ENTOMOLOGICAL Communications

Entomological Communications, 8, 2026: ec08036
doi: 10.37486/2675-1305.ec08036
e-ISSN: 2675-1305
Open Access Full Text Article

Scientific Note

Interaction between *Allomerus auropunctatus* (Roger, 1863) (Hymenoptera: Formicidae) and a Fruiting Body of *Ganoderma* P. Karst., 1881 (Agaricomycetes: Polyporaceae) and Summary of Feeding Habits Based on Citizen Science

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***Edited by:* Jorge L. P. Souza**

***Received:* August 05, 2025. *Accepted:* May 08, 2026. *Published:* September 10, 2026.**

Abstract. *Allomerus auropunctatus* (Roger, 1863) (Hymenoptera: Formicidae) is considered one of the world's worst invasive species. Although it is described as a generalist, few detailed descriptions of this behavior exist in the literature. We observed the first record of *A. auropunctatus* workers on a fungal fruiting body of *Ganoderma* sp. Our observations indicate that the ants use the fruiting body both as a foraging site and as a potential nesting area, with workers actively collecting an exudate produced by the fungus. Based on citizen science data, most feeding strategies recorded for *A. auropunctatus* involve tending and collecting honeydew from treehoppers, aphids, and scale insects. Beyond reporting the first recorded interaction between *A. auropunctatus* and a fungus, the main finding of this study is the remarkable feeding flexibility of this species, demonstrating its high adaptive capacity and its potential relevance for biological control research.

Keywords: Attini, Myrmicinae, Polysaccharide, *Wasmannia*.

The ant genus *Allomerus* Mayr, 1878 (Myrmicinae: Attini) is a Neotropical lineage comprising 19 currently recognized species. Recent molecular phylogenetic evidence demonstrated that *Wasmannia* Forel, 1893 is paraphyletic with respect to *Allomerus*. Consequently, Longino & Branstetter (2026) synonymized *Wasmannia* under *Allomerus* and transferred its 11 valid species to *Allomerus* as new combinations. Among these, *Wasmannia auropunctata* (Roger, 1863) is now recognized as *Allomerus auropunctatus* (Roger, 1863).

Among the species in this genus, *A. auropunctatus* stands out for its exceptional adaptation to disturbed areas. These ants are generalists in their feeding habits, with records of them consuming other arthropods, scavenging organic matter, and collecting floral or extrafloral nectar (Supplementary Tab. 1). Despite their small size, they are highly defensive and territorial, delivering painful stings. Due to their ecological flexibility, *A. auropunctatus* has become a globally invasive species and is listed among the 100 worst by the IUCN (Cuezzo et al. 2015).

Despite their diverse feeding habits and nesting strategies, there are no previous records of *A. auropunctatus* workers feeding on or nesting within fungal fruiting bodies. Until recently, such behavior was believed to be exclusive to species within the subtribe Attina (Voglmayr et al. 2011). Outside of Attina, mutualistic relationships between ants and fungi have only been observed in a few other genera, such as *Crematogaster* Lund, 1831, *Camponotus* Mayr, 1861, and *Dolichoderus* Lund, 1831, which utilize filamentous fungi, particularly from the orders *Capnodiales* and *Chaetothyriales*, to reinforce their nest walls (Voglmayr et al. 2011; Dejean et al. 2023).

Ganoderma P. Karst., 1881 is a genus of wood-decaying fungi with cosmopolitan distribution that causes white rot in the roots and lower trunks of trees from various plant families (Loyd et al. 2018). Although the taxonomy of *Ganoderma* remains under revision due to difficulty in distinguishing morphologically similar species, at least eighteen are known to occur in Brazil, many of which were, until recently, only recorded from their type localities and remained poorly characterized (Torres-Torres et al. 2013). The fruiting bodies of *Ganoderma* typically emerge directly from the tree root or trunk and display a woody, varnished or laccate appearance in older areas. In growing regions, the active mycelium is white and capable of secreting polysaccharides in response to environmental stressors such as changes in temperature, pH, or mechanical trauma (Nie et al. 2013). These secretions likely serve as a first line of defense against pathogen infection, although few studies have explored this role in detail. Instead, most research focuses on the biological and medicinal properties of these polysaccharides, which have been associated with antibiotic, antidepressant, and other therapeutic effects (Zhang et al. 2019; Seweryn et al. 2021).

