

## INDEX

- adaptive plumage traits
  - colour, 264–267, 279
  - number of spots, 275–277, 279
  - size of spots, 262, 268–274, 279
- adoption, 197, 198
  - see also* nest switching
- age structure, 231
- aggression towards humans, 63
- agriculture, 21–22, 26, 30–31, 37–38, 40, 45, 104–105
- albinism, 241
- allopreening
  - adult, 219
  - anti-parasite, 58, 219, 220
  - exchange of commodities, 220
  - massage, 220
  - nestlings, 3, 200, 216, 219, 220
  - reciprocation, 219, 220
  - timing, 200
- altruism, 217, 266
- anthropocentrism, 28–29
- anthropogenic environments, 21–22, 23, 26
  - see also* human structures
- anti-parasite adaptations, 56, 58, 59
- anti-predator behaviour, 63–64, 270
- assortative pairing, 258, 259
- asynchrony, *see* hatching asynchrony
- autosome, 247, 253
- begging behaviour, 185–187, 190, 203–209, 210–214
  - escalating, 211
  - hunger level, 188, 211, 218
  - parental response, 184, 185, 187, 189, 190, 210, 211
  - risk of predation, 62
  - sibling competition, 203, 206, 211
  - sibling negotiation, 204, 206, 210, 211
  - towards parents, 206, 210, 211
- Bering land bridge, 13
- bill
  - anti-parasite adaptations, 56, 58, 59
  - heritability, 86
  - length, 83, 85, 89
- biological pest control, 30–31, 40–41
- body mass, adult
  - adaptation to flight, 75, 80, 93, 107, 109, 264
  - age, 193
  - breeding failure, 34
  - carrying prey, 75, 93
  - food deprivation, 77, 80
  - incubation, 156
  - manoeuvrability, 75
  - melanin-based plumage trait, 270
  - pellet production, 74, 75
  - reproduction, 191–193
  - sexual dimorphism, *see* sexual dimorphism
  - wing loading, 107, 109
- body mass, nestling
  - food supply, 174
  - growth, 166, 173–175
- maternal nest desertion, 180
- melanin-based plumage traits, 258, 270, 271
- overshoot, 173, 174
- rain, 174
- recession, 173, 174
- second brood, 177
- sexual dimorphism, 90
- body size, 82–87
  - effect of parental feeding rate, 86
  - foraging, 89
  - geographic variation, 82
  - see also* body mass
- body temperature, *see* temperature
- Bogert's rule, 284
- breeding age, 131, 231, 235
- breeding dispersal, 228–229
- breeding failure, 142, 170–172, 180
- breeding season, 152–154
  - see also* phenology
- brood patch, 162

