

## A review of New World Asiracinae (Hemiptera: Auchenorrhyncha: Delphacidae) with five new taxa

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**Abstract:** The genera of New World asiracine planthoppers are reviewed and discussed in the context of new taxa discovered in canopy fogging samples from Ecuador. Twelve nominative genera, including 3 Ugyopinae and 9 Asiracinae (1 new) are reported from the New World, although the generic identity of the single *Asiraca* species could not be verified. A key to New World asiracinae genera, excluding *Asiraca*, is provided. The new taxa include *Pentasteira* gen. nov. (Asiracinae: Platysystatini) with 1 species (*P. albifrons* n. sp.) and a new *Tetrasteira* (Asiracinae: Tetrasteirini), prompting a generic revision with three new described species (*T. vulgaris*, n. sp., *T. trimaculata* n. sp., and *T. solata* n. sp.). A key to the species of *Tetrasteira* is provided. *Tetrasteira vulgaris* n. sp. has been taken in large numbers in canopy fogging samples from terre firme forest in the Amazon basin in Ecuador.

**Zusammenfassung:** Die Gattungen der Asiracinae der Neuen Welt werden im Kontext mit neu entdeckten Taxa aus Ecuador diskutiert und revidiert. Zwölf nominelle Gattungen, davon drei Ugyopinae und neun Asiracinae (eine neu) werden aus der Neuen Welt gemeldet. Die tatsächliche Gattungszugehörigkeit der einer bislang zur Gattung *Asiraca* gestellten Art konnte nicht geklärt werden. Schlüssel zu den Asiracinae der Neuen Welt (ohne *Asiraca*) und zur Gattung *Tetrasteira* werden präsentiert. Neu beschrieben werden *Pentasteira* gen. nov. (Asiracinae: Platysystatini) mit *P. albifrons* n. sp., sowie drei Arten der Gattung *Tetrasteira* (Asiracinae: Tetrasteirini): *T. vulgaris*, n. sp., *T. trimaculata* n. sp., and *T. solata* n. sp. Große Mengen von *Tetrasteira vulgaris* n. sp. wurden im Amazonasbecken von Ecuador in Regenwäldern außerhalb von Überflutungsgebieten durch „canopy fogging“ gesammelt.

**Key words:** Delphacidae, Auchenorrhyncha, Fulgoroidea, Fulgoromorpha, Planthopper, Asiracinae, Ugyopinae, New Species, New Genus, Canopy Fogging

### 1. Introduction

In an ongoing study of planthoppers (Hemiptera: Fulgoroidea) from Ecuador canopy fogging samples (taken by Terry Erwin, National Museum of Natural History, Smithsonian Institution, Washington D.C.), the most frequently observed taxon has been a species in the genus *Tetrasteira* (Delphacidae: Asiracinae: Tetrasteirini). Because delphacids mostly feed on grasses, rushes, and sedges in wet situations, there was no *a priori* expectation for delphacids to be found in canopy samples.

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The genus *Tetrasteira* currently includes two species, *T. minuta* Muir, 1926, from Brazil; and *T. albitarsus* Fennah, 1945, from Trinidad. The abundant delphacid species was initially assumed to be *Tetrasteira minuta*, but comparison with the type specimen of *T. minuta* revealed it to be a new species. A second, similar new species was found to be a new genus in Platysystatini, most closely related to *Equasystatus*. Here we describe and illustrate these two new taxa, along with two additional new *Tetrasteira* species, and review the current systematics of New World asiracine Delphacidae.

Important works concerning New World asiracines since the Metcalf catalog (Metcalf 1943) include Fennah (1945, *Tetrasteira*; 1969, *Idiosystatus*); Penner (1947, *Pentagramma*), Caldwell & Martorell (1951, keys and descriptions to species of Puerto Rico); Asche (1983a, *Neopunana*, *Equasystatus*; 1983b, *Platysystatus*; 1988, Ugyopini); and Wilson & Wheeler (1986, *Pentagramma*).

Table 1: Classification of New World primitive delphacids (excluding taxa here described). New World generic synonymies since Metcalf (1943) provided.

Asiracinae	Notes
<u>Asiracini</u>	
<i>Asiraca</i> Latreille, 1796	1 species, <i>A. germari</i> Metcalf, 1943; nom. nov. for unavailable <i>Asiraca longicornis</i> Germar 1830 (nec. Latreille 1802); Brazil
<i>Copicerus</i> Swartz, 1802	4 species, 1 subspecies; Neotropics, 1 species widespread Neotropics and south temperate
<u>Idiosystatini</u>	
<i>Idiosemus</i> Berg, 1883	1 species, <i>I. xiphias</i> (Berg, 1879); Argentina
= <i>Stenosystatus</i> Muir, 1930; syn. by Fennah, 1965: 251.	
<i>Idiosystatus</i> Berg, 1883	5 species
<i>Pentagramma</i> Van Duzee, 1897	8 species, Nearctic and temperate South America
= <i>Bergias</i> Kirkaldy, 1904; nom. nov. for <i>Bergia</i> Scott, 1881; syn. by Asche, 1985: 283.	
Platysystatini	
<i>Equasystatus</i> Asche, 1983a	1 species, <i>E. breviceps</i> (Muir, 1926); Ecuador
<i>Platysystatus</i> Muir, 1930	2 species; Brazil
<u>Tetrasteirini</u>	
<i>Tetrasteira</i> Muir, 1926	2 species; Brazil, Trinidad
Ugyopinae	
<u>Neopunanini</u>	
<i>Neopunana</i> Asche, 1983a	8 species; Caribbean
<u>Ugyopini</u>	
<i>Ugyops</i> Guérin-Meneville, 1834	12 species; Neotropical
= <i>Eucanyra</i> Crawford, 1914; syn. by Fennah, 1959: 247.	
= <i>Epibidis</i> Fowler, 1905; syn. by Fennah, 1959: 247; see Fennah 1965: 122.	
<i>Canyra</i> Stål, 1862	8 species; Neotropical

Asiracines are primitive delphacids, bearing a spine-like calcar without teeth. The Asiracinae of Asche (1985, 1990) consists of two tribes. The Asiracini (s.l.) have a calcar rounded in cross-section with scattered hairs, and have the distal spines of the hind basitarsis in a regular row. The Ugyopini (s.l.) have a calcar quadrangular in cross-section, bearing a row of bristles on each edge, and the middle of the distal spines of the basitarsus of the hind leg is displaced basad (Asche 1985, 1988, 1990). In Asche's (1985, 1990) treatment of the Asiracinae, the subfamily was acknowledged to be paraphyletic, but the distribution of synapomorphic features did not provide confidence in the division into definitive monophyletic units. Emeljanov (1996) nonetheless raised Asche's (1985, 1990) asiracine tribes to subfamilies (*viz.* Asiracinae, Ugyopinae), and described 4 new tribes (Table 1). Emeljanov's (1996) classification has not been evaluated in a quantitative phylogenetic setting.

The Ugyopinae of Emeljanov (1996) in the New World consists of the Caribbean tribe Neopunanini (*Neopunana* only, Figs. 1F, 2F, 3F; see Asche 1983a), and the Ugyopini (s.s.). The Ugyopini, including only *Ugyops* and *Canyra* in the New World, present a difficult problem. *Canyra* consists of 8 Neotropical species (type *Delphax placida* Stål, 1854, Figs. 1A, 2A, 3A). The features of *Canyra* are first antennal segment sulcate above, median carinae of the frons may be forked, veins of forewing not granulate, Sc+R forked basad of cubital fork, and the absence of a distinct pterostigma (Metcalf 1938a). Presumably, species of *Ugyops* do not possess this combination of features, but *Ugyops* is broadly defined and various ugyopine genera have been subsumed into *Ugyops* over time. We have found no feature (including the sulcate antennae) that uniformly separates species currently placed in *Canyra* from New World *Ugyops* taxa; however, this may be the result of misassignment of *Canyra* species to *Ugyops* (see below).

*Ugyops* consists of over 100 species, distributed mostly through the western Pacific and Southeast Asia (type species *U. percheronii* Guérin-Ménéville, 1834, from Southeast Asia). Among the Neotropical fauna there are 12 species of *Ugyops*, 2 of which were formerly placed in *Epibidis* Fowler, 1905 (type *Epibidis godmani* Fowler, 1905), and 3 in *Eucanyra* Crawford 1914 (Type *Eucanyra stigmata* Crawford, 1914) (Metcalf 1943) until synonymized by Fennah, 1959: 247 (he stated only that the generic divisions were "unwarranted"). However, the status of these taxa needs to be reinvestigated. Most specimens of New World "*Ugyops*" appear to have sulcate, or at least non-terete, antennae, including *U. stigmata* and *U. godmani* (contrary to Crawford, 1914), suggesting that *Epibidis* and *Eucanyra* might actually belong to *Canyra* (assuming *Canyra* is distinct from *Ugyops*). *Eucanyra* has been defined as having the first segment of antennae terete (!), eyes not emarginate, median carinae of frons not forked, frons narrow, stigma distinct, nodal line from stigma to apex of clavus, pygofer elongate, parameres short, anal segment asymmetrical (Crawford 1914, Metcalf 1938a, b). *Epibidis* has the first segment of antennae "prismatic" (according to Metcalf 1938a, although Crawford, 1914, stated that it was the calcar that was triangular-prismatic), eyes emarginate, frons broadened at clypeus, veins of the tegmina granulate, setigerous, stigma indistinct, pygofer short robust; parameres nearly as long as pygofer (Fowler 1905, Crawford 1914, Metcalf 1938a). For the purposes of the present work, we key ugyopines having a sulcate first antennal segment to *Canyra*, although nomenclaturally this may not be the case. All New World ugyopine specimens we have examined so far have this feature, but we have not attempted to exhaustively survey *Ugyops*. We echo the sentiments of Asche (1988), who concluded that a cladistic analysis of the Ugyopini is badly needed.

The Asiracinae (*sensu* Emeljanov 1996) of the New World consists of the tribes Asiracini (s.s.), Idiosystatini, Platysystatini, and Tetrasteirini (Table 1). The Idiosystatini are all New World, and present few evident taxonomic problems, with *Idiosemus* monotypic (Figs. 1E, 2E, 3D), *Idiosystatus* revised by Fennah (1969) (Figs. 1D, 2D, 3E), and *Pentagramma* by Penner (1947) (Fig. 1G, 2G, 3G), although South American *Pentagramma* were not treated.

The New World Asiracini (s.s., Emeljanov 1996) consists of the genera *Copicerus* and *Asiraca*. The species of *Copicerus*, in spite of their striking appearance, have never been revised, and comparative features among *Copicerus* species have never been elucidated. Specimens of *Copicerus* from North and Central America are usually asserted to be *C. irroratus* Swartz, 1802 (Figs. 1B, 2B, 3B), described from Jamaica (Asche, 1985, illustrated *C. irroratus* from Cuba), but superficial variation in size, color, antennal form, and phallic processes suggest that the species limits and distribution of *C. irroratus* need reevaluation. The remaining species of *Copicerus* are described from Venezuela (*C. insignicornis* (Lethierry 1890)) and Brazil (*C. swartzii* Stål 1857, and *C. obscurus* (Guerin-Meneville 1856)), and are unknown except for type material. Specimens of *Copicerus* not assigned to species have been observed from Argentina (e.g., a specimen from Buenos Aires in the USNM collection).

The one New World *Asiraca* is *A. germari* Metcalf, 1943 (nom. nov. for unavailable *Asiraca longicornis* Germar, 1830 [nec. Latreille 1802], from Brazil). The species is based on a Germar (1830) description, and specimens are unknown to us. The type material is evidently not with the Germar type collection at the University of Lviv Zoological Museum (Shydlovskyy and Holovachov 2005). The placement of this species in the Palearctic genus *Asiraca* is unlikely, at best, and has been excluded from our generic key.

The remaining two tribes are Neotropical and include the taxa described here. Emeljanov (1996) placed *Tetrasteira* in the monotypic tribe Tetrasteirini and *Platysystatus* (Figs. 1H, 2H, 3H)) and *Equasystatus* (Figs. 1C, 2C, 3C) in Platysystatini. Members of Tetrasteirini and Platysystatini are rarely collected, and are superficially similar in being small (less than 4 mm), stout-bodied, with short antennae, dark or patterned wings with evident setae bases, and having roughened, striate or punctuate cuticle. They differ most obviously in the shape of the head (see below) and the presence of a median carina on the mesonotum in Platysystatini.

As characterized by Emeljanov (1996: 139), Platysystatini have a short, wide head with a simple median carina of the vertex, without a “morphologically defined” areolet; mesonotum with 5 carinae, with intermediate carinae undulating; second tarsomere of hind tarsus with a straight row of spines; hindwing notched at apex of CuP. In contrast, Tetrasteirini have a “...short, narrow corypha, extended [forward projected], fairly narrow metopa with simple median carina [of vertex], absence of areolet, small flattened antennae, presence of 4 evenly arcuate mesonotal carinae, oblique row of teeth on the tip of the second segment of the hindtarsi, and notch on the posterior margin of the hindwings opposite the tip of CuP” (Emeljanov 1996: 139–140).

In this work we describe 3 new species of *Tetrasteira*, with a key to species, a new genus a species in the Platysystatini, and provide a key to genera of New World Asiracinae.

