Deep-sea octopus squid give up their secrets to a healthy, varied diet

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Dana octopus squid beak, which was studied by Flinders University researchers. Credit: Flinders University

Flinders University researchers have taken a look at why the large Dana octopus squid, which can weigh up to 160kg and measure 2.3 meters

long, is so popular on sperm whales' menu.

While rarely seen and relatively unknown, the new study of biochemical samples from the Dana octopus squid (Taningia danae) samples found floating in remote South Australian waters explains how these large animals capitalize on their deep-sea diet in the Southern Ocean and nutrient rich Great Australian Bight.

"While the tissues have very low amounts of calories per gram, their sheer size means they actually have more calories than all other fish in the Southern Ocean, aside from toothfishes," says marine biology researcher Bethany Jackel, from the College of Science and Engineering at Flinders University.

"This makes them a great food source for large predators like the sperm whale because, instead of having to hunt lots of smaller fishes or squids to gain calories, they could hunt a single Taningia danae and get the same amount or even more."

It also explains why the hard beaks of Dana octopus squid are often found in the stomachs of predators like sperm whales or large sharks and seals. It compares in size to the legendary Giant Squid, which can measure up to 13m long.

Flinders academic Dr. Ryan Baring, a co-author of the new study says levels of nitrogen and fatty acids measured in the tissues confirm the octopus squid feed quite high in their food web, probably eating mostly small deep-sea fishes as well as possibly other squid.

The study, "Towards unlocking the trophic roles of rarely encountered squid: Opportunistic samples of Taningia danae and a Chiroteuthis aff. veranii reveal that the Southern Ocean top predators are nutrient links connecting deep-sea and shelf-slope environments," has been published

in *Frontiers in Marine Science*.

"This relatively unknown species is an important part of the food webs of the Southern Ocean and the Great Australian Bight," says Dr. Baring.

"They eat deep-sea fishes and squids and in turn become calorie-rich food items for large predators including sperm whales, elephant seals and deep-sea sharks.

"Their movements between the Southern Ocean and the Great Australian Bight might also be an important way for nutrients to move between these two areas, especially from the nutrient-rich Great Australian Bight to the nutrient-poor deep Southern Ocean.

"The Southern Ocean is relatively poor in nutrients compared to the continental shelf in the Great Australian Bight, so maybe they visit to feed on this more nutrient-rich food web."

While rarely found intact, the research team—including other Flinders University experts and the Australian Southern Bluefin Tuna Industry Association—were able to collect and analyze several deceased Taningia danae bodies collected from the eastern Great Australian Bight.

Southern calamari squid, common in human seafood menus, can grow to about 55cm, compared to the octopus which has a body section up to 1.7m.

More information: Bethany Jackel et al, Towards unlocking the trophic roles of rarely encountered squid: Opportunistic samples of Taningia danae and a Chiroteuthis aff. veranii reveal that the Southern Ocean top predators are nutrient links connecting deep-sea and shelf-slope environments, *Frontiers in Marine Science* (2023). DOI: 10.3389/fmars.2023.1254461

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