ISSN 2007-9133

DUGESIANA

Revista de Entomología

Julio 2017

Volumen 24 Número 2

Disponible en línea
http://www.revistascientificas.udg.mx/index.php/DUG/index

DEPARTAMENTO DE BOTÁNICA Y ZOOLOGÍA

Dugesiana, Año 24, No. 2, julio 2017- diciembre 2017 (segundo semestre de 2017), es una publicación Semestral, editada por la Universidad de Guadalajara, a través del Centro de Estudios en Zoología, por el Centro Universitario de Ciencias Biológicas y Agropecuarias. Camino Ramón Padilla Sánchez # 2100, Nextipac, Zapopan, Jalisco, Tel. 37771150 ext. 33218, http://www.revistascientificas.udg.mx/index.php/DUG/index, glenusmx@gmail.com. Editor responsable: José Luis Navarrete Heredia. Reserva de Derechos al Uso Exclusivo 04-2009-062310115100-203, ISSN: 2007-9133, otorgados por el Instituto Nacional del Derecho de Autor. Responsable de la última actualización de este número: José Luis Navarrete Heredia, Editor y Ana Laura González-Hernández, Asistente Editorial. Fecha de la última modificación 1 de julio de 2017, con un tiraje de un ejemplar.

Las opiniones expresadas por los autores no necesariamente reflejan la postura del editor de la publicación.

Queda estrictamente prohibida la reproducción total o parcial de los contenidos e imágenes de la publicación sin previa autorización de la Universidad de Guadalajara.

Dugesiana 24(2): 269-277
Fecha de publicación: 1 de julio 2017
©Universidad de Guadalajara
ISSN 1405-4094 (edición impresa)
ISSN 2007-9133 (edición online)
http://zoobank.org/E36E1B31-E828-41AE-B516-FF3C94AD2132

Review of the New World *Tigava* Lace Bug Complex (Hemiptera: Heteroptera: Tingidae), with the Description of Two New Genera and Two New Species and a Key to Genera

Revisión del complejo de géneros de chinches de encaje del Nuevo Mundo *Tigava* (Hemiptera: Heteroptera: Tingidae), con la descripción de dos nuevos géneros y dos nuevas especies y una clave para géneros

Thomas J. Henry[1], Sara I. Montemayor[2], and Alexander H. Knudson[3]

[1]Systematic Entomology Laboratory, Agricultural Research Service, United States Department of Agriculture, c/o National Museum of Natural History, MRC-168, Smithsonian Institution, Washington, D. C. 20013-7013, thomas.henry@ars.usda.gov)*; [2]Universidad Nacional de La Plata, CONICET, División Entomología, Museo de La Plata, Paseo del Bosque s/n B1900FWA, La Plata, Buenos Aires, Argentina, smontemay@fcynm.unlp.edu.ar); [3]Department of Entomology, North Dakota State University, 1300 Albrecht Blvd., 202 Hultz Hall, Fargo, North Dakota 58102, alexander.knudson.2@ndsu.edu

*Corresponding author

ABSTRACT

The lace bug (Tingidae) genera belonging to the New World *Tigava* complex are reviewed. The two new genera and new species *Mexicotingis brailovskyi*, from México, and *Paraceratotingis convergens,* from Venezuela, are described. Diagnoses, descriptions, and digital color photographs of the new taxa, diagnoses and digital photographs of the heads and pronota of all genera, an updated checklist and distributions of the included species, and a key to genera are provided to help distinguish these closely related Tingidae.

Key words: Insecta, Neotropical, new genera, new species, checklist, distribution, key.

RESUMEN

Se revisan los géneros de chinches de encaje (Tingidae) del Nuevo Mundo pertenecientes al complejo *Tigava*. Se describen dos nuevos géneros y especies *Mexicotingis brailovskyi* de México, y *Paraceratotingis convergens*, de Venezuela. Se brindan diagnosis, descripciones, y fotos en color de los nuevos taxa, diagnosis y fotografías de la cabeza y el pronoto de todos los géneros, una lista actualizada de las distribuciones de todas sus especies, y una clave para géneros para distinguir estos Tingidae estrechamente emparentados.

Palabras clave: Insecta, Neotropical, géneros nuevos, nuevas especies, lista de especies, distribución, clave.

The nine tingid genera included in this paper have a scarcely ornate appearance, with flat, elongate bodies and long, slender antennae. *Tigava* Stål, now the second largest genus of this group, currently contains 12 species (Drake and Ruhoff 1965; Montemayor 2008, 2012). Previously, *Tigava* comprised a polyphyletic collection of species, some of which are now placed in the related genera *Campylotingis* Drake and Bondar (1932) with 14 spp., *Ceratotingis* Montemayor (2008) with 4 spp., *Niborskiana* Montemayor (2012) with 2 spp., *Tingicesa* Koçak and Kemel (2010) with 2 spp., and *Vatiga* Drake and Hambleton (1946) with 5 spp. Moreover, the type species of *Campylotingis* (Drake and Bondar 1932), *Niborskiana* (Montemayor 2012), and *Tingicesa* (as *Idiostyla* Drake 1945) were first described in *Tigava.* The obvious reason for this confusion is the relatively elongate, mostly opaque bodies, the long antennae, the reduced paranota and pronotal hoods, and similar hemelytra. Montemayor (2012) called this group of Neotropical genera, including *Macrotingis* Champion with 4 spp., the *Tigava* complex and provided a key to distinguish them.

During two collecting expeditions to México and through searches of the Texas A & M University and National Museum of Natural History collections, we have discovered two new species, representing two new genera belonging to the *Tigava* complex, one from México and one from Venezuela. Herein, we provide a description, and color photographs of the new taxa, diagnoses of all genera in the *Tigava* complex, an updated checklist and distributions of their included species, and a revised key, modified from Montemayor (2012) to help distinguish genera.

MATERIAL AND METHODS

Adult color habitus images were captured using a Visionary Digital imaging system that included an Infinity Optics K2 long-distance microscope affixed to a Canon EOS 40D digital SLR camera. A Dynalite M2000 power pack and Microptics ML1000 light box provided illumination and image stacks were montaged using Helicon Focus 4.2.1; and head and pronotal plate was captured using an EntoVision Imaging Suite that included a JAI Technologies (AT-200GE) digital camera mounted to a Leica Z16 zoom lens via a Leica z-step microscope stand and multiple focal planes were merged using Cartograph 8.0.6 (Microvision Instruments, France) software. Plates were edited using Adobe Photoshop CS4 and numbered in Adobe Illustrator CS4.

