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Scientific note

Asymmetry and experience in the predatory probing behavior of spitting spiders *Scytodes globula* Nicolet, 1849 (Araneae, Scytodidae)

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Resumo. Assimetria e experiência no comportamento de tocar a presa de aranhas cuspideiras *Scytodes globula* Nicolet, 1849 (Araneae, Scytodidae). Pouco se conhece a respeito das assimetrias comportamentais em aranhas. Procuramos aqui verificar, em oito aranhas da espécie *Scytodes globula*, vieses laterais e efeitos de experiência nos movimentos de tocar a presa com as pernas I e II, durante quatro encontros predatórios sucessivos com aranhas-marrons *Loxosceles intermedia*. No primeiro encontro, as pernas esquerdas de ambos os pares foram usadas mais do que as pernas direitas; no último encontro, apenas as pernas I esquerdas. A frequência dos toques com as pernas I e II diminuiu do primeiro para o último encontro. Os resultados confirmam resultados anteriores sobre a lateralidade de S. globula e mostram a existência de efeitos de experiência no comportamento predatório desta aranha.

Palavras-chave: Aranha cuspideira, *Scytodes*, Lateralidade, Experiência, Comportamento predatório.

Abstract. Little is known about behavioral asymmetries in spiders. We here examined lateral biases and experience effects in probing movements with legs I and II in eight spitting spiders *Scytodes globula* during four successive predatory encounters with recluse spiders *Loxosceles intermedia*. In trial 1, left leg probing was more frequent than right leg probing, for both pairs of legs; in the last trial, only for legs I. Frequency of probing by left and right legs of both pairs decreased from the first to the last trial. Results confirm previous ones on the laterality of S. globula and indicate that experience may influence the predatory behavior of this spider.

Key words: Spitting spider, Scytodes, Laterality, Predatory behavior.

The occurrence of left-right asymmetries in behavioral functions has been reported in a wide range of animals, mostly among vertebrates (Rogers & Andrews, 2002), but is less documented in invertebrate species (Kells & Goulson, 2001; Byrne et al., 2002; 2004; Pascual et al., 2004; Letzkus et al., 2006; Kight et al., 2008). Very little is known about laterality in spiders. Previous work on the spitting spider *Scytodes globula* Nicolet, 1849, detected behavioral asymmetries in probing movements between left and right legs, during predatory episodes (Ades & Ramires, 2002).

Scytodes globula, is a spitting spider of South America commonly found in forest or grassland foliage or in cracks in walls when living in human dwellings (Brescovit & Rheims, 2000). It usually attacks its prey by spitting sticky gum out of its chelicerae and completes prey immobilization by shifting back

and forth over the prey, binding it to the substrate with silk threads (Nentwig, 1995; Ramires, 1999; Suter & Stratton, 2005). Contact with prey, during the immobilization phase, is mostly done through up and down, probing movements of legs I and /or II.

In a study in which *S. globula* were individually confronted with the 'brown recluse spiders' *Loxosceles intermedia* Mello-Leitão, 1934, *L. gaucho* Gertsch, 1967 and *L. laeta* (Nicolet, 1849) as prey items, we previously showed that such movements were preferentially done with left legs I and II, relatively to right legs I and II (Ades & Ramires, 2002). In Ades & Ramires' research, spiders were tested only once, and the question of the stability of left/right asymmetries in leg use and of possible experience effects remained open. To answer these questions, we subjected *S. globula* spiders to a series of predatory encounters in which *L. intermedia* served as prey.

Eight adult females of *S. globula* collected in the city of São Paulo, Brazil, were tested in circular arenas (9 cm diameter) with young, smaller brown spider *L. intermedia* as prey. *Loxosceles intermedia* individuals were put in the arena 10 minutes after *S. globula*, and interactions were recorded for the next 30 minutes, with a VHS camera. Frequency of probing touches of *S. globula's* legs I and II on *L. intermedia*, after immobilization with the viscid adhesive substance was recorded using Etholog software (Ottoni, 2000). Each *S. globula* was submitted to four predatory sessions, with a minimum 24 hour interval. Data for only three trials were available for the spider 'S7', which was bitten by *L. intermedia* during the fourth predatory encounter.

