

Index

- abdominal sacs 105, 106, 160
Acanthopagrus berda 135
 acid-base balance 229–30
Acteonemertes 75, 165–6
Acteonemertes bathamae 75, 166
Aechmea paniculigera 235
Aegiceras 138
Aepophilus 153
 aestivation 18, 25, 30, 52, 172, 183, 185,
 186, 200, 208, 217, 229, 230, 248, 252
Agriolimax reticulatus 55
Agropyron 98
 air
 physical characteristics 15–16
 thermal capacity 15, 25
 variation of vapour pressure 26, 27, 28
 wind speed 28
Allolobophora caliginosa 190
Alma 190
Alma emini 190
Alopecosa accentuata 204, 205
Amia 175
 amino acids, isosmotic intracellular
 regulation 72–3, 76, 95
Ammophila 98
Amphibola 89–90
Amphibola crenata 70–1, 89
Amphipnous cuchia 177
 amphipods 48, 55, 62–3, 109–12, 127–31,
 132, 234, 261, 272
Anabas testudineus 177, 225
Anguilla anguilla 220
Anguria 266, 267
 arachnids 11, 30–1, 108, 119, 132, 204,
 205, 207, 213, 260, 269, 270, 344
 see also scorpions
Aratus 139, 140, 141
Aratus pisoni 65, 139–40
 arboreal habitat 124, 139
Archachatina 211
Architaenioglossa 12, 51–3
Arcitalitrus 62–3, 130, 131
Arcitalitrus dorrieni 55, 62, 63, 130
Arcitalitrus sylvaticus 130
Arenicola 15
Arenivaga investigata 205
Argonemertes 74, 75
Argonemertes dendyi 55, 74
Arion ater 71
Armadillidium 60
Armadillidium vulgare 59, 60
Armadillo 59
Armeria 118
Artemia salina 217
Ascophyllum nodosum 149
Asellus 61
Asellus aquaticus 57, 61
Assimineae 122–4
Assimineae grayana 124
Australoplax tridentata 65
Avicennia 133–5, 137, 138
Avicennia marina 139
Avicennia nitida 134
Aysheaia 38
Aysheaia pedunculata 38
Azolla 172, 173

Bdella 151
 behaviour 42, 66, 89–92, 93, 113, 120,
 124–5, 126, 136, 144, 157, 160, 176,
 195, 197, 245
 adaptations 63, 89, 110–12, 125, 126,
 128, 130, 142, 160, 163, 192, 198,
 217–19, 245
 behavioural mechanisms 30, 62, 63, 70,
 105, 192
 responses 70, 89–90, 122
 circadian rhythm 110, 128
 courtship 235
 patterns 42–3, 89, 92, 107, 109, 111, 113,
 126, 128, 244
 temperature control 30–4, 122
Bembicium nanum 156
Bembidion 159

Cambridge University Press

978-0-521-33669-7 - The Terrestrial Invasion: An Ecophysiological Approach to the
Origins of Land Animals

Colin Little

Index

[More information](#)296 *Index*

- biomass 252–7
Bipalium kewense 192
Birgus latro 228
 blood 50, 69, 89, 129, 130
 composition 50, 51, 52–3, 54, 55, 57, 58,
 61, 71, 72, 76, 80, 81–4, 126
 concentration of sodium 70
 control of ionic composition 66, 212,
 217
 haemolymph 60, 61, 64, 66, 76, 78, 215,
 223, 227, 231
 osmotic pressure 50, 52, 54–5, 59, 60,
 61, 64, 65, 66, 70, 71, 72, 78, 79, 81–4,
 212
 tolerance to changes 78–9, 84
 oxygen affinity 223, 227
 pigments 226–8
 ratio of ions 56–8, 61
 regulation of 64, 126
 ionic composition 212
 pH 229–30
 tolerance to changes in composition 50,
 68, 84
 body fluids 55, 59, 74, 77, 78, 83, 105, 108
 coelomic 76, 77
 control of composition 62, 64, 71, 82,
 94, 215
 rectal 80
 rhynchocoelic, osmotic pressure of 74
 tolerance to changes in 78, 83–4, 197
 body temperature
 distribution during aestivation 30
 effect of height above ground 29
 regulation of, behaviour mechanisms for
 30–4
 body weight
 fluctuation in 70
 loss of body water 64, 70–1
Boleophthalmus 143–5
Boleophthalmus boddaerti 144
Bostrychia 119
Bruguiera 133, 134, 137, 139
Bryobia praetiosa 206
Bufo americanus 55
Bufo bufo 55
Bufo marinus 270
 Burgess shale 36, 37
 burrowers 87, 91, 109, 110, 112–14, 124–7,
 140–5, 190–1, 193–8
 burrowing 7, 87, 89, 92, 113, 126, 135,
 141, 142, 144, 178, 185, 190, 191, 196

