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# *Astatometopon sakakibarai* gen. & sp. nov., a montane planthopper from Chile (Hemiptera: Fulgoroidea: Delphacidae)

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**Abstract.** *Astatometopon* gen. nov. is described to accommodate *A. sakakibarai* sp. nov., a delphacid planthopper distributed in the Nahuelbuta and Andes mountain ranges in the central and south central zones of Chile. The new taxon is placed into Delphacini but it presents some unusual features for the tribe, such as a strongly asymmetrical phallus with a porrect process arising from base, the absence of teeth on the hind margin of calcar, and an exceptional variation in carination of the eumetope.

**Resumen.** *Astatometopon* gen. nov. es descrito para acomodar a *A. sakakibarai* sp. nov., un delfácido distribuido en las cordilleras de Nahuelbuta y los Andes en las zonas centro y centro sur de Chile. El taxón es clasificado en Delphacini pero presenta características inusuales para la tribu, como un falo fuertemente asimétrico con un proceso porrecto erigido desde la base, la ausencia de dientes en el margen posterior del calcar, y una variación excepcional en la carenación de la eumetopa.

**Key words.** Auchenorrhyncha, Fulgoromorpha, Delphacidae, Delphacini, taxonomy, Andean Region, South America

## Introduction

The family Delphacidae Leach, 1815 is a species-rich group of planthoppers (Hemiptera: Fulgoroidea) characterized by the presence of a movable spur (calcar) at the apex of the hind tibia. Most of its members are grass feeders and it is the most economically important family within the Fulgoroidea (Urban et al. 2010). The literature on South American Delphacidae (and particularly the most diverse tribe Delphacini) is sparse, lacking an overview as in Bartlett et al. (2014) for North America. Most of recent research has been restricted to Argentina, and particularly focused on taxa of economical concern

(e.g. Remes Lenicov & Virla 1999, Remes Lenicov & Varela 2014). However, resources such as FLOW (Bourgoin 2017) and the Delphacid planthoppers of North America (Bartlett 2014, which also provides information for the rest of the New World) are useful tools for facilitating study on this group.

In Chile, the first contributions addressing the family were published by Spinola (1852) in Gay's "*Historia Física y Política de Chile*". However, most taxa were described by Muir (1927, 1929) and later by Fennah (1955, 1957, 1965, 1969) who revised *Idiosystatus* Berg, 1883 and the delphacids from the Juan Fernández Islands. Recent publications include faunistic contributions (Remes Lenicov & Rioja 2007; Campodonico 2015, 2017), revisions of some taxa represented in the country (Gonzon & Bartlett 2007, Asche & Emeljanov 2016), and studies on the biology of the corn planthopper, *Peregrinus maidis* (Ashmead, 1890) (Rioja et al. 2006, 2010).

In general, the taxonomy and diversity of Delphacidae is insufficiently known in the Andean Region and most of the Neotropical Region (sensu Morrone 2014, 2015); many taxa, some of them described nearly a century ago, remain enigmatic or taxonomically obscure (Asche & Emeljanov 2016). A typical case is the situation of several species currently assigned to *Delphacodes* Fieber, 1866 which deserve reclassification (Bartlett 2014).

Recent collecting and surveys in entomological collections have resulted in findings of new data on Chilean Delphacidae. The purpose of this contribution is to describe a new genus and species of the tribe Delphacini from Chile.

## Materials and methods

The morphological terminology mainly follows Asche (1985) with the following modifications: phallus is used for the male intromittent organ, segment X is used instead of anal tube, segment XI instead of anal style, styles instead of parameres, and using the terminology proposed in Anufriev & Emeljanov (1988) for the head, Bourgoin (1993) for the female genitalia, and Bourgoin et al. (2015) for the wing venation. For observation of genitalia, the abdomen was removed and placed in saturated KOH solution at room temperature for about 24 hours. Pieces were stored in glycerin in microvials pinned below the respective specimens. Photographs of specimens were taken with a conventional digital camera adapted to a stereoscopic (Figs 1–11, 14–15, 27) or a compound optical microscope (Figs 16–26, 28–32). Measurements are given in millimeters; mean, minimum, maximum and number of measured specimens are given for body length (not considering wings and postgenital segments), total length (including wings), and body width (at level of tegulae).

