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Rhizoglyphus echinopus (Acari: Acaridae) associado a *Atta sexdens* (Insecta: Formicidae)

Ademar Ferreira Silva¹  (<https://orcid.org/0000-0001-5984-8522>)

Rebecca Leal Caetano^{2,4}  (<https://orcid.org/0000-0001-7780-9981>)

Cesar Carriço^{3,4}  (<https://orcid.org/0000-0002-6272-2231>)

Marinete Amorim¹  (<https://orcid.org/0000-0003-4311-3374>)

Gilberto Salles Gazeta¹  (<https://orcid.org/0000-0003-2939-5301>)

Zeneida Teixeira Pinto^{4,*}  (<https://orcid.org/0000-0001-9926-0096>)

ABSTRACT: Four deutonymphs of bulb mites (hypopus) from *Rhizoglyphus echinopus* (Fumouze & Robin) (Acari: Acaridae) were found attached to the head of *Atta sexdens* in Rio de Janeiro, Brazil. This mite species is commonly associated with ornamental plants and trees with bulbs, corms and tubers. The results of this study provided an insight into the phoretic relationship between mites and ants, indicating the role of the latter in the dispersion of the first. Despite the abundant and diverse mite fauna existing in ants, little is known about their diversity, biology, ecology and the nature of their associations.

KEYWORDS: ant; arthropods; first record; phoresy.

RESUMO: Quatro deutoninfas de ácaros do bulbo (hipopus) da espécie *Rhizoglyphus echinopus* (Fumouze & Robin) (Acari: Acaridae) foram encontradas fixadas na cabeça de formigas da espécie *Atta sexdens* no Rio de Janeiro, Brasil. Essa espécie de ácaro está comumente associada a plantas ornamentais e plantas com bulbos e tubérculos. Os resultados desse estudo fornecem uma visão sobre a relação forética entre ácaros e formigas, indicando o papel destas últimas na dispersão dos primeiros. Apesar da abundância e da fauna diversa do ácaro em formigas, pouco se sabe sobre a diversidade, a biologia, a ecologia e a natureza dessa associação.

PALAVRAS-CHAVE: formiga; artrópodes; primeiro registro; forésia.

¹Fundação Oswaldo Cruz - Instituto Oswaldo Cruz - Laboratório de Referência Nacional em Vetores das Riquetsioses – Rio de Janeiro (RJ), Brazil.

²Universidade Estácio de Sá – Unidade Petrópolis – Rio de Janeiro (RJ), Brazil.

³Laureate International Universities - Instituto Brasileiro de Medicina de Reabilitação – Rio de Janeiro (RJ), Brazil.

⁴Fundação Oswaldo Cruz – Instituto Oswaldo Cruz – Laboratório de Educação em Ambiente e Saúde – Rio de Janeiro (RJ), Brazil.

*Corresponding author: zeneida@ioc.fiocruz.br

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Among pest insects of Brazilian agriculture and forestry, leaf-cutting ants are the main agents that cause damage since they attack all cultivated plants (SPIER et al., 2013). The species of the tribe Attini live in symbiosis with basidiomycete fungi, association that is important for the maintenance of the ants colony because it allows them to obtain nutrients and, on the other hand, enables symbiotic fungal growth with the substrates provided by the ants (SILVA et al., 2003). Among the species of the tribe Attini, *Atta sexdens*, popularly known as leaf cutters, collect fresh vegetation which they use to cultivate a symbiotic fungus inside their nests in order to provide food source to the brood (LUCIA et al., 2014).

Some species of the genus *Atta* are considered the main agricultural and forest pests in the neotropical region; there is a constant concern with their control in various agroecosystems (LUCIA et al., 2014; DORNELAS et al., 2016).

The association of mites with ants is usually common or mutualist, relying on bacteria, fungi and other resources accumulated within the ant nests. Confirmed parasitic species are rare and largely restricted to the order Mesostigmata (CAMPBELL et al., 2013). The first reference to myrmecophilous mites in Brazil is from SELLNICK (1926).

