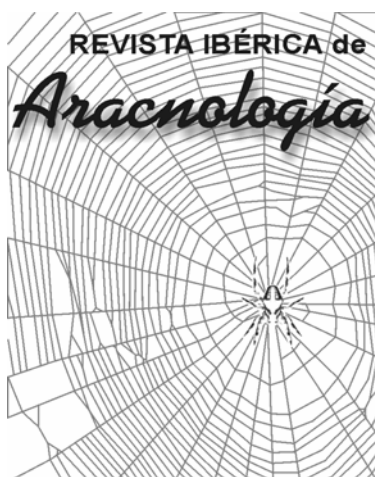




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Miguel Ángel García-Villafuerte

Museo de Paleontología
"Eliseo Palacios Aguilera"
Instituto de Historia Natural y
Ecología (IHNE),
Calzada de los Hombres
Ilustres s/n. Parque Madero.
C.P. 29000, Tuxtla Gutiérrez,
Chiapas; México.
mgarciavillafuerte@yahoo.com.mx

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Grupo de trabajo en Aracnología
de la Sociedad Entomológica
Aragonesa (SEA)
Avda. Radio Juventud, 37
50012 Zaragoza (ESPAÑA)
Tef. 976 324415
Fax. 976 535697
C-elect.: amelic@telefonica.net

Director: Carles Ribera
C-elect.: cribera@ub.edu

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ARTÍCULO:

A new fossil *Episinus* (Araneae, Theridiidae) from tertiary Chiapas amber, Mexico

Miguel Á. García-Villafuerte

Abstract:

Fossil inclusions in Mexican amber have been poorly studied to date. The fossil spider *Episinus penneyi* sp. n. (Theridiidae) is described from a mature male preserved in Tertiary (Miocene: 15–20 Ma) amber from Chiapas, Mexico and is most closely related to an extant species from Panama. It represents the first record of an extant theridiid genus from Mexican amber and adds a new locality record for this genus to the tertiary fossil fauna. Given the similarity of the Hispaniolan fossil (Dominican amber: Miocene: 15–20 Ma) and extant faunas and their proximity geographically and temporally to the Mexican fossil and extant faunas, the new species supports the idea that fossil and extant Mexican faunas may also show close similarities.

Key words: Palaeontology, new species, spider

Taxonomy: *Episinus penneyi* sp. n.

Un nuevo fósil de *Episinus* (Araneae, Theridiidae) del ámbar del terciario de Chiapas, México.

Resumen:

Las inclusiones fósiles del ámbar de México han sido pobremente estudiadas hasta la fecha. Se describe una especie nueva de araña fósil *Episinus penneyi* (Theridiidae) de un macho adulto incluido en el ámbar del terciario de Chiapas, México y es el pariente mas cercano a una especie aun existente de Panamá. Esta especie representa el primer registro del género theridiido viviente para el ámbar mexicano y además representa una nueva localidad de distribución del género a la fauna fósil del terciario. Dada la similitud de registro fósil de la Hispaniola (ámbar de Dominicana) y de las faunas recientes y también a su proximidad geográfica y temporal a los fósiles mexicanos y de faunas aun presentes en la actualidad, esta nueva especie apoya la idea de que los fósiles y faunas actuales en México actuales muestran similitudes cercanas.

Palabras clave: Paleontología, nueva especie, araña

Taxonomía: *Episinus penneyi* sp. n.

Introduction

The spider family Theridiidae is one of the most species-rich families of spiders, with 2,227 described extant species belonging to 86 genera (Platnick, 2006) distributed worldwide. They are commonly known as irregular-cobweb weaving spiders, and are characterized by possessing a non-rebordered labium, spineless long legs, and by having few cheliceral teeth (Agnarsson, 2003, 2004; Knoflach, 2004). Most species have eight eyes, but a few have six, typically in species that are found in dark caves or among the foliage of dense forest. Theridiids have three tarsal claws and almost all species possess a comb of strong serrated setae on the tarsus of the fourth leg (Coddington, 1986; Agnarsson, 2004), a useful character for identifying theridiid spiders.

The irregular web architecture of theridiid spiders ranges from complex to somewhat simple (e.g. Benjamín & Zschokke, 2003). The genera *Spintharus*, *Episinus* and some *Chrosiothes* build small webs and prey on tree-dwelling arthropods (Stowe, 1986). Given that amber-forming resin shows a preference for trapping trunk-dwelling arthropods (Penney, 2002), such behavior would make these spiders prone to preservation as fossils, and indeed, all these genera are recorded as fossils in Dominican Republic amber (Wunderlich, 1988).