Caiman sclerops 207
 calcium 17, 56, 169, 170, 189, 193, 194
 dependence on supply 12
Callinectes sapidus 122, 123
Calliphora erythrocephala 79, 80, 215
Campodea 107

 carbon-dioxide 16, 19
 elimination of 228–9
 from gills 228
 from lungs 228, 229
 from skin 228
 receptors 228
Carcinus 223
Carcinus maenas 57, 222, 245
Cardisoma 140–2, 223
Cardisoma armatum 55
Cardisoma guanhumi 141
Carychium 121
Cerriops 133
Chaetogammarus pirloti 154
 chelicerates 10, 48, 58, 78, 108–9, 223–4,
 239
Chelonodon patoca 135
Chthamalus 152
Cingula cingillus 152, 164, 165
 circulatory systems 226–8
 adaptations 226–7
Clarias 171, 175
Clarias batrachus 177, 225
 climate 8, 10, 12
 change 11
 coastal lagoons 169
Coenobita perlatus 217
Cooksonia 7, 9
Corophium volutator 88
 crabs 14, 64, 65, 66, 78, 87, 91–4, 112–14,
 124–7, 135, 137–42, 160–2, 196–8,
 199, 204, 212, 219, 222–3, 227, 228,
 235–6, 239, 243–4, 245
 freshwater 64–5, 196–8, 199
Crangon crangon 88
Craticheumon 271
 crayfish 193–6, 199
 crevice habitats 109, 150–3, 158–60, 166
 cryptobiosis 18, 103, 217, 245, 248
 cryptozoic fauna 18, 143, 146, 166, 211,
 217, 236, 245
 cryptozoic niche 18, 79, 105, 106, 108, 109,
 142–3, 160, 166, 189–93, 209
Ctenogobius criniger 135
Ctenolepisma terebrans 207
Cyclograpsus 160–2
Cyclograpsus lavauxi 65, 160, 161, 166
Cyclograpsus punctatus 222
Cyzenis 271

 decapods 48, 55, 57, 64–8, 112–14, 162,
 207, 212
 dehydration
 tolerance of 78
Dendrocoelum lacteum 194
 desiccation 18, 53, 59, 80, 88, 103, 120,
 124, 128, 131, 148, 149, 150, 151, 204,
 209, 265

- avoidance of 87, 92, 126, 128, 136, 140, 150, 160, 163, 245
 effect of 53, 79, 83
 protection from 112, 116, 151
 resistance to 108, 125, 156
 tolerance of 50, 53, 62, 63, 64, 68, 69, 90, 94, 104, 105, 108, 134, 158, 219, 248
 weight loss 60
Desmognathus ochrophoeus 206, 207
 detritivores 87, 89, 90, 101, 110, 122, 128, 131, 134–5, 165, 242, 261, 273
 plant relations 164, 341–2
 dilution 73, 75, 124
 response to 181
 tolerance of 90
Dipodomys 214, 218
 distribution of fauna 5, 48, 102, 137, 152, 164
 distributional evidence 40, 47–8
 diversity of groups 249
Donax 113
 dormancy 197
Dotilla 113
Dotilla fenestrata 113
Drosophila 32
Dugesia lugubris 194
Dysdercus fasciatus 80, 231
- earthworms 190–1
 eggs 89, 120, 124, 126, 136–7, 138, 139, 140, 156–7, 176, 183, 184, 185, 233–4, 236–7, 266
 size 183
 size related to oxygen supply 232
Eichhornia 172, 173
Eisenia foetida 77, 190
Electrophorus electricus 228
Eleodes armata 210
Ellobium aurisjudae 69
Engaeus tuberculatus 195, 196
 epicuticular waxes 106, 208–9
Eriocheir sinensis 196
Erythrinus unitaeniatus 172
 estuaries 168
Eutyphoeus 190
 evidence for routes to land
 distributional 40, 47–8, 51, 59
 from comparative anatomy and physiology 40–3
 geological 35–40
 negative 43
 palaeontological 81
 physiological 49, 51, 53, 54, 59, 81, 122
 excretion 17, 246
 adaptations 75, 193, 213, 214, 232
 allantoic acid 231
 allantoin 231
 ammonia 42, 144, 229, 230, 231, 232
 carbon-dioxide 228–9
 combined with digestion 214
 excess water 17, 54, 193, 211
 hydrogen ions 229
 magnesium 66, 212
 nitrogenous 42, 144, 211–12, 214, 216, 230–3
 sulphate 66, 212
 urea 83, 84, 144, 230, 231, 232
 uric acid 211, 212, 230–1, 232
 urine 50, 106, 211, 212, 214, 231
 hyper-osmotic 50, 68, 80, 84, 212, 213, 214
 hypo-osmotic 52, 53, 63, 64, 67, 75, 79, 80, 84, 211, 212, 213
 isosmotic 63, 64, 66, 70, 212, 213, 214
- excretory systems
 antennal glands 66, 212
 coxal glands 213
 cryptonephric tubules 215
 diverticula of the gut 66, 212
 flame cells 74, 75, 211
 gills 90, 212, 213, 228, 229, 231
 glomerular kidney 82
 kidney 50, 52, 70, 211, 212, 213, 214, 299
 labial kidney 105, 106
 Malpighian tubules 79, 106, 215
 mantle epithelium 230
 maxillary glands 212, 213, 214
 nasal glands 213
 nephridia 214
 pallial ureter 52
 pericardium 212
 protonephridia 58, 74–5, 193, 211
 rectal pads 215
 renal pore 212
 segmental excretory organs 214
 serial excretory organs 212
 skin 228
- feeding 10, 79, 87, 88, 89, 90, 92–4, 109, 112–13, 122, 134–5, 144, 150, 151, 159, 162, 177, 185, 186, 187, 191–2, 195, 197, 219, 264, 266, 272, 273
Feronia 271
 fish 88, 174–5, 213, 227, 228, 230, 231–2, 236, 241
 coelacanth 82, 180–4
 cyclostomes 81
 elasmobranchs 82
 lobe finned 173–80
 lungfish 174–5, 178–80, 225, 226, 227, 228, 229, 231
 rhipidistian 174–5, 180–4, 241, 243
 teleosts 17, 82, 135, 143–5, 175, 176–7, 225–6, 241

