

Contents

1	Arid Deserts of the World: Origin, Distribution, and Features	1
1.1	Historical	1
1.2	Definitions and Features	1
1.3	Distribution of Deserts	2
1.4	Meaning and Causes of Aridity	4
1.5	Arid Zone Climate and Vegetation	5
1.6	Vegetation Types	6
	References	7

Part I Egypt: The Land of Three Deserts

2	The Desert of Egypt	11
2.1	Location and Physiographic Features	11
2.2	General Features of Phytogeographical Divisions	13
2.2.1	The Western Desert	13
2.2.2	The Eastern Desert	13
2.2.3	The Sinai Peninsula	15
2.2.4	The Nile Land	16
2.2.5	The Western Mediterranean Coast	18
2.3	Concluding Remarks	18
	References	19
3	The Coastal Desert of Egypt	21
3.1	General	21
3.2	Surveyed Areas	23
3.2.1	The Western Mediterranean Coast (Sallum Area)	23
3.3	Concluding Remarks	46
3.3.1	The Eastern Mediterranean Coast (El-Arish-Rafah Area)	49
3.4	Floristic Relations	50
3.5	Vegetation Classification	52
3.5.1	Abbreviations of Indicator Species	54

3.6	Vegetation–Environment Relationships	55
3.7	Diversity Versus Environment	58
3.8	Concluding Remarks	58
3.8.1	A Coastal Plain in South Sinai (El-Qaa Plain).	61
3.9	Floristic Relations	63
3.9.1	Classification of the Vegetation	65
3.10	Soil Characteristics of the Vegetation Groups	69
3.11	Ordination of Stands	69
3.12	Vegetation and Soil Factors	70
3.13	Concluding Remarks	71
	Photo Gallery	74
	References.	77
4	The Inland Eastern Desert of Egypt	83
4.1	General.	83
4.2	Surveyed Areas	84
4.2.1	The Coastal Mountains: Gebel Elba	84
4.2.2	The Northern Wadis.	98
4.2.3	The Southern Wadis (Between 26°45' and 24°01' N and 32°45' and 35°00' E)	105
4.3	Concluding Remarks	130
4.3.1	Biogeographical Analysis of the Eastern Desert	132
4.4	Phytogeographical Reassessment	152
4.4.1	The Saharo–Sindian Chorotype	152
4.4.2	The Mediterranean Chorotype	156
4.4.3	The Irano–Turanian Chorotype	159
4.4.4	The Sudano–Zambeziian Chorotype.	161
4.4.5	The Cosmopolitan, Palaeotropical, and Pantropical Species	162
4.5	Concluding Remarks	165
	Photo Gallery	167
	References.	172
5	The Inland Western Desert of Egypt.	179
5.1	General Features	179
5.2	The Accidental Vegetation Along Two Transects.	182
5.2.1	Species and Life-Form Spectrum.	183
5.2.2	Classification of Vegetation	183
5.2.3	Ordination	188
5.2.4	Concluding Remarks	193
5.3	Endangered Species: <i>Randonia africana</i>	195
5.3.1	Species Composition of Population Sites	196
5.3.2	Classification of Vegetation Data.	196
5.3.3	Soil Characteristics of the Vegetation Groups	198
5.3.4	Stand Ordination	198
5.3.5	Soil–Vegetation Relationships	201

5.3.6	General Remarks	202
5.4	The Desert Oases	203
5.4.1	Flora and Vegetation in Ancient Wells	204
5.4.2	Habitat Types and Structure of Vegetation	217
	Appendix	244
	Abbreviations of Plant Names in Fig. 5.13	245
	Photo Gallery	245
	References	250
6	The Sinai Desert	257
6.1	General	257
6.2	Surveyed Areas of South Sinai	258
6.2.1	The Inland Wadis	258
6.2.2	The Coastal Wadis	284
6.2.3	The Isthmic Desert	301
	Appendix	307
	Photo Gallery	313
	References	317
7	Human Impacts	321
7.1	General	321
7.2	Desert Urbanization	323
7.2.1	Surveyed Areas	323
7.3	General Remarks	349
7.4	Desert Reclamation	350
7.4.1	Surveyed Area: Along the Northern Sector of the Nile Valley	350
7.5	General Remarks	365
7.6	Desert Roads	367
7.6.1	Surveyed Areas	368
7.7	General Remarks	376
7.7.1	Along Six Desert Roads Crossing the Eastern Desert	378
	Appendix	396
	Photo Gallery	403
	References	409
8	Plant Responses to Desert Environment	415
8.1	Climbing Plants	415
8.1.1	The Selected Plants	416
8.1.2	Succulent Plants	436
8.1.3	The Selected Plants	443
8.1.4	General Remarks	451
8.2	Parasitic Plants	453
8.2.1	Distribution of the Selected Species	454
8.2.2	Edaphic Conditions	454
8.2.3	Climatic Conditions	455