The type material is deposited in the following collections:

JCSC Juan F. Campodonico collection, Santiago, Chile;
MEUC Museo Entomológico, Universidad de Chile, Santiago, Chile;
MLPA Museo de la Plata, La Plata, Argentina;
MNNC Museo Nacional de Historia Natural, Santiago, Chile;
NMPC National Museum, Prague, Czech Republic;
UDCC University of Delaware Insect Research Collection, Newark, DE, USA.

## Taxonomy

### *Astatometopon* gen. nov.

(Figs 1–32)

**Type species.** *Astatometopon sakakibarai* sp. nov., here designated.

**Description.** ***General body shape*** (Figs 1–5) oblong, slightly more than twice longer than wide.

***Head*** (Figs 1–11) wider than or subequal in width to pronotum. Macrocoryphe (Figs 1–2, 4–5) quadrangular, wider than long; apex rounded; anterior side and posterior margin almost equal in width; posterior margin, in dorsal view, medially positioned at anterior half of eyes; coryphe composed by two pentagonal cells enclosed by carinae. Fastigium (Fig. 3) smoothly curved. Superior side of eumetope (Figs 6–11) wider than its inferior margin; carinae of metope fading on fastigium, then subparallel and converging on lower margin of eumetope; carinae sometimes weak, absent, or reduced to a single carina. Clypeus (Figs 6–11) tricarinate. Rostrum reaching mesocoxae. Antennae (Figs 6–11) with scape shorter than pedicel.

***Thorax*** (Figs 1–5). Pronotum (Figs 1–2, 4–5) subtrapezoidal, wider posteriorly; posterior margin bisinuate; median carina distinct; lateral carinae curved laterally behind eyes, not reaching posterior margin. Mesonotum (Figs 1–2, 4–5) with median and lateral carinae distinct; median carinae fading at scutellum; scutellum transversely striated.

***Legs.*** Metatibiae (Figs 14–15) with one lateral tooth near tibiofemoral articulation and another one near middle of its length. Calcar (Fig. 14) without teeth on its hind margin.

***Male abdomen.*** Sternum I (Fig. 16) with apodemes short and directed dorsocaudad. Pygofer (Figs 17–18), in lateral view, higher than long; opening with no ventral processes; diaphragm strong, with armature. Segment X (Figs 19–21) wider than long, with pair of posteroventral processes. Segment XI (Figs 19–21) longer than segment X. Phallus (Figs 21–24) asymmetrical, with conspicuous porrect process arising from base. Suspensorium (Figs 21–24) ring-like, projected caudally over phallus. Styles (Figs 25–26) short, not surpassing height of diaphragm, narrowed at apex.

**Differential diagnosis.** See discussion.

**Etymology.** Combination of the Greek words αστατος (= *astatos*, inconstant) and μέτωπον (= *metopon*, forehead) in reference to the inconstant carination of the metope in the eumetope. Gender neuter.

### *Astatometopon sakakibarai* sp. nov.

(Figs 1–32)

**Type locality.** Chile, Malleco prov., Nahuelbuta Mts., Vegas Blancas, Los Corrales, 37°48′S, 72° 56′W, 950 m a.s.l.

**Type material.** Holotype: ♂ (brachypterous), "**CHILE**, [**Araucanía reg.**] **Malleco prov.**, / Nahuelbuta, Vegas Blancas, / Los Corrales, 37°48'S. 72° / 56'W., 950 m., 25-26.I.2017, / J.F. Campodonico leg., / sweep netting // HOLOTYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC). Paratypes: 9 ♂♂ 6 ♀♀, same data as holotype, except for "PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC: 1 ♂ 1 ♀ brachypterous, 1 ♂ macropterous and 1 ♀ submacropterous; MEUC: 1 ♂ 1 ♀ brachypterous; MLPA: 1 ♂ 1 ♀ brachypterous; UDCC: 1 ♂ 1 ♀ brachypterous, 1 ♂ macropterous; JCSC: 2 ♂♂ 1 ♀ brachypterous, 1 ♂ macropterous); 1 ♂ (brachypterous) "**CHILE**, [**Araucanía reg.**] **Malleco prov.**, / Nahuelbuta,Vegas Blancas, / 37°50'S. 72°57'W., 1150 m., / 24-25.I.2017, / J.F. Campodonico leg., / sweep netting // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (JCSC); 2 ♂♂ 1 ♀, "**CHILE**, [**Araucanía reg.**] **Malleco prov.**, / Nahuelbuta, ~8 km W Angol,

