

2,000-year-old mystery of a havoc-wreaking worm

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Section of a piling attacked by shipworms in Belfast, Maine. Credit: Barry Goodell

Credit: University of Massachusetts Amherst

Humans have known for over 2,000 years that shipworms, a worm-like

mollusk, are responsible for damage to wooden boats, docks, dikes and piers. Yet new research from the University of Massachusetts Amherst published in *Frontiers in Microbiology* reveals that we still don't know the most basic thing about them: how they eat.

"It's unbelievable," says Reuben Shipway, adjunct assistant professor in microbiology at UMass Amherst, research fellow at the Centre for Enzyme Innovation at the University of Portsmouth, UK, and one of the paper's authors. "The ancient Greeks wrote about them, Christopher Columbus lost his fleet due to what he called 'the havoc which the worm had wrought,' and, today, shipworms cause billions of dollars of damage a year."

Shipworms also play a key role in mangrove forest ecosystems, found throughout the world's tropical regions, and are responsible for cycling a huge amount of carbon through the web of life. "Yet," says Shipway, "we still don't know how they do what they do."

Part of the problem is that the nutritious part of wood—cellulose—is encased in a thick and extremely difficult-to-digest layer of lignin. "Imagine a really thick, unbreakable eggshell," says senior author and UMass professor of microbiology, Barry Goodell.

Certain fungi possess enzymes capable of digesting the lignin, and it has long been thought that [symbiotic bacteria](#) living in shipworms' gills also had the enzymes. "We thought that the bacteria were doing the work," says Goodell, "but we now know they are not."

Researchers are still trying to figure out what within the shipworm could be responsible for breaking down the lignin. "I combed through the entire genomes of five different species of [shipworm](#)," says Stefanos Stravoravdis, the paper's lead author and a [graduate student](#) in [microbiology](#) at UMass, "looking for specific protein groups which

create the enzymes that we know are capable of digesting lignin. My search turned up nothing."

This, however, is not the end of the story, and the team will be publishing more research in the near future that will help unravel the mystery of how shipworms eat wood. "We need to understand this process" says Stravoravdis.

More information: Stefanos Stravoravdis et al, How Do Shipworms Eat Wood? Screening Shipworm Gill Symbiont Genomes for Lignin-Modifying Enzymes, *Frontiers in Microbiology* (2021). [DOI: 10.3389/fmicb.2021.665001](https://doi.org/10.3389/fmicb.2021.665001)

Provided by University of Massachusetts Amherst

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