



**FIRST DESCRIPTION OF THE MALE OF *Mastophora extraordinaria* HOLMBERG, 1876
(ARANEAE: ARANEIDAE), WITH NOTES ON THE NATURAL HISTORY AND POTENTIAL
DISTRIBUTION OF THE SPECIES**

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ABSTRACT

The genus *Mastophora* Holmberg, 1876 is represented by 50 species that are distributed mainly in America and the Antilles. Males are much smaller than females and are not described in more than half of the known species of the genus. The high specificity of their diet (moths) and the prey-hunting strategy used by females are also characteristic of the genus. The objectives of this contribution are: to describe for the first time the male of *Mastophora extraordinaria* Holmberg, 1876, the type species of the genus, to provide images of live specimens and genitalia of both sexes and to give data of natural history, development, feeding and its potential distribution. We performed observations in the field and laboratory. We maintained females with their egg sacs until the adulthood of the males occurred. Males of *M. extraordinaria* are distinguished by having a short and curved embolus and median apophysis with a broad base and hook-shaped apex. The species was founded in tree foliages in natural forests or urban gardens. Literature data, new distribution records and the potential model show that the species has a pampasic distribution.

Keywords: Bolas spider, taxonomy, favourability, pampasic distribution.

RESUMEN

Primera descripción del macho de *Mastophora extraordinaria* Holmberg, 1876 (Araneae: Araneidae), con notas sobre su historia natural y distribución potencial de la especie. El género *Mastophora* Holmberg, 1876 está representado por 50 especies que se distribuyen principalmente en América y Las Antillas.

Los machos son mucho más pequeños que las hembras y no están descritos en más de la mitad de las especies conocidas del género. La alta especificidad de su dieta (polillas) y la técnica de captura que emplean las hembras son también características del género. Los objetivos de este trabajo son: describir por primera vez el macho de *Mastophora extraordinaria* Holmberg, 1876, especie tipo del género, proporcionar imágenes de ejemplares vivos y genitalia de ambos sexos y dar datos de historia natural, desarrollo, alimentación y distribución potencial. Realizamos observaciones a campo y laboratorio, se criaron hembras con sus ootecas hasta alcanzar la adultez de los machos. Los machos de *M. extraordinaria* se distinguen por presentar un embolo corto y curvo y una apófisis media de base ancha con forma de gancho en el ápice. La especie vive en follaje de árboles de bosques nativos o en parques urbanos. Datos de la literatura, nuevos registros y el modelo potencial muestran que la especie tiene una distribución pampásica.

Palabras Clave: Araña boleadora, taxonomía, favorabilidad, distribución pampásica.

INTRODUCTION

The genus *Mastophora* Holmberg, 1876 comprises 50 known species which are mainly distributed in the Neotropical Region. The genus is distinguished from others Araneidae by the presence of tubercles and horns in the carapace and the absence of macrosetae in the legs (Levi, 2003). The type species of the genus, *M. extraordinaria* Holmberg, 1876, was described based on a single female from Buenos Aires, Argentina. Representatives of this genus are known as bolas spiders because the female performs an unusual



hunting strategy. It consists of holding, with the first pair of legs, a short thread with a drop of glue in its end, imitating the sex pheromone of certain moths (Gemeno, Yeargan and Haynes, 2000; Foelix, 2011; Fischer, 2019). Juveniles and males use pheromones for capturing prey with its legs but they do not construct bolas (Levi, 2003). Males are very small and until now they are only known from less than half of the species (World Spider Catalog, 2021).

In Uruguay it has been registered four species of *Mastophora*: *M. extraordinaria* Holmberg, 1876, *M. satan* Canals, 1931, *M. catarina* Levi, 2003 and *M. yacare* Levi, 2003 (World Spider Catalog, 2021). From these, only *M. satan* is known for both sexes. Recently, we collected females of *M. extraordinaria* with egg sacs, we waited for the hatching of the spiderlings and maintained them until the adulthood of the males. This study aims to describe the male of *M. extraordinaria* for the first time with a new diagnosis for the species. We also provide images of live specimens and genitalia. Finally, we contribute with data on natural history and potential distribution of the species.

MATERIAL AND METHODS

Sampling. Surveys were performed in gardens of Facultad de Ciencias, Montevideo, Uruguay (34°52'55"S, 56°07'06"W) between 2017 and 2020. The exemplars were observed *in situ* at night with a headlamp and females with egg sacs were collected by hand for the study in the laboratory.

Breeding. Females and egg sacs were placed individually in the laboratory on 49 × 20 × 15 cm glass boxes with tree branches from the study site and room conditions of temperature and humidity (24°–30°; 44%–50%). We fed the females with Lepidoptera (Crambidae: *Samea* sp. and Noctuidae) and juveniles with Diptera (Nematocera: Psychodidae, Culicidae and Chironomidae) from this location until males were adults. We measured the egg sacs and counted the number of eggs inside them.