Cambridge University Press

978-0-521-33669-7 - The Terrestrial Invasion: An Ecophysiological Approach to the
Origins of Land Animals

Colin Little

Index

[More information](#)298 *Index*

- food 149, 150, 170
 detritus 101, 151, 243, 272–4
 living plants 243, 272
 supply 101, 128, 151, 155, 242–3, 252
see also predation
- forests 10
 broad leaved 12
 coniferous 12
- fossils 3, 7, 11, 35, 39, 40, 43, 80, 82, 106,
 108–9, 178–81, 183, 187–9
 environment of 38–40
 evidence from 35
 lack of records 7, 121–2, 241
 problems of preservation 35–7
 records 3, 4, 6, 13, 37, 43, 121–2, 146–7,
 174
 relationship to modern forms 37–8
 soft bodied fauna 36
- fresh water habitat 169–74, 193–200
see also streams, lakes etc.
- Fucus serratus* 150
- Gammarus* 127, 130
- Gecarcinus* 140–2, 234
- Gecarcinus lateralis* 57, 58, 141, 142, 234
- geological periods
 Cambrian 36, 37, 106, 108
 Carboniferous 3, 8–11, 12, 39, 106, 121,
 146, 170, 183, 187
 Cretaceous 11–12, 94, 119, 123, 127,
 130, 132, 146, 170
 Devonian 3, 8–10, 12, 36, 39, 80, 106,
 108, 174, 178, 180, 181, 183
 Jurassic 11, 12, 121–2, 189
 Ordovician 6–7, 38, 80
 Permian 11, 272
 Pre-Cambrian 7
 Silurian 3, 6–8, 35, 38, 80, 106, 119, 272
 Tertiary 3, 12, 127, 146
 Triassic 11–12
- Geolycosa godeffroyi* 31
- Geomelania* 90
- Geonemertes* 75, 142–3, 166
- gills, *see* respiration
- Glomeris marginata* 207
- Glossina morsitans* 207, 208
- Goniopsis cruentata* 140
- Grapsus grapsus* 66
- habitat
 adaptations to 89, 92–4, 106, 108–9,
 113, 114, 159, 162, 190, 193, 197, 198
 aquatic 18–20, 34
 oxygen level 19
 temperature 18–20
see also rivers, lakes, etc.
- cryptozoic 10, 159, 166, 189–93, 209,
 245
- fringe 34
- 'porosphere' 102, 106, 109, 114
- shingle and boulder shore 153–66
- terrestrial 34
- Hadrurus arizonensis* 207
- haemolymph, *see* blood
- Haemopsis* 191
- Halimione* 118
- hearing 243–4
- heat loss by convection 30
 evaporation 33
 radiation 29–30, 34
- Helice* 91–4
- Helice crassa* 91, 93
- Heliconia imbricata* 270
- Heliconius* 266–7
- Helix* 209, 211
- Helix aspersa* 71, 73, 206, 207, 209, 221,
 231
- Helix pomatia* 55, 70, 73
- Helleria* 109
- Heloecius cordiformis* 135
- Hemigrapsus oregonensis* 66
- Hemilepistus* 59, 214
- Hepialus* 207
- herbivores 242, 243, 261–2
 insect 264–7
 interaction with plants 266–7
 plant relations 204–5
 vertebrate 267–8
- hibernation 217
- Hirudo medicinalis* 191
- Holoptychius* 182
- Holthuisana* 68
- Holthuisana transversa* 55, 57, 64, 65, 196,
 197, 198, 222
- Hoplosternum* 175, 177, 178
- Hoplosternum litorale* 172, 176
- Hoplosternum thoracatum* 225
- humid environments 18, 54, 186
 profile of 28, 129
- humidity 9, 26–9, 128, 129, 153, 186, 197,
 215, 265
 influence on animals 27
 preferred 130
 receptors 105, 106
 related to temperature 26, 129, 151, 163
 tolerance to low 157
- Hyale nilssoni* 63
- Hydrobia* 90
- Hydrobia jenkinsi* 194
- Hydrobia ulvae* 90–1
- Hydrogamasus salinus* 152
- hydrostatic skeleton 15, 237, 238, 239
- Hypostomus plecostomus* 226
- Ichthyostega* 175, 181, 182, 183, 241
- insects 10, 12, 29–34, 76, 77–80, 84, 107,

