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SHORT NOTE

Discovery of an isolated population of the dwarf tarantula *Homoeomma uruguayense* (Araneae, Theraphosidae) in central Argentina

Descubrimiento de una población aislada de la tarántula enana *Homoeomma uruguayense* (Araneae, Theraphosidae) en el centro de Argentina

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ABSTRACT

The genus *Homoeomma* has thirteen species distributed in Argentina, Brazil, Colombia, Peru and Uruguay. In Argentina, two species are recorded, *Homoeomma elegans* in Misiones province and *H. uruguayense* in Buenos Aires, Entre Ríos and Santa Fe provinces. The objective of this work is to provide the first record of *Homoeomma uruguayense* in the mountainous system of central Argentina, belonging to western record of the genus in this country. In addition, we provide data on natural history of the species, some notes on its sexual behavior and through the species distribution modeling we discussed about the geographic distribution of the species and factors that could led to this pattern.

Keywords. Distribution, natural history, new record, Theraphosinae

RESUMEN

El género *Homoeomma* presenta trece especies que se distribuyen en Argentina, Brasil, Colombia, Perú y Uruguay. En Argentina, se citan dos especies, *Homoeomma elegans* en la provincia de Misiones y *H. uruguayense* en las provincias de Buenos Aires, Entre Ríos y Santa Fe. El objetivo de este trabajo es reportar el primer registro de *Homoeomma uruguayense* para las sierras centrales de Argentina, lo cual corresponde al registro más occidental del género en este país. Además, se proveen datos sobre la historia natural de la especie, algunas notas sobre el comportamiento sexual y mediante el modelado de distribución de especies se discute sobre la distribución geográfica de la especie y los factores que pudieron conducir a este patrón.

Palabras clave. Distribución, historia natural, nuevo registro, Theraphosinae

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The genus *Homoeomma* comprises thirteen species distributed in Argentina, Brazil, Colombia, Peru and Uruguay (World Spider Catalog c2018). *Homoeomma uruguayense* (Mello-Leitão, 1946) is known from Buenos Aires, Entre Ríos and Santa Fe provinces, central eastern Argentina (Gerschman and Schiapelli 1972) and Uruguay (Costa and Pérez-Miles 2002). In a recent survey to Córdoba province, central Argentina, we recorded individuals of *Homoeomma uruguayense*. The location of this population is far away from the known geographic distribution of the species, thus we used a species distribution model to predict the potential distribution under different scenarios.

The specimens were deposited in the Arachnological collection of the Laboratorio de Zoología de Invertebrados II, Universidad Nacional del Sur, Bahía Blanca, Buenos Aires, Argentina. Photographs were taken with a digital camera attached to a Leica S8APO stereoscopic microscope and processed using the Leica Application Suite version 4.6.0. The following abbreviations are used: DA = digitiform apophysis, PI = prolateral inferior keel, PS = prolateral superior keel. We carried out eight encounters between four females and two males under laboratory conditions. All interactions took place in cages measuring 40 x 30 and 25 cm high with soil as substrate. For species distribution models we used 59 presence localities. Bioclimatic variables (19) were obtained from the WorldClim 2.0 (www.worldclim.org), at a resolution of 30 arc sec (Fick and Hijmans 2017). From those, using Pearson´s correlation as implemented in ENMTools ver. 1.4.4, we selected a subsample. The choice of a variable from a correlated ($r > 0.75$) pair was done in a preliminary run of the model with all the variables, retaining those with the best percent contribution and permutation importance in MaxEnt. The following subset of bioclimatic variables was selected: BIO1 = Annual Mean Temperature, BIO3 = Isothermality, BIO4 = Temperature Seasonality, BIO14 = Precipitation of Driest Month and BIO15 = Precipitation Seasonality. Past climatic conditions comprised 19 bioclimatic variables for the Last Inter-Glacial event on about 120 000 and 140 000 years ago obtained from WorldClim 1.4 (www.worldclim.org) (Otto-Bliesner *et al.* 2006). We predicted the potential distribution of *Homoeomma uruguayense* under different climate scenarios using MaxEnt 3.3.3k (Phillips *et al.* 2006). This algorithm searches for the maximum entropy density using Robust Bayes Estimation and requires only presence points as input data (Elith *et al.* 2011). MaxEnt estimates the relation between species presence and environmental variables in a geographic space and draws a model of environmental suitability for the occurrence of a given organism.

