

Index

- absorbance, 15
- absorption (of photons)
 - cross section for, 19
 - example calculations, 20–2
 - in human skin, 14
 - in nearly transparent solutions, 14, 15
 - in opaque solutions, 14, 16
 - in particulate samples, 17–18
 - in semitransparent solutions, 14, 16
 - time required for, 3
- absorption bands, 3, 27
- absorption continuum, 3
- absorption lines, 3
- absorption spectrum
 - adenine, 23, 24
 - caffeine, 182
 - cysteine, 25, 26
 - cystine, 25, 26
 - cytosine, 23, 24
 - DNA, calf thymus, 23, 25
 - DNA-containing 5'-bromouracil, 199
 - DNA, phage Φ X174, 31, 32
 - DNA, phage T4, 30, 31
 - guanine, 23, 24
 - histidine, 25, 26
 - phage Φ X174, 31, 32
 - phage T4, 30, 31
 - phenylalanine, 25, 26
 - protein, 23, 25
 - RNA, 23
 - thymine, 23, 24
 - thymine-thymine dimer, 34, 35
 - tryptophan, 25, 26
 - tyrosine, 25, 26
 - uracil, 23, 24
- absorptivity, molar, *see* molar extinction coefficient
- acetone, 201
- acetophenone, 200
- acridine dyes
 - as desensitizers for UV irradiation of DNA, 69, 201–2
 - as inactivating agents, 168
 - as photodynamic agents, 76, 102
 - as repair inhibitors, *see* acriflavine
- acriflavine
 - inhibition of excision repair, 100
- inhibition of host-cell reactivation, 94
- inhibition of liquid-holding effects, 124
- inhibition of mutation frequency
 - decline, 148–9
- actinometry, 13
- action spectrum
 - absolute, for photoenzymatic repair, 87–8
 - definition, 28
 - establishment, 28–30
 - growth delay by near-UV, 134, 168–9
 - inactivation of bacteria, 28, 29
 - inactivation of phage, 30–2
 - indirect photoreactivation, 133
 - mutation induction in eukaryotic plants, 28, 140–2
 - photoprotection, 132
 - photoreactivation of various organisms, 90–2
 - prolongation of latent period in phage, 163
 - requirements for meaningfulness of, 30
- adenine, 23, 24
- amplification processes (in target theory), 41
- Antirrhinum*, 140
- A+T/G+C ratio in DNA, effect on
 - dimer formation, 35–6
- 6-azathymine, 200
 - see also* desensitization of DNA to UV
- Bacillus megaterium*, 70
- Bacillus subtilis*, 9, 58, 71
- basal cell epithelioma, 192
- base analogs, *see* 5-bromouracil, 5-iodouracil, 6-azathymine
- benzophenone, 201
- biological objects in UV studies, 8–10
- Boltzmann's constant, 3
- 5'-bromouracil, 199
- Bunsen-Roscoe reciprocity law, 15, 127
- burst size (in phage), 163
- caffeine
 - as liquid filter, 182
 - binding to DNA, 100

