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To boldly go: on invasive goblin spiders in Brazil (Araneae, Oonopidae)

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ABSTRACT. Twelve non-native species of the spider family Oonopidae are recorded in Brazil: *Brignolia dasysterna* Platnick, Dupérré, Ott & Kranz-Baltensperger, 2011, *B. parumpunctata* (Simon, 1893), *Triaeris stenaspis* Simon, 1892, *Ischnothyreus peltifer* (Simon, 1892), *I. velox* Jackson, 1908, *Opopaea concolor* (Blackwall, 1859), *O. deserticola* Simon, 1892, *Pelicinus marmoratus* Simon, 1892, *Heteroonops spinimanus* (Simon, 1892), *Gamasomorpha parmata* (Thorell, 1890) (herein restored to its original combination in *Xestaspis*), *Orchestina pavesiiformis* Saaristo, 2007 and *O. dentifera* (Simon, 1893). Among these species, six new synonyms were detected: *Hytanis oblonga* Simon, 1893, *Xestaspis bipeltis* Thorell, 1895, *Gamasomorpha insularis* Simon, 1907 and *Opopaea lutzi* Petrunkevitch, 1929 with *Xestaspis parmata* Thorell, 1890; *Gammasomorpha humilis* Mello-Leitão, 1920 with *Opopaea concolor* (Blackwall, 1859) and *Gamasomorpha rufa* Banks, 1898 with *Opopaea deserticola* Simon, 1891. Since *Hytanis oblonga* is the type species of the genus, its synonymy with *Xestaspis parmata* imply in the synonymy of *Hytanis* Simon, 1893 with *Xestaspis* Simon, 1884. The partenogenetic species *T. stenaspis* is the most distributed synanthropic oonopid in Brazil, occurring all over the country, mainly in urban areas. Some species are reported here to occur in the interior of natural caves, a finding that should raise conservation concerns.

KEYWORDS. Spiders, synanthropy, distribution, conservation, globin spiders.

RESUMO. Audaciosamente indo: aranhas gnomo invasoras no Brasil (Araneae, Oonopidae). Doze aranhas consideradas não-nativas da família Oonopidae são registradas em áreas urbanas no Brasil: *Brignolia dasysterna* Platnick, Dupérré, Ott & Kranz-Baltensperger, 2011, *B. parumpunctata* (Simon, 1893), *Triaeris stenaspis* Simon, 1892, *Ischnothyreus peltifer* (Simon, 1892), *I. velox* Jackson, 1908, *Opopaea concolor* (Blackwall, 1859), *O. deserticola* Simon, 1892, *Pelicinus marmoratus* Simon, 1892, *Heteroonops spinimanus* (Simon, 1892), *Gamasomorpha parmata* (Thorell, 1890) (aqui restaurada para sua combinação original em *Xestaspis*), *Orchestina pavesiiformis* Saaristo, 2007 and *O. dentifera* (Simon, 1893). Entre estas espécies, seis novos sinônimos foram detectados: *Hytanis oblonga* Simon, 1893, *Xestaspis bipeltis* Thorell, 1895, *Gamasomorpha insularis* Simon, 1907 e *Opopaea lutzi* Petrunkevitch, 1929 com *Xestaspis parmata* Thorell, 1890; *Gammasomorpha humilis* Mello-Leitão, 1920 com *Opopaea concolor* (Blackwall, 1859) e *Gamasomorpha rufa* Banks, 1898 with *Opopaea deserticola* Simon, 1891. Uma vez que *Hytanis oblonga* é a espécie-tipo do gênero, sua sinonímia com *Xestaspis parmata* implica na sinonímia de *Hytanis* Simon, 1893 com *Xestaspis* Simon, 1884. *Triaeris stenaspis*, uma espécie partenogenética, é o oonopídeo sinantrópico com distribuição mais ampla no Brasil, ocorrendo de norte a sul do país, principalmente em áreas urbanas. Algumas espécies relatadas aqui ocorrem no interior de cavernas naturais, uma descoberta que deve levantar preocupações em relação à conservação das espécies nativas de cavernas.

PALAVRAS-CHAVE. Aranhas, animais sinantrópicos, distribuição, conservação, aranhas gnomo.

The theme of invasive species and the discussion on the artificial introduction of species from one continent to another have been amplified in recent years (Thompson, 2014; Pearce, 2015), with most studies involving vertebrates (Long, 1981, 2003; Kraus, 2009) or invertebrates from terrestrial or aquatic urban ecosystems (Dee Boersma *et al.*, 2006).

Invasions of alien spiders on the Neotropical Region are yet poor studied. Most of the available papers are descriptive (Carvalho *et al.*, 2007; Almeida-Silva & Brescovit, 2008; Ott & Brescovit, 2013; Pompozzi *et al.*, 2013; Ruiz & Bonaldo, 2013; Taucare-Ríos & Bustamante, 2015) and just a few deals with the relations of the studied species with their environments (Malumbres-Olarte, 2015; Rodríguez-Rodríguez *et al.*, 2015). Nevertheless, the handful studies carried on in Brazil have been showing a large number of invasive or synanthropic spiders and the list of those spiders in Brazilian territory depicts today at least fifty species (Brescovit, 2002; Indicatti & Brescovit, 2008; Simó *et al.*, 2015).

The recognition of a given species as alien to a certain country or continent depends on the availability of reliable taxonomic data across large geographical regions. The taxonomic impediment to recognize patters of biological invasions is particularly acute for megadiverse, poorly known arthropod groups. The spider family Oonopidae provides an excellent example in that context. This family has been subject of a worldwide coordinated effort to forward its taxonomic knowledge through the Goblin Spider Planetary Biodiversity Inventory project (PBI-Oonopidae), sponsored

by NSF/AMNH. Before this project, Oonopidae was one of the poorest-known spider families and faunistic papers invariably depicted extremely low systematic resolutions for this taxon (Abrahim *et al.*, 2012). During the activity peak of the PBI-Oonopidae between 2009 to 2014 the number of known species increased in nearly 300%. The efforts of the research group in that period raised the assigned species to the family from 472 to 1,600 (World Spider Catalog, 2019). Furthermore, due to the revisional approach adopted by the project, several previously unknown lineages were recognized and general patterns of geographic distribution of these lineages were brought to light (Álvarez-Padilla *et al.*, 2012; Thoma *et al.*, 2014). While most Oonopidae species are microdistributed, presenting a great potential in the recognition of areas of endemism, a small set of species are seemingly synanthropic and have attained Pantropical or almost cosmopolitan distributions (Platnick & Dupérré, 2009a; Platnick *et al.*, 2012a), boldly going where no other representative of their respective lineages has gone before.

Recently, studying substantial material of Brazilian oonopids, we detected twelve non-native species established today in Brazilian territory. Several of these species were apparently introduced relatively earlier (Tab. I) and are today established in large populations in urban areas, parks, houses and even in cave systems. The taxonomic status of the majority of these species was well defined in previous PBI-Oonopidae papers, but the examination of a large number of type specimens during the project allowed the discovery of six additional synonymies under the species here studied.

MATERIAL AND METHODS

The material examined and types cited belongs to the following institutions: AMNH, American Museum of Natural History, New York (curator: L. Prendini); BMNH, Natural History Museum, London (J. Beccaloni); HUJ, Hebrew University of Jerusalem, Jerusalem (A. Chipman); IBSP, Instituto Butantan, São Paulo (A. D. Brescovit); INPA, Instituto Nacional de Pesquisas da Amazônia, Manaus (C. Magalhães); MCN, Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre (R. Ott); MCTP, Museu de Ciências e Tecnologia, Pontifícia Universidade Católica, Porto Alegre (R. A. Teixeira); MCZ, Museum of Comparative Zoology, Harvard University, Cambridge (G. Giribet); MNHN, Muséum National d'Histoire Naturelle, Paris (C. Rollard); MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro (A. B. Kury); MPEG, Museu Paraense Emílio Goeldi, Belém (A. B. Bonaldo); MRAC, Musée Royal de l'Afrique Centrale, Tervuren (R. Jocqué); MZSP, Museu de Zoologia, Universidade de São Paulo, São Paulo (R. Pinto da Rocha); MZUT, Zoological Museum, Univesity of Turku, Turku (S. Koponen); SMNK, Staatliches Museum für Naturkunde Karlsruhe, Karlsruhe (H. Höfer).

Morphological observations were made using a Leica MZ12 stereomicroscope. Photographs were taken with a Leica DFC 500 digital camera mounted on a Leica MZ 16A stereomicroscope and extended focal range images were composed with Leica Application Suite version 2.5.0, at IBSP. Other images were taken through a Zeiss Standard compound microscope with attached Canon A620 camera and processed with Helicon Focus 5.3 multi-range program (Kozub *et al.*, 2012), at MCN. All figures were edited using Adobe Photoshop CS5 ver. 12.0. Maps were produced using QGIS 3.2.1 and edited in Adobe Photoshop CS6.

TAXONOMY

Brignolia dasysterna Platnick, Dupérré, Ott & Kranz-Baltensperger, 2011

(Figs 1-6, 58)

Brignolia dasysterna Platnick *et al.*, 2011:32, figs 95-141. Male holotype and female allotype taken in Berlese samples of young hammock forest litter at Deering Estate Park, SW 167th St. and SW 72nd Ave., South Miami, Dade Co., Florida, USA,1.VI–25.VIII.1986, J. & S. Peck leg., in AMNH 37534, PBI_OON 1270, not examined.

Brignolia cubana: Freitas *et al.*, 2013:9-10, 15 (misidentification).

Diagnosis. *Brignolia dasysterna* can be easily separated from autochthone Neotropical oonopids and from *B. parumpunctata* by the absence of ventral directed protrusion situated medially on the clypeus (see Platnick *et al.*, 2011, fig. 96), modified setae on the male sternum (Fig. 3), male palp with small protrusion on the palpal bulb (Figs 5, 6; Platnick *et al.*, 2011, figs 103-108) and females by the low protrusion situated between the epigastric furrow and the groove connecting the posterior spiracles (Fig. 4).

Description. Male and female, see Platnick *et al.*, 2011:32, figs 95-141.

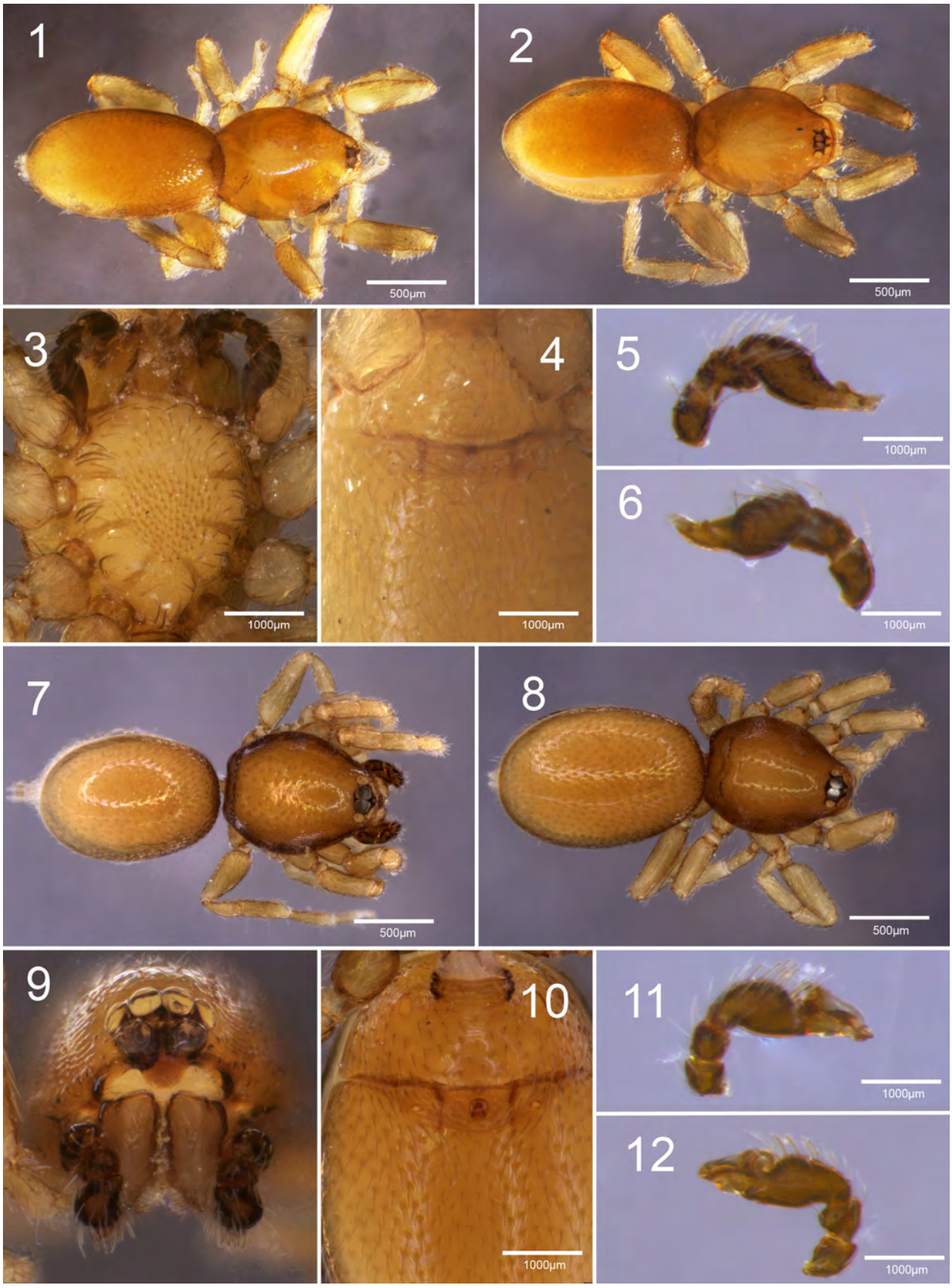
Distribution. This species was recently described by Platnick *et al.* (2011) as being restrict to southern Florida, USA. It is recorded here to occur in at least four states of north and northeast Brazil (Fig. 58), where it may have been introduced earlier than in the USA. Freitas *et al.* (2013) found a large population of *Brignolia dasysterna* (sub *Brignolia cubana*) in Fernando de Noronha archipelago.

Material examined. BRAZIL. **Pará**: Uruará (03°43'03"S - 53°44'14"W), 3♀, 2014, R. L. Cajaiba leg. (IBSP 166582; IBSP 166583); Belém, Campus IPEAN (01°24'46.14" -01°28'4.11"S - 48°20'4.6"- 48°20'31.84"W), 2♂ ♀, 2.V.1974, R. Schuh (AMNH PBI_OON 485-487); **Pernambuco**: Fernando de Noronha, Arquipélago de Fernando de Noronha (03°50'57.2814"S - 32°24'10.7922"W), 51♂ 55♀, X.2005-IV.2006, G. Freitas leg. (IBSP 67112–67143; IBSP 67726–67736; IBSP 67852–67882); **Tocantins**: Porto Nacional, urban area (10°42'S – 48°25'W), ♀, 14-23. XI.2003, I. Knysak & R. Martins leg. (IBSP 92232); **Bahia**: Salvador, Baía de Aratu, Ponte do Fernandinho (12°47'32.8"S – 38°28'15.3"W); ♀, 13.IX.2004, K. Benati leg. (IBSP 58898); Ipiaú (14°8'18.8844"S - 39°45'47.6028"W), ♂, 2008, J. Cardoso leg. (IBSP 121852).

Brignolia parumpunctata (Simon, 1893)

(Figs 7-12, 58)

Xestaspis parumpunctata Simon, 1893a:305. Female holotype from Sierra Leone, no specific locality, in MNHN.



