On the taxonomy of *Latonigena auricomis* (Araneae, Gnaphosidae), with notes of geographical distribution and natural history

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ABSTRACT. The male of *Latonigena auricomis* Simon, 1893 is described for the first time and the female is redescribed. New records are provided for Argentina, Brazil and Uruguay. Notes on the natural history and a potential distribution model of the species are presented in the Neotropical Region.

KEYWORDS. Spiders, Synanthropy, Neotropical Region.

RESUMO. Sobre a taxonomia de *Latonigena auricomis* (Araneae, Gnaphosidae), com notas da distribuição geográfica e história natural. O macho de *Latonigena auricomis* Simon, 1893 é descrito pela primeira vez e a fêmea é redescrita. Novos registros são fornecidos pra Argentina, Brasil e Uruguai. São apresentadas notas sobre a história natural e um modelo de distribuição potencial da espécie na Região Neotropical.

PALAVRAS-CHAVE. Aranhas, Sinantropia, Região Neotropical.

Gnaphosidae is one of the most speciose spider families, with 2,128 species distributed along the world (Platnick, 2012). Most taxonomic studies have been developed in Palearctic, Nearctic, Oriental and Australasian representatives meanwhile many Neotropical groups are still understudied. In this region, previous genera revisions and other taxonomic contributions were made mainly by Norman Platnick and collaborators (see Murphy, 2007; Platnick, 2012). The genus *Latonigena* was proposed by Simon (1893a) for a single species, *L. auricomis* Simon, 1893 based on a female and two immatures from Buenos Aires, Argentina (Simon, 1893b). Later a second species was described from South Africa, *Latonigena africanus* Tucker, 1923.

The genus and the species were described using somatic characters as ocular disposition, body coloration and the morphology of carapace, chelicerae, sternum and coxae. The original description of *L. auricomis* did not include figures of the genital features so the taxonomic status of the genus and the species were so far not clear. The generic name *Latonigena* is feminine, but in Roewer's catalogue (Roewer, 1954) the epithet *auricomis* was changed to the masculine *auricomus*. Although Bonnet (1957) corrected this mistake in his Bibliographia Araneorum, later Murphy (2007) and Platnick (2012) used Roewer's nomination. Murphy (2007) included *L. auricomis* in the *Herpyllus* group by the following characters: medium size spiders, dorsal pattern in the abdomen with dark and whitish coloration and the presence of a dorsal scutum in anterior abdomen of males. Considering that *L. africanus* has not the dorsal pattern in the abdomen, this author included it in the *Echemus* group, suggesting that this species is not congeneric with *L. auricomis*. Moreover a recent study proposed seven new South American species of *Latonigena* and provided a diagnosis for the genus, contributing to define its taxonomic limits and formally transferred *L. africana* to *Trichothyse* Tucker, 1923 (Ott *et al*., 2012). The study of collections from Argentina and Uruguay and recent field trips in both countries allowed us to obtain several specimens of both sexes of *L. auricomis*. Therefore the main objectives of this paper are: the redescription and illustration of *L. auricomis*, with the first description of the male, the citation of new records with an analysis of its geographic distribution and the report of data about the natural history of the species.

MATERIAL AND METHODS

Specimens studied are deposited in the following collections: Museum National d'Histoire Naturelle, Paris, France (MNHN, C. Rollard); Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" Buenos Aires, Argentina (MACN-Ar, C. Scioscia); Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Brazil (MCN, R. Ott); Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay (FCE, M. Simó) and Museo Nacional de Historia Natural, Montevideo, Uruguay (MNHN-Ur, M. Simó). The epygina were observed by immersion in clove oil. Measurements are expressed in millimeters. Photographs of the male genitalia were taken with a digital camera mounted on a stereoscopic microscope, and the focal planes were composed with Helicon Focus 4.62.2. The taxonomic description format follows Platnick & Murphy (1987) and Ott *et al*. (2012).

