

Index

A

AB₅ holotoxins, 2
AB₅ protein toxins, 35, 37
A1 domain, 2
Analyte peptide, 92, 93
Animal bioassay, 81
Antibodies (Abs), 34
Antimicrobials, 55
Array-based methods, 84
A subunit, 2, 22, 23, 25, 35, 68
Attaching and effacing (AE), 65
Attachment (*att*) site, 48, 53, 55

B

Baboons, 70
Binding immunoglobulin protein (BiP), 37
Bordetella pertussis, 35
Botulinum toxins, 8
B subunits, 25, 67
Burkitt lymphoma cells, 3

C

Campylobacter, 7
Cancer cells, 3, 101
CD77, 28
Cell-free translation (CFT), 83
Cell membrane milieu, 30
Cell phone technology, 90
Cellular models, 67
Central nervous system (CNS), 66
Charge-coupled device (CCD), 83
Cholera toxin (Ctx), 35–37
cI proteins, 48

Clustered, regularly-interspaced, short
palindromic repeats (CRISPR), 50,
54, 56
Converting phages, 51
CRISPR-associated genes (CAS), 50, 56
Cultural methods, 77–81
Cytosol, 34
Cytotoxic dose (CD₅₀), 82

D

Daisy ligand, 104, 106
4',6-Diamidino-2-phenylindole
dihydrochloride (DAPI), 89
Diarrhea, 7, 21, 64, 65
Domestic cattle, 3, 9, 12, 13, 55, 65, 102, 103

E

Endoplasmic reticulum (ER), 2
Endosomes, 31, 34
Engineered cell lines, 83
Enteroaggregative *E. coli* (EAEC), 66
Enterobacter cloacae, 88, 108
Enterobacteriaceae, 78, 79
Enterotoxin, 35
Enzyme-linked immunosorbent assay
(ELISA), 81, 83–88, 91
Eosin Methylene Blue (EMB) agar, 78
ER-routing protein toxins (ERTs), 23
Escherichia coli, 2, 3, 8, 10, 12, 21, 23, 24, 27,
35, 37, 48–51, 53–56, 64, 65, 69,
71, 77, 82, 86, 90, 102, 107
and associated pathologies, 6
cultural methods, 78

- Escherichia coli* (*cont.*)
 distinguishing media, 78
 mobile genetic elements, 50–51
 nonpathogenic, 56
 O157:H7, 8, 10, 12, 23, 24, 56,
 102–104, 107
 transposons and integrons, 50–51
 β -glucuronidase, 78
- F**
 Ferric uptake regulator (*fur*), 51
 Five B subunits, 2, 22, 23, 26, 28, 29, 34, 35
 Foodborne Disease Outbreak Surveillance
 System (FDOSS), 10
 Foodborne illness, 1, 7–11, 55, 64, 65, 88
 Foodborne Outbreak Online Database
 (FOOD Tool), 7, 10, 11
- G**
 Gangliosides, 66–67
 cell membrane milieu, 30
 Gb3, 28–30
 Gb4, 28, 29
 holotoxins, 28, 30
 Gastroenterological, 67
 Genetic sequence, 108
 Genetic toxoids, 86
 Globotetraosylceramide (Gb4) gangliosides,
 28, 29, 34, 66, 83, 101, 104, 108
 Globotriaosylceramide (Gb3) gangliosides,
 28–30, 34, 66, 68, 83, 101,
 104, 108
 β -glucuronidase, 78
 Golgi complex, 31
 Good Agricultural Practices (GAP), 109
 Good Handling Practices (GHP), 109
 Gram-positive bacteria, 78
 Guanidinium chloride (GuCl), 94
 Gut bacteria, 56
- H**
 Hazard Analysis and Critical Control Points
 (HACCP) principles, 107
 HeLa cell, 82, 88
 Helix-turn-helix (HTH), 48
 Hemolytic uremic syndrome (HUS), 66–70,
 81, 85, 104, 105
 Hemorrhagic colitis (HC), 67
 Holotoxin, 2, 26–28, 30, 32, 35, 92, 108
 Host cell, 2, 3, 47–49, 57, 66–67, 70
 Human kidney cells, 31, 69
 Human serum amyloid protein P (HuSAP), 33,
 34, 94
 Hybrid toxins, 26, 28
- I**
 IgG molecule, 84, 88
 IgY antibodies, 86
 Immunoaffinity chromatography, 88
 Immunoassay systems, 84
 Insertion sequence (IS), 50
 Integrons genes, 51, 55
 Internal standard (IS_t), 92
 Intimin, 65
- K**
 Kidney cells, 102, 108
 Kidney damage, 67
- L**
Lactobacillus casei, 104
 Lambdoid phages, 2, 47–50, 52–54
 Lateral flow assays (LFAs), 90
 Lateral flow device (LFD), 81, 90
 Latex agglutination assay, 87
 LexA, 50
 Lipopolysaccharides, 2
 Loop-mediated isothermal amplification
 (LAMP), 80
 Lysosome, 31, 34
 Lytic replication, 48
- M**
 MacConkey (MAC), 78
 Magnesium pyrophosphate, 80
 Mass spectrometry, 91–94
 Median lethal dose (LD₅₀), 8, 34, 69, 70, 81, 82
 Messenger RNA (mRNA), 70
 Metronidazole antibiotic, 69
 Microbead-based immunoassay, 90, 91
 Microbiological survey, 13, 55
 Minimum lethal dose (MLD), 81
 Mobile genetic elements, 3
E. coli, 50–51
 effect on pathogenicity, 55–57
 Mobile health (mHealth) technology, 90
 Monoclonal antibody (mAb), 81, 83, 86–89
 Stx
 detection, inactivation, and protection,
 86–87
 for differentiating subtypes, 87–88