Specimens are deposited in the following collections: TAMU (Texas A & M University, College Station; J. C. Schaffner), UNAM (Universidad Nacional Autónoma de México, México City; H. Brailovsky), USNM ([United States] National Museum of Natural History, Washington, D. C.; T. J. Henry)

Under "included species," states are given for the larger countries Argentina, Brazil, and México.

RESULTS

TAXONOMIC TREATMENT

Key to the Neotropical Genera of the *Tigava* Complex

1. Distiflagellomere spindleshaped, thicker at middle than either end 2
– Distiflagellomere filiform, equally slender throughout 5
2. Head with one spine; pronotum without lateral carinae or with only short carinae on posterior process (Fig. 3) ..... *Macrotingis* Champion
– Head with three spines; lateral carinae extending along entire length .....… 3
3. Occipital spines short or abbreviated, not extending anteriorly beyond middle of eye; pronotal carinae low, not areolate; paranota narrow, strongly reflexed (Figs. 4, 10–12) ..... *Mexicotingis*, n. gen.
– Occipital spines extremely long, extending well beyond anterior margin of eye; pronotal carinae high and areolate; paranota wide, areolate, and weakly curving upward 4
4. Occipital spines erect and divergent; paranota evenly rounded throughout; median pronotal carina highest over discal area; lateral height of hood much higher than lateral height of an eye (Fig. 2) .... *Ceratotingis* Montemayor
– Occipital spines reclining and convergent; paranota distinctly constricted on anterior half; median pronotum carina short and evenly high throughout; height of hood shorter than lateral height of an eye (Figs. 6, 13, 14) …. ..... *Paraceratotingis*, n. gen.
5. Paranota wide, with anterior, inner-most areole much larger than remaining areolae 6
– Paranota narrow, carinate or areaolate, if areolate, anterior inner-most areola the same size as remaining areolae 7
6. Head with three or four spines; mesosternal rostral laminae strongly constricted (Fig. 9) ....… *Vatiga* Drake and Hamilton
– Head with five spines; mesosternal rostral laminae parallel (Fig. 8) .....… *Tingicesa* Koçak and Kemel
7. Head with five spines (Fig. 1) .... *Campylotingis* Drake and Bondar
– Head with three spines 8
8. Occipital spines divergent and not extending to posterior margin of eyes; head with postero-orbital plates and lacking a deep median suture between eyes; costal area carinate (Fig. 5) …..... *Niborskiana* Montemayor
– Occipital spines subparallel or convergent and extending to or surpassing anterior margin of eyes; head without postero-orbitial plates and with a deep median suture present between eyes; costal area areolate (Fig. 7) ....… *Tigava* Stål

Campylotingis Drake and Bondar
(Fig. 1)

Campylotingis Drake and Bondar 1932: 89 (original description); Drake and Poor 1936: 385 (list, type species); Monte 1939: 66 (list), 1941: 81 (catalog), 1947: 8 (list, type species); Drake and Ruhoff 1960: 43 (list, type species), 1965: 108 (cat.); Guilbert 2017 (online catalog). Type species: *Tigava mollicula* Drake, 1922. Original designation.

Included species. *C. bondari* (Drake) [Drake 1930: Bahia, Brazil], *C. carvalhoi* Drake and Hambleton [Drake and Hambleton 1938: Minas Gerais, Brazil], *C. clara* Drake and Hambleton [Drake and Hambleton 1942: Minas Gerais, Brazil], *C. clavata* Drake and Hambleton [Drake and Hambleton 1939: Minas Gerais, Brazil], *C. genetica* Drake and Hambleton [Drake and Hambleton 1942: Minas Gerais, Brazil], *C. integra* Drake and Hambleton [Drake and Hambleton 1942: Minas Gerais, Brazil], *C. janson* (Drake) [Drake 1922: "Chapada," Brazil], *C. lenatis* Drake [Drake 1935: Paraguay], *C. levis* Drake and Hambleton [Drake and Hambleton 1942: São Paulo, Brazil], *C. machaerii* Drake and Hambleton [Drake and Hambleton 1934: Argentina; Minas Gerais, Brazil], *C. mollicula* (Drake) [Drake 1922: "Chapada," Brazil], *C. mollis* Drake and Bondar [Drake and Bondar 1932: Bahia, Brazil], *C. prudens* Drake and Hambleton [Drake and Ruhoff 1965: Argentina; São Paulo, Brazil], and *C. tantilla* Drake [Drake and Hambleton 1938: Brazil; Drake 1935: Paraguay].

Diagnosis. *Campylotingis* is recognized by the antenna shorter than the body; the scape as long as or shorter than the distiflagellomere; the slender filiform distiflagellomere; the five cephalic spines, with the occipital ones generally convergent and extending to the anterior margin of the head; the absence of postero-orbital plates; the sometimes constricted mesosternal rostral laminae; the scarcely developed to sometimes absent hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the narrow, reflexed areolate or carinate paranota; and the discoidal area not extending to half the length of hemelytra.

Ceratotingis Montemayor
(Fig. 2)

Ceratotingis Montemayor 2008: 444 (original description); Montemayor and Costa 2009: 638 (diagnosis, key); Maes and Knudson 2016: 12 (list, distribution). Type species: *Ceratotingis rafaeli* Montemayor, 2008. Original designation.

Included species. *C. costarriquense* Montemayor [Montemayor 2008: Costa Rica], *C. rafaeli* Montemayor [Maes and Knudson 2016: Nicaragua; Montemayor 2008: Panama], *C. spatula* (Monte) [Monte 1945: Goiás, Brazil], and *C. zeteki* (Drake) [Maes and Knudson 2016: Nicaragua; Drake 1950: Panama].

Diagnosis. *Ceratotingis* is distinguished by the length of the antenna longer than the body; the scape much longer than the distiflagellomere; the spindle-shaped distiflagellomere; the three cephalic spines with the occipital ones divergent and surpassing the anterior margin of the head; the absence of postero-orbital plates; the well-developed hood, higher than the lateral height of an eye; the tricarinate pronotum, with the lateral carinae extending

along the entire length; the wide, areolate, evenly rounded paranota; and the discoidal area extending nearly to half the length of the hemelytra.

