

Index

a

- ABC transporter 297
 acetate 311f.
 acetic acid bacteria 124
Acetobacter xylinum 124
Acetobacterium woodii 292, 318
 acetone 105ff., 321
 acetone-butanol fermentation 321f.
 acetyl-CoA 313
Acidianus ambivalens 282ff.
Acinetobacter
 – *baumannii* 215
 – *calcoaceticus* 313
 – species 249
 acyclovir (Zovirax) 227
 adenine 268
 adenosine 5'-diphosphate (ADP) 9, 60, 330
 adenosine 5'-triphosphate (ATP) 9, 60, 274f., 301, 317, 330
 – synthesis in microbes 301
Agrobacterium tumefaciens 165ff., 291
 AIDS (acquired immunodeficiency syndrome) 222ff.
 D-alanine 123
 L-alanine 123
Alcanivorax
 – *borkumensis* 313
 – species 249
 alcohol dehydrogenase 111ff.
 alcohol fermentation 318ff.
 – via the EMP and the ED pathways 321
 Ames test 33
 amino acid 271
 – fermentation 321
 ammonia 87ff.
 ammonia monooxygenase 313
 amphotericin 156
 amylase 300

Anabaena 289
 – *azollae* 85
 anabolic metabolism 288
 anammox 89
 animal
 – bacteria 203ff.
 anthrax 209f.
 antibiotic 151ff., 338f.
 – resistance gene 160ff.
 antimicrobial 150
Aquifex aeolicus 289
 Arc system 307ff.
 archaea 7, 17ff., 53, 278, 281ff.
 – metabolism 283
 – methane 93
 – methanogenic 292
 – phylogenetic tree 282
Archaeoglobus fulgidus 284
Arthrobacter simplex 313
 ascorbic acid (vitamin C) 124f.
Aspergillus species 215
 ATP, *see* adenosine 5'-triphosphate
 ATP synthase 60, 66, 303
 autotrophic growth 316
Azoarcus 85, 185
Azolla 85
Azospirillum 85, 185
Azotobacter vinelandii 293

b
Bacillus 156, 194ff.
 – *anthracis* 149, 186, 209, 290ff.
 – *licheniformis* 194, 290ff., 334f.
 – *subtilis* 194, 240, 274, 293, 325f.
 – *thuringensis* (Bt) 167, 293
 bacteria 53f., 73f.
 – animal 203ff.
 – climate 99f.
 – competence 139

