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On the identity of the type species of *Actinopus tarsalis* (Araneae: Actinopodidae)

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ABSTRACT. The type species of the Neotropical *Actinopus*, *A. tarsalis* Perty, 1833, is redescribed based on material from the type locality, the state of Piauí, Brazil. The species appears to be restricted to northeastern Brazil and is newly recorded from the state of Sergipe. An old record from the state of Rio Grande do Sul is rejected. *Actinopus tarsalis* differs from other species of the genus by details of the male copulatory bulb: tegular apophysis absent, robust embolar base, inserted basally at a right angle (90°); embolar apices apex flattened and expanded, arrow-shaped in dorsal view.

KEY WORDS. Arachnida; morphology; Mygalomorphae; Neotropical Region; taxonomy.

Actinopus was proposed by Perty (1833), to include only the type species, *Actinopus tarsalis* Perty, 1833, originally described in the same occasion. This species was based on a single male collected in the state of Piauí, Brazil, by J.B. von Spix and C.F.P. Martius, who traveled through Piauí during May, 1819, collecting in the villages of Amarante and Oeiras (Spix & Agassiz 1829, Papavero 1971, Levi 1964). The acceptance of *Actinopus* as a valid genus was not immediate, since Lucas (1837) transferred *A. tarsalis* to *Pachyloscelis* Lucas, 1835 and Walckenaer (1842) to *Sphodros* Walckenaer, 1835. C.L. Koch (1842) revalidated *Actinopus*, redescribing the type species and expanding its known distribution to Uruguay. The first informative illustrations of the male copulatory bulb were provided by Lucas *et al.* (1978/1979), based on a single specimen from São Raimundo Nonato, Piauí.

The systematic of Actinopodidae is now relatively well established. The seminal paper by Raven (1985) placed the family among the Fornicephalae, providing the first hypothesis of monophyly for the family. Presently, three putatively monophyletic lineages are recognized: the exclusively Neotropical *Actinopus*, the Australian/Chilean *Missulena* Walckenaer, 1805 and the Chilean *Plesiolena* Goloboff & Platnick, 1987. Goloboff & Platnick (1987) provided the first set of putative synapomorphies for *Actinopus*. Despite the advances in recognizing these putatively monophyletic groups, the taxonomic knowledge of Actinopodidae genera, especially that of *Actinopus*, is far from satisfactory. The 27 presently-valid species have not yet been revised, and preliminary surveys on Neotropical material from several collections indicate that the diversity of the genus is much larger than previously expected, with nearly twice the number of currently know species waiting to be described (L.T. Miglio, personal data). The first step toward a revision of such a large genus is to establish, beyond any doubt, the identity of its type species. The holotype was not located in the Musée de Historie Naturelle, Paris and, as most Perty's material, is probably lost. However, an exhaustive search for material coming from the state of Piauí revealed a number of individuals whose characteristics are consistent with those originally described for *A. tarsalis*. These individuals are co-specific with the specimen identified as such by Lucas *et al.* (1978/1979). Beyond the fact that the collecting localities of Spix & Martius in Piauí are within the area of occurrence here postulated for *A. tarsalis* in northeastern Brazil (Fig. 13), our specimens represent the only currently known species of *Actinopus* from Piauí (among four other morphospecies, all of them know only by males) that does not present characters fragrantly conflicting with the original description of *A. tarsalis*. We are therefore confident that the spiders presented below are co-specific with the specimen described by Perty (1833) as *A. tarsalis*. The record of this species for Uruguay by C.L. Koch (1842) probably refers to an erroneous identification: examining material from several localities in Uruguay, as well as from nearby regions (Rio Grande do Sul, Brazil and Buenos Aires, Argentina) indicated that *A. tarsalis* do not occur there.

Unfortunately, despite our efforts in gathering relevant material, the female of *A. tarsalis* remains unknown. The lack of females may be explained by the extreme behavioral differences presented by males and females in this genus. While the males present wandering habits, been commonly collected with pitfall-traps, the females dig trapdoor burrows to ambush their prey, which they rarely abandon (Coyle *et al.* 1990, Brescovit *et al.* 2002). These natural history particularities cause a predisposition on the number of *Actinopus* disponible in collections, in which nearly 75% are males and virtually no vial is composed by representatives of both sexes. Interestingly Coyle *et al.* (1989), suggested that females of *Actinopus* may be quite

abundant, reporting the observation of 50 *Actinopus* burrows in a single aggregation. Brescovit e*t al*. (2002) indicated that usually after the first specimen has been found, other specimens are easily seen, since their burrows present a clustered distribution. However, most of the modern records of *Actinopus* came from structured inventories, which employ a fixed, generally time-bounded sampling protocol that consistently undersamples trapdoor spiders and other burrowing arachnids.

