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### The first Hapalotremus Simon, 1903 (Araneae: Theraphosidae) from Argentina: description and natural history of Hapalotremus martinorum sp. nov.

Patricio E. Cavallo<sup>a</sup> & Nelson E. Ferretti<sup>b</sup>

<sup>a</sup> Universidad CAECE (Centro de Altos Estudios en Ciencias Exactas), Buenos Aires, Argentina

<sup>b</sup> Centro de Estudios Parasitológicos y de Vectores CEPAVE (CCT-CONICET- La Plata) (UNLP), La Plata, Argentina

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## The first *Hapalotremus* Simon, 1903 (Araneae: Theraphosidae) from Argentina: description and natural history of *Hapalotremus martinorum* sp. nov.

Patricio E. Cavallo<sup>a</sup> and Nelson E. Ferretti<sup>b\*</sup>

<sup>a</sup>Universidad CAECE (Centro de Altos Estudios en Ciencias Exactas), Buenos Aires, Argentina;

<sup>b</sup>Centro de Estudios Parasitológicos y de Vectores CEPAVE (CCT- CONICET- La Plata) (UNLP), La Plata, Argentina

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A new species of *Hapalotremus* Simon, 1903 from northern Argentina is described and illustrated. *Hapalotremus martinorum* sp. nov. differs from all other congeners by the colour pattern of live specimens. Males differ in the male palpal bulb morphology, with thickened and less curved embolus having a blunt subapical keel and less-developed apical keel. Females differ in the shape of the spermathecae, with the lateral bases more pronounced than the superiors and the upper edge more rounded. Specimens were captured inhabiting short burrows or crevices under stones in high cloud forests. *Hapalotremus cyclothorax* (Mello-Leitão 1923) is a junior synonym of *Homoeomma montanum* (Mello-Leitão, 1923), *Hapalotremus scintillans* (Mello-Leitão 1929) is a junior synonym of *Pachistopelma rufonigrum* Pocock, 1901, *Hapalotremus exilis* (Mello-Leitão 1923) and *Hapalotremus muticus* (Mello-Leitão 1923) are considered *species inquirenda*.

<http://zoobank.org/urn:lsid:zoobank.org:pub:1758F6FD-8883-445D-A757-0AC7E120DCF6>

**Keywords:** taxonomy; theraphosid; South America; Neotropical; Yungas

### Introduction

Theraphosid tarantulas comprise 124 genera and 950 species (Platnick 2013), being the most speciose family of Mygalomorphae, which includes the largest spiders in the world. The subfamily Theraphosinae is endemic to the New World and has the highest species richness of the family Theraphosidae. Little is known about the natural biology of many species of Theraphosidae and its taxonomy has been considered to be in a chaotic state (Raven 1990). Despite the progress in the taxonomy of Theraphosidae in the last 20 years, much is yet to be done (Bertani et al. 2012).

The genus *Hapalotremus* Simon, 1903 comprises six species distributed in Bolivia, Brazil and Peru (Platnick 2013). The type species, *Hapalotremus albipes* Simon, 1903 was described from a single adult male collected in Bolivia. This species is characterized by a whitish pattern on the dorsal abdomen and by white pubescence on the legs (from patella to tarsi), as Simon (1903) stated: “*macula anteriore subtriquetra fulvopilosa maculaque media majore subrotunda nigerrimo vellutina et albo-limbata decoratum, pedes albido-pubescentes*”. Gerschman de Pikelín and Schiapelli (1973) diagnosed the genus *Hapalotremus* and showed details of the tibial apophysis and the bulb

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\*Corresponding author. Email: [nferretti@conicet.gov.ar](mailto:nferretti@conicet.gov.ar)

of *H. albipes*. Later, Schmidt (1993) described for the first time the female of *H. albipes* based on a specimen from Bolivia with no further details on locality. Schmidt (1993) presented a picture of the spermathecae consisting in a single spermathecal receptaculum with superior lateral edges being of equal width to the bases. *Hapalotremus major* (Chamberlin 1916) is based on specimens from Peru, Cuzco Valley and Urubamba at an altitude of 2895 m. This species was originally described under *Hemirrhagus* and later transferred to *Hapalotremus* by Pérez-Miles and Locht (2003) because of the characteristic male palpal organ morphology and other characters of generic significance that remained unspecified. *Hapalotremus cyclothorax* (Mello-Leitão 1923) was originally placed in own genus, *Cyclothorax*, renamed *Cyclothoracoides* by Strand (1929). Then, Raven (1985) considered *Hapalotremus* as a senior synonym of *Cyclothoracoides*. *Hapalotremus cyclothorax* was based on a male specimen from Brazil, Retiro de Itatiaya (Atlantic Forest) at about 2200 m. The female of *H. cyclothorax* is still unknown. *Hapalotremus muticus* (Mello-Leitão 1923), described under the genus *Goniodontium*, later synonymized by Raven (1985) is known only by a female collected from Villa Nova, Bahia state, Brazil in Atlantic Forest. *Hapalotremus exilis* (Mello-Leitão 1923) and *Hapalotremus scintillans* (Mello-Leitão 1929), both from Brazil, were also described under *Dolichothele* and later synonymized with *Hapalotremus* by Raven (1985). This synonymy was later rejected by Schmidt (2002) because *Dolichothele exilis* (type species) belongs to the theraphosid subfamily Ischnocolinae, and the genus *Dolichothele* was considered *incertae sedis* because the male is unknown.

