

Ant mimicry by spiders and spider-mite interactions preserved in Baltic amber (Arachnida: Acari, Araneae)

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Abstract

Three examples of interactions between arachnids in fossil Baltic amber from the Early Tertiary are presented and discussed: a myrmecomorph spider (Araneae: Corinnidae), a parasitic mite larva (Acari: Trombidoidea) on a spider (Araneae: Agelenidae) and a predatory mite (Acari: Prostigmata: ?Labidostemmidae) on a spider (Araneae: Theridiidae).

Key words: Arachnida, Araneae, Acari (parasitic Trombidoidea, predatory Prostigmata), fossils, Baltic amber, myrmecomorphy

INTRODUCTION

During the last decades several new observations on fossils in Baltic amber inclusions were made. The well preserved Baltic amber fossils allow us to present hypotheses on the 'frozen behaviour' of Early Tertiary Arachnida. Here I give some initial short notes on selected fossils whose age is about 50 million years: the oldest discoveries of (1) an ant-mimicking fossil spider (Fig. 1), (2) a spider parasitized by a mite (Fig. 2), and (3) a spider attacked by a mite (Fig. 3). The material is kept in the private collection of the author. More detailed descriptions of the amber pieces are in preparation. The mites were identified by M. Judson (Paris) and A. Wohltmann (Berlin).

FOSSIL MYRMECOMORPH SPIDER

Interpretative drawing (Fig. 1): The body length of this beautifully preserved male spider is 6 mm. It is an undescribed member of the family Corinnidae. The slender body and legs, a saddle-shaped constriction of the opisthosoma and white hairs in this area give the illusion of a three-segmented body (ant-like).

The first fossil myrmecomorph spiders were described 15 years ago from Dominican amber (Wunderlich 1986, 1988). Ant-mimicry is characteristic for most extant members of the spider family Corinnidae. One may speculate about possible frozen ant-like behaviour in the fossil spider (Fig. 1): the forelegs are raised in antenna-like fashion, and the abdomen too. The resemblance of the spider to its ant model(s) may be placed between grades 2 and 3 in the sense of Wunderlich (1995).

Myrmecomorph spiders could not evolve before the origin of ants. The earliest unequivocal occurrence of ants is in the Cretaceous (Grimaldi & Agosta 2000). Rust & Andersen (1999) wrote '...early Tertiary records of true ants like *Pachycondyla* support the hypothesis of a pre-Tertiary origin of the ant lineage (and of caste differentiation and social organisation of populations) and a relatively rapid diversification of extant sub-families during the early Tertiary'.

I have found myrmecomorph spiders in the Early Tertiary Baltic amber, representing Batesian mimicry (Foelix 1992; Wunderlich 1995).

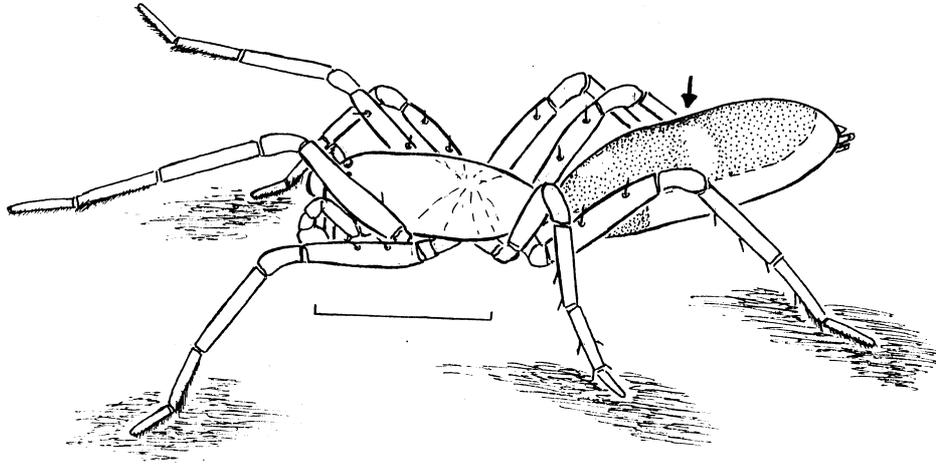


Fig. 1. A fossil male myrmecomorph member of the family Corinnidae in Baltic amber, lateral view. Note the raised forelegs and abdomen. The arrow indicates the saddle-shaped constriction of the abdomen. Scale 2.0 mm.

Fossil examples are found in the family Zodariidae and even more distinct, frequent and diverse examples has been documented in the family Corinnidae. No myrmecomorph spiders representing the families Salticidae or Gnaphosidae have yet been found in the Early Tertiary Baltic amber. However, myrmeco-morph Salti-

cidae are known from Young Tertiary Dominican amber (about 20 million years old) (Wunderlich 1988). From the data at hand, we can conclude that myrmecomorphy in Corinnidae is at least 50 million years old.

