



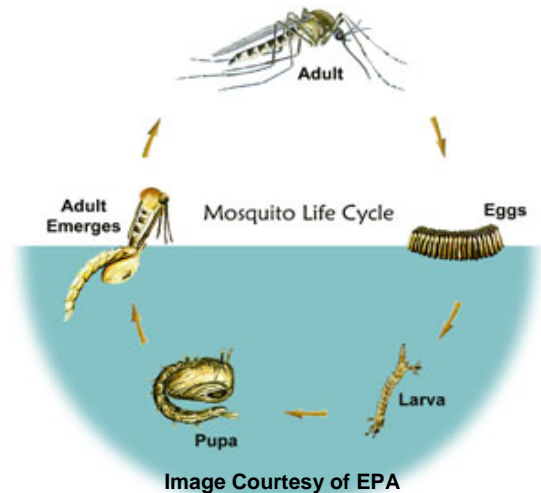
Earth Gauge

A National Environmental Education Foundation Program

Weather, Climate, and Mosquitoes

MOSQUITOES AND WEATHER: AN INTRODUCTION

Mosquitoes (from a Portuguese word for “little fly”) have existed in their modern form for at least 76 million years, and have spread to every continent except Antarctica. Mosquitoes are one of the few insects that routinely lay eggs and mature in small, transient bodies of water (found in areas such as tree cavities and even hoof prints). They are often the “first organism in and the first out” of new water bodies, which has helped them to not only thrive in a variety of climates, but also to evade predators, most of which have longer life-cycles and are not capable of surviving in short-lived water bodies. Although mosquitoes need water for reproduction and warm temperatures to be active, warmer and wetter conditions do not necessarily correspond to more mosquitoes. Here are some documented interactions between weather and mosquito populations:



This pond is just right... Ponds can be classified as *permanent*, *semi-permanent* (meaning that they dry-up when a drought is severe enough) and *temporary* (meaning that they usually dry at some point each year). Mosquitoes are generally rare in *permanent* ponds, where fish and water beetles prey on mosquito larvae. The same is true of mosquito populations in *temporary* ponds, where zooplankton, snails, and tadpoles generally out-compete the larvae for food. During years when *semi-permanent* ponds dry-up, however, both the mosquito’s predators and competitors are eliminated from those ecosystems, and most species lack the mosquitoes’ ability to quickly re-colonize. In years after droughts, when semi-permanent ponds recover, there are few predators and competitors in the ponds to keep mosquito numbers in check, and mosquito population booms are likely.



James Gathany, CDC

Watch out for Drought... During dry summers in the Southeast U.S., lack of rain allows water in storm drains to become stagnant. This stagnant water is the ideal breeding ground for southern house mosquitoes, which transmit West Nile Virus. Less rain, however, generally means fewer small plots of standing water (such as in used tires), where the Asian tiger mosquito (photo at left), which probably only occasionally carries West Nile Virus, breeds.

Evolution Fast-Track... Mosquito populations can change genetic characteristics rapidly. Pitcher-plant mosquito (*Wyeomyia smithii*, found in the northeastern U.S.) eggs hatch once daylight hours reach a certain duration. Those mosquitoes possessing genetic traits compelling them to hatch earlier in the year reproduced more successfully over the past 40 years, when the northeast U.S. warmed by one degree Fahrenheit and the frost-free season expanded. The population became full of individuals that possessed genes allowing them to hatch earlier in a period of only a few decades!

MOSQUITOES, TEMPERATURE, AND DISEASE

While the link between recent climate change and mosquito-borne diseases remains controversial, these links between disease activity and temperature have been established:

- *Plasmodium falciparum* and *Plasmodium vivax* are two species of protozoan that cause malaria. These cells only develop in mosquitoes when the temperature exceeds 64 and 59 degrees Fahrenheit, respectively. *P. falciparum* matures in 26 days when the temperature is at 68 degrees Fahrenheit, but matures in just 13 days once the temperature exceeds 77 degrees.
- West Nile Virus and St. Louis Encephalitis develop inside their hosts once the temperature reaches about 58 degrees Fahrenheit. The rate of development then doubles for each incremental 12 degree Fahrenheit increase in temperature.

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