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AN UPDATE CHECKLIST OF THE PSEUDOSCORPIONS (PSEUDOSCORPIONES) RECORDED FROM HISPANIOLA, WITH THE FIRST RECORD OF TWO SPECIES AND ONE GENUS

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Abstract: The actual number of pseudoscorpion species recorded from Hispaniola is clarified after an exhaustive revision of the literature. In addition, the first record of *Bituberochernes mumae* Muchmore, 1974, *Chelifer cancroides* (Linnaeus, 1758) and the genus *Paraliochthonius* Beier, 1956 from the Dominican Republic are presented, based on material deposited at the Arachnological Collection of the Museo Nacional de Historia Natural "Prof. Eugenio de Jesús Marcano", in Santo Domingo. The resulting list contains 45 species in 13 families recorded from Hispaniola, although the actual number of species is considered to be 37 (28 extant and nine fossils).
Key words: Pseudoscorpions, Cheliferidae, Chernetidae, Chthoniidae, checklist, first records, West Indies, Caribbean, Dominican Republic, Haiti.

Catálogo actualizado de los Pseudoscorpiones registrados en Hispaniola, incluyendo el primer registro de dos especies y un género
Resumen: Se esclarece el número real de especies de pseudoescorpiones registradas de la Hispaniola mediante una revisión exhaustiva de la literatura. Además, se presenta el primer registro de *Bituberochernes mumae* Muchmore, 1974, *Chelifer cancroides* (Linnaeus, 1758) y del género *Paraliochthonius* Beier, 1956 para República Dominicana, en base a material depositado en la Colección Aracnológica del Museo Nacional de Historia Natural "Prof. Eugenio de Jesús Marcano", en Santo Domingo. La lista resultante contiene 45 especies en 13 familias registradas para la Hispaniola, aunque el número real de especies se estima en 37 (28 actuales y nueve fósiles).
Palabras clave: Pseudoescorpiones, Cheliferidae, Chernetidae, Chthoniidae, catálogo, primeras citas, Indias Occidentales, Caribe, República Dominicana, Haití.

Introduction

Pseudoscorpions are small size arachnids (typically less than 4 mm) characterized by the possession of chelates pedipalps with venom glands on their tips. Other important features are the body divided in two tagmas (prosoma and opistosoma) united without intermediate narrowing, the absence of a telson or tail, and external reproduction by means of spermatophores (Zaragoza, 2015). They are predators, feeding on small invertebrates like mites, collembola, flies, and small insect larvae (Turienzo *et al*., 2010). More than 3 500 species distributed in 27 families are recognized from around the world (Harvey, 2013).

Hispaniola (currently composed by the countries of Dominican Republic and Haiti) is the second largest island in the archipelago of the Greater Antilles (Fig. 1). Its mountain systems are the highest and most extensive of the West Indies, with a great variety of ecosystems and microclimates containing a rich flora and fauna, especially arthropods (Peguero & Jiménez, 2015; Perez-Gelabert, 2020). Within the latter group, pseudoscorpion fauna in Hispaniola have been scarcely studied, beginning in 1907 with the report of a new species by the Swedish arachnologist H. A. Tullgren. In 1976, the Austrian arachnologist Max Walter Peter Beier reported 21 species, including seven new to science species. More species from fossil and recent fauna were added by prominent arachnologists and entomologists (e.g. Schawaller, 1980ab, 1981ab; Harvey, 1985; Muchmore, 1996, 1998; Judson, 1998, 2007). Later 25 species and 11 families were reported by Perez-Gelabert (2008), and Harvey (2013) slightly increased these numbers to 32 species distributed in 12 families. In 2016, Cosgrove *et al*. added four new records, raising the number of species to 36 species. Recently, Perez-Gelabert (2020) reported 27 species in 11 families.

Even though the number of species known from Hispaniola increased between the cited contributions, there are inconsistencies among those lists, mainly due to inaccurate recording of locality data and the inclusion of non-valid species and/or misidentifications. According to O´Shea & Kaiser (2018), inaccuracy of locality records could result in misconceptions regarding the range and conservation status of a particular species. For this reason, the task of assigning a collecting locality and the reproduction of species' checklists should be taken carefully.

