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Redescription of the New Zealand harvestman *Nuncia obesa obesa* (Opiliones: Laniatores: Triaenonychidae) and implications for the supposed transcontinental distribution of *Nuncia*

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Abstract. Harvestmen genera with transcontinental distributions are rare but represent very interesting models for evolutionary and biogeographical studies. However, before attempting to understand such distributions, it is crucial to have a good taxonomic foundation of the focal taxa. One of the most disjunct harvestmen genera is *Nuncia* Loman, 1902 (Triaenonychidae), which has been recorded from New Zealand and South America, but the alpha taxonomy is in need of improvement, mainly with respect to the detailed characterization of male genitalic morphology. The taxonomic and systematic revision of *Nuncia* remains an important and intriguing issue, and the redescription of *Nuncia obesa* (Simon, 1899) is a necessary starting point for the taxonomic revision of the genus. Herein we redescribe and illustrate *N. obesa* based on the reexamination of the syntypes of *Nuncia sperata* Loman, 1902 (type species of *Nuncia*) and the holotype of *Triaenonyx obesus* Simon, 1899 (senior synonym of *Nuncia sperata*). We also confirm the synonymy of both species.

Keywords: Arachnida, Gondwana, genitalic morphology, morphology, taxonomy

The harvestman family Triaenonychidae includes small to medium-sized Laniatores, which bear single claws with at least one pair of lateral prongs on legs III–IV (Kury 2007; Mendes & Kury 2012). It is the fourth most diverse family of Laniatores (*sensu* Kury 2018), with 493 described species (Kury et al. 2014). They are mainly distributed in the temperate regions of the former Gondwana, where they constitute the dominant opiliofauna in New Zealand, Madagascar and South Africa, also occurring in Australia, southern South America (Mendes & Kury 2008), Crozet Islands, (Hickman 1939), New Caledonia (Roewer 1914, 1915) and an isolated representative in North America, *Fumontana deprehendor* Shear, 1977 (Fernández et al. 2017).

Nuncia Loman, 1902, is the largest genus of Triaenonychidae and the 11th most speciose genus of Opiliones with 61 valid described species and subspecies (Kury 2018). They mainly occur in New Zealand, but five species have been described from South America (Mendes & Kury 2008). The only other Neotropical triaenonychid genus with a transcontinental distribution is *Ceratomontia* Roewer, 1915, but Mendes & Kury (2008) could not recover the monophyly of this genus in a morphology-based phylogenetic analysis. In this biogeographic context, the taxonomic and systematic revision of *Nuncia* is an important and intriguing issue. The key starting point for a generic revision is the detailed characterization of the type species, a point that is especially important in the case of *Nuncia*, which is thus the main goal of the current contribution.

The genus *Nuncia* was established by Loman (1902) for his new species *Nuncia sperata* Loman, 1902 collected from Stephens Island, New Zealand (Loman 1902). Previously, Simon (1899) described a triaenonychid from Stephens Island as *Triaeonyx* [sic] *obesus* Simon, 1899 (Simon misspelled the generic name *Triaenonyx* Sørensen, 1886), but this species was overlooked by Loman (1902). This fact was first noted by Forster (1954) who considered Loman's species as a junior subjective synonym of *T. obesus* Simon, 1899, establishing the new combination *N. obesa* (Simon, 1899). In the same work, Forster (1954) described three new subspecies of *N. obesa* and also described two new subgenera of *Nuncia* (*Corinuncia* Forster, 1954 and *Micronuncia* Forster, 1954).

Here we redescribe and illustrate *N. obesa obesa* (Simon, 1899) based on the reexamination of both Loman's (*N. sperata*) and Simon's (*T. obesus*) type specimens and confirm the synonymy of both taxa.

METHODS

The specimens used in this study are deposited in the Zoological Museum of Berlin (ZMB), and Senckenberg Naturmuseum und Forschungsinstitut, Frankfurt, Germany (SMF). They were examined using a Leica M205A microscope equipped with a Leica DF295 camera. Male genitalia were dissected and temporarily mounted on microscope slides (as described in Acosta et al. 2007) and cleared in clove oil. They were examined using an Olympus BH3 microscope and returned to 80% ethanol in microvials kept with their respective specimens. Morphological nomenclature follows Mendes & Kury (2012) and Pérez-González & Werneck (2018). Scutum shape outline nomenclature follows Kury & Medrano (2016).

SYSTEMATICS

Family Triaenonychidae Sørensen, 1886
Nuncia Loman, 1902

Nuncia Loman 1902:213; Hogg 1920:41; Roewer 1915:76; Roewer 1923:591; Roewer 1931:151; Roewer 1961:102; Muñoz-Cuevas 1971b:97; Cekalovic 1985:11; Maury & Roig Alsina 1985:78; Maury 1990:103; Kury 2003:21 Mendes & Kury 2008:273.

Parattahia [part]: H. Soares 1968:266; Muñoz-Cuevas, 1971: 873, fig. 28; Cekalovic 1985:11; Maury & Roig Alsina 1985:78.

