

Whole-genome sequencing uncovers the mysteries of the endangered Chinese alligator

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In a study published in *Cell Research*, Chinese scientists from Zhejiang University and BGI have completed the genome sequencing and analysis of the endangered Chinese alligator (*Alligator sinensis*). This is the first published crocodylian genome, providing a good explanation of how terrestrial-style reptiles adapt to aquatic environments and temperature-dependent sex determination (TSD).

The Chinese alligator is a member of the alligator family that lives in China. It is critically endangered with a population of ~100 wild and ~10,000 captive individuals in Zhejiang and Anhui Provinces. Great efforts have been put into uncovering the mysteries of this species because of its unique features that allow them being adapted for living in both water and land habitats.

In this study, researchers collected a Chinese alligator sample from Changxing Yinjiabian Chinese Alligator Nature Reserve (Zhejiang Province, China) and sequenced its genome using a whole-genome shotgun strategy. The genomic data yielded a [draft sequence](#) of Chinese alligator with the size of 2.3 Gb, and a total of 22,200 genes were predicted.

The [genomic data](#) provides a strong evidence from DNA level to illustrate why Chinese alligator can hold its breath under water for long periods of time, such as the duplication of the bicarbonate-binding hemoglobin gene, positively selected [energy metabolism](#), and others. Researchers further identified the genetic signatures of the powerful

sensory system and immune system of Chinese alligator. All the results presented evidence for co-evolution of multiple systems specific to the back-to-the water transition.

Chinese alligator exhibits TSD, and does not possess sex chromosomes. The absence of sex chromosomes is another interesting feature. In this study, researchers analyzed the [evolutionary mechanism](#) of [sex chromosomes](#), and reported that the alligator was the first TSD species whose genome has been sequenced, which will have great implication in resolving sex [chromosome evolution](#).

Shengkai Pan, Project manager from BGI, said, "The accomplishment of the Chinese alligator genome is significant for understanding its adaptation for both aquatic and terrestrial environments, and more importantly, for the conservation of such an endangered species."

Provided by BGI Shenzhen

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