

## **LYSSOMANES (ARANEAE, SALTICIDAE) IN OLIGOCENE-MIOCENE CHIAPAS AMBER**

**Miguel A. García-Villafuerte:** Museo de Zoología, Universidad de Ciencias y Artes de Chiapas, Escuela de Biología, Calzada Samuel León Brindis 151. C.P. 29000, Tuxtla Gutiérrez, Chiapas, México

**David Penney<sup>1</sup>:** Earth Sciences, The University of Manchester, Manchester, M13 9PL, UK

**ABSTRACT.** The genus *Lyssomanes* (Salticidae) is recorded and described from a fossil in 20–30 Ma Oligocene–Miocene amber from Chiapas, Mexico for the first time. This is the oldest described *Lyssomanes* and extends the known geological range of the genus by approximately 10 Ma from the previously oldest known specimens in Dominican Republic amber. The geological age of the family may be young compared to other extant spider families.

**RESUMEN.** El genero *Lyssomanes* (Salticidae) es descrito y registrado por primera vez incluido en el ámbar de Chiapas, México, tomando en cuenta una edad de 20 a 30 Ma (Oligoceno-Mioceno). Éste es el registro más antiguo que se tienen de *Lyssomanes* y con esto se extiende el rango geológico conocido para el género por aproximadamente 10 Ma de los especímenes previamente conocidos y más antiguos del ámbar de la República Dominicana. Geológicamente la edad la familia puede ser joven comparado con otras familias existentes de arañas.

**Keywords:** Fossil, jumping spider, Cenozoic, Mexico

Poinar & Poinar (1994) provide an interesting historical account of Mexican amber. Biological inclusions in Chiapas, Mexican amber were rediscovered, somewhat accidentally in 1952 and an expedition was launched by scientists from the Department of Entomology and Parasitology, University of California, Berkeley, to collect specimens and geological data for the deposits (Hurd et al. 1962). Twelve spiders from this collection were described by Petrunkevitch (1963), which he placed in seven extant families. Petrunkevitch (1971), published posthumously with additional notes by Harriet Exline, described ten species from 14 specimens in five extant families. Wunderlich (1986, 1988) synonymised some of Petrunkevitch's fossil genera with extant taxa, and considered the specimen identified as *Dysderidae* by Petrunkevitch (1971) as a dubious identification, but gave no reason for doing so. It is unclear whether Wunderlich examined the Mexican material or derived his conclusions from the descriptions alone. One partially preserved salticid was described from this amber

by Petrunkevitch (1971) but it was not possible to ascribe it to genus due to its incompleteness. Here, we describe the first identifiable salticid from Mexican amber, which belongs in the extant genus *Lyssomanes*.

Fossil *Lyssomanes* were first reported from Miocene Dominican Republic amber by Cutler (1984) and Reiskind (1986) and described by Wunderlich (1986, 1988) and Reiskind (1989); see also the synonymy of Penney (2001). Extant *Lyssomanes* are abundant in the Neotropics (e.g. Galiano 1980, 1984) with more than 60 species recorded; at least 14 species are known to occur in Mexico and one reaches north into the US (e.g. Platnick 2002). However, this genus is poorly studied in Mexico and the number of species present is probably greater than that observed (Galiano 1980). Extant *Lyssomanes* are usually translucent green, active hunters often seen stalking their prey on plant foliage and are able to jump considerable distances. They can easily be distinguished from most salticid spiders by having their eyes arranged in four rows rather than three, and they differ from other salticids with four eye rows, by the presence of dorsal

<sup>1</sup> Corresponding author.



Figures 1–2.—*Lyssomanes* sp. indet., juvenile, 5964 IHNE, in Oligocene–Miocene, Mexican amber: 1. Photograph, dorsal view; 2. Camera lucida drawing. Scale bars = 1 mm.

spines on the patellae and ventral leg spines (Galiano 1998).