210 *Index*

- caffeine (*cont.*)
 - enhancement of UV mutagenesis, 146, 147
 - inhibition of excision repair, 100
 - inhibition of host-cell reactivation, 94
 - inhibition of liquid-holding effects, 124
 - inhibition of photoenzymatic repair, 92
- capacity loss of bacteria for phage propagation
 - after far-UV irradiation, 178
 - after near-UV irradiation, 179
- carcinogenic UV effects
 - caused by sunlight, 190, 191–3
 - dark repair of, 197
 - effective wavelengths, 193–5
 - evidence for, 191–3
 - photoreversal of, 195–7
 - types of, 192
- cell division, UV-induced delay, 164–6
- cell growth, UV-induced delay
 - action spectrum (near-UV), 134, 168–9
 - far-UV photoproducts causing, 168
 - near-UV photoproducts causing, 134, 169–70
- chromophores, absorption bands of
 - biologically relevant, 27
- chromosomal aberrations, UV-induced, 150, 157–9
- competent cells (for bacterial transformation), 58, 63
- competitive inhibition of photoenzymatic repair, 80–1
- conjunctivitis, 190
- continuum (of absorption bands), 3
- correndonuclease, *see* repair endonuclease
- crosslink formation between DNA and protein, 32, 33, 37
- crosslink formation in DNA
 - by alkylating agents, 38
 - by psoralen and near-UV, 38, 201
 - by UV, 38–9
- cross reactivation in phage, *see* marker rescue
- cross section for absorption, 19
- curing (of lysogenic cells), 171, 173–4
- cut-and-patch mechanism in excision repair, 99–100
- 5,6-cyclobutyl dipyrimidines, *see* pyrimidine dimers in DNA
- cysteamine, 200
- cysteine, 25, 26, 37
- 5-S-cysteine-5, 6-dihydrothymine, 33, 37
- cystine, 25, 26
- cytosine, 23, 24
- cytosine-cytosine dimer, *see* pyrimidine dimers in DNA
- dark repair, *see* excision repair, host-cell reactivation, liquid-holding effects; recombination repair; *u*-gene repair, Weigle recovery; *x*, *y*-gene repair
- delayed occurrence of UV-induced mutations, 140, 155–6
- delayed phage multiplication, after UV, 163–4
- De Sanctis-Cacchione syndrome, 197
- desensitization of DNA to UV,
 - by acridine dyes, 69, 201–2
 - by incorporation of 6-azathymine, 200
- di-(2-chloroethyl)sulfide (“mustard gas”), 101
- Diplococcus pneumoniae*, 58
- division delay, *see* cell division, UV-induced delay
- DNA
 - absorption spectrum, 23, 25
 - base-substituted, 199–200
 - super-twisted circular, 38
 - transforming bacterial, 9, 58–62, 80–1, 100–1, 185–6
 - viral, 31, 62–4
- DNA polymerase I, 99, 100
- DNA-protein crosslinks, 32, 33, 37
- DNA synthesis after UV irradiation, 160
- dose, UV
 - absorbed, 13–17
 - incident, *see* fluence
- dose rate, *see* fluence rate
- dosimetry, 13
- Draper-Grotthus principle, 4
- Drosophila*, 140, 157, 159
- Einstein unit, 2
- elastosis of the skin, 190
- electromagnetic waves
 - emitted by the sun, 180
 - types of, 1
- electronic excitation, 2–3
- electronvolt (eV), 1–2
- endonuclease, UV-, *see* repair endonuclease
- energy, absorbed, *see* dose, UV, absorbed
- energy fluence, *see* fluence, energy
- energy quantum, *see* photon
- energy transfer, 200
- error-prone repair, 120–1, 145, 150–1
- erythema
 - from psoralen and near-UV, 201
 - from solar UV, 180, 189, 190
- Escherichia coli* (*E. coli*)
 - A+T/G+C ratio, 36