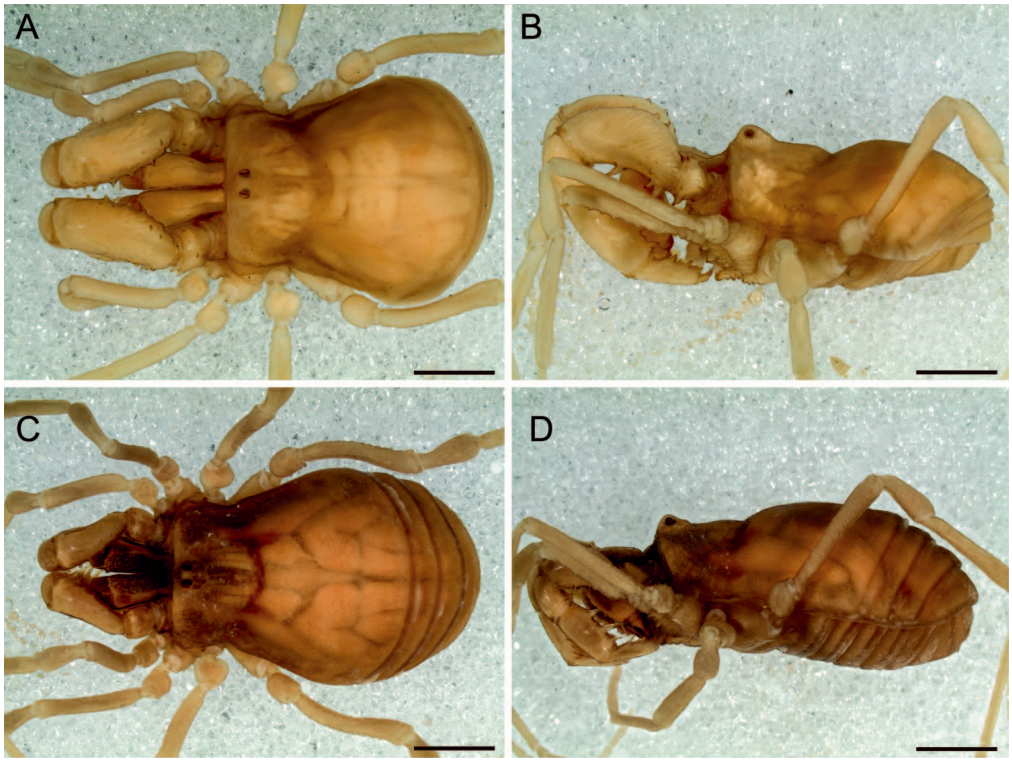

Figure 1.—*Nuncia (Nuncia) obesa obesa* (Simon), syntypes of *Nuncia sperata* Loman (ZMB 11782), habitus, dorsal and lateral views: A–B, male; C–D, female. Scale bars = 2 mm.

Chilenuncia Munoz-Cuevas 1971a:873; Cekalovic 1985:11 [junior subjective synonym of *Nuncia* Loman, 1902, by Maury (1990)].

Type species.—*Nuncia*: *Nuncia sperata* Loman, 1902, by monotypy (junior subjective synonym of *Triaenonyx obesus* Simon, 1899).

Chilenuncia: *Chilenuncia donosoi* Munoz-Cuevas, 1971, by original designation.

Nuncia* (*Nuncia*) *obesa (Simon, 1899)
(Figs. 1–5)

Triaeonyx [sic] *obesus* Simon 1899:431.

Nuncia sperata Loman 1902:214, plate 9, fig. 4; Roewer 1915:77, figs 4a–d; Roewer 1923:591, figs 738a–d; Roewer 1931:151; junior subjective synonym of *T. obesus* Simon, 1899, by Forster 1954:9,19].

Nuncia (Nuncia) obesa (Simon): Forster 1954:19.

Material examined.—*Triaeonyx* [sic] *obesus*: *Holotype female*. NEW ZEALAND: Stephens Island, leg. Schauinsland (SMF, no. 9904961).

Nuncia sperata: *Syntypes*: NEW ZEALAND: 2 ♂, 4 ♀, 2 juveniles, Stephens Island, leg. Thilenius (ZMB 11782); 1 ♂ "cotype", same data (SMF 9801017) (not examined).

Diagnosis.—*Nuncia obesa* differs from the other species of *Nuncia* included in the subgenus *Nuncia* as the penis *capsula interna* is thinner and more curved apically (Fig. 5). The small "teeth" of the *capsula interna* are more spaced in *N. obesa obesa* compared to other species of *Nuncia* (Fig. 5). It also differs from *N. obesa magna* by the size of the *scutum magnum*, being about 20% smaller in *N. obesa obesa*. There are also two other *Nuncia* recorded from Stephen Island: *Nuncia* (*Nuncia*) *conjuncta conjuncta* Forster, 1954, and *N.* (*Corinuncia*) *nigriflava nigriflava* Roewer, 1923. Both of them are clearly different from *N. obesa* by the (smaller) body size, pedipalpal armature and male genital morphology.

Description (male syntype of *N. sperata*, ZMB 11782).—*Measurements*: Total body length 12.1 mm, carapace length 2.6 mm, mesotergal length 6.6 mm, carapace maximum width 3.9 mm, mesotergal scute maximum width 5.9 mm.