In a recent survey carried out in the high cloud forest of Salta province, northern Argentina, a new species of *Hapalotremus* was discovered. The present work enhances the geographical distribution of *Hapalotremus*, describing the first species representative of the genus in Argentina. Additionally, *H. cyclothorax* is considered a junior synonym of *Homoeomma montanum* (Mello-Leitão, 1923), *H. scintillans* is proposed as a junior synonym of *Pachistopelma rufonigrum* Pocock, 1901, *H. exilis* and *H. muticus* are considered as *species inquirenda*.

### Materials and methods

Specimens were collected in Salta province, Argentina. The vegetation corresponds to the Yungas region (Cabrera and Willink 1980), comprising high cloud forest. Abbreviations: ALE = anterior lateral eyes, AME = anterior median eyes, *D* = dorsal, MLP = Museo de La Plata, Argentina, MNHN = Muséum National d'Histoire Naturelle, Paris, *P* = prolateral, PB = prolateral branch of tibial apophysis, PI = prolateral inferior keel, PLE = posterior lateral eyes, PLS = posterior lateral spinnerets, PME = posterior median eyes, PMS = posterior median spinnerets, PS = prolateral superior keel, *R* = retrolateral, RB = retrolateral branch of tibial apophysis, SMF = Senckenberg Museum, Frankfurt-am-Main. Female genitalia was dissected and cleared in concentrated lactic acid for 60–120 minutes to study the shape of spermathecae. All measurements are given in millimetres and were made with digital dial callipers with an error of 0.01 mm, rounded up to one significant decimal place where appropriate, and an Olympus stereoscopic microscope equipped with a calibrated ocular micrometer scale. Leg measurements were made dorsally. Photographs of preserved material were taken with a SONY Hx200v. The materials studied are deposited in the arachnological collection of the Museo de La Plata (MLP,

Luis Pereira), Buenos Aires, Argentina. Spine notation follows Petrunkevitch (1925). Palpal bulb structure classification follows Bertani (2000). Classification of urticating setae follows Cooke et al. (1972). Images and illustrations of type material and additional material from *Haplotremus albipes* were supplied to the authors by MNHN and SMF. Permission to use data, diagrams and images of examined material was obtained from colleagues (Fernando Pérez-Miles and Fabian Vol). All specimens were collected from areas outside Protected Areas and did not involve any endangered or protected species; hence collection and/or study permits were not required.

## Taxonomy

### Family THERAPHOSIDAE Genus *Haplotremus* Simon, 1903

*Dolichothele* Mello-Leitão, 1923. Considered a junior synonym by Raven 1985: 152.  
*Goniodontium* Mello-Leitão, 1923. Considered a junior synonym by Raven 1985: 153.  
*Cyclothorax* Mello-Leitão, 1923, preoccupied. Replacement name *Cyclothoracoides* Strand, (1929): 17. Considered a junior synonym by Raven 1985: 151.  
*Hemirrhagus* Simon, 1903 (in part: *H. major* Chamberlin, 1916).

#### Diagnosis

Representatives of the genus can be distinguished from the remaining Theraphosinae by the presence of reddish or whitish setae (colour of live specimens) on dorsum abdomen, presence of Type III urticating hair, labium wider than long with reduced labial cuspules (from 5 to 7 in *H. albipes* and *H. major*), with the exception of *Haplotremus martinorum* sp. nov. with 28 labial cuspules in females. It is characterized by the tarsi fully scopulated and divided by rows of setae increasing in width from legs I to IV, with tarsus IV divided by five or six rows of setae. Males of *Haplotremus* are also recognized by the following features: tibial apophysis present with two branches, the prolateral bearing a long stiff black thorn on inner side, slightly curved at tip and of similar size to the spur, the retrolateral with a long spine inserted on inner side at the middle of the spur, metatarsus of leg I noticeably curved at base, and male palpal bulb with embolus subcylindrical curved to the retrolateral side with conspicuous subapical keel. Females may be also recognized by the single spermathecal receptaculum.

### *Haplotremus albipes* Simon, 1903

#### Type material

*Haplotremus albipes* Simon, 1903, holotype male, Bolivia (Chaco), MNHN – images and illustrations examined (F. Pérez-Miles and F. Vol pers. comm.).

#### Other material examined

*Haplotremus albipes* Simon, 1903, three females, Bolivia, P. Klass leg. (SMF37093), SMF – illustrations examined (F. Pérez-Miles pers. comm.).

