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SUPPLEMENTARY ONLINE MATERIAL FOR

Pleistocene equid brain endocast from Shanxi Province, China

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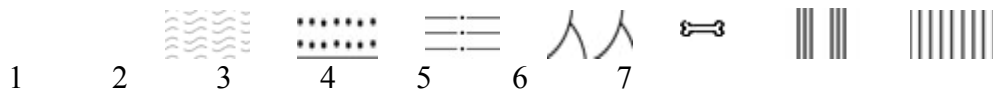
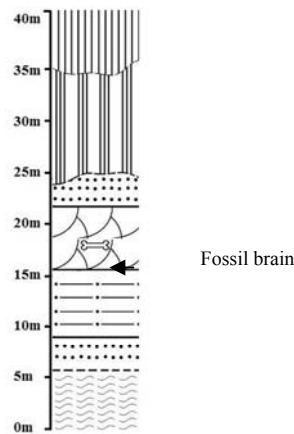
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SOM 1. Stratigraphic column at Chenjiagou, Ronghe Town, Wanrong County, Shanxi Province.

SOM 2. Faunal list for the Chenjiagou site and comparison with the Linyi Fauna (early Pleistocene deposits exposed in southwestern Shanxi Province).

SOM 3. Estimation of the encephalization quotient of TNU V44.

S1. Stratigraphic column for locality at Chenjiagou, Ronghe Town, Wanrong County, Shanxi Province.



1 Mudstone; 2. Yellow-red sands; 3. Yellow sands with carbonate concretions; 4. Fluvial sediment □ yellow sands with cross-bedding; 5. Fossil occurrence; 6. Lishi Loess (Middle Pleistocene); 7. Malan Loess (Upper Pleistocene).

Stratigraphic descriptions:

1. Pleistocene

1.1 Upper Pleistocene Malan Loess (layer 7)

The Malan Loess is composed of brownish yellow sandy soil and has a thickness of 5m in this area. No fossils are known from this layer.

1.2 Middle Pleistocene Lishi Loess (layer 6)

The Lishi Loess is composed of gray yellow sandy soil and brownish red sandy soil, and has a thickness of around 10m in this area. No fossils are known from this layer.

1.3 Lower Pleistocene Sanmen Fm. (including layers 2-4)

The Sanmen Formation is composed of yellow-red sandstone in its upper portion and yellow sandstone with carbonate concretions in its lower portion. Between the two is a layer of cross-bedded fluvial sediment; the cross-bedded layer has yielded a variety of vertebrate fossils, including *Trionyx* sp., *Equus sanmeniensis*, *Hipparion* sp., *Axis*, *Cuon dubius*, and others. The thickness of this layer is about 20m.

2. Pliocene ? (layer 1)

This layer is composed of purple to pink mudstone, and has yielded some snail fossils.

S2. Faunal list for the Chenjiagou site and comparison with the Linyi Fauna (Lower Pleistocene deposits in southwestern Shanxi Province).

Taxon	Chenjiagou	Linyi Fauna
Cypriniformes		
Cyprinidae indet.		+
Chelonia		
<i>Trionyx</i> sp.	?	+
Emydidae indet.		+
Galliformes		
<i>Shanxiornis fenyinis</i>	+	
Rodentia		+
<i>Trogontherium</i> sp.		+
<i>Myospalax fontanieri</i>		+
<i>Myospalax tingi</i>	+	
Carnivora		
<i>Megantereon nohowanensis</i>		+
<i>Megantereon</i> sp.	+	+
<i>Ursus</i> sp.		+
<i>Canis</i> sp.	?	+
<i>Cuon dubius</i>	+	
<i>Hyaena</i> sp.		+
Proboscidea		
<i>Stegodon</i> cf. <i>zdanskyi</i>	+	+
<i>Palaeoloxodon tokunagai</i>	+	+
Perissodactyla		
<i>Equus sanmeniensis</i>	+	+
<i>Equus przewalskii</i>	+	?
<i>Equus</i> cf. <i>hounghoensis</i>	+	+
<i>Hipparion (Proboscidipparion) sinense</i>	?	+
<i>Hipparion</i> sp.	+	+
<i>Coelodonta antiquitatis</i>	+	+
<i>Coelodonta</i> sp.		+
<i>Nestoritherium</i> sp.		+
Artiodactyla		
<i>Paracamelus</i> sp.	+	+
<i>Euctenoceros boulei</i>	+	+
<i>Euctenoceros</i> cf. <i>tetraceros</i>	+	+
<i>Euctenoceros</i> sp.	+	+
<i>Elaphurus bifurcates</i>	+	+
<i>Elaphurus chinmaniensis</i>	+	+
<i>Axis shansius</i>	+	+
<i>Axis rugosus</i>	+	+
<i>Rusa elegans</i>	+	+
<i>Cervus</i> sp.	+	+
<i>Gazella</i> sp.	+	+
<i>Sus</i> sp.	+	+
<i>Bison</i> sp.	+	+

Tang *et al.* (1983) assigned the Linyi fauna to the early Pleistocene on biostratigraphic grounds. Among the Chenjiagou species on the above faunal list, *Equus sanmeniensis*,

Euctenoceros boulei, *Euctenoceros* cf. *tetraceros*, *Elaphurus bifurcates*, *Elaphurus chinnaniensis* and *Axis rugosus* are characteristic of early Pleistocene faunas of Northern China, corresponding to the European Villafranchian age. However, *Hipparion* sp. and *Stegodon* cf. *zdanskyi* were known in Pliocene, although they are also known from Nihewan and other classic early Pleistocene faunas of China. Moreover, some morphological features of M₃ of *Cuon dubius* imply an early Pleistocene age (Wang and Zhao 2006). This suggests that the Chenjiagou fossil assemblage should indeed be assigned to the early Pleistocene (the geological age of Plio-Pleistocene boundary was given by Gradstein et al. 2012 as 2.588 Ma).

S3. Estimation of the encephalization quotient of TNU V44.

The body weight of early Pleistocene *Equus* is thought to have been similar to that of modern *Equus przewalskii*. We estimated the EQ of TNU V44 by using the function $EQ = E/0.12P^{0.67}$, where E and P are brain and body weight (Jerison 1970), respectively, in grams; and “t” stands for “TNU V44”. TNU V44 was 300kg, a value appropriate for *Equus przewalskii* (Jiang 2004), leading to the following calculated EQ_t value:

$$EQ_t = E_t / 0.12P_t^{0.67};$$

$$EQ_t = 465 / (0.12 * 300000^{0.67})$$

$$= 0.83$$

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