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A remarkable new asiracine delphacid planthopper from Ecuador (Hemiptera, Fulgoroidea, Delphacidae)

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Abstract

A new genus and species of the asiracine tribe Platysystatini (Hemiptera: Fulgoromorpha: Delphacidae), *Pichinchana gilletti* from Ecuador, are described. A key to the platysystatine genera is provided. The relationships of this species to other group members and its biology are discussed.

Key Words

Auchenorrhyncha
Fulgoromorpha
Platysystatini
Taxonomy
ground-dwelling

Introduction

The Asiracinae sensu Emeljanov (1995 [1996]) (Asiracini sensu Fennah 1979 and Asche 1985) are considered to represent the most plesiomorphic group within the Delphacidae (Asche & Remane 1982, Asche 1985, Emeljanov 1995 [1996]). Asiracinae can readily be distinguished from all other Delphacidae by the possession of an awl-shaped post-tibial spur which is nearly circular in cross-section and bears irregular bristles, but no marginal teeth.

With presently 11 genera and 32 species Asiracinae are widely distributed, especially in the tropics and subtropics. They are entirely missing in the Oriental Region as well as in Australia and the Pacific (Asche 1985). Most asiracine genera and species have been reported from the New World, especially Central and South America (see e.g., Muir 1926, 1930, Fennah 1969, Asche 1983a, b, Barringer & Bartlett 2011). Unfortunately, a cladistic analysis of taxa within Asiracinae as well as of Asiracinae in relation to other delphacid groups is still missing. However, Emeljanov (1995 [1996]) provided a phylogenetic hypothesis of Delphacidae which is mainly based on larval characters. Emeljanov (l.c.) distinguished the Protodelphacida (Asiracinae and Ugyopinae) and the Eudelphacida (all other groups of Delphacidae). He divided the Asiracinae into the 4 tribes Asiracini, Idiosystatini, Platysystatini, and Tetrasteirini, the latter three confined to the New World. Presently, the Platysystatini contain 3 genera and 4 species, viz., *Platysystatus* Muir, 1930 with *P. brunneus* Muir, 1930 and *P. itapetingus* Asche, 1983, both from Brazil; *Equasystatus* Asche, 1983 with *E. breviceps* (Muir, 1926) from Ecuador; *Pentasteira* Barringer & Bartlett, 2011 with *Pentasteira albifrons* Barringer & Bartlett, 2011 from Ecuador.

Here we describe an unusual flightless new species from Ecuador, strikingly similar to some Membracoidea associated with the soil (see Discussion), which could not be placed in any of the existing genera, thus a new genus is established. The finding of this species indicates the diversity of the South American asiracine fauna, and fosters the expectation of many more new discoveries in the future.

Material and methods

Measurements and illustrations (line drawings and photographs) of external body parts were taken from the dry specimen. A Leitz

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stereomicroscope with camera lucida was used for examinations and for providing line drawings. Studies of internal structures of the female genitalia were not carried out in order keep the specimen intact.

Taxonomy

The terminology of body and female genitalia used here is combined from Asche (1985) and Barringer & Bartlett (2011). The terms for wing-venation follows Barringer & Bartlett (2011) who interpreted the schemes of Dworakowska (1988) based on those of Kukalova-Peck (1983).

