

Notes and Comments

Nesting plants and colony defense strategies of *Chartergus globiventris* (Hymenoptera: Vespidae) in the Brazilian Cerrado

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The nests of the Neotropical social wasp *Chartergus* Lepeletier, 1836 are of the phragmocytarous type with an initial comb attached to the substrate and covered by a protective casing. The second comb includes additional cells with its sides, also, covered by a casing and with an opening between both combs (Andena et al., 2009).

Chartergus spp. nests have been reported on different plant species from the Cerrado to tropical forests, some associated with bird nests (Souza et al., 2017). The nesting behavior of species of this genus is important because social wasps are used in biological control programs as these insects prey pests in different crops such as coffee, corn, eucalyptus, potatoes, and vegetables (Medeiros et al., 2019; Cabral et al., 2024). This important function increases the need of understanding and documenting the defense strategies of social wasp species to use these insects in pest management programs (Prezoto et al., 2019).

The strategies of social wasps and other social Hymenoptera for defense against predators includes passively behavior and chemicals as repellents or sticky traps, besides active defenses against predators, such as jawed, poisoning and stings (Jeanne, 2021).

The objective of this study was to report information on plant species with nests and defense strategies of *Chartergus globiventris* Saussure, 1854 (Hymenoptera: Vespidae) in the Cerrado biome.

1. Materials and Methods

Colonies of *C. globiventris* were found in the Cerrado biome in the municipality of Angical (12° 0' 25" S 44° 41' 38" W), Bahia state, Brazil in areas of riparian forest, from November 2020 to January 2021 and at the Rio Pandeiros Wildlife Refuge (15° 23' 31"S; 44° 53' 43"W), in deciduous forest in Minas Gerais state, Brazil, from February to November 2014.

Colonies of *C. globiventris* were recorded in an active survey with the inspection of rocky outcrops, cavities in trunks and treetops in pre-existing trails in the areas studied

(Municipality of Angical and Rio Pandeiros Wildlife Refuge) between 08:00 A.M. and 5:00 P.M. by two to four researchers per area. Sampling took place during two months in Angical totaling 36 hours and 20 days in the Rio Pandeiros Wildlife Refuge with a sampling effort of six hours per day, totaling 120 hours. Individuals from each colony were photographed and captured with an entomological net and their defense behavior observed during these procedures, using the *Ad libitum* methodology (Altmann, 1974). The individuals collected in the colonies were stored in flasks with 70% alcohol and used to identify this species by Dr. Marcos Magalhães de Souza from the Zoology Laboratory of IFSULDEMINAS, Campus Inconfidentes. The wasp specimens are deposited in the "Coleção Biológica de Vespas Sociais (CBVS)" of the same institution (registration 06442 to 06461-2021). One of the nests was collected and its morphometric measurements obtained.

2. Results

Nine *C. globiventris* nests were found in areas of riparian forest in the municipality of Angical, and six in the Rio Pandeiros Wildlife Refuge, all in the Cerrado biome (Figure 1A-1D) and with white or light gray color.

Six nests were found on *Triplaris gardneriana* Wedd. (Polygonaceae), one on *Cordia glabrata* Mart. (Boraginaceae), one on *Hymenaea martiana* Hayne (Fabaceae) and one on *Libidibia ferrea* Mart. (Fabaceae). All nests of this social wasp in the municipality of Angical and the Rio Pandeiros Wildlife Refuge were found between 4 m and 10 m high (Figure 1E).

The *C. globiventris* individuals flew towards the researchers and stung them during their approach for photos and specimen collection. The length of the *C. globiventris* nest ranged from 15.44 cm to 31.22 cm with an opening of 0.5 to 0.8 cm in diameter at its lower central region.

