Index

A
Aberrant Crypt Foci type (ACF), 135
Acidic extraction, 193
Actinomycetes, 184
Active hexose correlated compound (AHCC), 257, 264, 265
Adenosine receptors (ARs), 336
Aerated compost teas (ACT), 310
Affinity chromatography, 198
Agaricus, 20, 159
  A. blazei, 196
  A. macrosporus, 95
Agaricus bisporus, 85, 117, 118, 121, 124, 131, 150, 162, 191, 236, 275, 278, 280, 281, 284, 293, 305–308, 310, 311, 314
  agar disc diffusion, 88, 89
  AgNPs, 89
  ethanolic extract, 97
  methanolic extracts, 85
  polysaccharides, 88
Agaricus bisporus polysaccharides (ABP), 195
Agaritine, 150
Agrochemicals
  agricultural pollutants, 183
  agro chemicals
    bioremediation, 186
    enzymatic mineralization, 184
    metal bio-sorption, 185
    metal leaching, 185
    metal transformation, 185
    precipitation, 186
  azo reductases, 181
  biodegradation, 183
  biosorption, 180
  edible mushrooms, 178
  industrial dyes, 182
  laccase, 181
  peroxidises, 182
  pesticides, 182
  textile and industrial dyes, 178–179
  white-rot fungi, 177
  xenobiotics, 182
Agrocybe aegerita, 138, 169
Agrocybe cylindracea (ACE), 119, 144
Agro-wastes, 277, 282, 284
Alanine aminotransferase (ALT), 104, 327
Albatrellus prescaprae, 151
Alcohol, 83
Alcohol induced liver disease (ALD), 102
Alkaline extraction, 193
Amanita, 20, 21
  A. caesarea, 159
  A. muscaria, 16, 33
Amino acids, 33
AMP-activated protein kinase (AMPK), 326
Amphotericin B, 232
Amplified fragment length polymorphism (AFLP), 3
Anionic dye, 180
Antiangiogenic, 263
Antibiofilm, 93, 95
Antibiotics, 83, 129, 288, 355
Anticancer, 247, 251–262, 277, 320
Anti-cancer properties
  AHCC, 265
  and immunomodulatory compounds, 250
  cytotoxicity, 264
  diagnostic and therapy, 250
  GLU, 263
  Hispolon, 263
  immunostimulatory properties, 264
  ROS, 250

B. P. Singh et al. (eds.), *Biology of Macrofungi*, Fungal Biology,
https://doi.org/10.1007/978-3-030-02622-6

Anticancer therapeutics, 245
cancer types, 248
macrofungi, 244
mushrooms (*see* Mushrooms)
paediatric cancer, 245
Anti-cancerous, 387
Anticarcinogenic, 388
Anti-complementary, 234
Antidepressant activity, 143
Antidiabetic, 320
Antigenotoxic effects, 120
Anti-HIV, 387
Anti-inflammatory, 22, 140, 214, 320, 330, 388
Antimetastatic, 263
Antimicrobial, 2, 211, 355, 387
Agaricus brasiliensis, 93
Coprinus comatus, 93
extensively cultivated
Agaricus bisporus, 85
Lentinula edodes, 90
Pleurotus ostreatus, 91
Laetiporus sulphureus, 94
Meripilus giganteus, 94
Morchella esculenta, 94, 95
Polyporus squamosus, 95
Antimycotic drug, 232
Antioxidant, 2, 140, 234, 277, 320, 387, 388
Antioxidative genes, 123
Anti-proliferation, 297
Anti-quorum sensing (AQ), 89
Antitumor, 2, 22, 34, 211, 220, 326, 387
Antiviral, 211, 387, 388
Antrodia camphorata, 139, 150, 216
Aqueous extraction, 193
Armillaria blazei, 135, 136
Armillaria melenea, 137
Armillaria mellea, 139, 150
Aromatic metabolites, 36, 37
Ascomycetes, 1, 159
Ascomycota, 15
Ash, 36
Aspartate aminotransferase (AST), 104, 327
Aspergillus sp., 184
Aspergillus terreus, 129
Assembling the Fungal Tree of Life (AFTOL), 76
Atherosclerosis, 98, 333
Auricularia, 21, 159, 168
A. auricula, 275, 278, 284
A. auricula-judae, 168
A. polytricha, 168
2,2′-Azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS), 97, 116, 356
Azo dyes, 178

