

17.青藏高原大地形演化与资源环境效应

High-elevation Qilian Mountains and its inspiration for tectonics and biodiversity during the late Middle Miocene

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摘要: Accurate paleoelevation reconstruction of the Qilian Mountains contributes to understanding the integrity of the Tibetan Plateau (TP) uplift model, its deep structural mechanisms, and their connections with climate, environmental change, and biodiversity evolution. Recently, the first quantitative reconstruction of the paleomid-rang (i.e., average elevation of the basin and mountains) of the northern Tibetan Plateau (NTP) was completed, using innovative palynological paleoaltimetry-TP/TPAP ratios $((Tsuga\% + Podocarpus\%) / (Tsuga\% + Podocarpus\% + Abies\% + Picea\%))$, which revealed a rapid uplift of the NTP from low to high elevations during the late Middle Miocene. Here, we examine the Ebotu Fauna pollen recored (13–12 Ma) from the Hongyazi Basin, situated within the Qilian Mountains, to directly reveal the paleoelevation of the Qilian Mountains. The pollen assemblages are predominantly composed of conifers pollen taxa (average of 64.0%), including *Picea*, *Cedrus*, and *Pinus* of Pinaceae, as well as and Cupressaceae, with broadleaf and steppe taxa each accounting for < 15%. This pollen composition evidently reflects a vegetation landscape dominated by high-mountain conifers forest, consistent with Middle Miocene pollen assemblages from the Qaidam Basin. Through TP/TPAP ratios, the paleomid-range was found to be 3492 ± 87 m during 13–12 Ma. Combined with the known elevation of the Qaidam Basin during this period (1885 ± 566 m), the mountainous elevation was deduced to be 4338 ± 653 m, in turn, indicating an elevation of 2646 ± 740 m for the Hongyazi Basin. This high-elevation terrain not only provides evidence to support the isostatic uplift model of the NTP caused by crustal shortening and thickening, but also led to the formation of a humid vegetation landscape dominated by conifers forest in the Qilian Mountains, supporting the change of mammals towards more diverse taxa.

关键词: Pollen; Paleoelevation; Biodiversity, Late Middle Miocene, Qilian mountains