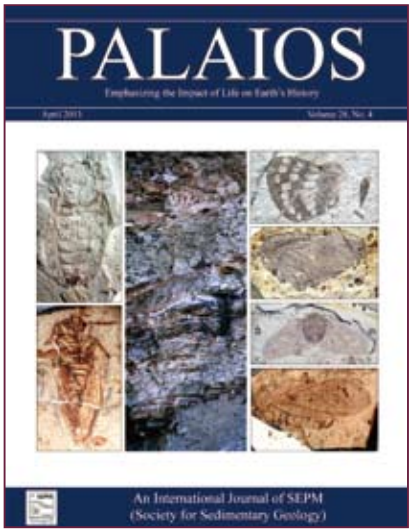
New Progress Made in the Taphonomy of Fossil Insects

Insects are the most diverse group of animals on Earth today, and also have an extensive fossil record from the Carboniferous to recent. Interpretation of fossil insects and reconstruction of their paleodiversity must consider the taphonomic processes involved because decay influences the preserved morphology, which strongly affects diversity estimates. Furthermore, the taphonomy of insects is essential to interpreting the paleoecology and paleoenvironment.

Various intrinsic as well as extrinsic factors significantly control the preservation of insects. Few studies have presented a quantitative comparison of biostratinomic patterns in different groups, however.



Related information of this paper: Wang Bo, Zhang Haichun, Jarzembowski E.A., Fang Yan, Zheng Daran (2013) Taphonomic variability of fossil insects: a biostratinomic study of Palaeontinidae and Tettigarctidae (Insecta: Hemiptera) from the Jurassic Daohugou Lagerstätte. *PALAIOS*, 28: 233–242.

Associate Professor WANG Bo and Professor ZHANG Haichun from Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences and their colleagues systematically investigated the preservation of 277 specimens of Palaeontinidae and 113 of Tettigarctidae, two hemipterous families from the Jurassic Daohugou beds lacustrine Konservat-Lagerstätte. They carried out quantitative analyses of their size and taphonomic characters, including body orientation, articulation, and preservational quality, and also performed a preliminary experiment to understand the floating and decay process of cicadas. Their statistical analyses reveal significant differences in both body orientation and preservational quality between the two families. Palaeontinidae experienced longer flotation time (mostly over one month) before settling through the water column due to their high SM index (wing surface/body mass ratio) and unfolded wings, increasing the opportunity to decompose on the water surface, and resulting in the dorsoventral preservational position with lower preservational quality. In contrast, Tettigarctidae have a comparatively low SM index and overlapping wings, so that their drifting period on the water surface might have been short (mostly within 2 weeks), leading to the lateral preservation position with higher preservational quality.

Their taphonomic variations were controlled by different SM indices and wing folding modes. The biological factors recognized may control taphonomic patterns in other fossil insects with similar body forms and wing folding patterns. Insects sometimes possess very different ecological traits and morphological characteristics. The results suggest that these differences may determine their preservation patterns by controlling their taphonomic processes, such as transport distance, floating time, and decay rate. Different taxonomic groups of insects may have different taphonomic processes, leading to contrasting preservational patterns and taphonomic bias. The taphonomic variability of insects at family level should be noted in future taphonomic studies. In addition, the wing folding behavior and subsequent different modality of fossilization between these two groups also introduced another difficulty during the taxonomic study, *i.e.* important wing venation characters are mainly obscured in the Tettigarctidae. The taphonomic variability should, therefore, be taken into account in future studies of paleodiversity estimation and paleoecological reconstruction of fossil insects.