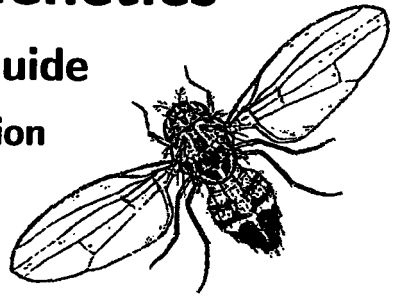


Population Genetics

A Concise Guide

Second Edition



John H. Gillespie

THE JOHNS HOPKINS UNIVERSITY PRESS
Baltimore and London

Contents

List of Figures	ix
Preface	xi
1 Genetic Variation	1
1.1 DNA variation in <i>Drosophila</i>	2
1.2 Loci and alleles	6
1.3 Genotype and allele frequencies	10
1.4 The Hardy-Weinberg law	12
1.5 Answers to problems	18
2 Genetic Drift	21
2.1 A first look at genetic drift	22
2.2 The decay of heterozygosity	25
2.3 Mutation and drift	29
2.4 Molecular evolution	32
2.5 The neutral theory	36
2.6 The coalescent	40
2.7 The effective size of a population	47
2.8 Another model of genetic drift	49
2.9 The stationary distribution	53
2.10 Is genetic drift important in evolution?	55
2.11 Answers to problems	56
3 Natural Selection	59
3.1 The fundamental model	61
3.2 Relative fitness	62
3.3 Three kinds of selection	64
3.4 Mutation-selection balance	70
3.5 Genetic load	71
3.6 The heterozygous effects of alleles	76
3.7 Changing environments	85
3.8 The stationary distribution	90
3.9 Selection and drift	91

3.10	Molecular evolution	95
3.11	Answers to problems	98
4	Two-Locus Dynamics	101
4.1	Linkage disequilibrium	101
4.2	Two-locus selection	105
4.3	Genetic draft	111
4.4	Answers to problems	116
5	Nonrandom Mating	119
5.1	Generalized Hardy-Weinberg	120
5.2	Identity by descent	121
5.3	Inbreeding	123
5.4	The evolution of selfing	127
5.5	Subdivision	131
5.6	Answers to problems	136
6	Quantitative Genetics	139
6.1	Correlation between relatives	139
6.2	Response to selection	150
6.3	Evolutionary quantitative genetics	154
6.4	Dominance	160
6.5	The intensity of selection	166
6.6	Answers to problems	168
7	The Evolutionary Advantage of Sex	169
7.1	Genetic segregation	170
7.2	Crossing-over	173
7.3	Muller's ratchet	174
7.4	Kondrashov's hatchet	179
7.5	Answers to problems	183
	Appendix A Mathematical Necessities	185
	Appendix B Probability	189
	Bibliography	207
	Index	211