Nest camouflage records on five social wasp species (Vespidae, Polistinae) from southeastern Brazil

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Abstract: Social insects adopt different strategies to defend their colonies, including camouflage. Aiming to increase the knowledge about this strategy on social wasps, in this study we present records of nest camouflage for Parachartergus smithii (de Saussure), Parachartergus wagneri du Buysson, Chartergelius communis Richards, Metapolybia cingulata (Fabricius) and Mischocttarsus anthracinus Richards. Being is last, P. smithii and P. wagneri are poorly discussed within the specialized literature regarding their nesting behavior. Therefore, we made records in different conservation units, between 2011 and 2019, in Minas Gerais state, southeastern Brazil. We point out that, due to their docile behavior, the camouflage appears to be the main defense strategy for these species, as demonstrated by the color and shape of the nests within the substrate. The exception is M. cingulata, which presents both camouflage and aggressive behavior in some situations.

Keywords: Chartergelius; Colony Defense; Metapolybia; Parachartergus.
regression, there were no individuals on the outside of the colony. However, the disturbance of the observed structure confirmed that it was a colony, as it prompted the exit of the individuals, which demonstrated docile behavior, remaining over the nest wrapper. The shape and gray color of the nest allows it to disappear into the substrate, which demonstrates homochromy or homotype camouflage (Table 1). MATEUS et al. (1997), for instance, reported a case of a *P. smithii* nest with a light gray colored envelope, striated with brown and dark gray, which produced a camouflage for the nest. *Parachartergus wagneri* (Figure 1C and 1D) did not present individuals on the colony surface, at the time of registration. However, disturbances in the nest prompted the exit of individuals through the opening in the posterior portion of the nest, also cryptic due to its adherence to the tree trunk. Outside the nest, the individuals remained immobile, not attacking, then flying around due to the disturbance persistence. Such docile behavior seen in *P. wagneri* suggests the adoption of alternative strategies of colony defense. Also, the gray color similarity between the nest and the vegetal substrate reinforces the hypothesis of camouflage (Table 1).

*Metapolybia cingulata* nests presented a gray color similar to the trunk or the wood used in nesting, which suggests homochromic camouflage. However, when the nest is similar to the shape of the trunk bark, a camouflage of the homotype kind is suggested (Figure 1E), as reported by SOMVILLA et al. (2012). Therefore, camouflage in this species is based on two simultaneous strategies, homotype and homochromia. In addition, the nests of this genus are of the astelocyttarus type (RICHARDS & RICHARDS 1951), where the single honeycomb is firmly adhered to the substrate, making its distinction difficult. Differently from the species of *Parachartergus* and *Chartergellus*, the individuals of *M. cingulata* presented aggressiveness when the intentional disturbances, by dispersing and investing in attempts to sting. This suggests camouflage and aggressiveness as joint defense mechanisms (Table 1) (Chavarría-Pizarro & West-Eberhard 2010).

In the case of *C. communis* (Figure 1F) the shape of the nests combined with their coloring made them difficult to distinguish in the environment (Table 1). Their behavior was similar to that shown by *P. smithii* (MATEUS et al. 1997), *P. colobopterus* (STRASSMANN et al. 1990), *Chartergellus punctator* Richards, and *Chartergellus golfitensis* West-Eberhard (Chavarría-Pizarro & West-Eberhard 2010).

Similar reports were made for *Metapolybia* and for *Synoeca* species, which, although building camouflaged nests, show aggressive behavior when there are disturbances external to the colony (Chavarría-Pizarro & West-Eberhard 2010). In this sense, it must be mentioned that the alternation between aggressiveness and docile behavior is directly associated with the stage of the colony, being docile in nests with low productivity and aggressive when increasing the production of eggs and pupae, as described for *Metapolybia aztecooides* Richards (FORSYTH 1978).

Regarding color and shape of *M. anthracinus* colonies, there is considerable similarity with the capitulum type inflorescence of the Asteraceae (Figure 1G). This makes the identification of the nest hard within the environment. Therefore, we infer, once again, nest camouflage based on shape and color. When there was an approach to the colony, the individuals flew away or remained in it, moving to the opposite side of the nest, without any aggressiveness. Due to the susceptibility of some species of the *Mischocyttarus* genus to predators in colonies with few individuals and lacking a protective wrapper due to factors such as stunted stingers (JANNE 1975; RAPOSO-FILHO & RODRIGUES 1984), direct and indirect defense strategies can be observed. In this regard, camouflage is a relevant strategy for the genus, as demonstrated by recent studies (e.g. BARBOSA et al. 2016, MILANI et al. 2020).

We conclude that camouflage is the main defense strategy in colonies of *P. smithii, P. wagneri, C. communis* and *M. anthracinus*, while for *M. cingulata* it is adopted in combination with aggressive behavior.

## REFERENCES


### Table 1. Number of colonies, substrate used for nesting, height of the nest in relation to the ground, camouflage strategy used (regarding color and shape), behavior (docile or aggressive) and place of registration (RVS = Pandeiros River Wildlife Refuge; PN = Sempre Vivas National Park; PE = Rio Doce State Park and Serra do Papagaio State Park; APA = Environmental Protection Area of Machado River) of different species of social wasps in the state of Minas Gerais, southeastern Brazil.

<table>
<thead>
<tr>
<th>Species</th>
<th>Parachartergus smithii (de Saussure)</th>
<th>Parachartergus wagneri du Buysson</th>
<th>Chartergellus communis Richards</th>
<th>Metapolybia cingulata (Fabricius)</th>
<th>Mischocyttarus anthracinus Richards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N° of colonies</strong></td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td><strong>Substrate</strong></td>
<td>Trunk</td>
<td>Trunk</td>
<td>Trunk and light post</td>
<td>Trunk and roofing woods</td>
<td>Inflorescence</td>
</tr>
<tr>
<td><strong>Ground height (m)</strong></td>
<td>Raging from 8 to 10</td>
<td>4</td>
<td>Raging from 0.5 to 8</td>
<td>Raging from 1 to 9</td>
<td>1</td>
</tr>
<tr>
<td><strong>Camouflage</strong></td>
<td>Color and shape</td>
<td>Color and shape</td>
<td>Color and shape</td>
<td>Color and shape</td>
<td>Color and shape</td>
</tr>
<tr>
<td><strong>Behavior</strong></td>
<td>Docile</td>
<td>Docile</td>
<td>Docile</td>
<td>Docile /aggressive</td>
<td>Docile</td>
</tr>
<tr>
<td><strong>Locality</strong></td>
<td>RVS Rio Pandeiros</td>
<td>APA Rio Machado</td>
<td>RVS Rio Pandeiros</td>
<td>RVS Rio Pandeiros</td>
<td>PE do Serra do Papagaio</td>
</tr>
<tr>
<td></td>
<td>PN das sempre vivas</td>
<td>PE do Rio Doce</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Figure 1. Camouflaged nests of social wasp species, Minas Gerais state, southeastern Brazil. A and B - *Parachartergus smithii* recorded at Pandeiros River Wildlife Refuge (RVS); C and D - *Parachartergus wagneri* recorded in the Environmental Protection Area of the Machado River; E - *Metapolybia cingulata* also from RVS; F - *Chartergellus communis* in RVS; G - *Mischocyttarus anthracinus* in Serra do Papagaio State Park.
Nest camouflage records on five social wasp species (Vespidae,...) Souza et al. (2020)


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Suggestion citation: