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Team makes strides in fight against Zika

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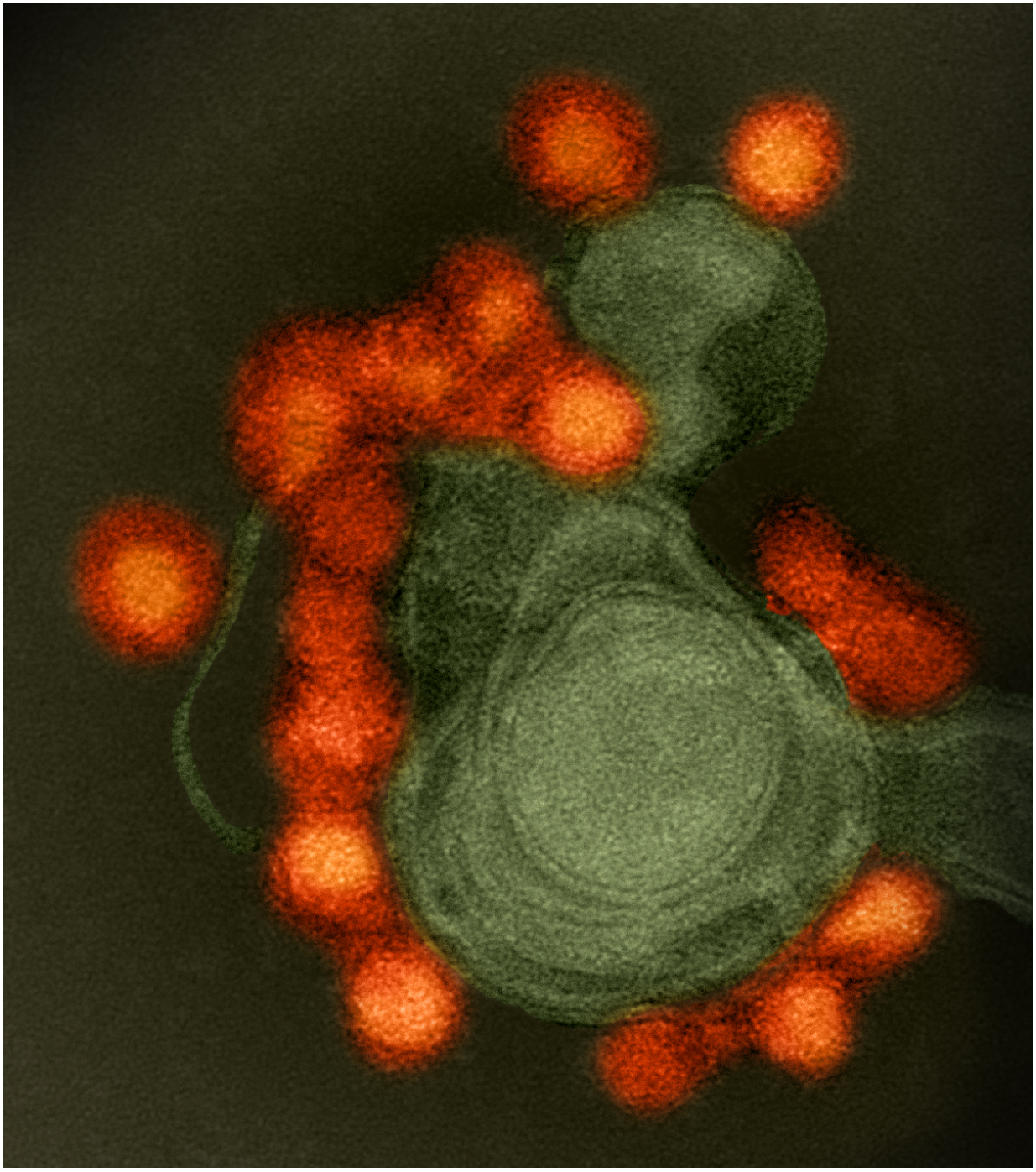

Transmission electron microscope image of negative-stained, Fortaleza-strain Zika virus (red), isolated from a microcephaly case in Brazil. The virus is associated with cellular membranes in the center. Credit: NIAID

There's a war raging on a tiny battlefield and the outcome could well touch millions of people worldwide threatened by Zika and related viruses. The key ally unlocking the mystery surrounding this conflict is the long-dreaded yellow fever virus.

Dr. Kevin Myles, Glady "Hazitha" Samuel and Dr. Zach Adelman are Texas A&M AgriLife Research scientists at Texas A&M University, College Station, who published "Yellow fever virus capsid protein is a potent suppressor of RNA silencing that binds double-stranded RNA."

The paper appears in the *Proceedings of the National Academy of Sciences*.

The mystery has been how these viruses get around the insect's immune response, and the answer is the virus makes a protein that suppresses the immune response, Myles said.

"When mosquitoes are infected with these viruses, there's a signal that lets the mosquito's cells know that they are infected, resulting in targeting of the virus by the mosquito's immune response.

"Something similar occurs in our bodies when we're infected with these viruses; there are signals our cells detect that let our immune system know all is not well," he said.

The AgriLife Research team found a protein that is produced by yellow fever virus, as well as Zika virus, West Nile virus and dengue virus, that suppresses the immune response of the mosquito.

"While the mosquito doesn't want the virus in its body any more than we want it in ours, and is trying to get rid of it, the virus isn't defenseless," Myles said. "It's fighting back and deploying its own countermeasures. Basically this is what's known as an evolutionary arms race. The survival of this group of viruses depends on their ability to stay one step ahead of the mosquito's immune response."

Now that the scientists know this, there are a couple of options. By using gene drive, a method targeting specific genes, they could go in and tip the scale in the mosquito's favor. Alternatively, they could give the nod to the virus. In the latter, the virus would actually make the mosquito sick preventing transmission to humans.

"It will also be interesting to see if this protein interferes with the human immune response," Myles said. "Certainly similar types of proteins have been found in other viruses that are not transmitted by mosquitoes but do infect people, influenza viruses for example.

"If it does interfere with our immune response, it could become a target for vaccine development, not only for Zika virus, but possibly other viruses as well.

"More research is needed before we reach that point though, but as ironic as it may seem, we are using the yellow fever virus, once arguably the most feared pestilence in the Western Hemisphere, to help us defeat the Zika virus and quite possibly others as well."

Myles and his colleague Dr. Zach Adelman joined the department of entomology at Texas A&M on Aug.1. The scientists were previously at

Virginia Tech and now lead AgriLife Research's efforts to stop Zika.

Myles is working to understand the basic biology of how viruses such as Zika replicate in mosquitoes, and Adelman's projects involve creating mosquitoes resistant to viruses such as Zika.

More information: Yellow fever virus capsid protein is a potent suppressor of RNA silencing that binds double-stranded RNA, *PNAS*, DOI: 10.1073/pnas.1600544113

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