CAMBRIDGE

Cambridge University Press 978-1-107-09602-8 — Radioecology R. J. Pentreath Table of Contents <u>More Information</u>

Contents

Preface		<i>page</i> vii
Acknowledgements		ix
	-	
1 The	e Emergence of Radioecology	1
1.1	Glowing in the Dark	1
1.2	An Explosive Entry into the Atomic Age	8
1.3	Atmospheric Testing of Nuclear Weapons and the Pressures of the Cold W	Var 13
1.4	Environmental Contamination by Design and by Accident	20
1.5	Fluctuating Nuclear Fortunes	24
1.6	Back to Basics: The Origins of Atoms and Elements	26
1.7	The What, Why, and Wherefore of Radioecology	29
2 Sta	ble and Unstable Atoms	32
2.1	Atoms and Elements	32
2.2	Elementary Particles and Their Interactions	33
2.3	Radioactive Decay and the Resultant Radiation	37
2.4	Rates of Radioactive Decay	44
2.5	Nuclide Abundance	51
2.6	The Interaction of Radiation with Matter	56
2.7	Detection and Measurement of Radiation and Radioactivity	62
3 Radionuclides and Other Sources of Radiation in the Natural		
Env	vironment	69
3.1		69
3.2	····· , ····	76
3.3	Radiogenic Heat and Earth's Interior	89
3.4	Solar and Galactic Radiation	91
3.5	I I I I I I I I I I I I I I I I I I I	99
3.6	Environmental Inputs from Man-made Nuclear Sources	102
3.7	Environmental Inputs in Perspective	124

v

CAMBRIDGE

vi

Cambridge University Press 978-1-107-09602-8 — Radioecology R. J. Pentreath Table of Contents <u>More Information</u>

> 4 Radionuclide Distributions and Their Value as Environmental Clocks and Tracers 126 4.1 The Temporal and Spatial Relevance of Radionuclides in Closed and Open Systems 126 4.2 Primordial Radionuclides as Markers of Temporal Events Within Closed Systems 127 4.3 Cosmogenic Radionuclides Used for Determining Absolute Ages 133 4.4 Radionuclides in Open Systems 136 4.5 Dynamic Environmental Processes 146 4.6 Use of Radionuclides to Study the Rates of Sedimentation and Bioturbation 162 5 The Accumulation of Radionuclides by Plants and Animals 172 5.1 The Chemical Elements and Life 172 5.2 Ecological Considerations in the Accumulation of Elements by Animals and Plants 178 5.3 Dynamic Aspects of Radionuclide Accumulation by Individual Organisms 184 5.4 The Biological Accumulation of Radionuclides: Surprises and Puzzles 202 5.5 Transfer of Radionuclides Through Ecosystems 210 6 **Radiation Dosimetry and Biological Effects** 226 6.1 Relating Radiation Exposure to Absorbed Radiation Dose 226 6.2 The Basic Interactions of Radiation with Biological Material at a Cellular Level 234 6.3 Relating Radiation Dose to Biological Effects in Humans 242 6.4 Relating Radiation Dose to Biological Effects in Animals and Plants 255 Managing Environmental Radiation Exposures: Experiences 7 and Challenges 285 7.1 Natural Radiation Backgrounds 285 7.2 Radiological Protection Frameworks 293 7.3 Radiological Protection Experiences 308 7.4 Issues of the Past, Present, and Future 330 Index of nuclides 338 Index 341

Contents