Brazilian Journal of Biology®

ISSN 1519-6984 (Print)
ISSN 1678-4375 (Online)

Notes and Comments

Protopolybia exigua (Hymenoptera: Vespidae) nesting on *Eugenia uniflora* (Myrtaceae) plant in the Atlantic Forest region

G. L. Vinha[a], B. P. Brügger[b], V. C. Santos-Júnior[c*], W. S. Ribeiro[a], C. F. Wilcken[d], M. M. de Souza[e], J. C. Zanuncio[c] and R. Zanetti[f]

[a]Universidade Federal de Viçosa – UFV, Departamento de Agronomia, Viçosa, MG, Brasil
[b]Universidade Federal de Juiz de Fora – UFJF, Programa de Pós-graduação em Biodiversidade e Conservação da Natureza, Laboratório de Ecologia Comportamental e Bioacústica – LABEC, Juiz de Fora, MG, Brasil
[c]Universidade Federal de Viçosa – UFV, Departamento de Entomologia, Laboratório de Controle Biológico de Insetos – LCBI, Viçosa, MG, Brasil
[d]Universidade Estadual Paulista – UNESP, Faculdade de Ciências Agronômicas, Campus de Botucatu, Botucatu, SP, Brasil
[e]Instituto Federal de Educação, Ciência e Tecnologia do Sul de Minas Gerais, Laboratório de Zoologia, Inconfidentes, MG, Brasil
[f]Universidade Federal de Lavras – UFLA, Departamento de Entomologia, Laboratório de Entomologia Florestal, Lavras, MG, Brasil

Protopolybia Ducke, 1905 (Hymenoptera: Vespidae) comprises a monophyletic genus of neotropical social wasps of the Epiponi tribe (Santos Junior et al., 2015), with 24 species described in Brazil (Somavilla et al., 2021), including *Protopolybia exigua* Saussure, 1854. This wasp is native to South America (Colombia and south Brazil) (Richards, 1978) preying insects and collecting cellulose, nectar, resin, and water (Rocha et al., 2009; Brügger et al., 2011).

Social wasps are generalist predators, important in the biological control, preying mainly Lepidoptera caterpillars (Richter, 2000) and used as environment conservation bioindicators (Souza et al., 2010). Behavioral aspects of social wasps, such as foraging activity, diet, ecology, and nesting (Brügger et al., 2017) should be studied to evaluate their potential for integrated pest management. The objective is to report, for the first time, *P. exigua* nesting on the fruit tree *Eugenia uniflora* (Myrtaceae) in the Atlantic Forest biome of Brazil.

An active *P. exigua* nest was collected in Marechal Floriano, Espirito Santo State, Brazil (20.418668 °S, 40.757004 °W) in the Atlantic Forest biome in December 23, 2017. This nest was at 2 m high, fixed by four pedicels on the abaxial face of a completely expanded *Eugenia uniflora* L. (Myrtaceae) leaf (Figure 1A). Wasps fixed adjacent leaves over its nest (Figure 1B) increasing protection against climatic conditions.

The *P. exigua* nest was brought to the Biological Control Laboratory of the Universidade Federal de Viçosa (UFV) in Viçosa, Minas Gerais State, Brazil where its individuals were killed in ether vapor and preserved in 70% ethanol for identification. The number of pedicels, brood cells, and wasp individuals in the colony were counted. The honeycomb and the honeycomb layers sizes were measured using a ruler and the rearing cells using a pachymeter to determine the size of the honeycomb parts.

Protopolybia exigua is identified by its posterior wing with 4.8 mm long; short first tergite with similar length and width; clypeos with ventral margin narrowly subtruncated; forehead with a trilobed stain; vertex with two non-oblique yellow marks and the second tergite with basal band or subcontigous oblique spots (Santos Júnior et al., 2015) (Figure 1, 2A-D).

The *P. exigua* nest had four pedicels, a common number in *Protopolybia* colonies, whose species build their nests supported by a central unique peduncle or several smaller ones (Wenzel, 1998). *Protopolybia exigua* nests use different plants, including native (Francisco et al., 2018) and exotic species (Brügger et al., 2019). This is the first record of a nest of this wasp in the Atlantic Forest biome on *Eugenia uniflora*, arboreal native Myrtaceae fruit with wide distribution in Brazil, popularly known as *pitanga*, of great pharmacological interest for its antioxidant and antimicrobial activity (Auricchio et al., 2007).

A total of 305 breeding cells and 214 individuals were found in this *P. exigua* colony. The number of individuals is similar to that of this wasp in the Middle São Francisco region, Bahia state, Brazil in a post-emergence colonial stage, with 223 individuals divided into queens, intermediates, and workers (Rocha et al., 2009), suggesting that this parameter does not vary with the biome where this wasp nests. On the other hand, the number of individuals per *P. exigua* nest varies with their colonial stage and the workers collected indicate that the nest studied was in the post-emergence stage (from the emergence of the first adult through the irreversible decline of the brood population) (Jeanne, 1972; Rocha et al., 2009).

