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Taphonomic Variability Of Fossil Insects: A Biostratinomic Study Of Palaeontinidae And Tettigarctidae (Insecta: Hemiptera) From The Jurassic Daohugou Lagerstätte

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ABSTRACT

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, especially at the familial level. Here, we systematically investigated the preservation of 277 specimens of Palaeontinidae and 113 of Tettigarctidae, two hemipterous families from the Jurassic Daohugou beds lacustrine Konservat-Lagerstätte. We 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. Our 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 preservation 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. Our results show that the wing-folding behavior and relative size of wings (SM index) influence the buoyancy times and significantly control the preservation patterns of both groups.