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## A Black Fly of the Subgenus *Simulium* (*Psaroniocompsa*) (Simuliidae, Diptera) from the High Andes of Colombia

BY PEDRO WYGODZINSKY<sup>1</sup>

### ABSTRACT

*Simulium* (*Psaroniocompsa*) *schmidtummi*, new species, is described from the Colombian Andes, where it has been found at altitudes between 3050 and 3450 meters. All previously known species of the subgenus are found in lowland areas not exceeding 1000 meters altitude. The new species differs from all others in having only four filaments to the gill of the pupa; six is the usual number in *Psaroniocompsa*.

### INTRODUCTION

One of the most surprising finds made during research on the black flies of cool and cold temperate western South America was the discovery of a high altitude species of *Simulium* (*Psaroniocompsa*) in the Andes of Colombia. The remaining species of this subgenus (*anamariae* Vulcano, *brevifurcatum* Lutz, *fuliginis* Field, *guttatum* [Enderlein], *incrustatum* Lutz, *juyuyense* Paterson and Shannon, and *opalinifrons* [Enderlein]) are lowland species of tropical and subtropical areas, and are not known to occur above 1000 meters altitude. The species described here differs from all others mentioned in the smaller number of filaments of the gill of the pupa, namely four as against six; in all other respects, differences are minor, and we do not hesitate to include the new species in this subgenus.

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

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Mr. Matthew Cormons and I made the drawings.

***Simulium (Psaroniocompsa) schmidtmmumi*, NEW SPECIES**

DIAGNOSIS: A species distinguished in having only four filaments in the pupal gill, there being six in all consubgeneric species.

DESCRIPTION: FEMALE: Wing length 3.0–3.3 mm. Frons and clypeus from silver gray to nacreous. Mouthparts piceous; maxillary palps dull black. Antennae black, with scapus, pedicellus and base of first flagellomere dark orange-colored (fig. 1C). Thorax black. Pleura and sterna with silver gray, faintly nacreous pruinosity; pleural membrane dull piceous. Scutum velvet black, lateral and posterior margins nacreous; anterior border submedially with 1+1 short cuneiform spots, in many specimens difficult to perceive. Scutellum velvet black; metanotum dark piceous, with faint silvery or nacreous pruinosity. Scutum and scutellum with setae golden-green. General color of legs from piceous to black; light-colored areas yellowish brown; anterior surface of fore tibia with white reflection. General color pattern of legs as shown in figure 1J–L. Setae and scales of legs colored as respective background. Anterior wing veins light brown; scales and setae of wing base dark brown. Stem of halteres light grayish brown; knob light yellow. Color pattern of abdomen as shown in figure 2C. First tergum from piceous to black; fringe brass-colored. Segments II–V blackish, with III–V velvet black at center dorsally. Tergum II with 1+1 large silver white spots not quite attaining hind border of segment; III–V with hind borders silvery, this area deeper at sides than toward center. Terga VI–IX piceous, highly polished. Under surface of abdomen grayish.

Head as shown in figure 1A. Frons very wide; frontal angle 110 degrees. Fronto-ocular triangle distinct, much wider than long. Antennae 11-segmented, shape and proportions of segments as illustrated (fig. 1C). Cibarium (fig. 1G) with dorsolateral arms less strongly sclerotized than parts of margin proper; central portion of margin emarginated, glabrous; submedian and sublateral portions of margin with subtriangular denticles, larger and arranged in two irregular rows toward middle, laterally smaller and only in one row. Maxillary palp as shown in figure 1D; apical segment as long as the two preceding combined. Sensory vesicle (fig. 1F) elongate, with its diameter equal to about half the width of third segment

