Páramo de Chisacá, 3200 m., July 11, 1967 (AMNH), two pupae; Páramo de Chisacá, Sumapaz, 3300 m., July 2, 1965 (AMNH), two pharate females, one pharate male, two pupae, two larvae.

ETYMOLOGY: The species name is from the Latin *furcillatus*, forked, an allusion to the forklike termination of the upper arm of the pupal gill.

DISCUSSION: This species shares the overall apomorphic structure of the pupal gills with that of *S. bicornutum*, viz., a halfmoon or approximately U-shaped main body, with two symmetrical arms in *bicornutum* and, in *furcillatum*, the upper arm with three tinelike appendages. Both species are highly derived in relation to the more conventional *Ectemnaspis*, and possibly share a recent common ancestor.

DISTRIBUTION: This species, as the foregoing, is known only from the paramos of the Eastern Cordillera of Colombia.

BIOLOGY: Pupae of *Simulium* (*Ectemnaspis*) *furcillatum* occur singly on blades of grasses trailing in rapid, clean streams, at a water temperature of about 10°C.

***Simulium* (*Ectemnaspis*) *simplex*,**  
new species  
Figure 8

DIAGNOSIS: Distinguished from all other *Simulium* by the unusual number of gill branches, viz., five.

DESCRIPTION: Pharate female. Color and structure poorly preserved but pattern of scutum discernible, much as in males of *bicornutum* and *furcillatum* (figs. 1B and 5C). Frontal angle 90°. Fronto-ocular triangle (fig. 8C) about as long as wide. Cibarium as in *furcillatum*. Legs and calcipala much as in *furcillatum*. Subbasal tooth (fig. 8D) well developed. Genitalia insufficiently developed for study.

Pharate male. Pigment pattern not fully developed; mesonotum yellowish brown. Genitalia not discernible. Calcipala very similar to that of preceding species.

Pupa. Cocoon (fig. 8E, H) shaped like a wall-pocket, with subrectangular flaplike anterior projection dorsally. Walls of cocoon

