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# A NEW SPECIES OF *GIBBOBRUCHUS* FROM BRAZIL, WITH NEW HOST PLANT AND DISTRIBUTION RECORDS FOR THE GENUS (COLEOPTERA: CHRYSOMELIDAE: BRUCHINAE)

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ABSTRACT

*Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.** (Coleoptera, Chrysomelidae, Bruchinae) is described from Brazil (state of Goiás) and it is here included in an updated key to the *Gibbobruchus* Pic species. The dorsal aspect, male and female pygidium and male genitalia are illustrated. This new species develops in seeds of 6 *Bauhinia* L. (Fabales: Fabaceae: Caesalpinioideae) species. New host plant records for other 4 species of *Gibbobruchus* are presented. Considering the host plants of *G. bergamini* **sp. nov.**, a total of eleven new hosts are added to the genus; with exception of *Phanera* Lour. (Fabales:Fabaceae)- which we recorded the first time for *Gibbobruchus*, all *Gibbobruchus* spp. were collected in *Bauhinia* seeds. Geographic distribution data and further comments on host plant associations are also included.

Key Words: new species, key, Neotropical region, seed beetles, taxonomy, host plants

RESUMEN

*Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.** (Coleoptera, Chrysomelidae, Bruchinae) se describe para Brasil (Estado de Goiás) y se la incluye en una clave actualizada de las especies de *Gibbobruchus* Pic. Se encuentran ilustrados el aspecto dorsal, pigidio del macho y hembra y la genitalia masculina. Esta nueva especie se desarrolla en las semillas de seis especies de *Bauhinia* L. (Fabales: Fabaceae: Caesalpinioideae). Se presentan nuevos registros de plantas hospederas para otras cuatro especies de *Gibbobruchus*. Incluyendo las plantas hospederas de *G. bergamini* **sp. nov.** un total de once nuevos hospederos se añaden al género; con excepción de *Phanera* Lour, por primera vez registrado en *Gibbobruchus*, todos ellos fueron recolectados en las semillas de *Bauhinia*. También se incluyen datos de distribución geográfica y comentarios sobre asociaciones con las plantas.

Palabras Clave: especie nueva, clave, región Neotropical , escarabajos de semillas, taxonomía, plantas hospederas

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*Gibbobruchus* Pic is placed in the subtribe Acanthoscelidina of Bruchini that comprises about half of all bruchines and has no precise limits (Silva & Ribeiro-Costa 2008). Recently, a cladistic study of *Gibbobruchus* was developed (Manfio et al. 2013) to improve the understanding of this subtribe and specially to the group *Merobruchus* where *Gibbobruchus* is included with more 6 genera (Silva & Ribeiro-Costa 2008). Manfio et al. (2013) synonymized 2 species names described other 2 new species, resulting in 13 valid species. The phylogenetic analysis recovered *Gibbobruchus* as a monophyletic group supported by 7 synapomorphies and composed of 5 monophyletic species groups. It occurs in the Nearctic and Neotropical regions, from the USA (Washington State) to Argentina (Buenos Aires Province), but more than a half of the species are exclusive to South America. Species with known host associations feed within seeds of *Bauhinia* L. (Fabales: Fabaceae: Caesalpinioideae: Cercideae), although there is a shift to the closely related genus *Cercis*

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L. (Fabales: Fabaceae: Caesalpinioideae: Cercideae) in the Nearctic region.

In our quest to elucidate the South American fauna of the Bruchinae, we collected specimens in savannah areas from Central Brazil, State of Goiás. The results presented in this paper include the recognition of an additional *Gibbobruchus* species from savannah, which brings the total to 14 species of *Gibbobruchus*, new host plant records for 4 described species placed in 2 different species groups and new geographic distribution records. Here we also record for the first time *Phanera* Lour. (Fabaceae: Caesalpinioideae: Cercideae) as a host of *Gibbobruchus* and provide an updated key to this genus.

