# Tertiary Insects

Diptera Bibionidae, *Plecia* sp., Lowermost Eocene, Chevriere, Oise, France. Specimen PA 74/2/5), housed in the Muséum National d'Histoire Naturelle, in Paris.

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# A fossil dragonf ly from the Paris Basin amber of F rance (Lowermost Eocene) (Insecta, Odonata, Anisoptera)

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ABSTRACT

A new fossil libelluloid dragonfly is recorded from the Lowermost Eocene amber of Oise (France). This discovery is not only exceptional as a dragonfly in amber but also represents one of the oldest records of the libelluloid clade in the Cenozoic.

*Keywords:* Odonata. Anisoptera. Eurypalpida. Lowermost Eocene. Paris Basin. Amber.

## INTRODUCTION

Odonata are very rare in ambers, and Anisoptera being even rarer than Zygoptera. Bechly (1996a, 1998a) listed only two known Anisoptera in ambers, one in Miocene amber (or recent copal ?) from the Dominican Republic, and the other in Baltic amber. Another specimen was discovered in Baltic amber at the begining of last century and is probably lost. We describe herein a wing of a libelluloid dragonfly from the Lowermost Eocene amber of Oise (France). We use the wing venation nomenclature of Riek (1976) and Riek and Kukalová-Peck (1984), amended by Nel et al. (1993) and Bechly (1995, 1996b). We follow the phylogenetic classification of Anisoptera proposed by Bechly (1996b), amended by Bechly (1999).

## SYSTEMATIC PALAEONTOLOGY

Libelluloid dragonfly
**Family:** Eurypalpida BECHLY, 1996

GENUS and SPECIES: undetermined
Figures 1 - 3

*Material:* Specimen n° PA 2410, collection Langlois-Meurinne / De Plöeg deposited in the Muséum National d'Histoire Naturelle, Paris.

*Locality deposit:* Le Quesnoy, Chevrière, region of Creil, Oise department, France.

*Geological age:* Lowermost Eocene, Sparnacian, level MP7 of the mammal fauna of Dormaal (Feugueur, 1963; De Plöeg et al., 1998; Nel et al., 1999).

*Description:* The costo-apical part of a hyaline wing in a fragment of amber (Fig. 1). The specimen has been mounted in canada balsam. The pterostigma is reticulated, brown, 2.5 mm long and 0.75 mm wide, covering one cell (Fig. 2). Only one cell preserved distal of the pterostigma, between C and RA, but there were probably no more than two or three cells on the complete