MATERIAL AND METHODS

The material examined belongs to the following institutions (curators in parentheses): IBSP, Instituto Butantan, São Paulo, São Paulo, Brazil (D.M. Barros Battesti); MCN, Fundação Zoobotânica do Rio Grande do Sul, Museu de Ciências Naturais, Porto Alegre, Rio Grande do Sul, Brazil (E.H. Buckup); and MPEG, Museu Paraense Emilio Goeldi, Belém, Pará, Brazil (A.B. Bonaldo).

All measurements are expressed in millimeters. Measurements of length and width of the eye area and height from the fovea were taken according to Griswold & Ledford (2001). The format of the description follows Griswold & Ledford (2001), except for the spine pattern, which follows Petrunkevitch (1925). The terminology for the structures of the copulatory bulb follows Bertani (2000) and acronyms for the height of carapace follows Griswold & Ledford (2001).

Approximated latitude and longitude data for those records that were not georeferenced, were obtained from online gazetteers (Miranda & Coutinho 2004, Fallingrain Genomics 2006). The approximate travel route of Spix and Martius through Northwest Brazil was plotted in Fig. 12 is based on Papavero (1971).

Abbreviations used in the descriptions and illustrations: (TA) tegular apophysis, (PA) paraembolyc apophysis, (PAc) prolateral accessory keel, (PI) prolateral inferior keel, (PS) prolateral superior keel, (Fe) femur, (Pa) patella, (Ti) tibia, (Me) metatarsus, (Ta) tarsus, (d) dorsal, (v) ventral, (p) prolateral, (r) retrolateral, (PME) posterior median eyes, (PLE) posterior lateral eyes, (ALE) anterior lateral eyes, (AME) anterior median eyes, (MOQ) median ocular quadrangle, (OAL) ocular area length, (OAW) ocular area width, (HF) Height from the fovea.

TAXONOMY

Actinopus tarsalis Perty, 1833

Figs 1-12

Actinopus tarsalis Perty, 1833: 198, pl. 39, fig. 6 (holotype male, Piauí, Brasil, not located in MNHN, probably lost); C.L. Koch, 1842: 101, fig. 753; Simon, 1892: 80, figs 80, 82; Lucas *et al*., 1978/1979: 133, figs 3-6; Platnick, 2012.

