African catfish skin mucus yields promising antibacterial compound

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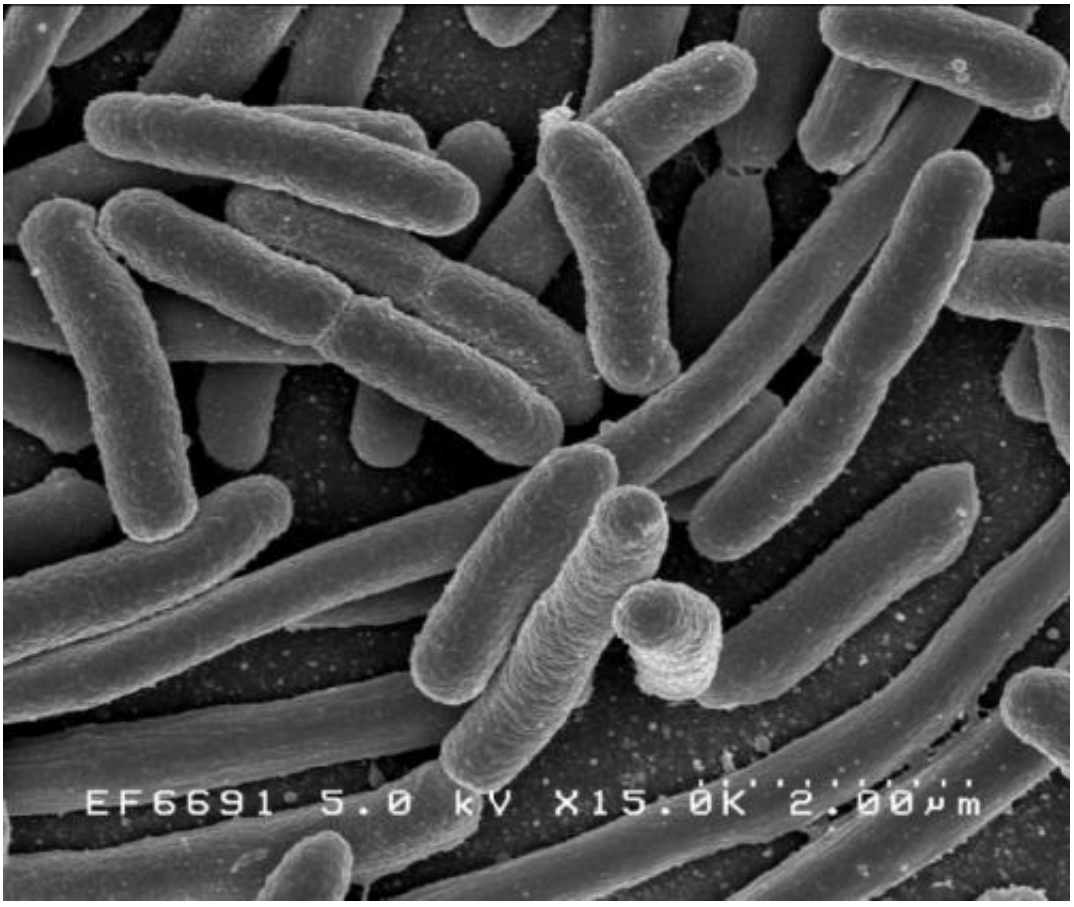

Escherichia coli. Credit: Rocky Mountain Laboratories, NIAID, NIH

Scientists report they have extracted a compound with powerful antibacterial properties from the skin of farmed African catfish. Although additional testing is necessary to prove the compound is safe

and effective for use as future antibiotic, the researchers say it could one day represent a potent new tool against antimicrobial-resistant bacteria such as extended-spectrum beta-lactamase (ESBL) producing E. coli.

Hedmon Okella is a postdoctoral researcher at the University of California, Davis, and led the project.

"The global public health threat due to antimicrobial resistance necessitates the search for safe and effective new antibacterial compounds," Okella said. "In this case, fish-derived antimicrobial peptides present a promising source of potential leads."

Okella presents the new research at Discover BMB, the annual meeting of the American Society for Biochemistry and Molecular Biology, held March 23–26 in San Antonio.

For the study, the researchers extracted several peptides (short chains of amino acids) from African catfish skin mucus and used machine learning algorithms to screen them for potential antibacterial activity. They then chemically synthesized the most promising peptide, called NACAP-II, and tested its efficacy and safety on ESBL-E. coli and mammalian blood cells, respectively.

These tests showed that NACAP-II caused the bacteria to break open, or lyse, without appearing to harm the mammalian blood cells. "Preliminary findings indicate that this promising peptide candidate potentially disrupts the bacterial cell envelope to cause lysis at a very low concentration," Okella said.

The place where the peptide was found—in the mucus on the skin of farmed African catfish—is not as unlikely as it may seem. As anyone who has tried to hold one can attest, fish are enveloped in a slippery layer of mucus. This mucus is known to protect the fish against

infections by physically carrying germs off of the skin and by producing antimicrobial compounds such as the one Okella's team isolated.

Many existing medicines are based on compounds that were first found in nature, and scientists speculate that marine and aquatic organisms represent a particularly rich—though largely untapped—source of bioactive compounds.

As a next step, the researchers plan to study the peptide's effects in animal models and explore strategies to produce it inexpensively.

"We are currently utilizing chemical synthesis to upscale the production of this peptide that we believe will one day be of use as drug candidate in the battle against antimicrobial resistance," Okella said.

More information: Abstract: In vitro activity of antimicrobial peptide from African catfish against the Extended-Spectrum Beta-Lactamase (ESBL) producing Escherichia coli

Provided by American Society for Biochemistry and Molecular Biology

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