As Zika virus threat grows, science steps up the fight against mosquitoes

By Los Angeles Times, adapted by Newsela staff on 02.18.16

Word Count 917

JOHANNESBURG, South Africa — As mosquitoes buzzed about her veranda one recent evening, Maureen Coetzee didn’t reach for bug spray or fly swatter. She grabbed a device resembling a drinking straw and sucked four mosquitoes into a jar.

She quickly identified them as Aedes aegypti, the villain in the Zika crisis a continent away. The mosquito-born disease is strongly suspected to be responsible for thousands of babies, who have been born with abnormally tiny heads and potentially crippling brain damage in Brazil.

Understanding Mosquitoes, To Kill Them

The next day, in her laboratory at the National Institute for Communicable Diseases in South Africa, Coetzee peered at her new captives.

To her delight, one had laid eggs, meaning she could breed them.

Coetzee has devoted her life to understanding mosquitoes — in order to kill them.
No other animal has done so much harm to the human race. Each year, they infect millions of people with malaria, yellow fever, dengue fever and other viruses and parasites. Mosquitoes killing at least 600,000, the vast majority of them children in Africa. The World Bank estimates that each year they cost afflicted African countries 1.3 percent of gross domestic product, the value of all goods and services produced by a country.

Which raises the question: Why not try to wipe mosquitoes off the planet?

**New Biological Weapons**

Coetzee and other scientists said that would be extreme, given that only about 150 of the 3,500 species of mosquitoes carry deadly diseases. It would also be wildly impractical to try attacking every mosquito breeding ground.

But mosquitoes may be better controlled through a combination of methods. After decades of fighting mosquitoes — and mostly losing — technology is bringing new biological weapons to the battle.

Coetzee, an entomologist at the University of Witwatersrand and international expert on mosquito control, is conducting research on preventing malaria, another disease that is spread by mosquitoes. It involves breeding male mosquitoes, sterilizing them with radiation and releasing them into the wild.

**Targeting The Bad Mosquitoes**

The concept was pioneered in the 1950s in the United States and relies on two basic facts: They mate only once, and only females bite.

The strategy depends on releasing enough mosquitoes to crowd out wild males, letting the current generation die out without reproducing. The life span of a mosquito is two to four weeks. Coetzee said that effective control would require releasing millions monthly during malaria season across vast areas.

One advantage of the strategy over other methods is that it allows scientists to target individual species of mosquitoes. “It makes sense to target only those mosquitoes that are involved in transmission of disease,” Coetzee explained. Even getting rid of those species is "highly unlikely."

**A Never-Ending Battle**

In the long history of the world's battle against mosquitoes, a central lesson has emerged: Never back off. The moment that authorities scale back control measures or lose track of mosquito population trends, the insects bounce back, and outbreaks of deadly disease inevitably follow.

In the 1950s, the World Health Organization launched a malaria eradication campaign that used an insecticide to kill mosquitoes. Malaria seemed to disappear, but of course it came roaring back, and mosquito populations have grown increasingly resistant to insecticides.
Another problem with insecticides is that mosquito breeding sites are easy to miss, said Laith Yakob, an expert at the London School of Hygiene and Tropical Medicine. For example, Aedes aegypti, which carries the Zika virus, is especially hard to reach. It often breeds in houses and can reproduce in thimble-sized pools of water.

**New Technologies Needed**

“Any of them can be viable breeding sites, and imagining that citywide, it would be impossible to eliminate all breeding sites,” he said. “And even if you did, the next time it rained, they would be back.”

That's where newer technologies can help.

One of the newest is a variation of the sterilized male strategy. It involves genetically modifying male mosquitoes so their offspring die before they mature and are able to reproduce.

In the months before the Zika outbreak in the Americas, a British company announced that it had conducted a successful experiment in the Brazilian city of Piracicaba. It cut the number of mosquito larvae by 82 percent.

**Genetically Modified Mosquitoes**

The company, Oxitec planned to build a facility in Brazil to produce enough genetically modified Aedes aegypti mosquitoes to protect a town of 300,000.

The mosquitoes are puffed out the window of an SUV in bursts of 1,000, and can be directed at hot spots or blanket an entire town.

But the company faces strong opposition from groups like the Britain-based group Gene Watch. It argues genetically modified mosquitoes have no proven benefits and that killing one species may result in another more invasive species filling the vacuum.

Back in Coetzee’s laboratory, thousands of mosquito eggs sat in a tub of water. They were already hatching into the larvae of a species that carries malaria. Gauze-topped vessels lined the walls.

"**Intriguing Little Organisms**"

“They’re intriguing little organisms,” said Coetzee, who has been studying mosquitoes for more than 40 years.

“Three and a half thousand species is a lot of variation and some of them are very beautiful,” she said.

To illustrate her point, she took a mosquito she had caught decades ago and placed it under a microscope: Toxorhynchites brevipalpis, better known as the elephant mosquito. It has a wingspan of almost an inch and a striking blue thorax flecked with gold and fuzzy antennae.
It lives off nectar and doesn’t bite humans.
Quiz
1. Based on the section "Genetically Modified Mosquitoes," which answer choice BEST describes the connection between the company Oxitec and the group Gene Watch?
   (A) Oxitec has discovered a way to fight the Zika virus and Gene Watch is documenting the company’s work.
   (B) Oxitec is trying to halt the spread of the Zika virus and Gene Watch is aiding the company’s efforts.
   (C) Oxitec has a strategy to reduce the Zika virus and Gene Watch disapproves of the company’s approach.
   (D) Oxitec is genetically modifying mosquitoes carrying the Zika virus using genes from Gene Watch.

2. Which answer choice BEST explains how the article illustrates the idea that not all mosquitoes should be wiped off the planet?
   (A) The article describes the weapons being used to kill mosquitoes.
   (B) The article gives an example of a mosquito that is not a threat to humans.
   (C) The article gives an example of a campaign used to kill mosquitoes that carry malaria.
   (D) The article points out the life span of a mosquito is very short.

3. Read this sentence from the second paragraph of the article.

   The mosquito-born disease is strongly suspected to be responsible for thousands of babies who have been born with abnormally tiny heads and potentially crippling brain damage in Brazil.

   Which word could replace "abnormally" WITHOUT changing the meaning of the sentence?
   (A) alarmingly
   (B) identically
   (C) imperfectly
   (D) unusually
Read this sentence from the section "A Never-Ending Battle."

*The moment that authorities scale back control measures or lose track of mosquito population trends, the insects bounce back, and outbreaks of deadly disease inevitably follow.*

What does the phrase "scale back" mean in the sentence?

(A) balance
(B) eliminate
(C) reduce
(D) separate