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Palynology and age of some Cretaceous nonmarine deposits in Mongolia and China

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Abstract

To provide biostratigraphic and paleoecologic data for a major international project studying dinosaur trackways in eastern Asia, samples were collected for palynological analysis from the Choyr Basin of southeastern Mongolia and the Yanji Basin, Jilin Province, northeastern China. Palynologically productive samples from the Choyr Basin are from strata previously identified as either the Shinekhudag Formation or the Zuunbayan Formation but recently renamed the Khuren Dukh Formation; productive samples from the Yanji Basin are from the Tongfosi Formation. The biostratigraphically most important palynomorphs from both units are angiosperm pollen. The Khuren Dukh Formation is determined to be middle to late Albian in age. The Tongfosi Formation is determined to be early Cenomanian in age. These results conflict with some previously published interpretations of the ages of these units. Lacustrine depositional environments are indicated for both units by the presence of freshwater algae in both deposits.
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Keywords: Palynomorphs; Mongolia; China; Choyr Basin; Yanji Basin

1. Introduction

Field work conducted for the major international research project studying dinosaur trackways in eastern Asia included collection of samples for palynological analysis to determine the age and paleoenvironment of stratigraphic units associated with dinosaur fossils (bones and/or tracks). Study areas were the Choyr Basin in the Gobi Desert, southeastern Mongolia; the Yanji Basin, Jilin Province, northeastern China; and the Tetori area, west-central Japan (Fig. 1). Results from analyses of the samples from Mongolia and China are discussed here; those from Japan are part of an ongoing study of that area, to be reported elsewhere. In the Choyr Basin, mudstone facies previously assigned to either the Shinekhudag Formation or the Zuunbayan Formation, but herein regarded as part of the recently renamed Khuren Dukh Formation (Ito et al., 2006), proved to be palynologically productive; other facies in the Choyr Basin were barren of palynomorphs. In the Yanji Basin, palynological samples were collected from the Laotougou, Tongfosi, Longjing, and Dalazi formations, but only those from the Tongfosi Formation were productive. Palynostratigraphic age determinations of productive samples are based on comparisons with well-dated assemblages from North America. Results conflict with some previously published interpretations of the geologic ages of the units in both basins.

2. Sample localities

2.1. Mongolia

The Choyr (also spelled Choir in some publications) Basin is located in southeastern Mongolia, centered at about latitude 45° 50′ N, longitude 108° 35′ E (Fig. 2). The stratigraphy of the Lower Cretaceous strata in the Choyr Basin has been studied by Novodvorskaya (1974), Shuvalov (1974), and

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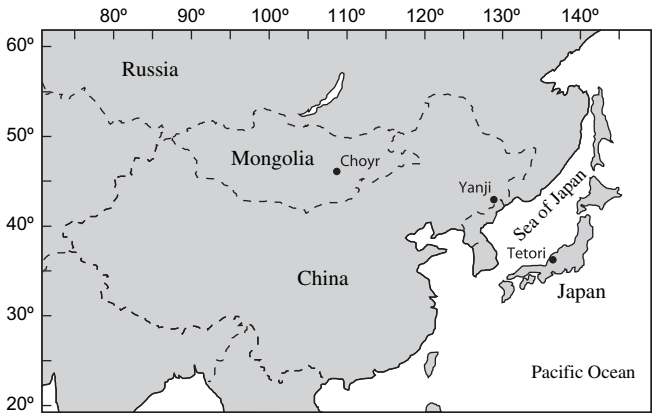

Fig. 1. Outline map of central and eastern Asia showing approximate locations of study areas (indicated by black dots) in Mongolia, China, and Japan.

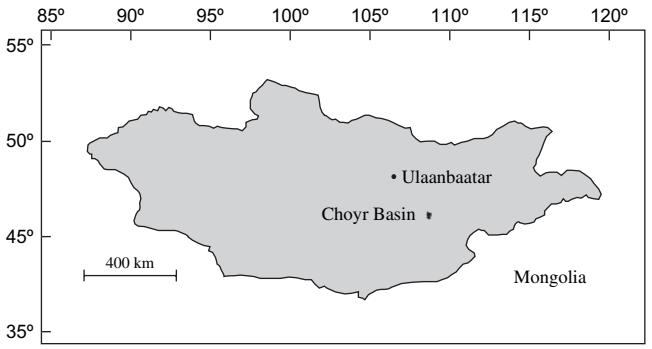

Fig. 2. Outline map of Mongolia showing approximate location of Choyr Basin in the Gobi Desert region, southeast of the capital city, Ulaanbaatar.