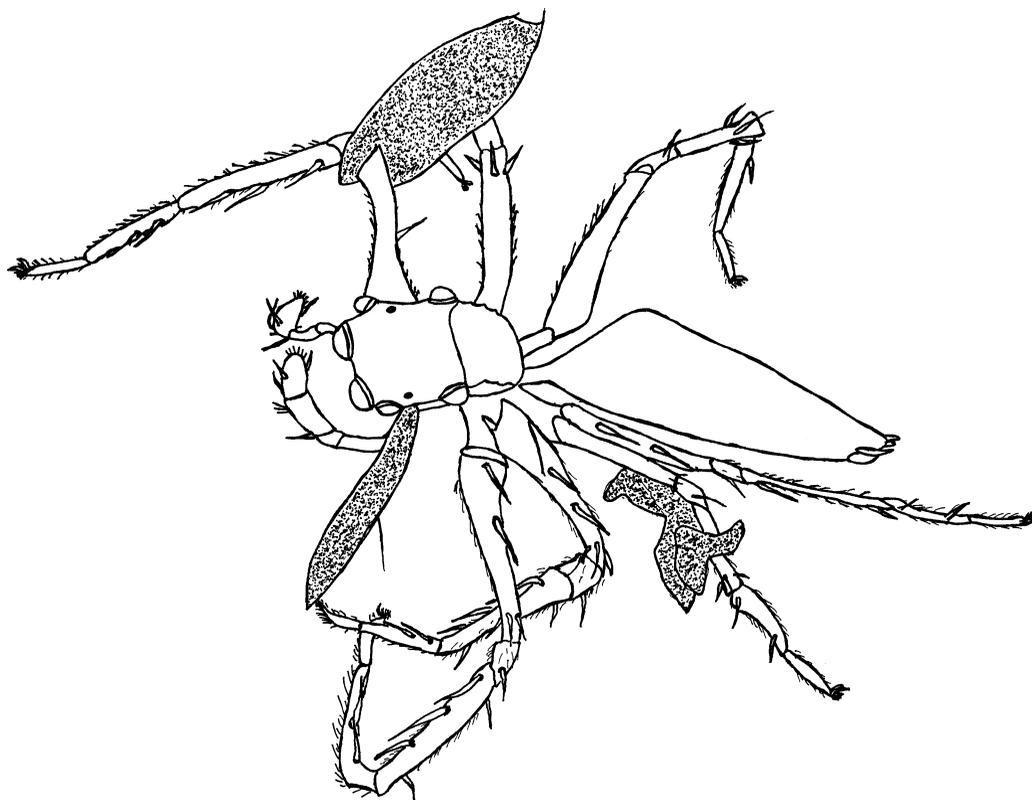
#### METHODS

The specimen is deposited in the Museum of Paleontology of the Instituto de Historia Natural y Ecología (IHNE) and was acquired on 30 October 2001 directly from the amber miners in Simojovel, Chiapas. All measurements are in mm and were made using an ocular graticule. Leg spination notation as in Galiano (1984). Abbreviations: d = dorsal, r = retrolateral, p = prolateral, v = ventral. Photography was with a Canon EOS 500N camera attached to a Zeiss Stemi 2000C microscope.

*Lyssomanes* sp. indet.  
Figs. 1–2

**Material examined.**—Juvenile, 5964 IHNE, in Oligocene–Miocene amber from Chiapas, Mexico, examined by MAG-V.

**Description.**—Total length 2.68; carapace length 0.99, with short setae dorsally. Clypeus high, chelicerae moderately large and robust, marginal dentition cannot be distinguished. Eight eyes in four rows, typical and diagnostic for the genus. Sternum small, wider in front than behind. Opisthosoma length 1.69 cylindrical, as shown in Figs. 1 & 2, and characteristic of the genus; two pairs of spinnerets, which appear flattened, visible terminally. All



Figures 1-2.—Continued.

coxae are more or less cylindrical, large, and close together. All legs long and relatively thin. Leg formula: 1+2,3+4; leg 1 fe 1.0, pat-tib 1.3, mt 0.7, ta 0.4, total 3.4; leg 2 fe 1.0, pat-tib 1.3, mt 0.7, ta 0.4, total 3.4; leg 3 fe 1.0, pat-tib 1.0, mt 0.7, ta 0.3, total 3.0; leg 4 fe 1.0, pat-tib 1.0, mt 0.7, ta 0.3, total 3.0. Leg spination: femora 1 and 2 d 1-1-1, r 0-0-1, p 0-0-1; 3 d 0-0-1, p 0-0-1, r 0-0-1; 4 d 0-1-1, patellae 1-4 d 0-0-1, tibiae 1 and 2 d 1-0-1, v 2-2-2; 3 and 4 d 1-0-1, p 0-0-1, r 0-0-1; metatarsus 1 v 2-2-2; 2 v 2-2-2; 3 p 0-0-1, r 0-0-1; 4 p 1-0-1, r 1-0-1. The pedipalp is somewhat compressed, the spider may be a subadult male. There is one Diptera syninclusion.