Platysystatini Emeljanov, 1995

Platysystatini Emeljanov, 1995: 782, 1996: 139

Diagnosis (adopted from Emeljanov 1995, with supplementary information). Small sized but robust Asiracinae with slightly depressed appearance. Vertex very short, anterior compartment obsolete or missing. Frons very broad, usually as wide as high or even wider, median frontal carina simple, deeply forked, or absent; frontal area more or less plain or moderately convex, surface chagrinated or finely peltate. Postclypeus short, vaulted. At least second antennal joints (pedicels) distally widened, in *Platysystatus* terete, in the other genera mostly compressed. Rostrum attaining hind coxae. Pronotum about as wide as head including compound eyes or slightly wider, carinae usually ridged, median carina reaching posterior margin, lateral carinae diverging parallel to compound eyes, not reaching posterior margin. Mesonotum pentecarinate, median carina obsolete towards scutellum, lateral carinae more or less straight, diverging and reaching posterior margin, sublateral carinae undulate or at least convexly arched, usually reaching posterior margin. Legs with post-tibia laterally armed with 3–5 spines, post-basitarsus distally with a uniform row of 5 spines, second post-tarsus distally with a row of 4 spines (in *Pichinchana gilletti* sp. n. grouped 1-2-1); post-tibial spur relatively short, not exceeding half the length of post-basitarsus. Tegmina coarse, leathery, veins usually beset with numerous bristles originating from callous bases (in *Pichinchana* gen. n. only in distal part), distally of nodal line inflected medially; hind wings with a distinct marginal notch at insertion of CuP (in *Pichinchana gilletti* sp. n. hind wing absent). Male genitalia: genital segment (pygofer) in lateral view subtriangular, in caudal view high subovate, ventrocaudal margin excavate, usually furnished with 1–3 projections; parameres slender, distally converging, pincer-shaped; aedeagus with elongate shaft and a flagellum shorter than the shaft, shaft and flagellum with a variable number of rigid and movable spinose processes; anal segment stout, ventrocaudal margin usually concave. Female genitalia with ovipositor strongly curved dorsocaudally, slightly surpassing tip of the anal style.

Distribution. All members of this tribe are confined to South America: Brazil (Muir 1930, Asche 1983) and Ecuador (Muir 1926, Asche 1983, Barringer & Bartlett 2011).

Remarks. Barringer and Bartlett (2011) mentioned morphological incongruences of their new genus *Pentasteira* with the concept of Platysystatini sensu Emeljanov (1995), viz., the intermediate mesonotal carinae of *Pentasteira* are arched not undulate. This character is similar in *Pichinchana* gen. n.; however, with a close look a very fine undulation of these carinae at the posterior end of the mesothorax is visible. For the time being, we agree with the placement of these genera into Platysystatini, the more as the other 3 tribes do not apply at all. However, it is conceivable that in the course of further exploration and discovery of more taxa of this group a finer grade of tribal assessment will become necessary.

Key to the genera of Platysystatini Emeljanov

1. Frons with simple median carina or median carina vestigial; distinct setae on veins over the entire tegmina 2
– Frons with median carina narrowly forked from near its base (Fig. 3b); distinct setae on tegmina only at margin distally of nodal line (Fig. 2) . . . . . *Pichinchana* gen n.
2. Second antennal joint (pedicel) flattened, compressed 3
– Second antennal joint terete . . . . . *Platysystatus* Muir
3. Sublateral (intermediate) carinae of mesonotum undulate. . . . . *Equasystatus* Asche
– Sublateral (intermediate) carinae of mesonotum convexly arched . . . . . *Pentasteira* Barringer & Bartlett

Pichinchana gen. n.

Type species. *Pichinchana gilletti* sp. n. [Ecuador]

Description. Small-sized, strongly sclerotized Asiracinae with coleopterous appearance (Figs 1–3). Head including compound eyes distinctly narrower than pronotum; eyes small, sheltered in a narrow furrow formed by the foliately ridged lateral carinae of vertex and frons; ocelli absent. Vertex subtriangular, posterior margin concave, lateral carinae converging towards apex and joining with the lateral frontal carinae. Frons very broad, subcircular; median carina prominent, narrowly forked, frontal area nearly plain. Postclypeus small, surface shallowly convex, median carina obsolete, lateral carinae strongly ridged; anteclypeus very narrow with a smooth median carina. Rostrum sturdy, elongate, attaining the hind coxae. Antennal bases very close to the lower margin of compound eyes; first antennal joint (scape) short, terete; second joint (pedicel) ca. 3 times longer than first, widening towards apex, laterally com-