## Material and Methods

Previously collected data were obtained from Manfio et al. (2013) and new specimens were obtained from mature pods of many *Bauhinia* species collected in several localities in the State of Goiás, Brazil, between 2009 and 2012. The fruits were stored in plastic bottles at room temperature for at least 2 months. The bottles were observed weekly and adults that emerged from seeds/pods were collected and stored in 70% alcohol. All specimens were sent to the *Laboratório de Sistemática e Bioecologia de Coleoptera* of the *Universidade Federal do Paraná* for identification by the first and second author.

The methods used for morphological study of the new species are those of Manfio et al. (2013), including the terminology for the male genitalia that was the same as that of Kingsolver (1970), except the subretangular, shallow structures on the median region of the median lobe here illustrated. For the type label data, quotation marks (“ ”) separate different labels and slashes (/) separates different lines in the same label. Text within square brackets [ ] is explanatory and was not included in the original labels.

The type specimens are deposited in the following collections: CEAM- Centro de Entomologica y Acarologia, Montecillo, Mexico (J. R. Nápoles); DZUP- Coleção de Entomologia Pe. J. S. Moure, Curitiba, Paraná, Brazil (C. S. Ribeiro-Costa); FSCA- Florida State Collection of Arthropods, Gainesville, Florida, United States of America (M. C. Thomas); MNRJ- Museu Nacional/Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil (M. A. Monné); MZSP- Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (S. Casari); TAMU- Texas A & M University, College Station, Texas, United States of America (E. Riley); USNM- National Museum of Natural History, Washington, D. C., United States of America (A. Konstantinov). All specimens of the sections “New host plants” and “New distribution records” for *Gibbobruchus*” are deposited in DZUP.

The new host plants, *Bauhinia mollis* (Bong.) D. Dietr., *B. curvula* Benth., *B. brevipes* Vogel, *B. vespertilio* S. Moore, *B. pentandra* Bong. (Steud.), *B. rufa* (Bong.) Steud, *B. ungulate* L., *Phanera* sp., were identified by the third author with the use of specific keys (Vaz 2003; Vaz *et al.* 2010) and are deposited in the Herbarium of the *Universidade Federal de Goiás*.

All botanical names of the plants were checked using the International Legume Database & Information Service (ILDIS) (http://www.ildis.org/LegumeWeb).

The host plants records recognized for the first time for the genus *Gibbobruchus* and the geographic distributional (to the state level) recognized for the first time for the species are marked with an asterisk (*).

Colored versions of the Figs. 1-8 can be seen online in Florida Entomologist 97(3) (September 2014) at http://purl.fcla.edu/fcla/entomologist/browse .

## *Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.**

(Figs. 1-8)

