

USE OF CICADA CARCASS CAUGHT IN SPIDER WEB AS A FOOD RESOURCE BY THE SOCIAL WASP *AGELAIA PALLIPES* (OLIVIER, 1791)

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Abstract: In addition to preying on other insects, species of social wasps of the genus *Agelaia* (Vespidae, Polistinae) have a necrophagic feeding habit, but little is known about its foraging behavior. Therefore, the aim of this study was to document an observation of foraging behavior of *Agelaia pallipes* (Olivier, 1791) on a cicada (Hemiptera) carcass caught in a spider web. It is not clear whether the use of prey in spider webs is a common behavior for *A. pallipes*. Similarly, studies are needed to assess the impact on spiders of the usurpation of prey in their webs by social wasps.

Keywords: Cleptobiosis, Polistinae, Vespidae.

UTILIZAÇÃO DE CARÇA DE CIGARRA PRESA EM TEIA DE ARANHA COMO RECURSO ALIMENTAR DA VESPA SOCIAL *AGELAIA PALLIPES* (OLIVER, 1791)

Resumo: Além de preda outros insetos, espécies de vespas sociais do gênero *Agelaia* (Vespidae, Polistinae) possuem hábito alimentar necrófago, mas pouco se sabe sobre seu comportamento forrageiro. Portanto, o objetivo deste estudo foi documentar a observação do comportamento de forrageamento de *Agelaia pallipes* (Olivier, 1791) em carcaça de uma cigarra (Hemiptera) presa em uma teia de aranha. Não está claro se o uso de presas em teias de aranha é um comportamento comum para *A. pallipes*. Da mesma forma, são necessários estudos que avaliem o impacto nas aranhas da usurpação de presas em suas teias por vespas sociais.

Palavras-chave: Cleptobiose, Polistinae, Vespidae.

The genus *Agelaia* (Vespidae: Polistinae) is found throughout the Neotropical region, with 31 species, 21 of which are recorded from Brazil (Somavilla et al., 2021).

These social wasps exhibit necrophagic feeding habits (O'Donnell, 1995; Gomes et al., 2007) but also prey on other insects (Machado et al., 1987; Garcia et al., 2022) and even small vertebrates (Frankhuizen et al., 2020).

Agelaia pallipes (Olivier, 1791), for instance, is a species with a wide distribution in Brazil, recorded in different biomes (Souza et al., 2020a,b; Somavilla et al., 2021). Its diet includes arthropods such as mites, spiders, beetles, dipterans, hemipterans, hymenopterans and lepidopterans (Machado et al., 1987) and even small vertebrates (Frankhuizen et al., 2020), as well as mammal carcasses (Moretti et al., 2008; Somavilla et al., 2019). Additionally, it uses plant material, such as pollen (Vitali-Veiga & Machado, 2000; Dalló et al., 2017) and fruits (Ameal et al., 2023; Renne et al., 2023), as a food resource too.

Although a variety of insects are known to be part of the diet of *A. pallipes* (Machado et al., 1987), still little is known about its foraging behavior. Therefore, the aim of this study is to document the foraging behavior of *A. pallipes* on a cicada (Hemiptera) carcass caught in a spider web.

The observation occurred occasionally on October 4, 2023, under the eaves of a house in an anthropized area at the School Farm of the Instituto Federal Sul de Minas Gerais, campus Inconfidentes (22°18'32.7"S 46°19'46.1"W), municipality of Inconfidentes, in the Southern region of Minas Gerais, within the Atlantic Forest biome. After the sighting, approximately five minutes of behavioral

observation were conducted using the ad libitum method (Del-Claro, 2010), with photographic documentation (Nikon Coolpix P600) and the capture of individuals involved in the behavior. The captured specimens were later sent to the Social Wasps Biological Collection (CBVS), where they were identified and deposited in the collection. The identification of the social wasp was carried out using dichotomous keys (Richards, 1978) and by comparison with the CBVS collection.

The behavioral record is as follows: In the morning, the cicada *Quesada gigas* (Olivier, 1790) was observed being preyed upon by the spider *Trichonephila clavipes* (L., 1767) in its web (Figure 1A). In the late afternoon of the same day, around 4:00 PM, when the spider was sheltered in its web, four specimens of *A. pallipes* simultaneously landed on the carcass of the cicada left in the web. They began to remove fragments of soft tissue from the ventral region of the cicada (Figure 1B), with ingestion on-site by two individuals, while the others flew carrying fragments removed with their mandibles, likely towards their colony. This behavior has already been reported for *A. pallipes* (Fig 1c) feeding on mammal carcasses (Somavilla et al., 2020).

