



Why Do Mosquito Adore Me: An Article

Reetu Pundir¹, Rishbah Bhardwaj², Meenal Maan², Dr. Vinit Kumar Sharma*³

1. Department of Basic Science(Zoology), Shri Ram College Muzaffarnagar, UP, India
2. Department of Basic Science(Chemistry), Shri Ram College Muzaffarnagar, UP, India
3. Department of Basic Science(Mathematics), Shri Ram College Muzaffarnagar, UP, India

Article info

Received: 29/04/2021

Revised: 28/06/2021

Accepted: 25/07/2021

© IJPLS

www.ijplsjournal.com

Introduction

While serving as a physician in the Indian Medical Service in 1897, Sir Ronald Ross made the discovery that malaria was carried by female Anopheles mosquitoes. This discovery allowed researchers to conclude that mosquito threats to humans outweighed whatever discomfort that their bites may have produced in terms of itching, pain, allergies, or other symptoms.(Ross R.). In addition to spreading malaria, certain mosquito species also carry dengue, yellow fever, West Nile fever, and chikungunya, which cause millions of deaths annually throughout the world. Researchers discovered an odd occurrence while trying to control the mosquito population and stop mosquito-borne illnesses: certain people get bitten by mosquitoes more frequently than others.

WHY DO MOSQUITO LOVES ME



*Corresponding Author

E.mail: vksharmaraj@gmail.com

A number of variables, such as heat, carbon dioxide, and smells that humans release depending on their genetics, nutrition, skin microbiota, and other circumstances, draw female mosquitoes to particular individuals. Only female mosquito bites not male, and they favor certain persons over others. Systematic investigations that date back to the middle of the 20th century provide insight into mosquito preferences.

Decoding Preferences for Mosquito Odor Microbes on the skin

Female mosquitoes are guided toward their targets by chemical and physical cues such as vision, smell, heat, and humidity; however, some body scents attract them to particular hosts. According to some experts, the development of these smells may be influenced by local skin microorganisms. "The volatiles that are released by the bacteria on our skin are unique to each individual," Boston University neuroscientist Meg Younger said. "This variation in human odor explains why different people are more or less attractive to mosquitoes."

How mosquitoes detect skin volatiles



Researchers discovered that mosquitoes use olfactory receptors in their antennal olfactory receptor neurons to detect volatiles from the skin. Six determining which odor profiles mosquitoes like is still a challenging endeavor, though, because human odor is made up of hundreds of different volatile chemical compounds. Despite the difficulty, Younger and associates demonstrated that in an olfactory glomerulus, aldehydes from human odor selectively produced significant and persistent neuronal activation (Zhao Z, et al.). Furthermore, they discovered that a less-selective glomerulus responded either poorly or not at all to animal

odors, but responded strongly to human odors, which may attract mosquitoes to people from a great distance.

Research has indicated that skin microbiota is not the only factor that can affect body temperature, carbon dioxide, ammonia, and lactic acid emission. Pregnancy, malaria parasite infection, food, and heredity have all been linked to increased mosquito attraction in certain individuals (Ellwanger JH, et al.). For instance, researchers evaluated mosquito attraction to volatiles extracted from twins in order to investigate a possible hereditary component (Fernández-Grandon GM, et al.) They discovered that, in contrast to fraternal (dizygotic) twins, mosquitoes were similarly drawn to substances extracted from identical (monozygotic) twins.

The bugs' preferred odor profile also differs between mosquito species. *Culex quinquefasciatus* favored ethylene glycol and heptanal in addition to carbon dioxide, but *Anopheles gambiae* and *Aedes aegypti* are significantly drawn to carbon dioxide, ammonia, and lactic acid.

Chemical Cues for Mosquitoes

Species	Attractants/ Chemical Cues
<i>Anopheles gambiae</i>	Carbon Dioxide, Ammonia, L-(+)-Lactic Acid
<i>Aedes aegypti</i>	Carbon Dioxide, Ammonia, L-(+)-Lactic Acid
<i>Culex quinquefasciatus</i>	Carbon Dioxide, Ethylene Glycol, Heptanal

Researchers advise utilizing mosquito netting, donning protective gear, or, better yet, remaining inside during mosquito bite season to prevent getting bitten by mosquitoes. 10 Mosquito bites can be decreased by lightly misting clothing or exposed skin with N-diethyl-3-methyl-benzamide, or DEET, or other chemical repellents. However, prolonged exposure to, ingestion of, and inhalation of these substances can result in neurotoxicity and other health issues.