B
Bacillales, 166
Bacterial blotch, 311
Bacterial diseases, 310
Basidiomycetes, 1, 159, 235
Basidiomycota, 15
4′-Benzoyloxy precursor, 338
Beta-glucans, 298
Bifidobacterium, 214
Bio-accumulation, 351
Bioactive compounds, 2, 305, 310, 314
Bioactive substances, 211
Bioactivities, 211, 216, 222
Biochemical analysis, 75
Biodegradation, 183
Biodiversity, 2, 74
Bioelements, 150
Biofilm forming, 355
Biofilms, 186, 313
Biological control
antagonism, 305
bacterial diseases
antagonistic properties, 312
microbiota, 311
phytochemical control, 312
symptoms, 307
WLIP, 311
Berliner (Bti), 313
biocontrol agents, 308, 309, 311, 313
biotic disorders
Agaricus bisporus, 305
blotch symptoms, 311
causative agents, 306
fungal diseases, 306, 308
control of sciarids, 313
conventional pesticides, 313
insecticide treatment, 312
microbial diseases, 313
microbial pathogens, 305, 307
mycoparasites
biocontrol agents, 309
bubble and cobweb, 310
EOs, 310
source of infection, 308
nematodes, 312
phytosanitary products, 312
Biological mechanism, 221
Biological Oxygen Demand (BOD), 178
Biological response modifiers (BRM), 216
Biomass, 293
Bio-mineralization, 351
Bioreactors, 293
Bioremediation, 278, 372
Bioremediators, 277, 278

Bioresources, 57
Biosorption, 180, 278
Biosynthesis, 130, 230
Biotic disorders, 305
Biotransformation, 235
Blewit mushroom, 24
B lymphocytes, 132
Bolete, 244
Boletus, 21, 22
Bostrycoidin, 91
Bubbles, 307

C
Cadmium sulfide (CdS), 357
Caesar's mushroom, 17
Caffeic acid, 141
Calocybe indica, 172, 173
Cancer therapy, 249, 334
Cancer-transformed skin cells (CH72), 134
Cancer treatment, 245
Candida albicans, 92
Candidate biocontrol agents (CBAs), 309
Cantharellus, 22
Cantharellus cibarius, 141, 142
Capillary electrophoresis (CE), 339
Capillary electrophoresis mass spectrometry (CE–MS), 341
Capillary zone electrophoresis (CZE), 337, 339
Carbohydrate polymers, 34
Carbohydrates, 34, 35, 131
Carbon tetrachloride (CCl_4), 100
Carotenoids, 29
Caspases-3, 329
Caspases-9, 329
Catalase (CAT), 115, 122, 327
Cauliflower mushroom, 27
Cell cycle, 148
Cell proliferation, 263
Chemical Oxygen Demand (COD), 178
Chemopreventive agents, 234
Chemoprotectants, 237
Chemotherapeutic drugs, 264
Chitin, 35, 137–140
Chitosans, 137
Chorioallantoic membrane (CAM), 330
Claviceps, 129, 229
Clitocybe, 22
Clitocybe maxima, 145
Clitocybe nebularis, 263
Clitocybe nebularis lectin (CNL), 253, 263
Closed dialysis and ultrafiltration, 204
Coducepin
  hinderance, 323
  mTOR, 323–325
  RNA, 323
  transcription, 323
Column chromatographic extraction (CCE) technique, 340
Column fractionation, 204
Competitors, 306
Complement Receptors (CR), 263
Complementary medical (CAM) approaches, 102
Compost teas (CT), 310
Coprinopsis cinerea, 235
Coprinus comatus, 93, 140
Cordycepin
  anticancer activity, 327–330
  anti-inflammatory activity, 330–331
  antioxidant activity, 326–327
  biosynthesis pathway, 322
  characterization, 339
  chemical structure, molecular and physical properties, 321–322
  cultivation conditions, 336–337
  hypoglycemic (anti-diabetic) activity, 331
  pharmacokinetic, 325–326
  synthesis and delivery, 337–339
Cordycepin-triphosphate (CoTP), 325
Cordyceps, 22, 320
  C. kyushuensis, 340
  C. militaris, 196, 322, 328, 330, 331, 334, 337, 338
  C. sinensis, 18, 195, 327, 328, 335, 336, 339
Cortinarius, 23
Cosmeceuticals, 29
Cultivation, 16
Cultivation technologies, 381
Cup fungi, 244
Cyclin-subordinate kinase (CDK), 335
Cyclooxygenase-2(COX2), 248
Cytochrome oxidase I (COX I), 76
Cytochrome P450 (CYP), 237, 371
Cytokines, 234
Cytostatic activity, 149
Cytotoxic T lymphocytes (CTL), 132
Cytotoxicity, 118, 356

D
Dampa Tiger Reserve, 4–6, 9, 11
Death cap, 21
De novo biosynthesis of purines, 323
Desert truffles, 27
Desulfo vibrio, 186
Detoxification, 351