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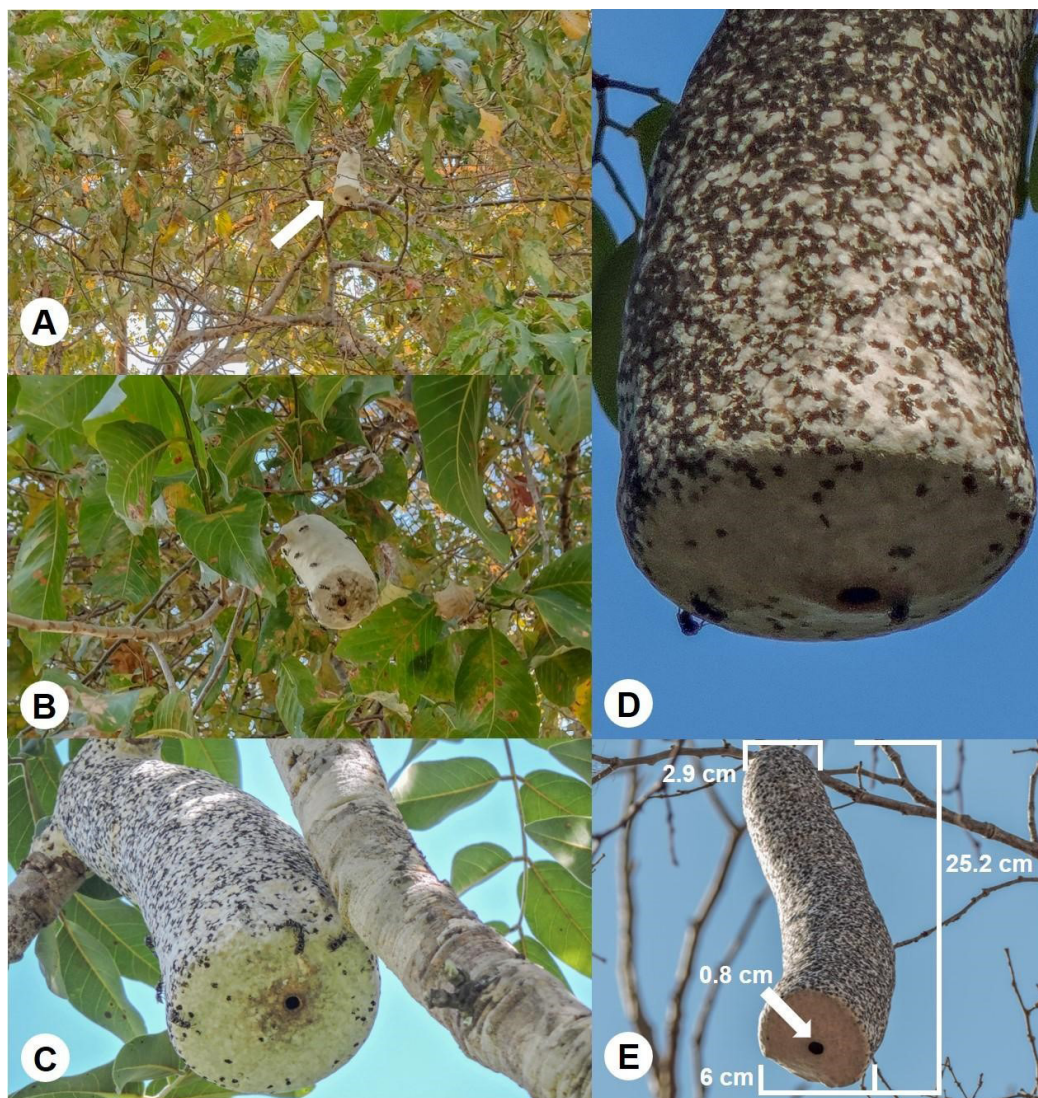


Figure 1. Nests of *Chartergus globiventris* (Hymenoptera: Vespidae): A e B - Areas at the Angical, Bahia state, Brazil; C, D and E - Areas at the Rio Pandeiros Wildlife Refuge, Minas Gerais state, Brazil.

3. Discussion

The diversity and abundance of social wasps depend on resources available for nesting and foraging, including water, explaining the *C. globiventris* nesting in the riparian or gallery forests (Santos et al., 2009). The nesting of this wasp on *T. gardneriana* may also be related to food resources, such as pollen grains with starch and nectar in flowers of this plant (Custodio et al., 2017).

The white or light gray colors of *C. globiventris* nests (Hozumi et al., 2010) can help temperature control in the nests of this wasp (Jeanne, 1996) frequently found at treetops where they are more exposed to high temperatures, as in northern Minas Gerais state, Brazil. The use of cellulose from trees where this wasp nests also explains its colour (Wenzel, 2020) and may be a defense strategy for *C. globiventris*, camouflaging their nests to reduce or avoid predation (Wenzel, 2020).

The aggressive flying and stings by *C. globiventris* on the researchers can be a defense behavior against mammals or birds, that commonly attack *Chartergus* spp. nests (Le Guen et al., 2015; McCann et al., 2013), although they have been found associated with those of the bird *Myiozetetes similis* Spix in the Pantanal biome, Brazil (Almeida and Anjos-Silva, 2015).

Defense strategies such as camouflage, nesting near ant colonies, and aggressiveness, reported for *Chartergellus golfitensis* West-Eberhard, 2010 and *Polybia rejecta* Fabricius, 1798 (Chavarría-Pizarro and West-Eberhard, 2010; Souza et al., 2013) is related to nest defense at higher and more visible places and therefore more susceptible to attack (Jeanne, 1975).

The reduced diameter of the entrance to the *C. globiventris* nest, average of 0.8 cm, may also be associated with defense against ants, with only one individual of this species blocking the entrance against ants, as observed for *Chartergus artifex* Christ., 1791 (Richards, 1978).

The width of the passages between the combs within the nest is equivalent to that of a brood cell, possibly an adaptation allowing a single wasp to block ant access to the combs with larvae or pupae in the lower chambers (Jeanne, 1975). The resistant envelope of some social wasp species nesting on treetops, as *C. artifex*, as a defense against birds and monkeys (Detoni et al., 2021), may explain the high resistance of *C. globiventris* nests collected and kept intact and undamaged since 2014.

The information presented reinforces the diversity in defense strategies of social wasps, but camouflage and aggressiveness are the most used by *C. globiventris*. The nesting of *C. globiventris* on plant substrates in riparian or gallery forests may be associated to food availability and the nesting above four meters high may be a defense strategy.

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