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New combinations on *Paratibraca* Campos & Grazia, 1995 (Hemiptera: Pentatomidae), with description of a new species

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Abstract. New combinations for *Paratibraca amazonica* (Gonçalves & Campos, 2016) **comb. n.**, *Paratibraca dubia* (Campos & Souza, 2016) **comb. n.** and *Paratibraca spinosa* (Campos & Grazia, 1998) **comb. n.** are proposed. *Paratibraca rideri* Barros, Barão & Grazia **sp. nov.** from Brazil is described. Additions to the genus description, and photographs of type-specimens are provided.

Keywords: *Mecocephala* group, stink bug, *Oriza sativa*.

Paratibraca Campos & Grazia, 1995 (Hemiptera: Pentatomidae) used to be a monotypic genus, included in the *Mecocephala* group (Carpocorini Mulsant & Rey, 1866). The latter include many species of economic importance associated with rice crops (Barros et al. 2020a; 2020b). Because of the head and male genitalic morphologies *Paratibraca* have been associated with *Hypatropis* Bergröth, 1891, *Mecocephala* Dallas, 1851, *Glypheapomis* Berg, 1891, and *Tibraca* Stål, 1860. Morphological variation of male genitalia of *Paratibraca infuscata* Campos & Grazia, 1995 is known for distinct populations (Campos & Grazia 1995) highlighting male genitalic variation for this species or the necessity of better species delimitation. In the last two decades, *Glypheapomis* was revised and several species described, including *Glypheapomis spinosa* Campos & Grazia, 1998 (Campos & Grazia 1998), *Glypheapomis amazonica* Gonçalves & Campos, 2016 and *Glypheapomis dubia* Campos & Souza, 2016 (Bianchi et al. 2016). Detailed examination of the seven species currently included in *Glypheapomis* showed that *G. amazonica*, *G. dubia* and *G. spinosa* share diagnostics characters to the species included in *Paratibraca*, such as the outline of mandibular plates, form of bucculae, outline of anterolateral margins of pronotum, and genitalic characters of both sexes. Results of an ongoing study about the phylogenetic relationships within the *Mecocephala* group (Barros et al. in prep.) also suggested that those three species are more related to *Paratibraca* than to *Glypheapomis*. Here, we propose new combinations, describe a new species, and update the genitalic terminology for *Paratibraca*.

Type-material of all species included in *Glypheapomis*, *Paratibraca*, and allied genera were studied, from type specimens or images of type specimens. Types specimens of species treated here are deposited in either of these institutions: INPA-Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil; MZUSP-Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil; RMNH-Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands; UFRG-Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil; USNM-National Museum of Natural History, Washington D.C., United States. Preparation of the photographs, terminology of general and genitalic morphologies, as well as for the thoracic scent efferent system, follows Barros et al. (2021).

Paratibraca Campos & Grazia, 1995
Figs. 1A-C, 2A-K

Type-species. *Paratibraca infuscata* Campos & Grazia, 1995, by monotypy.

Paratibraca Campos & Grazia, 1995: 163-171, figs 1-15; Barros et al. 2020b: 321, 353-355, tabs. 1, 2.

Glypheapomis Berg, 1891 (partim); Campos & Grazia 1998: 205-207, figs 1, 3-6, 19, 24-26, 36, 40; Bianchi et al. 2016: 445-450, figs 1-3, 5a-f, 6a-b, 7a, c, tab. 1.

Diagnosis. Anterolateral margins of pronotum flat; posterior margin of pronotum slightly convex, humeral angles produced, acute or rounded apically. Ostiole of external scent efferent system (ESES) elliptical; peritreme spout or bean-shaped; outer margin of metapleural evaporatorium convex or concave. Scutellum as wide as long. Apex of radial vein calloused. Spiracles not visible in abdominal sternite 2. Superior layer of ventral rim covering parameres; lateral margin of each projection of superior layer of ventral rim of pygophore entire; ventral rim with one or a pair of processes, of variable size, visible in lateral view (Figs. 2C, 2H), segment X quadrangular or rectangular. *Processus capitati* short or long in relation to *phallotheca* distal margin; conjunctiva with a pair of processes truncate apically, and lateral lobes present or not. Mesial margins of valvifers 8 reflected or not; posterior margins of valvifers 9 convex, with or without processes. Median wall of vesicular area cylindrical sub-proximally; *ductus receptaculi* into vesicular area rectilinear or coiled; distal *ductus receptaculi* short or long; diameter of anterior annular flange equal to *pars intermedialis* length; *pars intermedialis* enlarged or fanfolded.

