

[Short report]

A new specimen of *Gobiopithecus khan* (Mammalia; Pantolestia) from the Eocene Ergilin Dzo Formation, Mongolia

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Introduction

Gobiopithecus is a genus of the Pantolestia, which are a group of archaic eutherian mammals, and is represented only by the single species, *Gobiopithecus khan*. It was described from the upper Eocene Ergilin Dzo Formation of Mongolia by Dashzeveg and Russell (1992). Although the pantolestans are widely recorded in the Paleogene of North America, Europe, Africa, and Asia (McKenna and Bell, 1997), they are very rare in Asia with a few published occurrences (Lucas and Emry, 2004). *Gobiopithecus* is one of the latest records of the Asian pantolestans together with *Kiinkerishella* and *Oboia* from the late Eocene of the Zaysan basin of eastern Kazakhstan (Lucas and Emry, 2004). *Gobiopithecus* was described as a dyspternine pantolestid (Dashzeveg and Russell, 1992). *Kiinkerishella* was described as an arctocyonoid 'condylarth' by Gabunia and Biryukov (1978), and later it was assigned to the Paroxyclaenidae (Pantolestia) by Russell and Godinot (1988) and to the Dyspterninae by Dashzeveg and Russell (1992). *Oboia* was described as a pantolestine pantolestid by Gabunia (1989). However, the phylogenetic relationships of these late Eocene Asian pantolestans have not been clarified due to the extreme scarcity of fossil specimens (Lucas and Emry, 2004). *Gobiopithecus* is represented only by the holotype, a mandible with m3 (Dashzeveg and Russell, 1992).

The purpose of this short report is to describe a new specimen of *G. khan* recovered from the Ergilin Dzo Formation by the Hayashibara and Mongolian Paleontological Center Joint Paleontological Expedition. The specimen is a mandible with p4-m3, showing previously unknown morphology of this rare taxon.

New specimen

The new specimen, MPC-M 30/82 (Fig. 1A-H), is stored in the Mongolian Paleontological Center (MPC), Ulaanbaatar, Mongolia. It was discovered from the Ergilin Dzo Formation at the Khoer Dzan locality, southeastern Mongolia (Dashzeveg, 1993; Tsubamoto *et al.*, in press). The Khoer Dzan locality is the type locality of *Gobiopithecus* (Dashzeveg and Russell, 1992) and is currently correlated to the late Eocene based on its mammalian fauna (Meng and McKenna, 1998; Tsubamoto *et al.*, 2008).

MPC-M 30/82 is a right mandibular fragment with p4-m3. The molar row is oblique to the long axis of the mandible in occlusal view (Fig. 1A). The base of the alveolus for the canine root reaches below p4 (Fig. 1B). The posterior mental foramen is located below the distal root of p4 (Fig. 1D). The mandibular depth below m3 on the lingual side = 11.0 mm. Dental measurements are shown in Table 1.

