Bee-killing parasite genome sequenced

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Agricultural Research Service (ARS) scientists have sequenced the genome of a parasite that can kill honey bees. *Nosema ceranae* is one of many pathogens suspected of contributing to the current bee population decline, termed colony collapse disorder (CCD). Researchers describe the parasite's genome in a study published June 5 in the open-access journal *PLoS Pathogens*.

In 2006, CCD began devastating commercial beekeeping operations, with some beekeepers reporting losses of up to 90 percent, according to the USDA. Researchers believe CCD may be the result of a combination of pathogens, parasites and stress factors, but the cause remains elusive. At stake are honey bees that play a valuable part in a $15 billion industry of crop farming in the United States.

The microsporidian Nosema is a fungus-related microbe that produces spores that bees consume when they forage. Infection spreads from their digestive tract to other tissues. Within weeks, colonies are either wiped out or lose much of their strength. Nosema apis was the leading cause of microsporidia infections among domestic bee colonies until recently when N. ceranae jumped from Asian honey bees to the European honey bees used commercially in the United States.

The ARS scientists used genetic tools and microscopic analysis at the ARS Bee Research Laboratory (BRL) in Beltsville, Maryland to examine *N. ceranae*. They collaborated with colleagues at the University of Maryland, College Park, Maryland, Columbia University, New York, New York, and 454 Life Sciences, of Branford, Connecticut.

Sequencing the genome should help scientists trace the parasite's migration patterns, determine how it became dominant, and help resolve the spread of infection by enabling the development of diagnostic tests and treatments.

More information: Cornman RS, Chen YP, Schatz MC, Street C, Zhao Y, et al. (2009) Genomic Analyses of the Microsporidian Nosema ceranae, an Emergent Pathogen of Honey Bees. PLoS Pathog 5(6): e1000466. doi:10.1371/journal.ppat.1000466; dx.plos.org/10.1371/journal.ppat.1000464

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