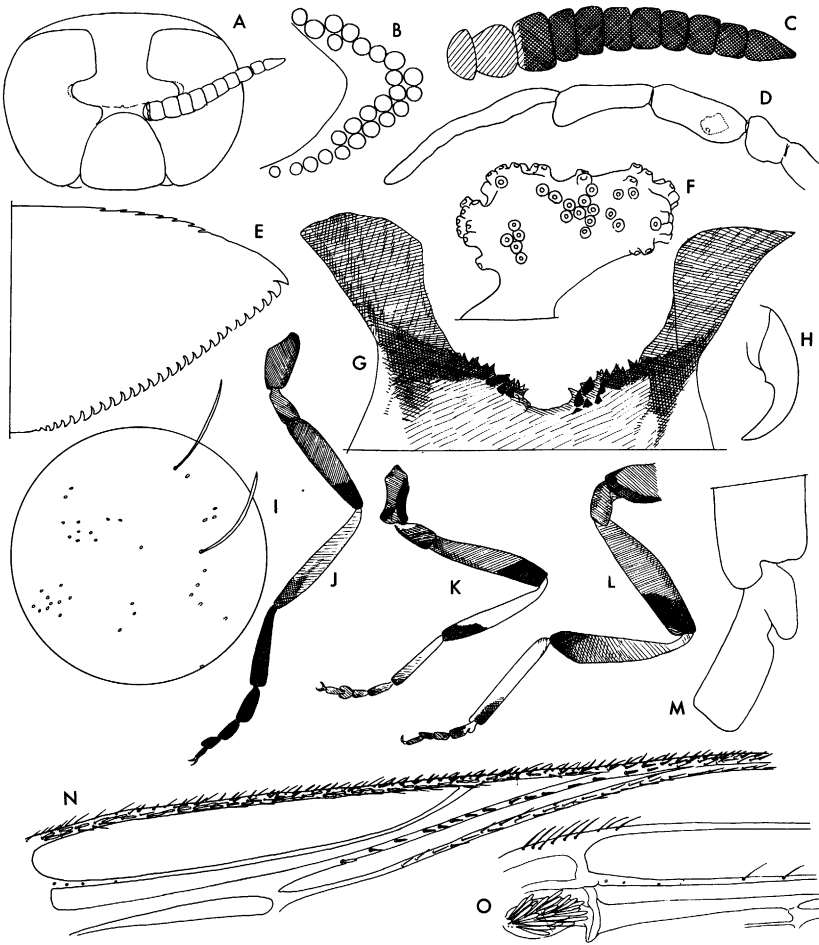


FIG. 1. *Simulium schmidtummi*, female. A. Head, front view. B. Fronto-ocular triangle. C. Antenna. D. Maxillary palp. E. Apex of mandible. F. Sensory vesicle of maxillary palp. G. Border of cibarium. H. Claw. I. Detail of scutum, high magnification. J. Foreleg. K. Midleg. L. Hind leg. M. Calcipala and second tarsal segment of hind leg. N. Anterior veins of wing. O. Detail of wing base, with scale tuft at base of R.

of palp; neck short; tubercles as illustrated. Maxillae and mandibles serrate on both edges. Maxillae with 22–28 teeth. Mandibles (fig. 1E) with 5–13 (generally 11 or 12) teeth on outer and 25–28 teeth on inner margin.

Scutum without scales; setae elongate, narrow, adpressed, isolated or in small groups (fig. 1I), these groups somewhat longitudinally arranged, but not forming distinct lines. Setae of scutellum as on scutum.

C with hairlike and spinelike setae, its basal portion with scales intermixed between setae (fig. 3E). Sc and basal portion of R glabrous; extreme base of R with conspicuous scale patch (fig. 1O).  $R_1$  with spiniform setae arranged in a single row beginning somewhat beyond base of vein; in some cases, basal setae substituted by scales (fig. 1N).

Shape of legs and proportions of segments as shown in figure 1J–L. First segment of fore tarsus widened, 5–5.7 times as long as maximum width. Calcipala shorter than wide, remote from level of pedisulcus (fig. 1M). Claws with minute subbasal tooth (fig. 1H). Femora and tibiae densely covered with scales (fig. 3G) in addition to setae.

