

Scientific Note

First record of *Thaumasia* Perty, 1833 nursery web spider (Araneae: Pisauridae) preying upon *Polistes canadensis* (Linnaeus, 1758) (Hymenoptera: Vespidae) in the Neotropical region

Silvio F. B. Lima¹, Marcio B. DaSilva², Paulo G. L. Coelho Júnior²

¹Universidade Federal de Campina Grande, Cajazeiras, PB, Brazil. ²Universidade Federal da Paraíba, João Pessoa, PB, Brazil.

✉ Corresponding author: sfblima@gmail.com

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Abstract. *Thaumasia* Perty, 1833 are opportunistic spiders that inhabit the Neotropical region. This study reports a spider of the genus *Thaumasia* preying upon *Polistes canadensis* (Linnaeus, 1758) in semiarid region of Brazil. A spider of the genus *Thaumasia* was observed moving rapidly from the fountain's water surface to capture an individual of *P. canadensis*. After successfully capturing the wasp, *Thaumasia* sp. was observed partially perched on the wall of the fountain, with the prey still on the water surface and trapped by its chelicerae. The pedipalps and chelicerae of *Thaumasia* sp. manipulated the head of *P. canadensis*, which stopped moving shortly after being captured, probably because of the action of the spider's venom. The study records a wasp in the diet of *Thaumasia* based on the capture of a prey not reported in the literature and allows a better understand the ecological role of arachnids in ecosystems.

Keywords: Araneomorphae, Caatinga, Insecta, Paraíba, predation.

Insects and arachnids comprise the greatest diversity of arthropods, successfully occupying a rich variety of niches in terrestrial ecosystems (Coddington & Colwell 2001; Pechenik 2016; Giribet & Edgecombe 2020; Brusca et al. 2023; Redak 2023) and playing important roles, mainly in complex landscapes (Maharani et al. 2024). These metazoans provide unique ecosystem services and are a major component of the structural complexity of food webs (Sharma 2023). Insects and arachnids are either predators or preys of a wide variety of small vertebrates as well as other invertebrates, especially arthropods (Toft 1980; Coville 1987; Landes et al. 1987; Young 1989; Zimmermann & Spencee 1989; Teixeira et al. 1991; Coddington & Colwell 2001; Menin et al. 2005; Domínguez & Jiménez 2008; Rosa et al. 2012; Nyffeler & Knörnschild 2013; Nyffeler & Pusey 2014; Baba et al. 2019; von May et al. 2019; Nyffeler & Altig 2020; Valdez 2020; Sierra Ramírez et al. 2021; Karthika et al. 2023).

Pisauridae Simon, 1890 includes web-building and hunting araneomorph spiders usually referred as nursery-web or raft/fishing spiders (Santos 2007; Tiwari & Singh 2021; Mulla et al. 2024). This group typically inhabits various terrestrial ecosystems worldwide, mainly associated with phytogeographic domains and limnetic habitats (Jocqué & Dippenaar-Schoeman 2007; Tiwari & Singh 2021; Mulla et al. 2024; Yu et al. 2025). Nursery web spiders (Pisauridae) have a number of lifestyles, including semi-aquatic, terrestrial, and web-building species (Sierwald 1997; Jocqué & Dippenaar-Schoeman 2007; Dippenaar-Schoeman et al. 2020; Yu et al. 2025) that prey opportunistically on a variety of aquatic and terrestrial vertebrates and invertebrates (Zimmermann & Spencee 1989; Baba et al. 2019; Cerveira & Jackson 2002; Dippenaar-Schoeman et al. 2020; Tiwari & Singh 2021; Nyffeler & Gibbons 2022).

Pisaurids of the genus *Thaumasia* Perty, 1833 are terrestrial to semi-aquatic spiders that inhabit the Neotropical region (Menin et al. 2005; Silva & Carico 2012; Luiz et al. 2013). This group of opportunistic predators is commonly associated with vegetation near the banks of streams, rivers, and lakes (Silva & Carico 2012), capturing and feeding primarily on mosquito larvae, insects, fishes, and tadpoles to medium sized frogs on the ground or surface water of these limnetic ecosystems

(Menin et al. 2005; Santos 2007; Jara 2008; Luiz et al. 2013; Santos-Silva et al. 2013; Machado & Lipinski 2014; Arrillaga et al. 2019; Pedroso-Santos et al. 2020). Pedroso-Santos et al. (2020) recorded a congener exhibiting scavenger behavior on an anuran. Despite the ecological importance of spiders of the genus *Thaumasia* as keystone predators of neustonic insects, there is no information on the occurrence of social wasps in their diet.

Polistes canadensis (Linnaeus, 1758) (Vespidae) is a relatively non-aggressive social wasp (Oliveira et al. 2017), with a wide distribution throughout the Americas (Carpenter 1996; Montefusco et al. 2017). *P. canadensis* usually lives near sources of fresh water, primarily in the Amazon Rainforest, Caatinga (dry forest), and Cerrado (savanna) phytogeographic domains of Brazil (Montefusco et al. 2017; Santos et al. 2020). These wasps can forage hundreds of meters away from their colonies and exhibit characteristics that identify them as enemies of insects considered pests (Oliveira et al. 2017). *P. canadensis* males are territorial as well as exhibit patrolling behavior regardless of proximity to resources or nests being able to descend to the ground or perch in elevated areas between territories (Polak 1993a; 1993b). *P. canadensis* females nest in artificial substrates (e.g., concrete, metal, tile, plastic, and wood) (Virgínio et al. 2016) as well as in shrubby and arboreal vegetation (Polak 1993a; 1993b; Virgínio et al. 2016).

