

Analysis reveals malaria, other diseases as ancient, adaptive and persistent foes

November 2 2011



This culicine mosquito was discovered in amber from the Dominican Republic, and carried a type of Plasmodium malaria able to infect birds. It shows malaria was established in the New World at least 15 million years ago. (Photo courtesy of Oregon State University)

One of the most comprehensive analyses yet done of the ancient history of insect-borne disease concludes for the first time that malaria is not only native to the New World, but it has been present long before humans existed and has evolved through birds and monkeys.

The findings, presented in a recent issue of *American Entomologist* by researchers from Oregon State University, are based on the study of [insect specimens](#) preserved in amber.

The study outlines the evolution of several human diseases, including

malaria, [leishmaniasis](#) and trypanosomiasis. It makes clear that these [pathogens](#) have existed for at least 100 million years, and suggests that efforts to conquer them will be an uphill battle against such formidable and adaptive foes.

"Amber tells us that these diseases have been here for many millions of years, have co-evolved with their hosts and move readily from one species to another," said George Poinar, Jr., a professor of zoology at OSU and one of the world's leading experts on the study of fossils in this semi-precious stone.

"Malaria is one of the greatest insect-borne killers in [human history](#), and more than one million people a year are still dying from it," Poinar said. "But the evolutionary record suggests it can easily change its [protein coat](#) in response to vertebrate immune reactions. That's why it's always becoming resistant to drugs, and efforts to create vaccines will be very difficult."

Insects preserved for tens of millions of years are offering new clues to the ancient history of these diseases. Blood-feeding vectors trapped [eons](#) ago in oozing [tree sap](#) reveal in near-perfect detail stages of vertebrate pathogens they were carrying when they became entombed.

"Most people think of malaria as a [tropical disease](#), which today it primarily is," Poinar said. "But historically it occurred in many parts of the world, including temperate zones."

"As recently as 1935 there were 900,000 cases of malaria in the United States," he said. "Near Portland, Ore., malaria almost wiped out some local Indian tribes in the 1830s, and the mosquitoes that carried it are still prevalent there. In the 1600s it hindered colonization from Massachusetts to Georgia. And there are 137 million people right now living in areas of risk in the Americas.

"It's possible epidemics could explode again, almost anywhere in the world," he said.

Having traveled much of the world to pursue amber, Poinar knows first-hand the risks involved.

"I caught malaria in the 1970s in the Ivory Coast in Africa," he said.

"My arm had bumped up against some mosquito netting while I slept.

The following day, I started shaking with cold, then sweating with a high fever, thinking I was going to die."

Millions have died. Globally, about 300-500 million cases of malaria occur each year, with more than a million deaths in Africa alone.

Among the points made in this report:

- Discoveries in amber have helped to pin down the minimum ages, origins and early hosts of several insect-borne human diseases.
- An archaic and now extinct malarial parasite was found in 100 million-year-old amber.
- Mosquitoes carrying malaria of the genus *Plasmodium*, the type that causes human illness, were established in the New World at least 15 million years ago, long before modern humans existed. At that time, the disease infected various types of birds.
- Spaniards arriving in South America found that when native peoples acquired fevers, they drank infusions of cinchona bark, which was later found to contain quinine, an effective anti-malarial drug.
- Malaria apparently first went from birds to monkeys and eventually into humans.

Anatomically modern humans are only about 200,000 years old, experts

say. These findings indicate they evolved with [malaria](#) for their entire existence.

Provided by Oregon State University

Citation: Analysis reveals malaria, other diseases as ancient, adaptive and persistent foes (2011, November 2) retrieved 24 April 2024 from <https://phys.org/news/2011-11-analysis-reveals-malaria-diseases-ancient.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.