

## Contents

	<i>Preface</i>	page xi
	<i>Acknowledgements</i>	xiii
<b>Part I Carnival of the Animals</b>		
<b>1</b>	<b>Quo Vadis?</b>	3
<b>2</b>	<b>Mammalian Classification and Evolution</b>	6
	How Many Species of Mammals Are There?	6
	Subclasses of the Mammalia	7
	Subclass Monotremata	9
	Subclass Marsupialia	12
	South American Marsupials	12
	Australasian Marsupials	14
	Subclass Placentalia	25
	Phylogeny of the Extant Placental Mammals	25
	The Superorder Laurasiatheria	25
	The Superorder Euarchontoglires	34
	The Superorder Afrotheria	41
	The Superorder Xenarthra	46
	Dating the Origins of Placental Mammals	50
<b>Part II The Act of Mating</b>		
<b>3</b>	<b>Copulatory Patterns: Phylogeny and Modes of Life</b>	57
	Defining and Classifying Copulatory Patterns	57
	The Phylogenetic Distribution of Copulatory Patterns	60
	The Five Major Patterns	60
	The Minor Patterns	67
	The Phylogenetic Distribution of Individual Copulatory Traits	69
	Copulatory Locks	69
	Pelvic Thrusting	72
	Multiple and Single Intromissions	73
	Prolonged Intromission	74

	Ecological Factors That May Influence Copulatory Behaviour	75
	Carnivorous Versus Herbivorous Modes of Life	75
	Copulation in Subterranean Mammals	76
	Spiny Species: Effects of Body Armour	79
	Aquatic and Terrestrial Copulations	81
	Effects of Body Size and Other Anatomical Constraints	83
	Copulatory Postures	84
<b>4</b>	<b>Copulatory Interactions and Sexual Selection</b>	89
	Caveats Concerning the Classification of Mating Systems	89
	How Common are Multiple-partner Matings by Female Mammals?	92
	Monotremes	93
	Marsupials	93
	Placental Mammals	95
	Copulatory Patterns, Sperm Competition and Cryptic Female Choice	99
	Primates	99
	Rodents	102
	Copulatory Courtship and Cryptic Female Choice	105
	<b>Part III The Evolution of Reproduction</b>	
<b>5</b>	<b>Phallic Structure and Function</b>	111
	Phylogeny and Phallic Morphology	111
	The Evolution of Morphological Diversity	114
	Penile Morphology and Primate Mating Systems: A Test Case	116
	Pelvic Bones, Penes and Post-copulatory Sexual Selection in Cetaceans	119
	Diverse Penile Morphologies in Marsupials	121
	Penile Morphology and Copulatory Locks in Diverse Taxa	125
	Urethral Processes and Related Structures	130
	The Evolution and Functions of the Baculum	134
	Some Observations Concerning Fossil Bacula	141
	The Evolution and Functions of Penile Spines	142
	The Evolution and Functions of the Striated Penile Muscles	149
<b>6</b>	<b>The Testes and Spermatozoa</b>	155
	Relative Testes Size and Sperm Competition	156
	Sperm Competition in Bats	156
	Sperm Competition in Primates	156
	Sperm Competition in Terrestrial Carnivores	159
	Sperm Competition in Cetaceans	161
	A Caveat Concerning the Compartments of the Testis	163
	Sperm Production	163
	The Epididymis: Sperm Maturation and Storage	165
	Sexual Selection and Sperm Morphology	171

	The Evolution of Sperm Length	174
	The Sperm Midpiece and Sperm Energetics	176
	Altruistic Sperm? Sperm Bundles, Binary Sperm and Sperm Hooks	178
	Testicular Descent and the Evolution of the Scrotum	182
<b>7</b>	<b>The Accessory Reproductive Glands and Ducts</b>	187
	Phylogenetic Distribution of the Accessory Reproductive Glands	187
	Rapid Sperm Transport: The Vas Deferens and Sperm Competition	189
	The Vesicular and Prostate Glands: Effects of Sexual Selection	194
	Coagulation of Semen and the Formation of Copulatory Plugs	196
<b>8</b>	<b>Cooperation, Conflict and Cryptic Female Choice</b>	205
	Comparative Anatomy of the Female Reproductive System	205
	The Female Genitalia: Copulatory and Post-copulatory Sexual Selection	211
	Copulatory Courtship: Reflexive Responses to Penile Stimuli	211
	Other Types of Tactile Stimulation Provided By Males During Copulation	214
	Copulatory Courtship: The Mechanical 'Fit' Between Genitalia	217
	Cryptic Female Choice: Sperm Survival, Storage and Transport	228
	Polyovulation and Cryptic Female Choice	243
	Some Concluding Remarks Concerning Long-term Sperm Storage	246
<b>9</b>	<b>The Evolution of Mating-induced and Spontaneous Ovulation</b>	248
	The Phylogenetic Distribution of Mating-induced Ovulation	248
	Ovulation Considered From a Social and Ecological Perspective	252
	Insights From the Fossil Record of Mammalian Evolution	253
	The Neuroendocrine Control of Ovulation	255
	Somatosensory Feedback and Mating-induced Ovulation	257
	Beta Nerve Growth Factor in Semen and Induced Ovulation	259
	Induced Ovulation and Post-copulatory Sexual Selection	262
	Summary and Conclusions	263
 <b>Part IV Epilogue</b>		
<b>10</b>	<b>An End of Day Glass</b>	267
	Conclusions and Unresolved Questions	267
	Post-copulatory Sexual Selection and Human Evolution	276
	The Age of Mammals	279
	<i>Appendices</i>	283
	<i>References</i>	313
	<i>Index</i>	371