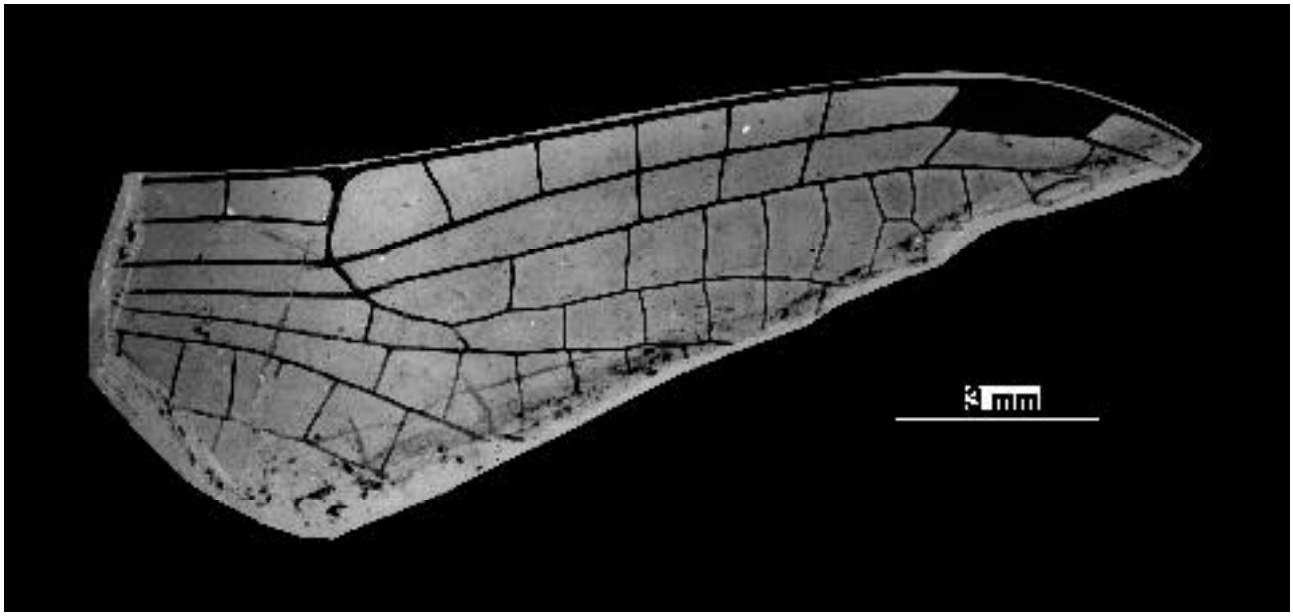


Figure 1. Photograph of the specimen n° PA 2410.

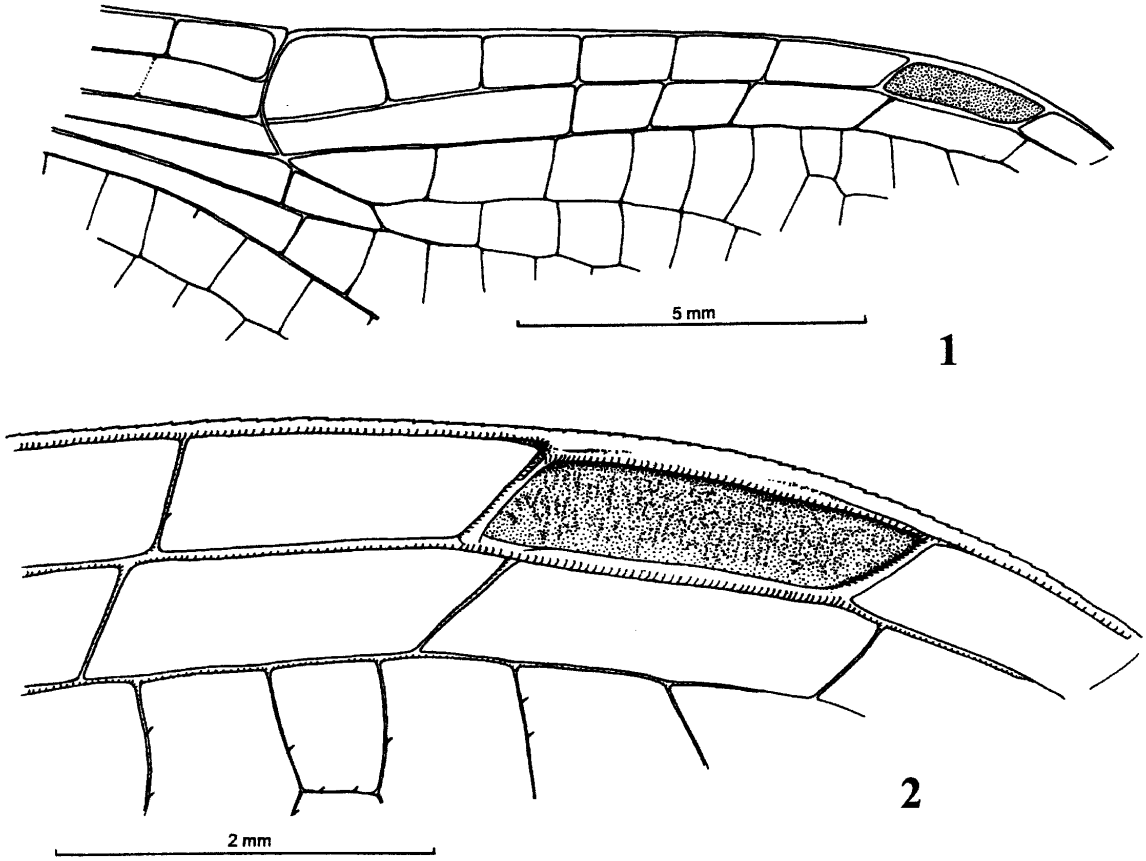


Figure 2. 1.- Drawing of the specimen n° PA 2410; 2.- Detailed drawing of the pterostigma.