***Hapalotremus martinorum* sp. nov.**  
(Figures 1–3AB, 5, Tables 1–2)

*Types*

Holotype: male: ARGENTINA: Salta province (25°09.513' S, 65°36.704' W), 20 April 2011, Patricio E. Cavallo, Martin Hüsser and Martin Gamache legs. Found southwest of Salta, near provincial route 33, adjacent to Escoipe River at an altitude of 1496 m, (MLP 19152). Paratype female (MLP 19153): same data as holotype.

*Etymology*

The specific epithet is a patronym in honour of Martin Hüsser (Switzerland) and Martin Gamache (Canada), who participated in the collection and discovery of this new species.

*Diagnosis*

Males and females of *Hapalotremus martinorum* sp. nov. differ from all other congeners by the colour pattern of live specimens with distinct greenish pubescence between the patella and tarsi of the legs, also on the lateral faces of the abdomen, and by the reddish setae of the urticating setae patch on the dorsal abdomen (Figure 1). From *H. albipes* by the smaller size of adult males and females; males by the palpal bulb morphology with the thickened and less curved embolus having a blunt subapical keel and less-developed apical keel, and less curved metatarsus I (Figure 2A, B, E). Females of *H. martinorum* differ from *H. albipes* Simon 1903 by the shape of the spermathecae, with the lateral expansions in the base being wider than apical portion; the upper edge is also more rounded (Figure 3B, C). *Hapalotremus martinorum* sp. nov. resembles *H. major* (Chamberlin 1916) by the reddish setae on the abdomen dorsum but differs from this species by the smaller size and by the male palpal bulb morphology, with thickened and less curved embolus (Figure 2A, B).



Figure 1. *Hapalotremus martinorum* sp. nov. (A) Paratype female, habitus; (B) holotype male, habitus. Scale = 1.0 cm.

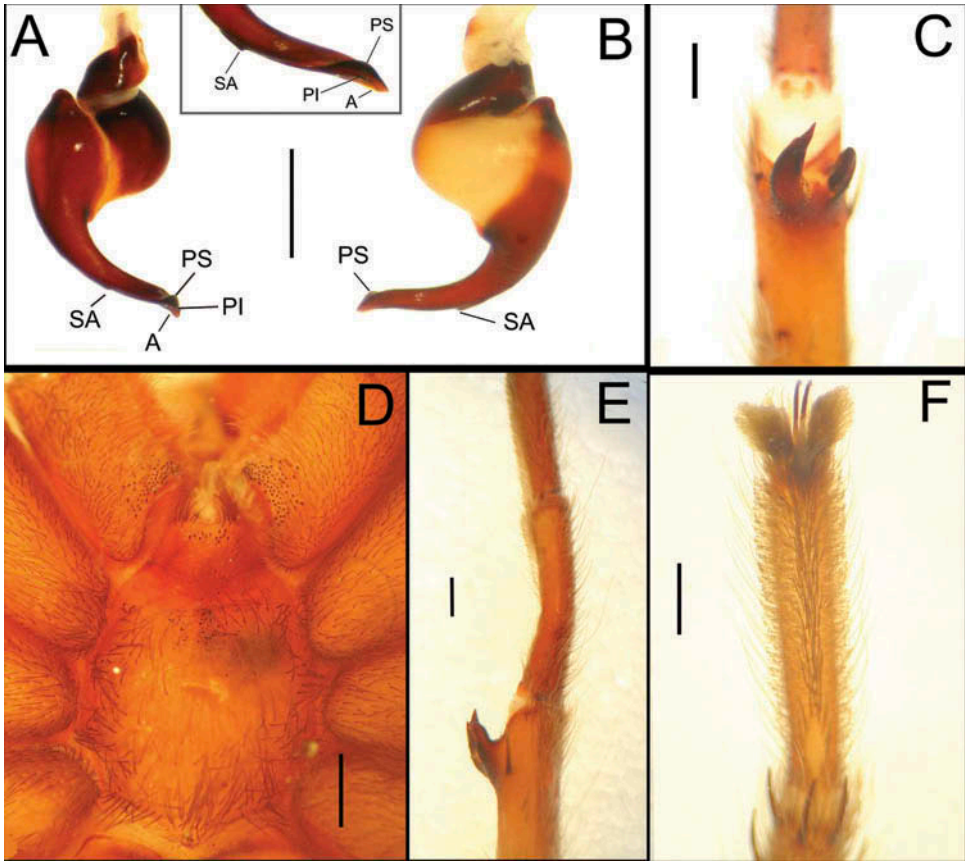


Figure 2. *Hapalotremus martinorum* sp. nov., male. (A) Left palpal bulb, prolateral; (B) left palpal bulb, retrolateral; (C) tibial apophysis, ventral view; (D) sternum, ventral view; (E) prolateral face of leg I; (F) tarsus IV, ventral view. Scale = 1.0 mm.

