

Index

Page numbers in *italic* indicate figures or tables.

- abandonment of young 268–9
- Acrobates pygmaeus* (feathertail glider) 52, 97, 147, 148, 318
- Acrobatidae (family) (feathertail gliders) 7, 16, 97
 - taxonomic lists and conservation status 318, 320
- activity rhythms 174, 233–4
- aestivation 234 *see also* hibernation; torpor
- agonistic calls 238–9
- agonistic displays 244–6
- alarm calls 240
- Americas (marsupial species)
 - causes of declines 308–9
 - future prospects 329
 - history of marsupial dominance 307–8
 - recognition and legal listing 326
 - recovery process 328
 - taxonomic list and conservation status 322–4
 - threatened species 318, 321–5
- Ankotarinja* 6
- Antechinus stuartii* (brown antechinus) 143–4, 273, 312
- Antechinus subtropicus* (subtropical antechinus) 209, 211, 212, 213, 214, 312
- Antechinus swainsonii* (dusky antechinus) 104, 143, 312
- anti-nutrients in foods 137, 138
- arboreal folivores
 - dentition and digestive tract 151–3
 - energy and nutrient requirements 153–4
 - lactation strategy 130–1, 135
 - see also* browsers; foraging behaviour; herbivorous marsupials
- Argyrolagida (order) 5, 6, 18
- asynchronous concurrent lactation 104, 115–16, 131–3
- auditory communication 183–4, 234–40
- auditory system 183–4
- Australian marsupials
 - causes of declines 301–6
 - extinct species and subspecies 301–6, 309
 - future prospects 328–9
 - importance of islands 305–6
 - reasons for conservation 300–1
 - recognition and legal listing 325
 - recovery process 326–7
 - Tasmania 305–6
 - taxonomic list and conservation status 312–18
 - threatened species 301–6, 309, 312–18
- B lymphocytes 187–8, 193–4, 195–6, 198
- Balbaridae (family) 7
- behaviour of marsupials
 - activity rhythms 233–4
 - burrowing 231–2
 - communication 234–48
 - daily activities 230–4
 - 'death feigning' 234
 - environmental influences 229–30
 - feeding behaviour and adaptations 231
 - food caching 234
 - grooming and care of the body 231, 233
 - maintenance behaviour 230–4
 - modes of locomotion 230–1, 232
 - mother–young 263–71
 - nest-building 232–3
 - play 271–7
 - sexual 248–63
 - sleep patterns 233–4
 - social organisation 289–98
 - torpor, aestivation and hibernation 234
- bettongs, life-history strategies 209, 220–1
- biodiversity
 - Convention on Biological Diversity (Rio Convention) 299
 - in population genetics 63–6
 - reasons for conservation 299–300
 - threats to 74
- birth in marsupials 101–2
 - sensory development of neonates 177–9
- BMR (basal metabolic rate) of marsupials
 - arboreal folivores 153
 - carnivores 144

BMR (basal metabolic rate) of marsupials (*cont.*)
 omnivores 148
 wombats 151
 body size of marsupials 201
 Borhyaenidae (extinct family) 5
 brain
 anatomy of marsupial brains 167, 174–5, 176, 277–8
 archaeocortex 171–2
 cerebrospinal fluid 170
 diencephalon 173–4
 forebrain components 170–4
 hypothalamus 173–4
 limbic system 174
 membranes (meninges) 170
 neocortex 171, 172–3
 olfactory bulb 170–1, 172
 optic nerves 174
 palaeocortex 171, 172
 pineal gland 174
 pituitary gland 173
 relative brain size among mammals 184–5
see also nervous system
 brain development 166–9
 brainstem 167–8
 cerebral hemispheres 168–9
 diencephalon 168
 forebrain (prosencephalon) 166, 168–9
 hindbrain (rhombencephalon) 166–8
 midbrain (mesencephalon) 166–8
 neural tube 166
 radial glial cells 169
 telencephalon 168
 browsers, life-history strategies 210, 223–5 *see also*
 arboreal folivores; foraging
 behaviour; herbivorous marsupials
 Burramyidae (family) 16, 97
 hibernation in pygmy-possums 148
 taxonomic lists and conservation status 318, 320
Burramys parvus (mountain pygmy-possum) 97, 318
 burrowing 231–2
 caecal fermentation 148–50, 151–4
 caecotrophy 152
Caenolestes fuliginosus (rat opossum) 140, 142, 324
 Caenolestidae (family) 5–6, 16
 taxonomic list and conservation status 324
 Caluromyidae (family) 5, 16
Caluromys lanatus (western woolly opossum) 52, 322
Caluromys philander (bare-tailed woolly opossum)
 209, 218–20, 322
Canis lupus dingo (dingo) 306
 carbohydrates
 forms found in foods 137, 138
 levels in marsupial milk 121–9
 cardiogastric gland 140, 142, 151
 carnivorous marsupials
 dentition 140, 141
 diets 201–2
 digestive function 143–4
 digestive tract 140–3
 energy and nutritional requirements 144

