Scientific Research Publishing

Open Journal of Geology, 2019, 9, 581-584
https://www.scirp.org/journal/ojg
ISSN Online: 2161-7589
ISSN Print: 2161-7570

Preliminary Study of Flora from the Upper Lower Cretaceous Dalazi Formation in Luozigou Basin, Wangqing, Jilin Province, Northeast China

Qing Xu[1,2], Xiaoju Yang[1*]

[1]Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences, Nanjing, China
[2]Dongshahu School of Suzhou Industrial Park, Suzhou, China
Email: *xjyang@nigpas.ac.cn

How to cite this paper: Xu, Q. and Yang, X.J. (2019) Preliminary Study of Flora from the Upper Lower Cretaceous Dalazi Formation in Luozigou Basin, Wangqing, Jilin Province, Northeast China. *Open Journal of Geology*, **9**, 581-584.
https://doi.org/10.4236/ojg.2019.910047

Received: August 15, 2019
Accepted: September 20, 2019
Published: September 23, 2019

Abstract

In the middle Cretaceous vegetation changed rapidly for the diversification of angiosperms, there are few extensive analyses of the plant fossils (including leaves, fruits, seeds and woods) from this period in China. New abundant fossil plants collected from the upper Lower Cretaceous Dalazi Formation in the Luozigou Basin, Wangqing, Jilin Province were studied and 25 species belonging to 17 genera were recognized. Up to date totally 39 species belonging to 25 genera were discovered in the Luozigou Basin. The assemblage is composed mainly of conifers (47.5%) and early angiosperms (30%) and indicates that the vegetation was a transitional flora between the Early Cretaceous fern-gymnosperm flora and the Late Cretaceous angiosperm flora. The flora was a *Pseudofrenelopsis*-angiosperm assemblage in succession of Early Cretaceous flora and the late Early Cretaceous, probable Albian in age. During the late Early Cretaceous, the Luozigou Basin was dominated by hot and arid climate and sometimes probably interrupted by wet climate.

Keywords

Dalazi Formation, Early Cretaceous, Flora, Jilin

1. Introduction

Analyses of the plant fossil record have provided clear evidence for the rapid diversification of angiosperms from the Early Cretaceous onwards [1] [2]. The Cretaceous represents an intriguing interval to examine how changes in vegetation and environment. The plant-bearing strata in the Luozigou Basin of

Wangqing, Jilin Province, have been considered to belong to the Lower Cretaceous Dalazi Formation which is well developed in Dalazi, Zhixin Town, Longjing County in Yanji Basin, Jilin Province [3] [4] [5]. Fossil plants from the Luozigou Basin were firstly recognized by Japanese palaeobotanist Oishi [6] and the following collections of fossil plants yet no detailed study except for some additions to the plant list [2] [5]. In recent years some studies have been carried on cheirolepidiaceous conifers [7] [8] and abundant plant fossils are collected from the Luozigou Basin. The new collection provides more detailed morphological and taxonomic information of this flora. The characteristics of this flora give a new interpretation of palaeovegetation and ecological environment in this area during the late Early Cretaceous.

2. Materials and Methods

The fossil plant specimens with well-preserved cuticle were collected from the Dalazi Formation in the Luozigou Basin. All specimens are deposited in the Nanjing Institute of Geology and Palaeotology, Chinese Academy of Sciences.

3. Results and Discussion

Based on the new collection 25 species belong to 17 genera of fossil plants were identified. There are a number of fossil plants listed and reported previously from the Dalazi Formation in the Luozigou Basin of Wangqing. Combined with previous studies totally 39 species belonging to 25 genera were discovered in the Luozigou Basin. The plant assemblage from the Dalazi Formation consists of *Selaginellites* cf. *fausta*, *Ruffordia goepperti*, *Gleichenites nipponensis*, *Coniopteris saportana*, *Onychiopsis elongate*, *Cladophlebis exiliformis*, *C.* sp., *Otozamites anglica*, *O.* sp., *Pityocladus iwaiana*, *P.* sp., *Pityocladus*? sp, *Pityolepis* sp., *Elatides curvifolia*, *Cupressinocladus elegans*, *C. gracilis*, *C.* sp., *Pseudofrenelopsis gansuensis*, *Frenelopsis*? sp., *Suturovagina intermedia*, *Brachyphyllum crassum*, *B. ningshiaense*, *B.* sp.1, *B.*? sp.1, *Elatocladus* cf. *manchuria*, *Pagiophyllum* sp., *Conites* spp., *Sassafras*? sp., *Paliurus*? sp., cf. "*Andromeda*" *parlatorii*, *Eucalyptophyllum oligonerve*, *Rogersia longifolia*, "*Sassafras*" *bilobatum*, *Sterculaephyllum eleganum*, *Ulmiphyllum brookense*, *Dicotylophyllum* spp and *Monocotylophyllum*? sp. (detailed description and discussion will be in another paper). There is only one species of *Selaginellales* in the assemblage; six species of five genera belong to ferns; Bennettitales are rare with only two species of one genera; *Ginkgoales* is absent; conifers are composed of 19 species of 10 genera which accounting 47.5% in the assemblage and early angiosperms are composed of 12 species of 8 genera accounting about 30% in the assemblage. It is noted that *Selaginellites fausta* was firstly reported from the Dalazi Formation in the Luozigou Basin which represents the latest fossil record of *Selaginellites* in China so far. Moreover, conifers are mainly represented by scale leafy shoots including *Cupressinocladus Brachyphyllum* and *Pseudofrenelopsis*, cuticles of them are preserved well, and angiosperms in this assemblage are all dicotyledons and their

