

TRILOBITES

Blue Whale Genes Reveal Less Inbreeding, More Interbreeding Than Expected

Researchers completed genomic research on carcasses of the largest animals that have ever lived to understand North Atlantic whale populations.

By **Darren Incorvaia**

Darren Incorvaia previously wrote about the genes that make whales so massive.

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In 2014, nine blue whales died after being trapped by ice near Newfoundland, Canada. Two of their carcasses washed ashore and began bloating as they decomposed, causing worries of an imminent explosion and possibly inspiring a sketch on “Saturday Night Live” that ended with Charlize Theron covered in whale guts. More recently, the colossal corpses of these unlucky mammals have made an important contribution to science.

Nearly a decade after their deaths, researchers have analyzed the DNA of the beached whales — along with samples collected from 26 other blue whales — to create the most accurate picture to date of the North Atlantic population’s structure. The results, published this month in the journal *Conservation Genetics*, reveal a ticking time bomb in blue whale demographics, peculiar migration patterns and even clandestine cross-species matings.

The global population of blue whales was seriously damaged by industrial whaling in the early 20th century. A declining population can raise rates of inbreeding, which can lower the variety in a population’s gene pool and increase the risk of species extinction.

With fewer than 3,500 adult blue whales remaining in the North Atlantic, scientists expected to find such a genetic bottleneck. At first, they were surprised when their genomic analysis showed no signs of one. They say it may result from the length of time it takes blue whales to reproduce — about 30 years to go from one generation to the next.

“It probably hasn’t been enough time to really see a bottleneck effect,” said Mark Engstrom, a genomicist at the Royal Ontario Museum in Toronto who supervised the research effort.

That North Atlantic blue whales have “kept their genetic variation despite about a century of industrial whaling” is good news, said Axel Janke, a genomicist at Goethe University Frankfurt in Germany who was not involved in the study.




But if the population doesn’t grow over the next century, Dr. Engstrom said, he would expect a bottleneck to emerge — to the detriment of the whales.

Whalers historically thought that blues in the North Atlantic were split into distinct east and west populations. But the whales’ DNA tells a different story. Dr. Engstrom’s team found plenty of evidence for east-west intermingling.

“There are differences,” he said, “but that is a fairly recent split.” Most often, genes flow from western blue whales to those in the east. The team speculates that this movement may be mirroring the North Atlantic Current, in which seawater flows from west to east. Western whales may be following their favorite food, krill, as the waves wash the shrimpy crustaceans eastward, where they encounter a different population of whales.

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Even more surprisingly, genes are crossing evolutionary lines as well as geographic ones.

Blue whales have long been known to mate and reproduce with fin whales, even though the two aren't especially close relatives — and blue whales can be a good 25 feet longer and as much as 85 tons heavier. Many hybrid animals (like mules, for example) are sterile. But armed with their new data set, Dr. Engstrom's team found evidence of persistent interspecies mixing. All told, about 3.5 percent of the blue whale genome comes from fin whales.

"This is fantastic," Dr. Janke said. He had previously looked for blue whale DNA in fin whale genomes and not found it. The new data, coupled with an analysis that Dr. Engstrom's team performed, suggests that though the hybrids aren't sterile, they mate only with blue whales.

"What traits are transferred from the fin whale to the blue whale?" Dr. Janke asked. He wonders if these genes benefit blue whales in any way.

Dr. Engstrom plans to collect more blue whale genomes, which Dr. Janke hopes could help scientists understand populations in other parts of the world. It's a big ocean, and with the diminished blue whale numbers, he said, knowledge is power.

"There's kind of a motto that we have," Dr. Janke said. "You can only protect what you know."