



RECENSIÓN

Collins, M.E., Manchester, S.R. & Wilde, W. 2012. *Fossil fruits and seeds of the Middle Eocene Messel biota, Germany*. Abhandlungen der Senckenberg Gessellschaft für Naturforschung, 570, 251 pp. ISBN 978-3-510-61400-4

The Middle Eocene Messel maar lake oil shales, located near Darmstadt, Germany, are famous worldwide because of the amazingly well preserved fossils that they bear. Since its discovery this site was considered a fossil lagerstätten and became a UNESCO World Nature Heritage Site in 1995 (<http://whc.unesco.org/en/list/720>). Complete and articulated skeletons of mammals, birds, reptiles, fish, insects and plant remains all contribute to an extraordinary fossil assemblage.

This book presents a survey of the extensive fruit and seed collection found at the Middle Eocene Messel site. The first part of the book is dedicated to a few introductory chapters about the site, geologic setting, age control of the sedimentary sequence and taphonomy of the fossil remains. It is worth pointing out that unlike many lacustrine deposits in which fruits are preserved as impressions, most of the Messel plant macrofossils are preserved as remnants of the original plant material.

After the introduction, the authors focus on the very rich floristic composition (156 morphotypes: 75 genera assigned to modern families; 65 unidentified) that includes Menispermaceae, Iacacinaceae, Vitaceae, Mastixiaceae, Anacardiaceae, Rutaceae and Juglandaceae as the most diversified families. Pollen and leaf macrofossils are also abundant in the sediments (i.e., Thiele-Pfeiffer, 1988; Wilde, 1989; Lenz *et al.*, 2012). A floristic comparison between the different palaeobotanical records is then provided.

A chapter about fruit and seed biology, dispersal mechanisms and animal diets is then included in this book. Interestingly, some of the fruit fossils were found in vertebrate (mammals and rodents) and bird guts. These animals probably acted as seed dispersers. Borings by weevils also occur in some of the seeds. Many other fossil seeds, with “wings”, were dispersed by the wind. The authors also discuss about the probable close proximity of the plants that generated the fruit and seeds to the palaeolake. Some of them probably approached the lakeshore and plant remains, including potentially many fruits and seeds, may have fallen directly into the lake.

The vegetation around the lake is reconstructed later on in the book. Lianas were very abundant around the lake area. This makes sense as they typically cover the edges of the forest. Other forest species indicate a multiple canopy rainforest. Some ferns, Araceae, palms, aquatic plants and herbs populated the lakeshores.

A small section about climate interpretations is also shown. A humid tropical-subtropical climate is interpreted and supported by other previous studies. The biogeographical implications of the flora found at this site are more developed in the book and a comparison with floras from other mid-latitude Eocene sites from the northern Hemisphere is given (North America, Western Europe and Eastern Asia). This section also includes a brief comparison with present day floras from southeastern Asia and Malesia, eastern North America, old world tropics and Neotropics.

Finally and before the systematics of all the fruit and seed species found, a small section describes the future directions for the palaeobotanical research at Messel.

Probably the most interesting part for palaeobotanists working on Eocene plant macrofossils starts in page 17, the systematics. The different fruit and seed species identified (plus 65 morphotypes of unknown familial affinities) are described and very well illustrated with 76 photo plates. In some cases extant species are shown for comparison.

In brief, this book is highly recommended for palaeobotanists working on Palaeogene, and in particular Eocene, macrofloras. It contains very good descriptions of the much diversified flora and great photos of very well preserved specimens for comparison.

## REFERENCES

- Lenz, O., Wilde, V., Riegel, W. & Harms, F.J. 2012. A 600 k.y. record of El Niño-Southern Oscillation (ENSO): evidence for persisting teleconnections during the Middle Eocene greenhouse climate of Central Europe. *Geology*, 38, 627-630.
- Thiele-Pfeiffer, H. 1988. Die mikroflora aus dem mitteleozänen ölschiefer von Messel bei Darmstadt. *Palaeontographica B*, 211, 1-86.
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