Taxonomic description. Description and terminology follow Levi (2003). Details of the genitalia of males and females were examined under a stereo microscope (Nikon SMZ-10). Photographs of male genitalia were taken using a digital camera (Nikon D3000) attached to a microscope (Nikon YS100), and the stacking was made with Helicon Focus version 7.6.4 Lite. Photographs of live specimens were taken using digital cameras, Nikon D3000+Micro-NIKKOR 55mm f/2.8 lens and NIKON 1 S1.

Voucher specimens were deposited at the Arachnological Collection of Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay (FCE Ar, M. Simó). The distribution map was elaborated with the program QGIS v3.10 (QGIS

Development Team, 2020) using data from literature (Levi, 2003), Global Biodiversity Information Facility (GBIF) and exemplars deposited in the collection of Facultad de Ciencias. Measurements are in millimeters.

Modelling. The geographic distribution dataset contained 21 records obtained from the literature (Capocasale, 1973; Levi, 2003), GBIF.org (2 March 2021 GBIF Occurrence Download <https://doi.org/10.15468/dl.d384y4>) and recent surveys in Uruguay. The potential distribution model of the species was constructed to estimate the favourable areas following the methodology described by da Silva et al. (2020). For analyzing the geographical data we considered all the South America area which was divided into 181,221 hexagons (approximately 6.2 km side) using QGIS v3.10 (QGIS Development Team 2020). We used presence/absence data of the species and average values of 49 predictor variables obtained from different repositories (see Table 1). The variables were grouped into three factors: 1) spatial, this variable reveals the spatially favourable area for the species due to its mere spatial location. They are the area close to the center of dispersal or origin of the species, 2) topographic, hydrological and climatic, 3) global land cover and use land (Table 1) for using the favourability function (FF) as the modelling algorithm. It incorporates the proportion of presences or prevalence using a logit function (see Real, Barbosa and Vargas, 2006; Acevedo and Real, 2012). The modelling analyses were performed with the fuzzySim package (Barbosa, 2015) implemented in the R program (R Core Team 2021). The multGLM function was used, which allows the modelling process to be carried out sequentially (for more information, see <https://modtools.wordpress.com>).

The modeling procedure is carried out according to this sequence, first, we performed a 3rd-degree polynomial trend-surface analysis (Legendre and Legendre, 1998) to reflect the effect of factors that may involve purely spatial trends; second, for the selection of variables, we first controlled for the increase in type I error (accepting a false hypothesis) using the false discovery rate (FDR) following the procedure of Benjamini and Hochberg (1995) with the function FDR. Second, we calculated the Pearson correlation between the variables that passed the FDR filter, using a threshold value of 0.8 and the function corSelect (Barbosa, Real, Muñoz and Brown, 2015). For model construction, with the variables selected, we used the function step (Hastie and Pregibon, 1992) to perform stepwise variable selection and apply the Akaike information criterion (AIC) (Akaike, 1973). This analysis allows to compare different possible models and to determine which one is the best fit for the data according to the parsimony criterion (Burnham and Anderson, 2002; McPherson, Jetz, and Rogers, 2004; Bulluck, Fleishman, Betrus and Blair, 2006). Using the

Table 1. Variables and factors used in the modeling process for *Mastophora extraordinaria*.

