

# Scientists gain new insights into dolphin's evolutionary history and conversation

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Credit: Wikipedia

Researchers from Nanjing Normal University and BGI report their original genomic research on Baiji, also known as Yangtze River dolphin (*Lipotes vexillifer*). The study gives new insight into the genetic and evolutionary adaptations of Dolphin, and provides valuable resources for the conservation of mammals and cetaceans in particular. The latest study was published online in the journal *Nature Communications*.

Nicknamed "Goddess of the Yangtze", the baiji was regarded as the goddess of protection by local fishermen and boatmen in China. Unfortunately, this species has suffered huge losses in recent decades largely due to the extreme pressures brought by human's activities. The baiji has become one of the most famous species in aquatic conservation. There have been many great efforts made to conserve the baiji, but most of them failed.

In this study, researchers presented a high-quality draft genome and three re-sequenced genomes of the baiji using next-gen sequencing technology. Comparative genomic analysis revealed that cetaceans (baiji and the bottlenose dolphin) have a slower molecular clock than previous thought.

The further analysis reveals that the genes involved in oxidoreductase activity, ferric iron binding, metabolic processes and ATPase activity show significant expansion, whereas the genes involved in olfactory receptor activity decreased most significantly. Researchers suggested that these changes of genes maybe related with the baiji's basic physiological activities required for underwater living, such as oxygen carrying and sensing.

Researchers found there were many factors related with the aquatic adaptations of cetaceans, such as positively selected genes (PSGs), and some functional changes. One of the noticeable findings is that PSGs in the baiji lineage were also involved in DNA repair and response to DNA damage stimulus, which have not been reported in previous studies of mammals or dolphin.

The independent origin of echolocation in toothed whales and echolocating bats is a classic model of [convergent evolution](#). When identifying genes exhibiting convergent evolution in the baiji and bat, researchers found nine genes (including SLC26A5, TMC1, and

DFNB59) have evolved under significant accelerated evolution, and 17 [genes](#) contained parallel amino acid changes in echolocating mammals.

Compared to all other mammalian genomes reported so far, researchers also found a significantly lower number of heterozygous single nucleotide polymorphisms (SNPs) in the baiji. The reconstruction of the demographic history of the baiji indicated that a bottleneck occurred near the end of the last deglaciation, a time coinciding with a rapid decrease in temperature and the rise of eustatic sea level.

Fengming Sun, project manager from BGI, said, "We not only found some special evolutionary characteristics of baiji, but also found that the functional extinction of this species was mainly due to human activities. The high-quality draft genome of baiji will provide a valuable resource for researchers to uncover the genetic mechanisms underlying extinct species, and will make a great contribution to the protection of endangered [species](#)."

Provided by BGI Shenzhen

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