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pressed, very few sensory pits (plaques) at apex only. Sides of head above eyes between lateral carinae of vertex and frons with a fine ridge; genae devoid of an oblique carina. Pronotum short, posteriorly deeply excavated; carinae prominent, median carina attaining posterior margin, lateral carinae foliately ridged, convexly arched, not attaining posterior margin. Mesonotum with 5 smoothly ridged carinae: lateral ones diverging and attaining posterior margin; sublateral (intermediate) carinae arched, slightly undulate, not attaining posterior margin; median carina vanishing towards tip of scutellum. Surface of pro- and mesonotum rugose. Tegulae very small. Tegmina very robust, coriaceous, rugose; main veins roundly prominent and interspersed by numerous swellings, pustules and cross-bars, these in some part confluent; venation, especially in distal part reduced, veins devoid of pustules and setae except for those in distal part; costa and subcosta enclose a plain strongly sclerotized cell which is inflected and exposed basally; tegmina distally strongly inflected medially, shielding the entire dorsal and lateral abdomen. Hind wings in holotype of type-species vestigial. Legs relatively short, post-tibia subquadrangular in cross-section with numerous sturdy bristles along the rims, laterally with 3–4 short spines, post-tarsal joints more or less terete in cross-section; post-basitarsus distally with 5 spines in a row, second post-tarsus distally with 4 spines groups into a longer outer and inner spine and 2 smaller median spines; post-tibial spur awl-shaped, with several rather long irregular setae, especially on the inner side. Female genitalia with ovipositor strongly curved dorsocaudally, distinctly surpassing tip of the anal style.

Diagnosis. Pichinchana gen. n. can readily be distinguished from the other platysystatine genera by displaying a forked median frontal carina (versus single or absent in the other genera), by a deep furrow formed by foliate lateral carinae of vertex and frons shielding small compound eyes and the antennae (different in the other genera), by robust tegmina with reduced venation and dorsally wrapped around the abdomen (less robust and with more or less complete venation in the other genera), by a strongly sclerotized costal cell pointing basally (only feebly expressed in the other genera), by the absence of setae along the veins except for rather long bristles at the distal margin (setae along vein over the entire tegmina in the other genera).

Distribution. Only known from South America: Ecuador.

Figure 1. *Pichinchana gilletti* gen. & sp. n., holotype ♀, a. habitus dorsal view, b. habitus left lateral view, scale bar: 0.5 mm.

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Etymology. The generic name refers to the province Pichincha in Ecuador where the type species was collected. The gender is feminine.

Remarks. Although we could examine a single female of the type species only, the differences to other asiracine genera are so striking that the establishment of a new genus seems justifiable. The placement of *Pichinchana* gen. n. in Platysystatini is tentative, the more as we do not know males of the type species yet. Also, the configuration of the hind wing (presence or absence of a CuP-notch) cannot be judged as they are absent in the type-species. However, the other three tribes appeared to be evidently more unsuitable for an assignment. The very specialized morphological properties of the type species may indicate that within Platysystatini *Pichinchana* gen. n. represents a derived taxon in comparison to the morphologically less modified genera *Equasystatus*, *Pentasteira* and *Platysystatus*; however, as presently a cladistic analysis is missing (and obviously difficult to perform), we will not provide another example of "*falling into the* '*autapomorphic trap*' " (Bourgoin & Campbell 2002).

***Pichinchana gilletti* sp. n.**

Figures 1–5

Description. Small, robust Asiracinae, habitus resembling ground-living beetles due to strongly sclerotized, coelopterous tegmina (Figs 1, 2, 4a, b).

Length. 3.85 mm (measured from tip of vertex to tip of tegmina).

Colouration. All parts of head and thorax testaceous to umber, rims of lateral carinae of vertex, frons and pronotum dark brown; abdomen fuscous; legs tawny, spines of hind legs dark brown; tegmina fulvous with reddish brown veins, tegminal cells sprinkled with numerous irregular tawny swellings or pustules, anteriorly of nodal line a narrow brown cross-band, distally infuscate, distal bristles fuscous; lateral cell included by costa and subcostal honey-yellow.