CODE	VARIABLES	CODE	VARIABLES
Spatial			
Ysp	Spatial logit ¹ (linear polynomial combination of Latitude (°S) and Longitude (°W) from the spatial logistic regression) ⁽¹⁾		
Topography, hydrology and climatic			
A	Average altitude (m) ⁽²⁾	S	Slope (°) (calculated from altitude)
Ori-NS	Orientation; degrees of exposure North-South (calculated from slope)	Ori-EW	Orientation; degrees of exposure East-West (calculated from slope)
Rough	Roughness (m) (calculated from altitude)	TRI	Terrain Ruggedness Index (calculated from altitude)
TPI	Topographic Position Index (calculated from altitude)	SumRiver	Summation of Rivers (km) ⁽³⁾
Dist_River	Minimum distance to Rivers (km) ⁽³⁾	Sum_BigRiv	Summation of Big Rivers (km) ⁽⁴⁾
Dist_BigRiv	Minimum distance to Big Rivers (km) ⁽⁴⁾	BIO1	Average annual temperature (°C) ⁽⁵⁾
BIO11	Mean annual temperatures of the coldest quarter (°C) ⁽⁵⁾	BIO2	Mean diurnal range temperatures (°C) (°C) ⁽⁵⁾
BIO12	Annual precipitation (mm) ⁽⁵⁾	BIO3	Isothermality (BIO ₂ /BIO ₁₇) (*100) (°C) ⁽⁵⁾
BIO13	Precipitation of the wettest month (mm) ⁽⁵⁾	BIO4	Seasonal temperatures (°C) ⁽⁵⁾
BIO14	Precipitation in the driest month (mm) ⁽⁵⁾	BIO5	Maximum temperatures in the warmest month (°C) ⁽⁵⁾
BIO15	Seasonal precipitation (mm) ⁽⁵⁾	BIO6	Minimum temperatures in the coldest month (°C) ⁽⁵⁾
BIO16	Precipitation in the wettest quarter (mm) ⁽⁵⁾	BIO7	Annual temperature range (BIO ₅ -BIO ₆) ⁽⁵⁾
BIO17	Precipitation in dry quarter ⁽⁵⁾	BIO8	Mean annual temperatures of the wettest quarter ⁽⁵⁾
BIO18	Precipitation in the warmest quarter ⁽⁵⁾	BIO9	Mean annual temperatures in the dry quarter ⁽⁵⁾
BIO19	Precipitation in coldest quarter ⁽⁵⁾	BIO10	Mean annual temperatures in the warmest quarter ⁽⁵⁾
ETP seasonal	Monthly variability in potential evapotranspiration ⁽⁶⁾	ETP	AnnualAnnual potential evapotranspiration ⁽⁶⁾
ClimMoist	Climatic Moisture Index ⁽⁴⁾	GDD0	sum of mean monthly temperature for months with mean temperature greater than 0°C multiplied by number of days ⁽⁴⁾
GDD5	sum of mean monthly temperature for months with mean temperature greater than 5°C multiplied by number of days ⁽⁴⁾		
Global Land Cover and Use Land			
Crops	Crops (%) ⁽⁷⁾	Grass	Grass (%) ⁽⁷⁾
Moss	Moss (%) ⁽⁷⁾	Shrub	Shrub (%) ⁽⁷⁾
Tree	Tree (%) ⁽⁷⁾	Urban	Urban (%) ⁽⁷⁾
WaterPerm	Water permanent (%) ⁽⁷⁾	Snow	Snow (%) ⁽⁷⁾
WaterSeas	Water seasonality (%) ⁽⁷⁾	BareCover	Bare (%) ⁽⁷⁾
PopDen	Population density ⁽⁸⁾	Distroad	Distance to roads (km) ⁽⁸⁾
DistUrban	Distance to the main urban centers (km) ⁽⁸⁾	SumRoads	Length of roads (m) ⁽⁸⁾

Sources:

⁽¹⁾ Spatial variables, latitude and longitude, were generated from the QGIS (www.qgis.org) program according to the vector geometry tools: a) with "centroids of polygons", the centroid of each cell was calculated, and b) with "Export / Add columns of geometry", the values of length and latitude expressed in the 1984 World Geodetic System were allocated to each centroid (WGS84).

⁽²⁾ Danielson, J.J., and Gesch, D.B., 2011, Global multi-resolution terrain elevation data 2010 (GMTED2010): U.S. Geological Survey Open-File Report 2011-1073, 26 p. https://www.usgs.gov/core-science-systems/eros/coastal-changes-and-impacts/gmted2010?qt-science_support_page_related_con=0#qt-science_support_page_related_con (accessed in February 2021).

⁽³⁾ United States Geological Survey. HydroShed. Hydrological data and maps based on Shuttle Elevation Derivatives at multiple Scales. Available in: <https://www.hydrosheds.org/page/hydrorivers> (Accessed November 2020)

⁽⁴⁾ Natural Earth Data. North American Cartographic Information Society (NACIS). Available at: <https://www.naturalearthdata.com/downloads/> (Accessed November 2020)

⁽⁵⁾ Karger D.N., Conrad, O., Böhrer, J., Kawohl, T., Kreft, H., Soria-Auza, R.W., Zimmermann, N.E., Linder, H.P., Kessler, M. Data from: Climatologies at high resolution for the earth's land surface areas. Dryad Digital Repository. <http://dx.doi.org/doi:10.5061/dryad.kd1d4>

⁽⁶⁾ Environmental Raster for Ecological Modelling. <https://envirem.github.io/#varTable>

⁽⁷⁾ Buchhorn, M.; Smets, B.; Bertels, L.; Lesiv, M.; Tsendbazar, N.-E.; Masiliunas, D.; Linlin, L.; Herold, M.; Fritz, S. (2020). Copernicus Global Land Service: Land Cover 100m: Collection 3: epoch 2015: Globe (Version V3.0.1) [Data set]. Zenodo. DOI: <https://doi.org/10.5281/zenodo.3939038>

⁽⁸⁾ Gridded Population of the World (GPW), v11. Socioeconomic Data and Applications Center (SEDAC). A Data Center in NASA's Earth Observing System Data and Information System (EOSDIS). Hosted by CIESIN at the Columbia University. 2020. <https://sedac.ciesin.columbia.edu/data/set/gpw-v4-data-quality-indicators-rev11/data-download#close> (Accessed November 2020).