A species distribution model was elaborated using Maxent 3.3.1, a maximum entropy based program (Phillips *et al*., 2006). The occurrence data were obtained from the records of the collections studied and in two

cases, the specimens were identified in the field, sexed but not collected (see list below the section "Other material examined"). The climatic variables were obtained from the database WorldClim 30 sec, with a resolution of 1 km (Hijmans *et al*., 2005a), that comprises nineteen different bioclimatic variables related to temperature and precipitation. They are widely used in researches related with the ecophysiological tolerances of a species in the habitat (Graham & Hijmans, 2006; Dias *et al*., 2011). To determine whether climatic variables have a greater impact on the model we use a Jackniffe analysis to measure the weight of each variable. For developing the model we choose the "equal training sensitivity plus specificity" threshold rule, with the following options: 2,500 maximum interaction, random test percentage of 25%, logistic output formatted, remove duplicates from the same grid cell and auto features (Dias *et al*., 2011). The total area modeled was situated between the following coordinates: latitude -56.4939 to -21.9056 S, longitude -75.8 to -41,6340 W. The model was evaluated using the Maxent function Receiver Operating Characteristic (ROC) (Hanley & McNeil, 1982). The resulting map of the model was elaborated with DIVA-GIS 7.0 (Hijmans *et al.*, 2005b).

RESULTS

Latonigena auricomis Simon, 1893

(Figs 1-19)

Latonigena auricomis Simon, 1893a:310 (Female holotype and two immatures from Banda Oriental del Uruguay, in MNHN, AR9782, examined on the basis of photographs supplied by C. Rollard); 1893b:372 (descr. gen and desig. type species).

Latonigena auricomus: Murphy, 2007:46, figs 286-287; Jorge, 2011:74.

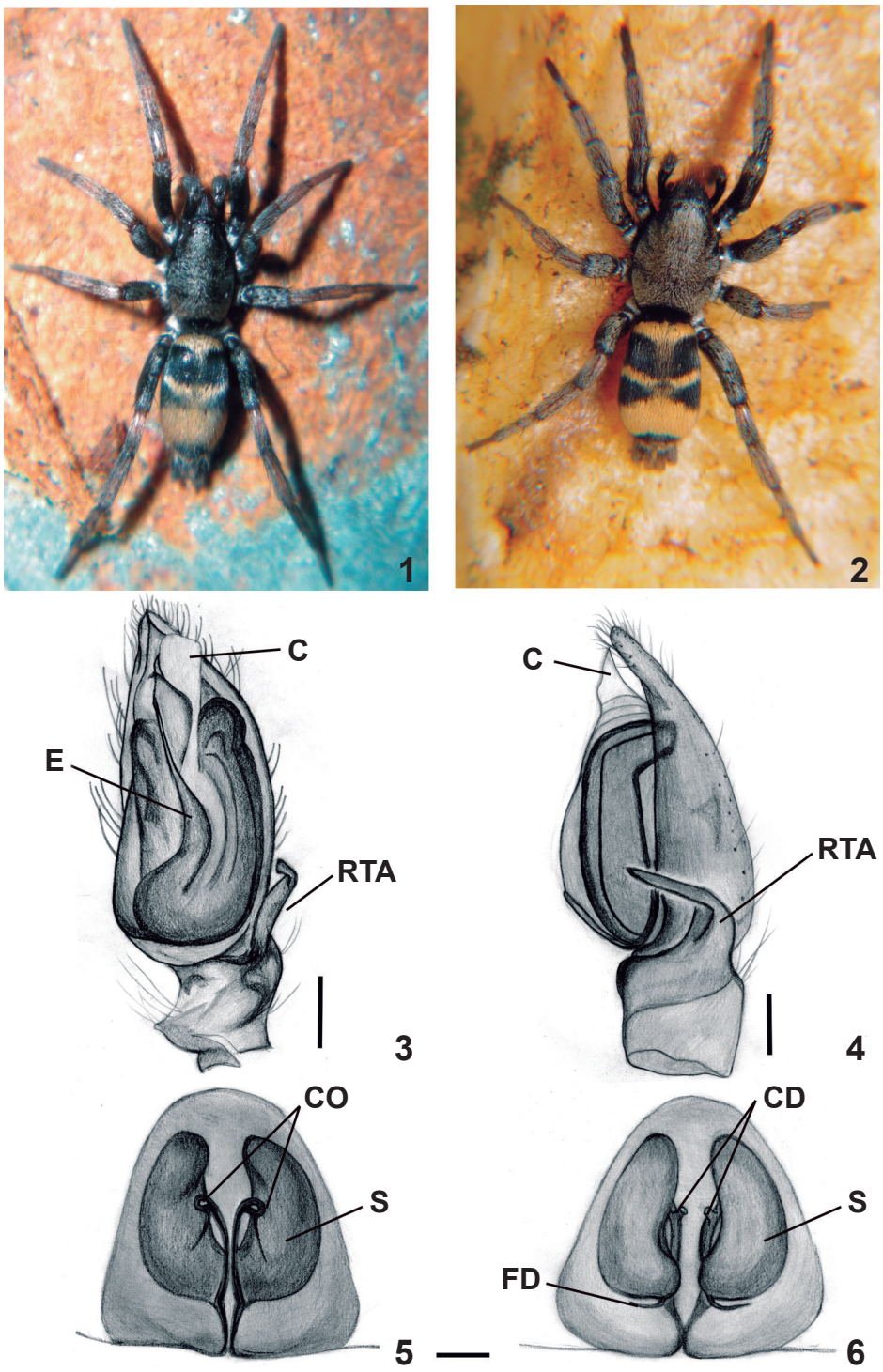
Taxonomic note. A female (MNHN - AR9782) from "Banda Oriental del Uruguay", currently República Oriental del Uruguay was considered by Murphy (2007) as the holotype but in the original description it was indicated Buenos Aires, Argentina as the type locality. The body length and the somatic characters of this female agree with the Simon's description. The collector Friedrich Wilhelm Karl Berg, a German naturalist who lived and died in Buenos Aires, also stayed in Uruguay for two years. The species is present in both countries so the actual confirmation of the type locality is difficult to determine.

