

TABLE OF CONTENTS

Preface to the Fourth Edition xi

PART I

Remembrance of Things Past 1

1 To Catch a Dinosaur 7

What's in This Chapter 7
 Preservation and Fossils 8
 Bagging a Dinosaur 13
 Collecting 13
 Box 1.1 A Dino Named "Sue" 16
 Summary 24
 Selected Readings 24
 Topic Questions 24

2 Dinosaur Days 27

What's in This Chapter 27
 When Did Dinosaurs Live (and How Do We Know)? 28
 Continents and Climates 33
 Climates During the Time of the Dinosaurs 36
 Summary 38
 Selected Readings 39
 Topic Questions 39
 Appendix 2.1 Chemistry Quick 'n Dirty 40
 Appendix 2.2 Plate Tectonics 41

3 Who's Related to Whom – and How Do We Know? 45

What's in This Chapter 45
 Who Are You? 46
 Organic Evolution 46
 Phylogenetic Systematics – the Reconstruction of Phylogeny 49
 Box 3.1 What's in a Name? Cladograms versus Trees 54
 Summary 60
 Selected Readings 61
 Topic Questions 61
 Appendix 3.1 What is "Organic Evolution"? 61

4 Who Are the Dinosaurs? 65

What's in This Chapter 65
 Finding the History of Life 66
 The Beginning 66
 Tetrapoda 69
 Box 4.1 Fish and Chips 70
 Diapsida 78
 Box 4.2 What, if Anything, is a "Reptile"? 78
 Dinosaurs 81
 Box 4.3 Stance: It's Both Who You Are and What You Do 83
 Summary 84
 Selected Readings 85
 Topic Questions 85

5 In the Beginning... 87

What's in This Chapter 87
 Finding the First Dinosaur 88
 Archosauria 88
 Early Dinosauria 93
 Ornithischia and Saurischia 95
 Is Saurischia More Primitive than Ornithischia? 97
 The Evolution of Dinosauria 97
 Box 5.1 But What if We've Had it TOTALLY Wrong for Over a Century? 98
 Let the Games Begin! 100
 Box 5.2 No Dates; No Rates 102
 Feathers 105
 Feathers Without Flight 105
 Summary 108
 Selected Readings 109
 Topic Questions 110

PART II

Saurischia: Meat, Might, Muscle, and Magnitude 113

6 Theropoda I 119

Nature Red in Tooth and Claw
 What's in This Chapter 119

- Theropoda 120
 Theropod Lives and Lifestyles 121
 Box 6.1 Putting Meat on the Bones...
 Through “Extant Phylogenetic
 Bracketing” 133
 Thoughts of a Theropod 135
 Summary 147
 Selected Readings 148
 Topic Questions 149
- 7 Theropoda II 151**
 Meet the Theropods
 What’s in This Chapter 151
 Neotheropoda 153
 Tetanurae 153
 Box 7.1 Will the Real *Tyrannosaurus rex*
 Please Stand Up? 161
 Summary 177
 Selected Readings 177
 Topic Questions 178
- 8 Theropoda III 179**
 The Origin and Early Evolution
 of Birds
 What’s in This Chapter 179
 Avialae 180
 Box 8.1 The Bird is a Word 180
 The Mesozoic Avialary 184
 Box 8.2 Plus ça Change... 185
 Neornithes (Aves) 193
 Origin of Avian Flight 196
 Box 8.3 Birds as Dinosaurs: at First, not
 Exactly a Love(bird)fest 197
 Summary 204
 Selected Readings 207
 Topic Questions 206
 Appendix 8.1 What Makes a Modern Bird a
 Modern Bird? 206
- 9 Sauropodomorpha 211**
 The Big, the Bizarre, and the
 Majestic
 What’s in This Chapter 211
 Sauropodomorpha 212
 “Prosauropods” 214
 Sauropoda 217
 Reaching for the Stars 223
 The Evolution of Sauropodomorpha 230
 Box 9.1 On Again; Off Again: the Checkered
 Career of *Brontosaurus* 236
 Summary 239
 Selected Readings 240
 Topic Questions 240
- PART III**
**Ornithischia: Armored, Horned,
 and Duck-Billed Dinosaurs 243**
- 10 Thyreophora 255**
 The Armor-Bearers
 What’s in This Chapter 256
 Thyreophora 256
 Euryopoda 257
 Euryopoda: Stegosauria 257
 Box 10.1 Dino Doggerel 257
 Euryopoda: Ankylosauria – Mass
 and Gas 268
 Box 10.2 The Year of the Ankylosaur
 (at Least in Canada) 274
 The Evolution of Thyreophora 278
 Summary 281
 Selected Readings 282
 Topic Questions 283
- 11 Marginocephalia 285**
 Bumps, Bosses, and Beaks
 What’s in This Chapter 285
 Marginocephalia 286
 Marginocephalia: Pachycephalosauria – in
 Domes We Trust 286
 The Evolution of Pachycephalosauria 293
 Marginocephalia: Ceratopsia – Horns and All
 the Frills 296
 Box 11.1 Dino Brains 310
 The Evolution of Ceratopsia 312
 Summary 316
 Selected Readings 317
 Topic Questions 318
- 12 Ornithopoda 321**
 Mighty Mesozoic Masticators
 What’s in This Chapter 321
 Ornithopoda 322
 Box 12.1 Those Rascals, the Basal
 Ornithischians! 335
 The Evolution of Ornithopoda 337
 Summary 340