Dexidative damage to DNA
H_2O_2 prevention
ethanolic extract, 119
Dielectric heating technique, 355
Dimethyl sulfoxide (DMSO), 198
Dimethylhydrazine, 136
1,1-Diphenyl-2-picrylhydrazyl (DPPH), 326
2,2-Diphenyl-1-picrylhydrazyl (DPPH), 97, 116
Disk-diffusion, 90
Dissolved oxygen (DO), 178
DNA barcode, 74
DNA fragmentation, 119, 329
DNA repair, 235

E
Ectomycorrhizal, 43
Edible mushrooms
antimicrobial activity (*see* Antimicrobial)
bioactive compounds, 82
description, 81
hepatoprotective activity
(*see* Hepatoprotective activity)
natural products, 82
therapeutic compounds, 82
Elaphomyces granulatus, 142
Electroencephalogram (EEG), 336
Elicitors of immune system, 384
Engineered nanoparticles (ENPs)
AgNPs, 354
AuNPs, 355
CdS, 357
Fe-NPs, 357
mushroom derived AgNPs, 355
mushroom derived AuNPs, 356
mushroom derived Se-NPs, 356
Se-NPs, 356
Entheogenics, 16
Entomopathogenic, 305
Environmental stress, 235
Enzymatic mineralization, 184–185
Enzymes, 144–145
Epigenetic, 74
Ergosterol, 146, 228–229
applications
antimycotic drug development, 232–233
health benefits, 234
plant immunity, 233
vitamin D, 232
biosynthesis, 229–230
conventional and advanced techniques, 231
molecular structure, 229
spore separation method, 228
Ergosterol peroxide (EP), 234
Ergothioneine, 140
ERIC-PCR, 215
Essential oils (EOs), 309, 310
Ethanol (EtOH), 328
Ethnic communities, 57
Ethnic tribes, 18
Ethnomycology, 389
cultivated mushrooms, 381
dietary and therapeutic uses, 380
edible mushrooms, 18
ethnobotanical studies, 380
fragments, 18
hallucinogenic mushrooms, 16
long net stinkhorns/bamboo fungus, 18
mushrooms, 380
mycology, 380
mycophagy, 381
mycophilic, 17
mycophobic, 19
nutritional values, 19
poisonous mushrooms, 18
truffles, 17
WEF, 16
wild edible mushrooms, 381
Ethyl acetic acid derivation (EtOAc), 328
Eukaryota, 2
Eumycotic fungi, 229
European Nucleotide Sequence Archive of European Molecular Biology Laboratory (EMBL), 76
Ewingella americana, 307
Exopolysaccharides, 298
extraction
acidic, 193, 194
alkaline, 193
aqueous, 193
MAE, 196
PLE, 194
SFE, 197
UAE, 195, 196
purification
column fractionation, 204
dialysis and ultrafiltration, 204
Fehling solution treatment, 198
freeze–thawing, 198
solvent treatment, 198
Extracellular enzymes, 352
Extracellular matrix metalloproteinaseinducer (EMMPRIN), 333

F
Fats/lipids, 33, 34
Fatty acids, 141

Fehling solution, 198, 204
Fermentation technology, 295
Ferric reducing antioxidant power (FRAP), 97, 116
Fiber, 34
Filamentous fungi, 363
Flammulina, 23, 159
Flammulina velutipes, 136, 168, 278, 283, 284, 293
Flavin adenine dinucleotide (FAD), 354
Flavin mononucleotide (FMN), 354
Flavonoids, 29
Fluorescent microscopy, 116
4-Aminophenol (4-AP), 355
4-Nitrophenol (4-NP), 355
Freeze–thawing, 198
Fruiting bodies, 306, 384, 386, 387
FT-IR, 236, 337, 354
Fungal biomass, 180
Fungal diseases, 306, 308, 309
Fungal immunomodulatory protein (FIP), 263
Fungal phenol oxidases, 354
Fungal taxonomy, 78
Fungicides, 305
Fusarium fujikuroi, 129