Distribution. Panama (Chiriqui); Trinidad and Tobago (Curepe); Colombia (Meta, Tolima, Santander, and Valle del Cauca); Suriname (Clevia and Paramaribo); Brazil (Amazonas, Pará, Tocantins, Maranhão, Mato Grosso, Goiás, and São Paulo); Peru (Loreto) and Bolivia (Santa Cruz).

Included species

Paratibraca infuscata Campos & Grazia, 1995: 165-171 [original description].

Paratibraca spinosa (Campos & Grazia, 1998) **comb. n.** (Fig. 1A).

Glypheapomis spinosus Campos & Grazia, 1998: 205-207 [original description].

Paratibraca dubia (Campos & Souza, 2016) **comb. n.** (Fig. 1B).

Glypheapomis dubia Campos & Souza, 2016: 445-447 [original description].

Paratibraca amazonica (Gonçalves & Campos, 2016) **comb. n.** (Fig. 1C).

Glyphepomis amazonica Gonçalves & Campos, 2016: 447-450 [original description].

Paratibraca rideri Barros, Barão & Grazia **sp. nov.** (Fig. 2).

Paratibraca rideri Barros, Barão & Grazia **sp. nov.**

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Fig. 2A-K

Type material. Holotype: ♀, Brazil, Pará, Santarém, 17-26.I.2016, D. Maggio leg., (INPA). Paratypes: 3 ♀ (UFRG) 1 ♂ (INPA), same data as holotype.

Etymology. This species is dedicated to David Rider in recognition of his great contribution to the knowledge of heteropteran systematics.

Diagnosis. Relatively larger than other congeners (see Measurements), general body color light brown dorsally and dark brown ventrally, humeral angles produced and rounded apically, the pygophore trapezoidal, with posterolateral angles rounded, opening of genital cup broad, and inferior layer produced, the posterior margins of valvifers 9 convex and laterotergites 9 longer than valvifers 8.

Description. General colour light brown dorsally; ventral surface dark brown; body densely punctate with dark punctures. Ocelli red. Antennomere 4 and 5 mostly dark brown. Callosity of radial vein concolor with surface of hemelytra. Pro, meso, metasternum and evaporatorium dark-brown; peritreme of ESES light brown. Legs light brown, with dark spots. Body oval. Dorsal and ventral surface of body convex (Fig. 2C). Head longer than wide (Fig. 2D). Mandibular plates rounded apically, shorter than clypeus; outer margins of mandibular plates sinuous and lower than inner margins. Clypeus narrower basally than apically, apex obtuse; clypeus in a higher level than mandibular plates in lateral view; clypeal suture beginning after an imaginary line crossing anterior margin of compound eyes. Antenniferous tubercles visible in dorsal view, each with an obtuse process laterally. Proportions of antennomeres: $1 > 2 < 3 > 4 < 5$. Antennomere 1 not reaching apex of head; antennomere 3 cylindrical; antennomere 4 conical, slightly flattened dorsally, slightly grooved dorsally. Bucculae rectilinear, tapering toward base of the head, not reaching its base. Labium reaching abdominal sternite 3 medially (Fig. 2B). First labiomere contained between bucculae. Pronotum trapezoidal; each anterior angle of pronotum with an obtuse process directed laterally; anterolateral margins of pronotum concave, flat and smooth; humeral angles produced, rounded apically; posterolateral margins of pronotum sinuous; posterior margin of pronotum slightly convex (Fig. 2D). Mesosternal carina slightly elevated and smooth. Metasternum with a shallow groove. Ostiole of ESES elliptical, opening posterolaterally; periostolar depression present; each ostiolar peritreme spout-shaped, long, occupying half of the distance to lateral margin of evaporatorium. Evaporatorium punctate, occupying more than half of the width of meso and metapleuron. Anterolateral margins of metapleuron rounded. Evaporatorium on mesopleuron surpassing the limits of mesocoxal sutures, reaching its anterior and posterior lateral angles, and the outer margin (Fig. 2E). Metathoracic spiracle wide. Femora subequal than tibiae in length. Tarsi 3-segmented. Scutellum longer than wide (Fig. 2A); apex rounded, surpassing the posterior margin of the abdominal tergite 5. Basal angles of scutellum with foveae smaller than the diameter of a compound eye. Corium longer than scutellum, surpassing apices of abdominal tergite 5; apex of radial vein calloused; veins of membrane linear. Membranal suture sinuous. Apex of hemelytra not surpassing apex of body. Connexivum exposed (Fig. 2A). Posterolateral angles of sternites unarmed, straight. Callus mesial to each spiracle (Fig. 2C).