Index

299

- 119, 131–2, 158–60, 171, 204–6, 207, 208–9, 210, 212–13, 215–16, 224–5, 231, 236, 239, 244, 260, 261, 262–4, 264–70, 274
- adaptations 268
- chelicerates in relation to 10, 108
- co-evolution with plants 10, 12, 131
- distribution 11
- feeding 264–5
- origins of terrestrial 104–8
- plant relationships 132, 262–3, 267
- temperature regulation 31–4
- interstitial habitat 107
- meiofauna 101–4, 115
- meiofauna densities 101, 102
- microfauna 100–4
- ionic regulation 56, 63, 236
- isopods 48, 55, 59–62, 109–12, 151, 162–3, 202, 208, 221, 231, 234, 261, 272
- isosmotic regulation 73, 92
- Ixodes ricinus* 207
- kidneys, *see* excretory systems
- Lacuna vincta* 150
- Laguncularia* 133
- Laguncularia racemosa* 134
- lakes and swamps 171–4, 183, 184
- Lampetra fluviatilis* 81
- Lampito mauritii* 76
- Laporteia* 268
- larvae
- gobioid 144
- pelagic 127, 140, 142, 157, 158, 233, 234
- veliger 89, 120, 124, 136, 139, 156, 157
- zoa 127, 140, 141
- Lasaea* 153
- Lasaea rubra* 152, 164
- Latimeria* 175, 182, 241
- Latimeria chalumnae* 81, 180
- leeches 191–2
- Lepidosiren* 175, 178, 179
- Lepidosiren paradoxa* 178
- Leuconopsis* 165
- Leucophytia* 151, 165
- Leucophytia bidentata* 152, 164
- Lichina pygmaea* 152
- lifestyles on land 17–18
- Ligia* 60, 61, 155, 162–3
- Ligia italica* 61
- Ligia oceanica* 57, 59, 61, 151, 162, 163, 204, 207, 221
- Ligidium* 59
- Limax maximus* 71
- limbs 181, 226, 239, 241–2
- derivation 179
- fins 144, 177, 180, 181, 241
- legs 239
- lobe fins 180, 181, 241
- Limonium* 118
- Limulus* 224
- Lineus ruber* 74
- Lithobius* 159
- Littoraria* 122–4, 136–8, 139
- Littoraria articulata* 137
- Littoraria carinifera* 138
- Littoraria conica* 137, 138
- Littoraria irrorata* 119, 122, 123, 124
- Littoraria luteola* 136, 138
- Littorina* 123
- Littorina acutispira* 155, 156, 157
- Littorina angulifera* 136
- Littorina arcana* 156, 234
- Littorina aspersa* 155, 157, 158
- Littorina littorea* 51, 123, 155, 156
- Littorina mariaae* 150
- Littorina melanostoma* 136
- Littorina modesta* 158
- Littorina neglecta* 156, 157, 234
- Littorina nigrolineata* 156
- Littorina obtusata* 149, 155
- Littorina saxatilis* 138, 152, 155, 156, 157, 164, 234
- Littorina scabra* 136
- Littorina tenebrosa* 157
- Littorina unifasciata* 155, 156
- Littorinacea 11, 49–51
- locomotion 42, 127, 143, 144, 177, 178–9, 180, 181–3, 192, 237–42, 246
- adaptations 192, 238, 241, 242
- comparison between marine and terrestrial animals 15, 237–242
- pectoral girdle 181, 241
- pelvic girdle 181, 241
- speed 15–16, 112, 113, 162, 239
- Locusta migratoria* 79
- Lophius piscatorius* 75
- Lumbricus* 15
- Lumbricus terrestris* 55, 75, 77, 190
- lungs, *see* respiration
- Lymnaea pereger* 194
- Lymnaea stagnalis* 220
- Macoma balthica* 88
- Macrophthalmus* 91–4, 113
- Macrophthalmus hirtipes* 91, 92, 93
- Malacosoma americanum* 32
- mangrove swamps 116, 132–47
- distribution 133
- fauna of 134
- marginal environment 19
- Marrella* 38
- Megascolecides* 190
- Melampus* 119–22, 124, 127
- Melampus bidentatus* 69, 119, 121
- Melarhapha neritoides* 155, 156, 234