Figs 1-12. Figs 1-6, *Brignolia dasysterna* Platnick, Dupérré, Ott & Kranz-Baltensperger, 2011, male: 1, dorsal; 3, modified hairs in the sternum; 5, palp, retrolateral; 6, palp, prolateral. Female: 2, dorsal; 4, genitalia, ventral. Figs 7-12, *Brignolia parumpunctata* (Simon, 1893), male: 7, dorsal; 9, projection of clypeus; 11, palp prolateral; 12, palp retrolateral. Female: 8, dorsal; 10, genitalia, ventral.

Gamasomorpha perplexa Bryant, 1942:325, figs 11-12, 18. Male holotype from Saint Croix, Virgin Islands, in MCZ; Platnick *et al.*, 2011:15 (Syn.).

Opopaea recondita Chickering, 1951:231, figs 18-19. Female holotype from Canal Zone Biological Area [= Barro Colorado Island], Panama, Panama, in MCZ; Platnick *et al.*, 2011:15 (Syn.).

Brignolia cubana Dumitrescu & Georgescu, 1983:107, pl. 22, figs 1-8. Male holotype from Estacíon Ecológica Siboney, Santiago de Cuba, Cuba, in Institut de Spéologie, Bucharest; Platnick *et al.*, 2011:15 (Syn.).

Brignolia recondita: Platnick & Dupérré, 2009a:4.

Brignolia parumpunctata: Platnick *et al.*, 2011:14.

Diagnosis. *Brignolia parumpunctata* can be easily separated from *B. dasysterna* by the males having a ventrally directed protrusion situated medially on the clypeus (Fig. 9; Platnick *et al.*, 2011: fig. 21) and by the distinctive curled dorsal protrusion on the palpal bulb (Figs 11, 12; Platnick *et al.*, 2011: figs 31-32). Females can be easily recognized by the rounded, elevated protrusion situated between the epigastric furrow and by the groove connecting the posterior spiracles (Fig. 10).

Description. Male and female, see Platnick *et al.*, 2011:14, figs 1-94.

Distribution. This species has a Pantropical distribution, occurring in the Americas, Africa, Southern Asia, Pacific Islands and Australia. Platnick *et al.*, 2011:31, reported only one previously Brazilian record, in the state of Pará, norther Brazil. Here it is recorded in areas of north, northeast and southeast Brazil (Fig. 58). According to Platnick *et al.* (2011), this species may have an Asian origin, where the bulk of the genus diversity is from.

Material examined. BRAZIL. **Rondônia**: Porto Velho, Campo Experimental da EMBRAPA (08°48'9.7878"S - 63°49'48.1188"W), ♂, 2008, L. S. P. Trigueiro & C. A. D. Teixeira *et al.* leg. (IBSP 121507); **Pará**: Belém, *Campus* IPEA, 2♂, ♀, 02.V.1974, R. Schuh leg. (AMNH, PBI_OON 485–487); **Pernambuco**: São Lourenço da Mata, Estação Ecológica de Tapacurá (08°0'39.8088"S - 35°5'2.8422"W), 2♂, 2008, C. Valença leg. (IBSP 97891, 97892); **Minas Gerais**: Belo Horizonte, Campus UFMG, Estação Ecológica da UFMG (19°52'S – 43°58'W), 3♂, 29.III.2000, É. S. S. Álvares & C. S. Azevedo leg. (IBSP 27202); 2♂, 10♀, IX.1999-II.2001, É. S. S. Álvares, E. O. Machado & C. S. Azevedo leg. (IBSP 32350); 4♂, XII.2000-I.2001, É. S. S. Álvares leg. (IBSP 66797); 5♂, I.2001, É. S. S. Álvares leg. (IBSP 66801); 2♂, II.2001 (IBSP 67303); Jaboticatubas, Serra do Cipó, Parque Nacional da Serra do Cipó (19°15'S - 43°31'W), 31♂, 21♀, 07-14.X.2002–26.VI.2003, Equipe Biota leg. (IBSP 69443, 69445–69476); Marliéria, Parque Estadual do Rio Doce (19°48'/19°29'S – 42°38'/42°28'W), 18♂, 20♀, 01-10.IX.2003, Equipe Biota leg. (IBSP 144583–144597); **Bahia**: Salvador, Baía de Aratu, Ponte do Fernandinho (12°47'32.8"S – 38°28'15.3"W), 18♂, ♀, 13.IX.2004, K. Benati leg. (IBSP 58842, 58843, 58852, 58863, 58869, 58874, 58875, 58877, 58883, 58884, 58901, 58906, 58907, 58915, 58917, 58922, 58938, 58970, 58976, 59013, 59019); Parque da Cidade Joventino Silva (12°59'57.6522"S - 38°28'11.1606"W), ♂, 22.VIII-03.IX.2008, C. Queiroz & D. Mendes leg. (IBSP 125569); Baía de Aratu (12°47'32.8"S – 38°28'15.3"W), 42♂ 8♀, 2007-2008, K. Benati leg. (IBSP 125210, 125260, 125289, 126033, 126035–126039, 126044, 126047, 126051–126056, 126058, 126060, 126064–126065, 126067–126068, 126074, 126077–126078, 126080, 126083–126085, 126087, 126091–126092, 126094, 126097, 126100, 126104, 126106, 126111–126112, 126114, 126116, 126118–126125, 126128, 126130, 126134); Ilhéus, CEPLAC (14°47'45.5712"S - 39°11'25.2024"W, 5♂, 2♀, 11.IV.1998, A. D. Brescovit *et al.* leg. (IBSP 19206, 19211, 19220, 19290, 19302); 2♂, 14♀, 24.VII.1998 (IBSP 36122); 2♂, 18.IV.2007 - 06.IX.2007, P. P. Santos leg. (IBSP 98012, 98042); Una, Reserva Ecológica do Una (15°17'48"S - 39°04'28"W), ♂, X.1999 - IX.2000, M. F. Dias leg. (IBSP 64428); Itapetinga, Parque Municipal da Matinha (15°15'43.8618"S - 40°17'44.9376"W), ♂, III-IV.2003, J. P. S. Alves leg. (IBSP 66457); **Rio de Janeiro**: Volta Redonda, Mata da Cicuta (22°33'2.016"S - 44°5'31.7328"W), ♀, 11-18.VI.2003, F. S. Cunha leg. (IBSP 44865); 5♂, 2♀, 04-11.III.2002 - 11-18.VI.2001, Equipe Biota leg. (IBSP 136203-136208); ♂, 11.III.2002, E. F. Ramos leg. (IBSP 144105); Paraíba do Sul, Fazenda Maravilha, ♂, 17-21.VIII.2001, Equipe Biota leg. (IBSP 136639); Resende, Mata das Indústrias Nucleares (22°31'2.2326"S - 44°39'10.7748"W), ♂, VII-IX.2007, E. F. Ramos leg. (IBSP 97542); **São Paulo**: São Paulo, Campus USP, Mata do Cuaso (23°33'54.9432"S - 46°43'43.9608"W), ♂, 16-23.XI.1999, D. F. Candiani leg. (IBSP 42190); Campus Instituto Butantan, Mata do Butantan (23°33'59.493"S - 46°43'14.7612"W), ♂, 12-19.XII.1999, D. F. Candiani leg. (IBSP 68979).

Triaeris stenaspis Simon, 1891

(Figs 13, 14, 60)

Triaeris stenaspis Simon, 1891:561. Syntype female from Saint Vincent in MNHN and females syntypes from same locality in the BMNH; Platnick *et al.*, 2012a:22, figs 1-40.

Triaeris patellaris Bryant, 1940:268, fig. 4. Female holotype from Soledad, Cienfuegos, Cuba, in MCZ; examined; Chickering, 1968b:358, figs 14-18 (Syn.).

Triaeris berlandi Lawrence, 1952:5, figs 3a-f. Female holotype from Thysville [= Mbanza-Ngungu], DR Congo, in Musée Royal de l'Afrique Centrale, Tervuren; Platnick *et al.*, 2012a:23 (Syn.)

Triaeris lepus Suman, 1965:235, figs 27-31. Female holotype from Puu Papaa Peak, Kaneohe, Oahu, Hawaii, in Bishop Museum; Platnick *et al.*, 2012a:23 (Syn.).

Triaeris lacandona Brignoli, 1974a:208, figs 4A-F. Female holotype from Cueva de Yaxchilan, Peten, Guatemala, depository unknown; Brignoli, 1975a:34, figs 1H-J; Platnick *et al.*, 2012a:23 (Syn.).

Diagnosis. *Triaeris stenaspis* is known only by females, easily recognized by their orange color, genitalia occupying the greater part of the postepigastric scutum, with a median longitudinal slit and internally with sinuous and distally squiggled duct, visible by transparence (Fig. 14).

Description. Female, see Platnick *et al.*, 2012a:22, figs 1-40

Biology. The taxonomic status of the pantropical goblin spider *Triaeris stenaspis* was defined by Platnick *et al.* (2012a). Presently, this species is well established in

many parts of the world (Koponen, 1997; Kielhorn, 2008; Korenko *et al.*, 2009; Platnick *et al.*, 2012a) and apparently sustained populations are present in various continents. Korenko *et al.* (2009) showed that at least one population from Czech Republic is parthenogenetic. Since no males were found with sampled females so far, including the 200 records here reported, parthenogenesis might actually be true for all known populations of this species. *Triaeris stenaspis* occur from north to south Brazil, being very common in the ground at urban parks. The invasion of this species in Brazilian territory might occurred long ago, giving its wide distribution in the country and the fact that it is not strictly peri-domiciliar, collected as well in forest litter and even in natural caves, but the first known record of this species in Brazil dates as recently as 1996. The large number of records reported here from natural caves in the states of Tocantins, Goiás and Minas Gerais might be cause for conservation concerns. Since this species appears to be a dominating faunistic component in those cavities, it may represent danger for autochthones species in these sensible environments.

Distribution. This Pantropical species have a wide distribution range in Brazil, occurring mainly in urban areas (Fig. 60). Platnick *et al.* (2012a) hypothesized that *Triaeris* belongs to a West African sub-group of the *Zyngoonops* group of genera, a large putatively monophyletic lineage with representatives in both the Neotropics and Africa. Under this assumption, *Triaeris stenaspis* would be an African species in origin, which attained a Pantropical distribution.

Material examined. BRAZIL, **Acre**: Senador Guiomard, Reserva Extrativista Catuaba (10°12'51.4584"S - 67°45'17.1216"W), 5♀, 2002, E. Morato *et al.* leg. (IBSP 86836, 86850, 86873, 86879, 86920); **Pará**: Uruará (03°43'4"S - 53°44'13"W), 2♀, 2014, R. L. Cajaiba leg. (IBSP 166581); **Tocantins**: Dianópolis, Gruta Vozinha (11°27'36"S – 46°51'00"W), 3♀, 04-09.XII.2007, R. Andrade *et al.* leg. (IBSP 97622); Gruta Areia (11°27'36"S – 46°51'00"W), 4♀, 04-09.XII.2007, R. Andrade *et al.* leg. (IBSP 97640); Gruta 3 Morros III (11°27'36"S 46°51'00"W), ♀, 21-29.V.2008, F. Pellegatti Franco *et al.* leg. (IBSP 134439); **Goiás**: São Domingos, Lapa de São Bernardo II (16°34'31.26"S - 49°10'32.307"W), 5♀, 18.IX.1997, P. Gnaspini *et al.* leg. (IBSP 23729, 23730); Lapa de Terra Ronca II (16°34'31.26"S - 49°10'32.307"W), 2♀, 20. IX.1997, P. Gnaspini *et al.* leg. (IBSP 23741, 23743); 3♀ 4 imm., 19.IX.1997, P. Gnaspini *et al.* leg. (IBSP 23746); Parque Estadual de Terra Ronca, Caverna Angélica (16°34'31.26"S - 49°10'32.307"W), 9♀, 6 imm, 06-09. IX.2000, F. P. Franco leg. (IBSP 26050, 26053, 26054, 26070, 26072); Parque Estadual de Terra Ronca, Caverna Passa Três (16°34'31.26"S - 49°10'32.307"W), 7♀, 5 imm., 03-05.IX.2000, C. A. Rheims & F. P. Franco leg. (IBSP 26064, 26077, 26079, 26080); Morrinhos, Parque Ecológico Jatobá Centenário (17°43'36"S – 49°07'55"W), 2♀, XII.2006 - VIII.2007, R. C. Santana leg. (IBSP 140921); **Mato Grosso**, Primavera do Leste, Gruta KNL-1-S1EMAL004 (181326E - 8383239mN), ♀, 12-20.VIII.2014, Equipe Spelayon leg. (IBSP 166573); **Mato Grosso do Sul**: Campo Grande, Reserva UCDB (20°24'50.0256"S -54°36'55.854"W); 2♀, 07.IV.1997, K. O. Vieira leg. (IBSP 38355); Inocência, Fazenda Lagoinha (19°17'03"S – 51°03'06"W), ♀, 18.XI.2004, J. Raizer leg. (IBSP 68030); Anastácio, Fazenda Jatiuca (20°31'54"S – 55°50'27"), ♀, 16-26.II.2008, R. Bessi leg. (IBSP 127638); Ivinhema (22°31'19.1856"S - 53°50'49.1676"W), 34♀, X.2004-XII.2006, K. Anjos leg. (IBSP 92829, 92833, 92839–92866); **Bahia**: Jaguaripe (13°10'01"S - 39°00'04"W), ♀, 02. III.2011, C. M. P. Leite leg. (IBSP 166609); Wenceslau Guimarães (13°34'32"S - 39°42'25"W), ♀, 21.I.2011, C. M. P. Leite leg. (IBSP 166610); Salvador, Baia do Aratu (12°47'32.8"S – 38°28'15.3"W), 5♀, 2008-2009, K. Benati (IBSP 126081, 126090, 126101, 126103, 126109); Ponte do Fernandinho (12°47'32.8"S – 38°28'15.3"W), 9♀, 13.IX.2004, K. Benati leg. (IBSP 58840–58841, 58860, 58893; 58897, 58902, 58918, 58939, 59023); Itapetinga, Parque Municipal da Matinha (15°15'43.8618"S - 40°17'44.9376"W), ♀, III-IV.2003, J. P. S. Alves leg. (IBSP 66524); Una, Reserva Ecológica de Una (15°17'48"S - 39°04'28"W), 4♀, X.1999-IX.2000, M. F. Dias leg. (IBSP 64221, 65268, 65350); **Minas Gerais**: Prudente de Morais, Fazenda Sapé (19°28'8.2344"S - 44°5'31.7328"W), 2♀, 13.X.2001, É. S. S. Álvares leg. (IBSP 44224, 44232); Uberlândia, Estação Ecológica do Panga (19º11'10"S - 49º23'30"W), 3♀, IV.2005-II.2006, M. F. Mineo leg. (IBSP 92663-92665); Belo Horizonte, Estação Ecológica da UFMG (19°52'S - 43°58'W), 8♀, I.2001, É. S. S. Álvares leg. (IBSP 66796, 66798, 66800); Estação Ecológica da UFMG, Mata do Sossego (19°52'S - 43°58'W), ♀, II.2001, É. S. S. Álvares, E. O. Machado & C. S. Azevedo leg. (IBSP 68573); Belo Horizonte, COPASA (20°10'S - 44°21'W), ♀, IV.2002, Equipe Biota (IBSP 136439); Jaboticatubas, Serra do Cipó, Parque Nacional da Serra do Cipó (19°15'S - 43°31'W), 40♀, 2002-2003, Equipe Biota leg. (IBSP 68258-68294); Mariana, Gruta FN-12 (20°10'18.3684"S - 43°25'13.029"W), 2♀, 16-21.I.2009, R. Andrade *et al.* leg. (IBSP 146210, 146216); Mina Alegria (20°10'18.3684"S - 43°25'13.029"W), 2♀, 16-17.IV.2009, R. Bessi *et al.* leg. (IBSP 149764); Prados, Gruta S3_HOL_010 (596862E - 7657188N), ♀, 29.VII.2014, L. T. Fonseca leg. (IBSP 166568); Córrego Fundo: Gruta MC_SM_ 015 (20°26'32"S; 45°35'57"W), ♀, 19-21.V.2014, Santos *et al.* leg. (IBSP 166569); Gruta MC_SM_016 (20°26'33"S; 45°35'56"W), ♀, 08-20.I.2014, Equipe Spelayon leg. (IBSP 166570); Pains (20°22'15"S; 45°39'39"W): ♀, 31.VII.2014, F. Bondezan leg. (IBSP 166571); Gruta Loca dos Negros (20°26'06"S; 45°39'33"W), ♀, 20.III.2009, R. Zampaulo leg. (IBSP 166584); Gruta Tamafi (20°23'39"S; 45°40'48"W), ♀, 09.III.2009, R. Zampaulo leg. (IBSP 166585); Gruta SPA_015 (20°17'53"S; 45°25'38"W), ♀, 24.I.2014, M. Barcelos leg. (IBSP 166587); Cave SPA_030 (20°18'24"S; 45°35'48"W), ♀, 05.II.2014, N. T. Pimentel & T. F. Ferreira leg. (IBSP 166588); Cave SPA_037 (20°18'26"S; 45°35'45"W), ♀, 05.II.2014, F. O. Borges & M. Barcelos leg. (IBSP 166589); Cave SM-68 (20°20'47"S; 45°36'09"W), 2♀, 12.III.2012, Equipe Spelayon leg. (IBSP 166590); Cave SM-180 (20°22'21"S;