G
G-aminobutyric acid (GABA), 104
Ganoderma, 227, 264
Ganoderma lobatum, 245
Ganoderma lucidum, 117–119, 123, 125, 170, 171, 197, 247, 248, 263
  aphyllophorales, 227
  ergosterol, 228
  polysaccharides, 227
  triterpenes, 227
Ganoderma spore lipid (GSL), 231
Gano-protein province
  hydrophobins, 236
  physiological and developmental role, 235–236
  therapeutic/ pharmaceutic proteins, 234–235
Gel filtration, 198
Genetic structure, 32
Genoprotection, 118, 121, 122
Genoprotective effect
  Agaricus bisporus, 121
  anendogenous catalase-like activity, 118
  LCC, 121
  L-DOPA-tyrosinase system, 122
  mushroom extracts, 118
  vs. tyrosine hydroxylating activity, 121
Germination, 307
Glutathione (GSH), 327
Glutathione peroxidase (GPx), 101, 115, 151, 327
Glutathione reductase (GR), 327
Glutathione-S-transferase (GST), 327
Glycerol, 82
Glycoproteins, 138
Gold nanoparticles (AuNPs), 355
Golden needle mushroom, 23
Gram-negative bacteria, 85
Gram-positive bacteria, 85
Granulocytes, 132
Grifola frondosa, 136, 139, 172
Gut microbiota, 214–216

H
Hallucinogenic mushrooms, 37–39
Hazard analysis and critical control points (HACCP), 298, 299
Health potentiators, 384
Hep 3b, 326
Hepatitis B (HBV), 103
Hepatitis B surface antigen (HBsAg), 103
Hepatitis C (HCV), 103
Hepatocytes, 82
Hepatoprotective activity, 83, 93
  antioxidant properties, 96, 97
  cholesterol and triglycerides
    beneficial effects, 98
    LF, 99
    mevinolin, 98
    oxidative damage, 98
  clinical utility, 103, 104
  hepatitis treatment methods
    Agaricus brasiliensis, 103
    CAM, 102
    HBV and HCV, 103
    therapeutic agents, 102
  induced liver injury, 99–102
  shiitake mushrooms, 98–99
Hepatotoxicity, 84, 85, 99, 101, 102
HepG2 cells, 148
Hepialus armoricanus, 320
Herceptin (trastuzumab), 243
Hericium erinaceus, 136, 172, 289
Heteropolysaccharides, 132
High-density lipoprotein (HDL), 98
High-performance liquid chromatography (HPLC), 120, 231, 334, 339
High-speed counter-current chromatography (HSCCC), 341
Histolyticum, 213

Human epithelial carcinoma cells (HeLa), 134
Hydrolytic enzyme, 282
Hydrophobin proteins, 236
Hydrophobins, 236–237
Hypercholesterolemia, 138
Hyphae, 310
Hypocholesterolemic effect, 137
Hypogeous fungi, 2
Hypoglycemic, 293
Hypolipidemic properties, 149
Hypsizygus marmoreus, 171, 172

I
Identification
  ITS marker, 76–78
  molecular markers, 75, 76
Imleria badia, 141
Immature cultivation, 295
Immobilization, 179
Immunomodulating, 34
Immunomodulatory, 22, 216, 320, 388
Immunosuppression, 136
Indoor fermentation, 281
Inducible nitric oxide synthase (iNOS), 330
Innate immunity, 216
Inonotus obliquus, 119
Inosine 5′-monophosphate (IMP), 337
Insecticides, 305
Integrated management programs, 305, 313
Interferon (IFN-γ), 133
Interferons (IFNs), 234, 264
Interleukins (ILs), 234, 264
Internal transcribed spacer region (ITS), 75
International Fungal Barcoding Consortium, 76
Inter-simple sequence repeat (ISSR), 3
Iron nanoparticles (Fe-NPs), 357

J
Japanese traditional medicine, 246
Jelly fungi, 244

L
Laccaria, 23
Laccase, 181–182, 370
Lactarius, 23, 24
Lactarius deliciosus, 134
Lactic acid, 211, 214, 216
Lactobacillus plantarum, 297
Lactophenol cotton blue, 58
Laetiporus sulphureus, 84, 87, 94, 95, 102
Lamellar hymenophore, 149
Lanosterol pathway, 230
Lard functionalized (LF), 99
Large ribosomal subunit (LSU), 76
Layered double hydroxides (LDHs), 337
Lecanicillium fungicola, 306–310
Leccinum, 24
Lectins
  antiproliferative, 138, 139
  caspase-3 activity, 138
  cytotoxic effect, 138
  glycoproteins, 138
  heterodimeric, 139
Lentinan, 133, 134, 264
Lentinula, 24
Lentinula edodes, 159, 167, 236, 247, 275, 278–280, 284
  bacteriostatic effects, 90
  description, 90
  disk-diffusion, 90
  ethyl acetate extract, 90
Lentinus, 24
Lentinus edodes (LEE), 119
Lepista, 24
Lignin peroxidase (LiP), 180
Lignocellulosic, 298
Lignocellulosic materials, 168, 178
Lignocellulosic waste, 277, 282
Lignoclytic enzymes, 180
Lignolytic (oxidative) enzymes, 185
Lignosus rhinoceros, 297, 298
Lipid peroxidation, 147, 327
Lipopeptide, 311
Lipopolysaccharide (LPS), 131, 331
Liquid chromatography mass spectrometry (LCMS) method, 341
Liquid state fermentation (LSF), 295, 296, 299
Listeria monocytogenes, 89, 90
Liver
  alcohol, 83
  CCl_4, 100
  description, 82
  diseases, 100
  functions, 100
  hepatocytes, 82
  inflammatory response, 83
  injury, 99–102
  NASH, 83
Long chain fatty acids (LCFAs), 213
Low-density lipoprotein (LDL), 98
L-tryptophan, 144
Lycoperdon, 25
Lycoperdon perlatum, 151
Lycoris aurea, 196
Lysed cell comet (LCC), 120

