



Sex Chromosome Evolution in Termites with Different Social Complexities

Author(s): Ann Kathrin Huylmans, Ann Kathrin Huylmans , Beatriz Vicoso

Institution(s): Institute of Science and Technology Austria ; Institute of Science and Technology Austria ; Institute of Science and Technology Austria

Termites are the oldest group of social insects and contrary to the haplodiploid social hymenopterans, such as the much younger ants and bees, termites are diploid. In termites, sex is determined by sex chromosomes and karyotyping suggests that most species possess an XY sex determination system but until now, genomic studies are still scarce and the few existing ones have not focused on sex chromosomes. Since many termite species show uneven sex ratios in helper castes and recent evidence suggests that in some species genes involved in genetic caste determination may be sex-linked, this is an intriguing system to study the interplay between sex determination and eusocial organisation. The increasing genomic and transcriptomic resources for termites make genome-wide comparative studies feasible. In this study, we investigate the sex chromosomes, the sex determination pathway, and the link to social complexity in termites. We use three termite species with different degrees of social complexity: the two lower termites *Cryptotermes secundus* and *Reticulitermes flavipes* and the higher termite *Macrotermes natalensis*. We identify their sex chromosomes and test how conserved they are among termite species and characterise how their gene content and expression has evolved in order to determine whether evolutionary changes in sex chromosomes are linked to the evolution of social complexity. Furthermore, we use transcriptomics for different castes and sexes to characterise the sex determination pathway in termites and find which genes and pathways link caste and sex determination.