- deep sea 47f.
 - diversity 289ff.
 - ethanol-producing 111
 - food resource 203ff.
 - Gram-negative 152f., 274
 - Gram-positive 152f., 274
 - human 203ff.
 - methanotrophic 314
 - nickel-resistant 131
 - nitrifying 313
 - phylogenetic tree 289f.
 - plant 217f.
 - production factory 191ff.
 - resistance 160ff.
 - sulfate-reducing 50
 - symbiotic 48
 - bacterial fermentation 318
 - bacterial food 203
 - bacterial genome 239
 - bacterial growth 4ff., 261ff.
 - bacterial sex life 133ff.
 - bacterial spore 108
 - bacterial sulfur cycle 284
 - bacteriophage 145ff.
 - bacteriorhodopsin 58f., 283, 304
 - Bacteroides fragilis* 77
 - base pairing 269
 - beer 115
 - Beggiatoa* 252
 - *alba* 285
 - beta (β)-lactam antibiotic 153f.
 - beta (β)-lactamase 135
 - Bifidobacterium* 79
 - bile acid 78
 - biodiesel 118
 - bioelement 127
 - bioenergy 118
 - bioethanol 114f.
 - biofilm 182
 - biofuel 102, 109, 111ff.
 - biogas 93ff., 117f.
 - bioinformatics 235
 - biological warfare 209f.
 - bioluminescent bacteria 178
 - biomass 101, 109, 114, 117
 - biotechnology 191, 339f.
 - Bordetella pertussis* 204
 - Borrelia burgdorferi* 206
 - borreliosis 205
 - bronchitis 209
 - bubonic plague 205
 - Buchnera*
 - *aphidicola* 187
 - butanol 105ff., 117, 321
 - γ -butyrolactone 309
- C**
- c-AMP receptor protein (CRP) 328
 - Calvin-Benson-Bassham (CBB) cycle 62, 316f.
 - cancer 215ff.
 - candididin 156
 - Candida*
 - *albicans* 76, 215
 - *lipolytica* 313
 - species 249
 - capsid 221
 - capsomer 221
 - carbohydrate 311
 - carbon cycle 56, 101
 - carbon dioxide 100ff., 111
 - fixation 317ff.
 - carbon dioxide cycle 101
 - carbon metabolism 311ff.
 - carbon monoxide 246
 - Carboxydotherrmus hydrogenoformans* 246, 277
 - carcinogenic compound 33f.
 - Carsonella*
 - *ruddii* 333
 - species 187
 - cell membrane 273
 - cell wall 273f.
 - cellulase 113f., 300
 - cellulose 114
 - Cenarchaeum symbiosum* 281
 - Cephalosporium* 154ff.
 - *roseum* 313
 - Che protein 306
 - cheese 121ff.
 - chemiosmotic mechanism 301
 - chemolithotrophic way of life 49
 - chemostat 263
 - chemosynthetic symbiosis 48
 - chemotaxis 306
 - chitinase 300
 - Chlamydia pneumoniae* 209
 - Chlorella* 61f.
 - Chlorobium limicola* 291
 - Chloroflexus*
 - *aurantiacus* 289
 - chloroplast 187
 - cholera toxin (CTX) 211
 - Chondromyces robustus* 294
 - Chromatium okenii* 179, 285, 291
 - Citrobacter* species 196f.
 - Clamydia trachomatis* 76
 - cloning 173
 - Clostridium*
 - *aceticum* 292, 318, 325
 - *acetobutylicum* 105ff., 290ff., 321f., 325

- *acidiurici* 325
- *botulinum* 290ff., 323
- *difficile* 77, 211
- *histolyticum* 204, 323
- *ljungdahlii* 277, 292, 318
- *pasteurianum* 325
- *perfringens* 204
- species 196
- *sporogenes* 323
- *sticklandii* 323
- *tetani* 204f., 238, 290ff., 326, 333
- *thermoaceticum* 130
- cobalt 127
- coenzyme B 95
- coenzyme B₁₂ 128
- coenzyme F₄₃₀ 94, 127
- coenzyme M 95
- cold seep 50
- cold vent 50
- combustible air 91ff.
- competence
 - bacteria 139
- complementary DNA (cDNA) 224
- conjugation 140ff.
- conjugative plasmid 142
- coral bleaching 186
- Corynebacterium glutamicum* 179, 192
- Crenarchaeota 281
- CTP (cytidine 5'-triphosphate) 330
- cyanobacteria 31ff., 69f.
- cyclic AMP (cAMP) 328
- cytoplasmic membrane 273
- cytosine 268

d

- deep-sea vent 48
- Deinococcus radiodurans* 245f., 289
- denitrification 304
- Desulfobacterium autotrophicum* 285, 304, 318
- Desulfovibrio vulgaris* 179, 285
- Desulfurococcales 281
- Desulfuromonas acetoxidans* 285
- diabetes 194f.
- diarrhea 210
- dicarboxylic azobenzene (DCAB) 134
- dihydroxyacetone phosphate (DAP) 316
- DNA (deoxyribonucleic acid) 7ff., 267
 - base 268
 - complementary (cDNA) 224
 - methylation 171, 326
 - mitochondrial (mtDNA) 187f.
 - regulation 326
 - replication 10, 270

- restriction enzyme 169ff.
- sequence 236
- transfer 136ff.
- DNA polymerase 174, 228
- DNA virus 225
- Dunaliella* 45f.