Table 2. Predictor variables included in the full models of the species of *Mastophora extraordinaria* in this study. Wald parameter indicates the relative importance of every variable on the model. Signs in brackets show the positive or negative relationship between favorability and the variables in the models. Variable abbreviations are included in Table 1.

Variables	Wald values and sign
Ysp	17.26733 (+)
UrbanCover	53.65786 (+)
SumRoads	12.88889 (+)
TreeCover	15.09828 (+)
BIO9	4.964077 (+)
DistUrban	4.200559 (-)

Table 3. Comparative assessment of models for the species *Mastophora extraordinaria* according to their discrimination and classification capacity. Abbreviations: AUC, area under the ROC (receiving operating characteristic) curve; CCR, correct classification rate; TSS, True Skill Statistic.

	Evaluation indices	Value
Discrimination	AUC	0.993
Classification	Sensitivity	0.952
	Specificity	0.939
	CCR	0.939
	TSS	0.891

modEVA R package (Barbosa, Brown, Jiménez-Valverde and Real, 2016), we evaluated the discrimination and classification capacity of the model. The discrimination ability was assessed using the area under the curve (AUC) of the receiving operative characteristic (ROC), which is independent of any favorability threshold (Hanley and McNeil, 1982; Dodd and Pepe, 2003; Guisan, Thuiller and Zimmermann, 2017). The classification capacity of the models was evaluated using four threshold-dependent indices: 1) sensitivity, 2) specificity, 3) correct classification rate (CCR) and 4) true skill statistic (TSS) (Allouche, Tsoar and Kadmon, 2006; Liu, White and Newell, 2009). Finally, the favorability areas were compared with the biogeographic provinces proposed by Morrone (2014).

RESULTS

Taxonomy

Family Araneidae Clerck, 1757

Genus *Mastophora* Holmberg, 1876

Type species: *M. extraordinaria* Holmberg by monotypy.

Mastophora extraordinaria Holmberg, 1876 (Figs. 1-4).

Mastophora extraordinaria Holmberg, 1876: 20. Holotype female from Buenos Aires, Argentina, lost.

Mastophora extraordinaria: Levi, 2003: 357, Figs. 281-287.

For a complete synonymic list see World Spider Catalog (2021).

New records. URUGUAY: **Montevideo:** Facultad de Ciencias (-34.881994, -56.117269), 2 January 2018 (C. Costa), 3 males (FCE-Ar 9364); same loc., 10 May 2017 (C. Costa, D. Hagopián and A. Laborda), 1 female (FCE-Ar 9376); same loc., 18 March 2019 (C. Costa), 1 female (FCE-Ar 12265); same loc., 31 January 2019 (C. Costa), 2 males (FCE-Ar 12266); same loc., 25 March 2019 (C. Costa), 1 male (FCE-Ar 12267).

Rocha: Parque Nacional San Miguel (-33.7139826, -53.5780197), 19 March 2005 (S. Carreira and D. Roibal), 1 female (FCE-Ar 4241).



Fig. 1. *Mastophora extraordinaria*, male (FCE-Ar 9364). A, B, Habitus, dorsal. C–E, Palp. C, prolateral, D, ventral, E, retrolateral. Scale bars: A, B 0.5mm; C–E 0.1mm.

Diagnosis. Males of *M. extraordinaria* can be distinguished by the most of the described males of the genus by the shape of the embolus, short, thin and curved with the tip pointing anteriorly (Fig. 1 C,D). They resemble males of *M. phrynosoma* Gertsch, 1955 and *M. yeargani* Levi, 2003 but differ from these species in the shape of the median apophysis, being more hook shaped in *M. extraordinaria* (Fig. 1 C,E). Differs from the male of *M. stowei*, by the different shape and curvature of the embolus, it is wider and with the tip

pointing posteriorly in *M. stowei*. Females of *M. extraordinaria* resemble that of *M. melloleitai* Canals, 1931 but differ by having in the carapace flat tubercles, smooth and shiny horns and indistinct bulge at the median eyes. The abdomen is white anteriorly. The epigynum has a flat median plate and the atria are closer to each other (Levi 2003: figs. 280-282, 284, 286-287).

