

# The genome sequence of Tibetan antelope sheds new light on high-altitude adaptation

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Why Tibetan antelope can live at elevations of 4,000-5,000m on the Qinghai-Tibetan Plateau? In a collaborative research published in *Nature Communications*, investigators from Qinghai University, BGI, and other institutes provide evidence that some genetic factors may be associated with the species' adaption to harsh highland environments. The data in this work will also provide implications for studying specific genetic mechanisms and the biology of other ruminant species.

The Tibetan antelope (*Pantholops hodgsonii*) is a native of the high mountain steppes and semi-desert areas of the [Tibetan plateau](#). Interestingly, it is the only member of the genus *Pantholops*. Tibetan antelope is a medium sized antelope with the unique adaptations to against the harsh high-altitude climate. For non-native mammals such as humans, they may experience life-threatening [acute mountain sickness](#) when visiting high-altitude regions.

In this study, researchers suggest that Tibetan antelopes must have evolved exceptional mechanisms to adapt to this extremely inhospitable habitat. Using next-gen sequencing technology, they have decoded the genome of Tibetan antelope and studied the underlying genetic mechanism of high-altitude adaptations.

Through the comparison between Tibetan antelope and other plain-dwelling mammals, researchers found the Tibetan antelope had the signals of [adaptive evolution](#) and gene-family expansion in genes associated with [energy metabolism](#) and oxygen transmission, indicating

that gene categories involved in energy metabolism appear to have an important role for Tibetan antelope via efficiently providing energy in conditions of low partial pressure of oxygen (PO<sub>2</sub>).

Further research revealed that both the Tibetan antelope and the highland American pika have signals of positive selection for genes involved in DNA repair and the production of ATPase. Considering the exposure to high levels of ultraviolet radiation, positive selective genes related to [DNA repair](#) may be vital to protect the Tibetan antelope from it.

Qingle Cai, Project manager from BGI, said, "The completed genome sequence of the Tibetan antelope provides a more complete blueprint for researchers to study the [genetic mechanisms](#) of highland adaptation. This work may also open a new way to understand the adaptation of the low partial pressure of oxygen in human activities."

Provided by BGI Shenzhen

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