

TAXONOMY AND NOMENCLATURE

Description of the last nymphal instar of *Talipes appendiculatus* (Hemiptera: Membracidae: Membracinae), and notes on the biology of the immatures and adults

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ABSTRACT. The last instar nymph of *Talipes appendiculatus* (Fonseca) is described and illustrated, and biological data are given on the immatures and adults. The 5th instar nymph has the body covered with tuberculate chalazae; head and thorax without scoli; abdomen with terga III-VIII with single dorsal scoli, all different in size, III and VIII small, V the largest about 2x longer than wide. Descriptions of the adults (male and female) are also provided, with the addition of some new characters. The species (adults, immatures of various stages) has been collected on branches of *Cassia fistula* L. (Leguminosae: Caesalpinioidea), and is frequently attended by bees and wasps.

KEYWORDS. Description, nymphal stages, Talipedini, taxonomy, treehopper.

Talipes was described by DEITZ (1975) based on *Tylopelta appendiculata* Fonseca, 1936, a species originally included in Membracini. Since the species differs from other Membracini in some characteristics (forewing venation simple, not reticulate, metathoracic tibiae not foliaceous, clavate distally, metatarsus much shorter than pro- and mesothoracic tarsi), the author transferred *Talipes* to a new tribe, Talipedini. Years later, MCKAMEY & DEITZ (1991) discovered that *Trinarea* Goding, 1926 (type species: *Ochropepla carinata* Funkhouser, 1922), formerly described as a subgenus of *Hoplophorion* Kirkaldy, shared a large number of characters with *Talipes*. Based on that, they considered the latter as a junior synonym of *Trinarea*. With this synonym, two additional species were included in the tribe Talipedini Deitz (joining *Trinarea appendiculata* (Fonseca)): *T. carinata* (Funkhouser), and *T. fenestrata* (Strümpel, 1974). SAKAKIBARA (2012) redefined Talipedini, reinstated *Talipes* and added two other genera to it, *Erechtia* Walker, 1858 (= *Trinarea* Goding) and *Pseuderechtia* Sakakibara, 2012. *Talipes* remained with two species, *Talipes appendiculatus* (Fonseca) and *T. fenestratus* (Strümpel). In the present paper, immatures of *T. appendiculatus* are described for the first time and biological data are also provided about the species.

MATERIAL AND METHODS

The specimens of *T. appendiculatus* were observed and collected (January, 2016) at an urban area of Santa Branca city, state of São Paulo (23°23'59"S, 45°53'12"W), a place with many trees and lots of shade. Nymphs at different stages of development were found on the lower branches of *Cassia fistula* L. (Leguminosae, Caesalpinioidea), an exotic plant introduced from India, and which is widely disseminated throughout Brazil as an ornamental plant. Some immatures were brought to the laboratory and maintained for observation. The emergence of an adult female was observed through the whole process of ecdysis. The immatures (also egg mass) and adults were photographed either in nature or in the laboratory using a Canon Power Shot Sx1015, with macro and super-macro lens, and also with Dino Capture connected to a Hund Wezlar stereomicroscope, to capture fine details. The presence of wasps, bees, and ants feeding on the honeydew produced by the nymphs of *T. appendiculatus* was also recorded.

The terminology used for the description of immatures follows MCKAMEY et al. (2015). Vouchers of adults and immatures are deposited in Coleção de Entomologia Pe. J.S. Moure, Departamento de Zoologia-UFPR, Curitiba (DZUP).

TAXONOMY

Talipes appendiculatus (Fonseca, 1936)

Tylopetta appendiculata Fonseca, 1936: 158 (type locality: BRAZIL, Pernambuco, Tapera); Strümpel, 1974: 539.

Talipes appendiculata [sic]; Deitz, 1975: 41.

Trinarea appendiculata; McKamey & Deitz, 1991: 195; McKamey, 1998: 215 (cat.).

Talipes appendiculatus; Sakakibara, 2012: 573.