Abdomen without scales, with scattered setae. Tergal plates well developed. Seventh sternite lacking specialized setae. Eighth sternite as shown in figure 2A, with about 10+10 setae. Gonapophyses (fig. 2A, F) broadly subtriangular, lacking true setae but with numerous microtrichia that become very long near median border of gonapophyses. Cerci and paraprocts as shown in figure 2G, paraprocts very short. Genital fork as illustrated (fig. 2B); stem slender, heavily pigmented; anterior processes of posterior arms very narrow. Spermatheca (fig. 2E) oval, its texture smooth; spicules of inner surface of variable size (fig. 2D), scattered or arranged in small comblike groups. Spermathecal duct and area of its insertion membranous.

MALE: Wing length 3.0 mm.

Color of clypeus and mouthparts as in female. Antennae entirely black. Color of thorax and its setae as in female; submedian spots of anterior margin of scutum difficult to perceive. General color scheme of legs similar to that of female and as shown in figure 3H, J. Abdomen velvet black; basal fringe dark brown. Segments II and IV–IX silver white laterally, extension of white area as shown in figure 3K; in many specimens spots on IV and V not distinct, although very conspicuous in other specimens such as the one illustrated.

Holoptic. Antennae 11-segmented; shape and proportions of segments as shown in figure 3B. Maxillary palp as shown in figure 3A; sensory vesicle (fig. 3C) subglobular, smaller, and with fewer tubercles than in female.

Setae of thorax as in female.

Wing venation and chaetotaxy as in female, but in some cases Sc with one or two setae on central portion.

Shape of legs and proportion of segments as shown in figure 3D, F, H–J.

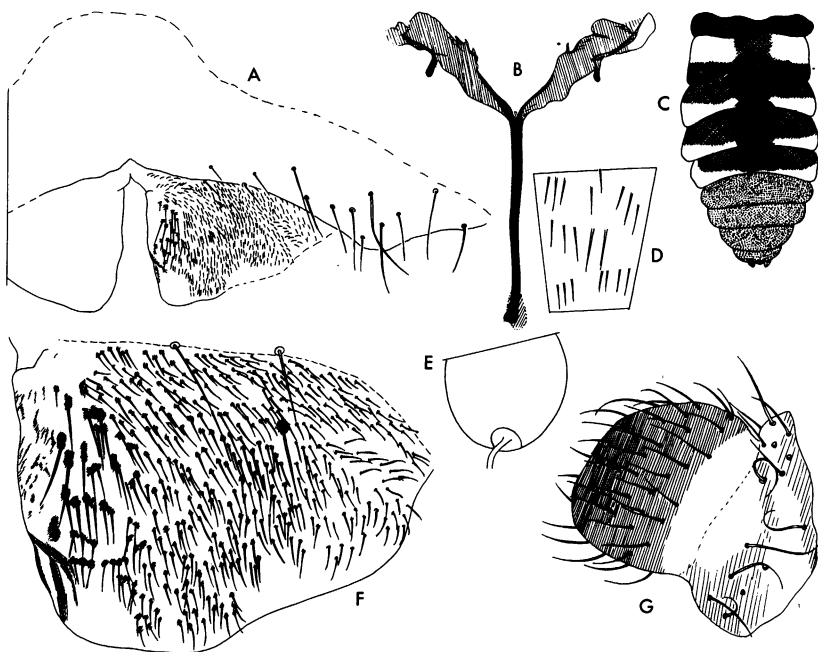


FIG. 2. *Simulium schmidtummi*, female. A. Eighth sternite, with gonapophyses. B. Genital fork. C. Color pattern of abdomen, schematic, dorsal view. D. Spicules of inner surface of spermatheca. E. Portion of spermatheca. F. Gonapophyses, high magnification. G. Cercus and paraproct.

Fore basitarsus widened, 5.2–5.3 times as long as maximum width. Hind basitarsus comparatively narrow (fig. 3F), 5.8–6.6 times as long as wide. Calcipala (fig. 3D) much as in female. Scales of legs more numerous than in female, very dense on femora and tibiae, and also present although only scattered, on coxae and basitarsi.