***Homoeomma uruguayense* (Mello-Leitão, 1946)**

Figs. 1–3

Diagnosis. *Homoeomma uruguayense* differs from all other species of the genus by the serrated base of prolaterial inferior keel (PI) (Figs. 2c–d) and metatarsus I curved at middle (Fig. 1g). Females of *H. uruguayense* are characterized by a spermathecae with membranous base and semicircular receptacles as high as wide (Fig. 3e). For further taxonomic information see Gerschman and Schiapelli (1972) and Pérez-Miles *et al.* (1996).

Distribution. This species is distributed in Argentina and Uruguay (Fig. 5). New record from Córdoba province (Fig. 5), at the locality of Villa Berna.

Natural history. Females of this species were found inhabiting short burrows under small stones (Figs. 4a–b).

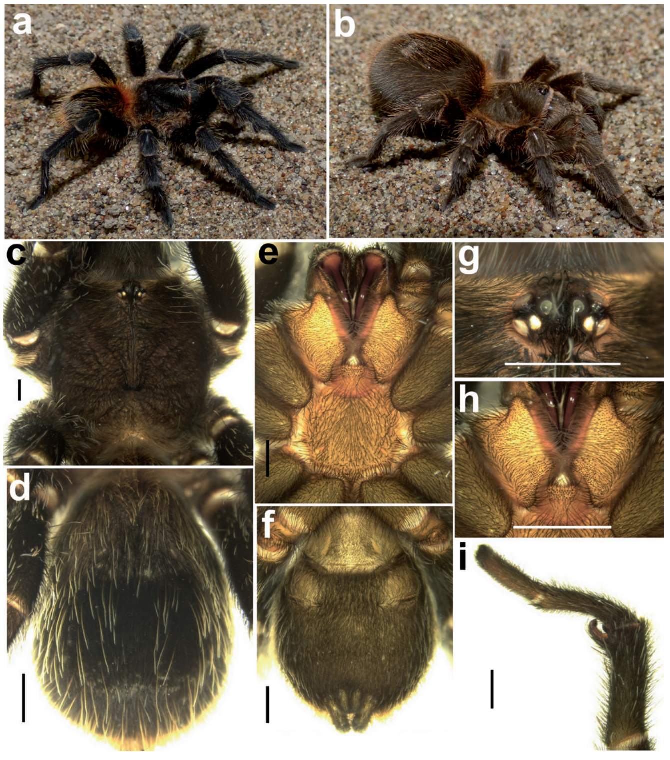

Figure 1. *Homoeomma uruguayense*. **a.** adult male; **b.** adult female; **c.** male carapace, dorsal view; **d.** abdomen, dorsal view; **e.** labium and sternum, ventral view; **f.** abdomen, ventral view; **g.** eyes, dorsal view; **h.** maxillae, ventral view; **i.** tibial apophysis of leg I, lateral view. Scale bars = 1 mm.

