



On the Identity of the Mirine Plant Bug *Capsus bimaculatus* Fabricius (Hemiptera: Miridae): New Synonyms, and Lectotype Designation

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Abstract

The identity of *Capsus bimaculatus* Fabricius, 1803 is revised, as well as the varieties described by Berg (1892): *Cal. (Par.) bimaculatus typicus*, *Cal. (Par.) bimaculatus vittatus*, and *Cal. (Par.) bimaculatus niger*. The examination of all the bibliographies treating these names as well their type specimens resulted in the selection of a lectotype for *C. bimaculatus*, the synonymization of the three varieties described by Berg, selecting *Taedia typica* (Berg, 1892) as the valid name, and other taxonomic problems traced during the revision process are addressed.

Key words: *Taedia*, *Paracalocoris*, lectotype, Miridae, Heteroptera, Hemiptera

Fabricius (1803), in his *Systema Rhyngotorum* (p. 243), described *Capsus 2maculatus* from *America meridionali* (currently recognized as South America). Stål (1868) transferred *C. bimaculatus* to the genus *Calocoris* and mentioned that the type specimens were mutilated: “*Exempla typica valde mutila*”; and gave measurements for a male and a female. Afterwards, Walker (1873) reduced *Calocoris* to subgeneric status and treated the species as *Capsus (Calocoris) bimaculatus*.

There is no other mention of the species in the literature until Berg (1892), who treated the species as *Calocoris (Paracalocoris) bimaculatus* (Fabricius) from Amer. merid., Argentina Republic (the Argentinean Misiones Territory [Misiones Province]), and described the three varieties:

α *Cal. (Par.) bimaculatus typicus* (Figs. 2, 4)

β *Cal. (Par.) bimaculatus vittatus*

γ *Cal. (Par.) bimaculatus niger*

Following the ICZN (2000) Art.45.6.4 stating “it is subspecific if first published before 1961 and its author expressly used one of the terms “variety” or “form”.....”, Berg’s (1892) three varieties should be considered available names introduced at the subspecific level.

Calocoris (Paracalocoris) bimaculatus typicus Berg, 1892

Calocoris (Paracalocoris) bimaculatus vittatus Berg, 1892

Calocoris (Paracalocoris) bimaculatus niger Berg, 1892

We also interpret that Berg considered the name *typicus* to be the “typical” form of *bimaculatus* (i.e., *bimaculatus bimaculatus* as we would name this nominal taxon according to the current rules of nomenclature). According to the Article 46.1 of the ICZN, Fabricius (op. cit.) is deemed to have established the name *bimaculatus* simultaneously at either rank in the species group.

Later, Reuter (1907) considered *Paracalocoris* a valid generic name and recognized all three varieties described by Berg based on specimens from Rio Grande do Sul (Brazil). In this work, he listed these varieties as follows:

Capsus (Paracalocoris) bimaculatus F.

Calocoris (Paracalocoris) id. typicus Berg

Calocoris (Paracalocoris) bimaculatus niger Berg

Calocoris (Paracalocoris) bimaculatus vittatus Berg

The different ways treating the name *typicus* and the other two varieties implies that he also considered the name “*typicus*” as the “typical” form of Fabricius’ species, equivalent to *Calocoris (Paracalocoris) bimaculatus bimaculatus* Fabricius, 1803, the nominotypical subspecific name.

Carvalho (1952) synonymized *Paracalocoris* Distant under *Taedia* Distant. These two genera were described by Distant (1883), with *Taedia* described first on page 262, including only one species (*T. bimaculata*, type species by monotypy) and *Paracalocoris* described on the next page, with seven included species. Distant (1883) did not designate a type species for *Paracalocoris*, but later (Distant 1904) designated *P. jurgiosus* Distant. When establishing the synonymy of the two genera, a homonym was produced: *Taedia bimaculata* Distant, 1883 and *Taedia bimaculata* (Fabricius, 1803). This homonymy was fixed a few years later when Carvalho (1954) gave the new name *T. distantina* for *Taedia bimaculata* Distant, 1883. He also indicated that the type specimen of *Paracalocoris bimaculatus* (Fabricius, 1803) is a male and that it belongs to the genus *Taedia* and gave a short description of its color pattern. He also stated that “this species is not the same as the one treated by Berg or Reuter as *bimaculatus* Fabricius”, and therefore proposed a new name *Taedia sulina* Carvalho, 1954 for Berg’s and Reuter’s taxon.

Carvalho & Gomes (1971) revised the genus *Taedia* and treated the species as follows:

- *Taedia sulina* Carvalho, 1954 from Argentina (Misiones) and Brazil
- *Taedia sulina* var. *vittata* Berg, 1892 from Argentina (Misiones) and Brazil
- *Taedia sulina* var. *niger* Berg, 1892 from Brazil.