Spiders and wasps establish disharmonious biological relationships, with each being a prey or predator of the other. However, there is sparse information on the diversity of interactions among such arthropods (Guimarães 2011; Noguchi & Ikeda 2022; Silva et al. 2023). Predation events of wasps on spiders are more numerous than those of spiders feeding on wasps (Matsuura & Yamane 1990; Wilson et al. 2009; Noguchi & Ikeda 2022; Oliveira et al. 2024). To our knowledge, this is the first report of a predation event by a semi-aquatic spider of the genus *Thaumasia* on the wasp *P. canadensis* in South America, specifically in the semiarid region of the state of Paraíba in northeastern Brazil.

The predation event on a wasp by a spider was observed (*ad libitum*) for approximately 15 minutes and photographed on August 30, 2025, at 05:30 PM in an urban environment in the municipality of

Cajazeiras (06°51'38"S, 38°33'16"W), which is located the westernmost portion of the semiarid region of the state of Paraíba, Brazil (Fig. 1). The region has a warm, dry, tropical climate, with the dry season typically spanning from July to November and the rainy season spanning from December to June. The region has an average annual rainfall of 982.4 mm and an average annual temperature of 26.8°C. The vegetation is xerophilic and deciduous, with herbaceous, shrubby, and arboreal strata (Leal et al. 2005; Gariglio et al. 2010).



Figure 1. Map of study area showing the location of the predation event: A. Part of South America, highlighting Brazil, northeastern Brazil and state of Paraíba; B. State of Paraíba and municipality of Cajazeiras; C. Municipality of Cajazeiras showing the location of the predation event; D. Area of occurrence of the predation event (yellow circle shows exact location from fountain).

The generic identification of the pisaurid was based on Silva & Carico (2012). The vespidae was identified based on Montefusco et al. (2017). Both predator and prey were collected (SISBIO 24771-4) and deposited together in the *Coleção de Aracnídeos e Miriápodes da Universidade Federal da Paraíba* [Arachnid and Myriapod Collection of the Federal University of Paraíba (voucher: UFPB Ar-4240)].

An adult male pisaurid spider of the genus *Thaumasia* (9.78 mm: cephalothorax–abdomen length) was observed moving rapidly about 50 cm away from the fountain's water surface during two incursions to capture an adult female individual of the vespidae *P. canadensis* (20.50 mm: head–thorax–abdomen length) (Fig. 2). The prey exhibited slow movements on the water surface at the time and shortly after capture. After successfully capturing the wasp on the second attempt, *Thaumasia* sp. was observed partially perched on the wall of the fountain, with the prey still on the water surface and trapped by its chelicerae (Fig. 2). The pisaurid was resting/floating with its first three pairs of legs on the water surface, while the last pair of legs was a few centimeters out of the water, resting on the wall of the fountain (Fig. 2). The pedipalps and chelicerae of *Thaumasia* sp. manipulated the head of *P. canadensis*, which stopped moving shortly after being captured, probably because of the action of the spider's venom.

In South America, pisaurids were recorded feeding predominantly on anurans in Amazonia and Atlantic Rain Forests, the Caatinga dry forest and Cerrado savanna (Bernarde & Kokubum 1999; Menin et al. 2005; Costa-Pereira et al. 2010; Luiz et al. 2013; Santos-Silva et al. 2013; Bovo et al. 2014; Machado & Lipinski 2014). In contrast, the observation of pisaurids preying on wasps has not yet been documented in South America. This study describes for the first time a unique predation event on the vespidae *P. canadensis* by a pisaurid spider of the genus *Thaumasia*, which hunted, captured and manipulated an individual of *P. canadensis* on the water surface, while it was still daylight. The predation event by *Thaumasia* sp. on *P. canadensis* is considered herein as rather casual due to the aggressive hunting nature of wasps on arachnids and the non-composition of vespids in the neustonic community. These pisaurids are common cursorial spiders that hunt prey through vibrations at the land–water interface of aquatic and semi-aquatic environments (Luiz et al. 2013), mainly during the

daytime (Jara 2008). Luiz et al. (2013) reported that congeners typically transport their prey out of the water after capture.



Figure 2. *Thaumasia* sp. (Araneae: Pisauridae) preying upon *Polistes canadensis* (Linnaeus, 1758) (Hymenoptera: Vespidae) in a fountain in the municipality of Cajazeiras (state of Paraíba) in semiarid region of Brazil.

The nephilid spider *Trichonephila clavipes* (Linnaeus, 1767) was also recorded preying on wasps of the species *Protopolybia sedula* (de Saussure, 1854) (Silva et al. 2023). Unlike the capture method used by *Thaumasia* sp. on wasps, *P. sedula* individuals were trapped, entangled, and partially consumed by *T. clavipes* in webs located on the edges of forest fragments in southeastern Brazil (Silva et al. 2023). This spider inhabits a number of phytogeographic domains throughout the Americas. It is notable for its intricate web-building behavior and diet primarily composed of insects (Silva et al. 2023; WSC 2024; Porto 2025).

The ecological implications of spiders as predators of wasps are poorly understood. In this case, alternative research methods, such as DNA metabarcoding (see Sierra Ramírez et al. 2021), need to be employed to assess differences in the cryptic diet of spiders, and thus better understand the ecological role of arachnids in ecosystems.

Authors' Contributions

SFBL: Conceptualization, Investigation, Methodology, & Writing – original draft. MBS: Conceptualization, Investigation, Methodology, Validation, & Writing – review & editing. PGLC: Investigation, Validation, & Writing – review & editing.

Conflict of Interest Statement

The authors declare no competing interests.

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The authors declare that no generative artificial intelligence tools were used in the preparation of this manuscript.

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