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Some New Mayflies of the Subfamily Leptohyphinae

(Ephemeroptera : Tricorythidae)

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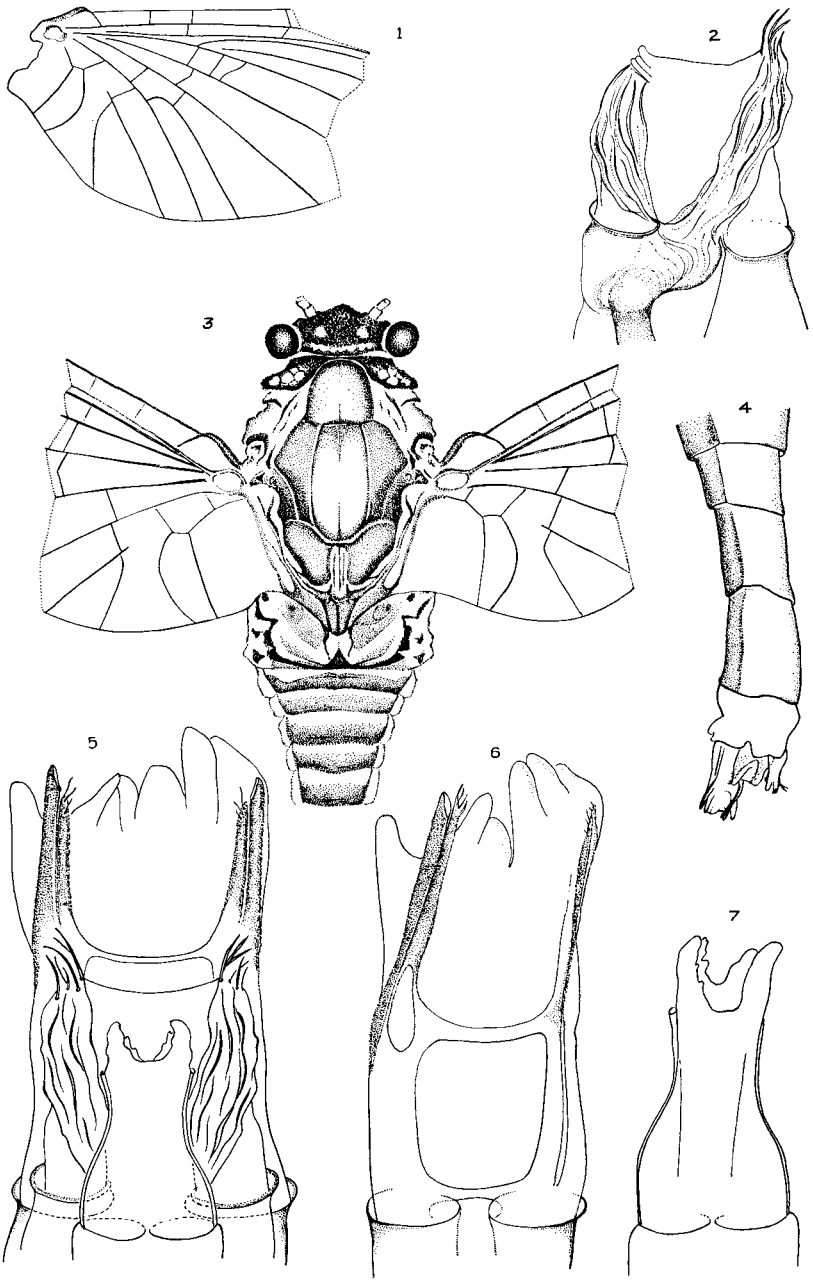
Among the mayflies collected by the writer in Macuchi, Cotopaxi Province, Ecuador were three new species of nymphs of *Leptohyphes*. Also a male specimen with unique genitalia was taken and herein described as a new genus as follows:

Cotopaxi Mayo, new genus

(Figs. 1–7)

Distinguishing characteristics of *Cotopaxi* include: unique form of genitalia; membranous processes on wings, absense of hind wings, CuP strongly arcuate, cross veins few in number, compound eyes small, well separated dorsally; small species about 4 mm in body length, wings about 8 mm.

