

Index

A

- Absorption, distribution, metabolism and extraction (ADME), 209
- Access and benefit-sharing (ABS) regime, 520
- 2-Acetamido-2-deoxy- β -D-glucose, 334
- Acyl-CoA diacylglycerol acyltransferases, 433
- African sleeping sickness, 144
- Agars, 52, 53
- Algae
- autotrophic organisms, 36
 - biochemical components, 284
 - diatoms, 37
 - extremophile conditions, 36
 - fatty acids, 37
 - lactones, 38
 - oil technology, 282
 - peptides, 38
 - phlorotannins, 38
 - polysaccharides, 38
 - residues, 243
 - terpenes, 38
- Alginate-derived oligosaccharide (ADO), 38, 53–54
- Alguronic acid, 53, 273
- Alkaloids, 7, 17, 21
- Allergic diseases, 69
- α -linolenic acid (ALA), 327
- Alpha-chitin, 556
- α -tocopherol, 63
- Alumina-supported ruthenium (Ru/Al₂O₃) catalysts, 245
- Alzheimer's disease, 433, 434
- Amad ite, 298
- Amantadine, 127
- Amathaspiramides, 21
- Aminoacetone moiety, 13
- 2-Amino-2-deoxy- β -D-glucopyranose, 334
- Aminoglycoside, 3, 5, 120
- Ammonificins, 12
- Amplicons, 529
- Anaerobic digestion (AD)
- advantages, 249
 - biogas, 246
 - chemical composition, 247
 - commercialisation, 250
 - corrosive environment, 249
 - electrical generation plant, 247
 - GHG emissions, 247
 - hydrolysis, 248
 - lipid, protein and carbohydrate composition, 247, 248
 - macroalgae, 247, 250
 - mesophilic methanogens, 249
 - metal ions, 249
 - methanogenic microorganisms, 249
 - nitrogen- and phosphorus-containing compounds, 247
 - organic volatile solids, 248
 - phenolics, 249
 - seaweed, 247, 248
 - stages
 - acetogenesis, 247
 - acidogenesis, 246
 - hydrolysis, 246
 - methanogenesis, 247
- sulphate concentration, 249
- terrestrial biomass and municipal solid waste, 250

- Anaerobic sugar fermentation, N₂ and CO₂
 bacterial growth and tolerance, 224–225
 glucose consumption and hydrogen yield,
 226–227
 organic metabolites production, 227–229
- Angiotensin-converting enzyme (ACE), 72
- Angiotensin-I-converting enzyme (ACE-I),
 72, 333
- Annelida
 AMPs, 28–30
 antimicrobial activity, 28
 arenicin-1 (1) and- 2 (2), 39
 benthic communities, 27
 coelomic fluid, 28
 comprises ringed/segmented worms, 27
 Gram-negative bacteria, 28
 hedistin, 29
 immunity system, 28
 innate immune system, 28
 lysozymes, 28
 metamerisms, 27
 perinerin, 28
 phylogenetic interest, 27
 taxonomic classes, 27
 vibrial collagenase, 30
- Antagonistic molecules, 9
- Antarctic Treaty area, 592, 594
- Anthozoans, 194
- Anthracimycin, 106
- Anthraquinones, 164
- Antiallergic activity, phlorotannin, 69–70
- Antibacterial activity, polysaccharides, 55–58
- Antibacterial compounds
 algae, 114–115
 bacteria
 α-phenylsarcosine unit, 104
 bioassay-guided fractionation, 106
 erythromycin/azithromycin, 105
 gageomacrolactins, 102
 human erythrocytes, 103
 human neonatal foreskin fibroblast
 cells, 106
 macrolactins and macrolides, 101
 mammalian cell cytotoxicity, 106
 MRSA-caused infections, 104
 rifamycins, 107
 ROESY spectra, 101
 fungi
 ambuic acid, 110
 azaphilones, 109
 cancer cell lines, 110
 curvulamine, 112
 DKP, 111
 FabI inhibition assay, 111
 hydroanthraquinone derivatives, 112
 MIC values, 109
 naphtho-γ-pyrone, 110
 spirokastixones, 113
 viridicatumtoxins, 108
- invertebrates
 bromotyrosine derivatives, 116
 clathric acid, 116
 eusynstyelamide alkaloids, 119
Haliclona sponges, 115
 ianthelliformisamine, 115
 MeOH extract, 117
 4-oxazolidinone ring, 119
 proline-rich peptides, 117
 secondary metabolites, 118
- Antibiofilm activity, 14
- Antibiotic resistance, 150
- Antibiotics
 antimicrobial agents, 5, 6
 antimicrobial resistance, 5
 classes, 5, 6
 development, 3
 metabolites, 6
 microorganisms, 6
 problems, 5
 resistance, 3–5
- Antibody drug conjugate (ADC), 350
- Anticancer activity
 phlorotannin, 67–68
 polysaccharides, 60
- Anticoagulant activity, polysaccharides, 59–60
- Antidiabetic activity, phlorotannin, 68–69
- Antifungal compounds
 bacteria, 120–122
 fungi, 122
 invertebrates, 122–124
- Antihyaluronidase activity, 69
- Antihypertensive activity, seaweed-derived
 peptides, 72
- Anti-infective compounds
 antibiotic discovery, 99
 antimicrobials, 99, 100
 macro- and microorganisms, 99
 molecular targets, 148, 149
- Anti-inflammatory activity
 phlorotannin, 70
 pigments of seaweeds, 63–64
 polysaccharides, 58–59
- Antileishmanial activity, 201–202
- Antimetastatic activity, 60
- Antimicrobial peptides (AMPs), 13, 28–30, 32
- Antimicrobial resistance, 3, 5

