



Embargoed until 9pm Tuesday, August 18

20th Anniversary Australian Museum Eureka Prizes

Dying for a Drink!

australianmuseum.net.au/eureka

Water is essential for life. But some water can kill.

Toxins produced in blue-green algae are capable of causing organ damage and cancer. And blooms of blue-green algae - cyanobacteria - are often found in the water supplies for our cities. Fortunately, not all water-based bacteria produces poison. In general, only half are toxic. But which is which?

For his world-class research, which has identified the biochemical pathways responsible for the production of lethal toxins formed in cyanobacteria, Professor Brett Neilan, Federation Fellow, University of New South Wales, has won the Land & Water Australia, Professor Peter Cullen Eureka Prize for Water Research and Innovation.

The Australian Museum Eureka Prizes are the most prestigious awards in Australian science. They were announced last night in Sydney, at a star-studded formal dinner attended by the country's most inspiring scientific minds.

Turning twenty this year, 'The Eureka's,' as they are fondly known, have become the most coveted science awards in this country. Every scientist knows a 'eureka' moment comes after decades of singular dedication, deep inquiry and rich collaboration. Receiving an Australian Museum Eureka Prize is regarded as a pinnacle achievement for any Australian scientist

"Professor Neilan's work has fundamentally improved our understanding of the conditions that lead to toxin production in waterways and water supplies. This knowledge is critical for public health, the health of our environment, and even water security," says Frank Howarth, Director of the Australian Museum.

Found in temperate and sub-tropical freshwaters worldwide, cyanobacterial toxins are extremely potent, causing either nerve damage and acute liver failure in large doses or carcinoma after prolonged low-level exposure. Due to extreme toxicity, they are listed in the top-ten chemical weapons by the United Nations.

The DNA testing, made possible by Professor Neilan, has revolutionised management of our water supplies. DNA tests can now be done while cell numbers are low, with results available within hours. This means prompt action can be taken before toxin levels become significant.

Previously, toxicity tests were only possible with high cell numbers and results not available for some weeks. And while laboratory animals were once used, Neilan's test means animals are no longer be sacrificed to ensure safe drinking water.

In a measure of the significance and impact of his work, many international groups, including the World Health Organisation, have adopted Professor Neilan's techniques for the rapid and accurate detection of toxic cyanobacteria in drinking water supplies, and these patented tests are now the standard means of assessing environmental health.

Neilan's research will also lead to the design of antidotes to cyanobacterial poisoning, which can also occur through seafood.

Professor Neilan's work has uncovered the genetic pathways for four versions of cyanobacterial toxin, one of which is saxitoxin. He has also recently discovered a link between the high salinity of the Murray-Darling River system and the growth of saxitoxin-producing cyanobacteria.

The Land & Water Australia, Professor Peter Cullen Eureka Prize for Water Research and Innovation Eureka Prize, which recognizes research making an outstanding contribution to the sustainable use and management of Australia's water resources, carries \$10,000 prize money.

More information and Eureka teaching resources can be found at
australianmuseum.net.au/eureka.

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