The p4 is mesiodistally elongated with a large

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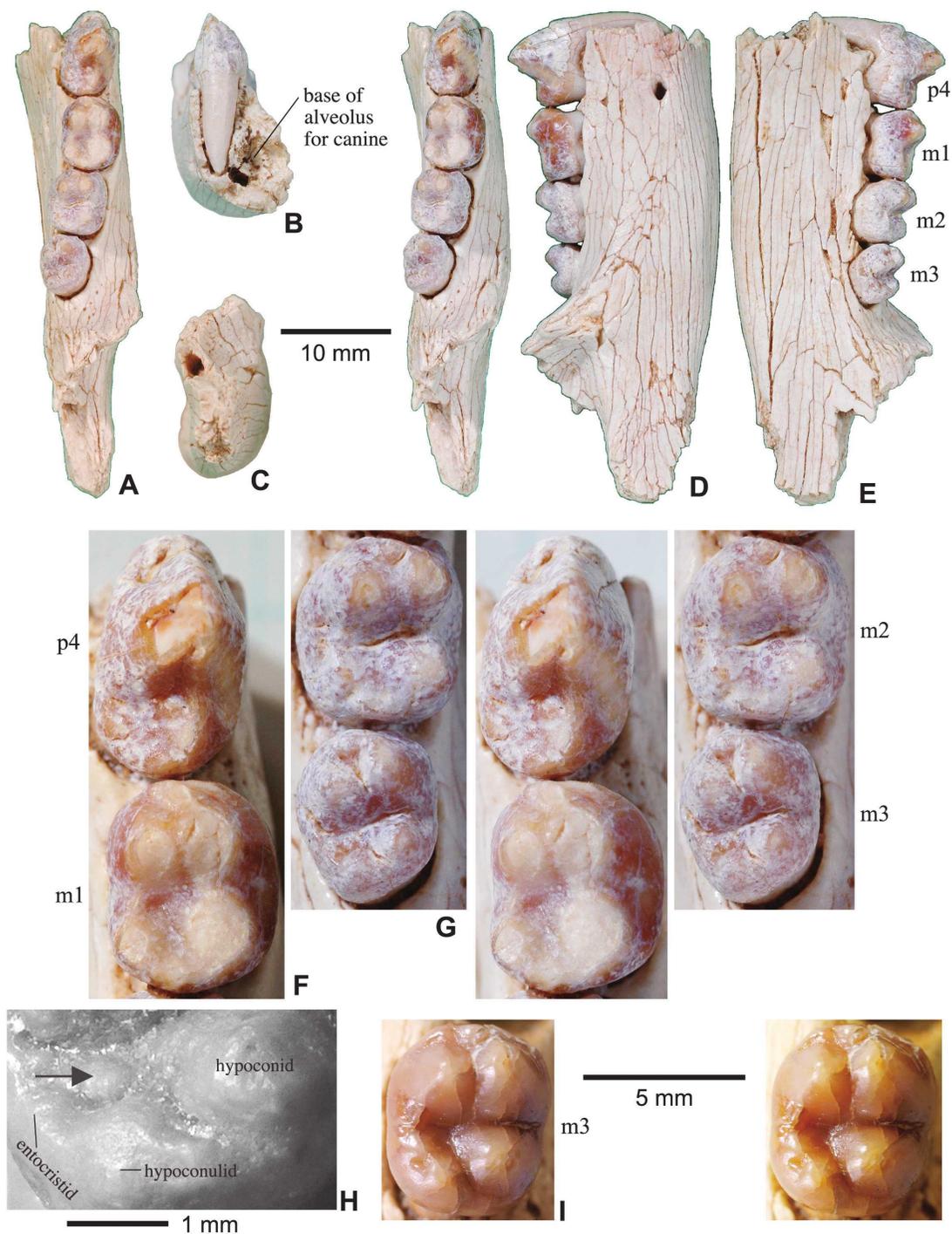


Fig. 1. *Gobiopithecus khan* Dashzeveg and Russell from the late Eocene of Mongolia. **A–H**, MPC-M 30/82 (new specimen), a right mandibular fragment with p4-m3: **A**, occlusal view (stereo pair); **B**, mesial view; **C**, distal view; **D**, buccal view; **E**, lingual view; **F**, occlusal view (stereo pair) of p4-m1; **G**, occlusal view (stereo pair) of m2-m3; **H**, occlusal view of the m3 talonid (cast) showing an accessory cusplule on the talonid basin (arrow). **I**, PSS 27-125 (holotype), occlusal view (stereo pair) of right m3. Upper scale corresponds to A–E; lower left scale corresponds to H; lower right scale corresponds to F, G, I.

Table 1. Dental measurements (in mm) of *Gobiopithecus khan* Dashzeveg and Russell. L, mesiodistal length. W, buccolingual width.

	p4	p4	m1	m1	m2	m2	m3	m3
	L	W	L	W	L	W	L	W
MPC-M 30/82 (new specimen)	8.1	5.0	6.7	5.5	5.8	5.4	5.4	4.5
PSS 27-125 (holotype)	–	–	–	–	–	–	6.2	5.3

protoconid (Fig. 1F). The mesial root is large and deep. A large wear facet is developed on the distobuccal face of the protoconid. The paraconid is absent. The metaconid appears to be absent, but this is unclear due to the breakage at the distolingual face of the protoconid. The hypoconid is low and crest-like. The talonid is not basined but is flat and open lingually with a raised buccal margin (prehypocristid). The cingulum exists at the mesial base. The p4 crown is longer than the m1 crown (Table 1).

