

## **Geometric morphometrics of bee fossils (Hymenoptera: Anthophila) wing shape provide insights to bee evolution**

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One of the main challenges in palaeontology is to integrate fossils in the taxonomy and phylogeny of extant clades. Robust statistic tools are quite rare to achieve this important task. Fossil taxonomy is still often based on the description of a few qualitative and subjective characters, mostly limited to the estimation of the author. Here we present a taxonomic revision we developed on bee fossils with new statistic tools. Bees are an interesting model because their ecology, diversity and most importantly their systematics are well known. Wing-shape analysis by geometric morphometrics procedures has proven to be a powerful tool for morphological discrimination of bee taxa at different taxonomical levels. Moreover, bee forewings are easy to analyse because of their flatness and because they represent a neutral character with enough variation to discriminate taxa at different levels. Previous studies showed the utility of wing shape analysis to assess taxonomic affinities between extinct and extant clades of bees. Bees are relatively rare in fossil deposits; nonetheless using this method, fossils of anthophorids, halictids, bumblebees and other clades have been revised or described, from deposits like the Eocene shale of the Green River Formation (USA), the Oligocene lacustrine beds of Céreste (France), the Late Miocene lacustrine beds of Cerdanya (Spain), the Florissant shale of Colorado (USA), the Miocene deposit of Oeningen (Germany) and the Eocene Baltic amber.

**This is a single abstract for two related talks in the same session**