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Notes and Comments

First record of the predatory stink bug *Podisus sagitta* (Hemiptera: Asopinae) in Brazil

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Predatory stink bugs (Asopinae) are found in a wide range of natural and agricultural habitats and are important biological control agents (Pires et al., 2015; Pereira et al., 2017). *Podisus* spp. is the most diverse genus in Asopinae, currently with 32 species distributed in the Neotropical and Nearctic regions. Several *Podisus* species have been recorded in the Americas, mainly *Podisus maculiventris* (Say, 1831) in North America, *P. nigrispinus* (Dallas, 1851), *P. sagitta* (Fabricius, 1794) and *P. distinctus* (Stål, 1860) in Central and South America (Brugnera et al., 2020).

Podisus sagitta has been reported occasionally in the literature. Its original locality is Central America, occurring from the southern United States to South America. This species was more studied in Europe - Belgium, between the 80s and 90s of the 20th century by Clercq and Degheele (1990), when a rearing of *P. sagitta* was established in the laboratory in 1982, using insects originating from Surinam. However, these same authors later reported that a misidentification occurred and that the species studied really treated *P. nigrispinus* and not *P. sagitta* (Clercq and Degheele, 1995).

The objective was to record, for the first time, the natural occurrence of *P. sagitta* in Brazil and preliminary data of its biology in the laboratory.

The predator was found associated with outbreaks of defoliating Lepidoptera in eucalyptus plantations in Itamarandiba, Minas Gerais state, Brazil (17° 51' S, 42° 51' W, at an elevation of 910 masl). The occurrence of the *P. sagitta* was verified in November 2015, during monitoring in eucalyptus plantations, preying on caterpillars of *Thyrinteina arnobia* Stoll, 1782 (Lepidoptera: Geometridae). Approximately, 30 predator nymphs from the third to fifth stages were collected and taken in 1000 mL plastic pots to the Laboratório de Controle Biológico de Insetos (LCBI) of the Universidade Federal dos Vales do Jequitinhonha e Mucuri (UFVJM) in Diamantina, Minas Gerais state, Brazil. Insects were maintained at 25 ± 1 °C, 70 ± 10% relative humidity, and 12-hours photophase. The nymphs were fed with pupae of *Tenebrio molitor* Linnaeus, 1758 (Coleoptera: Tenebrionidae) and distilled water until the emergence of adults.

The adults of *P. sagitta* were sexed, according to the characteristics of the external genitalia, and transferred to 500 mL plastic pots and mated. Two generations of *P. sagitta* (F1 and F2) were evaluated daily in the laboratory to obtain data on biological, survival and reproductive parameters for stages of nymphs (Table 1) and adults (Table 2).

Ten individuals from each stage were killed in a death chamber, stored in 70% alcohol and sent to the Asopinae taxonomist Dr[a]. Jocélia Grazia at the Universidade Federal do Rio Grande do Sul (UFRGS), in Porto Alegre, Rio Grande do Sul state, Brazil. The predator was identified as *Podisus sagitta* (Fabricius, 1794) (Hemiptera: Asopinae) (see Figure 1). In addition to external differences, morphological changes in the male's genitalia were the main characteristics that allowed distinguishing the species *P. sagitta*. The specimens used for this identification are in the Asopinae Collection at UFRGS.

Podisus sagitta has a more northern distribution in South America and has been recorded in the Bahamas, Colômbia, Costa Rica, Cuba, Curacao, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Puerto Rico, Trinidad, USA and Venezuela (Thomas, 1992; Castro-Huertas et al., 2015). Studies of Asopinae in Brazil were initiated in the 1930s, focusing on the use of these insects in biological control programs (Silva, 1933). Much research has been published on various aspects of Asopinae, but none has previously reported *P. sagitta* (Pires et al., 2015). Individuals of *P. sagitta* may have been mistakenly identified as *P. nigrispinus* in field surveys, due to the morphological similarity of these species. *Podisus sagitta* has adapted to the conditions of mass-rearing in the laboratory and to alternative prey, commonly used to feed other species of the genus, being promising as a natural enemy in forest

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Table 1. Duration and survival of nymph stages, of two generations (F1 and F2, mean ± standard deviation) of *Podisus sagitta* fed with larvae of *Tenebrio molitor*

Stages	F1		F2	
	Duration stage	Survival	Duration stage	Survival
Second	7.4 ± 2.32	87 ± 19.47	5.5 ± 2.12	80.15 ± 19.28
Third	6.6 ± 2.55	98 ± 4.22	5.3 ± 2.83	98.57 ± 4.52
Fourth	8.7 ± 3.95	98.57 ± 4.52	6.8 ± 3.46	90.33 ± 16.14
Fifth	10.6 ± 2.37	94.03 ± 8.64	6.9 ± 2.28	84.68 ± 20.08

Table 2. Reproductive parameters of two generations (F1 and F2, mean ± standard deviation) of *Podisus sagitta* fed with larvae of *Tenebrio molitor*

Parameters	F1	F2
Pre-oviposition period (days)	2.9 ± 1.37	8.38 ± 9.36
Oviposition period (days)	19.1 ± 12.18	14.13 ± 9.17
Post-oviposition period (days)	5.4 ± 7.78	8.75 ± 9.36
Number of postures	10.5 ± 5.3	6.2 ± 4.94
Number of eggs	202 ± 100.77	86 ± 71.84
Number of eggs per postures	19.45 ± 2.58	11.53 ± 6.97
Number of nymphs	173.1 ± 92.54	69.2 ± 57.66
Viability of eggs (%)	85.88 ± 8.54	81.29 ± 9.44
Longevity of females (days)	29.4 ± 17.54	30.5 ± 1.47

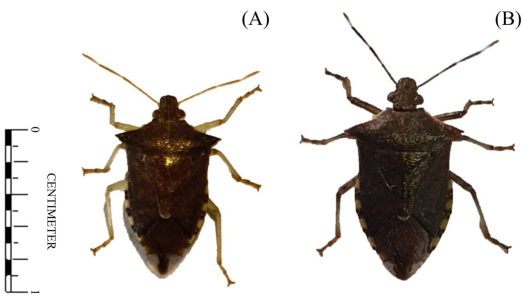

Figure 1. Male (A) and female (B) of *Podisus sagitta* (Hemiptera: Asopinae) collected in the municipality of Itamarandiba, Minas Gerais state, Brazil.

plantations. This study recorded, for the first time, the species *P. sagitta* in Brazil, occurring naturally in the Minas Gerais state.

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