Head (Figs 3a–c) including compound eyes 0.7 times the width of pronotum. Vertex quarter-moon-shaped, ca. 4.4 times wider than medially long, posterior margin shallowly concave, anteriorly convex; lateral carinae foliately ridged, uniting at apex, rims shiny smooth with small setae; median carina very faint, almost obsolete, surface of vertex medially and anteriorly depressed, between median and lateral carinae on each side a rugose bulge; transition of vertex to frons forming an acute angle, lateral vertical and frontal carinae uniting at apex. Frons (Fig. 3b) subcircular, about as high as wide, widest at level of antennae; ca. 1.4 times higher than post- and anteclypeus together; lateral carinae foliately ridged, median carina prominent, continuously narrowly forked from a short common stem close to the frontoclypeal suture towards junction with vertex; frontal surface very shallowly concave, almost plain, beset with numerous fine setae; frontoclypeal suture

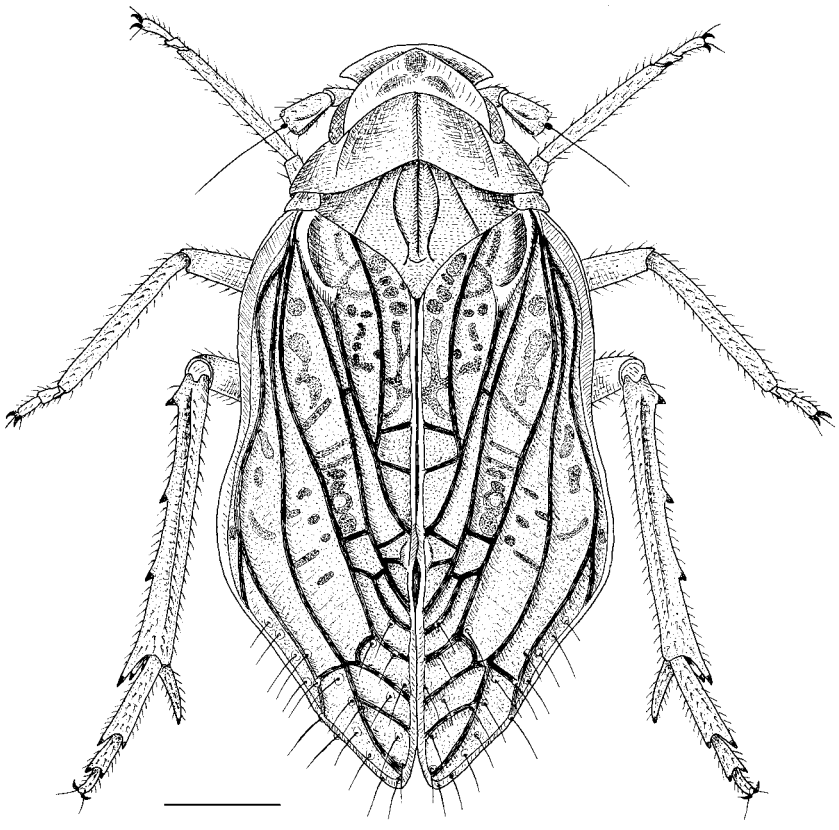

Figure 2. *Pichinchana gilletti* gen. & sp. n., holotype ♀, a. habitus dorsal view, scale bar: 0.5 mm.