Diagnosis. Females of *L. auricomis* resemble to those of *L. beni* Ott *et al.*, 2012 and *L. lami* Ott *et al*., 2012 by the shape of the epigynum (without anterior hoods), but differ by having a more elongated and narrow median septum (Fig. 5). Males are very similar to those of *Latonigena taim* Ott *et al.*, 2012 (see Ott *et al*. 2012, figs 53-58) by the ventrally curved dorsal branch of the RTA with a basal hump, however, the bulb of *L. auricomis* is larger, the dorsal branch of the RTA is longer, and the basal hump is less prominent (but see variation below) (Figs 7-18).

Description, male (FCE 5746). Coloration: carapace dark brown, sternum brown, darker on the margins. Femora, patellae and metatarsi dark. Abdomen with a dorsal transversal pattern of three yellow bands (the third one is the widest) and four black areas with an anterior reddish brown scutum (Figs 1, 2). Ventrally brown, with two lighter longitudinal lines from the epyginal furrow converging in the posterior region, coloration darker near the spinneret region; white spots are distributed laterally to the longitudinal bands. Total length 6.4. Carapace 2.8 long, 1.8 wide. Thoracic groove conspicuous. Eye diameters and interdistances: AME 0.10, ALE 0.13, PME 0.08, PLE 0.10, AME-AME 0.10, AME-ALE 0.03, PME-PME 0.13, PME-PLE 0.08, ALE-PLE 0.15. Posterior eye row slightly procurved. Chelicerae with two retromarginal teeth. Leg measurements: I – femur 1.4/ patella 0.73/ tibia 0.9/ metatarsus 0.95/ tarsus 0.55/ total 4.53; II – 1.05/ 0.55/1.07/ 0.82/ 0.65/ 4.14; III – 1.3/ 0.55/ 0.85/ 0.8/ 0.65 /4.15; IV – 1.6/ 0.7/ 1.08/ 1.18/ 0.63/ 5.19. Leg spination: femora I-II d1-1-0, p0-0-2, II d1-1-1, III d1-2-2, IV d1-1-1; patella II r1-0-0, III d0-0-1, r0-1-0, IV r1-0-0; tibiae I v0-2-2, II v1-2-2, III p1-0-1, r1-0-1, v0-2-2, IV r1-0-1, v1-2-2; metatarsi I-III v2-0-0, III d0-2-2, p0-1-1, r0-1-1, v2-0-2, IV d0-2-2, p0-1-1, r1-0-1, v2-1-2. Palpal bulb with the embolus directed forward, nearly straight and basally widened, and with a membranous apical conductor (Figs 3, 7-10). Retrolateral tibial apophysis curved, with serrate tip, directed ventrally (Figs 4, 11-14).

