

Contents

	Preface to the second edition	xiii
PART I	Setting the stage	I
Chapter 1	Introduction	3
	Fossils	5
	Taphonomy	6
	Collection	13
	Prospecting	13
	Collecting	15
	Back at the ranch	17
	Important readings	19
Chapter 2	Back to the past: the Mesozoic Era	21
	When did the dinosaurs live and how do we know?	22
	Chronostratigraphy	22
	Age of rocks	23
	Lithostratigraphy	25
	Biostratigraphy	27
	Eras and Periods and Epochs, Oh My!	28
	Growth of a prehistoric timescale	30
	Where were the continents during the time of the dinosaurs?	30
	What were climates like during the time of the dinosaurs?	35
	Potential effects of plate motions on climate	35
	Climates through the Mesozoic	36
	Box 2.1 Stable isotopes, ancient temperatures, and dead oceans	38
	Important readings	41
Appendix:	Chemistry quick 'n dirty	43
Chapter 3	Discovering order in the natural world	45
	Hierarchy	45
	Characters	46
	Cladograms	48
	A monkey's uncle	51
	Evolution	51
	Chopping down the "tree of life"	54
	Using cladograms to reconstruct phylogeny	56
	Box 3.1 Wristwatches: when is a watch a watch?	57
	Parsimony	58
	Science and testing hypotheses	61
	Important readings	62

Chapter 4	Interrelationships of vertebrates	63
	In the beginning	63
	Jumping to chordates	64
	Box 4.1 Body plans	65
	Vertebrata	67
	Gnathostomata	67
	Box 4.2 Biological classification: what's in a name?	68
	Tetrapoda	69
	The tetrapod skeleton made easy	70
	Box 4.3 Fish and chips	71
	Amniota	77
	Synapsida	78
	Reptilia	79
	Anapsida	79
	Diapsida	80
	Archosauromorpha	80
	Dinosaurs	82
	Box 4.4 Stance: it's both who you are and what you do	83
	Important readings	85
Chapter 5	The origin of the Dinosauria	87
	History of the Dinosauria	87
	Dinosaurs divided	88
	Dinosaurs united	90
	Dinosaurian monophyly	91
	Origins	92
	The rise of dinosaurs: superiority or luck?	94
	Important readings	98
PART II	Ornithischia: armored, horned, and duck-billed dinosaurs	101
	Important readings	106
Chapter 6	Stegosauria: hot plates	107
	Stegosaur lives and lifestyles	110
	Stance and gait	110
	Dealing with mealing	111
	Brains	114
	Box 6.1 The poetry of dinosaurs	116
	Social lives of the enigmatic	117
	Plates and spines	118
	The evolution of Stegosauria	121
	Stegosaurs meet history: a short account of their discovery	123
	Box 6.2 Nineteenth century dinosaur wars: boxer versus puncher	126
	Important readings	130

Chapter 7	Ankylosauria: mass and gas	132
	Ankylosaur lives and lifestyles	134
	Going their way	134
	Food and mouths to feed	135
	Defensive moves	137
	The evolution of Ankylosauria	139
	Ankylosaurs meet history: a short account of their discovery	142
	Box 7.1 Indiana Jones and the Central Asiatic Expeditions of the American Museum of Natural History	144
	Important readings	146
Chapter 8	Pachycephalosauria: ramrods of the Cretaceous	147
	Pachycephalosaur lives and lifestyles	148
	Feeding	150
	Thoughts of a pachycephalosaur	151
	Social behavior	151
	Sexual selection	156
	The evolution of Pachycephalosauria	157
	Pachycephalosaurs meet history: a short account of their discovery	160
	Important readings	163
Chapter 9	Ceratopsia: horns and all the frills	164
	Ceratopsian lives and lifestyles	167
	Feeding	167
	Locomotion	169
	Horns, frills, and ceratopsian behavior	170
	The evolution of Ceratopsia	177
	Ceratopsidae	180
	Ceratopsians meet history: a short account of their discovery	181
	Important readings	184
Chapter 10	Ornithopoda: the tuskers, antelopes, and "mighty ducks" of the Mesozoic	186
	Ornithopod lives and lifestyles	189
	Going their way	189
	Box 10.1 Hypotheses that didn't go the distance	191
	Feeding and food	192
	Social behavior	197
	The evolution of Ornithopoda	205
	Heterodontosauridae	206
	Euornithopoda	206
	Iguanodontia	208
	Hadrosauridae	209
	Ornithopods meet history: a short account of their discovery	211
	Important readings	218

