



## SHORT NOTE

### *Polybia* (Myrapetra) *scutellaris* (Hymenoptera: Vespidae) foraging on flies at carcasses of *Rattus norvegicus* (Rodentia: Muridae)

AS HERDINA<sup>1</sup>, GSS BITENCOURT<sup>1</sup>, RA DI MARE<sup>1</sup>, BC BARBOSA<sup>2</sup>

1 - Universidade Federal de Santa Maria, Rio Grande do Sul, Brazil

2 - Universidade Federal de Juiz de Fora, Minas Gerais, Brazil

#### Article History

##### Edited by

Gilberto M. M. Santos, UEFS, Brazil

Received 16 October 2015

Initial acceptance 05 November 2015

Final acceptance 11 February 2016

Publication date 29 April 2016

#### Keywords

Brachycera, Epiponini, Itaara, predation.

#### Corresponding author

Anita da Silva Herdina

Laboratório de Biologia Evolutiva,

Departamento de Ecologia e Evolução

Universidade Federal de Santa Maria

CEP: 97105-900, Santa Maria

Rio Grande do Sul, Brazil

E-Mail: anitabioufsm@gmail.com

#### Abstract

Social wasps stand out due to their role in the trophic balance of the ecosystems. These insects can get nutrients by preying on other insects, such as Lepidoptera, Diptera, Hymenoptera and the decomposing remains of vertebrates. Some species, such as *Polybia scutellaris*, can also use pollen and nectar stored in their nests to produce honey. Some studies lay emphasis on the prey captured by social wasps, showing that predation, in some conditions, is directed to Lepidoptera larvae, such as for *Polybia occidentalis*, *Polybia paulista* and *Polybia ignobilis*. Other species like *P. scutellaris* focus on flies of the Tabanidae, Syrphidae, Muscidae and Anthomyiidae families. There are few studies with social wasps that feed on animal carcasses; this way, our study aims to report the predation on individuals of the Sarcophagidae family, which use *Rattus norvegicus* carcasses as a food source, by the social wasp *Polybia scutellaris*.

Social wasps stand out due to their role in the trophic balance of ecosystems. This is the result of their generalist and opportunistic foraging features (Hunt, 2007; Prezoto et al., 2008; Prezoto & Souza, 2015), which comprises carbohydrates such as nectar, pollen, fruit pulp (Clemente et al., 2012; Barbosa et al., 2014) and also proteins. Social wasps can obtain these substances through predation of other insects, such as Lepidoptera, Diptera, Hymenoptera and from decomposing remains of vertebrates (O'Donnell, 1995; Lima & Prezoto, 2003). Thereby, the group shows potential as possible pest control agents (Elisei et al., 2010).

Some species, such as *Polybia scutellaris* (Telleria, 1996), can also use pollen and nectar stored in their nests to produce honey. There are also researches focused on the capture of prey by some species of social wasps (Prezoto et al., 2005; Prezoto et al., 2006; Bichara et al., 2009; Brocanelli, 2015). These works show that predation, in certain circumstances,

can be directed to Lepidoptera larvae such as for *Polybia occidentalis* (Olivier, 1791) (Gobbi et al., 1984), *Polybia paulista* (Ihering, 1896) (Gobbi & Machado, 1985) and *Polybia ignobilis* (Haliday, 1836) (Gobbi & Machado, 1986). Furthermore, other species, such as *P. scutellaris*, seem to prefer capturing insects of the Diptera order, particularly from the families Tabanidae, Syrphidae, Muscidae and Anthomyiidae (Matsuura, 1984).

There is a lack of knowledge on social wasps' foraging in animal carcasses (O'Donnell, 1995; Gomes et al., 2007). This study aims to contribute to the knowledge of this behavior by reporting the predation of flies in carcasses of *Rattus norvegicus* (Berkenhout, 1769) by social wasp *Polybia scutellaris* (White, 1984).

The observations were made in August 2014 in the Itaara town, Rio Grande do Sul (29°36'56.1"S; 53°48'27.6" W). For that, were used Shannon traps (Fig 1A) with *R. norvegicus* carcasses. These traps were placed in a forest area (Fig 1B).



