

Charophytes from the Cretaceous-Paleocene boundary of the Songliao Basin (Northeastern China) and calibration of the Chinese charophyte biozonation to the Global Polarity Time Scale

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Charophyte assemblages from the mid-Campanian to lower Paleocene of the Songliao Basin (NE China) are re-studied and their biozones are correlated to the Global Polarity Time Scale (GPTS). Three charophyte biozones are recognized from the Sifangtai and Mingshui Formations, including a latest Campanian–early Maastrichtian *Microchara gobica* zone, a late Maastrichtian *Microchara prolixa* zone and an earliest Danian *Psilochara changzhouensis* zone. Among them, the *Microchara gobica* zone and the *Microchara prolixa* zone can be correlated with the *Microchara cristata* zone (without the top) from the Pingyi Basin, NE China, and the Àger Basin in Spain. *Psilochara changzhouensis* appears first at the depth of 336.04 m (in the C29r magnetic polarity chron of the SK1 from the upper Mingshui Formation) and this event is proposed as the marker of the basal Paleocene.

The comparison of biozones of the Pingyi Basin with those of the Songliao Basin allow for two observations. First, the flora between the two basins differed probably due to different paleogeography and environments. In the Late Cretaceous, geographically, *Atopochara trivolvis ulanensis* was only found in the Songliao Basin and adjacent areas such as Inner Mongolia and Mongolia. Ecologically, the brackish species *Feistiella anluensis* occurred in the Pingyi Basin but not lived in the Songliao Basin without brackish water sediments. In the Paleocene, the floral difference between the two basins increased mainly due to totally different environments. In the Songliao Basin, a diverse flora consisting of *Microchara cristata*, *M. prolixa*, *Lychnothamnus vectensis*, *Sphaerochara parvula*, *S. jacobii*, *Collichara taizhouensis*, *Psilochara changzhouensis* and *Peckichara sinulata* thrived in flooded lakes, while in the Pingyi Basin the flora was dominant by *Peckichara varians* in permanentlacustrine environments with little terrigenous inputs. Second, the two basins also share the same species, such as *Lamprothamnium ellipticum* and *Mesochara voluta* in the Late Cretaceous and *Microchara cristata* in Late Cretaceous to Paleocene. In the Paleocene, the two basins shared the species *Sphaerochara parvula*. In fact, some of these species are widely distributed in Eurasia, which are very important for correlations between Asia and Europe.