The use of an adult cicada as a food resource for *A. pallipes* appears to be occasional

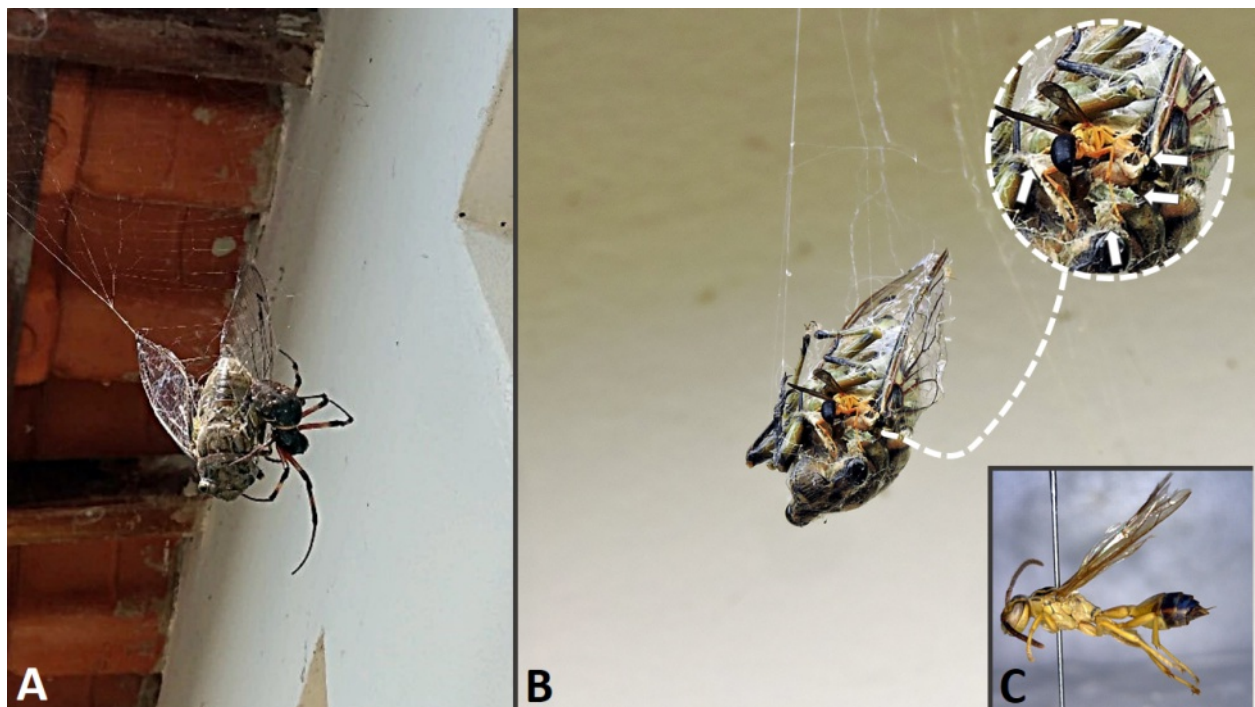


Fig. 1. Specimen of *Quesada gigas* caught in the web of *Trichonephila clavipes*. A - *T. clavipes* feeding on *Q. gigas*; B - Individual of *Agelaia pallipes* feeding on the underside of *Q. gigas*; C - *A. pallipes* in detail, lateral view. White arrows point to damage caused by *A. pallipes* to the carcass of *Q. gigas*

and circumstantial. Therefore, the wasp benefited from the capture of the cicada by the spider, supporting the generalist and opportunistic habits exhibited by this species. *A. pallipes* feeds on a wide variety of live or dead animals, a characteristic that has been identified as one of the reasons for the success and widespread distribution of this species. This type of behavior is known as cleptobiosis, in which individuals steal resources from other organisms during foraging, and it has been documented in other species of social wasps, although it had not been previously observed in *A. pallipes*.

Similarly rare to the record of social wasps of the genus *Agelaia* feeding on live adult insects (Garcia et al., 2022) is the report of prey usurpation in spider webs by *Agelaia spp.* Although there are records of this behavior in other species of social wasps, such as *Parischnogaster depressigaster* (Rohwer, 1919) (Willians, 1928), *Polybia occidentalis* (Olivier, 1791) and *Mischocyttarus drewseni* de Saussure, 1857 (Jeanne 1972), there is only one report of this behavior, with few details, of an individual of *Agelaia angulata angulata* (Fabricius, 1804) attempting to usurp prey in a spider web in the Brazilian Cerrado in Mato Grosso state (Richards, 1978).

In species of social wasps of the genus *Mischocyttarus* that forage in spider webs, it is discussed that such behavior may be associated with morphological modifications in their tarsi, which likely enable these wasps to move efficiently on silk threads for prey usurpation or predation (Jeanne, 1972; Oliveira et al., 2024). However, these modifications are not observed in *Agelaia spp.*, which could explain why the workers landed on the cicada carcass rather than on the spider web (Figure 1B), as landing on the web could promote the predation of the social wasps by the spider (Silva et al., 2023).

O'Donnell (1995) and Silveira & dos Santos (2011) suggest that individuals of *Agelaia spp.* have modifications in their mandibles related to the manipulation of carcasses and carrion, indicating a probable specialization in the use of these items. Therefore, the use of these food resources can be an important source of nutrients for social wasps, especially for this genus (Cornaby, 1974). Our study records that *A. pallipes* can obtain food from prey caught in spider webs, however, it is not clear whether this is a common behavior for *A. pallipes*, therefore, more studies are needed to investigate it more deeply. Similarly, studies are needed to assess the impact on spiders of the usurpation of prey in their webs by social wasps.

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