

[ENVIRONMENT]



Above: As the number of Tasmanian devils drops precipitously, breeding projects such as this one at the Tasmanian Devil Conservation Park in Taranna, Tasmania, aim to prevent the animal from becoming extinct. PHOTO: AFP



Left: The Tasmanian devil was listed as an endangered animal on May 21 because of a deadly, contagious cancer that has cut its population by nearly 70 percent. PHOTO: AP

Devilish cancer

Since 1996 a deadly facial tumor disease has preyed on the Tasmanian devil, pushing it to the brink of extinction. Now the contagious cancer shows signs of evolving, which might eventually enable it to cross the species barrier

BY ERICA REX
NY TIMES NEWS SERVICE, NEW YORK



They're inky black, pointy-eared, furry and, in a fierce sort of way, cute. And in May of this year, they were added to Australia's endangered species list.

Ordinarily solitary, Tasmanian devils commune only to feast on carrion and to mate in short-lived passionate couplings during which they tear each other to ribbons. Their spine-decalcifying caterwauls — a sequence of whuffings, snarlings and growlings — have evoked satanic visions since the first European settlers arrived on the island of Tasmania more than a century ago.

"Parents used to tell their kids: 'Don't go out into the bush because the devil will get you,'" recalled Greg Woods, an associate professor of immunology at Menzies Research Institute in Hobart, Tasmania's capital. But in the past decade, the Tasmanian devil has been trapped in a purgatory of its own. Since 1996 a deadly cancer, devil facial tumor disease, has preyed on the devil. Its population plummeted to fewer than 50,000 from about 150,000, said Hamish McCallum, senior scientist with the Devil Facial Tumour Disease Program at the University of Tasmania.

The devils' situation is dire. Yet as more has been learned about the disease, hope has appeared. Scientists have begun an experimental inoculation program, and this year, Woods identified one devil able to mount an antibody response to the tumor.

The devil, Cedric, is a three-year-old male from western Tasmania who has been living in captivity for several months. Woods inoculated Cedric and his half-brother, Clinky, who was also disease-free at the time, with irradiated — that is, dead — devil tumor cells. Although they had the same mother, Cedric and Clinky had different fathers. Woods repeated the vaccination three times.

He then administered live tumor cells to both. Cedric mounted an immune response and lived. Clinky did not develop an immune response, and he succumbed to the cancer. His father's genetics made Clinky's immune system more like that of the devils found in eastern Tasmania.

All mammalian immune systems rely on certain cells to recognize invaders. Demarcation of "otherness" at the cellular level is carried out in a part of the mammalian genome called the major histocompatibility complex, or MHC. An animal's ability to fight off disease depends

on this group of genes. MHC is responsible for the cell markers that flag the difference between cells that are "self" and those that are "nonself." But the tumor's MHC is what makes it deadly to the devil.

"The tumor has no foreign cell surface markers," said Katherine Belov, a scientist in the Australasian Wildlife Genomics Group at the University of Sydney. "If tumor cells get into a devil, its own immune system should be able to see the cells as foreign. That doesn't happen because the tumor's cells look like devils' own cells."

Belov likened the process to genetic matching for an organ transplant: "You have to have the same genes at the MHC as your donor. If they're different, you'll reject the organ."

If the tumor were a needed organ, devils would be perfect recipients. In other words, the devils' MHC is identical to that of the tumor. The devil and the tumor are genetic clones. Not recognizing a foreign cell, the immune system does not create antibodies.

Devil facial tumor disease first showed up in a 1996 photo taken by a Dutch wildlife photographer, Christo Baars, while he was visiting at Mount William in north-eastern Tasmania. Sightings of ailing devils — their lips and jaws deformed by tumors, their noses and eyes obscured by swollen, ulcerating wounds — increased in frequency, notably in the east and north. The disease is always fatal. The devils die of starvation and dehydration when the growths in their jaws and throats make eating and drinking impossible.

Until recently, scientists were at a loss to explain the cancer's cause or mode of transmission.

"We'd predicted they'd be vulnerable to viruses" because they are an inbred population, Woods said. "That what got them was a cancer took everyone by surprise." But this cancer, Woods and his colleagues found, was unlike any the researchers had seen before.

"In all other cancers, what you've got is your own cells gone haywire, whereas in this particular cancer, the cells are not from the host, they're from a different animal," McCallum said. "The tumor itself is the infectious agent."

The tumor plaguing the devil is a clone, derived from one devil. When animals bite each other in the face, as they do during mating season, tumor cells are passed from host to host.

The Tasmanian devil is about the size of a corgi when fully grown and is the largest surviving carnivorous marsupial. The animal became legally protected in 1941, when farmers and settlers hunted them aggressively, believing the nocturnal scavengers

were preying on livestock. Both agriculture and population growth have contributed to fragmentation of the devils' habitat. From 1900 to the present, the human population of Tasmania increased almost threefold, to just less than 500,000. Once widespread, devil populations became more isolated, inbred and genetically similar.

