

OR394*Mapping a novel sex determination gene in ants***Yu-Ching Huang**, Mingkwan Nipitwattanaphon, Chih-Chi Lee, Laurent Keller, John Wang

Sex determination is a fundamental biological process that has evolved in many organisms and functions through diverse mechanisms. In haplodiploid insects, such as Hymenoptera (which includes ants and bees), sex is determined by the ploidy of the individual. Males are haploid and develop from unfertilized eggs with one set of chromosomes. Females are diploid and obtain two sets of chromosomes from fertilization. In these species, the mechanism to ascertain ploidy has been proposed to be complementary sex determination (csd): individuals heterozygous at the sex locus develop into females, whereas hemizygous haploid or homozygous diploid individuals develop into males. Studies in the honeybee, *Apis mellifera*, have identified a single locus, *csd*, as the master sex determination gene. Although ants and honeybees share many putative homologs in the sex determination pathway, evidence for their functional conservation is still lacking in ants. We are using the fire ant *Solenopsis invicta* as a model organism to study sex determination. Our genetic analyses have revealed that the fire ants have evolved a novel master sex determination gene. We have mapped the sex locus to a 175 Kb region of chromosome 3, which contains fourteen predicted genes, none with homology to any known sex genes. A hypervariable region was further identified by genome comparisons among different individuals, which is consistent with balancing selection acting on the sex determination locus. Thus far, we have identified 10 sex alleles from individuals sampled from Taiwan and USA in the invasive range. We are currently conducting gene expression analyses and functional tests to identify and characterize this novel sex determination gene in ants.