

Index

- abi* 37, 109, 141, 146–153
- abortive infection 140–154
- adherence 260, 261
- adsorption inhibition 13, 127–130
- agg* 7–8
- aggregation 4–8
- amino acid transport 195–198
- amino terminal leader 86–89, 92–95, 178, 219–221, 227–228, 232
- aminopeptidase 184–188, 259
- aminopeptidase A 185
- aminopeptidase C 187–188
- aminopeptidase N 186–187
- amplification 35, 36, 68–69
- amylase 37, 59, 69–70, 84, 88, 90, 92–93, 275, 276, 278
- antirestriction 139–140
- antisense RNA 154–155
- ATP binding proteins 222
- ATP-dependent transport 222
- att* sites 111, 113, 125, 126
- attenuation 85, 271

- Bacillus* 16, 19, 26, 30, 31, 56, 59, 61, 62, 65, 66, 67, 71, 72, 74, 77, 79, 86, 88, 90, 93, 111, 175, 176, 197, 203, 256, 268, 269, 270, 274–278
 - amyloliquefaciens* 268, 275
 - cereus* 19, 243
 - licheniformis* 71, 88, 90, 274
 - pumilis* 71, 90
 - stearothermophilus* 77, 88, 90, 93, 256, 275, 276
 - subtilis* 30, 31, 56, 59, 61, 63, 66, 67, 72, 74, 86, 88, 90
- bacteriocin 3, 8, 40, 58, 96, 212, 223–224, 239–240, 243–244, 261
 - application 243–244
 - mode of action 223–224, 239–240
 - S50 212
 - translocation 221–223, 234–235
- bacteriophage 7–9, 26, 90–91, 106–158, 279, 282
 - adsorption 108, 127–130
 - classification 114–117
 - DNA homology 116–117
 - genomes 117–127
 - lysine 26, 90–91
 - modification 114–116
 - resistance 1, 3, 28, 29, 34, 37, 127–158, 260, 281–282
 - strains
 - BK5-T 13, 74, 118, 121, 124–125
 - c2 108
 - c6A 109
 - F4-1 120–125
 - FSV 121
 - FSW 125–126
 - LL-H 111, 119, 121, 126
 - mv1 121
 - φ50 118, 121, 123, 124, 140
 - φ*adh* 15, 113, 121
 - φJ1 25, 108
 - φT712 11–12, 40
 - φvML3 107, 120, 121, 125
 - P008 25, 108
 - PL-1 108, 110
 - Tuc2009 110
 - US3 121
 - biochemical characterization 171
 - bitter flavour 13
 - broad host range plasmid 1
 - burst size 108

 - C-terminal anchor 88, 173, 178
 - calf chymosin 90, 92–94
 - Campbell integration 35, 36, 37, 38, 67
 - capacitance 20
 - carboxypeptidase 194–195
 - Carnobacterium* 65, 212, 213, 227
 - piscicola* 213, 227
 - carnocin U149 227
 - casein degradation 173–175
 - cell aggregation 4–8
 - cellulase 275
 - cholesterol oxidase 275
 - chromosomal integration 6, 12, 30, 35–38, 67, 278–279
 - chromosome mapping 39, 41–43
 - chymosin 90, 92–94
 - citrate 31, 277
 - cloning vectors 260–263, 264–265
 - Clostridium* 62, 65, 243
 - botulinum* 243
 - clu* 7
 - codon usage 79–80
 - cointegration 2, 5–7, 9–10, 15, 31
 - competence 16
 - composite transposon 30
 - conjugation 1–10, 30, 31, 32–34, 261, 265, 267–268, 232–233
 - conjugative transposon 3, 32–34