venations show a certain extent development. The abundant conifers and the considerable diversity of angiosperms show that this flora was a *Pseudofrenelopsis*-angiosperm assemblage in succession of Early Cretaceous flora.

4. Conclusion

Based on preliminary analysis totally 39 species belonging to 25 genera were recognized from the Lower Cretaceous Dalazi Formation in the Luozigou Basin. The result shows that the assemblage is composed mainly of conifers (47.5%) and early angiosperms (30%), accounting 77% totally. *Bennettitales* and *Ginkgoales* are few or absent. The characters of this assemblage from the Dalazi Formation indicate a late Early Cretaceous age, probable Albian. The vegetation was a transitional flora between the Early Cretaceous fern-gymnosperm flora and the Late Cretaceous angiosperm flora. The features of the assemblage indicate that the Louzigou region of Wangqing in the late Early Cretaceous was dominated by hot and arid climate and sometimes probably interrupted by wet climate.

Acknowledgements

The study was supported by the National Natural Science Foundation of China (41472011, 41688103, 41790454), and the Strategic Priority Research Program (B) of the Chinese Academy of Sciences (Grant No. XDB1800000). This is a contribution to UNESCO-IUGS IGCP Project 679.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Sun, G., Cao, Z.Y., Li, H.M. and Wang, X.F. (1995) Cretaceous Floras. In: Li, X.X., Ed., *Fossil Floras of China through the Geological Ages*, Guangdong Science and Technology Press, Guangzhou, 411-454.

[2] Tao, J.R. (2000) Fossil Plants of the Early Cretaceous in Northeast China. In: Tao, J.R., Ed., *The Evolution of the Late Cretaceous-Cenozoic Floras in China*, Science Press, Beijing, 6-11, 282 p. (In Chinese)

[3] Bureau of Geology and Mineral Resources of Jilin Province (1997) Stratigraphy (Lithostratic) of Jilin Province. China University of Geosciences Press, Wuhan, 324 p.

[4] Li, G., Ohta, T., Batten, D. J., Sakai, T. and Kozai, T. (2016) Morphology and Phylogenetic Origin of the Spinicaudatan *Neodiestheria* from the Lower Cretaceous Dalazi Formation, Yanji Basin, North-Eastern China. *Cretaceous Research*, **62**, 183-193. https://doi.org/10.1016/j.cretres.2015.09.019

[5] Zhou, Z.Y., Chen, P.J., Li, B.X., Li, W.B., Wen, S.X., Zhang, L.J., Ye, M.N., Liu, Z.S., Li, Z.P. and Yang, X.L. (1980) Younger Mesozoic Non-Marine Deposits of the Yanbian Area, Eastern Jilin. *Bulletin of Nanjing Institute of Geology and Palaeontology, Academia Sinica*, **1**, 1-21. (In Chinese)

[6] Oishi, S. (1941) Note on Some Mesozoic Plants from Lo-Tzu-Kou, Province Chientao, "Manchoukuo". *Journal of Faculty of Science of Hokkaido Imperial University*,

4, 167-176.

[7] Yang, X.J. and Deng, S.H. (2007) Discovery of *Pseudofrenelopsis gansuensis* from the Lower Cretaceous of Wangqing, Jilin Province, and Its Significance in Correlation of Cretaceous Red Beds in China. *Acta Geologica Sinica*, **81**, 905-911. https://doi.org/10.1111/j.1755-6724.2007.tb01012.x

[8] Yang, X.J., Guignard, G., Zhou, Z.Y. and Xu, Q. (2018) *Suturovagina intermedia* (Cheirolepidiaceae) from the Lower Cretaceous Dalazi Formation of Wangqing, Northeast China: Cuticle Ultrastructure and Palaeoenvironmental Insights. *Cretaceous Research*, **91**, 80-99. https://doi.org/10.1016/j.cretres.2018.05.005