## 2. Materials and Methods

All available specimens of *Tetrasteira* were examined, including the type specimens of *Tetrasteira minuta* from the BPBM, and the type specimen of *T. albitarsus* from the USNM (Table 2). Redescriptions of *T. minuta* are based on the holotype, and *T. albitarsus* are

based on representative specimens. Descriptions of new species are based on all available material. A total of 380 specimens were examined and reported here (Table 2), plus 2,660 additional specimens of *Tetrasteira vulgaris* n. sp. available from canopy fogging samples. The type specimens of *Equasystatus breviceps* (Muir, 1926) (holotype from NHRS), *Canyra placida* (Stål, 1854) (syntypes from NHRS), and *Platysystatus brunneus* Muir 1930 (holotype from BPBM) were examined through photographs provided by helpful workers at those institutions.

The morphological terminology follows Asche (1985), but for descriptive purposes the parameres will be referred to as having a proximal “basal angle”, and distal “inner”, and “outer angles”, the pygofer a “lateral angle” (*sensu* Metcalf 1949); “segment 10” will be used instead of “anal tube” (= “analrohr”), and “segment 11” instead of “anal style”. For simplicity, the “male genitalia” within the descriptions should be understood to include the postgenital segments. Wing venation (Fig. 4B) is interpreted following Dworakowska’s (1988) elucidation of Kukalová-Peck’s (1983) general scheme. Features that appear invariant at the generic level are not reiterated in the species descriptions. Label information for primary types is quoted, with each line break indicated by “/” and each label separated by “//”. Reported data for other specimens follows the format of the specimen label, with added notes in square brackets, and information edited for style and consistency. All specimens are macropterous. The collections from which specimens were examined are abbreviated as follows (collection abbreviations according to Arnett et al. 1993):

AMNH – American Museum of Natural History, New York, NY.

BPBM – Bernice P. Bishop Museum, Honolulu, HI.

LBOB – Lois O’Brien Collection (Associated with California Academy of Sciences, CASC), Green Valley, AZ.

NHRS – Naturhistoriska Riksmuseet (Swedish Museum of Natural History), Enheten för Entomologi, Stockholm, Sweden.

UDCC – University of Delaware, Department of Entomology and Wildlife Ecology, Insect Reference Collection, Newark, DE.

USNM – US National Museum of Natural History, Smithsonian Institution, Washington, DC.

Table 2: Specimens examined

Species	Gender		Localities
	Males	Females	
<i>Equasystatus breviceps</i> (Muir)	0	1	Ecuador
<i>Pentasteira albifrons</i> n. sp.	47	22	Ecuador
<i>Pentasteira</i> sp.	0	2	Bolivia, French Guiana
<i>Tetrasteira albitarsus</i> Fennah	5	2	Trinidad
<i>Tetrasteira minuta</i> Muir	1	0	Brazil
<i>Tetrasteira solata</i> n. sp.	7	11	Panama, ? Venezuela
<i>Tetrasteira trimaculata</i> n. sp.	35	46	Belize, Costa Rica, Columbia, Honduras, Mexico, Panama
<i>Tetrasteira vulgaris</i> n. sp. <sup>1</sup>	108	92	Ecuador
<i>Tetrasteira</i> sp.	0	1	French Guiana
<b>Totals</b>	<b>203</b>	<b>177</b>	

<sup>1</sup> Type and paratypes only; see *Remarks* under *T. vulgaris*.

All canopy-fogging specimens are attributed to the USNM, but exemplars of this material will be deposited at the Quito Catholic Zoology Museum, Departamento de Biología, Pontificia Universidad Católica Del Ecuador (QCAZ) and representatives will be retained at UDCC.

Lengths reported are averages  $\pm$  standard deviation in millimeters (mm), with *n* (number measured) reported, and males and females reported separately. Body length is given by measuring from apex of vertex at midlength to tip of wings. Body width was measured at the tegulae, length of vertex was measured at vertex midline, width of the vertex and frons were taken at the widest part, and the vertex length was taken at midline between frontoclypeal suture and the fastigium. Length to width (L:W) and length to length (L:L) ratios are determined using the average of ratio of specimens. Antennal measurements are from males only. Photographs and measurements were taken using a Nikon SMZ-1500 Digital Imaging Workstation with Nikon DS-U1 digital Camera and NIS-Elements imaging software (Ver. 3.0).

### 3. Results

#### Systematics

There are currently 52 species plus 1 subspecies, in 11 described genera of primitive delphacids in the New World (Table 1). Here we add the new genus *Pentasteira* with 1 new species, plus three new *Tetrasteira* for a total of 56 species and 12 genera in the New World. As previously noted, *Asiraca germari* is unknown to us and is excluded from the key. The remaining taxa can be separated as follows.

#### Key to genera of New World Asiracinae (s.l.) delphacid planthoppers

- 1 Head greatly elongate, extending in front of eye for a distance greater than the length of the eye (Figs. 1E, 2E, 3D); Chile, Argentina, Uruguay.....*Idiosemus*  
 Head not greatly elongate .....2
- 2 Antennae with both segments very long, flattened, and foliaceous, exceeding apex of mesonotum (Figs. 1B, 2B, 3B); widespread .....*Copicerus*  
 Antennae with segments terete, if flattened then antennae short, not reaching apex of mesonotum .....3
- 3 Frons with median carina paired for entire length (Figs. 3E, 3G).....4  
 Frons with median carina single (Figs. 3A–C, F, H).....5
- 4 Body pale, usually greenish; fastigium rounded in lateral view; carinae of frons usually concolorous with disk; wings without conspicuous setae (Figs 1G, 2G, 3G); widespread, mostly temperate.....*Pentagramma*  
 Body dark, brownish; fastigium angled in lateral view; carinae of frons paler than disk; wings with conspicuous setae (Figs. 1D, 2D, 3E); Argentina, Chile ...*Idiosystatus*

(key continued on page 15)

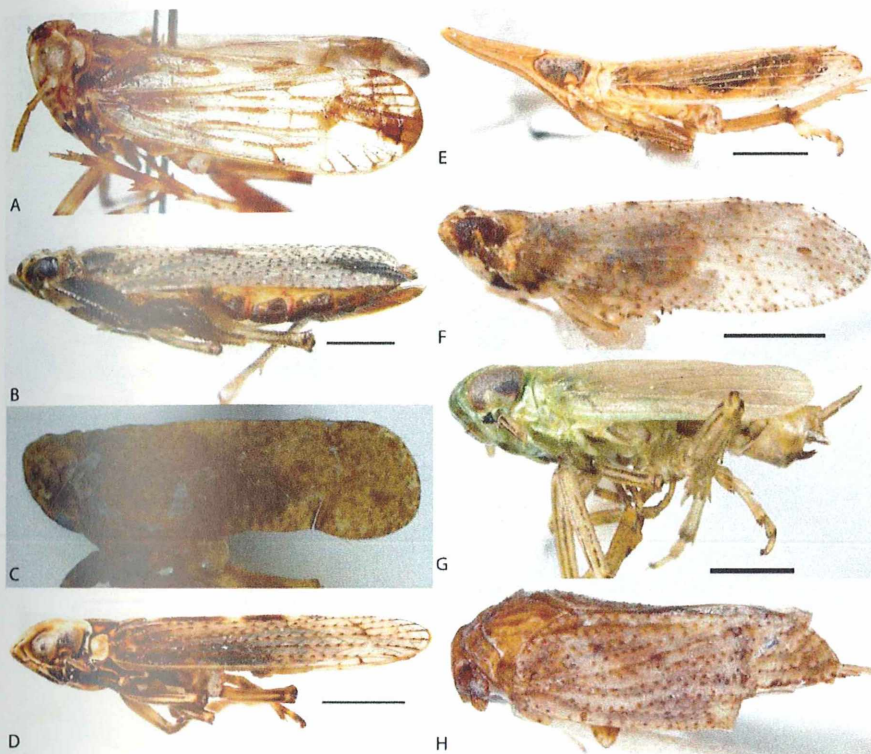


Fig. 1: Lateral view of asiracines: A *Canyra placida* (Stål, 1854) (syntype), B *Copicerus irroratus* Swartz, 1802, C *Equasystatus breviceps* (Muir, 1926) (holotype), D *Idiosystatus acutiusculus* (Spinola, 1852), E *Idiosemus xiphias* (Berg, 1879), F *Neopannana caribbeensis* (Caldwell, 1951), G *Pentagramma vittatifrons* (Uhler, 1876), H *Platysystatus brunneus* Muir, 1930 (holotype) (scale = 0.5 mm).

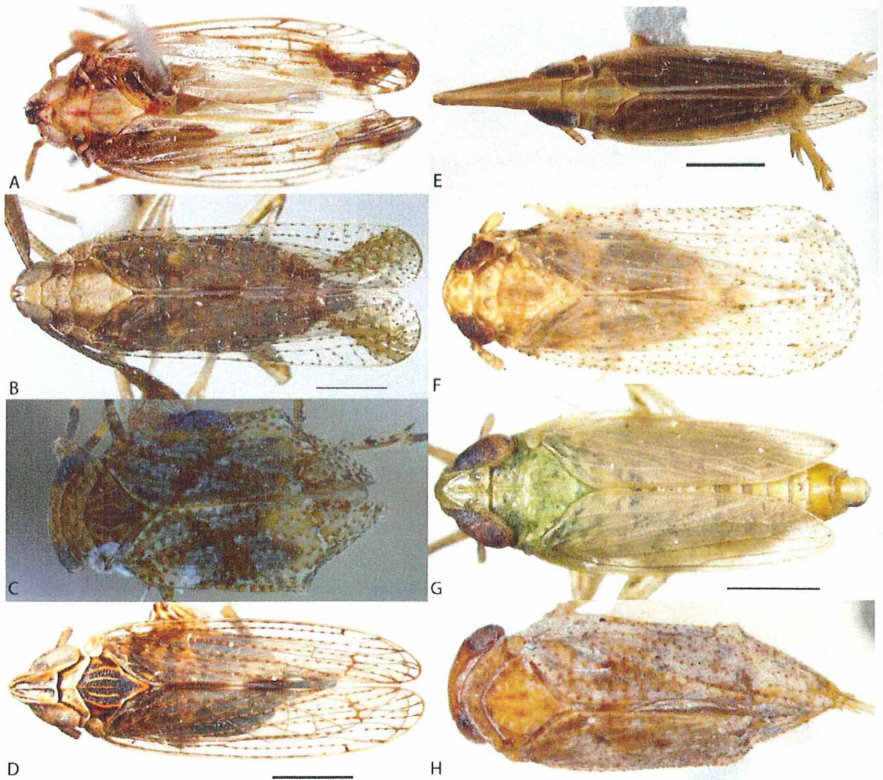


Fig. 2: Dorsal view of asiracines: A *Canyra placida* (Stål, 1854) (syntype), B *Copicernus irroratus* Swartz, 1802, C *Equasystatus breviceps* (Muir, 1926) (holotype), D *Idiosystatus acutiusculus* (Spinola, 1852), E *Idiosennus xiphias* (Berg, 1879), F *Neopunana caribbeensis* (Caldwell, 1951), G *Pentagramma vittatifrons* (Uhler, 1876), H *Platysystatus brunneus* Muir, 1930 (holotype) (scale = 0.5 mm).

(key continued)

- 5 Smaller species, mostly less than 5 mm (usually less than 4 mm); antennae short, not exceeding midlength of mesonotum; first segment about as long as wide, second segment longer than wide; frons broad, usually with rounded lateral margins (Figs. 3C, 3F, 3H); calcar usually rounded in cross section bearing scattered hairs .....6
- Large species, exceeding 6 mm; antennae long exceeding midlength of mesonotum, first segment more than 2x longer than wide, second segment subequal or longer than first; frons elongate (Fig. 3A); calcar quadrate in cross section bearing hair in rows.....10
- 6 Intermediate carinae of mesonotum diverging (uniformly arched or straight) (e.g., Fig. 6C), median mesonotal carina absent; antennae terete, fastigium without transverse carina, lateral margins of frons weakly rounded (Figs 6-10)... *Tetrasteira*
- Intermediate carinae of mesonotum sinuate (e.g., Fig. 2C), median carina usually present; first antennal segment often flattened; transverse carina may be present at fastigium (weak in *Neopunana*), frons broadly rounded laterally, lateral margins strongly arched (Figs 3C, 3F, 3H, 5B) .....7
- 7 Body length, including wings, greater than 5 mm, body distinctly dorsoventrally flattened; calcar bearing rows of hairs (Figs. 1F, 2F, 3F); Caribbean.....*Neopunana*
- Body length, including wings, less than 4 mm; body not or weakly flattened (e.g., Fig. 5A); calcar with scattered hairs; South America .....8
- 8 Antennae terete in cross-section; frons in frontal view convex between eye and laterally projecting beneath eyes to cover (or nearly cover) the base of scape (Figs. 1H, 2H, 3H); Brazil ..... *Platysystatus*
- Antennae flattened in cross-section; frons in frontal view not (or weakly) convex and weakly projecting laterally beneath eyes, not covering base of scape .....9
- 9 Intermediate carinae of mesonotum serpentine, frons laterally rounded, aedeagus with stout flagellum; body color light brown mottled with pale, lacking broad white stripe on frons (Figs. 1C, 2C, 3C) ..... *Equasystatus*
- Intermediate carinae of mesonotum uniformly arched, frons peltate, aedeagus with fine flagellum; body deep brown with broad white stripe along frontoclypeal suture (Fig. 5) ..... *Pentasteira* n. g.
- 10 First antennal segment sulcate, with dorsal longitudinal concavity (Figs. 1A, 2A, 3A) ..... *Canyra*
- First antennal segment terete, lacking concavity..... *Ugyops*

