VICTORIA UNIVERSITY WELLINGTON
TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI

Fighting Cancer with Sponges

A VICTORIA UNIVERSITY OF WELLINGTON SCIENCE TEACHING RESOURCE

WHO?

A team of researchers from Victoria University of Wellington and NIWA (The National Institute for Water and Atmospheric Research), including Associate Professor Peter Northcote and Professor Paul Teesdale-Spittle.

WHAT'S THE DISCOVERY?

Peloruside A, an extract of the sponge (Mycale hentscheli) found in the Pelorus Sound in New Zealand's Marlborough Sounds, has been discovered to have tumour-inhibiting properties.

HOW DOES IT FIGHT CANCER?

It acts as a microtubule stabiliser. Microtubules are tube-like filaments in cells that, among other functions, make up the mitotic spindles that pull chromosomes apart during mitosis—the process of cell division. By stabilising the microtubules, Peloruside A prevents them from growing and shrinking, and stops mitosis from happening in cancer cells

A CURE FOR CANCER?

Cancer is a much more complicated disease than many people realise, with a lot of variation in how it behaves. Peloruside A has been identified as a potentially effective treatment for cancer, though this may differ from patient to patient. There are other microtubule stabilisers, such as paclitaxel, and ixabepilone, that are effective in cancer treatment. The advantage of peloruside A is that it at least as active as these drugs, but is less prone to being ejected from the cancer cell. It also binds to a different site on the cell surface than other drugs, which is useful if mutations in the cell result in those drugs becoming less effective.

Getting the Supply

Unfortunately, only a small population of the sponges found in Pelorus Sound produce peloruside A. This makes it difficult to obtain enough of the chemical to run clinical trials, let alone make it available globally as a treatment.

- *What are some ways the researchers could produce more of the chemical than is currently available?*

There are three options for sourcing more pelorus A:

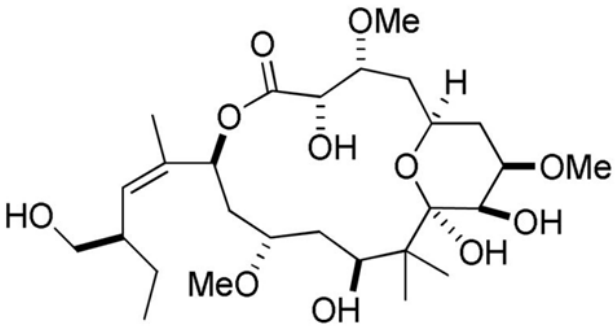
- Farming the sponges
- Industrial synthesis
- Biosynthesis.

- *What do you think each of these might involve?*

CAPITAL THINKING. GLOBALLY MINDED.
MAI I TE IHO KI TE PAE

Examining Peloruside A

Below is the chemical structure of peloruside A.



- Find the following functional groups (Me=methyl group):

Alcohol	Alkanol
Ester	Carbonyl
Alkene	Ether

PRODUCING PELORUSIDE A

Researchers have a few options available to them.

1. Harvest it from the sponges, or manufacture the chemical through industrial synthesis. To preserve the wild population, researchers have tried working with the aquaculture industry to farm the sponges. This creates a problem when it comes to extraction, as 200 kilograms of sponge will only result in 2g of peloruside A. Producing enough peloruside would require industrial-scale processing technology.

2. The other option is to synthesise peloruside A using industrial techniques. To do this effectively, researchers will need to understand more about the structure of the chemical while also figuring out how to manufacture it at the scales required to make it viable as a treatment.

3. Researchers can isolate the genes responsible for making peloruside A in the sponges and insert those genes into the genome of bacteria. Bacteria are much easier to grow, and so could be used to produce the drug in much higher volumes.

- *Of these three options, which would you choose? What are the benefits and limitations of each?*