292 INDEX

- brood reduction, 3, 155, 163, 165, 166  
 brood size, 77, 165, 167, 170, 180, 184, 185, 246  
 brooding, 180, 221, 272  
 buildings, 23–26, 145–149
- cannibalism, 215, 216  
*Carnus hemapterus*, 59, 60, 270  
 caves  
   nesting, 144, 145, 149  
   roosting, 95, 97, 98, 124, 126  
 circadian rhythm, *see* diurnal activity, nocturnal activity  
 cliffs  
   nesting, 23, 144, 145, 148  
   roosting, 97  
 clutch size, 129, 142, 158, 159, 160, 167  
 cold weather, 76–80  
   *see also* winter  
 colonization, 19  
 colour polymorphism, 240–244, 264–267  
   genetics, 245–251  
 communal breeding, 133–134  
 communal roosting, 99  
 competition, *see* sibling competition  
 consanguinity, 135  
 conservation, 27–52  
 cooperation between siblings, 3, 180, 203, 204  
 cooperative breeding, 133, 135  
 copulation, 129–131, 189  
   clutch size, 131  
   colour polymorphism, 244  
   deserting female, 182  
   extra-pair, *see* extra-pair copulation  
   frequency, 130–132, 157  
   timing, 128, 130  
 corticosterone, *see* glucocorticoids  
 cosmopolitan distribution, 2, 3, 18–22, 278, 287  
 courtship, 128–130  
   winter, 128, 129  
 courtship feeding, 129, 178  
 cultural views of barn owls, 36, 49, 52
- daytime activity, *see* diurnal activity  
 decapitation of prey, 189  
 desertion, *see* nest desertion  
 developmental homeostasis, 270  
 diet, 71–73, 118–126  
   barn owl species complex, 118–125  
   opportunism, 21, 116–117  
   prey selection, 116–117  
   Tytonidae, 126  
 digestion, 215  
   age, 73  
   digestive juice, 73  
   food deprivation, 77  
   food intake, 196  
   gastrointestinal tract, 73, 74,  
   parasites, 56  
   pellets, 73–75  
   poor digestion, 72–75  
 disassortative pairing, *see* assortative pairing  
 diseases, 54–57, 58  
 dispersal, *see* breeding dispersal, natal dispersal  
 diurnal activity  
   hunting, 63, 70, 93  
   nestlings, 200–202  
   roosting, 95–98  
 divorce, 138, 140, 229  
 double brooding, *see* second broods
- ear, 66, 67, 69  
 ectoparasites, 58, 60, 61, 219, 220, 270  
 education, 49, 52, 287  
 eggs  
   fertilization, 130, 135, 163, 164  
   formation, 129, 154–158, 161  
   size, 89, 155, 157, 158, 160, 256, 272  
 emigration, 231, 236  
 endoparasites, 54, 55, 58  
 erythrisms, 241  
 ethics, 32–34  
 eumelanin, 240, 255  
 evolution, 10–15  
   Africa, 13  
   Americas, 14  
   Asia, 13–14  
   Europe, 13  
   Oceania, 14–15  
 experimental design, 33–35  
 extra-pair copulation, 130, 133, 135, 181, 257  
 extra-pair paternity, 135  
 eye, *see* vision
- facial disc, 21, 66–67  
 falls from the nest, 46, 49, 56, 190  
 farming, *see* agriculture

- fasting  
 daily fast, 93, 192, 215, 271  
 food depletion, 77, 80
- feather structure, 107–111  
 barb, 108  
 barbule, 108  
 calamus, 107, 272  
 rachis, 107  
 serrations, 108, 109  
 shaft, 107, 272  
 transverse bars, 109, 110, 272  
 vane, 107–109, 272
- feather wear, 255, 272, 284
- feeding rate  
 father, 185  
 mother, 171  
 parents, 174, 184, 185, 194, 210, 211
- fertilization, 130, 135, 163, 164
- fidelity, 138–142  
*see also* divorce, nest-site fidelity
- flight  
 mechanics, 106–111  
 silent, 3, 21, 108, 109, 111  
 speed, 66, 73, 101, 106–109, 112, 116  
 wing loading, 109
- food  
 allocation, 211, 214  
 sharing, 3, 217–220, 266  
 theft, 198, 211, 215, 216, 218
- food requirement  
 adult, 71–73, 93  
 maternal plumage, 270  
 nestling, 174, 196
- food stores, 93, 194–196  
 consumption, 192, 195  
 determinants, 194, 196  
 effect on reproduction, 194  
 feeding offspring, 185  
 outside breeding season, 128  
 parental feeding rate, 185, 194  
 sharing, 218  
 theft, 93
- foot, anti-parasite adaptations, 59
- frequency-dependent selection,  
 243, 244
- gastrointestinal tract, *see* digestion
- genetics  
 genetic conflict, 249, 261, 262  
 good genes, 257  
 plumage traits, 247, 248
- Gloger's rule, 284
- glucocorticoids  
 allopreening, 220  
 colour polymorphism, 244, 270,  
 272  
 oxidative stress, 269  
 sibling negotiation, 206  
 stress, 269
- habitat, 102–105  
 habitat loss, 37–38
- hatching, 161–162, 163–166  
 before hatching, 163  
 egg size, 155, 157  
 maternal care, 162, 180, 185, 189,  
 210  
 mother–father relationship, 131  
 parasites, 59, 60  
 success, 161–164, 167, 238
- hatching asynchrony, 3, 164–166  
 age difference, 163  
 allopreening, 220  
 brood reduction, 3, 163, 165, 166  
 comparison with other species, 165  
 food sharing, 217, 218, 220  
 incubation, 162  
 parental care, 166, 192  
 sibling competition, 86, 163, 165,  
 166, 180, 206, 211, 214, 215,  
 218, 222, 226  
 thermoregulation, 221
- hatching synchrony, 164, 165
- hearing, 3, 21, 66, 68, 69, 112, 209  
*see also* ear, facial disc
- home range, 100–105
- hovering, *see* hunting methods
- huddling, 180, 221, 222, 275, 276
- human attitudes, 28–31, 46–52
- human habitats, 21–22, 23, 26
- human impacts, 39–43, 49
- human structures, 145–149  
*see also* buildings, nest boxes
- hunting methods, 112–115  
 from a perch, 73, 106, 112, 113, 115  
 hovering, 112  
 on the wing, 21, 106, 108, 112, 113  
 timing, 185