Mites have radiated into many habitats like phytophagous, mycophagous, saprophagous and parasites, and can be seen in various hosts, as well as in stored products, homes, nests and various types of soils and waste (PHILIPS; DINDAL, 1990).

Species of the family Acaridae are commonly found in humid organic substrates. *Rhizoglyphus echinopus* (Fumouse & Robin) (Acari: Acaridae) (Robine bulb mite) are typical phoretic mite and widely distributed throughout the world (SILVA et al., 2016). They are known to be good indicators of environmental impact (PAOLETTI et al., 1991) and can accumulate heavy metals in their bodies, making them an important tool as indicators of disturbed sites (VAN STRAALLEN, 1996). This mite can cause injuries on plant tissue creating a gateway to diseases (VENEGAS, 2003; FAN; ZHANG 2004), frequently attacking bulbs, roots, tubers and protected crops (DÍAZ et al., 2000; ZHANG, 2003).

Four deutonymphs of *R. echinopus* (Acari, Astigmata: Acaridae) were taken by the first author of this article from the head of *A. sexdens* (Linnaeus, 1758) (Insecta, Formicidae) in Cascadura, Rio de Janeiro (22.88.2'62.7"S, 43.33.8'59"W).

One hundred *A. sexdens* were collected from fresh leaves of the plants *Vernonia condensata* Baker (Asteraceae) during October of 2018 in the botanical garden of the Laboratório de Zoologia da Fundação Técnico Educacional Souza Marques (FTESM), located in Cascadura, Rio de Janeiro, Brazil. The ants were properly identified by dichotomic keys from MAYHÉ-NUNES (1991) and GONÇALVES (1961) and checked out for the presence of phoretic mites.

The bulb mites removed from *A. sexdens* were mounted between slide and coverslip in Hoyer's medium (FLECHTMANN, 1973) and examined under optical light microscopy. Specimens were properly identified following

FLECHTMANN (1975), KRANTZ; WALTER (2009) and FAN; ZHANG (2004) and were deposited with the voucher specimen registration (CAVAISC – ACA-4134) at the Coleção de Artrópodes Vetores Ápteros de Importância em Saúde das Comunidades (CAVAISC) of the Laboratório de Referência Nacional em Vetores das Riquetsioses (LIRN), Instituto Oswaldo Cruz, Fundação Oswaldo Cruz (IOC/FIOCRUZ) (Fig. 1).

Leaf-cutting ants are a keystone species because of their influence on environmental diversity, productivity, nutrients and energy flow. This species of ants directly and indirectly changes the physical state of biotic and abiotic materials and may cause economic losses (LUCIA et al., 2014).

The correct identification of pathogens that cause damage to species of agricultural importance is fundamental for the development of biological control strategies (JOHANSSON et al., 2013). *Rhizoglyphus echinopus* deutonymphs have been observed associated with many arthropods, such as ants (BERGHOFF et al., 2009; RETTENMEYER et al., 2011; CAMPBELL et al., 2013), beetles (NORTON, 1973; ROGERS, 1974; DE; PANDE, 1988; POPRAWOSKI; YULE 1992; MARAKOVA, 1995), Diptera (GARMAN, 1937; ZAKHVATKIN, 1941) and Siphonaptera (FAIN; BEAUCOURNU, 1993) as well as in some Blattodea Subterranean termite (SILVA et al., 2016). This study is the first record of the association between the bulb mite *R. echinopus* and *Atta sexdens* in Brazil.

Mites are the most abundant organisms found in ants nests (CAMPBELL et al., 2013). Four deutonymphs of *R. echinopus* associated with *A. sexdens* were found attached to their heads and, according to SILVA et al. (2016), the presence of mites in the head, mouthparts and abdomen of insects make difficult normal feeding behavior. The abundance of mites can also harm the sexual behavior of the phoront (RODRIGUES et al., 2013).

Despite the vast number of mite species that have been described from the association with insects, the study of social insect-mite interactions is still insipient. The mite species that occur in nests of most tropical ants remain totally unknown.



Figure 1. Ventral view of *Rhizoglyphus echinopus* (Deutonymph) (50×).

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