Male genitalia. (Figs. 2F-H). Genital cup of pygophore broad, opened dorsoposteriorly, and occupying more than half the length of pygophore. Middle region of dorsal rim entire, and extension of dorsal rim not produced (Fig. 2F). Layers of ventral rim not separated by a carina; area between layers depressed and striated (Fig. 2G). Superior layer of ventral rim projected over genital cup, developed laterally to segment X, covering parameres; lateral margins of superior layer of ventral rim entire, in caudal view; with a pair of superior processes.

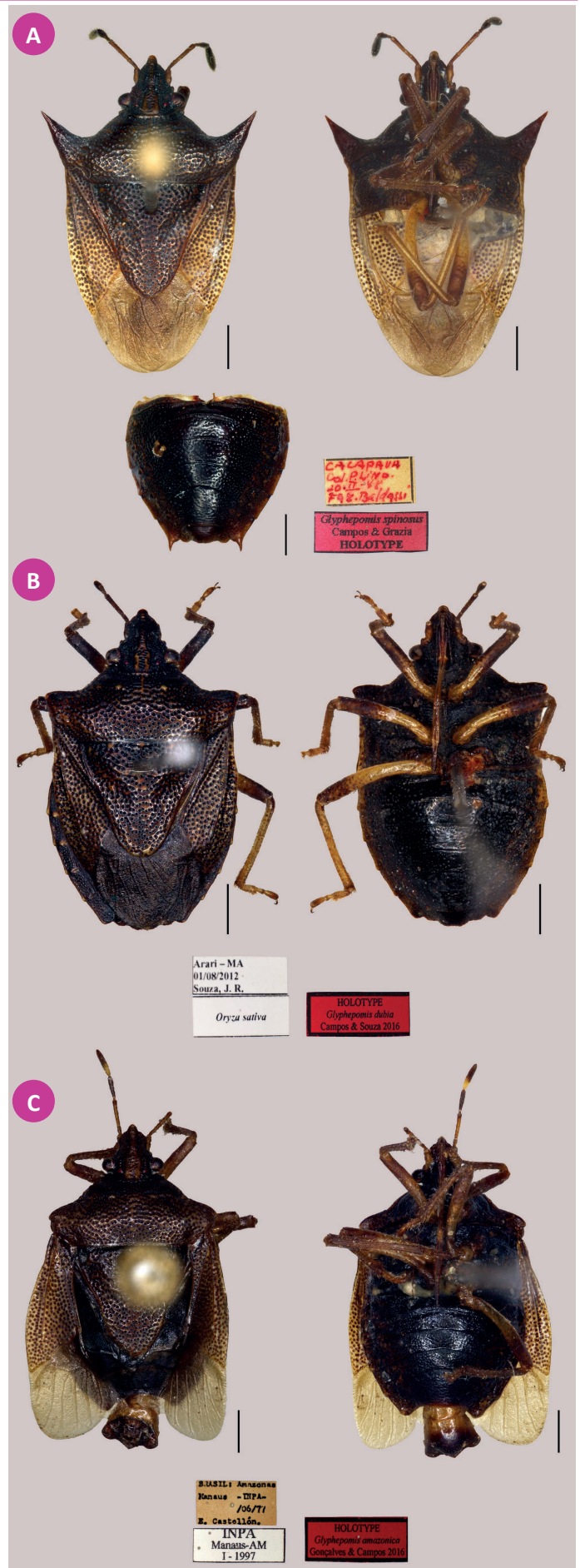


Figure 1. Dorsal and ventral habitus of holotypes of *Paratibraca* species. A-*Paratibraca spinosa* **comb. n.**; B-*Paratibraca dubia* **comb. n.**; C-*Paratibraca amazonica* **comb. n.**

Inferior layer of ventral rim with a pair of processes (Fig. 2H). Segment X rectangular, not carinate, without processes. Parameres present, crown reduced. The male genitalia was not dissected because this species is represented by a single male specimen.

Female genitalia. Valvifers 8 flat, sub equal to valvifers 9 in length, partially covering valvifers 9, mesial margins juxtaposed, posterior margins sinuous. Valvulae 8 not visible externally (Figs. 2I-J). Valvifers 9 depressed, leveled to segment X, with esclerotized lateral arms attaining anterior margins of laterotergites 9, anterior margins straight, posterior margins convex. Laterotergites 9 surpassing abdominal tergite 8, mesial margins divergent, posterior margins obtusely projected. Valvulae 9 with 1+1 medially sclerotized areas (Fig. 2K). Ring sclerites elliptical. Arcuate posterior portion of thickening of

vaginal intima longer than the round anterior portion. Median wall of vesicular area cylindrical subproximally. Proximal *ductus receptaculi* long in relation to length of vesicular area, twisted, and diameter equal and aspect straight into vesicular area. Distal *ductus receptaculi* short in relation to vesicular area, twisted. Annular flanges parallel to each other, diameter of anterior annular flange equal to *pars intermedialis* length and posterior annular flange wider than *capsula seminalis*. *Pars intermedialis* fanfolded. *Capsula seminalis* globose and shorter than the *pars intermedialis* (Fig. 2K).