e

- Eco R1 169
- EET (extracellular electron transfer) 248
- EHEC (enterohemorrhagic *E. coli*) 211f.
- Embden-Meyerhof-Parnas (EMP) pathway 302, 311, 321ff.
- endosymbiont 185ff.
- endosymbiosis 70f.
- energy 297ff.
- energy conservation 117ff.
- Enterococcus*
 - *aecium* 215
 - *faecalis* 215
- Entner-Doudoroff (ED) pathway 311ff.
- enzyme 9, 269
 - anaerobic 321
- enzyme activity
 - regulation 330
- epidemics 221
- Epstein-Barr virus (EBV) 227, 344
- Erwinia uredovora* 167
- erythromycin 155
- Escherichia coli* 76f., 94, 145ff., 179, 196, 213ff., 291, 326ff.
- ETEC (enterotoxigenic *E. coli*) 211f.
- ethanol 111
- Eubacterium rectale* 77
- eukaryotic cell 13
- Euryarchaeota 281
- exoenzyme 300
- extremozyme 200

f

- F-factor 159
- fermentation
 - acetone-butanol 105ff., 318ff., 321f.
 - alcohol 318ff.
 - amino acid 321
 - butyrate 321
 - homoacetate 319, 321
 - lactic acid 318
 - mixed acid 321ff.
 - propionate 123
- ferredoxin 119
- Firmicutes* 293
- flagella 179f., 306
- flavin adenine dinucleotide (FAD) 303
- food chain 291

Frankia 85, 185
 furanosyl borate ester 309

g

GC content 335
 gene 333
 gene cloning 173
 gene technology 171
 gene therapy 232
 gene transfer 137, 142, 333f.
 – horizontal 333, 137
 genetic code 272
 genetic engineer 165ff.
 genetic engineering 196
 genome 333
 genomics 235ff.
Geobacter metallireducens 304
 glacier ice 244
 global warming potential (GWP)
 103f.
Gloeocapsa 290
Gluconobacter oxydans (*Gluconobacter*
oxidans) 124, 316
 glucose 313
 glucose isomerase enzyme 192
 glyceraldehyde 3-phosphate (GAP)
 316f.
 glyoxylic acid (glyoxylate) cycle 311f.
 GMO (genetically modified microorganism)
 219
 Gram-negative bacteria 152f., 274
 Gram-positive bacteria 152f., 274
 green manuring 84
 green sulfur bacteria 67
 growth
 – aerobic heterotrophic 311
 – microbial 4ff., 261ff.
 guanine 268

h

HAART (highly active antiretroviral therapy)
 231
 habitat 283
Haemophilus influenzae 76, 235ff., 305
Haloarcula marismortui 46, 283
Halobacteriales 283
Haloferax volcanii 46
Haloraptus utahensis 42
Halorubrum sodomense 47
Helicobacter pylori 74, 216, 291
Heliobacterium 290ff.
 hemagglutinin (HA, H) 225f.
 hemicellulose 114
 Herpes 222

Herpes simplex virus 227
 Herpes virus 8 (HHV-8) 231
 heterodisulfide 95
 HIV (human immunodeficiency virus)
 228ff.
 homoacetate fermentation 321
 homoserine lactone 309
 horizontal gene transfer 137, 333
 human
 – bacteria 73ff., 203ff.
 hydrocarbon 250
 – degradation 315
 hydrochlorofluorocarbon (HCFC) 99
 hydrogen sulfide 49
Hydrogenobacter thermophilus 318
 hyper cycle 27
 hyperthermophiles 281

i

Ignicoccus hospitalis 255, 281
 immunotherapy 149
 infection 204
 – in hospital 215
 influenza virus 222ff.
 – infection cycle 226
 informational macromolecule 267
 insulin 195
 interbacterial relationship 177ff.
 intestinal microflora 78
 isoamyl alcohol 105