45°35'34"W), ♀, 13.II.2014, Equipe Spelayon leg. (IBSP 166591); Cave SM-287 (20°21'46"S; 45°35'51"W), ♀, 20.II.2014, Equipe Spelayon leg. (IBSP 166592), Cave SM-103 (20°21'40"S; 45°36'12"W), ♀, 18.VIII.2012, Equipe Spelayon leg. (IBSP 166596); Cave SM-246 (20°21'51"S; 45°35'46"W), ♀, 20.II.2014, Equipe Spelayon leg. (IBSP 166597); Cave SM-42 (20°21'50"S; 45°35'58"W), 2♀, 21.III.2012, Equipe Spelayon leg. (IBSP 166593); Cave SM-258 (20°21'52"S; 45°35'43"W), 2♀, 19.IX.2013, Equipe Spelayon leg. (IBSP 166602); Cave SM-153 (20°22'03"S; 45°35'38"W), ♀ (IBSP 166594); Cave SM-236 (20°22'11"S; 45°35'51"W), ♀ (IBSP 166595); Cave SM-178 (20°22'20"S; 45°35'23"W), ♀ (IBSP 166598); Cave SM-205 (20°22'23"S; 45°35'40"W), ♀ (IBSP 166599); Cave SM-157 (20°21'53"S; 45°35'39"W), ♀ (IBSP 166600); Cave SM-195 (20°22'23"S; 45°35'37"W), ♀ (IBSP 166601), all collected in 13.II.2014 by Equipe Spelayon; Matozinhos, Cave 100, 4♀, VI.2014, F. Bondezan leg. (IBSP 166575 - IBSP 166578); Cordisburgo, Gruta da Morena (19°8'25.584"S - 44°21'20.5272"W), ♀, 12.IX.2001, P. Gnaspini leg. (IBSP 71833); Lavras (21°13'43.9638"S - 44°58'1.6608"W), 17♀, 16-19.VI.2000, M. Andreizza leg. (IBSP 86329-86330, 86337-86339, 86342, 86346-86347, 86349-86350, 86352-86355, 86357, 86359, 86361); ♀, 2000, A. Almeida leg. (IBSP 121445); **Rio de Janeiro**: Rio de Janeiro, Bairro Laranjeiras, Parque Guinle (22°55'50.38"S - 43°11'1.12"W), 2♀, 20.X.2001, R. Baptista leg. (MNRJ 3759); Volta Redonda, Floresta da Cicuta (22°33'2.016"S - 44°5'31.7328"W), ♀, 11.III.2002, E. Folly leg. (IBSP 39605); 4♀, 04-11.III.2002-11-18.VI.2001, Equipe Biota (IBSP 136199-136202); Pinheiral, Fazenda Santa Helena, Fazenda Regional de Criação (Posto Zootécnico) (22°34'S - 44°21'W), ♀, 05.11.XI/1999, A. D. Brescovit leg. (IBSP 66897); **São Paulo**: Jacareí, Campus Vila Branca, Univap (23°12'28.7886"S - 45°56'52.746"W), ♀, 2007, N. M. C. Velho leg. (IBSP 143942); Cotia, Caucaia do Alto, Reserva do Morro Grande (23°40'52.4742"S - 46°59'25.4472"W), 2♀, III.2003, Equipe Biota leg. (IBSP 136732, 136733); São Paulo, Campus USP, Mata do Cuaso (23°33'54.9432"S - 46°43'43.9608" W), 16♀, 14-21.IX.1999, D. Candiani leg. (IBSP 69027-69032, 69034, 69036-69040); 10♀, 16-23.II.2000, D. F. Candiani leg. (IBSP 42154, 42156, 68768-68769); Parque da Previdência (23°34'47.9886"S - 46°43'38.8236"W), 19♀, 16-23.VIII.1999, D. F. Candiani leg. (IBSP 42159, 42162, 68785, 68787, 68797, 68806); 146♀, 14-21/IX/1999-19/XII/1999, D. Candiani leg. (IBSP 69041-69047, 69049-69082, 69084-69103); ♀, V.2000 - II.2001, D. F. Candiani (IBSP 76545); 7♀, 2000-2001, D. F. Candiani *et al.* leg. (IBSP 117046); 5♀, 1999, D. Candiani leg. (IBSP 69083, PBI_OON 10912); Parque dos Príncipes (23°34'24.0162"S - 46°46'17.5944"W); ♀, 05-12.X.2004, P. A. M. Goldoni & S. Guizze leg. (IBSP 48525); Reservatório Guarapiranga, Jardim Ângela, Ilha dos Eucaliptos (23°45'9.5286"S - 46°44'23.3082"W), 17♀, 07-13.X.2003, I. Cizauskas & C. R. M. Garcia leg. (IBSP 61400-61413); Parque Ecológico Guarapiranga, 2♀, 2009, I. Cizauskas leg. (IBSP 155047-155048); Parque do Estado (23°39'8.625"S - 46°36'57.9924"W), ♀, 21-28.I.2003, J. Valvassori leg. (IBSP 68057); Itapevi, Condomínio TransUrb (23°35'28.284"S - 46°58'29.121"W), ♀, 30.IV.1999, V. C. Onofrio leg. (IBSP 67591); Louveira (23°05'11"S – 46°57'02"W), 2♀, 16.I.1996, A. E. C. Farinha leg. (IBSP 12067); Pindamonhangaba (22°55'26"S – 45°27'42"W), ♀, 08-10.IV.1998, R. Martins & I. Knysak leg. (IBSP 20066); Peruíbe, Estação Ecológica Juréia-Itatins (24°33'015"S – 7°13'292"W), 2♀, 26.IX-03.V.1999, A. D. Brescovit *et al.* leg. (IBSP 25696, 25791); Iporanga, Parque Estadual Turístico Alto do Ribeira, (24°30'1.3968"S - 48°35'8.415"W), ♀, R. Andrade leg. (IBSP 29414); Dois Córregos, Sítio Guedes (22°19'5.3436"S - 48°21'45.6912"W), ♀, 01-06.IV.2002, G. Q. Romero leg. (IBSP 34974); Teodoro Sampaio, Parque Estadual do Morro do Diabo (22°31'S - 52°18'W), ♀, 24-31.III.2003, Equipe Biota leg. (IBSP 60189); Apiaí, Parque Estadual Turístico Alto do Ribeira, Núcleo Santana (24°27'36"S - 48°36'0"W), 4♀, 08-14.XII.2002, Equipe Biota leg. (IBSP 136440, 136515-136517); Jaboticabal (21°14'54.6288"S - 48°16'9.7278"W), 8♀, III–IV.2004 (IBSP 55862, 55909); Ubatuba, Parque Estadual da Ilha Anchieta (23°32'S – 45°03'W), 2♀, 23-30.VII.2001, Equipe Biota leg. (IBSP 56408, 56413); **Paraná**: Foz do Iguaçu, Parque Nacional de Foz do Iguaçu (25°36'S - 54°25'W), 8♀, 03-12.III.2002, Equipe Biota leg. (IBSP 60249, 60256, 136460-136465); Londrina, Parque Estadual Mata dos Godoy (23°27'1.0656"S - 51°14'11.0646"W), 6♀, 13.IV.1999-07.II.2000, J. Lopes leg. (IBSP 38208, 38240, 38258, 38266, 38269); Cornélio Procópio, Parque Estadual Mata São Francisco (23°9'30.2826"S - 50°33'52.416"W), 3♀, 08.V.2009, N. G. Cípola leg. (IBSP 150237, 150289, 150294); **Santa Catarina**: Brusque (27°05'53"S - 48°55'03"W), Bairro Bateias, campus Empresa Buettner, 10♀, 2014, D. L. Ronchi leg. (IBSP 166603-166608); Blumenau, Parque Natural Municipal Nascentes do Rio Garcia (26°55'10.7862"S - 49°05'36.5748"W), ♀, 23.I.2005, R. C. Francisco leg. (IBSP 68394); Palhoça (27°38'42"S - 48°40'04"W), Serra do Tabuleiro, ♀, I.2003, Equipe Biota leg. (IBSP 136435); Paulo Lopes, Parque Estadual da Serra do Tabuleiro (27°55'S - 48°42'W), ♀, 10-20.I.2003, Equipe Biota leg. (IBSP 60491); Santo Amaro da Imperatriz (27°41'0.9018"S - 48°43'50.9442"W), ♀, 2004, J. Steiner leg. (IBSP 91114).

Xestaspis parmata Thorell, 1890, comb. rest.

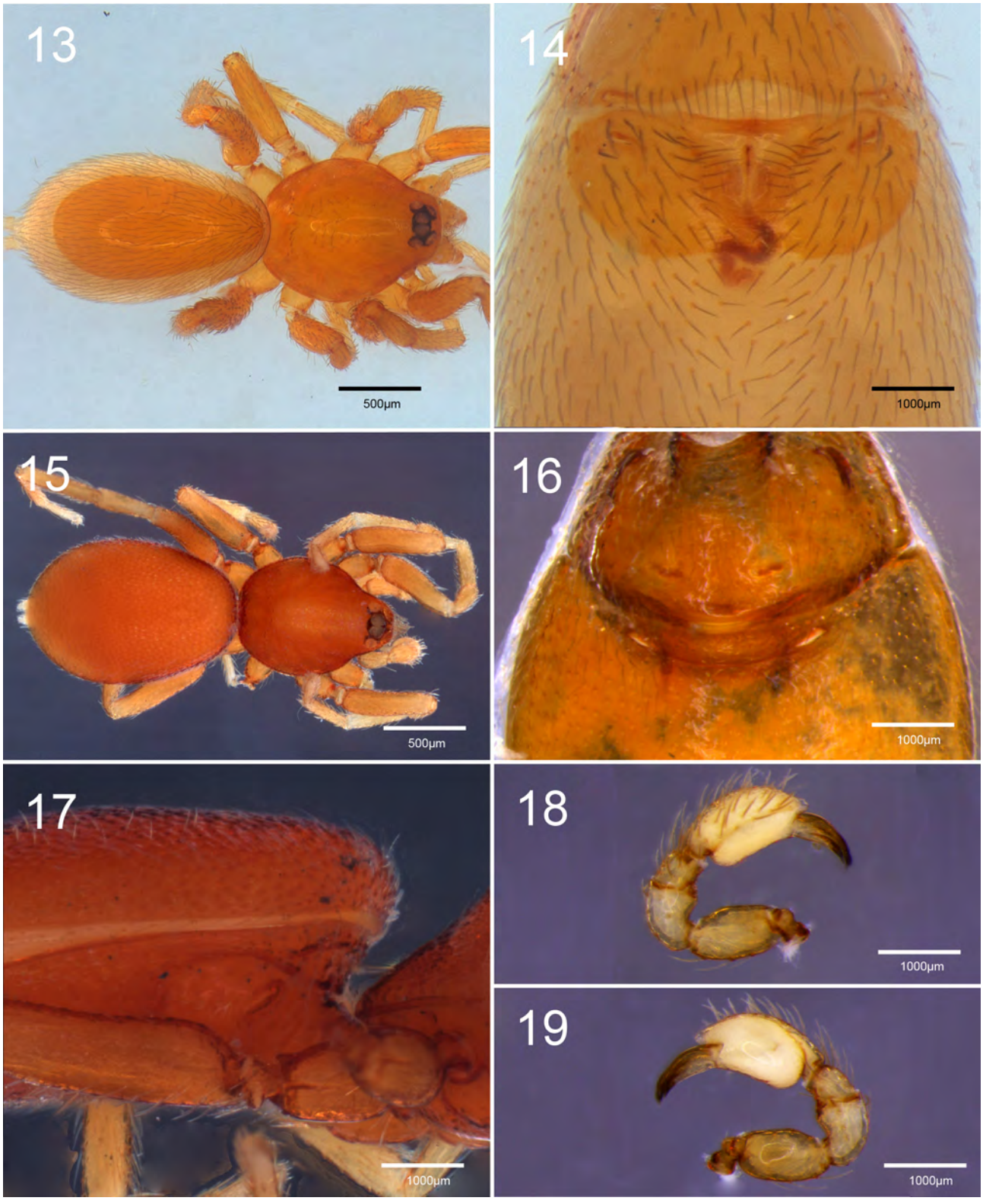
(Figs 15-19, 59)

Xestaspis parmata Thorell, 1890:391 (Holotype female from Ajer Mancior, Sumatra, Cel. Beccari leg., deposited in Museu Civico di Storia Naturela Giacomo Doria, examined).

Hytanis oblonga Simon, 1893b:440 (Syntypes: one female, labeled "6537 *Hytanis oblonga* E. S. from Iquitos (de M.)", deposited in MNHN, AR 5692, PBI_OON 4743, examined; one female deposited in MNHN, AR 5681, PBI_OON 4742, labeled "14080 *Hytanis oblonga* E. S.; Free Town (Mq)", examined). **Syn. nov.**

Gamasomorpha paramata: Simon, 1893a:301 (lapsus).

Xestaspis bipeltis Thorell, 1895:16 (Holotype male from Burma, Tharrawady & Oates col., in BMNH, 1895.9.21.43, PBI_OON 25537, examined). **Syn. nov.**



Figs 13-19. Figs 13, 14, *Triaeris stenaspis* Simon, 1891, female: 13, dorsal; 14, genitalia, ventral. Figs 15-19, *Xestaspis parmata* Thorell, 1890, comb. rest., female: 15, dorsal; 16, genitalia, ventral; 17, abdomen, anterior, lateral. Male: 18, palp prolateral; 19, palp retrolateral.

