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Problem of terrestrial Jurassic and Cretaceous boundary in northern China

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The Jurassic and Cretaceous strata in northern China are mostly terrestrial origin. The boundary transition is mostly reddish sediments yielding few age-dating fossils. It is an obstacle to the biostratigraphical correlation and appears a difficulty to define the boundary. Recently, we worked from west to east of China in the Junggar basin of Xinjiang, northern Hebei-western Liaoning, and the Songliao Basin with investigation on the Jurassic-Cretaceous boundary problem.

In the Junggar basin, Xinjiang, northwest China, the Jurassic-Cretaceous sequences were studied on integrated lithostratigraphy, biostratigraphy, chronostratigraphy, cyclostratigraphy and magnetostratigraphy. It indicates that the age of Qigu Formation ranges from late Callovian to Oxfordian, the Kalaza Formation is Kimmeridgian in age, and the overlying Qingshuihe Formation belongs to Earliest Cretaceous. A clear unconformity exists between the Kalaza and Qingshuihe formations. In the northern Hebei and western Liaoning area, the Upper Jurassic to Lower Cretaceous strata are well preserved. The J-K boundary involves with the Tuchengzi, Zhangjiakou and Dabeigou formations in ascending order. The Tuchengzi Formation yields possible Yanliao Biota of Jurassic, with an isotopic age of 139 Ma on the top. The Zhangjiakou and Dabeigou formations contain the Jehol Biota of Early Cretaceous. In the Songliao Basin, The Huoshilin Formation is the first basin-fill sedimentary-volcanic sequence. The formation yields plant fossils. The spore-pollen assemblage shows a blooming age of Early Cretaceous, but megaspore fossils and magnetostratigraphy indicate the age of Late Jurassic. The isotopic ages dated on the volcanic rocks of the formation generally range from 140-150 Ma. The age of Huoshilin Formation, therefore, can be constrained from Tithonian to Berriasian. It is the potential succession to locate the Jurassic-Cretaceous boundary.

The northern Hebei-western Liaoning area is the type locality for the terrestrial J-K boundary in China. In the previous biostratigraphic work, the J-K boundary was referred to a higher position of much younger age, which caused a big controversy between local biostratigraphy and international age. The pronounced provincialism of terrestrial fauna and flora obstructs global correlation. The solution of persistent debates on the J-K boundary in China should be the integrated stratigraphic markers which might provide the most useful global correlation. Owing to the obscure of terrestrial fossil evidences to indicate the boundary, the macro biotic evolution is suggested as a potential workable J-K boundary indicator. The Yanliao Biota and Jehol Biota are two big fossil groups representing Jurassic and Cretaceous respectively. If it is the case, the transition beds of two biotas would be between the Tuchengzi and Zhangjiakou formations. The 139 Ma on top of the Tuchengzi Formation might be suggested as the boundary age. But, correlating with the current international age of 145 Ma, the J-K

boundary would be down into the Tuchengzi Formation. Thus, only accurate indicators or makers would be obtained from the Tuchengzi Formation and/or GSSP accepted, the J-K boundary in China could be located. (*Supported by the National Natural Science Foundation of China, Project NO. 41172037*)

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