

# Index

- Acarina 237
- Acerolitos 225
- Aedes* (see also *Aedes aegypti*; *Aedes albopictus*) 7, 15–17
  - behaviour 17
  - breeding sites 137–138, 141, 152
  - control measures 53, 135, 138, 357
  - dengue transmission 36, 39
  - distinguishing features 12, 13
  - filariasis transmission 29, 30–31
  - life cycle 11, 16–17
  - yellow fever transmission 34, 36, 37
- Aedes aegypti* 15, 16, 17
  - breeding sites 16, 137–138
  - control measures 39, 107, 114, 134
  - dengue transmission 36, 39
  - yellow fever transmission 34, 36, 37
- Aedes albopictus* 15, 16–17
  - breeding sites 17, 137–138
  - control measures 114
  - dengue transmission 36
- Aerial spraying
  - blackflies 44, 45, 132
  - ticks 274–275
  - tsetse flies 208
- Aerosol sprays, insecticidal 63, 69–70
  - in bedbug control 239
  - in cockroach control 296–298
  - in housefly control 319, 320–321
  - in mosquito control
    - fabric treatment 94
    - in tents 103
    - in tick control, animals 273
- Aleppo boil, see Leishmaniasis, cutaneous
- Allergic reactions
  - to bedbugs 239
  - to biting Diptera 17, 24
  - to biting mites 277
  - to cockroaches 292
  - to fleas 245
  - to house dust mites 282
  - to lice 257
  - to triatomine bugs 213
- Allethrin, in mosquito coils 63, 66, 67
- Alphacypermethrin 86, 362
  - in cockroach control 297
  - in housefly control 320
  - in tsetse fly control 203
- Amblyomma americanum* 271
- Amblyomma hebraeum* 266
- American cockroach, see *Periplaneta americana*
- Anaemia 213, 239
- Animal reservoirs
  - Chagas disease 213–214, 215
  - leishmaniasis 47, 48, 51
  - Lyme disease 270, 275
  - schistosomiasis 348
  - sleeping sickness 182
  - viral encephalitis 40–41
  - yellow fever 34, 36–37
- Anklets, repellent-treated 61–62
- Annual killifishes 124, 127, 160
- Anopheles* 7, 13–14
  - behaviour 13–14
  - breeding sites 13, 159, 161
  - control measures 53, 107, 135, 155, 164
  - distinguishing features 12, 13
  - filariasis transmission 29, 30–32
  - insecticide resistance in 26
  - life cycle 11, 13
  - malaria transmission 26–27
- Anopheles balabacensis* 122
- Anopheles barbirostris* 29, 32
- Anopheles culicifacies* 13
- Anopheles darlingi* 161
- Anopheles maculatus* 122, 158
- Anopheles minimus* 122
- Anopheles stephensi* 138, 141
- Antimalarial drug resistance 26
- Antimony, pentavalent 49
- Ants 386
- Ant traps, mosquito control 138, 139
- Aphyosemion* 124
- Aplocheilus (panchax)* 124, 127, 164
- Arboviruses 33–41
- Argasidae (soft ticks) 263, 264–265
- Argentine pearlfish, see *Cynolebias bellotii*
- Arsenite, sodium 316
- Attractants
  - cockroach 299
  - housefly 317
  - tsetse fly 185, 195–196
- Australian cockroach, see *Periplaneta australasiae*
- Avoidance
  - of biting Diptera 105
  - of snail-infested waters 346, 350
  - of ticks 272
- Azamethiphos, in housefly control 317, 320, 322
- Azolla*, in mosquito control 123, 163
- Babies, protection of
  - fly nets 311, 312
  - mosquito nets 78
- Bacillus sphaericus* 131, 137
  - in pit latrines 150–152
- Bacillus thuringiensis* H-14
  - in blackfly control 45, 136–137
  - in drinking-water 147
  - in irrigated fields 164
  - in mosquito control 131, 136–137
  - in ponds 160
- Bacterial larvicides (see also *Bacillus sphaericus*; *Bacillus thuringiensis* H-14) 123, 131,

- 136–137
- Bahia ulcer, *see* Leishmaniasis, cutaneous
- Bait(s)
- boxes, rats 250, 251
  - cockroach 299–300
  - housefly 316–318
    - dry scatter 318
    - liquid dispensers 318
    - liquid sprinkle 318
    - viscous paint-on 317, 318
- Bancroftian filariasis, *see* Filariasis, lymphatic, bancroftian
- Bands, repellent-treated 61–62
- Bar, repellent 58
- Bathing places, placement of tsetse traps/ screens 191–192
- Bed(s)
- camp, with mosquito net cover 79
  - curtains, insecticide-treated 84–85
  - mosquito nets, *see* Mosquito nets
  - protection from ticks 272
- Bedbugs 237–243
- biology 237–238
  - control measures 239–243, 357, 388
  - detection 239
  - dispersal 238
  - insecticide resistance in 109, 241, 242
  - public health importance 239
- Bedding, insecticide-treated
- in bedbug control 241
  - in biting Diptera control 60–61
  - in flea control 248–249
- Bendiocarb 362, 366
- in bedbug control 242
  - in cockroach control 297
  - in flea control 249
  - in housefly control 317
  - in tick control 274
- Benzene hexachloride (BHC), in triatomine bug control 218
- Benzimidazole, in Chagas disease 215
- Benzyl benzoate
- in house dust mite control 283
  - in scabies mite control 282
- Betacyfluthrin, in cockroach control 297
- Biconical tsetse trap 186–187
- Bilharziasis, *see* Schistosomiasis
- Bioallethrin
- in louse control 260
  - in mosquito/biting Diptera control 67, 71
- Bioassay cone method, *see* Residual insecticides, efficacy testing
- Biological control
- freshwater snails 352, 353
  - mosquitos 122–127, 136–137
- Biomphalaria* 337–338, 339, 352
- Bioresmethrin, in housefly control 322
- Bithionol, in fascioliasis 350
- Blackflies 7, 17–20
- behaviour 18, 20
  - breeding sites 17, 19, 45
  - control measures 53
    - personal protection 59, 60
    - prevention of breeding 44, 45, 132, 136–137
  - distinguishing features 8–9
  - life cycle 17–18
    - mansonellosis transmission 51–52
    - onchocerciasis transmission 41–43, 44
- Blatta orientalis* 288, 289, 294
- Blattella germanica* 288, 289, 290, 294, 300
- Blowflies 148, 302
- Borrelia* 268
- Borrelia burgdorferi* 269
- Borrelia recurrentis* 258
- Borrow-pits
- filling/drainage 160, 352
  - mosquito larva control 160
- Boxes
- bait, for rats 250, 251
  - surveillance, in triatomine bug control 233–234, 235
- Breeding sites
- blackflies 17–18, 45
  - freshwater snails 338, 352
  - houseflies 304–305, 308–310, 321–323
  - mosquitos, *see* Mosquito breeding sites
- Briquettes, insecticidal 132
- Bromophos, in housefly control 320, 323
- Brown-banded cockroach, *see* *Supella longipalpa*
- Brugia malayi* 29, 31–32
- Brugia timori* 29, 32
- Building blocks, pressed stabilized soil 226–228
- Buildings (*see also* Houses; Shelters), residual insecticide spraying 381
- Bulinus* 337–338, 339, 352
- Buzzers, electronic 71
- Campers
- camp bed with mosquito net cover 79
  - protection measures for 103–104
- Capture bags, tsetse traps 196
- Carbamates (*see also* Bendiocarb; Propoxur) 360, 362, 365–366
- in housefly control 316, 317, 318
  - as mosquito larvicides 130
- Carbaryl
- in bedbug control 242
  - in louse control 260
  - in tick control 274
- Card agglutination test for trypanosomiasis (CATT) 185
- Carp
- common, *see* *Cyprinus carpio*
  - grass, *see* *Ctenopharyngodon idella*
  - tooth, *see* *Aplocheilichthys panchax*; *Gambusia affinis*; *Poecilia reticulata*
- Catfish, Chinese 147
- Cats
- fleas 243–244, 245, 246, 247–248
  - tapeworms 246
- Ceilings
- in mosquito control 99
  - mosquito nets 74
- Cement roofing sheets, fibre-reinforced 225
- Central European tick-borne encephalitis 271
- Cercariae 340, 343
- Cesspools, housefly control 310
- Chagas disease 210, 213–216
- clinical symptoms 214–215
  - prevention and control 215–216, 357, 381
  - transmission 213–214

