# Gigantic whales have stretchy 'bungee cord' nerves

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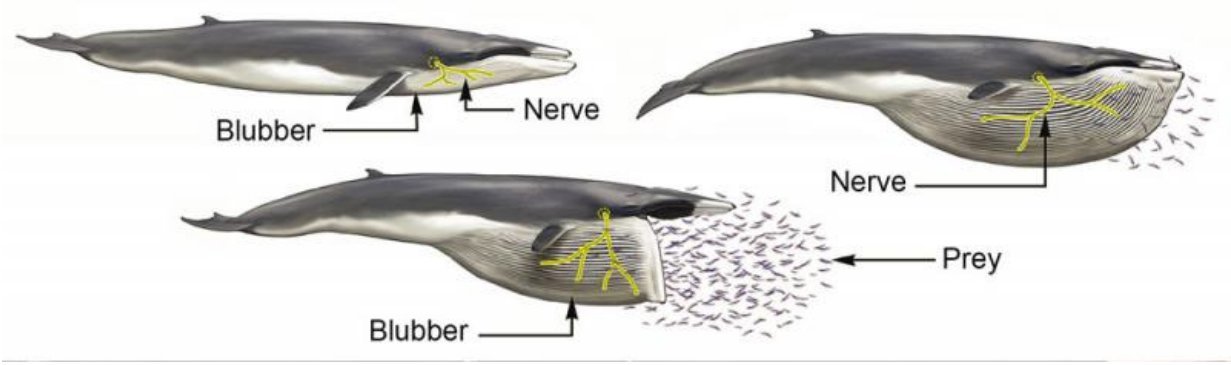



To eat, rorqual whales open their mouths and lunge while their tongues invert and their mouths fill like giant water balloons full of floating prey. The whales' nerves are stretchy so they can withstand the tissue deformation. Credit: Vogl et al./*Current Biology* 2015

University of British Columbia (UBC) researchers have discovered a unique nerve structure in the mouth and tongue of rorqual whales that can double in length and then recoil like a bungee cord.

The stretchy nerves explain how the massive whales are able to balloon an immense pocket between their body wall and overlying blubber to capture prey during feeding dives.

"This discovery was totally unexpected and unlike other nerve structures

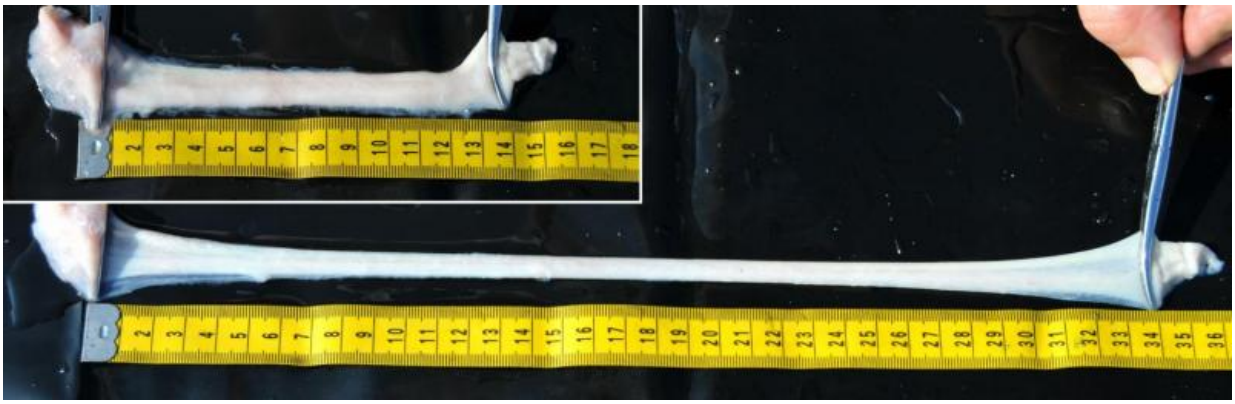
we've seen in vertebrates, which are of a more fixed length," says Wayne Vogl of UBC's Cellular and Physiological Sciences department.

"The rorquals' bulk feeding mechanism required major changes in anatomy of the tongue and mouth blubber to allow large deformation, and now we recognize that it also required major modifications in the nerves in these tissues so they could also withstand the deformation."

In humans, stretching nerves usually damages them. In these whales, the nerve cells are packaged inside a central core in such a way that the individual nerve fibers are never really stretched, they simply unfold.

"Our next step is to get a better understanding of how the nerve core is folded to allow its rapid unpacking and re-packing during the feeding process," says UBC zoologist Robert Shadwick.

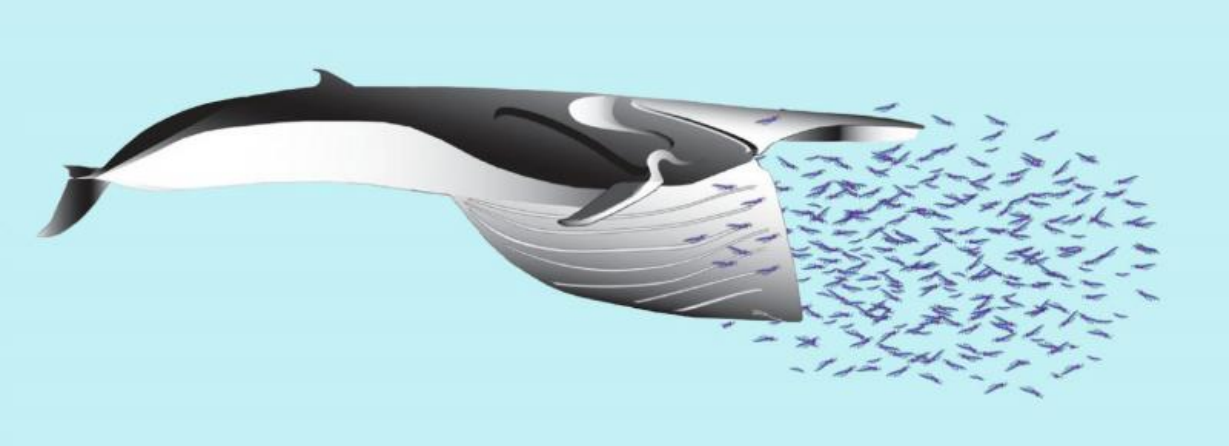
The researchers don't know yet whether anything similar will turn up in other animals—the ballooning throats of frogs, for example, or the long and fast tongues of chameleons.



A segment of a tongue nerve at its initial length prior to being stretched. The nerve has been manually stretched to more than twice its initial length until it abruptly resists further extension. Credit: University of British Columbia.

"This discovery underscores how little we know about even the basic anatomy of the largest animals alive in the oceans today," says Nick Pyenson, a former UBC postdoctoral researcher currently at the Smithsonian's National Museum of Natural History. "Our findings add to the growing list of evolutionary solutions that whales evolved in response to new challenges faced in marine environments over millions of years."

The findings are reported in *Current Biology*. Rorquals are the largest group among baleen whales, and include blue whales and fin whales. Specimens the researchers studied were obtained at a commercial whaling station in Iceland.



Expansion of the ventral grooved blubber during a fin whale lunge is shown. Credit: University of British Columbia.

**More information:** *Current Biology*, Vogl et al.: "Stretchy nerves are an essential component of the extreme feeding mechanism of rorqual

whales" dx.doi.org/10.1016/j.cub.2015.03.007

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