Parameres as shown in figure 3M, O, P. Basimere subquadrate. Distimere shorter than basimere, subrectangular, slightly longer than wide; apical spine in sublateral position. Ventral plate (fig. 3N) narrowly subtriangular, main body transverse, its setae as illustrated; pigment distinct, strongest on basal arms; faint median keel present. Endoparameral organ as shown in figure 3Q. Median sclerite (fig. 3L) very narrow, not incised apically.

PUPA: Cocoon (fig. 4A–C) slipper-shaped, with anteroventral collar absent; anterior dorsal margin projected at center, in shape of somewhat blunt triangle. Ventral wall of cocoon delicate but complete. Cocoon

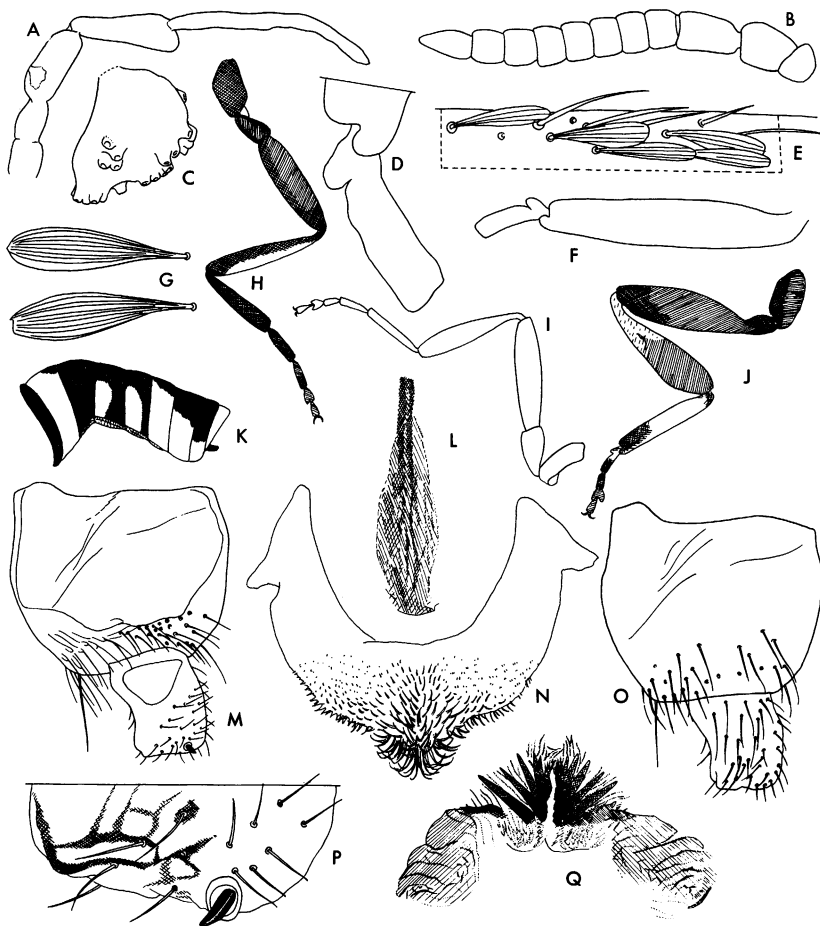


FIG. 3. *Simulium schmidtummi*, male. A. Maxillary palp. B. Antenna. C. Sensory vesicle of maxillary palp. D. Calcipala and second tarsal segment of hind leg. E. Portion of basal region of costa, with setae and scales. F. Basitarsus and second tarsal segment of hind leg. G. Scales of hind femur, high magnification. H. Foreleg. I. Midleg, color pattern not shown. J. Hind leg. K. Color pattern of abdomen, side view. L. Median sclerite. M. Paramere, dorsal view. N. Ventral plate. O. Paramere, ventral aspect. P. Apex of distimere. Q. Endoparameral organ.

translucent, its surface smooth but individual threads distinctly perceptible; borders of anterior opening slightly reinforced laterad of median projection. Color of cocoon light brown. Length of cocoon along dorsal surface 3.5–4.0 mm.; along ventral surface 4.0–4.2 mm. Length of pupa