k

Klebsiella 197f.
 – *aerogenes* 325
 – *pneumoniae* 331
 Korarchaeota 281

l

β -lactam antibiotic 153f.
 β -lactamase 135
 lactic acid bacteria 121
 lactic acid fermentation 318
Lactobacillus
 – *bulgaricus* 121, 318
 – *helveticus* 318
 – *lactis* 318
 – species 196
 lambda (λ) bacteriophage 147f.
Legionella pneumophila 206ff.
 Legionnaire's disease 206
Leuconostoc mesenteroides 318
 lignocellulose 113
 lipase 300
Listeria monocytogenes 214

listeriosis 214
 LUCA (last universal common ancestor)
 15ff., 277
 Lyme disease 205

m

macromolecule
 – informational 267
Magnetospirillum gryphiswaldense 247
 malaria 205
 MCP (methyl-accepting chemotaxis protein)
 306f.
 membrane 297ff.
 metabolism
 – anabolic 288
 – archaea 283
 – carbon 311ff.
 – microbial 325
 metagenomic library 242
 metagenomics 241f.
 metal needle effect 94
 methane 91ff., 103, 117, 313f.
 – aerobic oxidation 314
 – anaerobic oxidation 50
 methane monooxygenase 313
 methane seep 50
 methane-oxidizing archaea 51
 methanoarchaea 50, 93f., 118
Methanobrevibacter smithii 282
Methanocaldococcus jannaschii 282, 292
Methanococcus 53
 methanogen 318
 methanogenesis 94, 285
 methanogenic archaea 292
 methanogenic pathway 286f.
Methanohalobium evestigatum 282
 methanol 313
Methanopyrus kandleri 282
Methanosaeta concilli 282
Methanosarcina 305
 – *acetivorans* 282
 – *barkeri* 282
 – *mazei* 282, 292, 326, 334
Methanosarcinales 285
Methanosphaera stadtmanae 282
Methanospirillum hungatei 253
Methanothermobacter
 – *marburgensis* 282
 – *thermoautotrophicus* 282
 methanotroph 313
 methanotrophic bacteria 314
 methicillin-resistant *Staphylococcus aureus*
 (MRSA) 215
 methyl-coenzyme M 95

Methylobacterium 104, 218
Methylomonas 104
 methylotrophy 217f.
 microbe
 – ATP synthesis 301
 – climate maker 99ff.
 – incredible 245ff.
 – resistance to radiation 245
 microbial growth 261ff.
 – batch culture 261
 – condition 263
 – continuous culture 263
 – logarithmic 261
 microbial metabolism
 – regulation 325ff.
 microbial shape 264
 microbial size 264
 microorganism
 – aerobic 264
 – anaerobic 264
 – chemotrophic 264
 – dead sea 45ff.
 – facultative anaerobic 264
 Miller-Urey soup 24
 mitochondria 187
 mitochondrial DNA (mtDNA) 187f.
 mixed acid fermentation 321ff.
 molybdenum 83
Moorella thermoacetica 130, 318
 motility 305
 MRSA (methicillin-resistant *Staphylococcus aureus*, multiresistant *Staphylococcus aureus*) 161, 215
Mycobacterium
 – *smegmatis* 313
 – species 249
 – *tuberculosis* 186, 206ff., 290
Mycoderma aceti 123ff.
Mycoplasma
 – *genitalium* 238
 – *mycoides* 256
 – *pneumoniae* 209
Myxobacteria 293

n

NADH 302ff., 330
 Nanoarchaeota 281
Nanoarchaeum equitans 255, 281
Natronomonas pharaonis 42, 254, 283
 (connected on p. 254)
Neisseria meningitidis 76
 neuraminidase (NA, N) 225f.
 nickel 94, 127ff.
 nickel-resistant bacteria 131

