

SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

A New Species of *Saccharosydne* Kirkaldy from Argentina (Hemiptera: Delphacidae)

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ABSTRACT - *Saccharosydne* is the most diverse genus of the tribe Saccharosydmini. Male, female and nymphal *Saccharosydne* have been captured in recent collections from garlic (*Allium sativum*), rye (*Secale cereale*) and pampas grass (*Cortaderia* spp.) in Argentina. In this contribution, we describe and illustrate a new species *S. subandina* sp. nov., adding information on the geographical distribution and host plants. *Saccharosydne subandina* can be distinguished from its congeners by the following combination of features: uniformly light green-yellowish color with a distinctive rounded black macula on both genae; vertex 1.5x longer than wide, and projecting beyond eyes almost one half of its length; parameres divergent with internal and external angles acute; and dorsolateral angles of pygofer produced caudad. A key for species identification based on male genitalia and external morphology, is provided.

KEY WORDS: Fulgoromorpha, taxonomy, host plant, distribution

The Saccharosydmini (Delphacinae) includes the primarily Neotropical genera *Neomalaxa* Muir (one species, *N. flava*), *Pseudomacrorupha* Muir (one species, *P. wagneri*) and *Saccharosydne* Kirkaldy (seven species) Asche (1985). The tribal diagnostic characteristics include the presence of seven (2+5) post-tibial distal spines, the hind wings with M and Cu fused almost all of its length and the distal anal vein not forked (convergence with most Delphacinae: Tropidocephalini).

The genus *Saccharosydne* is distinguished mainly by the slender and elongated forms; head much narrower than pronotum, and angular in profile; vertex extended before eyes; median carina forked on vertex; and pronotum with lateral carinae reaching posterior margin. The male terminalia with aedeagus well developed, represented by a caudally directed process and an elongate long tube coiled within pygofer anteriorly directed; pygofer subcylindrical; parameres dorsocaudally directed; the lack of processes on the anal segment and the anal style elongate. The genus is represented in the Neotropical region by six species: *S. brevisrostris* (Muir), *S. gracillis* (Muir), *S. ornatipennis* (Muir), *S. rostifrons* (Crawford), *S. saccharivora* (Westwood) and *S. viridis* (Muir) (Metcalf 1943, Asche 1985, Rossi Batiz & Remes Lenicov 2009).

Male, female and nymphs of *Saccharosydne* were recently collected from garlic (*Allium sativum*), rye (*Secale cereale*) and pampas grass (*Cortaderia* spp.) in Argentina. These specimens have morphological characteristics different from those of described *Saccharosydne*, thus we describe as a new species, *S. subandina* sp. nov., and provide information on its geographical distribution and biology. Given that

the species of this genus are insufficiently studied – the original descriptions for most of them are not fully adequate, we provide an identification key based on the external morphology and male genitalia to distinguish the new species from the previously described ones.

Material and Methods

Almost all adults studied were field collected on garlic in agricultural areas from Mendoza and San Juan provinces using water traps and sweep nets; others were hand captured on pampas grass and rye from several sites in Argentina. Both male and female genitalia of the specimens were prepared for microscopic examination according to standard taxonomic techniques (Remes Lenicov & Virla 1993); the dissected parts were stored in microvials with glycerin. Scanning electron microscopy was used to illustrate some male genital structures; specimens were fixed by soaking in formol for 48h, then dried and coated with 65-70 µm gold-palladium film. Measurements were taken for ten specimens with each sex reported independently, taken with an optical micrometer, in millimetres, followed by the range in parentheses.

Paratype specimens of *S. viridis*, *S. gracillis*, *S. brevisrostris* and *S. ornatipennis* from the British Museum Natural History collection were examined. Illustrations were drawn using a stereoscopic microscope with a camera lucida. We follow the Asche's (1985) terminology to describe the main morphological features of the male and female, especially the genital structures; we also follow Yang & Yang (1986) for the head terminology.