hibernation and torpor states 144
 life-history strategies 209, 211–17
 central nervous system (CNS) 159 *see also* brain;
 nervous system
Cercartetus concinnus (pygmy-possum) 52, 97, 318
Cercartetus lepidus (pygmy-possum) 97, 318
Cercartetus nanus (pygmy-possum) 97, 318
 chemical messages *see* olfactory communication
Chironectes minimus (water opossum) 231, 322
 chromosome painting 53–6
 chromosome staining techniques 51, 52
 chromosomes
 sex chromosomes 33–4
 structure and sequence 32–4, 51
 chromosomes (marsupials) 33, 50–7
 karyotype variation 50–7
 recombination 23
 sex chromosomes 23, 57–63
 size 23
 X-chromosome inactivation 23
 class (classification category) 4
 classification of marsupials
 analogous and homologous forms 8–13
 anatomical schemes 10–13
 bases for modern classification 8–10
 comparison with placental orders 4
 descriptions of orders 5–8
 development of 3–5
 hierarchical categories 3–4
 historical 1
 molecular phylogeny 13–15, 16, 16–17
 symplesiomorphic homologous features 9–13
 synapomorphic homologous features 9–13
 taxa 3–4
see also taxonomic lists of marsupials
 communication 234–48
 auditory 234–40
 olfactory 234–6, 240–4
 tactile 234–6, 246–8
 visual 234–6, 243–6
 concurrent asynchronous lactation *see* asynchronous
 concurrent lactation
 conservation genetics
 conserving variation between populations 79–80
 effects of small populations 70–4
 ESUs 76–80
 hybridisation in captivity 78, 79
 loss of genetic variation 70–4
 management units (MUs) 78–9
 population genetics 76
 conservation of biodiversity 299–300
 conservation of marsupials 300–1
 causes of declines 301–9
 extinct species 301–8
 future prospects 328–9
 importance of genetics 81–2
 recognition and legal listing 325–6
 recovery process 326–8
 species at risk 309–25
 treatment for recovery 325–8
 conservation status of marsupials (taxonomic lists)
 Americas 322–4

