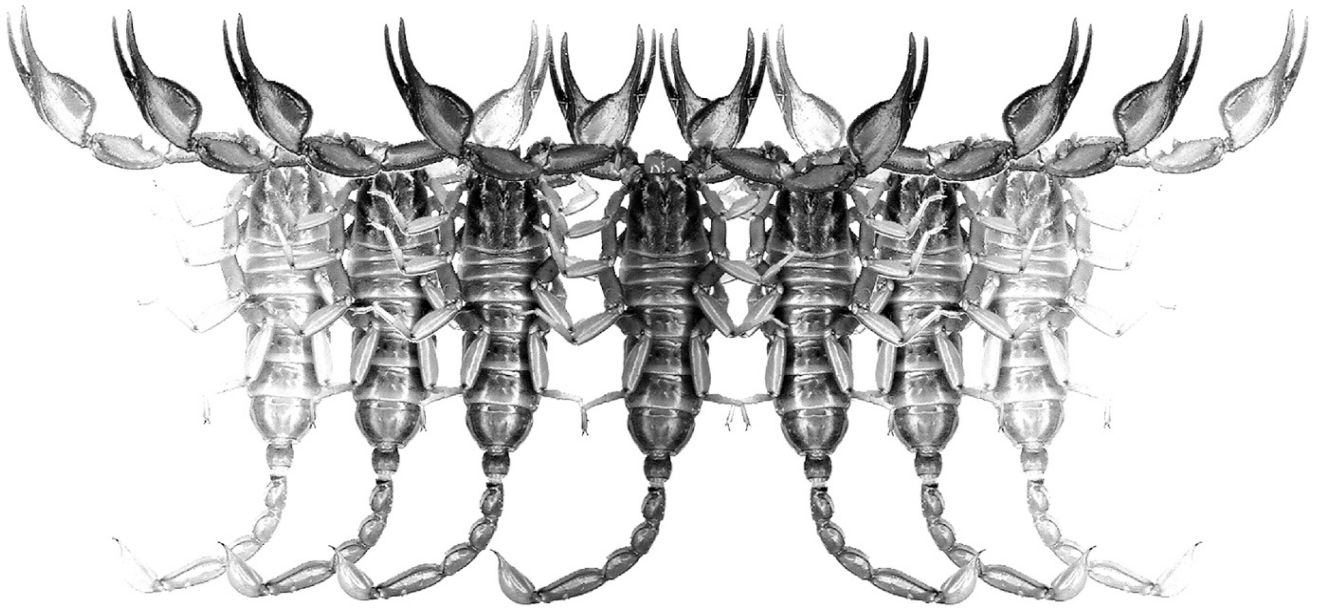


Euscorpium

Occasional Publications in Scorpiology



The correct identity of *Centruroides hoffmanni* Armas, 1996
(Scorpiones: Buthidae), with the description of a new species
from Chiapas, Mexico

Luis F. de Armas & Rolando Teruel

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The correct identity of *Centruroides hoffmanni* Armas, 1996 (Scorpiones: Buthidae), with the description of a new species from Chiapas, Mexico

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Summary

The Mexican scorpion *Centruroides hoffmanni* Armas, 1996 was described on the basis of a supposed adult female (actually a juvenile) from La Gloria, Arriaga Municipality, southwest of the Chiapas State. In its redescription, this species was also recorded from the southeastern of Oaxaca State. Nevertheless, in the recent revision of the “*thorellii*” species-group of the genus *Centruroides* Marx, 1890, a new species from Chiapas was misidentified as *C. hoffmanni* and, also, an erroneous new diagnosis was given for *C. hoffmanni*. In the present contribution, this new species is named *Centruroides concordia* sp. n., and the correct identity of *C. hoffmanni* is established.

Introduction

In a recent revision of the “*thorellii*” species-group of the genus *Centruroides* Marx, 1890, which was published in two simultaneous papers by Goodman et al. (2021a, 2021b), these authors presented a revised diagnosis of the medium sized bark scorpion *Centruroides hoffmanni* Armas, 1996. This species was described by Armas (1996), on the basis of a single, supposedly adult female collected at La Gloria Farm in Arriaga municipality, at the extreme southwestern corner of Chiapas, Mexico. Later, Armas (1999), Armas et al. (2003) and Martín-Frías et al. (2005) correctly stated that the holotype was actually immature; and in the last paper, Martín-Frías et al. (2005) redescribed *C. hoffmanni* and recorded it from several localities in southeastern Oaxaca. This geographical distribution was recently confirmed by Teruel et al. (2015), by examining these same specimens (holotype included) and additional samples from the Tehuantepec Isthmus area.