Many researchers looked at plant extracts or oils as mosquito repellents since plant-based substances are generally safe, affordable, and plentiful. 11 Researchers discovered that essential oils from lavender, camphor, and many other plants provided protection against some mosquito

species for up to 8 hours, while *Ligusticum sinense* extract provided total protection for as long as 11.5 hours. In the meantime, scientists are working to develop new and more efficient methods of controlling mosquito populations, like the use of poisonous sugar baits, innovative pesticides, and genetically modified biological controls (Dahmana H, et al.) The question of what draws mosquitoes is complex and involves elements like body temperature, carbon dioxide, and other volatile substances or smells released by human skin. Mosquitoes are more drawn to human scents than animal ones, according to research. Mosquito-attracting human chemicals are influenced by a variety of circumstances, including skin micro biome, illness, alcohol intake, pregnancy, and food.

Which blood type is preferred by mosquitoes?

- It's unknown if mosquitoes have a preference for any particular blood type. While some studies indicate that people with type O blood prefer it, others find no association and support the preference for type O blood. Thirteen Most scientists concur that the main factor attracting mosquitoes is the volatile molecules released from the skin. Does mosquito attraction have anything to do with genetics?

- Research on genome-wide associations and twin studies imply that mosquito attraction could have a genetic basis.

Do mosquitoes have uniform preferences?

- Studies have indicated that various mosquito species have distinct preferences for attractants.

- People can protect themselves against mosquito bites by donning protective clothes and using mosquito netting. Applying plant extracts or using chemical repellents sprays can both be beneficial. What piques your interest? Send us a question to be answered in upcoming "Just Curious" columns.

References

1. Ross R. On some peculiar pigmented cells found in two mosquitos fed on malarial blood. *Br Med J.* 1897;2(1929):1786-1788.
2. Dahmana H, et al. Mosquito-borne diseases emergence/resurgence and how to effectively control it biologically. *Pathogens.* 2020;9(4):310.

3. Brown AW. Factors in the attractiveness of bodies for mosquitoes. *Nature.* 1951;167(4240):202.
4. Zhao Z, et al. Mosquito brains encode unique features of human odour to drive host seeking. *Nature.* 2022;605(7911):706-712.
5. Dekker T, et al. Carbon dioxide instantly sensitizes female yellow fever mosquitoes to human skin odours. *J Exp Biol.* 2005;208(Pt 15):2963-2972.
6. Konopka JK, et al. Olfaction in *Anopheles* mosquitoes. *Chem Senses.* 2021;46:bjab021.
7. Ellwanger JH, et al. Variability in human attractiveness to mosquitoes. *Curr Res Parasitol Vector Borne Dis.* 2021;1:100058.
8. Fernández-Grandon GM, et al. Heritability of attractiveness to mosquitoes. *PLoS One.* 2015;10(4):e0122716.
9. Coutinho-Abreu IV, et al. Human attractive cues and mosquito host-seeking behavior. *Trends Parasitol.* 2022;38(3):246-264.
10. Vander Does A, et al. Update on mosquito bite reaction: Itch and hypersensitivity, pathophysiology, prevention, and treatment. *Front Immunol.* 2022;13:1024559.
11. Asadollahi A, et al. Effectiveness of plant-based repellents against different *Anopheles* species: a systematic review. *Malar J.* 2019;18(1):436.
12. Prasadini M, et al. Blood feeding preference of female *Aedes aegypti* mosquitoes for human blood group types and its impact on their fecundity: implications for vector control. *Am J Entomol.* 2019;3(2):43-48.
13. Thornton C, et al. Effects of human blood group sweating and other factors on individual host selection by species A of the *Anopheles gambiae* complex (Diptera, Culicidae). *Bull Ent Res.* 1976;66(4):651-663.