- Australia 312–18
 Indonesia 319–21
 Papua New Guinea 319–21
 conservation units 76–80
 contact calls 237
 Convention on Biological Diversity (Rio Convention) 299
 courtship behaviour 247–8
 courtship calls 239–40
- Dactylopsila trivirgata* (striped possum) 183, 317
 daily rhythms, regulation 174
 Darwin, Charles 8
 Dasyuridae (family) 6, 16, 263–5
 taxonomic lists and conservation status 312–13, 319
 Dasyuromorphia (order) 6, 18–19
Dasyurus hallucatus (northern quoll) 312
 birth and journey to the pouch 178, 179
 brain 166, 167, 168, 171, 173, 174
 vocalisations of pouch young 183–4
Dasyurus maculatus (spotted-tailed quoll) 70, 312
 dentition and diet 140, 141
 digestive function 143–4
 ESUs 76–8
 mounting behaviour 251
 play behaviour among young 273, 274
Dasyurus viverrinus (eastern quoll)
 28, 38, 52, 312
 dentition and diet 140
 digestive function 143
 life-history strategy 209, 212, 214, 215
 milk composition 123
 reproductive pattern 105–6
 dentition 3
 arboreal folivores 151, 152
 carnivorous marsupials 140, 141
 herbivorous marsupials 141
 kangaroos, wallabies and rat-kangaroos 155
 omnivorous marsupials 145
 wombats 150
 diapause, in marsupial embryos 97–101
 Didelphidae (family) 16, 263–5
 taxonomic list and conservation status 322–4
 Didelphimorphia (order) (opossums) 5, 18
Didelphis spp. 1, 2, 209, 221, 222, 322
Didelphis marsupialis (common or black-eared opossum) 181, 322
Didelphis virginiana (North American or Virginia opossum) 75, 96, 322
 activity rhythms 233–4
 behavioural studies 230
 birth and journey to the pouch 178
 ‘death feigning’ behaviour 234
 dentition and digestive tract 142, 145
 face-washing behaviour 231, 233
 sleep patterns 234
 thermoregulation in young 122
 tree climbing 230–1, 232
 diets of marsupials 201–5
 digestive tract anatomy and function
 arboreal folivores, 151–3
 cardiogastric gland 140, 142
 carnivorous marsupials 140–4
 herbivorous marsupials 148–58
 kangaroos, wallabies and rat-kangaroos 149, 155–7
 omnivorous marsupials 145–7
 Diprotodontia (order) 4, 7, 18–19
 classification of 8–9, 10–11, 14
 Diprotodontidae (family) 7
 diprotodonty 8, 10–11
 dispersal
 genetic biases in 69–70
 genetic estimates of 75
 patterns in marsupials 74–5
Distoechurus pennatus (feathertail glider) 97, 320
 DNA
 allelic variation 27–8
 different forms in genomes 28–38
 microsatellite 28, 30
 mitochondrial 36, 37, 70
 polymorphism 27–8
 structure 25
 DNA amplification by PCR 28, 29, 30
 DNA comparison methods
 amino-acid sequencing 14
 DNA hybridisation 14–15, 16, 16–17, 25
 DNA library 29
Dromiciops gliroides (monito del monte) 6, 11,
 14–15, 18, 143, 144, 324
- echidna (*Tachyglossus aculeatus*)
 brain 175, 176
 discovery of 2
 ecological attributes of marsupials
 body size 201
 diets 201–5
 habitats 205–7
 ecology and life histories 207–27
 carnivore life-history strategies 209, 211–17
 environmental influences 207–8
 herbivore life-history strategies 210, 223–7
 marsupial life-history strategies 208–27
 omnivore life-history strategies 209–10, 217–23
 ecology of marsupials
 history of study 199–200
 motivations for study 200
 Ektopodontidae (extinct family) 7
 embryonic diapause 97–101
 energy and nutrient requirements
 arboreal folivores 153–4
 carnivorous marsupials 144
 kangaroos, wallabies and rat-kangaroos 157–8
 omnivorous marsupials 148
 wombats 151
 environmental influences
 durational stability 207
 spatial heterogeneity 208
 temporal variability 207–8
Eomaia scansoria (oldest fossil placental mammal) 3
 ESUs (evolutionarily significant units) 76–80
 eutherian mammals, relationship with marsupials 24
 see also placental mammals