Gamasomorpha insularis Simon, 1907:231 (Syntypes: one female from Fernando Poo Island (presently Bioko), Gulf of Guinea, deposited in MNHN B524-23037 and one female from Mauritius Islands, Alluaud leg., deposited in MNHN B524-19782); Benoit, 1977:38, figs 14a-e (Male "allotype", from Santa Helene, N. Rupert's Valley, 28/12/1965, P. Basilaewsky, P. Benoit & N. Lelelup col., in MRAC 129.192; PBI_OON 25595, examined); Saaristo, 2001:311-314, figs 1A, 2A, 3A; 4-8); Freitas *et al.*, 2013:15. **Syn. nov.**

Opopaea lutzi Petrunkevitch, 1929:61, figs 42-50 (Holotype male from Desecheo Island, Puerto Rico, West Indians, Feb. 18-20, 1914, in

AMNH 3507A; PBI_OON 5512, examined); Chickering, 1969:153, figs 22-27. **Syn. nov.**

Gamasomorpha bipeltis: Roewer, 1942:285.

Gamasomorpha parmata: Roewer, 1954:1707.

Gamasomorpha lutzi: Brignoli, 1975b:228; Burger, 2011:149, figs 1C-E, 3F-H, 4A-B.

Gamasomorpha madeirensis Wunderlich, 1987:66, figs 40-43 (Holotype male and paratype female from Canico bei Funchal, Madeira Island, Dec. 1988, J. Wunderlich col., in SMF36925 and 36926, respectively); Saaristo, 2001:311 (Syn. with *G. insularis*).

Note. All species here synonymized had their types examined and no morphological differences were found in relation to *Xestaspis parmata*. Simon's original label of *Hytanis oblonga* was removed from the vial with syntypes received from MNHN; the current labels were quite recently printed. Simon (1893a) doesn't refer to specimens from Iquitos or Free Town (Africa?), however there is no other material of this species available at MNHN. Since *H. oblonga* is the type (and currently the sole) species of *Hytanis*, the genus is bound to be considered a junior synonym of *Xestaspis* (**Syn. nov.**).

Diagnosis. Specimens of *Xestaspis parmata* resembles those of *Brignolia* and *Opopaea* by the shape of the body, but can be distinguished from the species of these genera by the red coloration of the carapace and abdomen (Figs 15-17), larger size, less sclerotized palp and bulb, and, particularly from *Opopaea*, by the less enlarged patella.

Description. Male and female, see Wunderlich, 1987:66, figs 40-43 sub *Gamasomorpha madeirensis*.

Distribution. This species was probably introduced from south Asia, and is known to occur in just four areas in Brazil, in the north of the state of Piauí and in the Archipelago de Fernando de Noronha, which belongs to the state of Pernambuco, and from states of Minas Gerais and São Paulo (Fig. 59). It is an open question if this species has already managed to establish viable populations in the Brazilian territory.

Material examined. BRAZIL. **Piauí**: Parnaíba, Tabuleiros Litorâneos do Piauí (02°55'S - 41°50'W), Distrito de Irrigação, ♂, 2008, J. A. S. Santos col. (IBSP 144005); **Pernambuco**: Fernando de Noronha, Arquipélago de Fernando de Noronha (3°50'57.2814"S - 32°24'10.7922"W), ♂, ♀, IV/2006, G. Freitas col. (IBSP 67706-67707); **Minas Gerais**: Governador Valadares (18°51'03"S - 41°56'56"W), 15.X.1981, L. N. Sorkin, ♀ (AMNH, PBI_OON 1167); **São Paulo**: São Paulo (23°33'S - 46°38'W), ♂, 2♀ (AMNH, PBI_OON 37857).

Ischnothyreus peltifer (Simon, 1891)

(Figs 20-25, 59)

Ischnaspis peltifer Simon, 1891:562 (four female syntypes from Saint Vincent, Antilles, in BMNH, and one female syntype from St. Vincent, in MNHN).

Ischnothyreus peltifer: Simon, 1893c:298 (not male, fig. 264, = *Camptoscaphiella simoni* Baehr); Platnick *et al.*, 2012b:7, figs 1-99.

Dysderina antillana Bryant, 1942:324, figs 1, 7 (male holotype from Christiansted, Saint Croix, Virgin Islands, in MCZ; examined); Chickering, 1968a:80 (Syn.)

Ischnothyreus omus Suman, 1965:226, figs 1-8 (male holotype from Kailua, Oahu, Hawaii, in Bishop Museum, Honolulu). Saaristo, 2001:345 (Syn.).

Ischnothyreus formosus Brignoli, 1974b:80, figs 12-18 (male holotype from Akau, Taiwan, in Zoological Museum, Hamburg); Saaristo, 2001:345 (Syn.).

Ischnothyreus sechellorum Benoit, 1979:208, figs 7A-E (female holotype from Mahe, Seychelles Islands, in MRAC); Saaristo, 1999:3 (Syn.).

Diagnosis. Males of *Ischnothyreus peltifer* can easily be separated from those of *I. velox* by the large protuberance on the base of the cheliceral fang in males (Fig. 23) and narrow, posteriorly situated, sinuous ridge on the postepigastric scutum (Fig. 22) in females.

Description. Male and female, see Platnick *et al.* 2012b:7, figs 1-99.

Distribution. According to Platnick *et al.* (2012b), this Pantropical species was probably introduced in Americas from Asia. Our records indicated that it was present only in three Brazilian states, the Northern State of Pará, the Northeastern State of Bahia and in the Southeastern State of São Paulo (Fig. 59). Judging by the records obtained, at the moment this species is not sympatric with *I. velox* in Brazil.

Material examined. BRAZIL. **Pará**: Belém, Ilha de Cotijuba (01°14'51.44"S - 48°32'47.14"W), ♀, XI.2004, L. Macambira leg. (MPEG 10271, PBI_OON 40724); Bosque Rodrigues Alves (01°25'49"S - 48°27'23"W), 2♀, XI/2004, J. Barreiro leg. (MPEG 10478, 10479; PBI_OON 40726, 40727); Belém, Mata de Várzea, ♂, 2♀, X.2004, L. Macambira leg. (MPEG 10709, PBI_OON 40692); **Bahia**: Salvador, Baia do Aratu (12°47'32.8"S – 38°28'15.3"W), 3♂, ♀, 2007-2009, K. Benati leg. (IBSP 126042, 126086, 126131, 126135); Presidente Tancredo Neves (13°24'32"S - 39°20'05"W), 2♀, 07.II.2011, C. M. P. Leite (IBSP 166612, 166614); Itamaraju (16°57'58"S - 39°26'01"W), ♀, 14.IV.2011, C. M. P. Leite leg. (IBSP 166613); **São Paulo**: Ubatuba, Parque Estadual da Ilha Anchieta (23°32'S – 45°03'W), ♂, 23-30.VII.2001, Equipe Biota leg. (IBSP 69881).

Ischnothyreus velox Jackson, 1908

(Figs 26-30, 59)

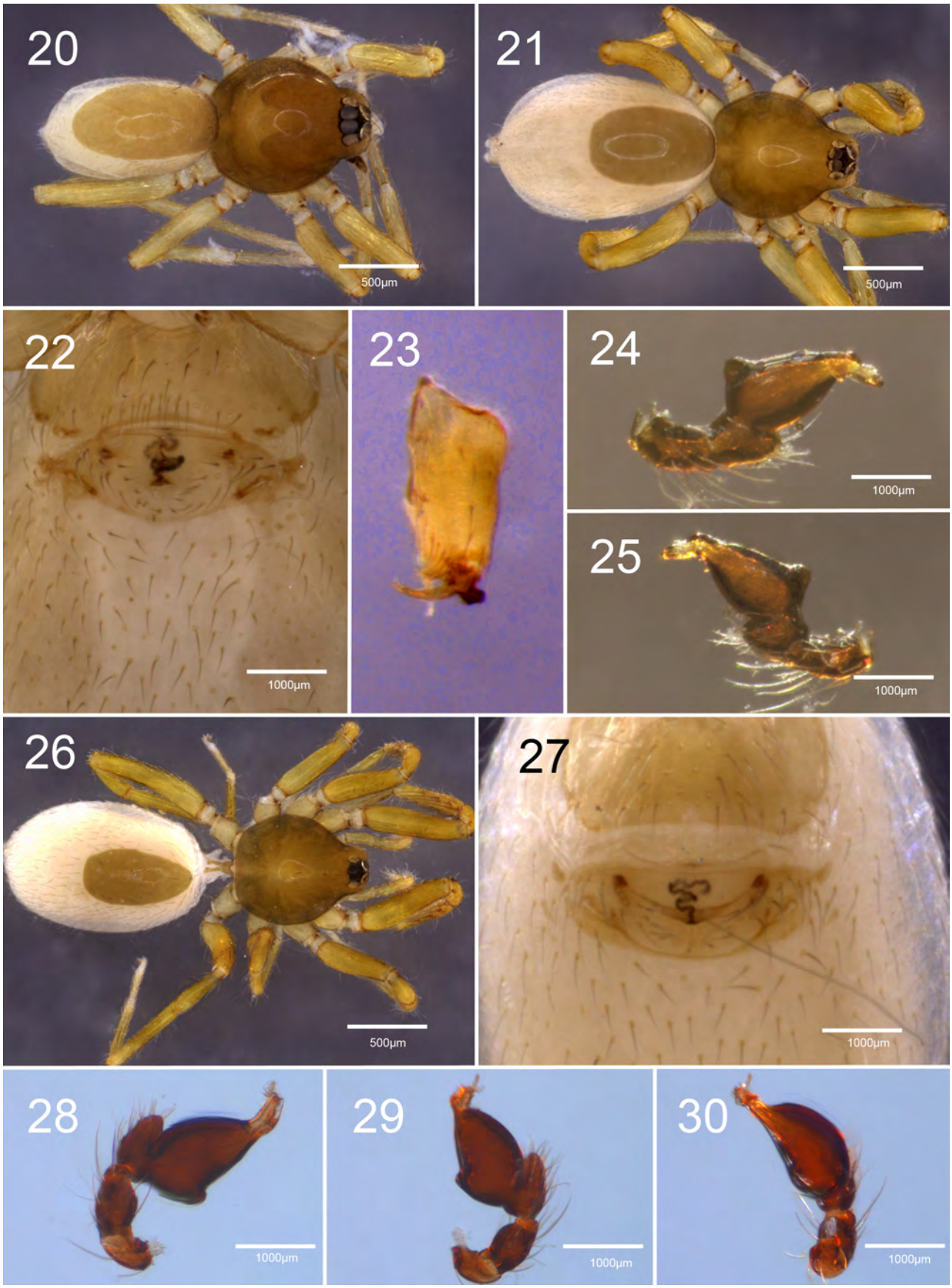
Ischnothyreus velox Jackson, 1908:51, pl. 4, figs 9-13 (Lectotype male from greenhouse in Chester, England, in BMNH); Saaristo, 2001:347 (desig. lectotype); Platnick *et al.*, 2012b:27, figs 100-132.

Ischnothyreus barrowsi Chamberlin & Ivie, 1935:9, pl. II, fig. 7 (female holotype from Marco Island, Collier Co., Florida, USA, in AMNH). Platnick *et al.*, 2012b:27 (Syn.).

Ischnothyreus indressus Chickering, 1968a:84, figs 13-20 (male holotype from Nevis, Leeward Islands, in MCZ; examined); Platnick *et al.*, 2012b:27 (Syn.).

Diagnosis. *Ischnothyreus* velox differ from *I. peltifer* by the males lacking a protuberance on the base of the fang; palps with rounded bulb and sperm pore larger than that of *I. peltifer* (Figs 28-30). Females of *I. velox* have a distinctively procurved ridge occupying most of the width of the postepigastric scutum (Fig. 27).

Description. Male and female, see Platnick *et al.* 2012b:27, figs 100-132.



Figs 20-30. Figs 20-25, *Ischnothyreus peltifer* (Simon, 1891), male: 20, dorsal; 23, projection of chelicerae; 24, palp prolateral; 25, palp retrolateral. Female: 21, dorsal; 22, genitalia, ventral. Figs 26-30, *Ischnothyreus velox* Jackson, 1908, female: 26, dorsal; 27, genitalia, ventral. Male: 28, palp retrolateral; 29, palp prolateral; 30, palp ventral.

Distribution. According to Platnick *et al.* (2012b), who recorded this species in the state of Amazonas, this Pantropical species was probably introduced in Americas from Asia. The present records in Brazil are anecdotic but depict a wide distribution in the Western and Central Amazonia, as well as in the Northeastern state of Sergipe (Fig. 59).

Material examined. BRAZIL. **Acre**: Senador Guiomard, Reserva Extrativista Catuaba (10°12'51.4584"S - 67°45'17.1216"W), ♀, 2002, E. Morato *et al.* leg. (IBSP 86903); **Amazonas**: Benjamin Constant (04°22'58"S - 70°1'51"W), ♀, 2010, P. S. Pompeu *et al.* leg. (IBSP 166574); Coari, Rio Urucu, Base de Operações Geólogo Pedro de Moura (04°52'16"S - 65°20'04"W), ♂, ♀, 11-20.VII.2003, A. B. Bonaldo, J. Dias & D. Guimarães leg. (MPEG 10212, 10214; PBI_OON 40693, 40725); **Sergipe**: Simão Dias, Toca da Raposa (10°43'46.992"S - 37°50'54.9702"W), 2♀, 20.VI.2014, no col. (IBSP 166579-166580).

Opopaea concolor (Blackwall, 1859)

(Figs 31-35, 61)

Oonops concolor Blackwall, 1859:265 (Male and female syntypes from Madeira Island, Portugal, should be in Hope Department of Oxford University).

Opopaea concolor: Kulczyński, 1899:339, pl. 6, fig. 25; Platnick & Dupérré, 2009a:22, figs 74-104.

Myrmecoscaphiella borgmeyeri Mello-Leitão, 1926:2 (Male holotype from Rodeio (26º55'22"S 49º21'59"W), Santa Catarina, Brazil, 1926, T. Borgmeyer col., in MNRJ 953); Platnick & Dupérré, 2009a:22 (Syn.).

Gammasomorpha humilis Mello-Leitão, 1920:172 (Female holotype from Pinheiro (actually Pinheiral), Barra do Piraí, Rio de Janeiro, Brazil, in MNRJ 955; PBI_OON 10963, examined). **Syn. nov.**

Opopaea devia Gertsch, 1936:5, fig. 13 (Female holotype from Edinburg, Hidalgo Co., Texas, USA, in AMNH); Platnick & Dupérré, 2009a:22 (Syn.).

Opopaea guaraniana Birabén, 1954:203, figs 30-36, 50 (Female holotype and male allotype from Manantiales, Corrientes, Argentina, lost); Platnick & Dupérré, 2009a:22 (Syn.).

Opopaea bandina Chickering, 1969:147, figs 1-3 (Female holotype from Largo, Pinellas Co., Florida, USA, in MCZ); Platnick & Dupérré, 2009a:22 (Syn.).

Gamasomorpha atlantica Benoit, 1977:35, figs 13a-e (Male holotype from Prosperous Bay Plain, Saint Helena Island, in MRAC); Saaristo & Marusik, 2008:20 (Syn.).

Opopaea atlantica: Brignoli, 1983:188.

Diagnosis. *Opopaea concolor* can be distinguished from those of *O. deserticola* by the ventrally unexpanded palpal bulb in males (Figs 34, 35; Platnick & Dupérré, 2009a, figs 99-104), and by having the small, dark knob marking the origin of the receptaculum situated quite far from the epigastric furrow in females (Fig. 33).

Description. Male and female, see Platnick & Dupérré, 2009a:22, figs 73-104.

Distribution. According to Platnick & Dupérré (2009a), this Pantropical species was probably introduced in Americas from the Old Word. In the New World it is known to occur from the southern United States and Bahamas Islands south to Argentina. This species is synanthropic in Brazil and in many cases sympatric with *O. deserticola*, mainly in the southern portions of the country (Fig. 61). It is normally found inside houses and buildings, but can be also found in caves, especially those most intensely disturbed by human activities.

