



# Trends in Molecular Sciences

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## Lice DNA Study Shows Humans First Wore Clothes 170,000 Years Ago

*A new University of Florida study following the evolution of lice shows modern humans started wearing clothes about 170,000 years ago, a technology which enabled them to successfully migrate out of Africa.*

Principal investigator David Reed, Associate Curator of Mammals at the Florida Museum of Natural History on the UF campus, studies lice in modern humans to better understand human evolution and migration patterns. His latest five-year study used DNA sequencing to calculate when clothing lice first began to diverge genetically from human head lice.

Funded by the National Science Foundation, the study is available online and appears in this month's print edition of *Molecular Biology and Evolution*.

"We wanted to find another method for pinpointing when humans might have first started wearing clothing," Reed said. "Because they are so well adapted to clothing, we know that body lice or clothing lice almost certainly didn't exist until clothing came about in humans."

The data shows modern humans started wearing clothes about 70,000 years before migrating into colder climates and higher latitudes, which began about 100,000 years ago. This date would be virtually impossible to determine using archaeological data, because early clothing would not survive in archaeological sites.

The study also shows humans started wearing clothes well after they lost body hair, which genetic skin-coloration research pinpoints at about 1 million years ago, meaning humans spent a considerable amount of time without body hair and without clothing, Reed said.

"It's interesting to think humans were able to survive in Africa for hundreds of thousands of years without clothing and without body hair, and that it wasn't until they had clothing that modern humans were then moving out of Africa into other parts of the world," Reed said.

Lice are studied because unlike most other parasites, they are stranded on lineages of hosts over long periods of evolutionary time. The relationship allows scientists to learn about evolutionary changes in the host based on changes in the parasite.

Applying unique data sets from lice to human evolution has only developed within the last 20 years, and provides information that could be used in medicine, evolutionary biology, ecology or any number of fields, Reed said.

"It gives the opportunity to study host-switching and invading new hosts -- behaviors seen in emerging infectious diseases that affect humans," Reed said.

A study of clothing lice in 2003 led by Mark Stoneking, a Geneticist at the Max Planck Institute in Leipzig, Germany, estimated humans first began wearing clothes about 107,000 years ago. But the UF research includes new data and calculation methods better suited for the question.

"The new result from this lice study is an unexpectedly early date for clothing, much older than the earliest solid archaeological evidence, but it makes sense," said Ian Gilligan, lecturer in the School of Archaeology and Anthropology at The Australian National University. "It means modern humans probably started wearing clothes on a regular basis to keep warm when they were first exposed to Ice Age conditions."

The last Ice Age occurred about 120,000 years ago, but the study's date suggests humans started wearing clothes in the preceding Ice Age 180,000 years ago, according to temperature estimates from ice core studies, Gilligan said. Modern humans first appeared about 200,000 years ago.

Because archaic hominins did not leave descendants of clothing lice for sampling, the study does not explore the possibility archaic hominins outside of Africa were clothed in some fashion 800,000 years ago. But while archaic humans were able to survive for many generations outside Africa, only modern humans persisted there until the present.

“The things that may have made us much more successful in that endeavor hundreds of thousands of years later were technologies like the controlled use of fire, the ability to use clothing, new hunting strategies and new stone tools,”

Reed said.

Study co-authors were Melissa Toups of Indiana University and Andrew Kitchen of The Pennsylvania State University, both previously with UF. Co-author Jessica Light of Texas A&M University was formerly a post-doctoral fellow at the Florida Museum. The researchers completed the project with the help of Reed’s NSF Faculty Early Career Development Award, which is granted to researchers who exemplify the teacher-researcher role.

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