- evolution of marsupials, timing and geographic course
 15, 17–19
 extermination of marsupials 200
- family (classification category) 4
 feeding behaviour and adaptations 231 *see also*
 foraging behaviour
- female marsupials
 birth 101–2
 embryonic diapause 97–101
 hormonal control of the reproductive cycle 93, 94,
 95–7
 lactation 102–4
 mate-choice 256–9
 oestrous cycles and pregnancy 92–101
 reproductive anatomy and function 89–92
 seasonal breeding 104–5
 variations in pouches 92
- FISH (fluorescence *in-situ* hybridisation) 46–7
 flehmen 243, 254
 FMR (field metabolic rate) of marsupials
 arboreal folivores 153
 carnivores 144
 omnivores 148
 wombats 151
- food caching 234
 foods used by marsupials, classification 137–9
 foot-stamping communication 236
 foraging behaviour 281–9
 foregut fermentation, herbivorous marsupials 148–9,
 154–8
 frugivore–omnivores, life-history strategies 209,
 218–20
 fungivore–omnivores, life-history strategies 209,
 220–1
- galactopoiesis, hormonal control of 115–16, 117–19
 gastrointestinal tract *see* digestive tract anatomy and
 function
- gene cloning 28, 29, 38–9
 gene flow 74
 gene mapping 41–50
 comparisons between species 47–50
in-situ hybridisation 45–7, 48, 49
 linkage maps 42
 somatic cell genetics 43–4, 45
- gene origins 40
 genes
 coding for proteins 24–7
 competition and spread in populations 63–6
 DNA mutations 27–8
 DNA structure 24–7
 expression and regulation 24–7, 40–1
 marsupial 38–41
 genetic biases in dispersal 69–70
 genetic estimates of dispersal 75
 genetic relationships, molecular phylogeny 13–15, 16,
 16–17
 genetics
 conservation genetics 24
 ecological and evolutionary genetics 24
 gene expression and regulation 23–4
 gene identification and transmission 23
 genetic variation 64–5, 70–4
 importance in marsupial conservation 81–2
 population genetics 24
 similarities to eutherians 22–3
- genomes 28–38
 evolution 41, 80–1
 gene mapping 34–8
 information from marsupial studies 80–1
 mammalian ancestral genome 54–7, 80–1
 marsupial ancestral genome 80–1
 recombination in marsupials 42
 recombination of genes 34–8
- genus (classification category) 4
 gestation, marsupials and placentals compared 134
 grazers, life-history strategies 210, 225–7 *see also*
 foraging behaviour; herbivorous marsupials
- Groeberida (order) 5–6, 18
 grooming and care of the body 231, 233
 gut flora, acquisition by young herbivores 126–8,
 129
Gymnobelidius leadbeateri (Leadbeater's possum)
 146, 148, 317
- habitats of marsupials 205–7
 herbivorous marsupials
 acquisition of gut flora by young 126–8, 129
 browser life-history strategies 210, 223–5
 caecal fermenters 148–50, 151–4
 dentition 141
 diets 204–5
 digestive physiology and nutrition 148–58
 foregut fermenters 148–9, 154–8
 grazer life-history strategies 210, 225–7
 life-history strategies 210, 223–7
 microbial fermentation 148–50
 proximal colon fermenters 148–9, 150–4
see also arboreal folivores
- hibernation 144, 148, 234
 hopping of kangaroos 230
 hormonal control of lactation 115–19
 human β -globin sequence 28
 hybridisation in captivity 78, 79
Hypsiprymnodon moschatus (musky rat-kangaroo) 92,
 155, 315
 Hypsiprymnodontidae (family) 7, 16
- immune system in young marsupials 130 *see also*
 immunolymphatic system
- immunoglobulins, in marsupial milk 130
 immunolymphatic system 186–98
 adenoids 194
 B lymphocytes 187–8, 193–4, 195–6, 198
 cell-mediated immunity 196, 198
 disease diagnosis 198
 functional aspects 195–8
 humoral immunity 196–8
 immune system 189, 191–98
 lymph fluid 189
 lymph nodes 193