Goodman et al. (2021a, 2021b) unexplainably deemed the redescription of *C. hoffmanni* confuse and considered all of its Oaxacan records as misidentifications, restricting *de facto* its distribution to Chiapas State. Nevertheless, the taxonomic identity of *C. hoffmanni* assumed by Goodman et al. (2021a, 2021b) is wrong, as we demonstrate below. The most important cornerstone in taxonomy, ruled by the Article 61.1.1 of the Code (ICZN, 1999) is that: “... *the valid name of [...] a taxon is determined [...] from the name-bearing type(s)...*”. As *C. hoffmanni* was described from a **single specimen** (holotype), there is no possible alternative identity (the absence of any syntypes automatically precludes the chance of more than

one species involved) and the identity of *C. hoffmanni* is not a matter of personal opinion (i.e., our taxonomic interpretation *versus* their). Even though Goodman et al. (2021b: 53) listed the holotype, it is clear that they either did not examine the holotype of *C. hoffmanni*, or it has been swapped for another specimen truly belonging to the “*thorellii*” species-group, due to the mismatch of key morphological characters between the holotype described and repeatedly examined by us and the specimens assumed as *C. hoffmanni* by them (see a detailed discussion of these differences below). An enlightening clue can be found in the simultaneous paper by the same authors and dealing with the same subject: Goodman et al. (2021a: 3) explicitly declared to have examined specimens from “... *the type localities of all species except C. hoffmanni [...] the identifications of which were verified based on morphology...*”.

Second, the list of the specimens examined by Goodman et al. (2021a, 2021b) and identified by them as *C. hoffmanni*, clearly show that none were actually conspecific with the holotype. Moreover, they did not study any topotypes of the authentic *C. hoffmanni* (as explicitly declared by Goodman et al. (2021a: 3; see above)), which would have been another source of legitimacy in their identification of that species. This is especially important because the distribution of the authentic *C. hoffmanni* according to the data currently available (Martín-Frías et al., 2005; Teruel et al. 2015; Kovařík et al., 2016; R. Teruel, unpublished), is completely allopatric to that of the species identified as such by Goodman (2021a, 2021b): the Pacific Coastal Plain in the former, *versus* the Chiapas Central Depression and mountain slopes facing it in the latter, both isolated by the biogeographical barrier of the Sierra Madre del Sur (Fig. 2).

