CONTENTS

Other Physical Disturbances 122
Pathogens 126
Marine Disturbances 126

CHAPTER 6  COMMUNITIES, FORMATIONS AND BIOMES 132

Communities 133
Plant Physiognomy, Vegetation Structure, and Formations 139
Ecological Equivalents, Life Zones, and the Biomes 141
   Tropical Rainforest 145
   Tropical Seasonal Forest 153
   Tropical Savanna 154
   Desert 159
   The Mediterranean Biome 164
   Temperate Grassland 167
   Temperate Forests 171
   Temperate Rainforest 176
   Coniferous Boreal (Taiga) and Montane Forests 178
   Tundra 181

PART II  TIME AND LIFE

CHAPTER 7  CHANGING CONTINENTS AND CLIMATES 191

Life and the Geologic Time Scale 191
Shifting Continents 196
Quaternary Climatic Change 205
Future Changes in Continents and Climate 217

CHAPTER 8  DISPERSAL, COLONIZATION, AND INVASION 227

Dispersal 228
Colonization, Seasonal Migrations, and Irruptions 234
Diffusion Versus Jump Dispersal 241
Barriers, Corridors, Filters, Stepping Stones, and Sweepstakes 246
Recent Invasions by Exotic Species 252

CHAPTER 9  EVOLUTION, SPECIATION, AND EXTINCTION 262

Evolution and Speciation 262
   Some Basic Genetics 263
   Historical Development of Evolutionary Theory 267
   Isolation and Speciation 272
   The Temporal Pattern of Evolution 275
   Direction in Evolution 277
   Perfection in Evolution 278
   Increasing Species Diversity 279
Geography and Evolution: Founder Effects, Bottlenecks, Vicariance Events, Adaptive
   Radiation, and Evolutionary Convergence 280
Extinction 287
   The Relationship Between Evolution and Extinction 295
CHAPTER 10  REALMS, REGIONS, AND PROVINCES: THE BIOGEOGRAPHIC SUBDIVISIONS OF THE EARTH  299

Defining Biogeographic Realms, Regions, and Provinces  299
Determining the Boundaries Between Regions  305
Factors Behind the Modern Biogeographical Regions  307
  Evolution of the Mammals  308
  Evolution of the Flowering Plants  311
The Modern Biogeographic Regions  315
  Nearctic and Palearctic Regions—The Holarctic  315
  Neotropical Region  317
  Ethiopian (African) Region  319
  Oriental Region  320
  Australian Region  321

CHAPTER 11  BIOGEOGRAPHY AND HUMAN EVOLUTION  324

The Primate Linkage  324
Early Primates  327
The Hominids: Australopithecus  330
The Hominids: Early Homo  336
The Hominids: Homo Sapiens  340
The Geographic Expansion of Modern Humans  344

CHAPTER 12  HUMANS AS A FORCE IN EVOLUTION AND EXTINCTION  350

Humans as an Evolutionary Force  350
  Animal and Plant Domestication  351
  Questions of the Origin and Spread of Agriculture  357
Humans as a Force of Extinction  362
  Prehistoric Extinctions  362
  Historic Extinctions  368

PART III  THEORY AND PRACTICE

CHAPTER 13  DESCRIPTION AND INTERPRETATION OF BIOGEOGRAPHIC DISTRIBUTIONS  377

Mapping Biogeographic Distributions  378
Biogeography of Range Size and Range Shape  380
Common Biogeographical Distributional Patterns  386
  Endemic and Cosmopolitan Distributions Revisited  387
  Continuous Zonal Biogeographic Distributions  388
  Amphiregional Disjunct Distributions  388
  Dispersal Disjunctions  389
  Climatic Disjunctions  390
  Geologic Disjunctions  391
  Evolutionary Disjunctions  391
  Biogeographic Relicts  392
Biogeographic Distributions and the Reconstruction of Evolutionary History  394
  Centers of Origin and the Dispersalist Model  395
  Cladistic Biogeography  396
  Panbiogeography and Vicariance Models  398
Beyond Vicariance Biogeography: The Phylogeographic Revolution  402