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A NEW SPECIES OF SCORPION FROM CHIAPAS AMBER, MEXICO (SCORPIONES: BUTHIDAE)

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Abstract: *Tityus* (*Brazilotityus*) *knodeli* **sp. n.**, a new species of fossil scorpion, is described from a specimen in amber from Chiapas, Mexico. The new species is clearly related to the extant fauna of the Neotropical region and is tentatively placed in the genus *Tityus* C. L. Koch, 1836, presently largely distributed in the Neotropical region but not in Mexico.
Key words: Scorpiones, Buthidae, *Tityus*, fossil, new species, amber, Chiapas, Mexico.

Una especie nueva de escorpion del ámbar de Chiapas, México (Scorpiones: Buthidae)
Resumen: Se describe *Tityus* (*Brazilotityus*) *knodeli* **sp. n.**, una especie nueva de escorpión fósil, sobre un espécimen encontrado en ámbar procedente de Chiapas, México. La especie está claramente relacionada con la fauna actual de la región Neotropical, y tentativamente se ubica en el género *Tityus* C. L. Koch, 1836, que en la actualidad está ampliamente distribuido por la región Neotropical pero no en Mxico.
Palabras clave: Scorpiones, Buthidae, *Tityus*, fósil, especie nueva, ámbar, Chiapas, México.

Taxonomy / Taxonomía: *Tityus* (*Brazilotityus*) *knodeli* **sp. n.**

Introduction

As noted in previous papers (e.g. Lourenço, 2009a), scorpions are rare among the arthropods fossilized in amber. The histories of the very first scorpions discovered in amber have been outlined in detail by Lourenço and Weitschat (1996).

Scorpions found in amber from sites located in the New World are still poorly known. Although some studies of amber fossil scorpions from Dominican Republic were carried out at the end of the 1970s (Schawaller, 1979, 1982), only a few species have been correctly diagnosed and described during the last 35 years (Santiago-Blay & Poinar, 1988; Santiago-Blay, Schawaller & Poinar, 1990; Lourenço, 2009b, 2013).

In fact, several specimens from this region have been found in the last decades, but have not yet been studied (Grimaldi, 1996). This is particularly true for specimens from Mexican amber. To date only one Mexican amber scorpion has been reported by Santiago-Blay & Poinar (1993), but these authors remained vague about its identity. The specimen was tentatively placed in the genus *Centruroides* Marx, 1890, but no specific name was given. The amber fossils found in Hispaniola and Mexico seem, without exception, to be closely related to the extant buthid scorpion taxa of the Caribbean and Neotropical regions.

In this publication a new species of Buthidae is described from Mexican Chiapas amber. It is tentatively assigned to the genus *Tityus* C. L. Koch, 1836, which has a modern distribution over most of the Neotropical region, including the Caribbean area, but is absent from the Mexican fauna.

Chiapas amber

For the history, geological setting and locality details of Chiapas amber, also referred to as Mexican amber, I resume here the data presented by Dunlop et al (2008). This amber is mostly recovered from the state of Chiapas in southern Mexico, typically from the northern mountain ranges of the state (the Chiapas highlands) in the Simojovel area between Rapilula, Yajalón and Los Cruces. Chiapas amber, which is typically very transparent and similar in its appearance and formation history with Dominican amber, originated from the extinct Leguminoseae tree *Hymenaea mexicana*. Langenheim (1995) suggested that it was produced by mangrove vegetation in a shallow marine environment; i.e. a near-shore habitat, such as a coastal lagoon. The putative amber-forming period was originally thought to span the Palaeogene-Neogene boundary, with an estimated age of late Oligocene (26 Ma) to early Miocene (22.5 Ma). However, more recent results suggest a slightly younger, mid-Miocene date of perhaps 16 Ma. For further details see other references cited by Dunlop et al. (2008) and Solórzano-Kraemer (2010).

Material and methods

The specimen investigated was obtained by Mr. Herbert Knodel (Rotonda, USA), and is now deposited in his personal collection. It is in a very clear, rounded piece of reddish-yellow amber (40 x 23 x 9 mm). The amber shows a typical laminated structure and it is possible to see how individual layers have been formed as a result of several resin flows at regular intervals. Both dorsal and ventral sides of the scorpion are reasonably visible, allowing a more or less detailed investigation, particularly of the trichobothria. The schematic drawings provided here are interpretations of what was observable. Right pedipalp fingers are not cut but twisted; consequently, the rows of granules can be observed. Illustrations and measurements were produced with the aid of a Wild M5 stereomicroscope equipped with a drawing tube and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974). Trichobothria were definitely recorded only when their bothria (areoles) could be observed. Other trichobothria may be suggested by the presence of transverse hairs.