- control of gene expression 29, 177, 273–274
- copy number 85
- cotransduction 11
- cryptic plasmids 18, 54, 58–60, 260, 264
- curvacin A 219, 221
- dehydro amino-acids 225, 227, 230
- dipeptidase 192–193
- dnaJ* 84
- dnaK* 84
- electroporation 16, 19–24, 266
- buffer 21
- electrotransfer 24
- electrotransformation 16, 19–24, 266
- endoglucanase 37
- endonuclease 132–134, 138–139
- Enterococcus faecalis* 1–3, 30, 31, 54–55, 62, 90, 268, 278
- Escherichia coli* 3, 23, 24, 55, 58–59, 63–64, 67, 72, 74, 86, 90, 125, 175, 176, 256, 264, 266, 269, 270, 275, 276
- food grade markers 83, 95–97
- foot and mouth virus 275, 276
- galactose 277
- α-galactosidase 90, 96
- β-galactosidase 32, 38, 55, 59, 72–73, 79, 90, 256, 261, 263, 275, 276
- gene cloning 52–105, 269–278
- gene expression 52–105, 269–278
- gene regulation 80–86
- gene replacement 37–39, 67
- generalized recombination 5, 34–41
- glucose responsive elements 83
- β-glucuronidase 72, 73, 90
- glutamyl amino peptidase 185
- groEL* 84
- gus* 72, 73, 90
- haemolysin translocator 86, 222–223, 235
- heat shock response 84
- helvetican J 213, 224–225
- heterologous transposons 30–32
- HFT 11–13
- high frequency transduction 11–13
- high molecular weight plasmid multimers 61
- histidine operon 85
- hybrid proteinase 202
- immunity 89, 223–225, 235, 238–239
- immunogold labelling 199–200
- incompatibility 23
- induction 113
- insertion sequences 5–6, 8, 12, 27–30, 33, 42–43, 124, 137, 263, 264, 272
- instability 56, 61–66
- int* 33, 113
- integrase 33, 113
- integration 12, 31, 34–41, 66–70, 278–279
- integrative gene cloning 66, 278–279
- inulase 96
- IS elements 12, 27–30, 137, 263, 264, 272
- IS904 27, 28, 29, 33, 233
- IS905 28, 29
- IS946 27, 28, 29, 30, 124
- IS981 28, 29, 30
- IS1076 28, 29
- IS1165 28, 29, 264
- ISLI 27, 28, 263, 264, 272
- ISSI 5–6, 8, 27, 28, 29, 42–43, 177
- ISSIN 27, 28
- ISSIS 5, 8, 27, 28
- ISSIT 5–6, 8, 27, 28
- ISSIW 27, 28
- isoleucine operon 85
- β-lactamase 72, 88, 90
- lac* 55, 56, 67–70, 72–73, 80–83, 77, 79, 90, 92, 95–97, 113, 255–258, 261, 263, 268, 270, 273, 277, 279
- lactacin B 213
- lactacin F 212, 216, 217–221, 223, 224
- lactacin N 213
- lacticin 481 226, 228–229
- Lactobacillus* 3, 8, 9, 10, 14–16, 19, 20–23, 25–26, 28, 29, 30, 32, 37, 52, 56, 60, 62, 64, 65, 73, 107, 108, 109, 111–113, 115, 117, 118, 119, 125, 126, 171, 175, 177–179, 187, 190, 195, 200, 212, 213, 216–218
- acidophilus* 15, 19, 20, 21, 23, 190, 212, 216, 218, 259, 261, 267, 268, 271, 275, 276, 281
- amylophilus* 276
- amylovorus* 276, 277
- brevis* 270, 276
- bulgaricus* 255, 256, 257, 260, 263, 267, 270, 278, 280, 281
- casei* 3, 20–27, 29, 56, 60, 73, 108, 111, 118, 119, 125, 171, 177, 256, 257, 261, 263–267, 270–276, 281
- confusus* 270
- curvatus* 64, 271, 275
- delbrueckii* 25, 111, 112, 115, 117, 119, 126, 171, 175, 190, 200, 201, 255, 259
- fermentum* 20, 26, 253, 261
- gasseri* 15, 26, 113, 262, 268, 278
- helveticus* 21, 22, 23, 29, 111, 112, 117, 171, 175, 187, 190, 224, 254, 259, 261, 264, 268, 275, 278, 281, 282
- lactis* 187, 190
- paracasei* 171, 175, 177, 178, 179, 276
- pentosus* 23, 258, 261, 265, 270–275
- plantarum* 9, 20, 21, 23, 25, 26, 30, 32, 37, 52, 64, 73, 109, 111, 118, 119, 171,