General aspects of probing behavior observed were: (1) The first pair of legs was more frequently used in probing than the second pair both on trial 1 (Wilcoxon, left legs, $p<0.01$; right legs, $p<0.01$) and on trial 4 (trial 3 for spider 'S7'; Wilcoxon, left legs, $p<0.01$; right legs, $p<0.05$). (2) In trial 1, there was a correlation between the frequency of probing touches of contralateral legs of the first (Spearman, $r=0.95$, $p<0.01$) and second (Spearman, $r=0.84$, $p<0.05$) pair of legs. In trial 4 (trial 3 for spider 'S7'), there also was a significant correlation between the contralateral touches of the first (Spearman, $r=0.99$, $p<0.001$) and second (Spearman, $r=0.90$, $p<0.01$) pairs of legs. This result indicates that there is left-right coordination in probing movements. In trials 1 and 4, probing with left leg I was significantly more frequent than probing with right leg I (Wilcoxon, $p<0.05$). The difference between probing with left and right legs II approached significance (Wilcoxon, $p = 0.054$) in trial 1, but was not significant in trial 4 (Wilcoxon, $p>0.05$). Frequency of probing touches was significantly higher in trial 1 than in trial 4 (trial 3 in the case of spider S7) in both left and right legs I (Wilcoxon, $p<0.05$), and left and right legs II (Wilcoxon, $p<0.05$, Figure 1).

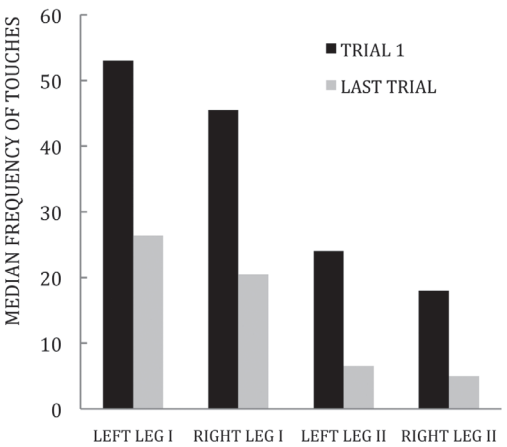

Figure 1 Median number of probing touches of *Scytodes globula* (n=8) in the first and last predatory trials with *Loxosceles intermedia*

Our results, like those of Ades & Ramires (2002), point to the existence of a left laterality bias in probing movements of the spitting spiders *Scytodes globula* during the capture of recluse brown spiders. This bias was more pronounced and persistent in the case of legs 1 than in the case of legs 2. The proximate mechanisms underlying the left probing bias are uncertain. Lateralization of leg use in spiders may be mediated, as we hypothesized earlier (Ades & Ramires, 2002), by motor or sensory differences between the front legs of *S. globula*. Preferred legs might be supplied with a higher density of chemoreceptors being thus better equipped for assessing prey characteristics. Letzkus *et al.* (2006) demonstrated that honeybees would learn better an olfactory discrimination when trained through stimulation of the right antenna than through stimulation of the left one and that the mean number of olfactory receptor cells (*sensilla placodea*) was higher in the right than in the left antenna.

The decrease in probing touches throughout trials is probably a learning effect. Spiders of different families are able to flexibly adapt to external conditions in a predatory context (Ades, 1982; Jackson & Wilcox, 1993; Sébrier & Krafft, 1993; Rodríguez & Gamboa, 2000; Punzo, 2002; Punzo & Preshkar, 2002). If *S. globula* displays less probing responses after repeated experience with the same prey, this may be due to the building up of habituation (Szlep, 1964) or, alternatively, to the acquisition of motor routines which facilitate capture and handling of this type of prey. As *Loxosceles* spiders are relatively frequent, both indoors and in the field, in sites where *Scytodes* dwell, an opportunity for repeated predation exists and, in this context, learning effects may have adaptive value.

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