#### DISCUSSION

The ambers of Mexico and the Dominican Republic are approximately contemporary and are thought to have occurred in similar settings (Grimaldi 1996). The amber-producing tree in both instances belongs to the extant genus *Hymenaea* (Leguminosae) although

different species were involved in each case (Langenheim 1995). The Mexican amber occurs in lignites and associated marine sandstones; pollen analysis suggests they were deposited in a complex of mangrove vegetation in a shallow sea environment (Langenheim 1995). Dominican Republic amber also occurs in marine sandstones with lignitic lamellae, which were also deposited in a nearshore context, probably in coastal lagoons (Itturalde-Vinent & MacPhee 1996). The Dominican Republic amber spider fauna is well known (e.g. Wunderlich 1988) and is very similar to the Recent Neotropical fauna (Penney 1999). It is not unreasonable to expect the same to be true for the Mexican amber fauna but further work on both fossil and Recent Mexican faunas is required to confirm this. We place this specimen in *Lyssomanes* because it has the following combination of characters diagnostic of the genus: eyes in four rows, dorsal patellar spines and ventral tibial spines on the anterior legs (e.g. Galiano 1998). This is the oldest recorded fossil *Lyssomanes* and extends the

known geological range of the family by approximately 10 Ma from the previously oldest described fossils in Miocene Dominican Republic amber (e.g. Wunderlich 1988).

The Salticidae is the largest extant spider family with more than 4800 species in 531 genera (Platnick 2002) and has a worldwide distribution. They occur frequently as Tertiary fossils, for example in ambers from the Baltic region (e.g. Petrunkevitch 1958) and the Dominican Republic (e.g. Wunderlich 1988). However, no salticids have been described from older strata, amber or otherwise (the specimen listed as a salticid in New Jersey amber by Grimaldi et al. (2002) is a misidentification, DP pers. obs. and the specimen figured as Salticidae by Néraudeau et al. (2002) from Cretaceous amber of France has not been described and does not clearly show the diagnostic features of the family), yet it is evident that many extant spider families have a long geological history (Selden & Penney 2001). The active predatory behavior of salticids, predisposes them to becoming trapped in resin (Penney 2002), so it may be that the Salticidae are a recently evolved family and that in earlier times their niche was occupied by a now extinct spider family such as the Lagonomegopidae or indeed, that the Salticidae may have evolved from the latter family (Eskov & Wunderlich 1994). In recent years, new Cretaceous material has become available which is currently being studied and will hopefully shed some light on this problem.

#### ACKNOWLEDGMENTS

We thank Javier Avendaño Gil, Instituto de Historia Natural y Ecología (IHNE) for providing the amber; María Luisa Jiménez, Centro de Investigaciones del Noreste en Baja California and Guillermo Ibarra-Núñez, El Colegio de la Frontera Sur (ECOSUR unidad Tapachula) for providing literature; Lorena Ruiz M, El Colegio de la Frontera Sur (ECOSUR unidad San Cristóbal) for the loan of an ocular graticule, Miguel Angel Pérez F. for translating the first draft of the manuscript. DP acknowledges a Leverhulme Trust research grant on Mesozoic Arachnids.