Description. Male (FCE-Ar 9364): carapace

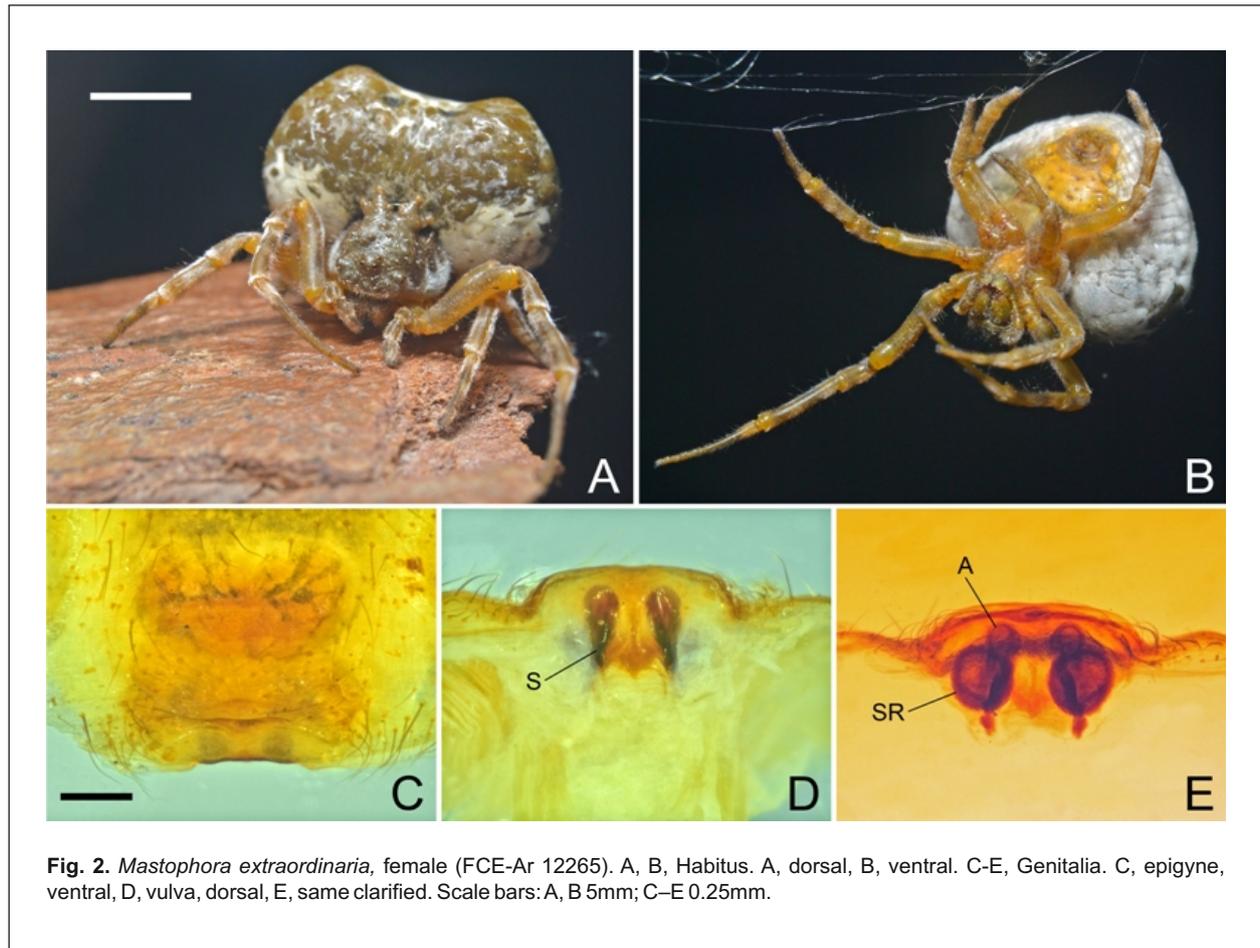


Fig. 2. *Mastophora extraordinaria*, female (FCE-Ar 12265). A, B, Habitus. A, dorsal, B, ventral. C-E, Genitalia. C, epigyne, ventral, D, vulva, dorsal, E, same clarified. Scale bars: A, B 5mm; C-E 0.25mm.

