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BOOK REVIEW

Review of Fossil Spiders in Amber and Copal by Joerg Wunderlich. Published by the author (Verlag J. Wunderlich) in two volumes under the reference Beiträge zur Araneologie 3a (Volume 1 with 848 pages) and 3b (Volume 2 with 1060 pages). ISBN 3-931473-10-4. Cost for each volume is 48 Euro with orders to be placed with the author at Ober Häuselbergweg 24, Hirschberg, 69493, Leutershausen, Germany.

This voluminous work covers every conceivable aspect of fossil spiders in amber and copal, from systematics and evolution to behavior and ecology. Since our conceptions of fossils are based on our knowledge of extant forms, many examples of modern day taxa are used to interpret the behavior of fossil taxa (Boucot 1990). The present work differs from the authors two earlier books on fossil spiders (Spinnenfauna gestern und heute [1986] and Die fossilen Spinnen im Dominikanischen Bernstein [1988]) by being written in both English and German, thus making it accessible to a wider audience.

Reviewing a book of 1908 pages is no small task and I apologize if some aspects, which have special significance to certain readers, are omitted. Since pagination continues sequentially in both volumes, I will refer to the two as a single work. To begin, this definitely is a ''one of a kind book'' which has its own unique type of presentation. Most of the chapters appear as separate publications with a title, author, abstract, introduction, references and figures, so they can be cited separately. Some of the final chapters are authored by others.

This book presents a wealth of information on all aspects of fossil spiders in amber and copal, although most of the new taxa and examples presented are in Baltic and Dominican amber and Madagascar copal. While the major part of the book covers systematic placement and taxonomic descriptions of fossil spiders, a large and significant section deals with fossil evidence of spider biology and behavior. Topics in this portion include leg amputation and regeneration, ballooning, bleeding, camouflage, webs, sperm and sperm webs, courtship behavior, egg sacs, enemies, fecal remains, exuviae, ant mimicry, wound healing, molting, cannibalism, parasitism, phoresis and predation by spiders on a wide range of other organisms (including beetles, flies, bark lice, ants, planthoppers, termites, other spiders, caddis flies, parasitic wasps, scale insects, spring tails, roaches, aphids, mites, a web spinner, weevils, bristle tails, insect larvae, myriapods and pseudoscorpions).

Of special interest are the author's comparisons of extant and extinct spiders in Europe and the Dominican Republic based on present day records and amber taxa. While amber only entraps a small percentage of spiders in any ecosystem, it is amazing how many species have been found. In Dominican amber, there are some 152 spider species in comparison with 296 extant ones in the Dominican Republic while Baltic amber has some 500 species in comparison with some 1300 extant ones in Northern Europe. At the higher level, there are more spider families in Baltic amber (51) than in Europe today (46).

Findings show that Theridiidae is the dominant family in both Baltic and Dominican amber, thus reflecting the tropical-subtropical conditions at both of those sites in the mid-Tertiary. In contrast, the Linyphiidae is the most diverse family in central Europe today, reflecting the temperate climate. Spiders in Baltic amber are over twice as diverse as in Dominican amber. This is probably due to the

different ecotypes in the Baltic amber forest, including not only subtropical-tropical, but also warm temperate forms (Larsson 1978). This diversity is also reflected in the plant genera reported from Baltic amber. The tropical-subtropical and many warm temperate forms undoubtedly disappeared during the post-Eocene cooling events (Prothero 1994). In contrast, the climate in Hispaniola remained fairly constant until the Pliocene-Pleistocene cooling period, which eliminated the strictly tropical forms (Poinar & Poinar 1999). This explains why approximately 88% of the spider taxa in Baltic amber are now extinct, compared with only 33% in Dominican amber.

Since fossilized resin is the best medium for preserving taxonomic characters, a wealth of new fossil taxa have been described from specimens preserved in amber and copal. A number of new spider species and genera are described in the present work, mostly from Baltic and Dominican amber, but a few also in Lebanese and Burmese amber. Each chapter in volume 2 deals with a specific spider family, usually beginning with a key to the amber species and then describing new taxa.

Of all the spiders covered in this work, one group in particular is especially interesting because of its phylogeny, appearance and biogeography. These spiders belong to the primitive family Archaeidae, the ''Dawn'' or ''Long- necked spiders''. Wunderlich lists two subfamilies, the Mecysmaucheniinae, from Australia, New Zealand and South America and the Archaeinae from South Africa, Madagascar and the Australian Region. Five genera in the subfamily Archaeinae occur in Baltic and Bitterfeld amber, the most common fossil being *Archaea paradoxa* Koch & Berendt 1854 in Baltic amber. Members of the genus *Archaea* have an elongated prosoma and long chelicerae, the inner edges of which are lined with peg teeth to grasp prey. All extant members of this subfamily prey on spiders and the long chelicerae hold the prey far enough away to avoid receiving injury. Dawn spiders are quite small (usually less than 4 mm in length); do not make capture nets, live among dead leaves or moss and lichens on tree limbs and carry around their egg sacs. Wunderlich shows an *Arachaea* sp. in Baltic amber holding a member of the family Theridiidae as prey. The descendants of *Archaea* are long gone from the Northern Hemisphere but can be found in Madagascar copal, a product of the legume tree, *Hymenaea verrucosa*. Today, most copal from Madagascar is less than 100 years old, yet at the rate of habitat destruction in that land, it is an important source of rare and endangered and probably even extinct species (Poinar et al 2001).

Volume one contains 696 color photos of spiders covered in the text and numerous examples of spider behavior. Also included are color photos of the only known Baltic amber solfugid and opilioacarid. The unique type of presentation and some spelling errors in this work should not detract from its wealth of information, which will be of interest not only to arachnologists, but amber enthusiasts in general, since the color plates are quite fascinating and the keys can be used for the identification of amber and copal spiders.

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