### Diagnosis

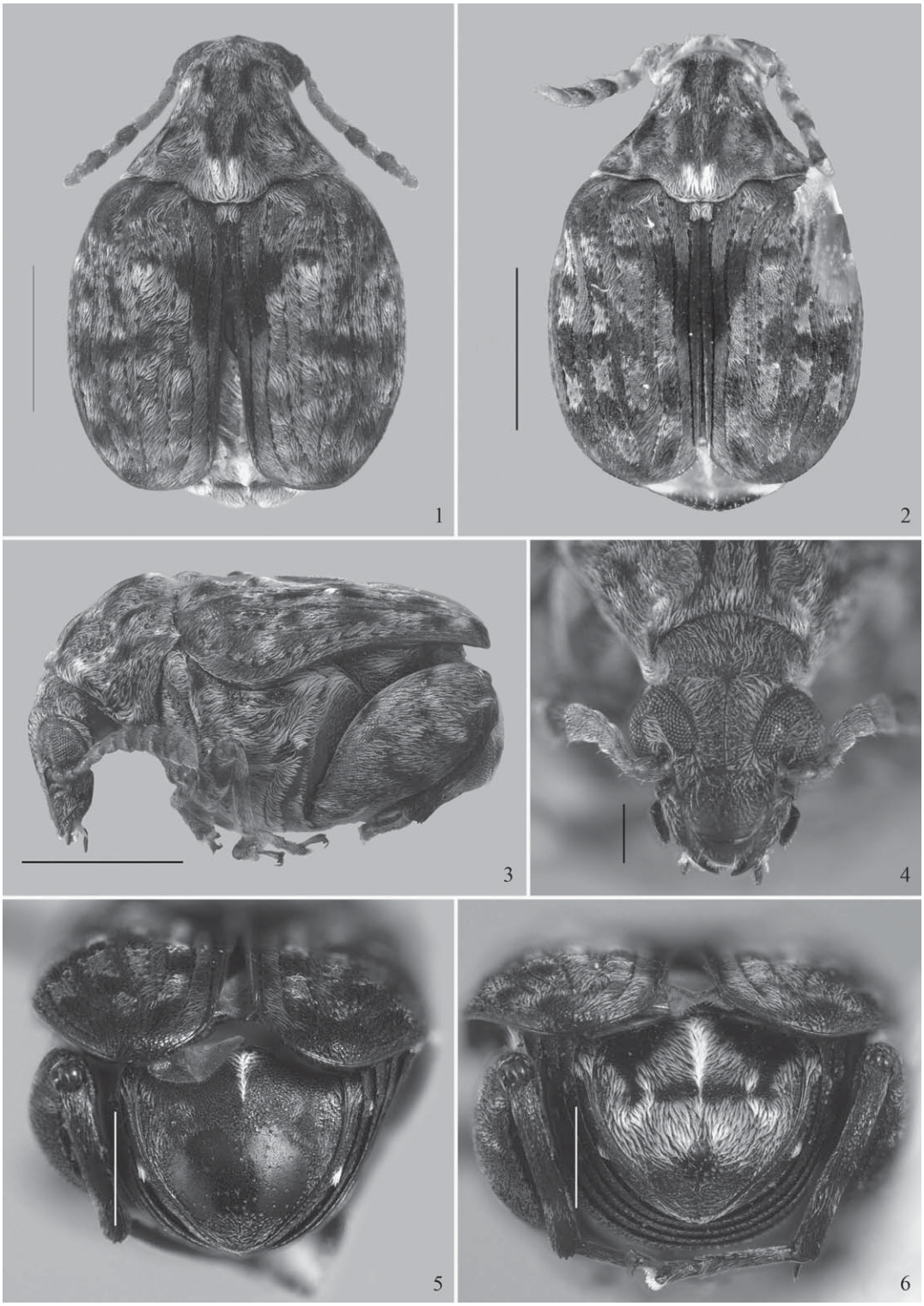
This species is probably closer to species of the group *scurra* as *G. cavillator* (Fåhraeus, 1839), *G. bolivianus* (Manfio & Ribeiro-Costa 2013) and *G. scurra* (Boheman, 1833), which is supported by the following synapomorphies (Manfio et al. 2013): alutaceous female pygidial speculum (Fig. 5) and lateral apical margin of the pronotum concave (Figs. 1 and 2). *Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.** has external morphology very similar to *G. cavillator* and *G. bolivianus*, sharing mainly the vestiture on dorsum, the female pygidium and the ventral region (Manfio et al. 2013). Only the male can be distinguished based on characters of internal sac of male genitalia, such as the apical region with dense small and thin spines near the valves forming lateral and median lines and median region with subretangular, shallow structures and sparse thick spines and denticles (Fig. 7). For details about the morphology of *G. cavillator* and *G. bolivianus* see Manfio et al. (2013).

### Description

Body length: 2.1-3.3 mm; body width: 1.4-2.5 mm.

