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ABC Science

'Supergene' explains red fire ant society

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AFP

Complex genetics The complex social structure of the red fire ant, a fast-spreading invasive insect with a painful bite, is made possible by a DNA fusion known as a supergene, say biologists.

It is the first study to link supergenes to animal behaviour, the scientists reported in the journal *Nature* (<http://dx.doi.org/10.1038/nature11832>), and predicted a similar effect would be found in other species.

Native to South America, the red fire ant organises itself into two distinct types of social structure - one with a single queen per colony, the other with hundreds.

Though they are the same type of ant, the workers of either group would kill the queens of the other, the international researchers write.

The two groups also differ physiologically: one produces large queens which accumulate a lot of fat and fly away to start new colonies, where they feed their first larvae from their body reserves.

The other group yields smaller queens that remain in an established colony with existing workers and other queens.

Scientists have previously identified a gene variation between the two groups, but have been at a loss to explain how a single gene change could yield so many social and physiological differences.

"People had speculated it could be a supergene, and now that has been confirmed," says biologist Andrew Bourke of the University of East Anglia in a comment on the paper.

"There are other cases known where supergenes affect complex traits. But this is the first case where a supergene is shown to underpin complex social behaviour... in any animal."

Social chromosome

A supergene is a grouping of neighbouring genes on a chromosome that somehow become fused together and are then passed on, unchanged, from generation to generation.

In this case, the team found two variants of a supergene on a pair of ant chromosomes, comprising more than 600 genes or nearly 60 percent of the chromosome.

"This is the first description of a social chromosome," write the authors, "yet it is likely that such supergenes affecting social organisation also exist in other social insects."

As far as human beings are concerned, there is no evidence to date that supergenes are in any way involved in our social organisation, says Bourke.



The red fire ant has become a pest in the southern United States, China and Australia (*Source: Romain Libbrecht and Yannick Wurm*)

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