294 INDEX

- immigration  
 impact on phenotypic adaptation, 21, 80  
 population dynamics, 46, 139, 236, 244
- inbreeding, 137, 227
- incest, 135
- incubation, 132, 161, 162  
 brood patch, 162  
 chattering calls, 210  
 effort, 63, 89, 162, 164, 185, 191, 192  
 failure, 35, 167, 171  
 feeding, 129, 162, 185, 188  
 hatching asynchrony, 164, 165  
 hatching rank, 165  
 kestrel eggs, 133, 198  
 testosterone, 272  
 time, 161
- independence from parents, 104, 155, 173, 178,  
 179, 181, 198, 225, 230
- infanticide, 194, 215
- infertility, 163
- intestine, 73  
*see also* digestion
- island syndrome, 86
- islands  
 colouration, 6, 253, 284  
 diet, 41, 86, 119, 124  
 dispersal, 13, 86, 227  
 distribution, 13  
 impact of barn owls, 40–41, 43  
 introduction, 14, 41  
 roost, 145  
 speciation, 14, 15
- Israel, *see* Middle East peace process
- Jordan, *see* Middle East peace process
- kin selection, 188, 217, 218
- laboratory animals, 6–7
- laterality, 270
- laying date, *see* breeding season
- leucism, 241
- lice, 58–59
- lift, 107, 109
- literature, scientific, 8–9
- manoeuvrability, 75
- mate choice, 247, 257–259
- mate guarding, 130
- maternal effect  
 begging for food, 189  
 egg, 59  
 maternally inherited genes, 138
- mating system, 132, 133
- melanin, 240, 247, 272, 273, 284, 286, 287
- melanism, 241, 278
- melanocortin-1-receptor (*mclr*) gene,  
 250
- melanogenesis, 240, 247, 249, 271
- Middle East peace process, 30–31
- migration, 15, 22, 229
- model system, 6–7
- monogamy, 130, 135, 142
- mortality, 230–234  
 conservation, 44, 49  
 food deprivation, 270  
 population dynamics, 235, 236  
 roads, *see* road deaths  
 shooting, 234, 234  
 size of plumage spots, 262  
 starvation, 49  
 temporal change, 230  
 wind turbines, 234  
 winter, 76
- mutual preening, *see* allopreening
- myths, 36, 44, 49, 52
- natal dispersal, 137, 224, 225–227, 228,  
 236, 266  
 Europe, 225  
 North America, 226
- negotiation, *see* sibling negotiation
- nest boxes, 45–47, 148–149, 151  
 monitoring, 42
- nest desertion, 178–180  
 changing site, 181  
 by female, 182  
 by male, 179, 181  
 effect of brood size, 178, 180  
 effect of date, 180  
 female quality, 180  
 fitness effects, 171, 180  
 frequency, 179, 180  
 reproductive success, 180  
 second brood, 179, 180
- nest-site fidelity, 138, 140, 178, 228, 229