- action spectrum for inactivation, 28–9
- division delay, 164–6
- excision repair, 97–100, 101, 104
- filament formation, 167–8
- growth delay, 168–70
- inactivation by far-UV, 49–50, 54
- inactivation by solar UV, 183–5
- inhibition of macromolecular syntheses, 160–2
- lethal sectoring, 74
- liquid-holding recovery, 77, 124–7
- loss of capacity, 178
- lysogeny, 172–4
- mutagenic effects, 144–51, 155, 157
- photoreactivation (enzymatic), 82, 85
 - 86, 88, 89, 90, 92
- recombination, 177–8
- recombination repair, 104–8
- repair-related phenomena, 128–34
- sensitized effects, 201–2
- ethyl-methanesulfonate (EMS), 101
- excision of photoproducts from double-stranded DNA, 97–100
- excision repair
 - general significance of, 101–2
 - in animal viruses, *see* host-cell reactivation
 - in *E. coli*, 97–100
 - in *Haemophilus* transforming DNA, 100–1
 - in human cells, 95–6, 197–8
 - in phages, *see* host-cell reactivation; *v*-gene reactivation
 - in vitro*, 101
 - inhibition by caffeine or acriflavine, 100
 - mechanism of, 97–101
 - modification of, *see* modification of the extent of cellular repair
 - mutants deficient in, 98–9
 - of damage by agents other than UV, 101
 - phage-controlled, 102–4
 - reaction steps involved, 97
- excision-resynthesis repair, *see* excision repair
- excitation, electronic, 2–3
- excited states of molecules
 - life times, 2, 3
 - singlet, 3, 200
 - triplet, 3, 200
- exonucleases, role in excision repair, 99
- F factor, 174, 178
- Fanconi's anemia, 197
- filament formation after UV, 73, 130, 167–8
- filters, optical
 - glass, 5
- interference, 5
 - liquid, 5, 182
- flash, light, 83–7
- fluence
 - energy, 12
 - photon, 12
- fluence decrement (in photorepair), 84
- fluence fractionation, 127–30
- fluence modification factor, 55, 81
- fluence protraction, 127–30
- fluence rate, 12–13
- fluence reduction factor, 55, 81
- fluorescence, 3
- fluorescent lamps, 11, 92
- formaldehyde, 113, 114
- frameshift mutation, 150
- functional cooperation, 113
- functional damage to DNA, 72–3, 135–6
- furocoumarins, 201
- Gasteria*, 159
- gene functions, UV-sensitivities of, 43, 104
- genetic recombination,
 - bacterial mutants defective in, 104–6
 - enhancement by UV, 174–7 (in phage), 177–8 (in bacteria)
 - in bacterial transformation, 59–61
 - in marker rescue, 114–18
 - in multiplicity reactivation, 111–13
 - in postreplication repair, 104–6
 - in recombination repair, 104–6
 - phage mutants defective in, 121–2
- germicide lamp, 6–7
- germicide UV radiation, 4
- germinating spores,
 - photoproducts in, 70–1
 - UV sensitivity, 70
- growth delay in bacteria, *see* cell growth, UV-induced delay
- guanine, 23, 24
- Haemophilus influenzae*, 9, 36, 58, 79, 100–1, 185
- heteroduplex repair, 102
- heterogeneity of populations, *see* population heterogeneity
- Hfr* chromosome, 157, 174, 177–8
- histidine, 25, 26
- hit, 40, 43
- host-cell reactivation (HCR)
 - absence in T-even phages and T5, 93, 94
 - discovery, 92
 - inhibition by acriflavine or caffeine, 94
 - mechanism, 94
 - of animal viruses, 95–6

212 *Index*

- human skin fibroblasts, 96
- hydrogen peroxide, 156–7
- 6-hydroxy-5-hydrocytosine, 38
- 6-hydroxy-5-hydouracil, 38
- 5-hydroxy-6-4' [5'methyl-pyrimidin-2'-one]-dihydrothymine, 36
- inactivation
 - cross section for, 42
 - definition, 40
 - kinetics, *see* survival kinetics
- incision (nicking) of DNA by repair endonuclease, 98–9
- indirect lysogenic induction, 174
- indirect photoreactivation, 79, 133
- indirect UV mutagenesis, 156–7
- inducible repair, 121, 151
- induction of prophage by UV, *see* lysogenic induction
- infective viral DNA, 62–4
- infective viral RNA, 64–5
- interference filters, 5
- interstrand crosslinks in DNA, *see* crosslink formation in DNA
- intrinsic UV sensitivity
 - definition, 43, 56
 - examples, 56–7, 92
- 5'-iodouracil, 200
- ionization, 2
- ionizing radiation
 - definition, 2
 - effects of, 75, 113, 114, 140, 157, 159, 168
- isomeric forms of pyrimidine dimers, 34
- killing of cells or viruses, *see* inactivation
- lag period, for cell division, 164–6
- Lambert-Beer's law, 15
- latent period (in phage), 163
- lethal mutation, 73
- lethal sectoring, 74–5
- lethality
 - expression of, 73
 - general causes of, 66–7
 - potential, 66
- ligase, *see* polynucleotide ligase
- light scattering, 17
- liquid-holding effects
 - inhibition by caffeine, acriflavine, KCN, 124
 - liquid-holding recovery, 124–7
 - negative, 124–7
 - see also* fluence fractionation; fluence protraction
- Luria-Latarjet effect in phage
 - lambda and T1, 137
 - Φ X174, 137–9
 - T-even, 134–7
- lysogenic bacterial strains, 170
- lysogenic induction
 - description, 170–4
 - effect on UV sensitivity of cells, 73, 172
 - excision repair of photoproducts causing, 173
 - indirect, 174
 - photorepair of photoproducts causing, 172
- lysogenization of cells by UV-irradiated phage, 171
- lysogeny
 - definition, 170
 - effects of UV on, 171, 172
- lysozyme, 136
- macromolecular syntheses, UV effects on, 160–3
- mammalian cells, 8, 95–6, 191–2, 197
- marker rescue, in phage
 - by agents other than UV, 114
 - description, 114
 - of pairs of markers or extended markers, 115–16
 - restricted, 117–18
 - studied by selective methods, 115, 118
 - studied by single-burst technique, 114
- marker rescue model
 - for explaining marker rescue in viruses, 116–17
 - for explaining survival of bacterial transforming DNA, 60–1
- marsupial mammals, 196
- mean lethal fluence ($F_{0.37}$), 42, 47
- melanoma, malignant
 - incidence in U.S., 192
 - regions of body affected, 192, 194
 - relation to geographic latitude, 192–3
- mercury vapor lamp
 - high pressure, 5
 - low pressure, 6–7
- metastable state, 3
- 8-methoxypsoralen, 201
- methyl-methanesulfonate (MMS), 101
- Micrococcus luteus*, 36, 100, 101
- Micrococcus radiodurans*, 50–1, 69, 79, 160, 185
- missense mutation, 150
- mitomycin C, 101, 168
- mitotic cycle, 127
- model systems, 8
- modification of survival kinetics, 55–6
- modification of the extent of cellular repair
 - by composition of plating medium, 130
 - by fluence fractionation or protraction, 127–30