The present paper offers the outcomes of an exhaustive revision to the lists of pseudoscorpions recorded from Hispaniola, resulting in the up-to-date checklist, which includes the first record of the species *Bituberochernes mumae* Muchmore, 1974 (Chernetidae), *Chelifer cancroides* (Linnaeus, 1758) (Cheliferidae), and the genus *Paraliochthonius* Beier, 1956 (Chthoniidae) from Dominican Republic and Hispaniola.

Material and methods

The validation of the species records was made through an exhaustive revision of literature, which did include the work of Beier (1976), the catalog of pseudoscorpions (Harvey, 2013) and the arachnids' checklist made by Beron (2018),

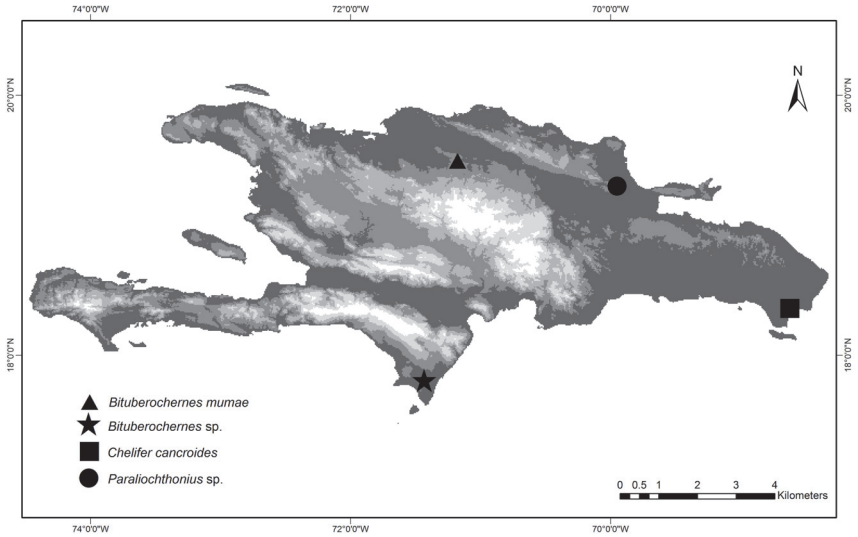


Fig. 1. Collecting sites of the new records from Dominican Republic.

among others. Additionally, the collector's itineraries were tracked when possible (e.g. Luigi Balzan expeditions' in Paraguay, in Mahnert [2016]).

The new records of species originated from material deposited at the Arachnological Collection of the Museo Nacional de Historia Natural "Prof. Eugenio de Jesús Marcano", Santo Domingo, Dominican Republic (MNHNSD). For the identification of these new records, the works of Muchmore (1974) and Harvey (2009, 2014) were consulted.

The specimens were examined with an EMZ-5TRD zoom stereo with SWF20X eyepieces. Photographs were taken with a Canon EOS 7D camera using a 65 mm f/2.8 macro lens.

Results and discussion

● **First records**

A total of four species belonging to three families were identified. Chernetids were collected under stones, the unidentified one inside a vertical cave. *Chelifer cancroides* specimens were obtained by canopy fogging. The chthoniid *Paraliochthonius* were found in a Winkler sample of leaf litter. The list of the collected taxa is given below with detailed locality information, number of collected individuals and developmental stage.

Family Cheliferidae Risso, 1826

Chelifer Geoffroy, 1762

***Chelifer cancroides* (Linnaeus, 1758)** MNHNSD 08.328 (2♂ 1♀, figures 2–4): La Altagracia Province. Parque Nacional del Este, Boca de Yuma (18°21´36´´N 68°37´10´´W), 60 m a.s.l. 26.III.2002, B. Farrell, K. Guerrero. Canopy fogging.

Remarks: The species *Chelifer cancroides* reported in this paper was collected using canopy fogging. It is likely that these individuals were inhabiting the nest of a bird (or more than one) since, according with Turienzo *et al*. (2010), this species is associated with nests of 13 families of birds.

