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Scientific Note/Comunicação Científica

Nesting associations between *Chartergus globiventris* Saussure (Hymenoptera: Vespidae) and *Tolmomyias sulphurescens* Spix (Passeriformes: Tyrannidae) in southeastern Brazil

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Abstract. The success of social wasps is highly dependent on nest construction and colony maintenance. Species use different strategies to avoid nest predation, including forming associations with other insects and vertebrates. This study describes for the first time the association between the social wasp *Chartergus globiventris* Saussure and the yellow-olive flycatcher *Tolmomyias sulphurescens* Spix in a deciduous seasonal forest fragment in southeastern Brazil. We located eight active *C. globiventris* colonies in the study site, three of which were associated with active *T. sulphurescens* nests. Bird-wasp associations in previous studies have been regarded as commensalism because only birds seem to benefit. However, further studies are needed to better understand the potential benefits of this relationship for both taxa.

Keywords: Bird nest; Hymenoptera; interaction; nesting; social wasp.

Associações de nidificação entre *Chartergus globiventris* Saussure (Hymenoptera: Vespidae) e *Tolmomyias sulphurescens* Spix (Passeriformes: Tyrannidae) no sudeste do Brasil

Resumo. O sucesso das espécies de vespas sociais está relacionado tanto a construção quanto a manutenção das colônias. Várias espécies utilizam de diversas estratégias para evitar a predação de seus ninhos, como a associação com outros insetos e vertebrados. O presente estudo descreve o primeiro registro da associação da vespa social *Chartergus globiventris* Saussure com a ave *Tolmomyias sulphurescens* Spix em fragmento de Floresta Estacional Decidual no Sudeste do Brasil. Foram registradas oito colônias de *C. globiventris* ativas em diferentes espécies arbóreas, das quais três estavam associadas a ninhos ativos de *T. sulphurescens*. A associação entre a ave e a vespa tem sido tratada como comensalismo, pois apenas a ave obtém vantagens aparente, como discutido na literatura. Contudo, é necessário realizar experimentações ou análises mais aprofundadas a fim de se obter afirmações sobre os benefícios dessa relação.

Palavras-chave: Hymenoptera; interação; nidificação; ninho de aves; vespa social.

Nest construction and colony maintenance are crucial factors for the persistence of social wasp species in associated environments (Jeanne 1975; Dejean *et al.* 1998; Hunt 2007). Several factors can directly affect these processes, including abiotic factors (*e.g.* sunlight, precipitation) (Corbara *et al.* 2009), nest predation by vertebrates (Raw 1997; Sick 2001; Sazima 2014) and ants (Jeanne 1975), nesting habits, nest architecture (Wenzel 1991; Corbara *et al.* 2009; Souza *et al.* 2014), and anthropogenic changes (Souza *et al.* 2010). Social wasp species adopt different strategies to avoid nest predation, such as construction near ant nests (Vesey-Fitzgerald 1938; Richards 1945; Herre *et al.* 1986; Corbara *et al.* 2009). For example, Souza *et al.* (2013) and Somavilla *et al.* (2013) described the association between the social wasp *Polybia rejecta* (Fabricius) and the ant *Azteca chartifex* Forel, in which the wasps defend ant colonies from potential predators and in turn, ants attack avian and primate predators of wasp colonies.

Interactions between social wasps and birds are documented in the literature (Somavilla *et al.* 2013; Menezes *et al.* 2014; Sazima & D'Angelo 2015). In this association, birds construct nests near social wasp colonies. Social wasps become aggressive when other animals approach their colonies, (Myers 1935; Cazal *et al.* 2009; Almeida & Anjos-Silva 2015), and as a result they effectively defend neighboring bird nests from predators, enhancing nestling success. This association is assumed to be an example of commensalism, as only birds seem to benefit (Sazima & D'Angelo 2015).

Relationships between species of social wasps and birds are known to differ among ecosystems in Brazil (Somavilla *et al.* 2013; Menezes *et al.* 2014; Sazima & D'Angelo 2015; Almeida & Anjos-Silva 2015). However, data on this association in deciduous forests are scarce. In this study we report an association between social wasp *Chartergus globiventris* Saussure and *Tolmomyias*

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sulphurescens Spix in a deciduous forest area in southeastern Brazil.

The study took place in the "Refúgio Estadual da Vida Silvestre do Rio Pandeiros" (45°95' W, 15°88' S and 43°95' W, 14°40" S) in the municipality of Januária, northern Minas Gerais state. The refuge contains both Cerrado and Caatinga vegetation (IEF 2008; Nunes *et al.* 2009) and the regional climate is semi-arid, with well-defined dry and wet seasons. The average annual temperature is 25 °C, and annual rainfall is about 1,000 mm, concentrated in the wet season (October through February) (Santos *et al.* 2007).

Sampling events were carried out from June 2014 to April 2015, in both the rainy season (spring and summer) and the dry season (fall and winter). There were five continuous sampling days in each of the four seasons, totaling 20 days with 30 discontinuous hours of observation (one to two hours per event). Observations were carried out using the *ad libitum* method with binoculars (Del-Claro 2010). Colonies were located through active search by following existing tracks. Colonies were photographed, and the distance between nests was estimated for each nesting association. The two species were considered to be associated when bird nests and wasp colonies were built up to a meter (Wunderle & Pollock 1985). Wasp specimens from each nest were collected and birds were photographed to confirm species identifications.

We located eight active *C. globiventris* colonies in several tree species, of which three were associated with active *T. sulphurescens* nests. Wasp colonies and bird nests were approximately 40 to 60 cm apart, sufficiently close to be characterized as a nesting association (Wunderle & Pollock 1985). Bird nests were always positioned below wasp colonies (Figure 1).

T. sulphurescens associations with other social wasp species have recently been reported in southeastern Brazil (Menezes *et al.* 2014). In some regions, *T. sulphurescens* nests are built in the vicinity of colonies belonging to aggressive wasp species (Fitzpatrick 2004). *C. globiventris* has also been found in association with *Myiozetetes similis* (Spix) in the Pantanal region in Mato Grosso (Almeida & Anjos-Silva 2015).

Most studies of associations between social wasps and birds are described as commensalism (Beier & Tungbani 2006; Somavilla *et al.* 2013; Sazima & D'Angelo 2015). The suggestion is that only birds benefit, by gaining protection from attacks by predators such as arboreal mammals, birds of prey, and snakes (Myers 1935; Cazal *et al.* 2009; Somavilla *et al.* 2013; Sazima & D'Angelo 2015). However, Bologna *et al.* (2007) in a study of *Belonogaster lateritia* Gerstaecker in association with *Philetarius socius* (Latham) found that this wasp constructs colonies very near bird nests, then visits the nest to capture larval and adult flies developing in bird feces. These findings, despite being restricted to only one bird and one wasp species, indicate the potential for other mutualistic associations between social wasps and birds.

In conclusion, we report for the first time the association between the social wasp *C. globiventris* and bird *T. sulphurescens*. Further studies are needed to elucidate the nature of the relationship in terms of potential benefits for each species.

Figure 1. A) *Chartergus globiventris* Saussure colony. B) Association between a *C. globiventris* colony and *Tolmomyias sulphurescens* Spix.

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