

Contents

Chapter 1. <i>Introduction</i>	1
Chapter 2. <i>Occurrence of Peritrophic Membranes</i>	5
Chapter 3. <i>Formation and Structure</i>	31
3.1 Beginning of Secretion of Peritrophic Membranes	31
3.2 Textures of Microfibrils	34
3.3 Formation of Peritrophic Membranes	50
3.3.1 Formation Zones	52
3.3.2 Formation by the Whole Midgut Epithelium .	53
3.3.3 Secretion of Peritrophic Membranes in Restricted Parts of the Midgut	75
3.3.3.1 Secretion of Peritrophic Membranes by Annular Groups of Cells in the Posterior Midgut	76
3.3.3.2 Secretion of Peritrophic Membranes in the Cardia	76
3.3.4 Crossbands in Peritrophic Membranes	100
3.3.5 Induction of Formation of Peritrophic Membranes	102
3.3.6 Rate of Formation of Peritrophic Membranes	103
3.3.7 Formation of Peritrophic Membranes in Vitro	106
3.3.8 Factors Influencing the Formation of Peritrophic Membranes	111
Chapter 4. <i>Degradation of Peritrophic Membranes</i> ...	119
Chapter 5. <i>Chemical Composition</i>	123
5.1 General Remarks	123
5.2 Chitin	123
5.2.1 Properties	123

5.2.2	The Chitosan Reaction	125
5.2.3	Enzymatic Degradation	127
5.2.4	Histochemical Methods for the Localization of Chitin	127
5.2.4.1	Electron Microscopy (TEM)	128
5.2.4.2	Light Microscopy	129
5.3	Proteins and Glycoproteins	129
5.3.1	Amino Acids	129
5.3.2	Proteins	133
5.3.3	Glycoproteins	134
5.3.4	Lectins	140
5.4	Proteoglycans	147
Chapter 6. <i>Functions of Peritrophic Membranes</i>		149
6.1	General Remarks	149
6.2	Lectins and the Association of Bacteria	150
6.3	Immobilized Enzymes	153
6.4	Permeability	157
6.4.1	Technical Problems	157
6.4.2	Water Transport Across Peritrophic Membranes	159
6.4.3	Permeability Properties of Peritrophic Membranes	161
6.4.4	Use of Peritrophic Membranes for Cellular Sieving	168
6.5	Compartmentalization of the Midgut by Peritrophic Membranes	168
6.5.1	Countercurrent Flow in the Midgut and the Role of the Midgut Caeca in Locusts	169
6.5.2	Countercurrent Flow in the Midgut and the Role of the Midgut Caeca of Mosquito Larvae	169
6.5.3	Compartmentalization of the Midgut and Diversity of Enzymes	174
6.6	Peritrophic Membranes as a Barrier to Parasites	176
6.6.1	Viruses	177
6.6.2	Bacteria	178
6.6.3	Actinomyces	181
6.6.4	Flagellata	181
6.6.5	Sporozoa	184
6.6.6	Microsporidia	186
6.6.7	Larvae of Cestoda	187

6.6.8	Microfilariae	187
6.6.9	Summary	190
6.7	Fecal Pellets or Ecological Aspects of Peritrophic Membranes	191
6.7.1	Aquatic Ecosystems	191
6.7.2	Fecal Pellet Membranes = Peritrophic Envelopes	191
6.7.3	Production	193
6.7.4	Contents of Fecal Pellets	194
6.7.5	Pollutants in Fecal Pellets	195
6.7.6	Sinking Rates	195
6.7.7	Digestion-Resistant Components	198
6.7.8	Nutritional Content	198
6.7.9	Colonization of Fecal Pellets by Microorganisms	199
6.7.10	Coprophagy	200
6.7.11	Coprorhexy	202
6.7.12	Sediment Formation	202
6.7.13	Element Depletion in Surface Layers and Recycling Problems	204
6.7.14	Terrestrial Ecosystems	204
6.8	Peritrophic Membranes Used as Cocoon Material for Pupation	204
	<i>References</i>	211
	<i>Subject Index</i>	233