- 175, 195, 261, 262, 267, 268, 273,
275–279, 281
reuteri 19, 20, 26, 261, 267
sake 212, 213, 226, 227, 261
salivarius 15, 115
lactocin 27 213
lactocin S 212, 226, 227–228
lactococcin A 212, 216–221, 222, 223
lactococcin B 212, 216, 217, 219, 221, 222,
223
lactococcin G 211, 212
lactococcin M 212, 216, 217, 219–221, 222
Lactococcus garviae 52
Lactococcus lactis
18–16 31
712 2–7, 11, 12, 13, 31, 55, 59, 175, 185,
196–197
AM1 174
AM2 189, 190
ATCC11454 33
BK5 13
C2 3, 5, 6, 10, 11, 12, 13, 18, 31, 107, 108
C3 13
CNRZ481 228
DL11 33, 42
DRC3 55
E8 175
H1 175
H2 13
HP 174, 183, 190
IL1403 2, 7, 18, 39, 42, 43, 53, 56, 91,
217, 221, 222
K1 33
KH 108
LM0230 18, 22, 55, 60
ME2 9, 128, 135, 147
MG1363 2, 3, 6, 30, 31, 42, 53, 55–60,
67, 70, 74, 88, 93, 120, 186, 187
MG1614 33, 196
MG1820 92
MG2081 52, 211
MG5276 67, 69–70
ML3 3, 5, 6, 13, 40, 41, 107, 108
NCDO763 88, 171, 174, 175, 177, 183,
191, 201
NCDO1201 171
NCFB894 33
R5 33
SK11 59, 85, 88, 128, 129, 130, 171, 172,
174–179, 202
UC317 60, 174, 175, 202
UC503 128, 129, 132
Wg2 58, 74, 85, 88, 108, 171, 172,
175–179, 183, 184, 187, 193, 202
WM4 9, 217, 221
YP2-5 68, 95
Lactococcus piscium 52
Lactococcus raffinolactis 52
lactose 56, 60, 67–70, 72–73, 77, 79, 80–83,
90, 92, 95–97, 113, 255–258, 261, 263, 268,
270, 273, 277, 279
lactose plasmid 1, 4–7, 9–10
lacZ 55, 59, 72–73, 79, 90, 256
lanthionine 225, 227, 228, 229–230
lantibiotics 211, 213, 222, 225–244
large heat labile bacteriocins 224–225
large heat labile protein 211
large isometric bacteriophage 115, 116
latent period 108–110
lci 217, 221, 222
lcn 86–87, 89, 217, 221, 222
leader cleavage 219–220, 221, 235
leucine operon 85
leucocin A UAL–187 187, 212, 216, 218,
219, 220, 277
Leuconostoc 19, 21, 23, 24, 25, 26, 28, 29,
62, 65, 73, 79, 107, 109, 113, 115, 116, 117,
119, 157, 212, 216, 217, 218, 252–283
cremoris 20, 116, 276, 281
dextranicus 263
gelidum 212, 216, 218, 277
lactis 29, 73, 79, 257, 263, 264, 277
mesenteroides 21, 22, 26, 29, 109, 116,
117, 119, 263, 264, 277, 278, 281
oenos 29, 113, 157, 263, 264, 278, 281
paramesenteroides 20, 24, 266
lipoprotein 89, 235
liposome 223, 266–267
Listeria 65, 90, 266
Ll1 113, 138, 140
luciferase 72, 73, 90, 275
lux 72, 73, 90, 275
lysine 26, 90–91, 111, 120, 125
lysogeny 10, 111–114, 116, 124–125
lysostaphin 275
lysozyme 17, 58, 90–91

macrogenomic rearrangement 33
malolactic fermentation 31, 157, 281
maltose 13, 31, 261
mannose 13
membrane anchor 88, 173–178
membrane vesicles 223
mesentericin 219, 220
minus origin 61
mitomycin C 113, 281
mobilization 1–3
mode of bacteriocin action 223–224,
239–241
mucoid 2
mutanolysin 16, 18