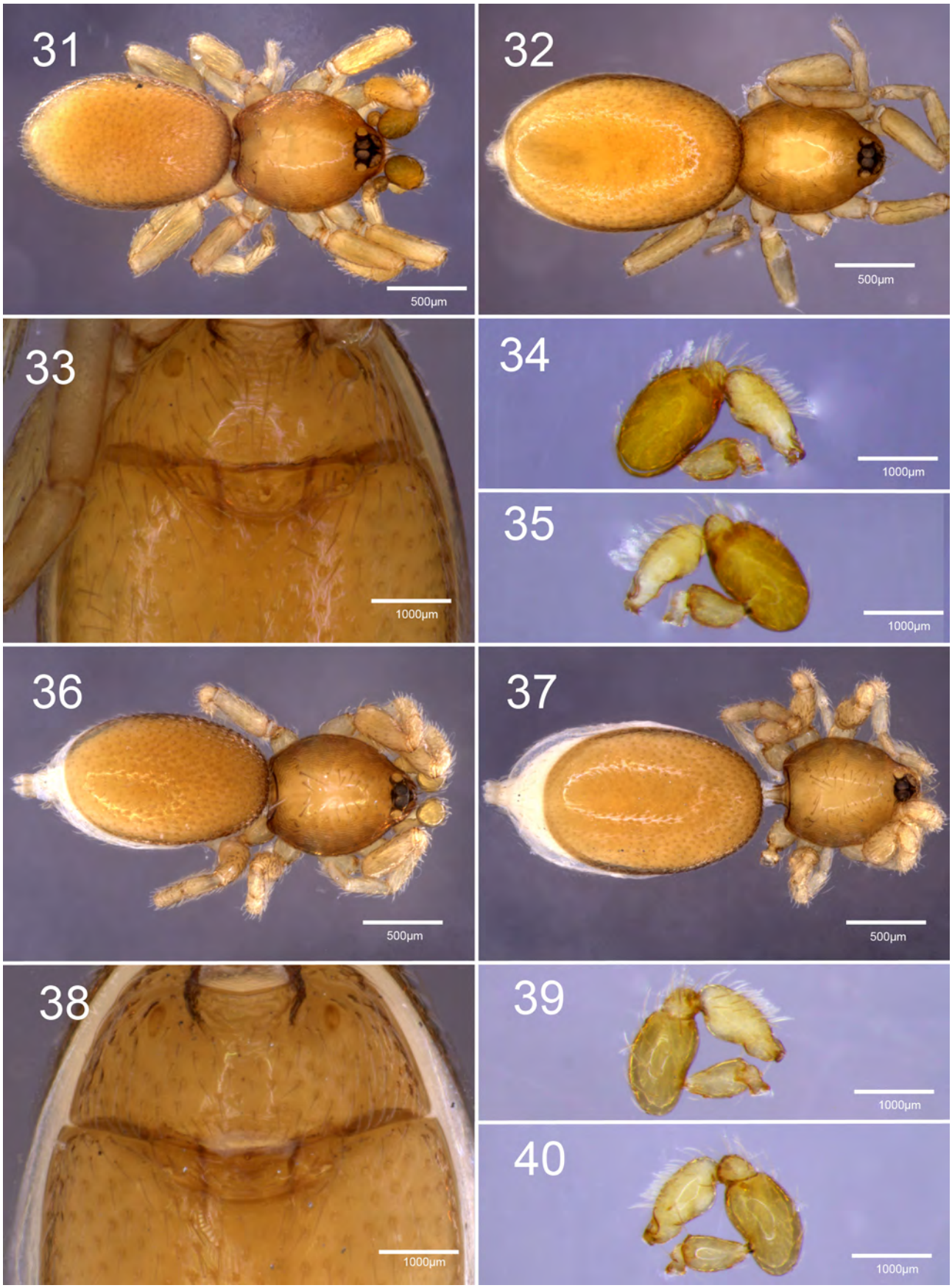
Material examined. BRAZIL, **Bahia**: Lajedinho (12°21'21"S - 40°54'21"W), Gruta da Mocozeira, ♀, 22.X.2014, F. Bondezan leg. (IBSP 166572); Presidente Tancredo Neves (13°22'44"S - 39°19'31"W), ♀, 07.II.2011, C. M. P. Leite leg. (IBSP 166611); **Mato Grosso do Sul**: Corumbá, Pantanal, Passo da Lontra (18°57'31.0674"S - 57°39'52.5918"W), ♀, I.1998-XI.1999, J. Raizer leg. (IBSP 68454); **Minas Gerais**: Jaboticatubas, Serra do Cipó, Parque Nacional da Serra do Cipó (19°15'S - 43°31'W), ♂, 03-09.I.2003, Equipe Biota leg. (IBSP 69444); Belo Horizonte, Campus da UFMG/ICB (19°52'S – 43°58'W), ♀, VII.2002, É. S. S. Álvares leg. (IBSP 73190); **Rio de Janeiro**: Teresópolis (22°26'26.2536"S - 43°5'13.9158"W), ♀, 28.XI.1976, Leny leg. (MNRJ 2094); Rio de Janeiro, Gávea (22°58'46.2324"S - 43°14'46.6224"W), 2♀, R. Arlé leg. (MNRJ 41760); **São Paulo**: São Paulo (23°32'51"S – 46°38'10"W), ♀, 13.II.2002, F. S. Cunha leg. (IBSP 33063); ♀, 20.IV.2007, G. Ruiz leg. (IBSP 122228); Parque da Previdência (23°34'49.7136"S - 46°43'38.4558"W), ♀, 17.XII.1999, D. F. Candiani leg. (IBSP 33007); Parque Alfredo Volpi (23°35'12.5766"S - 46°42'16.005"W), ♀, 19-23.III.2005, A. Bagio leg. (IBSP 59276); Campus da USP (23°33'44"S - 46°43'39"W), ♂, 13.V.2003, D. F. Candiani leg. (IBSP 131540); Mata do Cuaso (23°33'54.9432"S - 46°43'43.9608"W), ♀, 1999, D. Candiani leg. (IBSP 68981); campus Instituto Butantan, Mata do Butantan (23°33'59.493"S - 46°43'14.7612"W), ♂, 12-19.XII.1999, D. Candiani leg. (IBSP 68980); ♀, 18.VIII.2006, A. D. Brescovit leg. (IBSP 72788); Itapevi, Condomínio TransUrb (23°35'28.284"S - 46°58'29.121"W), ♀, 28.V.1999, V. C. Onofrio leg. (IBSP 67601); Campinas, Campus da Unicamp (22°48'45.9786"S - 47°4'12.198"W), ♂, 02.I.2006, A. J. Santos leg. (IBSP 72970); Guarujá, Ilha da Moela (24°02'57.5016"S - 46°15'48.0558"W), ♂, 17-19.VIII.2009, R. P. Indicatti & G. P. Perroni leg. (IBSP 144859); **Paraná**: Adrianópolis, Vale do Ribeira (24°47'0.726"S - 49°6'45.4962"W), ♀, 17.III.2005, D. M. B. Battesti leg. (IBSP 51581); Londrina, campus Universidade Estadual de Londrina, Fazenda Escala (23°20'23,45'5"S – 51°12'32,8"W), 2♂, VIII.2007, J. O. Fernando leg. (IBSP 118415, 118429); **Rio Grande do Sul**: Sapucaia do Sul (29°50'20"S 51°08'38"W), ♀, 20.VI.2013 (MCN 49333); Porto Alegre (30°01'58"S - 51°13'48"W), 5♀, 24.V.1981 - 21.II.1991, A. A. Lise, A. B. Bonaldo & L. Moura leg. (MCN 10350, 20746-20747, 28335); ♂, 6♀, 31.V.1935, P. Buck leg. (MNRJ 2090); Jardim Botânico (30°03'6.07"S - 51°10'37.95"W), ♂, 29.IV.1997, L. Moura leg. (MCN 28335); ♂, 25.III.2011, L. Moura leg. (MCN 49332).

Opopaea deserticola Simon, 1891

(Figs 36-40, 61)

Opopaea deserticola Simon, 1891:560, pl. 42, fig. 5 (female syntype from Saint Vincent, Antilles, in BMNH); Platnick & Dupérré, 2009a:4, figs 1-72

Gamasomorpha rufa Banks, 1898:211, pl. 13, fig. 12 (female holotype from Baja California, Mexico, G. Eisen & H. Vaslit, in the California Academy of Sciences, destroyed in the earthquake in 1900). **Syn. nov.**



Figs 31-40. 31-35. *Opopaea concolor* (Blackwall, 1859), male: 31, dorsal; 34, palp retrolateral; 35, palp prolateral. Female: 32, dorsal; 33, genitalia, ventral. Figs 36-40, *Opopaea deserticola* Simon, 1891, male: 36, dorsal; 39, palp retrolateral; 40, palp prolateral. Female: 37, dorsal; 38, genitalia, ventral.

Opopaea darlingtoni Bryant, 1940:267, figs 5, 7 (male holotype from Maisí, Guantánamo, Cuba, in MCZ); Dumitrescu & Georgescu, 1983:103 (Syn.)
Gamasomorpha floridana: Bryant, 1945:199, figs 1, 2 (male, misidentified).
Opopaea timida Chickering, 1951:233, figs 20, 21 (male holotype believed to have been taken from a bat collected in the Chilibrillo Caves, Canal Zone, Panama, in MCZ); Platnick & Dupérré, 2009a:4 (Syn.).
Opopaea brasima Chickering, 1969:148, figs 4-10 (male holotype from Kendall, Dade Co., Florida, USA, in AMNH, examined); Dumitrescu & Georgescu, 1983:103 (Syn.).
Gamasomorpha Battirola *et al.*, 2004:423, 426; Marques *et al.*, 2007:144.

Note. The figure of *Gamasomorpha rufa* presented by Banks (1898) shows clearly a flattened oonopid, indicating in the description of the ventral face of abdomen "a dark stripe each side near furrow", a characteristic structure found in the female genitalia of all *Opopaea*, but particularly distinctive in *O. deserticola*. In addition, this species is common in urban areas in Baja California (Platnick & Dupérré, 2009a).

Diagnosis. *Opopaea deserticola* can be distinguished from *O. concolor* by the ventrally more expanded palpal bulb in males (Figs 39, 40; Platnick & Dupérré, 2009a, figs 61-66) and females having small, dark knob marking the origin of the receptaculum situated very close to the epigastric furrow in genital area (Fig. 38).

Description. Male and female, see Platnick & Dupérré (2009a:4, figs 1-72).

Distribution. According to Platnick & Dupérré (2009a), this Pantropical species was probably introduced in Americas from the Old World. In the New World, it is known to occur from Florida, USA, to Southern Brazil. There were only two previous records from Brazil, one in the Northern State of Pará and other in the Southwestern State of Rio de Janeiro (Platnick & Dupérré, 2009a), in a building and in a botanical garden, respectively (Platnick & Dupérré (2009a:21). This species is synanthropic in Brazil, sympatric with *O. deserticola*, mainly in the states of Bahia and Mato Grosso (Fig. 61). Several specimens were collected in tree canopy at the district of Pirizal, Brazilian Pantanal, state of Mato Grosso. These specimens were collected mainly in *Vochysia divergens* (Vochysiaceae) and *Calophyllum brasiliense* Cambess. (Calophyllaceae) and determined erroneously as *Gamasomorpha* sp. at that time (Battirola *et al.*, 2004; Marques *et al.*, 2007). However, this species is most commonly found inside houses, buildings and, exceptionally, in disturbed caves.

Material examined. BRAZIL. **Amapá**: Laranjal do Jari (0°50'31"S - 52°30'57"W), ♂, 14.XI.2003, J. A. P. Barreiros leg. (MPEG 10406); **Amazonas**: Manaus, Reserva Florestal Adolpho Ducke (02°57'42"S - 59°55'40"W), ♀, 15.IX.1995 (INPA); J. Adis leg. (INPA); ♀, 23.III.1996, J. Adis (INPA); **Pará**: Belém, campus Museu Paraense Emilio Goeldi, ♀, 10.II.1959, A. Nadler leg. (AMNH, PBI_OON 10524); 5 Km East Belém, ♂, 02.V.1974, R. Schuh leg. (AMNH, PBI_OON 10514); **Mato Grosso**: Nossa Senhora do Livramento, Pirizal, Pantanal de Poconé, Fazenda Retiro Novo (16°15'12"S - 56°22'12"W), 4♂, 10♀, XI–XII.1999, L. A. Battirola (IBSP 40724-40725, 40729, 40754, 40756, 40765-40767); Poconé (16°26'49.5924"S - 56°42'52.0518"W), 4♂, 7♀, 2003, I. Marques & Castilho leg. (IBSP 67014, 67025, 67027, 67029, 67032-67033, 67035, 67037); **Mato Grosso do Sul**: Dois Irmãos do Buriti, Piraputanga, Fazenda Correntes II (20°27'S – 55°30'W), ♀, 16-26.II.2008, R. Bessi leg. (IBSP 128724); **Bahia**: Paulo Afonso (9°24'28"S – 38°13'19'S), Ilha do Urubu, ♀, 2008, E. Daniele leg. (IBSP 125008); Salvador, Baía de Aratu (12º47'32,8"S - 38º28'15,3"W), 2♂, 73♀, 2007-2008, K. Benati leg. (IBSP 125202-125230, 125232-125236, 125238-125240, 125242-125243, 125245, 125248-125252, 125254-125259, 125261-125266, 125268-125270, 125272-125278, 125280, 125282-125291); Parque da Cidade Joventino Silva (12°59'57.6522"S - 38°28'11.1606"W), 2♀, 22.VIII-03.IX.2008, C. Queiroz & D. Mendes leg. (IBSP 125544-125545); **Minas Gerais**: Belo Horizonte (19°52'S - 44°06'W), ♀, 09.XII.2007, A. J. Santos leg. (IBSP 151663); Pains, Gruta Isaias (431402mE - 7747672mN), ♀, 19.VI.2009, R. Zampaulo leg. (IBSP 166586); **Rio de Janeiro**: Rio de Janeiro, Jardim Botânico (30°03'6.07"S - 51°10'37.95"W), ♀, 20.I.1959, A. Nadler leg. (AMNH, PBI_OON 10526); Santa Teresa, ♀, 26.VI.1946, H. Sick leg. (AMNH, PBI_OON 28177); Bairro Laranjeiras, Parque Guinle (22°55'50.38"S - 43°11'1.12"W), ♀, 20.X.2001, R. Baptista leg. (MNRJ 3760); **São Paulo**: São Paulo, Parque do Estado (23°39'8.625"S - 46°36'57.9924"W), ♂, 18-25.X.2003, J. Valvassori leg. (IBSP 68059); campus Instituto Butantan (23°33'59.493"S - 46°43'14.7612"W), ♀, 30.IX.2009, A. M. Giroti leg. (IBSP 151545); ♀, VII.2007, G. Perroni (IBSP 151566).

