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## Quaternary International

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# Dental remains from Longtanshan cave 1 (Yunnan, China), and the initial presence of anatomically modern humans in East Asia



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## ARTICLE INFO

### Article history:

Available online 16 June 2015

### Keywords:

Late Pleistocene

China

Anatomically modern humans

Dentition

## ABSTRACT

We describe and compare two hominin teeth identified here as a RP<sup>1</sup> (YV1361) and a LM<sub>2</sub> (YV1362) recovered in 1977 from Late Pleistocene deposits at Longtanshan 1, a cave locality near Kunming, Yunnan Province, Southwest China. Placed within the broader context of known variation in Late Pleistocene hominins and recent humans from the region both teeth probably sample anatomically modern humans. They appear to exhibit simple crown morphology, possess narrow buccolingual diameters, YV1361 has a single (simple) root, YV1362 has two simple roots that bifurcate close to the crown, and the roots of both teeth are long but not especially robust compared to the size of their crowns. Previous dating research at Longtanshan 1 suggests both teeth have a minimum age of close to 60–83 ka, but further research will be required to establish this more precisely. These findings combined with recent discoveries from other parts of China suggest that anatomically modern humans appeared in the region during Marine Isotope Stages 4 or 5.

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## 1. Introduction

Yunnan Province has provided the largest sample of Late Pleistocene hominin remains in China (Wu and Poirier, 1995). Yet, they remain largely unknown internationally. We have recently reported details of the unusual morphology of Pleistocene–Holocene transition hominins from Maludong near Mengzi, southeast Yunnan (Curnoe et al., 2012; Ji et al., 2013). Another poorly known hominin bearing locality in this province is the Longtanshan palaeocave system in Dayu Town (Chenggong District), Kunming City, around 50 km southeast of the provincial capital Kunming (Fig. 1).

Longtanshan is a limestone hill that was used periodically as a quarry from World War 2 until the 1970s. The Longtanshan system contains three fossiliferous palaeocaves – Longtanshan 1, 2 and 3 – all of which have yielded hominin remains (Wu and Poirier, 1995). From 1973 to 1977, quarry workers found various faunal fossils at Longtanshan 1. During 1977, one of us (SH), then working as a cultural officer at the Chenggong County Cultural Bureau,

discovered two hominin teeth at the locality. Subsequent excavations the same year led by SH recovered only faunal remains and no artefacts were found (Zhang et al., 1978). The stratigraphic sequence of Longtanshan 1 has been described as comprising three units (Fig. 2). From top to bottom:

- Layer III, thickness 2.0 m: red clay with sands, gravels, and stalagmite blocks; fossils recovered from the lower part of this layer including the two hominin teeth and the Pleistocene species *Crotula ultima* (Louys et al., 2007; Turvey et al., 2013).
- Layer II, thickness: 1.5–2.0 m: yellow clay layer with breccia containing limestone gravel and stalagmite, capping flowstone above and below; containing stone artefacts and abundant mammalian fossils of probable Late Pleistocene age.
- Layer I, thickness unknown (cave floor not reached), but >1.2 m: purple clay with limestone breccia and basalt gravel; small number of stone artefacts and mammalian fossils.

There has been controversy in the literature surrounding the provenance of the human teeth. Zhang et al. (1978) and Gao et al. (2007) assumed they derived from the upper part of Layer II, while they were actually recovered by SH in the lower half of Layer III (Fig. 2). Taxonomic identification of fauna recovered during

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Fig. 1. Location of Late Pleistocene hominin localities in China providing teeth that can be compared metrically to those from Longtanshan 1 (KMG = Kunming).

excavations of all layers suggested that the entire Longtanshan 1 deposit dated to the Late Pleistocene (see list in Zhang et al., 1978; reproduced by Wu and Poirier, 1995). Moreover, the hominin teeth were described as belonging to “modern” *H. sapiens* (or anatomically modern humans) on account of their apparent young geological age and small crown dimensions (Zhang et al., 1978; Wu and Poirier, 1995).

In her review of the dating of anatomically modern human fossil localities in China, Keates (2010) discussed a <sup>14</sup>C date on bone of 18,300 ± 250 (PV-0340) from Longtanshan 1. However, this sample

was actually collected from the adjacent Longtanshan 3 locality, so it should be ignored within the present context. A uranium-series dating study of samples from the Longtanshan 1 sequence is the only geochronological investigation undertaken so far (Gao et al., 2007). While dates for flowstones ranged from 305 ± 5 ka to 564 + 71/–48 ka (Gao et al., 2007), their relationship to the fossil bearing units could not be established in this study because most of the sediment was removed during excavation.

In Fig. 2, we summarize the U-series dates of Gao et al. (2007) determined on bone, placing them in stratigraphic order

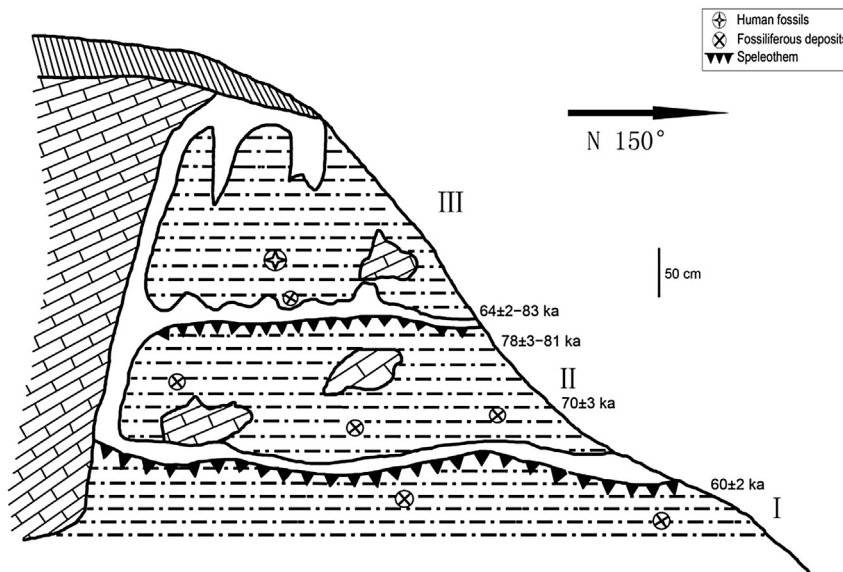


Fig. 2. Stratigraphic section of Longtanshan 1 (dates indicated are from U-series dating of bone produced by Gao et al., 2007).

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