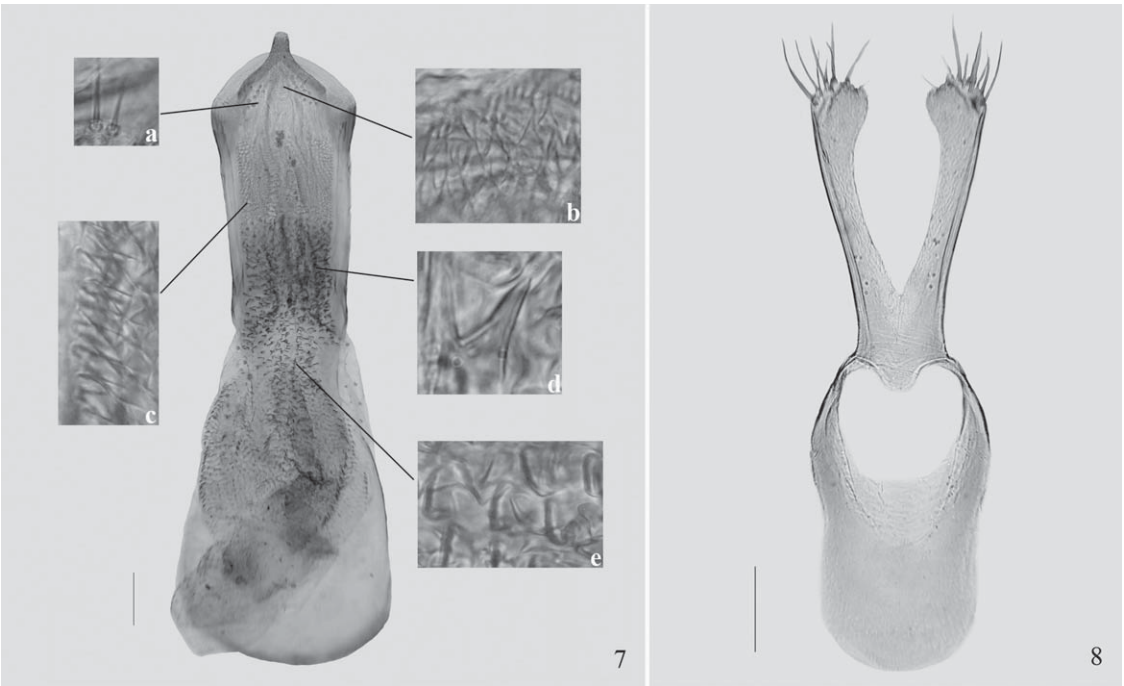
Integument. Color usually different between sexes: male light brown to brown with variegated pattern (Fig. 1) and female dark brown to black (Fig. 2). Antenna light brown to dark brown, darkened antennomeres varying in position (Figs. 1-3). Pygidium of female black, sometimes rufous, except on speculum (Fig. 5) and

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Figs. 1-6. *Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.** 1. Male dolsal habitus; 2. Female dorsal habitus; 3. Male lateral habitus; 4. Male head, frontal view; 5. Female pygidium; 6. Male pygidium. Scale: 1-3. 1 mm; 4. 0.25 mm; 5-6. 0.5 mm. Colored versions of these figures can be seen online in Florida Entomologist 97(3) (September 2014) at http://purl.fcla.edu/fcla/entomologist/browse .

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Figs. 7 and 8. Male genitalia of *Gibbobruchus bergamini* Manfio & Ribeiro-Costa **sp. nov.** 7. Median lobe; 7a. Setae; 7b-c. Denticles; 7d. Spine; 7e. Subretangular, shallow structures; 8. Lateral lobes. Scale: 7-8. 0.1 mm. Colored versions of these figures can be seen online in Florida Entomologist 97(3) (September 2014) at http://purl.fcla.edu/fcla/entomologist/browse .

of male brown to dark brown (Fig. 6). Ventral region dark brown to black, rarely rufous (Fig. 3). Anterior and middle femur and tibiae bicolor; dorsal half of hind femur sometimes lighter than the ventral half (Fig. 3).