Morbidity and Mortality Weekly Report (MMWR), 9
 Mosaic phages, 54–55
 Mouse models, 56, 81
 Multiple Reaction Monitoring method (MRM), 92, 94

N

National Outbreak Reporting System (NORS), 10
 N-glycolylneuraminic acid, 37
 N-glycosidase, 2, 3, 25, 32
 Nucleic acid amplification techniques, 80
 Nucleic acid detection methods, 80

O

O104:H4, 66, 68
 O157:H7, 2, 7, 8, 10, 12, 13, 23, 24, 26, 56, 65, 66, 69, 70, 78, 79, 86, 103, 104, 107
 O26 serogroup, 9
 O157 serogroup, 54

P

P38a protein, 31
 P^k blood group antigen, 28
 Person-to-person contact, 12, 64
 Pertussis toxin, 37
 Phage λ , 47–50, 53
 PKC δ proteins, 31
 Planar array system, 90
 Polyclonal antibodies (pAbs), 83–86
 Polyketide azithromycin, 104
 Polymerase Chain Reaction (PCR) technology, 56, 57, 70–72, 79, 80, 89
 Polymyxin antibiotic, 69
 Portable assays, 89
 P_R promoter, 54
 Premier EHEC, 87
 ProspecT STEC assay, 87

Q

Quantitative PCR (qPCR), 80, 84, 86, 87
 Quick service restaurant (QSR), 1

R

Rainbow[®] Agar O157, 79
 RecA*, 50
 Receptor binding assays, 83
 Recombination protein (RecA), 54

Research Collaboratory for Structural Bioinformatics (RCSB), 23, 24, 26–28, 33, 36, 38
 Ribosomes, 32

S

Salmonella, 7
 Shiga toxin-producing *Escherichia coli* (STEC), 3, 51, 53–57, 64–66, 69, 71, 78, 79, 81, 83, 84, 104, 105, 107–109
 causes severe disease, 8
 clinical manifestations, 7
 common sources of, 12–13
 development of serious sequelae, 67–68
 economic cost, 5–7
 evolution, 8–12
 humans, 5, 7
 microbiological survey, 13
 symptoms, 7
 waterborne, 10
 Shiga toxins (Stx), 5, 54–57, 77
 AB₅ protein toxins, 35–37
 antibiotic treatment, 68–69
 beneficial uses, 101–102
 binding sites, 66–67
 bioassay, 81–83
 cells and intracellular trafficking, 30–32
 gangliosides, 28–30
 general considerations and ELISAs, 83–86
 intestinal damage, 67
 phage control, 51–55
 prevent or treat, 102–107
 production, activity, and gene structure, 24–28
 STEC (*see* Shiga toxin-producing *Escherichia coli* (STEC))
 structure, 21–25
 Stx1, 57, 68, 108
 Stx2, 57, 68, 86, 108
 threat to human health, 63–65
 threat to worldwide health, 3
 types and subtypes, 33–34, 69–70
 type 1 (Stx1), 23–27, 29, 30
 type 2 (Stx2), 23–27, 29, 30, 34
Shigella, 64, 65, 82
 S. boydii, 64
 S. dysenteriae, 23, 24, 64, 88, 103
 type 1, 8, 21, 27, 37, 56, 57, 63, 64, 67, 68, 70, 72
 type 4, 64
 S. flexneri, 25, 64
 S. sonnei, 10, 25, 64
 Shigellosis, 64
 Sorbitol-MacConkey agar (SMAC), 78

SOS response, 48, 69, 103, 108
Starfish ligand, 104–106
Subtilase cytotoxin (SubAB), 35

T

Target cell, 2, 23, 26–28, 30, 31, 33–35, 66,
92, 102, 104, 105
Three-dimensional (3D) ribbon structure, 22
Translational medicine, 108
Transposable elements, 50
Transposon genes, 3, 51, 54, 55, 72
Trypsin, 27
Tryptone bile X-glucuronide (TBX), 78

U

US Department of Agriculture’s Food Safety
and Inspection Service
(USDA-FSIS), 79
US Food Safety Modernization Act (FSMA), 109

V

Vero cells, 33, 69, 82, 83, 89, 90, 93
Verocytotoxin-producing *E. coli* (VTEC).
 See Shiga toxin-producing *E. coli*
 (STEC)
Verocytotoxins (VCT), 21
Verotoxins (VT), 21

W

Waterborne, 64
Waterborne Disease & Outbreak Surveillance
& Reporting (WDOSR), 10
Whole genome sequencing (WGS)
 technique, 80
World Health Organization
 (WHO), 109

X

Xenoproteomic, 102