

Brief Contents

PART I	INTRODUCTION TO THE MAMMALIA	1	Chapter 15 Chiroptera	244	
Chapter 1	Introduction	3	Chapter 16 Carnivora	282	
Chapter 2	Mammalian Origins	13	Chapter 17 Perissodactyla	310	
Chapter 3	Mammalian Characteristics	33	Chapter 18 Artiodactyla	325	
Chapter 4	Classification of Mammals	60	Chapter 19 Cetacea	346	
PART II	MAMMALIAN DIVERSITY	67	PART III	MAMMALIAN STRUCTURE AND FUNCTION	369
Chapter 5	Monotremata	69	Chapter 20 Reproduction	371	
Chapter 6	Metatheria	79	Chapter 21 Aspects of Physiology	405	
Chapter 7	Introduction to Eutherian Mammals	105	Chapter 22 Echolocation	447	
Chapter 8	Afrosoricida, Macroscelidea, and Tubulidentata	111	PART IV	ECOLOGY, BEHAVIOR, AND CONSERVATION	473
Chapter 9	Paenungulata	123	Chapter 23 Ecology	475	
Chapter 10	Cingulata, Pilosa, and Pholidota	139	Chapter 24 Behavior	525	
Chapter 11	Dermoptera and Scandentia	153	Chapter 25 Zoogeography	572	
Chapter 12	Primates	159	Chapter 26 Mammalian Conservation Ethics	599	
Chapter 13	Rodentia and Lagomorpha	187	Chapter 27 Mammalian Domestication	611	
Chapter 14	Erinaceomorpha and Soricomorpha	231	Chapter 28 Mammalian Disease and Zoonoses	625	

Contents

Preface	x
Acknowledgments	xii

PART I

INTRODUCTION TO THE MAMMALIA	1
1 Introduction	3
Classification	6
Phylogeny Reconstruction	7
2 Mammalian Origins	13
Morphological Features of Synapsids	15
Important Evolutionary Transformations	19
Early Mammals	23
Mesozoic Mammalian Radiations	25
Cretaceous Mammals	30
3 Mammalian Characteristics	33
Soft Anatomy	35
The Skeleton	47
4 Classification of Mammals	60

PART II

MAMMALIAN DIVERSITY	67
5 Monotremata	69
Morphology	70
Reproduction	71
Paleontology	73
6 Metatheria	79
Morphology	80
Reproduction	81
Paleontology	82
Metatherians Versus Eutherians: Relative Competitive Abilities	87
South American Metatherians	88
Australasian Metatherians	91
7 Introduction to Eutherian Mammals	105
8 Afrosoricida, Macroscelidea, and Tubulidentata	111
Order Afrosoricida	113
Order Macroscelidea	117
Order Tubulidentata	120

9	Paenungulata	123	14	Erinaceomorpha and Soricomorpha	231
	Order Proboscidea: Elephants	125		Order Erinaceomorpha	232
	Order Sirenia: Sirenians	131		Order Soricomorpha	234
	Order Hyracoidea: Hyraxes	134	15	Chiroptera	244
10	Cingulata, Pilosa, and Pholidota	139		Morphology	247
	Paleontology	141		Flight	250
	Order Cingulata	145		Paleontology	254
	Order Pilosa	147		Non-Echolocating Bats	255
	Order Pholidota	150		Echolocating Bats	257
11	Dermoptera and Scandentia	153	16	Carnivora	282
	Order Dermoptera	154		Feliformia	284
	Order Scandentia	156		Caniformia	293
12	Primates	159		Pinnipedia	298
	Primate Origins	160		Musteloidea	302
	Suborder Strepsirrhini	163	17	Perissodactyla	310
	Suborder Haplorrhini	171		Perissodactyl Evolution	312
	Platyrrhini	174		Cursorial Specialization	314
	Catarrhini	177		Feeding Specialization	317
13	Rodentia and Lagomorpha	187		Living Perissodactyls	317
	Order Rodentia	188	18	Artiodactyla	325
	Morphology	189		Evolution	326
	Paleontology	189		Morphology	327
	Jaw Muscle and Skull Specializations	192		Ruminantia	333
	Suborder Sciuromorpha	193	19	Cetacea	346
	Suborder Castorimorpha	196		Paleontology	347
	Suborder Myomorpha	201		Morphology	350
	Suborder Anomaluromorpha	210		Cetacean Adaptations	351
	Suborder Hystricomorpha	212		Suborder Mysticeti	355
	Infraorder Hystricognathi	213		Suborder Odontoceti	359
	Order Lagomorpha	224			