Abbreviations used are as follows: L., total length; B.L., body length; B.W., body width; t.l., tegmina length; t.w., tegmina width; v.m.l., vertex median length; v.w., vertex width at base; f.l., frons length; M.f.w., maximum frons width; c-l.l., clypeus-labrum length; m.c-l.w., maximum clypeus-labrum width; r.l., rostrum length; a.l.I, first antennal segment length; a.l.II, second antennal segment length; p.l., pronotum length; m.l., mesonotum length; m.w., mesonotum width; pfe.l., postfemur length; pti.l., posttibia length; pbas.l., postbasitarsus length; pta. II+III, posttarsomere II+III length; s.l., metatibial spur length.

The specimens studied were deposited in the Museo de La Plata collection, Buenos Aires, Argentina.

Results and Discussion

Genus *Saccharosydne* Kirkaldy 1907:39.

Genotype *Delphax saccharivora* Westwood 1833: 413 (by original designation).

Remarks. *Saccharosydne* was defined by Kirkaldy (1907) by its immaculate pale green colour and the nervation of tegmina, with Cu forked nearer to the base than R; Muir (1915) highlighted the following as diagnostic features: submedian carinae of vertex meeting together considerably before apex and continued onto frons as a single median carina, vertex –long and narrow– well produced beyond eyes; Y-shaped carina obsolete or absent. Muir & Giffard (1924) separated this genus and the monotypic *Neomalaxa* from all other Delphacidae by the male genitalia, in which the external aedeagus is reduced to a minute organ with a long thin internal portion.

Geographical distribution. The six species represented in the Neotropical region have been reported from Grenada (Westwood 1833), Ecuador, Brazil, Cuba, British Guiana (Muir 1926), Antigua, Barbados, Haiti, Jamaica, Puerto Rico, Dominican Republic, Trinidad, U.S.A. and Venezuela (Guagliumi 1953), Colombia (Gómez & Lastra Borja 1995) and Argentina (Rossi Batiz & Remes Lenicov 2009). Two other species are known from the Nearctic, Palearctic and Oriental regions: Japan, China, Russia (Metcalf 1943) and India (Arocha *et al* 2005).

Host plants. Mostly grasses are recorded as hosts of *Saccharosydne*: *S. brevisrostris* on a grass on shore of river from Napo, Ecuador (Muir 1926); *S. ornatipennis* on *Paspalum intermedium* from Rezende and Campinas, Brazil (Muir 1926); *S. gracilliss* surrounding rank grass on the sides of Corcovado, Rio de Janeiro, Brazil (Muir 1926); *S. viridis* on rice (*Oryza sativa*) and rice grass from Blairmont, British Guiana (Muir 1926); *S. procerus* on rice fields (Matsumura 1931) and in neighboring water-bamboo (*Zizania caduciflora*) habitats (XiaoPing *et al* 2005); *S. saccharivora* on sugarcane (*Saccharum officinarum*) (Westwood 1833, Guagliumi 1953), *Andropogon glomeratus* and *A. bicornis* (Caldwell & Martorell 1951, Metcalfe 1969) and *S. subandina* sp. nov. on garlic (*Allium sativum*) (Liliaceae), rye (*Secale cereale*) and pampas grass (*Cortaderia* spp.).

Saccharosydne subandina Remes Lenicov and Rossi Batiz (Figs 1-5)

Diagnosis. In size, body shape, proportion, wing venation and general coloration very similar to its congeners. Light green-yellowish with a distinctive rounded black macula on both genae and the apical portions of parameres and anal stylus, dark brown; head slightly rounded in profile, vertex projecting beyond eyes almost one half of its length. Male in lateral view with the dorsolateral angles of pygofer well produced; the parameres (genital styles) elongate, distally diverging in posterior view, narrow and closed to each other at base, and the apex with internal and external angles acute.

Holotype male

Coloration. Uniformly light green-yellowish, turning to yellow when dried or preserved in 70% alcohol, with a distinctive rounded black macula on both genae before the genal suture (oblique carinae), ocelli and an anterodorsally longitudinal black stripe on scape and pedicel of antennae; leg spinulation, spur teeth, claws, apical portions of parameres and anal stylus dark brown; eyes reddish.