- lymphatic system 187–9, 190
 macrophages 193–4, 195–6
 marsupial studies 186
 MHC molecules and antigen presentation 193–4, 195–6
 mucosa-associated lymphoid tissues (MALTs) 186, 194
 Peyer's patches 194
 spleen 194–5
 T lymphocytes 187–8, 192, 193–4, 195–6, 198
 thymus 191–3
 tissues of 186–7
 tonsils 194
- inbreeding depression 66–7
- Indonesian marsupials
 future prospects 329
 recognition and legal listing 326
 recovery process 328
 taxonomic list and conservation status 319–21
 threatened species 309, 318, 319–21
- insectivore–omnivores, life-history strategies 209, 217–18
- intelligence, marsupials compared with placentals 277–81
- intraspecific competition, and social organisation 290, 294–6
- introns 26, 30–1, 40, 43, 80
- Isodon auratus* (golden bandicoot) 148, 314
- Isodon macrourus* (northern brown bandicoot) 96, 314
 digestive function 146–7
 digestive tract 145–6
 life-history strategy 221–3
 milk composition 123
 reproductive pattern 106
 reproductive strategy 136
- Isodon obesulus* (southern brown bandicoot) 52, 210, 222–3, 314
- IUCN Red List of Threatened Species 301, 309
 Australian marsupials and monotremes 312–18
 categories and criteria 309, 310–11
 Indonesian marsupials 319–21
 marsupials of the Americas 322–4
 New Guinea marsupials 319–21
- kangaroos *see* Macropodidae
- karyotype, stability and variation 50–7
- Keeuna* 6
- kingdom (classification category) 4
- Kollikodon* 21
- lactation 102–4
 adaptive features in marsupials 134–6
 asynchronous concurrent lactation 104, 115–16, 131–3
 benefits for mammals 108
 carbohydrate levels in marsupial milk 121–9
 changes in marsupial milk composition 119–30
 different strategies among mammals 109
 duration in marsupials and placentals 134–5
 energy requirements in marsupials 134–6
 hormonal control of 115–19
 level of efficiency in marsupials 134–6
 level of milk production in marsupials 134–6
 lipid levels in marsupial milk 121–9
 maintenance of 112, 115–16, 117–19
 mammary gland structure 110–14
 phases of marsupial lactation cycle 109–10
 protein levels in marsupial milk 121–9
 strategies of marsupials and placentals 130–1
 strategy of arboreal folivores 130–1, 135
- lactogenesis, hormonal control of 115–17, 118
- Lagorchestes conspicillatus* (spectacled hare-wallaby) 157, 315
- Lasiorhinus* spp. (hairy-nosed wombats) 314
 colon fermentation 150
 dentition 150
 digestive tract form and function 150
 energy and nutrient requirements 151
- Lasiorhinus krefftii* (northern hairy-nosed wombat) 69–70, 73, 314
- Lasiorhinus latifrons* (southern hairy-nosed wombat) 52, 85, 314
- learning behaviour in marsupials 277–81
- Linnean classification 1, 4, 8
- lipid levels in marsupial milk 121–9
- locomotion
 bipedal ricochet (kangaroos) 230
 modes of 230–1, 232
- locomotor play behaviour 272
- lymphatic system *see* immunolymphatic system
- Macropodidae (family) (kangaroos and wallabies) 7, 16
 dentition 155
 digestive tract anatomy and function 149, 155–7
 embryonic diapause 97–101
 energy and nutrient requirements 157–8
 foregut fermentation 154–5
 mother–young behaviour 265–8
 reproductive pattern 106–7
 taxonomic lists and conservation status 315–17, 319–20
- Macropus* spp., play-fighting 274–6
- Macropus agilis* (agile wallaby) 131–3, 315
- Macropus eugenii* (tammar wallaby) 53, 55, 96, 315
 asynchronous concurrent lactation 131–3
 birth 101–2
 embryonic diapause 98, 99–100
 hybridisation between populations 79
 lactation 102–4
 lactation cycle 110
 life-history strategy 225
 male reproductive tract 84
 milk composition 123, 125
 nutritional deficiency in captivity 157–8
 pouch development 115
 scrotum development 115
 seasonal breeding 104–5
 thermoregulation in young 122
- Macropus fuliginosus* (western grey kangaroo) 100, 179, 225, 316

Macropus giganteus (eastern grey kangaroo) 1, 53, 136, 149, 179, 316
Macropus parma (parma wallaby) 157, 316
Macropus robustus (euro) 33, 53, 101, 157, 226–7, 257, 316
Macropus rufogriseus (Bennett's wallaby) 98, 100, 104–5, 316
Macropus rufogriseus (red-necked wallaby) 225, 226, 316
Macropus rufus (red kangaroo) 53, 83, 316
 asynchronous concurrent lactation 115–16, 131–3
 embryonic diapause 98–9
 life-history strategy 210, 226–7
 mother–young behaviour 247
 reproductive strategy 136
 vigilant behaviour 244
Macrotis lagotis (bilby) 70, 146, 147, 314
 male marsupials
 development of scrotum 115
 lack of mammary glands 114–15
 reproductive anatomy and function 83–4
 seasonal breeding 104–5
 sperm 87–8
 testes and accessory glands 84–6
 testicular endocrinology 88, 89
 Mammalia (class) 4
 mammals
 age of the lineage 2–3
 ancestral genome 24, 54–7, 80–1
 mammary gland
 development and structure 110–14
 in males 114–15
Marmosa murina (murine mouse opossum) 218, 322
Marmosa robinsoni (Robinson's mouse opossum) 323
 energy requirements 144
 life-history strategy 209, 218
 mating behaviour 249
 threat display 245
Marmosops incanus (gray slender mouse opossum) 217–18, 323
 Marsupial Genome Project 38
 marsupials
 age of the group 3
 date of separation from placentals 3
 discovery of 1, 199
 distinguishing features xi–xiii
 extinct orders 4–5
 historical distribution 3, 4–5
 present-day distribution 3, 4–5
 relationship to placentals (eutherians) 2–3, 20–1, 24
 Marsupionta (proposed grouping) 20–1
 mating behaviour
 and reproductive success 67–9
 effects on genes 66–70
 inbreeding avoidance 66–7
 mating systems 259–63
 see also reproduction
 microbial fermentation, herbivorous marsupials 148–50
 Microbiotheria (order) 6, 18
 Microbiotheriidae (family) 324

