NOTAS / NOTES

First report of immatures of *Cryptocephalus* Geoffroy, 1762 (Coleoptera: Chrysomelidae) from Brazil with notes of its bioecology on *Wedelia goyazensis* Gardner (Asteraceae) and synthesis of the genus occurrence records in Brazilian territory

Jefferson Duarte-de-Mélo¹*, Suianne Oliveira dos Santos Cajé², Leticia Ribes de Lima³ & Iracilda Maria de Moura Lima⁴

¹,²,⁴ Laboratório de Bioecologia de Insetos, Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Alagoas, Maceió, Alagoas, 57072-970, Brazil.
³ Laboratório de Botânica, Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Alagoas, Maceió, Alagoas, 57072-970, Brazil.

* Corresponding author: jeffersonduartedemelo@gmail.com – ORCID iD: https://orcid.org/0000-0003-0268-279X

ABSTRACT

>*Cryptocephalus* Geoffroy, 1762 is recognized for its cosmopolitan distribution and great richness, with at least 1700 described species. However, information is lacking for Brazil: (1) no record of immatures; and (2) almost nothing about the biology of this genus. Here, immature stages of *Cryptocephalus* from Brazil are reported for the first time, as well as some notes of its bioecology on the host plant. Records in Brazilian territory are also compiled from the literature.

**Keywords:** Anthocoridae; Cryptocephalinae; host plant; larva; Neotropical *Cryptocephalus*.

RESUMEN

Primer reporte de inmaduros de *Cryptocephalus* Geoffroy, 1762 (Coleoptera: Chrysomelidae) de Brasil con notas de su bioecología sobre *Wedelia goyazensis* Gardner (Asteraceae) y síntesis de los registros de presencia del género en territorio brasileño

*Cryptocephalus* Geoffroy, 1762 es reconocido por su distribución cosmopolita y gran riqueza, con al menos 1700 especies descritas. Sin embargo, falta información para Brasil: (1) no hay registro de inmaduros; y (2) no se conoce casi nada sobre la biología de este género. En este trabajo se documentan por primera vez las etapas inmaduras de *Cryptocephalus* de Brasil y se presentan algunas notas sobre su bioecología en la planta huésped. Además, se recopilan sus registros en territorio brasileño a partir de la bibliografía.

**Palabras clave:** Anthocoridae; Cryptocephalinae; *Cryptocephalus* Neotropical; larva; planta huésped.

Cómo citar este artículo/Citation: Duarte-de-Mélo, J., Cajé, S.O.S., Lima, L.R. & Lima, I.M.M. 2022. First report of immatures of *Cryptocephalus* Geoffroy, 1762 (Coleoptera: Chrysomelidae) from Brazil with notes of its bioecology on *Wedelia goyazensis* Gardner (Asteraceae) and synthesis of the genus occurrence records in Brazilian territory. *Graellsia*, 78(1): e158. https://doi.org/10.3989/graellsia.2022.v78.317

Copyright: © 2022 SAM & CSIC. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License.
Here we present the first report of immature stages of *Cryptocephalus* from Brazil with some notes of its bioecology on the host plant. We also compile *Cryptocephalus* occurrence records in Brazil from the recent literature.

Adult beetles were collected on Asteraceae inflorescences at A.C. Simões Campus, Federal University of Alagoas (-9.557309, -35.775158), in September 2018. Adults were taken to the laboratory together with the inflorescences of Asteraceae to document bioecological aspects. Sexing was performed by observing copulation. Rearing was carried out to obtain juveniles, with inflorescences being replaced daily (24.7-26.8 °C and 51-72 % RH; photoperiod 12:12 h). To avoid predation, the rearing proceeded with the removal of any other insect from the collected fresh inflorescences, which were immersed in water, with one drop of detergent to break its tension, for 12 hours before being used for food replacement. Digital photographs of the plant and the beetle were taken; and morphometric measurements were performed. Beetles and host plant have been identified by

Figs. 1-6.— *Cryptocephalus* Geoffroy, 1762 sp. (Coleoptera: Chrysomelidae) en *Wedelia goyazensis* Gardner (Asteraceae). 1: Macho (izquierda) y hembra (derecha). 2: *Wedelia goyazensis* en un área urbana de Maceió, Alagoas. 3: Adultos copulando (círculo blanco) en la inflorescencia. 4: Adulto alimentándose del pétalo de flor tubular. 5: Hembra ovopositiendo (círculo blanco) sobre la axila de la flor ligulada. 6: Inmaduro alimentándose (círculo blanco) del polen de flores tubulares. Barra de escala = 1 mm.
slight kick to the fecal capsule, throwing it back. Eggs do not have a chorionic stem and can be found on ligulate flower axils or sepal axils. No eggs were seen on tubular flowers. After hatching, the larvae look for tubular flowers to feed on pollen, often entering almost entirely into the floral tube (Fig. 6), and may go unnoticed in a superficial search.