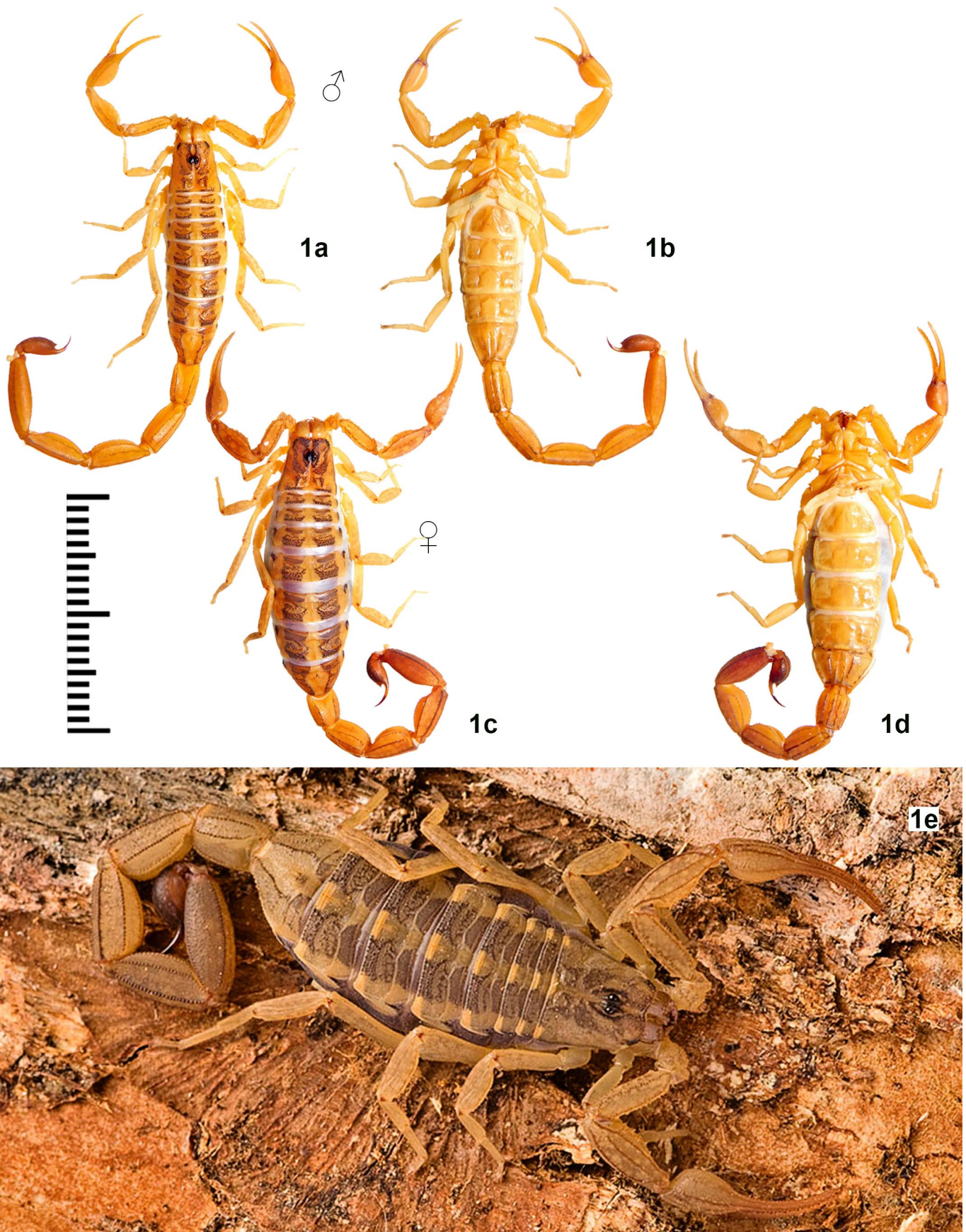


Figure 1. Adults of the authentic *Centruroides hoffmanni*: **a–b**) preserved male (RTO) from Salina Cruz, Oaxaca, dorsal and ventral views; **c–d**) preserved female topotype (RTO) from La Gloria Farm, Chiapas, dorsal and ventral views; **e**) live female from Salina Cruz, Oaxaca, photographed in its natural habitat under the loose bark of a fence post (photo courtesy David Hoferek). Scale bar in mm (a–d).

Systematics

As a corollary, the taxon misidentified as *C. hoffmanni* by Goodman, Prendini & Esposito (2021a, 2021b) actually represents an undescribed species, which is herein named:

Centruroides concordia sp. n.

(Figure 2)

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Centruroides hoffmanni [misidentification]: Goodman, Prendini & Esposito, 2021: 3, 6–7, 9–10, 13, 15; fig. 2; tabs. 1–2. Goodman, Prendini, Francke & Esposito, 2021: 8, 53–55, figs. 2, 4, 7a–b, 10 a–b, 15a, 16a, 17c–f, 18c–f, 19c–f, 20c–f, 21c–f, 22c–f, 23c–f, 24c–f, 25c–f, 38–39; tabs. 1, 8, 10.

TYPE LOCALITY AND TYPE REPOSITORY. **Mexico**, *Chiapas State*, La Concordia Municipality, Villa Corzo-La Tigrilla, San Julián, Revolución Mexicana.

TYPE MATERIAL. 1♀ holotype (CNAN SC3998): **Mexico**, *Chiapas State*, La Concordia Municipality, Villa Corzo-La Tigrilla, San Julián, Revolución Mexicana (16°00'00"N 92°50'47"W), 544 m a. s. l, 17 April 2007, leg. C. Mayorga, G. Ortega & L. Cervantes. Paratypes: all other specimens listed under “Material examined” by Goodman et al. (2021b: 55).

ETYMOLOGY. The specific name is an indeclinable noun in apposition, taken straight from the Spanish name of the municipality from which the holotype originates.