- nest sites, 23–26, 144–151  
 artificial, 145–149, *see also* nest boxes  
 competition, 150–151  
 ground, 13, 26, 63, 144  
 hygiene, 56  
 trees, 23, 26, 145, 148, 149  
 underground, 144, 145
- nest switching, 198  
*see also* adoption
- nestling growth, 59, 73, 86, 155, 157, 165,  
 173–175, 270, 271
- nocturnal activity, 92–94  
 anatomy and physiology, 68–69  
 behaviour, 69–70  
 hunting, 92–93  
 visual acuity, 69
- opportunistic diet, 21, 116, 117
- oxidative stress, 269, 270
- Palestine, *see* Middle East peace process
- parasite resistance, 240, 268, 270, 273, 278, 284
- parasites, 54–61  
*see also* ectoparasites, endoparasites
- parent–offspring conflict, 286
- parental roles, 184–190
- paternal care, 129, 185, 188, 196
- peace, *see* Middle East peace process
- pellets, 73–75  
 content, 2, 30, 73, 74, 118  
 ejection, 75  
 hygiene, 56  
 nest material, 149  
 number of bones, 72, 73  
 number per day, 75  
 pollutants, 39  
 sodium content, 73  
 sub-fossil pellets, 124, 126  
 suffocation, 75
- persecution, 36
- personality, 241, 268, 286
- pest control, biological, 30–31, 40–41
- pesticides, 26, 30, 39, 40, 235, 287
- pet trade, 49, 233
- phaeomelanin, 240, 255
- phenology  
 determinants, 153, 154  
 variation, 152, 154, 156, 157, 165
- Phodilus* (bay owl), 13, 105, 158
- phylogeny, 11, 14–15
- Plasmodium*, 54
- pleiotropy, 240
- plumage traits, 240–284  
 adaptive, *see* adaptive plumage traits  
 age, 254–256  
 alternative strategies, 3, 243, 244, 266  
 colour, 240–244, 279  
 dispersal, 264, 266  
 genetic correlation between sexes, 248, 249  
 genetics, 245–251  
 geographic variation, 278–284  
 grass owls, 280  
 heritability, 247  
 masked owls, 281  
 mate choice, 257–259  
 number of spots, 275–277, 279  
 parasite resistance, 240, 268, 270, 273,  
 278, 284  
 personality, 241, 268, 286  
 sex, 248–249, 252–253, 260–263, 282  
 size of spots, 262, 268–274, 279  
 Tytonidae, 282–283
- pollution, 39–41  
*see also* pesticides
- polyandry, 88, 133, 178
- polygyny, 132, 133
- polymorphism, *see* colour polymorphism,  
 plumage traits, sexual dimorphism
- population decline, 36–38
- population dynamics, 3, 235–238  
*see also* immigration, mortality
- predation, 270  
 on barn owls, 62–64
- preening  
 ectoparasites, 58  
 mother, 266  
 nestling, 200, 220, 270, 272  
*see also* allopreening
- prey, *see* diet
- reciprocation, 218, 219
- reconciliation, *see* Middle East peace process
- rehabilitation, 46, 49
- replacement clutches, 152, 167, 171, 172,  
 180, 194
- reproductive potential, 3, 21

