

# Suicide: unexpected coral killer

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A mysterious disease is causing the corals of the Great Barrier Reef to kill themselves - and scientists are battling to find out why.

PhD researcher Tracy Ainsworth, from the ARC Centre of Excellence for Coral Reef Studies and The University of Queensland, is investigating the causes of a rapidly-emerging coral reef killer known as White Syndrome, and has found unexpected results.

Instead of being killed by bacterial invaders as previously thought, Ms Ainsworth's studies reveal that the cells within the coral activate programmed cell death, or PCD - a cellular process which acts like a self-destruct mechanism.

"We expected to see a lot of bacterial activity which was directly causing the corals to die. We were quite surprised when that proved not to be the case," Ms Ainsworth said.

"The coral death is not being caused by something outside coming in. Something is going wrong internally with the coral that doesn't fit any previous notions about how coral diseases work.

"Programmed cell death occurs in all organisms, including humans. It is one of the ways our bodies' immune systems fight infection. Just about every life form has this cellular mechanism.

"For example, plants use PCD to protect themselves from attack by viruses and bacteria. They kill off an area around infected cells to create

a barrier of dead cells which prevents further attack by the disease.”

This seems to be the case in corals. The problem is, without clear evidence of bacteria attacking the coral in the first place, the question is why.

“In some cases, it seems that the PCD continues uncontrolled, like a self-destruct mechanism,” Ms Ainsworth said.

The disease at the centre of this investigation, White Syndrome, is an emerging killer on the Great Barrier Reef. Researchers from the ARC Centre at James Cook University found that the disease has increased 20-fold across the GBR during 2002/2003 and can kill entire coral colonies, leaving behind only their white chalky skeletons.

The findings of Ms Ainsworth's study in white syndrome show that closer attention must now be paid to how diseases affect corals at the cellular level, if there is to be any chance of controlling them or understanding why they are increasing.

“We're looking more closely now at what is actually happening on the inside of the coral. We need to look beyond what seems to be happening between coral and its disease at first glance,” said Ms Ainsworth.

Using techniques to look closer at the dying coral cells, Ms. Ainsworth and her supervisor, Professor Ove Hoegh-Guldberg, are aiming to establish the cause of these apparent coral ‘suicides’.

“I think the smoking gun is climate change. We have had a series of hot summers recently in which corals in the shallows become bleached and literally ‘worn out’. This leads to mechanisms that allow the coral to retract tissues that are no longer functioning due to this stress,” says Professor Hoegh-Guldberg. “This is somewhat similar to Eucalyptus

trees dropping branches when they run short of water.”

“We need to pinpoint what is happening in the cellular process [of this disease], what is switching it on and switching it off. We need to look at the genes and pathways involved,” Ms Ainsworth said.

“Are the corals in control of their own programmed cells death - or is it simply out of control?”

The findings of this and other research into coral diseases may help to develop better warning systems to help minimise their impact on our reefs.

The findings from this study are in the March edition of the scientific journal, *Marine Biology*.

Source: University of Queensland

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