The foraging of *P. scutellaris* (Fig 1C) was exclusively focused on Sarcophagidae flies during the winter (August). By observing the trap's contents, we conclude that the wasps first overfly the carcasses and then they capture the flies and remove them out the trap; lastly, they lacerate their prey in

order to carry them to the colony. *P. scutellaris* showed four stages during the foraging of Diptera (Fig 2): I. Prey capture using mandibles (Fig 2A); II. Prey decapitation (Fig 2B); III. Prey's wings removal (Fig 2C) and IV. Thorax's removal and transportation to the colony (Fig 2D).



**Fig 1.** A – Shannon trap containing PET bottle of 500 ml, nylon pyramid, iron cage and wooden tray; B – Trap in the forest area; C – Lateral and dorsal view of *Polybia scutellaris*.



**Fig 2.** *Polybia scutellaris* foraging flies of Sarcophagidae's family in carcasses of *Rattus norvegicus*. A – Fly captured by *P. scutellaris* using mandibles; B – *P. scutellaris* decapitating the fly captured; C – *P. scutellaris* removing the wings; D – Abdomen removed by wasp, holding the thorax to be transported to the nest.

The foraging pattern observed on this study is similar to the behavior of other social wasp species previously studied: *Mischocyttarus drewseni* (Saussure, 1857) (Jeanne, 1972), *Polybia sericea* (Olivier, 1792) (Richter & Jeanne, 1991) and *Polybia ignobilis* (Gomes et al., 2013). We also observed the wasps' opportunistic behavior, since they forage the prey caught in traps near animal carcasses. As a consequence, this behavior grants resource saving when compared to active searching preys in the natural environment.

Despite of the recent increase of forensic entomology studies in Brazil (Moretti et al., 2008; Moretti et al., 2011; Barbosa et al., 2015; Maciel et al., 2015), there is no effective understanding of ecological interaction related to social wasps within the scavenger community yet. Therefore, wasps foraging on forensic-important insects such as the Calliphoridae and Sarcophagidae families could influence on the abundance and diversity of these families' species and, as a result, lead to an underestimation of the postmortem interval.