Macrotingis Champion
(Fig. 3)

Macrotingis Champion 1897: 22 (original description); Drake and Poor 1936: 387 (list, type species); Hurd 1946: 469 (description); Drake and Ruhoff 1960: 66 (list, type species), 1965: 294 (catalog); Brailovsky and Torre 1986: 902 (description, distribution, key); Froeschner 2003: 31 (diagnosis, key spp.); Montemayor and Costa 2009: 631 (diagnosis, key); Guilbert 2017 (online catalog). Type species: *Macrotingis biseriata* Champion, 1897. Subsequent designation by Drake and Poor, 1936: 387.

Included species. *M. biseriata* Champion [Froeschner 2003: Costa Rica; Drake 1928: Honduras; Champion 1897: Panama], *M. novicis* Drake [Drake 1928: Honduras; Froeschner 2003: Chiapas, México], *M. schaffneri* Froeschner [Froeschner 2003: Oaxaca, México], and *M. uniseriata* Champion [Champion 1897: Guatemala].

Diagnosis. Species of *Macrotingis* are recognized the antenna longer than the body; the scape much longer than the distiflagellomere; the spindle-shaped distiflagellomere (Fig. 3); the single erect, frontal, cephalic spine; the absence of postero-orbital plates; the well-developed hood higher than the lateral height of an eye; the pronotum uni- or tricarinate, with the lateral carinae abbreviated or absent; the wide, areolate, evenly rounded paranota; and the discoidal area not extending to half the length of the hemelytra.

***Mexicotingis* Henry, Montemayor, and Knudson, new genus**
(Figs. 4, 10–12)
http://zoobank.org/D558560A-207A-42C7-B756-05650FF3CD3E

Type species: *Mexicotingis brailovskyi* Henry, Montemayor, and Knudson, new species.

Diagnosis. This new genus is distinguished by the antenna as long as or longer than the body; scape much longer than distiflagellomere; the spindle-shaped distiflagellomere; the three cephalic spines, the occipital ones extremely short and not extending anteriorly beyond the middle of an eye; the absence of postero-orbital plates; the scarcely developed hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the narrow, reflexed paranota; and the discoidal area posteriorly undefined and not extending to half the length of hemelytra.

Mexicotingis shares the spindle-shaped distiflagellomere with *Ceratotingis*, *Macrotingis*, and *Paraceratotingis*, but can be distinguished by the short occipital spines, evenly low pronotal carinae, and the narrow, strongly reflexed paranota.

Description. Length of males 5.10–5.35 mm; length of females 5.25–5.35 mm. Head shorter than broad, impunctate, with three cephalic spines; occipital pair weakly convergent, extremely short, arising near posterior margin of eyes and ending before middle of eyes; median spine relatively short, stout, and erect. Eye ovate in lateral view, higher than long. Antennae long and slender, distiflagellomere spindle-shaped in lateral view, more slender in dorsal view, with numerous erect and semierect setae, total antennal length slightly longer than length of body (1.12–1.16 times). Bucculae touching anteriorly, enclosing all of labial segment I and basal half of segment II; laminae broadest posteriorly, relatively long, extending past base of head and onto prosternum just beyond collar. Labium short, extending only slightly beyond bases of procoxae. Pro- and mesosternal laminae parallel and areolate; metasternal laminae mostly rounded, with only the posterior margin truncate. Pronotum evenly and finely punctate, with three low, non-areolate carinae, lateral carinae ending at bases of calli; disc moderately convex; calli impunctate; hood short, little higher than median carina; collar distinct, width subequal to height of hood in lateral aspect. Hemelytra elongate, subparallel, narrowing slightly on apical two thirds before flaring and becoming rounded distally, extending well beyond apex of abdomen; hypocosta narrow, with one row of tiny areolae; costal area narrow, anterior half carinate, posterior half areolate; subcostal area narrow, with two irregular rows of small areolae on basal two thirds, narrowing to one row beyond; discoidal area relatively distinct on basal two thirds before inner vein disappears, leaving posterior end open and undefined. Legs slender, nearly glabrous, with only tiny, short, recumbent setae on tibiae.

Etymology. The generic name comes from the country where all of the specimens were collected and the ending *tingis* indicates its family association. The gender is feminine.

***Mexicotingis brailovskyi* Henry, Montemayor, and Knudson, new species**
(Figs. 4, 10–12)
http://zoobank.org/32C2E5B5-90A6-414C-AA59-5EC839109B1E

Diagnosis. General color yellowish brown; collar, apical third of pronotum and legs paler yellow. This species is distinguished from all other tingids by the structural characteristics given in the generic description.

Description. *Male* (n = 4, plus holotype measurement in parentheses): Length 5.10–5.35 mm (5.15 mm). *Head*: Length 0.40–0.42 mm (0.42 mm), width 0.54–0.58 mm (0.56 mm), interocular width 0.26–0.27 mm (0.27 mm). *Labium*: Length 0.72–0.78 mm (0.75 mm). *Antenna*: Scape, 1.12–1.23 mm (1.14 mm); pedicel, 0.16 mm (0.16 mm); basiflagellomere, 3.30–3.80 mm (3.65 mm); distiflagellomere, 0.75–0.80 mm (0.80 mm). *Pronotum*: Median length 1.82–1.92 mm (1.79 mm), width across humeral angles 0.98–1.06 mm (1.01 mm). *Hemelytron*: Widest width of discoidal area 0.27–0.29 mm (0.27 mm).

Head: Yellowish brown, impunctate, glabrous, frons with a deep median groove; eyes dark brown; inner margins of eye often with a narrow band of white exudate; bucculae pale or whitish. *Antenna:* Yellowish brown, scape darker yellowish brown; distiflagellomere spindle-shaped, black, slender base yellowish brown; scape with short, somewhat stout, pale setae; basiflagellomere with tiny, sparse setae, and distiflagellomere thickly set with relatively long erect and semierect setae. *Labium*: Segments I–III yellowish brown, segment IV fuscous. *Pronotum*: Yellowish brown

with apical third, collar, paranota, and carinae paler yellow; calli slightly darker brown. *Hemelytron*: Yellowish brown, middle of discoidal area and an inverted V-shaped mark on distal third darker brown; areoles on apical third becoming larger and more translucent. *Ventral surface*: Yellowish brown, mesosternum black outside pale rostral laminae. *Legs*: Pale yellowish brown.

Female (n = 4): Length 5.25–5.35 mm. *Head*: Length 0.42–0.43 mm, width 0.56–0.58 mm, interocular width 0.27–0.29 mm. *Labium*: Length 0.75–0.80 mm. *Antenna*: Scape, 3.70–4.00 mm; pedicel, 0.14–0.16 mm; basiflagellomere, 1.10–1.23 mm; distiflagellomere, 0.77–0.80 mm. *Pronotum*: Median length 1.80–1.92 mm, width across humeral angles 1.02–1.09 mm. *Hemelytron*: Width of discoidal area 0.29–0.30 mm.