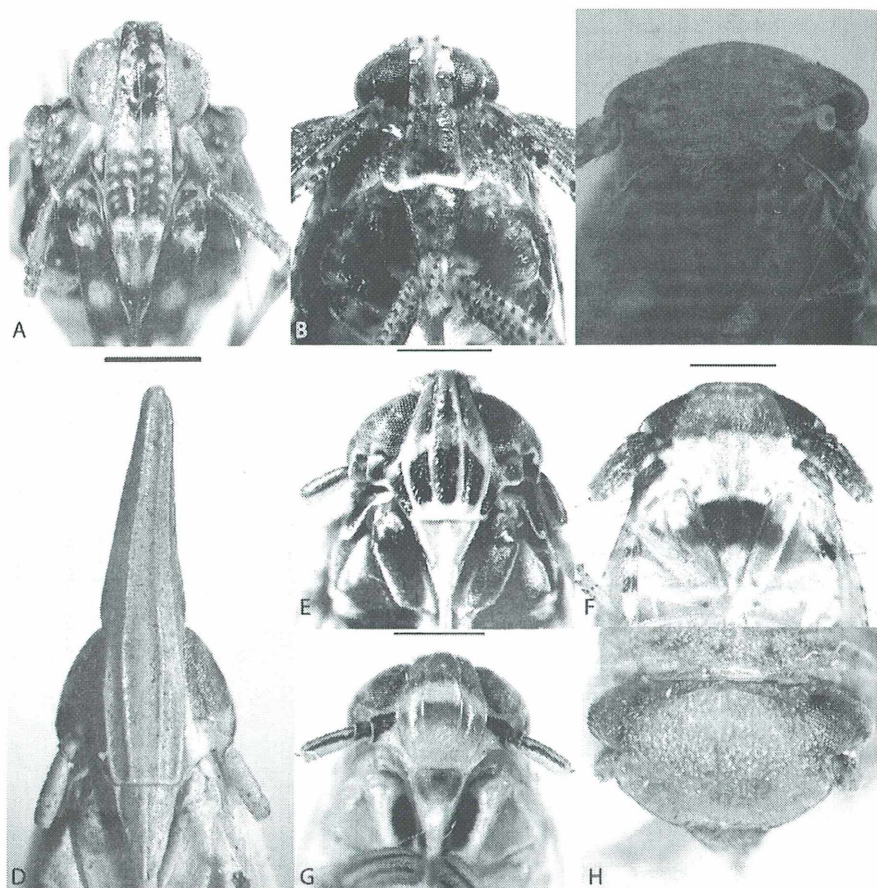


Fig. 3. Frons of asiracines: A *Canyra placida* (Stål, 1854) (syntype), B *Copicernus irroratus* Swartz, 1802, C *Equasystatus breviceps* (Muir, 1926) (holotype), D *Idiossemus xiphias* (Berg, 1879), E *Idiosystatus acutiusculus* (Spinola, 1852), F *Neopunana caribbeensis* (Caldwell, 1951), G *Pentagramma vittatifrons* (Uhler, 1876), H *Platysystatus brunneus* Muir, 1930 (holotype) (scale = 0.5 mm).

## Tribe Platysystatini Emeljanov, 1996

### *Pentasteira* nov. gen.

(Figs. 4A, 5)

**Type species.** *Pentasteira albifrons* New species.

**Diagnosis.** Body robust, small, about 3.4–4.0 mm; bearing conspicuous, fine setae on most surfaces; cuticle finely sculptured with fine pits or ridges (Fig. 5). Head slightly broader than pronotum, vertex much wider than long. Vertex with strongly keeled, arched carina (presumably the submedian) extending from behind eyes, curving transversely across vertex, dividing vertex into anterior and posterior compartments; posterior longer at midlength than anterior; lateral carinae evident, fastigium strongly carinate; median

carina of vertex vestigial. Frons, in lateral view, flat; clypeus slightly curved ventrally. Frons strongly peltate in frontal view, median carina evident from frontoclypeal suture to carinate fastigium. Clypeus triangular, bearing median carina, weakly subdivided into ante- and postclypeus. Antennae rather flattened, first segment wider distally, slightly longer than wide; second segment broader, more distinctly flattened, and nearly 3x length of first with apical cluster of sensory pustules; flagellum short.

Pronotum slightly longer than vertex at midlength, median carina weak, lateral carinae strongly diverging, following contour of eyes. Mesonotum longer than midlength of vertex and pronotum combined; median carina evident, becoming obsolete at scutellum, lateral carinae diverging, intermediate carinae approximate to median anteriorly, diverging posteriorly, smoothly arched to converging near midlength.

Legs hairy, femora flattened, tibiae quadrate. Hindleg with three tibial spines (1 near tibiofemoral joint, 1 in proximal third, 1 in distal third); apical spinal formula of hindleg 5 (tibia) - 5 (basitarsus) - 4 (2<sup>nd</sup> tarsomere); homonomous in uniform rows on basitarsus and second tarsomere, apical tarsal spines in row, increasing in size from inner- to outermost. Calcar rounded in cross-section with irregularly distributed hairs, approximately half the length of basitarsus.

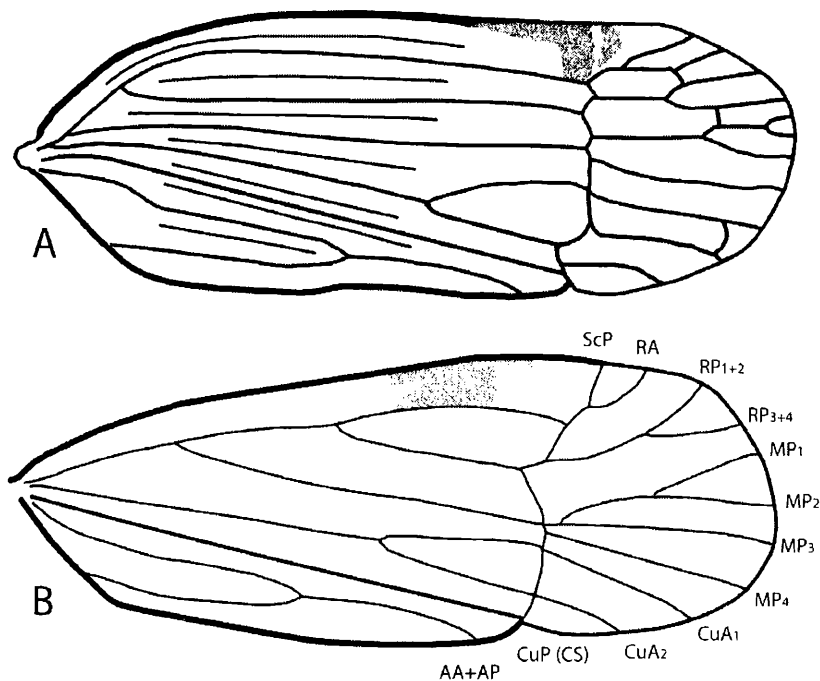


Fig. 4: Venation of forewing. A *Pentasteira albifrons*, n. sp. (type specimen), B *Tetrasteira trimaculata*, n. sp. Abbreviations: AA = Anterior Anal, AP = Posterior Anal, C = Costa, CuA = Anterior Cubitus, CuP = Posterior, CS = Claval Suture; Cubitus, MP = Posterior Media, RA = Anterior Radius, RP = Posterior Radius; Sc = Subcosta.

Forewings dark, in dorsal view inflected medially at flexion near nodal line, distinctly infolded near costa. Forewing veins with conspicuous setae, marked with white in proximal half of wing, with white spurious veins (lacking setae) interpolated between each longitudinal vein; distal portion of wing with veins concolorous with wing.

Pygofer triangular in lateral view bearing a medioventral and lateral processes around the pygofer opening; diaphragm very weak, unarmed. Parameres elongate, unbranched, medially directed apically. Phallus elongate, membranous phallosome enveloping a sclerotized aedeagus bearing an elongate, retrose terminal flagellum; suspensorium absent. Segment 10 subcylindrical, caudally projecting, processes absent; segment 11 fairly short.

**Remarks.** *Pentasteira* is here assigned to the Platysystatini, but differs from the tribal description in having the intermediate carinae of the mesonotum smoothly curved. The best diagnostic features of the tribe appear to be the wide head with a greatly shortened vertex bearing a keeled transverse suture (presumably the submedian carinae), a fastigium bearing a transverse carina, and the mesonotum 5-carinate. Evidently, all three genera of Platysystatini have the lateral carinae of the pronotum strongly diverging and following the contour of the eye, whereas in *Tetrasteira* these carinae diverge, but reach the posterior pronotal margin. All three genera of Platysystatini have a very broad frons, but the frons is closer to parallel sided in *Tetrasteira*. The “undulating” nature of the intermediate carinae of the mesonotum is evidently not a tribal feature of Platysystatini. The absence of an areolet and median carina of the vertex in Platysystatini is through reductive loss; vestigial remnants of these structures can be found by careful observation. *Tetrasteira* also does not have an evident median carina of the vertex or areolet, but the head is narrow relative to the pronotum, with a more elongate vertex with the fastigium more rounded, lacking a transverse carina. The mesonotum in *Tetrasteira* lacks a median carina, and the intermediate carinae diverge posteriorly. All taxa of Tetrasteirini and Platysystatini have a body vestiture of setae (which may be fine in *Tetrasteira*), fine punctures or ridges on the cuticle, the forewing medially inflected at the flexion near the nodal line, and the hindwings deeply lobed.

Superficially, *Pentasteira* is most similar to *Equasystatus*. *Pentasteira* differs most obviously from *Equasystatus* and *Platysystatus* in that the median carinae of the mesonotum are smoothly arched, instead of undulating. The frons on *Pentasteira* is distinctly peltate, whereas it is laterally rounded and broadest near the antennae in the other Platysystatini. *Platysystatus* also has terete antennae, as opposed to weakly flattened in both *Pentasteira* and *Equasystatus*, and a weak median carinae of the frons. *Pentasteira albifrons* n. sp. has “spurious” veins interpolated between the longitudinal veins in the proximal half of the forewing (Fig. 4A) that is unique among Platysystatini and Tetrasteirini. *Equasystatus breviceps* (Muir 1926), *Platysystatus brunneus* Muir, 1930, and *Platysystatus itapetingus* Asche, 1983b, are evidently known only from holotypes at present (but see below).

In addition to the specimens described here as *Pentasteira albifrons*, two female specimens of a different species were examined (one Bolivia, Cocha Villa Tunari, Hotel El Puente, ~400m, II-15-2007; and French Guiana, 1km S. Amazon Nature Lodge, Kaw Road, 30km S Roura, N04°32.961', W 052° 12.830', 288m, MV light, both LBOB). These specimens differ from the type species in being much paler (irregularly brown patterned, similar to *Equasystatus*), and lacking the “spurious veins” on the forewings. They do have a similar shaped frons with a broad white stripe. Superficially, it would appear that the two specimens represent different species, but description of these species must await the discovery of males. Additionally, a female specimen that appears to be *Equasystatus*

*breviceps* (Muir, 1926) was found in the canopy samples (Tiputini Biodiversity Station, 00 37' 55" S, 076 08' 39" W, 4.vii.98, 1 female, USNM).

**Etymology.** The generic name is derived from Greek, with “*pente*” (=five) combined (using an “*a*”) with “*steira*” (from “*Tetrasteira*”); “*steira*” is evidently from the Greek term “*steiros*” (barren, sterile) with the female termination “*-a*”

***Pentasteira albifrons* nov. spec.**

(Figs. 4A, 5)

**Type locality.** Ecuador, Orellana province, Reserva Etnica Waorani, Onkone Gare Camp.

**Diagnosis.** Body dark brown, with conspicuous broad white transverse band of approximately half length of frons, continuing to ventral portion of frons, genae, and adjacent pronotum, terminating on mesopleura beneath tegulae. Head broad, just wider than pronotum, mesonotum with 5 carinae; median carina weak, intermediate carinae bowed (converging cephalad and caudad), weaker posteriorly.

**Description.** Color. Body dark brown, with conspicuous broad white transverse band of approximately half length of frons, continuing to ventral portion of frons, genae, and adjacent pronotum, terminating on mesopleura beneath tegulae (Fig. 5B). Forewings dark, veins marked with white in proximal half of wing, with white spurious veins in proximal half of forewing; distally forewing veins dark, membrane slightly paler (Fig. 5A, C).

Structure. Body length, male:  $3.41 \pm 0.07$  (n=5), female:  $3.85 \pm 0.08$  (n=3); body width, male:  $1.14 \pm 0.05$  (n=5), female:  $1.22 \pm 0.09$  (n=3); vertex length, male:  $0.18 \pm 0.02$  (n=5), female:  $0.15 \pm 0.02$  (n=3); vertex width male:  $0.54 \pm 0.02$  (n=5), female:  $0.56 \pm 0.04$  (n=3); frons length, male,  $0.53 \pm 0.06$  (n=5), female:  $0.56 \pm 0.02$  (n=3); frons width, male:  $0.55 \pm 0.01$  (n=5), female:  $0.57 \pm 0.01$  (n=3).