N-terminal leader 86–89, 92, 95, 178,
219–221, 227–228, 232
neutral proteinase 90–92, 203
nis 38, 67, 85–89, 181, 231, 233
nisin 32–34, 61, 67, 85, 86–89, 92, 94, 181,
212, 213, 217, 222, 225, 229–244, 264, 268,
275, 278, 281, 282

- nisin breakdown 230
 nisin immunity 235, 238–239
 nisin mode of action 239–240
 nisin protein engineering 240–243
 nisin transposon 29, 32–34
 nisin Z 231, 240, 242
 NMR spectra 230
- oligopeptidase 180–184
 oligopeptide transport 184, 196–198
 operators 82–85
opp 184, 196–198
 original replicon 38
- pac* site 14, 115–116
 PCP 186
 pediocin 212, 213, 216, 218, 219, 220, 222
Pediococcus 19, 20, 22, 25, 28, 29, 62, 65,
 96, 113, 157, 212–213, 216, 264, 281
 acidilactici 20, 22, 96, 212–213, 216
 halophilus 157
 pentosaceus 96
 penicillinase 72, 77, 88, 90
 PEP-dependent phosphotransferase
 system 80–81, 255, 257
pepA 185, 200
pepC 182, 187–188, 199
pepN 60, 67, 77, 92, 96–97, 182, 186, 188,
 199, 201
pepO 182, 183–184, 199
pepT 182, 193–194, 199
 peptidase cellular location 198–200
 peptide uptake 184, 195–198
pepXP 36, 37, 67, 182, 190–192, 199
 phospho- β -galactosidase 59, 72, 73
 physical map 39, 42–43
 PI/PIII type proteinase 173–175, 202
 plasmid 11, 38, 53–66, 71–73, 88, 90–95,
 212–213, 217, 228
 free strains 53
 replication 38, 61
 vectors 54–56, 71–73, 88, 90–95
 stability 11, 61
 plasmids
 p3085-2 135
 pA1 63, 262
 pACYC184 54, 67, 121
 pAM401 55
 pAM β 1 1, 3, 9, 14, 26, 54–56, 61–62, 65,
 68, 91–92, 267, 275
 pAT153 58
 pBF61 135, 142, 152
 pBR322 3, 34–35, 66–67, 121, 265
 pBU8 144, 153
 pC194 56, 58, 275
 pCC34 145, 153
 pCI203 2
 pCI301 2
 pCI305 5, 54, 60–61, 65–66
 pCI374 54, 57, 60
 pCI528 128, 129, 143, 152
 PCI726 10
 pCI750 10, 143, 151, 156
 pCI829 142, 153, 156
 pCK1 14, 54, 59
 pCLP51R 144
 pDG13 90
 pDI25 54, 59, 63, 70
 pDL276 55
 pDL278 54–55
 pE194 36, 56–58, 66–68, 275
 pEB56 145, 153
 pER8 262
 pFV1001 135
 pFV1202 135
 pFX1 54, 60, 90
 pFX3 24, 54, 72
 pG+Host 32
 pGA13 90
 pGA14 90
 pGB301 54, 55
 pGK12 15, 27, 32, 54, 58, 67, 90, 265
 pGKV2 54, 57–58, 90–91
 pGKV21 26
 pGKV210 57, 58, 72, 90
 pGL3 54
 pHD131 135, 136
 pHV1301 18, 54, 56
 pIL6 135, 136
 pIL7 135
 pIL103 135
 pIL105 142, 150–151
 pIL107 135
 pIL204 56
 pIL206 56
 pIL251 264, 265
 pIL252 54, 56, 62, 64
 pIL253 14, 54, 56, 57, 62, 68, 90
 pIL277 92
 pIL611 142, 149–150
 pIP501 1–2, 54–56, 61–62
 pJS40 144, 153
 pJS88 10, 144, 153
 pJW563 135
 pJW565 135
 pKB32 10
 pKM1363 90
 pKR223 135, 137, 138, 143, 151–152
 pLB4 63, 262
 pLC1 64
 pLJ1 262
 pLP1 262
 pLP712 4, 6, 11, 12
 pLP825 265
 pLR1020 135
 pLS1 63
 pME0030 128
 pME100 135, 137