Pubescence. Dorsum variegated; male usually white, light brown, brown and dark brown, with denser setae than female (Fig. 1); female in general white, brown and dark brown setae (Fig. 2). Pronotum at basal region and median gibbosity usually with dense white or light brown pubescence; median gibbosity with 2 subparallel, narrow, brown or dark brown strips anterior and posterior to median transverse sulcus (Figs. 1, 2). Scutellum light brown to brown, sometimes white (Figs. 1 and 2). Elytron with median, slightly curved, dark brown to black macula on interstriae 1-3, sometimes on 1-5; basal third without white patch on interstriae 5; rest of elytron white with black tufts and with light and dark brown strips (Figs. 1 and 2). Pygidium of female, except on speculum, with sparse, white pubescence at lateral regions and denser, light brown setae at medianbasal region with short, white median strip (Fig. 5). Pygidium of male with dense light brown pubescence, except median patch and medianbasal strip white; apical region with sparse white pubescence (Fig. 6). Ventral region usually white; mesepisternum, mesepimerum and metepisternum with conspicuous light brown pubescence (Fig. 3). First male abdominal ventrite with uniform color, without median anterior region of dense light brown to white pubescence; ventrites not uniformly pubescent, 1-2, rarely 1-3 with polished lateral areas.

Body. Ocular sinus: 0.1-0.2 mm; ocular index: 3.1-4.0; frons not elevated; frontal carina usually not polished and wide basally. Antenna not sexually dimorphic, subserrate (Figs. 1-3). Pronotum with median and lateral gibbosities strongly elevated; laterobasal margin concave; basal emargination deep (Fig. 1). Elytron with basal gibbosity elevated to strongly elevated; striae 3 and 4 curved basad; striae 7-9 limited basally by humeral gibbosity usually elevated; interestriae 3, 5, 7 and 9 with or without conspicuous gibbosities; interstria 10 with basal sulcus (Figs. 1 and 2). Pygidium of female usually with a large apical tubercle; median lateral depressions; large rounded alutaceous speculum, basally emarginate (Fig. 5). Pygidium of male convex at apical third with large tubercle or slightly bituberculate; median depressions on median transverse line; punctuate apical strip (Fig. 6). Mesosternum truncate or slightly emarginate at apex. Male abdomen never compressed; first male abdominal ventrite without median apical

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tubercle; last male and female abdominal ventrite medially emarginate. Hind femur strongly incrassate (Fig. 3); pecten with 4 teeth, anterior tooth not contiguous to the posterior ones. Hind tibiae with 3-4 coronal teeth.

Male genitalia. Median lobe short, broad; median basal margin straight, not emarginate (Fig. 7). Ventral valve subtriangular, wider than long; lateral margins concave and internal margin strongly emarginate; slightly rounded to truncate at apex (Fig. 7). Internal sac at apical region with setae on lateral of ventral valve (Fig. 7a), dense small and thin spines near valves (Fig. 7b) and forming lateral and median lines (Fig. 7c); median region with subretangular, shallow, sparse structures (Fig. 7e) mixed with spines and denticles (Fig. 7d); basal region with thin spicules near gonopore sclerite. Lateral lobes moderately deeply emarginate and internal subapical margin concave; apex strongly convergent (Fig. 8).

Type Material

HOLOTYPE male deposited in DZUP, labels: "Brasil- GO, Hidrolândia,/ 16°55' 40.71" S 49°14' 43.00" W/ 22/v/2011/ Borda de mata, L. L./ Bergamini" "Em sementes de/ *Bauhinia mollis* " "HOLOTYPE/ *Gibbobruchus Bergamini*/ Manfio & Ribeiro-Costa/ Desig. Ribeiro-Costa & Manfio, 2013" (DZUP).