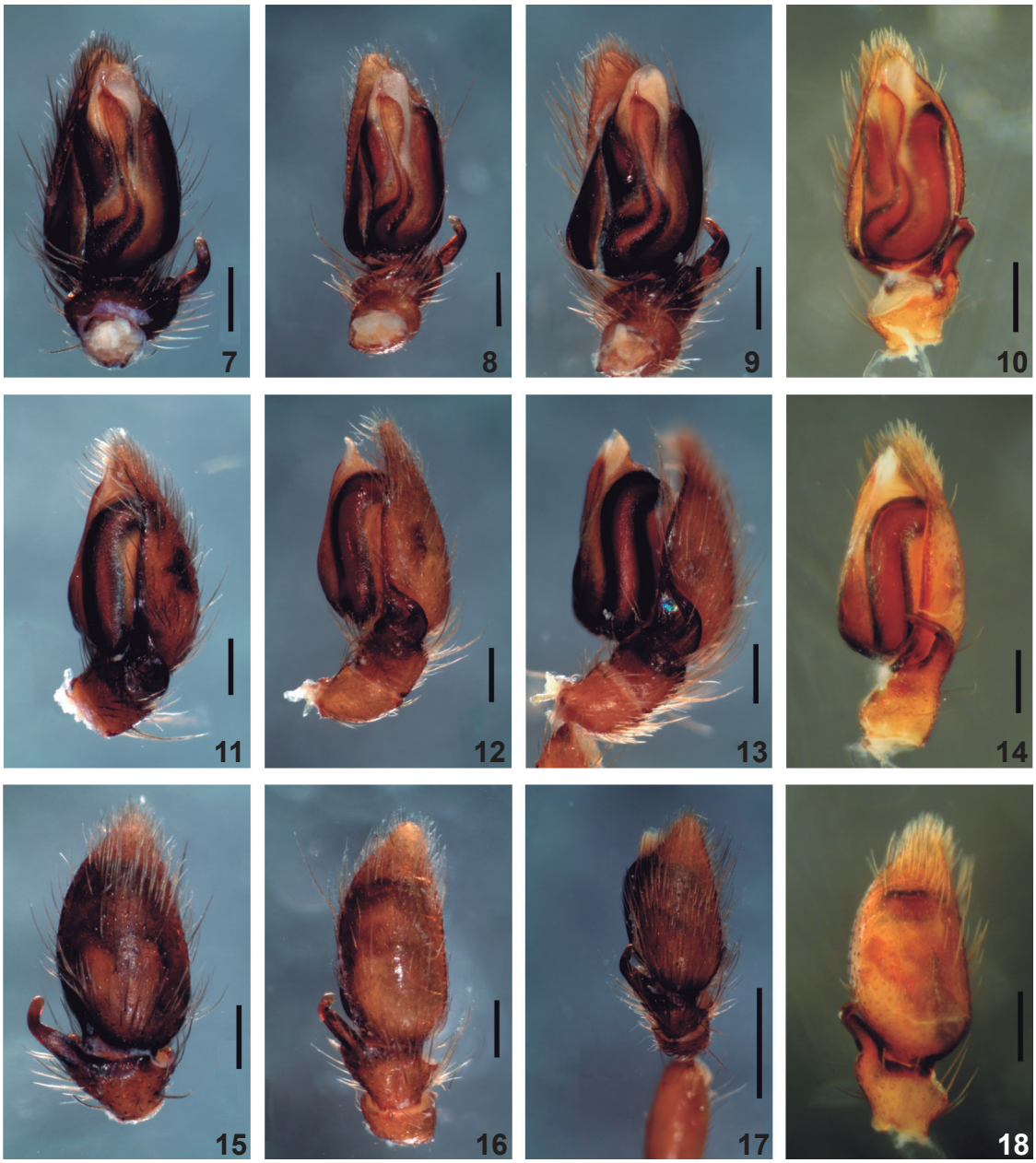
Female (FCE 2880). As in male except as noted. Abdomen without dorsal scutum. Total length 9.2. Carapace 3.4 long, 2.2 wide. Eye diameters and interdistances: AME 0.15, ALE 0.13, PME 0.10, PLE 0.13, AME-AME 0.08, AME-ALE 0.05, PME-PME 0.15, PME-PLE 0.13, ALE-PLE 0.20. Leg measurements: I – femur 1.33/ patella 0.53/ tibia 1.08/ metatarsus 0.75/ tarsus 0.70/ total 4.39; II – 1.43/ 0.45/1.08/ 1.10/ 0.58/4.64; III – 1.65/ 0.75/ 1.05/1.30/ 0.78/5.53; IV – 2.00/1.20 / 1.73/ 1.80/ 0.80/7.53. Leg spination: femora I d1-1-1, p0-0-2, II d1-1-1, p0-0-2, III d1-2-2, IV d1-1-1; patella IV r0-1-0; tibiae I v1-1-1, II p1-0-0, v1-1-1, III d2-1-0, p2-1-1, r0-1-1, v 2-2-2, IV p1-0-1, r1-0-1, v1-2-2; metatarsi I v2-0-0, II v2-0-0, III d0-2-2, v2-1-2, p1-1-1, r1-1-1, v2-1-2, IV d0-2-2, p0-1-1, r1-1-1, v2-2-2. Epyginum large with median septum elongated and medial copulatory openings (Fig. 5). Spermathecae large and reniform, visibles in ventral view (Fig. 6).