The lower molars have bunodont and bulbous cusps (Fig. 1F-H). There are three large and main cusps, the protoconid, metaconid, and hypoconid. The paraconid is small and low and is located at the mesio-central margin of the crown. The paraconid is proportionally smaller on m3 than on m1-m2. The hypoconid is lower than the trigonid and is taller than the hypoconulid and entoconid. The hypoconulid is located at the disto-central margin of the crown. The hypoconulid is smaller than the entoconid on m1, is as large as the entoconid on m2, and is subequal in size to the hypoconid on m3. The m3 hypoconulid is not so protruding distally. The entoconid is absent on m3. The cristid obliqua is absent. The mesial cingulum is present between the bases of the protoconid and paraconid. The buccal, lingual, and distal cingula are absent except for the distolingual base of the metaconid on m3. The entocristid extends to the distal base of the metaconid on m1-m2; and it extends to the distolingual base of the metaconid on m3, making a small cingulum. On m3, there is a tiny accessory cuspule (Fig. 1H) on the talonid basin. The lower molar sizes are: $m1 > m2 > m3$ (Table 1).

Discussion

The new material is the second specimen of *Gobiopithecus* and shows the previously unknown morphology of its p4-m2, confirming its dyspternine pantolestid affinity as suggested by Dashzeveg and Russell (1992). The p4 is simple and only slightly longer

than m1. It has an unicuspid talonid and lacks paraconid, likely without a metaconid. It has a semi-shearing facet on the distobuccal face of the protoconid. The p4 talonid is not basined. The canine alveolus reaches below p4, implying the presence of a large lower canine. These newly-found key characteristics (Cray, 1973) reinforce that *Gobiopithecus* is assigned to the Pantolestinae or Dyspterninae (Pantolestidae). The new specimen demonstrates that the lower molars decrease in size from m1 to m3, although this was inferred by the alveoli of the holotype (PSS 27-125) (Dashzeveg and Russell, 1992). In addition, *Gobiopithecus* has bulbous molar cusps, and its hypoconulid on m3 is distinct but is not protruding distally (Dashzeveg and Russell, 1992). These molar characteristics indicate that *Gobiopithecus* is assigned not to the Pantolestinae but to the Dyspterninae (Dashzeveg and Russell, 1992). The p4 of *Gobiopithecus* appears to be more robust than that of other dyspternines. However, it is difficult to know whether or not this difference is a true diagnostic feature of *Gobiopithecus* among the Dyspterninae, due to the scarcity of p4 specimens in the subfamily. In general, *Gobiopithecus* is distinguished from other dyspternines in having more bulbous and bunodont molar cusps (Dashzeveg and Russell, 1992).

The new specimen slightly differs from the holotype in size and morphology, showing individual variation. The posterior mental foramen is located below p4 in the new specimen (Fig. 1D); but it is located below m1 in the holotype (Dashzeveg and Russell, 1992). This variation is common in the Dyspterninae (Cray, 1973; Dashzeveg and Russell, 1992). The size of m3 of the new specimen is smaller than that of the holotype (Table 1). On m3 of the new specimen (Fig. 1G-H), the entoconid on the entocristid is absent, making the talonid basin open lingually. But, on m3 of the holotype (Fig. 1I), the vestigial entoconid is present on the entocristid (Dashzeveg and Russell, 1992), making the talonid basin closed lingually. This

kind of m3 variation is common in various mammals. The new specimen has an accessory cuspule on the talonid basin on m3 (Fig. 1H). The holotype lacks this accessory cuspule (Fig. 1I). This accessory cuspule is likely not homologous with the entoconid but appears to be a neomorphic anomalous cuspule because it is not located on the entocristid but on the talonid basin.

A precise analysis of the phylogenetic relationships of the Asian pantolestans is indeed necessary (Lucas and Emry, 2004) for the study of pantolestan dispersal during the Eocene-Oligocene transition. However, it is not discussed here because it is beyond the scope of this short report and because the materials are still too incomplete for phylogenetic analysis. Better material, particularly upper dentitions, of *Gobiopithecus* will clarify the phylogenetic relationships and paleobiogeographic features of the late Eocene Asian pantolestans.

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