Body with vestiture of fine hairs. Head broad, just wider than pronotum. Vertex 3x wider than long (L:W ratio 0.31:1, n=8); submedian carinae conspicuous, keeled, in shallow arc over vertex, dividing vertex transversely into subequal anterior and posterior compartments (posterior compartment slightly longer); lateral carinae weak anterior to submedian carinae; median carina very weak, unbranched (areolet absent) or branched anterior to submedian carinae forming small areolet. Fastigium strongly carinate. Frons slightly wider than long (L:W ratio 0.92:1, n=8); broad dorsally, widest at antennae, narrowing to frontoclypeal suture; median carinae weak, not forked. In frontal view, clypeus peltate, in same plane as frons, median carina weak; obscurely divided into post- and anteclypeus. Antennae short; scape approximately as wide as long, weakly flattened, cup shaped, hirsute with thick long hairs; pedicel approximately 3x length scape (L:L ratio 2.66:1, n=3), flattened and rather convex on dorsal surface, ovate, laterally and distally hirsute. With ca. 12 apical sensory structures irregularly arranged around flagellum. Rostrum reaching hindcoxae.

Pronotum much wider than long; median carina weak, lateral carinae widely divergent, approaching posterior margin ventrad of tegulae; compartments slightly depressed. Mesonotum with 5 carinae; median carina weak, intermediate carinae bowed (converging cephalad and caudad), weak posteriorly, not reaching hind margin; lateral carinae weakly arched, diverging posteriorly, reaching hind margin. Hind tibiae with 3 lateral teeth. Calcar approximately half length of basitarsus (ratio 0.53:1, n=3).

Forewings with conspicuous setae, with white spurious veins (lacking setae) interpolated between each longitudinal vein in proximal half of wing. Costal margin with small precostal field, RA+ScP fork in basal fifth of wing, near basal cell (Fig. 4A). Details

of the peripheral veins varied among specimens, including numbers of branches and presence of subapical crossveins. Crossvein connecting AA with CuP sometimes present. Hind wing deeply lobed, folded near CuP.

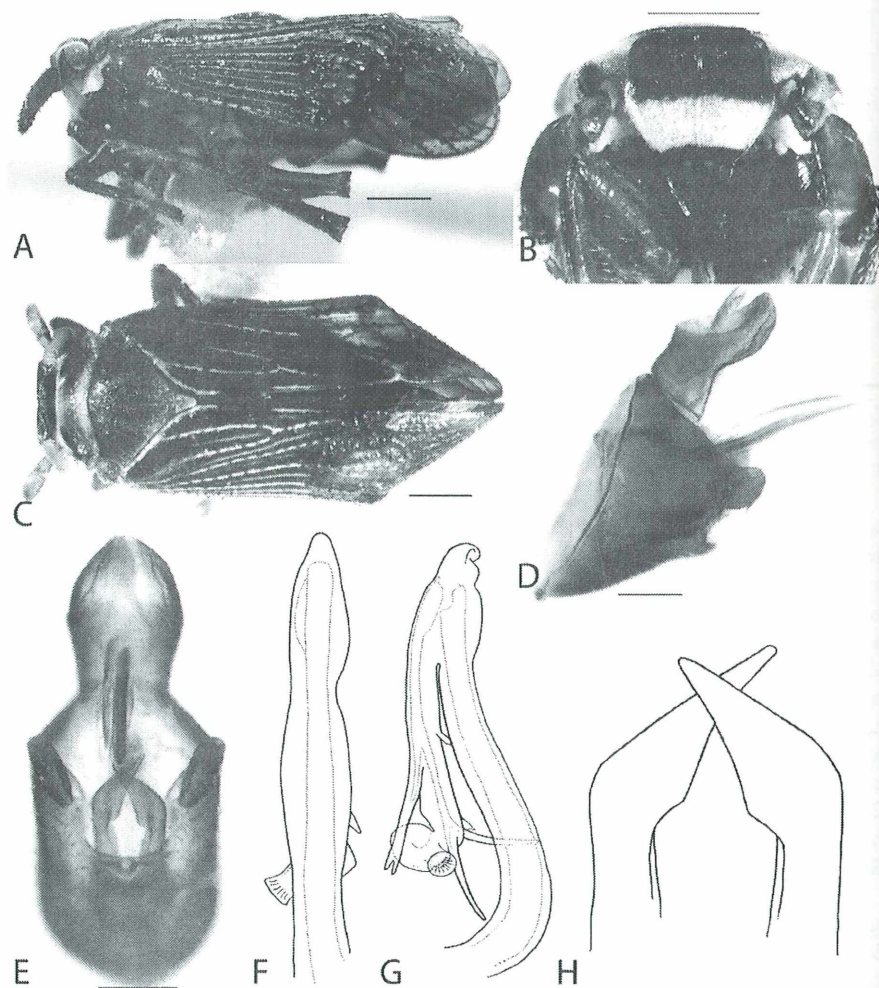


Fig. 5: *Pentasteira albifrons*, n. sp. A lateral view, B frontal view of the head, C dorsal view, D male genitalia, lateral view, E male genitalia, caudal view, F phallus, ventral view, G phallus, lateral view, H parameres, caudal view (Scale A-C = 0.5mm, D-E = 0.2 mm).

Pygofer of male genitalia approximately triangular in lateral view; widest near ventral margin, greatly narrowed dorsally; ventrally diagonal, weakly concave; caudal with large quadrate projections at lateral angles; strongly narrowed dorsally (Fig. 5D). In caudal view, opening slightly longer than wide, strongly excavated ventrally for parameres; margins weakly carinate; ventral margin of opening with projecting medioventral process, medially notched. Parameres elongate, flattened, cultrate, distally curved medially (apices may cross), narrowed to acute apices. Phallus narrow, terete, weakly narrowing distally; terminating in narrow, elongate, strongly retrose, internally sclerotized flagellum, nearly length of shaft, distally dividing into 2 weakly sclerotized strap-like processes, 1 bulbous process, and 1 or more small teeth (Figs. 5F, 5G). Segment 10 in lateral view elongate, distal portion dorsocaudally elongated, ventral margin concave; segment 11 short, approximately 2/3 length of segment 10.

**Remarks.** All specimens of *Pentasteira albifrons*, except 1, were from canopy fogging samples. No potential host plants have been identified. The specimens from the canopy samples were evenly distributed among seasons (23 taken in February [dry season], 24 in June-July [wet season], 22 in October [transitional]) indicating no evident seasonality in the species.

The wing venation of the type specimen is provided in Fig. 4B. The forewing is strongly inflected medially along the nodal line and bears a bulla at the inflection near the distal end of the clavus. The wing venation distal to the nodal line is remarkably variable among specimens including the presence or absence of crossveins, peripheral branches, and the spacing of the peripheral veins. The wing venation of *Tetrasteira* is also variable among specimens, but to a much lesser degree than *Pentasteira*. Intraspecific variation in the details of wing venation is evidently common in delphacids. The junior author (CRB) previously observed intraspecific variation in the Stenocraninae (Bartlett 2010).

Distribution. Ecuador.

**Etymology.** The generic name is formed from the Latin term “*alba*” (white), with “*frons*”, (front), combined with an “*i*”, understood to be feminine. The name refers to the large white band running horizontally across the frons.

**Material Examined.** Holotype: “756 ECUADOR Orellana / Transect Ent. 1 km S. / OnkoneGareCamp200m / Reserva Etnica Waorani // 29-VI-1994 T. L. Erwin et al. / 00 39° 10” S 076 26° 00” W / Fogging terre firme forest // Holotype / *Pentasteira / albifrons* [red paper]” (male, USNM).

Paratypes: Napo. P., Est. Cient. Yasuni, 00°40’28”S, 76°38’50”W, IX- 5-10-1999, E. G. Riley (1 male, LBOB); Onkone Gare Camp, Reserva Etnica Waorani, 00 39° 10” S, 076 26° 00” W, 220m, Erwin et al., fogging terre firme forest (all USNM, dates and genders as follows): 21.vi.1994 (1 male); 29.vi.1994 (1 male, 1 female); 7.x.1994 (3 male, 1 female); 9.x.1994 (1 male); 8.ii.1995 (1 male); 9.ii.1995 (1 male), 10.ii.1995 (3 male, 2 female); 12.ii.1995 (2 male, 1 female); 2.vi.1995 (2 female); 30.vi.1995 (1 male); 2.vii.1995 (1 male); 9.vii.1995 (1 female); 7.x.1995 (3 male); 7.ii.1996 (1 female); 8.ii.1996 (3 male); 22.ii.1996 (2 male); 25.vi.1996 (3 male, 3 female); 26.vi.1996 (1 male, 2 female); 2.x.1996 (1 male, 3 female); 3.x.1996 (3 male, 1 female); Tiputini Biodiversity Station nr Yasuni National Park, Erwin Transect T/5, 220-250m, 00 37° 55” S, 076 08’ 39” W, 7.ii.-99, T.L. Erwin et al., fogging terre firme forest (2 male); 1.vii.1998 (1 male).

## Tribe Tetrasteirini Emelyanov, 1996

### *Tetrasteira* Muir, 1926

(Figs. 4B, 6–10)

**Type species.** *Tetrasteira minuta* Muir, 1926, by monotypy.

**Diagnosis.** Body robust, small, about 2.0–3.0 mm; head slightly deflexed in lateral view; cuticle with short, inconspicuous hairs and finely sculptured or pitted on most surfaces. Mostly dark colored, legs paler, carinae concolorous with body.

Head narrower than pronotum. Vertex about as wide as long, median carina absent or vestigial, submedian and lateral carinae strong, converging before anterior margin of eyes (well before fastigium), dividing vertex into pentagonal posterior compartments (much wider than long at midlength), and short anterior compartments. Fastigium smoothly rounded, not carinate. Frons curved, in lateral view; clypeus ventrally situated. Frons nearly slightly laterally bowed (close to parallel sided), median carina strong, extending onto vertex to intersect submedian carinae. Clypeus triangular, ventrally situated, bearing median carina, subdivided into ante- and postclypeus. Antennae short (just reaching mesothorax or shorter), terete, segment 1 much shorter than segment 2; segment 2 with irregular apical cluster of sensory pustules; flagellum short. Rostrum reaching hindcoxae.

Pronotum longer than vertex at midlength, carinae distinct, lateral carinae diverging, reaching hind margin caudad of compound eyes; with auxiliary carinae extending between tegulae and eye present and variably distinct. Mesonotum at midlength about as long as vertex and pronotum combined; median carina absent, lateral carinae subparallel, slightly diverging posteriorly; intermediate carinae approximate cephalad, curved and diverging posteriorly.

Legs with short setae, femora subquadrate in cross-section, tibiae quadrate. Hindleg with two tibial spines (1 near tibiofemoral articulation, 1 distad of midlength), hindleg apical spinal formula 5–5–4; apical tarsal spines in broken row of two sizes (3+2); spines of basitarsus subequal in size, middle spine slightly offset; spines of second tarsomere in uniform row. Calcar approximately half length of basitarsus, rounded in cross-section with irregularly distributed hairs.

Forewings dark or patterned, in dorsal view inflected medially at flexion near nodal line. Forewing veins with conspicuous setae concolorous with membrane.

Pygofer subquadrate to triangular in lateral view; lateral angles expanded; in caudal view, opening weakly carinate to rounded, ventrally excavated for parameres; diaphragm very weak, unarmed. Parameres elongate, unbranched, curved medially toward apex. Phallus elongate, membranous phallosome enveloping a sclerotized aedeagus bearing a complex, multiply branched flagellum; suspensorium absent, phallobase attached to base of segment 10. Segment 10 short and wide, caudally projecting, sometimes into short, broad paired processes; segment 11 short.

**Remarks.** See remarks for *Pentasteira* for comparative features. Among the New World asiracines, members of *Tetrasteira* are smallest in size. They are otherwise easily recognized by the head being narrower than the pronotum, by the absence of a transverse carina at the fastigium, and the 4-carinate mesonotum. The auxiliary carinae of the pronotum, extending between tegulae and eye, appears to be a generic feature.

No hosts have been identified for any species of *Tetrasteira*. *Tetrasteira vulgaris* was observed in large numbers from the canopy samples from Ecuador (~2,880 specimens). Other species of *Tetrasteira* were collected at lights and from yellow pan traps.

**Etymology.** *Tetrasteira* is derived from the Greek term “tetra” (=four) combined with “steira”, evidently from the Greek term “steiros” (barren, sterile) with the female termination “-a” (although the Latin term “stria” (=furrow, line) might have been intended).