### Description

*Male* (holotype, MLP 19152). Colour in life: legs and palps femora dark, patella to tarsi with lighter pubescence. Carapace ochre, light brown, with margins bearing long pinkish setae. Lateral sides of abdomen with light green pubescence and yellowish-reddish setae on dorsum (Figure 1B). Total length (not including chelicerae or spinnerets) 15.9. Cephalothorax 8.3 long, 7.8 wide. Abdomen 7.5 long, 4.0 wide. Urticating setae type III present, posterior dorsal circular patch. Spinnerets: PMS, 1 long, 0.4 wide; PLS, 0.6 basal, 0.6 middle, 0.3 domed distal. Eyes: tubercle length 0.65, width 0.8. Clypeus 0.3. Anterior eyes row procurved, posterior row recurved. Eyes sizes and inter-distances: AME 0.11, ALE 0.21, PME 0.10, PLE 0.13, AME–AME 0.16, AME–ALE 0.07, PME–PME 0.39, PME–PLE 0.06, ALE–PLE 0.10. Fovea: deep straight, 0.8 long. Labium: length 1.1, width 1.25, with 13 cuspsules (Figure 2D). Maxillae: each with 69 and 79 cuspsules spread over internal face (Figure 2D). Sternum: length 3.5, width 3.

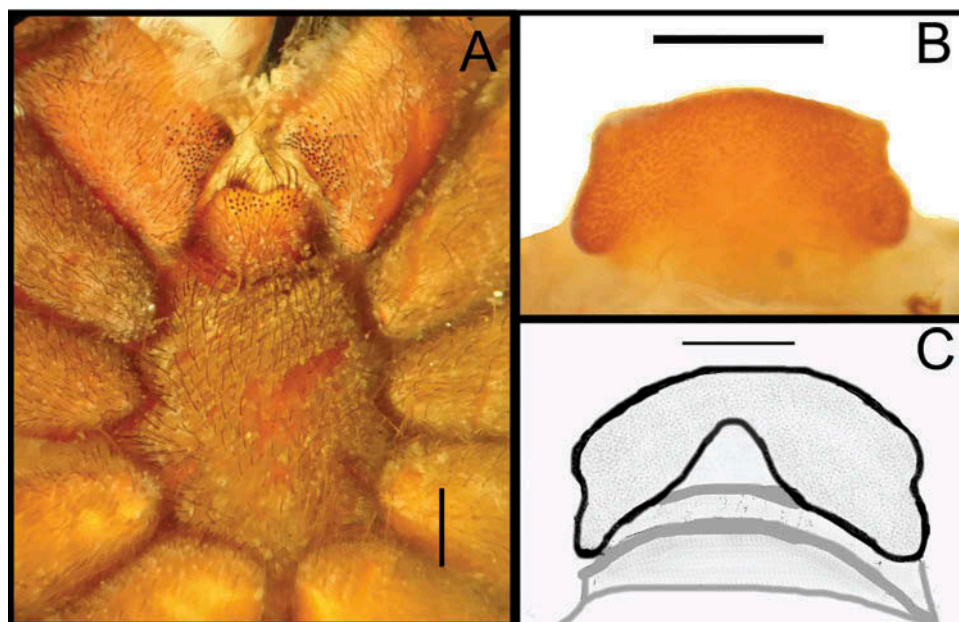


Figure 3. *Hapalotremus martinorum* sp. nov., female (A–B). *Hapalotremus albipes* Simon, 1903, female (SMF37093) (C). (A) Sternum, ventral view; (B) spermathecae, dorsal view; (C) spermathecae, ventral view. Scale = 1.0 mm.

Table 1. *Hapalotremus martinorum* sp. nov., length of leg and palpal segments of male.

	I	II	III	IV	Palp
Femur	6.9	6.1	5.3	6.4	4.7
Patella	3.9	3.5	3.4	3.4	2.8
Tibia	5.3	4.8	4.4	6.0	3.9
Metatarsus	4.5	4.5	5.4	7.3	–
Tarsus	3.7	3.5	3.6	4.2	1.6
Total	24.3	22.4	22.1	27.3	13.0

Table 2. *Hapalotremus martinorum* sp. nov., length of leg and palpal segments of female.

	I	II	III	IV	Palp
Femur	6.3	5.5	5.0	6.6	4.7
Patella	4.2	3.0	3.7	4.2	3.5
Tibia	5.0	4.4	4.3	5.4	3.9
Metatarsus	4.0	3.8	4.6	7.6	–
Tarsus	3.6	3.3	3.7	4.2	4.1
Total	23.1	20.0	21.3	28.0	16.2



Chelicerae with 13 large teeth on promargin and 16 small teeth on retromargin. Length of legs and palpal segments in Table 1. Tarsi I–IV fully scopulated divided by rows of setae increasing in width from legs I to IV (Figure 2F). Metatarsi I one-half apical scopulated, II one-third apical scopulated, III one-half apical scopulated, IV one-quarter apical scopulated.

Spination. Femora and patellae of I–IV and palp, 0. Tibiae: palp 0; I 1 V, 1–1–1 R, 1 P; II 2–2–2 V, 1–1 P; III 1–1–2 V, 1–1 R, 1–1 P; IV 1–1–1–1–2 V, 1–1–1–1 R, 1–1–1–1 P. Metatarsi: I 2 V; II 1–1–2 V, 1 P, 1 D; III 1–1–3 V, 1–1–1 R, 1 P, 1–1–1 D; IV 1–1–1–2 V, 1–1–1–1–1 R, 1–1–1 P. Tarsi I–IV, palps 0.