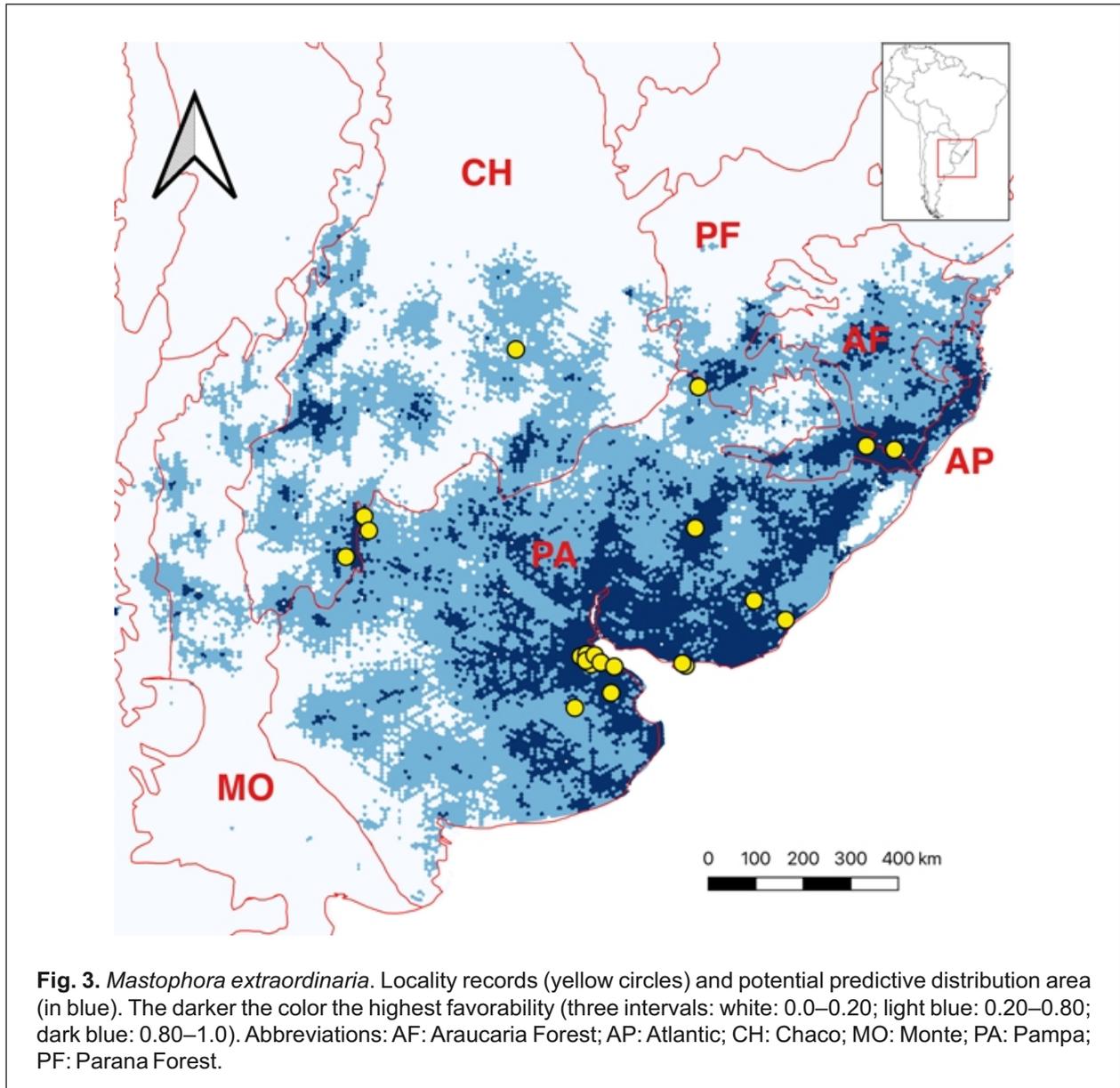
orange with white line in the middle, branching posteriorly into the median tubercles (Figs. 1 A,B). Chelicerae, sternum, coxae and legs yellowish. Abdomen whitish, with two adjacent humps. Total length 1.7 Carapace 0.8 long, 0.75 wide in thoracic region, 0.5 wide at lateral eyes. First femur 0.7, patella and tibia 0.75, metatarsus 0.5, tarsus 0.3. Second patella and tibia 0.7, third 0.3, fourth 0.4. Length of first patella and tibia are same as width of carapace. Palp (Fig. 1 C-E): embolus short and slightly curved with the tip pointing anteriorly, median apophysis with round base, curved at the end. Tibiae has long retrolateral macrosetae.

Female: See Levi (2003: 357). Epigynum (FCE-Ar 12265): flat plate in ventral view (Fig. 2C). In posterior view slits converging posteriorly (Fig. 2D), seminal receptacles and atria rounded (Fig. 2E).

Natural history. The egg sacs (N=22) were found from September (spring) to March (autumn) in tree branches, trunks and rural fences between 0.5-2 meters from the ground level. The diameter variation

was 8-10 mm and contained 104-297 eggs. In the field we observed juveniles feeding on Diptera (Nematocera). We observed 6 egg sacs parasitized by Hymenoptera (Fig. 4D) and flies of *Pseudogaurax* Malloch, 1915 (Diptera: Chloropidae) and others 5 egg sacs parasitized only by Hymenoptera. Also, we found one egg sac of Salticidae hosting inside an open egg sac of *M. extraordinaria*. We observed that juveniles have the first molt inside the egg sac. After emerging they construct a communal web and stay there until the second molt, then, they disperse. Males emerge from the egg sac as subadults and reach adulthood after the second molt. We observed 249-294 spiderlings emerging the egg sac. Subadult males represented 4%-10% of the juveniles inside the egg sacs.