Pelicinus marmoratus Simon, 1891
(Figs 41-45, 60)

Pelicinus marmoratus Simon, 1891:559, fig. 4 (One male and two female syntypes from Saint Vincent Island, Antilles, in BMNH).
Philesius marmoratus: Simon, 1893a:303.
Myrmopopaea jacobsoni Reimoser, 1933:397, figs 1-3 (Male holotype and female paratype from Fort de Kock [= Bukittinggi], Sumatra, in Naturhistorischen Museum Wien); Platnick *et al.*, 2012c:18-19, figs 1-60, 121-144 (Syn).
Gamasomorpha minima Berland, 1942:5, fig. 1a (Male holotype from Canton Island, Phoenix Islands, in Bishop Museum, Honolulu); Platnick *et al.*, 2012c:18-19, figs 1-60, 121-144 (Syn).
Hytanis pusilla Bryant, 1942:326, figs 13, 14 (Female holotype from Christiansted, Saint Croix, Virgin Islands, in MCZ); Platnick *et al.*, 2012c:18-19, figs 1-60, 121-144 (Syn).
Scaphiella ula Suman, 1965:230, figs 15-20 (Male holotype from Puu Papaa peak, Oahu, Hawaii, in Bishop Museum, Honolulu); Platnick *et al.*, 2012c:18-19, figs 1-60, 121-144 (Syn).
Triaeris reticulatus Chickering, 1968b:354, figs 6-13 (Male holotype from Saint Croix, Virgin Islands, in MCZ); Chickering, 1973:228 (Syn. with *Hytanis pusilla*).
Triaeris pusillus: Chickering, 1973:228.
Silhouettella mahei Benoit, 1979:205, fig. 6A (male holotype from Morne Blanc, Mahe, Seychelles, in MRAC); Platnick *et al.*, 2012c:18-19, figs 1-60, 121-144 (Syn).
Gamasomorpha gracilipes Wunderlich, 1987:65, figs 37-39 (male holotype from Valle Gran Rey, La Gomera, Canary Islands, in Naturmuseum Senckenberg); Saaristo, 2001:321 (Syn. with *Silhouettella mahei*).
Pelicinus mahei: Saaristo, 2001:321, figs 40-46.

Diagnosis. Specimens of both sexes of *Pelicinus marmoratus* can be easily separated from all other Brazilian synanthropic species by the weakly sclerotized scuta on the abdomen (Fig. 42), light embolus with distal process in the

male palp (Figs 43, 44) and postepigastric scutum covering about 3/4 of abdominal length (Fig. 45).

Description. Male and female, see Platnick *et al.* (2012c:18, figs 1-60, 121-144).

Distribution. Considered Pantropical by Platnick *et al.* (2012c) who recorded this species in the African continent, in several Caribbean and Pacific islands and in the city of Ananindeua, state of Pará, Brazil (Fig. 60), where the specimens were collected manually in a house bathroom, along with synanthropic ants. This remains the single record of this species in Brazil.

Material examined. BRAZIL. **Pará**: Ananindeua (01°23'S - 48°24'W), ♀, 04.II.2009, B. Silva leg. (MPEG 18820, PBI_OON 811); ♂, ♀, 08.II.2009, B. Silva leg. (MPEG 18821, PBI_OON 810).

Heteroonops spinimanus (Simon, 1891)

(Figs 46-48, 59)

Oonops spinimanus Simon, 1891:563, pl. 42, fig. 6 (Female syntype from Saint Vincent Island, Antilles, in BMNH and five female syntypes from Caracas, Distrito Federal, Venezuela).

Oonops bermudensis Banks, 1902:269, fig. 1a-c (Female holotype from the Bermuda Islands, no specific locality, in Peabody Museum, Yale); Sierwald, 1988:10 (Syn.).

Heteroonops spinimanus: Dalmas, 1916:203; Platnick & Dupérre, 2009b:22, figs 79-139.

Oonopinus hunus Suman, 1965:238, figs 35-37 (Female holotype from SE slope of Ulumawao Peak, Kailua, Oahu, Hawaii, in Bishop Museum, Honolulu); Platnick & Dupérre, 2009b:22 (Syn.).

Matyotia tetraspinosus Saaristo, 2001:351, figs 165-169 (Male holotype from Anse Cimitière, Silhouette, Seychelles Islands, in Zoological Museum at University of Turku, Turku); Platnick & Dupérre, 2009b:22 (Syn.).

Diagnosis. Specimens of *Heteroonops spinimanus* can be easily separated from all other Brazilian synanthropic species by the enlarged posterior projection on the male endites (see Platnick & Dupérre, 2009b:22, figs 84-86), angular embolus and conductor (see Platnick & Dupérre, 2009b:22, figs 87, 88) and the umbrella-shaped anterior receptaculum in the female genitalia (Fig. 47).

Description. Male and female, see Platnick & Dupérre (2009b:22, figs 79-139).

Biology. *Heteroonops spinimanus* has been considered to be parthenogenetic by some authors (Saaristo, 2001), resembling, in that regard, *T. stenaspis*. Even though it was originally described from St. Vincent, it's currently known to have a Pantropical distribution. Although many populations of *H. spinimanus* may be parthenogenetic, apparently conspecific males have been collected together with females twice, in Seychelles Islands and in Florida (Platnick & Dupérré, 2009b). All known specimens from Brazil are females, but the low number of samples prevents any claim on a parthenogenetic condition in Brazilian populations.

Distribution. According to Platnick & Dupérré (2009b), this species has a Pantropical distribution, but only two records in the South American countries were provided so far, from Colombia and Venezuela. Here the first Brazilian records of *H. spinimanus* are presented, from states of Bahia, São Paulo and Rio Grande do Sul (Fig. 59).

Material examined. BRAZIL. **Bahia**: Itamaraju (16°59'26"S - 39°25'55"W, ♀, 14.IV.2011, C. M. P. Leite leg. (IBSP 166615); Jaguaripe (13°10'39"S - 38°59'51"W), 6♀, 02.III.2011, C. M. P. Leite leg. (IBSP 166616-166618); **São Paulo**: São Paulo, Vila Butantã, 2♀, 18.I.2000, F. S. Cunha leg. (IBSP 30397; IBSP 32967); Ubatuba, Parque Estadual da Ilha Anchieta (23°32'S - 45º03'W), ♀, 23-30. VII.2001, Equipe Biota (IBSP 69884); **Rio Grande do Sul**: Porto Alegre, Jardim Botânico, ♀, 02.I.2013 (MCN 49944); 2♀, 3.V.2013 (MCN 49945); 2♀, 5.VII.2013, all collected by G. O. Silva *et al.*

Orchestina pavesiiformis Saaristo, 2007

(Figs 49-52, 61)

Orchestina pavesiiformis Saaristo, 2007:124, figs 16, 18, 20, 21 (male holotype from Israel, Jerusalem, deposited in HUJ 14220; male paratype, same locality in MZUT 3703; female paratype, same locality, in MZUT 3704; female paratype, same locality, in HUJ 15326; female paratype, same locality, in HUJ 14184); Izquierdo & Ramírez, 2017:24, figs 11, 17D-F, 19G, 20N, O, 22D, maps 1, 25.

Diagnosis. Both sexes have lateral setae on the carapace margins, a character exclusive in relation to other native American species. Males can be distinguished from those of the American species by the dorsal V-pattern on the abdomen (see Izquierdo & Ramírez, 2017:24, fig. 11A-C) and by the shape of the embolus, sinuous and with distal extensions (Fig. 51; Izquierdo & Ramírez, 2017, figs 17D-F, 20N, O). Females have genitalia with external pockets and an anterior receptaculum widened at its base with V-shaped anterior apodemes at the tip (Fig. 52; Izquierdo & Ramírez, 2017:24, figs 19G, 22D).

Description. Male and female, see Izquierdo & Ramírez (2017: 24).

Biology. According Izquierdo & Ramírez (2017) this species has been introduced into many countries and its natural origin is still unknown. In Argentina, it has been collected in disturbed environments and in houses or other human buildings. Specimens were observed walking on walls, furniture and collected in leaf litter. In Brazil, it has been collected in the interior of houses as well as in the interior of disturbed caves.

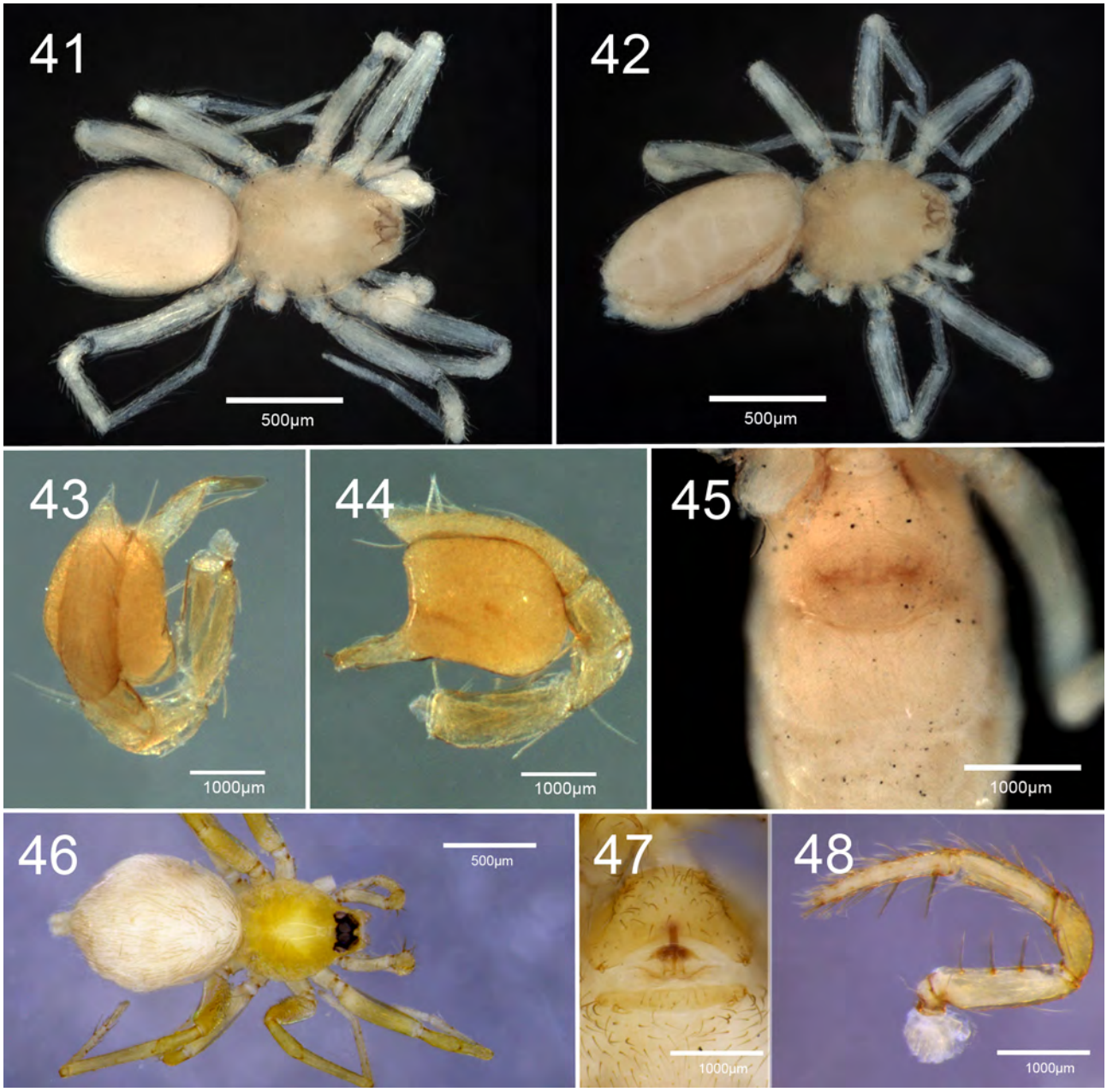
Distribution. According to Izquierdo & Ramírez (2017), this species occurs in Israel, United States, Portugal, Brazil, and Argentina (Fig. 61).

Material examined. In addition to the Brazilian material recorded to the states of São Paulo and Minas Gerais by Izquierdo & Ramírez (2017), only one specimen is reported here, from state of **São Paulo**, São Paulo, campus of Instituto Butantan, building of LECZ, collected manually on the table, ♀, 26.VII.2017, A. D. Brescovit leg. (IBSP 221179).

Orchestina dentifera Simon, 1893

(Figs 53-57, 61)

Orchestina dentifera Simon, 1893c:248 (one male, four females, and one juvenile syntypes from Sri Lanka (ex Ceylan), Kandy!, deposited in MNHN 6025 [additional number 15250], PBI_OON 50024); Simon, 1893d:294; Dalmas, 1916:232, figs 21, 27.



Figs 41-48. Figs 41-45, *Pelicinus marmoratus* Simon, 1891, male: 41, dorsal; 43, palp dorso-prolateral; 44, palp retrolateral. Female: 42, dorsal; 45, genitalia, ventral. Figs 46-48. *Heteroonops spinimanus* (Simon, 1891), female: 46, dorsal; 47, genitalia, ventral; 48, female palp, lateral.

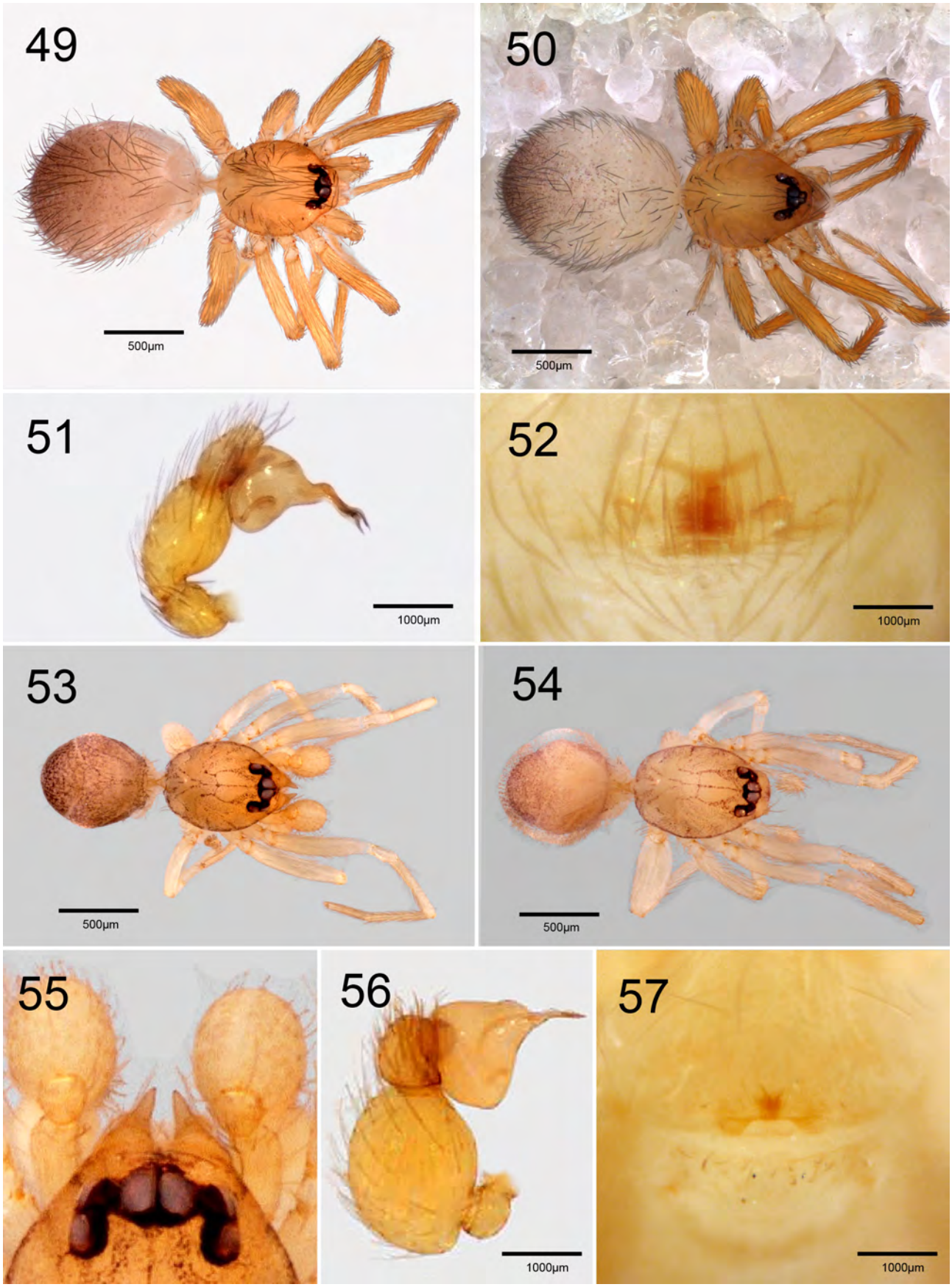
Orchestina justini Saaristo, 2001:356, figs 190-195 (male holotype from Seychelles Islands, Silhouette, Anse Cimitiére, deposited in MZUT 1250, PBI_OON 50030; 3 male and 3 female paratypes, same data, in MZUT 1251, PBI_OON 50029). Izquierdo & Ramírez, 2017:26 (Syn.).