- pMG24 58
 pMG36 57–58, 90–91
 pMG36e 57–58, 90–91
 pMG820 6
 pMV158 2
 pMV1328 72
 pNP2 145, 153, 221
 pNP40 56, 144, 156
 pNZ10 58
 pNZ12 54, 57, 59, 90, 265
 pNZ18 59, 90
 pNZ19 59
 pNZ121 54, 59
 pNZ122 59
 pNZ123 54, 57, 59, 90
 pNZ220 72
 pNZ262 72, 90
 pNZ288 90
 pNZ305 68
 pNZ336 72, 91
 pNZ1125 97
 pNZ2014 57
 pPW2 5
 pRK212-1 3
 pRL1 43
 pRSO1 5–6, 30, 137
 pSA3 27, 54–55, 60, 90, 121, 138, 154, 265, 268
 pSA34 60, 121, 137
 pSC2 277
 pSC101 66–67
 pSH71 14, 54, 59–61, 63–65, 72, 84–85, 88, 90–91, 176
 pSK08 5–6
 pSK11L 40, 65
 pSK111 176
 pSK112 1, 128, 129, 130
 pSL2 65
 pSL101 35
 pSRQ2202 129, 145
 pST1 262
 pTB19 35, 67
 pTG222 55
 pTG262 59, 121
 pTK6 137
 pTN20 135, 136, 137, 142, 150, 156
 pTN1060 135, 136, 137
 pTR2030 27, 123, 124, 133, 135, 136, 138, 140, 142, 146–149, 153, 156
 pTRK11 135, 136
 pTRK12 135
 pTRK18 142
 pTRK30 135
 pTRK68 135
 pTRK317 135
 pTS101 121
 pTV1ts 22
 pUB110 35, 56, 58, 66–67, 69
 pUC vectors 54, 66–67, 131
 pUCL22 65
 pVA380-1 54–55, 61, 72
 pVA797 2–3, 55, 268
 pVA838 54, 63, 265, 268
 pVE6002 67, 90
 pVS2 59, 90
 pWV01 38, 54, 58, 60–61, 63–65, 67–68, 72, 88, 90–91, 176
 pWV02 60, 65–66
 pWV05 176
 plus origin 61
 polyethylene glycol 16, 17, 18, 25, 26
 polysaccharide 1, 2, 260–261
 pore formation 223
 post-translational modification 225–231, 233–234, 235
 prochymosin 90, 92–94
 prolate headed bacteriophage 114, 116, 120
 prolidase 189–190, 259
 prolinase 259
 proline iminopeptidase 190, 259
 proline-specific peptidase 189–192
 promoters 74–77, 82–83
 prophage 113
Propionibacterium 65
 protein engineered nisin 238–239, 240–241
 protein engineering 82, 94, 179, 200–203, 240–243
 protein secretion 86–89, 92–95
 proteinase 1–3, 10, 12, 27, 37, 39, 56, 59, 64, 70, 77, 85, 87, 88, 90, 91, 94, 113, 170, 172, 175–180, 196, 201–202, 258–259, 260, 261, 276
 proteinase cellular location 198–200
 proteinase maturation 179–180
 proteinase specificity 173–175
 proteolytic system 169–203
 protoplasts 16–19, 26–27, 266–267
 buffer 17
 fusion 26–27, 266–267
 regeneration 18
 transformation 16–19
prt 27, 56, 59, 64, 70, 77, 85, 87, 88, 90, 91, 94, 170, 172, 175–180, 196, 201–202, 259
 pulsed field gel electrophoresis 6, 33, 41, 42
 pyrrolidonyl carboxylate peptidase 186