Similar to male in overall color and structure.

Etymology. We name this interesting new species after our friend and colleague, Dr. Harry Brailovsky, in honor of his many contributions to the study of Heteroptera, especially the Coreoidea and Lygaeoidea.

Hosts. This species has been taken on *Quercus* sp., *Quercus rugosa* Née, and *Q. candicans* Née [Fagaceae], and *Persea americana* Mill. [Lauraceae]. The three specimens from *Quercus* sp. (holotype and two paratypes) were collected by beating the outer branches of a large open-growing tree.

Distribution. Known only from the Mexican states of Jalisco, México, Michoacán, and Morelos.

Type material. HOLOTYPE ♂, México, Morelos, Felipe Neri, 19º01.602'N, 98º57.155'W, elev. 2425 m, 28 Feb. 2017, T. J. Henry & H. Brailovsky, ex *Quercus* sp. (USNM). PARATYPES: 5♂♂, 1♀, México, Jalisco, Nevado de Colima road, 5.9 mi W hwy jct (nr. Atenquique), 20-21 April 1977, R. Murray, M. Sweet, & J. C. Schaffner (4 ♂♂; TAMU; 1♂, 1♀ USNM); 1 ♂, 1♀, México, 14.8 mi NW Cd. Guzmán, 13 April 1980, Cuda & Schaffner (1 ♂ TAMU; 1♀ USNM); 1 ♀, México, Jalisco, 11 mi. NW Cd. Guzmán, 13 April 1980, Cuda & Schaffner (TAM). 1 ♂, México, México, Ciudad de Bravo, Avandaro, 3 Mar. 1974, A. Garcia (UNAM); 1♂, 1♀, México, México, Francisco Zarco, 2 km S of Tenancingo, Mex. Rd 55, 18º59.8'N, 99º34.9'W, elev. 2275 m, 19 Nov. 2003, T. J. Henry, H. Brailovsky, & L. Cervantes, ex *Persea americana* (USNM). 3♂♂, 4♀♀, México, Michoacán, 12 mi NE Uruapan, 17 April 1980, Cuda & Schaffner, taken on *Quercus rugosa* and *Q. candicans* (2 ♂♂, 3♀♀ TAMU; 1♂, 1♀ USNM); 2 ♂♂, 1 ♀, Michoacán, 11.5 mi. E Morelia, 9 April 1990, Ferreira & Schaffner, (TAMU). 1 ♂, 1 ♀, Morelos, same data as for holotype (1♂ UNAM, 1♀USNM).

Niborskiana Montemayor

(Fig. 5)

Niborskiana Montemayor 2012: 52 (original description).

Type species: *Tigava notabilis* Drake, 1922. Original designation.

Included species. *N. gracilis* (Monte) [Monte 1940: Minas Gerais, Brazil] and *N. notabilis* (Drake) [Montemayor 2012: Bolivia; Drake 1922: "Chapada," Brazil].

Diagnosis. *Niborskiana* is distinguished by the antenna subequal to or shorter than the body; the scape and distiflagellomere subequal in length; the slender, filiform distiflagellomere; the three cephalic spines, with the occipital ones stout, divergent, not extending anteriorly beyond the middle of an eye; the presence of postero-orbital plates; the scarcely developed hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the narrow, carinate paranota; and the discoidal area not extending to half the length of hemelytra.

***Paraceratotingis* Henry, Montemayor, and Knudson, new genus**

(Figs. 6, 13, 14)

http://zoobank.org/6B279786-C68B-4358-82BA-5FDBED17603D

Type species: *Paraceratotingis convergens* Henry, Montemayor, and Knudson, new species.

Diagnosis. This new genus is recognized by the antenna as long as or longer than the body; the scape much longer than the distiflagellomere; the spindle-shaped distiflagellomere; the three cephalic spines, with the occipital ones surpassing anterior margin of eyes; the absence of postero-orbital plates; the small but well-developed hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the moderately wide, areolate paranota distinctly constricted on anterior half; and the discoidal area not extending to half the length of hemelytra.

Paraceratotingis shares with *Ceratotingis*, *Macrotingis*, and *Mexicotingis* a spindle-shaped distiflagellomere, but can be distinguished from these genera by the long, convergent occipital spines, the distinctly constricted anterior half of the paranota, and the short pronotal hood that is shorter than the lateral height of an eye.

Description. Length of holotype male 3.84 mm. Head length about two thirds width across eyes, impunctate, with a deep median groove or furrow on frons and three cephalic spines; the occipital pair, long, slender, arising at level just behind eyes, strongly convergent and nearly touching distally, median spine long, slender, subequal to dorsal width of an eye. Eye ovate in lateral view, higher than long. Antenna long and slender, subequal to body length, distiflagellomere spindle-shaped, with numerous erect and semierect setae, total length 3.88 mm. Bucculae touching anteriorly, enclosing all of labial segment I and base of II; laminae slightly broader posteriorly, long, extending past base of head and onto pronotum just beyond collar. Labium extending past mesocoxae to base of metasternum. Pro- and mesosternal laminae parallel; prosternal laminae short, nonareolate; mesosternal laminae higher with one row of areolae; metasternal laminae parallel. Pronotum evenly punctate on disc, punctures becoming areolate on posterior third; with three areolate carinae; disc weakly convex; calli shiny, impunctate; hood about two times as high as median carina; collar about as wide as height of median carina; paranota wide, distinctly constricted on anterior half, with two rows of evenly sized areolae. Hemelytron elongate, subparallel, rounded distally, extending well beyond abdomen; hypocosta narrow, with one row of tiny areolae; costal area wide, with two rows of large areolae; subcostal area narrow, about half the width of the costal area, with two rows of small areoles; discoidal area narrow, width subequal to width of subcostal area, not extending beyond basal third of hemelytra. Legs slender, with only fine, short, indistinct, recumbent setae.

Etymology. The name of this new genus is a combination of the Greek prefix "para," meaning near, and the generic name *Ceratotingis*, alluding to the apparent close relationship of these two genera. The gender is feminine.

Paraceratotingis convergens Henry, Montemayor, and Knudson, new species

(Figs. 6, 13, 14)

http://zoobank.org/7F65BFD7-CEFD-4A3E-BBE1-CAD4E111BC5E

Diagnosis. General coloration pale yellowish brown, head darker brown; calli black. This new species can be distinguished from all other tingids by the structural characteristics given in the generic description.