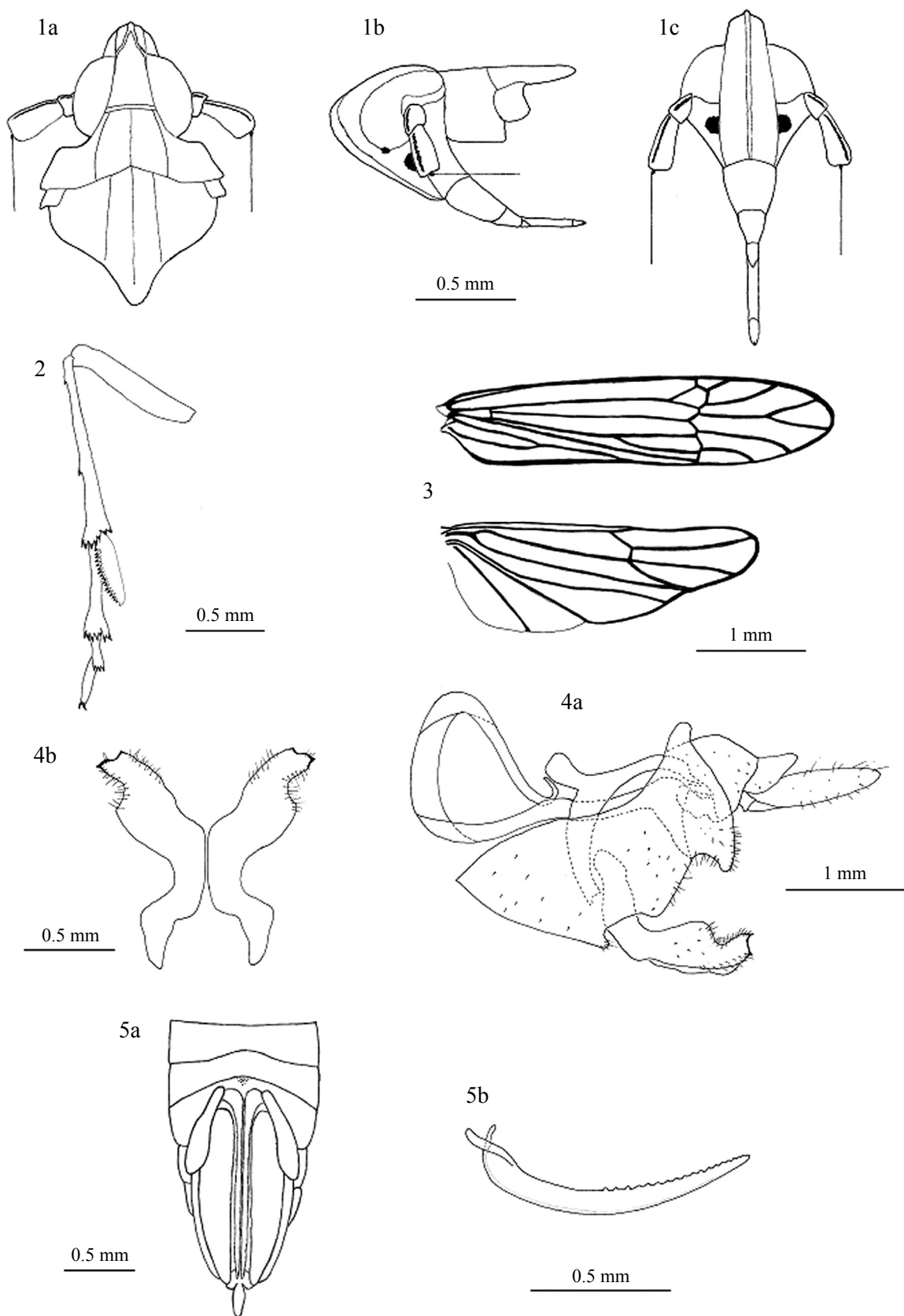
Structure. Slender elongated forms. L.: 4.50 mm; B.L.: 2.90 mm.