Description of adult (SAKAKIBARA 2012, in part). Female (Figs. 1, 2). Color yellowish-brown, blackish on head and metopidium, and on top of median carina; forewings castaneous, opaque, with an oblique band formed by white and blackish dots crossing the membrane from costal margin to apex of clavus, apex and limbus clear translucent; legs light castaneous.

Head (Fig. 2) wider than long between eyes; eyes globose; ocelli located above transocular line, almost equidistant to each other and to eyes, closer to superior margin of head; postclypeus flat, triangular, axe-shaped, slightly convex at middle, much wider than long, widely rounded at apex, with tuft of long hairs at apex.

Pronotum (Fig. 1), in lateral view, with pre- and post-metopidium well marked; top of post-metopidium projected forwards forming a small rounded process, strongly compressed at base, thickened in front and foliaceous posterodorsally; dorsal contour line bisinuate, distinctly humped at middle; median carina percurrent; primary lateral carinae strong, laminar, much elevated above humeral angles, slightly higher than median carina, extended posteriorly to middle of lateral margin; latero-apical carinae conspicuous; secondary lateral carinae (1-2) very weak, wrinkle-like; suprahumeral carinae short, conspicuous.

Forewings coriaceous on costal margin and basal half of clavus; membrane opaque, micro-reticulate, clear translucent at apex; limbus wide and wrinkled; veins conspicuous, with simple line of hairs at each side; three discoidal cells (one *s*, two *m-cu* and two *r-m* crossveins), internal discoidal cell about 2x smaller than external.

Legs with prothoracic tibiae spatulate, mesothoracic tibiae foliaceous; metathoracic tibiae club-like, curved inwards, dilated at apex, with tarsi very reduced.

Abdomen with sternum III with mid-ventral tubercle, sternum IV with transverse keel; sternum VII widely and deeply emarginated at posterior margin; pygofer large, about as long as all preceding abdominal segments together, visibly flattened ventrally; apex of valvulae slightly exceeding pygofer.

Male (Figs. 3-7). Similar to the female, smaller, with anterior projection of pronotum reduced, only angulate at the top of post-metopidium (Fig. 3), general color much darker, with disc of head, median carina and lateral carinae above humeral angles, underside of thorax, black. Forewings dark castaneous; internal discoidal cell small (about 2x smaller than external cell). Pygofer small, hairy, lateral plate well developed, detached from

pygofer, hairy at apex (Fig. 4); subgenital plate scoop-shaped, apically notched (Figs. 5, 6); aedeagus slender, cylindrical, strongly curved upwards, tapering to apex, with minute teeth on dorsal surface (Figs. 5, 6); styles curved distally, hook-like, apex pointed (Fig. 7).

Measurements (mm). Female/male. Total length 4.80/4.20; length of pronotum 4.00/3.20; width of head 2.08/1.90; length of head 1.00/1.10; width between humeral angles 2.40/2.20.

Material examined. 10 females and 6 males, labeled "BRASIL. São Paulo | Santa Branca – 15/I/2016 | F. Lencioni Neto col."; "*Talipes* | *appendiculatus* | (Fonseca, 1936)". All deposited in DZUP.