Appendages lengths, (min/max) of males (in mm); Pedipalp: trochanter 0.6–0.7/femur 2.6–2.7/patella 1.4–1.5/tibia 1.9–2.1/ tarsus 1.3–1.4/claw 0.5–0.7; Leg I: trochanter 0.6–0.7/ femur 2.6–2.7/ patella 1.1–1.2/ tibia 1.9/ metatarsus 2.4–2.5/ tarsus 1.4–1.6/; II: 0.5/ 3.1–3.2/ 1.1–1.2/ 2.5/3.1–3.5/ 2.4–2.5; III: 0.6–0.8/2.4–2.7/ 1.0–1.1/ 1.7–1.8/ 2.1–2.4/ 1.3–1.9/; IV: 0.7–0.9/ 3.2–3.4/ 1.4–1.5/ 2.6/ 3.4–4.1/ 2.4–2.6.

Dorsum: *Scutum magnum* outline hourglass–shaped with Eta (η) shape (Kury & Medrano 2016, fig. 2K), without conspicuous ornamentations (smooth). Carapace with unarmed anterior margin. Ocularium elevated, conical, without median acute apophysis (Fig. 1 A,B); eyes located high, separated from the base of ocularium. Mesotergal scutum with inconspicuous grooves, without clear delimitation of areas. Free tergites, and anal operculum unarmed (Fig. 1B).

Venter: Coxae I armed ventrally with an anterior row of 4 stout tubercles, the remaining area covered by several other ventral small tubercles (Fig. 4). Coxae II bearing 4 dorsal-proximal projections, the anterior is 3x larger than posterior, coxae III–IV smooth. Spiracles not concealed.

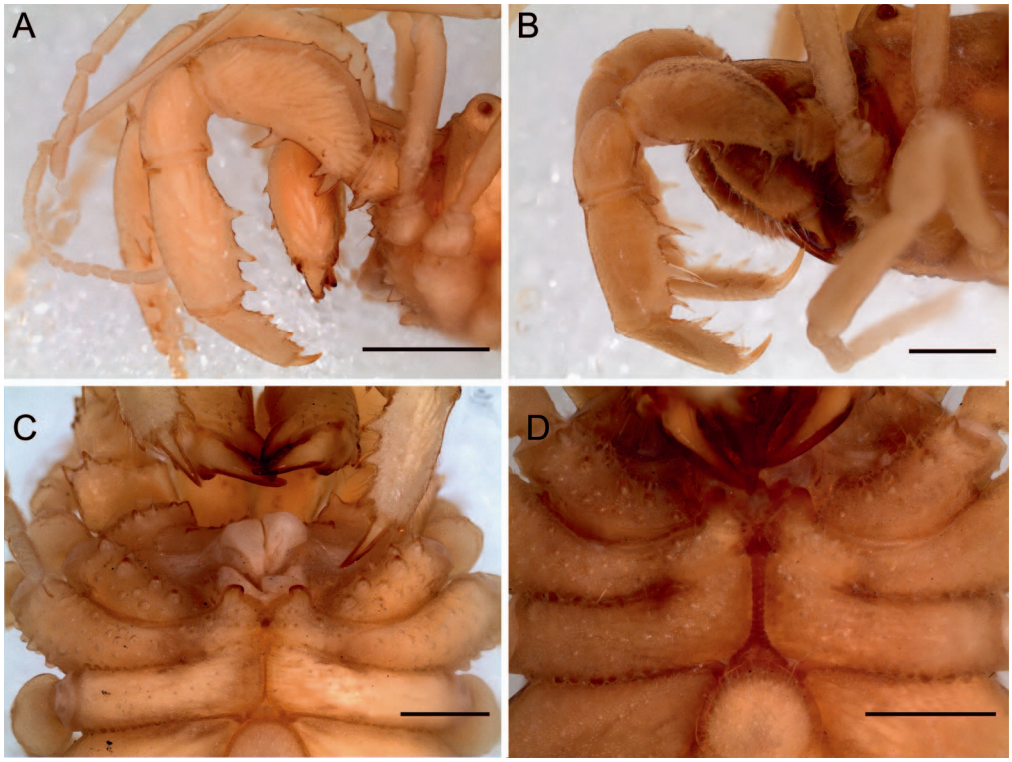

Figure 2.—*Nuncia (Nuncia) obesa obesa* (Simon), syntypes of *Nuncia sperata* Loman (ZMB 11782): A–B, pedipalp, lateral view: A, male; B, female; C–D, cephalothorax, ventral view, C, male; D, female. Scale bars = 2 mm (Fig. A); 1 mm (Figs. B–D).

Chelicerae: With 2 dorsal meso-apical spiniform tubercles on basichelicerite. Cheliceral hand with sparse setiferous tubercles.

Pedipalps (Figs. 2A, 3A, C): Coxae with sparse setiferous tubercles. Trochanter with 3 ventral setiferous tubercles and a row of small meso-distal tubercles in dorsal view. Femur robust, bearing 5 ventral tubercles, 2 basal are more setiferous, and a dorsal row of setiferous tubercles. Patella with 2 ventral tubercles. Tibia with 3 mesal and 3 ectal setiferous tubercles. Tarsus with 3 mesal and a row of small ectal setiferous tubercles.