## References

- Barbosa, B.C.; Paschoalini, M.F.; Prezoto, F. (2014). Temporal activity patterns and foraging behavior by social wasps (Hymenoptera: Polistinae) on fruits of *Mangifera indica* L. (Anacardiaceae). *Sociobiology*, 61: 239-242. doi: 10.13102/sociobiology.v61i2.239-242.
- Barbosa, R.R., Carriço, C., Souto, R.N., Andena, S.R., Ururahy-Rodrigues, A., & Queiroz, M. M. (2015). Record of postmortem injuries caused by the Neotropical social wasp *Agelaia fulvofasciata* (Degeer) (Hymenoptera, Vespidae) on pig carcasses in the Eastern Amazon region: implications in forensic taphonomy. *Revista Brasileira de Entomologia*, 59: 257-259. doi: 10.1016/j.rbe.2015.07.004
- Bichara-Filho, C.C., Santos, G.M.M., Resende, J.J., Dantas, C.J., Gobbi, N. & Machado, V.L.L. (2009). Foraging behavior of the swarm-founding wasp, *Polybia* (Trichothorax) *sericea* (Hymenoptera: Vespidae): prey capture and load capacity. *Sociobiology*, 53: 61-69
- Clemente, M.A., Lange, D., Del-Claro K., Prezoto F., Campos, N.R. & Barbosa, B.C. (2012). Flower-visiting social wasps and plants interaction: Network pattern and environmental complexity. *Psyche: A Journal of Entomology*: 1-10. doi: 10.1155/2012/478431
- Elisei, T., Nunes, J.V.E., Ribeiro Junior, C., Fernandes Junior, A.J. & Prezoto, F. (2010). Uso da vespa social *Polistes versicolor* no controle de desfolhadores de eucalipto. *Pesquisa Agropecuária Brasileira*, 45: 958-964.
- Gobbi, N. & Machado, V.L.L. (1986). Material capturado e utilizado na alimentação de *Polybia* (*Trichothorax*) *ignobilis* (Haliday, 1836) (Hymenoptera: Vespidae). *Anais da Sociedade Entomológica do Brasil*, 15: 117-124.
- Gobbi, N., Machado, V.L.L. & Tavares-Filho, J.A. (1984). Sazonalidade das presas utilizadas na alimentação de *Polybia occidentalis occidentalis* (Olivier, 1791) (Hymenoptera: Vespidae). *Anais da Sociedade Entomológica do Brasil*, 13: 63-69.
- Gomes, L., Gomes, G., Oliveira, H.G., Morlin Jr., J.J., Desuó, I.C., Silva, I.M., Shima, S.N. & Zuben, C.J.V. (2007). Foraging by *Polybia* (Trichothorax) *ignobilis* (Hymenoptera: Vespidae) on flies at animal carcasses. *Revista Brasileira de Entomologia* 51: 389-393. doi: 10.1590/S0085-56262007000300018
- Hunt, J.H. (2007). *The Evolution of Social Wasps*. Oxford University Press, New York, 259 p.
- Lima, M.A.P. & Prezoto, F. (2003). Foraging activity rhythm in the neotropical swarm-founding wasp *Polybia platycephala sylvestris* Richards, 1978 (Hymenoptera: Vespidae) in different seasons of the year. *Sociobiology*, 42: 645-752.
- Maciel, T.T., Castro, M.M., Barbosa, B.C., Fernandes, E.F., Santos-Prezoto, H.H. & Prezoto F. (2015) Foraging behavior of fire ant *Solenopsis saevissima* (Smith) (Hymenoptera: Formicidae) in *Felis catus* Linnaeus (Carnivora: Felidae) carcass. *Sociobiology* 62: 610-612.
- Moretti, T. D.C., Giannotti, E., Thyssen, P.J., Solis, D.R., & Godoy, W.A.C. (2011). Bait and habitat preferences, and temporal variability of social wasps (Hymenoptera: Vespidae) attracted to vertebrate carrion. *Journal of Medical Entomology*, 48: 1069-1075. doi: 10.1603/ME11068
- Moretti, T.C., Thyssen P.J., Godoy W.A.C. & Solis D.R. (2008). Necrophagy by the social wasp *Agelaia pallipes* (Hymenoptera: Vespidae: Epiponini): possible forensic implications. *Sociobiology*, 51: 393-398.
- O'Donnell, S. (1995). Necrophagy by Neotropical swarm founding wasps (Hymenoptera: Vespidae: Epiponini). *Biotropica* 27: 133-136. doi: 10.2307/2388911
- Prezoto, F. & Braga, N. (2013). Predation of *Zaprinus indianus* (Diptera: Drosophilidae) by the Social Wasp *Synoeca cyanea* (Hymenoptera: Vespidae). *Florida Entomologist*, 96: 670-672. doi: 10.1653/024.096.0243.
- Prezoto, F. & Souza, C.A.S. (2015). A vida secreta das vespas. In: Lima, M.S.C.S.; Carvalho, L.S. & Prezoto, F. (Ed.). *Métodos em ecologia e comportamento animal* (pp. 121-148). Teresina: Editora da UFPI.
- Prezoto, F., Cortes, S.A.O. & Melo, A.C. (2008). Vespas: de vilãs a parceiras. *Ciência Hoje*, 48: 70-73.
- Prezoto, F., Lima, M.A.P. & Machado, V.L.L. (2005). Prey captured and used in *Polybia platycephala* (Richards) (Hymenoptera: Vespidae, Epiponini) Neotropical Entomology, 34: 849-851. doi: 10.1590/S1519-566X2006000500021
- Prezoto, F., Santos-Prezoto, H.H., Machado, V.L.L. & Zanuncio, J. C. (2006). Prey captured and used in *Polistes versicolor* (Olivier) (Hymenoptera: Vespidae) Nourishment. *Neotropical Entomology* 35: 707-709.