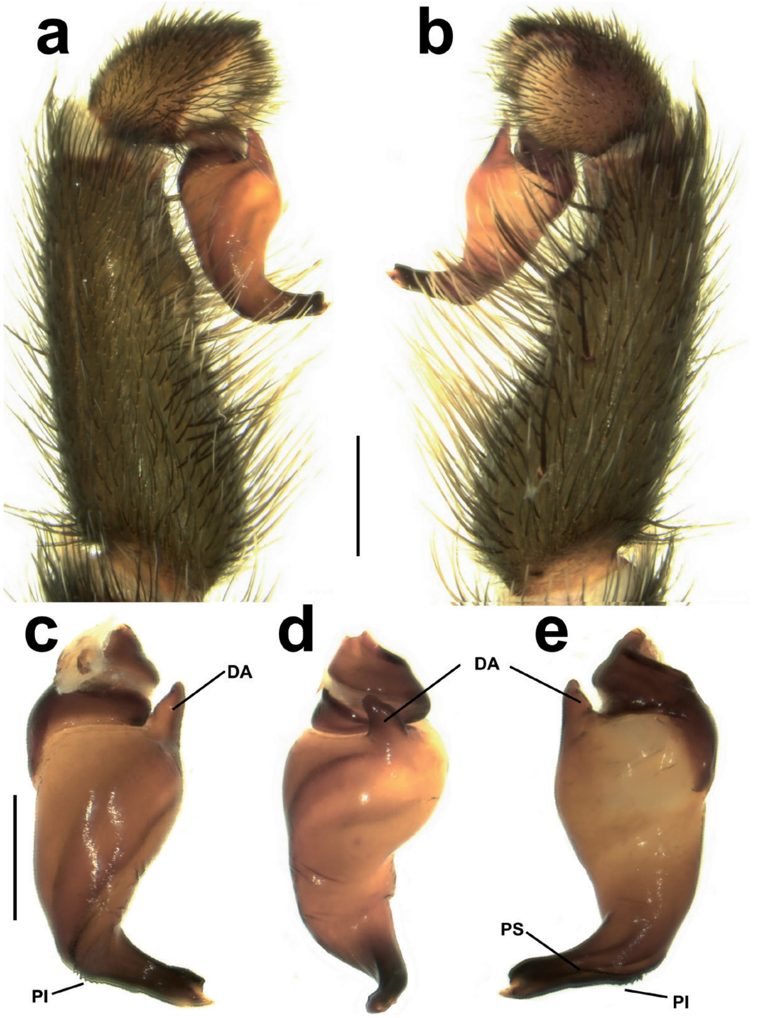

Figure 2. *Homoeomma uruguayense*, male. **a.** palpal tibia, prolateral view; **b.** palpal tibia, retrolateral view; **c.** palpal bulb, prolateral view; **d.** palpal bulb, dorsal view; **e.** palpal bulb, retrolateral view. DA: digitiform apophysis; PI: prolateral inferior keel; PS: prolateral superior keel. Scale bars = 1 mm.

Burrows usually presented more than one entrance (Figs. 4c–d). The median length of burrows was 11.52 cm ± 3.63 SD (n = 9). One female captured constructed an egg sac on October 30, 2015 and 40 juveniles emerged after 42 days.

Sexual behavior. We facilitate nine sexual encounters using three males and three females during August 2017 according to the mating period reported for this species (Costa and Pérez-Miles 2002). All males courted before contacting the females. The male courtship was characterized by body vibrations caused by leg III and palpal drumming as an alternating movement of palps against the substrate. We recorded three mating events. None female accepted a second copulation. All females responded to male courtships by making leg tapping with the first and second pairs of legs against the substrate before contacting the male. The mean duration of copulation was 38.5 s ± 4.94 SD with a range of one to three palpal insertions from males. The courtship and mating behavior observed was similar to that reported by Costa and Pérez-Miles (2002) with the exception that the female response was observed before individuals make contact.

Material examined. Argentina, **Córdoba**: five females, Valle de Calamuchita, Villa Berna, 31°54'35.60"S – 64°44'21.35"W, 1308 meters, 9 Sept 2015, *N. Ferretti, S. Copperi, G. Pompozzi*; three males, Valle de Calamuchita, Villa Berna, 31°54'35.60"S – 64°44'21.35"W, 1405 m, molted on laboratory, captured as juveniles on 16 Jun 2017, *N. Ferretti, S. Copperi, G. Pompozzi*; four females and thirteen juveniles, Valle de Calamuchita, Villa Berna, 31°54'35.60"S – 64°44'21.35"W, 1405 m, 16 Jun 2017, *N. Ferretti, S. Copperi, G. Pompozzi*.

