

Contents

	The Problem of Reception and the Evolution of the Cytological and Molecular Organization of Sense Organs	1
Chapter I	Structure and Development of Biological Membranes . .	5
	1. Introduction	5
	2. Structure and Chemical Composition of Membranes	5
	3. Development, Differentiation and Growth of Membranes	15
	4. Conclusion	23
Chapter II	Ultrastructural and Molecular Organization of Antennae	25
	1. Introduction	25
	2. Microvilli	28
	3. Stereocilia	30
	4. Flagella and Cilia (Kinocilia)	32
	5. Conclusion	40
Chapter III	Structural and Cytochemical Organization of Synapses	41
	1. Introduction	41
	2. Organization of Synapses	41
	3. Synapses with Chemical Transmission	45
	4. Ephaptic (Electrogenous) Synapses	56
	5. Conclusion	57
Chapter IV	Vision	59
	1. Introduction	59
	2. Molecular Evolution of the Visual Pigment	60
	3. Function of Rhodopsin	65
	4. Development of the Visual Cell	71
	5. Structural, Cytochemical and Functional Organization of Visual Cell	84
	A. Photoreceptors of Vertebrates	84
	B. Biopotentials of the Visual Cell	100
	C. Insect Photoreceptors	103
	D. Photoreceptors of Cephalopod Molluscs	116
	E. Color Vision in Vertebrates and Insects	122
	6. Conclusion	130

Chapter V	Taste	132
	1. Introduction	132
	2. Chemical Basis of the Action of Gustatory Substances and Theories of Taste	133
	A. Chemical Basis of the Action of a Saline Stimulus	133
	B. Chemical Basis of the Action of an Acid Stimulus	134
	C. Chemical Basis of the Action of a Sweet Stimulus	135
	D. Chemical Basis of the Action of a Bitter Stimulus	138
	E. Theories of Taste	140
	3. Sweet-Sensitive and Bitter-Sensitive Proteins	143
	4. Structural Organization of Gustatory Receptor Cells of Vertebrates	147
	5. Structural Organization of Contact Chemoreceptor (Gustatory) Sensillae of Insects	159
	6. Cytochemical Organization of Taste Buds and Function of Taste Cells	162
	7. Electrophysiological Investigations	165
	8. Conclusion	168
 Chapter VI	 Smell	 170
	1. Introduction	170
	2. Structure of Odorant Molecules. The Problem of Their Interaction with Olfactory Cells. Theories of Smell	170
	3. Structural and Cytochemical Organization of the Olfactory Cells of Vertebrates	181
	4. Functional Shifts of the Structural and Cytochemical Organization of Olfactory Cells in Vertebrates	193
	5. Structural Organization of Olfactory Cells of Insects	194
	6. Electrophysiological Investigations	201
	7. Conclusion	206
 Chapter VII	 Hearing	 208
	1. Introduction	208
	2. Auditory Stimulus, its Nonspecific and Specific Effect, and the Evolution of Auditory Receptor Mechanisms	209
	3. Theories of Hearing	221
	4. Structural and Cytochemical Organization of Hair Cells in the Organ of Corti in Birds.	225
	5. Structural and Cytochemical Organization of Hair Cells of Organ of Corti in Mammals	232

6. Structural Organization of Receptor Cells of Chordotonal Sensilla in Insects	259
7. Electrophysiological Studies	266
8. Conclusion	269
 Chapter VIII Gravity Reception	 272
1. Introduction	272
2. Gravitational Stimulus	272
3. Evolution of the Structural and Functional Organization of the Gravireceptor of Unicellular, Invertebrate and Protochordate Organisms	276
4. Evolution of the Structural and Functional Organization of Gravireceptor of Vertebrates	303
5. Conclusion	317
 Chapter IX The Molecular Theory of Sensory Reception	 322
 References	 336
 Subject Index	 384