wing. The pterostigmal brace is slightly stronger and more oblique than the other crossveins between RA and RP1, but it is not aligned with the basal side of the pterostigma. Distance between the nodus (Fig. 3) and the pterostigma, 8.9 mm. Five postnodal crossveins between C and RA, basal of the pterostigma, three post-subnodal crossveins between RA and RP1, thus there is a long 'libellulid' gap (*sensu* Bechly, 1996b) of three cells. There is also a 'cordulegastrid' gap (*sensu* Bechly, 1996b) between RA and RP1, basal of the subnodus. One Bq crossvein opposite the subnodus. The oblique crossvein is 1.4 mm distal of the subnodus. The base of RP2 is aligned with the subnodus. The area between RP1 and RP2 is progressively widened, with two rows of cells just basal of the pterostigma. The first crossvein between RP1 and RP2 is not curved and slightly oblique, thus there is no 'libellulid oblique vein' (*sensu* Bechly, 1996b). The area between RP2 and IR2 is distally widened, basal of the pterostigma, but the distal parts of these veins are not preserved. Only the most distal antenodal crossvein is preserved between C and ScP, but it is complete, nearly aligned with the last antenodal crossvein between ScP and RA. MA and IR2 are slightly zigzagged. RP2 is curved. No Mspl and Rspl preserved. The nodus is very transverse with a strong curve of ScP. The spines of C are not very densely distributed.

*Discussion:* Although incomplete, this wing fragment has two characters of the Eurypalpida (*sensu* Bechly, 1996b), i.e. the 'cordulegastrid gap' and the 'libellulid gap'. It does not fit in the Synthemistidae because of the absence of numerous Bq crossveins, the basal position of the oblique crossvein 'O' and the shortened pterostigma, covering only one cell.

The absence of the specialized 'libellulid oblique vein' and the pterostigmal brace present would exclude the Libellulida (*sensu* Bechly, 1996b). Nevertheless, these characters states are rather homoplasic, thus they are weak arguments to support this hypothesis.

The position of the pterostigmal brace somewhat displaced distally, combined with the position of the next crossvein between RA and RP slightly distal of the pterostigma, are shared with certain 'corduliids'.

This wing superficially resembles the wings of *Dorocordulia*, *Williamsonia* and *Hemicordulia*, the main difference being its branching of IR2 which is in a more basal position.

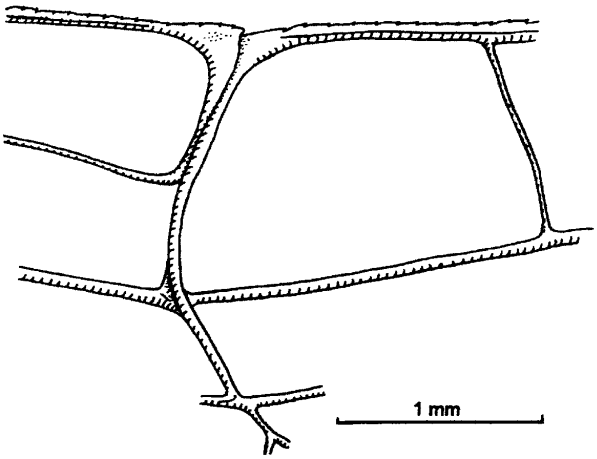


Figure 3. Detailed drawing of the nodus.

Because of the lack of preservation of all the structures of the basal half of the wing, Rspl, Mspl, etc., it is very difficult to attribute this fossil to an exact group within the Eurypalpida, even if the Synthemistidae and Libellulida are excluded with reasonable probability.

Despite its fragmentary preservation, this fossil is exceptional because it represents the fourth known anisopteran in amber. It is also one of the oldest Cenozoic Eurypalpida, even if it is far from being the oldest representative of this group (Jarzembowski and Nel, 1996; Bechly et al., 1996; Bechly, 1998b; Fleck et al., 1999). Surprisingly, the Odonata are clearly less frequent in Palaeocene and Lower Eocene European lacustrine deposits (Menat, Messel, Geiseltal, etc.) than in the Upper Eocene or Oligocene deposits from the same region (Alès, Lubéron, Aix-en-Provence, Rott, etc.) (Nel and Paicheler, 1994a,b). Therefore, the present discovery of a libelluloid fossilised in amber, under conditions that are clearly less favourable for the preservation of specimens belonging to this order, demonstrate that the Odonata were flourishing in Europe at this time. Its remains to explain why there are so few fossil Odonata in the European Paleocene/Eocene lacustrine deposits.

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