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The Origin of Human Malaria

New data indicates that *Homo sapiens* picked up the malaria parasite from chimpanzees

By Lynne Peeples

From where did human malaria come: chickens or chimps? That's been one of the questions up for debate over the last half-century regarding the origin of the most common human malarial parasite, *Plasmodium falciparum*, which is responsible for taking the lives of at least one million people every year. Now, new research points a convincing finger at our [primate cousin](#).

"This is one of the outstanding medical mysteries of mankind," says Nathan Wolfe, director of the [Global Viral Forecasting Initiative](#) based in San Francisco and co-author on the finding published online August 3 in the [Proceedings of the National Academy of Sciences](#). "We have perhaps the most devastating disease of humanity, but where it came from has been unclear."

Some investigators had hypothesized that *P. falciparum* was a variant of a parasite found in chickens; most argued that chimpanzee and human malarias co-evolved from a common ancestor several million years ago.

That was all before Wolfe and his team uncovered the surprisingly diverse range of the *Plasmodium* parasite that infects chimpanzees—namely, *P. reichenowi*, which has far more genetic variability than the species that targets humans. Because older parasites have more time to evolve variants, the less diverse human form appeared to be far younger than the chimp's.

This relative youthfulness was further corroborated when the researchers dissected the species' genomes in more detail. "The human malaria parasites were nested right inside the chimp parasites," says [Stephen Rich](#), a geneticist at the University of Massachusetts Amherst and co-author of the paper. In fact, the genetic data suggests that *P. falciparum* is a mutated form of *P. reichenowi*. "When we looked at the branching pattern, we found [humans and chimps] did share a common ancestor from about five [million] to seven million years ago. But there was no example where a human malaria was more closely related to a bird or a chicken than to a chimp malaria."



The resulting theory: a mosquito fed on a chimp and then fed on a human, introducing the parasite into our lineage as recently as 10,000 years ago, Rich says.

Based on research to date, malaria is less virulent in its chimpanzee host. This observation is also consistent with the finding that the chimp version has been around longer. "Parasites generally evolve towards a benign association with their hosts," Rich notes. "Given enough time, parasites and hosts balance in their arms race and both live happily." Chimps and their form of malaria, therefore, have had lots of time to reach a peace agreement.

The latest conclusion "is consistent with what we know about the evolution of the [malaria] vector," says Greg Lanzaro, director of the [Vector Genetics Lab](#) at the University of California, Davis and not involved in the study. "But you have to put all the pieces together to understand what is going on: human genetics, the biology of the vector that is doing the transmitting [the mosquito], and, of course, the parasite itself." This finding is one piece of that puzzle, he says.

Rich and his colleagues are continuing to collect data and sequence genomes, hoping to gain a better understanding of how malaria affects chimps and to pinpoint when it made the jump to humans. Meanwhile, their finding could already start helping [medical research](#). [Sarah Tishkoff](#), a geneticist at the University of Pennsylvania School of Medicine who was also not involved in the study, believes the differences in human and primate susceptibility "could provide important clues for ways to design [more effective vaccines or treatments](#)." Wolfe agrees: the discovery, he says, is "not necessarily just for the history buffs."

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