Contents

Preface xiii
Overview xv
Acknowledgements xix
About the Author xx

Chapter 1 Food 1

Introduction 1
Carbohydrates 2
Polysaccharides 6
Amino Acids and Proteins 8
Amino Acids 8
Polypeptides and Proteins 10
Lipids 11
Taste Sensations 12
Meat 12
Cheese 15
Blue Cheeses 17
Lactose and Camembert 18
Cheddar 21
Bread 22
Baking 24
Potato 28
Boiled Potatoes 30
Baked Potatoes 31
Potato Chips 32
Mushrooms 33
Puffball Mushrooms 36
Onions 37
Fresh Onions 38
Cooked Onions 39
Tomatoes 39
Strawberries 45
Wild Strawberries 48
Oranges and Lemons 51
Orange Juice and Limonene Isomer Smells 53

Chapter 2 Vitamins 56

Introduction 56
Vitamin A 56
Vitamin B_1, Thiamin 58
Vitamin B_2, Riboflavin 60

Vitamin B_3, Niacin 61
Vitamin B_5, Pantothenic Acid 64
Vitamin B_6, Pyridoxine 64
Vitamin B_7, Biotin 66
Vitamin B_9, Folic Acid 66
Vitamin B_{12}, Cobalamin 68
Vitamin C, L-Ascorbic Acid 69
Vitamin D, Calciferol 70
Vitamin E 72
Vitamin K 73

Chapter 3 'Hot' and 'Cold' 75

Introduction 75
Spices and 'Hot' 75
Capsaicin 76
The TRPV1 Receptor 77
Black pepper 79
Ginger 79
Clove 80
Nutmeg 81
Cinnamon 82
Szechuan Peppers 82
Cool and Menthol 84
How It Works? 87
Carvone 87
A New Minty Molecule 88
Mustard 89

Chapter 4 Abused Painkillers and Other Drugs of Abuse 92

Opium 92
Morphine 94
Heroin 95
Fentanyl 97
Carfentanil and Other Powerful Fentanyls 100
Oxycodone and Oxycontin 102
Oxycodone 102
Krokodil 105
Spice 108
Nitazenes 112

Chapter 5 Nasty-Smelling Molecules 115

Introduction 115
Hydrogen Sulfide 115
Dimethyl Sulfide 116

Dimethyldisulfide and the Titan Arum 119
Thiols 120
Skunks 123
Personal Hygiene – and Wines 125
Trimethylamine 128
The Smell of the Living and the Dead 129
The Scent of Death 132
Euglossine Bees 136

Chapter 6 War and Peace in Nature 137

Cut Grass 137
Plant Defence 141
Weaponised Insects 145
Out of Detective Novels 150
Blister Beetles 151
Plants Attracting Insects 152
Insect Repellents 155

Chapter 7 Organochlorine Compounds 159

Organic Chlorine Compounds 159
Pesticides 161
Dieldrin and Aldrin 163
Anaesthetics – and Others 164
Chlorinated Phenols 165
Natural Germ-Killers from the Earth 166
Teicoplanin 169
Chloramphenicol 170
Halogenated Compounds from Marine Fungi 171
Another Killer 171

Chapter 8 Organofluorine Compounds 173

CFCs, Serendipity and a Serious Problem 174
Other Organofluorine Compounds 181
Other Problematic Organofluorine Compounds 182
A Natural Problem 182
Fluorinated Pharmaceuticals 183
Anaesthetics 183
Celecoxib 187
Blood Substitutes 188
And the Latest News? 189

Chapter 9 Smoking and Vaping 190

Smoking 190
Nicotine 191

Health Effects of Smoking 194
Toxic Chemicals in Tobacco 195
Vaping 198
Issues with Nicotine 198
Metal Heating Elements and Metal Pieces 199
Solvents 200
Flavourings 201
Diacetyl 202
Benzaldehyde, Cinnamaldehyde and Vanillin 203
Vitamin E Acetate 204
Nicotine Analogues 205
Student Vaping 206
Conclusions and Summary 206

Chapter 10 Isotopes at Work 208

Isotopes 208
What's the Difference between H_2O and D_2O? 210
Lead Isotopes 211
Coinage and Isotopes 213
Uranium Isotopes and Their Separation 213
Carbon Isotopes 214
Detecting Food Fraud 215
Radiocarbon 217
Fraudulent White Truffles 218
Isoscapes 218
Carbon in Foods 219
Strontium Isotopes 219
Isotopes and Drugs 219
King Richard III 220
Isotopes in Solving Crimes 221
The Welsh Case 221
The 'Scissor Sisters' Case 221
A Unsolved Crime.... Five Thousand Years Ago 222

Chapter 11 Methane 224

Introduction and Historical Background 224
Wood, Coal and Coal Gas 225
Coal, the Environment and Smogs 226
Natural Gas and Methane 226
Methane, a Greenhouse Gas 227

Bibliography 229

Index 287