PART III	Saurischia: predators and giants	221
	Important readings	226
Chapter 11	Sauropodomorpha: the big, the bizarre, and the majestic	229
	Lifestyles of the huge and ancient	232
	Box 11.1 Tendaguru!	233
	Feeding	240
	Locomotion	243
	Social behavior	244
	Sauropodomorph growth and development	245
	The evolution of Sauropodomorpha	248
	Prosauropoda	249
	Sauropoda	250
	Diplodocoidea	252
	Box 11.2 The decapitation of " <i>Brontosaurus</i> "	253
	Macronaria	255
	Titanosauria	256
	Sauropodomorphs meet history: a short account of their discovery	257
	Important readings	264
Chapter 12	Theropoda I: Nature red in tooth and claw	265
	Theropod lives and lifestyles	270
	Going their ways	270
	Theropods as living organisms	270
	Weaponry	271
	Jaws and teeth	273
	Box 12.1 <i>Triceratops</i> as spoils ... or spoiled <i>Triceratops</i> ?	276
	Senses	278
	Prey	279
	Social behavior – sex and the Rex	282
	The evolution of Theropoda	284
	Ceratosauria	286
	Tetanurae	286
	Coelurosauria	288
	Eumaniraptora	289
	Theropods meet history: a short account of their discovery	290
	Important readings	298

Chapter 13	Theropoda II: The origin of birds	300
	Living birds	301
	<i>Archaeopteryx lithographica</i> and the ancestry of living birds	305
	Anatomy of <i>Archaeopteryx</i>	308
	The ancestry of living birds	312
	Living birds as dinosaurs	312
	Pneumatic bones and feathers: adaptation versus inheritance	315
	The revolution of the 1990s: feathered dinosaurs	316
	The origin of feathers	316
	The Liaoning fossils	319
	What, if anything, is a bird?	322
	Dissent	323
	Box 13.1 <i>Plus ça change ...</i>	324
	Flight	326
	Conclusions	329
	Important readings	330
Chapter 14	Theropoda III: The early evolution of birds	333
	The Mesozoic avialary	334
	Getting to be a modern bird	340
	Important readings	341
PART IV	Endothermy, environments, and extinction	344
Chapter 15	Dinosaur thermoregulation: some like it hot	347
	An enigma explored	347
	Box 15.1 Warm-bloodedness: to have and have not	348
	Is warm-bloodedness superior to cold-bloodedness?	349
	Temperature regulation among vertebrates	349
	Endothermic and ectothermic metabolism	350
	Box 15.2 A primer on metabolism	351
	Dinosaur endothermy: the evidence	353
	Anatomy	353
	Box 15.3 In the tracks of the dinosaurs	356
	Box 15.4 Dinosaur smarts	361
	Histology	362
	Ecology	367
	Box 15.5 Weighing in	370
	Zoogeography	371
	Phylogeny	374
	Geochemistry	374
	Opinions on dinosaur endothermy	376
	Modern views on dinosaur metabolism	378
	Important readings	380

Chapter 16	Patterns in dinosaur evolution	383
	Box 16.1 The shape of tetrapod diversity	385
	Box 16.2 Counting dinosaurs	386
	Dinosaurs through time	387
	Late Triassic (227–205 Ma)	387
	Early Jurassic (205–190 Ma)	394
	Middle Jurassic (190–159 Ma)	395
	Late Jurassic (159–144 Ma)	395
	Early Cretaceous (144–99 Ma)	396
	Late Cretaceous (99–65 Ma)	397
	Out with a whimper or a bang?	398
	Plants and herbivores	402
	Plants	403
	Dinosaur and plant co-evolution	404
	Box 16.3 Dinosaurs invent flowering plants?	406
	Carnivorous dinosaurs	408
	Important readings	409
Chapter 17	Reconstructing extinctions: the art of science	412
	Extinctions	413
	Resolving the past	416
	Resolution: the “R word”	416
	Higher taxa	419
	Box 17.1 Full disclosure: the ugly truth about higher taxa	421
	Important readings	422
Chapter 18	The Cretaceous–Tertiary extinction: the frill is gone	423
	Geological record of the latest Cretaceous	424
	Earth gets a makeover	424
	Asteroid impact	425
	Biological record of the latest Cretaceous	434
	Oceans	435
	Terrestrial record	437
	Box 18.1 Dinosaurs and mass extinctions	442
	Extinction hypotheses	443
	Adhering to a scientific standard	443
	Extinction hypotheses	444
	Box 18.2: The real reason dinosaurs became extinct	446
	Recovery	448
	Toward a consensus?	449
	Important readings	452
	Glossary	455
	Subject index	466
	Generic index	475
	Author index	481