Leopard seals suck up krill like whales

Top Antarctic predator can strain small prey from the water with sieve-like teeth.

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The leopard seal (*Hydrurga leptonyx*) is one of Antarctica's top predators. It kills penguins and smaller seals by biting them with sharp canine teeth and repeatedly smashing them against the ocean surface to flay and dismember them. But it now seems that this seal is also equipped to tackle smaller prey.

David Hocking from Monash University in Melbourne, Australia, and his colleagues have shown that the leopard seal eats krill like a whale, by sucking them into its mouth and sieving them through special teeth. Other scientists had predicted this behaviour from the shape and arrangement of the seal's teeth, but this is the first time that it has been observed and filmed. The researchers' results are published in *Polar Biology*¹.

By switching between two feeding styles, the leopard seal can dine from both the top and bottom of the Southern Ocean's food web. "This is equivalent to a lion hunting down zebras, but also regularly feasting on ants or termites," says Erich Fitzgerald from Museum Victoria, Melbourne, who was involved in the study.

"You'd expect that leopard seals would sacrifice something in not specializing on either large or small prey, but the authors persuasively argue that it is a dual specialist," says Alexander Werth, a biologist from Hampden-Sydney College in Virginia. "This helps to explain why leopard seals are so successful."

From whale to seal

Hocking, Fitzgerald and Alistair Evans from Monash University studied leopard seals because the animals' trident-shaped postcanine teeth are similar to those of ancient fossil whales, such as *Janjucetus*, and the researchers were interested in the feeding habits of these whales. Because the seals were thought to use their postcanine teeth to strain krill from the water, it seemed possible that prehistoric whales did too. But as Hocking searched the literature to confirm this, "it became apparent that nobody had ever actually observed leopard seals underwater [while they fed] on small prey like krill."

To do that, Hocking travelled to Taronga Zoo in Sydney, Australia, the only institution in the world that houses leopard seals. Once

there, he presented the resident seals, Casey and Sabine, with four small fish sticking headfirst out of a plastic box. At her very first go, Sabine sucked a fish out and expelled the excess water through the sides of her mouth. Hocking called up his team: "Yep, they do it, all right!"

Casey and Sabine repeatedly used the same technique. Their thick lips allowed them to create suction, and their interlocking trident-shaped teeth imprisoned ingested fish or krill when the animals blew out the ingested water. California sea lions lack such complex teeth — when the same fish-primed box was presented to them, they often blew their prey out of the sides of their mouth along with the water.

There is indirect evidence that wild leopard seals behave in the same way as the two captive seals. The team examined the skulls of 26 wild-caught adults and found that, whereas their gripping canines were often worn down, the postcanines showed fewer signs of wear, consistent with their role as sieves.

Although the team saw the captive seals sucking only one fish at a time, it seems likely that the animals could ingest krill en masse by using their flexible necks to strike at the heart of a shoal. Krill can constitute up to 83% of a leopard seal's diet in regions in which larger prey are in short supply. One individual that was dissected was found to have more than 10,000 freshly caught krill in its stomach. "That's a lot of krill to catch one at a time!" says Fitzgerald.

The researchers now plan to observe the same behaviour in wild leopard seals. "A trip down to the ice is in order," says Hocking.

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References

1. Hocking, D. P., Evans, A. R. & Fitzgerald, E. M. G. *Polar Biol.* <http://dx.doi.org/10.1007/s00300-012-1253-9> (2012).