EVOLUTION OF IMMUNITY-RELATED GENES IN MYRMECIINE ANTS

Helge Schlüns*, Y Ching Crozier, Ross H Crozier

Centre for Comparative Genomics, James Cook University , Australia

Pathogenic microorganisms impose strong selection pressures on animal immune systems. Immunity-related genes include the most rapidly evolving genes in insect genomes. In social insects pathogens can be easily transmitted among nest mates. Thus they are very well suited for studying the evolution of immunity-related genes. Here, we study the molecular evolution of immunity-related genes in Australian hopper and bulldog ants (genus *Myrmecia*), and in the "dinosaur" ant *Nothomyrmecia macrops*. We cloned and sequenced several immunity-related genes whose products include pathogen recognition, signal transduction, and effector molecules. We discovered positive selection in some but not all immunity-related genes studied in myrmeciine ants applying codon-based comparative analyses. Moreover, we produced a molecular phylogeny facilitating insights into the evolution of phenotypic characters in myrmeciine ants.

SOCIAL IMMUNITY AND THE EXPRESSION OF IMMUNE-RELEVANT GENES IN THE EASTERN SUBTERRANEAN TERMITE

Qi Gao*, Graham J Thompson

Department of Biology, University of Western Ontario, Canada

For social insects, there are two levels of immune defence. Individual immunity consists of a conserved innate response involving the expression of antimicrobials upon infection. Social immunity, by contrast, is a derived phenomenon specific to social animals whereby individuals cooperate to reduce each other's pathogen load. Although examples of social immunity are known from a few well-studied taxa, the extent to which this phenomenon occurs in termites is unknown. Moreover, it is not known the potential impact that socially-enabled defences might have on individual-level immunity. In this study we manipulate two social variables that are expected to affect the number and nature of social interactions, and measure the ability of individuals within groups to resist infection. From laboratory experiments we report that both group size and caste composition affect individual survivorship, despite an individually uniform pathogen load. This pattern suggests that contact rate and type are important for controlling contagion in termite societies, and further suggests that social immunity is affected by caste-based divisions in labour. Secondly, from a novel cDNA library that is enriched for immune genes, we report the first comparative test of termite immune gene diversity against other social and non-social genomes. Like the honey bee, the Eastern subterranean termite appears to harbour relatively few immune genes when compared to *Drosophila* and *Anopheles*. Social living and social immunity may therefore be generally associated with loss of immune loci in insects.