The *P. exigua* nest had a large honeycomb (65.0 x 45.0 mm) with an oval shape, 252 rearing cells (5.4 x 5.0 mm), a fragile envelope of whitish color and a single exit hole. Its second honeycomb layer (25.0 x 12.0 mm) had 53 rearing cells (5.4 x 5.0 mm) without envelope (Figure 1C). The *P. exigua* nest size varies with predominantly one

*e-mail: scvaldeir@gmail.com
Received: March 8, 2022 – Accepted: June 7, 2022

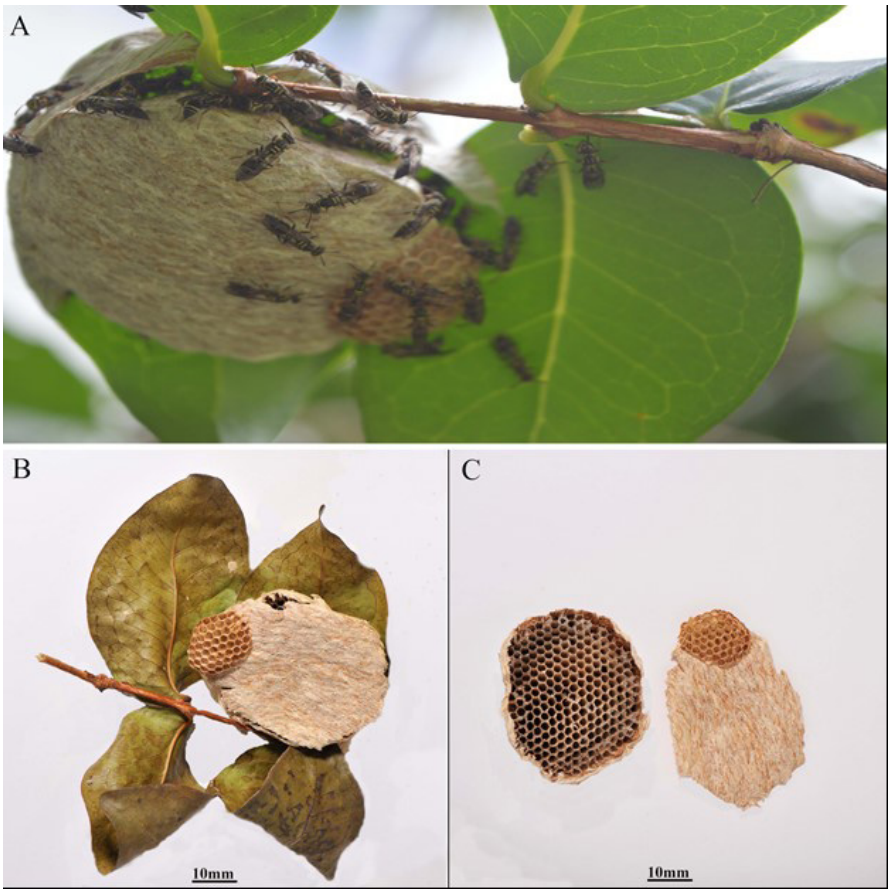

Figure 1. *Protopolybia exigua* (Hymenoptera: Vespidae) nest on a *Eugenia uniflora* (Myrtaceae) plant in Marechal Floriano, Espirito Santo state, Brazil. Active colony (A), external (B) and internal (C) parts of this wasp nest.

Figure 2. *Protopolybia exigua* (Hymenoptera: Vespidae) individual. Dorsal (A), ventral (B), lateral (C) and frontal (D) views.

comb (Santos Júnior et al., 2015), but the presence of an additional one is not uncommon (Richards, 1978; Santos Júnior et al., 2015). The second honeycomb indicates nest expansion, as reported for *Synoeca septentrionalis* (Richards, 1978) (Hymenoptera: Vespidae) colonies with the construction of an additional layer of brood cells on the existing structure (Santos et al., 2018). The *P. exigua* nest is of the fragmocitaro type with its architecture variation used to identify this and other wasp species (Somavilla et al., 2012).

Protopolybia exigua individuals did not damage the *E. uniflora* plant. The identification of social wasps nesting habits in agroecosystems is important to establishing biological control programs using these insects, being this the first report of *P. exigua* nesting on an *E. uniflora* plant in the Atlantic Forest Biome of Brazil.

Acknowledgements

This work was partly financed by the Brazilian agency Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES/PELD).

References

AURICCHIO, M.T., BUGNO, A., BARROS, S.B. and BACCHI, E.M., 2007. Atividades antimicrobiana e antioxidante e toxicidade de *Eugenia uniflora. Latin American Journal of Pharmacy*, vol. 26, no. 1, pp. 76-81.