Tibia I with ventral apophysis, the PB bearing a long stiff black thorn on inner side, slightly curved at tip and of similar size to the spur, RB with a long spine inserted on inner side at the middle of the spur (Figure 2C). Metatarsus I moderately curved (Figure 2E). Male palpal bulb with embolus subcylindrical, curved 70° to the retrolateral side. Prolateral keels present, the subapical keel (SA) conspicuous and blunt, the PS forming the embolus edge distally and pronounced; PI less-developed, apical keel not pronounced, R absent (Figure 2A, B).

*Female (paratype, MLP 19153).* Colour in life: colour pattern as in male, but patella to tarsi with very light green pubescence, carapace dark, and reddish setae on dorsum more evident than male (Figure 1A). Total length (not including chelicerae or spinnerets) 25.1. Cephalothorax 9.4 long, 8.6 wide. Abdomen 15 long, 10.8 wide. Urticating setae type III present, posterior dorsal circular patch. Spinnerets: PMS, 1 long, 0.7 wide; PLS, 1 basal, 1 middle, 0.6 domed distal. Eyes: tubercle length 1.5, width 1. Clypeus 0.4. Anterior eyes row procurved, posterior row recurved. Eyes sizes and inter-distances: AME 0.15, ALE 0.41, PME 0.19, PLE 0.32, AME–AME 0.36, AME–ALE 0.09, PME–PME 0.69, PME–PLE 0.07, ALE–PLE 0.15. Fovea: deep straight, 1.3 long. Labium: length 1.5, width 2, with 28 cuspules (Figure 9). Maxillae: with 95 and 106 cuspules spread over internal face (Figure 3A). Sternum: length 4.4, width 4.

Chelicerae with 12 large teeth on promargin and 13 small teeth on retromargin. Length of legs and palpal segments in Table 2. Tarsi I–IV fully scopulated divided by rows of setae increasing in width from legs I to IV. Metatarsi I one-half apical scopulated, II one-third apical scopulated, III one-quarter apical scopulated, IV one-quarter apical scopulated.

Spination. Femora and patellae of II–IV, 0. Femora: palp 1 D; I 1 D. Tibiae: palp 0; I 1 V; II 1–1 P; III 1 R, 1 P; IV 1 V. Metatarsi: I 1–3 V; II 1–1–3 V; III 2 V, 1–1–1 R, 1–1–1 P; IV 1 D, 1–1–1–2 V, 1–1–1 P, 1 R. Tarsi I–IV, palps 0. Single spermathecal receptaculum with their lateral extensions in the base, being wider than apical portion, and the upper edge more rounded (Figure 3B).

### *Distribution*

Known only from the type locality (Figure 4).

### *Natural history*

*Haplotremus martinorum* sp. nov. was found inhabiting high cloud forest in the Yungas eco-region. This region comprises a hotspot of biodiversity in northern Argentina. The mean annual precipitation in this area is above 1000 mm; the mean

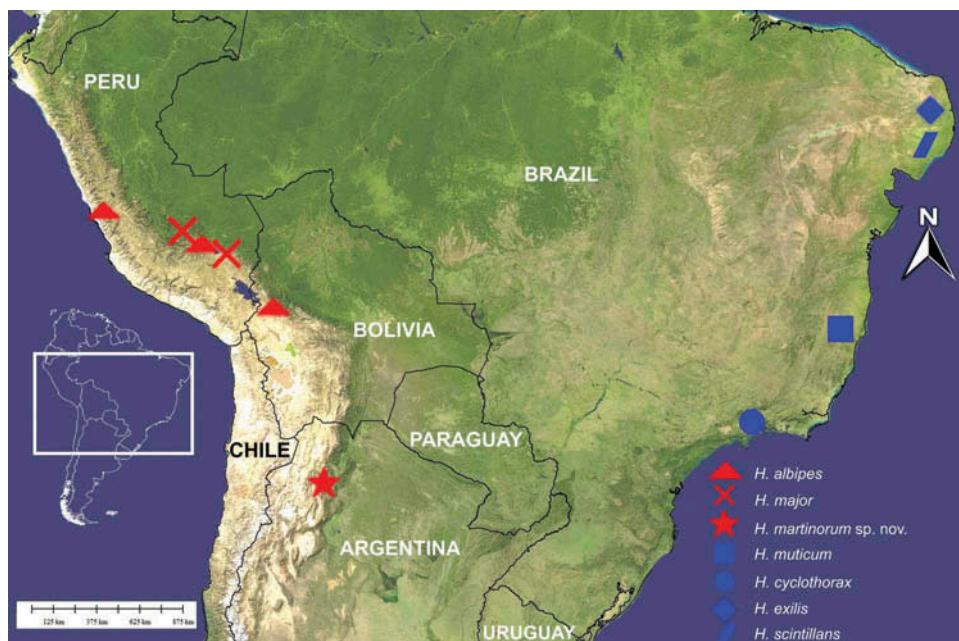


Figure 4. Distribution map of *Hapalotremes* species in South America.