Variation. Dorsal coloration. Some specimens present a black area dividing the second transversal light band in two sectors. Measurements, females (5 specimens): carapace long, 3.3-3.7; carapace width, 2.0-2.5; femur I length, 1.7-2.2. Measurements, males (5 specimens): carapace long, 1.9-2.4; carapace width, 1.2-2.0; femur I length, 1.6-2.4. We found variations in some characters of the palp morphology. Among Argentine specimens, the specimen from Campo de Mayo (MACN-Ar 28737) have the RTA more separated (distally diverging) from the bulb, and the basal hump of the RTA well developed, as in *L. taim* (Figs 7, 11, 15); the male from General Roca (MACN-Ar



Figs 1-6. *Latonigena auricomis* Simon, 1893. Living specimens: 1, male from Paysandú, Uruguay; 2, female from Sierra de Mahoma, Uruguay. Left palp: 3, ventral; 4, retrolateral. Female epyginum: 5, ventral; 6, dorsal. (C, conductor; CD, copulatory ducts; CO, copulatory opening; E, embolus; FD, fertilization ducts; RTA, retrolateral tibial apophysis; S, spermathecae). Scale bars: 0.2 mm.

18364), the Southernmost record, in Northern Patagonia, shows the RTA closer to the bulb, which have more elongated proportions than other specimens (Figs 8, 12, 16). The male from Burzaco (MACN-Ar 18365) appears as intermediate between the above mentioned Argentine males (Figs 9, 13, 17). In Uruguayan representatives, the males have the RTA close to the bulb (Figs 10, 14, 18, FCE 2875), except one specimen from Paysandú (FCE 2889) where this structure is more separated. These findings show that the RTA morphology of *L. taim* could fit among the range of variability observed across the Argentine and Uruguayan males. Given that we have not found significant differences among all the females examined in the studied area, and that *L. taim* was described on base of a single male, the finding of females of *L. taim* will clarify the taxonomic status of this species.



Figs 7-18. *Latonigena auricomis* Simon, 1893, palp variation. Figs 7-10, ventral; Figs 11-14, retrolateral; Figs 15-18 dorsal (MACN-Ar 28737, Figs 7, 11, 15; MACN-Ar 18364, Figs 8, 12, 16; MACN-Ar 18365, Figs 9, 13, 17; FCE 2875, Figs 10, 14, 18). Scale bar: Figs 7-16, 18, 0.2 mm; Fig 17, 0.5 mm.