300 *Index*

- metabolic rate 197
Metopaulias depressus 235
Metopograpsus 138, 139
microclimate 7–9, 21–34, 128, 149, 150,
161, 162, 186, 257–8, 259, 265, 274
air near the ground 25–7
influence of plants 27–9
interactions between animals and 29–34
of forests 28–9
of soils 21–5
microhabitat 23, 70, 84, 184, 233, 257–8,
262
micro-organisms 6
Microplana terrestris 192
migration 196, 234
Misgurnus anguillicaudatus 226
molluscs 11, 12, 17, 35, 39, 48, 56–8, 67,
87, 89–91, 119–24, 132, 135, 149, 164,
168, 184–9, 194, 211–12, 221, 230–1,
261
movement, *see* locomotion
mud flats 86–95
predators of 88
Musca domestica 79
Mustelus canis 81
myriapods 3, 8, 10, 48, 59, 77–80, 104–7,
204, 207, 208, 210, 212, 215, 223–4,
236, 250–1, 254–5, 261
origins of terrestrial 104–7
Myxine glutinosa 81

Nais elinguis 97
Neoceratodus 175, 178, 179, 180, 182, 228
Nephasoma 164
Nereis diversicolor 88
Nerita 139
Neritacea 11
Neritodryas 187
Nodilittorina pyramidalis 156
Nypa 137, 138

Ocypode 65, 112–14, 204, 235, 244
Ocypode albicans 212
Ocypode ceratophthalma 66, 67, 112, 113,
239
oligochaetes 88–91, 126–8
Oniscus 61
Oniscus asellus 59, 61
Onychophora 3, 25, 38, 48, 59, 77, 79–80,
104–8, 212, 239, 261
origins of terrestrial 104–8
Onymacris plana 31
Onymacris rugatipennis 32, 33
Onymacris unguicularis 204
Operophtera brumata 270, 271
Orchestia 62, 63, 127, 128, 130, 131
Orchestia cavimana 62, 63
Orchestia chiliensis 128

Orchestia gammarellus 62, 128, 129, 130
Orchestia grillus 128
Orchestia platensis 62
origin of life
on land 3–5
in sea 3–5
Ornithodoros delanoei acinus 207
Orthoporus ornatus 207
osmoregulation 49, 50, 54, 59, 62, 63, 64,
66, 67, 68, 69, 77, 83–4, 85, 94, 122,
124, 129, 138, 168, 191, 203–19
adaptations 77, 92, 204–19
behavioural methods 66, 217
hyper- 62, 66, 67, 68, 70, 76, 92, 124,
129, 203–4
hypo- 60, 62, 66–7, 68, 77, 129
isosmotic intracellular 72–3, 76
related to desiccation 60, 83
osmotic gradient 215
osmotic pressure 17, 52–3, 54–6, 60, 64,
68, 72, 74, 76, 77, 78, 81–3
changes produced by desiccation 53, 79
feeding 79
tolerance to changes in 62–3, 64–5, 66,
67–8, 76, 78–9, 80, 85, 120
osmotic stress 66
tolerance 59, 120, 122
Osteolepis 182
Otala lactea 207, 208
Otina 151
Otina otis 152
Ovatella 119–22, 124, 151, 164, 165
Ovatella myosotis 69, 120, 124, 164
oxygen 16, 19, 86–7, 174, 176, 198, 225,
227
availability of 86–8, 97
concentration 19, 97, 172
consumption, rate of 160, 161
‘debt’ 224
de-oxygenation 173
diurnal changes in 20
levels 173–4, 177, 178, 199
tension 154–5, 199, 219, 220, 223, 226,
227
uptake 89, 125, 130, 139, 144, 160, 179,
220, 222, 225
mechanisms for, *see* respiration
rate of 89, 125, 221

