

# Study of intestinal bacteria of insects may reveal strategies for combatting them

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Claire Valiente Moro. Credit: FAPESP

More than half the world's population runs the risk of contracting infectious diseases transmitted by mosquitoes in the next few years. With climate change, these so-called arboviruses—once a problem concentrated in the planet's tropical regions—appear to also be occurring in places with a temperate climate.

"Recent studies indicate that the bacteria present in the intestine of vector [mosquitoes](#) contribute to the adaptive potential of these insects. It is therefore important to study genetic, microbiological, and [ecological factors](#) in order to understand the invasive potential, for example, of the

tiger mosquito (*Aedes albopictus*)," said Claire Valiente Moro, a researcher at the Laboratoire d'Ecologie Microbienne, Université Claude Bernard Lyon 1, in a lecture given at FAPESP Week France.

The tiger mosquito is one of the vectors of dengue and is today present on five continents (except in Antarctica). Originating from Asia, the insect has presented a high adaptive potential and is found both in areas with a tropical climate and those with a temperate one. Recently, the French government issued warnings about the mosquito's presence in the country.

A recent study, led by Valiente Moro, compared the microbiota of tiger mosquitoes captured in a forest in Vietnam with that of insects of the same species captured in France. The researchers observed that the intestines of these insects were predominantly inhabited by *Dysgonomonas* sp bacteria and that there was a greater variety of strains in the Vietnamese mosquitoes.

Genetic analyses showed a correlation between the [bacterial diversity](#) in the intestine and the genetic diversity of the mosquito populations. "It is possible that [environmental factors](#) and human activities influence the diversity of the mosquito's intestinal microbiota and this is a factor that should not be ignored when studying arboviruses," said the researcher.

One of the group's aims is to evaluate the influence of [climate change](#) on the variety of the microbiota of *Aedes albopictus* mosquitoes from France and from Vietnam.

## **Combatting the bug**

French researchers are also studying the symbiotic relationship that exists between insects of the *Cimex lectularius* species, known as bedbugs, and the bacteria of the *Wolbachia* genus.

"This bug is a human parasite and feeds solely on blood—an unbalanced diet. We discovered that the intracellular bacteria is its source of vitamin B and thus plays a crucial role for the insect's survival," said Natacha Kremer, a researcher at Université Claude Bernard Lyon 1.

According to the researcher, the constant use of insecticides means that the bugs have acquired resistance since the 1990s. "In 2017, 180,000 infestations were recorded and, in 2019, it was 360,000. We urgently need control methods, hence the need to study this type of mutualistic relationship," she said.

The group is seeking to better understand the dynamic between the [bacteria](#) and the bug with the aim of identifying a strategy for combatting the insect.

Provided by FAPESP

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