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RESEARCH NOTE

COMPARISON OF THE FERTILITY BETWEEN *LOXOSCELES INTERMEDIA* AND *LOXOSCELES LAETA* SPIDERS (ARANEAE, SICARIIDAE)

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Envenomation by brown spiders of the genus *Loxosceles* Heinecken & Lowe 1832 of North America, the Middle East, South Africa and South America commonly results in a local necrotic skin lesion and sometimes causes systemic effects that can lead to the death of the patient (Denny et al. 1964; Efrati 1969; Newlands 1982; Gerstch 1967; Gerstch & Ennik 1983; Futrell 1992). *Loxosceles* spp. are the most poisonous spiders in Brazil and children who develop the more severe systemic effects after envenomation nearly always die. At least three different *Loxosceles* species of medical importance are known in Brazil: *L. intermedia* Mello-Leitão 1934, *L. laeta* (Nicolet 1849) and *L. gaucho* Gertsch 1967. More than 1500 cases of envenomation by *L. intermedia* alone are reported each year. Because of a lack of understanding of the mechanism of action of the venom, an effective treatment is not available.

Loxosceles are nocturnal and non-aggressive spiders. In the natural environment, they live under rocks, inside tree holes and other places that may serve as shelter. While some occupy hot and arid regions, others inhabit relatively damp areas. They also live in dark, dry places in houses, such as doorsteps, wall cracks, spaces behind pictures, furniture or even curtains, as well, in household rubbish and buildings (Gertsch 1967; Gertsch & Ennik 1983).

Loxosceles intermedia prevails in the urban environment of the states of Paraná and Santa Catarina (south region of Brazil) (Fischer 1994; Mattosinho et al. 1997). This species is restricted to the southern regions of South America including Brazilian Federal District (middle west region), the states of Rio de Janeiro and Sáo Paulo (southeast region), Rio Grande do Sul (south region), and also in Argentina. The distribution of *L. laeta* is much wider, and it can be found throughout South America including Peru, Chile, Ecuador, Brazil (from the state of Paraiba to the state of Rio Grande do Sul, from the northeast region to south region), Uruguay and Argentina. According to Gerstch (1967), *L. laeta* has also spread to some parts of North America, being found in Massachusetts and other locations due to its sinanthropy (Levi & Spielman 1964). In Brazil, *L. laeta* is also found in the same States as *L. intermedia.* It prevails in the south of Santa Catarina State (south region) (Mattosinho et al. 1997) and, in Curitiba city (Paraná State, south region) during June and July, although being less abundant than *L. intermedia*.

Although *L. intermedia* and *L. laeta* can be both found in the south region of Brazil, there has been a significant increase in the number of *Loxosceles* bites mainly associated with *L. intermedia* which seems to be positively correlated with the expansion of this species' range (Ribeiro et al. 1993). The present study was performed to compare the fertility of the two species reared in laboratory to better understand expansion of the *L. intermedia* population in the south region of Brazil.

This study was conduced in ''Biotério de Criação e Manutenção de Aranhas'' of the Immunochemistry Laboratory, Butantan Institute, São Paulo, Brazil. The spiders used in this study were collected in the town of Campo Alegre (Santa Catarina State, south region, Brazil) from June to August. The sampled group of females, fertilized in the natural environment, comprised 108 *L. intermedia* and

47 *L. laeta*. They were transferred to plastic boxes (9.5 cm diameter × 5.5 cm high) and kept in the laboratory under normal environmental temperature and relative humidity (19.3 °C ± 2.8 and 81.3% RH ± 2.07). The spiders were fed with cockroach nymphs (*Pycnoscellus surinamensis*, Dictyopthera, Blaberidae) or with darkling beetle larvae (*Tenebrio mollitor*, Coleoptera, Tenebrionidae) twice a month.

All specimens were observed weekly for eight months. During this period, the following variables were evaluated: number of egg sacs per spider, total number of eggs per egg sac, total number of spiderlings hatched per egg sac and time for spiderlings to hatch. The mean of the values was compared using a two-tailed *t*-test at a significance level of 0.05.

The results show that the differences between the mean number of egg sacs per spider of *L. intermedia* [1.79 ± 0.83] and *L. laeta* [1.67 ± 0.84] were not statistically significant (Fig. 1A). However, the mean number of eggs per egg sac per spider and as well as the total number of eggs was significantly higher for *L. laeta* (Fig. 1B). Mean times to hatching for *L. laeta* spiderlings were significantly greater for *L. laeta* than *L. intermedia* (Fig. 1C). The percentage of hatched spiderlings was high but did not reveal statistically significant differences between the two species.