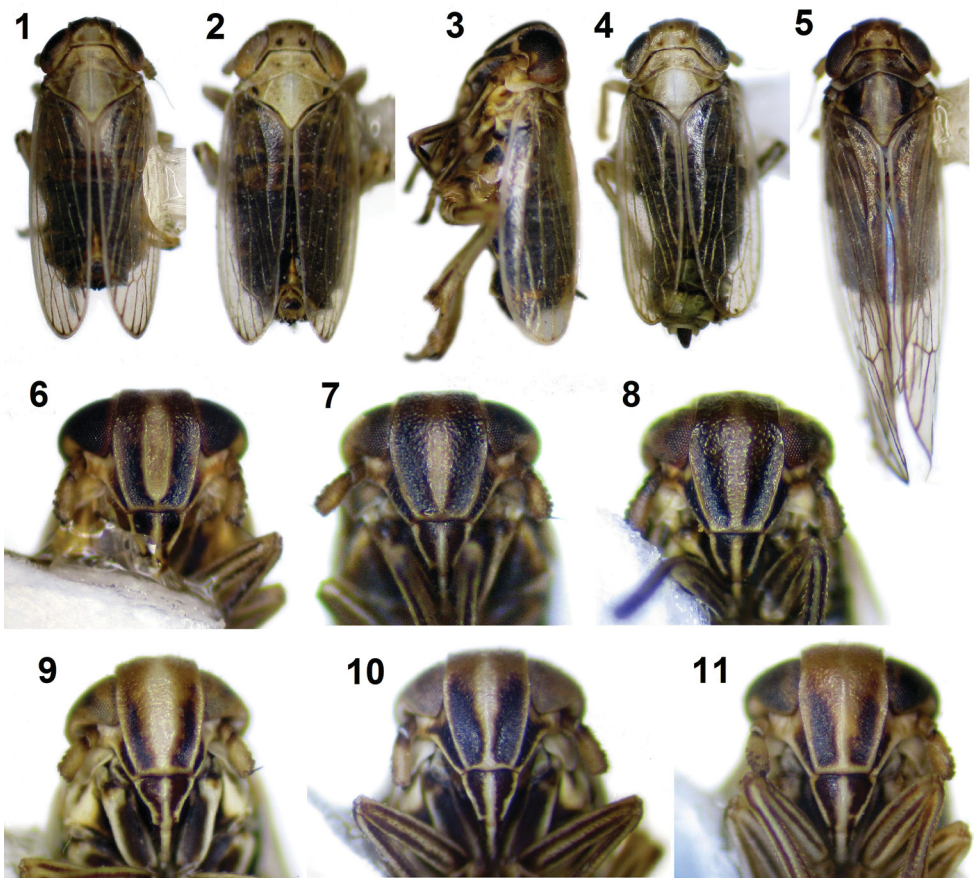
/ 37°49'S. 72°48'W., 850 m., / 26.I.2017, / J.F. Campodonico leg., / sweep netting // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC: 1 ♂ brachypterous; JCSC: 1 ♂ brachypterous 1 ♀ macropterous); 2 ♂♂ (brachypterous and macropterous) 1 ♀ (macropterous), "**CHILE**: **IX. La Araucanía Region** [**Malleco Province**] / PN Nahuelbuta, Pehuenco 26- / 29.xi.2013, campsite CH12b / 37°49.8'S 73°0.4'W; 1125 m / Fikáček, Kment & Vondráček lgt. // margins of *Nothophagus* [sic] forest / and secondary grassland, swee- / ping of vegetation // Collectio / National Museum / Praha, Czech Republic // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (NMPC); 2 ♂♂ 1 ♀ (brachypterous), "**CHILE** / Nahuelbuta/ [**reg. Araucanía**] **prov. Malleco** / 14-XII-1992 / Leg. J.E. Barriga // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC); 1 ♂ (brachypterous) 1 ♀ (macropterous), "**CHILE** / Nahuelbuta/ [**reg. Araucanía**] **prov. Malleco** / 2-II-1993 / Leg. J.E. Barriga // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC); 1 ♀ (brachypterous), "**CHILE** / [**reg. Araucanía**] **prov. Malleco** / Paso Pino / Hachado / 14 dic. 1994 [14-XII-1992] / Leg. JE. Barriga // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC); 2 ♂♂ 8 ♀♀ (brachypterous), "**CHILE**, [**Bío Bío reg.**] **Arauco prov.**, / Nahuelbuta, Caramavida, / 37°48'S. 73°05'W., 1000 m., / 8-9.X.2016, / J.F. Campodonico leg., / sweep netting // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC: 1 ♂ 4 ♀♀; JCSC: 1 ♂ 4 ♀♀); 3 ♂♂ 3 ♀♀ (brachypterous), "**CHILE**/ **Región del Bío Bío** / **Prov. Ñuble** / Los Sauces / 11.I.2015 / Leg. Campodonico // Chile / 36°37'S. / 71°14'W. / 1300-2000 m. / Arrastre de red // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (MNNC: 1 ♂ 1 ♀, JCSC: 1 ♂ 1 ♀; UDCC: 1 ♂ 1 ♀); 2 ♂♂ 1 ♀ (brachypterous), "**CHILE**, **O'Higgins reg.**, / **Cachapoal prov.**, Coya, / Cajón del río Las leñas / 34°24'S. 70°12'W. 2130 m. / 10.II.2016 / Leg. J.F. Campodonico // PARATYPE / *Astatometopon* / *sakakibarai* / Campodonico, 2017" (JCSC).