Systematic description

Family Buthidae C. L. Koch, 1837
Genus *Tityus* C. L. Koch, 1836
Subgenus *Brazilotityus* Lourenço, 2006

***Tityus* (*Brazilotityus*) *knodeli* sp. n.**
Fig. 1-11.

DIAGNOSIS: Total length about 12.43 mm (including telson). Morphology somewhat similar to that of some primitive species of *Tityus*. However the specimen has suffered dissection and distortion within the resin and some volumes are unnatural. The new species can be distinguished from other species of *Tityus* and in particular from *Tityus (Brazilotityus) hartkorni* Lourenço, 2009, described from Dominican Republic amber by the combination of several distinct characters: (i) pectines with only 16 to 18 teeth and vestigial to obsolete fulcra; (ii) spiracles oval and very short; (iii) fixed and movable fingers of pedipalp chela with 10 to 12 rows of granules vs 14-15 in *T.* (*B.*) *hartkorni*; (iv) trichobothrial pattern of type A-α (alpha), possibly orthobothriotaxic (not all trichobothria can be observed); external trichobothria of femur close to each other and placed in a proximal position; (v) carapace and tergites weakly granular, almost smooth; (vi) sternum form intermediate between triangular and subpentagonal; (vii) subaculear tooth strong and spinoid.

HOLOTYPE: Probably a juvenile. Considering the morphology and distance between pectines, it is certainly a female.

TYPE LOCALITY AND HORIZON: Mexico, Chiapas, Simojovel area (precise locality not recorded). Neogene: Miocene.

DEPOSITORY: The specimen is deposited in the personal collection of Mr Herbert Knodel, Rotonda, USA.

ETYMOLOGY: The specific name is dedicated to Mr Herbert Knodel, (Rotonda, USA), who allowed me to study the specimen.

DESCRIPTION:

Coloration: general colour yellowish with some brownish patches more or less well defined on the pedipalps, carapace and metasoma. The ventral aspect of the specimen shows shaded areas associated with the zone of the book lungs.

Morphology. Carapace weakly granular; anterior margin with a moderately marked median concavity. Antero-median superciliary carinae weak; other carinae not well observable. Furrows weak to obsolete. Median ocular tubercle distinctly anterior to centre of the carapace. Median eyes separated by a little more than one diameter. Three pairs of lateral eyes. Sternum intermediate in form between triangular and subpentagonal, longer than wide. Mesosoma: Tergites I to V not well observable; weakly granular to smooth; tergite VI with one, weak to moderate, longitudinal carina. Tergite VII pentacarinate. Venter: genital operculum formed by two semi-oval plates. Pectines not well observable, with 3 to 5 marginal lamellae and some small median lamellae; fulcra small to vestigial; pectinal tooth count 16 to 18 (some teeth may be fused). Sternites almost smooth; spiracles small and oval. Metasoma: Segment I with 10 carinae; segments II-IV with 8 carinae; segment V with 5 carinae; dorsal and dorso-lateral carinae on segments I to IV with slightly spinoid granules posteriorly. Telson elongated, not globular; vesicle with 3 ventral carinae; aculeus long but moderately curved; subaculear tooth strong and spinoid. Cheliceral dentition typical of the family Buthidae; external and internal distal teeth of movable finger similar in length (Vachon, 1963). Pedipalps: Femur pentacarinate; patella with seven carinae; internal aspect with 7-8 spinoid granules; chela with nine carinae; all faces almost smooth. Fixed and movable fingers with 10 to 12 rows of small granules (not all observable). Trichobothriotaxy: Type A-α (alpha) (Vachon, 1974, 1975) possibly orthobothriotaxic. Tarsus of legs with thin ventral setae; pedal spurs moderate; tibial spurs absent.

Measurements (in mm) of holotype of *Tityus* (*Brazilotityus*) *knodeli* sp. n. (some measurements could not be taken because of the position of the specimen). Total length 12.43 (including telson). Carapace: length 1.47, anterior width 0.80, posterior width 1.07. Mesosoma length 3.73. Metasoma: segment I length 0.94, width 0.47; segment II length 1.00, width 0.47; segment III length 1.14, width 0.40; segment IV length 1.27, width 0.40; segment V length 1.54, width 0.34. Telson length 1.34, width 0.34. Pedipalp: femur length 1.27, width 0.34; patella length 1.67, width 0.40; chela length 2.07, width 0.40; movable finger length 0.87.