temperature during April (autumn in southern hemisphere, when specimens were captured) is about 16.4°C and the relative humidity during this month is about 82.4% in the area. Individuals were found at 1496 m above sea level next to the Escoipe River and provincial Route 33 (Figure 5A, B). The nearest locality to the point where spiders were found is Las Ánimas, at approximately 45 km from Salta city. *Hapalotremes martinorum* sp. nov. is a fossorial theraphosid that occupies short burrows or crevices under stones (Figure 5C). Usually, the stones where individuals were found are covered with mosses and small ferns. This species could inhabit similar habitats as other theraphosids of the high cloud forests, as indicated by Pérez-Miles and Weinmann (2009) for species of *Cyriocosmus* Simon, 1903.

#### Misplaced species

##### *Homoeomma montanum* (Mello-Leitão, 1923)

*Tmesiphantes montanus* Mello-Leitão, 1923: 139, figs 48–50.

*Homoeomma montanum* Gerschman and Schiapelli, 1972: 249, figs 11–17 (transferred from *Tmesiphantes*).

*Hapalotremes cyclothorax* Mello-Leitão, 1923 new synonymy.

#### Type material

Holotype male: Brazil, Rio de Janeiro. Itatiaia. Retiro de Itatiaia (Retiro do Ramos, Parque Nacional de Itatiaia, about 2200 m). Carlos Moreira leg. 1903. Museu Nacional, Rio de Janeiro (1410), not examined.



Figure 5. *Hapalotremus martinorum* sp. nov. from Yungas region, Argentina (A–C). (A) Habitat, showing the Escoipe River; (B) microhabitat where specimens were found; (C) immature found under a stone. Scale = 1 cm.

### Notes

*Hapalotremus cyclothorax* was described by a single male from Retiro de Itatiaia (Rio de Janeiro, Brazil) (Figure 4) and the type material has been listed as “not located” in the annotated check list by Silva-Moreira et al. (2010) of Arachnida type specimens deposited in the Museu Nacional, Rio de Janeiro. It is possible that it could be a junior synonym of *Cantanduba tuskae* Yamamoto et al. (2012), *Oligoxystre mineirum* Guadanucci 2011 or *Magulla obesa* Simon, 1892, considering the overlapping of their geographical distributional range in the Atlantic forest (Indicatti et al. 2008; Guadanucci 2011; Yamamoto et al. 2012). However, *H. cyclothorax* differs from *C. tuskae*, *O. mineirum* and *M. obesa* in the colour pattern, the size of the body and legs and in the shape of the palpal bulb (Mello-Leitão stated in the original description that the male has a bulb with twisted embolus). Another species that overlaps its distributional range with *H. cyclothorax* is *Homoeomma montanum* (Mello-Leitão, 1923) (Gerschman de Pikelin and Schiapelli 1972, Yamamoto unpubl. data). Moreover, the type locality (Retiro de Itatiaia) of *H. montanum* is the same for *H. cyclothorax* and additionally, both specimens were captured by the same collector, Carlos Moreira (Gerschman de Pikelin and Schiapelli 1972). The length of body and legs of the male *H. cyclothorax* is

consistent with that of *H. montanum*. The colour pattern with abdomen dark bearing numerous long reddish setae, the tibial apophysis with two branches bearing short apical spines, the bent metatarsus I and the shape of the bulb with a curved embolus are characteristics typical of *Homoeomma* species (Gerschman de Pikelín and Schiapelli 1972, Yamamoto unpubl. data). For these reasons, *Hapalotremus cyclothorax* is considered a junior synonym of *Homoeomma montanum*.

### ***Pachistopelma rufonigrum* Pocock, 1901**

*Pachistopelma rufonigrum* Pocock 1901: 548; Mello-Leitão 1923: 337; Roewer 1942:256.

*Pachystopelma rufonigrum*: Simon 1903: 959; Petrunkevitch 1911: 82.

*Avicularia pulchra* Mello-Leitão 1933: 171, fig. 33.

*Avicularia recifiensis* Struchen and Brändle 1996:2, f 1–4.

*Pachystopelma rufonigrum* Bertani, 2012: 29, figs 29–45, 58–60, 67, 76–78.

*Hapalotremus scintillans* (Mello-Leitão, 1929) new synonymy.

#### *Type material*

Holotype female: Brazil, Pernambuco. Caruaru. Bento Pickel leg. Collected in bromeliads. Museu Nacional, Rio de Janeiro (215), not examined.