- Chiclero's ulcer, *see* Leishmaniasis, cutaneous
- Chiggers 276, 277
- Chigoes, *see* Jigger fleas
- Chikungunya virus disease 41
- Chinese catfish 147
- Chitin synthesis inhibitors 135
- Chlorfenvinphos, in housefly control 320
- Chlorpyrifos  
in cockroach control 297  
as mosquito larvicide 131, 134  
in tick control 274
- Cholera 292, 307
- Cholinesterase, blood 392
- Chrysomyia*, *see* Blowflies
- Chrysops*, *see* Deerflies
- Cichlid fish, *see* *Oreochromis mossambicus*
- Cimex hemipterus* 237
- Cimex lectularius* 237
- Citronella, in mosquito/biting Diptera control 56, 57
- Clarias fuscus* 147
- Cleaning  
hand-compression sprayers 378–379  
used pesticide containers 388
- Cleanliness, *see* Hygiene
- Clegs 23
- Clonorchis sinensis* 348
- Cloth, *see* Fabrics/cloth
- Clothing  
body lice in 255, 262  
insecticide/repellent-treated 59–63  
in biting mite control 278  
choice of chemical 60  
in louse control 262  
method of treatment 60  
in tick control 272  
types 60–63  
protective 389–391  
in biting insect control 59–63  
for insecticide impregnation of fabrics 391  
for insecticide spraying 377, 378, 383, 389–390  
maintenance 391  
for mixing insecticides 390–391  
in tick control 272  
removal of contaminated 395, 396
- Clou de Biskra, *see* Leishmaniasis, cutaneous
- Cockroaches 288–300  
behaviour 290–291  
biology 288–291  
control measures 292–300  
chemical 293–300, 357, 386  
environmental management 293  
dispersal 291  
life cycle 288–290  
public health importance 291–292
- Coils, mosquito 63–66  
for campers 103  
holders 65, 66  
method of making 66  
near hammocks 72  
use 64–65
- Colorado tick fever 271, 272
- Colour  
mosquito nets 74  
tsetse traps/screens 185
- Comb, louse 259
- Community  
approach, house-spraying 358  
disease control in 52, 53  
education 382  
health workers 358  
insecticide delivery to 205  
protection  
by mosquito nets 82  
from ticks 274–275  
by tsetse traps 186  
triatomine bug surveillance 232
- Compression sprayers, *see* Hand-compression sprayers
- Conjunctivitis, epidemic 307
- Constant-head dispenser 355
- Construction blocks, pressed stabilized soil 226–228
- Construction materials 140, 226–228
- Cotton  
cloth  
insecticide impregnation 87  
for water filtration 334  
netting  
insecticide impregnation 87  
for mosquito nets/screens 73, 100
- Coumaphos, in tick control 274
- Coxiella burnetii* 268–269
- Creeks, *see* Streams/creeks
- Crimean–Congo haemorrhagic fever 271, 272
- Gtenocephalides canis*, *see* Fleas, dog
- Gtenocephalides felis*, *see* Fleas, cat
- Gtenopharyngodon idella* 125, 164, 352
- Culex* 7, 14–15  
behaviour 15  
breeding sites 15, 148, 152, 153, 161  
control measures 33, 53  
insecticide spraying 107, 357  
larval control 135, 137, 155  
distinguishing features 12, 13  
life cycle 11, 15
- Culex gelidus* 148
- Culex quinquefasciatus* 15  
breeding sites 15, 148  
control measures 33, 107  
filariasis transmission 29, 30, 31
- Culex tritaeniorhynchus*  
breeding sites 15, 161  
viral encephalitis transmission 40–41
- Culicoides* 21, 51–52
- Culverts 116–117
- Curtains  
anti-fly 311, 312  
bed, insecticide-treated 84–85  
insecticide-treated 100–102
- Cyclopoid copepods 123
- Cyclops 324–336  
biology 324, 325  
control measures 332–336  
life cycle 326, 327  
public health importance 324–332
- Cyfluthrin 362  
in bedbug control 242  
in cockroach control 297  
in flea control 249

- in housefly control 320, 322
  - in mosquito control
    - clothing treated with 60
    - net/fabric treatment 86, 87
    - screen treatment 102
- Cynolebias (bellotii)* 124, 127, 160
- Cypermethrin 362, 366
  - in housefly control 320
  - mosquito net/fabric treatment 86
- Cyphenothrin, in cockroach control 297
- Cyprinus carpio* 125, 128, 164
- Cyromazine, in housefly control 323
  
- Dams, mosquito larva control 121–122, 155, 156
- DDT 357, 362, 363–364
  - comparative cost 364
  - in flea control 249–250
  - in louse control 260, 262
  - preparation of suspension 367
  - resistance 241, 248, 357, 360
  - in tick control 274
  - in tsetse fly control 207
  - vaporizers 64
- Deerflies 8, 9, 22–23
  - behaviour 23
  - disease transmission 52, 270
  - life cycle 23
- Deerfly fever, *see* Tularaemia
- Deet 57
  - in cockroach control 300
  - in flea control 247
  - in mite control 278
  - in mosquito control
    - clothing treated with 60
    - repellent bars 58, 60
- Deltamethrin 362, 368
  - in bedbug control 242
  - in cockroach control 297
  - comparative cost 364
  - in flea control 249
  - in housefly control 320, 322
  - in louse control 260
  - in mosquito control
    - net/fabric treatment 86, 87
    - screen treatment 102
  - in tsetse fly control 203, 207
- Dengue 36–39
  - control measures 107, 357
  - haemorrhagic fever (DHF) 36–39
- DEPA, *see* *N,N*-diethylphenylacetamide
- Dermacentor andersoni* 266, 271
- Dermacentor silvarum* 271
- Dermacentor variabilis* 271
- Dermatobia hominis* 24
- Dermatophagoides* 282–283
- Diarrhoea 292, 307
- Diazinon
  - in bedbug control 242
  - in cockroach control 297
  - in flea control 249
  - in housefly control 317, 320, 322, 323
  - in tick control 274
- Dichlorodiphenyltrichloroethane, *see* DDT
- Dichlorvos
  - in cockroach control 297
  - in flea control 249
  - in housefly control 315, 317, 322, 323
  - in jigger infections 252–253
  - in tick control 274
  - vapour dispenser 68–69, 315
- Dieldrin 363
  - in bedbug control 241
  - in flea control 248
  - in triatomine bug control 218
- Diesel oil, as mosquito larvicide 129, 131
- N,N*-Diethyl-3-toluamide, *see* Deet
- Diethylcarbamazine (DEC), in filariasis 33
- Diethylcyclohexylacetamide (DECA), in cockroach control 300
- N,N*-Diethylphenylacetamide (DEPA)
  - in cockroach control 300
  - as mosquito repellent 57
- Diflubenzuron
  - in housefly control 323
  - as mosquito larvicide 136
- Dimethoate, in housefly control 317, 320, 322, 323
- Dimethyl phthalate (DMP)
  - in cockroach control 300
  - in mite control 278
  - as mosquito repellent 57
- Dimetilan, in housefly control 317
- Dioxacarb, in cockroach control 297
- Dioxathion, in tick control 274
- Diphtheria, cutaneous 307
- Diptera, biting (*see also* Blackflies; Deerflies; Horseflies; Midges, biting; Mosquitos; Sandflies, phlebotomine; Stable flies; Tsetse flies) 5–177
  - biology 7–24
  - control measures 52–164
    - avoidance and diversion 105–106
    - insecticide spraying 106–112
    - insect-proofing of houses/shelters 98–105
    - personal protection 54–98
    - prevention of breeding 112–164
    - selection 52, 53
  - diseases transmitted by 7
  - distinguishing features 7–10
  - public health importance 24–52
- Ditches, open drainage 115–117
- Dogs 51, 246
  - fleas 245, 247–248
  - jigger fleas 252–253
  - tapeworms 246
- Doors 99
  - anti-fly curtains 311, 312
  - screening 99–102
- Dracunculiasis, *see* Guinea-worm disease
- Dracunculus medinensis*, *see* Guinea worm
- Dragonflies 123
- Drainage systems 114–118, 154–155
  - borrow-pits 160
  - control measures 154–155, 310, 311
  - open ditches 115–117
  - schistosomiasis transmission 347
  - subsoil 117–118
  - swamps and marshes 155, 156
- Drip-feed technique, molluscicide application 354–355