- Selected Readings 341
 Topic Questions 341
- PART IV**
Endothermy, Endemism, and Extinction 345
- 13 The Paleobiology of Dinosaurs I 349**
 What's in This Chapter 349
 Paleobiology 350
 Dino Breath 350
 Dino Brains 351
 Dino Bones 352
 Tonnage 357
 Fleet-Footed... or Flat-Footed 361
 Pathologies 363
 Zombies 363
 Summary 366
 Selected Readings 367
 Topic Questions 367
- 14 The Paleobiology of Dinosaurs II 371**
 Dinosaur Metabolism – Some Like it Hot
 What's in This Chapter 371
 The Way They Were 372
 Physiology: Temperature Talk 372
 Box 14.1 Warm-Bloodedness: to Have and to Have Hot 373
 So What About Dinosaurs? 373
 Bone Histology 380
 Air Conditioning 382
 Stable Isotopes 382
 Summary 388
 Selected Readings 389
 Topic Questions 390
 Appendix 14.1 Chain of Fuels 390
- 15 The Flowering of the Mesozoic 393**
 What's in This Chapter 393
 Dinosaurs in the Mesozoic Era 394
 Box 15.1 The Shape of Tetrapod Diversity 395
 Box 15.2 Counting Dinosaurs 398
 Plants and Dinosaurian Herbivores 407
 Box 15.3 Dinosaurs Invent Flowering Plants... or at Least Fuel Their Evolution? 414
 Summary 415
- Selected Readings 416
 Topic Questions 416
- 16 A History of Dinosaur Paleontology Through the Ideas of Dinosaur Paleontologists 419**
 What's in This Chapter 419
 In the Beginning 420
 Seventeenth and Eighteenth Centuries 421
 Box 16.1 Indiana Jones and the Central Asiatic Expeditions of the American Museum of Natural History 422
 The Nineteenth Century Through the Mid Twentieth Century 422
 Box 16.2 Sir Richard Owen: Brilliance and Darkness 424
 Dinosaurs in the First Half of the Twentieth Century 425
 Dinosaurs Before *Jurassic Park* (BJP): the Second Half of the Twentieth Century (Most of it Anyway!) 427
 Box 16.3 Dinosaur Wars in the Nineteenth Century: Boxer versus Puncher 428
 Box 16.4 Louis Dollo and the Beasts of Bernissart 430
 Box 16.5 "Mr Bones" 432
 Box 16.6 Tales of Two Germans 434
 Box 16.7 Franz Baron Nopcsa: Politics, Dinosaurs and Espionage 438
 Dinosaurs After *Jurassic Park* – the Late 1990s 442
 Today: Young Turks and Old Turks 444
 Summary 449
 Selected Readings 450
 Topic Questions 451
- 17 The Cretaceous–Paleogene Extinction 453**
 The Frill is Gone
 What's in This Chapter 453
 How Important Were the Deaths of a Few Dinosaurs? 454
 Asteroid Impact! 454
 Box 17.1 Extinction 458
 Volcanic Eruptions 462
 Biological Record of the Latest Cretaceous 464

x Table of Contents

| | |
|--|--|
| Box 17.2 Getting Fooled by the Fossil Record: the Signor–Lipps Effect 470 | Summary 484 Selected Readings 487 |
| Box 17.3 Dinosaurs: All Wrong for Mass Extinctions 472 | Topic Questions 486 |
| Extinction Hypotheses 474 | <i>Glossary</i> 487 |
| Box 17.4 The Real Reason the Dinosaurs Became Extinct 482 | <i>Index of Subjects</i> 507 <i>Index of Genera</i> 517 |