

Early Cretaceous Fossil Plants from Huolinhe Basin of Inner Mongolia, China and their Geological Analysis

Sun, Bainian^{1,*}, Li, Ruiyun², Xu, Xiaohui³, Yan, Defei⁴

1) School of Earth Sciences, Lanzhou University, Lanzhou, China, *E-mail: bnsun@lzu.edu.cn

2) Northwest University Museum, Northwest University, Xi'an, China

3) Anhui University of Science & Technology, Huainan, China

4) School of Earth Sciences, Lanzhou University, Lanzhou, China)

Some fossil plants were collected from the Lower Cretaceous of Huolinhe Basin, Inner Mongolia, China. The fossils were classified and identified based on the general morphology and the anatomical features. They were assigned to *Blasiites*, *Marchantites*, *Reboullothallus*, *Ricciopsis*, *Lycopodites*, *Equisetites*, *Eogonocormus*, *Osmunda*, *Coniopteris*, *Cladophlebis*, *Athyrium*, *Adiantopteris*, *Dicksonia*, *Ctenis*, *Pterophyllum*, *Nilssoniopteris*, *Anomozamites*, *Ginkgo*, *Baiera*, *Sphenobaiera*, *Phoenicopsis*, *Pityocladus*, *Athrotaxites*, *Taxus*, *Podozamites*, and *Schizolepis*. Among them, *Ginkgo* sp. is identified as a new species on the basis of well-preserved *Ginkgo* ovulate organ fossils from the Huolinhe Basin of Inner Mongolia. The microstructures of ovulate organ of *Ginkgo* sp. and associated *Ginkgo* leaves are detailedly studied. This finding is further confirmed that the ovulate organs of living *Ginkgo biloba* could have originated from the Jurassic *Ginkgo yimaensis* type. Then, the morphological features and microstructures of *Schizolepis longipetiolus* are analyzed in detail. The result shows that it is not appropriate to assign *Schizolepis* into Pinaceae, so it could be as a conifer incertae sedis. And then, stable carbon isotope compositions ($\delta^{13}\text{C}$) of *Marchantites huolinhensis* were measured. The paleoatmospheric CO_2 concentration of the early Early Cretaceous were reconstructed using the BRYOCARB model. The result is in the range of the GEOCARB II. Based on the distribution of the related living species of the fossil liverworts, and we think that the fossil liverwort studied here can be considered as a paleoclimatic proxy. Finally, a preliminary estimation on paleoelevation was made by using $\delta^{13}\text{C}$ values of *Marchantites huolinhensis*.

Key words: fossil plants, microstructures, carbon isotope, paleoclimate, the Early Cretaceous, Huolinhe Basin, Inner Mongolia

This research is supported by the National Basic Research Program of China (973 Program) (No. 2012CB822003), the Specialized Research Fund for the Doctoral Program of Higher Education (No. 20120211110022), and the National Natural Science Foundation of China (No. 41172022).