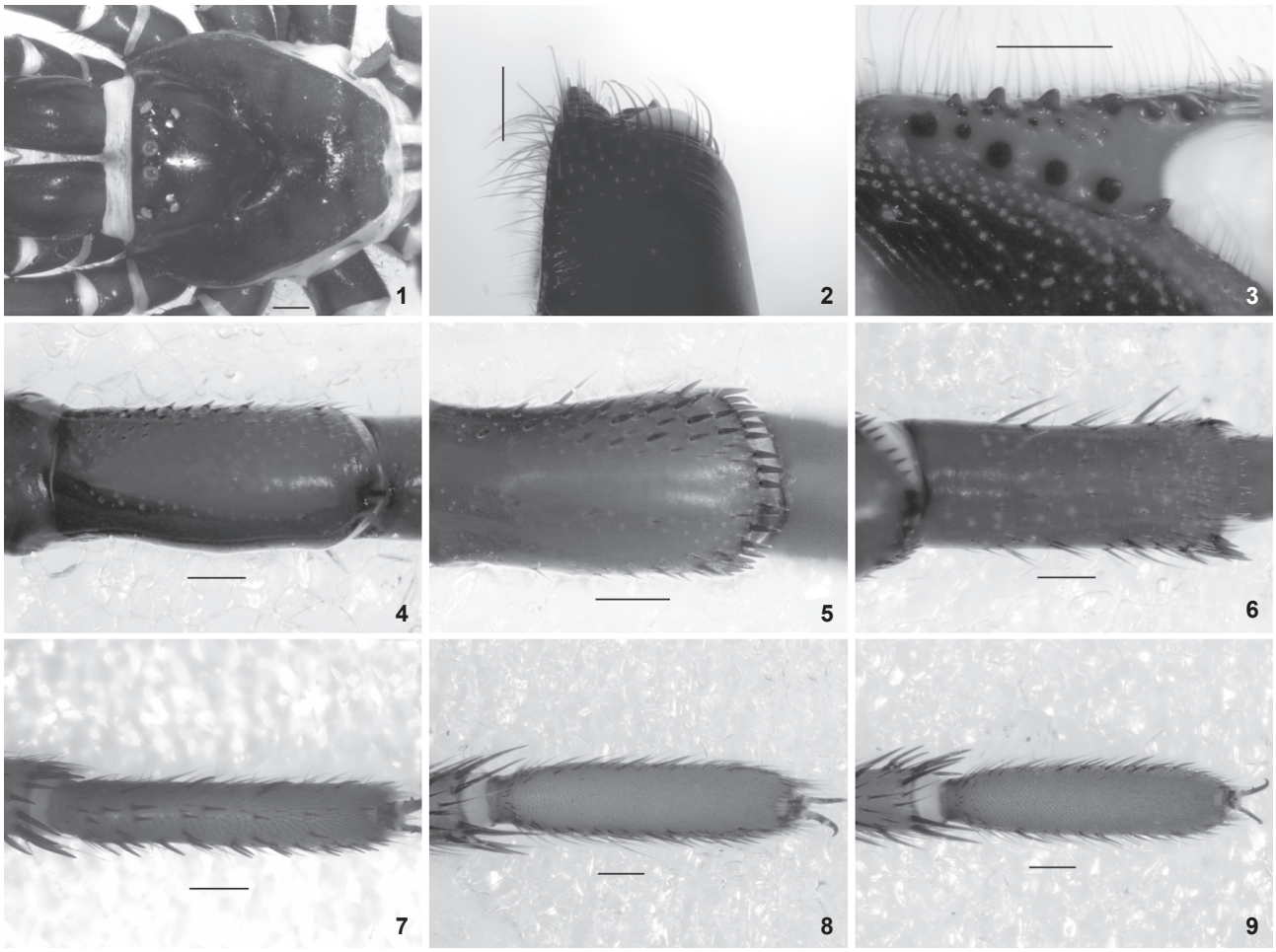
Pachyloscelis tarsalis; Lucas, 1837: 377.

Sphodros tarsalis; Walckenaer, 1842: 437.

Diagnosis. Males of *Actinopus tarsalis* differs from the ones of all other species of the genus by the copulatory bulb without a tegular apophysis and by the robust embolar base, inserted basally at a right angle (90°); embolar apex flattened and expanded, arrow-shaped in dorsal view (Figs 9-11).

Male (MPEG 11715). Total length 14.3; Carapace, long 6.51; wide 2.82. Carapace anterior region tapering. Anterior eye row slightly procurved, posterior row recurved (Fig. 1). One bristle between OMA-clypeus, few bristles distant between the PME-PME and PLE-PLE. Rastellum protuberant, inverted V-shaped, hirsute, without spines (Fig. 2). Chelicera with denticles close to the prolateral row of teeth (Fig. 3). Patella and tibia III with distal crown of well developed thorns (Figs 5 and 6). Patela III and IV with spines on prolaterodorsal face (Figs 4 and 5). Ventral scopulae occupying 50% of the length of tarsus I, 90% to 100% of II and III and IV (Figs 7 and 8). Scopula of tarsi I and II with setae spaced, forming diffuse group of bristles. Carapace and chelicera pale brown, sternum yellowish brown, coxae, trochantera, femora and patellae pale brown, tibiae, metatarsi and tarsi pale orange, abdomen pale gray. **Eyes: Diameters:** PME 0.19 PLE 0.24 ALE 0.36, AME 0.34; MOQ: Length 0.92, front width 0.92, back width 1.89; **Interdistances:** PME-PME 1.44, PLE-PME 0.09, AME-AME 0.22, ALE-AME 0.41, ALE-PLE 0.38, AME-PME 0.37. **Ocular area:** OAL 2.76, OAW 3.86, and IF 1.76. **Body:** Clypeus: 6.51; Fovea: 2.82; Labium: lenght 0.91; width 0.87; Chelicera: lenght 3.82; width 1.59; Sternum: lenght 3.03; width 2.56; Abdomen: lenght 7.56; width 5.18. **Leg measurements:** I: Fe 6.14/Pa 2.64/Ti 3.48/Me 4.76/Ta 2.93/total 19.95. II: 5.94/2.48/3.43/4.97/2.88/19.7. III: 4.66/2.58/2.25/4.96/3.34/17.77. IV: 6.5/2.89/4.98/5.44/3.12/22.93. Formula 4123. **Spinulation:** I – Fe v0, d0, p0, r0; Pa v0-0-1, d0, p0, r0; Ti v4-7-9, d0, p0-0-2, r0-0-3; Me v10-8-11, d0, p1-2-3, r0-1-3; Ta v10-7-10, d0, p0-1-3, r1-3-6. II – Fe v0, d0, p0, r0; Pa v0-0-1, d0, p0, r0; Ti v4-5-8, d0, p0-0-1, r1-3-5; Me v8-11-12, d0, p0-0-2, r2-4-6; Ta v9-8-6, d0, p0-0-1, r4-3-6. III – Fe v0, d0, p0, r0; Pa v0-0-4, d7-10-23, p1-0-3, r0-0-3; Ti v3-3-4, d1-0-3, p0-3-4, r0-0-4; Me v5-6-4, d0, p0-1-3, r1-2-5; Ta v0-1-2, d0, p1-4-6, r0-4-5; IV – Fe v0, d0, p0, r0; Pa v0-0-3, d15-8-3, p0, r0; Ti v3-2-5, d0, p0-1-0, r0-0-2; Me v8-9-6, d0, p1-1-3, r0-0-1; Ta v0-0-4, d0, p0-5-9, r0-2-3. **Palp:** PA well developed, embolus with three small keels (Pa, PI and PS); keels evident in dorsal and retrolateral views, barely visible prolaterally. TA absent; prolateral surface of tegulum serrated next the base of the embolus (Figs 9-11).

