

Species diversity in space and time

Michael L. Rosenzweig

Professor
Department of Ecology and Evolutionary Biology
University of Arizona

&

Brittingham Fellow
Department of Zoology
University of Wisconsin



CAMBRIDGE
UNIVERSITY PRESS

Contents

	<i>Preface</i>	xiii
Chapter 1	<i>The road ahead</i>	1
	How many rooms in Noah's Ark?	1
	The structure of this book	4
Chapter 2	<i>Patterns in space</i>	8
	Species–area curves	8
	Latitudinal gradients	25
	Habitat variety	32
	Disturbance	36
	Productivity	39
	Hot spots	46
	Relative diversity of polyploid species	48
Chapter 3	<i>Patterns in time</i>	50
	Evolutionary time	50
	Ecological time	62
Chapter 4	<i>Dimensionless patterns</i>	73
	Body size	73
	Patterns in food webs and food chains	77
Chapter 5	<i>Speciation</i>	87
	Geographical speciation	87
	Polyploidy	96
	Competitive speciation	97
	Evidence for competitive speciation	105
	The relative importance of speciation modes	107
	Immigration	110
Chapter 6	<i>Extinction</i>	112
	Basic causes	112
	Who suffers accidents?	113
	The role of population interactions	125
	Extinction rates and diversity	128

	Measuring extinction rates	135
	Doomed species – extinction may take a long time	145
	Mass extinctions	146
Chapter 7	<i>Coevolution of habitat diversity and species diversity</i>	151
	The tradeoff principle	151
	Speciation will break up a cartel of phenotypes	156
	The coevolution of niche breadth	157
	Plants also restrict themselves to their best habitats	166
	Seasonality	174
	The evolution of habitat diversity	175
Chapter 8	<i>Species–area curves: the classical patterns</i>	190
	Mainland patterns	190
	Island patterns	210
Chapter 9	<i>Species–area curves: large issues</i>	264
	Interprovincial patterns: species–area curves in evolutionary time	264
	The linearity of species–area curves and their slopes	268
	Synthesis: species–area curves at several scales of space and time	276
	The effect of drifting continents	279
	Latitudinal gradients	284
Chapter 10	<i>Paleobiological patterns</i>	297
	The epochal steady state	297
	Why, over hundreds of millions of years, does diversity rise?	306
Chapter 11	<i>Other patterns with dynamic roots</i>	317
	Population dynamics and food webs	317
	Polyploidy	338
	Disturbance and non-equilibrium systems	341
Chapter 12	<i>Energy flow and diversity</i>	345
	Experimental increase of productivity	345
	The unimodal pattern in regions	348
	The global scale	370
	Prospects	371

Chapter 13	<i>Diversity dynamics: a hierarchical puzzle</i>	373
	The role of differential equations	374
	A large piece of the puzzle: area effects	376
	Future exploration of data for pattern	377
	The dinosaur's challenges	378
	Salute	381
	<i>References</i>	385
	<i>Index</i>	423