#### *Notes*

*Hapalotremus scintillans* was described from a single female from Caruaru (Pernambuco) (Figure 4) and the type material has been listed as “not located” in the annotated check list by Silva-Moreira et al. (2010) of Arachnida type specimens deposited in the Museu Nacional, Rio de Janeiro. Considering the type locality and the fact that the specimen was captured from inside bromeliads, *H. scintillans* could be a junior synonym of *Iridopelma hirsutum* Pocock, 1901 or *Pachistopelma rufonigrum* Pocock, 1901 (Bertani 2012). Both species had field records indicating a strict dependency on bromeliads occurring in the Brazilian Atlantic rainforest (Santos et al. 2004; Bertani 2012). *Hapalotremus scintillans* was originally described under *Dolichothele*, but later synonymized by Raven (1985). The general shape of the spermathecae presented by Bücherl et al. (1971) and Schmidt (2002) of other species originally described under *Dolichothele*, now *Hapalotremus exilis*, is also consistent with that of *Pachistopelma rufonigrum* (Bertani 2012). Moreover, the collector of the holotype of *H. scintillans*, D. Bento Pickel, is the same for the captured holotype of *Avicularia pulchra* Mello-Leitão, 1933, at Pernambuco state. Recently, Bertani (2012) considered *A. pulchra* a junior synonym of *P. rufonigrum* due to its geographical distribution and colour pattern. For these reasons and all the generic characteristics from the original description, *Hapalotremus scintillans* is a junior synonym of *Pachistopelma rufonigrum*.

### ***Hapalotremus exilis* (Mello-Leitão, 1923) species inquirenda**

*Dolichothele exilis* Mello-Leitão, 1923: 120.

*Dolichothele exilis* Bücherl, Da Costa and Lucas, 1971: 127, fig. 52.

*Dolichothele exilis* Schmidt, 2002: 16, fig. 1.

*Dolichothele* was transferred to *Hapalotremus* by Raven 1985: 152.

*Type material*

Holotype female: BRAZIL, Paraíba. Probably Campina Grande. Tranqüilino Leitão leg. Museu Nacional, Rio de Janeiro (13898), not examined.

*Remarks*

*Hapalotremus exilis* was described by a single female from Campina Grande (Paraíba) (Figure 4) and the type material has been listed as ‘not located’ in the annotated check list by Silva-Moreira et al. (2010) of Arachnida type specimens deposited in the Museu Nacional, Rio de Janeiro. According to the geographical distribution and many of the morphological characteristics from the original description, such as the small size of the female and the reduced number of labial and maxillary cuspules, together with the shape of the spermathecae presented by Bücherl et al. (1971) and Schmidt (2002) it could be a junior synonym of *Oligoxystre* (Guadanucci 2011) or *Guruyita* (Guadanucci et al. 2007) (Ischnocolinae). Unfortunately, the original description does not warrant recognition of the species, and, therefore the identity of *H. exilis* cannot be confirmed. The species is here considered *species inquirenda*, pending the finding of the type material or availability and careful examination of material from the type locality.

*Hapalotremus muticus* (Mello-Leitão, 1923) *species inquirenda*

*Goniodontium muticum* Mello-Leitão, 1923: 127.

*Goniodontium* was transferred to *Hapalotremus* by Raven (1985): 151.

*Type material*

Holotype female: Brazil, Bahia, Villa Nova, Garbo E. leg. Museu Paulista (N. 159), not examined.

*Remarks*

*Hapalotremus muticus* was described by Mello-Leitão in 1923 from a single female collected in Villa Nova, state of Bahia, Brazil (Figure 4). Mello-Leitão noted a reduced number of labial cuspules (of about three or seven) and maxillary cuspules of about 10–12. The author also remarked that the tarsi of all legs are scopulated and undivided. The original description does not warrant recognition of the species, and, therefore the identity of *H. muticus* cannot be confirmed. The species is here considered *species inquirenda*, pending the finding of the type material or availability and careful examination of material from the type locality.

## Discussion

Species of the *Hapalotremus* clearly show habitat preferences involving high altitudes at cloud forests and mountains of western South America. The species considered as valid in this work, *H. albipes*, *H. major* and *H. martinorum* sp. nov. are distributed in the biogeographic provinces Puna and Coastal Peruvian desert (Figure 6) at the South American Transition Zone of the Andean region (Morrone 2001, 2006). This area extends along the highlands of the Andes between western Venezuela, northern Chile, and west central Argentina. Moreover, a close biotic links has been proposed between the Coastal Peruvian Desert and Puna (Fjeldsa 1992; Posadas et al. 1997; Morrone 2004). *Hapalotremus martinorum* sp. nov. was found living at the southern limit of the Puna biogeographic province (Figure 6) at about 1500 m above sea level. This record is the lowest for the genus, considering that *H. albipes* and *H. major* live at altitudes between 2000 and 4000 m (Chamberlin 1916; Schmidt 2003; Krajič 2006). Krajič (2006) showed an image of a candidate *H. albipes* at the Cordillera Vilcanota in Peru at 4480 m and Chamberlin (1916) reported on a female *H. major* inhabiting altitudes of about 2895 m at Urubamba, Cuzco (Peru). The habitat of *H. albipes* at the Coastal Peruvian Desert involves an area of sparse vegetation, more abundant at both sides of rivers or next to the sea, and between 1500 and 3000 m the dominant vegetation comprises cacti and shrubs (Cabrera and Willink 1980; Morrone 2006). At the biogeographic province of Puna, *H. albipes* and *H. major* inhabit shrub steppes, montane grasslands with low shrubs, trees and grasses (Cabrera and Willink 1980;

