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Notas

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Primer caso teratológico del patrón ocular en la araña reclusa parda del género Loxosceles Heineken & Lowe (Araneae, Sicariidae)

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Abstract: An ocular malformation is described for the first time in the genus *Loxosceles*, specifically in a female of *Loxosceles surca* Gertsch. The specimen was collected at 3,540 m.a.s.l. in Tarapaca Region, Chile. It is the first record for this family and the first case of teratology described for spiders in this country.

Keywords: Deformity, Eye anomalies, Teratology.

Resumen: Se describe por primera vez una malformación ocular en el género *Loxosceles*, específicamente en una hembra de *Loxosceles surca* Gertsch. El espécimen fue recolectado a una altitud de 3.540 m.s.n.m. en la Región de Tarapacá, Chile. Constituye el primer registro para esta familia y es el primer caso teratológico descrito para arañas en este país.

Palabras clave: Anomalía ocular, Deformidad, Teratología.

Teratology is the study of malformations and has long been documented in spiders (Kaston, 1962; Jimenez & Llinas, 2002; Napiórkowska & Templin, 2017; Mitchell et al., 2020). The study of teratological cases is important because they may indicate the effect a particular environmental condition may play during development in arthropods (Balazuc, 1948; Burke et al., 2018). Teratologies have been studied in genitalia, legs and eyes, but of all the documented cases in spiders, ocular teratologies are the most frequent (Denis, 1939; Jiménez & Llinas, 2002; Napiórkowska et al., 2007; Gonzalez-Moliné, 2008; Mitchell et al., 2020). For example, the genus *Stasimopus* Simon (1892) (Actinopodidae) from Africa, has shown a teratologies range from reduced eye size to numerous additional eyes (Mitchell et al., 2020), or the European species *Macrothele calpeiana* (Walckenaer) (Hexathelidae) in which a reduction of the left AME (anterior median eye) and the absence of the PME (posterior median eye) were observed (Gonzalez-Moliné, 2008). In the Neotropical region,

ocular anomalies have been recorded in spiders of the families Lycosidae, Linyphiidae, Tetragnathidae, Amaurobiidae, and Agelenidae with a most often reduction or absence of the secondary eyes (Kaston, 1982; Jiménez & Llinas, 2002). Some authors have suggested that the teratology of the eyes of spiders tends to be more common in spiders that live in caves due to a stronger reliance on senses other than vision (Kaston, 1962; Jiménez & Llinas, 2002; Gonzalez-Moliné, 2008; Mitchell et al., 2020). An ocular teratology is considered to be a significant deviation from the normal ocular pattern and can have profound repercussions for spider's survival (Mitchell et al., 2020). In this sense, recent experimental studies have suggested that these malformations and aberrations are related to strong temperature changes, high humidity and different chemicals present in the environment during embryonic development (Napiórkowska et al., 2007; Napiórkowska & Templin, 2017, 2018; Mitchell et al., 2020).

Spiders of the genus *Loxosceles* are better known in South America as "corner spiders" or "brown recluse spiders". They are well known because their bites can cause dermonecrotic lesions in humans (Schenone et al., 1989; Swanson & Vetter, 2009). Chile is represented by six species that preferably inhabit arid and semi-arid environments, although some species live in urban environments, associated with human dwellings (Brescovit et al., 2017). In the extreme north of this country, there are only two species: *Loxosceles laeta* (Nicolet) and *Loxosceles surca* Gertsch. The first species is essentially synanthropic and lives naturally from the coast to "La Pampa del Tamarugal", while the second inhabits preferably natural environments in the sub-Andean region between 2,000 and 3,700 meters above sea level (Brescovit et al., 2017). The characteristics of the physical environment of the Puna and Pre-Puna ecosystems where *L. surca* lives are physiologically stressful: (a) low partial pressure of oxygen and carbon dioxide, (b) high solar radiation, (c) low temperatures with marked daily variation, (d) irregular distribution of rainfall (Taucare-Ríos, 2012; Matteucci, 2018).

We collected a specimen of *L. surca* with ocular anomalies in the extreme north of Chile. The specimen collected was preserved in 90% ethanol and deposited in Museo Nacional de Historia Natural (MNHN, curator: Mario Elgueta), Santiago, Chile. We describe the specimen and comment on the possible factors that caused this distortion in the ocular pattern. For spider identification we follow Brescovit et al. (2017). For the classification and teratological terminology, Jiménez & Llinas (2002) and Balazuc (1948) were followed, respectively. Used abbreviations were: AME = anterior median eye; ALE anterior lateral eye; PME = posterior median eye; PLE = posterior lateral eye. Photos were taken with a Nikon S3700 digital camera adapted to a Leica M205C stereoscopic microscope. All measurements are in millimeters.

Material examined: Chile: Tarapacá region, Pozo Almonte, Altos de Pica, Road to Salar del Huasco, 1 ♀, 7. I.2020, 20°21'35.72" S, 69°0'31.46" W, 3,540 m, Andrés Taucare-Ríos leg.

Material to compare: Chile: Arica and Parinacota Region, Putre, Zapahuira, 1 ♀, 24.X.2010, 18° 21′ 12″ S, 69° 37′ 6″ W, 3,200 m, Andrés Taucare-Ríos leg.