Legs: Trochanter I armed with prolateral small tubercles. Trochanter II–IV smooth. Femur I covered by small ventral tubercles. Femur II–IV smooth. Patella and tibia I–IV smooth. Metatarsus with astragalus almost seven times larger than calcaneus on legs I and III, and 11x larger on legs II and IV. Tarsal counts: 3:10-12:4:4.

Genitalia: *Pars distalis* with large, deeply cleft ventral plate, dividing the plate into 2 lamellae, the cleft markedly more wide basally. Each lamella bearing a group of 4 long and pointed macrosetae, 3 on the ventral and 1 on the dorsal surface. (Figs. 5A–C). Glans with simple *capsula externa* forming a dorsal plate smaller than the ventral plate, with a wide median cleft, dividing the dorsal plate into 2 thin halves that converge apically (Figs. 5A, B). *Capsula interna* much larger than *capsula externa*, with a strong, long and ventrally directed curved stylus; *capsula interna* with fused conductors that are not fused with the stylus, at least in the visible portion extending almost two-thirds of its length. Apically, the fused conductors partially surround the stylus and are armed with small "teeth" on the apical fold (Fig. 5B).

Description (female syntype of *N. sperata*, ZMB 11782).—*Measurements*: Total body length 11.2 mm, carapace length 2.3 mm, *scutum magnum* length 6.1 mm, carapace maximum width 4.1 mm, mesotergal scute maximum width 5.4 mm.

Appendages lengths. (min/max) of females (in mm); Pedipalp: trochanter 0.5–0.7/femur 1.0–2.2/patella 0.9–1.2/tibia 0.8–1.7/tarsus 0.7–1.2/claw 0.3–0.7; Leg I: trochanter 0.3–0.7/ femur 1.4–2.5/ patella 0.7–1.4/ tibia 1.1–2.0/ metatarsus 1.4–2.3/ tarsus 1.0–1.6/; II: 0.4–0.7/ 1.7–3.6/ 0.9–1.6/ 1.6–2.7/1.9–3.8/ 1.8–3.3; III: 0.3–0.8/1.1–2.6/ 0.7–1.2/ 1.0–1.7/ 1.1–2.3/ 1.0–2.1/; IV: 0.5–0.7/ 1.7–3.9/ 0.9–1.7/ 1.5–3.1/ 2.1–4.2/ 1.0–2.5.

Similar to male in relation to the armature of the dorsal scutum. Females with pedipalps markedly smaller in size (Figs. 2B, 3B, D), but with the spines of tibia longer than males. Posterior side of carapace smaller than male.

Distribution.—*Nuncia obesa obesa* is known only from the type locality, Stephens Island, New Zealand.

Remarks.—Simon (1899) provided no information regarding the number of type specimens of *Triaenonyx obesus* or their repository, but Forster (1954) stated that the types were deposited in the Muséum National d'Histoire Naturelle, Paris although he was unable to examine them. The specimens studied by Simon (1899) were loaned to him by the collector Prof. Hugo Hermann Schauinsland, at that time the founding director of the Städtischen Sammlungen für Naturgeschichte und Ethnographie, currently known as the Übersee-Museum Bremen (Overseas Museum in Bremen), Germany. It seems that after he studied the specimens, Simon returned most of the Schauinsland collection to the Overseas Museum in Bremen. Schauinsland was succeeded by Roewer after his