- by growth phase of cells, 130, 131
- by incubation temperature, 130
- by liquid holding, 124–7
- by pH of plating medium, 130
- molar extinction coefficient, 15
- monochromator, 5
- monocomplexes of phage-infected cells, 109
- Morowitz correction, 17, 18
- multicomponent survival curves, 52
- multihit survival curves, 45–6, 49
- multiplicity of infection, average, 109
- multiplicity reactivation
 - absence in phages containing single-stranded DNA or RNA, 111, 113
 - after damage by agents other than UV, 113
 - description, 108–9
 - in animal viruses, 114
 - in phage lambda, 112–13
 - in T-even phages, 109
 - mechanism, 111–13
 - role in Luria-Latarjet effect, 136
- multitarget survival curves, 45, 48
- mutagenesis by ionizing radiations, 140, 157
- mutagenic UV effects
 - action spectrum, 28, 140–2
 - delayed, 140, 155–6
 - enhancement by caffeine, 146
 - excision repair of photoproducts causing, 146
 - in bacteria, 140, 144–51, 155, 157
 - in *Drosophila*, 140, 157
 - in higher plants, 140, 141
 - in phages, 119–21, 146, 152
 - in *Trichophyton* (fungus), 142
 - kinetics of, 152
 - lack of, in certain bacterial strains, 150
 - mechanism, 150–2
 - photoproducts causing, 144–5
 - photoreversal of, 143–5
- mutation fixation, 150
- mutation frequency
 - absolute, 143
 - effect of caffeine on, 146
 - relative, 142
- mutation frequency decline (MFD)
 - conditions for occurrence of, 146–7
 - inhibition of, 148, 149
 - mutants incapable of, 149
- neoplasms, *see* carcinogenic UV effects
- nitrogen mustard, 168
- 4-nitroquinoline-N-oxide (4-NQO), 102
- nitrous acid, 113, 114, 168
- nonionizing radiation, 2
- nonlethal UV effects, 66
 - see also* cell division, UV-induced delay;
- cell growth, UV-induced delay; genetic recombination, enhancement by UV; mutagenic UV effects
- nonphotoreactivable mutants, 92
- nonsense mutations, 150
- nucleic acid, *see* DNA; RNA
- nucleotide bases, *see* purines; pyrimidines
- nutrient broth, UV-irradiated, 156
- one-hit, one-target survival curves, 41–5
- one-step growth curve (phage), 163
- optical density, *see* absorbance
- ozone
 - lack of, in earth's history, 187
 - production by germicidal lamps, 6–7
 - production by solar radiation, 190
 - stratospheric, 180, 190
- pantoyl lactone, 130, 168
- patch-and-cut mechanism (in excision repair), 99–100
- peptide bond, UV absorption, 25
- peroxides, 156, 168
- pH
 - effect on bacterial UV survival, 130
 - effect on photoenzymatic repair *in vitro*, 90
- phage (bacteriophage), types of
 - Haemophilus* phage HP1, 53, 64, 94
 - lambda, 10, 57, 112–13, 118, 123, 137, 151, 174, 177, 178
 - RNA-containing, 43, 44, 57, 83, 113
 - Salmonella* phage P22, 92, 93
 - Serratia* phage sigma, 119
 - single-stranded DNA-containing, 31, 32, 43, 44, 57, 63–4, 81, 111, 113, 137–9, 168, 178
 - Staphylococcus* phage, 28
 - T1, T3, and T7, 53, 57, 64, 93, 94, 108, 124, 137, 163–5, 178, 186
 - T2, 48–9, 82–3, 92, 102–4, 109
 - T4, 10, 30, 48–9, 82, 102–4, 109–10, 111, 113, 115–18, 121–2, 162, 178, 186, 199
 - T5, 56–7, 93, 118
- phage-controlled repair
 - by gene *red*, 123
 - by gene *v*, 102–4
 - by genes *x* and *y*, 121–2
- phenylalanine, 25, 26
- phosphorescence, 3
- photodynamic damage, 76, 102
- photoenzymatic repair
 - mechanism, 79–81
 - mutants incapable of, 92, 132, 144
 - organisms lacking, 79
 - reaction steps, detailed, 85–8
 - see also* photoreactivation; photoreactivating enzyme