Furthermore, Theridiidae is the most species rich family in terms of fossils described from both Dominican (15–20 Ma) and Baltic (44–49 Ma) ambers (see Penney & Langan, 2006: Table 1; Penney & Perez-Gelabert, 2002; Marusik & Penney, 2004). The family also occurs as fossils in ambers from Romania (30–35 Ma) (Protescu, 1937) and Japan (27,000 years old) (Nishikawa, 1974 [specimen described but not identified]).

Fossil theridiids have also been recorded, but not described, from Tertiary (44–49 Ma) Bitterfeld amber (Schumann & Wendt, 1989), (53 Ma) French amber from the Paris Basin (Penney, 2006a) and Cretaceous ambers from Canada (76.5–79.5 Ma) (McAlpine & Martin, 1969) and Burma (100 Ma) (Rasnitsyn & Ross, 2000; Grimaldi *et al.*, 2002). However, until these specimens are described their correct placement in the Theridiidae should be considered tentative, particularly those from the Cretaceous (Marusik & Penney, 2004).

Two non-amber fossils attributed to Theridiidae are known from the Tertiary of Aix-en-Provence (Gourret, 1888; Berland, 1939), however their generic and even family placements are dubious (Marusik & Penney, 2004). Given the lack of demonstrable Theridiidae in the Cretaceous, the fact that all reliably identifiable theridiids in Baltic amber belong to basal subfamilies (Marusik & Penney, 2004), and that numerous higher theridiid subfamilies occur in Dominican amber, Marusik & Penney (2004) proposed that the origins of Theridiidae were probably relatively recent, with major radiations during the mid-Eocene to early Miocene (20–40 Ma).

Mexican amber is another important palaeontological resource, but has been poorly studied relative to other major deposits. The amber is found deposited in lignite beds associated with marine sandstones and pollen. Pollen analysis suggests that the environment in which the amber was deposited was a complex of mangrove vegetation from a shallow sea ecosystem (Langenheim 1995). Poinar & Brown (2002) described the extinct amber-producing tree as *Hymenaea mexicana* (Leguminosae).

Spiders in Chiapas amber from Mexico have been described by Petrunkevitch (1963, 1971), García-Villafuerte & Vega-Vera (2002), García-Villafuerte & Penney (2003) and Penney (2006b). Petrunkevitch (1963) described two new species of Theridiidae from Mexican amber, both of which he attributed to a new fossil genus. In this paper I describe a new species, and the first theridiid fossil preserved in Tertiary amber from Chiapas, Mexico, which can be placed in an extant genus.

Methods

The specimen is deposited in the amber collection of the Eliseo Palacios Aguilera Museum of Paleontology of the Instituto de Historia Natural y Ecología (IHNE), Tuxtla Gutiérrez, Chiapas, Mexico. The piece of amber was obtained directly from the mines of the Simojovel de Allende Municipality. The pictures were taken using a Cannon digital camera attached to a stereoscopic microscope.

The measurements were taken with a ocular reticule and expressed in millimeters. The abbreviations used in the text and figures are: fe, femur; pat, patella; ti, tibia; mt, metatarsus; ta, tarsus; ci, cymbium; AME, anterior median eyes; PME, posterior median eyes; ALE, anterior lateral eyes; PLE, posterior lateral eyes.

To facilitate study, the piece of amber was cut and polished using a fine-cutting fretsaw and sandpapers of several grades as well as abrasives for polishing.

TAXONOMY

Order Araneae Clerck, 1757

Family Theridiidae Sundevall, 1833

Genus *Episinus* Walckenaer, in Latreille, 1809

TYPE: *Episinus truncatus* Latreille, 1809.

Recent species, widespread distribution.

Episinus penneyi sp. n.

(Figs. 1–3)

DIAGNOSIS: The new species can be distinguished from the other *Episinus* species by the relative proportions of the embolus, tegular apophysis and conductor and the three strong, dorsal spines at the tip of the cymbium (Fig. 3). It is most similar to the extant Panamanian species *E. bigibbosus* O. P.-Cambridge, 1896, but differs from it in the structure and position of the tegular apophysis and embolus. In the extant species the base of the tegular apophysis is wider, and distally the tegular apophysis passes beneath the embolus, whereas in the fossil species the tegular apophysis is distinctly shorter and does not reach the embolus.

