

# Contents

<b>1</b>	<b>Introduction . . . . .</b>	<b>1</b>
	Plants are no Less Complex than Animals:	
	They are Just Different . . . . .	2
	Natural versus Human Selection . . . . .	4
	The First Gardens . . . . .	5
	Plants versus Animals . . . . .	7
	Plant Blindness . . . . .	8
	Popular Science . . . . .	10
	Complexity . . . . .	12
<b>2</b>	<b>Basic Plant Organisation: How it Differs from that of Animals . . . . .</b>	<b>17</b>
	Plants are Nutritionally Self-sufficient . . . . .	19
	Nutritional Self-sufficiency Renders Movement Redundant and Determines Plant Design and Construction . . . . .	24
	The Concept of Death in the Plant Kingdom . . .	32
	Plants as Modular Organisms with Increased Autonomy of their Parts . . . . .	42
<b>3</b>	<b>Why Trees are Almost Immortal and Other Related Issues . . . . .</b>	<b>45</b>
	Annual Rings as Climatic Memory . . . . .	46
	Longevity Elixirs . . . . .	52
	Plants as Environmental Engineers . . . . .	63
	Chemical History of the Atmosphere: Photosynthesis and Plants as the Main Players . .	74
	Planetary Aspects of an Enzymic Reaction . . . .	85
	Size and Age are not Always Related . . . . .	94
	How Tall can a Tree Become? . . . . .	97
	Life Span and Species Immortality . . . . .	108

<b>4</b>	<b>Short Evolutionary History of Plants . . . . .</b>	<b>113</b>
	Which Organisms are Characterised as Plants? . .	114
	Life on Planet Earth before the Appearance of Plants: Some Key Biological Episodes that Paved the Way . . . . .	117
	Required Structural and Functional Innovations that Enabled Land Colonisation . . . . .	128
	Interactive Systems: Plants, Climate, Animals, Soil . . . . .	136
	Violent Environmental Perturbations and their Evolutionary Significance . . . . .	140
	Why did Plants not Suffer Mass Extinction? . . . . .	145
	Reproductive Idiosyncrasies of Plants: Resistance to Extinction . . . . .	151
<b>5</b>	<b>Sex in Nonmotile Organisms . . . . .</b>	<b>161</b>
	Hermaphroditic in Form, Yet Sexually Segregated with the Help of Chemistry . . . . .	162
	Solitude and Self-pollination . . . . .	168
	As Always, Heterosexuality Carries a High Price; However, in the Case of Plants, it Is the Middleman that Profits . . . . .	171
	Colours and Scents . . . . .	179
	Trick and Truth . . . . .	191
	Why do Plants Manufacture Costly Fruits? . . . .	199
	Plant Migration Takes Place at the Embryonic Stage . . . . .	203
<b>6</b>	<b>The World through the Eyes of Plants . . . . .</b>	<b>209</b>
	In the Beginning, there was Light . . . . .	212
	What do Plants ‘See’? . . . . .	217
	How do Plants Measure Time? . . . . .	228
	What else do Plants Perceive? . . . . .	232
<b>7</b>	<b>The Defence of a Stationary Organism . . . . .</b>	<b>243</b>
	The Complex Chemistry of Plants Determines the Dietary Habits of Herbivores . . . . .	244
	Cost of Armaments, Defensive Strategies, Alliances, and Nonconventional War . . . . .	256
	How do Plants Communicate with One Another? . . . . .	277
<b>8</b>	<b>Symbioses Galore . . . . .</b>	<b>285</b>
	The Fine Balance between Symbiosis and Parasitism . . . . .	286

Too Close a Symbiosis Leads to Deformation . . . . .	290
The Nitrogen Problem on Planet Earth and a Plant–Bacteria Symbiosis of Huge Impact . . . . .	293
Fungi and Plants Connected in an Underground Web . . . . .	300
Animals that Photosynthesise, or an Evolutionary Episode in the Making . . . . .	304
<b>9 Deviations from the Basic Biological Type . . .</b>	<b>311</b>
Carnivorous Plants . . . . .	312
Plant Movements . . . . .	319
<b>10 Are Plants Intelligent Organisms After All? . .</b>	<b>323</b>
Towards a Biological Definition of Intelligence . . . . .	324
Examples of Intelligent Plant Reactions . . . . .	327
Recognition and Decision Making . . . . .	336
Memory? . . . . .	340
<b>Epilogue . . . . .</b>	<b>343</b>
<b>Additional Reading . . . . .</b>	<b>361</b>
<b>Index . . . . .</b>	<b>369</b>

Alice in the Land of Plants

Biology of Plants and Their Importance for Planet Earth

Manetas, Y.

2012, XVIII, 374 p., Hardcover

ISBN: 978-3-642-28337-6