

Topics in population genetics

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This thesis deals with a number of independent topics in theoretical population genetics. A summary of the topics treated is given below, chapter by chapter.

The first four chapters are concerned with the modification of linkage, by a selectively neutral locus, in deterministic genetic models. The general result, obtained for randomly mating and selfing diploids, and for haploids mating under an incompatibility mechanism, is that, given a stable two locus polymorphism, there can be 'secondary selection' to reduce the recombination frequency between these loci. Under certain conditions in the selfing and randomly mating populations, a polymorphism can exist at the recombination modifying locus, if the heterozygote at the modifying locus causes tighter linkage than either of the homozygotes.

Chapter 5 shows that the migration rate between population can be reduced, if migration rate is controlled by a selectively neutral locus. A two locus sex-linked model is formulated in Chapter 6, and equilibria and stability conditions determined for a particular symmetric set of fitnesses. In Chapter 7, the substitutional load for two linked loci is calculated numerically for a deterministic haploid model, and the effects of linkage and epistasis noted. In Chapter 8, diffusion methods are used to determine the absorption probability of an allele in a haploid population in which the allele has a selective advantage or disadvantage with probabilities π and $1 - \pi$. The final chapter applies some methods of branching processes to multiallelic populations, and to populations of changing size.

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