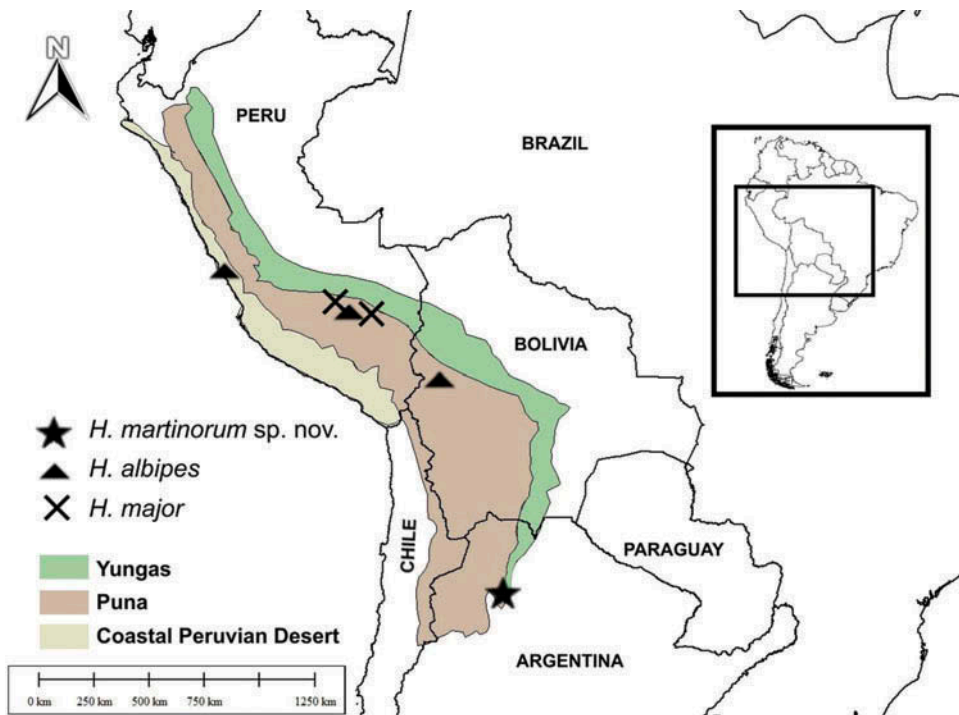


Figure 6. Distribution map of current *Hapalotremus* species in western South America at the Puna, Coastal Peruvian Desert and Yungas biogeographic provinces.

Morrone 2006). *Hapalotremus martinorum* sp. nov. was captured next to the Yungas biogeographic province and occupying a different habitat type in relation to that of *H. albipes* or *H. major*. The Yungas is characterized by dry and cloud forests, especially rich on Lauraceae and Myrtaceae plants, alternating with *Alnus accuminata* and *Podocarpus* spp. forests. Morales et al. (1995) recognized three vegetation types: premontane subtropical forest, montane subtropical humid forest and temperate cloud forest, where *H. martinorum* sp. nov. was found. According to the species of *Hapalotremus* from eastern South America (all originally described by Mello-Leitão), their localities are placed in the Brazilian Atlantic Forest within the states of Paraíba, Pernambuco, Bahia and Rio de Janeiro (from north to south) (Figure 4). The Atlantic Forest is a region that extends along the Atlantic coast of Brazil from Rio Grande do Norte state in the north to Rio Grande do Sul state in the south. This region is characterized by the following phytophysiology: tropical and subtropical moist broadleaf forests, tropical and subtropical dry broadleaf forests, Tropical and subtropical grasslands, savannas and shrublands, and mangrove forests (Dafonseca 1985). Some of these forests have between 700 and 1600 mm of precipitation annually with a distinct dry season. This includes deciduous and semi-deciduous seasonal forests each with their own lowland and montane regions. The Atlantic Forest is isolated from the Andean Forest mainly by the dry vegetation of the central depressions of the Chaco, resulting in an evolution of numerous endemic species (Dafonseca 1985). This large geographical barrier between the *Hapalotremus* species from the Andes and the Atlantic Forest, together with the advance during recent years in the study of the taxonomy of many theraphosid species from Brazil (Indicatti et al. 2008; Guadanucci 2011; Bertani 2012) led us to question the taxonomic status of the Brazilian *Hapalotremus* species. Moreover, the synonymies proposed by Raven (1985) involving *Cyclothoracoides*, *Dolichothele* and *Goniodontium* were made mainly considering only the reduced number of cuspules on the labium and maxillae, a widespread character between many theraphosid species (Guadanucci 2004, 2007; Indicatti et al. 2008; Guadanucci and Silva 2012; Guadanucci and Wendt 2014). Finally, a comprehensive cladistic analysis including all species of *Hapalotremus* is still needed to shed light on the status of the genus.

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