

Shipworms' competitive sex frenzy caught on film

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Shipworm orgy; multiple shipworms wrestle for access to a mate. Credit: Dr Reuben Shipway, University of Portsmouth

A competitive sexual frenzy in which bigger appendages have the most success of reproducing might sound like the briefing for a porn film, but instead, it's the finding of a new study examining a clam.

Scientists, led by Dr. Reuben Shipway, at the University of Portsmouth, studying the sex life of the giant feathery [shipworm](#) may be the first to have witnessed the wrestling and sparring between individuals during copulation.

The shipworm is a gender fluid, worm-like, wood-eating clam common throughout the world's oceans and notorious for causing billions of pounds in damage by eating wooden ships, docks, piers and sea defenses.

Dr. Shipway said, "When we first noticed these animals reproducing in the aquarium, we couldn't believe what we were seeing. They were using their siphons to wrestle and inseminate one another and trade [sperm](#). As far as we know, this wrestling and jousting hasn't been reported before."

The animals have two long siphons—one used to breathe in water and the other expels waste—and these are the only parts of the shipworm protruding from the wood.

"Most of the time, they're not very interesting to look at. I just happened to be in the aquarium one day, and I noticed there was this thick plume of creamy liquid in the tank, which I knew had to be eggs and sperm," said Dr. Shipway. "When I got a little closer, I realized the siphons of these animals were just going crazy and I was witnessing a sexual frenzy, and I decided to film it.

"I'd periodically leave and come back a few hours later and they were still at it."

In the footage, multiple shipworms were recorded mating with one another, with some receiving sperm at one end, and planting their own sperm in a different shipworm at the same time. Some are seen removing sperm from themselves, and others can be seen wrestling with rivals and removing a rival's sperm as the creatures fight it out to

reproduce.

Within one piece of wood, 74 of the 79 shipworms engaged in pseudocopulation, while five remained on the sidelines, lodged in their place in the wood, too far away to be able to take part.

One of the co-authors, Dr. Daniel Distel, is Director of the Ocean Genome Legacy Center at Northeastern University, in Boston, U.S..



Siphons from the shipworm wrestling for access to a mate . Credit: Dr Reuben Shipway, University of Portsmouth

He said, "While pseudocopulation has been known for some time to occur in shipworms, this may be the first time the behavior has been

caught on film and the first time its apparent competitive nature has been revealed."

The team identified clear stages of the shipworms' sperm transfer:

- First, the recipient siphon becomes inactive and opens wide. Then donor siphons crawl across the surface of the wood until they encounter the recipient siphon of a neighbor. Once they have found a receptive individual, the siphons entwine and the donor transfers sperm to the recipient.
- In areas of high competition, siphons joust and wrestle for access to a mate.
- After sperm transfer the fertilized eggs are released into the sea.

Competitive mating and pseudocopulation are known to occur in only a handful of marine invertebrates.

Dr. Shipway said, "It's a rare and sophisticated form of reproductive behavior, with sparring between rival mates, pulling potential mates closer and away from rivals, and going as far as to include pulling a rival's sperm out of a siphon so it floats away."

The researchers think the shipworms that grow quickly to a larger size may have a competitive advantage because they have longer siphons, thereby reaching further to fend off rivals and fertilize their neighbors.

Although shipworms get a bad press for 'eating' ships, the creatures play an important role in carbon cycling in the ocean, and new research into their bacteria suggest they are potentially important for the discovery of new drugs in the fight against antibiotic resistance. Enzymes in their guts have a high potential for use in biofuel production.

Another of the research team, Nancy Treneman, said, "Shipworms are

one of a few animals that can digest wood; converting it into tasty clam tissue and larvae.

"Humanity's battle over millennia with these fragile animals to limit their voracious appetite for our wood ships, docks, and dykes has met with limited success. Studying their reproduction increases our understanding of their place in the ocean's web of life and how we might, one day, keep them from eating boats."

Dr. Shipway said, "Shipworms have evolved a stunning diversity of reproductive strategies, some simply spawn their eggs and sperm into the water, some recruit a harem of dwarf males to mate with, and now we know they compete to directly inseminate each other using their siphons."

The study is published in *Biology Letters*.

More information: Mate competition during pseudocopulation in shipworms. Shipway, Reuben; Treneman, Nancy; Distel, Daniel L. *Biology Letters*, 18.11.2020.

[https://researchportal.port.ac.uk/portal/en/publications/mate-competition-during-pseudocopulation-in-shipworms\(3bf9c4fa-41c6-4c44-a853-81ffb00a1bcd\)/export.html](https://researchportal.port.ac.uk/portal/en/publications/mate-competition-during-pseudocopulation-in-shipworms(3bf9c4fa-41c6-4c44-a853-81ffb00a1bcd)/export.html)

Provided by University of Portsmouth

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