

Contents

<i>Introduction</i>	<i>1</i>
 <i>Part One Tools of the Trade</i>	 <i>3</i>
<i>Chapter 1 Some Mathematics for Population Biologists</i>	<i>5</i>
1.1 Matrices and Simple Matrix Operations	5
1.2 Eigenvalues and Eigenvectors	15
1.3 Diagonalizing Matrices	19
1.4 Interpreting Complex Roots	23
1.5 Dispersion	26
1.6 Partial Derivatives	31
1.7 The Taylor Expansion	33
 <i>Part Two The Structural Framework: Population Dynamics</i>	 <i>35</i>
<i>Chapter 2 Populations Without Age Structure</i>	<i>37</i>
2.1 Basic Models	39
2.2 Density Feedback	46
2.3 Changing Environments	50
2.4 Spatially Structured Populations	68
Review Questions	73
 <i>Chapter 3 Age-Structured Populations</i>	 <i>74</i>
3.1 Basic Models	75
3.2 Changing Environments	94
3.3 Spatially Structured Populations	98
Review Questions	100
 <i>Chapter 4 Prey–Predator Interactions</i>	 <i>102</i>
4.1 Basic Models	104
4.2 Changing Environments	122
4.3 Spatially Structured Populations	125
Review Questions	129

Chapter 5	<i>Competitive Interactions</i>	130
5.1	Basic Models	133
5.2	Changing Environments	143
5.3	Spatially Structured Populations	149
	Review Questions	154
Chapter 6	<i>Multispecies Interactions</i>	156
6.1	The Nature of Multispecies Interactions	156
6.2	Changing Environments	166
6.3	Spatially Structured Populations	175
6.4	Species Diversity	180
6.5	Measurement of Species Interaction Coefficients	192
	Review Questions	196
	<i>Part Three Evolutionary Mechanisms: The Genetic Basis of Adaptation</i>	199
Chapter 7	<i>The Genetic Structure of Populations</i>	201
7.1	Basic Models and Temporal Changes	201
7.2	Spatially Structured Populations	216
	Review Questions	219
Chapter 8	<i>Natural Selection: I. Single-Locus Models</i>	221
8.1	Basic Models	225
8.2	Some Extensions of the Basic Models	236
	Review Questions	243
Chapter 9	<i>Single-Locus Models in Time and Space</i>	245
9.1	Changing Environments	245
9.2	Spatially Structured Populations	250
	Review Questions	270
Chapter 10	<i>Natural Selection: II. Multilocus and Quantitative Models</i>	271
10.1	Interacting and Interconnected Loci	271
10.2	The Evolution of Polygenic Traits	284
10.3	The Maintenance of Variance	294
10.4	Spatially Structured Populations	299
	Review Questions	306

Part Four Adaptation: Fine-Tuning the Structural Framework **309**

Chapter 11 The Evolution of Population Parameters **313**

11.1 The Allocation of "Effort" into Reproduction and Survival 313

11.2 Discrete or Continuous Population Growth? 326

11.3 Brood Size 327

Review Questions 338

Chapter 12 The Evolution of Age Structure **340**

12.1 A General Theory of Life Histories 340

12.2 The Real World 356

***12.3 An Alternative Approach and Some Implications for
Population Dynamics*** 359

Review Questions 362

Chapter 13 Genetic Feedback and the Evolution of Dispersal **363**

13.1 Genetic Feedback 363

13.2 The Evolution of Dispersal 371

13.3 Population Consequences of Dispersal 377

***13.4 Models for the Evolution of Density Feedback
Patterns*** 380

Review Questions 382

Chapter 14 Sociality: I. Spacing and Mating Systems **383**

14.1 Spacing Systems 383

14.2 Mating Systems 394

Review Questions 410

Chapter 15 Sociality: II. The Structure of Social Groups **411**

15.1 Communal Breeding Units 411

15.2 The Evolution of Social Groups 415

15.3 Conflict Resolution 425

15.4 Group Size 437

Review Questions 438

Chapter 16	<i>The Evolution of Prey–Predator Interactions</i>	439
16.1	Predator Adaptations	439
16.2	Prey Adaptations	459
16.3	The Coevolution of Prey and Predator	468
	Review Questions	473
Chapter 17	<i>The Evolution of Competitive Interactions</i>	474
17.1	Niche Separation and Community Organization	475
17.2	The Evolution of Niche Overlap	487
17.3	Measuring Alpha Coefficients	494
	Review Questions	497
	<i>Bibliography</i>	499
	<i>Index</i>	539