

# Ancient Ants Arose 140-168 Million Years Ago

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The ant group formicoide, which includes pavement and carpenter ants, is among the most ancient. Credit: Photo © Alex Wild 2004

Ants are considerably older than previously believed, having originated 140 to 168 million years ago, according to new research on the cover of this week's issue of the journal *Science*.

But these resilient insects, now found in terrestrial ecosystems the world over, apparently began to diversify only about 100 million years ago in concert with the flowering plants, the scientists say.

"This study integrates numerous fossil records and a large molecular data set to infer the evolutionary radiation of ants, which have deeper roots than we thought," said Chuck Lydeard, program director in NSF's

Division of Environmental Biology, which funded the research.

Led by biologists Corrie Moreau and Naomi Pierce of Harvard University, the researchers reconstructed the ant family tree using DNA sequencing of six genes from 139 representative ant genera, encompassing 19 of 20 ant subfamilies around the world.

"Ants are a dominant feature of nearly all terrestrial ecosystems, and yet we know surprisingly little about their evolutionary history: the major groupings of ants, how they are related to each other, and when and how they arose," said Moreau. "We now have a clear picture of how this extraordinarily dominant - in ecological terms - and successful - in evolutionary terms - group of insects originated and diversified."

Moreau, Pierce and colleagues used a "molecular clock" calibrated with 43 fossils distributed throughout the ant family tree to date key events in the evolution of ants, providing a well-supported estimate for the age of modern lineages. Their conclusion that modern-day ants arose 140 to 168 million years ago pushes back the origin of ants at least 40 million years earlier than had previously been believed based on estimates from the fossil record.

"Our results support the hypothesis that ants were able to capitalize on the ecological opportunities provided by flowering plants and the herbivorous insects that co-evolved with them," said Pierce. The herbivorous insects that evolved alongside flowering plants provided food for the ants.

The researchers found that the poorly known ant subfamily Leptanillinae is the most ancient, followed by two broad groups known as the poneroids (predatory hunting ants) and the formicoids (more familiar species such as pavement ants and carpenter ants).

Other co-authors of the Science paper are Charles Bell at Florida State University and Roger Vila and S. Bruce Archibald in Harvard's Museum of Comparative Zoology.

The study was also supported by the Green Fund.

Source: NSF

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