In this context, the present study documents the first recorded interaction between *A. auropunctatus* and a living fruiting body of *Ganoderma* sp. We also compile citizen science data from iNaturalist to further characterize the feeding interaction and provide additional insight into the generalist feeding behavior of *A. auropunctatus* as described in the literature.

The observations were conducted in Laranjal Paulista, São Paulo, Brazil, in a highly disturbed area influenced by rural and urban development near the Sorocaba River, in the transition zone between the Atlantic Forest and Cerrado biomes.

Live specimens of *A. auropunctatus* and *Ganoderma* sp. were photographed in situ at night using a Nikon D5000 camera equipped with a Nikkor AF-S 60 mm f/2.8G ED macro lens and an external Nikon Speedlight SB-800 flash paired with a 23 × 23 cm folding Mini Diffuser Softbox. Image editing was carried out using PhyloPic, CANVA (version 2.303.0), and GIMP (version 2.10.38). Due to the accidental nature of the discovery, no specimens were collected at the time because field equipment was unavailable. A follow-up visit one week later aimed to collect both the ant colony and the fungus, but the area had been burnt and cleared.

In addition to field observations, we compiled records of *A. auropunctatus* from iNaturalist, accessed via the Global Biodiversity Information Facility (GBIF 2025), and supplemented with records retrieved directly from iNaturalist, totaling 787 observations. Observations with blurry, distant images or involving baiting and artificial feeding were excluded. Retained observations were manually examined to assess taxonomic plausibility based on visible morphological characters and published diagnostic traits. Workers were identified by yellowish-to-golden coloration, a strongly developed subquadrate petiolar node (Fig. 1A detail), and well-developed propodeal spines (Fig. 1B detail), using literature (Longino & Fernández 2007), and AntWeb (2025) as references. Records lacking diagnostic characters were excluded.

This approach follows established methods for extracting and validating ecological interactions and behavioral data from citizen science sources (Gazdić & Groom 2019; Hochmair et al. 2020; Di Cecco et al. 2021). Recent studies have demonstrated the utility of iNaturalist for documenting ecological, behavioral, and biogeographical patterns across multiple scales and highlighted the reliability of community-validated observations when combined with expert review (Callaghan et al. 2022; Beninde et al. 2023; Arcos 2025; Arcos et al. 2025; Hu et al. 2025). Integrating these records allowed us to contextualize field observations within a broader perspective of the foraging behavior of *A. auropunctatus*, highlighting the potential of citizen science databases to complement traditional field-based investigations.

The interaction between *A. auropunctatus* and *Ganoderma* sp. is characterized by direct contact, with ants using the fruiting body both as a foraging site and a potential nesting area (Fig. 1A). Workers were observed actively collecting an exudate secreted by the fungus, often in coordinated groups recruited to the site (Fig. 1B). Remains of other arthropod species were frequently found on the surface of the fruiting body, especially near potential nest entrances (Fig. 1C), suggesting possible opportunistic predation on visiting arthropods and/or waste disposal by the colony in humid exudate-rich areas. Other ant species (cf. *Ectatomma* sp.) were also occasionally seen collecting the same substance. In addition to foraging, *A. auropunctatus* workers were observed entering and exiting the fruiting body through natural openings in its surface, suggesting possible nesting behavior within the fungus (Fig. 1D).

Out of 787 original iNaturalist records reviewed, 150 observations (~18.8%) were associated with feeding behavior. After screening, 25 records were excluded. The remaining 125 records (16.27%) were computed and included as supplementary material with links to the original observations (Fig. 2; Supplementary Tab. 2). Approximately 22.6% of feeding records involved interactions with various insect taxa, including Hymenoptera (Apidae and Formicidae), Diptera, Lepidoptera, Coleoptera, Isoptera, Orthoptera, and Hemiptera, either as prey or scavenged material. One record involved a worker gathering what appeared to be saliva or food debris from the mouth of a living chameleon. Around 21% of feeding observations depicted *A. auropunctatus* foraging on plant-derived resources, mostly floral and extrafloral nectar, but also including leaf tissue, pollen, plant sap, and fruits. Another 9.4% of records showed scavenging of unidentified organic matter. The most common feeding strategy, accounting for 45.6% of records, involved tending and collecting honeydew from hemipterans, particularly Membracidae, Aphidoidea, and Coccoidea. Only the author's record involved *A. auropunctatus* feeding from a fungal source.