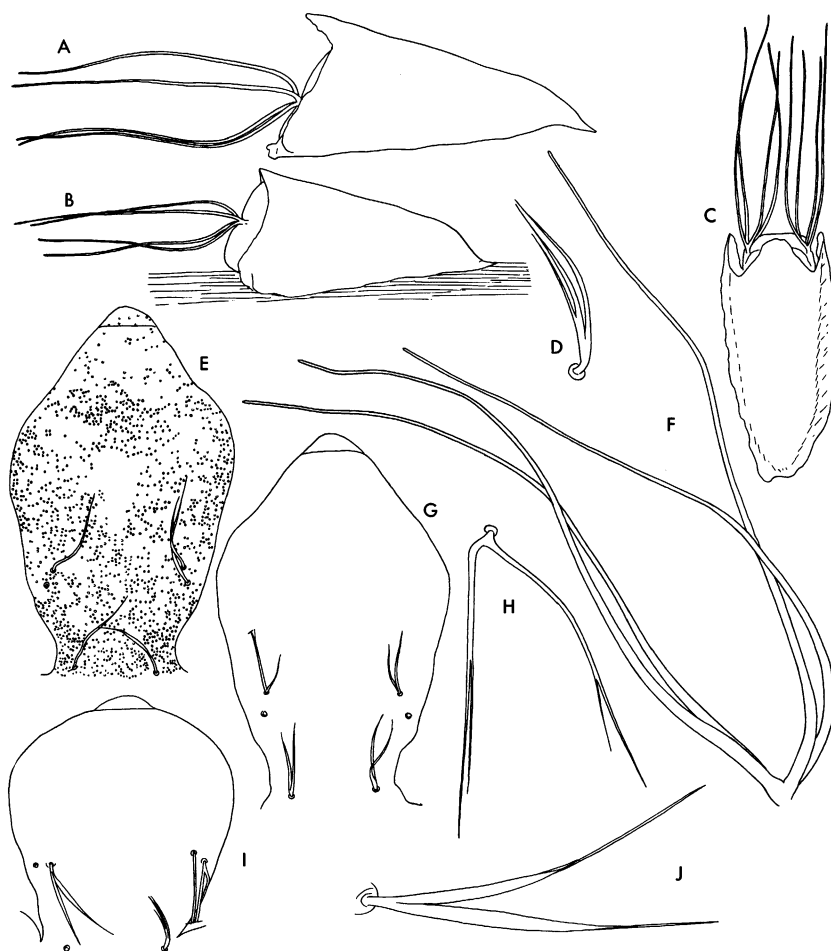


FIG. 4. *Simulium schmidtummi*, pupa. A, B. Cocoon with pupa, lateral view. C. Cocoon with pupa, dorsal view. D. Trichome of frontoclypeus. E. frontoclypeus of male. F. Gill. G. Frontoclypeus of male, different specimen, platelets not shown. H. Trichome of frontoclypeus. I. Frontoclypeus of female. J. Trichome of frontoclypeus.

3.5–3.8 mm.; of gills up to 4.3 mm., viz., distinctly longer than body of pupa.

Gills composed of four forwardly directed slender filaments (figs. 4A–C, F; 6B). Two extremely short primary branches each giving rise to two filaments; latter gradually tapering to rounded apices. Surface of filaments

with minute tubercles arranged in irregular spirals.

Head and thorax of pupa with numerous small, irregularly arranged, rather faint platelets (fig. 4E). Head with 2+2 frontal and 1+1 facial trichomes (figs. 4E, G, I; 6G); these trichomes from simple to four-branched (figs. 4D, H, J; 5B). Thorax with 5+5 anterodorsal, 1+1 posterodorsal and 1+1 posteroventral trichomes (fig. 5A, C); these trichomes with up to 12 branches, many branches clavate at apex (fig. 5D).