M
Macrofungi, 352
commercial mycelium spawn, 160
decomposers, 366
mushroom growth and development, 159–160
nutritional requirements
basidiomes, 162
cellulose-degrading enzymes, 161
fermentation, 162–167
heterotrophic organisms, 161
lignin-degrading enzymes, 161
omics, 373
pH, 173
vegetal biomass transformation
oligomers and monomers, 363
pre-treatment, 363
Macrolepiota, 25
Macrolepiota procera, 134, 151
Macromycetes, 81, 84
Macrophages, 132
Magdalenian population, 17
Malignant cancer cells, 326
Mammalian focus of rapamycin (mTOR), 323
Manganese peroxidase (MnP), 180
Mannitol, 35
Matrix metalloproteinase (MMP), 333
Medicinal mushroom
atherosclerosis, 333
biotherapeutic activities, 320
Chinese caterpillar fungus, 319–320
cordycepin, 320
cytotoxicity, 332
DNA synthesis, 332
interleukin-10, 332
submerged medium, 320
Medicinal properties, 289, 296, 297
Medicinal value, 379
Melatonin, 142
Melzer staining, 58
Meripilus giganteus, 94
Mesophilic microbiota, 163
Messenger RNA (mRNA), 332
Metal bio-sorption, 185
Metal leaching, 185
Metal transformation, 185
Methionine, 33
2-Methyltetrahydrofuran (MeTHF), 338
Mevinolin, 98
Microbial biomass, 185
Microbial community, 163
Microbiota, 162, 308, 310, 311
Microdilution, 84, 89, 94
Microwave-assisted extraction (MAE)
microwaves, 196
UMAE, 196
Minerals, 35, 36
Minor Forest Products, 379
Mitogen-activated protein kinases (MAPKs), 331
Mizoram, 4
Modified atmosphere packing (MAP), 37
Molecular fingerprinting, 3
Molecular weight (*Mw*), 215
Morchella, 25
Morchella esculenta, 94, 95, 295
Morphogenic stage, 235
Morphotyping, 58
Moulds/rust, 75
Multi-drug resistant, 91
Multiple antibiotic resistant (MAR), 355
Murlen National Park, 5, 6, 9, 11
Mushroom capital of the world, 43
Mushroom caps, 307
Mushroom cultivation, 305
Mushroom-derived polysaccharide
Lactobacillus acidophilus and *Bifidobacterium longum* subsp., 215
prebiotics, 214
Mushroom nutraceuticals, 386
Mushrooms, 244
agro/lignocellulosic wastes, 277
anticancer activity, 265
bioactive compounds, 2
bioactives, 295, 298, 299
bio-innovation and technological diffusion, 277
biological control (*see* Biological control)
bioremediation tools, 287
characteristics, 277
collectors, 249
consumption of, 276
cultivation, 39, 42, 43, 278
artificial, 296, 297
and biomass production, 293
commercial, 298
medicinal, 295, 298
methods, 293–295, 298
protocols, 297
cultivation techniques and developing, 279
Dampa Tiger Reserve, 4, 5
definition, 1
diversity, 5
ecological climate, 1
edible and non edible, 289
environmental factors, 282

