

Observations on the Subgenus *Phalangomyia* of the Genus *Culex* in Ecuador with Description of a New Species (Diptera: Culicidae)

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THE SUBGENUS *Phalangomyia* has rather generally been considered as a synonym of the subgenus *Culex* although, especially in the species found in Ecuador and described herein, it has characters which differentiate it very clearly. The terminalia are very characteristic. The strongly chitinized structure of the clasper and the presence of strong hairs on its outer surface constitute a great difference from the condition found in members of the subgenus *Culex*. *Phalangomyia* seems to represent one of the oldest branches of the genus *Culex*, as indicated by its adaptation to a high-altitude environment.

All the members of this subgenus are found only in the Andean countries of South America. They are large mosquitoes with very well-developed bodies and strong, long legs. They are adapted for high-altitude flying and for low oxygen consumption and, therefore, are always found at altitudes of more than 2,000 meters above sea level, where no other mosquitoes and few other insects of any sort can live. One of the two species considered here was found at an altitude of 2,900 meters near the city of Quito and the other near the town of Cuenca at an altitude of 2,500 meters. In the Andean region of Ecuador the median temperature is ordinarily between 14.5° and 20°C. (58°—68°F.), and wind velocities of 5 to 25 miles per hour prevail. Thus, in order to live, mosquitoes must be adapted to this environment.

The most interesting characteristic of these mosquitoes is the fact that larvae, pupae, or adults die very shortly if they are taken to sea level, apparently because their metabolism has been adapted to the oxygen shortage of the high altitudes of the Andes. Thus the author was unable to breed larvae of *Phalangomyia* at sea level, even when water from the breeding places, with all the algae present, was brought to the laboratory. Apparently, then, compression is a main factor in killing the larvae, although they sometimes survive 10 to 12 hours of being at sea level. Also temperature changes will kill the larvae, and at sea level both the temperature and humidity are higher than those at over 2,000 meters above sea level. However, even placing the larvae brought to sea level in refrigerators held at the same temperatures as the highlands does not prevent their dying in a few hours. This proves that the subgenus *Phalangomyia* is only adapted to live at high altitudes, in the Andean region of Ecuador. The problem of the effects of oxygen, basal metabolism, and environment on highland mosquitoes has not been studied sufficiently, and it is one of the research projects of the Ecuadorian Center for Entomological Research.

Two species of *Phalangomyia* have been taken in the highlands of Ecuador, one previously known and one new to science. They are both described here.

Culex (*Phalangomyia*) *archegus* Dyar, 1929

LARVA (Fig. 1a, b): *Head* rounded, wider than long. *Antennae* long, tapering, with a sub-

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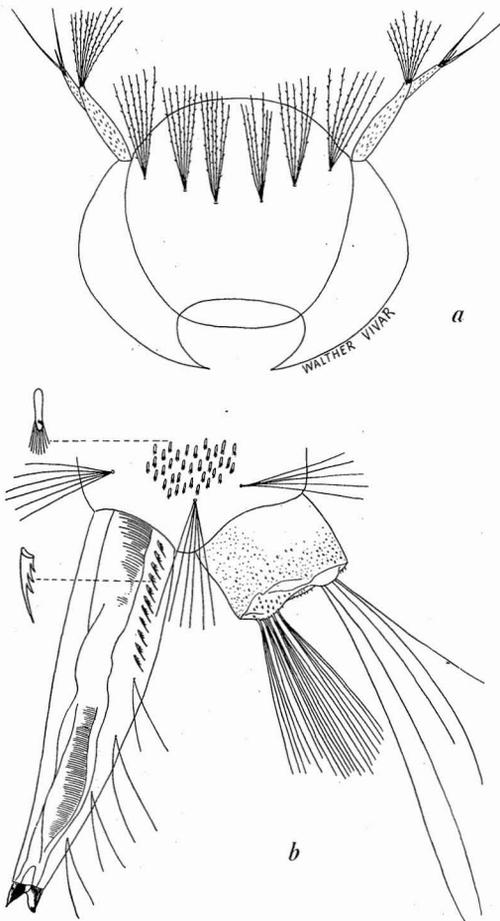


FIG. 1. Larval structures of *C. (Ph.) archegus*. *a*, Head; *b*, cauda.

apical hair tuft, spiculate body, and 2 pairs of long apical hairs. *Preantennal hairs* 6 to 8, finely spinulate, longer than the antennae. *Interior dorsal hairs* 4 to 6, finely spinulate. *Exterior dorsal hairs* 3 to 4, spinulate.