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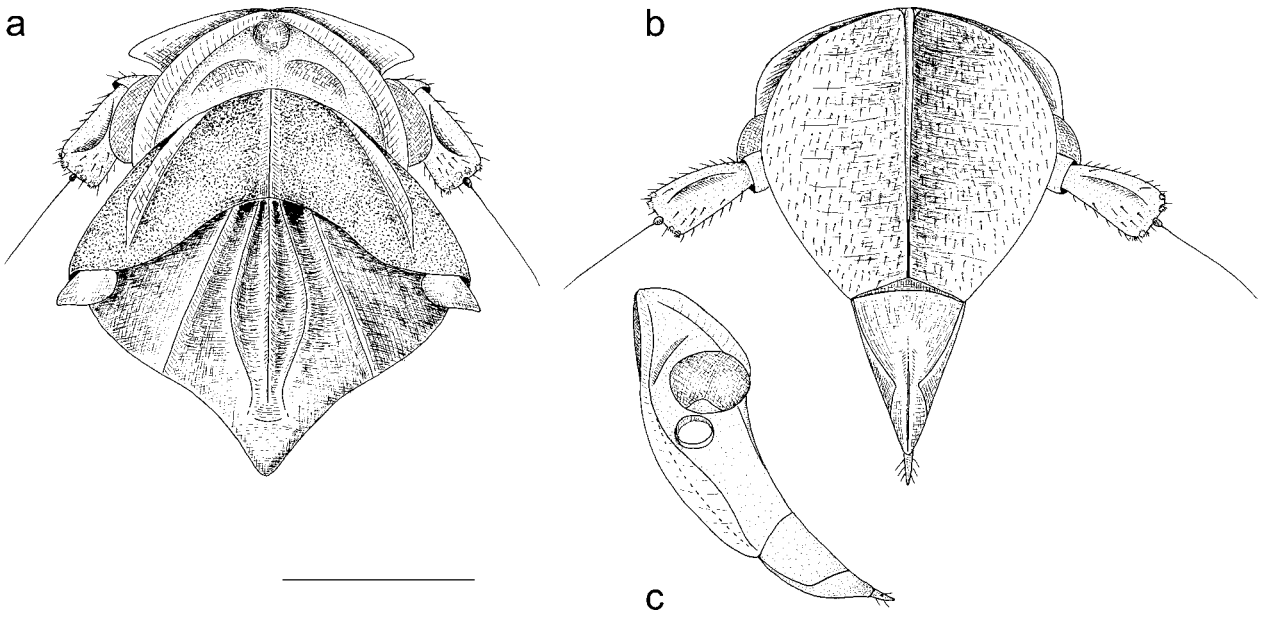

Figure 3. *Pichinchana gilletti* gen. & sp. n., holotype ♀, a. head and thorax, dorsal view, b. head left lateral view, c. head frontal view, scale bar: 0.5 mm.

concave, transition to postclypeus deeply notched. Postclypeus subtriangular, surface shallowly convex, lateral carinae ridged, median carina only present in lover half as a broad swelling. Anteclypeus with a distinct median carina. Antennae relatively short, 1st antennal joint ring-like, slightly widening towards apex; 2nd antennal joint cone-shaped, furnished with distinct bristles, about twice as long as 1st, widening towards apex, anteriorly slightly compressed, around apical rim about 9–10 sensory fields (plaques) of apparently star-shaped impression; antennal base very close to the inferior margin of compound eye. Compound eyes very small, kidney-shaped, lower margin only slightly incised; ocelli absent; eyes in a deep furrow caused by the lateral carinae of frons and vertex; above the eyes a short oblique rim.

Thorax. Pronotum (Fig. 2) about as wide as mesonotum, medially slightly longer than vertex, anterior margin straight, posterior margin deeply excavated; lateral carinae foliately ridged, strongly arched, not attaining the posterior margin; median carina ridged, reaching posterior margin; surface rugose, submedially slightly depressed. Mesonotum (Fig. 2) medially about 2.6 times longer than pronotum; lateral carinae straight, diverging, reaching posterior margin; sublateral (intermediate) carinae relatively close to median carina, undulate, not reaching posterior margin; median carina ridged, vanishing towards tip of mesonotum; surface between carinae slightly concave, less rugose than that of pronotum. Tegulae very small. Tegmina (Fig. 4a, b) sturdy, coelopterous, about twice as long as wide, widest shortly before nodal line; in repose dorsally closing tightly together, laterally embracing and sheltering the abdomen, distally slightly reduced with subacute tip, median margin distally of nodal line slightly concave; surface of tegmina leathery; veins prominent, reduced in distal part, R and M not forming a basal cell, but a common stem, C and Sc rectangularly inflected enclosing a large plain cell which points basally and tapers towards apex (Figs 1b, 4b); tegminal cells with numerous irregularly shaped pustules and swellings; veins anteriorly devoid of distinct setae and their bases, posteriorly in the marginal area with few rather long and sturdy bristles; outer margin along Sc with very fine setae. Hind wings strongly reduced, as remnant only a very tiny rigid flap recognizable. Legs relatively short; hind leg (Fig. 4c) with post-tibia subquadrangular in cross-section, rims with distinct setae, in the holotype left post-tibia laterally with 3 spines, right one with 4 spines; distally 4 spines grouped in 3 short inner spines and 2 longer outer spines; post-basitarsus subcircular in cross-section, 2.2 times longer than 2nd and 3rd post-tarsomeres together, distally with a row of 5 spines which continuously become longer towards the outer side; 2nd post-tarsomere distally with 4 spines grouped into 2 longer at inner and outer side and 2 smaller median ones; post-tibial spur very slender, awl-shaped, ca. 0.4 times shorter than post-basitarsus, densely furnished with irregular, relatively long bristles, especially on the outer side.