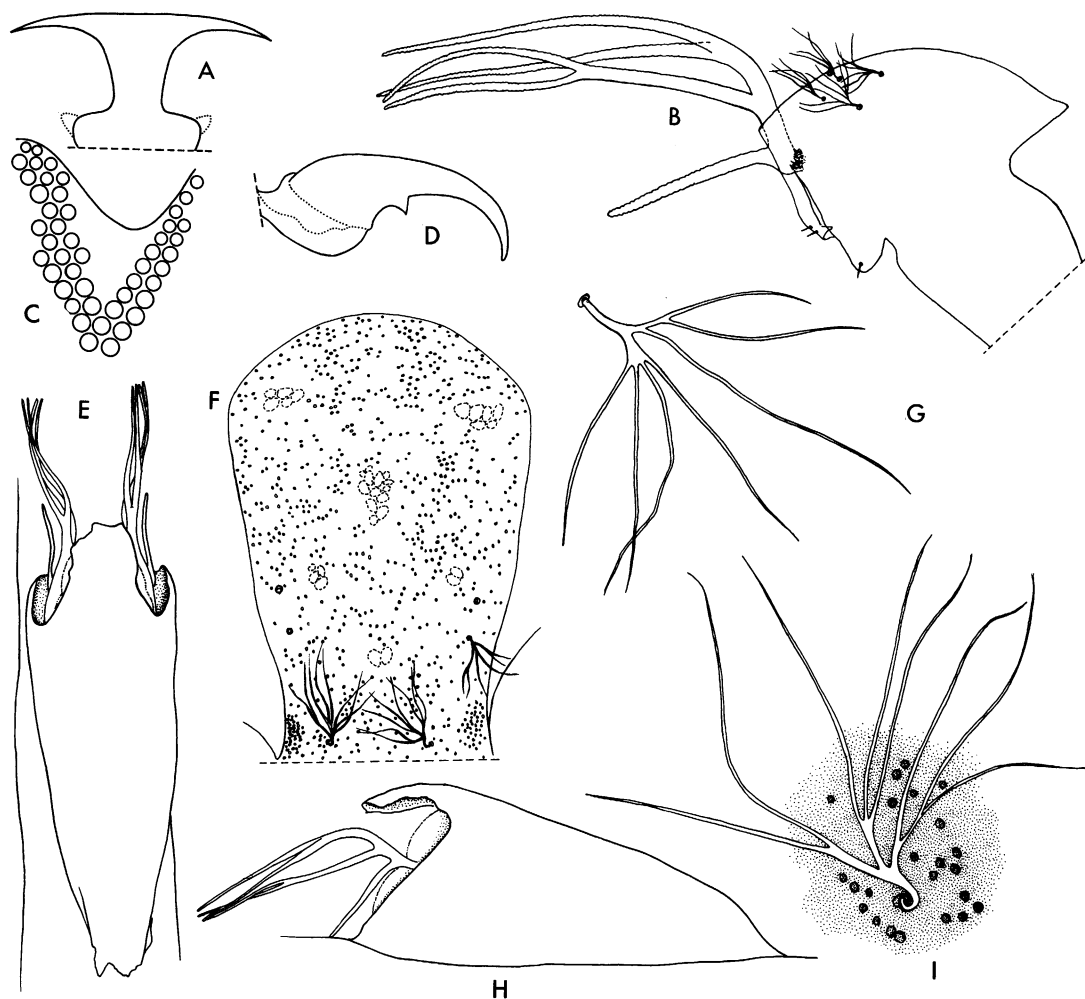


FIG. 8. *Simulium simplex*. A. Frons of female. B. Portion of thorax with gill. C. Fronto-ocular triangle. D. Claw. E. Cocoon with pupa, dorsal aspect. F. Frontoclypeus of pupa. G. Thoracic trichome. H. Cocoon with pupa, lateral aspect. I. Facial trichome.

thick, individual threads not perceptible. Length of cocoon along dorsal surface (projection included) 3.2–3.5 mm., along ventral surface 3.4–3.5 mm.

Head and exposed portion of thorax with numerous platelets (fig. 8F, I).

Gill (fig. 8B, E, H) consisting of five rigid cylindrical branches forming tight forwardly directed bundle. Length of gill 1.8–2.0 mm., its color light grayish brown, surface minutely wrinkled. First branch perpendicular to stem

of gill. Second branch divided into two divisions. Lower division subdivided apically, the resulting branchlets about as long as common stem. Upper division also bifurcate, the two branchlets much longer than common stem.

Head of pupa (fig. 8F) with one pair of facial and two pairs of frontal trichomes, each with five to eight branches (fig. 8I). Thorax (fig. 8B) with five or six pairs of trichomes with five or six branches each (fig. 8I). On-

chotaxis of abdomen as in *S. furcillatum* (fig. 6A).

**MATERIAL EXAMINED:** COLOMBIA: Tolima: Ibagué-Armenia highway, near La Linea, east slope of hillside, 3100 m., August 14, 1967 (AMNH) one pupa, holotype, one pupa, paratype, one pharate male, one pharate female.

**ETYMOLOGY:** The specific name is from the Latin *simplex*, simple.

**DISCUSSION:** The most striking character of this species is the structure of the thoracic gill of the pupa, with its five thick, cylindrical branches. We have been unable to find in the literature a reference to any other simuliid the pupal gills of which have five branches, except for the unrelated prosimuliine *Tlalocomyia revelata* Wygodzinsky and Días Nájera which occurs in the Mexican highlands. The pharate female is not too well preserved, but it permits one to establish the subgeneric position of the species. The scutum shows a definite pattern identical to that of *Ectemnaspis* (see Wygodzinsky, 1971) and figures

2B and 5C of the present paper. This pattern is characteristic for *Ectemnaspis*, and found in no other subgenus. We therefore include *simplex* in *Simulium* (*Ectemnaspis*). There is, however, no evidence that these three *Ectemnaspis* form a monophyletic group.

**DISTRIBUTION:** This is the only unusual *Ectemnaspis* that we have collected in the Central Cordillera of Colombia.

**BIOLOGY:** The specimens were collected on plants trailing in a stream with clear water, approximately one-half m. wide.

#### LITERATURE CITED

- Vargas, L., and A. Días Nájera  
1957. Simúlidos Mexicanos. Rev. Inst. Salubridad Enfermedades Tropicales, vol. 17, pp. 143-399, 516 figs.
- Wygodzinsky, P.  
1971. Descriptions and redescrptions of species of the blackfly genus *Simulium* from the northern Andes. Amer. Mus. Novitates, no. 2447, 38 pp.