Diagnosis. *Orchestina dentifera* can be distinguished from *O. pavesiiformis* by the anterior face of male chelicerae with strong and conical projections on median line (Fig. 55; Izquierdo & Ramírez, 2017, figs 25G, 26B, 27A, E) and labium with two pairs of large and flattened setae (see Izquierdo & Ramírez, 2017:26, fig. 27B). Females are distinguished from *O. pavesiiformis* by the epigastric region with highly convex ridge, anterior receptaculum with wide, rounded base, bifid tip; posterior receptaculum present, posterior apodeme bar-shaped (Fig. 57; Izquierdo & Ramírez, 2017:26, figs 41A, 44C).

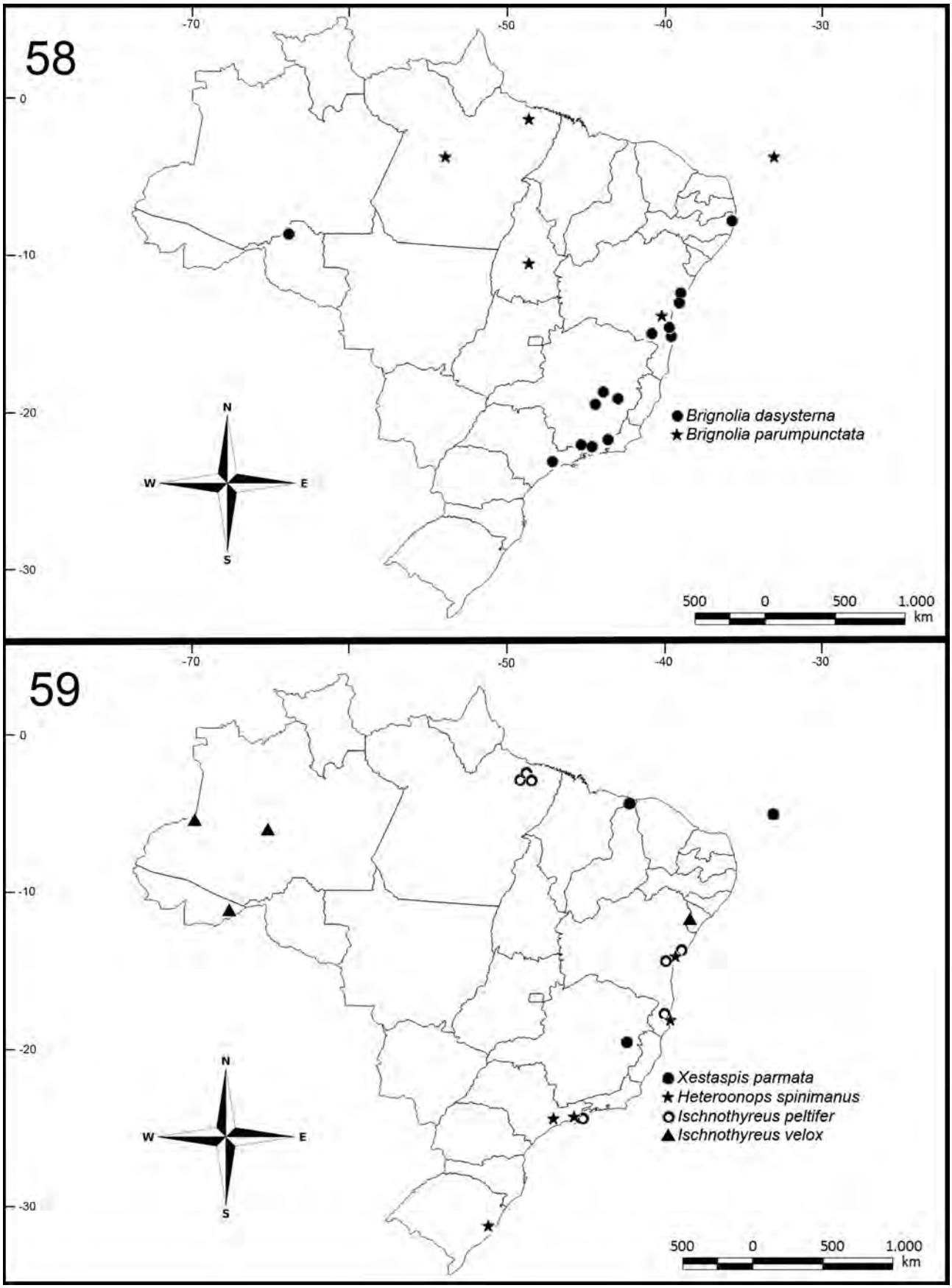
Description. Male and female, see Izquierdo & Ramírez (2017:26, figs 25-27, 36D-F, 41A, 43, 44C).

Biology. In Brazil, specimens were found inside or around houses and in building constructions.

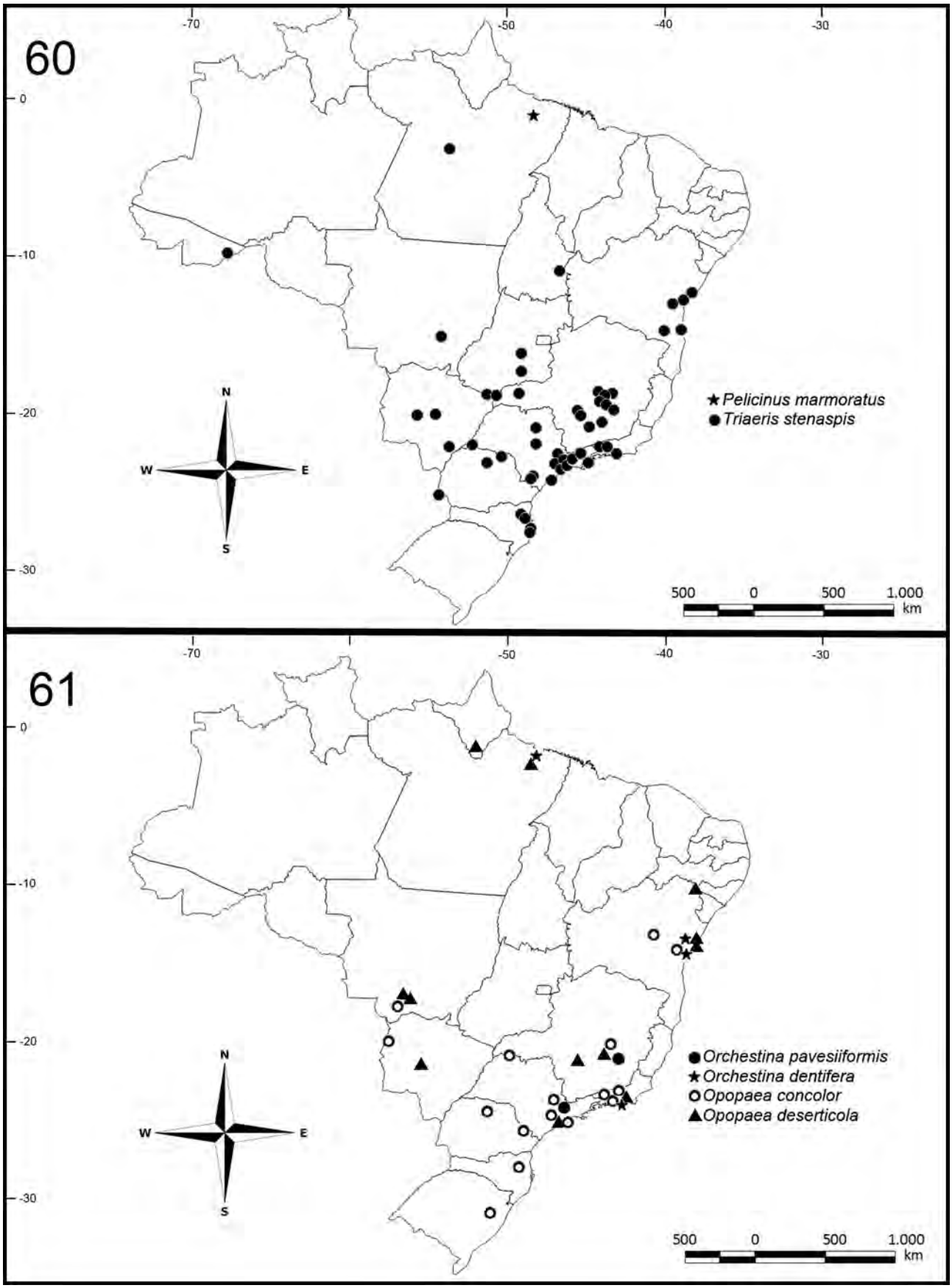
Distribution. According to Izquierdo & Ramírez (2017), this species occurs in Sri Lanka, Seychelles, Isla Reunion (Indian Ocean), Tanzania, Haiti, Jamaica and Brazil (Fig. 61).



Figs 49-57. Figs 49-52, *Orchestina pavesiiformis* Saaristo, 2007, male: 49, dorsal; 51, palp retrolateral. Female: 50, dorsal; 52, genitalia, ventral; 53-57. *Orchestina dentifera* Simon, 1893, male: 53, dorsal; 55, projection of the chelicerae; 56, palp retrolateral. Female: 54, dorsal; 57, genitalia, ventral.



Figs 58, 59. Brazilian records of: 58, *Brignolia dasysterna* and *B. pauropunctata*; 59, *Xestaspis parmata*, *Heteronoops spinimanus*, *Ischnothyreus peltifer* and *I. velox*.



Figs 60, 61. Brazilian records of: 60, *Pelicinus marmoratus* and *Triaeris stenaspis*; 61, *Orchestina pavesiiformis*, *O. dentifera*, *Opopaea concolor* and *O. deserticola*.

Material examined. In addition to the Brazilian material recorded to the states of Pará and Bahia by Izquierdo & Ramírez (2017), only three specimens are recorded here: **Rio de Janeiro**, Rio de Janeiro, Campus UFRJ, 2♀, 23.IX.2010, Students from Universidade Federal do Rio de Janeiro leg. (IBSP 167792); **Bahia**, Salvador, Parque Metropolitano do Pituaçu, ♂, 19.I-26.II.2008, D. U. Sena leg. (IBSP 126003).

DISCUSSION

Brazil has currently 149 known species of Oonopidae (World Spider Catalog, 2019), of which 12 are non-native, representing 8% of the described diversity of oonopids in the country. Some species appear to have been introduced in as early as the first half of the 20th century and have large distribution ranges, as shown in the data of the examined material and Table I. Noteworthy, among the oldest records are the ones of *Opopaea* species, *O. concolor* and *O. deserticola*, sampled as early as 1935 and 1946, respectively (Tab. I). These species are mainly peridomiciliary dwellers and records in native areas are very rare, despite being in the country by at least 70 years. The most intriguing case is perhaps that of *O. deserticola*, which is apparently well established in the Pirizal regions of the Pantanal, state of Mato Grosso, where they are commonly found in canopies (Battirola *et al.*, 2004).

Judging only by the collecting dates here reported, the most recent introductions would be those of *Orchestina dentifera* and *Pelicinus marmoratus*, with records dated as recently as 2008 and 2009 respectively. The populations of these species are apparently small and restricted to a few scattered portions of the Brazilian territory: *P. marmoratus* was found only in the state of Pará, with a single record in an urban area, while *O. dentifera* was recorded along Atlantic coastal areas in three states (Pará, Bahia and Rio de Janeiro). It is not clear at this point if the Brazilian populations of these two species are not yet viable (being continually refilled with new specimens introduced anthropochorically) or represent already established populations that were undersampled in most environments.

The records of the remaining species are also recent, sampled in the last 10 years. The species *Triaeris stenaspis* appears to have the largest distribution range in the country, being the species that has invaded the largest number of natural areas. Assuming that the sampling dates are reliable indicators of a recent arrival, the success of this species in invading and colonizing both urban areas and natural habitats in all Brazilian biomes, including cave environments, could only be explained by the explosive reproduction rates allowed by parthenogenesis, a reproductive trait already proved by Korenko *et al.* (2009) to occur in at least one population of this species. *Heteroonops spinimanus* also appears to have been introduced very recently and, to date, has been recorded in three Brazilian states, also along the Atlantic coast. Being considered another possible parthenogenetic species (see discussion in Platnick *et al.*, 2009b:3, 4), it may well reach quite quickly a wider distribution range in the country.

The richness and abundance of introduced Oonopidae species that eventually colonized urban areas in Brazil highlights the potential deleterious effects of these aliens on native spider populations and communities. Unfortunately, studies on the ecological effects of introduced spiders are sparse and there are a general lack of reliable data properly addressing critical questions for conservation, such as degrees of direct competition, rates of species substitution and the chain effects on the affected ecosystems, even the allegedly simplified ones, as is the case of caves. Cave environments could be particularly affected since they are prone to contain endemic faunistic components, maintaining species with varying degrees of troglomorphisms and population sizes. This issue deserves urgent attention regarding the implementation of studies to prevent, stop or at least reduce the expansion of these small invasive spiders in those environments.

Tab. I. Number of records and earliest recorded year of introduction of invasive oonopids in Brazil.

	Number of records	Earliest record
Brignolia dasysterna	114	1974
Brignolia parumpunctata	220	1974
Triaeris stenaspis	515	1996
Xestaspis parmata	2	2006
Ischnothyreus peltifer	14	2001
I. velox	6	2002
Opopaea concolor	37	1935
O. deserticola	117	1946
Pelicinus marmoratus	3	2009
Heteroonops spinimanus	9	2000
Orchestina pavesiiformis	8	2002
O. dentifera	5	2008

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REFERENCES

Abrahim, N.; Brescovit, A. D.; Rheims, C. A.; Santos, A. J.; Ott, R. & Bonaldo, A. B. 2012. A revision of the Neotropical goblin spider genus *Neoxyphinus* Birabén, 1953 (Araneae, Oonopidae). **American Museum Novitates 3743**:1-75.

Almeida-Silva, L. M. & Brescovit, A. D. 2008. First record of *Zimiris doriai* (Araneae, Prodidomidae) in Brazil. **The Journal of Arachnology 35**:554-556.

Álvarez-Padilla, F.; Ubick, D. & Griswold, C. E. 2012. *Noideattella* and *Tolegnaro*, two new genera of goblin spiders from Madagascar, with comments on the gamasomorphoid and silhouettelloid oonopids (Araneae, Oonopidae). **American Museum Novitates 3745**:1-76.

Banks, N. 1898. Arachnida from Baja California and other parts of Mexico. **Proceedings of the California Academy of Sciences 1**:205-308.

Banks, N. 1902. Some spiders and mites from the Bermuda Islands. **Transactions of the Connecticut Academy of Arts and Sciences 11**:267-275.