Family Chernetidae Menge, 1855

Bituberochernes Muchmore, 1974

Bituberochernes mumae Muchmore, 1974 MNHNSD 08.337 (1♂ 1♀, figures 5–7): Valverde Province. La Furnia de Gurabo (19Q 271407 2156854), 204 m a.s.l. 12.IX.2018, G. de los Santos. Under stone.

***Bituberochernes* sp.** MNHNSD 08.338 (1♂ 1♀, figures 8–10): Pedernales Province. Tres charcos (19Q 242189 19702 86), 77 m a.s.l. 17.I.2018. G. de los Santos, E. Gabot, J. Almonte, G. Feliz. Colected inside cave.

Remarks: The specimens of *Bituberochernes mumae* reported here were collected under stones and those of *Bituberochernes* sp. under stones inside a vertical cave. The related species *Bituberochernes mumae* and *B. jonensis,* described by Muchmore (1974 and 1979, respectively), were collected under bark. This variety of habitats was to be expected since members of the family Chernetidae are distributed in most regions of the world, and mainly occur in leaf litter, soil, under rocks and stones, or within caves (Harvey, 2013).

Family Chthoniidae Daday, 1888

Paraliochthonius Beier, 1956

***Paraliochthonius* sp.** MNHNSD 08.341 (7♂, figures 11–12): María Trinidad Sánchez Province. Loma Guaconejo (19.29954°N 69.94941°W), 285 m a.s.l. 22.VII.2015, D. Lubertazzi, M. Prebus. Leaf litter/Winkler sample.

Remarks: Although Harvey (2009) states that species of this genus occur exclusively in halophilic habitats, and are totally or mostly restricted to seashore environments, the individuals we identified came from a locality situated 13 km (8 miles) from the nearest coast. This can be explained by a) the influence of the proximity marine (marine winds) or b) the alkalinity of the soil of Loma Guaconejo, limestone (A. Sánchez, 2019, pers. comm.). According to Sarwar *et al*. (2015), habitats with alkaline soils favor the existence of halophiles. A related species from The Bahamas, *Paraliochthonius carpenteri* Muchmore, 1984, was collected inside a cave about 1 km from the ocean, and Muchmore (1984) commented that this species is not adapted for life in the cave.

● **Updated checklist of the Pseudoscorpions recorded from Hispaniola**

A total of 44 species from 13 families, representing 52 % of the recent families reported in the world (Benavides *et al*., 2019), were found to be recorded from Hispaniola; of these, two (2) species are treated here as "dubious presence", one (1) as "identification error" and one (1) as "non-valid" (see the