Head (Fig 1 a-c) with eyes narrower than pronotum, slightly rounded in profile; vertex medially longer than broad at base, lateral margins gradually converging towards fastigium, projecting beyond eyes almost one half of its length; area of basal compartment concave occupying approximately the basal third, submedian and lateral carinae well developed; stem and arms of Y-shaped carinae not always visible; median frontal carinae narrowly prominent in the inflexion region continued on frons as a well developed single percurrent median carina. Frons narrower at fastigium, longer than the width at apex. Clypeus longer than wide at base; clypeus plus labrum almost as long as frons. Rostrum attaining anterior margin of middle coxae; subapical segment much longer than the apical one. Compound eyes in lateral view elongate. Antennae attaining frontoclypeal suture; scape and pedicel subcylindrical, slightly widened at apex; scape about as long as broad; pedicel length 2x width and about 3x length of scape; number and arrangement of sensory fields of pedicel equals 8 or 9 in groups of three rows.

Pronotum medially shorter than length of vertex, tricarinate, lateral carinae attaining the deeply excavated hind margin; laterally elevated at level of the tegulae, lateral edges slightly expanded. Mesonotum shorter than vertex plus pronotum; almost as long as broad, tricarinate; lateral carinae not attaining hind margin; feeble median carinae obscure on slightly depressed scutellum (Fig 1).

Wings. Tegmina hyaline, slender with round apex, about 4x longer than maximum width. Hind wing with microtrichiae (Fig 3).

Legs (Fig 2). Posttibia longer than postfemur and postbasitarsus, with two spines on outer margin. Distal spines of posttibia with two inner and five outer spines (2+5). Posttibial spur leaf-like with a longitudinal submedian rib; shorter than length of posttarsomere II+III; spur bearing 18-22 teeth (including apical tooth) on hind margin. Postbasitarsus



Figs 1-5 *Saccharosydne subandina* sp. nov.; 1, Head in dorsal (a), lateral (b) and frontal views (c); 2, Leg III; 3, Wings; 4, Male terminalia, lateral view (a), parameres, posterior view (b); 5, Female terminalia, ventral view (a), valvulae II, lateral view (b).

longer than 2nd and 3rd hindtarsal segments together, apical spinulation of postbasitarsus: 8 (2+6), 2nd segment 4.

Abdomen with 11 distinguishable segments.

Male drumming organ. Second abdominal tergite of male drumming organ with a distinctly sclerotized, separated central plate.

Terminalia (Fig 4 a,b). Pygofer subcylindrical; dorsally with deeply concave anal emargination reduced to a narrow rim attached to basal margin of tenth segment; in lateral view with dorsolateral angles well produced; ventral side much longer than dorsal one; medioventrally produced into a short rounded process; diaphragm with dorsal margin V-shaped and ventrally concave. Genital "chamber" elongate, tubular, connected with the phallobase throughout two lateral little projection. Phallobase closely connected with anal segment by a short mount-shape suspensorium, continuing with a well developed aedeagus. Aedeagus consisting of a curved spine, basally projecting as an elongate, slightly sclerotized elastic tube, coiled into pygofer, reaching 7th abdominal segment; phallosome apical. Parameres elongate, distally diverging, dorsocaudally directed; in posterior view, narrow and closely approximate at base, inner margin slightly sinuate, outer margin deeply excavated near apex, apically with acute internal and external angles; basally interconnected by a V-shaped transverse strut. Connective almost as long as the "chamber", Y shaped at base, broadly fused with the basal half of the "chamber". Anal segment (10th segment) collar-like, without posterior processes; 11th segment ventrally incomplete, anal stylus elongate.