Measurements (mean \pm standard deviation, mm). Total length: 11.12 ± 2.32 ; Abdominal width: 6.96 ± 1.16 ; Head length: 2.15 ± 0.13 ; width: 1.92 ± 0.07 ; Interocular distance: 1.10 ± 0.04 ; Clypeus length: 1.23 ± 0.03 ; Antennomeres. 1: 0.59 ± 0.04 ; 2: 0.47 ± 0.03 ; 3: $1.18 \pm$



Figure 2. *Paratibraca rideri* sp. nov.. A-B-Habitus in dorsal and ventral views of holotype; C-habitus lateral of male, paratype; D-Head and pronotum of holotype; E-evaporatorium of holotype; F-H-Pygophore in dorsal, posterior and ventral view of male paratype; I-J-Genital plates in lateral and posteroventral views of holotype; K-Female receptaculum seminis and aussenwand of female paratype. Scale bars = A-C: 1.0 mm; D-K: 0.5 mm. **Abbreviations:** aaf-anterior annular flanges; alvr-area between layers of ventral rim; ddr-distal *ductus receptaculi*; dr-dorsal rim; ev-evaporatorium; ilvr-inferior layer of ventral rim of pygophore; la8-laterotergites 8; la9-laterotergites 9; ms-mesopleuron; mt-metapleuron; paf-posterior annular flange; pdr-proximal *ductus receptaculi*; pi-*pars intermedialis*; pilvr-process of inferior layer of ventral rim; pslvr-process of superior layer of ventral rim; rs-ring sclerites; slvr-superior layer of ventral rim of pygophore; tvi-thickening of vaginal intima; va-vesicular area; vf8-valvifers 8; vf9-valvifers 9; vr-ventral rim; x-segment X.

0.04; 4: 0.86 ± 0.03 ; 5: 1.09 ± 0.03 ; Labiomeres. 1: 0.94 ± 0.12 ; 2: 1.57 ± 0.16 ; 3: 1.11 ± 0.03 ; 4: 0.85 ± 0.04 ; Pronotum. length: 2.35 ± 0.18 ; width: 5.53 ± 0.41 ; Scutellum. length: 3.69 ± 0.20 ; width: 3.80 ± 0.19 .

Distribution. Brazil (Pará).

Comments. *Paratibraca rideri* sp. nov. and *P. infuscata* share similar dorsal facies, peritreme spout and long, anterolateral margins of metapleural evaporatorium rounded, dorsal rim of pygophore with marginal processes, inferior layer of ventral rim of pygophore with a pair of processes, segment X without processes, and the annular flanges wider and *pars intermedialis* fanfolded; in the other congeners the *pars intermedialis* is enlarged. The remarkable character shared by both species with *P. dubia* and *P. spinosa* is the distal *ductus receptaculi* twisted and short. *P. rideri* and *P. amazonica* can be easily distinguished because the latter is the smallest of the species and present the genitalic morphology of both sexes different from its congeners, such as: inferior layer of ventral rim of pygophore with one process; phallic characters; *ductus receptaculi* narrower, long and coiled in and out the vesicular area.

Taxonomic Authorities

Carpocorini Mulsant & Rey, 1866 in Mulsant & Rey (1866). *Glypheapomis* Berg, 1891 in Berg (1891). *Glypheapomis amazonica* Gonçalves & Campos, 2016 in Bianchi et al. (2016). *Glypheapomis dubia* Campos & Souza, 2016 in Bianchi et al. (2016). *Glypheapomis spinosus* Campos & Grazia, 1998 in Campos & Grazia (1998). *Hypatropis* Bergroth, 1891 in Bergroth (1891). *Mecocephala* Dallas, 1851 in Dallas (1851). *Paratibraca* Campos & Grazia, 1995 in Campos & Grazia (1995). *Paratibraca infuscata* Campos & Grazia, 1995 in Campos & Grazia (1995). *Tibraca* Stål, 1860 in Stål (1860).

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Authors' Contributions

All authors contributed to the writing and reviewing of this work.

Conflict of Interest Statement

No potential conflict of interest was reported by the authors.

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