

From Cretaceous to Eocene: an overview of the fossiliferous amber deposits from France

Vincent Perrichot

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Abstracts

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LIFE TRACES IN AMBER

ORAL PRESENTATIONS

From Cretaceous to Eocene: an overview of the fossiliferous amber deposits from France KEYNOTE lecture

VINCENT PERRICHOT

Géosciences, Université de Rennes, Campus de Beaulieu bat. 15, 263 avenue du Général Leclerc, 35000 Rennes, France, *vincent.perrichot@univ-rennes1.fr*

The presence of amber in France was mentioned as early as in the beginning of the 18th century (Anonymous 1705), and by the early 20th century amber was reported from nearly 70 French localities of Carboniferous to Miocene age (Lacroix 1910). Despite these early reports, the French fossil resins remained largely ignored by paleontologists, and it is only in the 1970s that fossil biological inclusions were first documented, with approximately 70 arthropods described from two Cenomanian deposits of the Paris Basin (Schlüter 1975, 1978, 1983). However, these arthropods were found in a turbid, barely translucent amber (Figure 1), making investigation for fossil inclusions excessively difficult (Schlüter and Stürmer 1982). This and the fact that Lacroix (1910) depicted all French fossil resins as brittle retinites, inapt to sizing and polishing, probably explain that no further work was done on French amber until more recently.



Fig. 1. Typical aspect and colours of the Cretaceous (Cenomanian) amber of the Paris Basin. Scale bar: 0.5 mm.

Two amber-rich, highly fossiliferous deposits were then discovered simultaneously in the late 1990s: the early Eocene (Sparnacian) Oise amber in the Paris Basin (Figure 2A-B), from which more than 20.000 arthropod inclusions have been reported to date (Nel et al. 1999; Nel and Brasero 2010); and the mid-Cretaceous (Albian-Cenomanian) Charentese amber in the Aquitain Basin (Figure 2E-F), that has yielded more than 2.000 arthropods (Néraudeau et al. 2002; Perrichot et al. 2010). Following these discoveries, extensive field investigations have revealed fossiliferous amber in several other historical or new outcrops across France, all restricted to the Cretaceous period. Although less abundant and diverse than in Oise and Charentese ambers, arthropods have been found in a Cenomanian amber from two localities in the Alps (SE France) and the Pyrenees (SW France) (Perrichot et al. 2006; Girard et al. 2013); a small but highly fossiliferous deposit has been found in the Turonian of Vendée (NW France; Figure 2C-D) (Néraudeau et al. 2017); and few arthropods have also been found in the Santonian amber of Provence (SE France) (Choufani et al. 2013; Nel et al. 2017).

The chemical analysis of these ambers from various localities and ages indicates a succession of different plant sources through time (Nohra et al. 2015). All Cretaceous resins originated from conifers, more

specifically the families Araucariaceae and Cheirolepidiaceae during the Albian and Cenomanian, and Cupressaceae during the Turonian and Santonian. The Eocene Oise amber was produced by an angiosperm of the family Fabaceae, differing markedly from the slightly younger Baltic amber that has a coniferous origin.



Fig. 2. Representative amber samples and insect inclusions from France. **A-B**. Eocene amber of Oise; **B**. a non-biting midge (Diptera: Chironomidae). **C-D**. Turonian amber of Vendée; **D.** *Microphorites magaliae* Perrichot et Engel, 2014 (Diptera: Dolichopodidae). **E-F**. Albian-Cenomanian amber of Charentes; **F**. a scelionid wasp (Hymenoptera). Scale bars: 0.5 mm.

Both Oise and Charentese ambers constitute major world deposits in terms of abundance and diversity of inclusions, providing a rare glimpse into two ancient forest ecosystems of Western Europe. Oise amber was produced by legume trees growing in a semi-deciduous forest in a lacustrine to palustrine environment of a deltaic region (Nel and Brasero 2010). Charentese amber originated from conifers growing in a marginal marine setting, likely a mosaic of estuarine and mangrove environments (Perrichot et al. 2010).

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20 years of the Museum of Amber Inclusions at the University of Gdańsk

ELŻBIETA SONTAG, JACEK SZWEDO, RYSZARD SZADZIEWSKI

Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, Department of Invertebrate Zoology and Parasitology, University of Gdańsk, 59, Wita Stwosza St., PL80-308 Gdańsk, Poland,
elzbieta.sontag@biol.ug.edu.pl, jacek.szwedo@biol.ug.edu.pl, ryszard.szadziewski@biol.ug.edu.pl

Twenty years ago, on 29 May 1998, the Senate of the University of Gdańsk decided to establish the Museum of Amber Inclusions at the Department of Invertebrate Zoology, Faculty of Biology. On a single day, a dream came true for two organisations: the Fossil Insects Section (currently the Palaeoentomological Section of the Polish Entomological Society) and the International Amber Association. And so, owing to the joint efforts of researchers and the Gdańsk-based amber community, the pre-WWII tradition of collecting natural amber artefacts returned to Gdańsk, while a scientific centre focused on gathering and studying inclusions preserved in fossil resins began to develop here. The idea to create a collection of inclusions and raw amber at the University of Gdańsk was successfully implemented owing to the kind support of the UG Rector Prof. Marcin Pliński, the Faculty's Dean Prof. Halina Piekarek-Jankowska, the Chairman of the Fossil Insects Section Prof. Jan Koteja and the Gdańsk-based amber artist Wiesław Gierłowski.

The collaboration between Gdańsk scientists and the amber industry began in the early 1980s when the then doctor, today Prof. Ryszard Szadziewski of the University of Gdańsk, together with the then doctor and currently Prof. Wiesław Krzemiński (Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków) extended their research on contemporary dipterans to include fossil species preserved in Baltic amber, based on the collection of the PAS Museum of the Earth, Warsaw. In 1985, the Fossil Insects

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