The mean number of the egg sacs produced per female was similar for both species, the maximum was five egg sacs for *L. intermedia* and four for L. *laeta*; the minimum was one egg sac for both species. These results differ from those of Galiano & Hall (1973) who described up to 15 egg sacs per female of *L. laeta*. However, those females were mated under laboratory conditions, which makes it possible to record all the egg sacs produced per female. Nevertheless, it cannot be excluded that, because they were not feeding in the natural environment, they may possibly have had enhanced fertility. Hite et al. (1966) described up to five egg sacs per female of *L. reclusa*, while Fischer (1996) observed up to three egg sacs for *L. intermedia*. As in our study, these authors observed adult females collected in their natural environment, and therefore the possibility that they had produced previous egg sacs could not be excluded. The *Loxosceles* spiders can live from 3–7 years (Galiano & Hall 1973; Lowrie 1980, 1987). The age of the spiders collected can also affect the quantity of egg sacs produced per spider.

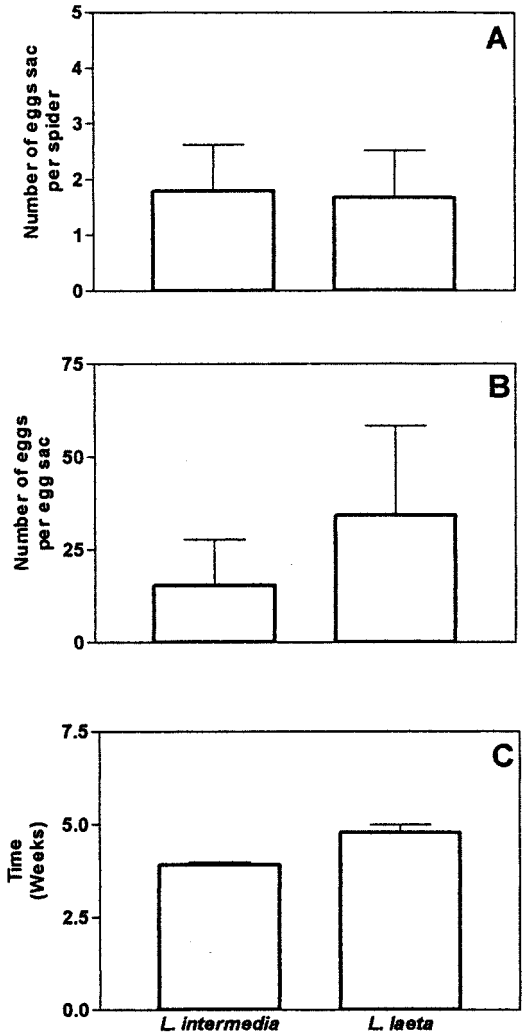

Figure 1.—Comparison of the fertility of *Loxosceles intermedia* and *Loxosceles laeta* collected as fertilized adults. (A) Number of egg sacs per spider, (B) Number of eggs per egg sac, and (C) Time to hatching of spiderlings. The results ae expressed as mean ± SD.

The analysis showed that *L. laeta* exceeded *L. intermedia* in both the total number of eggs produced per female and per egg sac. These results may reflect differences in body weight between the two species. The females of *L. laeta* were larger and heavier [1.161 cm ± 0.52; 0.2115 g ± 0.026] than *L. intermedia* [1.096 cm ± 0.093; 0.1260 g ± 0.035] (Cristina de Oliveira et al. 1999; G. de Andrade

unpubl. data), and such differences might allow the former species to have a greater oviposition potential. It is well-known that fecundity tends to be correlated with body mass for female invertebrates, including spiders (Higgins 1992; Fischer 1996; Schneider 1996).

Under the conditions of this study, the means of the total number of eggs produced per spider and per egg sac were greater for *L. laeta* which suggests that a greater fertility could be ascribed to *L. laeta* than to *L. intermedia*. If so, these considerations suggest that the significant expansion of *L. intermedia* in the south region of Brazil is not due to a great reproductive rate of that species. Studies on the ecological aspects of the sinanthropy of both species, as well as the possible environmental alterations in the south region of Brazil, may explain the predominance of the *L. intermedia* spiders.

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