Laboratory observations showed that adults and nymphs of pirate bug (Hemiptera: Anthocoridae) forage quickly on inflorescences of *Wedelia goyazensis*, finding *Cryptocephalus* egg capsules and newly hatched larvae which they handled with their front legs. Eggs resist this attack, but the newly hatched larvae are preyed upon.

*Wedelia goyazensis* is a shrub endemic from Brazil, with prevalent occurrence in the phytogeographic domain of the Caatinga, northeast region (Alves & Bringel Jr., 2020). Immatures of *Cryptocephalus* were registered only once feeding on an Asteraceae (Paulian, 1953), but there are no other reports of Asteraceae flowers as food.

There are 18 published records of *Cryptocephalus* in Brazil (Table 1), four of them in the northeast (Bryant, 1954; Harley *et al*., 1995; Guedes *et al*., 2019). Beetle voucher specimens will be deposited in the Padre Jesus Santiago Moure Entomological Collection, Federal University of Paraná; plant exsiccates was deposited at the Herbarium-MAC, Environmental Institute of Alagoas, under registration 65501.

The beetle was identified as belonging to the genus *Cryptocephalus*; the female (≈ 2 mm) being larger than the male (≈ 1.6 mm) (Fig. 1). The plant is *Wedelia goyazensis* Gardner (Synonyms: *Aspilia ramagii* Ridl.; *Seruneum goyazense* (Gardner) Kuntze; *Wedelia alagoensis* Baker; *Wedelia hookeriana* Gardner; *Wedelia ramagii* (Ridl.) J.U. Santos; *Wedelia villosa* Gardner) (Asteraceae) (Fig. 2).

In the field, adults were observed copulating on tubular flowers (Fig. 3) or hidden on the ligulate flower axils or sepal axils. During rearing, adult *Cryptocephalus* fed on petals of tubular flowers of *W. goyazensis* (Fig. 4), never on ligulate ones, causing damage to the floral tube. Females oviposit on sepal axils and on ligulate flower axils (Fig. 5). At the end of covering the egg with fecal plates, the female gives a slight kick to the fecal capsule, throwing it back. Eggs do not have a chorionic stem and can be found on ligulate flower axils or sepal axils. No eggs were seen on tubular flowers. After hatching, the larvae look for tubular flowers to feed on pollen, often entering almost entirely into the floral tube (Fig. 6), and may go unnoticed in a superficial search.

Laboratory observations showed that adults and nymphs of pirate bug (Hemiptera: Anthocoridae) forage quickly on inflorescences of *Wedelia goyazensis*, finding *Cryptocephalus* egg capsules and newly hatched larvae which they handled with their front legs. Eggs resist this attack, but the newly hatched larvae are preyed upon.

*Wedelia goyazensis* is a shrub endemic from Brazil, with prevalent occurrence in the phytogeographic domain of the Caatinga, northeast region (Alves & Bringel Jr., 2020). Immatures of *Cryptocephalus* were registered only once feeding on an Asteraceae (Paulian, 1953), but there are no other reports of Asteraceae flowers as food.

There are 18 published records of *Cryptocephalus* in Brazil (Table 1), four of them in the northeast (Bryant, 1954; Harley *et al*., 1995; Guedes *et al*., 2019). Beetle voucher specimens will be deposited in the Padre Jesus Santiago Moure Entomological Collection, Federal University of Paraná; plant exsiccates was deposited at the Herbarium-MAC, Environmental Institute of Alagoas, under registration 65501.

The beetle was identified as belonging to the genus *Cryptocephalus*; the female (≈ 2 mm) being larger than the male (≈ 1.6 mm) (Fig. 1). The plant is *Wedelia goyazensis* Gardner (Synonyms: *Aspilia ramagii* Ridl.; *Seruneum goyazense* (Gardner) Kuntze; *Wedelia alagoensis* Baker; *Wedelia hookeriana* Gardner; *Wedelia ramagii* (Ridl.) J.U. Santos; *Wedelia villosa* Gardner) (Asteraceae) (Fig. 2).