- Drum dispensers, molluscicides 354–355
- Dung 304, 308–309  
larvicide treatment 321–322
- Dusts, insecticidal  
in cockroach control 296, 298  
in flea control 247–248, 249, 250  
in louse control 259, 262, 263  
in tick control 273
- Dysentery 292, 307
- Eastern equine encephalitis 40, 41
- Eaves 99, 101  
screening 102
- Eflornithine, in sleeping sickness 184
- Eichhornia* 17, 18
- Electric liquid vaporizers 68
- Electrocutors, fly 314
- Electro-hydrodynamic sprayers 94
- Electronic buzzers 71
- Elephantiasis 31, 32
- Emergency measures, pesticide poisoning 393–397
- Emulsifiable concentrate, insecticide 132, 361–362, 367
- Encephalitis, viral, *see* Viral encephalitis
- Endosulfan, in tsetse fly control 207
- Enteric infections 292, 307
- Environment  
management  
cockroach control 293  
freshwater snail control 352  
housefly control 308–311  
manipulation, mosquito breeding sites 120–122  
modification, mosquito breeding sites 114–120
- Equipment, for house-spraying 383
- Erythema chronicum migrans, *see* Lyme disease
- Esbiothrin, in mosquito control 67
- Espundia, *see* Leishmaniasis, mucocutaneous
- Eucalyptus trees, in mosquito control 119
- Excreta, *see* Faeces
- Eye(s)  
infections 307  
pesticide contamination 395  
protection 390, 391
- Fabrics/cloth, insecticide treatment of 85–95, 101–102, 104  
dosages 87  
for hammocks 72  
measuring residual efficacy 95–98  
methods 88–95  
patches for personal use 62–63  
protective clothing 391  
safety precautions 392, 393  
spray-on application 93–95  
for tsetse traps/screens 195–196  
when to re-treat 95
- Face protection 390–391
- Faeces  
animal, housefly breeding 304, 308–309  
bedbugs 239  
fluke control measures 349  
human, housefly breeding 309  
schistosome egg counts 346  
triatomine bugs 233, 234, 235
- Far Eastern tick-borne encephalitis 271
- Fasciola gigantica* 348
- Fasciola hepatica* 348, 349–350
- Fascioliasis 348, 349–350
- Fasciolopsis buski* 348
- Fenchlorvos  
in bedbug control 242  
in flea control 249  
in housefly control 317, 320, 322, 323
- Fenitrothion 360, 362, 365  
in bedbug control 242  
in cockroach control 297  
comparative cost 364  
in flea control 249  
in housefly control 320, 323  
as mosquito larvicide 131
- Fenthion  
in flea control 249  
in housefly control 323  
as mosquito larvicide 131, 133
- Fenvalerate, in housefly control 320
- Ferns, floating 123, 163
- Filaria, lymphatic 29–33  
bancroftian 29, 30–31  
brugian 29, 31–32  
clinical symptoms 32  
control 33, 107, 357  
prevention and treatment 32–33  
transmission 29–32
- Filling  
borrow-pits 160  
breeding sites 114  
ponds 159
- Filth fly, *see* *Musca sorbens*
- Filtration, water 332–334, 335
- First-aid, in pesticide poisoning 394–397
- Fish  
in biological control of aquatic plants 159, 352  
larvivorous, *see* Larvivorous fish  
sanitary handling 310
- Flea collars 247, 249, 273, 274
- Fleas 237, 243–253  
behaviour 244–245  
biology 243–245  
cat 243–244, 245, 246, 247–248  
control measures 60, 246–250, 357  
dog 245, 247–248  
human 243, 245, 248–249  
public health importance 245–246  
rat 243, 245, 246, 249–250  
sand (jigger) 243, 251–253
- Flies, *see* Diptera, biting; Houseflies
- Floors  
in flea control 247, 248  
improvement, in triatomine bug control 224–225  
open, entry of insects via 81  
residual insecticide spraying 241
- Floor traps, mosquito control 139, 140
- Flufenoxuron, in cockroach control 297
- Fluke infections  
foodborne 337, 348–350  
waterborne, *see* Schistosomiasis
- Flumethrin, mosquito net treatment 86, 94

- Flushing, water, *see* Streams/creeks, sluicing  
 Fly nets 311, 312  
 Fly traps 313–314  
 Foggers, total release 240  
 Food  
   contamination  
     by cockroaches 291–292  
     by houseflies 306–307  
   protection  
     during insecticide spraying 391, 392  
     from cockroaches 293  
     from houseflies 311  
   trematode infections spread via 337, 348–350  
   waste from processing 304  
 Forests  
   tick control 274–275  
   tsetse resting places 178–180  
   tsetse traps/screens 191–193, 194  
 Formaldehyde, in housefly control 316, 317  
*Francisella tularensis* 246, 270  
 Freshwater snails, *see* Snails, freshwater  
 Fumigant canisters, insecticide  
   bedbug control 240–241  
   cockroach control 298  
   flea control 247, 249  
   safety 232  
   triatomine bug control 230–232  
   use 230–231  
 Fungi 123  
  
*Gambusia affinis* 123–124, 126, 147, 164  
 Garbage, *see* Refuse  
 Gauze, for water filtration 334, 335  
 Gerbil, great 51  
 German cockroach, *see* *Blattella germanica*  
*Glossina*, *see* Tsetse flies  
*Glossina fusca* group 178  
*Glossina morsitans* group 178, 179, 182  
*Glossina palpalis* group 178, 179, 182  
 Gloves  
   for handling pesticides 390, 391  
   for impregnation of fabrics 88, 91, 392, 393  
 Gourami, giant 125  
 Granules, insecticide 132  
 Greenheads 23  
 Ground spraying, tsetse flies 206–208  
 Guinea worm 324, 327, 328  
 Guinea-worm disease 324–332  
   clinical signs and symptoms 328, 330  
   transmission 326–328  
     sites 326, 329–330  
   treatment, prevention and control 330–332  
 Guppy, *see* *Poecilia reticulata*  
 Gutters, mosquito control 140, 143  
  
