学位論文要旨（博士（理学））

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論文題名：Influence of meiotic recombination on the neo-Y chromosome evolution of *Drosophila albomicans*

（邦題）：減数分裂組換えがアカショウジョウバエの neo-Y 染色体の進化に及ぼす影響（英文）

本文

The evolution of sex chromosomes is one of crucial issue to understand molecular evolution of eukaryotic species. One hallmark of this process is recombination cessation on Y (W) chromosome evolution. The recombination cessation decreases population size and impairs the efficacy of natural selection of Y chromosome and differentiates sex chromosomes including Y degeneration. Although most of preceding studies showed natural selection under non-recombination environment shaped lack of genetic diversity for Y chromosome, alternative possibility may apply for achiasmatic species, e.g. *Drosophila* species. For example in the case of male achiasmy, Y chromosome has had no chance to introduce genetic diversity through recombination since its origination. Indeed, neo-Y chromosome in *D. miranda* suggested extremely low genetic diversity. Here, in contrast, I focused on a real case of neo-Y chromosome in *D. albomicans* which is in transition from an autosome to a typical Y chromosome but has genetic diversity as rich as gametologous neo-X chromosome.

The neo-X and the neo-Y chromosomes were formed by fusion of sex chromosomes and third chromosomes within 50 million years which is the time *D. albomicans* and its sister species *D. nasuta* diverged. Because most of genes have been maintained intact on the neo-sex chromosomes, I can compare genetic diversity between gametologous genes. The objective of this study is to clarify the influence of recombination on early stage of Y chromosome evolution in *D. albomicans*.

Using analyses of sequence variations in 53 genes and cross experiments, I elucidated ancestral recombination and current no recombination for the neo-Y chromosome. The time of recombination suppression of the neo-Y chromosome was estimated as a quarter million years ago. My results thus showed the neo-Y chromosome originated from a single chromosomal fusion event, obtained genetic diversity through meiotic recombination during the first few hundred thousand years and diverged from neo-X chromosome after the recombination cessation a quarter

million years ago. Consequently, the observed high genetic diversity on the neo-Y chromosome suggested a strong effect of meiotic recombination to introduce genetic variations into the newly arisen sex chromosome.