microsatellite DNA 28, 30
 milk see lactation
 minerals, in marsupial milk 129–30
 Miralinidae (extinct family) 7
 mitochondrial DNA 36, 37, 70
 molecular ecology, and neutral variants 65–6
 molecular phylogeny 13–15, 16, 16–17
Monodelphis domestica (grey short-tailed opossum) 323
 humoral immune response 198
 life-history strategy 216–17
 nerve cell studies 166
 sensory and motor nerve development in pouch young 170
 spinal cord regeneration studies 177
 monotremes
 brain 175, 176
 classification 9
 discovery of 2
 evolution 17–18, 20–1
 relation to marsupials and placentals 2–3, 20–1
 sex chromosomes 59, 63
 mother–young behaviour 263–71
 abandonment of young 268–9
 contact calls 237–8
 relative investment in sons and daughters 269–71
 MUs (management units) 78–9
 Myrmecobiidae (family) 6, 16, 263–5, 313
Myrmecobius fasciatus (numbat) 6, 15, 313
 natural selection 64
 neonate marsupials
 journey to the pouch 177–9
 sensory development 177–9
 see also pouch; pouch young
 nervous system
 astrocytes 160
 autonomic 163
 cell death during development 169
 cells 159–63
 glial cells 159, 160–1, 162, 163
 interneurons 161, 163
 mammalian pattern 159
 microfilaments 160
 microtubules 159–60
 motor nerves 161, 170
 motor units 164
 myelin proteins 161, 162, 163
 nerve cell activation 163–4
 nerve cell growth and regeneration 169–70
 neurons 159–63
 neurotransmitters 164–6
 oligodendrocytes 160–1, 163
 Schwann cells 160–1, 162
 sensory nerves 161, 170
 sensory receptors 164
 synapses 160, 164–6
 nervous system development (marsupials)
 auditory system 183–4
 in the pouch 179–85
 olfactory system 184

- relative brain size 184–5
 relative development of neocortex 184–5
 sensory and motor nerve development in pouch
 young 170
 sensory development of marsupial neonates 177–9
 somatosensory system 183
 visual system 179–82
 see also brain; spinal cord
 nest-building 232–3
 neutral variants, and molecular ecology 65–6
 New Guinea (and southwest Pacific) marsupials
 causes of decline 306–7
 future prospects 329
 recognition and legal listing 325–6
 recovery process 327–8
 taxonomic list and conservation status 319–21
 threatened species 309, 318, 319–21
Ningau spp. 52, 312
 nitrogen content of foods 137, 139
 Notoryctemorphia (order) (marsupial moles) 6–7,
 18–19
Notoryctes 15
Notoryctes typhlops (marsupial mole) 85, 182, 314
 Notoryctidae (family) 16, 314
 nutrition
 arboreal folivores 153–4
 carnivorous marsupials 144
 foods used by marsupials 137–9
 forms of carbohydrates in foods 137, 138
 kangaroos, wallabies and rat-kangaroos 157–8
 nitrogen content of foods 137, 139
 omnivorous marsupials 148
 water content of foods 137, 139
 wombats 151
- object play behaviour 272–3
 odour-producing glands 240–3
 olfaction 170–1, 172, 184
 olfactory communication 234–6, 240–4
 omnivorous marsupials 145
 dentition 145
 diets 202–4
 digestive function 146–7
 digestive tract 145–6
 energy requirements 148
 frugivore–omnivore life-history strategies 209,
 218–20
 fungivore–omnivore life-history strategies 209,
 220–1
 insectivore–omnivore life-history strategies 209,
 217–18
 life-history strategies 209–10, 217–23
 nutrient requirements 148
 use of hibernation and torpor states 148
 order (classification category) 4
Ornithorhynchus anatinus (platypus)
 brain 175, 176
 discovery of 2
- Palorchestidae (extinct family) 7
 Papua New Guinea *see* New Guinea
- Parantechinus apicalis* (dibbler) 31, 312
 paternity control 256–9
 Paucituberculata (order) 5–6, 18
 PCR amplification, marsupial loci 39–40
 Peramelemorphia (order) (marsupial bandicoots) 7
Perameles gunnii (eastern barred bandicoot) 72–3,
 222–3, 314
Perameles nasuata (long-nosed bandicoot) 52, 314
 birth and journey to the pouch 178
 digestive function 143
 life-history strategy 210, 221–3
 reproductive pattern 106
 Peramelidae (family) 7, 16, 265
 taxonomic lists and conservation status 314, 319
 peripheral nervous system (PNS) 159 *see also* nervous
 system
 Peroryctidae (family) 7
 taxonomic lists and conservation status 313, 319
 Petauridae (common gliders) 7, 16, 265
 taxonomic lists and conservation status
 317–18, 321
Petauroides volans (greater glider) 152, 153–4, 210,
 223–4, 317
Petaurus breviceps (sugar glider) 142, 145, 146, 148,
 318, 321
Petrogale spp. (rock wallabies) 53, 57, 74, 76, 226,
 316–17
Petrogale assimilis (allied rock-wallaby) 67–9, 316
Petrogale lateralis (black-footed rock-wallaby) 71–2,
 316
Phalanger gymnotis (ground cuscus) 153, 320
 Phalangeridae (family) (cuscuses) 7, 16
 taxonomic lists and conservation status 317, 320
Phascogale tapoatafa (brush-tailed phascogale) 74,
 142, 312
 Phascolarctidae (family) (koala) 7, 16, 314
Phascolarctos cinereus (koala) 314
 asynchronous concurrent lactation 131–3
 changes in food intake of young 127
 dentition and digestive tract 141, 151–2, 153
 energy and nutrient requirements 153–4
 lactation strategy 123, 131, 135
 life-history strategy 210, 224
 loss of genetic variation in small populations 71
 low genetic differentiation 75, 76
 milk composition 123, 126
 population management units 78–9
 vocalisation 183
 pheromones 240–3
 phylogenetic constraints on social organisation 296–8
 phylogenies, from population genetics 76
 phylum (classification category) 4
 pituitary gland 173
 placental mammals
 age of the group 3
 relationship to marsupials 20–1
 see also eutherian mammals
Planigale gilesi (paucident planigale) 209, 212, 214,
 215–16, 313
Planigale maculata (common planigale) 209, 212,
 216–17, 313

