

Mosquito mysteries: Genetics of bite vulnerability

A rich and long anecdotal lore suggests that some of us are more vulnerable to mosquito bites than others.

In the United States, this is more an itching inconvenience (or a fortuitous repellent strategy if you're lucky). But, in places where malaria and other mosquito-borne illness is endemic, like those now dealing with the spread of locally acquired Zika virus, it can mean the difference between recurrent, life-threatening infections or a natural resistance to deadly disease.

So when evidence was unveiled that attractiveness to mosquitoes may be as genetically linked as height or intelligence, it was widely reported to be the definitive explanation for the anecdotal history and a potential bright spot for public health research.

To make the determination, researchers used pairs of twins. Half were identical and therefore had identical DNA and half were fraternal, meaning they shared only 50 percent of the same genes. Mosquitoes were attracted (or not) to the identical twins in the same way, but didn't share that attraction or repulsion to non-identical twins. The strength of the effect, 68 percent, the researchers say, was as strong as the connection between our genes and [height](#) or [intelligence](#).

[According to some media outlets](#), the story is now solved and repellents based on these genetic findings are just around the corner:

The findings could lead to new ways to keep mosquitoes at bay, the researchers said. "By investigating the genetic mechanism behind attractiveness to biting insects such as mosquitoes, we can move closer to using this knowledge for better ways of keeping us safe from bites and the diseases insects can spread through bites...In the future we may even be able to take a pill which will enhance the production of natural repellents by the body and ultimately replace skin lotions," said senior author James Logan.

What this study can't tell us is how that genetic effect compares to the other factors we already know attract mosquitoes like body mass index, pregnancy and booze consumption. And, potentially, how those things interact. Even malaria itself can make people more attractive to mosquitoes, especially when the disease-causing parasite is most contagious.

The study also didn't analyze which genes were responsible for making some people more appetizing to mosquitoes. The researchers hypothesized that it might be related to the [major histocompatibility complex](#)—a set of genes that in part determines our personal scent and controls our immune system. But that's a ton of genes! In order to pin the MHC down, or to further isolate genes within that group the researchers will need a lot more participants in their studies, like tens of thousands more.

Even more interesting, the researchers pointed out that the effect could not be genes at all, but rather the interaction of a person's genes and environment combining in malicious way to make them particularly tasty snacks. One potential avenue for interaction is the bacteria and other microorganisms that live on

our skin. Their makeup is definitely influenced by our genetics. But it could be that their bio-signatures are responsible for attracting or repelling the bugs, [writes Kings College London epidemiologist Tim Spector](#):

The next time you get bitten by a mosquito on the ankle – don't blame bad luck or your cheap repellent – think of the amazing evolutionary match-making processes that hooked up your special mix of genes to a particular community of microbes that feed off your skin and produce a chemical that only certain species of mosquito find irresistible.

This study is another great example of how it's really difficult to implicate a single gene as responsible for complex human traits, from [intelligence](#) down to something as seemingly simplistic as mosquito attractiveness.

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