### Key to species of *Tetrasteira*

- 1 Forewings uniformly dark (Figs. 6A, C), without clear patches; legs paler at distal end of tibiae and basitarsus; phallus with large flange on right side, flagellum comprised of 3 processes (Figs 6F, G); Trinidad.....*T. albitarsus* Fennah  
Forewings with clear patches, legs not usually as above, phallus with fewer than three processes.....2
- 2 Forewings rather variegated with three large clear patches (Figs. 9A, C); phallus with an irregular lateral flange, and a long helically curved membranous flagellum (Figs. 9F, G); Central America ..... *T. trimaculata* n. sp.  
Forewings rather uniform in color with clear patches along nodal line or at apex of peripheral veins.....3
- 3 Wings with clear patches along apical wing margin at peripheral veins (Fig. 8A); segment 10 elongate, rather quadrate, without processes (Fig. 8D).....*T. solata* n. sp.  
Wings with clear patches only along nodal line; segment 10 elongate and ventrally convex bearing ventral or caudoventral processes.....4
- 4 Segment 10 broad, with posterior projections symmetrical to subsymmetrical, strongly angled ventrad (Fig. 10E); Ecuador.....*T. vulgaris* n. sp.  
Segment 10 narrowing distally, with posterior projections asymmetrical, weakly arched ventrally (Fig. 10G); Brazil ..... *T. minuta* Muir

### *Tetrasteira albitarsus* Fennah, 1945

(Fig. 6)

**Type locality.** British West Indies, Trinidad, St. John’s Valley.

**Diagnosis.** Forewings uniformly dark. Legs dark except apex of tibiae and tarsi paler. Pygofer in lateral view with large projections at lateral angles, phallus with a large flange with large acuminate tooth on right side, flagellum with three processes. Segment 10 caudally elongated into a pair of short, flat, ventrally projected, apically rounded processes.

**Description.** Color. Body dull dark brown, legs, antennae and portions of midventer and rostrum paler; tarsi and end of tibiae much paler; wings usually uniformly brown (Figs. 6A, C).

**Structure.** Body length, male:  $2.44 \pm 0.16$  (n=4), female:  $2.57 \pm 0.19$  (n=3); body width, male:  $0.74 \pm 0.09$  (n=4), female:  $0.77 \pm 0.03$  (n=3); vertex length, male:  $0.11 \pm 0.01$  (n=4), female:  $0.11 \pm 0.02$  (n=3); vertex width, male:  $0.17 \pm 0.02$  (n=4), female:  $0.17 \pm 0.01$  (n=3); frons length, male:  $0.43 \pm 0.04$  (n=4), female:  $0.46 \pm 0.07$  (n=3); frons width, male:  $0.26 \pm 0.01$  (n=4), female:  $0.24 \pm 0.03$  (n=3).

Body with vestiture of inconspicuous fine hairs. Vertex longer than wide (L:W ratio 1.54:1, n=7), posterior margin weakly concave; submedian carinae distinct, keeled, united near midlength of vertex; median carina weak, unbranched (areolet absent) or obsolete;

posterior compartment depressed, roughly pentangular. Frons curved in lateral view; in anterior view longer than wide (L:W ratio 1.65:1,  $n=7$ ), widest in ventral third; lateral margins weakly bowed below eyes; median carina distinct, keeled, unbranched, reaching submedian carinae on vertex. Clypeus with median carina distinct on postclypeus, weaker on anteclypeus. Antennae not reaching posterior margin of pronotum; scape wider than long, cup shaped; pedicel approximately 1.75x long as wide (ratio 1.66:1,  $n=3$ ), bulbous, hirsute distally with thick long hairs and bearing  $\sim 7$  subapical sensory structures on dorsal surface.

Pronotum much wider than long, anteriorly weakly convex, posterior margin slightly concave; median carina distinct, reaching hind margin, lateral carinae strong, diverging, reaching posterior margin; compartments slightly depressed. Mesonotum with 4 carinae (median carina absent); intermediate carinae curved, strongly diverging near posteriorly extreme, just (or nearly) reaching posterior margin at anterior angles of scutellum; lateral nearly straight diverging posteriorly reaching hind margin just lateral of intermediate carinae. Calcar 1/3<sup>rd</sup> length of basitarsus (L:L ratio 0.39:1,  $n=3$ ).

Pygofer of male genitalia approximately triangular in lateral view (Fig. 6D); widest near ventral margin, narrowed dorsally; anterior margin in lateral view weakly concave with slight dorsal projection cephalad of segment 10; caudal margin with large rounded projections at lateral angles (in caudal view, projections slightly curved medially); in caudal view opening slightly longer than wide, strongly excavated for parameres; lateral margins of opening carinate, ventral margins rounded. Parameres subterete, parallel-sided, with a small, blunt tooth on caudomedial margin; distally cupped with rounded apices (uncrossed); basal angle reduced. Phallus terete, slightly narrowed distally, with large flange with large acuminate tooth on right side, and 3 elongate, irregularly strap-like, weakly sclerotized, retrose distal processes; one arising ventral and subterminally process, the other 2 terminally and more distal (Fig. 6F, G). Segment 10 wider than tall in lateral view, distal portion ventrocaudally elongate and curved into a pair of ventrally projected, short, thick, flattened, blunt projections.

**Remarks.** *Tetrasteira albitarsis* is so far known only from Trinidad and is not sympatric with any other species of *Tetrasteira*. It can be separated from its congeners by its uniformly dark forewing and pale tarsi and tibiae, but the best feature is probably the phallus bearing a large lateral flange bearing an acuminate tooth and the three-parted flagellum.

**Distribution.** Trinidad.

**Material Examined.** Holotype: “TRINIDAD / COLL.#3010 / VI-12-42 / Fennah // TypeNo / 56680 / USNM // Coll.No.3010 / HOLOTYPE ♂ TETRASTEIRA / ALBITARSIS Fennah / coll Trinidad BWI June12,1942” (USNM).

**Trinidad:** Northern Range, Arima Blanchisseuse Rd., mi. 10, L. B. & C. W. O'Brien, May 11, 1985, (1 male, LBOB); Northern Range, Arima Blanchisseuse Rd., Textel, nr. Morne Bleu, 2300', L. B. & C. W. O'Brien, May 12, 1985 (1 male, 1 female, LBOB); Northern Range, Cooker trace, 3 mi E. Arima Blanchisseuse Rd, 1900' May 11, 1985, L. B. & C. W. O'Brien (1 male, LBOB); St. George, 8 km South of Maracas Bay village, 21 March 1985, March 21, 1985, G.F. & J.F. Hevel (1 male, USNM); Blue Basin, May 1953, NHL Krauss, (1 female, USNM).

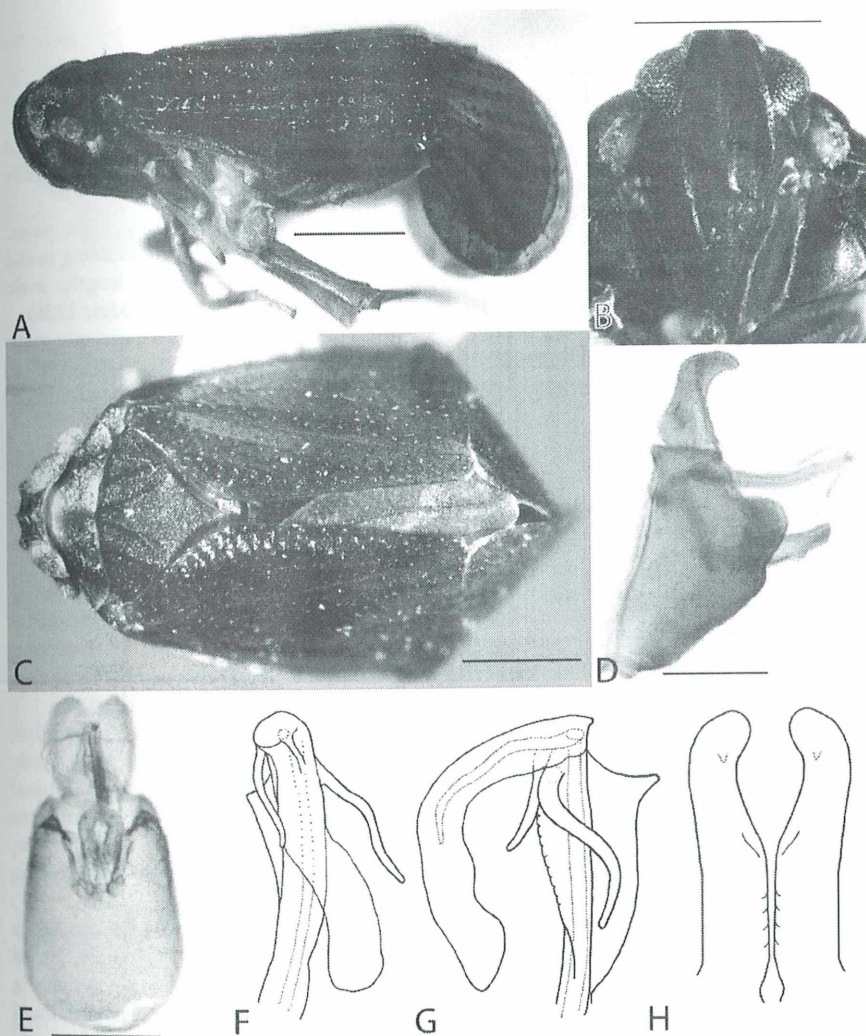


Fig. 6: *Tetrasteira albicans* Fennah. A lateral view, B frontal view of the head, C dorsal view, D male genitalia, lateral view, E male genitalia, ventral view, F phallus, lateral view, G phallus, ventral view, H parameres, caudal view (Scale A-C = 0.5mm, D-E = 0.2 mm).

***Tetrasteira minuta* Muir, 1926**

(Fig. 7)

**Type locality.** Belém, Pará State, Brazil.**Diagnosis.** Body mostly dark brown, wings dark brown with clear spots on nodal line. Male genitalia with segment 10 elongate, slightly curved ventrally, projected caudally into asymmetrically caudally projecting processes.**Description.** Color. General body color brown, legs and region near tegulae paler. Wings dark, except clear patches on costal margin near ScP and RA ( $R_1$ ) and along nodal line, veins concolorous with membrane (Figs. 7A, C). Structure: Body length, male (holotype) reported as 1.3 mm frons to abdomen; 1.9 mm frons to wing tip (Muir 1926).

Body with fine hairs, cuticle roughened with fine punctures. Head narrower than pronotum. Vertex about half as wide as long; anterior compartments very short at midlength, posterior compartments wider than long, occupying most of vertex; median carina obsolete.

Frons longer than wide (L:W ratio 1.4,  $n=1$ ); broadest ventrally, widest above frontoclypeal suture; media carinae distinct (Fig. 7B). Clypeus with median carina distinct. Antennae short, not reaching posterior margin of pronotum; scape wider than long, cup shaped; pedicel approximately 2x long as wide, with apical sensory structures irregularly arranged around flagellum.

Pronotum wider than long (Fig. 7D); median carina evident, reaching posterior margin, lateral carinae distinct, strongly diverging, slightly sinuate, reaching posterior margin. Mesonotum longer at midlength than head plus pronotum, bearing 4 carinae; lateral carinae diverging, reaching posterior margin; intermediate approximate cephalad, posteriorly diverging in arc, reaching posterior margin.

Genitalia of holotype embedded in balsam between microscope slide cover slips, allowing limited examination. Pygofer appears triangular in lateral view; lateral angles only slightly developed, ventral opening concave for parameres (Fig. 7B). Parameres with basal angle obsolete, slightly narrowed in distal two-thirds, expanded apically into a short outer and longer inner angle. Phallus badly damaged in type. Segment 10 elongate, narrow, posterior projecting as two asymmetrically processes, weakly curved ventrally, narrowing distally to rounded apices (Fig. 7E).

**Remarks.** Originally described from a male (holotype) and female (specimens at BPBM), a male was later reported from Taracua, River Uaupes, Amazonas State, Brazil (A. Roman, 1924) (specimen at NHRS), but the latter specimen was actually a female. Inquiries to collections, including institutions in Brazil, failed to reveal additional specimens.

The genitalia of the holotype were dissected, dissociated and embedded in balsam between two microscope cover slips, limiting how the genitalia may be observed. One paramere is missing, and the position of the phallus makes this difficult to interpret. Muir (1926: 5) specified: "Anal segment small, very short, apical corners produced asymmetrically, the left large, curved, and acute, the right shorter and blunter. Periandrium short with the apodeme extending through it to base of penis which is membranous and bears two curved spines." Because of the position of the genitalia in the balsam, both the asymmetry of segment 10 and the phallus are difficult to interpret.

