

# Diving shrews -- heat before you leap

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The researchers nicknamed the American water shrews they study the "silver bullet." Credit: Robert A. MacArthur

How does the world's smallest mammalian diver survive icy waters to catch its prey? A recent study of American water shrews to be presented at the Society for Experimental Biology meeting in Salzburg on 1st July has surprised researchers by showing that the animals rapidly elevate body temperature immediately before diving into cold water.

This behaviour is unexpected because lower body temperatures enable diving [mammals](#) to stay underwater for longer, so heating up doesn't make sense. This is because animals use up oxygen more quickly when they are warmer.

According to Professor Kevin Campbell of the University of Manitoba, who led the study, "This finding goes against prevailing [dogma](#) regarding the physiology of divers. Divers, especially small ones, have always been expected to try to maximize their underwater endurance."

Campbell added that this behaviour indicates the shrews are optimising factors other than just dive duration. Given that they are highly proficient aquatic predators, an elevated body temperature presumably heightens foraging efficiency.



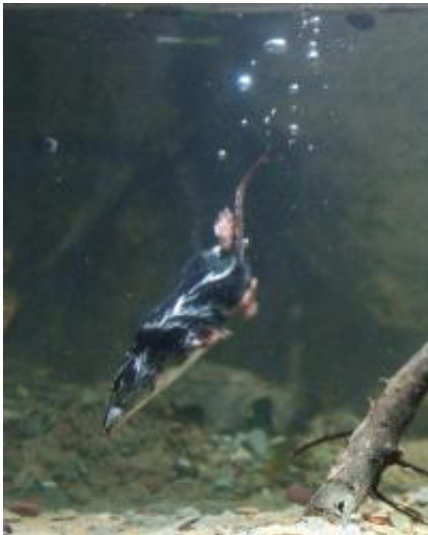
The researchers nicknamed the American water shrews they study the "silver bullet." Credit: Robert A. MacArthur

Large animal divers, like seals and [penguins](#), have been studied extensively, but these findings show that small diving animals deserve attention as well.

## Life at the limit

Compared to other diving mammals, the shrews carry the least amount of oxygen under water and use it up the most quickly. Typical dives thus last only 5-7 seconds. Being so small also makes them lose heat the fastest.

Dr Roman Gusztak, who participated in the study, said: "The shrews are likely surviving at the limits of what is possible for a diving mammal. They must continually feed to provide for their voracious appetites but have to contend with very short dive durations and the constant threat of [hypothermia](#)."



The reaction time of the American water shrew is 10-20 times faster than a human's. Credit: Robert A. MacArthur

Exactly how the shrews warm themselves is unknown. Often, the shrews elevated body temperature while they were simply sitting still at the water's edge before a dive. The researchers believe the shrews are shivering or using their brown fat to generate heat.

As part of this study, the researchers observed the shrews' behaviour when diving into water of different temperatures. They compared the length of the shrews' dives in warm and [cold water](#) and also monitored the shrews' [body temperatures](#) before, during, and after dives.

Provided by Society for Experimental Biology

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