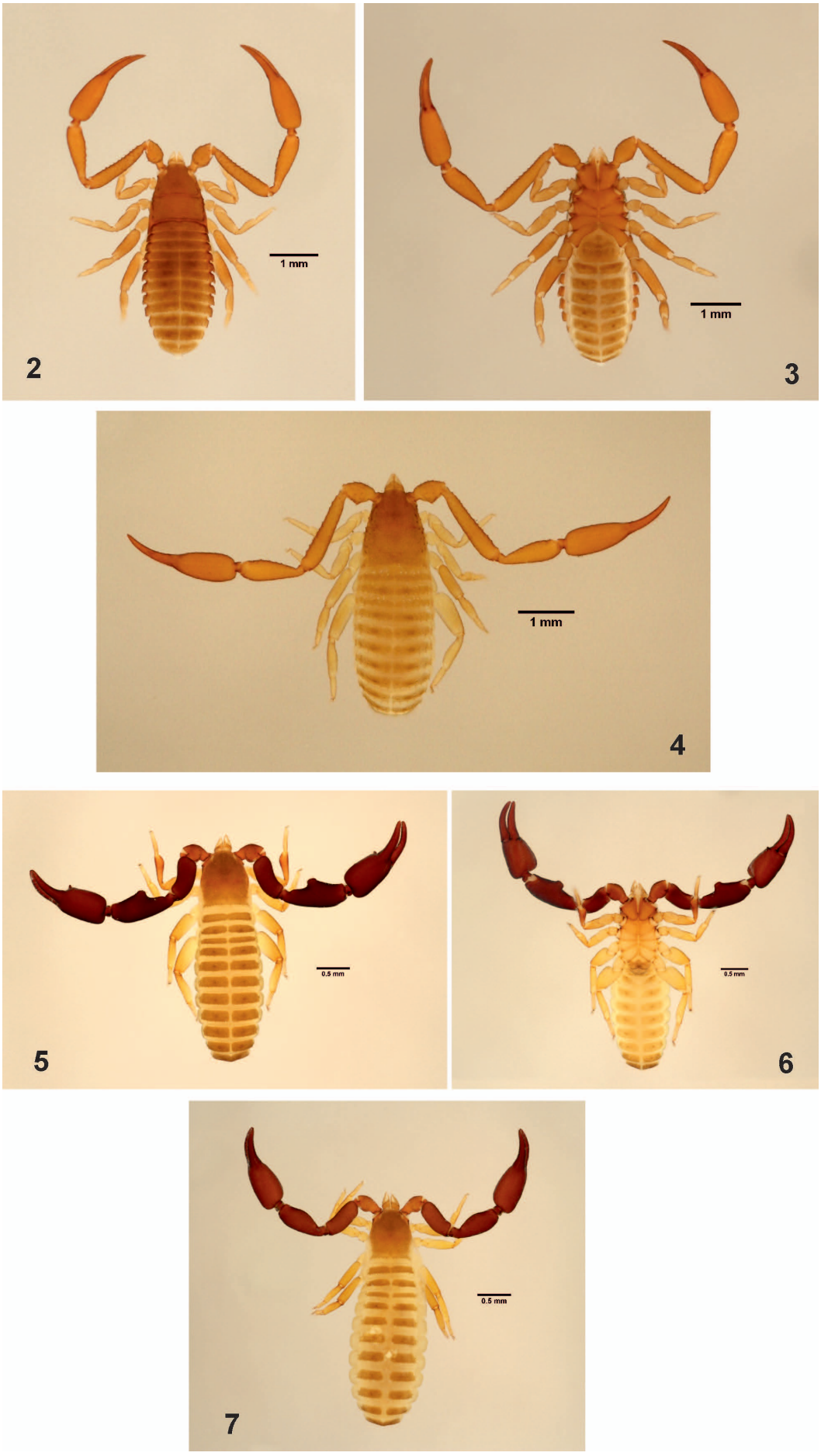


Fig. 2-4. *Chelifer cancroides*. Male: **2**. Dorsal, **3**. Ventral. Female: **4**. Dorsal.
Fig. 5-7. *Bituberochernes mumae*. Male: **5**. Dorsal, **6**. Ventral. Female: **7**. Dorsal.