They also described a new variety from Brazil named *Taedia sulina* var. *fasciata*. They did not mention the type material, but the way they treated the species, it can be inferred that they considered Berg’s variety *typicus*, as what should have been named *T. sulina sulina*.

Carvalho & Carpintero (1992), in their catalog of Berg’s type specimens, referred to *Calocoris (Paracalocoris) bimaculatus* (Fabr., 1803) as “(=*Taedia sulina* (Berg, 1891 (*sic*)) Carvalho, 1954)”. This listing is erroneous since “*sulina*” was proposed by Carvalho (1954), not by Berg. Carvalho & Carpintero (1992) also designated lectotypes from Berg material named as the varieties *T. typicus* and *T. vittatus* and recognized the one specimen labeled *T. niger* as the holotype.

Coscarón & Carpintero (1996), in the list of type specimens of Miridae deposited in the Museo de La Plata, included the following names (and corresponding type specimens):

- *Taedia sulina* var. *vittata* (Carvalho, 1954) as valid name for *Paracalocoris bimaculatus vittatus* Berg, 1892
- *Taedia sulina* var. *typica* (Carvalho, 1954) as valid name for *Paracalocoris bimaculatus typica* Berg, 1892
- *Taedia sulina* var. *niger* (Carvalho, 1954) as valid name for *Paracalocoris bimaculatus niger* Berg, 1892

In this work, the authors mentioned the original names of the varieties as for the combinations proposed by Reuter, not the original formula given by Berg.

Coscarón et al. (2015), in their checklist of type specimens housed at the MLP, erroneously mentioned some of these specimens as follows:

bimaculatus, Paracalocoris Berg, 1892a (Figs 12 B, C)

Anales de la Sociedad Científica Argentina. 33: 90

SYNTYPE, female, Argentina, Misiones; MLP: 880/1

SYNTYPE, 2, females, Argentina, Misiones; MLP: 256/1-2

Valid name: *Taedia sulina* Carvalho

They did not use the combinations used by Berg, they omitted the varieties he described, excluded the two specimens of the variety ‘*vittata*’, and did not mention the designation of a lectotype for *typicus* made by Carvalho & Carpintero (1992).

Results

We examined Berg’s collection deposited at the Museo de La Plata and found the specimens labeled by Berg according to the three names he established in his 1892 work. We observed that none of the specimens include the classical label of “*typus*” that he usually used in his newly described taxa. Here we include the details of every label attached to each specimen, on the first line in bold Berg’s labels; and on the second line, labels added later by Carvalho & Carpintero: the number on each specimen corresponds to Carvalho’s numbering of his new names/ type specimens, between brackets the sex of the specimen. Lastly, we have also given them catalog numbers for the MLP collection. Label data are cited verbatim. Contents of different labels are separated with ‘/’ and remarks are given in brackets ‘[]’.

- **[female] Misiones/ *Calocoris (Paracalocoris) bimaculatus* 03-68 (F.) Stål/ *typicus* var. Berg/**
256/ Lectotypus C & C, 1990/ *Taedia sulina* var. *typica* B, 1891 D: Carpintero/ HE-10656
- **female Misiones/**
256/ Paralectotypus Carv. & Carp., 1990/ *Taedia sulina* var. *typica* B, 1891 Det: Carpintero/ HE-10657
- **[male] Misiones/ *vittatus* var. Berg/**
258/ Lectotypus C & C, 1990/ *Taedia sulina* var. *vittata* B, 1891 D: Carpintero/ HE-10658
- **[male] Misiones/**
258/ Paralectotypus Carv. & Carp., 1990/ *Taedia sulina* var. *vittata* B, 1891 D: Carpintero/ HE-10659
- **[female] Misiones/ *niger* var. Berg/**
880/ Lectotypus C & C, 1990 [This is an obvious error in labeling. We have replaced the Lectotype label with a Holotype label]/ *Taedia sulina* var. *nigra* B, 1891 det. Carpintero/ HE-10660

