

Contents

	List of Sites	xv
1	The Subterranean Domain	1
	1.1 Introduction	1
	1.2 Caves	4
	1.3 Small-cavity subterranean habitats	15
	1.4 Shallow subterranean habitats	17
	1.5 Summary	23
2	Sources of Energy in Subterranean Environments	24
	2.1 Introduction	24
	2.2 Sources of energy	24
	2.3 Summary	40
3	Survey of Subterranean Life	43
	3.1 Introduction	43
	3.2 Temporary subterranean visitors	43
	3.3 Residents of cave entrances	46
	3.4 Ecological and evolutionary classifications	48
	3.5 Taxonomic review of obligate subterranean species	50
	3.6 Subterranean organisms in the laboratory	74
	3.7 Collecting stygobionts and troglobionts	75
	3.8 Summary	79
4	Ecosystem Function	80
	4.1 Introduction	80
	4.2 Scale and extent of subterranean ecosystems	81
	4.3 Stream reaches	83
	4.4 Caves	87
	4.5 Karst basins	93
	4.6 Summary	96

5	Biotic Interactions and Community Structure	98
5.1	Introduction	98
5.2	Species interactions—generalities	98
5.3	Predator–prey interactions—beetles and cricket eggs in North American caves	100
5.4	Competition and other interactions in Appalachian cave streams	104
5.5	Morphological consequences of competition	108
5.6	Competition as a result of eutrophication	111
5.7	Community analysis—generalities	112
5.8	Epikarst communities	113
5.9	Interstitial groundwater aquifers	115
5.10	Overall subterranean community structure in the Jura Mountains	116
5.11	Summary	118
6	Adaptations to Subterranean Life	119
6.1	Introduction	119
6.2	History of concepts of adaptation in subterranean environments	120
6.3	Adaptation in amblyopsid cave fish	124
6.4	Adaptation in the amphipod <i>Gammarus minus</i>	130
6.5	Adaptation in the cave fish <i>Astyanax mexicanus</i>	138
6.6	Experimental studies of adaptation in other subterranean organisms	143
6.7	How long does adaptation to subterranean life take?	144
6.8	Revisiting the selection–neutrality controversy	145
6.9	Summary	146
7	Colonization and Speciation in Subterranean Environments	147
7.1	Introduction	147
7.2	Colonization of subterranean environments	149
7.3	What determines success or failure of colonizations?	151
7.4	Allopatric and parapatric speciation	152
7.5	Vicariance and dispersal	158
7.6	Cryptic speciation	165
7.7	Age of lineages	169
7.8	Phylogeography of three different subterranean lineages	170
7.9	Summary	175
8	Geography of Subterranean Biodiversity	179
8.1	Introduction	179
8.2	The struggle to measure subterranean biodiversity	180

8.3	Caves as islands	186
8.4	Global species richness	190
8.5	Regional species richness	195
8.6	Summary	205
9	Some Representative Subterranean Communities	206
9.1	Introduction	206
9.2	Shallow subterranean habitats	207
9.3	Deep non-cave habitats	216
9.4	Cave habitats	218
9.5	Summary	225
10	Conservation and Protection of Subterranean Habitats	226
10.1	Introduction	226
10.2	Rarity	227
10.3	Other biological risk factors	230
10.4	Threats to the subterranean fauna	231
10.5	Site selection	240
10.6	Protection strategies	243
10.7	Preserve design	244
10.8	Summary	246
	Glossary	247
	Literature Cited	255
	Index	291
	• Danube Flood Plain National Park	
	• Lobau wetlands	
	Belgium	
	• Walloon	
	Bermuda	
	• Walsingham Cave	
	Bosnia & Hercegovina	
	• Dabarska pećina	
	• Popovo polje	
	• Trebišnjica River System	
	• Vjetrenica	