Dolphins use a 'fat taste' system to get their mother's milk, study reveals

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The suckling behavior of a wild Indo-Pacific bottlenose dolphin. Credit: Takashi Hayakawa / Mikurashima Tourism Association

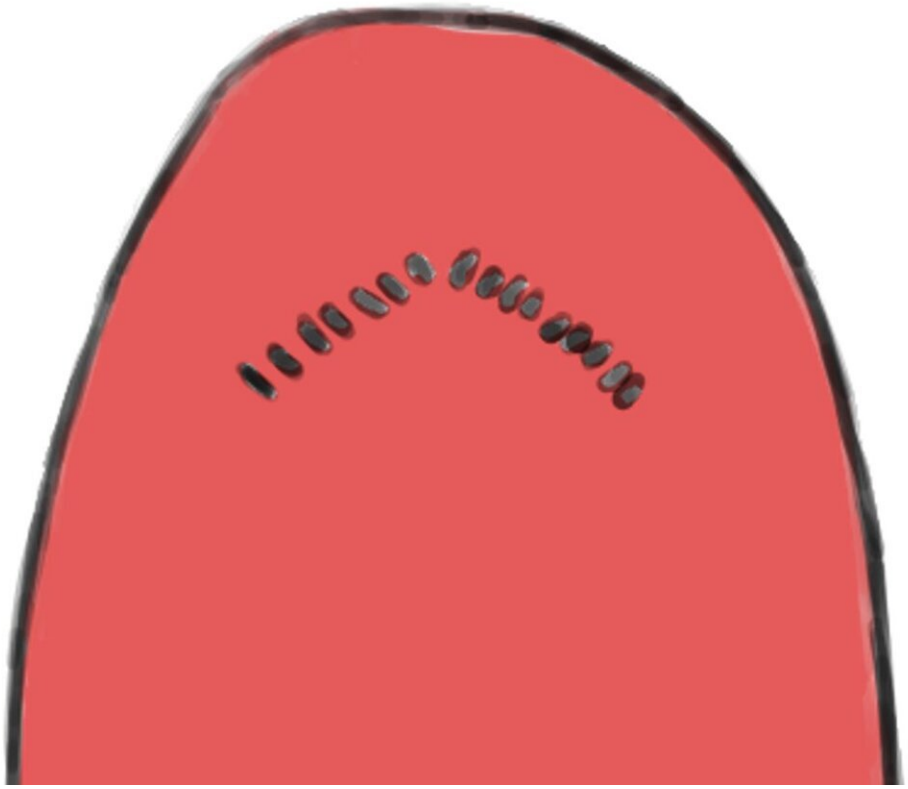
Scientists have discovered that juvenile bottlenose dolphins have specialized receptors for detecting the fatty acids in their mother's milk. These findings, published in the journal *Marine Mammal Science*, offer important insights into how these marine mammals grow, feed, and communicate.

The new findings challenge previous assumptions about cetacean sensory systems. Unlike land mammals, dolphins and other marine mammals have limited olfactory capabilities—their sense of smell is largely nonfunctional in aquatic environments. Researchers have therefore speculated that dolphins had other ways of sensing their surroundings and detecting food.

Fat plays an essential role in providing energy and supporting brain development in dolphin calves, which are entirely dependent on their mother's milk during their early stages of life.

"We looked at the tongue of a young Indo-Pacific bottlenose dolphin and confirmed special structures that may help it detect fat," says the study's first author Hinako Katsushima of the Graduate School of Environmental Science at Japan's Hokkaido University.

"At the back of the tongue, there's a V-shaped row of taste receptors that are specifically tuned to pick up fatty acids. These receptors also have enzymes that help break down the fat, making it easier for the dolphin to sense and process it."



The V-shaped row and marginal papillae of the tongue were analyzed in this study. Credit: Takashi Hayakawa

In a second experiment, the team gave young dolphins a choice between two liquids: one containing milk and the other a cloudy solution. The dolphin showed an unexpected preference for the cloudy solution. This reinforces the finding that dolphins can distinguish between the two liquids, but the researchers are unsure why they avoided the milk.

One possibility is that they found the milk unfamiliar—it was a mixture of milk from two females—and so avoided it from a fear of new foods, a habit called neophobia.

"Our findings suggest that the ability to detect fatty acids in their

mother's milk is part of a specialized 'fat taste' system that could help dolphins assess the nutritional value of their food," says Assistant Professor Takashi Hayakawa from the Faculty of Environmental Earth Science at Hokkaido University, who led the study.

"In the wild, where fat-rich diets are critical for survival, this capability may provide dolphins with an evolutionary advantage, allowing them to select high-quality milk from their mothers and later evaluate the nutritional content of their prey."

The new study opens new avenues for understanding how marine mammals perceive and interact with their environment, as well as how they communicate and forage in the wild. Further research will be necessary to explore the full scope of this "fat taste" system and how it functions in other marine species.

More information: Hinako Katsushima et al, Fat taste receptors and fatty milk in dolphins, *Marine Mammal Science* (2024). DOI: 10.1111/mms.13195

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