

# Contents

<i>Preface</i>	vii	III.3 Theory of Selection in Populations	206
<i>Contributors</i>	ix	III.4 Kin Selection and Inclusive Fitness	215
		III.5 Phenotypic Selection on Quantitative Traits	221
<b>Section I Introduction</b>	<b>1</b>	III.6 Responses to Selection: Experimental Populations	230
I.1 What Is Evolution?	3	III.7 Responses to Selection: Natural Populations	238
I.2 The History of Evolutionary Thought	10	III.8 Evolutionary Limits and Constraints	247
I.3 The Evidence for Evolution	28	III.9 Evolution of Modifier Genes and Biological Systems	253
I.4 From DNA to Phenotypes	40	III.10 Evolution of Reaction Norms	261
		III.11 Evolution of Life Histories	268
<b>Section II Phylogenetics and the History of Life</b>	<b>47</b>	III.12 Evolution of Form and Function	276
II.1 Interpretation of Phylogenetic Trees	51	III.13 Biochemical and Physiological Adaptations	282
II.2 Phylogenetic Inference	60	III.14 Evolution of the Ecological Niche	288
II.3 Molecular Clock Dating	67	III.15 Adaptation to the Biotic Environment	298
II.4 Historical Biogeography	75		
II.5 Phylogeography	82	<b>Section IV Evolutionary Processes</b>	<b>305</b>
II.6 Concepts in Character Macroevolution: Adaptation, Homology, and Evolvability	89	IV.1 Genetic Drift	307
II.7 Using Phylogenies to Study Phenotypic Evolution: Comparative Methods and Tests of Adaptation	100	IV.2 Mutation	315
II.8 Taxonomy in a Phylogenetic Framework	106	IV.3 Geographic Variation, Population Structure, and Migration	321
II.9 The Fossil Record	112	IV.4 Recombination and Sex	328
II.10 The Origin of Life	120	IV.5 Genetic Load	334
II.11 Evolution in the Prokaryotic Grade	127	IV.6 Inbreeding	340
II.12 Origin and Diversification of Eukaryotes	136	IV.7 Selfish Genetic Elements and Genetic Conflict	347
II.13 Major Events in the Evolution of Land Plants	143	IV.8 Evolution of Mating Systems: Outcrossing versus Selfing	356
II.14 Major Events in the Evolution of Fungi	152		
II.15 Origin and Early Evolution of Animals	159	<b>Section V Genes, Genomes, Phenotypes</b>	<b>363</b>
II.16 Major Events in the Evolution of Arthropods	167	V.1 Molecular Evolution	367
II.17 Major Features of Tetrapod Evolution	174	V.2 Genome Evolution	374
II.18 Human Evolution	183	V.3 Comparative Genomics	380
		V.4 Evolution of Sex Chromosomes	387
<b>Section III Natural Selection and Adaptation</b>	<b>189</b>	V.5 Gene Duplication	397
III.1 Natural Selection, Adaptation, and Fitness: Overview	193	V.6 Evolution of New Genes	406
III.2 Units and Levels of Selection	200	V.7 Evolution of Gene Expression	413
		V.8 Epigenetics	420

V.9	Evolution of Molecular Networks	428	VII.5	Sexual Selection: Male-Male Competition	641
V.10	Evolution and Development: Organisms	436	VII.6	Sexual Selection: Mate Choice	647
V.11	Evolution and Development: Molecules	444	VII.7	Evolution of Communication	655
V.12	Genetics of Phenotypic Evolution	452	VII.8	Evolution of Parental Care	663
V.13	Dissection of Complex Trait Evolution	458	VII.9	Cooperation and Conflict: Microbes to Humans	671
V.14	Searching for Adaptation in the Genome	466	VII.10	Cooperative Breeding	677
V.15	Ancient DNA	475	VII.11	Human Behavioral Ecology	683
<b>Section VI</b>	<b>Speciation and Macroevolution</b>	<b>483</b>	VII.12	Evolutionary Psychology	690
VI.1	Species and Speciation	489	VII.13	Evolution of Eusociality	697
VI.2	Speciation Patterns	496	VII.14	Cognition: Phylogeny, Adaptation, and By-Products	703
VI.3	Geography, Range Evolution, and Speciation	504	VII.15	Evolution of Apparently Nonadaptive Behavior	710
VI.4	Speciation and Natural Selection	512	VII.16	Aging and Menopause	718
VI.5	Speciation and Sexual Selection	520	<b>Section VIII</b>	<b>Evolution and Modern Society</b>	<b>727</b>
VI.6	Gene Flow, Hybridization, and Speciation	529	VIII.1	Evolutionary Medicine	733
VI.7	Coevolution and Speciation	535	VIII.2	Evolution of Parasite Virulence	741
VI.8	Genetics of Speciation	543	VIII.3	Evolution of Antibiotic Resistance	747
VI.9	Speciation and Genome Evolution	549	VIII.4	Evolution and Microbial Forensics	754
VI.10	Adaptive Radiation	559	VIII.5	Domestication and the Evolution of Agriculture	760
VI.11	Macroevolutionary Rates	567	VIII.6	Evolution and Conservation	766
VI.12	Macroevolutionary Trends	573	VIII.7	Directed Evolution	774
VI.13	Causes and Consequences of Extinction	579	VIII.8	Evolution and Computing	780
VI.14	Species Selection	586	VIII.9	Linguistics and the Evolution of Human Language	786
VI.15	Key Evolutionary Innovations	592	VIII.10	Cultural Evolution	795
VI.16	Evolution of Communities	599	VIII.11	Evolution and Notions of Human Race	801
<b>Section VII</b>	<b>Evolution of Behavior, Society, and Humans</b>	<b>605</b>	VIII.12	The Future of Human Evolution	809
VII.1	Genes, Brains, and Behavior	609	VIII.13	Evolution and Religion	817
VII.2	Evolution of Hormones and Behavior	616	VIII.14	Creationism and Intelligent Design	825
VII.3	Game Theory and Behavior	624	VIII.15	Evolution and the Media	832
VII.4	Sexual Selection and Its Impact on Mating Systems	632	<i>Index</i>		837