**Description.** ***Measurements.*** Body length (excluding wings): male 2.2 (2.2–2.3; N=5); female 2.5 (2.4–2.7; N=5). Total length (including wings): brachypterous male 2.5 (2.4–2.7; N=5); brachypterous female 2.7 (2.5–2.9; N=5); submacropterous female 3.3 (N=1); macropterous male 3.9 (3.7–4.2; N=3); macropterous female 3.9 (3.8–3.9; N=2). Body width: male 0.8 (0.8–0.9; N=5); female 0.9 (0.8–0.9; N=5).

***Coloration*** (Figs 1–11). Dorsal side of head and thorax fulvous to brown (dark brown to blackish in macropterous specimens), medially paler; foveolae of head and pronotum and pair of lateral markings on mesonotum dark (brown to black). Ventral side of head and inferior side of genae dark brown (usually blackish in macropterous specimens), carinae of eumetope and clypeus, and median fringe of eumetope (intercarinal space) pale. Legs fulvous to brown with dark longitudinal stripes. Forewings with brown tonalities, slightly darkened at end of veins and in clavus (the last feature in macropterous specimens), veins brownish, margin (including costa) whitish. Abdomen dark brown to black with lighter parts medially and laterally (orange in males and light brown in females).

***Head*** (Figs 1–11). Macrocoryphe with length of about three fifths of basal width; basal width inconspicuously narrower than anterior one, about two fifths of total head width; cells of coryphe and areolet with rounded foveolae. Eyes (Fig. 3), in lateral view, oblong, height of about five sevenths of length, notch slightly surpassing inferior third of its height. Ocelli (Fig. 3) adjacent to eyes. Genae (Figs 3, 6–11) bearing row of thin setae. Eumetope (Figs 6–11) rough, with maximum width in second fifth from superior side, about three fourths of its length; a median fringe normally enclosed (Fig. 6) by paired carinae (meeting near frontoclypeal suture), paired carinae sometimes absent (Figs 7–9), eventually reduced to single carina (Figs 10–11); paired or single median carinae fading at fastigium. Clypeus (Figs 6–11) with basal width of about two thirds of its length. Rostrum with last segment the widest. Antennae with pedicel nearly twice longer than scape.

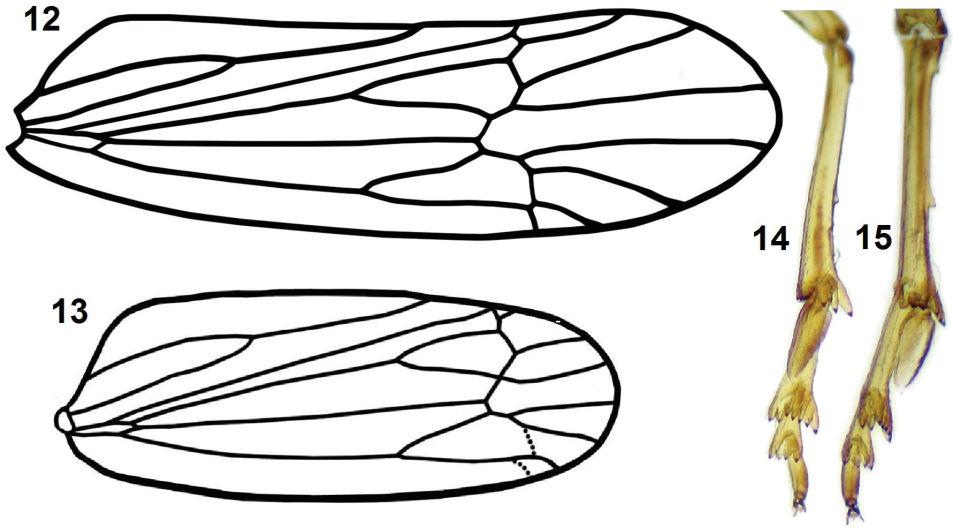
***Thorax*** (Figs 1–2, 4–5). Pronotum (Figs 1–2, 4–5) with pair of rounded foveolae on disc; anterior margin straight, width of about two fifths of posterior width; posterior margin bisi-