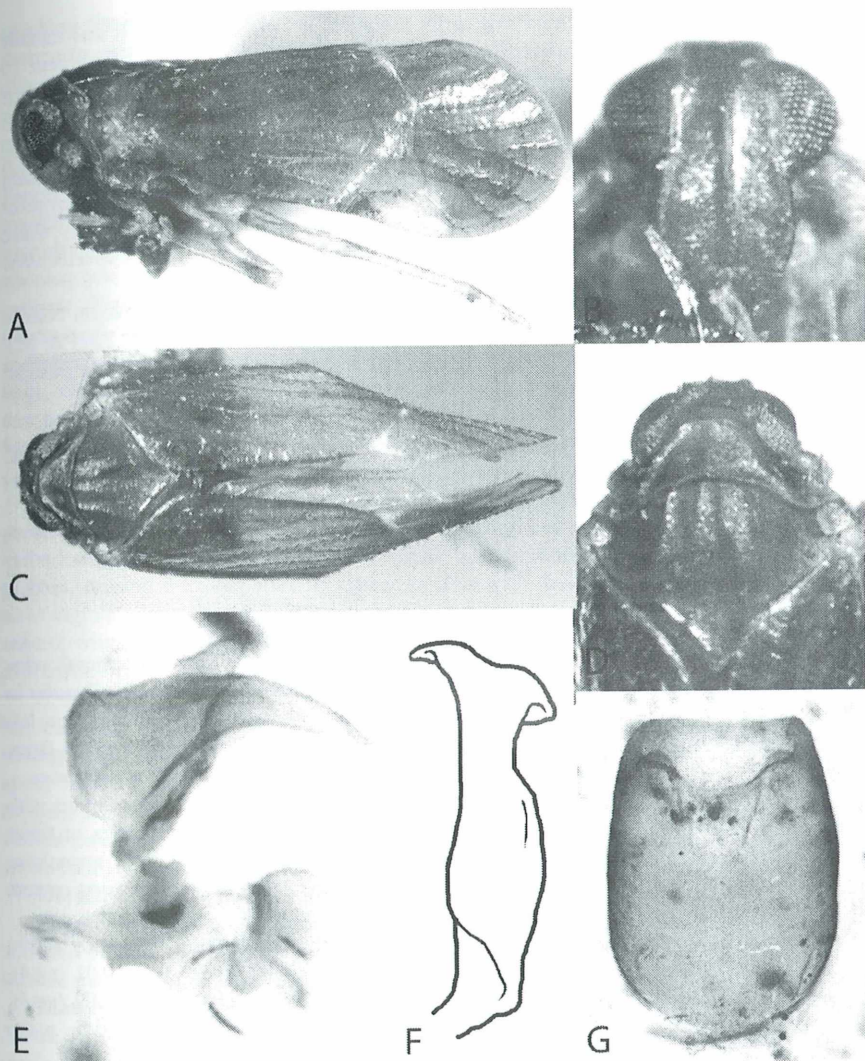


Fig. 7: *Tetrasteira minuta* Muir (holotype). A lateral view, B frontal view of the head, C dorsal view, D head and thorax, dorsal view, E male genitalia, postgenital segments and portions of aedeagal complex, lateral view, F paramere, G male pygofer, ventro-caudal view (male genitalia were embedded in balsam and could not be manipulated).

*Tetrasteira minuta* is externally most similar to *T. vulgaris* n. sp., with which it was initially assumed to be conspecific; however, in *T. minuta*, the posterior projection of segment 10 is rather narrow and weakly curved ventrad, and asymmetrical. In *T. vulgaris*, the posterior projection of segment 10 is stout, abruptly angled ventrad, abruptly narrowed to symmetrical apices. Also, in *T. minuta*, Muir (1926) specifies two spines (which we presume to be the flagellum); in *T. vulgaris* the flagellum consists of a broad, flat flagellum bearing an elongate, bifid process, and a process on the shaft (Figs. 10F, G). The pygofer of *T. vulgaris* also appears to bear larger lateral processes than *T. minuta*. Collectively, these differences, plus the smaller size of *T. minuta*, indicate that these are different species even given some of the genital features of *T. minuta* are unclear.

One female specimen from French Guiana French Guiana: 1 km S. Amazon Nature Lodge, Kaw Rd., 30 km S. Roura, 288m, N 04°32.961', E052° 12.830', JE Eger & MT Messenger, June 3-4, 2005, MV light [1 female, LBOB]) is possibly *T. minuta*, but this can not be confirmed without a male.

**Distribution.** Brazil (Amazonas, Pará).

**Material Examined.** Holotype: "Belem, Para/June, 1924 // F. X. Williams/Collector" (male, BPBM).

### *Tetrasteira solata* nov. spec.

(Fig. 8)

**Type locality.** Panama, San Blas, Nusagandi, Ina Trail.

**Diagnosis.** Wings dark with series of small clear patches near distal peripheral veins along wing margin. Legs dark except apex of tibiae and portions of tarsi paler. Pygofer in lateral view weakly projected at lateral angles. Phallus with large irregular flange on left side (without acuminate tooth), weakly flanged on right, flagellum with one process (apex bifid or trifid). Segment 10 quadrate in lateral view, without ventrally directed processes.

**Description.** Color. Usually uniformly brown, paler ventrally, some specimens with pale patches posteriorly on pronotum and mesonotum, legs dark, paler at apex of tibiae and portions of tarsi; forewings dark (sometimes paler in axillary region), sometimes weakly marked along nodal line, wings distally with a series of clear patches along margin at apical peripheral veins (from ScP to apex of clavus) (Figs. 8A, C).

Structure. Body length, male:  $2.48 \pm 0.08$  (n=3), female:  $2.62 \pm 0.12$  (n=3); body width, male:  $0.67 \pm 0.16$  (n=4), female:  $0.79 \pm 0.09$  (n=4); vertex length, male:  $0.10 \pm 0.01$  (n=4), female:  $0.11 \pm 0.03$  (n=4); vertex width, male:  $0.17 \pm 0.04$  (n=4), female:  $0.19 \pm 0.02$  (n=4); frons length, male:  $0.41 \pm 0.03$  (n=4), female:  $0.40 \pm 0.02$  (n=4); frons width, male:  $0.22 \pm 0.03$  (n=4), female:  $0.24 \pm 0.05$  (n=4).

Body with very inconspicuous hairs. Vertex wider than long (L:W ratio 0.58:1, n=8); submedian carinae distinct, keeled, joined near posterior margin of compound eyes; median carinae faint or absent; posterior compartment distinct, pentagonal, wider than long. Frons longer than wide (L:W ratio 1.86:1, n=8), lateral margins slightly bowed; widest near frontoclypeal suture; median carinae distinct, not forked, extending onto vertex to submedian carinae (Fig. 8B). Clypeus with median carina distinct. Antennae just reaching hind margin of pronotum; scape shorter than long, cup shaped; pedicel approximately 2x long as wide (L:W ratio 2.4:1, n=3), distally hirsute with thick hairs, bearing group of ~7 irregularly arranged sensory structures on dorsal side.

Pronotum longer than vertex, much wider than long; carinae (including auxiliary carinae) distinct; medial carinae reaching hind margin, lateral carinae widely diverging,

reaching (or nearly reaching) hind margin near lateral margin of compound eye; lateral compartments slightly depressed. Mesonotum with 4 carinae; intermediate carinae diverging posteriorly, j-hooked at posterior margin; lateral carinae approximately straight, diverging posteriorly, reaching posterior margin laterad of intermediate carinae; scutellum not clearly differentiated. Calcar approximately half the length of the basitarsus (ratio 0.42:1,  $n=3$ ).

Pygofer of male genitalia approximately quadrangular in lateral view, widest near ventral margin, narrowing dorsally; anterior margin diagonal, slightly concave; caudal margin irregular, with two small humps at lateral angles, arched to dorsal margin; in caudal view opening just longer than wide, ventrally excavated for parameres; lateral margins weakly carinate (Figs. 8D, E). Parameres cylindrical, forceps-shaped; distally curved medially (uncrossed) to broad, rounded apices (a subapical tooth on medial margin in one specimen); basal angle indicated by a small tooth. Phallus terete, narrowing distally, with large, elongate, irregular lateral flange on left side and weak flange on right; phallus terminating in single strap-like, retrose flagellum, apically bifid or trifid (Figs. 8F, G). Segment 10 rather quadrate in lateral view, longer than tall, caudally elongated into caudally directed flat, rounded projections.

**Remarks.** This species may most easily be recognized from its congeners by the presence of clear patches along the apical wing margin at each peripheral vein. On most individuals, these clear spots are quite small, but a few individuals possess larger clear patches, causing the wing apex to appear as clear with dark patches. The male terminalia have segment 10 rather quadrate and lacking processes, as opposed to *T. minuta* and *T. vulgaris*, which are both ventrally convex with apical ventrally or caudoventrally directed processes.

A single male specimen from Venezuela (label data below) is tentatively referred here, but excluded from the paratype series. It differs from the Panamanian specimens in having 4 clear spots in the wing in addition to clear patches at peripheral veins at the wing apex; segment 10 is narrower and slightly curved ventrally, the parameres are more cupped, the phallic projection is more elaborate and the phallic shaft includes an elongate ventral projection. Additional specimens are needed to determine whether this represents an additional new species, or representative of a geographic cline of variation.

**Distribution.** Panama, ? Venezuela.

**Etymology.** The generic name is formed from the Latin term “*solatus*” (=sunstruck), with the female termination “-a” The name refers to patterns of clear patches on the outside margins of the forewings that are reminiscent of the sun’s rays.

**Material Examined.** Holotype: “Panama, San Blas, / Nusagandi, Ina Trail/ 250-350m. 7-26-1995/ C.W. & L.B. O’Brien// Holotype / Tetrasteira / solata [red paper]” (male, LBOB).

Paratypes: **Panama:** San Blas: Nusagandi, Nusagandi Tr. 150-350m, July 27, 1995, C.W. & L.B. O’Brien (1 male, 2 female, LBOB); Panama: Cerro Campana, June 29, 1974, C. W. & L. O’Brien & Marshall, at night (1 male, 1 female, LBOB); same, July 5, 1974 (2 female, LBOB); Cerro Campana, May 13, 1978, C. W. & L. O’Brien & Marshall (1 male, 1 female, LBOB); same, VII-29-1999 (1 female, LBOB); Canal Zone, pipeline road. P.N. Soberania [Soberania National Park], July 30, 1995; C. W. & L. O’Brien (2 male, LBOB); km 7.5-9 Llano-Carti Road, Aug 3, 1995, C. W. & L. O’Brien (1 male, 4 female, LBOB).

Excluded from paratype series: **Venezuela:** Amazonas: Cerro de la Neblina, base camp, 140m, Feb. 17, 1984, Rozen & Stupakoff (1 male, AMNH).

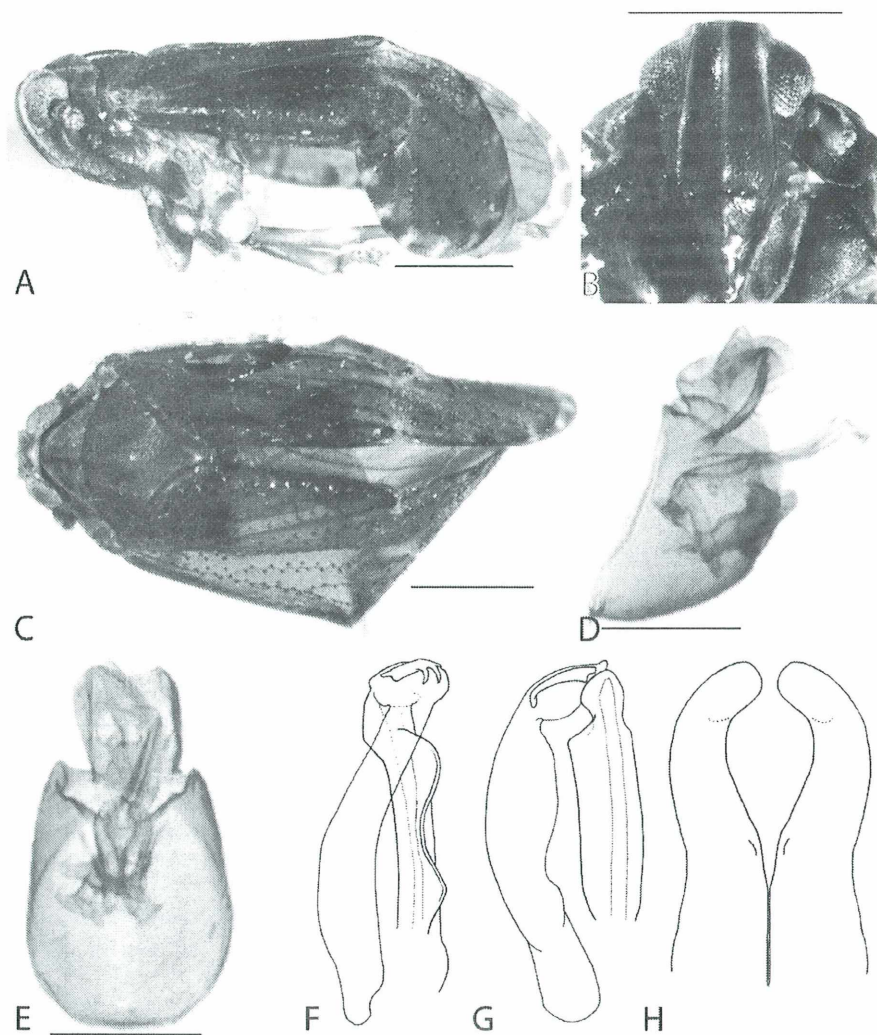


Fig. 8: *Tetrasteira solata*, n.sp. A lateral view, B frontal view of the head, C dorsal view, D male genitalia, lateral view, E male genitalia, caudal view, F phallus, lateral view, G phallus, ventral view, H parameres, caudal view (Scale A-C = 0.5mm, D-E = 0.2 mm).

*Tetrasteira trimaculata* nov. spec.

(Figs. 4B, 9)

**Type locality.** Belize, Orange Walk, Rio Bravo Conservation Area, Well Trail.

**Diagnosis.** Wings dark brown with 3 clear patches, one near apex of ScP and RA, one at a peripheral branched of M at wing apex, one near middle of claval suture; wing also with small clear patches along nodal line and at peripheral veins along the wing apex. Phallus with a large caudally projecting apical flange and a large retrose, sinistrally curled flagellum as long as, or exceeding, length of phallus shaft. Segment 10 stout, subquadrate, concave ventrally bearing pair of short, fine, ventrally projected processes.