Description. *Male* (holotype): Length 3.84 mm. *Head*: Length 0.38 mm, width 0.58 mm, interocular width 0.28 mm. *Labium*: Length 1.14 mm. *Antenna*: Scape, 1.26 mm; pediceel, 0.14 mm; basiflagellomere, 1.70 mm; distiflagellomere, 0.78 mm. *Pronotum*: Median length 1.60 mm, humeral width 1.10 mm. *Hemelytron*: Length 2.75 mm, length of discoidal area 1.10 mm, width of discoidal area 0.24 mm.

Head: Shiny brown, clypeus dark brown, impunctate, glabrous, frons with a deep median groove; eyes dark brown; surface, especially around eyes and ventrally, with a scattered white exudate; bucculae pale yellow or whitish. *Antenna*: Yellowish brown, scape slightly darker brown; distiflagellomere spindle-shaped, black, slender base yellowish brown, with numerous long, semierect setae subequal to diameter of segment. *Labium*: Yellowish brown. *Pronotum*: Yellowish brown, with apical third, collar, paranota, and carinae paler yellow; calli black. *Hemelytron*: Pale yellowish brown; central areolae slightly darker brown. *Ventral surface*: Yellowish brown; mesosternum and a small area above proacetabula black. *Legs*: Pale yellowish brown.

Female: Unknown.

Etymology. This species is named *convergens* for the long, strongly convergent occipital spines.

Hosts. Unknown.

Distribution. Venezuela (Aragua).

Type material. HOLOTYPE: ♂, Venezuela, Aragua, El Limón, 4 July 1968, J. Maldonado C. (USNM).

Other specimen examined. 1 [sex?] (abdomen and antennal segments III and IV missing), same data as for holotype (USNM).

Tigava Stål

(Fig. 7)

Tigava Stål 1860: 63 (original description), 1873: 121 (key); Drake and Poor 1936: 389 (list, type species); Monte 1939: 80 (list), 1941: 143 (catalog), 1944: 158 (n. spp., list); Hurd 1946: 449 (diagnosis, key); Drake and Ruhoff 1960: 84 (list, type species), 1965: 387 (catalog); Brailovsky and Torre 1986: 908 (description, distribution, key); Maes and Knudson 2016: 59 (list, distribution, hosts); Guilbert 2017 (online catalog). Type species: *Tigava praecellens* Stål, 1860. Monotypic.

Included species. *T. bombacis* Drake and Poor [Kormilev 1955: Argentina; Drake and Poor 1938: Minas Gerais, Brazil], *T. brevicollis* Monte [Monte 1944: Rio de Janeiro, Brazil], *T. ceibae* Drake and Poor [Drake and Poor 1938: Bahia, Brazil; Drake and Ruhoff 1965: Paraguay], *T. convexicollis* Champion [Champion 1897: Panama], *T. corumbiana* Drake [Drake 1942: Matto Grosso, Brazil], *T. ferruginea* Monte [Monte 1940: "Brazil"], *T. graminis* Drake and Poor [Drake and Poor 1938: Bahia, Brazil], *T. hambletoni* Drake [Drake 1948: Peru], *T. praecellens* Stål [Stål 1860: Rio de Janeiro, Brazil; Drake and Poor 1937: Bolivia], *T. pulchella* Champion [Guilbert and Montemayor 2010: Jujuy, Argentina; Drake and Ruhoff 1965: Cuba; Guatemala; Honduras; Champion 1897: Veracruz, México; Maes and Knudson 2016: Nicaragua], *T. semota* Drake [Drake 1931: "Chapada," Brazil; Drake 1935: Paraguay], and *T. tingoana* Drake [Drake 1948: Peru].

Diagnosis. Members of this genus are recognized by the length of the antenna subequal to or shorter than the body; the scape and distiflagellomere subequal in length; the slender, filiform distiflagellomere; the three cephalic spines, the occipital ones long, convergent or sub-parallel, extending to or surpassing the anterior margin of eyes; the absence of postero-orbital plates; the scarcely developed or completely absent hood; the tricarinate pronotum, with the lateral carinae developed along the entire length; the narrow, areolate, or carinate paranota; and the discoidal area not extending to half the length of the hemelytra.

Tingicesa Koçak and Kemel

(Fig. 8)

Idiostyla Drake 1945: 97 (original description); Drake and Ruhoff 1960: 61 (list, type species); 1965: 248 (catalog); Montemayor 2012: 51 (list, key), Guilbert 2017 (online catalog). Type species: *Tigava anonae* Drake and Hambleton, 1938. Preoccupied by *Idiostyla* Meyrich, 1921 (Lepidoptera) (Koçak and Kemel 2010: 152).

Tingicesa Koçak and Kemel 2010: 152 (new name).

Included species. *T. anonae* (Drake and Hambleton) [Drake and Hambleton, 1938: São Paulo, Brazil] and *T. rolliniae* (Drake and Hambleton) [Drake and Hambleton 1934: Minas Gerais, Brazil].

Diagnosis. This genus is distinguished by the length of the antenna shorter than the body; the scape and distiflagellomere subequal in length; the slender, filiform distiflagellomere; the five cephalic spines, with the occipital ones long, convergent or sub-parallel, extending to or surpassing the anterior margin of the eyes; the absence of postero-orbital plates; the parallel mesosternal rostral laminae (Fig. 8); the small, but well-developed hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the wide paranota with the anterior, inner-most areola greatly enlarged; and the discoidal area not extending to half the length of the hemelytra.

Vatiga Drake and Hambleton
(Fig. 9)

Vatiga Drake and Hambleton 1946: 10 (original description); Hurd 1946: 466 (diagnosis, key); Drake and Ruhoff 1960 (list, type species), 1965: 424 (catalog); Froeschner 1993: 457 (diagnosis, key, synonymy); Guidoti et al. 2015: 412 (hosts, pest status); Maes and Knudson 2016: 61 (list, distribution, host); Guilbert 2017 (online catalog). Type species: *Vatiga vicosana* Drake and Hambleton, 1946, a junior synonym of *Leptopharsa manihotae* Drake, 1922 (synonymized by Froeschner 1993: 460). Original designation.