Battirola, L. D.; Marques, M. I.; Adis, J. & Brescovit, A. D. 2004. Aspectos ecológicos da comunidade de Araneae (Arthropoda: Arachnida), em copas da palmeira *Attalea phalerata* Mart. (Arecaceae) no Pantanal de Mato Grosso, Brasil. **Revista Brasileira de Entomologia 48**:421-430.

Benoit, P. L. G. 1977. Fam. Oonopidae et Tetrablemmidae. *In*: La faune terrestre de l'île de Saite-Hélène IV. **Annales Musée Royal de l'Afrique Centrale, Sciences Zoologiques 220**:31-44.

Benoit, P. L. G. 1979. Contributions à l'étude de la faune terrestre des îles granitiques de l'archipel des Séchelles (Mission P. L. G. Benoit - J. J. Van Mol 1972). Oonopidae (Araneae). **Revue Zoologique Africaine 93**:185-222.

Berland, L. 1942. Polynesian spiders. **Occasional Papers of the Bernice P. Bishop Museum 17**:1-24.

Birabén, M. 1954. Nuevas Gamasomorphinae de la Argentina (Araneae, Oonopidae). **Notas del Museo de la Plata 17**:181-212.

Blackwall, J. 1859. Descriptions of newly discovered spiders captured by James Yate Johnson Esq., in the island of Madeira. **Annals and Magazine of Natural History 4**:255-267.

Brescovit, A. D. 2002. Aranhas da cidade de São Paulo: espécies de importância médica, sinantrópicas e controle. **Biológico 61**:31-32.

Brignoli, P. M. 1974a. Notes on spiders, mainly cave-dwelling, of southern Mexico and Guatemala (Araneae). **Quaderno, Accademia Nazionale dei Lincei 171**:195-238.

Brignoli, P. M. 1974b. On some Oonopidae from Japan and Formosa (Araneae). **Acta Arachnologica 25**:73-85.

Brignoli, P. M. 1975a. Über die Gruppe der Haplogynae (Araneae). **Proceedings of the 6th International Arachnological Congress**, Amsterdam, p. 33-38.

Brignoli, P. M. 1975b. Ragni del Libano. I. Note su *Opopaea punctata* (O. Pickard Cambridge, 1872) ed altre specie dello stesso genere (Araneae, Oonopidae). **Fragmenta Entomologica 11**:223-233.

Brignoli, P. M. 1983. **A catalogue of the Araneae described between 1940 and 1981**. Manchester, Manchester University Press. 755p.

Burger, M. 2011. Structure and function of the female reproductive system in three species of goblin spiders (Arachnida: Araneae: Oonopidae). **Invertebrate Biology 130**:148-160.

Bryant, E. B. 1940. Cuban spiders in the Museum of Comparative Zoology. **Bulletin of the Museum of Comparative Zoology 86**:247-532.

Bryant, E. B. 1942. Notes on the spiders of the Virgin Islands. **Bulletin of the Museum of Comparative Zoology 89**:317-366.

Bryant, E. B. 1945. Notes on some Florida spiders. **Transactions of the Connecticut Academy of Arts and Sciences 36**:199-213.

Chamberlin, R. V. & Ivie, W. 1935. Miscellaneous new American spiders. **Bulletin of the University of Utah 26**:1-79.

Carvalho, L. S.; Bonaldo, A. B. & Brescovit, A. D. 2007. The first record of the family Cithaeronidae (Araneae, Gnaphosoidea) to the new world. **Revista Brasileira de Zoologia 24**:512-514.

Chickering, A. M. 1951. The Oonopidae of Panama. **Bulletin of the Museum of Comparative Zoology 106**:207-245.

Chickering, A. M. 1968a. The genus *Ischnothyreus* (Araneae, Oonopidae) in Central America and the West Indies. **Psyche 75**:77-86.

Chickering, A. M. 1968b. The genus *Triaeris* Simon (Araneae, Oonopidae) in Central America and the West Indies. **Psyche 75**:351-359.

Chickering, A. M. 1969. The family Oonopidae (Araneae) in Florida. **Psyche 76**:144-162.

Chickering, A. M. 1973. Notes on *Heteroonops* and *Triaeris* (Araneae; Oonopidae). **Psyche 80**:227-229.

Dalmas, R. de. 1916. Révision du genre *Orchestina* E.S., suive de la description de nouvelles espèces du genre *Oonops* et d'une étude sur les Dictynidae du genre *Scotolathys*. **Annales de la Société Entomologique de France 85**:203-258.

Dee Boersma, P.; Reichard S. & Van Buren, A. N. 2006. **Invasive species in the Pacific Northwest**. Washington, University of Washington Press. 276p.

Dumitrescu, M. & Georgescu, M. 1983. Sur les Oonopidae (Araneae) de Cuba. **Résultats des Expéditions Biospéologiques Cubano-Roumaines à Cuba 4**:65-114.

Gertsch, W. J. 1936. Further diagnoses of new American spiders. **American Museum Novitates 852**:1-27.

Freitas, G. C. C.; Brescovit, A. D. & Vasconcelos, S. D. 2013. Spider diversity on the oceanic island of Fernando de Noronha, Brazil, and implications for species conservation. **Journal of Insect Science 13**:1-16.

Indicatti, R. P. & Brescovit, A. D. 2008. Aranhas (Arachnida, Araneae) do Município de São Paulo. *In*: Malagoli, L. R.; Bajesteiro, F. B. & Whately M. orgs. **Além do concreto: contribuições para a proteção da biodiversidade paulistana**. São Paulo, Instituto Socioambiental, p. 54-89.

Izquierdo, M. A. & Ramirez, M. J. 2017. Taxonomic revision of the jumping goblin spiders of the genus *Orchestina* Simon, 1882, in the Americas (Araneae: Oonopidae). **Bulletin of the American Museum of Natural History 410**:1-362.

Jackson, A. R. 1908. On some rare arachnids captured during 1907. **Transactions of the Natural History Society of Northumberland 3**:49-78.

Kielhorn, K.-H. 2008. A glimpse of the tropics—spiders (Araneae) in the greenhouses of the Botanic Garden Berlin-Dahlem. **Arachnologische Mitteilungen 36**:26-34.

Koponen, S. 1997. *Triaeris stenaspis* (Araneae, Oonopidae) found in the Botanical Garden of the University of Turku, Finland. **Entomologica Fennica 8**:7.

Korenko, S.; Šmerda, J. & Pekár, S. 2009. Life-history of the parthenogenetic oonopid spider, *Triaeris stenaspis* (Araneae: Oonopidae). **European Journal of Entomology 106**:217-223.

Kozub, D.; Khmelik, K.; Shapoval, J.; Chentsov, V.; Litovschenko, B. & Starikh, V. 2012. **Helicon Focus 5.3**. Helicon Focus Ltd. Available at <www.heliconsoft.comhttp://cybercom.net/~dcoffin/dcraw/>. Accessed on 12 Oct 2018.

Kraus, F. 2009. **Alien Reptiles and Amphibians**. Springer, Berlin. 563p.

Kulczyński, W. 1899. Arachnoidea opera Rev. E. Schmitz collecta in insulis Maderianis et in insulis Selvages dictis. **Rozprawy i Sprawozdania z Posiedzen Wydzialu Matematyczno Przyrodniczego Akademji Umiejetnosci 36**:319-461.

Lawrence, R. F. 1952. A collection of cavernicolous and termitophilous Arachnida from the Belgian Congo. **Revue de Zoologie et de Botanique Africaines 46**:1-17.

Long, J. 1981. **Introduced Birds of the World: The worldwide history, distribution, and influence of birds introduced to new environments.** New York, Universe Books. 528p.

Long, J. 2003. **Introduced Mammals of the World: their History, Distribution and Abundance.** CSIRO Publishing, Collingwood, Victoria, Australia, and CABI Publishing, Wallingford, United Kingdom, 589p.

Malumbres-Olarte, J.; Barratt, B. I. P.; Vink, C. J.; Paterson, A. M.; Cruickshank, R. H.; Ferguson, C. M. & Barton, D. M.. 2015. Big and aerial invaders: dominance of exotic spiders in burned New Zealand tussock grasslands. **Biological Invasions 16**:2311-2322.

Marques, M. I.; Adis, J.; Battirola, L. D.; Brescovit, A. D.; Silva, F. H. O. & Silva, J. L. 2007. Composição da comunidade de artrópodes associada à copa de *Calophyllum brasiliense* (Guttiferae) no Pantanal, Mato Grosso, Brasil. **Amazoniana 19**:131-148.

Mello-Leitão, C. F. de 1920. Algumas aranhas novas. **Revista da Sociedade Brasileira de Sciencias 3**:169-176.

Mello-Leitão, C. F. de 1926. Algumas aranhas do Brasil meridional. **Boletim do Museu Nacional do Rio de Janeiro 2**:1-18.

Ott, R. & Brescovit, A. D. 2013. First record of *Cithaeron reimoseri* (Araneae: Cithaeronidae) from the New World and first record of the family from southern Brazil. **Check List 9**:1594-1595.

Pearce, F. 2015. **The new wild: why invasive species will be nature's salvation**. Boston, Beacon Press. 245p.

Petrunkevitch, A. 1929. The spiders of Porto Rico. Part one. **Transactions of the Connecticut Academy of Arts and Sciences 30**:1-158.

Platnick, N. I. & Dupérré, N. 2009a. The goblin spider genera *Opopaea* and *Epectris* (Araneae, Oonopidae) in the New World. **American Museum Novitates 3649**:1-43.

Platnick, N. I. & Dupérré, N. 2009b. The goblin spider genus *Heteroonops* (Araneae, Oonopidae), with notes on *Oonops*. **American Museum Novitates 3672**:1-72.

Platnick, N. I.; Dupérré, N.; Ott, R. & Kranz-Baltensperger, Y. 2011. The goblin spider genus *Brignolia* (Araneae, Oonopidae). **Bulletin of the American Museum of Natural History 349**:1-131.

Platnick, N. I.; Dupérré, N.; Ubick, D. & Fannes, W. 2012a. Got males? The enigmatic goblin spider genus *Triaeris* (Araneae, Oonopidae). **American Museum Novitates 3756**:1-36.

Platnick, N. I.; Berniker, L. & Kranz-Baltensperger, Y. 2012b. The goblin spider genus *Ischnothyreus* (Araneae, Oonopidae) in the New World. **American Museum Novitates 3795**:1-32.

Platnick, N. I.; Dupérré, N.; Ott, R.; Baher, B. & Kranz-Baltensperger, Y. 2012c. The goblin spider genus *Pelicinus* (Araneae, Oonopidae), Part 1. **American Museum Novitates 3741**:1-43.

Pompozzi, G.; Peralta, L. & Simó, M. 2013. The invasive spider *Badumna longinqua* (L. Koch, 1867) (Araneae: Desidae) in Argentina: New distributional records, with notes on its expansion and establishment. **Check List 9**:218-221.

Reimoser, E. 1933. Fauna Sumatrensis. Araneina. I. Systematischer Teil. **Tijdschrift voor Entomologie 76**:396-400.

Roewer, C. F. 1942. **Katalog der Araneae von 1758 bis 1940**. 1. Band (Mesothelae, Orthognatha, Labidognatha: Dysderaeformia, Scytodiformia, Pholciformia, Zodariiformia, Hersiliaeformia, Argyopiformia). Natura, Buchhandlung für Naturkunde und exakte Wissenschaften Paul Budy Bremen. 1040p.

Roewer, C. F. 1954. **Katalog der Araneae von 1758 bis 1940.** Bremen. v.2. 1751p.

Rodríguez-Rodríguez, S. E.; Solís-Catalán, K. P. & Valdez-Mondragón, A. 2015. Diversity and seasonal abundance of anthropogenic spiders (Arachnida: Araneae) in different urban zones of the city of Chilpancingo, Guerrero, Mexico. **Revista Mexicana de Biodiversidad 86**:962-71.

Ruiz, G. R. S. & Bonaldo, A. B. 2013. Vagabond but elusive: two newcomers to the eastern Amazon (Araneae: Cithaeronidae; Prodidomidae). **Zootaxa 3694**:92-96.

Saaristo, M. I. 1999. An arachnological excursion to the granitic Seychelles, 1-26th January 1999. Arachnid species lists for Silhouette, Cousine & Mahé. **Phelsuma 7**:1-12.

Saaristo, M. I. 2001. Dwarf hunting spiders or Oonopidae (Arachnida, Araneae) of the Seychelles. **Insect Systematics & Evolution 32**:307-358.

Saaristo, M. I. 2007. The oonopid spiders (Aranei: Oonopidae) of Israel. **Arthropoda Selecta 15**:119-140.

Saaristo, M. I. & Marusik, Y. M. 2008. A survey of African *Opopaea* Simon, 1891 (Arachnida, Aranei, Oonopidae). **Arthropoda Selecta 17**:17-53.

Sierwald, P. 1988. Spiders of Bermuda. **Nemouria, Occasional Papers of the Delaware Museum of Natural History 31**:1-24.

Simó, M.; Laborda, A.; Núñez, M. & Brescovit, A. D. 2015. First records of the invasive spider *Badumna longinqua* (L. Koch) (Desidae) in southern Brazil with notes on the habitats and the species' dispersion. **CheckList 11**:1533-1535.

Simon, E. 1891. On the spiders of the island of St. Vincent. Part 1. **Proceedings of the Zoological Society of London 1891**:549-575.

Simon, E. 1893a. Études arachnologiques. 25e Mémoire. XL. Descriptions d'espèces et de genres nouveaux de l'ordre des Araneae. **Annales de la Société Entomologique de France 62**:299-330.

Simon, E. 1893b. Arachnides. *In*: Voyage de M. E. Simon au Venezuela (décembre 1887 - avril 1888). 21e Mémoire. **Annales de la Société Entomologique de France 61**:423-462.

Simon, E. 1893c. **Histoire naturelle des araignées**. Paris, Librairie encyclopedique de Roret, v. 1, p.257-488.

Simon, E. 1893d. Descriptions de quelques arachnides appartenant aux familles des Leptonetidae et Oonopidae. **Annales de la Société Entomologique de France 62**:247-248.

Simon, E. 1907. Arachnides recueillis par L. Fea sur la côte occidentale d'Afrique. 1re partie. **Annali del Museo Civico di Storia Naturale di Genova 3**:218-323.

Suman, T. W. 1965. Spiders of the family Oonopidae in Hawaii. **Pacific Insects 7**:225-242.

Taucare-Ríos, A. & Bustamante, R. O. 2015. Alien spiders in Chile: evaluating Darwin's naturalization hypothesis. **Journal of Arachnology 43**:90-96.

Thoma, M.; Kranz-Baltensperger, Y.; Kropf, C.; Graber, W.; Nentwig, W. & Frick, H. 2014**.** The new Southeast Asian goblin spider genus *Aposphragisma* (Araneae, Oonopidae): diversity and phylogeny. **Zootaxa 3798**:1-86.

Thompson, K. 2014. **Where do camels belong?** Vancouver/Berkeley, Greystone Books. 262p.

Thorell, T. 1890. Studi sui ragni Malesi e Papuani. IV, 1. **Annali del Museo Civico di Storia Naturale di Genova 28**:1-419.

Thorell, T. 1895. **Descriptive catalogue of the spiders of Burma**. London. 406p.

Wunderlich, J. 1987. **Die Spinnen der Kanarischen Inseln und Madeiras: Adaptive Radiation, Biogeographie, Revisionen und Neubeschreibungen**. Langen, Triops Verlag. 435p.

World Spider Catalog 2019. **World Spider Catalog. Version 19.5**. Natural History Museum Bern. Available at http://wsc.nmbe.ch. Accessed on 15 March 2019.