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Two new species of *Phareicranaus* Roewer, 1913 (Opiliones: Laniatores: Cranaidae), with notes on gregarious behavior and maternal care in *Phareicranaus manauara*

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Abstract

In this paper we describe two new species of *Phareicranaus* Roewer, 1913: *Phareicranaus rohei* **sp. nov.** from the state of Amazonas, Brazil and *Phareicranaus tizana* **sp. nov.**, from the state of Zulia, Venezuela. The number of known species of this genus increases to 47. We discuss and suggest the possible relationships of these species with their relatives and assign them into the clades proposed by Pinto-da-Rocha & Bonaldo (2011). Additionally, we conducted field observations at the type locality of *Phareicranaus manauara* (Pinto-da-Rocha, 1994), provide the first descriptions of maternal care and gregarious behavior, and discuss the occurrence of this behavior in the genus.

Key words: Andes, Amazon, harvestmen, Neotropics, systematics, social behavior, taxonomy.

Introduction

Cranaids belonging to the genus *Phareicranaus* Roewer, 1913, are exquisitely colorful, large, hard-bodied and armored harvestmen endemic of tropical forests of Northern South America, ranging from the state of Acre, in Brazil, to Panamá (Townsend & Milne 2010; Pinto-da-Rocha & Bonaldo 2011). This group previously included 11 species, however *Santinezia* Roewer, 1923 was established as a junior synonym of *Phareicranaus* and now it comprises 45 taxa (Pinto-da-Rocha & Bonaldo 2011). Two other important papers have been published in the last decade on the genus (sub *Santinezia*): a taxonomic review of the Venezuelan species (González-Sponga 2003), and the first phylogenetic analysis (Pinto-da-Rocha & Kury 2003).

Phareicranaus was divided then into three groups of species based on 35 somatic and genital characters, as armature of the dorsal scutum and leg IV, number and distribution of setae and the shape of the ventral plate of the penis (Pinto-da-Rocha & Kury 2003). In a more recent revision, Pinto-da-Rocha & Bonaldo (2011) divided the genus into two clades based on 53 somatic and genital characters, and listed the following combination of characters supporting *Phareicranaus*: pedipalpal femur with a dorsoapical spine, strong ventral tubercles on pedipalpal femur, area II invading area I and base of penis glans ringed. The “first clade” is supported by the lateral strong tubercles in the pedipalp, absence of submedial mesal and curved apophysis on male femur IV, and stout spine on scutal area III. The “second clade” is supported by the pedipalpal femur incrassate, the penis with one spatulate distal setae on the ventral plate, free tergite III unarmed, and a ventral spur on the male coxa IV once or twice as long as it is wide (Pinto-da-Rocha & Bonaldo 2011).

Unlike other arachnids, many species of harvestmen form aggregations that can range from 3 to 70.000 individuals (Machado & Macías-Ordoñez 2007a). Aggregations seem to be induced predominantly by environmental conditions, the physiological hypothesis, and confer defensive advantages by speeding the defensive signal communication through scent-gland secretions, increasing the chances of avoiding predation, the defensive hypothesis (Holmberg *et al.* 1984; Machado *et al.* 2000). Gregariousness for species of *Phareicranaus* was only suggested to generally occur in nests of birds and lizards, *Ameiva* Meyer and *Cnemidophorus* Wagler

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illustrations of *Phareicranaus* species (simple schematic line drawings and SEM, Kury 2012), these setae can be found within two species: *P. gigantea* and *P. festae*, both from the first clade of Pinto-da-Rocha & Bonaldo (2011). Until now, this character has not been registered for species of the second clade (including the old *P. curvipes* group). The distance between species with these setae, in the most recent cladogram (Pinto-da-Rocha & Bonaldo 2011), suggests that this character has evolved independently, in different lineages inside the genus. However, the phylogenetic importance of this character remains poorly know, since it was not used in the two phylogenetic analysis of the genus (Pinto-da-Rocha & Kury 2003; Pinto-da-Rocha & Bonaldo 2011).