Other material examined. ARGENTINA, **Córdoba**: Calamuchita (31°28'45.84"S, 64°12'50.76"W), ♀, X.1960, J. M. Viana col. (MACN-Ar 18317); Alta Gracia (walking in wall of a house, 31°40'00"S, 64°26'00"W), ♀, 2.IV.2005, M. Ramírez col. (MACN-Ar 18227); **Entre Ríos**: Route 14, Km 101 (in *Anumbius annumbi* nest, 32°7'55.78"S, 58°14'23.61"W), 11♀, 1.VI.2005, P. Turienzo col. (MACN-Ar 28735); **Buenos Aires**: Campo de Mayo, Km 26 Ferrocarril Gral. Belgrano (in *Anumbius annumbi* nest, 34°28'59.16"S, 58°38'16.44"W), ♀, three immatures, 27.III.2005 (MACN-Ar 28736); ♂, 2♀ ,12 immatures, 05.II.2006 (MACN-Ar 28737) all collected by P. Turienzo; San Isidro (34°29'9.67"S, 58°31'9.59"W), ♀, XI.1930, L. Guinazu col. (MACN-Ar 18353); Brandsen (35°9'41.91"S, 58°13'41.61"W), 2♀, 02.VIII.1971, J. Arias Obarrio (MACN-Ar 18355); Bahía Blanca (Chapalcó, 38°42'44.28"S, 62°16'19.20"W), ♀, 1945, S. G. De Pikelin col. (MACN-Ar 2230); El Tordillo (34°38'59.64"S, 58°28'12.00"W), 2♀, three immatures, XI.1969 Maury col. (MACN-Ar 18363); Burzaco (34°49'42.96"S, 58°23'35.52"W), ♂ (MACN-Ar 18365); Punta Lara (34°48'59.19"S, 57°58'34.42"W), ♀, II.1941, F. Monrós col. (MACN-Ar 1322); Luján, F. C. O (34°33'59.40"S, 59°6'51.84"W), ♀, 21.IX.1940, F. Monrós col. (MACN-Ar 18315); Adela (35°41'1.97"S, 57°57'13.68"W), 2♀, two immatures, 5-6. IX.1974, Dominguez Toth & Maury cols. (MACN-Ar 18314); **La Pampa**: Santa Rosa (in *Anumbius annumbi* nest, 36°37'21.72"S, 64°17'9.24"W), 2♀, 05.VIII.2007, P. Turienzo col. (MACN-Ar 28738); **Capital Federal** (Ciudad Autónoma de Buenos Aires, 34°36'29.88"S, 58°22'24.60"W): ♀, 1968, A. Bachmann leg. (MACN-Ar 18294); **Río Negro**: Gral. Roca (39°1'36.48"S, 67°34'31.08"W), ♂, 24.III.1959, A. Bachmann col. (MACN-Ar18364); BRAZIL**, Rio Grande do Sul**: Porto Alegre (30°1'44.40"S, 51°13'42.96"W), ♂, 18.I.1992 (MCN 21955); ♀, 08.XII.1993 (MCN 24490); ♀, 28.XII.1993 (MCN 24672) all colected by M. A. L. Marques; same place, ♀, 23.IX.2007, M. C. Pairet Jr col. (MCN 43575); (Jardim Botânico, 30°3'6.84"S, 51°10'34.32"W), ♀, 07.IX.1985, A. D. Brescovit col. (MCN 13406); same place, ♂, 17.XII.2010, I. Heydrich col. (MCN 47741); Palmares do Sul (30°15'37.08"S, 50°31'1.56"W), 31.VIII.1997, ♀, L. A. Moura col. (MCN 28482); Pelotas (31°46'15.96"S, 52°20'37.32"W), ♀, 04.VI.2000, E. N. L. Rodrigues col. (MCN 33496); Rio Grande (Estação Ecológica do Taim) (32°44'33.00"S, 52°34'28.00"W), ♂, 04.XII.1986,

E. H. Buckup col. (MCN 16582); URUGUAY, **Tacuarembó**: INIA, Route 5 Km 398 (in *Eucalyptus* bark, 31°44'23.64"S, 55°58'46.92"W), ♀, 16.V.2009, M. Simó col. (FCE 2879); Paso de los Toros Camping (Route 5 Km 250, in *Eucalyptus* bark, 32°47'13.02"S, 56°31'32.04"W), ♀, one immature, 16.V.2009, M. Simó col. (FCE 2873); **Treinta y Tres**: Santa Clara de Olimar (under rock, 32°54'59.76"S, 54°57'59.76"W), ♀, 19.XI.1958, L. Zolessi col. (FCE 2874); **Paysandú**: Paysandú City (walking on a external wall, 32°19'22.80"S, 58°4'14.16"W), ♂, 26.II.2004 (FCE 2875); same place inside a house, ♂, 31.III.2010 (FCE 2889); (in a garden, 32°19'1.56"S, 58°4'6.24"W), one immature, 12.VIII.2010 (FCE 5450); same place under tree trunks, ♂, 14.VII.2012 (FCE 3911) all collected by A. Laborda; 10 km from Paysandú City (under trunk in a farm, 32°17'19.32"S, 58°1'54.84"W) one immature, 8.IV.2009, M. Castro col. (FCE 2877); **Rocha**: Cerro Verde (33°56'43.08"S, 53°30'24.84"W), one immature, 11.II.2009, A. Aisenberg col. (FCE 2365); Santa Teresa (in *Eucalyptus* bark, 34°0'2.52"S, 53°31'56.58"W), ♀, 19.XI.2011, M. Castro col. (FCE 5453); Cabo Polonio (34°25'16.21"S, 53°51'16.46"W), ♀, 27.XII.2011, A. Laborda col. (FCE 5449); **Florida**: Municipally Park (34°5'52.08"S, 56°11'49.56"W), ♀, 15.V.2009, M. Simó col. (FCE 2876); ♀, 15 May 2009, A. Laborda col. (FCE 5747); **Maldonado**: Sierra de Animas (34°42'0.00"S, 55°18'59.76"W), ♀, 10.XII.1965, F. Achaval col. (MNHN-Ur 1000); one immature, XII.1990 División Zoología Experimental, IIBCE col. (MNHN-Ur 2007); **Colonia**: Colonia City (34°28'2.68"S, 57°50'40.96"W), one immature, 30.VI.1991 (FCE 108); **San José**: Sierra de Mahoma (under rocks, 34°6'57.60"S, 56°57'44.28"W), 4♀, 01.VI.2011, A. Laborda & C. Jorge cols. (FCE 2325); **Canelones**: Las Piedras (34°43'59.88"S, 56°12'59.76"W), ♂, 01.III.2010, A. Laborda col. (FCE 2890); **Montevideo**: Buceo (inside a house, 34°53'60.00"S, 56°7'59.88"W), ♀, 23.III.2003, L. Montes de Oca col. (FCE 2880); Cilindro (in a window, 34°51'47.52"S, 56°9'1.80"W), ♀, 25.XII.2009 C. Rojas col. (FCE 2892); Jardines del Hipódromo (inside a house, 34°50'34.08"S, 56°7'59.52"W), ♀, 01.II.2010 (FCE 2891); (in the garden), ♂, 19.IV.2010, (FCE 5452); ♂, 22.VIII.2010 (FCE 5746); (walking on a wall), ♀, 19.XII.2010, (FCE 5451), all collected by C. Jorge.