Figs 1–11. *Astatometopon sakakibarai* sp. nov. 1–2 – brachypterous male, habitus, dorsal view; 3 – brachypterous male, habitus, lateral view; 4 – brachypterous female, habitus, dorsal view; 5 – macropterous male, habitus, dorsal view; 6–11 – anterior part of body, ventrocranial view (6, 10 – male; 7–9, 11 – female).

nuate, medially broadly concave; median length of about fifth of posterior width; posterior width slightly narrower than head. Mesonotum (Figs 1–2, 4–5) with length from posterior margin of pronotum to its apex of about four sevenths of its width. Tegulae short.

***Wings*** (Figs 1–5, 12–13). Forewings of brachypterous specimens surpassing abdomen in males, rarely in females (Figs 1–4). Venation (Figs 12–13) with nodal line in apical third; vein ScP+R branched into ScP+RA and RP; ScP+RA frequently unbranched in brachypterous specimens (Fig. 13, dotted line); RP unbranched but fused for short distance with MP, then separated; *ir* crossvein little distad of fusion of RP and MP, enclosing outer subapical cell, frequently absent in brachypterous specimens (Fig. 13, dotted line); MP normally unbranched; crossvein *m-cu* little basad of fusion of RP with MP and little basad or at level of branching of $CuA_1$; CuA branched near level of fork of ScP+RA; vein $CuA_1$ branched; crossvein between

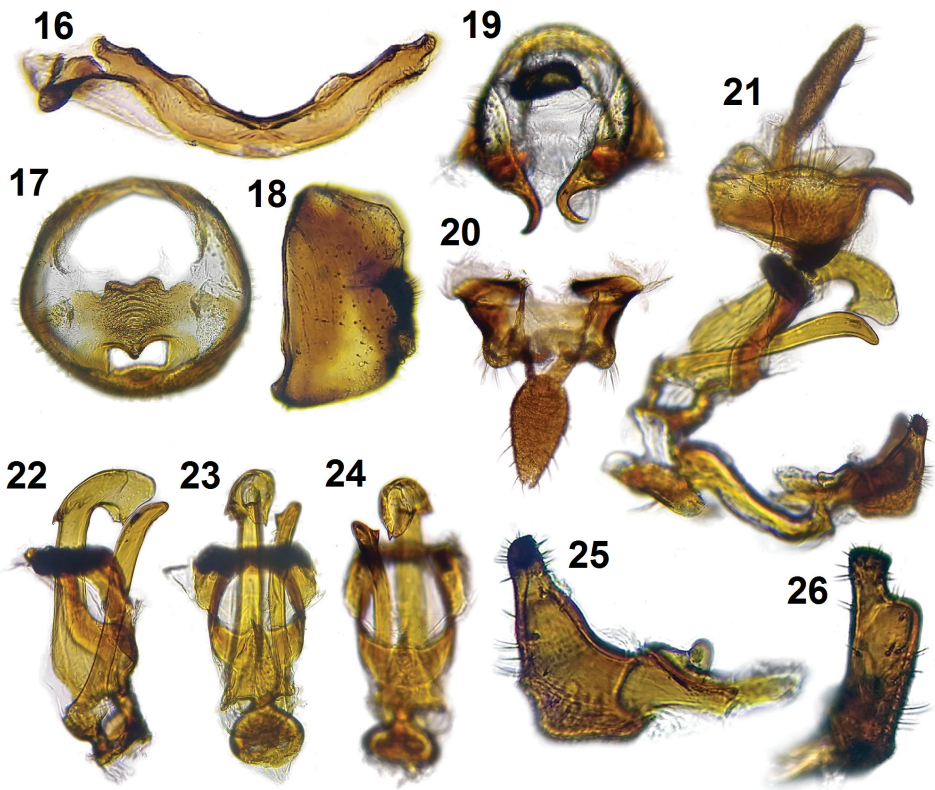



Figs 12–15. *Astatometopon sakakibarai* sp. nov. 12 – forewing of a macropterous specimen; 13 – forewing of a brachypterous specimen; 14 – hind leg, outer view; 15 – hind leg, inner view.