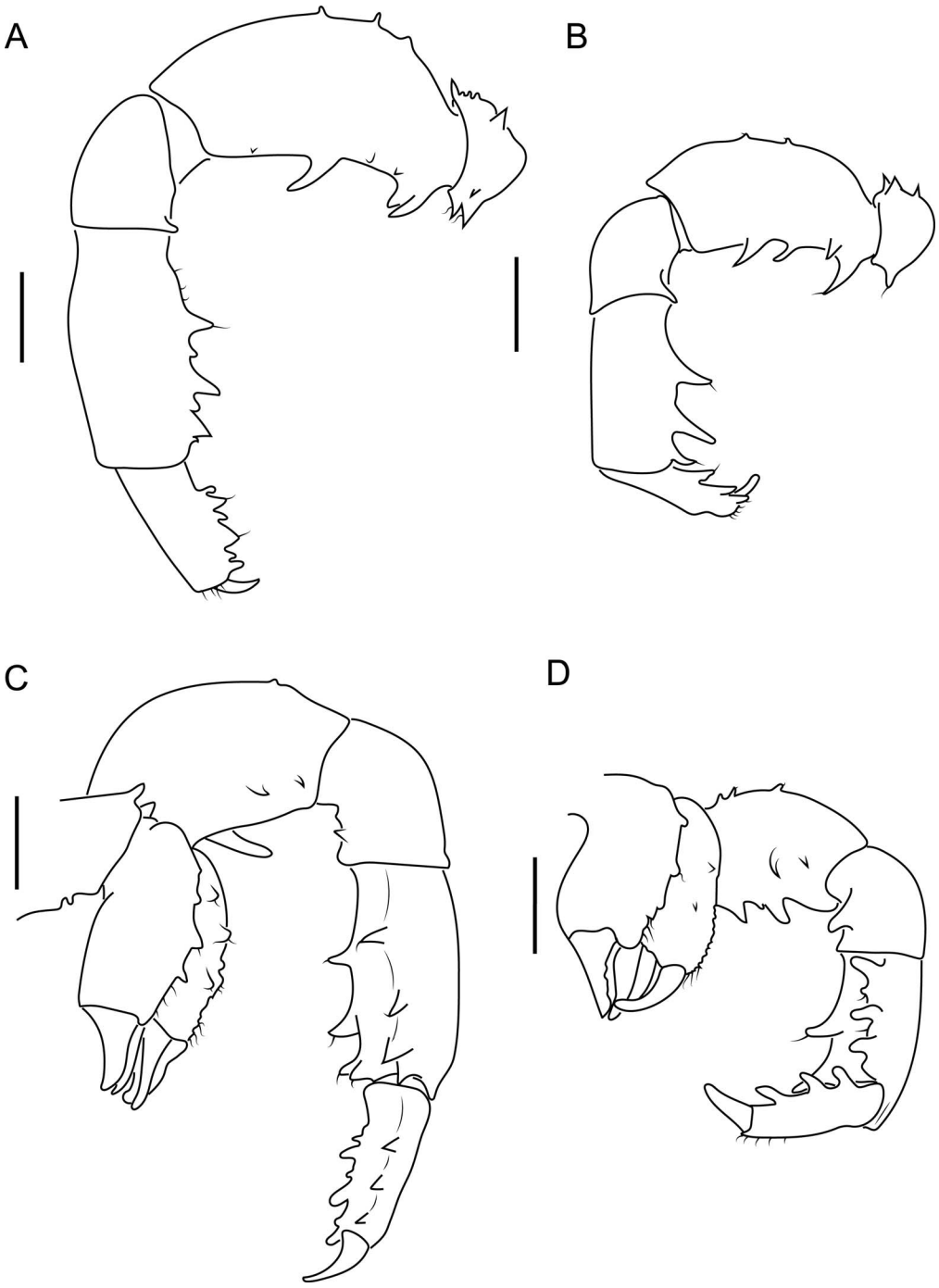

Figure 3.—*Nuncia (Nuncia) obesa obesa* (Simon), syntypes of *Nuncia sperata* Loman (ZMB 11782), pedipalps: A, ectal view, male; B, ectal view, female; C, mesal view, male; D, mesal view, female. Scale bars = 1 mm

retirement in 1933 and Roewer was the museum director until the end of the Second World War (1945). Roewer kept with him several specimens of the Schauinsland collection that are currently part of Roewer's collection in SMF including most of the types of the species described by Simon (1899) (information obtained by consulting the SMF database, online at https://search.senckenberg.de/aquila-public-search/search—October 2018). We found in SMF a female specimen labelled by Roewer as "*Triaenonyx obesus*... Typus Sim." (Fig. 6A) that we assume is the holotype, even though the label incorrectly states that the specimen is a male. Therefore, we believe that the indication of the MNHN as the repository of any type material of *T. obesus* Simon, 1899, made by Forster (1954), is erroneous. According to the curator responsible for Opiliones, no specimens of *T. obesus* Simon, 1899, can be located at the MNHN arachnological collection (Mark Judson pers. comm.), this is probably because the type series was constituted by a single specimen and therefore the specimen