Comb of the eighth abdominal segment (Fig. 1*b*) formed by a patch of elongate teeth with apex hairy. *Air tube* long, 4.5 times as long as wide. *Pecten* of 13 to 15 triangular scales, sharp and with 3 to 5 teeth each. Tuft of the pecten double and long, other tufts double and long, located at different places along the air tube. *Anal segment* longer than wide, finely spinulate on most of its surface. *Lateral hair tuft* double and large. *Dorsal brush* formed by 3 long, strong elements. *Ventral brush* formed

by 8 hairs, 4 elements each, very well developed and long.

PUPA (Fig. 2*a, b*) (Chaetotaxy according to Knight and Chamberlain, 1948): *Segment I*, hair 10 well developed and long, hair 2 with strong base, very ramified; *Segment II*, hair 8 developed, long, hair 2 long and thin; *Segment III*, hairs 2 and 5 long and ramified, hair 7 long; *Segment IV*, hairs 2 and 5 ramified and long, hairs 4, 6, 7 long; *Segment V*, hair 2 ramified and long, hair 5 very long and diramified; *Segment VI*, hair 2 diramified and very long, hair 5 ramified and long, hair 7 long and simple; *Segment VII*, hair 2 medium

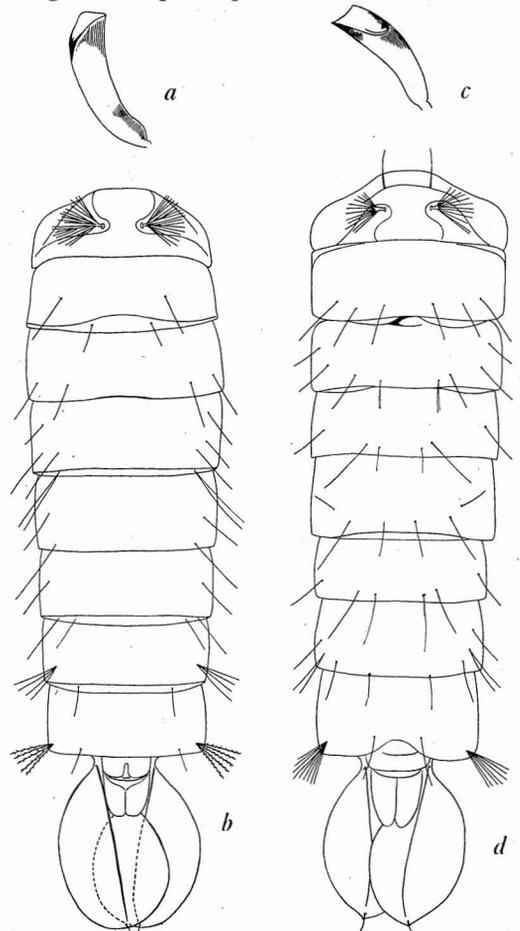


FIG. 2. Pupal structures of *C. (Ph.) archegus* Dyar and *C. (Ph.) quitensis* n.sp. *a*, Trumpet of *C. archegus*; *b*, dorsal aspect of abdomen of *C. archegus*; *c*, trumpet of *C. quitensis*; *d*, dorsal aspect of abdomen of *C. quitensis*.

and diramified, hair 6 long and simple, hair 5 medium and diramified, hair 8 ramified and very well developed; *Segment VIII*, hair 5 medium and simple, hair 8 multiramified, very well developed and spiculated. *Pupal trumpets* longer than wide, with a triangular opening, rounded at the angular borders, tapering and very sinuous. *Pupal paddles* rounded with strong medium rib, apical hairs small.

ADULT (both male and female): Proboscis medium, slightly enlarged near the tip, olive green. Palpi thin and long in the males, short and lobulous in the females, with many setae, olive green and black. Vertex with dark integument revetted with plumous white scales, which form an overlapping tuft toward the clypeus, and bordering the eyes. Occiput dark with plumous scales as on the vertex. Prothoracic lobes revetted with golden scales and dark hairs. Mesonotum with 3 strips of small, compact brown scales forming circular spots at the wing base, the disc revetted with small golden hairs, with clear spaces among the compact scales. Scutellum trilobate with the median lobe larger than the others, with golden scales as on the mesonotum, with long dark hairs on all the lobes. Postnotum bare of scales, light brown. Abdomen olive brown, segments with basal white bands that become larger, forming wide white bands that cover lateral portion of abdomen, white scales covering nearly all of preapical segment and apical segment except for small black spot. Venter with central dark portion toward which lateral white bands converge, forming latero-ventral white spots. Legs long, second and third pairs successively larger. All legs black, with basal and apical white spots on femora and tibiae. Segments of tarsi with small white spots at base and tip. Wings revetted with small dark scales.