$CuA_{1b}$ and $CuA_2$, little basad or at level of crossvein between $CuA_2$ and CuP (*icu*), enclosing inner subapical cell; sometimes (in brachypterous specimens) $CuA_2$ ending at end of CuP.

***Legs*** (Figs 14–15). Apex of metatibiae (Figs 14–15) with three outer and two inner teeth; teeth larger to smaller from outermost to innermost, outermost tooth more separated from others; inner teeth smaller than outer teeth, of about same length, in form of truncate lobes with apiculum (Fig. 15); lobe produced innermost of apex of tibiae reaching level of inner teeth (Fig. 15). Calcar (Fig. 14) greater than two thirds of length of metabasitarsus; fore margin basally angled, then smoothly curved; hind margin curved near apex and base; apical tooth present, usually reduced. Metabasitarsi (Fig. 14) near half of length of metatibiae; apex with five outer and two inner teeth; outer teeth slightly and gradually reducing its size from outer- to innermost; inner teeth of about same size, positioned distad of outer teeth. Second metatarsomere (Fig. 14) about half as long as metabasitarsus; apex with four teeth in regular row.

***Male abdomen.*** Sternum I (Fig. 16) with apodemes as short obtuse lobes. Pygofer (Figs 17–18) about twice higher than long in lateral view (Fig. 18); dorsal concavity of posterior margin broad and surpassing middle length of dorsal surface (in dorsal view); median irregular ridge on diaphragm; armature of diaphragm as concave projection, near level of middle of pygofer height; median ridge produced ventrad and acutely onto foramen; foramen small, with ventral margin convex. Segment X (Figs 19–21) short; in dorsal view (Fig. 20) subtrapezoidal, posterior width of about two thirds of basal width; length of about third of basal width (Fig. 20) and two thirds of height (in lateral view, Fig. 21), ventrally not sclerotized; pair of caudoventral spines initially converging, then diverging laterad (Fig. 19). Segment XI (Figs 19–21) with shaft of about four thirds of length of segment X. Phallus (Figs 21–24)




Figs 16–26. *Astatometopon sakakibarai* sp. nov., male. 16 – sternum I, cranial view; 17 – pygofer, caudal view; 18 – pygofer, lateral view; 19 – segment X, caudal view; 20 – segment X, dorsal view; 21 – phallic complex, lateral view; 22 – phallus, lateral view; 23 – phallus, dorsal view; 24 – phallus, ventral view; 25 – style, lateral view; 26 – style, caudal view.

with suspensorium projected beyond middle of its length; basal process slightly shorter and at side (left) of main limb, slightly inclined ventrad, distally slightly curved laterad, with tooth on inner side near apex; main limb basally abruptly curved dorsocaudad, then straight up to apex where it is abruptly curved ventrad; apex widened after curvature with gonopore opened laterally (on right), inner margin of apex slightly produced craniad; row of teeth running caudocraniad from lateral side at beginning of apical curvature. Styles (Figs 21, 25–26) short, in caudal view reaching about height of middle of diaphragm, narrowed from outer side in last fourth (Fig. 25); in lateral view (Fig. 26) wide, narrowing dorsad.

***Female abdomen.*** Segment X (Fig. 27) slightly wider basally; length of about two thirds of basal width; slightly higher than long; ventral surface longer than dorsal surface, with posterior margin slightly concave. Segment XI (Fig. 27) longer than segment X. Gonoplacs (Fig. 28) six times longer than wide; apex rounded; dorsal margin entire on distal two thirds.


Figs 27–32. *Astatometopon sakakibarai* sp. nov., female. 27 – abdomen, ventral view; 28 – gonoplac; 29 – gonapophysis IX; 30 – gonapophysis VIII; 31 – detail of gonapophysis VIII; 32 – gonocoxa VIII.

Gonapophyses IX (Fig. 29) serrated caudad in distal three fifths; with about 30 teeth, abruptly reduced and indistinct at apex. Gonapophyses VIII (Figs 30–31) longitudinally wrinkled; wrinkles turning onto transverse striae at apex. Gonocoxa VIII (Fig. 32) about four times longer than wide; basal angle sharply acute.

