

Dolphin Sponge Foraging Linked to Genetic Changes

Description

A small population of dolphins in Shark Bay, Australia, has been observed employing a remarkable technique: they utilise marine sponges to cover their snouts while searching for fish hidden beneath the sand. This method not only safeguards their mouths from the harshness of the sand but also enhances their foraging efficiency by allowing them to cover a larger area and probe deeper into the ocean floor.

Humans have recognised this innovative behaviour for over 25 years, highlighting dolphins as tool users. Research has documented that dolphins in Shark Bay also employ shells to capture and consume fish, a behaviour termed "shelling," which, according to studies from 2020, they learn from their peers. Conversely, the sponging technique is transmitted from mothers to their calves and presents challenges due to its interference with echolocation, yet it is sufficiently beneficial for dolphins to pass it down through generations.

New research reveals that these dolphins exhibit not only distinct behaviours but also subtle differences in their epigenomes—the chemical modifications affecting gene expression without altering the DNA sequence. This suggests that cultural practices may leave a biological imprint.

The research team, consisting of evolutionary biologist Michael Krützen from the University of Zurich, indicates that exploring the relationship between culture and epigenetics has been largely overlooked outside human studies. The implications could extend to understanding human evolution by linking cultural practices to biological foundations.

Among Shark Bay's Indo-Pacific bottlenose dolphins, primarily females practice sponging, which, while energetically demanding, appears to confer specific advantages. These dolphins forage for longer durations, engage less in rest, and often hunt alone. They also target different prey and maintain unique social networks, potentially enhancing their resilience to environmental changes such as marine heatwaves.

To investigate further, researchers analysed skin samples from 96 dolphins over two decades, identifying 23 confirmed spongers and 73 non-spongers. They examined nearly 30,000 genomic sites for DNA methylation—an epigenetic modification akin to a dimmer switch that adjusts gene activity without altering the genetic code.

The study found moderate success in using methylation patterns to differentiate between spongers and non-spongers, indicating that no single genetic marker predominated; rather, multiple small differences played a role. This aligns with current understanding of complex behaviours, which typically emerge from a range of genetic interactions.



However, the study raises questions about causality. While cultural behaviours like sponging might influence an individual's lifestyle and associated epigenetic changes, it remains uncertain whether these changes are inherited or if they arise from pre-existing genetic factors. The ethical considerations of using skin samples, the only feasible method for studying wild dolphins, may not fully capture the complexities of brain or organ-level changes linked to behaviour.

This research exemplifies the potential for gaining insights into the intersection of culture and biology. Evolutionary biologists recognise that culture can shape genetics over generations. This study suggests that epigenetics may offer a more immediate means for organisms to convey survival strategies through biological mechanisms. Further explorations are anticipated to clarify these phenomena and their implications.

Comprehension Questions

Multiple Choice

1. What do dolphins in Shark Bay use to cover their snouts while searching for fish?
Option: Marine sponges
Option: Coral
Option: Seaweed
Option: Fish scales
2. How long have humans recognized the tool-using behavior of dolphins in Shark Bay?
Option: Over 10 years
Option: Over 15 years
Option: Over 25 years
Option: Over 30 years
3. What is the behaviour of dolphins using shells to catch fish called?
Option: Sponging
Option: Shelling
Option: Fishing
Option: Foraging
4. Who led the research team investigating the dolphins' behaviour?
Option: David Attenborough
Option: Michael Krützen



Option: Jane Goodall
Option: Charles Darwin

5. What specific behaviour is practiced primarily by female dolphins in Shark Bay?

Option: Breaching
Option: Sponging
Option: Jumping
Option: Diving

6. What type of dolphins are primarily studied in Shark Bay?

Option: Atlantic bottlenose dolphins
Option: Indo-Pacific bottlenose dolphins
Option: Common dolphins
Option: Spinner dolphins

True-False

7. Dolphins in Shark Bay use marine sponges to cover their snouts for better foraging.
8. The sponging technique is learned from peers among dolphins in Shark Bay.
9. Epigenetic modifications can alter the DNA sequence in dolphins.
10. The study found a single genetic marker that distinguishes spongers from non-spongers.
11. Cultural practices in dolphins may influence their genetics over generations.
12. Dolphins are found to engage more in resting when practicing sponging.

Gap-Fill

13. Dolphins in Shark Bay utilize marine sponges to cover their snouts while searching for fish hidden beneath the _____ .
14. The sponging technique is passed from mothers to their _____ .
15. The study of dolphins' epigenomes examines modifications that affect gene expression without altering



the _____ sequence.

16. Among Shark Bay's dolphins, primarily _____ practice sponging.

17. The research team identified 23 confirmed spongers and _____ non-spongers.

18. Cultural behaviours in dolphins may influence epigenetic changes, but it is uncertain whether these changes are _____ or arise from pre-existing factors.

Answer

Multiple Choice: 1. Marine sponges 2. Over 25 years 3. Shelling 4. Michael Krützen 5. Sponging 6. Indo-Pacific bottlenose dolphins

True-False: 7. True 8. False 9. False 10. False 11. True 12. False

Gap-Fill: 13. sand 14. calves 15. DNA 16. females 17. 73 18. inherited

CATEGORY

1. Sci/Tech - LEVEL6

POST TAG

1. dolphins
2. ESL learning
3. esl news
4. genetics
5. Level 6
6. sponge foraging

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Date Created

2026/08/04

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