Abdomen as illustrated (fig. 6A). Tergite I with one long hair on each side; tergite II with several setae on each side, one or two of which bifid; tergites III and IV with 4+4 simple hooks; tergite V with one or two simple setae; tergites VI-IX or VII-IX with short spine-combs along anterior borders; tergites V-IX with lateral areas of minute scalelike cuticular processes. Apex of abdomen with 1+1 short, slightly sclerotized tubercles. Sternite IV with 1+1 groups composed of a few setae. Sternites V-VII with 2+2 hooks, closely approximated on V, distant on VI and VII; inner hooks bifid or trifid, outer hooks from simple to trifid. Sternites III-VIII each with 1+1 fields of minute scalelike cuticular processes.

LARVA: Length of mature larva 6.5 mm.; width of head capsule 0.60-

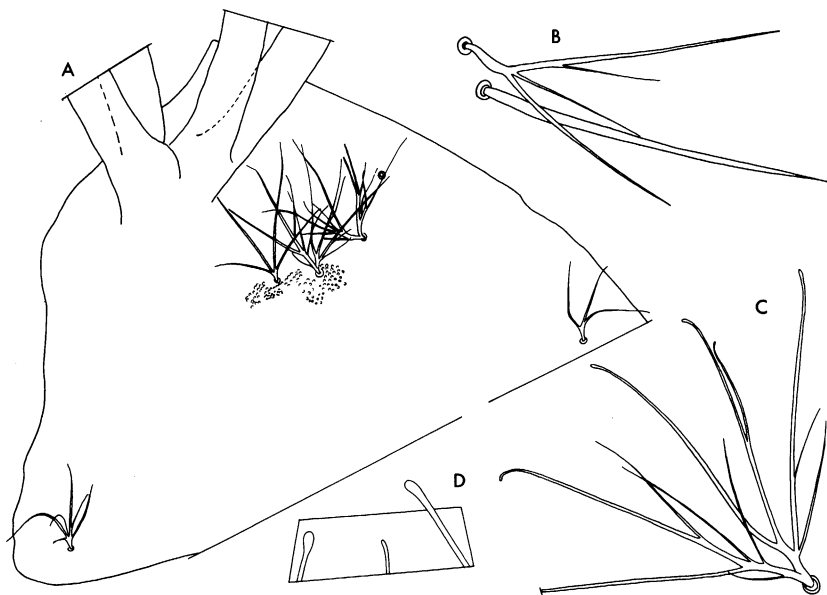


FIG. 5. *Simulium schmidtummi*, pupa. A. Part of thorax, with trichomes. B. Trichomes of frontoclypeus. C. Thoracic trichome. D. Apices of some branches of thoracic trichomes.



0.65 mm. General body color yellowish white, somewhat reddish posteriorly. Head yellowish; pattern of cephalic apotome brownish (fig. 7H). Body integument glabrous, except for a few perianal setae.

General body shape as shown in figure 7A, B; abdomen gradually widened toward behind, not abruptly truncate at tip. Ventral papillae conspicuous.