DIAGNOSIS. A medium-sized species (44–60 mm) of the “*thorellii*” group of the genus *Centruroides*, characterized for the following combination of characters: **1**) tergites with complete median carinae; **2**) pectinal tooth counts 13–15 in both sexes; **3**) metasomal segments I–II with strong ventral submedian carinae; **4**) male carapace 0.91–1.00 times as long as wide; **5**) carapace with posterior median carinae well developed, granular; **6**) pedipalp chelae with prodorsal carina; **7**) male telson vesicle elongate, 2.1–2.9 times longer than wide. Its closest relative seems to be *C. chanae* Goodman, Prendini, Francke & Esposito, 2001; for a comparison, see Goodman et al. (2021b).

COMMENTS. Below we will discuss in detail the complete mismatch between the holotype of *C. hoffmanni* and the species identified as such by Goodman (2021a, 2021b):

Color pattern. The holotype has the carapace with large and symmetrical dark blotches and the tergites with two broad and solid dark longitudinal stripes (see Armas, 1996: 29), exactly as in our specimens conspecific with it (see Martín-Frías et al., 2005: 2, fig. 1). On the other hand, Goodman, Prendini, Francke & Esposito (2021: 68–69, figs. 38–39) depicted the carapace and tergites densely and irregularly variegated in the second taxon.

Pectinal tooth counts. The holotype has 20/21 (see Armas, 1996: 30), while our conspecific specimens have 21–24 in males and 20–22 in females, as stated by Martín-Frías et al. (2005: 5; tab. 3). On the other hand, Goodman et al. (2021b: 48; tab. 8) recorded non-overlapping and much lower counts of 13–15 in both sexes of the second taxon.

Length / width of metasomal segments I / II / III / IV / V. The holotype female has the following ratios: 1.12 / 1.36 / 1.49 / 1.74 / 2.12 (calculated from Armas, 1996: 28, tab. 3), because of being immature, slightly shorter than our conspecific adult females with 1.15–1.23 / 1.40–1.59 / 1.45–1.73 / 1.76–1.95 / 2.14–2.35 (see Martín-Frías et al., 2005: 4, tabs. 1–2, enhanced with our new calculations). On the other hand, Goodman et al. (2021b: 48; tab. 8) gave precise measurements of adult females of the second taxon that allowed us to calculate the following non-overlapping and much longer ratios: 1.28–1.50 / 1.94–2.20 / 2.27–2.40 / 2.34–2.86 / 2.73–3.31.

Telson shape. Despite being an immature, the holotype has the vesicle short and bulbous and the subaculear tubercle spiniform (Armas, 1996: 30, fig. 8), just like our conspecific specimens (Martín-Frías et al., 2005: 2–3; figs. 5–6, 10; see also Santibáñez-López & Ponce-Saavedra, 2009: 328, fig. 11). On the other hand, Goodman et al. (2021b: 51–52, figs. 24c,f, 25c,f) depicted the vesicle elongate and slender and the subaculear tubercle triangular and compressed in the second taxon.

All differences listed above, as well as others well visible even to unaided eye, are clearly shown in the Figure 2 herein, which includes a toptype of the authentic *C. hoffmanni* with the following collecting data: Mexico, Chiapas State, Arriaga Municipality, La Gloria Farm, collected inside inhabited house by public health staff, no date, leg. J. G. Baldazo (1♀ RTO). The interested reader will easily realize its perfect match to the figures published by Armas (1996), Martín-Frías et al. (2005) and Santibáñez-López & Ponce-Saavedra (2009) on one hand, and its absolute contradiction to those by Goodman et al. (2021b) on the other.

With respect to the infrageneric affiliation of the authentic *C. hoffmanni*, the four diagnostic characters discussed above are enough to demonstrate beyond any reasonable doubt that it is not a member of the “*thorellii*” species-group. As first suggested implicitly by Martín-Frías et al. (2005) and then formally established by Teruel et al. (2015) and followed by Santibáñez-López & Ponce-Saavedra (2009), it belongs in the “*nigrovariatus*” species-group, where it is most closely related to *Centruroides baergi* Hoffmann, 1932, *C. franckei* Santibáñez-López & Contreras-Félix, 2013 and *C. poncei* Teruel, Kovařík, Baldazo-Monsivais & Hoferek, 2015.

REMARKS. The present description is made in full agreement with Article 13.1.2 of the Code (ICZN, 1999).