There are two known species from the state of Amazonas (Brazil): *P. manauara* (Pinto-da-Rocha 1994), and *P. singularis* (Kury 2003; Pinto-da-Rocha & Kury 2003; Pinto-da-Rocha & Bonaldo 2011); and two known species from the state of Zulia (Venezuela): *Phareicranaus calcarfemoralis* (Roewer, 1917) and *P. furvus* (Kury 2003; González-Sponga 2003; Pinto-da-Rocha & Kury 2003; Pinto-da-Rocha & Bonaldo 2011). Assessing the real distributional range of *P. rohei* **sp. nov.** and *P. tizana* **sp. nov.** is difficult because both species are from undersampled remote places. The addition of the two new taxa increases the know diversity of the genus to 47 species. There are several new species of this genera to be collected and described in the basin, we examined at least one more new species know only from females (one Amazonian "white spots" species in the INPA collection).

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References

Acosta, L.E., Pérez-González, A. & Tourinho, A.L. (2007) Methods for taxonomic study. *In*: Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: The Biology of Opiliones.* Harvard University Press, Cambridge, Massachusetts, pp. 494–510.

Avram, S. (1983) Gonyleptidae nouveaux du Venezuela et du Pérou (Opiliones: Gonyleptomorphi). *Boletín de la Sociedad Venezolana de Espeleología*, 20, 11–18.

Gnaspini, P. (2007) Development. *In*: Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: The Biology of Opiliones*. Harvard University Press, Cambridge, Massachusetts, pp. 455–472.

González Sponga, M.A. (2003) Arácnidos de Venezuela. Opiliones del género *Santinezia* (Laniatores, Cranaidae). *Acta Biológica Venezuela*, 21 (4), 1–69.

González Sponga, M.A. (1989) *Arácnidos de Venezuela. Opiliones Laniatores I. Familias Phalangodidae y Agoristenidae*. Adac. Cienc. Físicas, Matemáticas y Naturales, Caracas, 562 pp.

Goodnight, J.C. & Goodnight, M.L. (1943) Phalangida from South America. *American Museum Novitates*, 1234, 1–19.

Holmberg, R.G., Angerilli, N.P & LaCasse, L.J. (1984) Overwintering aggregations of *Leiobunum paessleri* in caves and mines (Arachnida, Opiliones). *The Journal of Arachnology*, 12, 195–204.

Hunter, R.K., Proud, D.N., Burns, J.A., Tibbetts, J.A. & Twonsend Jr., V.R. (2007) Parental care in neotropical harvestment Phareicranaus calcariferus (Opiliones, Cranaidae). *The Journal of Arachnology* 35, 199–201. http://dx.doi.org/10.1636/st06-18.1

Kury, A.B. (2003) Annotated catalogue of the Laniatores of the New World (Arachnida, Opiliones). *Revista Ibérica de Aracnología*, vol. especial monográfico nº 1, 1–337.

Kury, A.B. (2012) A new genus of Cranaidae from Ecuador (Opiliones: Laniatores). *Zootaxa,* 3314, 31–44.

Kury, A.B. & Pinto-da-Rocha, R. (2002) Opiliones. *In:* Adis, J. (Ed.), *Amazonian Arachnida and Myriapoda*. Pensoft Publishers, Sofia, Moscow, pp. 345–362.

Lança, L.S. (2011) *Padrões de distribuição espacial de opiliões (Arachnida: Opiliones) em uma área de floresta de terra firme na Amazônia Central*. MSc Thesis. Universidade Federal do Amazonas, Manaus, Amazonas, Brazil, 72 pp.

Machado, G., Raimundo, R.L.G. & Oliveira, P.S. (2000) Daily activity schedule, gregariousness and defensive behavior of the neotropical harvestmen *Goniosoma longipes* (Arachnida: Opiliones: Gonyleptidae). *Journal of Natural History*, 34, 587–596.
http://dx.doi.org/10.1080/002229300299453

Machado, G. & Macías-Ordoñez, R. (2007a) Reproduction. *In:* Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: The Biology of Opiliones*. Harvard University Press, Cambridge, Massachusetts, pp. 414–454.

Machado, G. & Macías-Ordoñez, R. (2007b) Social Behavior. *In:* Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: The Biology of Opiliones.* Harvard University Press, Cambridge, Massachusetts, pp. 400–413.