*Haemagogus* 34, 37  
*Haemaphysalis leporis-palustris* 271  
*Haemaphysalis spinigera* 271  
*Haematopora* 23  
 Haematuria 346  
 Hammocks 71–72  
   mosquito nets for 79, 80, 92  
   protection in absence of mosquito net 72  
 Hand-compression sprayers 368, 369–380  
   air pump assembly 370, 372  
   discharge assembly 370, 372  
   fabric treatment 94  
   functioning and design 369–372  
   molluscicide application 353  
   nozzles, *see* Nozzles, sprayer  
   problem-solving 380  
   storage 380  
   tank assembly 369  
   tsetse fly spraying 207  
   use and operation 373–380  
     application of spray 376–378  
     maintenance and repair 378–380  
     preparation/addition of insecticide 373–375  
     preparation of sprayer 375–376  
     training in 376–378  
 Hand-operated sprayers 367–380  
 Headnets, repellent-treated 61, 62  
 Hepatitis B virus 239  
 Herbicides 160  
 Holders, mosquito coil, *see* Coils, mosquito, holders  
 Horseflies 7, 22–23  
   behaviour 23  
   control measures 53  
   distinguishing features 8, 9  
   life cycle 23  
 House dust mite 282–283  
 Houseflies 302–323  
   biology 302–306  
   biting, *see* Stable flies  
   breeding sites 304–305, 308–310, 321–323  
   control measures 308–323  
     chemical methods 314–323  
     improvement of environmental sanitation/hygiene 308–311  
     physical methods 312–314  
   ecology 305–306  
   food 302, 304  
   life cycle 302, 303  
   public health importance 306–307  
 Houses  
   areas surrounding, *see* Peridomestic environment  
   bedbug control 239–243  
   cockroach control 292, 293, 294–300  
   flea control 247, 248  
   insecticide space-spraying, *see* Space-spraying, insecticide  
   mosquito breeding sites in/around 112, 137–155  
     with clean water 137–148  
     with polluted water 148–155  
   mosquito/insect-proofing 98–102  
     design 99  
     insecticide application to walls 110, 217–222  
     screening 99–102  
   residual insecticide spraying, *see* Residual insecticide spraying, indoors  
   siting to avoid mosquitoes 105  
   triatomine bug control 222–228  
     existing houses 222–225  
     new houses 226–228  
   triatomine bug resting places 211–213  
*Hyalomma marginatum* 271

- Hydramethylnon, in cockroach control 297
- Hygiene (*see also* Sanitation)
- in cockroach control 292, 293
  - in flea control 247
  - in housefly control 308–311
  - in louse control 259, 262
  - while using pesticides 388–389, 390
- Indirect immunofluorescence test (IFT) 185
- Insect growth regulators 131, 134–136
- in cockroach control 295–296, 297
  - in housefly control 323
  - in mosquito larva control 135–136, 164
  - safety 135
- Insecticides (*see also* Larvicides; Pesticides; *specific agents*)
- aerosol sprays, *see* Aerosol sprays, insecticidal
  - application to walls 110, 217–222
  - in bedbug control 239–240
  - clothing treated with, *see* Clothing, insecticide/repellent-treated
  - in cockroach control 293–300
  - in cyclops control 334–336
  - delivery to community 205
  - disposal of surplus 98, 385–388
  - in flea control 247–249
  - fumigant canisters, *see* Fumigant canisters in housefly control 314–323
  - larvicidal, *see* Larvicides, synthetic organic
  - in louse control 259, 260
  - in mosquito control
    - aerosol sprays, *see* Aerosol sprays, insecticidal
    - clothing treated with, *see* Clothing, insecticide/repellent-treated
    - hammock impregnation 72
    - impregnated ropes 67
    - impregnated sheeting for shelters 104–105
    - net treatment, *see* Mosquito nets, insecticide treatment
    - screen/curtain treatment 100–102, 103–104
  - poisoning, *see* Pesticides, poisoning
  - residual, *see* Residual insecticides
  - resistance 26, 360
  - safe use, *see* Pesticides
  - in scabies 281–282
  - in tick control 275
  - tsetse screen impregnation, *see* Tsetse screens, insecticide-impregnated
  - space-spraying, *see* Space-spraying, insecticide
  - vaporizers, *see* Vaporizers, insecticide
- Insect repellents, *see* Repellents
- Insects, *see* Bedbugs; Diptera, biting; Fleas; Lice; Tsetse flies
- Instant fish, *see* *Cynolebias bellottii*
- Irrigated fields
- mosquito larva control 161–164
  - schistosomiasis transmission 338, 347, 348
- Irrigation
- intermittent 121, 163
  - systems
    - construction and maintenance 163
    - mosquito larva control 161–164
    - snail control 352, 354–355
- Ivermectin
- in filariasis 33
  - in jigger flea infections 252–253
  - in onchocerciasis 45
  - in scabies 281
- Ixodes dammini* 271
- Ixodes holocyclus* 271
- Ixodes persulcatus* 271
- Ixodes ricinus* 266, 271
- Ixodidae 263, 265–267
- Japanese encephalitis 40–41, 107
- Jigger fleas 243, 251–253
- biology 251
  - prevention and control 252–253
  - public health importance 251
  - symptoms 252
  - treatment 253
- Jodfenphos
- in cockroach control 297
  - in flea control 249
  - in housefly control 320, 322
  - in louse control 260
  - as mosquito larvicide 131
- Juvenile hormone analogues 135
- Kala-azar, *see* Leishmaniasis, visceral
- Kerosene, as mosquito larvicide 129
- Knapsack sprayers 368
- molluscicide application 353
  - in tick control 275
  - in tsetse fly control 206
- Kyasanur Forest disease 271, 272
- Labels, pesticide containers 385, 386
- Lagoons, coastal 157
- Lakes
- mosquito larva control 156–157
  - schistosomiasis control 348
  - schistosomiasis transmission 338, 347
- Lambdacyhalothrin 362, 366
- in bedbug control 242
  - in mosquito control
    - fabric treatment 87
    - net treatment 86, 87
    - screen treatment 102
- Landfills, sanitary 140, 310
- Larval control 112–113
- biological methods 123–127
  - feasibility 113
  - field habitats 144–164
  - habitats in/around houses 137–155
  - larvicides, *see* Larvicides
- Larvicides 128–137
- bacterial 123, 131, 136–137
  - in borrow-pits 160
  - in housefly control 321–323
  - insect growth regulators 131, 134–136
  - in irrigated fields 164
  - in lakes and reservoirs 157
  - petroleum oils 128–130, 131
  - in pit latrines 150–152
  - in ponds 160
  - in rivers and creeks 158