Variation. Males (n = 10): **Eyes: Diameters:** PME 0.17 ± 0.25, PLE 0.22 ± 0.39, ALE 0.34 ± 0.5, AME 0.3 ± 0.43; MOQ: Length 0.85 ± 1.36, front width 0.8 ± 1.44, back width 1.64 ± 2.52; **Interdistances:** PME-PME 1.37 ± 2.21, PLE-PME 0.05 ± 0.1, AME-AME 0.14 ± 0.37, ALE-AME 0.41 ± 0.86, ALE-PLE 0.37 ± 0.66, AME-PME 0.32 ± 0.67. **Ocular area:** OAL 2.76 ± 4.52, OAW 2.7 ± 3.87, and IF 1.58 ± 2.21. **Body:** Total lenght: 11.09 ± 16.38; Carapace: lenght 4.83 ± 7.04; Width 4.9 ± 6.47; Clypeus: 0.13 ± 0.26; Fovea: 2.12 ± 4.06; Labium: lenght 0.91 ± 1.57; Width 0.84 ± 1.34; Chelicera: lenght 2.68 ± 3.82; Width 1.4 ± 1.96; Sternum: lenght 3.03 ± 4.19; Width 2.56 ± 3.93; Abdomen: lenght 5.43 ± 7.74; Width 3.97 ± 6.39. **Leg measurements:** I: Fe 5.58 ±



Figures 1-8. *Actinopus tarsalis*, male, 1-8 MPEG 11715: (1) carapace; (2) rastelum, dorsal; (3) cheliceral teeth, ventral; (4) patella IV, dorsal; (5) patella III, dorsal; (6) tibia III, dorsal; (7) scopula, tarsus II, ventral; (8) scopula, tarsus III, ventral; (9) scopula, tarsus IV, ventral. Scale bars: 0.5 mm.

6.71/Pa 2.25 ± 2.82/Ti 3.48 ± 4.44/Me 4.3 ± 5.4/Ta 2.84 ± 3.23/ total 18.19 ± 22.6. II: 5.37 ± 6.68/2.24 ± 2.88/3.07 ± 4.17/4.37 ± 5.59/2.8 ± 3.37/17.89 ± 22.69. III: 4.26 ± 5.33/2.15 ± 3.05/2.08 ± 3.09/4.38 ± 5.79/2.78 ± 3.65/15.65 ± 20.85. IV: 5.72 ± 7.41/2.48 ± 3.31/4.11 ± 5.53/4.89 ± 6.19/2.95 ± 3.68/20.33 ± 26.09.