TAXONOMIC REMARKS

The previously studied scorpion from Chiapas amber (Santiago-Blay & Poinar, 1993) was tentatively assigned to the genus *Centruroides*. This was a logical decision, since this is the dominant extant buthid group in Mexico (Lourenço & Sissom, 2000). The study of the present specimen shows, however, some characters that are not in accordance with the diagnosis of *Centruroides*, but agree instead with those of *Tityus* and *Tityopsis* Armas, 1974 (Lourenço & Vachon, 1996): (i) fixed and movable fingers of pedipalp chela with more than 9 rows of granules (ii) spiracles oval and short. The new species is therefore tentatively assigned to the first genus. Species of the genus *Tityus* have never been recorded for the fauna of Mexico; however species of *Tityus*, subgenus *Brazilotityus*, are known from Dominican Republic amber (Lourenço, 2009b). It can be suggested that during the Cenozoic period, primitive groups associated with *Tityus* possibly extended their distribution to the South of Mexico, but were subsequently eliminated by the more opportunistic species of *Centruroides* in a process of turnover (Pianka, 1970; Barbault, 1988; Lourenço, 1992). The only other buthid group known from Mexico is *Tityopsis* (Armas & Martín Frías, 1998), but it remains relictual. Only the study of new, better preserved specimens might clarify the generic position of these Mexican amber scorpions.

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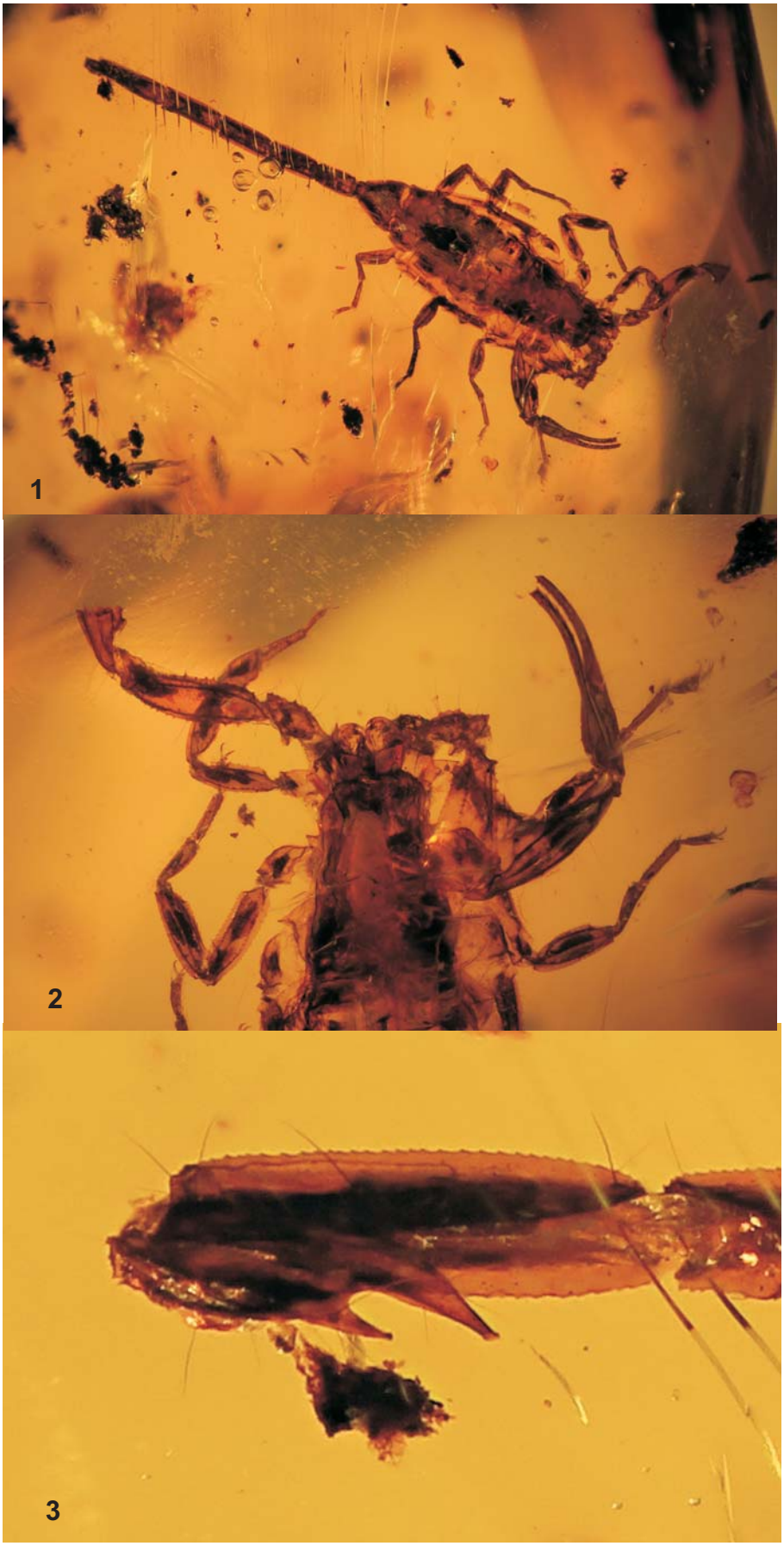


Fig. 1-3. *Tityus* (*Brazilotityus*) *knodeli* sp. n. **1**. Habitus, dorsal aspect. **2**. Carapace and pedipalps. **3**. Metasomal segment V and telson, dorso-lateral aspect.

