



PREFACE	vii
CHAPTER 1	A Brief History of Animals 1
	Animal origins and the fossil record2
	The animal tree6
	General features of animal design and diversity8
	Evolution and development: DNA and diversity13
CHAPTER 2	The Genetic Toolkit for Development 17
	Before the toolkit—organizers, fields, and morphogens18
	The genetic toolkit20
	Sharing of the genetic toolkit among animals46
	The toolkit and animal design51
CHAPTER 3	Building Animals 55
	Gene regulation in metazoans55
	The architecture of genetic regulatory hierarchies.....57
	The insect body plan.....61
	The vertebrate body plan.....83
	Review: the general logic and mechanisms controlling gene expression in cellular fields95
CHAPTER 4	Evolution of the Toolkit 103
	The history of gene families.....104
	Case study: evolution of the <i>Hox</i> complex.....114
	Interpreting the toolkit: inferences about animal evolution119
	The toolkit as developmental potential127
CHAPTER 5	Diversification of Body Plans and Body Parts 131
	Diversity of anterior/posterior body organization within arthropods and vertebrates132
	Morphological diversity within a conserved body plan.....142
	Regulatory evolution and the diversification of homologous body parts.....154

CHAPTER 6	The Evolution of Morphological Novelties.....	159
	What is morphological novelty?.....	160
	Novel functions from older morphological structures	161
	The evolution of vertebrate novelties.....	170
	Evolution of radical body plan changes	178
	Regulatory evolution and the origin of novelties	185
CHAPTER 7	Morphological Variation and Species Divergence	191
	Evolution of animal color patterns	192
	Nodal points in regulatory networks and the evolution of character number and pattern.....	201
	Qualitative and quantitative aspects of skeletal evolution in stickleback fish	205
	More variation than meets the eye: cryptic genetic variation and the potential for morphological evolution.....	206
	Regulatory evolution and species divergence	208
CHAPTER 8	From DNA to Diversity: The Primacy of Regulatory Evolution.....	213
	Why is regulatory evolution a primary force in morphological evolution?.....	213
	The function and evolution of <i>cis</i> -regulatory DNA.....	215
	The evolution of regulatory DNA and morphological diversity	230
GLOSSARY		239
INDEX		245