 random integration 30
rec 40–41
recA 41, 64
 recombination 34–41
 recombination genes 40–41
 regulation 80–86, 236
rep 34, 38, 63, 68, 271–272
 Rep proteins 63
 replacement recombination 67
 replication 61–66, 68
 replicative gene cloning 53
 replicon-screening 60

- reporter genes 71–73
repressor 81–84
resolvase 62
restriction and modification 23, 123, 124,
130–139, 261
restriction endonuclease 132–134, 138–139
ribosomal RNA 42, 54, 79
rolling circle replication 15, 39, 61, 64, 68,
69, 265
- S layer 108
sakacin P 213, 219, 220, 221
sakacin A 213, 218, 219, 223
Salmonella typhimurium 197
ScrF1 132–134
secondary structure 224
secretion 86–89, 92–95
secretion vector 92–95
segregation 56
sex factor 6–9, 31
sex pheromone 7
sigma factors 73, 74, 86
signal sequence 88–89, 92–95, 178,
219–221, 227–228, 232
single cross-over recombination 35, 36, 37,
38, 67
slime 260–261
small heat-stable peptides 211, 216–224
small isometric bacteriophages 115, 120
Ssl1 133
Staphylococcus 52, 56, 58, 59, 62, 63, 65,
66, 90, 255, 273
 aureus 52, 56, 58, 59, 63, 66, 90, 255,
273
Sth1 133, 281–282
strain identification 29
Streptococcus 2, 45, 54, 62, 63, 65, 74,
90, 117, 119, 125, 133, 157, 183, 190,
252–283
 agalacticae 2, 45, 54, 63
 ferus 2, 54
 mutans 90
 salivarius 253
 sanguis 74, 125, 267, 268
 thermophilus 117, 119, 133, 157, 183,
190, 252–283
streptodornase 93
streptokinase 90
subtilin 222, 225–226, 229
sucrose fermentation 3, 32, 83, 85, 96
surface protein 7, 90
- T7 RNA polymerase 90–92, 93, 94
tagatose phosphate pathway 60, 80–81
taxonomy 52–53, 253–255
temperate bacteriophage 10, 74, 110,
111–114, 116, 124–125
temperature sensitive replicon 22, 32, 34,
38–39, 67–69
tetanus toxin 90, 94
thermosensitive replicon 22, 32, 34, 38–39,
67–69
theta replication 61, 62, 65, 66
thyA 55
Tn554 33
Tn916 18, 30–31, 33, 40, 56
Tn917 30, 31–32, 57
Tn919 30, 31
Tn1545 33, 68
Tn5276 33–34, 85, 88
Tn5301 29, 32–33, 233, 237
Tn5306 33
Tn5307 33
transcription 73–77, 84–86, 177, 236–238,
269–274
transduction 10–15, 40, 113, 268–269
transductional shortening 6, 10–12
transfection 24–25, 266–267
transformation 15–25, 266
translation 77–79, 272–273
translocation 86–89
transport 86–89, 222
transposition 5, 12, 27–34
transposon 18, 29–32, 34, 40, 56, 57, 68,
85, 88, 178, 232–233, 237
tripeptidase 193–194
tRNA gene 77
two component bacteriocins 211–212
type II restriction endonuclease 132–134,
138–139
- usp45* 69, 70, 77, 79, 84, 87–88, 92–94
UV light 113
- vaccine 90, 94, 275
vector 264–265
Vibrio fischerii 73, 90, 275
- X-prolyl dipeptidyl aminopeptidase 36,
190–192
xis 33
xy lanase 275
xylose 258, 270, 271, 274, 275