One hundred PARATYPES: 51 deposited in DZUP and 49 deposited in follow collections: CNCI, MZSP, MNRJ, TAMU, USNM, FSCA, CEAM (7 in each) with same data of the holotype, except label "PARATYPE/ *Gibbobruchus bergamini*/ Manfio & Ribeiro-Costa/ Desig. Ribeiro-Costa & Manfio, 2013" ; 1, "Brasil - GO, Anápolis,/ 16° 27' 21.84" S 48° 59' 8.13" W,/ 23.viii.2011, Árvore em mata/ ripária, L. L. Bergamini" "Em sementes de/ *Bauhinia longifolia*", same paratype label (DZUP); 3, "Brasil - GO, Goiás/ 12.VI.2009 L. L. Bergamini col./ Coleta Manual/ Frutos de *Bauhinia* sp." "Chrysomelidae/ *Gibbobruchus* sp.2/ RI274" "Planta hospedeira/ *Bauhinia pentandra* (Bong.)" , same paratype label (DZUP); 6, "Brasil – GO, Goianápolis,/ 16° 35' 46.87" S 49°4' 6.88" W,/ 27/IV/2011, L. L. Bergamini" "Em sementes de/ *Bauhinia mollis*", same paratype label (DZUP); 2, "Brasil - GO, Hidrolândia,/ 16° 53' 27.98" S 49° 13' 22.60" W,/ 24/VI/2011, L. L. Bergamini" "Em sementes de/ *Bauhinia mollis*", same paratype label (DZUP); 2, "Brasil - GO, Hidrolândia,/ 16° 53' 54.74" S 49° 15' 22.74" W,/ 03/VII/2010,/ L. L. Bergamini" "Em sementes de/ *Bauhinia brevipes*", same paratype label (DZUP); 4, "Brasil - GO, Hidrolândia,/ 16 °59' 28.87"S 49°15' 9.50" W,/ 01/vii/2011, L. L. Bergamini" "Em sementes de/ *Bauhinia curvula*", same paratype label (DZUP); 20, "Brasil - GO, Senador Canedo/ V2010/ Em *Bauhinia curvula*", same paratype label (DZUP).

Additional Material

BRAZIL: Goiás: 4, Caldas Novas, 17°45' 57.58" S 48°36' 49.18" W, L. L. Bergamini col., *Bauhinia curvula,* (DZUP); 40, Goiânia, 16°40' 44.23" S 49°12' 13.88" W, 16-IV-2012, same collector and host plant (DZUP); 23, Hidrolândia, 16°55'40.71" S 49°14'43.00" W, 22-V-2011, L. L. same collector, *B. mollis* (DZUP); 2, same locality, 26-V-2012, same collector and host plant (DZUP); 10, Goiás, 12-VI-2009, same collector, *B. pentandra* (DZUP); 9, Goianápolis, 16°35'46.87" S 49°4'6.88" W, 27-IV-2011, same collector, *B. mollis* (DZUP); 3, same locality, 16°32'51.10" S 49°1'58.23" W, 4-VI-2011, same collector, *B. curvula* (DZUP); 4, Senador Canedo, 29-V-2012, same collector, *Bauhinia curvula* (DZUP); 10, same locality, 31-V-2012, same collector and host plant (DZUP); 2, same locality, 16°40'27.37" S 49°8'31.38" W, 15-VI-2012, same collector, *Bauhinia rufa* (DZUP); 2, same locality, 21-VI-2012, same collector, *Bauhinia curvula* (DZUP).

Distribution

Known only from Goiás (Anápolis, Caldas Novas, Goianápolis, Goiânia, Goiás, Hidrolândia, Senador Canedo), at the Central Region of Brazil.

Host Plants

**Bauhinia brevipes* Vogel (Fabales: Fabaceae: Caesalpinioideae), **B. mollis* (Bong.) D. Dietr., **B. curvula* Benth., *B. longifolia* Bong. (Steud.), **B. pentandra* Bong. (Steud.), *B. rufa* (Bong.) Steud.