BRÜGGER, B.P., CASTRO, B.M.C., PREZOTO, F., SERRÃO, J.E. and ZANUNCIO, J.C., 2017. Feeding by the social wasp *Polybia scutellaris* (Hymenoptera: Vespidae) on *Syzygium jambos* (Myrtaceae) fruits in Minas Gerais, Brazil. *The Florida*

Entomologist, vol. 100, no. 1, pp. 172-173. http://dx.doi.org/10.1653/024.100.0125.

BRÜGGER, B.P., SOUZA, L.S.A., SOUZA, A.R. and PREZOTO, F., 2011. Social wasps (*Synoeca cyanea*) damaging *Psidium* sp. (Myrtaceae) fruits in Minas Gerais state, Brazil. *Sociobiology*, vol. 57, no. 3, pp. 533-535.

BRÜGGER, B.P., ZANUNCIO, A.J.V., WILCKEN, C.F., SOARES, M.A. and ZANUNCIO, J.C., 2019. *Protopolybia exigua* (Hymenoptera: Vespidae) nesting on *Citrus grandis* (Rutaceae). *Florida Entomologist*, vol. 102, no. 1, pp. 262-263. http://dx.doi.org/10.1653/024.102.0149.

FRANCISCO, G.S., SOUZA, M.M., CLEMENTE, M. and BRUNISMANN, A.G., 2018. Substrato vegetal utilizado para nidificação de vespas sociais (Hymenoptera, Vespidae) em Floresta Decidual. *Revista Agrogeoambiental*, vol. 10, no. 3, pp. 35-45. http://dx.doi.org/10.18406/2316-1817v10n320181162.

JEANNE, R.L., 1972. Social biology of the neotropical wasp *Mischocyttarus drewseni*. *Bulletin of the Museum of Comparative Zoology at Harvard College*, vol. 144, no. 3, pp. 63-150.

RICHARDS, O.W., 1978. *The social wasps of the Americas excluding the Vespidae*. London: British Museum (Natural History, pp. 580.

RICHTER, M.R., 2000. Social wasp (Hymenoptera: Vespidae) foraging behavior. *Annual Review of Entomology*, vol. 45, no. 1, pp. 121-150. http://dx.doi.org/10.1146/annurev.ento.45.1.121. PMid:10761573.

ROCHA, A.A., GIANOTTI, E. and FBICHARA FILHO, C.C., 2009. Resources taken to the nest by *Protopolybia exigua* (Hymenoptera, Vespidae) in different phases of the colony cycle, in a region of the medio São Francisco River, Bahia, Brazil. *Sociobiology*, vol. 54, no. 2, pp. 439-453.

SANTOS, E.B., SHEMILT, S., DE-CARVALHO, C.A. and MARTIN, S.J., 2018. Life history and chemical ecology of the Warrior wasp *Synoeca septentrionalis* (Hymenoptera: Vespidae, Epiponini). *PLoS ONE*, vol. 13, no. 3, pp. e0194689. http://dx.doi.org/10.1371/journal.pone.0194689. PMid:29566087.

SANTOS-JÚNIOR, J.N.A., SILVEIRA, O.T. and CARPENTER, J.M., 2015. Phylogeny of *Protopolybia* Ducke, 1905 and taxonomic revision of the *Protopolybia exigua* species-group (Hymenoptera: Vespidae, Polistinae), with description of four new species. *Zootaxa*, vol. 3956, no. 2, pp. 151-182. http://dx.doi.org/10.11646/zootaxa.3956.2.1. PMid:26248912.

SOMAVILLA, A., BARBOSA, B.C., DE SOUZA, M.M. and PREZOTO, F., 2021. List of species of social wasps from Brazil. In: F. PREZOTO, F.S. NASCIMENTO, B.C. BARBOSA and A. SOMAVILLA, orgs. *Neotropical social wasps*. Cham: Springer, pp. 293-316. http://dx.doi.org/10.1007/978-3-030-53510-0_16.

SOMAVILLA, A., OLIVEIRA, M.L. and SILVEIRA, O.T., 2012. Guia de identificação dos ninhos de vespas sociais (Hymenoptera, Vespidae, Polistinae) na Reserva Ducke, Manaus, Amazonas, Brasil. *Revista Brasileira de Entomologia*, vol. 56, no. 4, pp. 405-414. http://dx.doi.org/10.1590/S0085-56262012000400003.

SOUZA, M.M., LOUZADA, J., SERRÃO, J.R. and ZANUNCIO, J.C., 2010. Social wasps (Hymenoptera: Vespidae) as indicators of conservation degree of riparian forests in Southeast Brazil. *Sociobiology*, vol. 56, no. 2, pp. 387-309.

WENZEL, J.W., 1998. A generic key to the nests of hornets, yellowjackets, and paper wasps worldwide (Vespidae: Vespinae, Polistinae). *American Museum Novitates*, vol. 3224, pp. 1-39.