Although it cannot be confirmed that the ants created the openings in the fruiting body, the main evidence supporting its use as a nesting site is the active disposal of food remains around the observed entrances, consisting mainly of insect fragments, particularly other ants (Fig. 1C). Since *A. auropunctatus* is described as a predator of

Figure 1. (A) shows the *Ganoderma* fruiting body and ant species feeding on exudate droplets; (A detail) shows the characteristic petiole with a strongly developed, subquadrate node forming a step-like profile in lateral view; (B) shows a detail of the exudate droplets with *Allomerus auropunctatus* (Roger, 1863) (Myrmicinae: Attini) workers collecting the substance; (B detail) shows the presence of well-developed propodeal spines. (C) shows discarded remains of other insects preyed upon by *A. auropunctatus*; (D) shows the entrance of *A. auropunctatus* on the *Ganoderma* fruiting body.

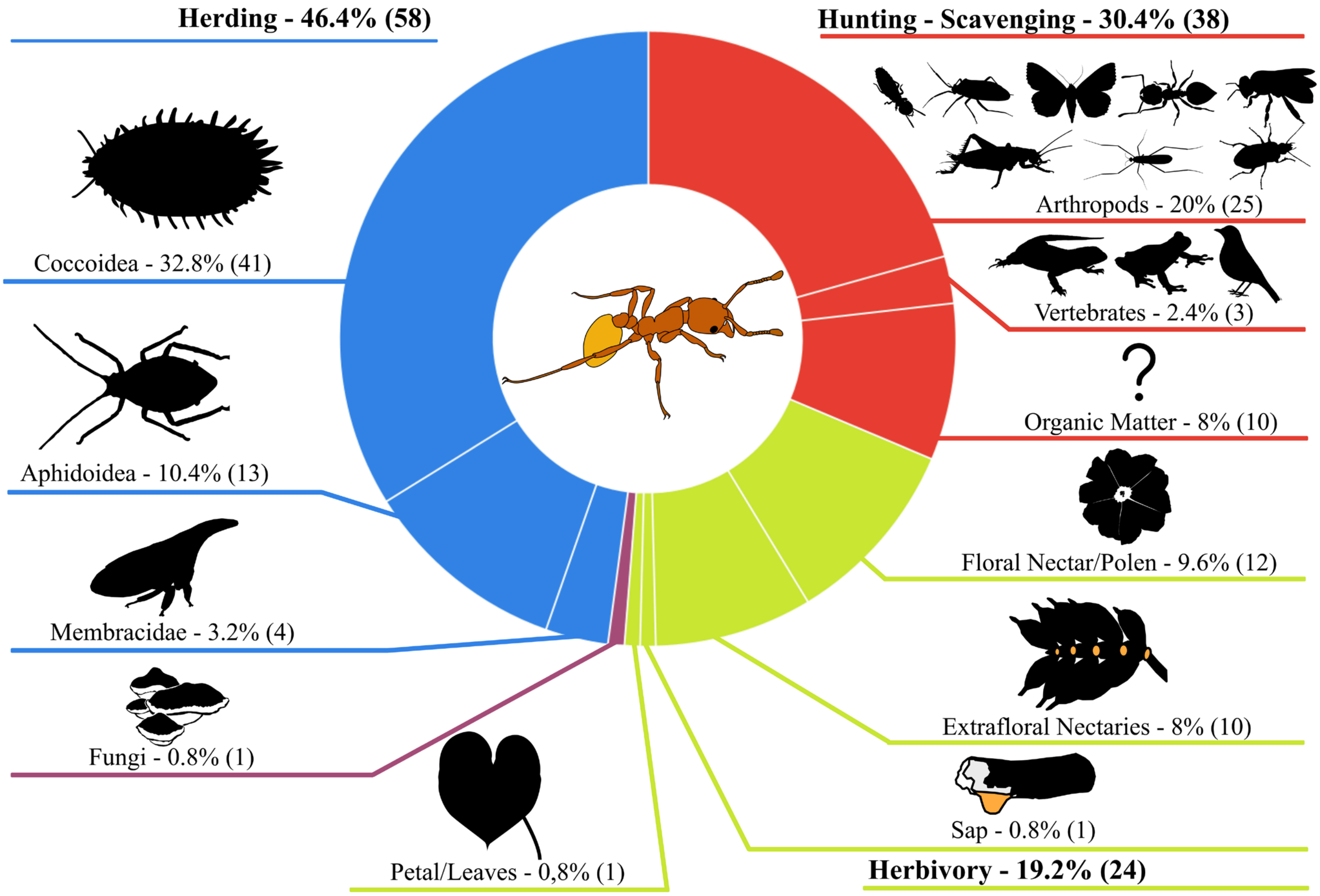

Figure 2. Compilation of food sources and feeding strategies of *Allomerus auropunctatus* (Roger, 1863) (Myrmicinae: Attini) based on citizen science. 125 records were compiled, 32 on its native range and 93 outside it.

other arthropods (Fabres & Brown 1978; Longino & Fernández 2007), we infer that these remains may result from opportunistic predation by the colony, especially because other ant species were also observed collecting the fungal exudate. Similar opportunistic behavior was documented in iNaturalist records, where bees and stink bugs were preyed upon by *A. auropunctatus* while workers collected nectar or tended aphids (Supplementary Tab. 2).

Due to the complexity of the behaviors observed between *A. auropunctatus* and the fruiting body of *Ganoderma* sp., this interaction may represent a recurrent association. However, given the limitations of observation time and sampling, as well as the species' generalist habits, it remains unclear whether this behavior reflects a regular component of the species' natural history or an opportunistic event.

The *Ganoderma* observed in this study likely produced polysaccharides in response to pH changes in the mycelium associated with the accumulation of organic matter deposited by the *A. auropunctatus* colony while foraging and possibly nesting, as well as mechanical damage caused by adults of *Mycotretus flavomarginatus* Lacordaire, 1842 feeding on the fruiting body. These factors are consistent with known laboratory-induced triggers of polysaccharide secretion (Nie et al. 2013).

The records analysed indicate that the descriptions available in the literature lack detailed examples (Supplementary Tab. 1). The citizen science dataset analysed in this work shows that *A. auropunctatus* is able to exploit numerous food sources under different situations and habitats, reinforcing its ecological flexibility and helping explain its success across diverse environments.