Abdomen. Tergites and sternites strongly sclerotized, sternites with very fine setae, laterotergites subrectangular, slightly narrowing posteriorly. Female genitalia (Fig. 5a) with strongly vaulted tergite IX; ovipositor distinctly curved dorsocaudally; anal segment short, ventrally slightly longer than dorsally; anal style little longer than anal segment, dorsoventrally depressed; valvifer VIII (Fig. 5c) clasp-like, medioanteriorly with a slight notch.

Diagnosis. Pichinchana gilletti can readily be distinguished from other platysystatine species by the follow-

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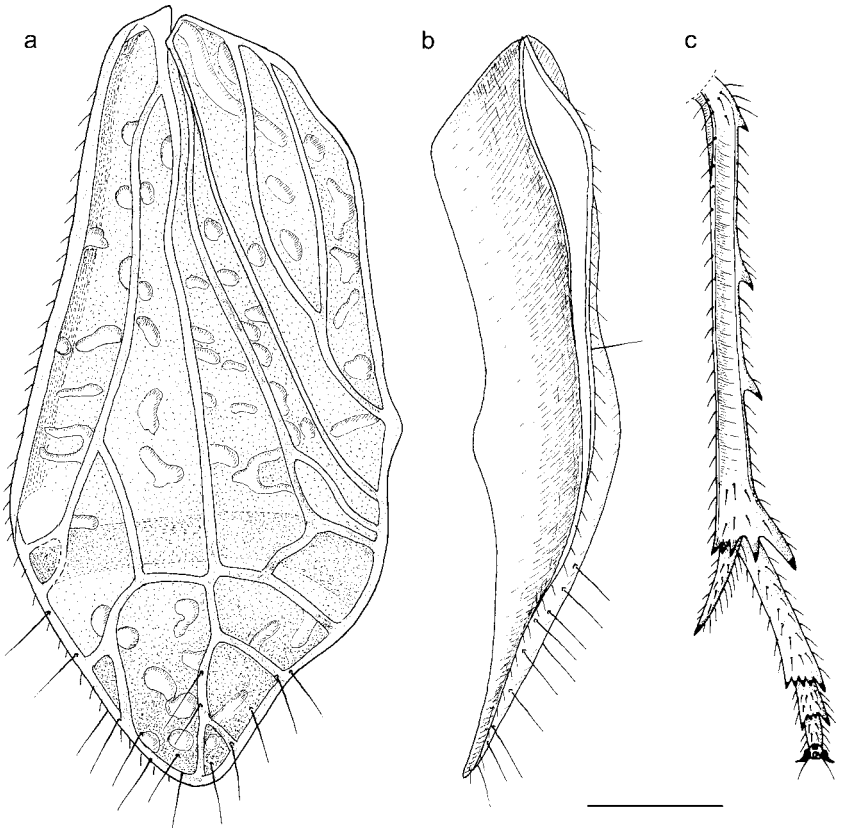

Figure 4. *Pichinchana gilletti* gen. & sp. n., holotype ♀, a. left tegmen, maximum view, b. left tegmen, view at the basal margin, c. left hind leg with post-tibial spur from below, scale bar: 0.5 mm.

ing combination of characters: strong sclerotization of head, thorax and tegmina; strongly foliaceous lateral carinae of vertex and frons; deeply forked median frontal carina; very small compound eyes; lack of tegminal setae except for a few rather long ones in the distal part; wide costal cell exposed to base; complete reduction of hind wings; spine-configuration of the second post-tarsomer: 1-2-1.

