

Malaria parasite manipulates host's scent

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Credit: CDC

Malaria parasites alter the chemical odor signal of their hosts to attract mosquitos and better spread their offspring, according to researchers, who believe this scent change could be used as a diagnostic tool.

"Malaria-infected mice are more attractive to mosquitos than uninfected mice," said Mark Mescher, associate professor of entomology, Penn State. "They are the most attractive to these mosquito vectors when the disease is most transmissible."

Malaria in humans and animals is caused by parasites and can be spread only by an insect vector, a mosquito. The mosquito ingests the parasite with a blood meal, and the parasite creates the next generation in the mosquito's gut. These nascent parasites travel to the mosquito's salivary glands and are passed to the host during the next meal.

"We were most interested in individuals that are infected with the [malaria parasite](#) but are asymptomatic," said Consuelo De Moraes, professor of entomology, Penn State. "Asymptomatic people can still transmit the disease unless they are treated, so if we can identify them we may be able to better control the disease."

The researchers found that using a mouse malaria model, the mosquitoes were more attracted to infected mice, even when the mice were otherwise asymptomatic. They report their findings today (June 30) in the *Proceedings of the National Academy of Sciences*.

The researchers, who also included Nina M. Stanczyk, former postdoctoral fellow; Heike S. Betz, research technologist, entomology; Hannier Pulido, graduate student in entomology; Derek G. Sim, technician, senior research assistant, biology; and Andrew F. Read, Alumni Professor in the Biological Sciences and Professor of Entomology, all of Penn State, also showed that several individual compounds whose concentrations were altered by [malaria infection](#) contributed to the increase in attractiveness to mosquitoes.

To eliminate other factors such as carbon dioxide production and body temperature as an attractant, the researchers extracted the body scent from the mice and showed that the changes in the scent alone altered the attraction of mosquitoes.

"Mosquitos wouldn't opt to carry the malaria parasite because it isn't good for the mosquito," said De Moraes. "Probably the parasite is not

only manipulating the mice to alter their scent, but the mosquitos to be more attracted to the infected scent."

While the mosquitos were not attracted to mice that had acute malaria symptoms, they were particularly attracted to [mice](#) during a period of recovery when the transmissible stage of the malaria parasite was present at high levels.

In regions where malaria is prevalent, significant numbers of people harbor asymptomatic infections but remain able to transmit the disease to others. The researchers hope this altered scent profile might help to identify those needing treatment.

"If this holds true in humans, we may be able to screen humans for the chemical [scent](#) profile using this biomarker to identify carriers," said Mescher.

More information: De Moraes C et al. Scent of disease: Malaria-induced changes in host odors enhance mosquito attraction. *PNAS Early Edition*, published online 30th June 2014.

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