The type species of *Cotopaxi* is *C. macuchae* Mayo, new species.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Cotopaxi macuchae Mayo, new species

(Figs. 1–7)

MALE.—In alcohol; genitalia and wing mounted on slide. Length: body about 4 mm; forewing about 8 mm. Head black except for amber circles between eyes and along posterior margin; eyes small, well separated dorsally (fig. 3); ocelli prominent; black around bases. Antennae and bases white. Head white on ventral surface between antennae; dorsally along posterior border with arc-shaped areas of amber. Pronotum black, roughened; close examination reveals honeycombed or lacy effect, like faint amber areas under rough black lace; medial triangular area more uniformly black with apex at posterior border of pronotum. Mesonotum amber or yellowish brown; sutures dark brown; postscutellum darker; supported by apparent heavy ridge which extends from posterior border to center of lateral border of posterolateral humps of scutum. Metanotum honey brown with black along posterior border and black markings on posterolateral angles. Wings hyaline, veins dark brown. Venation as in figure 1; few cross veins. CuP strongly arcuate (fig. 1). Wing membranes attach along posterior borders of mesoscutellum and end in free, well developed blackish membranous processes near midline. No hind wings. Pleuron pale amber, sclerites darker; episternum narrowly bordered with blackish brown; blackish at anterior attachment of wing to pleuron. Prosternum with lateral sclerites pale; basisternum blackish, roughened, appearing as soft black penciling on roughened surface. Mesosternum honey amber; pleural trochantin lateral to basisternum honey amber, and shiny smooth. Coxae and trochanters black anteriorly; femora amber; tibiae and tarsi missing. On tergum first abdominal segment penciled with black; other segments roughened and blackish about ⅓ of segment along posterior borders; anteriorly and laterally, hyaline; lateral borders with scalloped appearance. Sternites pale. Wing tips and part of caudal filaments still in subimaginal skin.

The genitalia are made up of three entirely different pairs of projections which are here described as ventral, medial, and dorsal structures. Before the genitalia were removed the long dorsal structure was extended out dorsally while the ventral and medial structures were directed downwards at right angles to the dorsal structure. The dorsal projections might represent the forceps. The genitalia are oriented on the slide so that each of the three structures is but slightly overlapping so a good view of each is available. It is believed that the ventral structure is the penes; each penis arises from a chitinized tube (fig. 7). Laterally

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FIG. 1. Wing of *L.* (*Cotopaxi*) *macuchae.* FIG. 2. Medial structure of the genitalia of *L.* (*Cotopaxi*) *macuchae.* FIG. 3. *L.* (*Cotopaxi*) *macuchae,* dorsal view. FIG. 4. Abdominal segments with the three structures of the genitalia of *L.* (*Cotopaxi*) *macuchae.* FIG. 5. Dorsal view of the three structures of the genitalia of *L.* (*Cotopaxi*) *macuchae.* FIG. 6. Dorsal structure of the genitalia of *L.* (*Cotopaxi*) *macuchae.* FIG. 7. Ventral structure of the genitalia of *L.* (*Cotopaxi*) *macuchae.*

the sperm ducts terminate in what in all probability, are traces of semen, for on the right side is what appears to be a long spine-like process; on the left at the same level is what appears to be a bristle. Along side of the sperm ducts about two-thirds of the way to the center, the structure is sclerotized. The unsclerotized structure of the terminal lobes extends down the center.

On the medial structure each lateral process also arises from a chitinized tube, the rim of which appears to be heavily ringed around each base (fig. 2). This is more clearly visible than in the ventral lobe. Each lateral process consists of an unsclerotized part and a sclerotized area which has prominent longitudinal wrinkles and terminates apically in long bristles. These wrinkled, sclerotized areas of the two processes are also connected at the base to a tubular structure situated between them; this tubular structure projects out ventrally nearly at a right angle to the whole medial structure. The unsclerotized parts arising from each lateral tube appear to form a clear plate behind or dorsal to the wrinkled structure which terminates near the apical lobes of the lateral processes.

The dorsal structure is almost twice as long as either of the others (fig. 6). The tubular structure from which each lateral process arises is likewise clearly visible and the rim appears as a ring around each base. The lateral processes are connected near the base and medially by a clear, narrow cross bar. Each process is paired and the apical halves are very heavily sclerotized. The lobes appear blackish and roughened. On the tips are several long bristles. The lateral processes are separated in the apical halves from the clear plate which is about the same length and terminates in several lobes. Caudal filaments were lost with the subimaginal skin.

Holotype male imago, 6 June 1945, V. K. Mayo, BRADEN QUEBRADA, MACUCHI, COTOPAXI PROVINCE, ECUADOR. In entomological collection of University of Utah, Salt Lake City.

LEPTOHYPHES NYMPHS

According to Allen (1967) "the characters most useful in distinguishing the species in the nymphal stage are: (1) the shape of the femora, and the relative lengths of the fore and hind femora; (2) the shape and length of the fore femoral spines; (3) the number and arrangement of denticles on the tarsal claws; (4) the shape of the abdominal segments; and (5) the shape and coloration of the operculate gills on segments 2." All nymphs in the genus have convex fore femora, with band of blunt spicules over highest point (fig. 14).