214 *Index*

- photolyase, *see* photoreactivating enzyme
- photolysis (in photoenzymatic repair), 83, 87
- photon, 1
- photon energy, 1–2
- photoproducts in UV-irradiated DNA
 - biological relevance, 66
 - DNA-protein cross-links, 32, 33, 37
 - interstrand cross-links, 38–9
 - purine derivatives, 31
 - pyrimidine adducts, 32, 33, 36–7
 - pyrimidine dimers, 32, 33, 34–6
 - pyrimidine hydrates, 32, 33, 38
 - spore photoproducts, 32, 33, 37
 - strand breaks, 38
- photoprotection
 - action spectrum, 132
 - definition, 132
 - relation to indirect photoreactivation, 133–4
- photoreactivable sector
 - affected by other repair processes, 82
 - definition, 81
 - examples, 82
- photoreactivating enzyme (PRE)
 - dark dissociation of enzyme-substrate complexes, 87
 - formation of enzyme-substrate complexes, 80, 85–6
 - in placental mammals, 196–7
 - molecular weight, 90
 - mutants lacking, 92, 132, 144
 - mutants with increased amounts of, 85, 86
 - number of molecules in *E. coli*, 85
 - organisms lacking, 79
 - physicochemical characteristics, 88–90
 - reaction rate constants, 85–8
 - repairing RNA photoproducts (in higher plants), 65, 83, 92
- photoreactivating light, 79
- photoreactivation
 - action spectra for various organisms, 90–1
 - definition, 79
 - flash, 83–7
 - indirect, 79, 133
 - inhibition by caffeine, 92
 - see also* photoenzymatic repair; photoreactivating enzyme
- photoreversal of mutagenic UV effects, 143–5
- photosensitization of DNA by exogenous molecules, 200–1
- photosteady state of pyrimidine dimers/monomers, 35, 68
- photovoltaic meter, 13
- Planck's constant, 1
- pneumococcus, *see* *Diplococcus pneumoniae*
- Poecilia formosa* (fish), 195–6
- point mutation, UV induction of, 150
- Poisson distribution
 - in phage adsorption, 109
 - in target theory, 42, 45–8, 152
- polio virus, 65, 114
- polynucleotide ligase, 100
- population heterogeneity
 - effects on survival kinetics, 51–5, 56
 - possible effects on mutation frequency kinetics, 153–5
- postreplication repair, *see* recombination repair
- potassium cyanide, 124
- potassium ferrioxalate, 13
- premutational state, evidence for, 143–50
- prophage, 170–1
- prophage induction, *see* lysogenic induction
- proteins
 - absorption spectrum, 23, 25
 - crosslinking with DNA, 32, 33, 37
- protein synthesis, inhibition by UV, 160, 161–3
- pseudo-one-hit curve, 45, 56
- psoralen, 201
- purines
 - absorption spectra, 23, 24
 - quantum yield for photoproduct formation, 32
- pyrimidine adducts, 36, 37
- pyrimidine dimers in DNA
 - absorption, 34, 35
 - carcinogenic effects, 195–7
 - lethality, 67–9
 - monomerization by photoenzymatic repair, 68, 78, 80, 81, 83, 85
 - monomerization by 240-nm UV radiation, 34–5, 68, 79
 - reduced formation in the presence of acridine dyes, 69, 201–2
 - stereoisomeric forms of, 34
- pyrimidine dimers in RNA, 65, 92
- pyrimidine hydrates, 38
- pyrimidines
 - absorption spectra, 23, 24
 - types of photoproducts formed in DNA, 32
- 6-4'[pyrimidin-2'-one] thymine, 36
- quantum energy, *see* photon energy
- quantum yield
 - definition, 203