In the field, adults were observed copulating on tubular flowers (Fig. 3) or hidden on the ligulate flower axils or sepal axils. During rearing, adult *Cryptocephalus* fed on petals of tubular flowers of *W. goyazensis* (Fig. 4), never on ligulate ones, causing damage to the floral tube. Females oviposit on sepal axils and on ligulate flower axils (Fig. 5). At the end of covering the egg with fecal plates, the female gives a slight kick to the fecal capsule, throwing it back. Eggs do not have a chorionic stem and can be found on ligulate flower axils or sepal axils. No eggs were seen on tubular flowers. After hatching, the larvae look for tubular flowers to feed on pollen, often entering almost entirely into the floral tube (Fig. 6), and may go unnoticed in a superficial search.

Laboratory observations showed that adults and nymphs of pirate bug (Hemiptera: Anthocoridae) forage quickly on inflorescences of *Wedelia goyazensis*, finding *Cryptocephalus* egg capsules and newly hatched larvae which they handled with their front legs. Eggs resist this attack, but the newly hatched larvae are preyed upon.

**Table 1.**— *Cryptocephalus* Geoffroy, 1762 occurrences in Brazilian territory according to the literature.

**Tabla 1.**— Citas bibliográficas de *Cryptocephalus* Geoffroy, 1762 en territorio brasileño.

| *Cryptocephalus* | Locality                  | Identification | Extra information          | References       |
|-----------------|---------------------------|----------------|----------------------------|-----------------|
| binotatus       | Brasília, Distrito Federal| Author         |                            | Dejean, 1837    |
| chalybeus       | Brasília, Distrito Federal| Author         |                            | Dejean, 1837    |
| confinis        | Brasília, Distrito Federal| Author         |                            | Dejean, 1837    |
| cruentatus      | Brasília, Distrito Federal| Author         |                            | Dejean, 1837    |
| geniculatus     | Brasília, Distrito Federal| Author         |                            | Dejean, 1837    |
| batesi          | Tapajós, Amazonas          | Author         |                            | Bryant, 1954    |
| brasiensis      | Alto da Serra, São Paulo  | Author         |                            | Bryant, 1954    |
| flavovittatus   | Pernambuco                | Author         |                            | Bryant, 1954    |
| herlaceus       | Amazonas                  | Author         |                            | Bryant, 1954    |
| roberti         | Chapada dos Guimarães, Mato Grosso | Author         |                            | Bryant, 1954    |
| servicus        | Tapajós, Amazonas          | Author         |                            | Bryant, 1954    |
| nr. miserabilis| Espírito Santo; Rio de Janeiro; Paraná | Specialists |                            | Harley *et al*., 1995 |
| nr. viridaeineus| Goiás; Minas Gerais; Rio de Janeiro; São Paulo | Specialists |                            | Harley *et al*., 1995 |
| spp.            | Bahia; Espírito Santo; Goiás; Minas Gerais; Paraná; São Paulo | Specialists |                            | Harley *et al*., 1995 |
| sp.             | Montes Claros, Minas Gerais | Specialists |                            | Leite *et al*., 2007 |
| androgyne       | Not informed              | Not informed   | Phylgenetic tree of biofilm using *Cryptocephalus* as an external group. | Silva, 2012     |
| sp.             | Santa Terezinha, Paraíba  | Specialists | Two specimens in Caatinga: one in xerophilous vegetation and one in riparian forest. | Guedes *et al*., 2019 |
| sp.             | Fernando de Noronha, Pernambuco | Specialists/Authors (it is unclear) |                            | Rafael *et al*., 2020 |
2019; Rafael et al., 2020). However, they only offer superficial information. Only one (Guedes et al., 2019) presents habitat data, but no information regarding host plants or biocology. It is worth noting that we did not compile data from museum collections, which should be consulted for a more complete overview of the distribution of the genus in Brazil.

Cryptocephalus is one of the most species-rich genera within the animal kingdom (Sassi, 2006). However, many descriptions need to be revised since there is a numerous history of taxonomic errors (Schöller, 2002). Very little is known about the biology of this genus in Brazil and this new information can help improve species recognition.

Acknowledgements

We are deeply grateful to Davide Sassi for the beetle genus identification and to Mara Angélica Galvão Magenta for the plant species identification. We also thank the two anonymous reviewers for comments that improved the manuscript.

References

Alves, M. & Bringel Jr., J. B. A., 2020. Wedelia in Flora do Brasil 2020. Jardim Botânico do Rio de Janeiro. Available from http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/TFB116444 [accessed 6 Apr. 2021]

Basalga, A. & Novoa, F., 2000. Cryptocephalus cantabricus Franz, a poorly known endemic species from the northwest of the Iberian Peninsula (Coleoptera: Chrysomelidae). Coleopterologische Rundschau, 70: 191–195.