Material examined. Brazil: *Piauí*: Brasileira e Piracuruca, Parque Nacional de Sete Cidades, 04°05'56.3"S, 41°05'56.3"W, Campo Limpo, 3 males, 15-20.IX.2006, L.S. Carvalho *leg*. (MPEG 2535); Cerradão, 4 males, 26.I.2007, L.S. Carvalho, M.T.L. Avelino & M.P. Albuquerque *leg*. (MPEG 11715, MPEG 11717, MPEG 11718, MPEG 11720); Mata Seca Semidecídua, 2 males, 22.I.2007, L.S. Carvalho *leg*. (MPEG 11716); 1 male, 23.I.2007, L.S. Carvalho, M.T.L. Avelino & M.P. Albuquerque *leg*. (MPEG 11719); São Raimundo Nonato, 09°0'S, 42°41'W, 1 male, III.1979, C.R. Russo *leg*. (IBSP 104407); XI.1999, F. Wolf *leg*. (MCN 33484); *Sergipe*: Canindé de São Francisco, Rio São Francisco, Usina Hidrelétrica de Xingó, Área 8, 2 males, 08.VI.2000 (IBSP 114464); São Cristóvão, 1 male, 1988, (IBSP 110499).

Distribution. Known from the states of Sergipe and Piauí, Brazil. The record from Uruguay (C.L. Koch 1842) is rejected.

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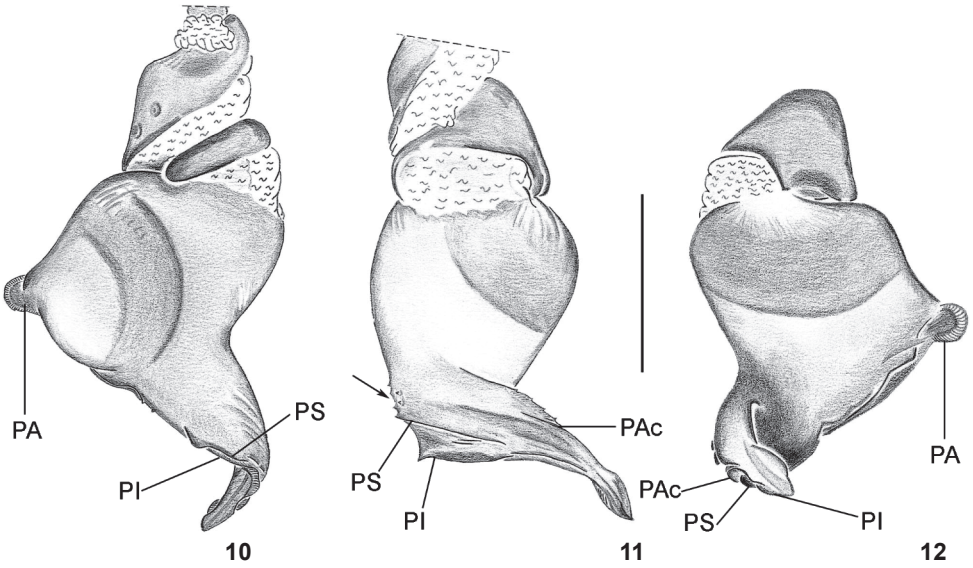

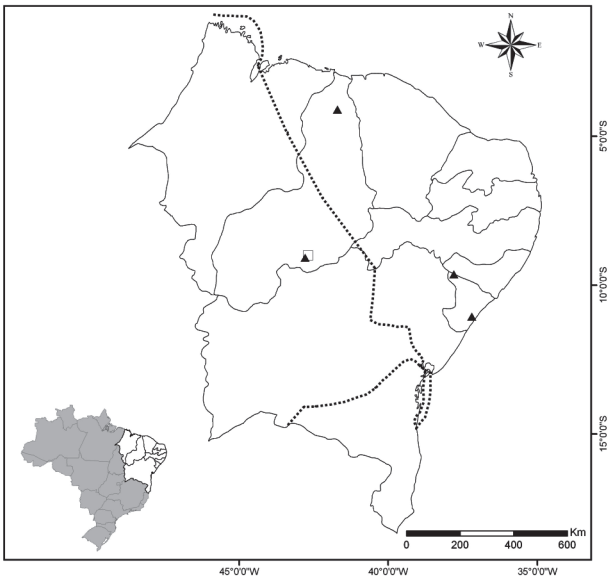

Figures 10-13. *Actinopus tarsalis*, male, 10-12 MPEG 11715: (10) copulatory bulb, prolateral; (11) copulatory bulb, dorsal; (12) copulatory bulb, retrolateral – (PA) Paraembolyc apophysis, (Pac) Prolateral accessory keel, (PI) prolateral inferior keel, (PS) prolateral superior keel. Arrow: serrated surface on prolateral tegulum; (13) known distribution of *Actinopus tarsalis*. The black triangles represent the records from the present paper; the white square represents the record by Lucas *et al.* (1978/1979). The dashed line indicates the approximated route of Spix & Martius expedition through northeastern Brazil, based on the information gathered by Papavero (1971). Scale bar: 1.0 mm.

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