What's killing Tassie devils if it isn't a contagious cancer?

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Is the dying Tassie devil the victim of some undone science? Credit: Flickr/Sy, CC BY-NC-SA

Scientists have been trying to figure out the cause of the deadly cancer affecting so many Tasmanian devils but the research doesn't seem to be providing many useful answers. What if they're looking in the wrong place for a cause and a cure?

The Tasmanian devil is Australia's largest carnivorous marsupial. It is currently listed as "endangered" and risks becoming extinct. Most of the devils in Tasmania are developing ugly tumours on their faces due to what is called devil facial tumour disease (DFTD), and it is nearly always fatal.

The disease was first observed in 1996 and research into it began in 2003.

In 2006, two Tasmanian government researchers, Anne-Marie Pearse and Kate Swift, published a short article in the scientific journal *Nature* suggesting that the devil disease was a contagious cancer spread from one devil to another by biting. This hypothesis became the basis for much subsequent research.

It was a bold and unorthodox theory, especially considering that there are only a handful of contagious wildlife cancers around the world. Furthermore, the pathway of spread by biting would be unique worldwide.

Theory doesn't bite

It is true that Tasmanian devils bite each other in ritual fights, but their teeth are not sharp and not an obvious mechanism for spreading cancer. Furthermore, various complications soon emerged from the biological research.

To spread from one devil to another, the genetics of the devils have to be similar so rejection of the foreign cells does not occur. It was proposed that devils had limited genetic variability, but later this turned out to be incorrect. There are not even any studies that conclusively show that the devil cancer is transmissible from one animal to another.

Eventually the research seemed to reach a dead end, with too many contradictions. Meanwhile, devils kept dying.

There is another possible explanation for the devil disease, either its origin or its spread or both: environmental chemicals.

Look to the trees

A Tasmanian devil with the deadly facial tumour disease. Credit: AAP Image/University of Sydney

In Tasmania, huge areas are taken up by plantation forests, and these are regularly sprayed with pesticides and poisons.

Of special concern is the pesticide atrazine, used to control grass and broadleaf weeds. The Australian Pesticides and Veterinary Medicines

Authority carried out an extensive review and considers atrazine safe to use under current guidelines which include "conditions outlined on product labels". The Tasmanian government's information on atrazine says it "does not cause mutations" and is "not likely to cause cancer".

But there are those who point to research that suggests atrazine is a cancer promoter. The US Environmental Protection Agency had this to say following its review of studies by a federal Scientific Advisory Panel:

Even though the panel agreed with EPA that the epidemiologic evidence does not strongly suggest a link between atrazine and cancer, the panel did not agree that a lack of strong evidence justifies a conclusion that atrazine is not likely to be a human carcinogen.

Also of concern is the poison 1080, used to kill native species that are a key part of the devil diet. The Tasmanian government says devils have a relatively high tolerance to the poison but it also concedes there is a risk of secondary poisoning with three poisoned pademelons likely to be fatal to a 5kg devil.

Plantation forestry pesticides contaminate 44 of 48 river catchments in Tasmania.

So a role for pesticides and poisons seems plausible, because the devil disease is found only in parts of Tasmania where there are extensive forest plantations. Furthermore, because devils, as carnivores, are at the top of the food chain, toxic chemicals in the environment are concentrated in their diet.

We need more studies

Early in the devil cancer story, some scientists called for studies of the

presence of toxic chemicals to be carried out. But this was not followed up at the time.

For some reason, the contagious-cancer hypothesis received the majority of funding and attention. There was eventually a limited pilot toxicology study, the reviewers of which called for further investigations, but there have been none.

A toxic-chemical cause is even more plausible considering the other three species about which claims have been made of a viral contagious cancer: Beluga whales in Canada, California sea lions in the US and green sea turtles in several countries including Australia. Each of these species is exposed to environmental chemicals, including atrazine, but again toxicological studies have not been carried out.

Environmentalists in Tasmania have fought courageous battles to protect native forests. But in the past decade there has been little public criticism of plantation forestry and the associated impacts on wildlife, perhaps because the plantations allow remaining native forests to be untouched.

There are political advantages to the forest industry and the government in ignoring the environmental-chemical hypothesis. When political and economic influences lead to research areas being neglected, these areas are called "undone science".

There are many examples of undone science around the world, especially in the environmental area. Citizen campaigners call for certain topics to be investigated, but governments and corporations ignore or neglect them, and sometimes try to censor relevant research that is done.

This is not a criticism of individual researchers, who do their investigations as well as they can. But a restricted availability of funds and focus of attention can lead to the trajectory of research in a field

being pushed in particular directions, especially ones convenient to the forest and chemical industries and their government patrons.

Meanwhile, the Tasmanian devil is dying out.

Valiant efforts are being made to preserve the species by removing individual animals from Tasmania to other states and countries where they and their offspring are presumed safe from the perceived threats in their natural environment in Tasmania. This is a rear-guard operation that may distract attention from examining alternative explanations for the disease.

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