PART III**MAMMALIAN STRUCTURE
AND FUNCTION**

20	Reproduction	369
	Reproductive System Anatomy	371
	Monotreme Reproduction	372
	Therian Reproduction	375
	Major Reproductive Patterns	376
	Control of Reproductive Timing	392
	Infanticide and Pregnancy Termination	396
	Reproductive Cycles and Life-History Strategies	397
	Litter Size and Seasonal Timing	398
21	Aspects of Physiology	400
	Endothermy: Benefits and Costs	405
	Coping with Cold	406
	Coping with Heat	410
	Behavioral Thermoregulation	424
	Fossorial Mammals:	428
	Physiological Problems	429
	Aquatic and Semiaquatic Mammals:	431
	Physiological Problems	433
	Energy Costs of Locomotion	436
	Water Regulation	436
22	Echolocation	447
	Introducing Echolocation	448
	The Role of Echolocation in the Lives of Mammals	454
	Evolution of Echolocation	457
	Echolocation Calls and Foraging Strategies	458
	Bats Versus Moths	462
	Echolocation in Cetaceans	464
	Echolocation by Other Mammals	468

PART IV**ECOLOGY, BEHAVIOR,
AND CONSERVATION**

23	Ecology	473
	Global Climate Patterns	475
	Populations	477
	Communities	481
24	Behavior	500
	Activity Rhythms	525
	Foraging Behavior	527
	Shelter-Building Behavior	529
	Communication	535
	Defensive Behavior	536
	Mating Systems	546
	Parental Care	546
	Social Behavior	551
25	Zoogeography	551
	Dispersal, Vicariance, and Faunal Interchange	572
	Mammals of the Biogeographic Regions	575
	Continental Drift, Mammalian Evolution, and Zoogeography	577
	Climate and Mammalian Distribution	580
	South American Mammals and the Great American Biotic Interchange	583
	The Unusual Mammalian Fauna of Madagascar	591
	The Island Syndrome	595
26	Mammalian Conservation Ethics	596
	State of the Earth	599
	Human Impact on Mammals	600
	A New Conservation Ethic	602

27 Mammalian Domestication	611
History of Domestication	612
Domesticated Mammals	612
Limits of Domestication	623

28 Mammalian Disease and Zoonoses	625
Viral Diseases	627
Prion Diseases	632
Bacterial Diseases	632

Parasitic (Nonzoonotic) Diseases	635
Other Emerging Pathogens (Nonzoonotic)	637
Marine Mammal Diseases	638
Conservation Medicine	639

Bibliography	642
Glossary	714
Index	726

New to the Sixth Edition

We have completely revised and updated our discussion of the fossil history of mammals, placed related topics in boxed insets in each chapter, and included two new chapters, "Mammalian Domestication" and "Mammalian Disease and Zoonoses." We have also added many new photographs and drawings to illustrate key points made in the text, while retaining the original anatomical drawings by senior author Jerry Vaughan. These drawings, which we regard as essential to the original chapters, should help students to understand the descriptions of structure and function. We have made liberal use of these drawings, most of which illustrate skulls, teeth, or feet. The profiles of skulls are usually of the right side, and most occlusal views of teeth show the right upper or the left lower tooth. When other teeth are shown, the legend indicates this. The chapter-opening illustrations were also provided by Jerry Vaughan.

In an effort to provide additional pedagogical tools and resources for students, we have placed key terms in bold

The first part of this book (Chapters 1 through 4) defines mammals and summarizes their origins. Chapter 1 summarizes the origin of mammals. Chapter 2 details the structural features that characterize mammals, and Chapter 3 introduces classification. In the second part of the book (Chapters 5 through 19), the orders and families of mammals are covered in detail. The taxonomic chapters in each introduction on the tooth in our current distribution, morphological characteristics, and basic behavior and ecology of each family of mammals. The third and fourth parts (Chapters 20 through 28) treat special topics such as mammalian evolution, physiology, behavior, ecology, and zoogeography. From this coverage of the subject, students can gain a general understanding and appreciation of the form and function of mammals. Two additional chapters (27 and 28), which were previously offered online and now included in the text, cover mammalian domestication and mammalian disease and zoonoses.

In the interest of reflecting the extraordinary recent activity in mammalian biology, one of the most important changes in the sixth edition is the more thorough use of phylogenetically based mammalian relationships. The widespread application of phylogenetic systematics in recent years has led to a new general agreement about the higher-level evolutionary relationships among living

in the interest of reflecting the extraordinary recent activity in mammalian biology, one of the most important changes in the sixth edition is the more thorough use of phylogenetically based mammalian relationships. The widespread application of phylogenetic systematics in recent years has led to a new general agreement about the higher-level evolutionary relationships among living