Mushrooms (*cont.*)
exopolysaccharides (*see* Exopolysaccharides)
exporters of, 277
family wise distribution, 10
farming and improved technology, 279
fruiting bodies, 296
global production, 276, 281, 284
health promoting properties, 289
humid climate, 1
hypertension, hypercholesterolemia and cancer, 2
industrial bio-products, 287
lignocellulosic materials, 282
LSF, 295
macrofungus, 275
macroscopic identification, 3
market value, 276
medicinal, 245, 276
anti-cancer agents, 247
anti-cancer properties, 247
breast and prostate cancer, 247
evidence of, 288
global market, 288
mass and social media, 289
natural remedies, 289
production of, 293
safe, 289, 298, 299
selective cytotoxicity, 248
TMM, 248
western medicine, 249
MFP, 385
microscopical analysis, 67–73
molecular characterization, 3, 4
morphological characterization, 61–66
mountain, 244
Murlen National Park, 5
NTFP, 385
nutrients composition, 2
nutritional and therapeutic properties, 277
oyster, 283
polysaccharides, 250, 264
production, 39–41
properties of, 251–262
saprophytes, 275
Shiitake, 280
socio-economic life, 11
spawning or casing or injecting nutrients, 281
SSF, 295
supply of, 276
synthetic log, 280
Tanegoma spawn, 279
taxonomy, 16
tissue/spore culture or breeding, 278
TMM, 297
traditional, 192
treatment options, 265
white rot fungi, 282
wild edible, 244
wild magic, 248
wild poisonous, 249
wild species, 265
year of cultivation, 281
zero-waste model, 278
Mycelial growth, 282
Mycobacterium tuberculosis, 90
Mycogone perniciosa, 306, 310, 314
Mycology, 74
Myco-nutraceuticals, 384
anti-inflammatory and immuno-modulatory, 388
antimicrobial, 387
antioxidant, 387
antitumor, 387
fruiting bodies, 386, 387
medicinal value, 387
prebiotics, 388
properties, 386
sustainable conservation, 388, 389
Mycoparasites, 308
Mycophagy, 15, 16, 313, 381, 386
Mycopharmaceuticals, 16
Mycophilia, 15, 17–19
Mycophilic, 386
Mycophobia, 15
Mycophobic community, 19
Mycorrhizal, 293
Mycosynthesis, 352, 354, 355, 358
Myxomycetes, 75

N

N-acetylgalactosamine, 139
N-acetylglucosamine polymer, 137
N-acetyl-L-cysteine, 334
NADPH-oxidase, 233
Nanobiosynthesis, 352
Nanoparticles (NPs), 237
biogenesis, 352
biological systems, 351
ENPs (*see* Engineered nanoparticles (ENPs))
extracellular and intracellular reductases, 357
inorganic, 353
mechanism, 354
medicinal mushrooms, 352
nanobiosynthesis, 353

physicochemical and optoelectronic properties, 351
prokaryotes, 352
resistance machinery, 351
unicellular eukaryotes, 352
xenobiotics, 351
National Centre for Biotechnology Information (NCBI), 76
Natural products, 96, 100
Natural resources, 379
Nematodes, 305, 308, 312
Nephrotoxicity, 136, 216
Neuroprotective, 289
Nicotinamide adenine dinucleotide (NADþ), 181
Nicotinamide adenine dinucleotide phosphate (NADPH), 123, 181
Nitric oxide synthase (NOS2), 330
Nitrite ions (NO^{2-}), 139
NK cells, 132
Non-aerated compost teas (NCT), 310
Nonalcoholic steatohepatitis (NASH), 83
Non-green revolution, 389
Nonrapid eye movement (NREM), 336
Non-Timber Forest Product (NTFP), 381
Northwestern Himalaya, 19
Nutraceuticals, 29, 277, 278, 380, 381, 385
Nutraceutics, 16
Nutritional composition, 29–31
Nutritive value, 379

O
Oligosaccharides
inulin or fructo, 215
low-molecular-mass, 215
prebiotics, 211
types, 213
Omics, 373
Oomycetes, 75
Ophiocordycep sinensis, 263
Ophiocordyceps, 296
Ophiocordyceps sinensis, 298
Orchids, 5
Organoleptic properties, 159
Origanum onites, 313
Ovariectomized (OVX), 336
Oxidative damage, 98, 327
Oxidative damage to DNA
comet assay
LCC, 116
SCGE, 116
dietary impact, 123
H_2O_2 prevention, 120
Agaricus blazei, 120
aqueous extracts, 117
clitocybin A, 120
Coriolus versicolor extract, 120
DNA fragmentation, 119
oxidative attack, 119
mushroom-based protection, 124–125
mushroom-mediated inhibition, 121, 123
ROS, 115
Oxidative stress, 101
Oxygen–glucose deprivation (OGD), 333
Oxygen radical absorbance capacity (ORAC), 97
Oyster mushroom, 26