Species distribution models. The model of current suitable climatic areas yielded an AUC value of 0.992 suggesting a good performance of the model. The bioclimatic variables that provided the highest contribution were: Bio4 (temperature seasonality) with 47.8 of percent contribution and Bio 14 (precipitation of driest month) with

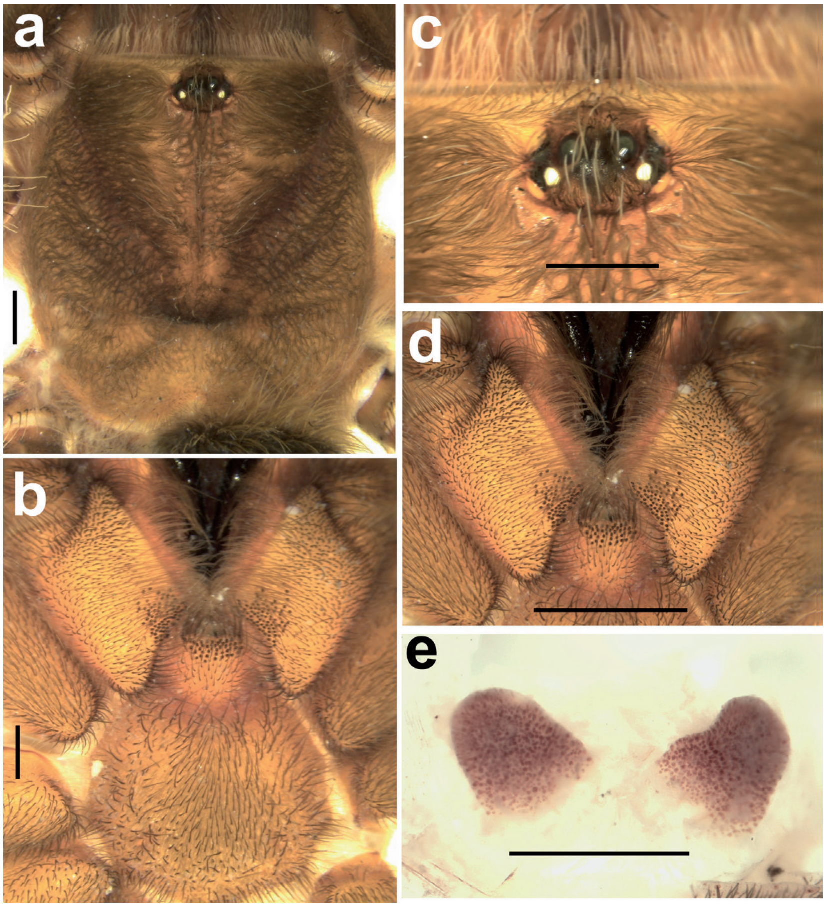

Figure 3. *Homoeomma uruguayense*, female. **a.** carapace, dorsal view; **b.** labium and sternum, ventral view; **c.** eyes, dorsal view; **d.** labium and maxillae, ventral view; **e.** spermathecae, dorsal view. Scale bars = 1 mm.