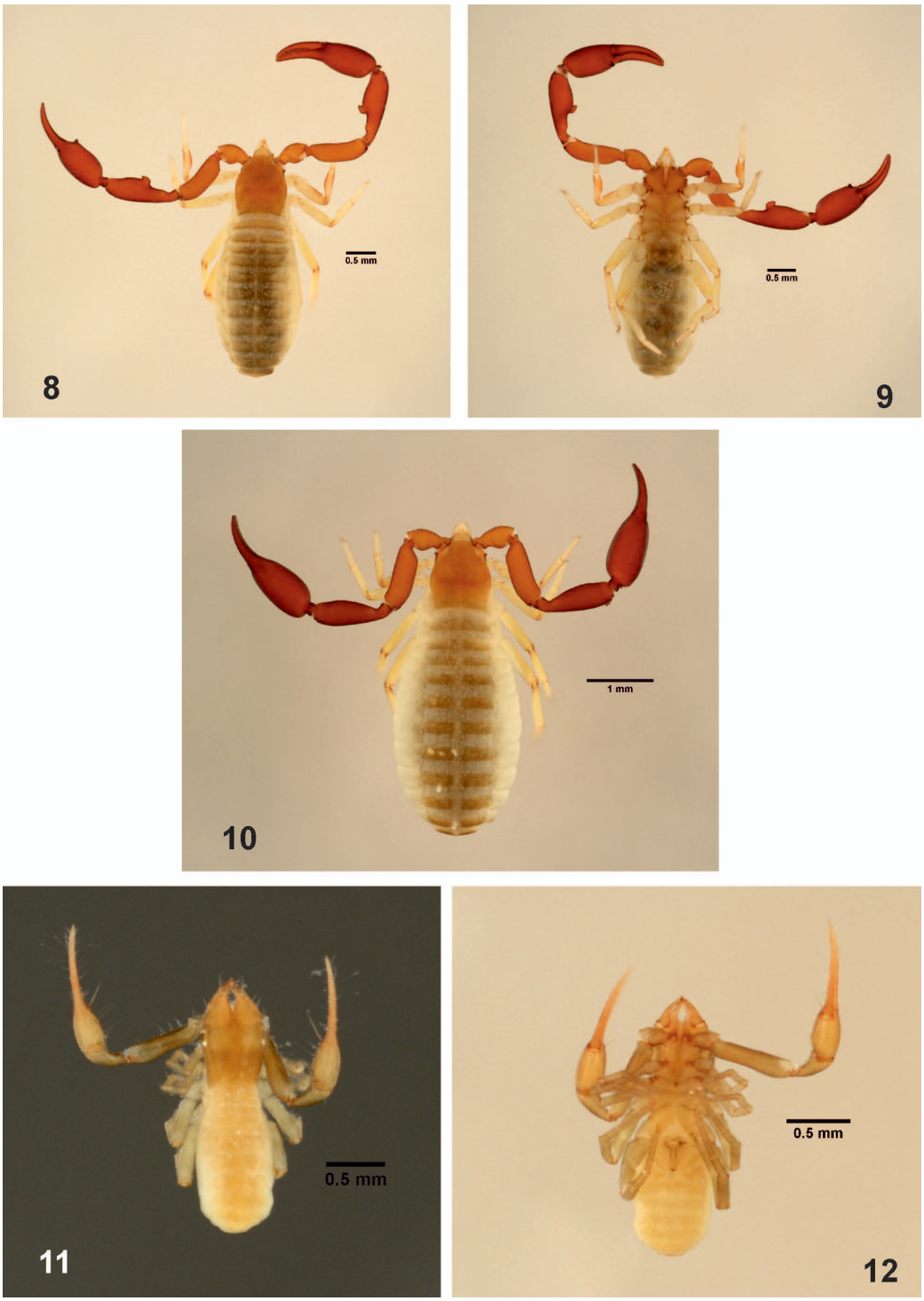


Fig. 8-10. *Bituberochernes* sp. Male: **8**. Dorsal, **9**. Ventral. Female: **10**. Dorsal.
Fig. 11-12. *Paraliochthonius* sp. Male: **11**. Dorsal, **12**. Ventral.

comments next to each case). Additionally, four (4) species are labelled as "waiting for collecting data confirmation" because there was no answer confirming their collecting localities in Hispaniola. The remaining 36 species (27 extant and nine fossils) are proposed as the actual number of species known from Hispaniola; of these, nine are endemic. **E**=endemic, †= fossil, *= new record.

Atemnidae

Paratemnoides nidificator (Balzan, 1888)

Bochicidae

Mexobisium dominicanum Muchmore, 1998 **E**

Cheiridiidae

† *Cryptocheiridium (Cryptocheiridium) antiquum* Schawaller, 1981. Neogene Dominican Amber (Dunlop *et al.,* 2020).