Male Terminalia: Coxite (Fig. 3a) triangular, tapering, external surface bearing many long and strong setae, basal portion with micropili and sinuosities. Subterminal lobe prominent, short, with 3 sinuous rods, median one slightly curved apically, all 3 arising from

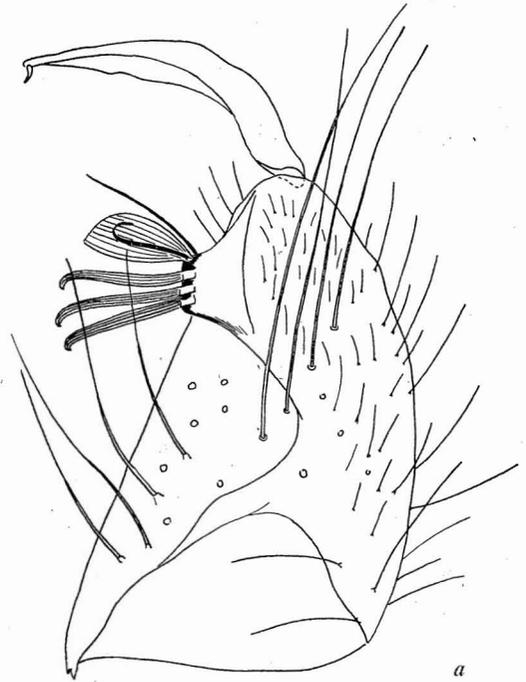


FIG. 3. Male terminalia of *C. (Ph.) archegus*. a, Coxite and clasper; b, mesosomal plate, tenth sternites, and ninth tergites.

tubercular bases, lobe also bearing very thin hair-like filament slightly curved at tip and shorter than rods. In addition, subterminal lobe with very large ovate leaf and long rod-like seta, almost as stout as rods. Clasper curved, broadened centrally, tapered distally,

with triangular spine nearly terminal. Mesosomal plate (Fig. 3*b*) with upper limb short, lower recurved, thumb-shaped, with several curved teeth between the lower and a very large tooth which arises from base and which tapers sharply distally and projects beyond plate. Tenth sternites with tips tufted with spines, with wide, very long curved arm from base. Ninth tergites forming elongate lobes with 6 to 8 thin long hairs, lobes very hairy and well sclerotized.

Culex (Phalangomyia) quitensis n.sp.

LARVA (Fig. 4*a, b*): Head round. *Antennae* long, tapering, with subapical hair tuft, spiculate body, 1 pair of long tapering hairs, 1 pair of short tapering hairs. *Preantennal hairs* 4 to 6 finely spinulate hairs. *Interior dorsal hairs* a bunch of 4 to 6 finely spinulate hairs. *Exterior dorsal hairs* 4 to 6 finely spinulate hairs.

Comb of eighth abdominal segment (Fig. 4*b*) formed by patch of oval teeth with apex hairy. *Air tube* long, 3.5 times as long as wide. *Pecten* of 14 to 16 conical scales with 4 to 6 teeth each. Tuft of pecten simple or double, finely spinulate, other tufts formed of 1 to 3 spinulated hairs located at different places along air tube. *Anal segment* wider than long, spinulate, with small and medium spinules on most of surface. *Lateral hair tuft* double, long and spinulate. *Dorsal brush* formed of 3 long, strong, spinulate hairs. *Ventral brush* formed of 6 to 8 hair tufts of 4 elements each, very well developed and long.

PUPA (Fig. 2*c, d*) (Chaetotaxy according to Knight and Chamberlain, 1948): *Segment I*, hair 10 well developed and long, hair 2 with strong base, very ramified; *Segment II*, hairs 2, 4, 8 long and simple; *Segment III*, hairs 2, 5, 8 long and simple; *Segment IV*, hairs 2, 8 long and simple; *Segment V*, hairs 2, 5, 6 long and simple; *Segment VI*, hairs 2, 5, 7 long and simple; *Segment VII*, hairs 2, 5, 7 long and simple, hair 8 long and diramified; *Segment VIII*, hair 5 long and simple, 8 long and multiramified. *Pupal trumpets* longer than wide,