Comments

In Goiás, Hidrolândia, *G. bergamini* **sp. nov** is found in sympatry with *G. cavillator* (group *scurra*) and, in the locality of Senador Canedo, with *G. scurra* (group *scurra*) and *G. speculifer* (Gyllenhal, 1833) (group *speculifer*). Interesting to observe most of the *G. bergamini* **sp. nov.** hosts are not coincident (Manfio et al. 2013), except *Bauhinia longifolia* (Bong.) Steud. and *B. rufa* (Bong.) Steud., however, recorded in a different place for *G. cavillator*. It is noteworthy, however, that *B. longifolia* seems to be an occasional host for *G. bergamini*, because from the *B. longifolia* record there were obtained only 2 individuals from a sample of approximately 30 mature pods. Besides, this host plant was found only in riparious forest vegetation, which is a very different habitat from the other *Bauhinia* of the region.

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Etymology

The species name is in honor of Leonardo Lima Bergamini, our colleague and third author, who collected almost all of the specimens of this paper. The name "*bergamini*" is a noun in apposition, gender masculine.

## Updated Key to the *Gibbobruchus* Species

To accommodate the species here described, the key to the *Gibbobruchus* species proposed by Manfio et al. (2013, p. 9) is modified as follows:

Couplets 1-7 without change.

8. Median lobe, lateral margins of ventral valve concave and internal margins moderately to strongly emarginated (Fig. 4; see also Manfio et al. 2013: p. 31, Fig. 112) (Group *scurra*) . . . . . 8A

—. Median lobe, lateral margins of ventral valve nearly straight and internal margins slightly emarginated (See Manfio et al. 2013: p. 32, Fig. 113) (Group *scurra*) . . . . . *G. bolivianus* Manfio & Ribeiro-Costa, 2013

8A. Median lobe, internal sac at median region with subterangular, shallow structures and thick spines; lateral lobes of tegmen strongly convergent at apex (Figs. 7 and 8) . . . . . *G. bergamini* Manfio & Ribeiro-Costa **sp. nov.**

—. Median lobe, internal sac at median region with long spicules forming a dense mass; lateral lobes of tegmen moderately convergent at apex (See Manfio et al. 2013: p. 31, Fig. 112; p. 33, Fig. 127) . . . . . *G. cavillator* (Fåhraeus, 1939)

Couplets 9-12 without change.

### Group *scurra*

*Gibbobruchus cavillator* (Fåhraeus, 1839)

Old Host Plant Records

*Bauhinia holophylla* (Bong.) Steud., *B. longifolia* (Bong.) Steud., *B. multinervia* (Kunth) DC., *B. ungulata* L. (Manfio et al. 2013).

New Host Plant Records

**B. vespertilio* S. Moore : Brazil. Goiás: 8, Hidrolândia, 16° 53' 27.98" S 49° 13' 22.60" W, 24-VI-2011, L. L. Bergamini col.

*B. rufa* (Bong.) Steud.: Brazil. Goiás: 1, Niquelândia, 18-III-2009, L. L. Bergamini col.

**Phanera* sp.: Brazil. Goiás: 7, Matrinchã, 15°26' S 50°45" W, VIII-2011, R. D. Sartin col.

Old Distribution Records

Argentina (Jujuy), Bolivia (Santa Cruz), Brazil (Bahia; Distrito Federal; Goiás: Jataí, Niquelândia, São Domingos; Minas Gerais; Pará; Paraná; Rio de Janeiro; Rio Grande do Sul; São Paulo; Tocantins) and Venezuela (Aragua, Bolívar, Calabozo, Vargas) (Manfio et al. 2013).

New Distribution Records

Goiás (Hidrolândia, Matrinchã).

*Gibbobruchus scurra* (Boheman, 1833)

Old Host Plant Records

*Bauhinia bauhinioides* (Mart.) J. F. Macbr., *B. pulchella* Benth., *B. rufa* (Bong.) Steud. (Manfio et al. 2013).

New Host Plant Records

**B. curvula* Benth.: Brazil. Goiás: 5, Senador Canedo, 16°40' 41.09" S 49°8' 33.30" W, VII-2011, L. L. Bergamini col.

**B. malacotrichoides* R. S. Cowan: Brazil. Goiás: 1, Pirenópolis, 15°51' 13.29" S 48°56' 25.83" W, 7-VII-2010, L. L. Bergamini col.