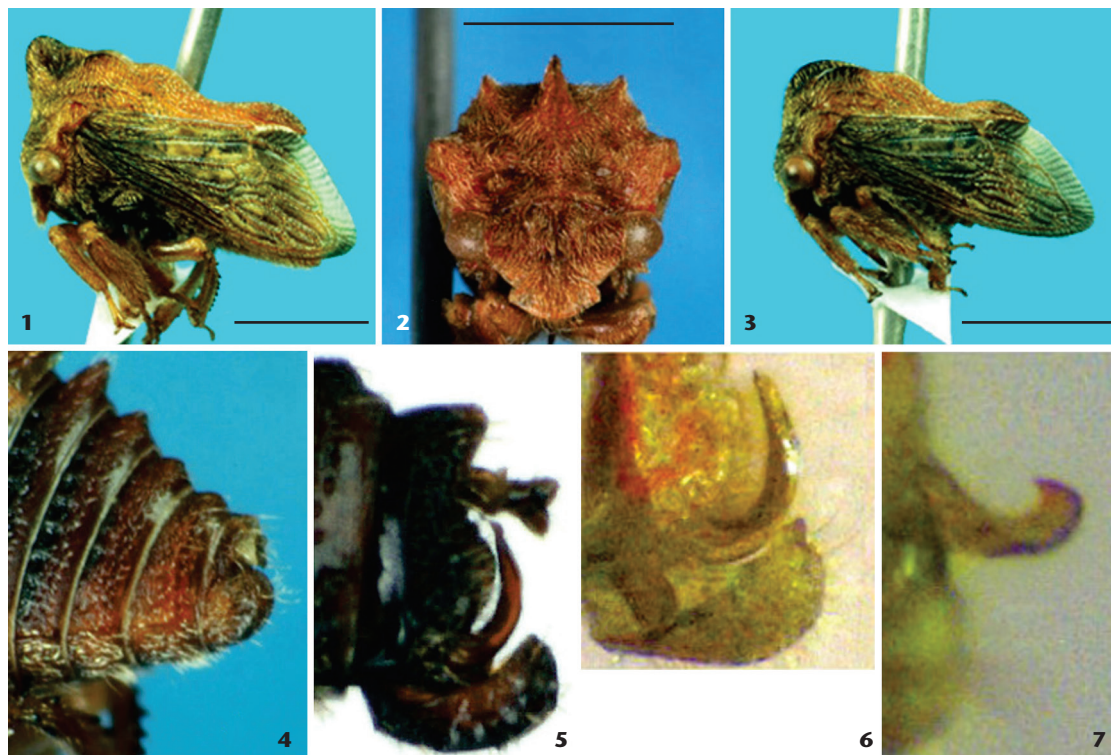
Distribution. Panama, Colombia, Peru, and Brazil (PE, MT, GO, MG, RJ, SP, PR, SC).

Remarks. *Talipes appendiculatus* is widely distributed, occurring from Panama to southern Brazil. This species was described by FONSECA (1936) based on a female specimen (from Pernambuco). This specimen has the pronotum projected forward into a short process. This process, however, is not present in all specimens examined. In fact, many specimens lack it, while females from Rio de Janeiro and São Paulo (Vale do Paraíba) have a projected horn. The males, on the other hand, exhibit, in some cases, only a slightly angulate tubercle on the top of the metopidium.

Last instar nymph (Figs. 8-10). Description. **Overall body.** Total length 3.50 mm. Covered with tuberculate chalazae, chazal setae simple, needlelike; dorsal contour of abdomen in lateral view (not including segment IX) subtriangular, the highest point at segment V. **Head.** Covered with chalazae; triangular, about 3x wider than long, deep furrow along coronal suture, vestigial ocelli distinct, superior margin of vertex arched, extended above tangential line of eyes; scoli absent. **Prothorax.** Pre- and postmetopidium distinct, the latter strongly depressed at base of posterior extension, without scoli; posterior extension of pronotum reaching posterior margin of metanotum. **Mesothorax.** Scoli absent; forewing pad with costal margin straight, with sparse chalazae more or less disposed along the veins. **Metathorax.** Similar to the former, without scoli. **Legs.** Chalazae of tibia very small, on lateral margins and many on dorsal surface; pro- and mesothoracic tarsi subequal in size, metathoracic tarsi shorter. **Abdomen.** Terga III-VIII with single dorsal scoli, all different in size, III and VIII small, V the largest, about 2x longer than wide. Chalazae distributed along marginal area. Segment IX. Dorsal length subequal to combined length of segments IV-VIII; apex with chalazae; ventral extension subequal to dorsal extension.

Material examined. 12 last instar nymphs, labeled "BRASIL. São Paulo | Santa Branca – 15/I/2016 | F. Lencioni Neto col."; "*Talipes* | *appendiculatus* | (Fonseca, 1936)". All deposited in DZUP.