Included species. *V. cassiae* (Drake and Hambleton) [Drake and Hambleton 1934: Minas Gerais, Brazil], *V. illudens* (Drake) [Drake 1922: Dominican Republic, Jamaica, Puerto Rico; Drake 1930: Minas Gerais and São Paulo, Brazil; Drake and Bruner 1924: Cuba, Haiti; Drake and Cobben 1960: Leeward Islands], *V. manihotae* (Drake) [Drake 1922, Drake and Hambleton 1946, Drake and Hambleton 1942: "Chapada," Minas Gerais, and São Paulo, Brazil; Drake 1922: Trinidad; Monte 1939: Cuba; Drake and Ruhoff 1965: Argentina, Paraguay, Peru], *V. pauxilla* (Drake and Poor) [Drake and Poor 1939: Corrientes, Argentina], *V. variana* Drake and Hambleton [Drake and Hambleton 1946: Rio Grande de Sul, Brazil], and *V. varianta* (Drake) [Drake 1930, Froeschner 1993: Bahia and Minas Gerais, Brazil; Froeschner 1993: Colombia].

Diagnosis. This genus is recognized by the length of the antenna shorter than the body; the scape shorter than the distiflagellomere; the slender, filiform distiflagellomere; the variable number of cephalic spines (two, three, four, or five), with the occipital ones varying in length and shape; the absence of postero-orbital plates; the deeply constricted mesosternal rostral laminae (Fig. 9); the scarcely developed to completely absent hood; the tricarinate pronotum, with the lateral carinae extending along the entire length; the wide paranota, with the anterior, inner-most areola greatly enlarged; and the discoidal area not extending to half the length of hemelytra.

ACKNOWLEDGMENTS

We thank editor José Luis Navarrete-Heredia for the invitation to participate in this special publication honoring Harry Brailovsky. We also are grateful to Harry Brailovsky (UNAM) and Joseph C. Schaffner (TAMU) for lending specimens used in this study and Taina Likwak (Systematic Entomology Laboratory, ARS, USDA, c/o USNM) for the color habitus plates of *Mexicotingis brailovskyi* and *Paraceratotingis convergens*. Marcus Guidoti Soares (Smithsonian Institution, Washington, D. C.) and Laura Torres Miller (West Virginia Department of Agriculture, Charleston, West Virginia) kindly reviewed the manuscript and offered suggestions for its improvement. Mention of trade names or products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture. The USDA is an equal opportunity employer.

LITERATURE CITED

Brailovsky, H. and L. Torre. 1986. Hemiptera-Heteroptera de México XXXVI. Revisión génerica de la familia Tingidae Laport. *Anales de Instituto de Biologia de la Universidad Nacional Autónoma de México*, 56(3): 869–932.

Champion, G. C. 1897. Insecta: Rhynchota (Hemiptera-Heteroptera). Volume II. In Godwin, F.D. and O. Salvin (Eds). *Biologia Centrali-Americana*. London. 1897: 1–32; 1898: 33–192; 1899: 193–304; 1900: 305–344; 1901: i–xvi + 345–416.

Drake, C. J. 1922 Neotropical Tingitidae with descriptions of three new genera and thirty-two new species and varieties (Hemiptera). *Memoirs of the Carnegie*, 9(2): 351–378.

Drake, C. J. 1928. Some Tingitidae (Heteroptera) from Honduras. *American Museum Novitates*, 190: 1–5.

Drake, C. J. 1930. Some Tingitidae from Brazil (Hemiptera). *Bulletin of the Brooklyn Entomological Society,* 25(1): 25–26.

Drake, C. J. 1931. Two new species of *Tigava* from South America, (Hemiptera-Tingitidae). *Proceedings of the Hawaian Entomological Society*, 7(3): 405–406.

Drake, C. J. 1935. American Tingitoidea (Hemiptera) in the Natural History Museum of Vienna. *Sondar-Abdruck aus "Konowia,"* 14(1): 9–20.

Drake, C. J. 1945. New Tingidae (Hemiptera). *Bulletin of the Southern California Academy of Sciences*, 44(3): 96–100.

Drake, C. J. 1948. Five new American Tingidae (Hemiptera). *Boletín de Entomología Venezolana*, 7(1–2): 15–19.

Drake, C. J. 1950. A new tinged from the Canal Zone (Hemiptera). *Proceedings of the Biological Society of Washington*, 52(6): 299–300.

Drake, C. J. and G. Bondar. 1932. Concerning Brasilian Tingitidae, Hemiptera. *Boletim do Museu Nacional de Rio de Janeiro*, 8: 87–96.

Drake, C. J. and S. C. Bruner. 1924. Concerning some Tingitidae in the West Indies (Hemip.). *Memorias de la Sociedad Cubana de Historia Natural*, 6: 144–154.

Drake, C. J. and R. H. Cobben. 1960. The Heteroptera of the Netherlands Antilles-V, Tingidae (lace bugs). *Studies on the fauna of Curaçao, and other Caribbean Islands*, 10: 67-97.

Drake, C. J. and E. J. Hambleton. 1934. Brazilian Tingitidae (Hemiptera), Part I. *Revista de Entomología de Río de Janeiro*, 4(4): 435–451.

Drake, C. J. and E. J. Hambleton. 1938. Concerning Brazilian Tingitidae (Hemiptera). Part III. *Revista de Entomologia*, 8(1–2): 44–68.

Drake, C. J. and E. J. Hambleton 1939. Twenty new Brazilian Tingitidae (Hemiptera) (Part V). *Arquivos do Instituto Biologico*, 10: 153–163.

Drake, C. J. and E. J. Hambleton. 1942. Seven New South American Tingitidae (Hemiptera). *Revista de Entomología de Río de Janeiro*, 13(1–2): 76–81.

Drake, C. J. and E. J. Hambleton. 1946. New species and new genera of American Tingidae (Hemiptera). *Proceedings of the Biological Society of Washington*, 59: 9–16.

Drake, C. J. and M. E. Poor. 1936. The genera and genotypes of Tingitoidea of the Western Hemisphere. *Iowa State College Journal of Science*, 10(4): 381–390.

Drake, C. J. and M. E. Poor. 1937. The South American Tingitidae (Hemiptera) described by Stål. *Memoirs of the Carnegie Museum*, 11(5): 301–312.

Drake, C. J. and M. E. Poor. 1938. Nine new American Tingitidae (Hemiptera). *Bulletin of the Brooklyn Entomological Society*, 33 (1): 28–34.

Drake, C. J. and M. E. Poor. 1939. Seven new American Tingitidae (Hemiptera). *Bulletin of the Brooklyn Entomological Society*, 34(3): 31–35.

Drake, C. J. and F. A. Ruhoff. 1960. Lace-bug genera of the world (Hemiptera: Tingidae). *Proceedings of the United States National Museum*, 112(3431): 1–105.