Cedric was the first devil to be inoculated successfully using killed cancer cells. Woods has since found a second devil that was able to mount an immune response. Three other inoculated devils from eastern Tasmania have developed the disease, supporting Woods's hypothesis that devils from the west have maintained greater genetic diversity.

Saving the devil from extinction has become a conservation imperative.

According to McCallum, without major intervention, the devil will be extinct in five years.

Woods said he would begin the search for naturally resistant devils early next year. He posits that the devils' best bet lies within its own genome.

Yet even if more MHC-different devils are found, Belov thinks the immunological arms race is far from over. She has already seen some evidence that the tumor is adapting.

Whereas before, the tumors were clonal, "now we're seeing slight variation — slight chromosomal differences. They've begun to evolve from original clone or cell," she said. "If it does evolve immune evasion strategies, such as turning off the MHC altogether, the tumor has potential to infect MHC-different individuals. If it down regulates its cell surface MHC — that is, switches off its MHC altogether — the tumor not only has potential to infect MHC-different individuals, but it may also cross the species barrier."

If that happened, the most likely victim would be the devil's closest living relative, the spotted-tail quoll. Another carnivorous marsupial indigenous to Tasmania, the quoll has a white-dotted reddish to dark chocolate brown coat and is about the size of a small house cat. Even now, it is considered an endangered species.

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— Katherine Belov, University of Sydney scientist



Puntland coastal guards stand on deck during a sea patrol near the northern Somali port town of Bosasso. PHOTO: REUTERS

Pirates in Somalia live the high life

Each successful hijack by Somail pirates operating in the Gulf of Aden draws more men to the remote fishing village Eyl, where the bandits splash their money around on lavish weddings and qat-chewing sessions at expensive hotels

BY XAN RICE AND ABDIQANI HASSAN
THE GUARDIAN, BOSASSO, SOMALIA

Devils rest on a white sand beach in front of a few dozen ramshackle homes. A creek cuts inland, traced by a dirt road that runs to a craggy fishing settlement 3km away. Until recently Eyl was a remote and rundown Somali fishing outpost of 7,000 people. Now, thanks to some spectacular ocean catches, it is a booming mini-town, awash with cash and heavily armed young men, and boasting a new notoriety: piracy capital of the world.

At least 12 foreign ships are being held hostage in the waters off Eyl in the Nugal region, 480km south of Africa's Horn, including a Ukrainian vessel loaded with 33 tanks and ammunition that was hijacked last month.

They are being closely watched by hundreds of pirates aboard boats equipped with satellite phones and GPS devices. Hundreds more gunmen provide backup on shore, where they incessantly chew the narcotic leaf qat and dream of sharing in the huge ransoms that can run into millions of US dollars.

In a war-ravaged country where life is cheap and hope is rare, each successful hijack brings more young men into the village to seek their fortune at sea.

"Even secondary school students are stopping their education to go to Eyl because they see how their friends have made a lot of money," Abdulqadir Muuse Yusuf, deputy fisheries minister for the Puntland region, said yesterday.

TRICKLE-DOWN EFFECT

The entire village now depends on the criminal economy. Hastily built hotels provide basic lodging for the pirates, new restaurants serve meals and send food to the ships, while traders provide fuel for the skiffs fitting between the captured vessels.

The pirate kingpins who commute from the regional capital, Garowe, 160km west, in new 4x4 vehicles splash their money around. When a ransom is received the gunmen involved in hijacking the particular ship join in the splurge, much to the pleasure of long-time residents. Jaama Salah, a trader, said that a bunch of qat can sell for US\$65, compared with US\$15 in other towns. Asli Faarah, a tea vendor, said: "When the pirates have money I can easily increase my price to US\$3 for a cup."

Somalis in the diaspora — especially in Kenya, the United Arab Emirates, Canada and the UK — finance the pirate gangs and keep a large chunk of the ransom money, estimated at more than US\$30 million this year alone, far more than Puntland's annual budget. But the gangs of gunmen sometimes split hundreds of thousands of US dollars between them.

In the region's bigger towns, such as Garowe and Bosasso on the Gulf of Aden coast, a successful hijack is often celebrated with a meal and qat-chewing session at an expensive hotel.

One successful pirate based in Garowe, Abshir Salad, said: "First we look to buy a nice house and car. Then we buy guns and other weapons. The rest of the money we use to relax."

WEALTH BUYS RESPECT

The pirates appear to have little fear of arrest by the weak administration, who many suspect of involvement in the trade. By spreading the money to local officials, chiefs, relatives and friends, the pirates have created strong logistical and intelligence networks, and avoided the clan-based fighting that affects so much of the rest of the country.

And though few believe the pirates when they claim to be eco-warriors or marines defending Somali waters from foreign exploitation, their daring and wealth has earned them respect. It has become something of a tradition for successful pirates to take additional wives, marrying them in lavish ceremonies.

Naimo, 21, from Garowe, said she had attended a wedding last month of the sort "I had never seen before."

"It's true that girls are interested in marrying pirates because they have a lot of money. Ordinary men cannot afford weddings like this," she said.