- for inactivation of cells and viruses, 43, 57, 66
- for nonenzymatic monomerization of pyrimidine dimers, 35
- for photoenzymatic monomerization of pyrimidine dimers, 87
- for pyrimidine photoproduct formation, 32
- for purine photoproduct formation, 32
- quartz, 5, 6, 181, 182
- radiation energy
 - absorbed, 13–20
 - incident, 12–13
- reactivation
 - definition, 77
 - detection, 77–8
 - see also* host-cell reactivation; liquid-holding effects; modification of the extent of cellular repair; multiplicity reactivation; photoreactivation; *v*-gene reactivation; *x*, *y*-gene reactivation
- recombination, *see* genetic recombination
- recombination repair
 - complementation with excision repair, 106–8
 - mechanism, 105–6
 - mutants defective in, 104–6
 - of phage, 121–3
- recovery, *see* reactivation
- rejoining of polynucleotide chains in
 - excision repair, 98–100
- repair endonuclease (UV endonuclease; correndonuclease), 97, 100
- repair inhibition
 - by acriflavine, 94, 100, 124, 148–9
 - by caffeine, 92, 94, 100, 124
 - by potassium cyanide, 124
 - in 5'-bromouracil substituted DNA, 199
- repair of DNA damage
 - dark, 77
 - definition, 77
 - excision-resynthesis (bacterial), 97–102
 - general considerations, 41, 76–8, 188–9
 - phage-controlled, 102–4, 121–3
 - photoenzymatic, 79–92
 - postreplication, 104–8
 - recombination, 104–8
 - types of mechanisms for, 78–9
- repair replication (in excision repair), 97
- repair synthesis, *see* repair replication
- replicational damage, 72, 73
- restoration, *see* reactivation
- rise period (in phage multiplication), 163
- RNA
 - absorption, 23
 - as genetic material in viruses, 23, 64–5, 92
 - double-stranded, 65
 - infective viral, 64–5, 92
 - messenger, 23, 162–3
 - photoproducts in, 65, 92, 134, 169
 - ribosomal, 23
 - tobacco mosaic virus, 64–5, 92
 - transfer, 23, 134, 169
- RNA synthesis
 - after far-UV irradiation, 160, 161–3
 - after near-UV irradiation, 169
- Saccharomyces cerevisiae*, 79, 80, 90, 124
- sailor's skin, *see* elastosis of the skin
- Salmonella typhimurium*, 146
- scattering of photons, *see* light scattering
- Schizosaccharomyces pombe*, 79, 124, 125
- semilog paper (for presenting survival data), 42
- sensitized UV effects on DNA, 199–202
- shouldered curves, general description, 45, 47–8
 - see also* multihit survival curves; multitarget survival curves
- sieve effect, 18
- single-strand breaks in UV-irradiated DNA, 38, 199–200
- skin cancer, *see* carcinogenic UV effects
- snakes, *see* filament formation
- solar UV radiation
 - as an adverse environmental factor, 7, 11, 180–1
 - as photoreactivating light, 183, 185
 - carcinogenic effects of, 190, 191–3
 - dark repair of damage by, 187
 - inactivation of bacteria, phage, and transforming DNA, 182–6
 - noncarcinogenic effects on human skin, 4, 189–90
 - photorepair of damage by, 183, 185
 - quantitative assessment of biological effectiveness, 4, 181, 185
 - spectral composition, 4, 180
 - SOS repair, *see* inducible repair
 - Sphaerocarpus donellii*, 28, 141
 - spheroplasts, infection by virus nucleic acids, 63
 - spontaneous mutation frequency, correction for, 152
 - spore photoproduct, 32, 33, 37, 70, 101
 - spore repair (non-excision type), 37, 71
 - squamous cell carcinoma, 192
 - Staphylococcus aureus*, 28
 - stereoisomers of pyrimidine dimers, 34
 - Streptomyces griseus*, 36, 92

