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Stratigraphical investigations on a new Miocene fossil-bearing sequence in Central Inner Mongolia, China

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Central Inner Mongolia has been an area of great paleontological interest since the beginning of the 20th century. Although the area has produced numerous diverse collections of Miocene faunas, fossil records from the early Miocene of Inner Mongolia are relatively rare. The localities occur mainly as scattered faunal horizons and their stratigraphy is challenging owing to lack of continuous vertical exposures. Consequently, most age estimations of these Miocene sites are based on paleontological evidence alone, with very few sites having been dated independently based on paleomagnetics.

The Damiao site in Siziwang Qi, Inner Mongolia, was discovered in 2006, and during the following four years extensive field activities were undertaken. The focus was on paleontological studies and on the stratigraphy of the Neogene sediments. The field survey led to the recovery of approximately 30 new fossiliferous localities, which have produced a rich mammalian fauna, including pliopithecid remains. The bulk of the vertebrate fossils and localities have been recovered from three main fossil horizons. We have interpreted the Damiao sequence as the remains of a fluvio-lacustrine system comprising channels, subaerially exposed floodplains and ephemeral/marginal lacustrine environments.

This study presents the litho- and magnetostratigraphy of the Damiao area and provides age estimations for the important fossil-bearing localities. The two local stratigraphic sections measured and sampled for paleomagnetic analysis coincide with important vertebrate fossil localities. The western section is about 30 m thick and includes fossil locality DM16 while the eastern section spans up 40 m and comprises localities DM01 and DM02. The paleomagnetic results and faunal evidence suggest a correlation in the magnetozones C6Ar through C5r with an age range of ca 21 to 11 Ma. The interval of reversed polarity at the base of the section (C6Ar) coincides with fossil locality DM16. The pliopithecid locality DM01 represents late middle Miocene and has an age estimate of about 12 Ma while the locality DM02 represents earliest late Miocene with an age estimate of about 11.6- 11.7 Ma.

Our magnetostratigraphic results confirm that the Damiao strata constitute one of the most continuous sequences in Inner Mongolia with early, middle and late Miocene fossil faunas in stratigraphic superposition. The results also provide constraints on the paleoenvironmenal evolution and bioevents of the area. The occurrence of pliopithecid primates in the middle Miocene of Inner Mongolia suggests relatively humid habitats and challenges the scenarios suggesting arid and highly seasonal conditions for Central Asia since Early Miocene.