For additional data of this species (measurements, pectinal tooth counts, illustrations, ecology and distribution), see Goodman et al. (2021b: as *C. hoffmanni*).

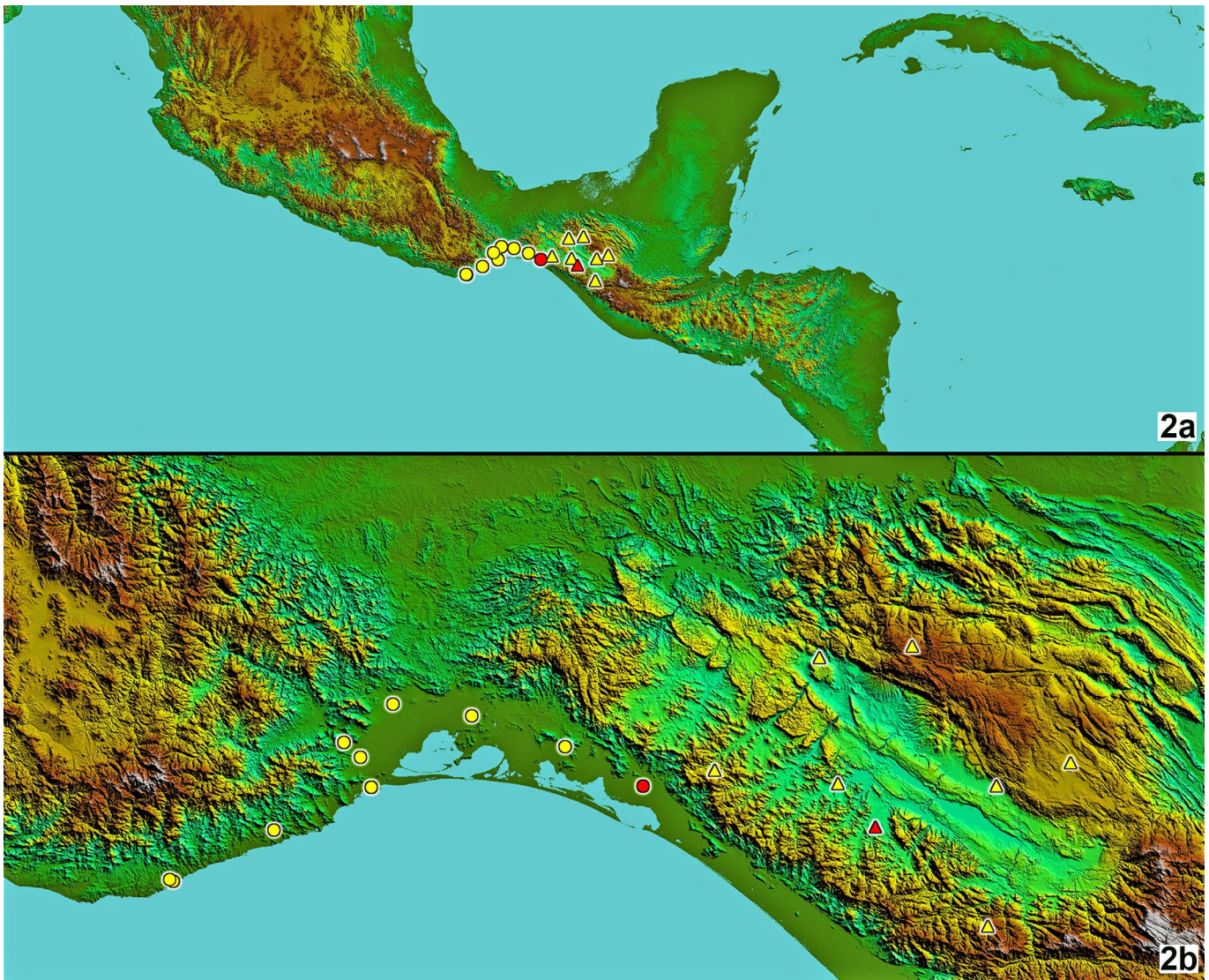


Figure 2. Geographical distribution of the authentic *Centruroides hoffmanni* (circles) and *C. concordia* sp. n. (triangles), with the type localities indicated in red. Image frame represents 3,800 x 1,550 km (a) and 600 x 245 km (b).

Acknowledgments

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