Planigale tenuirostris (narrow-nosed planigale) 263–4, 313

platypus (*Ornithorhynchus anatinus*)
brain 175, 176
discovery of 2

play behaviour 271–7

play-fighting, *Macropus* spp. 274–6

polymerase chain reaction (PCR) amplification (of DNA) 28, 29, 30

population genetics
biodiversity 63–6
distribution of alleles 63–6
effective population size 70–4
neutral variants 65–6

population substructuring in marsupials 75

postpartum oestrus 255–6

Potoroidae (family) 7
taxonomic list and conservation status 314–15

potoroos, life-history strategies 209, 220–1

Potorous tridactylus (long-nosed potoroo) 55, 141, 315

pouch
evolutionary development 115
journey of neonate marsupials 177–9

pouch young
development of locomotor abilities 170
development of the nervous system 179–85
sensory and motor nerve development 170
vocalisations 183–4

predation risk, and social organisation 290, 292–4

protein levels in marsupial milk 121–9

proteins, structure and DNA encoding 24–7

proximal colon fermentation, herbivorous marsupials 148–9, 150–4

Pseudantechinus bilarni (sandstone antechinus) 209, 212, 213, 214, 215, 313

Pseudocheiridae (family) (ringtail possums) 7, 16
taxonomic lists and conservation status 317, 321

Pseudocheirus peregrinus (common ringtail possum) 74, 317
digestive tract 152–3
energy and nutrient requirements 153–4
lactation strategy 123, 131
life-history strategy 210, 223–4
milk composition 123

random genetic drift 70–2

rat-kangaroos (Potoroidae)
dentition 155
digestive tract form and function 149, 155–7
energy and nutrient requirements 157–8
foregut fermentation 154–5

reproduction
adaptive features 134–6
brush-tail possum 106
comparison with placental strategies 134–6
duration 133–4
energy requirements 134–6
kangaroos and wallabies 106–7
northern brown bandicoot 106

quoll 105–6
reproductive patterns 105–7
sexual behaviour 248–63

reproduction (female marsupials)
anatomy and function 89–92
birth 101–2
embryonic diapause 97–101
hormonal control of the reproductive cycle 93, 94, 95–7
lactation 102–4
mate-choice 256–9
oestrous cycles and pregnancy 92–101
seasonal breeding 104–5
variations in pouches 92

reproduction (male marsupials)
anatomy and function 83–4
lack of mammary glands 114–15
scrotum development 115
seasonal breeding 104–5
sperm 87–8
testes and accessory glands 84–6
testicular endocrinology 88, 89

