

CONTENTS

PREFACE TO THE SERIES	iii
PREFACE TO VOLUME 19	v
CONTRIBUTORS	xiii
CONTENTS OF OTHER VOLUMES	xv
Chapter 1	
THE DISCOVERY OF IONOPHORES: AN HISTORICAL ACCOUNT	1
Berton C. Pressman	
Abbreviations	16
References	17
Chapter 2	
TETRACYCLINES AND DAUNORUBICIN	19
R. Bruce Martin	
1. Introduction	19
2. Tetracyclines	20
3. Daunorubicin	40
References	49

Chapter 3

INTERACTION OF METAL IONS WITH STREPTONIGRIN AND BIOLOGICAL PROPERTIES OF THE COMPLEXES	53
--	----

Joseph Hajdu

1. Introduction	54
2. Structural and Chemical Properties of Streptonigrin and Its Metal Complexes	55
3. Biological Activity and Suggested Mechanistic Schemes for the Antitumor Action of Streptonigrin	70
4. Conclusions	76
References	77

Chapter 4

BLEOMYCIN ANTIBIOTICS: METAL COMPLEXES AND THEIR BIOLOGICAL ACTION	81
---	----

Yukio Sugiura, Tomohisa Takita, and Hamao Umezawa

1. Introduction	82
2. Structural and Synthetic Aspects of Bleomycin	82
3. Characteristics of Bleomycin-Metal Complexes	85
4. Oxygen Activation and Redox Cycle of the Bleomycin-Iron Complex	89
5. Interaction of Bleomycin and Its Iron Complex with DNA	90
6. Sequence-Specific DNA Cleavage by the Bleomycin-Iron Complex	92
7. Metal Complexes and DNA Cleavage of Bleomycin Analogs: Peplomycin, Tallysomyacin, and Phleomycin	95
8. Metal Complexes and Oxygen Activation by Synthetic Analogues and Biosynthetic Intermediates of Bleomycin	97
9. Molecular Mechanism of Bleomycin Action	103
10. Conclusions	104
References	105

Chapter 5

INTERACTION BETWEEN VALINOMYCIN AND METAL IONS	109
--	-----

K. R. K. Easwaran

1. Introduction	110
2. Structure and Conformation of Free Valinomycin	112

CONTENTS

ix

3. Structure and Conformation of Valinomycin-Metal Ion Complexes	115
4. Valinomycin-Metal Ion Complexes in Transmembrane Ion Transport	131
Abbreviations and Definitions	132
References	133

Chapter 6

BEAUVERICIN AND THE OTHER ENNIATINS	139
-------------------------------------	-----

Larry K. Steinrauf

1. Introduction	140
2. Ion Binding	143
3. Membrane Transport	158
4. Analogs	165
5. Conclusions	167
Abbreviations	167
References	168

Chapter 7

COMPLEXING PROPERTIES OF GRAMICIDINS	173
--------------------------------------	-----

James F. Hinton and Roger E. Koeppe II

1. Introduction	174
2. Structural Properties	175
3. Ion-Complexing Properties	186
4. Transport Properties	193
References	200

Chapter 8

NACTINS: THEIR COMPLEXES AND BIOLOGICAL PROPERTIES	207
--	-----

Yoshiharu Nawata, Kunio Ando, and Yoichi Iitaka

1. Introduction	207
2. Molecular Structure of Nactins	209
3. Complexes	212
4. Biological Properties	224
References	225

Chapter 9

CATION COMPLEXES OF THE MONOVALENT AND POLYVALENT CARBOXYLIC IONOPHORES: LASALOCID (X-537A), MONENSIN, A23187 (CALCIMYCIN), AND RELATED ANTIBIOTICS	229
---	-----

George R. Painter and Berton C. Pressman

1. Introduction	230
2. Structure of Ionophore-Cation Inclusion Complexes	233
3. Techniques for Measuring Equilibrium Ionophore-Ion Affinities	239
4. Carboxylic Ionophore-Mediated Ion Transport	248
5. Biological Test Systems	266
6. Conformational Aspects of Ion Capture and Membrane Transport	272
7. Biological Applications of Ionophores	284
8. Overview	288
References	289

Chapter 10

COMPLEXES OF D-CYCLOSERINE AND RELATED AMINO ACIDS WITH ANTIBIOTIC PROPERTIES	295
--	-----

Paul O'Brien

1. Introduction	295
2. Mode of Action	297
3. Uses of D-Cycloserine	298
4. Organic Chemistry of D-Cycloserine	300
5. Metal Ion Coordination by D-Cycloserine	301
6. Metal Ion Coordination by D-Cycloserine Derivatives	307
7. Conclusions	308
Abbreviations	309
References	310

Chapter 11

IRON-CONTAINING ANTIBIOTICS	313
-----------------------------	-----

J. B. Neilands and J. R. Valenta

1. Introduction	314
2. Iron(III) Complexes	320
3. Iron(II) Complexes	324

CONTENTS

xi

4. Miscellaneous Compounds	327
5. General Conclusions	329
References	330

Chapter 12

CATION-IONOPHORE INTERACTIONS: QUANTIFICATION OF THE FACTORS UNDERLYING SELECTIVE COMPLEXATION BY MEANS OF THEORETICAL COMPUTATIONS	335
---	-----

Nohad Gresh and Alberte Pullman

1. Introduction	336
2. Outline of the Methodology	337
3. Selective Binding of Alkali Cations by Valinomycin	342
4. Selective Complexation of K^+ , Na^+ , and NH_4^+ by Nonactin	347
5. Selective Binding of Mg^{2+} and Ca^{2+} by Ionophore A23187	354
6. Structural Properties of Valinomycin and A23187	364
7. Energy Profiles for Single and Double Occupancy by Na^+ of the Gramicidin A Channel	374
8. Conclusions	379
Abbreviations	380
References	381

AUTHOR INDEX	387
--------------	-----

SUBJECT INDEX	411
---------------	-----