HOLOTYPE: IHNFG-2895, male, in Chiapas amber, Mexico: Oligocene-Miocene, the only known specimen (Eliseo Palacios Aguilera Museum of Paleontology of the Instituto de Historia Natural y Ecología (IHNE), Tuxtla Gutiérrez, Chiapas, Mexico).

ETYMOLOGY: In honor of Dr. David Penney (UK) for his contributions to spider palaeontology and for his enthusiastic and friendly assistance.

DISTRIBUTION: Only known from the type locality.

DESCRIPTION: Total length 2.00; carapace length 0.74, width 0.61; carapace dark yellow with a brownish spot or figure, inverted triangular form, ranging from the base of the ocular tubercle posteriorly for one third of the carapace length (Fig. 2).

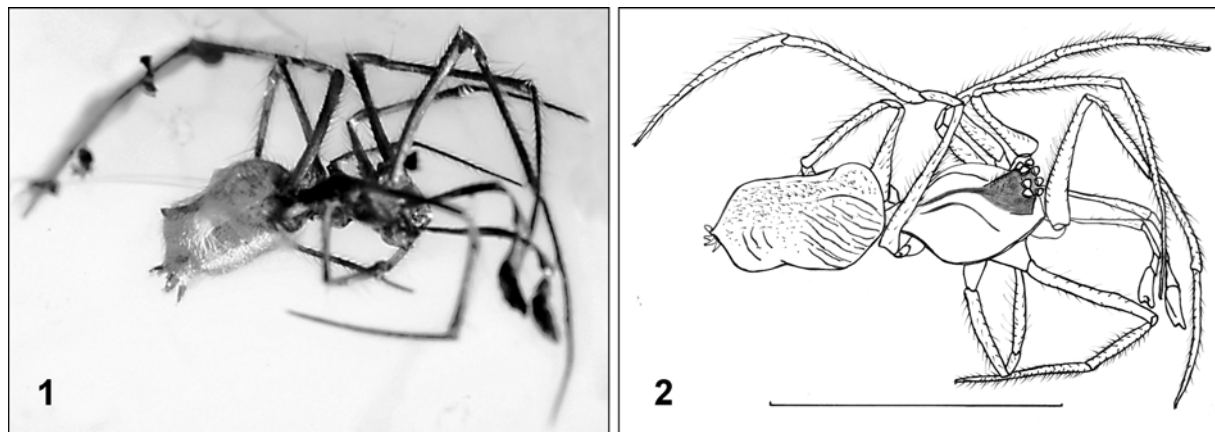
Eight eyes, all arranged on an ocular tubercle, diameters: AME 0.15, PME 0.10, PLE 0.08, ALE 0.09; PME separated by 0.04, AME by 0.06; AME and ALE separated by 0.04, PME and PLE by 0.03.

Dorsal aspect of carapace with two humps (**Figs. 1–2**), slender setae on the base of the tubercle, clypeus height 0.18, chelicerae longer (0.21) than wide (0.03). Labium not rebordered and slightly wider (0.11) than long (0.08). Pedicel 0.25 long, 0.17 wide. Leg formula: 1432. Leg 1: fe 1.12; pat 0.38; ti 1.33; mt 0.75; ta 0.25, total length 3.83. Leg 2: fe 0.60; pat 0.12; ti 0.39; mt 0.35; ta 0.20, total length 1.66. leg 3: fe 0.28; pat 0.80; ti 0.19; mt 0.25; ta 0.15, total length 1.67. Leg 4: fe 1.1; pat 0.11; ti 0.96; mt 1.05; ta 0.24, total length 3.46.

Abdomen longer than wide, with a distinctive hump, almost totally separated and a tubercle at the posterior tip (**Fig. 1**); abdomen greyish, setae slender, shorter on the dorsal side. Pedipalp: fe 0.80; pat 0.17; tib 0.17; ci 0.07; bulb 0.26, with a row of short spines on the dorsal region of the femur, ventrally spineless (smooth); patella with three pro-lateral macrosetae disposed on line 1-1-1 and a retro-lateral macroseta, tibia with a retro-lateral macroseta (0.20 in length) and three pro-lateral

macrosetae (0.22 long) (**Fig. 3**), three short spines (0.18) at the cymbial tip, almost aside the embolus (**Fig. 3**), tegular apophysis short, separated from conductor, the

latter slender; embolus describing a curve, extending anteriorly.



Figures 1-2: *Episinus penneyi* sp. nov.- (1) Holotype male, IHNFG-2895, in Chiapas amber from Mexico; (2) Drawing of specimen (holotype) in Fig. 1. Scale bar: 1 mm.