Antennae as shown in figure 7C, K, faintly but distinctly pigmented

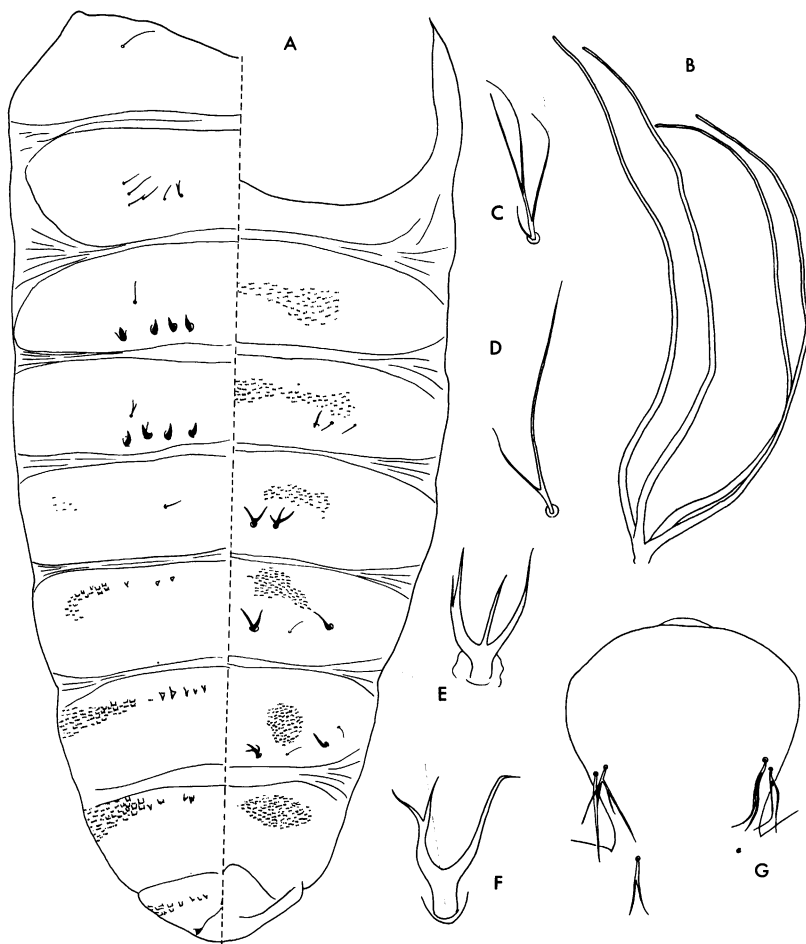


FIG. 6. *Simulium schmidtummi*, pupa. A. Onchotaxy of abdomen. B. Gill. C, D. Setae of anterior tergites. E, F. Hooks of posterior sternites. G. Frontoclypeus of female.

throughout. Second segment as long as, or very slightly shorter than, first or third, with one or two more or less distinct constrictions. Large fan of mouth brush with 50–55 rays. Primary teeth of rays stout, secondary teeth only slightly decreasing in size from one primary tooth to the next. Toothing of mandible as shown in figure 7I, J, L; two outer teeth and one apical tooth, all strongly sclerotized; three subapical teeth, conspicuously decreasing in size from first to third; inner teeth arranged in two series; marginal teeth generally numbering two, in some cases with one very small additional tooth (fig. 7I, L). Maxillary palp as shown in figure 7F. Hypostomium as shown in figure 7G; median and lateral teeth equally prominent; sublateral teeth and serrations distinct. Hypostomial setae in one irregular row, their number approximately six in each row. Gular cleft deep, somewhat deeper than length of postgenal bridge (fig. 7E).

Lateral sclerite of proleg as shown in figure 7M; setae arranged in groups of three or four on prominent tubercles; the longest setae almost as long as body of sclerite. Anal sclerite as shown in figure 7O. Posterior circlet with approximately 66 rows of 14 or 15 hooks each. Anal gills composed of three lobes, each with 12–16 lobules (fig. 7N).

**MATERIAL EXAMINED:** Colombia: Boyacá: Páramo de Tota, west slope, 3400 m., July 8, 1967 (P. and B. Wygodzinsky, E. W. Schmidt-Mumm), one male, holotype, one female, allotype, eight males, 22 females, paratypes, all reared, numerous pupae and larvae; *ibid.*, 3450 m., July 8, 1967 (P. and B. Wygodzinsky, E. W. Schmidt-Mumm), pupae and larvae; near shore of Lake Tota, 3050 m., July 8, 1967 (P. and B. Wygodzinsky, E. W. Schmidt-Mumm), pupae and larvae. Cundinamarca: "Buenos Aires," La Siberia, west of La Calera, on road to Páramo El Palacio, 3050 m., July 17, 1967 (P. and B. Wygodzinsky), six males, six females, paratypes, all reared, pupae and larvae; *ibid.*, Aug. 26, 1969 (P. and B. Wygodzinsky), pupae; road from Bogotá to Choachi, 3100 m., July 13, 1967 (P. and B. Wygodzinsky), one female, paratype, reared; *ibid.*, 3250 m., July 13, 1967, (P. and B. Wygodzinsky), one pupa. All specimens are in the collection of the American Museum of Natural History.