Measurements (n = 10). L.: 4.45 (4.10-4.90); B.L.: 2.67 (2.40-2.90); B.W.: 0.87 (0.75-0.95); t.l.: 3.51 (3.20-3.90); t.w.: 0.93 (0.85-0.97); v.m.l.: 0.37 (0.27-0.42); v.w.: 0.24 (0.20-0.30); f.l.: 0.53 (0.42-0.60); M.f.w.: 0.24 (0.22-0.25); c-l.l.: 0.46 (0.42-0.50); m.c-l.w.: 0.24 (0.22-0.27); r.l.: 0.40 (0.35-0.50); a.l.I.: 0.08 (0.05-0.12); a.l.II.: 0.19 (0.15-0.22); p.l.: 0.27 (0.25-0.30); m.l.: 0.59 (0.50-0.65); m.w.: 0.61 (0.50-0.70); pfe.l.: 0.67 (0.62-0.75); pti.l.: 0.84 (0.77-0.92); pbas.l.: 0.46 (0.37-0.52); pta. II+III: 0.32 (0.27-0.37); s.l.: 0.28 (0.27-0.32).

Female

Coloration and structure. Coloration and morphology resembling those of male. L.: 5.00 mm; B.L.: 3.00 mm.

Genitalia (Fig 5 a,b). Ovipositor slender: valvulae I (or ventral valvulae) attaining anal segment; valvulae II (median valvulae) with 19-21 rounded dorsal teeth in apical half, the proximal bigger; valvulae III (or dorsal valvulae) with microtrichiae, surpassing anal segment. Valvifers VIII slender, as long as the half of the dorsal valvulae. Anal segments as the male.

Measurements (n = 10). L.: 5.09 (4.90-5.20); B.L.: 3.35 (3.00-3.90); B.W.: 0.92 (0.80-1); t.l.: 4.06 (3.90-4.30); t.w.: 0.94 (0.87-1.12); v.m.l.: 0.49 (0.44-0.54); v.w.: 0.27 (0.25-0.30); f.l.: 0.58 (0.50-0.67); M.f.w.: 0.28 (0.25-0.30); c-l.l.: 0.47 (0.40-0.50); m.c-l.w.: 0.24 (0.20-0.25); r.l.: 0.41 (0.30-0.50); a.l.I.: 0.06 (0.05-0.07); a.l.II.: 0.19 (0.15-0.22); p.l.: 0.30 (0.30); m.l.: 0.67 (0.60-0.70); m.w.: 0.67 (0.60-0.80); pfe.l.: 0.80 (0.70-0.90); pti.l.: 0.87 (0.77-1); pbas.l.: 0.47 (0.40-0.50); pta. II+III: 0.32 (0.25-0.45); s.l.: 0.32 (0.30-0.37).

Etymology. The name refers to its prevalence in distant subandean areas that belong to the Monte biogeographic province along the Andes in Argentina (Morrone 2001).

Geographical distribution. Argentina: Tucumán, La Rioja, San Juan, Mendoza, Córdoba, La Pampa, Neuquén and Río Negro provinces. This species represents the southernmost limit of the genus.

Host plants. Frequently found on garlic, rye and pampas grass (Rossi Batiz & Remes Lenicov 2009).

Natural enemies. An unidentified species of Strepsiptera (Elenchidae) was found parasitizing adults of *S. subandina*.

Type material. Holotype male: Huerta Grande, Córdoba, Argentina, hand captured on pampas grass, 24/X/08. Rossi Batiz leg.

Paratypes. Four ♂♂ and three ♀♀, San Martín de Los Andes, Neuquén, Argentina, hand captured on pampas grass, 26/II/07. Logarzo, leg.; five ♂♂ and seven ♀♀, Huerta Grande, Córdoba, Argentina, hand captured on pampas grass, 24/X/08. Rossi Batiz leg.