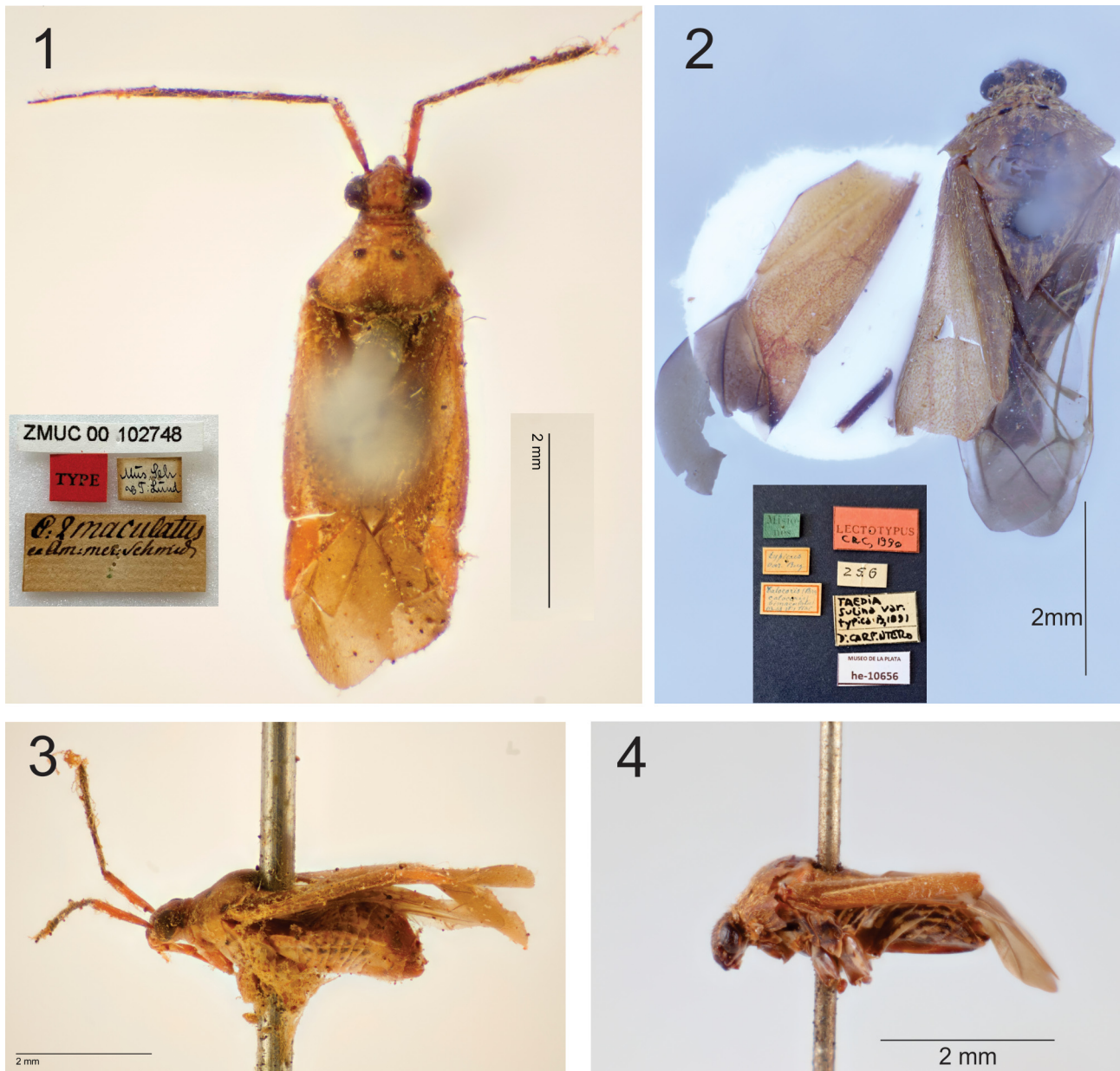
After examining these specimens, we consider the three names as synonyms and choose the epithet “*typicus*” as valid species name.

We also examined Fabricius’ type specimens of *Capsus bimaculatus* to corroborate the identity of the species, and Carvalho’s statements about Berg’s material and identity. We looked at Fabricius’ collection database at the Natural History Museum of Denmark, and we found two specimens associated with the name *Capsus bimaculatus*. We asked the curator, Prof. Lars Vilhelmsen, for images of both specimens, and he kindly sent us dorsal, lateral, and ventral views, and informed us that Fabricius’ collection was split in two institutions, although it is all actually housed in the Natural History Museum of Denmark in Copenhagen. One specimen belongs to the Zoological Museum of the University of Kiel (zmuc00102747) and the other to the Copenhagen Museum (zmuc00102748) (Figs 1, 3).

Both specimens are in bad shape, but the coloration and external morphological characters that can be studied through the photographs are consistent between the two specimens, so we have concluded that both belong to the same species. We also agree with Carvalho that they are a different species from Berg’s specimens. Specimen zmuc00102748 is a male as can be seen in the lateral view (Fig. 3) and corroborated by Prof. Vilhelmsen; specimen zmuc00102747 also seems to be a male according to the image. Although Fabricius did not specify the number of specimens he studied, Stål (1868) in his Hemiptera Fabriciana studied Fabricius’ specimens and referred to them as more than one specimen, at least a male and a female. When Carvalho (1954) transferred *Paracalocoris bimaculatus* (Fabricius, 1803) to *Taedia*, he stated that there was one male type specimen of *Capsus bimaculatus* Fabricius. He did not indicate in which collection it is deposited nor any other information about the specimen.