In conclusion, we describe a new interaction between ants and fungi that does not appear to be entirely beneficial to the fungus. The ants may prey upon insects associated with the *Ganoderma* fruiting body but may also negatively affect it through organic waste accumulation and burrowing activity. It remains impossible to determine whether these effects indirectly induce polysaccharide production for feeding and/or prey attraction, or whether they occur incidentally. We also provide additional evidence of the already recognized generalist behavior of *A. auropunctatus* through the first compilation of feeding behavior based on published information and Citizen Science records. Finally, this study highlights the value of Citizen Science as a tool for integrating academic and non-academic participation in natural history research. We hope these findings encourage further ecological and field studies to confirm and expand the patterns documented here.

Acknowledgments

The authors would like to thank all the iNaturalist community, curators and staff, for their hard work ensuring the continued updates and improvement of the platform. EC would like to specially thanks Bianca Rodrigues Strecht Valente and his family for their everloving support; his colleagues at Projeto Phasma and Rede Brasileira de Naturalistas for their incentive and insightful comments; the colleagues at Museu de Zoologia da Universidade de São Paulo, especially Prof. Dra. Eliana Marques Cancello and Dr. Mauricio Martins da Rocha for their tutoring and help; and his students and colleagues at Carandá Educação for always being supportive and interested.

Funding Information

The authors did not receive any grants or monetary funds from private or public institutions for the elaboration of this research and manuscript.

Authors' Contributions

JPSM: Data Curation, Investigation, Visualization, Writing - Original Draft, Writing - Review & Editing; EBC: Data Curation, Investigation, Visualization, Writing - Original Draft, Writing - Review & Editing;

KSC:Data Curation, Conceptualization, Supervision, Writing - Review & Editing.

Conflict of Interest Statement

The authors declare no potential conflict of interest.

Ethical Approval

Not applicable.

Data Availability

The data supporting the findings of this study are included in the article and its supplementary materials, which are available with the online publication. Raw data are available from the corresponding author upon reasonable request.

Supplementary Material

Supplementary materials are available with the online publication.

Generative AI Statement

No generative IA was used on this manuscript elaboration and image preparation.

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