Remarks. The immatures (Fig. 11) of different stages are quite similar to one another except in body size and the degree of pronotal and wing pad development. The general color also remains unchanged throughout development, yellowish-brown or brown. The 1st instar is about 0.90 mm long, covered with chalazae, without either pronotal extension or wing pads; ab-



Figures 1-7. *Talipes appendiculatus*. Female: 1-2, lateral and frontal view. Male: 3, lateral view; 4, apex of abdomen. Genitalia: 5-6, pygofer, subgenital plate and aedeagus; 7, style. Scale bars: 2.0 mm.

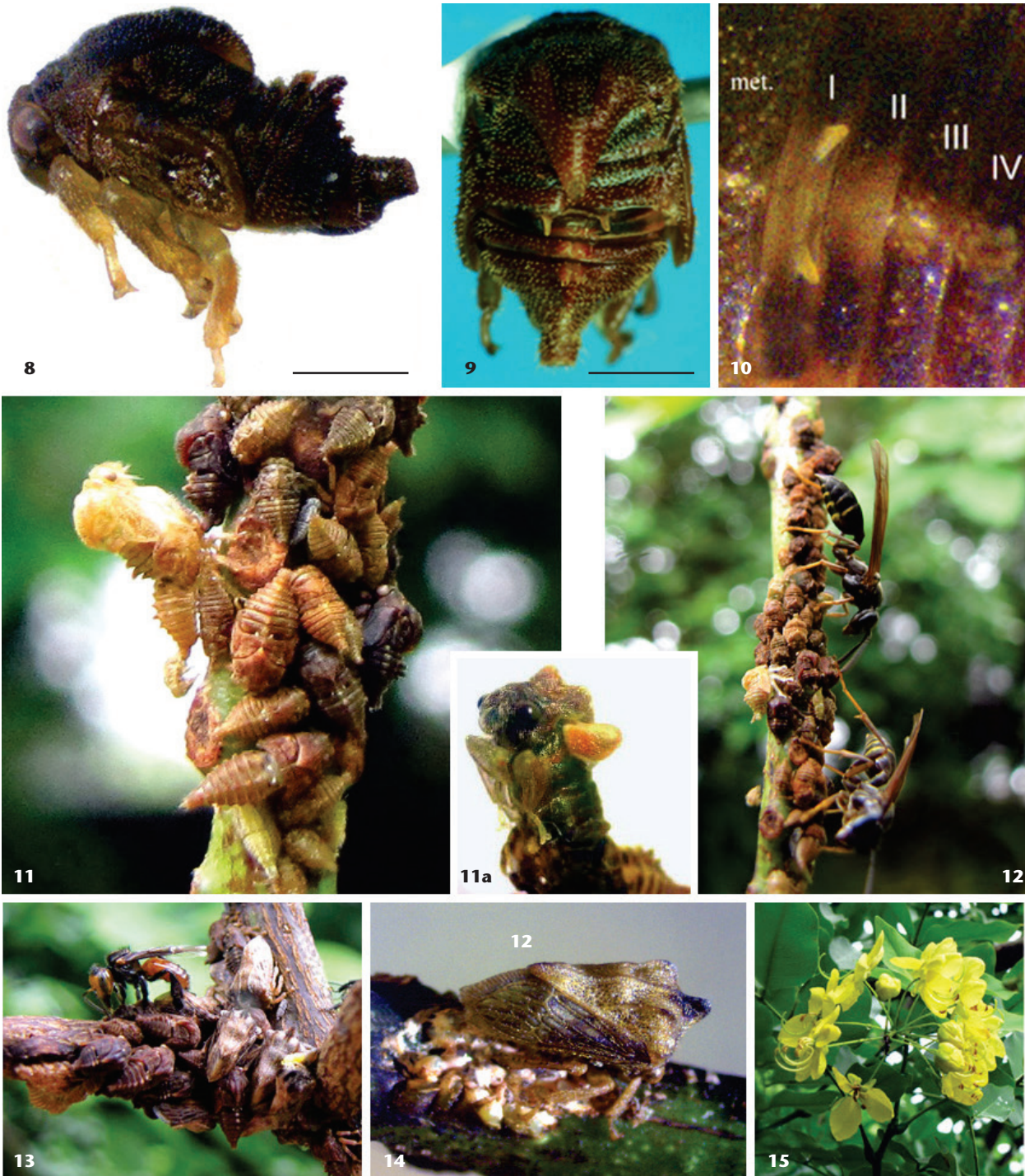
dominal terga scoli small, paired. The 2nd instar is about 1.80 mm long, already with a short pronotal extension as well as wing pads; abdominal scoli well developed, paired. The 3rd instar is about 2.15 mm long; pronotal extension not surpassing posterior margin of mesonotum. The 4th instar is about 2.80 mm long, quite similar to the 5th instar, pronotal extension almost reaching posterior margin of metanotum. In this stage, the abdominal scoli are not paired, but are fused into a single median scolus, sometimes just bilobed apically.