Our findings indicate that Fabricius described *Capsus bimaculatus* based on at least two males, but we are uncertain which specimen was examined by Carvalho. We therefore select the syntype specimen zmuc00102748 of *Capsus bimaculatus* Fabricius, 1803 as lectotype (Figs. 1, 3), leaving the original syntype zmuc00102747 as a paralectotype.

All mentions of *C. bimaculatus* from Argentina by previous authors i.e., Pennington 1921; Carvalho 1959; Carvalho & Gomes 1971; Carpintero & Carvalho 1993, Coscarón 2017) are erroneous.



FIGURES 1–4. Type specimens of the taxa studied. 1. *Capsus bimaculatus* Fabricius, 1803, Lectotype habitus, dorsal view, and labels; 2. *Calocoris (P.) typicus* Berg, 1892, Lectotype habitus, dorsal view, and labels; 3. *Capsus bimaculatus* Fabricius, 1803, Lectotype habitus, lateral view; 4. *Calocoris (P.) typicus* Berg, 1892, Lectotype habitus, lateral view.

Conclusions

- The syntype specimen of *Capsus bimaculatus* Fabricius, 1803 coded zmuc00102748 is designated as lectotype, and is deposited in the Natural History Museum of Denmark.
- *Taedia bimaculata* (Fabricius, 1803) is a valid name assigned to a species different than the one studied and named by Berg (1892).
- The three subspecific names introduced by Berg (1892) are available and considered synonyms.
- *Taedia sulina* Carvalho, 1954 is an available name for Berg's and Reuter's taxon.
- Following the Principle of Priority (Art. 23), Berg's species is given the following name:

***Taedia typica* (Berg, 1892)**

(Figs. 2, 4)

Calocoris (*Paracalocoris*) *bimaculatus* var. *typicus* Berg, 1892: 91; *Calocoris* (*Paracalocoris*) id. *typicus*: Reuter, 1907: 52; *Calocoris* (*Paracalocoris*) *bimaculatus*: Carvalho & Carpintero, 1992: 89 [lectotype designation]; *Taedia sulina typica*: Carpintero & Carvalho, 1993: 408; *Taedia sulina* var. *typica*: Coscarón & Carpintero 1996: 12; *Taedia sulina*: Carvalho & Gomes, 1971: 250, 283; *Taedia sulina* var. *typica*: Carvalho & Costa 1993: 218; *Paracalocoris bimaculatus*: Coscarón et al., 2015: 19 (in part).

Calocoris (*Paracalocoris*) *bimaculatus* var. *vittatus* Berg, 1892: 91; *Calocoris* (*Paracalocoris*) *bimaculatus vittatus*: Reuter, 1907: 52; *Calocoris* (*Paracalocoris*) *bimaculatus* var. *vittata*: Carvalho & Carpintero, 1992: 89 [lectotype designation]; *Taedia sulina vittata*: Carpintero & Carvalho, 1993: 408; *Taedia sulina* var. *vittatus*: Coscarón & Carpintero, 1996: 13; *Taedia sulina* var. *vittata*: Carvalho & Gomes, 1971: 251, 252, 283; *Taedia sulina* var. *vittata*: Carvalho & Costa, 1993: 220. NEW SYNONYM

Calocoris (*Paracalocoris*) *bimaculatus* var. *niger* Berg, 1892: 91; *Calocoris* (*Paracalocoris*) *bimaculatus niger*: Reuter, 1907: 52; *Calocoris* (*Paracalocoris*) *bimaculatus* var. *niger*: Carvalho & Carpintero, 1992: 89 [holotype mention]; *Taedia sulina niger*: Carpintero & Carvalho, 1993: 408; *Taedia sulina* var. *niger*: Coscarón & Carpintero, 1996: 7; *Taedia sulina* var. *niger*: Carvalho & Gomes, 1971: 251, 285; *Taedia sulina* var. *nigra*: Carvalho & Costa, 1993: 218; *Paracalocoris bimaculatus*: Coscarón et al., 2015: 19 (in part). NEW SYNONYM

Taedia sulina Carvalho, 1954: 426; Carvalho & Froeschner, 1987: 215; Carvalho, 1959: 263; Carvalho & Afonso, 1977: 12; Schuh, 1995: 958; Coscarón, 2017: 168; Schuh, 2002–2013 [online catalog]. NEW SYNONYM

Distribution: Argentina (Misiones) and Brazil. The reference to Corrientes Province comes from Carpintero & Carvalho (1993) and is erroneous since it refers to the type specimen which is known from Misiones Province in Argentina.

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Author Contributions

MCM and PMD contribute equally to the elaboration, interpretation and writing of the manuscript.

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