216 *Index*

- streptomycin resistance
 - mutations to, 145–6
 - transformation of cells for, 59
- sunburn, *see* erythema
- sunlight, *see* solar UV radiation
- survival kinetics of biological objects
 - animal viruses, 95–7, 118
 - bacteria, 50–1, 54, 182–5
 - phages, 43, 48–9, 53–4, 110, 186
 - single gene functions, 43, 104, 162–3
 - spores (bacterial), 70–1
 - transforming DNA, 58–62, 68, 185–6
 - virus nucleic acids, 62–5
- survival kinetics, types of
 - inverse square, 58–9, 117
 - inverse 4th order, 59
 - multicomponent, 52–3
 - multihit, 45–6
 - multitarget, 45
 - one-hit, one-target, 41–5
 - shouldered, 45–51
 - two-component, 51–2, 53–4
- target, 40
- target theory, basic considerations, 40–1
- terminal chromatid deletions, 158–9
- thermopile, 13
- 4-thiouracil, 134, 169
- threshold fluence, 47
- thymine, 23, 24
- thymine-cytosine dimer, *see* pyrimidine dimers in DNA
- thymine-thymine dimer, *see* pyrimidine dimers in DNA
- 5-thymine-5,6-dihydrothymine, 33, 37, 70
 - see also* spore photoproduct
- tobacco mosaic virus (TMV), 64–5, 92
- Tradescantia*, 140, 141, 147–9
- transcription, UV effects on, 162–3
- transfection, 63
- transformation, bacterial
 - competence of cells for, 58, 63
 - demonstration of, 28, 58
- transforming DNA, bacterial
 - excision repair of UV-inactivated, 100–1
 - fate in recipient cell, 59–60
 - inactivation by UV, 58–62, 185–6
 - photorepair of UV-inactivated, 81, 185
 - uptake by competent cells, 59
- translation, UV effects on, 162–3
- tryptophan, 25, 26
- tryptophan photoproduct, 157
- two-component survival curves, 51–2, 53–4
- tyrosine, 25, 26
- ultraviolet light, *see* ultraviolet radiation (UV)
- ultraviolet radiation (UV)
 - absorption by water and air, 1
 - as experimental tool, 10
 - as natural environmental factor, 7, 10, 11, 180–1
 - energy range of, 2
 - far UV, 4
 - germicidal, 4
 - intermittent, 127–8
 - monochromatic, 5
 - near UV, 4
 - polychromatic, 19
 - quantity of, 11–12; *see also* dose, UV, absorbed; dosimetry; fluence
 - quasi-monochromatic, 6
 - sources of, 5–7
 - spectral range of, 1
 - UV-A, UV-B, UV-C, 4
 - vacuum, 1
- uracil, 23, 24
- uracil as photoproduct in 5'-bromouracil substituted DNA, 199
- UV endonuclease, *see* repair endonuclease
- UV reactivation, *see* Weigle recovery
- UV restoration, *see* Weigle recovery
- velocity of light, 1
- v*-gene reactivation
 - description, 102
 - gene products involved, 104
 - of genomes other than T4, 104
- visible light, 1
- Vycor, 6
- Weigle recovery (or UV reactivation)
 - description, 118–19
 - hypothesis of inducible repair, 121
 - in animal viruses, 118
 - mutation induction in conjunction with, 119–20, 151
- xeroderma pigmentosum (XP), 96, 189, 197
- XP variant, 197
- X-rays, *see* ionizing radiations
- x*, *y*-gene reactivation, 104, 121
 - see also* phage-controlled repair
- Zea mays*, 140, 141, 157–8, 159