Not collected material registers. URUGUAY, **Treinta y Tres**: Quebrada de los Cuervos (33°9'27.33"S, 54°23'40.95"W), one immature, 21.III.1989, M. Simó det. *in situ*; **Salto**: Plaza Artigas (in *Eucalyptus* bark, 31°23'21.48"S, 57°57'36.72"W), ♀, 18.IX.2010, C. Jorge det. *in situ*; **Canelones**: INIA Las Brujas, in riparian forest (34°37'59.88"S, 56°19'59.88"W), one immature, 09.XI.2004, M. Simó det. *in situ*.

Natural history. In natural areas this species can be found in rocky hills, under stones, usually near the nests of *Camponotus mus* Roger, 1863 (Hymenoptera, Formicidae) to which the spiders are strikingly similar, and inside the nests of *Anumbius annumbi* (Vieillot, 1817) (Passeriformes, Furnariidae). Several records of *L. auricomis* were obtained in urban areas from Argentina, Brazil and Uruguay (under wall crevices inside or outside houses, in gardens, and under bark of *Eucalyptus* in urban parks or plantations). This fact suggests that this species seems to be secondarily adapted to synanthropic conditions.

Geographic distribution. The distribution model indicates that the most suitable area for the species is situated on southern Uruguay and province of Buenos Aires, Argentina, but the distribution of the species could comprise almost all the Uruguayan territory, and parts of the states of Rio Grande do Sul and Santa Catarina in Brazil and the provinces of Buenos Aires, Entre Ríos, Santa Fe, Córdoba, and Corrientes in Argentina (Fig. 19). The presence was set over the 0.196 logistic threshold and the algorithm converged after 720 iterations. Others thresholds were selected and the same performance of the model was obtained. The AUC test for training data was 0.960 that indicate a very good prediction of the model. The Jacknife analysis showed that the Precipitation of Driest Month (38.7%), Isothermality (20.5%) and Temperature Seasonility (18.2%) were the most important climatic