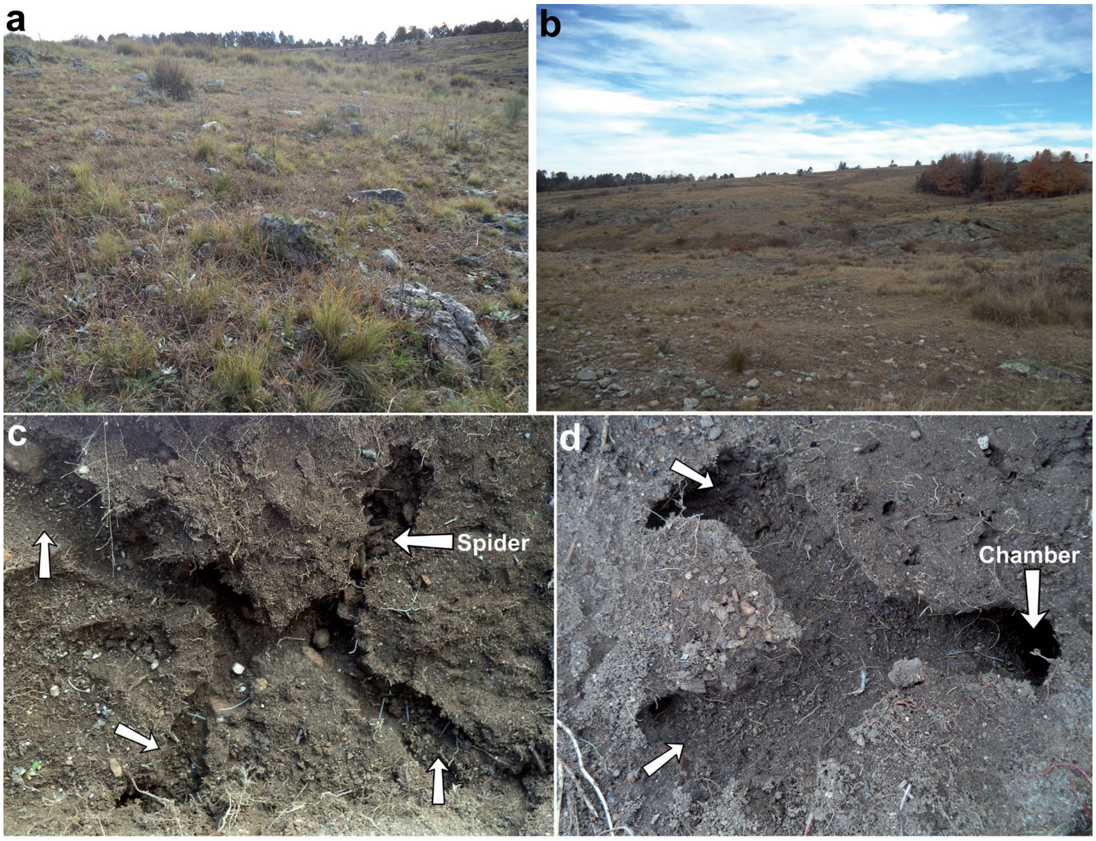

Figure 4. *Homoeomma uruguayense*. **a, b.** habitat where specimens were found; **c, d.** burrows of adult females (arrows point the multiple entrances).