Brown, C. G. & Funk, D. J., 2005. Aspects of the natural history of Neochlamisus (Coleoptera: Chrysomelidae): fecal case-associated life history and behavior, with a method for studying insect constructions. Annals of the Entomological Society of America, 98(5): 711–725. https://doi.org/10.1603/0013-8746(2005)098[0711:AOTN]2.0.CO;2

Bryant, G. E., 1954. CIIL. New species of South American Cryptocephalus (Col., Chrysomelidae). Annals and Magazine of Natural History: Series 12, 7(83): 845–853. https://doi.org/10.1080/00222935408651799

Chaboo, C. S., Chamorro, M. L. & Schöller, M., 2016. Catalogue of known immature stages of camptosomatous leaf beetles (Coleptera, Chrysomelidae, Cryptocephalinae and Lamprosomatinae). Proceedings of the Entomological Society of Washington, 118(2): 150–217. https://doi.org/10.4289/0013-8797.118.1.150

Chamorro, M. L., 2014. Cryptocephalinae Gyllenhal, 1813. In: R. A. B. Leschen & R. G. Beutel (vol. eds.). Coleoptera, Beetles. Volume 3: Morphology and Systematics (Phytophaga). In: N. P. Kristensen & R. G. Beutel (eds.). Handbook of Zoology. Arthropoda: Insecta. De Gruyter. Berlin/Boston: 230–236.

Dejean, P. F. M. A., 1837. Catalogue des Coleoptères de la collection de Dejean. Méquignon-Marvis. Paris. 503 pp.

Erber, D., 1988. Biology of Camptosomata Clytrinae - Cryptocephalinae - Chlamisinae - Lamprosomatinae. In: P. Jolivet, E. Petitpierre & T. H. Hsiao (eds.). Biology of Chrysomelidae. Kluwer Academic Publishers. Dordrecht/Boston/London: 513–552.

Guedes, R. S., Janella, F. C. V. & Grossi, P. C., 2019. Composição e riqueza de espécies de uma comunidade de Coleoptera (Insecta) na Caatinga. Theriana, Série Zoologia, 109: e2019012. https://doi.org/10.1590/1678-4766e20190102

Harley, K., Gillett, J., Winder, J., Forno, W., Segura, R., Miranda, H. & Kassulke, R., 1995. Natural enemies of Mimos� pigra and M. berlandieri (Mimosaceae) and prospects for biological control of M. pigra. Environmental Entomology, 24(6): 1664–1678. https://doi.org/10.1093/ee/24.6.1664

Leite, G. L. D., Silva, F. W. S., Jesus, F. M., Costa, C. A., Guanabens, R. E. M. & Gusmão, C. A. G., 2007. Efeito da adubação orgânica, espaçamento e tamanho de rizoma-semente sobre artrópodes em mangaritão Xanthosoma mafaffa Schott. Arquivos do Instituto Biológico, 74(4): 343–348.

Lencina Gutiérrez, J. L., Petitpierre, E., Andújar Fernández, C., Gallego Cambronero, D. & Gómez Ladrón De Guevara, R., 2007. Nuevas citas interesantes de Chrysomelidae de la Península Ibérica (Coleoptera). Heteropterus Revista de Entomología, 7(1): 61–66.

Paulian, R., 1953. XIV. Cryptocephalus fasciatuspunctatus Suffr. (Col. Chrysomelidae). Mémoires de l’Institut Scientifique de Madagascar Série E, Entomologie, 3: 10–11.

Rafael, J. A., Limeira-de-Oliveira, F., Hutchings, R. W., Miranda, G. F. G., Silva Neto, A. M., Somavilla, A., Camargo, A., Asenjo, A., Pinto, Â. P., Bello, A. M. et al., 2020. Insect (Hexapoda) diversity in the oceanic archipelago of Fernando de Noronha, Brazil: updated taxonomic checklist and new records. Revista Brasileira de Entomologia, 64(3): e20200052. https://doi.org/10.1590/1806-9665-rbent-2020-0052

Sassi, D., 2006. Insecta Coleoptera Chrysomelidae Cryptocephalinae. In: S. Ruffo & F. Stoch (eds.). Checklist and distribution of the Italian fauna of Coleoptera (Insecta). Méquignon-Marvis. Paris. 503 pp.

Schöller, M., 2002. Taxonomy of Cryptocephalus Geoffroy – what do we know? (Coleoptera: Chrysomelidae: Cryptocephalinae). Mitteilungen des Internationalen Entomologischen Vereins, 27(1): 59–76.

Silva, M. R. L., 2012. Caracterização da comunidade microbiana de biofilme anaeróbio em presença de bifenilas policloradas [master’s dissertation]. São Carlos: Universidade de São Paulo.