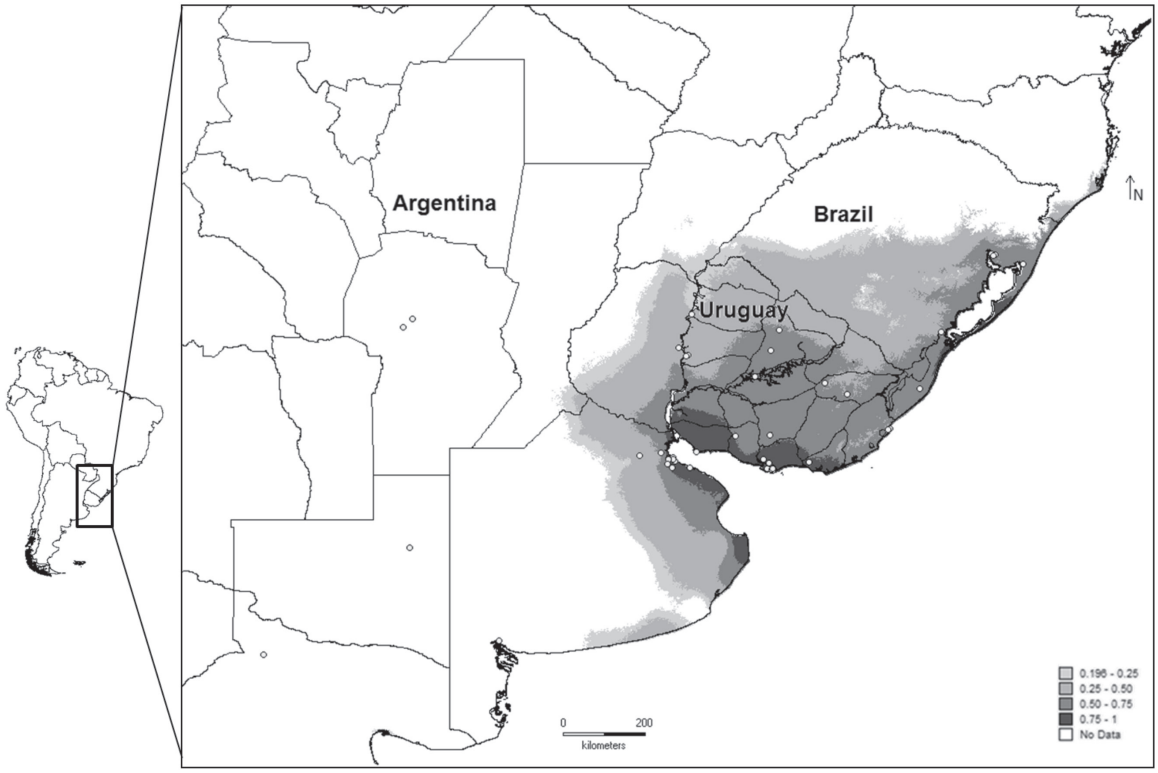


Fig. 19. *Latonigena auricomis* Simon, 1893, known records and potential predicted range of the species.

variables for the model contribution. Furthermore, the climatic variable that decreases the gain the most when it is omitted was Precipitation of driest month which therefore appears to have the most information that isn't present in the other variables. Most of the records were registered in modified environments such agroecosystems and urban areas. In Argentina, five points were situated outside the suitable area: Santa Rosa (La Pampa), General Roca (Río Negro), Calamuchita (Córdoba), Alta Gracia (Córdoba) and Bahía Blanca (Buenos Aires).

DISCUSSION

The distribution of this species appears to be mostly influenced by one pattern of precipitation and two of temperature. The precipitation of the driest month is an index that indicates the month with the lowest cumulative precipitation total (O'Donnel & Ignizio, 2012). The high value of this variable in the percentage contribution of the model suggests that the potential range of *L. auricomis* is more influenced by extreme precipitation conditions. Isothermality is a quantification of how large is the monthly diurnal temperature oscillation in comparison to the year oscillation (Xu & Hutchinson, 2011). Temperature seasonality indicates the temperature variation along the year calculated on the basis of the standard deviation of the monthly mean temperatures (O'Donnel & Ignizio, 2012). The influence of Isothermality and the Temperature Seasonality in the potential distributional range of *L. auricomis* indicates that this species is also sensible to temperature oscillations. This fact could explain that the best suitable conditions are represented in the model by a relative small area that comprises part of Argentina, Uruguay and Brazil. Therefore the species is mostly distributed in the province of Pampa, which is characterized by savannas with temperate grasslands and shrublands (Morrone, 2001). Only one record was reported by the province of Monte (General Roca). The synanthropic condition of *L. auricomis* is supported by the fact that most records were associated with human activities. The five records outside the suitable area could suggest that they could respond to peripheral populations of the species or probably others variables, not considered in the model, could be influencing in the distribution of this species (Rubio *et. al*, 2010). As was indicated, urban habitats bring good conditions to the establishment of some species than natural areas (Simó *et al*., 2011). Although *L. auricomis* was registered in native habitats, our results indicated that this species is beneficiated by urban areas in association with other species, and this would explain its presence out of predicted areas by the model. Future studies could be focused in the study of the relationships of *L. auricomis* with nest of birds or ants and the influence of the human activities in the distribution of the species.

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