Specimens of *M. extraordinaria* have been observed in a great variety of native trees in the gardens of Facultad de Ciencias: *Acanthosyris spinescens* (Mart. and Eichler) Griseb., *Azara uruguayensis* (Speg.) Sleumer, *Butia odorata* (Barb. Rodr.) Nobslick, *Celtis tala* Gillies ex Planch., *Citharexylum montevidense* (Spreng.) Moldenke,



Dipsacus sylvestris Huds., *Duranta erecta* L. var. *erecta*, *Lonchocarpus nitidus* (Vogel) Benth., *Myrcianthes cisplatensis* (Cambess.) O. Berg, *Myrrhinium atropurpureum* var. *octandrum* Benth., *Myrsine laetevirens* (Mez) Arechav., *Phytolacca dioica* L., *Prosopis affinis* Spreng., *Schinus engleri* F.A. Barkley, *Scutia buxifolia* Reiss., *Sebastiania commersoniana* (Baill.) L.B.Sm. and B.J. Downs, *Vachellia caven* (Molina) Seigler and Ebingerand, *Xylosma schroederi* Sleumer ex Herter. Also, it was registered in the exotic tree *Morus alba* L.

Sexual dimorphism. The species presents a notorious sexual dimorphism, being the female much

larger than the male (7:1). Variation of the body length: males 1.7 (N=3); females 11.9-13.0 (N=3).

Geographic distribution. North and eastern Argentina, Southern Brazil and Uruguay (Fig. 3).

Potential distribution of *Mastophora extraordinaria*. The distribution of *Mastophora extraordinaria* had an explicit spatial structure indicating the reachable area for the species (Legendre and Legendre, 1998). Five variables contribute to the final model, being the variable UrbanCover the most important according to the Wald test (Table 2) followed by TreeCover, SumRoads, (BIO9, mean annual

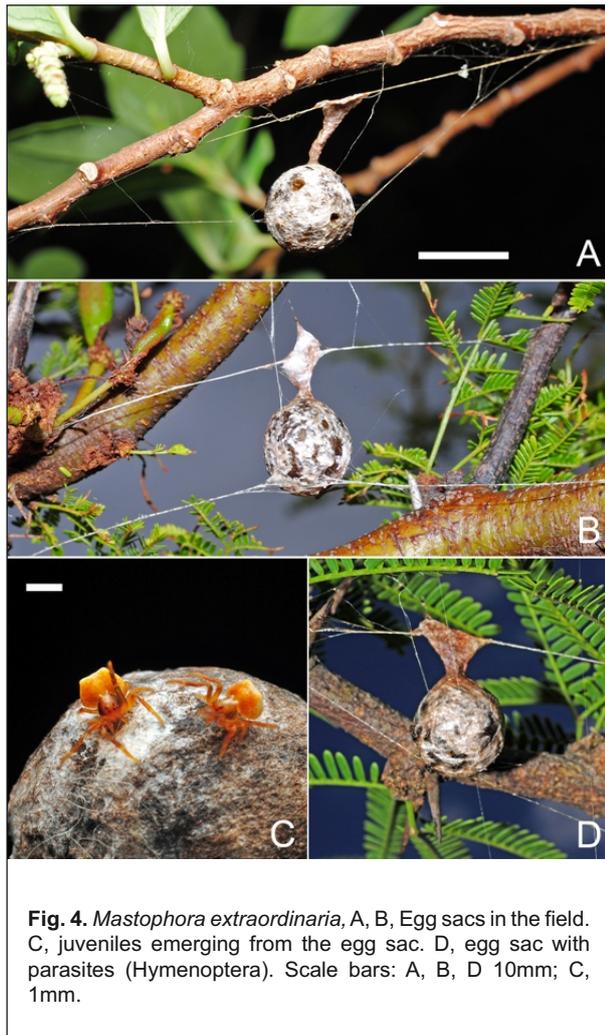


Fig. 4. *Mastophora extraordinaria*, A, B, Egg sacs in the field. C, juveniles emerging from the egg sac. D, egg sac with parasites (Hymenoptera). Scale bars: A, B, D 10mm; C, 1mm.

temperatures in the dry quarter) and finally DistUrban. The last two entered with a negative sign. Regarding the model assessment, the model had a very good discrimination capacity $AUC > 0.99$ (Hosmer and Lemeshow, 2000) having a high classification capacity in terms of presences and absences (the sensitivity, specificity and CCR values were higher than 0.9 and TSS higher than 0.8; see Table 3). The model recovered show a pampasic distribution of the species (Fig. 3).

