How a box jellyfish catches fish

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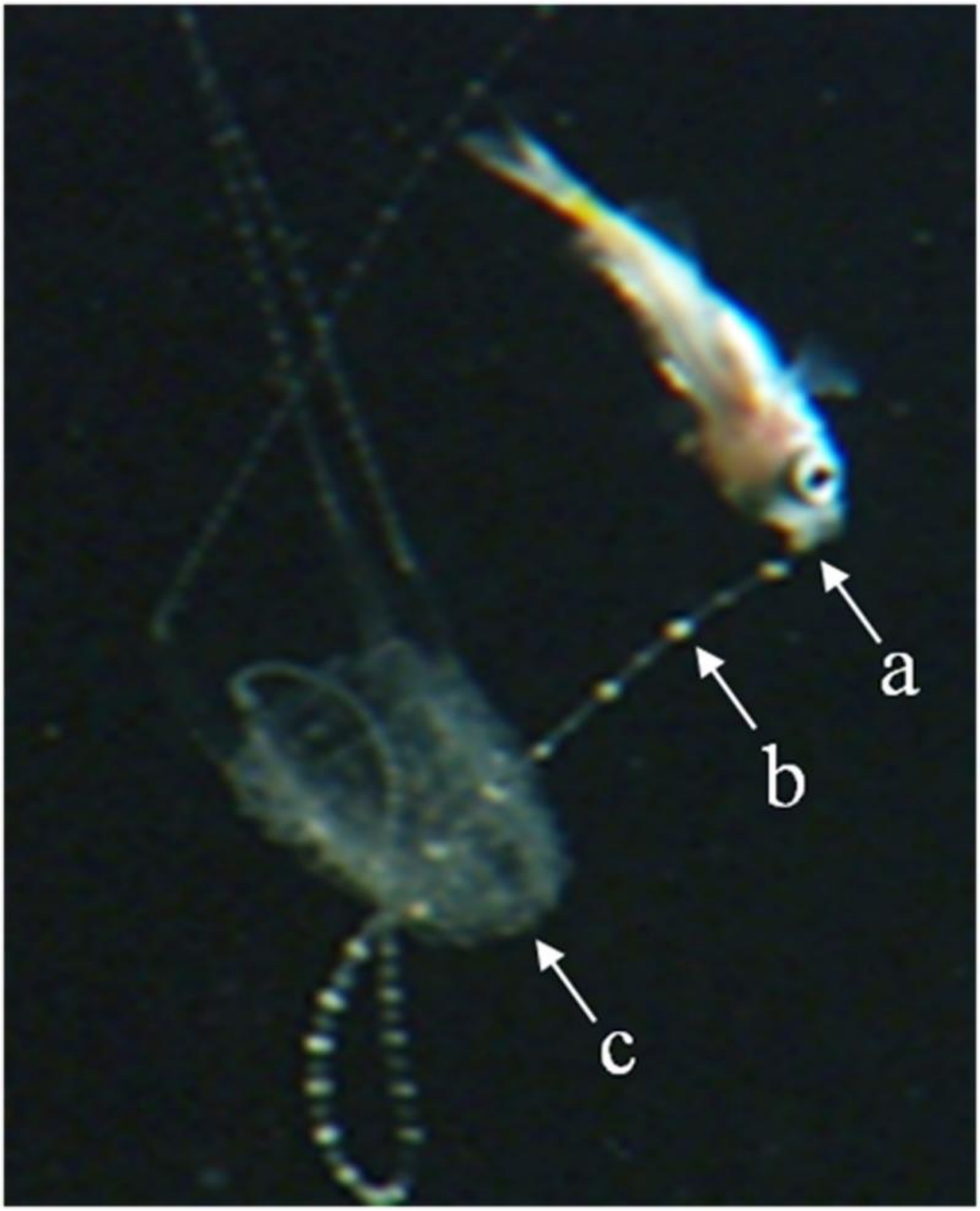

This image shows a Carukia barnesi catching a larval fish. a. a larval fish biting a venomous nematocyst cluster; b. nematocyst cluster; c. the bell of the jellyfish. The bell of this jellyfish is approximately 1.5cm (0.59 of an inch) high and the

fish is approximately 1cm (0.39 of an inch) in length. Credit: biopixel.tv

The first feeding study of tropical Australia's Irukandji box jellyfish has found that they actively fish. They attract larval fish by twitching their extended tentacles, highlighting their nematocyst clusters (stinging structures) and using them as lures.

It's an impressive feat by any standards, but particularly so for an animal that doesn't have a defined brain.

The laboratory-based study of *Carukia barnesi*, the tiny but deadly Irukandji jellyfish, was conducted at James Cook University (JCU) in Cairns, Australia, and has been published in the online journal *PLOS ONE*.

"This species is small, less than two centimeters (three-quarters of an inch) across the bell, they're 96% water, they lack a defined brain or central nervous system, and yet they're using their tentacles and nematocyst clusters like experienced fishers use their lines and lures," lead author Robert Courtney said.

"They're not opportunistically grazing - they're deliberately fishing. They're targeting and catching fish that are at times as big as they are, and are far more complex animals. This is a really neat animal that is displaying a surprisingly complex prey capture strategy."

The researchers were able to catch *Carukia barnesi* in the act by filming them through a full day and night cycle, using infrared-sensitive equipment to record behavior in times of complete darkness.

"We already knew what they ate, because gut contents analysis is pretty

straightforward with an animal that's transparent, but the fishing techniques we observed were a surprise," said senior researcher Associate Professor Jamie Seymour, from JCU's Australian Institute of Tropical Health and Medicine.

"During the night we saw they were less active and not fishing. They contract their tentacles down to four to five centimeters (approx. 1.5 to 2 inches) long, with the nematocyst clusters all bunched up. We believe they may do this to conserve energy when visually oriented prey such as larval fish may also be less active."

In daylight, the tiny jellyfish went fishing - stretching their tentacles out as long as 1.2 meters (3'10") with the nematocyst clusters evenly spaced along each almost-invisible thread, like a fishing line.

"The nematocyst clusters look like a series of bright pearls, which the jellyfish twitches to attract the attention of its prey, like a series of fishing lures," Mr Courtney said. "It's a very deliberate and selective form of prey capture."

Once a fish makes contact with the nematocyst clusters it is quickly paralyzed by *Carukia barnesi*'s powerful venom.

"It's a highly successful fishing strategy, and the only account of a box jellyfish using aggressive mimicry to capture prey," Mr Courtney said.

Being able to capture, transport, and house jellyfish specimens in a pristine state was essential to the research, Associate Professor Seymour said.

"Observing this species' feeding behavior in the ocean would be close to impossible, because they're so small and almost invisible," he said.

Carukia barnesi are attracted to light. By submerging high-powered lights in the waters off Double Island, just north of Cairns, the researchers were able to trap the jellyfish as they approached the lights.

The *Carukia barnesi* were then observed in a large, temperature-controlled tank in which the water rotates vertically, simulating local oceanic conditions. They were filmed through a complete night-day cycle, using infrared-sensitive equipment to record behavior during times of complete darkness.

Carukia barnesi's potentially fatal venom was extracted from each specimen for toxicology research by Associate Professor Seymour and others at JCU's Australian Institute of Tropical Health and Medicine.

The researchers also share details of the time and place of each capture with Surf Life Saving Queensland.

Provided by James Cook University