Drake, C. J. and F. A. Ruhoff. 1965. Lacebugs of the world: A catalog (Hemiptera: Tingidae). *United States National Museum Bulletin* 243. 634 pp.

Froeschner, R. C. 1993. The Neotropical lace bugs of the genus *Vatiga* (Heteroptera: Tingidae), pests of cassava: new synonymies and key to species. *Proceedings of the Entomological Society of Washington*, 95(3): 457–462.

Froeschner, R. C. 2003. Review of the Middle American lace bug genus *Macrotingis* (Heteroptera: Tingidae), with a key and a new species from México. *Entomological News*, 114(1): 29–32.

Guidoti, M., S. I. Montemayor and E. Guilbert. 2015. Lace bugs (Tingidae) (pp. 395–419). *In*: Panizzi, A. R. and J. Grazia (Eds.). *True Bugs (Heteroptera) of the Neotropics, Entomology in Focus*. Springer Science, Dordrecht. 901 pp.

Guilbert, E. and S. I. Montemayor. 2010. Tingidae (Insecta, Heteroptera) from the Argentinan Yungas: new records and descriptions of selected fifth instars. *Zoosystema*, 32(4): 549-565.

Guilbert, E. 2017. Lace bugs database. http://www.hemiptera-databases.com/tingidae. Accessed 14 May 2017.

Hurd, M. P. 1946. Generic classification of North American Tingoidea (Hemiptera–Heteroptera). *Iowa State College Journal of Science*, 20(4): 429–492.

Koçak, A. Ö. and M. Kemel. 2010. Nomenclatural notes on the genus group names of the families Veliidae and Tingidae (Hemiptera). *Priamus, Serial Publication of the Centre for Entomological Studies Ankara*, 12(6): 151–152.

Kormilev, N. A. 1955. Notas sobre "Tingidae" Neotropicales (Hemiptera). *Revista Brasileira de Biologia*, 15(1): 63–68.

Maes, J.-M. and A. Knudson. 2016. Tingidae (Heteroptera) de Nicaragua. *Revista Nicaraguense de Entomologia*, 113: 1–63.

Monte, O. 1939. Lista preliminar dos tingitídeos de Minas Gerais. *Revista da Sociedad Brasileira de Agronomia*, 2(1): 63–85.

Monte, O. 1940. Notas sôbra alguns tingideos do Brazil. *Arquivos de Zoología do Estado de São Paulo*, 1(11): 375–382.

Monte, O. 1941. Catálog dos tingitídeos do Brazil. *Arquivos de Zoologia do Estado de São Paulo*, 11(3): 65–174 (1940).

Monte, O. 1944. Concerning the genus "Tigava" Stal (Hemiptera, Tingitidae). *Revista Brasileira de Biologia*, 4(2): 157–159.

Monte, O. 1945. Trés novos tingitideos. *Revista de Entomología*, 16(1–2): 249–252.

Monte, O. 1947. Gêneros e genótipos dos tingideos do mundo. *Papéis Avulosos, São Paulo*, 8(1): 1–22.

Montemayor, S. I. 2008. A new genus and two new species of Tingidae (Heteroptera) from Central America. *Zoological Science*, 25: 444–450.

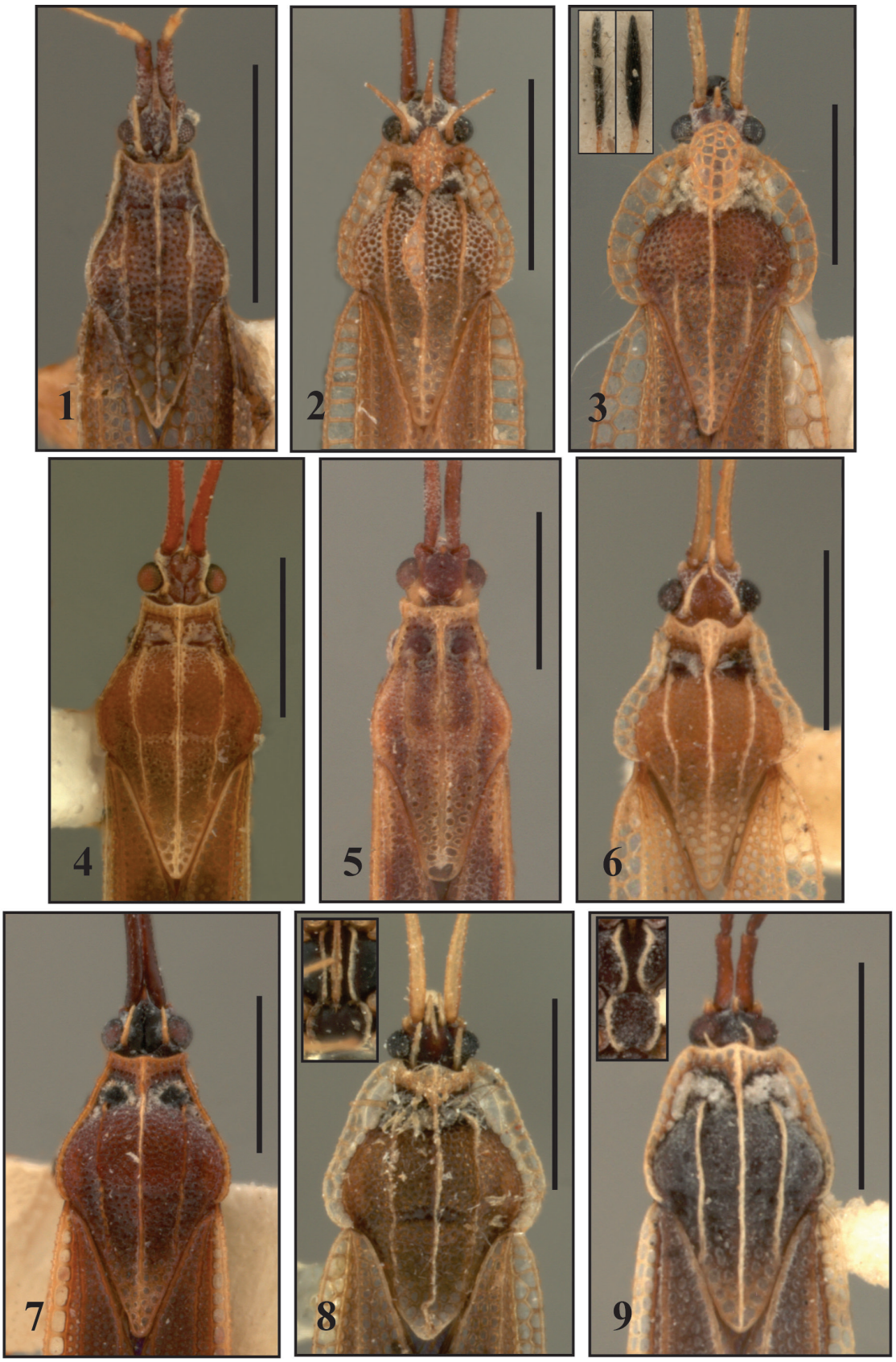
Montemayor, S. I. 2012. *Niborskiana*: A new genus to accommodate *Tigava gracilis* Monte and *Tigava notablis* Drake (Hemiptera: Heteroptera: Tingidae). *Zootaxa*, 3202: 51–57.