**Etymology.** This species is named after entomologist Albino M. Sakakibara.

**Host plant.** Unknown. The type series was collected in herbaceous stratum in open habitats; in Los Corrales, Caramavida, near Angol and Los Sauces it was dominated by tufted grasses.

**Distribution.** Chile: O'Higgins, Bío Bío and Araucanía regions in the Andes and Nahuelbuta mountain ranges.

## Discussion

The variation in the carination of the eumetope in *Astatometopon sakakibarai* sp. nov. is an exceptional feature among Delphacidae. The infrequent single carination which is clear only in one male and one female from Los Sauces and one male from Cajón del río Las Leñas (Figs 10–11) seems to be the basic condition: the median carina is commonly broade-

ned (Figs 6–9) letting a pale fringe which is normally coarsened at sides taking the form of paired carinae (Fig. 6).

The tribal placement of *Astatometopon* gen. nov. in Delphacini is supported by the articulation between suspensorium and segment X (Fig. 21) and the apodemes of sternum I (even though reduced) directed dorsocaudad (Fig. 16) (Asche 1990). Additionaly, features typical to some Delphacini such as the diaphragm of the pygofer bearing armature and the symmetrical processes of the segment X are also present in *Astatometopon*. The new taxon, however, shows also some similarities with Tropidocephalini, particularly the asymmetrical phallus and the calcar devoid of teeth on hind margin; these features are considered convergences.

*Astatometopon* gen. nov. shares several features with the Afrotropical genus *Leptoeurysa* Fennah, 1988: the head width in relation to pronotum, short apodemes of sternum I, segment X with two spinose processes, rather long segment XI, bifid phallus and short styles narrowed at apex (see Fennah 1988). The relationships between these two taxa, and possible biogeographical implications, would deserve a further study.

*Astatometopon sakakibarai* sp. nov. inhabits montane habitats; it seems to present a disjoint distribution in the Coastal and Andes mountain ranges. This would be a typical case of a taxon once distributed at lower altitudes during the glacial period, but currently with isolated populations (Villagrán 2001).

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## References

ANUFRIEV G. A. & EMELJANOV A. F. 1988: Podotryad Cicadinea (Auchenorrhyncha). [Suborder Cicadinea (Auchenorrhyncha)]. Pp. 12–495. In: LER P. A. (ed.): *Opredelitel' nasekomykh Dal'nego Vostoka SSSR v shesti tomakh. Tom 2. Ravnokrylye i poluzhestkokrylye.* [*Keys to the insects of the Far East of the USSR in six volumes. Volume II Homoptera and Heteroptera*]. Nauka, Leningrad, 972 pp (in Russian).

ASCHE M. 1985: Zur Phylogenie der Delphacidae Leach, 1815 (Homoptera: Cicadina: Fulgoromorpha). *Marburger Entomologische Publikationen* **2**: 1–910.

ASCHE M. 1990: Vizcayinae, a new subfamily of Delphacidae with revision of Vizcaya Muir (Homoptera: Fulgoroidea) – a significant phylogenetic link. *Bishop Museum Occasional Papers* **30**: 154–187.

ASCHE M. & EMELJANOV A. F. 2016: Review of the Neotropical genus Sparnia Stål (Hemiptera, Fulgoroidea: Delphacidae). *Entomological Review* **96**: 1209–1233.

BARTLETT C. R. 2014: *Delphacid planthoppers of North America.* University of Delaware, College of Agriculture & Natural Resources, Newark, Delaware, USA. Available online: http://ag.udel.edu/enwc/research/delphacid/index.html (accessed on 30 April 2017).

BARTLETT C. R., O'BRIEN L. B. & WILSON S. W. 2014: A review of the planthoppers (Hemiptera: Fulgoroidea) of the United States. *Memoirs of the American Entomological Society* **50**: 1–287.

BOURGOIN T. 1993: Female genitalia in Hemiptera Fulgoromorpha, morphological and phylogenetical data. *Annales de la Société Entomologique de France (Nouvelle Série)* **29**: 225–244.

BOURGOIN T. 2017: *FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha. Version 8*. Available online: http://hemiptera-databases.org/flow (accessed on 4 April 2017).

BOURGOIN T., WANG R. R., ASCHE M., HOCH H., SOULIER-PERKINS A., STROINSKI A., YAP S. & SZWEDO J. 2015: From micropterism to hyperpterism: recognition strategy and standardized homology-driven terminology of the forewing venation patterns in planthoppers (Hemiptera: Fulgoromorpha). *Zoomorphology* **134**: 63–77.