#### LITERATURE CITED

- Cutler, B. 1984. Late Oligocene amber salticids from the Dominican Republic. *Peckhamia* 2:45–46.
- Eskov, K.Y. & J. Wunderlich. 1994. On the spiders from Taimyr ambers, Siberia, with the description of a new family and with general notes on the spiders from the Cretaceous resins. *Beiträge zur Araneologie* 4:95–107.
- Galiano, M.E. 1980. Revisión del género *Lyssomanes* Hentz, 1845 (Araneae, Salticidae). *Opera lilloana* 30:1–104.
- Galiano, M.E. 1984. New especie of *Lyssomanes* Hentz, 1845 (Araneae, Salticidae). *Bulletin of the British Arachnological Society* 6:268–276.
- Galiano, M.E. 1998. Revision of the genus *Chinoscopus* (Araneae, Salticidae, Lyssomaninae). *Bulletin of the British Arachnological Society* 11:1–9.
- Grimaldi, D.A. 1996. Amber, Window to the Past. Harry N. Abrahams, Incorporated, New York.
- Grimaldi, D.A., M.S. Engel & P.C. Nascimbene. 2002. Fossiliferous Cretaceous amber from Myanmar (Burma): its rediscovery, biotic diversity, and paleontological significance. *American Museum Novitates* 3361:1–71.
- Hurd, P.D., R.F. Smith & J.W. Durham. 1962. The fossiliferous amber of Chiapas, Mexico. *Ciencia* 21:107–118.
- Itturalde-Vinent, M.A. & R.D.E. MacPhee. 1996. Age and paleogeographical origin of Dominican amber. *Science* 273:1850–1852.
- Langenheim, J.H. 1995. Biology of amber-producing trees: focus on case studies of *Hymenaea* and *Agathis*. Pp. 1–31. *In* ACS symposium series 617: Amber, resinite, and fossil resins (K.B. Anderson & J.C. Krelling, eds.). American Chemical Society, Washington.
- Néraudeau, D., V. Perrichot, J. Dejax, E. Masure, A. Nel, M. Philippe, P. Moreau, F. Guillocheau & T. Guyot. 2002. A new fossil locality with insects in amber and plants (likely Uppermost Albian): Archingeay (Charente-Maritime, France). *Geobios* 35:233–240.
- Penney, D. 1999. Hypotheses for the Recent Hispaniola spider fauna based on the Dominican Republic amber spider fauna. *Journal of Arachnology* 27:64–70.
- Penney, D. 2001. Advances in the taxonomy of spiders in Miocene amber from the Dominican Republic (Arthropoda, Araneae). *Palaeontology* 44: 987–1009.
- Penney, D. 2002. Paleoecology of Dominican amber preservation—spider (Araneae) inclusions demonstrate a bias for active, trunk-dwelling faunas. *Paleobiology* 28:389–398.
- Petrunkevitch, A. 1958. Baltic amber spiders in the Museum of Comparative Zoology. *Bulletin of the Museum of Comparative Zoology* 103:259–337.
- Petrunkevitch, A. 1963. Chiapas amber spiders. University of California Publications in Entomology 31:1–40.
- Petrunkevitch, A. 1971. Chiapas amber spiders 2.

- University of California Publications in Entomology 63:1–44.
- Platnick, N.I. 2002. The world spider catalogue version 3.0. <http://research.amnh.org/entomology/spiders/catalog81–87/intro1.html>
- Poinar, G.O.Jr. & R. Poinar. 1994. *The Quest for Life in Amber*. Addison Wesley, Massachusetts.
- Reiskind, J. 1986. A new *Lyssomanes* from the Dominican amber and the possible use of insular fossils in building phylogenies. *Actas X Congreso Internacional Aracnologia, Jaca (España)* 1: 423.
- Reiskind, J. 1989. The potential use of amber fossils in the study of the biogeography of spiders in the Caribbean with the description of a new species of *Lyssomanes* from Dominican amber (Araneae, Salticidae). Pp. 217–228. *In* Biogeography of the West Indies, past, present and future (C. A. Woods, ed.). Sandhill Crane Press, Florida.
- Selden, P.A. & D. Penney. 2001. Phylogeny of Araneae: the fossil evidence and its interpretation. Abstracts, XV International Congress of Arachnology, South Africa. Pp. 157.
- Wunderlich, J. 1986. Spinnenfauna gestern und heute. Fossil Spinnen in Bernstein und ihre heute lebenden Verwandten. Erich Bauer Verlag bei Quelle und Meyer, Wiesbaden.
- Wunderlich, J. 1988. Die Fossilen Spinnen im Dominikanischen Bernstein. *Beiträge zur Araneologie* 2:1–378.

*Manuscript received 5 June 2002, revised 11 November 2002.*