Pachygrapsus 160–2, 245
Pachygrapsus crassipes 57, 66, 67, 161,
217, 245
Paludina littorina 165
Pandinus imperator 207
Pantionemertes 74, 142–3
Pantionemertes agricola 74, 143
Pantionemertes californiensis 143
Pantionemertes winsori 143

- Paratelphusa* 197
Paratelphusa hydrodromous 57
Passiflora 266, 267
Pelvetia 119
Periophthalmus 143–5, 176, 177, 225, 231
Periophthalmus chrysospilos 144
Periophthalmus sobrinus 145
Peripatus 38, 239, 261
Peripatopsis acacioi 23, 25
Periplaneta americana 215
 permeability 64
 of body surfaces 197–8
 integumental 75, 161, 206–10
 skin 84, 85
 to salts 64
 to water 64, 65, 67
 sand 96
 see also waterproofing
Petrobius 105, 158–60, 162
Petrobius brevistylis 159, 204
Petrobius maritimus 159
Pheretima 190, 214
Pila 184–5
Pirata piraticus 31
Pistia 172, 173
 plants, 6, 7, 8, 9, 25, 27–9, 116–19, 132,
 149, 169, 172, 173, 258, 264–9, 272–5
 algae 119, 149–50, 242, 273
 angiosperms 12, 119, 131, 145–7, 265,
 268, 273, 274
 development of conifers 10
 fossil evidence 7, 146
 grasses 98, 116, 117–18, 257–8
 increase in size 9
 influence of carbon:nitrogen ratio 258
 mangrove 133–4
 origin of terrestrial plants 5, 8
 physiological adaptations 6
 to predation 265, 266, 268
 vines 226
Platyarthrus 59
Polycelis nigra 194
Polycelis tenuis 194
Polypedilum vanderplanki 217
Polypterus 175
Pomacea 184, 185, 221, 230
Pomacea depressa 184
Pomacea urceus 185, 186
Pomatias elegans 49, 50, 51, 55, 56, 57, 234
Pontodrilus matsushimensis 75
Porcellio 59–61
Porcellio scaber 55, 57, 60, 61, 221, 232
 ‘porosphere’ 102–3, 106, 109, 114
Potamon 65
Potamon niloticus 64, 196
Potamonemertes 74
Potamopyrgus jenkinsi 194
Poteria 56
Poteria lineata 55, 57
 pre-adaptations 20, 108, 112, 128
 excretory 231
 to life on land 65, 121, 124, 233
 reproductive 128, 233, 236
 predation 10, 88, 108, 113, 115, 117, 123,
 132, 135, 138, 144, 149, 159, 162, 185,
 191, 192, 193, 271
 adaptations 122
 avoidance of 122, 128, 140, 219
 effect on community 269–71
 importance of 115
 influence of 138
 protection from 126, 150–1, 266, 268
 preservation
 in amber 36
 problems of 35–7
Pristis microdon 81
Pristis perotteti 81
Procambarus gracilis 195
Procerodes littoralis 154, 193
Prosorhochmus 74
Prostoma 74
Prostoma jenningsi 74
Protopterus 178, 179, 228, 231
Protopterus amphibius 179
Protopterus annectens 178
Pseudocyclostus 124
Pseudothelphusa 222, 223
Pseudothelphusa garmani 65, 222, 229
Psilophyton 9
Puccinellia 118, 120
Pythia 69, 121

Rana cancrivora 83, 84
Rana pipiens 206, 207
Rangitotoa 165
 redox potential 83, 97
 reproduction 42, 105, 106–7, 120, 121, 124,
 126, 127, 128, 136–8, 139, 140, 141,
 144, 145, 156–7, 176, 178, 184–5, 197,
 233–7
 adaptations 120, 145, 156, 177, 236
 breeding migration 141, 234
 breeding nest 145, 176, 178
 brooding 112, 128, 136, 138, 156, 183,
 233, 234
 copulation 234, 235, 236
 fertilization 233, 234, 236
 oviparous 136
 ovoviviparity 136, 156, 157, 233
 spermatophores 236
 viviparity 185, 233–4
 respiration 129–30, 181, 214, 219–30
 adaptations 94, 109, 112, 113, 120, 125,
 176, 177, 184, 198, 209, 225
 availability of oxygen 16, 199
 buccal 220, 226

Cambridge University Press

978-0-521-33669-7 - The Terrestrial Invasion: An Ecophysiological Approach to the Origins of Land Animals