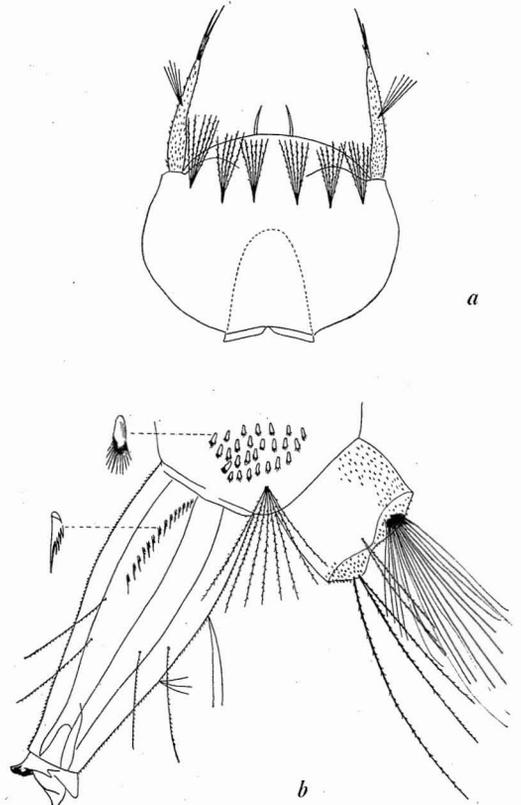


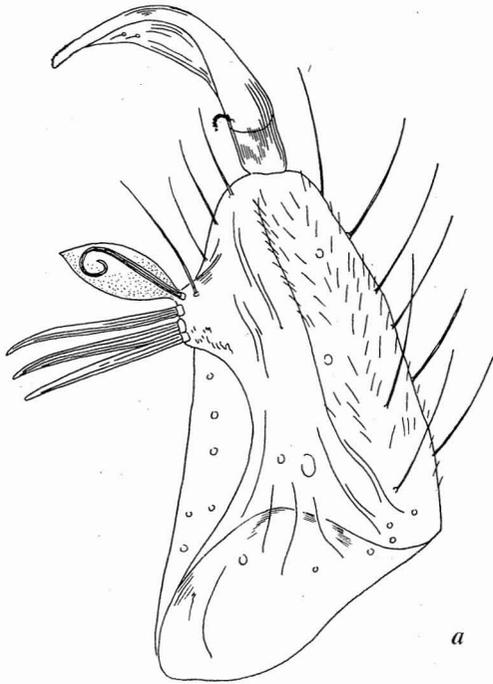
FIG. 4. Larval structures of *C. (Ph.) quitensis*. *a*, Head; *b*, cauda.

with wide pyramidal opening, rounded on one angle, tapering and very sinuous. *Pupal paddles* rounded, with strong median rib, apical hairs medium.

ADULT (both male and female): Proboscis black with white tip. Palpi black with white tips, small and hairy in female, long and thin in males. Vertex with white, truncate, triangular scales, dark triangular scales, and black setae, forming tufts that overhang clypeus. Occiput with white and black triangular scales. Borders of eyes with dark setae. Prothoracic lobes with integument dark brown, with long and strong hairs. Mesonotum with two bare lines, forming a lyre-like structure, with white scales, very compressed, forming tufts at bases of wings. Disc covered with dark-brown compressed scales and dark setae, posteriorly re-vetted with white scales and dark long setae.

Scutellum trilobed, revetted with white scales and dark hairs. Postnotum bare with integument dark brown. Abdomen covered dorsally

by brown scales and with basal spots of silvery white scales in each segment which become lateral bands. Venter with dark-brown scales in straight line up to tip, bands of white scales diverging from this line to form lateral spots of white scales. Legs very long, posterior pair longest. Pleurae and coxae revetted with white scales forming tufts and spots. Legs dark brown with femora and tibiae white ventrally and on dorsum basally and apically, segments of tarsi dark brown with white spots on knees. Wings large with small dark scales.



a



b

FIG. 5. Male terminalia of *C. (Ph.) quitensis*. a, Coxite and clasper; b, mesosomal plate, tenth sternites, and ninth tergites.

Male Terminalia: Coxite (Fig. 5a) triangular, tapering, external surface bearing many short, strong setae, and very small hairs. Subterminal lobe prominent, short, with 4 rods, one smaller and with tip curved like question mark, other 3 sinuous, slightly curved subapically, lobe also bearing medium-sized ovate leaf and long hair-like seta, all arising from tubercular bases. Clasper curved, very broad basally, tapering apically, with two small subapical setae and very small terminal spine. Mesosomal plate (Fig. 5b) with upper limb broad, with several spine-like teeth, very large formation of teeth from base curving sharply outward and projecting as a point beyond plate. Tenth sternites with tips tufted with spines, with wide, curved, very long arm from base. Ninth tergites forming elongate lobes with 6 to 10 long, strong, terminally curved hairs, lobes very hairy and well sclerotized.

TYPES: 2 males, 1 female, and their larval and pupal pelts in the collection of the Ecuadorian Center for Entomological Research.

TYPE LOCALITY: Quito, Ecuador (South America).

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