

# Tomorrow's life-saving medications may currently be living at the bottom of the sea

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OHSU researchers, in partnership with scientists from several other institutions, have published two new research papers that signal how the next class of powerful medications may currently reside at the bottom of the ocean. In both cases, the researchers were focused on ocean-based mollusks – a category of animal that includes snails, clams and squid and their bacterial companions.

Sea life studies aid researchers in several ways, including the development of new medications and biofuels. Because many of these ocean animal species have existed in harmony with their bacteria for millions of years, these benign bacteria have devised molecules that can affect body function without side effects and therefore better fight disease.

To generate these discoveries, a research partnership called the Philippine Mollusk Symbiont International Cooperative Biodiversity Group was formed. As the name suggests, the group specifically focuses on mollusks, a large phylum of [invertebrate animals](#), many of which live under the sea. Margo Haygood, Ph.D., an OHSU marine microbiologist, leads the group, with partners at the University of the Philippines, the University of Utah, The Academy of Natural Sciences in Philadelphia and Ocean Genome Legacy. Both of these newly published papers are the result of the efforts of this research group.

**Here are brief summaries of the two studies:**

## Shipworms: The source of a new antibiotic

Published in the current edition of the journal [Proceedings of the National Academy of Sciences](#)

The paper focuses on a unique animal called a shipworm, which despite its name is not a worm. Shipworms are mollusks and are clam-like creatures that use their shells as drills and feed on wood by burrowing into the wood fibers. They are best known for affixing themselves to the sides of wooden ships. Over time, their wood feeding causes serious damage to the hull of those ships.

The research team initially focused on shipworms because the animals' creative use of bacteria to convert wood—a poor food source lacking proteins or nitrogen—into a suitable food source where the animal can both live and feed.

This research revealed that one form of bacteria utilized by shipworms secretes a powerful antibiotic, which may hold promise for combatting human diseases.

"The reason why this line of research is so critical is because antibiotic resistance is a serious threat to human health," said Margo Haygood, Ph.D., a member of the OHSU Institute of Environmental Health and a professor of science and engineering in the OHSU School of Medicine.

"Antibiotics have helped humans battle infectious diseases for over 70 years. However, the dangerous organisms these medications were designed to protect us against have adapted due to widespread use. Without a new class of improved antibiotics, older medications are becoming less and less effective and we need to locate new antibiotics to keep these diseases at bay. Bacteria that live in harmony with animals are a promising source. "

## Cone snails: Another possible yet surprising source for new medicines

Published in the current edition of the journal *Chemistry and Biology*

A team led by researchers from the University of Utah, and including OHSU and the University of the Philippines researchers, took part in a separate study of cone snails collected in the Philippines. Cone snails are also mollusks. There have been few previous studies to determine if bacteria associated with these snails might assist in drug development. This is because the snails have thick shells and they can also defend themselves through the use of toxic venoms. Because of the existence of these significant defensive measures, it was assumed that the bacteria they carry do not have to produce additional chemical defenses that might also translate into human medications. The latest research shows that this previous assumption is incorrect.

The research demonstrated how bacteria carried by [cone snails](#) produce a chemical that is neuroactive, meaning that it impacts the function of nerve cells, called neurons, in the brain. Such chemicals have promise for treatment of pain.

"[Mollusks](#) with external shells, like the cone snail, were previously overlooked in the search for new antibiotics and other medications," said, Eric Schmidt, Ph.D., a biochemist at the university of Utah and lead author of the article.

"This discovery tells us that these animals also produce compounds worth studying. It's hoped that these studies may also provide us with valuable knowledge that will help us combat disease."

Provided by Oregon Health & Science University

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