Distribution. Only known from the type locality in the Pinchincha Province in Ecuador.

Etymology. This species is named in honour of the collector, C.P D.T Gillett.

Material examined. Holotype ♀, **Ecuador** (Pichincha), Bellavista Cloudforest Reserve, 0°00′55.77″ N, 78°40′49.73 W, 2.200–2.300 m, tropical cloudforest, Flight Interception Trap, 24.–28.VII.2007, coll. CPDT Gillett, BMNH (E), 2007–65, BMNH.

Discusion. Only a single female could be studied which – according to label information – was collected in a "flight interception trap"; however, the tegmina of this species are coriaceous, and the hind wings reduced; thus, it is definitely not capable to fly. As a flightless species, in accordance with bodily properties like strong sclerotization of head, thorax and tegmina, reduced complex eyes and somewhat depressed body shape, *Pichinchana gilletti* obviously has a specialized life-style. Similar looking Auchenorrhyncha are found living close to or in the soil, or in leaf litter. Unlike the new genus these have a Gondwanaland distribution, i.e., the delphacid ugyopine genus *Notuchus* Fennah from New Caledonia and Australia (see Donaldson 1979, 1987; Fennah 1969b, 1972, 1980, Hoch et al. 2006), some Cicadellidae, i.e., Sagmatiini from Australia and Madagascar and Evansiolini from Juan Fernández Islands (Chile) and Myerslopiidae from New Zealand and Chile (see Hamilton, 1999 and Szwedo 2004a). A rather stunning morphological similarity to Myerslopiidae species, for instance of the genus *Mapuchea* Szwedo, 2004, is observed in the shape of the coriaceous tegmina and in the absence of hind wings. For Myerslopiidae a life in "*decomposing leaf litter and soil debris with high organic content in forest environments*" (Szwedo 2004a: 2, 2004b: 2) is assumed which might equally apply to the new genus. However, the only female specimen of *Pichinchana gilletti* examined does not show any traces of encrusted soil or debris. The specimen is immaculately clean which also might indicate a camouflaged life on leaves, or on the bark of trees. Sieving probes of soil, ground litter and debris in the cloudforest area concerned and a close investigation of the epifauna of tree trunks may eventually yield more adults and possibly even nymphs of this species.

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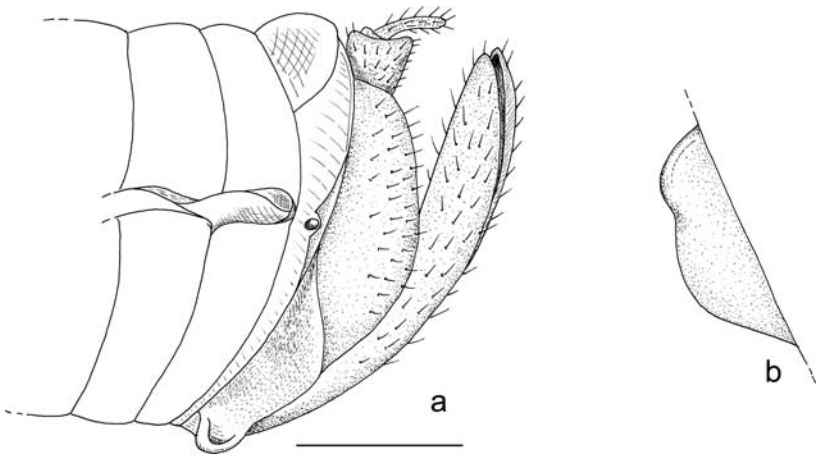

Figure 5. *Pichinchana gilletti* gen. & sp. n., holotype ♀, a. female genitalia left lateral view b. valvifer VIII, ventral view, scale bar: 0.5 mm.

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