Cheliferidae

Chelifer cancroides (Linnaeus, 1758) *

Cubachelifer strator Hoff, 1946. Dubious presence. The only known record of this species from the Dominican Republic was made by Beier (1976), based on a female, and he was not sure about this identification: "I make reservations about this species… the subterminal bristle is toothed, the claws are simple…".
Parachelifer dominicanus Beier, 1976 **E**
Tyrannochelifer cubanus Hoff, 1964
Tyrannochelifer floridanus (Banks, 1891)
Tyrannochelifer macropalpus (Tullgren, 1907) **E**

Chernetidae

† *Americhernes* sp. Schawaller, 1980a. Tertiary Dominican Amber (Dunlop *et al.,* 2020).
Bituberochernes mumae Muchmore, 1974 *
Bituberochernes sp. **E**
Byrsochernes caribicus Beier, 1976
Caribochernes pumilus Beier, 1976 **E**
Chernes hispaniolicus Beier, 1976 **E**
Gomphochernes communis (Balzan, 1888).
Hesperochernes vespertilionis Beier, 1976 **E**
† *Pachychernes effossus* Schawaller, 1980a. Neogene Dominican Amber (Dunlop *et al.,* 2020).
† *Pachychernes* sp. Schawaller, 1980a. Fossil in Dominican amber (Perez-Gelabert, 2020).
Parachernes (Parachernes) dominicanus Beier, 1976 **E**
Parachernes (Scapanochernes) compressus (Tullgren, 1907)
Parazoana klapperichi Beier, 1976 **E**

Chthoniidae

Lagynochthonius proximus (Hoff, 1959)
Mundochthonius dominicanus Muchmore, 1996 **E.**
Note: *Lagynochthonius dominicanus* is mentioned in Cosgrove *et al*., 2016: 264 as a species that occur in Dominican Republic, however, this was a lapsus for *Mundochthonius dominicanus*.
Paraliochthonius sp. *
† *Pseudochthonius squamosus* Schawaller, 1980b. Neogene Dominican amber (Dunlop *et al.,* 2020).
Pseudochthonius thibaudi Vitali-di Castri, 1984 (in Cosgrove *et al*., 2016: 264). Waiting for collecting data confirmation.
Tyrannochthonius imitatus Hoff, 1959

Hesperolpiidae

Planctolpium arboreum Hoff, 1964

Lechytiidae

Lechytia sini Muchmore, 1975 (in Cosgrove *et al*., 2016: 260, 268). Waiting for collecting data confirmation.
† *Lechytia tertiaria* Schawaller, 1980b. Neogene Dominican amber (Dunlop *et al.,* 2020).
Lechytia trinitatis Beier, 1970

Olpiidae

Antillolpium hummelincki Muchmore, 1991 (in Cosgrove *et al*., 2016: 264). Waiting for collecting data confirmation.
Novohorus suffuscus Hoff, 1945 (in Cosgrove *et al*., 2016: 264, 266-267). Waiting for collecting data confirmation.
Pachyolpium medium Hoff, 1945

Pseudochiridiidae

Pseudochiridium insulae Hoff, 1964
† *Pseudochiridium lindae* Judson, 2007. Neogene Dominican amber (Dunlop *et al.,* 2020).

Sternophoridae

Garyops depressus Banks, 1909
† *Idiogaryops pumilus* (Hoff, 1963). Neogene Dominican amber (Dunlop *et al.,* 2020).

Syarinidae

Ideobisium crassimanum Balzan, 1892. Identification error. Muchmore (1982: 197) indicated that these specimens do not pertain to this species, but rather to *I. puertoricense* or to an undescribed indigenous species.
Ideobisium puertoricense Muchmore, 1982
Ideobisium puertoricense puertoricense Muchmore, 1982. Non-valid.

Withiidae

Cacodemonius segmentidentatus (Balzan, 1887)
Dolichowithius (Dolichowithius) simplex Beier, 1932. Dubious presence. The only two known females and a protonymph recorded from Hispaniola, in words of Beier (1976): "… probably belong to this species, which until now has only been known from the male of Puerto Rico". Muchmore (1997) argued that because these specimens (from Beier, 1976) are much smaller than the type of *D. simplex*, they probably represent a different species.
† *Parawithius*? sp. Schawaller, 1981b. Fossil in Dominican amber.

Conclusion

Although it was not possible to study specimens from all the species included in the checklist, which would probably have revealed different results, this work clarifies the number of pseudoscorpions species in Hispaniola by revealing wrong locality records and species misidentification among others mistakes.

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