Terga I-II, in the 5th instar nymph, are normally hidden by the posterior portion of the metathorax. They can be visualized after forcing the abdomen down (fresh specimens); their texture (smooth and without chalazae) differs from the texture in the rest of the abdomen (Figs. 9, 10). Tergum I has a pair of slender, fingerlike projections submedially, white in color, directed up and backwards (scoli ?) (Fig. 10, and also in some specimens in Fig. 11). Tergum II lacks differentiated structures.

Adult emergence (Fig. 11a). The dorsal integument of the 5th instar nymph first splits near the base of the abdomen. Subsequently, the splitting extends over the entire thorax, thus liberating the head, the thorax (with the projection of the pronotum already visible) and the abdomen, through a slow, in an out, up and down movement of the body. The anal tube, in this last moment, is extruded and elongated in the effort to push

the body completely out of the exuviae. The entire process of ecdysis takes approximately 50 minutes. The emerged imago has a light-green body, with greenish-yellow legs, and orange on the ventral side of the forewings. The imago, as soon as it leaves the exuviae, stays on a branch with the head positioned upwards, and the expansion of the fore- and hind wings occurs slowly. The entire process takes approximately 70 minutes, during which the insect moves the body to different positions several times.

Behavior. The eggs are laid in the tissue of the host plant (Fig. 14), always at the end of a flowered branch (Fig. 15 – *Cassia fistula* L. (Leguminosae, Caesalpinioidea)). The nymphs and adults concentrate on branches that have flowers, more frequently at the lower branches in shady places. The female remains on the egg-mass protecting it (Fig. 14). The immatures of different stages are seen together with adult females and males (more males), and are attended by ants, bees, and wasps (Figs. 12, 13) collecting honeydew. The bees were identified as *Oxytrigona tataira* (Smith) (Apidae-Meliponini) (Fig. 13), popularly known as “abelha cospe-fogo” (fire-spitter bee) due to the formic acid present in their saliva. Wasps (Fig. 12 – Vespidae) were also observed touching the nymphs with their antennae, which elicited the liberation of exudates. One species of ant (unidentified) was observed in association with the treehoppers.



Figures 8-15. *Talipes appendiculatus*, associated insects and host plant. Nymphs: 8-9, 5th instar in lateral and dorsal view; 10, details of the abdominal terga I-IV, showing the finger-like projections on tergum I; 11, nymphs in different stages, one of them in process of ecdysis; 11a, emergence of an adult (female). Hymenoptera: 12-13, bee *Oxytrigona tataira* (Smith) (Apidae-Meliponini) and wasps (Vespidae) collecting honey dew. Posture: 14, female on the egg mass. Host plant: 15, flowered branch of *Cassia fistula* L. (Leguminosae, Caesalpinioidea). Scale bars: 1.0 mm.

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