Leptohyphes ecuador Mayo, new species

(Figs. 9, 12, 14–17)

NYMPH.—Length body about 4 mm; caudal filaments about 2 mm. General color amber with dark brown markings. Head blackish, mottled with amber, color pattern of adult showing through; two tubercules covered with white spicules on either side of midline between eyes. Mouthparts as in figures 12, 15–17; maxillary palpi three segmented. Antennae amber. Pronotum blackish brown mottled with amber; amber along anterior margin; small tubercles covered with white spicules similar to those on head on either side of midline near posterior border. Mesonotum amber with brown markings of adult pattern; wing pads amber; white spicules on mesonotum in elongated clusters on either side of midline near anterior border, and along anterior borders of wing pads; transverse striations between wing pads. Legs amber; fore femora not quite as wide as hind femora; middle femora narrower; hind femora about 30% longer than fore femora. Spines along anterior borders of middle and hind femora. Hind femora with large projection from distal end (fig. 14); projection about ⅕ length femur, not quite as big around as tibia; blackish lines from base of projection over half way up femur; row of prominent spines from base of projection entire length of femur, more prominent distally; under high magnification these spines appear as flattened scales, blunt at tips. Tip of projection with minute spicules; few striated oval scales on legs. Claws with 5 marginal denticles (fig. 9). First abdominal tergite with wide dark brown band medially, bordered with amber on anterior, posterior and lateral margins, and wider at midline; segments 2–7 with wide dark brown bands across posterior margins of tergites; bands mottled with amber and large amber spots on either side of midline on segments 8–10; segment 10 with blackish line medially and blackish laterally; lateral portions of tergites amber. Abdomen without tubercles, but with few scattered spicules similar to those on legs. Operculate gills amber with dark brown at base. Sternum with adult pattern showing through; abdominal sternites with triangular darkened areas along midline, dark patches laterally; triangular areas reduced to streaks on segments 8–9. Caudal filaments amber.

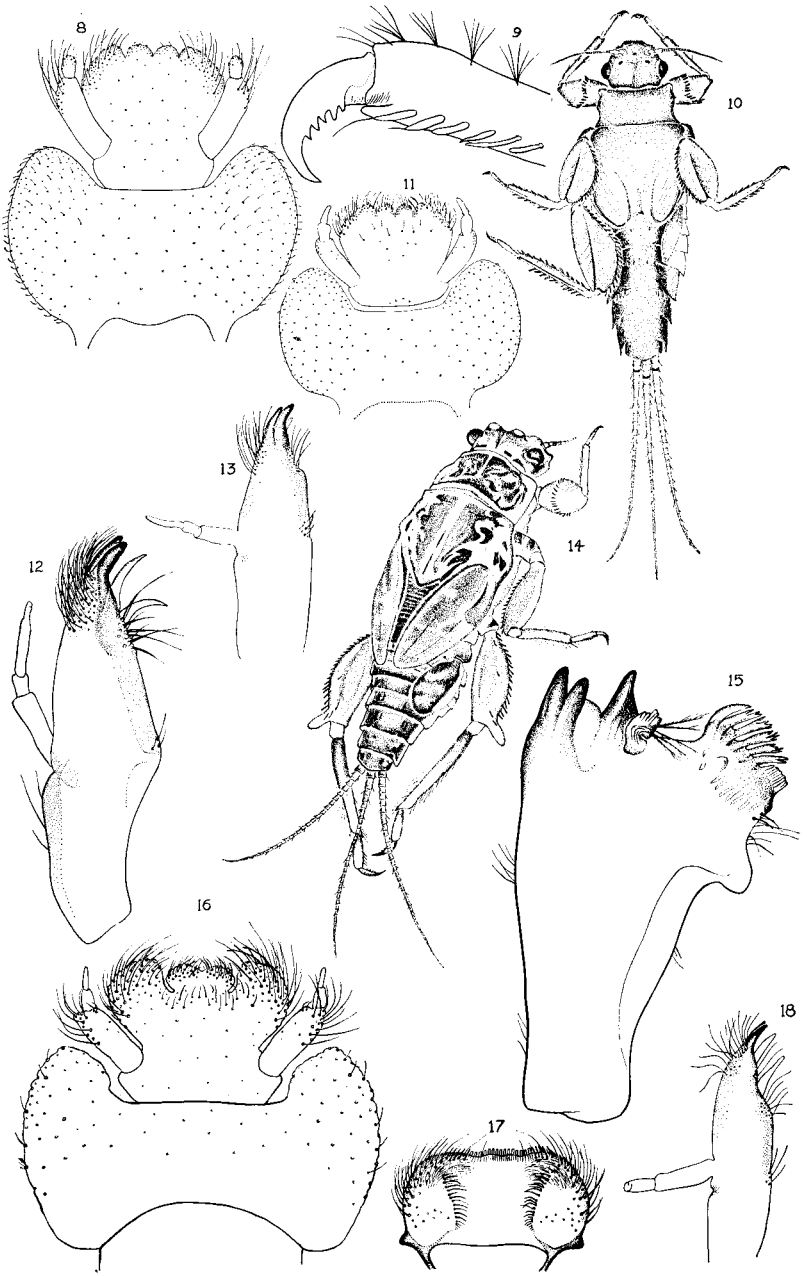
Holotype nymph, 6 June 1945. V. K. Mayo, BRADEN QUEBRADA, MACUCHI, COTOPAXI PROVINCE, ECUADOR; in entomological collection of University of Utah, Salt Lake City. Paratypes, 5 nymphs same data; four in entomological collection of University of Utah; one mounted on slide, in collection of writer.

