

# Mosquitos a pain in the neck for over 100 million years

By Abby Anthony

It is said that every species plays an important role in the greater scheme of things, but the mosquito compels us to re-examine the conventional wisdom.

Fossil records show that mosquitoes have plagued North America for over 100 million years. While a planet dominated by dinosaurs and sweltering heat does not seem hospitable to a tiny, 2.5 milligram, buzzing fly, the mosquito proved to be hardy and adaptable. Their adaptability has made them extraordinarily successful — after years of evolution there are now 2,700 species of mosquitoes worldwide and they cause more human suffering than any other organism. Over one million people die from malaria each year, and hundreds of thousands more contract dengue, yellow fever, West Nile virus, and Eastern equine encephalitis, and in the never ending battle between man and bug, the mosquitoes still seem to be winning.

Most female mosquitoes develop a long, tubular feeding appendage for piercing animals' and birds' skin. This appendage is known as a proboscis, which comes from the Greek words "pro" (before) and "boskein" (to feed). Unlike a syringe, the mosquitoes' proboscis is highly serrated, reducing the point of contact with the victim's skin. This reduces nerve stimulation, and the bite is hardly felt. The female mosquito needs protein for egg development, and since the usual mosquito diet consists of nectar

and sugar, many mosquito species must drink blood.

What attracts female mosquitoes and induces them to bite is a subject of much research. Carbon dioxide is the most universally recognized mosquito attractant and draws mosquitoes from up to 35 yards away. Once the mosquito detects carbon dioxide, she flies toward the plume of carbon dioxide in a zigzag pattern to locate its source. Once she is in the general vicinity of the source, other clues dominate, including heat and body odors. Human odor is made up of hundreds of different scents and determining which scents are mosquito attractants and which are repellants is incredibly complicated, but recent research in malaria-plagued villages indicates that 20 percent of the people attract 80 percent of the bites. The difference seems to be linked to subtle variations in smell. For example, drinking heavily or wearing perfume attracts mosquitoes, as does Limburger cheese, which is cultured with the same odor-producing bacteria as human feet and which may explain the tendency for some mosquitoes to find our feet.

Humans are rarely mosquitoes' first or even second choice

for a meal. Most species prefer horses, dogs, cattle, and birds. Humans, however, have created perfect environments for female mosquitoes to lay their eggs. Mosquitoes need standing water in order to reproduce and canals, cisterns, and even an overturned garbage can lid are ideal habitats.

Meanwhile, several viruses evolved to infiltrate mosquitoes' salivary glands and multiply in their guts. When the mosquito bites a person, the virus in the mosquito's saliva enters the bloodstream. The results have been deadly. West Nile virus or WNV, typically a bird virus, was first isolated in Uganda in 1937 and made its first appearance in the United States in 1999 in New York City. By 2004 the virus had been found in birds and mosquitoes in every state except Alaska and Hawaii. The first step in the transmission of WNV occurs when a mosquito bites an infected bird. The mosquito can then transmit the virus when it bites a human. People who contract WNV usually experience mild symptoms such as fever, headache, body aches, rash, and swollen lymph glands. But if the virus enters the brain it can cause life-threatening inflammation or meningitis.

Similarly, Eastern equine encephalitis or EEE, which was first recognized in Massachusetts in 1831 in 75 horses, is transmitted from birds to mosquitoes, which then infect humans and horses. Most people who contract EEE are asymptomatic or have general flu-like symptoms, but the infection may lead to encephalitis, an inflammation of the brain.

The most destructive virus, however, is malaria. It is the leading cause of death in the world, infecting 300 to 500 million people and killing more than 1 million each year — the vast majority of whom are children under the age of 5 in Africa. The species of mosquito, Anopheles, that carries the malaria parasite is very adaptable, and as a result is becoming resistant to the common insecticide DDT. In addition, health officials are reporting that strains of malaria are becoming resistant to the inexpensive and readily avail-

able drugs used to treat malaria in Africa, Asia, and South America.

Facing these challenges, many scientists are using a new approach. Instead of trying to eradicate mosquitoes, scientists are trying to "cure" the mosquitoes' malaria, preventing them from transmitting the disease to people. For example, Dr. Marcelo Jacobs-Lorena, a scientist at Johns Hopkins Malaria Research Institute, has developed a genetically modified mosquito that cannot transmit the malaria parasite. Similar research has also been inspired by donations from the Bill and Melinda Gates Foundation, which gave more than \$300 million to organizations researching anti-malarial drugs and mosquito control initiative.

For more information on mosquito control and disease prevention, visit the U.S. Center for Disease Control Division of Vector Borne Diseases at [www.cdc.gov](http://www.cdc.gov).

## Whistler on tap for museum talk

James McNeill Whistler: His Unexpected Relationships will be the topic of Lunch with the Artist Tuesday, Sept. 19, at the Newport Art Museum.

The informal noontime discussion will be facilitated by Jamestown Richard Tyre. It is free for museum members. There is a \$3 charge for non-members.

The museum provides coffee for each session of Lunch with the Artist, and bag lunches are welcome.

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