P
Paddy straw mushroom, 18
Paecilomyces, 320
Palynological, 57
Parasites, 306
Parasitic fungi, 306
Pattern recognition receptors (PRR), 131
Penicillium citrinium, 149
Penicillum chrysogenum, 129
Peripheral blood mononuclear cells (PBMC), 326
Peroxidises, 182
Pesticides, 182, 185, 298
Petroleum ether (PE), 328
Phagocytosis, 216
Phanerochaete chrysosporium, 177
Pharmaceuticals, 29, 288, 293
Phenolic compounds, 310
Phenolics, 29
Pholiota nameko, 172
Phosphatidylinositol 3-kinase-related kinase (PIKK), 325
Phosphorylation, 327
Photomicrographical analysis, 58
Phytosanitary, 305
Pimpinella anisum, 313
Piptoporus betulinus, 288
Pleuran, 135
Pleurotus, 25, 169, 275
P. citrinopileatus, 139
P. cornucopiae, 147
P. eryngii, 168
Pleurotus ostreatus, 94, 135, 136, 139, 166, 275
agar diffusion method, 91
antimicrobial potential, 92
fungal pathogens, 93
gemmotherapic extract, 92
multi-drug resistant, 91
oyster mushroom, 92

Pleurotus ostreatus (*cont.*)
polarity of solvents, 91
strains, 92
Pleurotus spp., 282, 284
Podaxis, 26
Poly A tail, 323
Polychlorinated biphenyl (PCBs), 178
Polycyclic aromatic hydrocarbons (PAH), 178, 183
Polyketides, 29
Polymerase chain reaction (PCR), 3, 74
Polymeric macromolecule, 216
Polyphasic, 76
Polyporus, 26
Polyporus squamosus, 95
Polysaccharide (POPS-1), 35, 135
Polysaccharide Krestin (PSK), 264, 289
Polysaccharide-peptide (PSP), 289
Polysaccharides, 137, 215, 263, 289, 326
anticancer activity, 132
anticancer effect, 132
anti-inflammatory effects, 131
antiproliferative, 134
apoptosis, 136
β-glucans, 131
cancer/viral diseases, 132
cytotoxic, 133
exopolysaccharides (*see* Exopolysaccharides)
freeze-thawing, 198
glucans, chitin and chitosans, 131
gut health improvement, 215
heteropolysaccharides, 132
immunomodulatory activity, 216–220
BRM, 216
isolation and purification, 199–203
L. edodes, 133
lentinan, 133
MAE, 196
mushroom-derived, 192
MWCO membrane, 204
PLE, 194
potential applications, 216, 221
prebiotics (*see* Prebiotics)
therapeutic effect, 133
UAE, 195
UMAE, 196
water-insoluble, 193
Polysaccharopeptide (PSP), 264
Polyunsaturated fatty acids (PUFA), 141
Potato dextrose broth (PDB), 339
Prebiotics, 35, 388
anti-inflammatory, 214
antiobesity effects, 215
biological properties, 214
criteria, 212
gut microbiota, 212
SCFAs, 212
gut bacteria effects, 215
immunomodulatory mechanism, 221
mechanism action, 213
beneficial effects, 214
Lactobacilli and *Bifidobacteria*, 213
LCFAs, 213
oligosaccharides, 213
Preparative chromatography, 192
Pressurized liquid extraction (PLE), 194, 340
Prevotella intermedia, 90
Proinflammatory cytokines, 150
Proinflammatory proteins, 131
Protein, 29, 32
Protein kinase, 325
Proteolytic activity, 237
Protists, 75
Pseudomonas syringae, 233
Pseudomonas tolaasii, 311
Psilocybins, 38, 248
Psychedelic fungi, 37–39
Psychoactive, 37
Puffballs, 25, 244, 384
Pyricularia chrysosporium, 184
Pyricularia oryzae, 184

Q
Quality control, 298
Quantitative trait loci (QTL), 314
Quantum confinement, 351
Quinones, 29

R
Ramaria, 26
Random amplified polymorphic DNA (RAPD), 3
Reactive oxygen species (ROS), 96, 115, 250, 334, 355
effects, 115
enzymic systems, 115
mediated damage, 116
scavenging activity, 119
Restriction fragment length polymorphism (RFLP), 74
Rhizosphere, 372
Riboflavin, 354
Ribonucleic acid (RNA), 249, 250, 252
Russula, 26

