

Fish-Killing Toxin Could Kill Cancer Cells

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A powerful fish-killing toxin that has caused major losses in commercial ponds of catfish, striped bass and tilapia may also have cancer-killing properties.

A powerful fish-killing toxin could have cancer-killing properties as well, according to collaborative research led by Agricultural Research Service microbiologist Paul V. Zimba and chemist Peter Moeller of the U.S. National Oceanic and Atmospheric Administration. The toxin, called euglenophycin, has a molecular structure similar to that of solenopsin, an alkaloid from fire ant venom known to inhibit tumor development.

The findings were published online in July in the journal *Toxicon*.

In the summer of 2002, a commercial aquaculture facility in North Carolina reported mysterious [fish](#) mortalities in its ponds. More than 21,000 striped bass had died in July and August, resulting in losses of more than \$100,000.

To find out why the fish had died, Zimba and Moeller collaborated with Michigan State University biologist Richard Triemer. Zimba works at the ARS Catfish Genetics Research Unit in Stoneville, Miss. The scientists isolated and analyzed dissolved compounds, bacteria and algae from pond water samples.

In a 2004 paper in the *Journal of Fish Disease*, they identified the culprits as *Euglena sanguinea* and *E. granulata*, two species of freshwater algae that had generally been considered benign.

It was the first report of freshwater algae causing fish kills, but it wasn't the last instance of such an event. Zimba and his colleagues have confirmed 11 additional occasions in which euglenoid [algae](#) have fatally impacted fish ponds. Losses from these events—which have affected striped bass, tilapia and channel catfish—are estimated to exceed \$1.1 million.

Moeller, working in NOAA's Center for Human Health Risk in Charleston, S.C., then purified the active compounds and fully characterized the molecular structure of euglenophycin, the algal [toxin](#) responsible for the fish kills. The scientists are seeking patent protection on the toxin, and are currently investigating its properties. Laboratory tests have confirmed that euglenophycin is deadly to fish. Catfish exposed to the purified form of the toxin died within 4 hours of exposure.

One potential use of the toxin is in treating cancer patients. Laboratory tests have shown that even low concentrations of euglenophycin led to a significant decrease in cancer cell growth, and can kill [cancer](#) cells. Future tests will attempt to verify whether the toxin can slow or prevent tumor formation. Positive results would indicate that this problematic alga could have beneficial medical applications.

Provided by Agricultural Research Service

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