Matsukawa et al. (1997). Novodvorskaya (1974) and Shuvalov (1974) assigned these rocks to the Zuunbayan (also spelled Dsunbayan, Dzunbayan, and Dzun Bayan) Formation (see also Shuvalov, 1975; Hicks and Brinkman, 1997; Ichinnorov, 2003). In disagreement, Matsukawa et al. (1997) assigned these rocks to three formations, the Sharilin, Tsagaantsav, and Shinekhudag formations, in ascending order. Realizing that none of these formation names is appropriate for the rocks in this isolated basin, because they are derived from distant localities and carry erroneous implications of geologic age, Ito et al. (2006) proposed new names. The ''Sharalin'' of Matsukawa et al. (1997) is now the lower member of the Khalzan Uul Formation, the ''Tsagaantsav'' is the upper member of the Khalzan Uul Formation, and the ''Shinekhudag'' is now the Khuren Dukh Formation (Ito et al., 2006); see Fig. 3, which is modified from the Matsukawa et al. (1997) map.

The exact age of the Lower Cretaceous strata in the Choyr Basin has long been uncertain. On the basis of fossil invertebrates, Shuvalov (1974) concluded that the age is Aptian-Albian. Using biostratigraphic data from fossil pollen, Bratseva and Novodvorskaya (1975) reached a similar conclusion; Hicks et al. (1999), Nichols et al. (2001), and Ichinnorov (2003) narrowed the age range to Albian. According to Matsukawa et al. (1997), however, the age of the strata in the Choyr Basin was reasoned to be Valanginian–Barremian, based primarily on the ostracode fauna of the mudstone interval, which was said to be Hauterivian–Barremian in age. Data presented herein support a middle to late Albian determination, as discussed later.

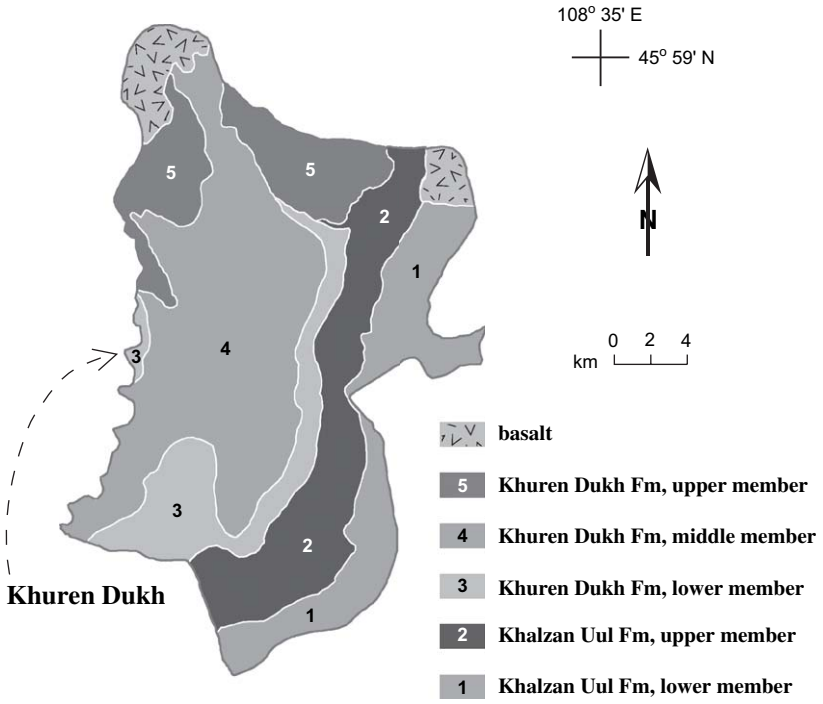

Fig. 3. Geologic map of Choyr Basin showing strata as named and mapped by Matsukawa et al. (1997) but renamed by Ito et al. (2006), and the approximate position of the Khuren Dukh locality.

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