resource distribution, and social organisation 290–2

RISH (radioactive *in-situ* hybridisation) 45, 47, 48, 49

Sarcophilus harrisi (Tasmanian devil) 6, 313
auditory communication 236
dentition and diet 140
life-history strategy 209, 217
refuge on Tasmania 306

scent marking 240–3, 248

scrotum, differences between marsupials and placentals 115

seasonal breeding 104–5

seasonal rhythms, regulation 174

Setonix brachyurus (quokka) 317
energy and nutrient requirements 157–8
life-history strategy 210, 226
visual development 181

sex-biased dispersal patterns 69–70

sex chromosomes 33–4
marsupial 57–63

sex determination in marsupials 57, 59–63

sex play 276–7

sexual behaviour 248–63 *see also* reproduction

single nucleotide polymorphisms (SNPs) 28

Sinodelphys szalayi (oldest fossil marsupial) 3

sleep patterns 233–4

Sminthopsis crassicaudata (fat-tailed dunnart) 26, 28, 31, 32, 38, 52, 55, 313
digestive function 143
energy requirements 144
life-history strategy 209, 212, 214, 216

social organisation 289–98
and intraspecific competition 290, 294–6
and predation risk 290, 292–4
and resource distribution 290–2
phylogenetic constraints 296–8
social play behaviour 273–7
somatosensory system 183

- Sparassodonta (extinct order) 5, 18
 relationship to thylacines 10, 12, 14
 species (classification category) 4
Spilocus maculatus (common spotted cuscus)
 153–4, 320
 spinal cord 175, 177
 marsupial regenerative abilities 177
Sterophodon 21
 syndactyly 10–11
- T lymphocytes 187–8, 192, 193–4, 195–6, 198
Tachyglossus aculeatus (echidna)
 brain 175, 176
 discovery of 2
 tactile communication 234–6, 246–8
Taeniolophus 21
 Tarsipedidae (family) (honey-possum) 7, 16, 97,
 318
Tarsipes rostratus (honey-possum) xi–xii, 85, 97,
 101, 318
 digestive tract 142, 146
 energy requirements 148
 Tasmanian marsupials 305–6
 taxa 3–4
 taxonomic lists of marsupials
 Americas 322–4
 Australia 312–18
 Indonesia 319–21
 Papua New Guinea 319–21
 see also classification of marsupials
 teeth see dentition
 thermoregulation in young marsupials 121, 122
 threat displays 244–6
 Thylacinidae (extinct family) 6, 16, 312
Thylacinus cynocephalus (thylacine) 312
 extermination 6, 200
 fossil record 14
 probable life history 217
 relationship to sparassodontans 10, 12, 14
 replacement by dingo 306
 Thylacoleonidae (extinct family) 7
 Thylacomyidae (family) 7, 16
 Thylacosmilidae (extinct family) 5
Thylamys elegans (fat-tailed opossum) 144, 324
- Thylogale billardieri* (Tasmanian pademelon) 53, 317
Thylogale thetis (red-necked pademelon) 157, 317
 torpor 144, 148, 234
Trichosurus caninus (short-eared possum) 210, 223–4,
 317
Trichosurus vulpecula (brushtail possum) 55, 96, 117,
 317
 asynchronous concurrent lactation 131–3
 birth and journey to the pouch 178
 dentition 152
 digestive tract 149, 152–3
 lactation strategy 123, 131
 life-history strategy 210, 223–4
 milk composition 123, 126
 reproductive pattern 106
- vigilant behaviour 243–4
 visual communication 234–6, 243–6
 visual system, development 179–82
 vitamin C, marsupial requirements 148
 vocalisations 183–4, 234–40
 Vombatidae (family) 7, 16, 265
 taxonomic list and conservation status 314
Vombatus ursinus (common wombat) 52, 314
 colon fermentation 150
 dentition 150
 digestive tract form and function 149, 150
 energy and nutrient requirements 151
- Wallabia bicolor* (swamp wallaby) 50, 53, 317
 wallabies see Macropodidae
 water content of foods 137, 139
 water requirements
 arboreal folivores 154
 carnivorous marsupials 144
 kangaroos, wallabies and rat-kangaroos 157
 wombats 151
 wombats see Vombatidae
- X chromosome 57–60
- Y chromosome 57, 58, 59–63, 79
 Yalkaparidontia (extinct order) 4, 7–8, 18–19
 Yaralidae (extinct family) 7