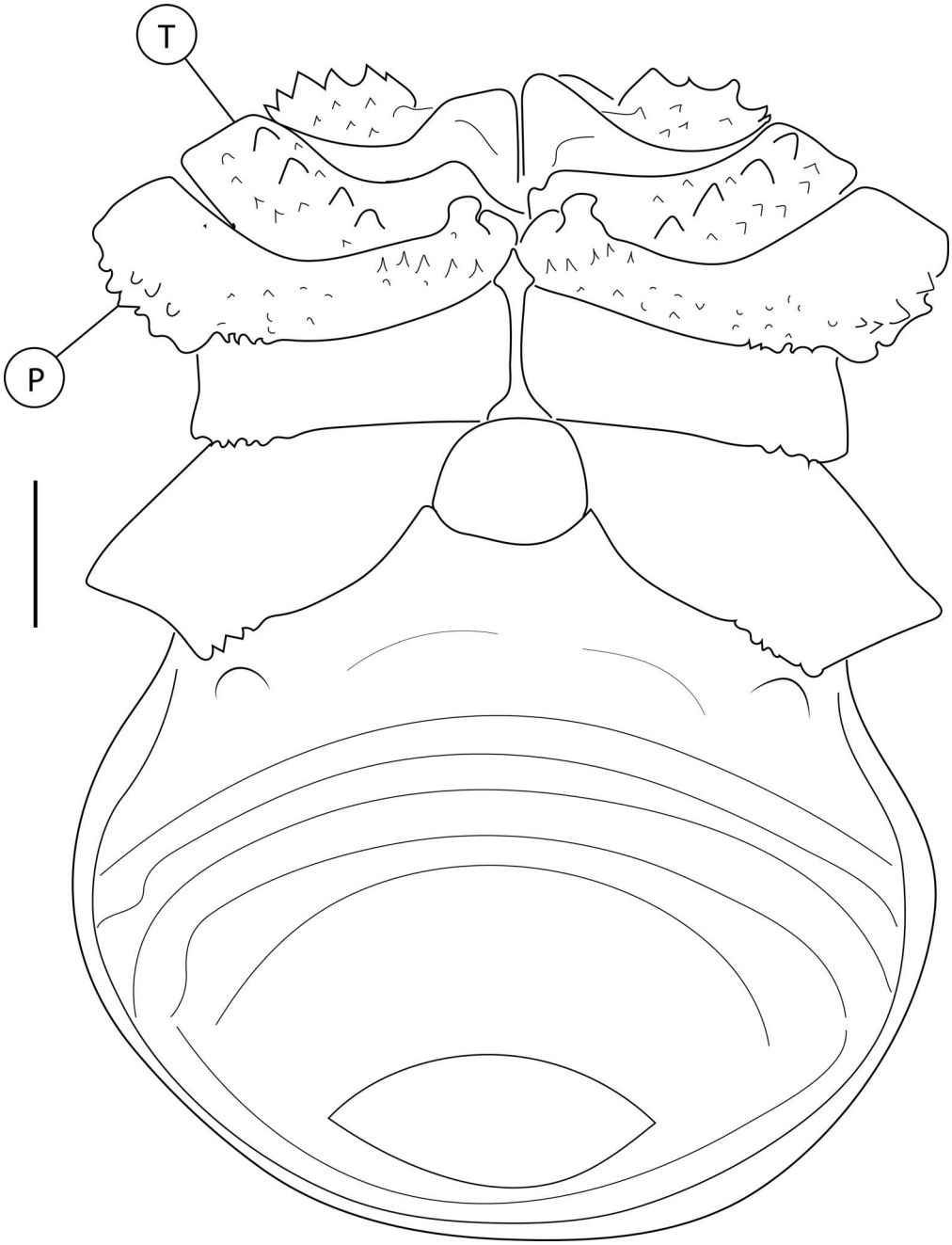

Figure 4.—*Nuncia (Nuncia) obesa obesa* (Simon), male syntype of *Nuncia sperata* Loman (ZMB 11782), habitus ventral (without chelicerae, pedipalps and anal operculum). Abbreviations: P, projections of coxa II; T, tubercles of coxa I. Scale bar: 1 mm

deposited at the SMF under the no. 9904961 should be considered as the holotype. (Fig. 6A). Other types of species collected by Schauinsland and described by Simon (1899) are currently at SMF collection and not in the MNHN; this is the case of the types of *Dasylobus australis* Simon, 1899 (SMF no. 9904977), another harvestman from New Zealand.

Moreover, Loman (1902) did not provide an exact number of *Nuncia sperata* syntypes (Fig. 6B) but Roewer (1915) examined the type series and stated that there are were nine specimens, including five males, two females, and two juveniles. Currently the type series deposited in ZMB includes two males, four females, and two juveniles (a total of eight specimens); the missing specimen was removed by Roewer from the type series and is currently deposited in the SMF under the catalogue number 9801017 as a "cotype" (not examined, but a label and specimen picture were kindly sent it to us by the curator Dr. Peter Jäger) (Fig. 6C). When examining the ZMB syntypes, we found that Roewer mistakenly sexed two females as males, but we were unable to confirm the sex of the SMF specimen.