Colin Little

Index

[More information](#)302 *Index*

- respiration (*cont.*)
 in air 8, 16, 88, 89, 92–3, 109, 113, 125, 136, 139, 176–7, 178, 185, 219–30
 selection pressure for 186
 in relation to temperature 222, 226
 in water 16, 89, 125, 176, 219
 mechanisms 220–6
 accessory respiratory organs 177, 225
 buccal tissue 225
 diffusion lungs 221, 224
 diffusion through epidermis 220–1, 235
 gills 109, 112, 125, 130, 139, 144, 160, 176, 178, 181, 184, 214, 219, 220, 221, 222, 225, 226–7
 haemocyanin 222, 226
 haemoglobin 226
 intestine 176, 225–6
 ‘lung books’ 109, 210, 223
 lungs 120, 125, 178, 179, 181, 184, 185, 189, 210, 219, 221, 222–3, 225, 226, 227, 229
 mantle cavity 89, 120, 124, 139, 184, 185, 189, 220, 221
 pleopods 221
 skin 220
 surface of abdomen 221
 temporary ‘lung’ 190
 trachea 224
 ventilation lungs 221
 rate 89, 125, 160, 221
 water loss 210
 respiratory pigments 226–7
 respiratory rhythms 111
Rhizophora 133, 134, 135, 137, 140, 147
Rhizophora mangle 133
Rhynchodemus bilineatus 192
 rivers and streams 170–1
 rocky shores 148–53, 155–8
Rostrhamus sociabilis 185
 routes to land 45–200
 angiosperm dominated 145–7
 coastal brackish water lagoons 91, 194
 freshwater 80–5, 167–200
 freshwater versus marine 49–54, 58–73, 199–200
 interstitial 73–80
 marine 63, 68, 71, 78
 mud flats 94
 rocky and shingle shores 148–70
 salt marshes and mangrove swamps 116–47
Salicornia 90
 salinity 77, 116, 117, 150
 changes in 66, 73, 134, 154, 168, 169
 tolerance to 50, 52, 62, 64, 66, 69, 70, 74, 77, 89, 90, 120, 124, 127, 139
Salmo salar 81
 salt marshes 7, 69, 70, 116–32
 conditions of 116–18
 formation of 117, 118
 salts
 absorption of 213
 availability 16–17
 balance 41, 64
 in rain 169
 in rivers 170
 reabsorption of 211–12
 supply of 110, 138, 142, 159, 204
 uptake 203–6
 sandy shores 87, 98–115
 physical environment
 coastal sand dunes 98–9
 formation of dunes 98
 marine sand flats 95–8
Scaphiopus couchii 84
Schistocerca 215
Schistocerca gregaria 32, 80, 216
Scolioplanes 153
Scopimera 113
Scopimera inflata 113
 scorpions 10, 59, 108, 207, 208
 aquatic 8
Scutigera coleoptrata 239, 240
 sea water 55
Seira domestica 207
 sense 45, 113
 chemical 191
 detection of changes in humidity 105, 106
 myochoordotonal 244
 organs 42, 109, 143–4, 245
 eyes 122, 244
see also hearing, vision
Sesarma 119, 124–7, 235
Sesarma cinereum 124, 125
Sesarma messa 135
Sesarma reticulatum 124, 125
Seymouria 175, 183
 shingle shores 153–66
Sidneyia 38
 size 69, 84, 90, 100, 113, 124, 156, 157, 179, 183–6, 192, 262
 skeletons 181
 axial 178, 180, 241
 brain case 180, 181
 hydrostatic 15, 237, 238, 239
 pectoral girdle 181, 241
 pelvic girdle 181, 241
 skull 183
 soil
 fauna 100, 190, 248–57, 272
 metabolism 256
 moisture tension 25
 mor 253

Cambridge University Press

978-0-521-33669-7 - The Terrestrial Invasion: An Ecophysiological Approach to the Origins of Land Animals

Colin Little

Index

[More information](#)

Index

303

- mull 253
- temperature 23–5, 118
- thermal capacity 22
- thermal conductivity 21, 26
- thermal diffusivity 22, 23
- water loss 28
 - retention 25
 - Sonneratia* 133, 137, 139
- sound production 243, 244
 - stridulation 243, 244
- Spartina* 117, 119, 122, 123, 128
- Spartina alterniflora* 117, 119, 122, 125
- Spartina anglica* 118
- Spartina patens* 117, 119, 125
- species numbers 88, 257–64, 269, 272
 - amphipods 269
 - carbon:nitrogen ratio 258
 - effect of grazing 258, 268
 - extremes of temperature 259
 - gastropods
 - prosobranch 269
 - pulmonate 269
 - insects 131, 260, 264
 - isopods 272
 - leaf litter 260
 - mites 260
 - myriapods 272
 - oligochaetes 261, 269
 - plants 259, 260
 - rain forests 260
 - rainfall, relation to 52
 - size, relation to 262–3, 268
 - soil populations 256
 - spiders 132, 260
 - vertebrates 260
- speed, comparisons of 15–16
- Sphaeroma rugicauda* 20
- Sphagnum* 31
- Sphincterochila* 70
- Sphincterochila boissieri* 30, 31, 71
- Sphincterochila prophetarum* 24, 25
- spiders, *see* arachnids
- Spirorbis borealis* 152, 153
- Stenocarpa phalangium* 32
- Strombus gigas* 57
- Suaeda fruticosa* 20
- Sudanonautes africanus* 57, 58