CAMPODONICO J. F. 2015: Sobre la distribución de Dicranotropis acheron Fennah, 1957 (Hemiptera: Fulgoroidea: Delphacidae) en Chile. *Arquivos Entomolóxicos* **14**: 265–268.

CAMPODONICO J. F. 2017: New distributional records of Delphacidae (Hemiptera: Fulgoroidea) from Chile. *Arquivos Entomolóxicos* **17**: 119–128.

FENNAH R. G. 1955: Delphacidae from Juan Fernandez (Homoptera: Fulgoroidea). *Proceedings of the Royal Entomological Society of London* **24**: 129–138.

FENNAH R. G. 1957: Los insectos de las Islas Juan Fernández 29. Fulgoroidea. *Revista Chilena de Entomología* **5**: 375–384.

FENNAH R. G. 1965: Fulgoroidea from Southern Chile (Hemiptera). *Bulletin of the British Museum (Natural History), Entomology* **17**: 233–272.

FENNAH R. G. 1969: A revision of Idiosystatus Berg (Homoptera: Fulgoroidea, Delphacidae). *Proceedings of the Royal Entomological Society of London* **38**: 47–52.

FENNAH R. G. 1988: New or little-known tropidocephaline and delphacine Delphacidae (Homoptera: Fulgoroidea) from Central and Southern Africa. *Revue de Zoologie Africaine* **102**: 391–409.

GONZON A. T. & BARTLETT C. R. 2007: Systematics of Hadropygos ng, Metadelphax Wagner and New World Toya Distant (Hemiptera: Delphacidae). *Transactions of the American Entomological Society* **133**: 205–277.

MORRONE J. J. 2014: Biogeographical regionalisation of the Neotropical region. *Zootaxa* **3782**: 1–110.

MORRONE J. J. 2015: Biogeographical regionalisation of the Andean region. *Zootaxa* **3936**: 207–236.

MUIR F. 1927: A new species of Sparnia Stål, from South Chile (Delphacidae, Homoptera). *Annals and Magazine of Natural History, Series 9* **20**: 296–297.

MUIR F. 1929: New and little-known South-American Delphacidae (Homoptera, Fulgoroidea) in the collection of the British Museum. *Annals and Magazine of Natural History, Series 10* **3**: 75–85.

REMES LENICOV A. M. M. & RIOJA T. C. 2007: Presencia de Toya argentinensis (Muir, 1929) (Hemiptera: Auchenorrhyncha: Delphacidae) en el Valle de Azapa, Región de Arica y Parinacota, Chile. *Acta Entomológica Chilena* **31**: 11–14.

REMES LENICOV A. M. M. & VARELA G. 2014: A new genus and species of Delphacini (Hemiptera: Fulgoroidea: Delphacidae) from Argentina. *Zootaxa* **3861**: 177–184.

REMES LENICOV A. M. M. & VIRLA E. G. 1999: Delfácidos asociados al cultivo de maíz en la República Argentina (Insecta-Homoptera-Delphacidae*). Revista de la Facultad de Agronomía, La Plata* **104**: 1–15.

RIOJA T. C., VARGAS H. E. & BOBADILLA D. E. 2006: Biología y enemigos naturales de Peregrinus maidis (Ashmead) (Hemiptera: Delphacidae) en el valle de Azapa. *Idesia* **24**: 41–48.

RIOJA T. C., VARGAS H. E. & BOBADILLA D. E. 2010: Observaciones sobre la fertilidad diferencial de dos morfotipos alares en Peregrinus maidis (Ashmead) (Hemiptera: Delphacidae) en condiciones de laboratorio. *Idesia* **28**: 89–95.

SPINOLA M. 1852: Tribu IV. Hipocephalocera. Pp. 238–305. In: GAY C.: *Historia Física y Política de Chile. Zoología. Tomo VII*. Maulde et Renou, Paris, France, 471 pp.

URBAN J. M., BARTLETT C. R. & CRYAN J. R. 2010: Evolution of Delphacidae (Hemiptera: Fulgoroidea): combined-evidence phylogenetics reveals importance of grass host shifts. *Systematic Entomology* **35**: 678–691.

VILLAGRÁN C. 2001: Un modelo de la historia de la vegetación de la Cordillera de La Costa de Chile central-sur: la hipótesis glacial de Darwin. *Revista Chilena de Historia Natural* **74**: 793–803.