DISCUSSION

As it has been reported for other species of the genus, *Mastophora extraordinaria* presents a notorious sexual dimorphism in the body size between sexes, with females 7 to 10 times larger than males (Levi, 2003). This agrees with the different number of molts required to raise adulthood in females and males. It was reported for species from temperate regions that

males become adults two months before females (Yeargan and Quate, 1997). The male of *M. extraordinaria* raises adulthood after the second molt. They emerge from the egg sac as subadults which coincide with what was reported by Eberhard (1980) for *M. dizzydeani* Eberhard, 1980. After hatching, the spiderlings construct a communal web and after the second molt the adult males disperse.

The egg sacs of *M. extraordinaria* are subspherical and attached to branches by strong threads similar to other species of the genus (Gertsch, 1955). The range number of eggs is about half that indicated for this species by Bréthes (1909) but similar as reported for North American species (Levi, 2003).

In *M. dizzydeani* and *M. caesariata* Levi, 2006 it was reported that when females are disturbed, they fold the legs against the body and produce a pungent odor (Eberhard, 1980; Eberhard and Levi, 2006). This singular behavior was observed in females of *M. extraordinaria* while juveniles disperse descending from the branches through a silk thread. It has been reported the secretion of allomones in some species of *Mastophora* where females imitate the male pheromone of moths for hatching them (Fischer, 2019) and juveniles produce them for predation on psychodid flies (Yeargan and Quate, 1996). In our observations in the laboratory females of *M. extraordinaria* only accepted moths as prey and juveniles captured psychodid flies, but also species of Culicidae and Chironomidae. Wasps of *Arachnophaga* Ashmed, 1896 were reported parasitizing the egg sacs of *Mastophora* species from Central Mexico (Basiuk, 2012). We recognized exemplars of Scelionidae parasitizing the egg sacs of *M. extraordinaria*. Flies of *Pseudogaurax* are suggested to be parasitoids of spider eggs (Gillung and Borkent, 2017). Although *Pseudogaurax* flies emerged from some of the egg sac, spider juveniles also emerged too, which can be explained since the larvae of these flies feed on the spider's eggs but not on all of them (Riccardi and Pádua, 2021). The species distribution model confirms a pampasic distribution of *M. extraordinaria*. The high favorability area is situated in the Pampean Province (*sensu* Morrone, 2014) but also there are favorable areas in Chaco, Monte, Paraná Forest, Araucaria Forest, southern Paraná Forest and southern coastal Atlantic Forest. The high amplitude of tree species from parks and gardens where the spider has been observed and the fact that most of records came from urban centers confirm the synanthropic condition of the species. In concordance, urban cover was the variable with high contribution to the model. Furthermore, the positive relationship with the spatial logit variable supports the distribution of the species in the Pampean Province which would be revealing its center of biogeographic origin. In addition, roads had a positive relationship with the distribution of the species. Considering that most of the known records of the species are from urban areas, this result is relevant to

take into account in future studies about the role of roads in the dispersion of the species. This variable was reported for another synanthropic spider, *Badumna longinqua* (Simó, Laborda, Núñez and Brescovit, 2015), where roads played an important role in the dispersal of the species. Also tree cover constitutes a variable that influence positively in the distribution. This fact could be explained because the species was mainly reported in branches of many species of trees. Only one climatic variable, BIO9 and, distance to urban centers were predicted by the model with negative relationship. This suggests that the species is sensitive to the increase of temperature in dry periods and with the distance to urban centers. We hypothesize that the synanthropic distribution of *M. extraordinaria* could be related with the availability of moths in urban areas. Bates et al. (2014) indicated for Great Britain that higher species richness and abundance of moths are correlated with gardens that have more diverse and extensive microhabitats and gardens near to the coast. Recently, Franzén, Betzholtz, Pettersson and Forsman (2020) found that urbanization promotes high intraspecific diversity and generalist lifestyles in moth communities. These findings indicate that for a spider with a specialized diet based in moths, urban centers provide suitable conditions for its establishment.

In a recent study of the phylogeny of Araneidae, Scharff et al. (2020) recognized the monophyletic group “Mastophorines” characterized by the loss of the orb web, using “bolas” as a hutching strategy instead and chemical mimicry as hunting behavior of females.

It is interesting fact that males of half of the known species of the genus remain unknown, probably because they are tiny, and it is not easy to find them in the field. The present contribution describes the male of *M. extraordinaria* for the first time, the type species of the genus, and supply data of its natural history and distribution. Efforts to reduce the number of undescribed males of the species of *Mastophora*, will improve the knowledge of this singular araneoid genus.

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