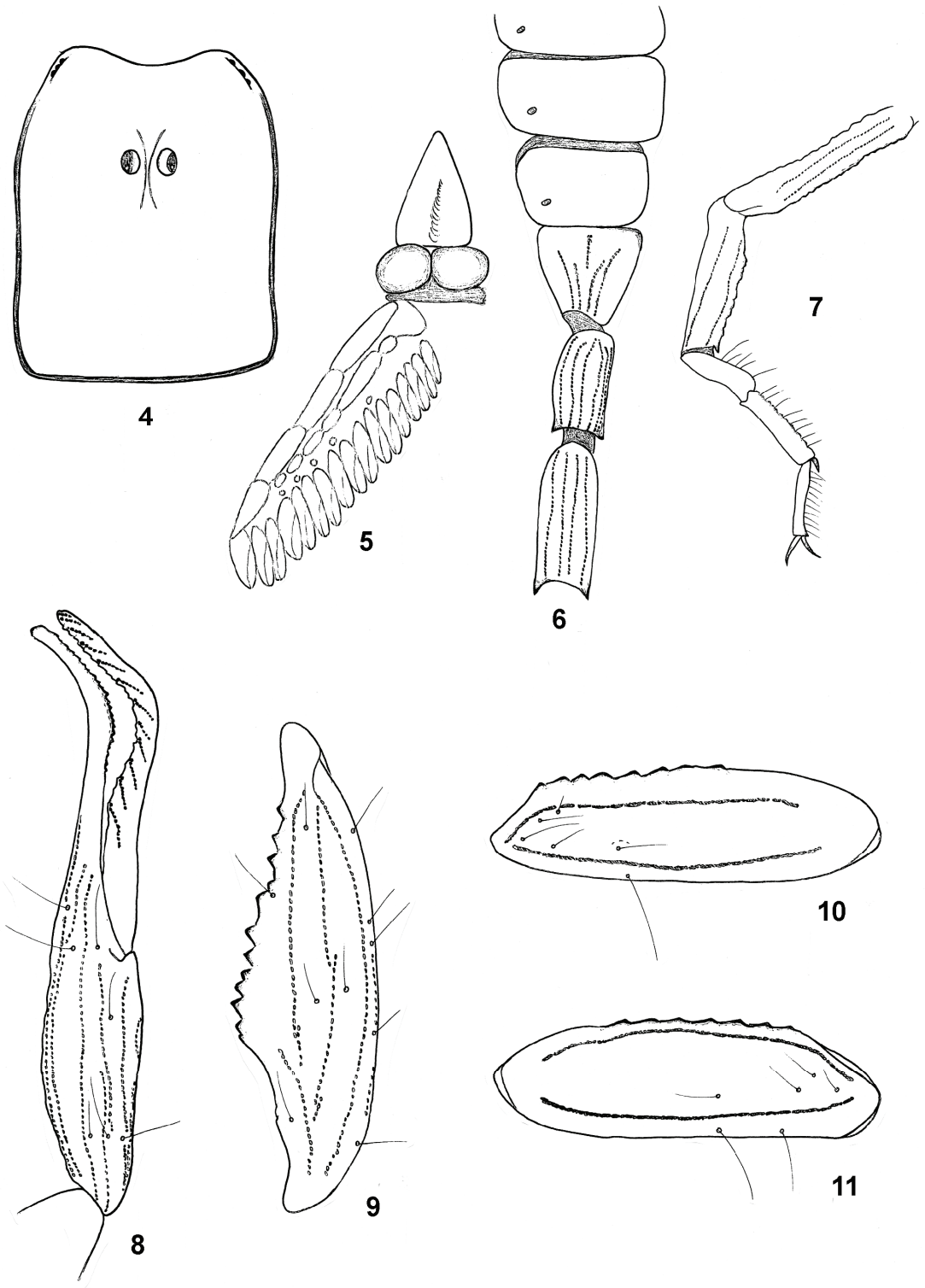


Fig. 4-11. *Tityus* (*Brazilotityus*) *knodeli* sp. n. **4**. Carapace. **5**. Sternum, genital operculum and right pecten, slightly crushed. **6**. Ventral aspect showing sternites IV-VII and metasomal segments I-II; spiracles and carinae visible. **7**. Leg IV showing pedal spur. Fig. **8-11**. Trichobothrial pattern. **8**. Right chela, dorsal aspect. **9**. Right patella, dorsal aspect. **10-11**. Right and left femurs, dorsal aspect.

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