- in swamps and marshes 156
  - synthetic organic 130–134
    - advantages and disadvantages 131
    - formulations 132
    - in irrigated fields 164
    - in onchocerciasis control 44, 45
    - in pit latrines 150–152
    - resistance 130
  - in wells 147
- Larvivoracious fish 112, 123–127
- in borrow-pits 160
  - in irrigated fields 163–164
  - in ponds 159
  - rearing 125
  - transportation and distribution 125–126
  - in water storage containers 147
  - in wells 147
- Latrines, pit 148–152, 311
- design 149–150
  - expanded polystyrene beads in 119–120, 150
  - insect-proofing 119, 149–150, 309
  - insect-proof lids 148, 149
  - larvicide use 150–152
  - pour-flush, with water seal 149, 150
  - in schistosomiasis control 350, 351
  - ventilated improved 149–150, 151
- Leishmania aethiopica* 47
- Leishmania braziliensis* 45, 47
- Leishmania chagasi* 45
- Leishmania donovani* 45
- Leishmania infantum* 47
- Leishmania major* 47
- Leishmania mexicana* 47
- Leishmaniasis 20, 45–51
- clinical symptoms 47–48, 49
  - cutaneous 46, 47–48, 49
  - mucocutaneous 45, 46, 47, 48, 50
  - prevention and control 50–51, 107, 357
  - transmission 47, 48
  - treatment 49–50
  - visceral 45, 46, 47, 49
- Leprosy 292, 307
- Leptoconops* 21
- Lice 237, 253–262
- biology 254–257
  - body 237, 253–254
    - biology 254, 255
    - control measures 60, 262, 263
    - public health importance 257–258
    - control measures 259–262
  - crab (pubic) 253
    - biology 254, 255, 257
    - control measures 261
  - head 253, 256
    - biology 254, 255, 256
    - control measures 259–261
    - public health importance 257–258
- Light traps with electrocutor 314
- Lindane 248, 362, 363
- in bedbug control 241
  - in louse control 260, 262
  - in scabies 282
  - in tick control 273, 274
- Liver flukes 348, 349–350
- Loa loa* 52
- Loiasis 52
- Lotion, insecticidal 259
- Louping ill 271
- Louse, *see* Lice
- Lufenuron, in flea control 247
- Lung fluke 348
- Lyme disease 269–270, 271, 275
- Lymnaea* 337, 339
- Malaria (*see also* Mosquitos) 25–29
- chemoprophylaxis 28
  - clinical symptoms 27
  - control 28–29, 52–164, 242, 357–358, 381
  - immunity 27–28
  - prevention and treatment 28
  - transmission 26–27
- Malathion 362, 365
- in bedbug control 242
  - in cockroach control 297
  - comparative cost 364
  - in flea control 249
  - in housefly control 317, 320, 322
  - in insecticidal paint 219
  - in louse control 260
  - as mosquito larvicide 131, 133–134
  - resistance 360
  - in scabies 282
  - in tick control 274
  - in triatomine bug control 219
- Mangrove flies, *see* Deerflies
- Mansonella ozzardi* 22, 51–52
- Mansonella perstans* 22, 52
- Mansonellosis 51–52
- Mansonia* 7, 17
- behaviour 17
  - control measures 53, 155, 159–160
    - insect growth regulators 135
    - water plant removal 33, 122, 159
  - distinguishing features 13
  - filariasis transmission 29, 31–32
  - life cycle 11, 17
- Manually operated sprayers 367–380
- Marshes
- molluscicide application 353–354
  - mosquito larva control 155–156
  - snail habitats 338
  - tidal salt 157
- Mats, vaporizing 67–68
- Mattresses
- bedbug control 241, 242
  - flea control 248
- Melarsoprol, in sleeping sickness 184
- Methomyl, in housefly control 317
- Methoprene, as mosquito larvicide 135, 147, 160
- Metrifonate, in schistosomiasis 346
- Microfilariae 29, 31, 41–44
- Midges, biting 21–22
- behaviour 22
  - control measures 53, 59, 60, 103
  - diseases transmitted by 7, 51–52
  - distinguishing features 8, 9
  - life cycle 22
- Mites 237, 275–283
- biting 237, 276–279
  - biology 276–277

- control measures 60, 278–279, 357
- distribution 277
- public health importance 277–278
- house dust 282–283
- scabies 279–282
  - biology 279–280
  - public health importance 280–282
- trombiculid 276–279
- Molluscicides 352, 353–355
  - application 353–355
    - in flowing water 354–355
    - in stagnant water 353–354
- Mosquito breeding sites (*see also* Larval control) 33, 39, 112
  - altering/eliminating 112, 113–122
  - in/around houses 112, 137–155
    - with clean water 137–148
    - drainage systems 154–155
    - permanent 141–148
    - pit latrines 148–152
    - with polluted water 137–155
    - septic tanks 152, 153
    - soakaway pits 152–154
    - temporary indoor 138–139
    - temporary outdoor 139–140, 141, 142–144
  - biological control measures 122–127
  - closing, screening or covering 119–120
  - drainage 114–118
  - filling 114
  - larval control, *see* Larvicides
  - man-made 112
  - removal/destruction 113
  - in rural areas 155–164
    - borrow-pits 160
    - irrigation systems/irrigated fields 161–164
    - lakes and reservoirs 156–157
    - ponds 159–160
    - rivers and creeks 157–158
    - swamps and marshes 155–156
    - water accumulations near roads 161
- Mosquito coils, *see* Coils, mosquito
- Mosquito fish, *see* *Gambusia affinis*
- Mosquito nets 73–98
  - availability 81
  - for camp beds 79
  - circular (conical) 77
  - for hammocks 79, 80
  - insecticide-treated
    - in bedbug control 240
    - in louse control 261
    - in malaria control 82–98
    - measuring residual efficacy 95–98
    - safety 88
    - in tick control 274
    - in triatomine bug control 228, 229, 230
    - types 84
  - insecticide treatment 85–95
    - choice of insecticide 85–86
    - choice of material 87
    - disposal of surplus insecticide 98
    - dosages 87
    - methods 88–95
    - safety measures 88
    - when to re-treat 95
  - instructions for use 80–81
  - materials 73–74, 84–85
  - models 75–80
    - rectangular 75–77
    - self-supporting 78, 79
    - untreated
      - problems 81, 82
      - protection provided by 82
    - wedge-shaped 78
- Mosquitos (*see also* *Aedes*; *Anopheles*; *Culex*; *Mansonia*)
  - behaviour 11, 13–14, 15, 17
  - biology 10–17
  - control measures 52–164
    - insecticide spraying 29, 106–112, 357, 358–359
    - personal protection 54–106
    - prevention of breeding 33, 39, 112–164
    - selecting 52, 53
  - diseases transmitted by 7, 25–41
  - distinguishing features 7, 8
  - life cycle 10–11
  - public health importance 7, 24–41
- Mosquito screens, *see* Screening, anti-mosquito
- Mouth-to-mouth resuscitation 394–395
- Mozambique mouthbrooder, *see* *Oreochromis mossambicus*
- Murray Valley encephalitis 40
- Musca domestica*, *see* Houseflies
- Musca sorbens* 302, 307, 309
- Myiasis 24
- Naled
  - in housefly control 317, 322
  - in tick control 274
- Neem 56, 123
- Nematodes, parasitic 123
- Nets
  - fly 311, 312
  - mosquito, *see* Mosquito nets
  - wide-mesh 84
- Netting
  - impregnated, for attaching to hammocks 72
  - for mosquito nets 73–74
  - for mosquito screens 100
  - treatment with insecticide 85–95
  - for tsetse traps 196
- Niclosamide, in snail control 353–355
- Nifurtimox, in Chagas disease 215
- Nits, *see* Lice, head
- Nochi 56
- Nothobranchius* 124
- Nozzles, sprayer 370, 372, 379
  - cleaning 379, 389
  - types 372–373
- Nuisance
  - bedbugs 239
  - biting Diptera 24–25
  - biting mites 277
  - cockroaches 291
  - fleas 245
  - houseflies 306
  - lice 257
  - ticks 268
  - triatomine bugs 213
  - tsetse flies 180
- Octoxinol, as mosquito larvicide 129
- Ohara disease, *see* Tularaemia

