# Fishing for new drugs

by Luis Wilfrido Atienza

Fishing and aquaculture are central parts of life in the Philippines. A wide variety of local fish such as *bangus* and *tilapia* are staples of the Filipino diet, feeding millions of Filipinos every day. The Philippines being an archipelago means that people all over the country support their communities and families by fishing and selling fish. Through aquaculture, or fish farming, people make a living, produce food, and drive the local economy.

Given the massive amounts of fish caught or farmed every year, what would be smart is to look into the different types of products aside from food that can be derived from fish. Developing secondary products would make fish even more valuable and useful.

A team of researchers from Polytechnic University of the Philippines is looking into this. In its study published in *Walailak Journal*, the team wanted to discover if the mucus coating the skin of common local species of fish had antimicrobial properties, which could be used to create antimicrobial products, or even to develop new drugs.

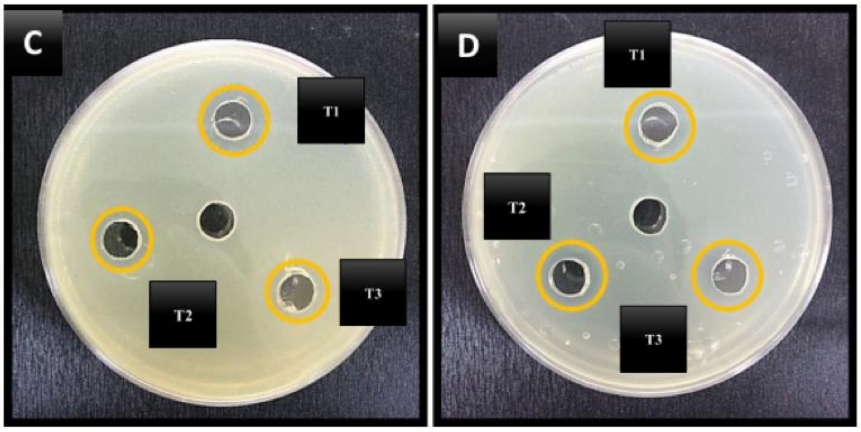
The constant development of new drugs and other antimicrobial products is essential because harmful pathogens over time develop resistance to antibiotics and require the development of new medicines and treatments. As a developing country, the Philippines is more vulnerable to outbreaks of bacterial infections, and the more treatment options are available to patients, the better.

The researchers looked at three species of fish: *Clarias batrachus* (walking catfish), *Channa striata* (mudfish), and *Oreochromis niloticus* (tilapia). All three are found in the wild in the Philippines and are common species used in aquaculture, making them perfect candidates for the development of a secondary product. The specimens used for this study were taken from Laguna de Bay.

The researchers collected samples of mucus from each fish specimen. They then obtained acidic mucus extracts, by adding an acid to the mucus, and tested the extracts.

They performed several types of tests to determine which fish extracts were the most effective against different pathogens. The pathogens they tested against were *Enterococcus faecalis, Staphylococcus aureus, Micrococcus luteus, Klebsiella pneumoniae, Pseudomonas aeruginosa, Aeromonas hydrophila, Escherichia coli,* and *Serratia marcescens*. These are very common and dangerous bacteria, which cause such conditions as urinary tract infections, pneumonia, and meningitis.

The first test the researchers performed was the agar overlay diffusion assay, which involved adding samples of each extract to petri dishes containing the different species of bacteria. The team was then able to determine how well each extract did at combating the bacteria by looking at how much of the petri dish the extract was able to prevent bacteria from growing.




Petri dishes of *P. aeruginosa* and *E. coli* with mucus extracts.
The yellow circles indicate areas where bacteria were not able to grow, indicating an antimicrobial effect.

The next test looked at different concentrations of the mucus extract to see which extracts would be the most effective at even lower concentrations. Extracts that work in lower concentrations are generally more effective, and manufacturing products with them is more economical since less of the extract would be needed. The researchers did the test by creating different concentrations of each extract, adding different types of bacteria to each, and looking at which concentrations were high enough to prevent bacteria from growing.

The wide variety of bacteria that the researchers were testing the extract against, as well as the different tests they performed, gave the researchers a sense of which extracts would be best suited to combating which types of bacteria. The researchers also got as clear a picture as possible of whether these extracts could feasibly be used to develop drugs or other products.

These tests yielded some interesting results. Generally, the catfish mucus extract was the most effective extract. It was most effective against the most types of bacteria in the agar overlay assay, and it was effective at the lowest concentrations. However, all the mucus extracts tested showed at least some inhibitory capabilities against the different strains of bacteria.

This study is a good first step in the development of drugs or antimicrobial products from the skin mucus extracts of fish. Catfish mucus clearly presents itself as a viable base for an all-around antimicrobial product. And while tilapia mucus and mudfish mucus were not as generally effective, they can still be studied as bases for products or drugs that target a more specific type of sickness or bacteria.

This work also opens up many possibilities for further research, including trying to discover ways to increase the antimicrobial effects of each mucus extract, or ways to incorporate them into actual products.

REFERENCE

Lirio GA, De Leon JA, Villafuerte AG. Antimicrobial activity of epidermal mucus from top aquaculture fish species against medically-important pathogens. Walailak J 2019; 16(5):329–40.

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