Carbon isotope reveals a solely C3 biomass diet for gigantopithecus in the early pleistocene of South China

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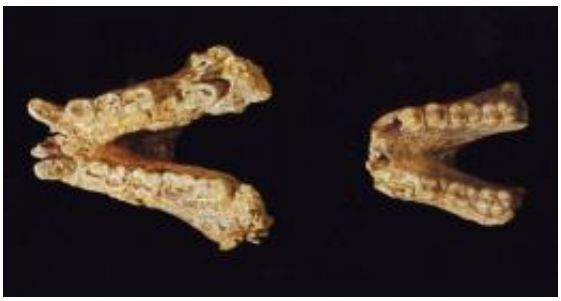

Fig.1: The mandibles of Gigantopithecus blacki from Juyuandong Cave of Liucheng, Guangxi Province, China.

The extinct giant ape, Gigantopithecus blacki, is a species of large hominoids that dominated the Pleistocene of South China. Its massive mandible, large postcanine teeth and extremely thick enamel always spark people's curiosity about what a diet for this giant ape was. The precise diet and habitat of Gigantopithecus remains unknown so far.

Drs. ZHAO LingXia, ZHANG LiZhao and WU XinZhi, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, and ZHANG FuSong from Institute of Geology and Geophysics, Chinese Academy of Sciences, analyze enamel stable carbon isotope values of G. blacki and the associated mammalian megafauna from two sites in South China, and find that this giant ape

and other large mammals solely fed on C3 biomass, and lived in forest habitats, as reported in the journal of *Chinese Science Bulletin*, 2011(56), No.33:3590-3595.

Zhao and her collaborators prepared and analyzed a total of 32 tooth samples for their study. Four teeth of G. blacki and 24 teeth of associated large mammals were from Longgudong Cave, Jianshi, Hubei Province, and the other 4 teeth of G. blacki were taken from Juyuandong Cave of Liucheng, Guangxi Province. The most enriched $\delta^{13}C$ value was -14.1‰, and the most depleted was -18.8‰. Concerning an enrichment of about 14‰ for $\delta^{13}C$ between food and enamel, the $\delta^{13}C$ values of food sources would be from -32.8‰ to -28.1‰, which is within the $\delta^{13}C$ range of C_3 biomass and far too negative for that of C_4 biomass. It is clear that Gigantopithecus and the affiliated megafauna, such as browsers (Cervus sp. and Tapirus sinensis), grazers (Equus sp. and Leptobos sp.) and carnivores (Pachycrocuta licenti and Ursus sp.), all derived their carbon from solely C_3 biomass sources. Zhao and her collaborators suggested that Gigantopithecus should live in closed forest habitat and not an open habitat, which is consistent with the associated faunal and floral analyses.

“Analysis of stable carbon isotopes is a powerful method for exploring the diet and habitat use of extinct herbivorous mammals, and it has been used in paleoanthropology in analysis on early hominins fossils. This method is based on the fact that the carbon isotope composition is significantly different between plants that use different photosynthetic pathways, such as C_3 plants ($\delta^{13}C$ from -22‰ to -35‰) and C_4 plants ($\delta^{13}C$ from -8‰ to -16‰), and the stable carbon isotope composition of enamel is dependent on the diet components throughout the food chain”, said Dr. ZHAO LingXia, the lead author and research designer, “The diet and habitat of Gigantopithecus blacki was significantly different from that of early hominins in Africa, such as Australopithecus and Paranthropus, which could consume both C_3 and C_4 resources and live in

open habitats, although they all somehow show similar powerful mastication morphology . Dependence on forest habitat might be an important factor that made Gigantopithecus extinct when the climate and environment changed dramatically during the Pleistocene."

Provided by Institute of Vertebrae Paleontology and Paleoanthropology