**B. pentandra* (Bong.) Vogel *ex* Steud.: Brazil. Goiás: 13, Goiás, 15°54' 28" S 50°14' 49" W, VIII-2009, L. L. Bergamini col.

Old Distribution Records

Brazil (Distrito Federal; Goiás: Barro Alto, Goiás, Jataí, Niquelândia; Mato Grosso; Minas Gerais; São Paulo; Pará), Paraguay (Cordillera) (Manfio et al. 2013).

New Distribution Records

Distrito Federal (Planaltina), Goiás (Pirenópolis, Senador Canedo).

### Group *speculifer*

*Gibbobruchus speculifer* (Gyllenhal, 1833)

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Old Host Plant Records

*Bauhinia forficata* Link, *B. forficata* Link var. *pruinosa* (Vogel) Fortunato & Wunderlin, *B. integerrima* Benth., *B. microstachya* (Raddi) Macbr. (Manfio et al. 2013).

New Host Plant Records

**B. curvula* Benth.: Brasil. Goiás: 7, Senador Canedo, 18-V-2010; 1, same locality, V-2010; 6, same locality, 21-VI-2012, L. L. Bergamini col.

Old Distribution Records

Argentina (Buenos Aires), Bolivia, Brazil (Paraná; Rio de Janeiro; Rio Grande do Sul; Santa Catarina; São Paulo), Uruguay (Montevideu) (Manfio et al. 2013).

New Distribution Records

*Goiás (Senador Canedo).

*Gibbobruchus vinicius* Manfio & Ribeiro-Costa, 2013

Old Host Plant Records

*Bauhinia longifolia* (Bong.) Steud., *Bauhinia rufa* (Bong.) Steud. (Manfio et al. 2013).

New Host Plant Records

**B. brevipes* Vogel: Brasil. Goiás: 7, Goiás, 4-IX-2012, B. R. Almeida col.

Old Distribution Records

Brazil (Bahia; Goiás: Niquelândia; Minas Gerais; Paraná). (Manfio et al. 2013).

New Distribution Records

Goiás (Goiás).

## Discussion

Eleven new host plant species are recorded, distributed in 5 species of *Gibbobruchus* (including *G. bergamini* Manfio & Ribeiro-Costa **sp. nov.**) belonging to 2 different species groups. Seven of them are recorded for the first time as hosts of *Gibbobruchus*. Considering these results, currently there is an increment of about 40% of known hosts, with more than 80% in *Bauhinia*; there is only one record on *Phanera* - previously considered a subgenus of *Bauhinia* (Vaz 2010) - the first time as a host of *Gibbobruchus*. The new host plants and distribution records are a first step toward a better understanding of the patterns and process involved in the interactions between the Neotropical seed beetles and their hosts.

*Gibbobruchus cavillator* and *G. bergamini* **sp. nov.** each have 7 hosts, which is the most for this genus, and 3 new host species are presented to the first species. *Gibbobruchus cavillator* is the most widely distributed in Brazil, where it has been recorded in 10 states of the 13 states of Brazil in which *Gibboruchus* spp. have been found (Manfio et al. 2013); i. e., from Pará to the Rio Grande do Sul.

Even with the 11 new hosts here presented, *B. divaricatae* L., an old record, remains the host predated by the largest number of *Gibbobruchus* spp., i.e., *G. wunderlini* Whitehead & Kingsolver, 1975 (group *wunderlini*), *G. divaricatae* Whitehead & Kingsolver, 1975, *G. guanacaste* Whitehead & Kingsolver, 1975 and *G. cristicollis* (Sharp, 1885) (group *mimus*) (Manfio et al. 2013). These 2 species groups are not commonly found in South America.

*Gibbobruchus speculifer* is recorded for the first time to the State of Goiás, Midwest region of Brazil, in the Central Plateau; the other 3 here quoted had already been known from this state, but new records of Goiás localities are included. *Gibbobruchus scurra* is recorded for a new locality to state of Distrito Federal, Planaltina.

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