Montemayor, S. I. and L. A. A. Costa. 2009. Systematic revision of *Macrotingis* and phylogenetic analysis of the genera *Macrotingis* and *Ceratotingis* (Heteroptera: Tingidae). *European Journal of Entomology*, 106: 631–642.

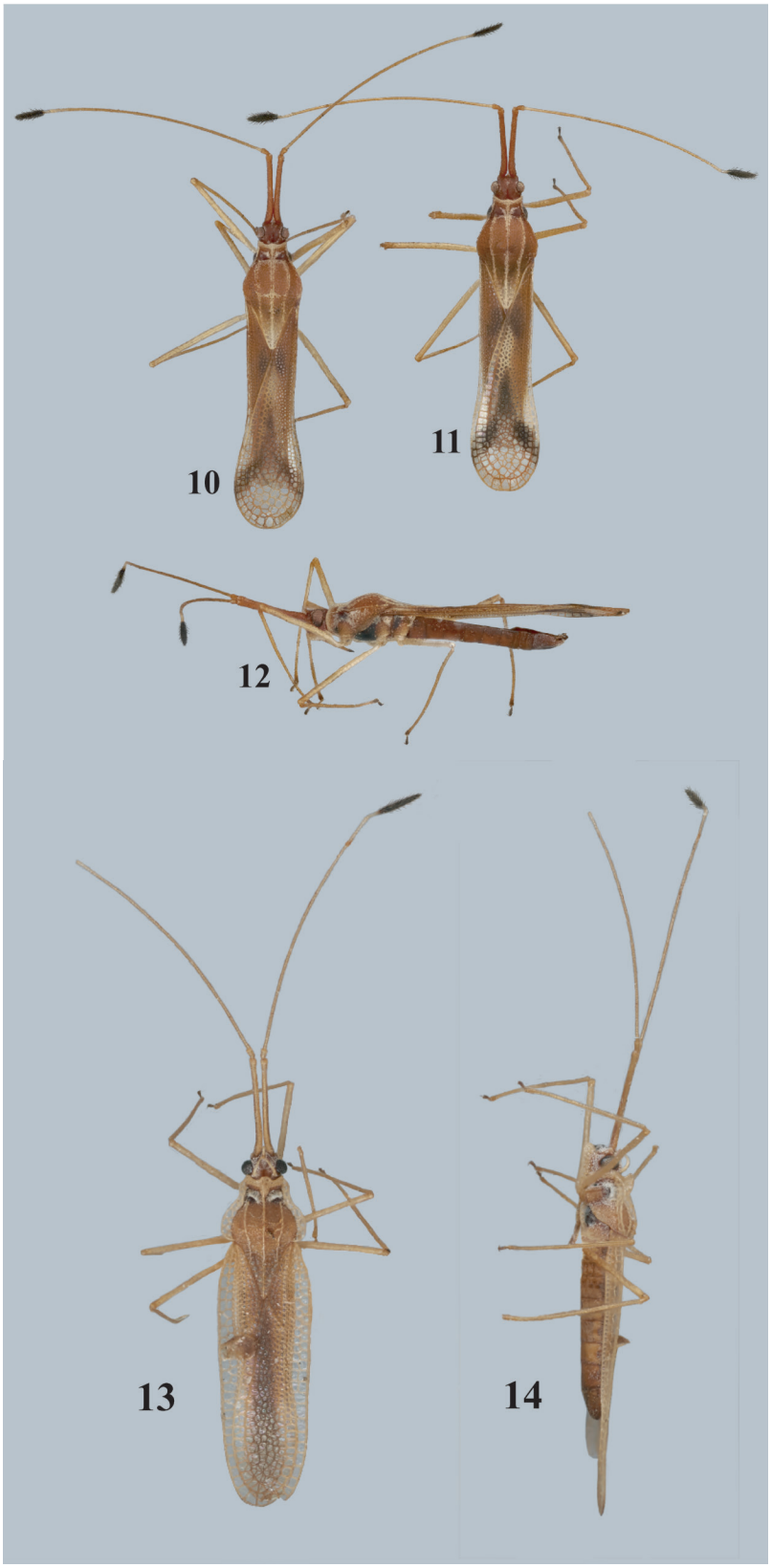
Stål, C. 1860–1862. Bidrag till Rio Janeiro-traktens Hemipter-fauna. *Kongliga Svenska Ventenskaps-Akademiens Handlingar*, 2(7): 1–84 (1860); 3(6): 1–75 (1862).

Stål, C. 1873. Enumeratio Hemipterorum: Bidrag till en förteckning öfver alla hittills kända Hemiptera, jemte systematiska meddelanden. *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, Part 3, 11(2): 1–163.

Recibido: 20 de mayo 2017
Aceptado: 7 de junio 2017



Figures. 1–9. Heads and pronota of the *Tigava* complex. Scale bar = 1 mm. 1, *Campylotingis mollicula*. 2, *Ceratotingis rafaeli*. 3, *Macrotingis biseriata* (inset: dorsal and lateral view of distiflagellomere). 4, *Mexicotingis brailovskyi*. 5, *Niborskiana notablis*. 6, *Paraceratotingis convergens*. 7, *Tigava ceibae*. 8, *Tingicesa anonae* (inset: ventral view of pro- and mesosternal laminae). 9, *Vatiga manihotae* (inset: ventral view of pro- and mesosternal laminae).



Figs. 10–12. *Mexicotingis brailovskyi*. 10, Holotype male, dorsal aspect. 11, Paratype female, dorsal aspect. 12, Holotype male, lateral aspect. Figures 13-14. *Paraceratotingis convergens*. 13, Holotype male, dorsal aspect. 14, Holotype male, lateral aspect.