**Description.** Color. Body brown to dark brown, irregularly paler on vertex, dorsal portions of pronotum, tegulae, posterior apex of scutellum, thoracic venter, and portions of legs (Figs. 9A, C). Legs mostly light brown, paler subapically on tibiae, apically on basitarsus (excluding apical spines), and distal tarsomeres; contrasting with dark brown tibial apex, calcar, and proximal basitarsus. Wings dark brown with 3 large clear patches, one at the apex of the ScP and RA one at a peripheral branched of M at wing apex, one near midlength of claval suture, often projecting distally; wing also with small clear patches along nodal line and at peripheral veins of radius and media along the wing margin.

Structure: Body length, male:  $2.82 \pm 0.05$  (n=3), female:  $2.98 \pm 0.07$  (n=2); body width, male:  $0.82 \pm 0.09$  (n=5), female:  $0.79 \pm 0.05$  (n=5); vertex length, male:  $0.10 \pm 0.03$  (n=5), female:  $0.11 \pm 0.02$  (n=5); vertex width, male:  $0.19 \pm 0.02$  (n=5), female:  $0.18 \pm 0.04$  (n=5); frons length, male:  $0.43 \pm 0.03$  (n=5), female:  $0.46 \pm 0.02$  (n=5); frons width, male:  $0.24 \pm 0.03$  (n=5), female:  $0.26 \pm 0.01$  (n=5).

Vertex wider than long (L:W ratio 0.52:1, n=10); submedian carinae distinct, keeled, slightly arched, converging prior to anterior margin of eyes; median carina absent. Frons longer than wide (L:W ratio 1.79:1, n=10); weakly arched laterally, widest midway between frontoclypeal suture and ventral margin of eyes; median carinae distinct, extending onto vertex to reach submedian carinae (Fig. 9B). Clypeus triangular with evident median carina. Scape of antennae wider than long, cup shaped; pedicel approximately 1.5x long as wide (L:W ratio 1.54:1, n=3), bulbous, hirsute, with ca. 8 subapical sensory structures irregularly arranged around flagellum, especially dorsally.

Pronotum subequal in length to vertex, much wider than long; carinae distinct, lateral carinae diverging, nearly straight until abruptly arching lateral near posterior margin; lateral compartments slightly depressed. Mesonotum with 4 distinct carinae (median carina vestigial or obsolete); intermediate carinae approximate cephalad, curving laterad posteriorly, reaching hind margin; lateral carinae diverging, weakly laterally curved posteriorly. Scutellum not differentiated. Hind tibia with 2 lateral teeth. Calcar one-third length of basitarsus (L:W ratio 0.30:1, n=3).

Pygofer of male genitalia approximately triangular in lateral view; widest near ventral margin, narrowing dorsally; cephalad margin diagonal, weakly convex; caudal margin broadly rounded at lateral angles (Fig. 9D). In caudal view, pygofer about as wide as long, excavated for parameres; opening mostly carinate along edge. Parameres subcylindrical in cross-section, distally curved medially (uncrossed), broadly rounded at apices, basal angle bearing tooth. Phallus terete, with small rounded basal flange on right, and a larger subapical flange caudally projecting from right side, extending beyond base of flagellum; flagellum large, membranous, retrose and strap-like, sinistrally curved into helix (Figs. 9F, G). Segment 10 in lateral view short, broad, subquadrate (narrowed caudally), ventral margin concave, bearing short, fine, ventrally projected processes.

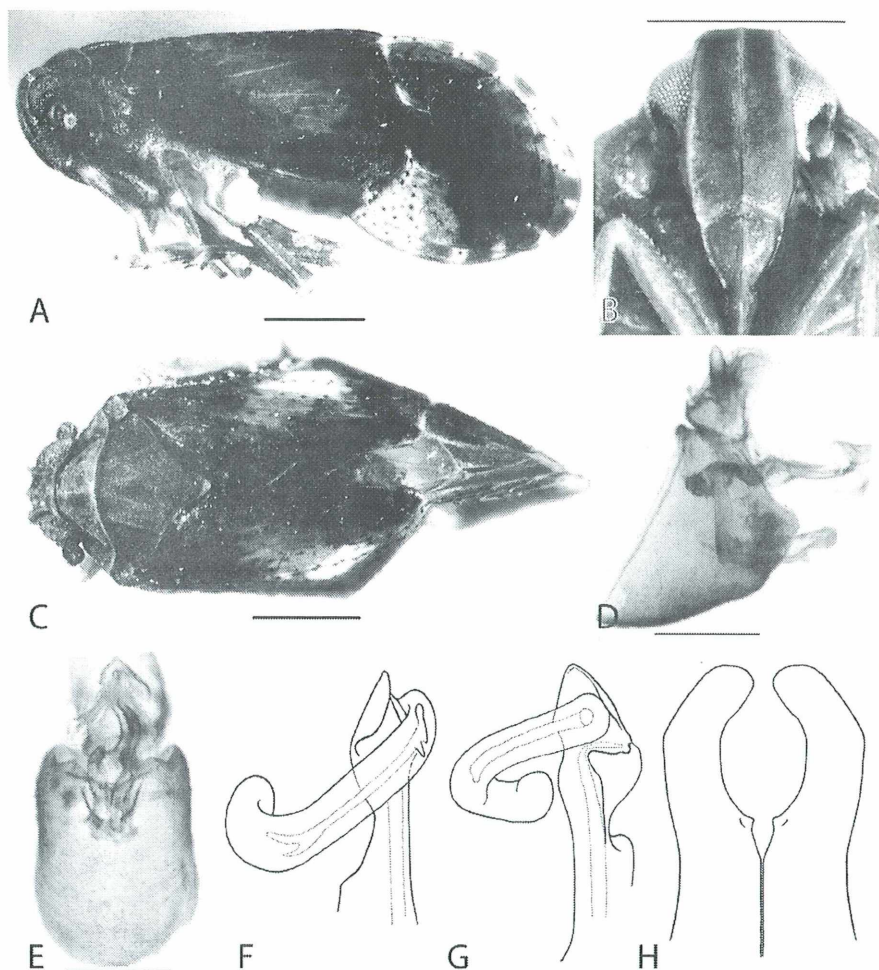


Fig. 9: *Tetrasteira trimaculata*, n.sp.: A lateral view, B frontal view of the head, C dorsal view, D male genitalia, lateral view, E male genitalia, caudal view, F phallus, lateral view, G phallus, ventral view, H parameres, caudal view (Scale A-C = 0.5mm, D-E = 0.2 mm).

**Remarks.** This species is distinguished by having more distinctively patterned wings than its congeners. It is also distinguished by its large, helical phallic flagellum and segment 10 rather quadrate bearing a pair of fine, ventrally projected processes. The venation of the forewing when viewed from the wing underside is often distinctly pale in color, strongly contrasting with the wing membrane; a feature is shared with some specimens of *T. vulgaris*. *Tetrasteira trimaculata* shares having clear spots along the apex of the wing margin at the peripheral veins with *T. solata*. The forewing of some specimens also sometimes has a vein that is either the humeral vein or an additional branch of ScP.

**Distribution.** Belize, Costa Rica, Columbia, Honduras, Mexico, Panama.

**Etymology.** The generic name is formed from the Latin terms “*tri*” (=three), combined with “*macula*”, (=spot, mark), with the suffix “*-atus*” (indicating possession), with feminine termination “*-a*” The name refers to the 3 clear patches evident on each forewing and characteristic of this species.

**Material Examined.** Holotype: “Belize, Orange Walk/ Rio Brave [sic.] Cons. Area/ Well Trail, 7-14.IV.1996/ P.W. Kovarik // Holotype / Tetrasteira / trimaculata [red paper]” (male, LBOB).

Paratypes: **Mexico:** Chiapas, Huixtla, VI-5-[19]35 , J. S. Caldwell Collection (3 male, 2 female, USNM). **Belize:** Cayo District: [San Jose Succotz], Xunantunich, Aug. 14, 1977, CW & L O'Brien & Marshall (1 male, 2 female, LBOB); TrekStop, E. San Jose Succotz, 17 05'30"N, 89 07'01"W, 10-12.IX. 2002, P. Kovarik, yellow pan trap (1 male, LBOB); 10 mi. S. Georgeville, O'Brien & Marshall, Aug. 21, 1977 (1 female, LBOB); ~8 mi S. Georgeville nr. Barton Creek, “pine ridge”, N17 4' 28.5, W88 59' 16.6, 4-July-[20]03, C. R. Bartlett [sweeping] (1 female, UDCC); near Teakettle Bank, Pook's Hill, 17 09.257N, 88 51.091W, 279ft., 3-VII-2003, C. R. Bartlett (1 broken, UDCC); same, 6-VII-2003 (5 male, UDCC), same, 7-VII-2003 (2 male, UDCC); same 8-VII-2003 (2 female, UDCC); same, 5-VII-2003, N. Nazdrowicz, light (1 male, UDCC); 23 mi. SE. Belmopan, Aug. 18, 1977, CW&L O'Brien&Marshall (1 male, LBOB); Orange Walk: Rio Bravo Cons.[ervation] Area, Mahogany trail, VII-12-1996, C. W. & L. B. O'Brien, UV & Hg Vapor Light (1 female, LBOB); same, vii-10-1996 (method not specified; 1 male, 1 female, LBOB); same, 5-13-IX-1995, P. Kovarik, yellow pan trap (1 male, LBOB); Rio Bravo Cons. Area, Well Tr. 11-18-vii-1996, P. W. Kovarik, Well Trail transect, yellow pan traps (3 female, LBOB); same, 7-14.IV.1996, yellow pan traps (3 male, 5 female, LBOB); same, VII-8-20-1996, yellow pan trap (2 female, LBOB); Rio Bravo Cons. Area, IV-16-18-1995, P. Kovarik, yellow pan trap (1 female, LBOB); same, 15-18-IV-1995 (1 male, LBOB); R. Bravo Cons. Area, Well Trail (Vic. Res[earch] Sta[tion], 3-13-ix-1991, P. W. Kovarik, yellow pan trap (1 female, LBOB); Rio Bravo Cons. Area, Lagunitas Trail, 7-19 [-VII?]-1996, C.W. & L.B. O'Brien [method not specified] (1 male, 1 female, LBOB); same, 7-15[-VII?]-1996 (1 male, LBOB); Rio Bravo Cons. Area, Medicine Trail, 7-20 [-VII?] 1996, C.W. & L.B. O'Brien [method not specified] (1 female, LBOB); Rio Bravo Cons. Area, 1<sup>st</sup> logging rd. off rd. to La Milpa Archeol. Site, 12-18-VII-1996, P. Kovarik, site #6 FIT (1 male, LBOB). Costa Rica: Puntarenas, Pen.[insula] Osa, 8 km S. Rio Ricon bridge, Coopemarti, 8°38'N, 83°28'W, 30m, Oct. 1990, #2 Malaise, P. Hanson (1 female, LBOB), same, Dec. 1990 (2 female, LBOB); Golfo Dulce, 24 km W. Piedras Blancas, 200m, xi-1991, P. Hanson (2 male, 1 female, LBOB); same, vii-viii-1989 (3 female, LBOB); same, v-1991, #2 [Malaise] (1 male, 3 female, 1 broken, LBOB); same, ii-1993 (1 male, LBOB); same, xii-1990 (1 female, LBOB); same, xi-1991, [P.] Hanson, [C.] Godoy (1 female, LBOB); 10m. Res. For. Golfo Dulce, 3km. SW. Ricón, xii-1989-iii-1990, Malaise, [P.] Hanson (1 male, LBOB); Golfo Dulce, 24km W. Piedras Blancas, 200m, 1-1993, P. Hanson, mal.[aise] (1 male, LBOB); Pen. Osa, LaPalma, 23km N. Pto. Jimenez, 10m, IX-X-1992 (2 male, 3 female, LBOB); Est. Biol. Las Alturas, 2000m [sic], III-V-1995 , Malaise trap, P. Hanson (1 male, 2 female, LBOB); Ricon, Osa Pen., 100 ft, VIII-11-1966, SLW (1 male, 1 female, LBOB). **Panama:** Panama: Las Cumbres, Wolda, 1 9-1975, Wim Wolda (1 female, LBOB). **Honduras:** Atlántida Department: 6 mi W. San Juan del Pueblo, 1-IX-1985, CW O'Brien (1 male, 1 female, LBOB). Colombia: Choco Dept. Camp Curiche, 1967 (1 female, LBOB); Liberia, 2-IX-1984, CW O'Brien, rain forest (1 female, LBOB). **Columbia:** Choco Dept.: Camp Curiche, 1967 (1 female, UDCC).

***Tetrasteira vulgaris* nov. spec.**

(Fig. 10)

**Type locality.** Ecuador, Orellana province, Reserva Étnica Waorani, Onkone Gare Camp.

**Diagnosis.** Dark, wings with large clear patch on both the trailing and leading edges at nodal line. Flagellum of phallus consisting of a broad flattened process bearing a fine elongate branched process, and the shaft bearing an elongate subapical process. Segment 10 with posterior projections broad, symmetrical to subsymmetrical, strongly curved ventrad near midlength and abruptly narrowed to rounded apices.