**BIOLOGY:** We have no information on the feeding habits of this species. Recently hatched females show very small ovaries that indicate they need to feed in order to start the first gonotrophic cycle. Well-developed mouthparts indicate hematophagous habits, and the very small tooth of the claws points to mammals as possible hosts.

Larvae and pupae of *Simulium schmidtummii* were found on grasses trailing in the water and on the upper and lower surfaces of rocks and stones, in clear streams with temperatures ranging between 9° and 12° C. The streams were generally small (less than 1 meter wide and not more

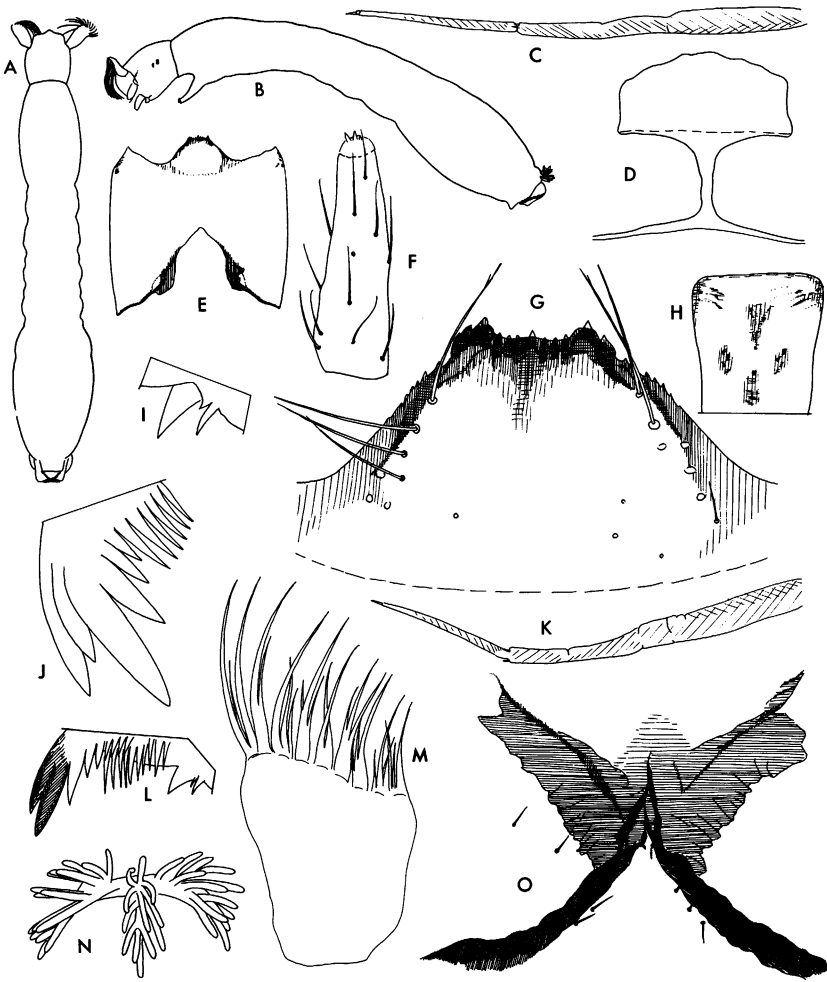


FIG. 7. *Simulium schmidtummi*, larva. A. Habitus, dorsal. B. Habitus, lateral. C. Antenna. D. Labral sclerite, schematic. E. Under surface of head capsule. F. Maxillary palp, pigment not shown. G. Hypostomium. H. Cephalic apotome. I. Marginal teeth of mandible. J. Teeth of different mandible. K. Different antenna. L. Apex of different mandible. M. Lateral sclerite of proleg. N. Anal gills. O. Anal sclerite.

than 15 centimeters deep), with crystal clear water, although in some cases abundant organic material was deposited on the substrate. All the localities where we collected this species were in the *páramo* formation, and situated between 3050 and 3450 meters.