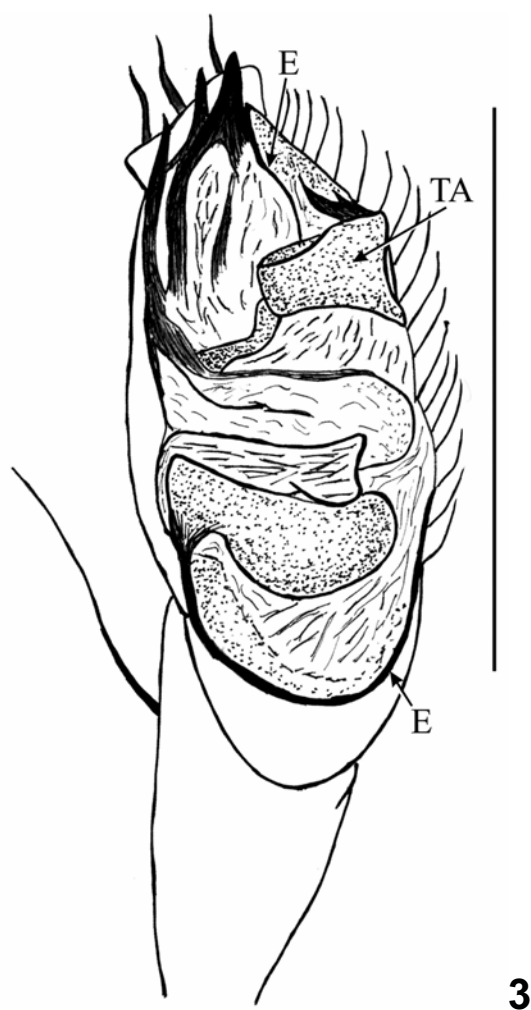


Figure 3: *Episinus penneyi* sp. nov., holotype male, IHNFG-2895, pedipalp, ventral view. TA= tegular apophysis; E= embolus. Scale bar: 0.5 mm.

Discussion

The new species is placed in *Episinus* because it conforms with the diagnostic characters of the genus (see Levi, 1964) and it represents the first record of an extant theridiid genus from Mexican amber. Currently, *Episinus* is distributed worldwide (approximately 81 species, mainly in tropical regions) with four species occurring in Mexico (*E. chiapanensis*, *E. colima*, *E. juarezi*, *E. putus*) (Platnick, 2006).

However this genus has been poorly studied in Mexico and the actual number of species may be higher. With regard to fossil species in amber, they have been previously reported from Baltic amber (*E. kaestneri*, *E. longimanus*, *E. succini*, *E. eskovi*, *E. balticus* [e.g. Marusik & Penney, 2004]) and in copal and amber from the Dominican Republic (*E. antecognatus*, *E. brevipalpus*, *E. cornutus*, *E. praecognatus*, *E. tuberosus* [e.g. Wunderlich, 1986, 1988]). Thus, *Episinus penneyi* sp. n. adds a new locality record of this genus from the Tertiary fossil fauna.

The recent genera *Episinopsis*, *Hyocrea*, *Hythimorpha*, *Janula*, *Penictis* and *Plocamis* were considered as synonyms of *Episinus* by Levi & Levi (1962). However, based on the structure of the male palp, in both the fossil and extant species of *Episinus*, is evident that most species are not closely related to the type species *E. truncatus* (Marusik & Penney, 2004). *Episinus* needs systematic revision which may resurrect some of the above named genera currently considered as synonyms.

Platnick's (2006) world spider catalog provides an excellent resource for taxonomists working with extant spiders, but it does not included data on fossil taxa and no similar complete resource exists for spider palaeontologists, although progress with regard to this deficit has been made for Dominican amber spiders by Penney (2006c) and for Baltic amber Theridiidae by Marusik & Penney (2004).

The latter authors pointed out that the taxonomy of arachnids, both in the fossil and Recent faunas can not be considered as independent disciplines and highlighted examples where extant taxa were shown to be synonyms of fossil taxa, including the genus considered in this paper (e.g. *Flegia* Koch & Berendt, 1854 = *Episinus* Walckenaer, 1809 [see Wunderlich, 1978, 1986]).

Given the similarity of the Hispaniolan fossil (Dominican amber) and extant spider faunas (Penney, 1999, 2005) and their proximity geographically and temporally to the Mexican fossil and extant faunas, the new species described here supports the idea that fossil and extant Mexican faunas may also show close similarities. However, additional studies on both fossil and extant Mexican spider faunas are required to confirm or reject this idea.

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