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Sensor makes marine poison glow

Cheap, convenient chemical could spot deadly toxin in fish and shellfish.

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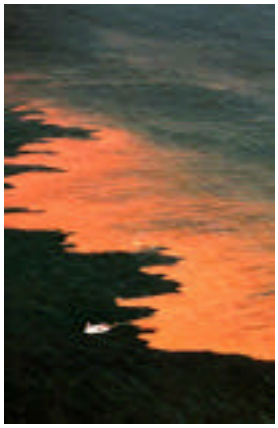

Florida-based chemists are developing a sensor with which fish farmers and conservationists might spot the poison that flourishing algae produce in coastal waters. They have found a compound that glows only in water that contains the toxin[1].

The poison in question is saxitoxin. A thousand times more potent than the nerve gas sarin, it can stifle breathing and cause numbness, dizziness, weakness, nausea and occasionally death. CIA agents in the 1950s were rumoured to carry saxitoxin suicide capsules.

Puffer fish make saxitoxin - earlier this year 13 people in Florida were poisoned when they ate locally caught puffer fish. So too do a handful of algae - these sometimes bloom into the 'red tides' that blanket the US East Coast as well as coastlines in Asia, Australia and South Africa. Saxitoxin produced by these algal blooms can contaminate shellfish and thence poison humans.

Managers of commercial shellfish beds in many countries monitor the presence of saxitoxin using mice - much like the miners' canaries of old. This is ethically contentious and too expensive for many developing countries, small operations or amateur fishermen.

Roger Leblanc at the University of Miami and colleagues have found an alternative: a class of molecules that recognize saxitoxin but ignore other, non-toxic biochemicals found in coastal waters. Called crown ethers, the molecules have fluorescent chemical groups that shine more brightly under ultraviolet light once they latch onto saxitoxin.

Crown ethers are ring-shaped molecules that lasso positively charged ions. Saxitoxin has two positively charged regions that are potential docking points for a crown ether.

What's more, the change in fluorescence is detectable even at concentrations of saxitoxin down to half the legal limit. This makes the chemical roughly as sensitive as the mouse method.

The researchers hope to find even more sensitive molecules, and to incorporate them into a portable monitoring device.

References

1. Gawley, R. E. *et al* . Chemosensors for the marine toxin saxitoxin. ***Journal of the American Chemical Society*** , **124,** 13448 - 13453, (2002).