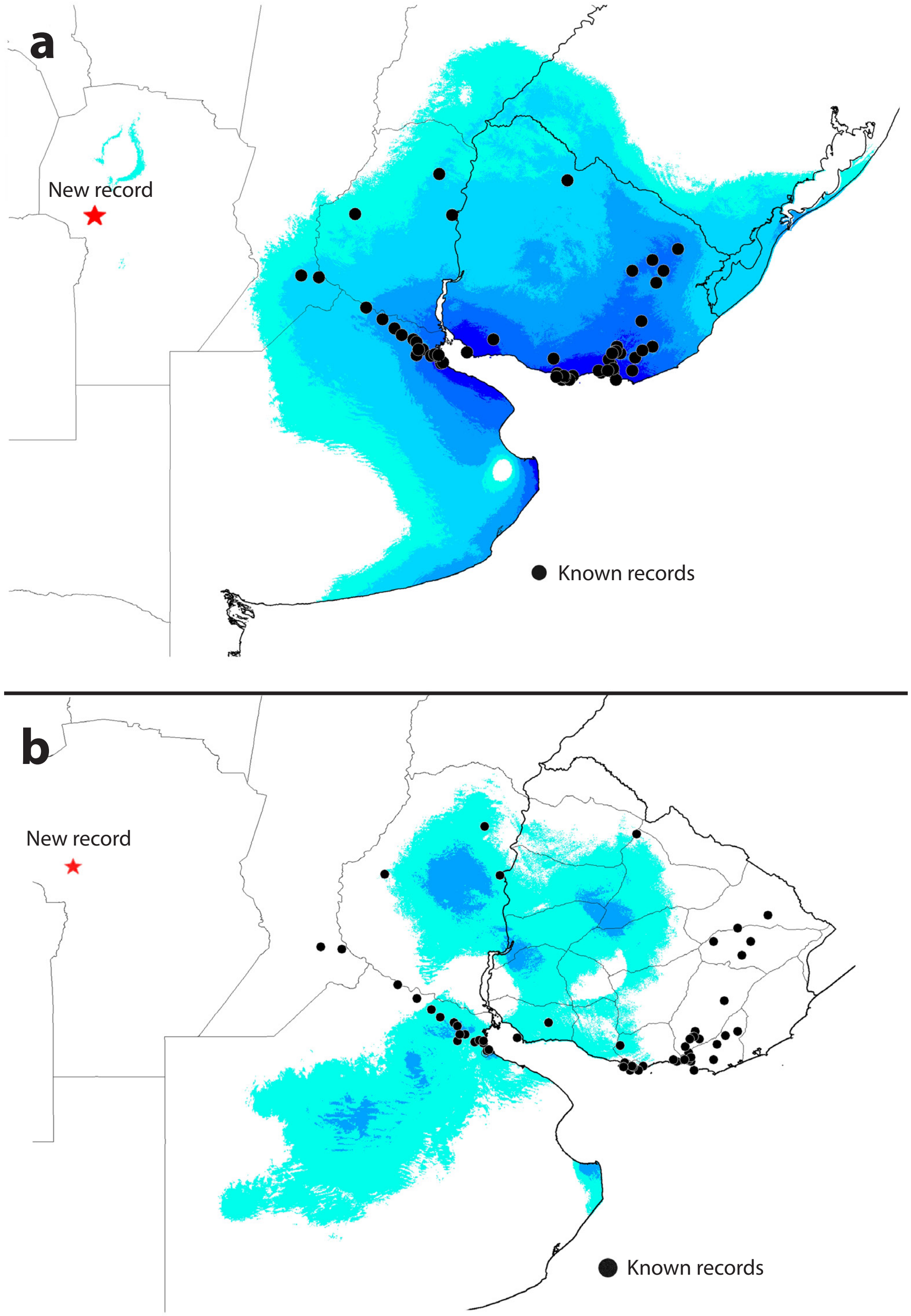

Figure 5. Species distribution models obtained with MaxEnt. **a.** Under current climatic conditions; **b.** Under climatic conditions dated ~120 000 years ago. Colors indicate low (light blue) to high (dark blue) habitat suitability.

29.8 of percent contribution. We observed that highest suitability areas for the species corresponded to the north-eastern areas and coasts of Buenos Aires province, southern Entre Ríos province in Argentina and central-eastern Uruguay (Fig. 5a). Moreover, it was possible to see that the suitable areas extended towards the new record provided in this work but not including it as a suitable area (Fig. 5a). From the model (AUC value of 0.993) under past climate conditions (~120 000 years ago), suitable habitats were identified at central Buenos Aires province, southern Entre Ríos province in Argentina and western Uruguay (Fig. 5b). The location of the population found would not be a possible refuge, it is probable that other factors even oldest than the last Inter-Glacial events could isolated this population. For example, the marine transgressions that took place during the middle Miocene (~15 Ma years ago) could have affected their distributional pattern, as was evidenced for other arachnids (Ferretti *et al.* 2012, Ojanguren-Affilastro *et al.* 2017). Moreover, during the marine transgressions, the emerged lands during this period corresponded to south of Buenos Aires province, the mountainous systems of central Argentina, in Córdoba province, and central-eastern Uruguay (Ortiz-Jaureguizar and Cladera 2006). The findings of the present work not only expand the known geographic distribution of the species but also remark the isolation of this population in relation to the suitable areas predicted with the species distribution model.

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AUTHOR´S CONTRIBUTION

All authors collected the material and obtained the information on natural history and sexual behavior; NF was responsible for the species distribution models and drafted the manuscript; GP took the photographs and NF prepared the images; all authors read and approved the final manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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