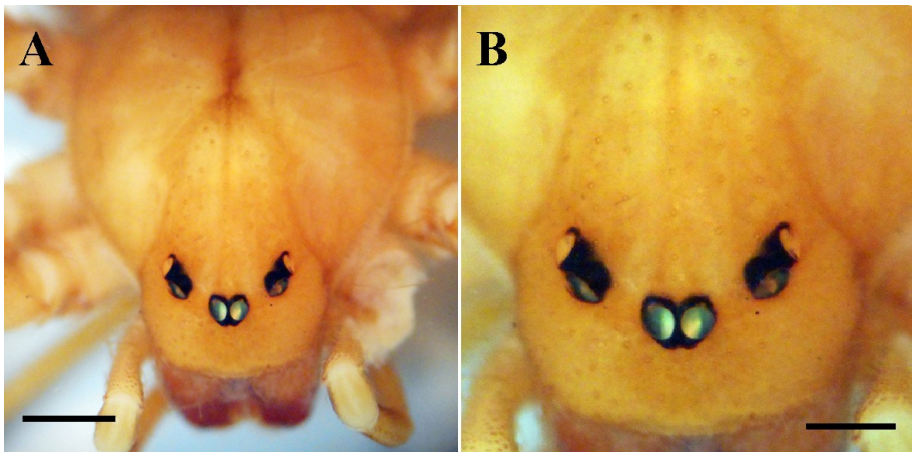

Fig. 1. Female of *Loxosceles surca* showing the normal ocular pattern. A Frontal view of carapace. B. Frontal view of cephalic zone. Photograph: Andrés Taucare-Ríos.
Scale bars = A: 1 mm; B: 0.5 mm.

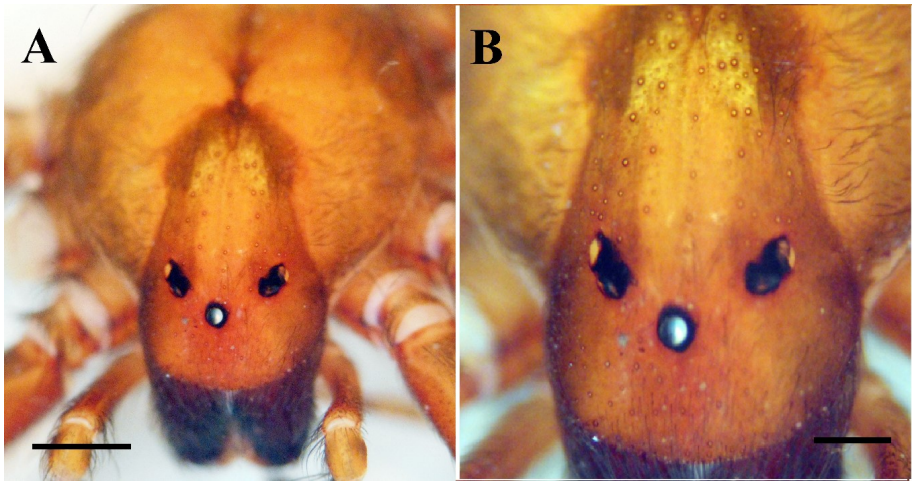

Fig. 2. Female of *Loxosceles surca* showing the ocular teratology. A. Frontal view of carapace. B. Frontal view of cephalic zone. Photograph: Andrés Taucare-Ríos.
Scale bars = A: 1 mm; B: 0.5 mm.

Central ocular symmelia in *Loxosceles surca*

All spiders in the genus *Loxosceles* have six eyes in total arranged in three dyads (Gertsch, 1967). The AM eyes are absent and the PM eyes have migrated to a more anterior position, remaining in a recurved disposition in relation to the lateral dyads. This standard pattern of *Loxosceles* is shown in Figure 1. Eye diameters for *L. surca*: ALE = 0.22, PME = 0.24, PLE = 0.22. For a better description of this species, see Brescovit et al. (2017). At this point, only teratological cases of the genitalia in Sicariidae (*Loxosceles, Sicarius* and *Hexopthalma*) have been published (Rivera-Quiroz et al., 2020), but cases of ocular abnormalities are completely unknown in this family (Jiménez & Llinas, 2002; Gonzalez-Moliné, 2008).

Teratological specimen: Total length: 10.5 mm. Carapace: 5.2 mm. The central pair of eyes of the female specimen observed are fused and slightly moved to the right (Fig. 2A). The PM eyes in normal conditions are oval, the teratological specimen has the eye completely round (Fig. 2B). The diameter of the fused eye is 0.25; whereas normal lateral eyes are: ALE = 0.21 and PLE = 0.22. We can also note a difference in distance between the dyads from 1.0 to 1.4 (compare with Fig. 1). Other deformations in the prosoma are not observed. The punctuation and setae are normal around the fused eye.

Symmelia are common on arthropods in appendixes like legs and antennae, and less frequent in other organs (Carvajal et al., 2019). Causes of these teratoses range from trauma in early stages of life and/or environmental factors like strong variation in humidity and temperature (Balazuc, 1948; Jiménez & Llinas, 2002).

According to the classification by Jiménez & Llinas (2002), the teratological specimen corresponds to the category of APME (Absence of one posterior median eye). This category is one of the most common in epigeal spiders, but seems to be more common in spiders with nocturnal activity (Kaston, 1982; Jiménez & Llinas, 2002; Gonzalez-Moliné, 2008).

Temperature is considered an important teratogenic factor during embryonic development in spiders and may be one of the causes of this phenomenon (Napiórkowska & Templin, 2017). We suggest that the altitude may have played a role in the eye formation and separation, although genetic causes cannot be disregarded. Therefore, this malformation can have both endogenous and exogenous origin. On the other hand, the lack of deformations and the presence of normal tegument around the fused eye discard a mechanical pressure or the action of a predator. Finally, it is good to remark that this is the first case documented for ocular teratosis in the genus *Loxosceles*, and the first one for a Chilean spider.

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