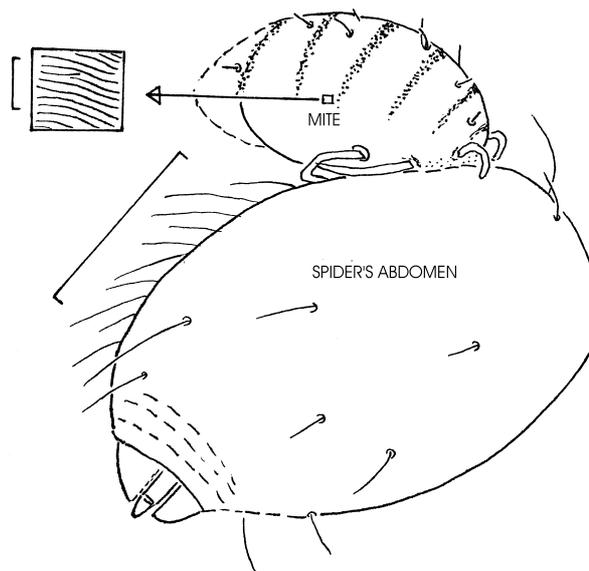


Fig. 2. A fossil mite (Acari: Trombidioidea) in Baltic amber sucking body fluids from the abdomen of a juvenile spider (Araneae: Agelenidae), lateral view. Scale 0.2 mm. Enlarged: The cuticle structure of the mite's abdomen.

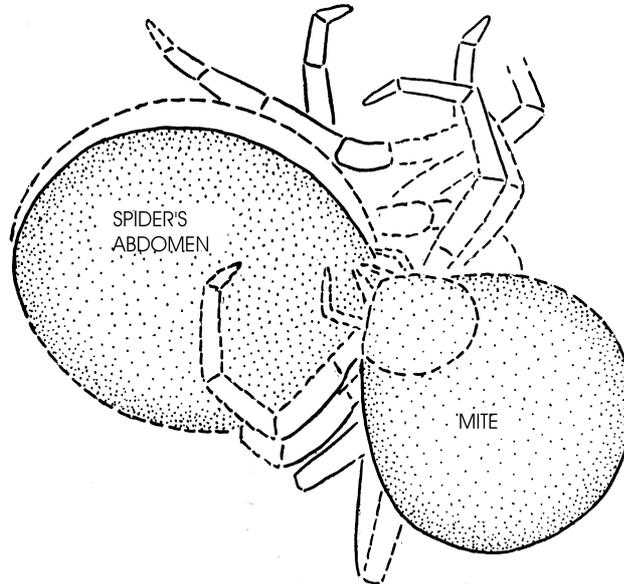


Fig. 3. A fossil predatory/parasitic mite (Acari: Prostigmata: ?Labidostemmidae) in Baltic amber, attacking a female spider (Araneae: Theridiidae), on the left side, dorsal view. Body length about 1 mm.

PARASITIC MITE LARVA SUCKING BODY FLUIDS FROM A SPIDER

Interpretative drawing (Fig. 2): A parasitic thin-legged mite, a larva of the Trombidoidea, body length 0.8 mm, was found attached to a spider, a juvenile member of the spider family Ageleidae, body length 2.4 mm. The abdomen of both arachnids is soft. The mite is situated antero-dorsally on the spider's abdomen. The enlarged abdomen of the larva suggest that it had already been feeding for a while.

Parasitic mites can occasionally be observed on extant spiders and the dorsally-frontally position of the mite (Fig. 2) on the spider's abdomen is characteristic for most extant parasitic mites as well as parasitic Hymenoptera larvae. In this position the spider cannot use their fangs for defense and cannot use their legs to wipe off the mite from the abdomen. Thus by Early Tertiary mites already used the same feeding position as extant relatives. Fossils including parasitic mites are rare. To date, I have only found three parasitic mites among the 100,000 fossils that I have investigated.

PREDATORY OR PARASITIC MITE ATTACKING A SPIDER

Interpretative drawing (Fig. 3): The small adult predatory/parasitic mite of the Prostigmata: ?Labidostemmidae shown on the right side of Fig. 3 has a body length of about 1 mm and is attacking a female of the spider family Theridiidae. Both arachnids are heavily armoured and both have large dorsal punctuated scuta (Fig. 3).

Both animals are heavily armoured. Extant members of both taxa are known as predators/parasites and they often attack animals of their own size. Blaszkak et al. (1990) suggested that the armour serves as protection against predators.

REFERENCES

- Blaszkak, C., Ehrnsberger, R. & Schuster, R. 1990. Beiträge zur Kenntnis der Lebensweise der Litoralmilbe *Macrocheles superbus* Hull, 1918 (Acarina: Gamasina). *Osnabrücker naturwissenschaftlicher Mitteilungen* 16, 51-62.
- Foelix, R. F. 1992. *Biologie der Spinnen*. Georg Thieme Verlag, Stuttgart & New York.

- Grimaldi, D. & Agosti, D. 2000. The oldest ants are Cretaceous, not Eocene: comment. *The Canadian Entomologist* 132, 691-693.
- Rust, J & Andersen, N. M. 1999. Giant ants from the Paleogene of Denmark with a discussion of the fossil history and early evolution of ants (Hymenoptera: Formicidae). *Zoological Journal of the Linnean Society* 125, 331-348.
- Wunderlich, J. 1986. *Spinnenfauna gestern und heute. Fossile Spinnen in Bernstein und ihre heute lebenden Verwandten*. Publishing House J. Wunderlich, D-75334 Straubenhardt, Germany.
- Wunderlich, J. 1988. Die fossilen Spinnen im Dominikanischen Bernstein. *Beiträge zur Araneologie* 2, 1-378. Publishing House J. Wunderlich, D-75334 Straubenhardt.
- Wunderlich, J. 1995. Über "Ameisenspinnen" in Mitteleuropa (Arachnida: Araneae). *Beiträge zur Araneologie* 4 (1994), 447-470. Publishing House J. Wunderlich, D-75334 Straubenhardt.