8.2.4	Host Ranges	457
8.2.5	Biomass	458
8.2.6	Water Content and Succulence Ratio	460
	Appendix	463
	References	466

Part II The Desert and Semi-desert of Mexico

9	The Deserts of Mexico	473
9.1	Location and Physical Environment	473
9.1.1	Climate	476
9.1.2	Lithology	477
9.1.3	Soil	477
9.1.4	General Characteristics of the Floristic Composition	478
9.2	The Sonora and Baja California Desert	480
9.2.1	Lower Colorado River Valley	481
9.2.2	Arizona Highlands	481
9.2.3	Central Gulf Coast	482
9.2.4	Plains of Sonora	482
9.2.5	Coastal Thorny Shrubland	483
9.3	The Chihuahuan Arid Region	483
9.3.1	Alluvial Desertic Shrubland	484
9.3.2	Calci Desert Scrub	486
9.3.3	Piedmont Scrub	486
9.3.4	Gypsophile Grassland	487
9.4	The Tamaulipan Semi-arid Region	491
9.4.1	The Sclerophyllous Brush or Chaparral	491
9.4.2	Subinerm Tall Matorral	492
9.4.3	Tamaulipan Thorny Shrubland	493
9.5	The Hidalgo Semi-arid Region	493
9.5.1	Tall Thorny Scrub	494
9.5.2	Rosetophyllous Thorny Scrub	494
9.6	The Poblano–Oaxaca Semi-arid Region	495
	References	498

10 Plant–Environment Relationships in Mexican

	Arid and Semi-arid Regions	503
10.1	Biotic Interactions	503
10.1.1	Plant–Plant Interactions	504
10.1.2	Plant–Animal Interactions	507
10.2	Abiotic Interactions: Environment and Vegetation	510
10.3	The Cactaceae: An Emblematic Family in Mexican Deserts	515
10.3.1	Habitat and Distribution	516
10.3.2	Group Diversity	518
10.3.3	Risks and Threats for Cacti	520
	References	523

Part III The Desert of China

11 The Deserts of China	531
11.1 Location and Physical Environment	531
11.1.1 Location	531
11.1.2 Landform	531
11.1.3 Climate	532
11.1.4 Soil/Parent Materials	532
11.2 General Features of Phytogeographical Divisions	534
11.2.1 Phytogeographical Divisions	534
References	536
12 Vegetation and Environment	537
12.1 Desert Plants	537
12.1.1 Plant Species	537
12.1.2 Flora	538
12.1.3 Life Form	539
12.2 Plant Communities	539
12.2.1 Typical Desert in the Jungar Basin	539
12.2.2 Extremely Arid Desert in the Gobi	540
12.2.3 Azonal Vegetation	541
12.3 Vegetation–Environment Relationships	542
12.3.1 Climate	542
12.3.2 Elevation	543
12.3.3 Water Table and Salinity	543
12.3.4 Soil Texture	543
12.3.5 Topographic Conditions	544
References	544

Part IV The Deserts of Pakistan

13 The Deserts of Pakistan	547
13.1 Introduction and Physical Environment	548
13.1.1 Thal Desert	548
13.1.2 Cholistan Desert	549
13.1.3 Nara Desert	550
13.1.4 Tharparkar Desert	550
13.1.5 Khاران Desert	550
13.2 Microhabitats and Vegetation Types	551
13.2.1 Microhabitats	551
13.2.2 Vegetation Types	555
13.3 Plant Biodiversity of Tharpakar Desert, Sindh	558
13.3.1 Phytogeography and Floristic Composition	558
13.3.2 Ecological Amplitude	560
13.3.3 Endemic Species	560
13.4 Conservatory Body	560

13.5	Anthropogenic Activities and Possible Remedial Measures	560
13.5.1	Anthropogenic Pressure	560
13.5.2	Remedial Measures	564
13.6	Phytogeography and Soil–Plant Relationships of the Nara Desert, Pakistan	565
13.6.1	Location and Physical Environment	565
13.6.2	Flora and Phytogeography	566
13.6.3	Vegetation and Microhabitats	567
13.6.4	Plant–Soil Relationships	569
13.7	Conclusion and Recommendations	572
	References	573
	Index	575

Plant Responses to Hyperarid Desert Environments

Abd El-Ghani, M.M.; Huerta-Martínez, F.M.; Hongyan, L.;
Qureshi, R.

2017, XV, 598 p. 227 illus., 148 illus. in color.,
Hardcover

ISBN: 978-3-319-59134-6