There is one other nymph of the genus *Leptohyphes* with a projection on hind femora; *L. tuberculatus* Allen from Peru. On that species there are "round median tubercles" (Allen, 1967) on abdominal terga 5–9. There are no abdominal tubercles on *L. ecuador*. There are no tubercles on head and thorax of *L. tuberculatus*; small tubercles are present on head and thorax of *L. ecuador*.

Leptohyphes albus Mayo, new species

(Figs. 8, 18)

NYMPH.—Length body 5 mm; caudal filaments about 3.5 mm. General coloring pale yellow. Head pale except for eyes and ocelli. Maxillary palpi two segmented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(fig. 18). Pronotum depressed laterally; dark streak on anterior border of pronotum lateral to midline; smoky patches laterally. Mesonotum pale except for anterior border narrowly rimmed with reddish brown; anterolateral corners smoky with blackish streaks extending from this area near anterior border on either side midline; dark V-shaped mark on scutellum between wing pads; white spicules on anterior borders of wing pads; pale transverse striations between wing pads. Costal margin of wings shows through as black in wing pads of two specimens; this black costal area is the most prominent marking on body. Hind wing pads pale. Spicules on fore femora same length as those of fore femora of *L. ecuador*, but more narrow; hind femora very wide; much wider than fore femora; flattened and with prominent reddish brown spines on anterior borders; hind femora 20% longer than fore femora; middle femora with similar spines, but not as wide as hind femora. Claws with five marginal denticles. Abdominal tergites smoky with pale yellow intersegmental areas. Operculate gills smoky at base, pale distally. Sternum pale.

Holotype nymph, 7 July 1942, V. K. Mayo, RIO AMAYO, MACUCHI, COTOPAXI PROVINCE, ECUADOR; in entomological collection of University of Utah, Salt Lake City. Paratypes: 2 nymphs, same data, same deposition as holotype.

Leptohyphes tacajalo Mayo, new species
(Figs. 10, 11, 13)

NYMPH.—Length body 4.5 to 5.0 mm; caudal filaments about 3 mm. General color reddish brown to light brown. No tubercules, but head and thorax slightly roughened with minute spicules. Maxillary palpi three segmented (fig. 13). Pronotum with protuberance along lateral margin near anterior border. Fore femora much more narrow than hind femora. Spicules on dorsal surface of fore femora are more narrow and longer than those of *L. ecuador* and *L. albus*; hind femora only about 30% longer than fore femora; hind and middle femora with elevated spineless ridge from distal end extending almost length of femur; flat, long blunt spicules prominent on anterior borders of middle and hind femora; tibiae with row of spines on anterior and posterior margins. Claws with three marginal denticles. Scattered spicules on abdomen; abdominal tergites 2–7 depressed on either side forming troughs in which gills lie. Depressed tergites flattened laterally; flattened area hyaline; segments 6–9 with posterolateral projections. Anterior margins of hind femora fit into curves of depressions on abdomen. Sternites reddish brown except hyaline laterally on segments 2–7. Caudal filaments narrowly banded with dark brown near base.

Holotype nymph, 6 June 1945, V. K. Mayo, BRADEN QUEBRADA, MACUCHI, COTOPAXI PROVINCE, ECUADOR. In entomological collection

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FIG. 8. Labium of *L. albus*. FIG. 9. Tarsus and claw of *L. ecuador*. FIG. 10. *L. tacajalo*, dorsal view. FIG. 11. Labium of *L. tacajalo*. FIG. 12. Maxilla of *L. ecuador*. FIG. 13. Maxilla of *L. tacajalo*. FIG. 14. *L. ecuador*, dorsal view. FIG. 15. Mandible of *L. ecuador*. FIG. 16. Labium of *L. ecuador*. FIG. 17. Labrum of *L. ecuador*. FIG. 18. Maxilla of *L. albus*.

of University of Utah, Salt Lake City. Paratypes, nine nymphs same data, same deposition as holotype.

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