## 296 INDEX

- reproductive season, *see* breeding season  
 research, 8–9, 32–35, 286–287  
 reversed sexual size dimorphism, *see* sexual dimorphism  
 road deaths, 26, 36, 44, 149, 230, 231, 232, 235  
 rodenticides, *see* pesticides  
 rodents as prey, 118–126  
 roosting, 95–99  
   buildings, 26, 95, 98, 145, 148  
   communal, 99  
   foliage, 97  
   foraging, 100, 113, 115  
   forest, 97, 105  
   frequency of use, 97, 98  
   ground, 97, 99  
   height above ground, 97  
   nest, 98, 99, 129, 173  
   nestlings, 174, 197  
   rocky sites, 97, 124  
   roost choice, 99  
   sex differences, 97, 129  
   sooty owl and masked owls, 95, 97  
   trees, 95, 97, 145  
   underground, 97  
   winter, 194  
   *see also* sleep
- scientific studies, 8–9, 32–35, 286–287  
 second broods, 176–178  
   clutch size, 158, 159, 176  
   copulation, 131, 178, 182  
   determinants, 152, 177, 178  
   dispersal, 227  
   frequency, 172, 176, 177, 180  
   interaction with first brood, 174  
   laying date, 159, 176, 178  
   mate change, 181  
   maternal desertion, 171, 178, 179, 180, 181, 218  
   nest site, 46, 178  
   parental investment, 177, 178  
   success, 176, 177  
   timing, 158  
 senescence, 238, 238  
 sex chromosomes, 247, 248, 253  
 sexual behaviour, 128–142  
 sexual dimorphism, 88–90, 250, 252, 253, 262, 282  
 sexual maturity, 131, 235  
 sexually antagonistic selection, 260–262  
 Shannon's diversity index, 119–121  
 sharing of food, 217–220, 266  
 shrews as prey, 122  
 siblicide, 215, 216  
 sibling competition, 3, 204, 211, 286  
 sibling interactions, 200–222  
 sibling negotiation, 200, 203–209, 210, 211, 215, 219, 286  
 silent flight, 21, 108, 109, 111  
 sleep, 93–94, 113, 150, 173, 200, 202, 275, 276  
   electroencephalography, 93, 202  
   non-REM sleep, 202, 276  
   rapid eye movement sleep (REM), 94, 200, 202  
   *see also* roosting  
 snow, 76–77, 153, 155, 230  
 soliciting behaviour, *see* begging behaviour  
 speciation, 14, 15, 21  
 spots in plumage  
   number, 275–277, 279  
   size, 262, 268–274, 279  
 starvation  
   brood reduction, 157, 165, 216  
   cause of mortality, 49, 76  
   death of father, 171  
   falling out of the nest, 49  
   food depletion, 77, *see also* fasting  
   sex differences, 80  
 stomach  
   digestion, 73  
   foraging, 93, 109, 264  
*Strigea*, 56  
 survival, *see* mortality  
 synchrony, *see* hatching synchrony
- tail  
   heritability, 86  
   number of feathers, 87  
   rigidity, 272  
 temperature  
   ambient temperature, 46, 71, 145, 149, 152, 164, 167, 170, 221, 222, 230, 275, 276, 284  
   body temperature, 76, 77, 132, 170, 210, 221, 222, 275  
   thermoneutral zone, 77, 221, 222  
 territorial behaviour, 46, 100, 104, 138, 140, 181, 224–226, 228, 229, 266  
 testosterone, 271, 272  
 theft of food, 198, 211, 215, 216, 218

- thermoregulation, 221  
 threats, *see* human impacts, persecution,  
   pesticides, pollution  
 ticks, 58–60  
*Tyto alba* subspecies, 13, 105  
*Tyto almae* (Seram masked owl), 14, 105  
*Tyto aurantia* (golden masked owl), 14, 105  
*Tyto furcata* (American barn owl), 15, 282  
*Tyto gigantea*, 10  
*Tyto glaucops* (ashy-faced owl), 13, 15  
*Tyto inexpectata* (Minahassa masked owl),  
   14, 105, 149  
*Tyto javanica delicatula* (Australian barn owl), 14  
*Tyto javanica javanica* (Asian barn owl), 14  
*Tyto javanica stertens* (Indian barn owl), 13  
*Tyto multipunctata* (lesser sooty owl), 15, 105  
*Tyto nigrobrunnea* (Taliabu masked owl), 13, 14  
*Tyto rosenbergii* (Sulawesi barn owl), 13, 97,  
   105, 149  
*Tyto sororcula* (Moluccan masked owl), 14  
*Tyto soumagnei* (Madagascar red owl), 13, 105  
*Tyto tenebricosa* (sooty owl), 15, 105  
*Tyto thomensis* (São Tomé barn owl), 13  
 Tytonidae  
   evolution, *see* evolution  
   cosmopolitan distribution, *see* cosmopolitan  
   distribution  
   uneaten food, 195–196  
     *see also* food stores  
   uropygial gland, 272  
 vision, 66, 68, 70, 112  
   acuity, 68, 69  
   eye, 68, 69, 113  
 vocal negotiation, 205–207  
 voles as prey, 122–123  
 wing  
   heritability, 86  
   island syndrome, 86  
   length, 84, 85  
   rigidity, 272  
 wing loading, 107, 109  
 winter  
   adaptation, 80  
   courtship, 128, 129  
   fat accumulation, 76, 77  
   foraging, 93, 113, 159  
   home range, 104  
   migration, 22, 77, 228  
   reproduction, 77, 145, 152, 153, 155, 159, 164  
   roost, 194  
   *see also* cold weather, snow  
 winter mortality, 44, 76, 80, 188, 230, 232, 235, 237