Dynamics of chromosome evolution in termites: Inbreeding, translocations and sociality

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Inbreeding is widespread in insects and may have negative effects on individual fitness. In social insects, only a few individuals reproduce often with related individuals. Inbreeding could thus encourage kin selection and plays a role in the evolution of eusociality. One very interesting trait that may occur due to inbreeding is the formation of ring chromosomes and chromosome chains. Ring chromosomes have been observed in male meiosis of several termite species and may increase the rate of translocations via uneven break-ups. Furthermore, this also involves the sex chromosomes and may thus enable fast evolution of sex determination. Furthermore, inbreeding may impact male and female fitness differently, as has, for example, been shown for immunity in Lepidoptera and crickets.
While the X chromosome in termites shows at least in parts homology to that of cockroaches from which termites have evolved, the Y chromosome is young and must have appeared at the base of the termites. It is likely that this new sex chromosome has evolved from a fusion or translocation, possibly as a consequence of increased inbreeding with the onset of sociality. We will investigate chromosome evolution in termites to answer questions with regard to the evolution of sociality, inbreeding, and sex determination.