**Description.** Color. Dark brown, paler on tegulae and legs dorsally on pronotum, posterior margin of head, mesonotum, and abdominal segments (Fig. 10A, C). Wings brown with clear patches on trailing and leading margins on nodal line.

**Structure:** Body Length, male:  $2.38 \pm 0.04$  (n=5), female:  $2.55 \pm 0.06$  (n=5); body width, male:  $0.77 \pm 0.05$  (n=5), female:  $0.82 \pm 0.08$  (n=5); vertex length, male:  $0.15 \pm 0.03$  (n=5), female:  $0.14 \pm 0.02$  (n=5); vertex width, male:  $0.17 \pm 0.02$  (n=5), female:  $0.17 \pm 0.01$  (n=5); frons Length, male:  $0.40 \pm 0.01$  (n=5), female:  $0.38 \pm 0.05$  (n=5); frons width, male:  $0.24 \pm 0.01$  (n=5), female:  $0.25 \pm 0.02$  (n=5).

Body with cuticle finely punctuate or rugose and a sparse vestiture of fine hairs. Vertex wider than long (L:W ratio 0.88:1, n=10); median carina obsolete, submedian carinae distinct, strongly convergent; posterior compartment much wider than long, forming 5-sided trapezoid; anterior compartments shorter than posterior at midlength. Frons longer than wide (L:W ratio 1.67:1, n=10); laterally bowed, widest just above frontoclypeal suture; median carina distinct, not forked, extending to submedian carinae on vertex (Fig. 10B). Antennae short, not exceeding posterior margin of pronotum; scape wider than long (ratio 1.17:1, n=3), cup shaped; pedicel approximately 2x long as wide (ratio 1.71:1, n=3), hirsute, slightly wider new apex, with ca. 8-10 apical sensory structures irregularly arranged around flagellum.

Pronotum much wider than long; medial weaker than lateral, lateral carinae widely arched, reaching posterior margin; paranota concave. Mesonotum intermediate carinae strong, approximated cephalad, curving laterally and becoming weaker posteriorly, not reaching (or just reaching) posterior margin near median, reaching hind margin; lateral carinae diverging. Calcar approximately half the length of the basitarsus (ratio 0.44:1, n=3).

Male pygofer approximately triangular in lateral view; widest near ventral margin, narrowed dorsally and ventrally; caudal margin with broad projections at lateral angles (Fig. 10E). In caudal view, pygofer opening as wide as long, ventrally excavated for parameres; margins of opening weakly carinate. Parameres weakly flattened, basal angle weak, distally curved medially (uncrossed), apices blunt. Phallus distinctly sclerotized internally within membranous phallosome; rounded in cross-section, bearing subdorsal and subventral flanges, subdorsal flange weakly serrate, ventral flange bearing long, membranous, subapical process; phallus terminating in elongate, retrose flagellum, subdivided into a long, broad, irregular narrowly strap-like membranous process bearing a fine elongate branched process, and with or without a short basal process (Figs. 10F, G). Segment 10 elongate, broad, posteriorly projecting as two symmetrical to subsymmetrical processes, ventral margin strongly concave into pair of ventrally projecting, bluntly pointed apices.

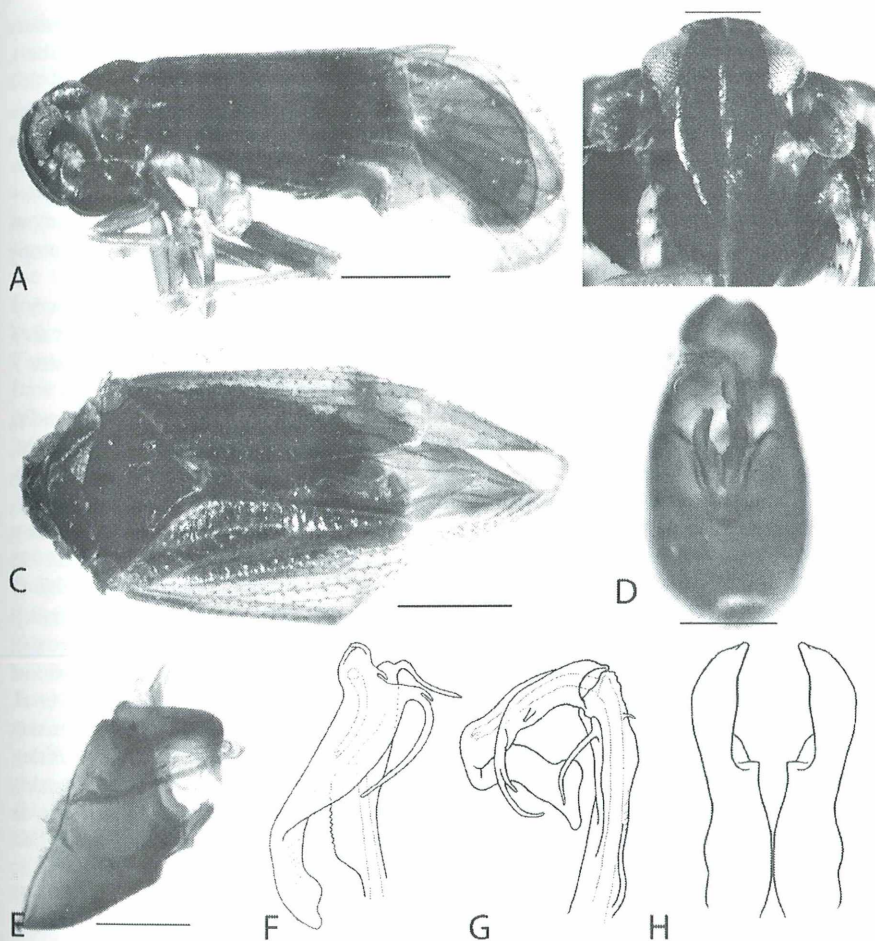


Fig. 10: *Tetrasteira vulgaris*, n.sp., A lateral view, B frontal view of the head, C dorsal view, D male genitalia, caudal view, E male genitalia, lateral view, F phallus, lateral view (slightly tilted), G phallus, ventral view, H parameres, caudal view (Scale A-C = 0.5mm, D-E = 0.2 mm).

**Remarks.** *Tetrasteira vulgaris* is most similar to *T. minuta*, and can be separated from that species most readily by the shape of abdominal segment 10, which is abruptly angled ventrad to narrow subsymmetrical processes in *T. vulgaris*, as opposed to slightly curved to asymmetrical projections in *T. minuta* (see also *Remarks* under *T. minuta*).

The underside of forewings frequently has the veins much paler than the membrane of the wing venation on the upper side, a feature shared with *T. trimaculata*. A vein is sometimes present that may be the humeral crossvein or a branch of the Sc in the forewing.

*Tetrasteira vulgaris* has been observed in abundance from the Ecuador canopy fogging samples. Specimens are present from both localities (Tiputini Biodiversity Station [763 specimens] and Reserva Étnica Waorani, Onkone Gare Camp [2,097 specimens]), and

from all three seasons: wet (930 specimens, June and July), dry (1,207 specimens, January and February), and intermediate/transitional (723 specimens, late September-October). Because of the large number of specimens available, we have arbitrarily selected 200 individuals as paratypes as indicated below, and provided the specimens with paratype labels. The material reported in table 2 indicates the sex ratio of the type and paratype specimens.

**Distribution.** Ecuador.

**Etymology.** The specific name is taken from the Latin term "*vulgaris*" (=common), to be treated as feminine, because of the large numbers of this species taken in the canopy fogging samples in Ecuador.

**Material Examined.** Holotype: "756 Ecuador Orellana/ Transect Ent. 1 Km S / Onkone Gare Camp 220m / Reserva Etnica Waorani // 29-VI-1994 T. L. Erwin et al. / 00 39' 10" S 076 26' 00" W / Fogging terre firme forest // Holotype / Tetrasteira / vulgaris [red paper]" (male, USNM).

Paratypes: **Ecuador:** Orellana, Onkone Gare Camp 220m, Reserva Etnica Waorani, 00 39' 10" S 076 26' 00" W, T. L. Erwin et al., Fogging terre firme forest (all USNM, dates and genders as follows): 20.vi.1994 (4 female); 21.vi.1994 (2 male, 9 female); 29.vi.1994 (2 male); 9.ii.1995 (13 male, 1 female); 10.ii.1995 (1 female); 11.ii.1995 (2 male, 2 female); 12.ii.1995 (1 female); 3.vi.1995 (1 male, 2 female); 6.vi.1995 (1 female); 25.vi.1995 (5 male, 1 female); 30.vi.1995 (1 male, 2 female); 6.vii.1995 (3 male); 9.vii.1995 (1 male, 2 female); 6.x.1995 (2 male); 7.x.1995 (1 female); 8.x.1995 (1 female); 3.vi.1996 (1 female); 4.ii.1996 (6 male); 7.ii.1996 (2 male, 6 female); 8.ii.1996 (2 male, 2 female); 10.ii.1996 (3 male); 22.vi.1996 (3 female); 25.vi.1996 (2 female); 26.vi.1996 (5 female); 3.x.1996 (5 male); 4.x.1996 (1 male); Tiputini Biodiversity Station nr Yasuni National Park, Erwin Transect T/5, 220-250m, 00 37' 55" S, 076 08' 39" W, T.L. Erwin et al. fogging terre firme forest (all USNM, dates and genders as follows): 1.vii.1998 (1 male); 4.vii.1998 (1 male, 1 female); 22.x.1998 (12 male, 5 female); 26.x.1998 (2 male, 2 female); 5.ii.1999 (1 male, 3 female); 6.ii.1999 (7 male, 2 female); 7.ii.1999 (16 male, 3 female); 8.ii.1999 (20 male, 18 female); 9.ii.1999 (4 male, 2 female); Provincia de Francisco de Orellana, Yasuni National Park, S00°40.478 W076°23.866, 26.iv.2005, CR Bartlett, N. Nazdrowicz, D. Chang; ex: @HG Vapor light/night (1 male, UDCC).

## 4. Discussion

With the species described here, the Platysystatini consists of 3 genera and 3 species, and the Tetrasteirini consists of 1 genus with 5 species, bringing the total number of New World asiracine taxa to 12 genera and 56 species. New World Asiracini and Ugyopini (*sensu* Emeljanov 1996) are in particular need of revision, and will undoubtedly add to this total.

The Platysystatini and Tetrasteirini are superficially quite similar, with all taxa small in size, with a body vestiture of hairs, the cuticle with fine punctures or ridges, the forewings medially inflected near the nodal line, and the hindwings deeply lobed. The tribes differ most evidently in that the Platysystatini have their head broader than the pronotum, a very short vertex that is carinate at the fastigium, a frons that is broadly rounded laterally, the median carinae of the mesonotum is present, and the intermediate carinae is serpentine. In the Tetrasteirini, the head is narrower than the prothorax, the vertex is longer and lacks the transverse carina at the fastigium, the frons is only slightly rounded laterally, the median carina of the mesonotum is absent, and the intermediate mesonotal

carinae are posteriorly diverging. It remains to be seen if these features will hold up to scrutiny as additional taxa are discovered.

Species of both tribes have been seldom taken by collectors. Of the 5 previously described species, only 1 was known from more than 3 specimens. While this may be an artifact of these taxa being small, unprepossessing, and/or missed by non-specialists, it may be that cryptic habits contribute to their apparent rarity. In Ecuador canopy fogging samples, ~2,880 specimens of *Tetrasteira vulgaris* and 69 specimens of *Pentasteira albifrons* have been obtained so far, with many specimens available from both sites and from all three seasons (dry, wet and transitional). The larger number of specimens available from the Onkone Gare site of these taxa is likely the result of there being ~900 available fogging samples from Onkone Gare versus ~300 from Tiputini. In contrast, the junior author (CRB), a specialist cogniscent of these taxa, obtained only a single specimen of *Tetrasteira vulgaris* at Yasuni National Park in Ecuador (which borders Tiputini) in May to June 2005, collecting mostly by sweeping and at lights. This suggests that taxa from these tribes are canopy dwellers with weak or no seasonality, either as feeders on tree foliage or perhaps more likely on canopy epiphytes. Among delphacids, this is remarkable because most taxa are grass or sedge feeders (see Wilson et al. 1994). Outside of *Tetrasteira* and *Pentasteira* (and a single *Equasystatus*), the only other delphacid taxon to be found in any numbers in the canopy fogging samples are the Ugyopini (s.s.), which are modestly common (a few dozen specimens representing several taxa). A small number of Delphacinae have been observed, although these are probably transients since Delphacinae are largely grass or sedge feeders. The biology and host relations of the Ugyopini are largely unknown, although specimens are not uncommon in collections.

While the hosts and biology of the species described here remain unclear, it is evident that they are unusual with respect to other delphacid taxa. It seems likely that additional taxa of Tetrasteirini and Platysystatini would be found in canopy samples at other localities, and perhaps taxa heretofore known only from a few specimens will be found in abundance in this manner. While the plesiomorphic hosts and habits of primitive delphacids remain unknown, the arboreal habits of *Pentasteira* and *Tetrasteira* are more likely to represent habits and hosts derived within these lineages than plesiomorphic traits of Delphacidae. The primitive habits of delphacids, if they are to be found, might more likely be discovered in more generalized-appearing taxa such as *Ugyops*.

## 5. Acknowledgements

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