- nif* gene 331f.
 nitrate 88f.
 nitrifying bacteria 313
 nitrite 88f.
Nitrobacter winogradskyi 291
 nitrogen 81ff.
 nitrogen cycle 88, 304
 nitrogen fixation
 – symbiotic 84
 – regulation 331
 nitrogenase 82f.
Nitrosomonas europaea 291, 313
Nocardia petroleophila 313
- o**
- Oculina patagonica* 186
Oligotropha carboxydovorans 291
 “omics” era 235
 oncogene 232
Oscillatoria 289
 oxidation
 – aerobic 314
 – D-glucose 316
 – incomplete 315
 oxygen 34ff., 278
- p**
- P700 305
 P840 305
 P870 system 304
Paracoccus denitrificans 325, 326
 pathogenic microorganism 341
 pathogenicity island (PAI) 212f.
 PCR (polymerase chain reaction) 172ff.
Pelagibacter ubique 249, 304
 penicillin 150ff.
Penicillium 150ff.
 phage 145, 335
 phosphoenolpyruvate (PEP) 298, 312, 330
 phosphotransferase system (PTS) 298
Photobacterium phosphoreum 180
 photosynthesis 29ff., 59, 65ff.
 – aerobic (oxygenic) 31, 68f.
 – anaerobic (anoxygenic) 31, 69, 291
 – first type 65
 – second type 59
 photosystem
 – PSI 305
 – PSII 305
 phototrophic bacteria 30
 phototrophic microorganism 263
 phylogenetic tree
 – archaea 282
 – bacteria 289f.
- Picrophilus torridus* 41, 255, 283, 333
 plague 211
Planctomyces 291
 plant
 – bacteria 217f.
 plasmid 159ff., 165ff.
Plasmodium falciparum 205
 pneumonia 209
Pocillopora damicornis 186
 polio virus 222ff.
 poly- β -hydroxy fatty acid (PHF) 198ff.
 poly- β -hydroxybutyric acid (PHB) 198ff.
Prochlorococcus marinus 248f., 289
 prokaryote 278
 prokaryotic cell 13
 prontosil 150
 1,3-propanediol 196
 propanediol dehydrogenase 197
 prophage 335
Propionibacterium acnes 73ff., 290
 propionic acid bacteria 123
Propionigenium modestum 252, 305
 protease 193, 300
 protein 269
 proteomics 241ff.
 proton motive force 59, 302ff.
 proton translocation
 – light-driven 304
Pseudomonas
 – *aeruginosa* 76, 181, 209ff., 291, 309
 – *fluorescens* 313
 – *lindneri*, see *Zymomonas mobilis*
 – *syringae* 218, 291
 pullulanase 300
 purple bacteria 66
Pyrococcus 201
 – *furiosus* 283
Pyrodictium occultum 39f., 255, 282
Pyrolobus fumarii 282
 pyruvate decarboxylase 111ff.
- q**
- quorum sensing 309
- r**
- radical 35
Ralstonia eutropha 199f., 291, 325
Reclinomonas americana 189
 reducing equivalent 31
 renewable resources 117
 repair system 294
 replication 10, 270
 resistance
 – bacteria 160ff.

resistome 163
 respiratory chain
 – aerobic 302f.
 restriction enzyme 169ff.
 retrovirus 228ff.
Rhizobium radiobacter 165
 rhizosphere 96
Rhodospirillum rubrum 291
 ribonucleotide reductase 233
 ribozyme 26ff.
 ribulose 1,5-bisphosphate 62, 316
 ribulose 1,5-bisphosphate carboxylase
 (rubisco) 63
Rickettsia
 – *prowazekii* 186ff.
 – species 291
 RNA (ribonucleic acid) 7ff., 222ff.
 – 16S-rRNA 17ff., 55
 – messenger (mRNA) 267, 326ff.
 – ribosomal (rRNA) 267
 – small (sRNA) 329
 – synthesis 12
 – transfer (tRNA) 269
 – translation 272
 – triplet 272
 RNA polymerase 228
 RNA virus 225
 RNA world 277
 ROS (reactive oxygen species) 35, 278
Roseobacter 304

