
Contents

Introduction	1
Chapter summary	3
The sequence of a predator–prey encounter and investment across multiple defences	5
1 Background matching	9
1.1 Introduction, definition, mechanism, and chapter overview	9
1.2 Empirical evidence of background matching	10
1.3 The evolution of background matching	11
1.4 Co-evolutionary considerations	14
1.5 Ecological considerations	17
1.6 Unresolved issues and future challenges	23
2 Disruptive camouflage	24
2.1 Introduction and overview	24
2.2 Examples of disruptive camouflage	26
2.3 The multiple mechanisms of camouflage by disruption	28
2.4 Identifying and quantifying disruptive camouflage	33
2.5 The relationship between disruption and other forms of protective coloration	35
2.6 The ecology of disruption	36
2.7 Unresolved issues and future challenges	39
3 Countershading	41
3.1 What is countershading?	41
3.2 Examples and taxonomic distribution of countershading camouflage	43
3.3 Countershading camouflage mechanisms	45
3.4 Evolution	50
3.5 Costs of countershading and counterillumination camouflage	51
3.6 Developmental genetics of countershading	51
3.7 The evolutionary ecology of countershading	52
3.8 Countering countershading and counterillumination adaptations	54
3.9 Unresolved issues and future challenges	55

4 Transparency	57
4.1 Definition and introduction	57
4.2 The distribution of transparency across habitats	57
4.3 How transparency influences ease of detection	58
4.4 Evolutionary considerations	63
4.5 Ecological influences	68
4.6 Co-evolutionary considerations	70
4.7 Unresolved issues and future challenges	70
5 Secondary defences	72
5.1 Introduction and overview of the chapter	72
5.2 Evolution of secondary defence	72
5.3 Consequences of variation in costs of secondary defence	76
5.4 Ecology	78
5.5 Co-evolutionary considerations	80
5.6 Unresolved issues and future challenges	83
6 Aposematism	84
6.1 What is aposematism?	84
6.2 Characteristics of aposematic organisms	84
6.3 Evolution of aposematism	90
6.4 Maintenance of aposematic signalling	95
6.5 Ecology of aposematism	95
6.6 Co-evolution of aposematic signals and receiver psychology	102
6.7 Future work and conclusions	102
7 The evolution and maintenance of Müllerian mimicry	103
7.1 Introduction	103
7.2 Examples	104
7.3 Müller's theory revisited	108
7.4 Evidence for Müller's hypothesis	110
7.5 Questions and controversies	115
7.6 Overview	127
8 Advertising elusiveness	128
8.1 Introduction and definition	128
8.2 Empirical evidence of elusiveness signals	129
8.3 Evolution	138
8.4 Ecology	143
8.5 Co-evolutionary considerations	145
8.6 Unresolved issues and future challenges	146
9 Batesian mimicry and masquerade	148
9.1 Introduction and overview of the chapter	148
9.2 Examples of protective deceptive mimicry	150

9.3 The origin of protective mimicry: selection or shared ancestry?	152
9.4 The evolution of protective deceptive mimicry	153
9.5 Ecological and phylogenetic considerations	169
9.6 Associated phenomena in the evolution of Batesian mimicry and masquerade	171
9.7 Overview	178
10 Startling predators	179
10.1 What do we mean by startle?	179
10.2 Empirical evidence for the defence	180
10.3 The evolution of startle defence	183
10.4 Ecological aspects of startle defences	186
10.5 Co-evolutionary considerations in startle defences	187
10.6 Unresolved issues and future challenges	188
11 Deflecting the point of attack	189
11.1 Overview	189
11.2 How deflecting traits work	189
11.3 The taxonomic distribution of deflecting traits	190
11.4 The evolution of deflective traits	198
11.5 Ecology	202
11.6 Co-evolutionary considerations	202
11.7 Future challenges	203
12 Dazzle camouflage	205
12.1 Camouflage in motion?	205
12.2 Examples of dazzle	206
12.3 How does dazzle camouflage work?	210
12.4 The evolution of dazzle	215
12.5 The costs and benefits of dazzle	215
12.6 The ecology of dazzle	215
12.7 Future challenges in dazzle camouflage research	216
13 Thanatosis	219
13.1 Introduction and overview of the chapter	219
13.2 Distribution	219
13.3 Form: the mechanisms involved	221
13.4 Evolutionary function: a cost/benefit approach	224
13.5 Ecological considerations	225
13.6 Co-evolutionary considerations	227
13.7 Unresolved issues and future challenges	228
Synthesis	229
References	235
Index	277