- Oils
- essential, as repellents 54, 300
  - larvicidal 128–130, 131
    - advantages and disadvantages 130
    - application 129
    - in borrow-pits 160
    - in irrigated fields 164
    - in pit latrines 150–152
    - in ponds 159
    - vegetable 129
- Omsk haemorrhagic fever 272
- Onchocerciasis 41–45
  - clinical symptoms 44
  - transmission 41, 44
  - treatment, prevention and control 44, 45
- Onchocerciasis Control Programme (OCP) 42, 45
- Oncomelania* 337, 338, 339, 352
- Opisthorchis felineus* 348
- Opisthorchis viverrini* 348
- Oreochromis mossambicus* 125, 127, 164
- Oreochromis niloticus* 125
- Oreochromis spiluris* 125, 147
- Organochlorine insecticides (*see also* DDT; Lindane) 362, 363–364
  - as mosquito larvicides 130
  - resistance 360
- Organophosphorus insecticides (*see also* Fenitrothion; Malathion; Pirimiphos methyl) 362, 364–365
  - in housefly control 317, 320, 322, 323
  - as mosquito larvicides 130, 131, 132–134
  - resistance 360
- Oriental cockroach, *see Blatta orientalis*
- Oriental sore, *see* Leishmaniasis, cutaneous
- Ornithodoros moubata* 264, 272
- Oshronemus goramy* 125
- Oxamniquine, in schistosomiasis 346
- Paints, insecticidal 110, 218–221
- Panchax, *see Aplocheilus panchax*
- Pappataci fever 20
- Paraffin, as mosquito larvicide 129
- Paragonimiasis 348
- Paralysis, tick 268
- Parathion, in housefly control 315
- Paris green, as mosquito larvicide 128, 131
- Pearlfish, Argentine, *see Cynolebias bellotii*
- Pediculus humanus*
  - capitis*, *see* Lice, head
  - humanus*, *see* Lice, body
- Pellets, insecticide 132
- Pentamidine, in sleeping sickness 184
- Peridomestic environment (*see also* Houses)
  - improvement 228, 229
  - insecticide spraying 381
  - triatomine bug resting places 211
- Periplaneta americana* 288, 289, 294, 300
- Periplaneta australasiae* 288, 289
- Periplaneta brunnae* 294
- Permethrin 362, 368
  - in bedbug control 242
  - in cockroach control 297
  - comparative cost 364
  - in flea control 249
  - in housefly control 320, 322
  - in louse control 260, 261, 262
- in mosquito control
    - clothing treatment 60
    - fabric treatment 87, 94
    - net treatment 86, 87, 90
    - repellent bars 58
    - screen treatment 102
    - in tents 104
  - in scabies 281, 282
- Personal protection
  - from mosquitos/biting Diptera 39, 54–98
  - from ticks 272–274
- Personnel, for house-spraying 358, 383
- Pesticides (*see also* Insecticides; Larvicides; Molluscicides; *specific agents*)
  - cleaning used containers 388
  - disposal of surplus 98, 385–386, 387–388
  - emergency measures 393–397
  - general hygiene 388–389
  - labelling 385, 386
  - poisoning 393–397
    - first-aid treatment 394–397
    - signs and symptoms 393
  - precautions 385–392
  - preparation/addition to sprayers 373–375
  - protective clothing 389–391
  - safe use 385–397
  - storage and transport 385, 387
  - techniques of use 391, 393
- Petri dish method, *see* Residual insecticides, efficacy testing
- Petroleum oils, larvicidal 128–130, 131
- Phenothrin
  - in flea control 249
  - in housefly control 322
  - in louse infestations 260
- Phoxim, in blackfly control 45
- Pirimiphos methyl 360, 362
  - in bedbug control 242
  - in cockroach control 297
  - in flea control 249
  - in housefly control 320, 322
  - as mosquito larvicide 131, 134
  - in tick control 274
- Plague 245–246, 292
  - bubonic 246
  - pneumonic 246
  - prevention and control 246, 249–250
  - rural 246
  - septicaemic 246
  - urban 246
- Planorbidae 337
- Plantations, tsetse traps/screens 193, 194
- Plants, *see* Vegetation
- Plasmodium falciparum* 25, 26, 27
- Plasmodium malariae* 25, 27
- Plasmodium ovale* 25, 27
- Plasmodium vivax* 25, 27
- Plaster
  - cement 224
  - insecticide mixing into 110
  - preparation 222–224
  - wire reinforcement 224, 225
- Poecilia reticulata* 123–124, 126, 147, 164
- Poisoning, pesticide 393–397
- Poisons, rat 250
- Poliomyelitis 292, 307
- Polystyrene beads, expanded

- in mosquito control 119–120, 146–147, 150
- production 120, 121
- Ponds
  - filling 159
  - guinea-worm disease transmission 326, 328, 330
  - molluscicide application 353–354
  - mosquito control 159–160
  - schistosomiasis transmission 338, 352
- Pools
  - guinea-worm disease transmission 326
  - mosquito control 139, 147–148
  - schistosomiasis transmission 352
- Poultry houses, housefly control 308
- Powders, insecticidal, *see* Dusts, insecticidal
- Praziquantel
  - in foodborne trematode infections 349
  - in schistosomiasis 346
- Pregnancy 27, 214
- Pressurization, hand-compression
  - sprayers 375–376
- Propetamphos
  - in bedbug control 242
  - in cockroach control 297
  - in flea control 249
  - in housefly control 317, 320
- Propoxur 362, 365–366
  - in bedbug control 242
  - in cockroach control 297
  - comparative cost 364
  - in flea control 249
  - in housefly control 317
  - in louse control 260
  - in tick control 274
  - in triatomine bug control 218
- Pthirus pubis*, *see* Lice, crab
- Pulex irritans*, *see* Fleas, human
- Pyramidal trap 187, 188
  - assembly 196–200
- Pyrethrins, in housefly control 322
- Pyrethroid insecticides (*see also*
  - Alphacypermethrin; Cyfluthrin; Cypermethrin; Deltamethrin; Lambdacyhalothrin; Permethrin) 360, 362
  - in aerosol sprays 69
  - in bedbug control 241
  - disposal of surplus 386
  - in housefly control 320, 322
  - in louse control 259
  - in mosquito control
    - in aerosol sprays 69
    - clothing treated with 59–60
    - as larvicides 130, 134
    - net treatment 82–98, 228
  - safety 88
  - in triatomine bug control 218, 228, 229
  - in tsetse fly control
    - spraying 207
    - tsetse trap/screen impregnation 203–206
  - vaporizers 63, 64, 66, 67
- Pyrethrum, in mosquito control 64, 86
  - in aerosol sprays 69
  - in mosquito coils 66
- Pyriproxyfen, in housefly control 323
- Q fever 268–269, 271
- Rabbit fever, *see* Tularaemia
- Rat(s)
  - bait boxes 250–251
  - control 249, 250
  - fleas 243, 245, 246, 249–250
  - poisons 250
- Refuse
  - disposal 139–140, 142
  - housefly breeding 304
  - insecticide spraying 321
  - protection
    - from cockroaches 293
    - from houseflies 309–310
- Relapsing fever
  - louse-borne 258
  - tick-borne 268, 272
- Repellent(s) 54–58
  - bar 58
  - in bedbug control 239
  - clothing treated with, *see* Clothing, insecticide/repellent-treated
  - in cockroach control 300
  - in flea control 247, 249
  - instructions for use 55
  - in mite control 278
  - modern synthetic 56–57
  - in mosquito control
    - on hammocks 72
    - ropes 67
    - screen treatment 103
  - ropes 67
  - in tick control 270, 272
  - traditional/natural 56
  - types 56–57
  - when and where to use 55
- Reservoirs
  - fluctuations in level 121, 156–157
  - mosquito larva control 156–157
- Residual insecticides 359–367
  - characteristics 360
  - commonly used 363–366
  - cost comparisons 364
  - dosages and cycles 362–363
  - efficacy testing 96–98, 221
  - formulations 360–362
  - preparation of suspension 366–367
  - resistance 360
  - safety 108, 109, 295, 360
- Residual insecticide spraying
  - in bedbug control 241–243
  - in biting mite control 279
  - in Chagas disease control 216, 217–222, 381
  - in cockroach control 295–296
  - in filariasis control 33, 107
  - in flea control 247, 249
  - in housefly control 318–319, 320
  - indoors 106–109, 357–384
    - alternatives to 110
    - calculating amount of insecticide for 383
    - factors affecting efficacy 358–359
    - insecticides for 359–367
    - measuring total surface area to be sprayed 382
    - methods 107, 359–360, 381–383