Machado, G. & Warfel, J. (2006) First case of maternal care in the family Cranaidae (Opiliones, Laniatores). *The Journal of Arachnology,* 34, 269–272.
http://dx.doi.org/10.1636/s04-63.1

Mello-Leitão, C. (1932) Opiliões do Brasil. *Revista do Museu Paulista*, 17 (2), 1–505.

Pinto-da-Rocha, R. (1994) A new species of *Santinezia* from Central Amazonia, with systematic comments on the genus (Arachnida, Opiliones, Cranaidae). *Andrias*, 13, 29–32.

Pinto-da-Rocha, R. & Bonaldo, A.B. (2011) Species relationships in the neotropical genus *Phareicranaus* Roewer, 1913 (Opiliones: Cranaidae): two new species and new data from penial morphology. *Zootaxa,* 3135, 1–34.

Pinto-da-Rocha, R. & Kury, A.B. (2003) Phylogenetic analysis of *Santinezia* with description of five new species (Opiliones, Laniatores, Cranaidae). *The Journal of Arachnology*, 31, 173–208.
http://dx.doi.org/10.1636/0161-8202(2003)031[0173:paoswd]2.0.co;2

Pinto-da-Rocha, R. & Kury, A.B. (2007) Cranaidae. *In*: Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: The Biology of Opiliones.* Harvard University Press, Cambridge, Massachusetts, pp. 185–188.

Roewer, C.F. (1913) Die Familie der Gonyleptiden der Opiliones-Laniatores. *Archives für Naturgeschichte*, 79A (4), 257–472.

Roewer, C.F. (1916) 7 neue Opilioniden des Zoolog. Museums in Berlin. *Archives für Naturgeschichte*, 81A (12), 6–13.

Roewer, C.F. (1917) 52 neue Opilioniden. *Archives für Naturgeschichte*, 82A (2), 90–158.

Roewer, C.F. (1925) Opilioniden aus Süd-Amerika. *Bolletino dei Musei di Zoologia ed Anatomia Comparata della Universita di Torino, NS,* 34 (40), 1–34.

Roewer, C.F. (1932) Weitere Weberknechte VII (7. Ergänzung der Weberknechte der Erde 1923). *Archiv für Naturgeschichte aus dem Berlin*, 1 (2), 275–350.

Roewer, C.F. (1952) Neotropische Arachnida Arthrogastra zumeist aus Peru. *Senckenbergiana*, 33 (1– 3), 37–58.

Roewer, C.F. (1963) Opiliones aus Peru und Colombia. [Arachnida Arthrogastra aus Peru V]. *Senckenbergiana Biologica*, 44, 45–72.

Simon, E. (1879) Essai dune classification des Opiliones Mecostethi remarques synonymiques et descriptions despéces nouvelles. *Annales de la Société Entomologique de Belgique*, 22, 183–241.

Soares, H.E.M. (1970) Novas espécies de opiliões da Região Amazônica (Opiliones, Cosmetidae, Gonyleptidae, Phalangiidae, Stygnidae). *Revista Brasileira de Biologia*, 30 (3), 323–338.

Townsend, V.R. Jr. & Milne, M.A. (2010) A new species of Santinezia (Opiliones: Cranaidae) from Panama. *The Journal of Arachnology*, 38, 460–465.
http://dx.doi.org/10.1636/ha09-55.1

Townsend, V.R. Jr., Rana, N.J., Proud, D.N., Moore, M.K., Rock, P. & Felgenhauer, B.E. (2009) Morphological changes during post-embryonic development in two species of Neotropical harvestmen (Opiliones, Laniatores, Cranaidae). *Journal of Morphology*, 270, 1055–1068.
http://dx.doi.org/10.1002/jmor.10742

Villarreal Manzanilla, O. & Machado, G. (2011) First record of paternal care in the family Stygnidae (Opiliones: Laniatores). *The Journal of Arachnology*, 39, 500–502.
http://dx.doi.org/10.1636/hi11-29.1

Villarreal Manzanilla, O. & Rodríguez, C.J. (2010) Revalidation of *Santinezia albilineata* Roewer 1932 (Arachnida, Opiliones, Cranaidae). *Journal of Threatened Taxa*, 3 (11), 2202–2206.
http://dx.doi.org/10.11609/jott.o2514.2202-6