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# The Fire Ant Social Supergene is Characterized by Extensive Gene and Transposable Element Copy Number Variation



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Interdisciplinary Research Building

跨領域科技研究大樓1樓演講廳

Host: Dr. John Wang 王忠信副研究員

Doctoral Dissertation Defense Presentation



## Abstract

In the fire ant *Solenopsis invicta*, a supergene composed of ~600 genes and having two variants, SB and Sb, regulates colony social form. In single queen colonies all individuals carry only the SB allele, while in multiple queen colonies, some individuals carry the Sb allele. In this study we characterized genes with copy number variation between SB and Sb-carrying individuals. We showed extensive acquisition of gene duplicates in the Sb genome, with some likely involved in polygyne-related phenotypes. We found 260 genes with copy number differences between SB and Sb, of which 239 have greater copy number in Sb. We observed transposable element (TE) accumulation on Sb, likely due to the accumulation of repetitive elements on the non-recombining chromosome. We found a weak correlation between TE copy number and differential expression, suggesting some TEs may still be proliferating in Sb while many of the duplicated TEs have presumably been silenced. Among the 115 non-TE genes with higher copy in Sb, enzymes responsible for cuticular hydrocarbon synthesis were highly represented. These include a desaturase and an elongase; both potentially responsible for differential queen odor and likely beneficial for polygyne ants. These genes seem to have translocated into the supergene from other chromosomes and proliferated by multiple duplication events. While the presence of TEs in supergenes is well documented, little is known about duplication of non-TE genes and their possible adaptive role. Overall, our results suggest that gene duplications may be an important factor leading to monogyne and polygyne ant societies.