- organization 358
- personnel/equipment needed 383
- planning a programme 382–383
- problems with 109, 357–358
- protective clothing 377, 378, 383, 389–390
- requirements 107
- safety precautions 108, 109, 295, 391–392
- surfaces to spray 108, 363, 381
- timing 108, 381
- in leishmaniasis control 50–51, 107
- in malaria control 29, 106–109, 357–358, 381
- manually operated sprayers 367–380
- selective 381
- in tents 104
- in tick control 273–274
- in tsetse fly control 206–208
- vectors/pests controlled by 357
- Resmethrin, in housefly control 322
- Respiration, artificial 394–395
- Resting places 381
  - biting Diptera 106–107
  - cockroaches 290, 296, 300
  - houseflies 305, 315–316, 318–319
  - ticks 265, 273–274
  - triatomine bugs 210–211, 212, 213
  - tsetse flies 178–180
- Resuscitation, mouth-to-mouth 394–395
- Rhipicephalus sanguineus* 271
- Rhodnius prolixus* 211
- Rice fields
  - mosquito larva control 161–164
  - schistosomiasis transmission 347
- Rickettsia australis* 268, 271
- Rickettsia conori* 271
- Rickettsial fevers, tick-borne 268–269, 271
- Rickettsia prowazekii* 257
- Rickettsia rickettsii* 268, 271
- Rickettsia sibirica* 268, 271
- Rickettsia tsutsugamushi* 276, 277
- Rickettsia typhi* 246
- Rift Valley fever 41
- River blindness, *see* Onchocerciasis
- Rivers (*see also* Streams/creeks) 157–158
  - blackfly control 44, 45
  - molluscicide application 354–355
  - mosquito larva control 158
  - schistosomiasis
    - control 354–355
    - transmission 347
  - sleeping sickness transmission 182
  - tsetse traps/screens 191–192
- Roads, water accumulations near 161
- Rochalimaea quintana* 258
- Rock hyrax 51
- Rodents (*see also* Rats) 270, 275
- Romaña's sign 214, 216
- Roofs, triatomine bug control 225, 226
- Ropes, repellent 67
- Ross River disease 41
- Rubbish, *see* Refuse
- Sabethes* 34, 37
- Safety
  - fumigant canisters 232
  - insecticide-impregnated mosquito nets 88
  - pesticide use 385–397
  - residual insecticides 108, 109, 295, 360
- St Louis encephalitis 41
- Salinity, changes in 122, 157
- Sand fleas, *see* Jigger fleas
- Sandflies, phlebotomine 7, 20–21
  - behaviour 21
  - control measures 53
    - personal protection 59, 60
    - residual insecticides 50–51, 107, 357
  - distinguishing features 8, 9
  - leishmaniasis transmission 47, 48
  - life cycle 20
- Sandfly fever 20
- Sanitation (*see also* Hygiene)
  - in housefly control 308–312
  - in mosquito control 148–155
- Sarcoptes scabiei* 279–282
- Scabies 280–282
  - diagnosis 281
  - distribution 280–281
  - symptoms 281
  - transmission 280
  - treatment 281–282
- Schistosoma haematobium* 337, 340, 342, 343–344, 345–346
- Schistosoma intercalatum* 337, 340, 341, 345
- Schistosoma japonicum* 337, 340, 342, 344–345, 348
- Schistosoma mansoni* 337, 340, 341, 344–345, 346
- Schistosoma mekongi* 337, 340, 342, 344–345
- Schistosomiasis 337, 340–348
  - clinical signs/symptoms 344–345
  - diagnosis 345–346
  - distribution 340, 341–342
  - intestinal 340, 341–345, 346
  - life cycle/transmission 340, 343–344, 347
  - prevention and control 346, 348, 350–355
  - treatment 346
  - urinary (vesical) 340, 342, 343–344, 345–346
- Screening, anti-mosquito 99–102
  - in housefly control 311, 312
  - insecticide-treated 100, 101–102, 103–104
  - materials 100, 102
  - problems with 101
  - for tents 103–104
  - treatment method 101–102
- Screens, tsetse, *see* Tsetse screens, insecticide-impregnated
- Scrub itch 277
- Scrub typhus 277–278
- Seasonal variations
  - in freshwater snail populations 339
  - in guinea-worm disease 326–328
- Self-protection
  - from biting Diptera 52, 53
  - in leishmaniasis 49
  - from ticks 272–274
- Septic tanks, in mosquito control 152, 153
- Sewage
  - disposal 154–155
  - housefly breeding 305

- Shampoo  
 anti-louse 259, 260  
 in flea control 247, 249
- Sheeting (*see also* Bedding)  
 border, mosquito nets 74  
 insecticide-treated 104–105
- Sheets, triatomine bug surveillance 234
- Shelters (*see also* Houses)  
 insect-proofing 98–105  
 temporary  
 insecticide spraying 381  
 treated sheeting for 104–105
- Shorelines, straightening/steepening 122, 160
- Simulium*, *see* Blackflies
- Simulium damnosum* complex 17, 20
- Simulium neavei* 17
- Skin  
 infections 307  
 pesticide contamination 395
- Sleeping sickness 178, 179, 180–185  
 clinical symptoms 182, 184  
 distribution 180, 181  
 gambiense 180, 182, 183  
 prevention and control 184–185  
 rhodesiense 180, 182, 183  
 transmission 180, 182, 183  
 treatment 184
- Sluice gates 157
- Sluicing, streams, *see* Streams/creeks, sluicing
- Smoke  
 insecticidal, *see* Vaporizers, insecticide  
 insect repellent effects 56
- Snails, freshwater 337–355  
 biology 337–339  
 control measures 350–355  
 biological 353  
 chemical 353–355  
 environmental management 352  
 removal and destruction 352  
 ecology 338–339  
 life cycle 337–338  
 public health importance 340–350
- Soakaway pits 152, 153, 154
- Soap, insecticidal 261
- Source reduction, mosquitoes 112  
 environmental manipulation 120–122, 156–157, 158, 159–160  
 environmental modification 113–120, 155, 159, 160
- Space-spraying, insecticide (*see also* Aerosol sprays, insecticidal) 110–112  
 acceptance 111  
 advantages and disadvantages 111–112  
 in cockroach control 298  
 in housefly control 319–321  
 in mosquito/biting Diptera control 69, 70, 110–112  
 outdoor  
 houseflies 321, 322  
 mosquitos/biting Diptera 39, 110–111  
 ticks 274  
 tsetse flies 208
- Spotted fevers, rickettsial 268–269, 271
- Spray cycle 362–363
- Sprayers, manually operated 367–380
- Spray guns 70–71
- Stable flies 8, 9–10, 24  
 behaviour 24  
 control measures 53  
 life cycle 24
- Stepwells 326
- Sticky tapes, in housefly control 314
- Stilt houses 81
- Stirrup pumps 369
- Stomoxys*, *see* Stable flies
- Storage  
 hand-compression sprayers 380  
 pesticides 385, 387
- Stouts 23
- Streams/creeks 157–158  
 blackfly control 45  
 flushing/sluicing 121–122, 158  
 molluscicide application 354–355  
 mosquito larva control 158  
 shading of banks 122  
 snails in 338  
 straightening/steepening shorelines 122
- Strips, toxic, in housefly control 315–316
- Sulfur, in scabies 282
- Supella longipalpa* 288, 289
- Suramin sodium, in sleeping sickness 184
- Surveillance  
 sleeping sickness 184–185  
 ticks 274  
 triatomine bugs 232–235  
 boxes 233–234, 235  
 collecting by hand 232, 233  
 sheets 234
- Suspension concentrate, insecticide 132, 361–362
- Swamps, *see* Marshes
- Swimmer's itch 345
- Synthetic fly attractant (SFA) 317
- Tabanids 9, 22–23
- Tabanus* 23
- Tapeworms 246
- Tapir nose 48
- Temephos  
 in blackfly control 45, 132  
 in cyclops control 334–336  
 in louse control 260  
 as mosquito larvicide 131, 132–133, 147
- Tents  
 protection measures for 103–104  
 spraying interior surface 104
- Tetrachlorvinphos, in housefly control 323
- Three-day fever 20
- Tick collars 273, 274
- Tick paralysis 268
- Ticks 237, 263–275  
 biology 263–267  
 control measures 272–275, 357  
 community protection 274–275  
 self-protection 60, 272–274  
 hard 263, 265–267  
 public health importance 268–272  
 soft 263, 264–265
- Tilapia* 125, 127, 147, 164
- Tiles, roofing 225, 226
- Toilets, *see* Latrines, pit
- Top minnow, *see* *Gambusia affinis*

