

Aphids borrowed bacterial genes to play host

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Most aphids host mutualistic bacteria, *Buchnera aphidicola*, which live inside specialized cells called bacteriocytes. *Buchnera* are vital to the aphids well being as they provide essential amino acids that are scarce in its diet. Now research published in the open access journal *BMC Biology* suggests that the aphids' ability to host *Buchnera* depends on genes they acquired from yet another species of bacteria via lateral gene transfer (LGT).

Atsushi Nakabachi from Japan's RIKEN institute with his colleagues had previously uncovered two clusters of [mRNA sequences](#) from the bacteriocyte of the [pea aphid](#) *Acyrtosiphon pisum* that were encoded in the aphid genome, but similar to bacterial [genes](#). Naruo Nikoh from The Open University of Japan and Nakabachi determined these sequences in full for more detailed analysis, and used real-time quantitative RT-PCR experiments to investigate the genes' expression levels in the aphid bacteriocytes.

The evidence points to LGT from bacteria to [aphids](#). Genetic family trees show that one of the genes came from a [bacterium](#) closely related to *Wolbachia*, a common inherited symbiotic microbe, which infects a high proportion of insects. The aphid strain used for the study is free from *Wolbachia* and other closely related bacteria, but the transferred gene could be a remnant of an infection in the distant past. The evidence suggests that the aphids use these acquired genes to host *Buchnera*, which has lost many genes that appear to be essential for bacterial life. The association between aphids and *Buchnera* is over 100 million years old, and has evolved so that today neither the bacteria nor the host can

reproduce without the other.

"The cases presented here are of special interest in that these transferred [bacterial genes](#) not only retain their functionality, but are highly expressed in the bacteriocyte that is differentiated so as to harbour *Buchnera*, which lack such genes," says Nakabachi.

LGT (also referred to as horizontal [gene transfer](#)) occurs when genetic material from one organism finds its way into another organism other than its offspring. Genetic engineering uses LGT deliberately, but there is increasing evidence that LGT has taken place in many organisms (usually between unicellular organisms) naturally. This has caused a major shift in how biologists view genetic family trees.

More information: Aphids acquired symbiotic genes via lateral gene transfer, Naruo Nikoh and Atsushi Nakabachi, *BMC Biology* (in press), www.biomedcentral.com/bmcbiol/

Source: BioMed Central

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