S
Saccharomyces cerevisiae, 233
Saprophytes, 244
Scavenger receptors (SR), 263
Schizophyllan (SPG), 264
Sclerotia, 248, 294, 295, 297
Sclerotial technology, 297
Scytalidium thermophilum, 163
Selective cytotoxicity, 248, 263
Selective ionmonitoring (SIM), 340
Selective reaction monitoring (SRM), 340
Selenium nanoparticles (Se-NPs), 356
Serotonin, 143
Serum triacylglycerides, 137
Sexual reproductive units, 74
Shiitake, 24, 247, 275
Short ribosomal subunit (SSU), 76
Short-chain fatty acids (SCFAs), 212, 213, 215
Shrooms, 37
Siderophores, 357
Signalling pathways, 245
Silver nanoparticles (AgNPs), 89, 353, 354
Simple sequence repeat (SSR), 3
Single cell gel electrophoresis assay (SCGE), 116
Size exclusion chromatography (SEC), 204
Small interfering RNA (si-JNK1), 329
Small ribosomal subunit (SSU), 76
Soil mycoremediation
  CYP, 371
  hydrocarbon pollutants, 367
  laccases, 370
Solid state fermentation (SSF), 295, 296, 299
Sparassis, 27
Sparassis crispa, 134
Spent mushroom substrate (SMS), 102, 354, 367
Spore separation method, 228
16S rRNA, 75
18S rRNA, 75
28S rRNA, 75
Standard alkaline comet (SAC), 120
Staphylococcus aureus, 89
Statins, 149
Steroids, 29, 145
Stinkhorns, 244
Streptococcus mutans, 90
Streptococcus pyogenes, 90
Structure of superoxide dismutase (SOD), 151
Subterranean truffles, 244
Suillus, 27
Suillus bovinus, 144
Supercritical carbon dioxide (SC-CO2), 197, 326
Supercritical fluid extraction (SFE), 340
  operating pressure, 197
  SC-CO2, 197
Superoxide dismutase (SOD), 101, 115, 233, 327
Sustainable conservation, 388
Sustainable development, 389
Synthetic dyes, 178

T
Taxol (paclitaxel), 243
TEM, 337
Terfezia, 27
Termitomyces, 27
Terpenoids, 29, 145
Theanine, 150
Therapeutic agents, 102
Tiger Milk Mushroom (TMM), 248, 249, 297
T lymphocytes, 132
Tocopherols, 145–148
Toll-like receptors (TLRs), 263
Tolypocladium inflatum, 129
Torrubiella, 320
Total flavonoid content (TFC), 96
Total phenolic content (TPC), 96, 97
Traditional Chinese Medicine (TCM), 246
Traditional knowledge (TK), 246
Trametes versicolor, 184
Trehalose, 131
Tremella mongolicum, 139
Trichoderma evansi, 334
Trichoderma sp., 184
Tricholoma, 28
Trifluoroacetic acid (TFA), 198
Triterpenes, 227
Truffles, 17, 20, 37
Trypanosomosis, 334
Tryptophane, 33
Tuber, 28
Tumour Necrosis Factor-alpha (TNF-α), 234, 250

U
Ultra-performance liquid chromatography (UOLC) technique, 340
Ultrasonic and microwave combined assisted extraction (UMAE), 196
Ultrasonic-assisted extraction (UAE)
  ABP, 195
  sound waves, 195
Ultrastructural components, 74–75
UV radiation, 129

V
Variegatic acid, 29
Vascular smooth muscle units (VSMC), 335
Vegetative mycelium, 173, 308
Vegetative stage, 235
Vitamins, 148
  vit B, 36
  vit B1, 36
  vit B2, 36
  vit B9, 36
  vit C, 36
  vit D, 36, 232
  vit D2, 36, 146, 147
Volatile compounds, 308
Volvariella spp., 28, 275, 278
Volvariella volvacea, 171

W
Weeping God, 16
WEF
  albumins and globulins, 32
  components, 37
  ethnomycology, 16
  non-timber forest resource, 19
  vitamin composition, 36
White-rot fungi, 177
Wild edible mushrooms
  amino acids and proteins, 140
  bioactive compounds, 384, 388, 389
  biological activity
    agaritine, 150
    antioxidative processes, 151
    bioelements, 150–151
    expression, 151
    phagocytosis, 151
    statins, 149
    theanine, 150
  biomass, 130
  carbohydrates, 131
  drying and storage, 385
  enzymes, 144
  ethno-mycological data, 383
  fatty acids, 141
  fungi, 129
  income benefits, 384, 385
  indole compounds, 142–144
  medicinal potential, 384
  myco-nutraceuticals (*see* Myco-nutraceuticals)
  North West Himalayas, 382
  nutritional potential, 384
  phenolic compounds, 141–142
  production and trade, 385, 386
  secondary metabolites, 129
  terpenoids, 145
  tocopherols and steroids, 145
  vitamins, 148

X
Xenobiotics, 182, 351
XRD, 337, 357

Y
Yarsagumba, 18
Yeast, 229

Z
Zero-waste model, 278
Zhejiang Academy of Agricultural Sciences (ZAAS), 280