- Talitroides* 130
- Talitrus* 62, 109–12, 113, 130, 244
- Talitrus saltator* 62, 63, 110
- Tanais chevreuxi* 153
- Tectarius* 158
- Tectarius muricatus* 155, 158
- temperature 18–19, 24, 150, 151, 153–4, 157–8, 186
 - body 28, 29–30, 33, 163, 186
 - control of 30–3, 122, 126, 157–8, 163
 - cues to trigger activity 23
 - distribution and heat flow 31
 - diurnal changes 20, 129
 - fluctuations in 23, 25, 118
 - 'preferred' 30
 - profiles 22, 25, 28, 173
 - tolerance to
 - changes 108, 127, 134
 - high 157, 217
- Tenebrio molitor* 205, 207, 215
- terrestrial ecosystems 5, 11, 12, 13, 247–74
 - communities 247–8, 264–74
 - compared to aquatic communities 272–4
 - development of in Devonian 8–10
 - grazing 273
 - influence of evolutionary time 272
- terrestrial species numbers 52, 261
- Testacella* 192
- Thalia* 172, 173
- Theodoxus fluviatilis* 187
- Theridion saxatile* 31
- Thermobia* 106–7
- Thermobia domestica* 80, 106, 107, 207
- Tomocerus problematicus* 207
- Trichostetha fascicularis* 79
- Trigla* 177
- Trocheta* 191
- Tropidophora ligata* 51
- Truncatella* 164
- Truncatella subcylindrica* 164, 165
- Turbinicola* 184
- Tylos* 109–12, 113
- Tylos granulatus* 110, 111
- Tylos latreilli* 61
- Tylos punctatus* 110
- Typha* 172, 173

- Uca* 14, 65, 112, 119, 124–7, 235, 243
- Uca annulipes* 207
- Uca marionis* 207
- Uca pugilator* 124–6
- Uca pugnax* 124–5
- Ulva* 162
- urine, *see* excretion
- Urtica dioica* 268

- Vaucheria* 119
- Venezillo* 59
- Venezillo arizonicus* 203, 207
- vertebrates 10, 15–16, 30, 33–4, 36–7, 38–9, 80–5, 168, 175, 207, 209–10, 225–6, 227–9, 231–3, 236–7, 241–2, 243, 261, 265, 268, 269, 270
 - classification 175
 - distribution 11
 - evolution of terrestrial 174–84
 - herbivores 10, 243, 267–8

Cambridge University Press

978-0-521-33669-7 - The Terrestrial Invasion: An Ecophysiological Approach to the
Origins of Land Animals

Colin Little

Index

[More information](#)304 *Index*

vision 112, 113, 122–3, 144, 162, 244

Viviparus 53*Viviparus viviparus* 52, 57

water

absorption of 141, 204–5, 211, 216,
218–19

adaptations 160, 204–6, 214

by abdominal sacs 105, 160

adaptations to shortage 178

balance 41, 47–85, 193, 203–19, 246

adaptations for 92, 122, 142, 217–19

density providing body support 15

effect of viscosity 15

loss 17, 70, 92, 126, 130

adaptations to reduce 71, 206, 210,
213, 225by evaporation 27, 29, 64, 70–1, 106,
142, 163, 206–8, 209, 210, 218

by transpiration 29

from gut 214–16, mucus 70

rate of 128, 129, 130, 206

renal 211–14

respiratory 109, 130, 206, 210

tracheal 210

osmotic inflow 17

pH 19, 154

physical characteristics 15–16, 181

rain pH 169

reabsorption 211, 212, 213, 214, 216

rectal 79, 106, 211, 214, 215

retention 71, 92, 190, 210, 211, 214

source of

condensation 26

dew 26, 28, 141

precipitation 26, 27–8, 98, 169

supply 17, 18, 27, 94, 102, 111, 124, 203

for activity 18

temperature variation 18–20

thermal capacity 16, 18, 21–2

conductivity 21–2

tolerance

to immersion 120

to loss 64, 69, 70–1, 73, 120, 126, 160,
196, 197uptake 25, 106, 124, 141, 160, 197,
203–6

related to respiration 206

waterproofing 85, 106, 184, 206–11, 225

wind speed profile 28

Xantusia vigilis 207*Zostera* 165*Zosterophyllum* 9*Zygiella* 159