Other material examined: Three ♂♂ and two ♀♀, El Infiernillo, Tucumán, Argentina, hand captured on pampas grass, 13/I/08. Virla leg.; two ♂♂ and five ♀♀, Cerro San Javier, Tucumán, Argentina, hand captured on pampas grass, 20/V/08. Virla leg.; four ♂♂, nine ♀♀ and one nymph, Las Talas, La Rioja, Argentina, hand captured on pampas grass, 24/XII/07. Virla leg.; one ♂, one ♀, Dto. Pocito, San Juan, with net on rye, 13-17/IX/04, Meneguzzi leg.; one ♀ 30/IX/02 "La Consulta" Mendoza, with water trap on garlic, Lanati leg.; nine ♂, five ♀ 18/VII, 22/VIII, 05/IX, 12/IX, 26/IX and 07/XI/03; six ♀ 9-13/VIII, 20-24/IX, 27/IX-1/X, 04-08/X, 29-03/XII and 13-17/XII/04; four ♂, one ♀ 13/IX, 15/IX, 18/IX, 02/X and 12/X/06, "La Consulta", Mendoza, with water trap on garlic, Lanati leg.; 11 ♂♂ and 10 ♀♀, "La Consulta", Mendoza, Argentina, with water trap on garlic crop, 22/VIII, 5/IX, 26/IX and 1/X/03; 23-27/VIII, 27/IX-01/X and 04-08/X/04; 14/IX, 21/IX and 20/X/05; 20/IX and 12/X/06. Lanati, leg.; one ♀ and one nymph, El Nihuil, Mendoza, Argentina, hand captured on pampas grass, 11/II/08. Virla leg.; two ♂♂, eight ♀♀ and one nymph, Huerta Grande, Córdoba, Argentina, hand captured on pampas grass, 29/VI/08. Virla leg.; one ♂, San Marcos Sierras, Córdoba, Argentina, hand captured on pampas grass, 30/VI/08. Virla leg.; one ♂ and one ♀, Mirador del Lago, Córdoba, Argentina, hand captured on pampas grass, 29/VI/08. Virla leg.; one ♀, Algarrobo del Águila, La Pampa, Argentina, hand captured on pampas grass, 10/II/08. Virla leg.; 11 ♂♂, seven ♀♀ and eight nymphs, Santa Isabel, La Pampa, Argentina, hand captured on pampas grass, 10/II/08. Virla leg.; five ♂, nine ♀, one nymph, hand captured on pampas grass, San Martín de los Andes, Neuquén, 26/II/07, Logarzo leg.; two ♂♂ and one ♀, Cutral-Co, Neuquén, Argentina, hand captured on pampas grass, 10/II/08. Virla leg.; four ♂♂ and two ♀♀, Aguada Florencio, Neuquén, Argentina, hand captured on pampas grass, 10/II/08. Virla leg.; three ♂♂, one ♀ and

one nymph, Zapala, Neuquén, Argentina, hand captured on pampas grass, 10/II/08. Virla leg.; seven ♂♂, six ♀♀ and 16 nymphs, R. Villegas, Río Negro, Argentina, hand captured on pampas grass, 04/II/08. Virla leg.; 13 ♂♂, five ♀♀ and eight nymphs, Lago Mess, Río Negro, Argentina, hand captured on pampas grass, 07/II/08. Virla leg.; one ♂ and one ♀, El Bolsón, Río Negro, Argentina, hand captured on pampas grass, 04/II/08. Virla leg.

Examined material from British Museum Natural History Collection. One ♀ *S. brevirostris* Muir, paratype, ex beach grass, Napo River, Ecuador (1923), F.X. Williams leg., B.M. 1929-293; one ♂, one ♀ *S. gracillis* Muir, paratypes, Río de Janeiro, Brazil (1924), F.X. Williams leg., B.M. 1929-293; one ♀ *S. ornatipennis* Muir, paratype, on grass, Rezende, Brazil (1924), F.X. Williams leg., B.M. 1929-293; one ♂ *Oxycramus procerus* Matsumura, Nagasaki, Japan (1913), F. Muir coll., B.M. 1932-279; one ♂ *S. procerus* (Matsumura), Foochow, China (1935), M. S. Yang leg., Pres. by Com. Inst. Ent. B.M. 1948-548; one ♀ *S. procerus* (Matsumura), Nantou, Taiwan (1984), C. T. Yang col. and det.; one ♀ *S. cf. rostifrons*, Jacareacanga, Brazil (1984), M. Alvarenga leg., M. Asche det., B.M. 1971-165; one ♂ *S. rostifrons* on *Paspalum conjugatum*, Cayo District Central Farm, Honduras, E. García leg., Pres. by Com. Inst. Ent., B.M. 1988-26; one ♂ *S. saccharivora* (Westwood), Bermuda Sandys P., Fort Scaur (1988), M.R. Wilson & D. J. Hilburn leg., M. R. Wilson det.; one ♂ *S. saccharivora* (Westwood) on sugarcane, Grenada (1961), F.D. Bennett leg., M.S.K. Ghauri det., Pres. by Com. Inst. Ent., B.M. 1961-6; one ♂ *S. viridis* Muir, paratype, (1923), on rice Blairmont, F.X. Williams leg., B.M. 1929-293.

