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LIBRARY PATHFINDER

UNDERSTANDING CETACEAN ECHOLOCATION

Cetaceans (whales) use sound to understand the world around them. Echolocation is the process where whales send out sound waves and hear the sound waves when they bounce off an object and return. Sound waves with a higher pitch have smaller wave lengths and in general do not travel far in water. This type is used to detect small objects. Lower pitched sounds travel great distances and in general are used to navigate. Whales also use sounds to communicate with each other.

Humans make sound in the throat and hear sound in the ears. Whales heads are like antennas focusing, filtering and modifying sound in many different ways. This allows whales to better hear the world around them.

Reading materials and Online Resources

Books

Encyclopedia of Marine Mammals, 3rd edition. / Academic Press, 2018.
'Sound Parts, Cetaceans', Ted Cranford and Petr Krysl, pp. 901-904.

Deep Thinkers: Inside the minds of whales, dolphins and porpoises / Janet Mann. Univ. of Chicago Press, 2017.

Websites

Dr. Ted W. Cranford

<https://www.spermwhale.org/SDSU/cranford.html>

Articles

Acoustic pathways revealed: simulated sound transmission and reception Cuvier's beaked whale (*Ziphius cavirostris*). Ted W Cranford¹, Petr Krysl² and John A Hildebrand. *Bioinspiration & Biomimetics*, 3 (2008) 016001 (10pp).

Anatomic Geometry of Sound Transmission and Reception in Cuvier's Beaked Whale (*Ziphius cavirostris*). T.W. Cranford et al., *The Anatomical Record* 291:353–378 (2008).

Building a virtual model of a baleen whale, Phase 2 / Dr. Ted W. Cranford, 2015.
www.dtic.mil/dtic/tr/fulltext/u2/1014015.pdf

Fin Whale Sound Reception Mechanisms: Skull Vibration Enables Low-Frequency Hearing. Cranford, TW & Krysl, P (2015). *PLoS ONE* 10(1):e0116222. doi:10.1371/journal.pone.0116222

Whales Drink Sounds: Hearing may use an ancient path / Rachel Ehrenberg. *Science News Online*, Week of Feb. 9, 2008; Vol. 173, No. 6 , p. 84

Whale skulls act like antennas: CT scans reveal. Jeremy Rehm.
<http://www.sciencemag.org/news/2018/04/whale-skulls-act-antennas-ct-scans-reveal>