

Mid-Cretaceous Charophyta Stratigraphy from Core SK1 (South) in Songliao Basin and its Correlation with Marine Chronostratigraphy

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Cretaceous plays a significant role during the sweep of geologic history in light of some major events such as global warming and mass extinction. Recent years, with the chronostratigraphy standard established, the marine Cretaceous is supposed to be well observed, while the non-marine Cretaceous is relatively poorly studied in part because there is a lack of comprehensive fossil records.

In northeastern China, however, we found Charophyta fossils in the Songliao Basin, one of the biggest Cretaceous continental rift basins all over the world, in which the southern hole of Songke-1 (SK1(S)) is located in the centre. According to Gramast (1972), Charophyta may be an ideal instrument of dating non-marine strata, in particular those of the Cretaceous and valuable tool for intercontinental correlation.

The target interval in this study is from the upper Quantou Formation to the lower Nenjiang Formation deposited during the depression stage in the Cretaceous. The member 3 of Quantou formation yields *Atopochara restricta*, *Mesochara symmetria*, *Obtuochara niaoheensis* and *Euaclistochara mundula*; Member 4 is dominated by *Amblyochara elliptica*, *Ambyochara quantouensis*, *Atopochara restricta* and others; Member 2-3 of Qingshankou Formation contains mostly *Aclistochara bransoni minor*, *Ambyochara elliptica*, *Atopochara restricta*, *Aclistochara songliaoensis*, *Maedlerisphaera ellipsoidalis*; Member 1 of Yaojia Formation yields *Aclistochara bransoni minor*, *Atopochara restricta*, *Obtuochara niaoheensis*, *Songliaochara heilongjiangensis*, *Songliaochara heilongjiangensis nonganensis*; Member 2-3 of Yaojia Formation contains *Aclistochara bransoni minor*, *Aclistochara songliaoensis*, *Obtuochara niaoheensis*. Based on the high-resolution sampling from SK1(S) and the outcrops across the basin, four charophyta assemblages are classified: *Obtuochara niaoheensis* Assemblage in member 3 to lower member 4 of Quantou Formation, *Amblyochara quantouensis* Assemblage in middle Member 4 of Quantou Formation, *Maedlerisphaera ellipsoidalis* Assemblage in upper Quantou Formation to lower Qingshankou Formation, and *Aclistochara songliaoensis* Assemblage in upper Qingshankou Formation to Yaojia Formation.

According to the previous research and the microfossils involved in SK1(S), it is suggested that the age of the upper Quantou Formation possibly is from Cenomanian to lower Turonian, the Qingshankou Formation is upper Turonian- lower Coniacian; the Yaojia Formation is referred to upper Coniacian to middle Santonian, and the lower Nenjiang Formation rests in upper Santonian.