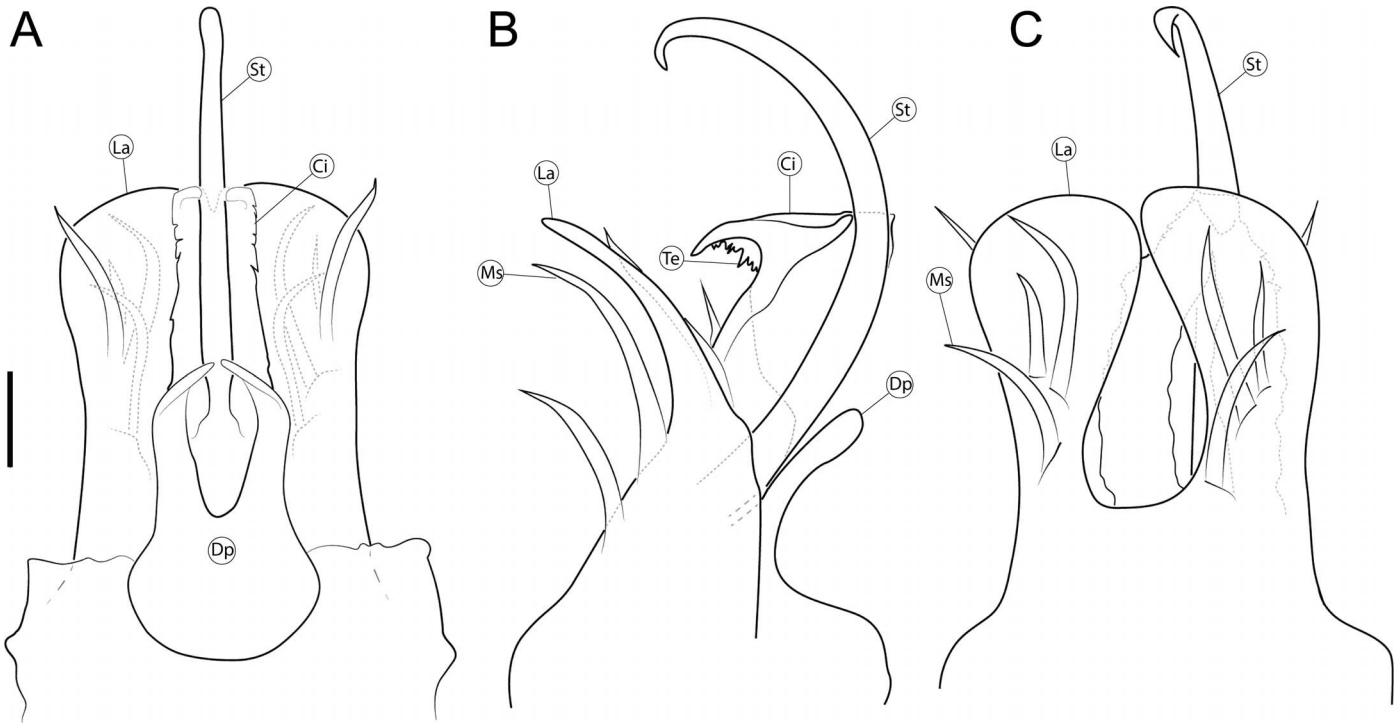

Figure 5.—*Nuncia (Nuncia) obesa obesa* (Simon), male syntype of *Nuncia sperata* Loman (ZMB 11782), genitalia: A, dorsal view; B, lateral view; C, ventral view. Abbreviations: Ci, *capsula interna*; Dp, dorsal plate; La, lamella; Ms, macrosetae; St, stylus; Te, teeth of *capsula interna*. Scale bar: 100 μm.

DISCUSSION

A redescription of the type species of *Nuncia*, *N. obesa*, provides a starting point for a much-needed taxonomic revision of the genus *Nuncia* and to assess whether the transcontinental distribution of *Nuncia* can be substantiated. The original description of *T. obesus* provided by Simon (1899) does not include any illustrations, making it difficult to identify the species, especially considering that this species was overlooked by harvestmen researchers until it was redescribed and transferred to the genus *Nuncia* by Forster (1954). On the other hand, *N. sperata* was originally described with only an illustration of the female sternum (Loman 1902, fig. 4). Roewer (1915, fig. 6) added drawings of the anterior part of the carapace with the chelicerae, anterior and lateral ocularium, metatarsus and tarsus of the leg I, which were reproduced in Roewer (1923). Forster (1954) made the most important contribution to the taxonomy of the species, for the first time proposing the synonymy between *T. obesus* and *N. sperata*. The redescription by Forster (1954) is the most complete and better illustrated with the addition of a drawing of the lateral habitus, coxal region, pedipalps of male and female, and a lateral view of the *pars distalis* of the male genitalia. Nevertheless, Forster's (1954) description does not satisfy modern standards of taxonomic description and illustration of Opiliones, mainly in regards to the description of male genitalia. Forster (1954) only provided a small and somewhat confusing drawing of the *pars distalis* of the penis in lateral view, without dorsal and lateral drawings, which could be the reason of some misinterpretations such as the number of macrosetae on each lamella of the ventral plate. Forster described the presence of three macrosetae on each lamella, instead of four, according to our observations (Figs. 5A–C). The misinterpretation and/or the incomplete description and

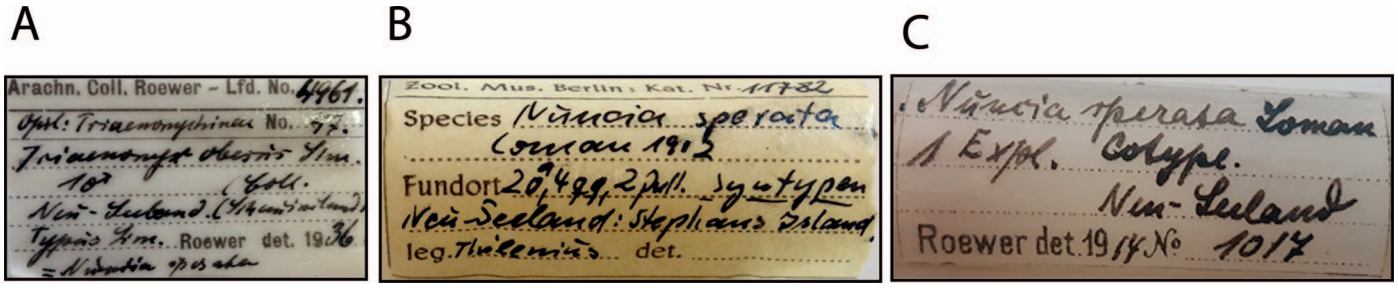

Figure 6.—Labels accompanying the type specimens involved in the study. A, female holotype of *Triaenonyx obsesus* Simon, 1899 (note that Roewer mistakenly wrote ♂) (SMF 9904961); B, syntypes of *Nuncia sperata* Loman, 1902 (ZMB 11782); C, a syntype of *Nuncia sperata* Loman, 1902 segregated by Roewer from the original type series (SMF 9801017).

illustration of male genitalia in Triaenonychidae is very common in the taxonomic literature (e.g., Pérez-González & Werneck 2018) making the recognition of old species difficult, as well as the use of this important system of characters in the construction and validation of a strong and stable systematic classification for the family.

