7th Denisovan from Qinghai-Tibet Plateau

By SONG Jianlan (Staff Reporter)

This work brought to light the first Denisovan fossil outside Denisova cave of Siberia.

It seemed that Denisovans, an extinct species or subspecies of hominids living in Asia about the same time as Neanderthals, who inhabited in much of European and Mediterranean lands about 100,000 to 35,000 years ago, had left behind nothing but the fragmentary fossils from Denisova cave in the Altai Mountains of Siberia. Thanks to the high-quality DNA extracted from these exclusive specimens, however, scientists managed to grasp some understanding of them. From the genome sequences scientists found that Denisovans had a mixture of genes distinct from either Neanderthals or modern humans. Interestingly, genetic inflow from them could be found in many modern people living across Asia today, indicating their once prevalence on this continent, despite the scarcity of fossil record of this species.

An unknown piece of material from Baishiya Karst cave, Xiahe, Gansu, China, turns out to be a fragment of Denisovan mandible dated to 160,000 years ago. This would have never been brought to light had not for a new technique to analyze ancient proteins. (Credit: ITP)

Genome analysis revealed that Denisovans might have genetically contributed both to some East Asians living in lower altitudes and modern Tibetans ranging on the Qinghai-Tibet Plateau. This genetic legacy is believed to have helped Tibetans adapt to the high-altitude environment on the Plateau. Nevertheless, due to the scarcity of morphological information, scientists have great difficulty in connecting them with the hominin fossil materials distributed across Asia and other regions; neither can they accurately understand their relation with modern Asians. Meanwhile, what has made modern Tibetans uniquely adapted to the hypoxic conditions on the high-altitude Plateau remains an important issue for science exploration. All this makes it crucial to identify and study Denisovan fossils.

Thankfully, advanced method to analyzing ancient proteins has facilitated the identification of an otherwise unknown piece of material as a mandible from this mysterious hominid. Found from Baishiya Karst cave of Xiahe County, Gansu Province of China, this specimen yields no DNA, in contrast with the Denisova cave specimens.

Joining hands with groups at Lanzhou University and the Max Planck Institute for Evolutionary Anthropology in Germany, a group led by Prof. CHEN Fahu at the Institute of Tibetan Plateau Research (ITP), CAS successfully extracted from the specimen collagen, a common protein, and found its characteristics matched up with those of collagen from the Siberia specimens. This suggested that the mandible was from a Denisovan, pinning down the first Denisovan fossil outside Denisova cave.

Via U-series dating of the carbonate matrix on the bone, they determined that the mandible was at least 160,000 years old, and reported May 2019 in *Nature* their discoveries.

The joint team's findings offered direct evidence for Denisovans outside the Altai Mountains, and shed new light on the mandibular and dental morphology of this hominin group. Further, their research indicated that ancient hominids occupied the Qinghai-Tibet Plateau as early as in the Middle Pleistocene epoch and successfully adapted to the hypoxic environments there long before modern *Homo sapiens* arrived in this area.

This work wins the 7th place in the annual top 10 science advances of China for 2019. It was also chosen by *Science* as the first of the nine "runners-up" in its picks for annual breakthroughs of 2019, second to the champion, the first "photo" of a blackhole.

Reference

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