Remarks. We observed slight differences in the general coloration, length of the head and shape of the parameres between the known species of *Saccharosydne* and the species found in Argentina. Although collected in ecologically different regions, the specimens of *S. subandina* are quite uniform in coloration, morphology and measurements.

Saccharosydne subandina can be distinguished from its congeners by the following combination of features: pattern coloration and male genitalia with the dorsolateral angles of the pygofer well produced and the parameres with internal and external acute apical angles.

Saccharosydne subandina most closely resembles *S. gracillis*, but can be distinguished from it by the black macula on both genae, the rounded head profile, the well produced dorsolateral angles of the male pygofer and the acute apical angles of the parameres.

Identification Key to *Saccharosydne* Species

The proposed key allows to distinguish the new species from other species in the genus. The characteristics belonging to *S. rostifrons*, *S. procerus* and *S. saccharivora* were taken from the following literature: Westwood (1833), Crawford (1914), Matsumura (1931) and Caldwell & Martorell (1951).

1. General coloration green or yellowish orange with dark marks on the wings. Head curved down towards the apex in lateral view; vertex long (more than three times longer than

- broad)..... 2
 1'. General coloration green, without marks on the wings. Head straight toward apex in lateral view; vertex short (less than three times the width)..... 3
 2. General coloration yellowish orange; median carinae of vertex and frons partially black; vertex projecting almost 2/3 of its length beyond eyes (figured in Crawford 1914: pl.46, fig J). Tegmina rhomboidal apically; venation different from that of congeners, with maculae along the veins ... *S. rostifrons*
 2'. General coloration green; median carinae of vertex and frons uniformly dark; vertex projecting 3/5 of its length beyond the eyes. Tegmina markedly broadened apically from nodal line, dark fuscous over the apical cells and venation. Parameres short, medially broader, abruptly narrowed subapically, external margin deeply excavated towards apex (figured in Muir 1926:pl.I, fig 28:41)....;... *S. ornatipennis*
 3. Vertex projecting 1/5 of its length beyond eyes; submedian carina forked at apex; with a dark mark around the ocelli. Parameres basally broad, apical portion narrow, deeply excavate on the external margin (figured in Muir 1926: pl.I, fig 27:41) *S. brevirostris*
 3'. Vertex projecting more than 1/5 of its length beyond eyes; submedian carina forked dorsally on vertex. Parameres gradually narrowed towards apex 4
 4. Parameres narrow, with linear lateral margins. Vertex projecting 1/3 of its length beyond eyes 5
 4'. Parameres broad, with sinuate lateral margins. Vertex projecting 1/3 or more of its length beyond eyes 6
 5. Parameres subparallel, slightly curved towards apex (figured in Muir 1926: pl.I, fig 26:41) *S. viridis*
 5'. Parameres divergent (figured in Matsumura 1931: 846) *S. procerus*
 6. Parameres with apex rounded, slightly constricted towards apex (figured in Muir 1926: pl.I, fig 29: 41) *S. saccharivora*
 6'. Parameres with the apex slightly truncated 7
 7. Parameres with apical external angle acute and internal angle rounded. Vertex projecting 1/3 of its length beyond the eyes; face with uniform coloration *S. gracillis*
 7'. Parameres with both apical external and internal angles acute (Fig 4b). Vertex projecting almost 1/2 of its length beyond the eyes; face with a rounded black macula on both genae (Fig 1c) *S. subandina*

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