In comparison to the South American species currently placed in *Nuncia*, the penis of *N. obesa obesa* shows remarkable differences. The ventral plate of *N. obesa obesa* contains a deeply medial cleft dividing the plate into two long lamellae, this cleft is markedly wide basally. The South American species also have a ventral plate with a medial cleft, but this cleft is smaller and not basally wider and therefore the lamellae are shorter (see Maury 1990). The smaller dorsal plate of the glans compared to the ventral plate described for *N. obesa obesa* is also present in the Chilean species *N. spinulosa* Maury, 1990, but in the other South American species, the ventral plate is smaller than the dorsal plate (Maury 1990). In addition, the South American species do not have a *capsula interna* with a long and ventral-backward curved stylus, nor the fused conductors armed with small "teeth" on the apical fold (Maury 1990). Most South American species have a lateral extension of the dorsal plate (lateral plate) (Maury 1990, figs. II, VI), which is lacking in *N. obesa obesa* and *N. spinulosa* (Maury 1990 fig. IV). These morphological differences point to the possibility that the current concept of *Nuncia* is not monophyletic but additional phylogenetic studies are necessary in order to test this hypothesis. Some molecular evidence also suggests a non-monophyletic *Nuncia* (Baker et al. 2019; Baker et al. unpublished data) but still awaiting publication.

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LITERATURE CITED

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

Baker, C.M., K. Sheridan, S. Derkarabetian, A. Pérez-González, S. Vélez & G. Gonzalo. 2019. A densely-sampled Sanger-based phylogeny of the temperate Gondwanan family Triaenonychidae (Opiliones: Laniatores), inferred from three markers. Abstract Book of the 21st International Congress of Arachnology, Canterbury, New Zealand, p. 96.

Fernández, R., P.P. Sharma, A.L. Tourinho & G. Giribet. 2017. The Opiliones tree of life: shedding light on harvestmen relationships through transcriptomics. Proceedings of the Royal Society B: Biological Sciences 284:1–9.

Forster, R.R. 1954. The New Zealand harvestmen (sub-order Laniatores). Canterbury Museum Bulletin 2:1–329.

Hickman, V.V. 1939. Opiliones and Araneae. Pp. 159–187. *In* B.A.N.Z. Antarctic Research Expedition, 1929–1931. (H. Johnston, ed.), B.A.N.Z.A.R. Expedition Committee, Adelaide.

Kury, A.B. 2007. Triaenonychidae Sørensen, 1886. Pp. 239–243. *In* Harvestmen: The Biology of Opiliones. (R. Pinto-da-Rocha, G. Machado & G. Giribet, eds.). Harvard University Press, Cambridge.

Kury, A.B. 2018. Classification of Opiliones. Museu Nacional/UFRJ Online at http://www.museunacional.ufrj.br/mndi/Aracnologia/opiliones.html (Accessed Feb/2019).

Kury, A.B. & M. Medrano. 2016. Review of terminology for the outline of dorsal scutum in Laniatores (Arachnida, Opiliones). Zootaxa 4097:130–134.

Kury, A., A.C. Mendes & D. Souza. 2014. World Checklist of Opiliones species (Arachnida). Part 1: Laniatores – Travunioidea and Triaenonychoidea. Biodiversity Data Journal 2:e4094.

Loman, J.C.C. 1902. Neue Aussereuropäische Opilioniden. Zoologische Jahrbücher 16:163–216.

Maury, E.A. 1990. Triaenonychidae sudamericanos.VI. Tres nuevas especies del género *Nuncia* Loman 1902 (Opiliones, Laniatores). Boletín de la Sociedad de Biología de Concepción 61:103–119.

Mendes, A.C. & A.B. Kury. 2008. Intercontinental Triaenonychidae—the case of *Ceratomontia* (Opiliones, Insidiatores). Journal of Arachnology 36: 273–279.

Mendes, A.C. & A.B. Kury. 2012. Notes on the systematics of the Triaenonychinae from Madagascar with description of a new species of *Acumontia* Loman (Opiliones: Laniatores). Zootaxa 3593:40–58.

Pérez-González, A. & R.M. Werneck. 2018. A fresh look over the genital morphology of *Triaenonychoides* (Opiliones: Laniatores: Triaenonychidae) unravelling for the first time the functional morphology of male genitalia. Zoologischer Anzeiger 272:81–92.

Roewer, C.F. 1914. Opilioniden von Neu-Caledonien. Pp. 439–443. *In* Nova Caledonia Forschungen in Neu-Caledonien und auf den Loyalty-Inseln. (J. Sarasin, F. Roux, eds.). Wiesbaden.

Roewer, C.F. 1915. Die Familie der Triaenonychidae der Opiliones - Laniatores. Archiv Für Naturgeschichte 80:61–168.

Roewer, C.F. 1923. Die Weberknechte der Erde. Systematische Bearbeitung der bisher bekannten Opiliones. G. Fischer, Jena.

Simon, E. 1899. Ergebnisse einer Reise nachdem Pacific (Schauinsland 1896–1897) Arachnoideen. Zoologische Jahrbucher, Abteilung für Systematik 12:411–437.

Sørensen, W. 1886. Opiliones. Pp. 53–86. *In* Die Arachniden Australiens nach der Natur beschrieben und abgebildet. (L. Koch, E. Keyserling, eds.). Bauer und Raspe, Nürnberg.

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