

Contents

Acknowledgements xi
Tribute to the author, Norman Gratz xii
Preface xiii

1 Introduction 1

Part I The vector- and rodent-borne diseases of Europe

2 Vector and rodent-borne diseases in European history 5

3 The arboviruses 9

4 The mosquito-borne arboviruses of Europe 10

West Nile Virus 10
Batai virus (Calovo virus) 24
Ockelbo virus 24
Inkoo virus 27
Tahyna virus 27
Usutu virus 28
Dengue virus 30

5 Mosquito-borne diseases of Europe – malaria 33

Recrudescence of autochthonous malaria in Europe 34
The problem of imported malaria in Europe 37
Imported malaria in other countries of Europe 49
Airport malaria 49

vi Contents

- 6 Mosquito-borne filarial infections 52**
 - The public health importance of dirofilariasis 53

- 7 Sandfly-borne diseases 55**
 - Sandfly-borne diseases – viruses 55
 - Sandfly fever in Europe 55
 - Sandfly-borne diseases – Leishmaniasis 57
 - Distribution and incidence of visceral leishmaniasis 58
 - Cutaneous leishmaniasis 67
 - Leishmaniasis/HIV 68
 - The sandfly vectors of leishmaniasis in Europe 70
 - Conclusions on the public health importance of leishmaniasis in Europe 72

- 8 Ceratopogonidae – biting midge-borne diseases 74**

- 9 Dipteran-caused infections – myiasis 75**

- 10 The flea-borne diseases 78**
 - Plague 78
 - Flea-borne rickettsial diseases 78
 - The ELB agent 80
 - Cat scratch disease 81

- 11 The louse-borne diseases 83**
 - Louse-borne rickettsial diseases 83
 - Trench fever 84
 - Louse-borne relapsing fever 86
 - Body louse infestations 86
 - Head louse infestations 86
 - Pubic louse infestations 87

- 12 Tick-borne diseases of Europe 89**
 - Tick-borne viruses 89
 - Bhanja virus 107
 - Thogoto virus 108
 - Dhori virus 108
 - Tribec virus 109
 - Tett nang virus 109
 - Eyach virus 109
 - Tick-borne bacterial infections 110

Tick-borne relapsing fever	110
Lyme disease	111
Tick-borne rickettsial infections	134
Other spotted fever rickettsiae in Europe	136
Ehrlichiosis	140
Q Fever	141
Babesiosis	144
The public health importance of babesiosis	145
Tularaemia	146
Tick paralysis	148
13 Mite-borne infections and infestations	149
Scabies	149
Rickettsial pox	151
Mites and allergies	151
14 Cockroaches and allergies	154
15 Vector-borne disease problems associated with introduced vectors in Europe	156
16 Factors augmenting the incidence, prevalence and distribution of vector-borne diseases in Europe	159
Ecological changes	159
17 The potential effect of climate change on vector-borne diseases in Europe	161
18 The rodent-borne diseases of Europe	163
The hantaviruses	163
Puumala virus	164
Dobrava virus	167
Saaremaa virus	168
Lymphocytic choriomeningitis virus	168
Bacterial diseases	169
Rat bite fever	170
Rodent-borne salmonellosis	171
Protozoal diseases	172
Rodent-borne cestode infections	173
Rodent-borne nematode infections	175
Conclusions	176

viii Contents

19 The economic impact and burden of vector- and rodent-borne diseases in Europe 177

- Costs associated with arboviruses 177
- Costs associated with malaria resurgence in Europe 178
- Costs associated with imported malaria 179
- Costs associated with mosquito control 180
- Costs associated with lice and scabies control 181
- Costs associated with Lyme disease 181
- Conclusions 182

Part II The vector- and rodent-borne diseases of North America

20 Vector- and rodent borne diseases in the history of the USA and Canada 185

- The arboviruses 185
- Epidemic or louse-borne typhus 187
- Rocky Mountain spotted fever 187
- Malaria 188

21 The mosquito-borne arboviruses 190

- Togoviridae 191
- Flaviviridae 195
- Bunyaviridae 202
- Conclusions on the public health importance of arboviruses in the USA and Canada 206

22 Mosquito-borne diseases – malaria 207

- Conclusions on the public health importance of malaria in the USA and Canada 209

23 Mosquito-borne filarial infections 211

- The public health importance of dirofilariasis 213

24 Sandfly-borne diseases 214

- The phleboviruses 214
- Leishmaniasis 214

25 Ceratopogonidae – biting midge-borne diseases 216

26 Dipteran caused infections – myiasis 217

- 27 Flea-borne diseases 220**
 - Plague 220
 - Flea-borne rickettsial diseases 224
 - Cat scratch disease (CSD) 226

- 28 The louse-borne diseases 228**
 - Louse-borne or epidemic typhus 228
 - Trench fever 229
 - Body louse infestations 230
 - Head louse infestations 230
 - Pubic louse infestations 231

- 29 Triatomine-borne diseases 233**
 - American trypanosomiasis or Chagas disease 233
 - Chagas disease vectors 234
 - Chagas disease reservoir hosts 234
 - The public health importance of Chagas disease in the USA 235

- 30 Tick-borne diseases of the USA and Canada 236**
 - Tick-borne viruses 236
 - Powassan virus 237
 - Tick-borne bacterial infections 239
 - Lyme disease 240
 - Conclusions on the public health importance of Lyme disease in the USA and Canada 244
 - Southern tick-associated rash illness 245
 - Rocky Mountain spotted fever 246
 - Reservoir hosts of Rocky Mountain spotted fever 248
 - Conclusions regarding Rocky Mountain spotted fever 248
 - Ehrlichiosis 249
 - Q fever 252
 - Babesiosis 253
 - Tularaemia 255
 - Tick paralysis 257

- 31 Mite-borne infections and infestations 259**
 - Scabies 259
 - Rickettsial pox 261
 - Mites and allergies 262

- 32 Cockroaches and allergies 267**
 - The public health importance of cockroach allergies 268

x Contents

33 Factors augmenting the incidence, prevalence and distribution of vector-borne diseases in the USA and Canada 269
The effect of ecological changes 269
The possible effects of climate change 270
Vector-borne disease problems associated with introduced vectors 271

34 The rodent-borne diseases of the USA and Canada 279
The hantaviruses 279
Rodent reservoir hosts 284
Arenaviruses 286
Leptospirosis 290
Rat-bite fever 291
Salmonellosis 292
Toxoplasmosis 293
Cestode infections 294
Nematode infections – trichinosis 296
Conclusions 296

35 The economic impact of vector- and rodent-borne diseases in the USA and Canada 298
Eastern equine encephalitis 298
La Crosse encephalitis 299
St. Louis encephalitis 299
West Nile virus 300
Dengue 301
Imported malaria 302
Lice infestations 303
Scabies infestations 303
Lyme disease 303
Mosquito control 304
Conclusions 305

36 Conclusions on the burden of the vector and rodent-borne diseases in Europe, the USA and Canada 306

References 310
Index 370