

# Scientists find a new tool to study a blue whale's life, its earwax

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In this Aug. 14, 2008, file photo provided by John Calambokidis, a blue whale is shown near a cargo ship in the Santa Barbara Channel off the California coast. AP Photo/John Calambokidis, Cascadia Research

Scientists are learning a lot about the life of a dead blue whale from a pretty unusual source: a giant plug of earwax.

It's smelly and full of the stuff you find in belly fat – lipids.

But the scientists' new method lets researchers understand when a whale develops certain hormones. The information can tell a lot about how a whale lived. At the same time, they can also learn what chemicals the whale swam through. So scientists can also see how pollutants still remain in the water today. Some of the pollutants have not been made for years.

Whales can show a lot about waters they swim through, said Sascha Usenko. He is a chemist at Baylor University who helped write a study about earwax. They live a long time and their bodies gather in and keep contaminants – bad things in the water, he said.

## A Play-By-Play Account

Researchers often study tissue and even the stuff that whales shoot through their blowholes to learn about chemicals. But fat tissue – called blubber – mostly only shows what the whale gathered in over its life, said Gina Ylitalo. She is a Seattle-based chemist. It doesn't really give scientists a play-by-play account of the chemicals an animal came in contact with or what hormones it produced over time.

But Usenko realized that earwax is rich in lipids. So is fat. So the same lipid-loving hormones and chemicals found in a whale's blubber would also end up in its ear canal.

Wax is deposited in the ear over time. So it forms a plug with layers. The layers can be counted like tree rings to determine its age.

But Usenko wondered if scientists could do more than just count the waxy layers. What if they could read each one, too?

If he could review each section, "then I could understand not only what they were exposed to today, but go back in time," said Usenko.

### **Testosterone And Cortisol**

The team used a very fine-toothed band saw. It cut up a 10-inch earplug pulled out of a nearly 70-foot-long male blue whale. The animal died after a 2007 accident with a ship off the Santa Barbara coast.

The wax is "naturally pretty heavy and strong," Usenko said. The earwax is mostly made up of lipids and the stuff found in hair and nails. It "doesn't necessarily smell great. When we were pulling it out, some of the crew actually just left."

The plug's 24 layers have light and dark stripes, Usenko said. The lighter bands have more lipids. They could result from times when there was more food. The darker parts may be a sign of leaner times.

The whale's testosterone levels jumped a bunch when it was around 10 years old. Researchers used the information to change estimates of when a male becomes a biological adult.

Researchers also looked at a hormone called cortisol. The hormone is released when an animal is stressed, or anxious. Cortisol levels jumped 800 percent shortly after the whale's testosterone shot up. The change could be because it had to compete with other males to find a mate.

The average amount of cortisol also doubled over the animal's life. It could have been more anxious because there was less food, the animal was living in more pollution, there was more noise, or other reasons, scientists said.

### **A Track Record Of Ocean Pollutants**

Scientists also found poisonous chemicals in the wax. These showed the long-term effects humans have had on the ocean.

DDT is an insect killer. You couldn't sell it in the U.S. after 1972. One reason was because it was suspected of causing cancer. DDT was found in the whale. So were signs of other chemicals. But this whale was born after the chemical's use was stopped.

In fact, almost all of the chemicals in its wax came from four old pest killers and a PCB. PCBs were used in cooling sprays and insulating fluids in machines.

Many of the pollutants in the whale's ear plug, particularly the discontinued chemicals, probably came from its mother's milk, Usenko said. Some spiked in the baby whale's first 6 months.

The researchers saw peaks in the chemical mercury too. One occurred when the whale was about 5 to 6 years of age. Another happened when it was about 10 years old. Because the whale seemed to travel up and down the California coast, perhaps it was swimming through regions where there was more mercury pollution, the authors wrote.

"I thought it was a novel idea, to be looking at contaminants at those different time points," Ylitalo said. "It's a neat little way to get that information."

## Quiz

1 Read this sentence from the article:

*But Usenko realized that earwax is rich in lipids.*

Which sentence uses the word 'rich' as in the sentence above?

- (A) India is a country rich in varied cultures and languages.
- (B) James was born rich so he doesn't value money.
- (C) Certain sports are meant only for rich people.
- (D) She is always on a search of ways to get rich.

2 Read this sentence from the article:

*Wax is deposited in the ear over time.*

What is a synonym of the word 'deposited' as mentioned in the sentence above?

- (A) dumped
- (B) left
- (C) removed
- (D) set

3 Read this sentence from the article:

*If he could review each section, "then I could understand not only what they were exposed to today, but go back in time," said Usenko.*

What is a synonym of the word 'exposed' as mentioned in the sentence above?

- (A) covered
- (B) protected
- (C) revealed
- (D) subjected

4 Select the paragraph from "A Track Record Of Ocean Pollutants" that contains a word that means 'new and different from what has been known before.'