- Toxorhynchites* 123  
Trachoma 307  
Training, compression sprayer use 376–378  
Traps  
  cockroach 299–300  
  fly 313–314  
  tsetse fly, *see* Tsetse traps  
Trees  
  along stream banks 122  
  aromatic 56  
  eucalyptus 119  
  holes in 140, 143  
Trematode infections  
  foodborne 337, 348–350  
  waterborne, *see* Schistosomiasis  
Trench fever 258  
*Triatoma dimidiata* 211, 224–225  
*Triatoma infestans* 211, 213  
Triatomine bugs 210–235  
  behaviour 210  
  biology 210–212  
  control measures 216–235  
    fumigant canisters 230–232  
    house improvement 222–228  
    impregnated mosquito nets 228, 229–230  
    improvement of peridomestic environment 228, 229  
    insecticide spraying of house walls 217–222, 357, 381  
    surveillance 232–235  
  life cycle 210, 211  
  public health importance 213–216  
  resting places 210–213  
Trichlorfon  
  in housefly control 317, 320, 323  
  in tick control 274  
Triclabendazole, in fascioliasis 350  
*Tricula* 337  
Triflumuron, in housefly control 323  
*Trypanosoma brucei*  
  *gambiense* 180, 181  
  *rhodesiense* 180, 181  
*Trypanosoma cruzi* 210–213, 215  
Trypanosomiasis  
  African, *see* Sleeping sickness  
  American, *see* Chagas disease  
  animal 186, 208  
Tsetse flies 8, 9, 178–208  
  biology 178–180  
  control measures 53, 185–208  
    insecticide spraying 206–208, 357  
    traps and insecticide-impregnated screens 185–206  
  food 180  
  life cycle 178  
  public health importance 7, 180–185  
  resting places 178, 179, 180  
Tsetse screens, insecticide-impregnated 185–206  
  advantages and disadvantages 189  
  assembly 195–196, 201–203  
  insecticide impregnation 203–206  
  maintenance 195  
  mode of action/design 186, 188, 189  
  placement 189–194  
Tsetse traps 185–206  
  advantages and disadvantages 189  
  assembly 195–201, 202  
    materials needed 195–196  
    pyramidal trap 196–200  
    Vavoua trap 200, 201–202  
  community use 186  
  insecticide impregnation 203–206  
  maintenance 195, 196  
  mode of action/design 185–186, 187, 188  
  models 186–189  
  placement 189–193  
Tularaemia 52, 246, 270–271  
*Tunga penetrans*, *see* Jigger fleas  
Typhoid fever 292, 307  
Typhus (fever)  
  flea-borne (murine) 246  
    control 249–250  
  louse-borne 253–254, 257  
  mite-borne 276, 277–278  
Urine, schistosome egg counts 345–346  
Vaporizers, insecticide 63–71, 103  
  aerosol sprays, *see* Aerosol sprays, insecticidal  
  coils, *see* Coils, mosquito  
  dichlorvos dispensers, *see* Dichlorvos, vapour dispenser  
  electric liquid 68  
  fumigant canisters, *see* Fumigant canisters, insecticide  
  mats 67–68  
  ropes 67  
  spray guns 70–71  
Vavoua trap 187  
  assembly 200, 201–202  
Vegetable oil, as mosquito larvicide 129  
Vegetation  
  aquatic, *see* Water plants  
  decaying, housefly breeding 305  
  insecticide spraying  
    biting mite control 279  
    tsetse fly control 206–208  
  management  
    in biting mite control 279  
    in mosquito control 122, 160  
    in tick control 274, 275  
Venezuelan equine encephalitis 40, 41  
Ventilation, house 99, 101  
Vigilance phase, Chagas disease 216, 217  
Villages, tsetse traps/screens in 192, 193  
Viral diseases  
  spread by cockroaches 292  
  spread by houseflies 307  
  mosquito-borne 33–41  
  tick-borne 271–272  
Viral encephalitis  
  mosquito-borne 40–41  
  tick-borne 271  
*Vitex negundo* 56  
Walls  
  improvement, in triatomine bug control 222–224

- insecticide application methods 110, 217–222
- materials, suitability for insecticide treatment 218
- residual insecticide
  - determination of efficacy 221–222
  - spraying, *see* Residual insecticide spraying, indoors
- Washing
  - after pesticide use 389, 390
  - in insecticide poisoning 395
  - in louse control 259, 262
  - places, tsetse traps/screens 191–192
- Water (*see also* Lakes; Ponds; Pools; Reservoirs; Rivers; Streams/creeks)
  - children playing in 350
  - drainage systems, *see* Drainage systems
  - drinking
    - boiling 336
    - filtration 332–334, 335
    - insecticide/larvicide treatment 147, 334–336
  - methods of covering surface 119–120, 146–147
  - resources development projects 348
  - salinity changes 122, 157
  - schistosomiasis transmission 340–344
  - snail habitats 338
  - sources
    - fluctuations in level 121, 156–157, 352
    - guinea-worm disease transmission 326, 328, 329–330
    - improving safety 332, 333, 346, 350, 351
    - tsetse traps/screens 193, 195
  - storage containers 141–147
  - tanks 144–147
- Water-dispersible powder, insecticide 132, 361–362, 366–367
- Water fleas, *see* *Cyclops*
- Water plants
  - biological control 159, 352
  - floating fern (*Azolla*) 123, 163
  - mosquito breeding sites 17, 18
  - removal/destruction
    - in mosquito control 33, 122, 159, 160
    - in snail control 352
- Wells
  - guinea-worm disease transmission 326
  - mosquito control 119, 147–148
- Western equine encephalitis 41
- Windows 99
  - screening 99–102
- Wuchereria bancrofti* 29
- Xenopsylla* 245
- Yellow fever 34
  - distribution 34, 35
  - prevention and control 34
  - transmission 13, 34, 36–37
- Yersinia pestis* 245
- Zooprophylaxis 105–106