

# In hot and cold water: The private lives of 'Hoff' crabs revealed

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Male Hoff crab on mineral spire is shown. Credit: Dr Leigh Marsh

Researchers at the University of Southampton have shed light on the private life of a new species of deep-sea crab, previously nicknamed the "Hoff" crab because of its hairy chest.

Male and female Hoff [crabs](#) lead largely separate lives at [volcanic vents](#) 1.5 miles (2.4 km) deep on the ocean floor near Antarctica, because of the conflicting demands of feeding and raising young among the sexes.

In 2010, a British expedition revealed a 'lost world' of deep-sea animals thriving around volcanic [vents](#) on the [ocean floor](#) near Antarctica. Among the many [new species](#) of deep-sea creatures was a hairy-chested crab. Using a deep-diving remotely operated vehicle (ROV) to examine the distribution, size and sex of these crabs at the vents, Dr Leigh Marsh and her colleagues have now pieced together their private lives.

"The life cycles of deep-sea animals have been largely hidden from us until now," says Dr Marsh, "but thanks to more frequent expeditions and advances in technology, we are getting a clearer picture of the natural history of the ocean depths that cover most of our world."

The researchers found that large male Hoff crabs live highest on the mineral spires of the [deep-sea vents](#), closest to the hot fluids that jet from them. At the base of the mineral spires, smaller males mingle with females in spectacular piles, many crabs deep, where they get together to mate. The females then crawl away from the bustling piles of crabs and the warm mineral-rich fluids seeping from the seafloor, which can be toxic to their young.

Away from the mineral spires, the few crabs found by the researchers were all females, carrying developing offspring under their curled-up tails.



Photos were taken in a tank onboard the ship. Female (left) and Male (right). Note the difference in size and the dimorphism in chela (claw) size. Credit: Dr Leigh Marsh

Moving away from the warmer waters of the spires takes the females across a gauntlet of predators, such as large [sea anemones](#) and seven-arm seastars. Away from the vents, the cold water of the deep Antarctic also slows down the metabolism of the adult female crabs, making them less active than in the warmer waters of the jostling piles. However, the conditions away from the vents may be more stable and less harmful to their offspring for their early development, making the journey of the females worthwhile.

Males, meanwhile, don't share in "child-care" arrangements with the females, and instead can climb up the mineral spires of the vents to take advantage of the warmth and conditions best suited for growing bacteria on their hairy chests. By scraping off and eating these bacteria using

comb-like mouthparts, the males can grow much larger than the [females](#).

Study co-author Dr Jon Copley says: "Deep-sea vents are island-like habitats on the seafloor, and discoveries like these show that our exploration of the life that thrives around them has only just begun."

The study is published in the *Journal of Animal Ecology*.

**More information:** hot and cold water: differential life-history traits are key to success in contrasting thermal deep-sea environments, *Journal of Animal Ecology*, 2015.

Provided by University of Southampton

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