s

Saccharomyces cerevisiae 111, 197,
 318
Salmonella
 – species 204ff.
 – *typhi* 211ff., 291
 – *typhimurium* 33, 179
 saltpeter 87
 salvarsan 150
 selenocysteine 130
 sensor kinase 307ff.
 sequencing
 – DNA 236
Shewanella oneidensis 248, 304
 shingles 227
 SHV-1 β -lactamase 135
Sinorhizobium meliloti 84
 sodium glutamate 191
 sodium ion pump 305
Sorangium cellulosum 333
 Spanish influenza virus 224
Sporomusa 109, 293
 sporulation 294

Staphylococcus
 – *aureus* 179, 204ff., 274, 290, 309
 – *epidermidis* 73, 215
Streptococcus 76
 – *cremoris* 121
 – infection 150
 – *pneumonia* 209
 – *salivarius* 76
 – *thermophilus* 121
Streptomyces 154ff., 193, 290
 – *griseus* 151ff.
 streptomycin 151ff.
 stromatolite 35f.
 substrate-level phosphorylation 301
 sugar 111
 sulfate-reducing bacteria 50
 Sulfolobales 281
Sulfolobus 252, 282
 – *acidocaldarius* 281ff.
 – *solfataricus* 246, 291
 sulfur cycle 284
 survival strategy 292
 symbiont 186
 symbiosis 185
 symbiotic bacteria 48
 symbiotic nitrogen fixation 84
 symporter 297
Syntrophus aciditrophus 252f.

t

T-DNA region 165
 T4 bacteriophage 147f.
Taq polymerase 174, 201
 TCA, *see* tricarboxylic acid
 TEM-1 β -lactamase 135f.
 tetanus 204ff.
 tetracycline 155
Thermobacterium mobile, *see* *Zymomonas mobilis*
Thermococcus 201
 thermophiles 281
Thermoplasma acidophilum 283
 Thermoproteales 281
Thermoproteus 282
 – *tenax* 179, 255, 277, 281, 318
Thermotoga maritima 289, 334
 thermozyme 42
Thermus
 – *aquaticus* 39, 228, 289
 – *thermophilus* 289
Thiobacillus 252
 – *ferrooxidans* 255
 – *thiooxidans* 255, 285, 291
 thioester 26

- Thiomargarita namibiensis* 250f.
Thioploca 252
Thiospirillum jenense 180, 291
 thymine 268
 Ti plasmid 165
 tobacco mosaic virus (TMV) 28
 transcription 12, 326
 – regulation 327ff.
 transformation 139
 translation 12, 272, 326
 – regulation 328f.
 transport 297
 – active 298
 – primary 297
 – secondary 297
 tricarboxylic acid (TCA) cycle 302, 312
Trichodesmium 289
 tuberculosis 206ff.
 tungsten 129
 two-component system 307f.
 typhoid fever 211
- u**
- UPEC (uropathogenic *E. coli*) 212
 uracil 269
 urease 94
- v**
- vanadium 83
 vancomycin 215
 vancomycin-resistant enterococci (VRE) 215
Varicella zoster 227
Vibrio
 – *cholerae* 210ff., 291
 – *fischeri* 180, 309
 – *harveyi* 309
 – *shiloi* 185f.
 vinegar 123ff.
 viral hypothesis 234
 virus 7, 145, 221ff., 343f.
 vitamin B₁₂ 127
 vitamin C synthesis 124
 VRSA 215
- w**
- wine 115
 Wood-Ljungdahl pathway 318f.
- x**
- Xanthomonas campestris* 218
 xylanase 300
- y**
- Yersinia pestis* 205ff.
 yogurt 121
- z**
- Zooxanthellae* 185f.
 zovirax 227
Zymomonas mobilis 112f., 291, 318