- Antimonials, 201
- Antioxidant activity
- phlorotannin, 66
 - pigments of seaweeds, 62–63
 - seaweed-derived peptides, 71
- Antiplasmodial activity, 201–202
- Antiproliferative activity, 60
- Antiprotozoal compounds
- algae, 141
 - bacteria
 - chloroquine, 137
 - companeramides, 140
 - drug-resistance development, 139
 - KAR425, 138
 - leishmaniasis, 135
 - malaria, 136
 - polyhydroxylated macrolide, 139
 - salinipostin, 138, 139
 - undecylprodigionine, 137
 - invertebrates
 - convolutamines, 147
 - cristaxenicin, 144
 - cytotoxicity assay, 146
 - didemnidines, 146
 - epiplakinidioic acid, 141
 - eudistidines, 146
 - Gorgonian octocorals, 145
 - Plakortis* sp., 143
 - protozoan parasites, 144
 - thiaplakortone, 142
- Antithrombotic activity, polysaccharides, 59–60
- Antituberculosis agents, 14
- Antiviral activity, polysaccharides, 55–58
- Antiviral compounds
- algae, 128–131
 - fungi
 - alkaloids, 125, 126
 - aromatic lactones, 127
 - butenolides, 124
 - hemagglutinin glycoprotein, 127
 - indole-diterpenoids, 124
 - pseudo-depsidone scaffold, 127
 - SAR, 125
 - invertebrates, 131–135
- Aplysinopsins
- analogs, 194
 - anticancer activity, 205–207
 - anticancer agents, 192
 - antiplasmodial and antileishmanial activity, 201–202
 - biomedical community, 192
 - clinical development, 191
 - CNS activity
 - MAO inhibition, 204–205
 - neuromodulatory activities, 202
 - receptors, 203
 - serotonin receptor activity, 202–204
 - crystallography, 193
 - dimers, 195, 196
 - FDA-approved NPs, 192
 - glycine-gated chloride channel receptor, 207–208
 - GlyR modulatory activities, 208
 - ^1H , ^{13}C heteronuclear coupling, 193
 - 5-HT2A and 5-HT2C, 203
 - hydantoin/creatinine derivatives, 195
 - imidazolidinone, 195
 - in vitro assays, 195
 - in vivo assays, 208–211
 - microwave-assisted synthesis, 199
 - MNPs, 191
 - oxazolones recyclization, 200
 - pentamidine-aplysinopsin synthesis, 197–199
 - reagents and conditions, 197–200
 - second-generation, 210
 - serotonin receptor subtypes, 203, 204
 - sources, 192
 - structure, 192–194
 - thioaplysinopsin analogs, 197
- Aquiferous system, 16
- Areas beyond national jurisdiction (ABNJ), 497, 589, 592
- Ariakemicins, 13
- Arminin, 21
- Aromatic dicarboxylic acid (ADCA), 570
- Arteriosclerosis, 72
- Ascidians, 35
- Astaxanthin, 337, 338
- Asterosaponins, 31
- Atlantic fish autolysate, 333
- Aurelin, 20
- Axinellamines, 17, 18
- Azaphilones, 109
- 2,20-Azinobis-3 ethylbenzothiazoline-6-sulfonate (ABTS), 62
- B**
- Bacille Calmette-Guérin (BCG), 111
- Bacteria
- antagonistic molecules, 9
 - antibacterial activity, 9, 10, 12
 - antimicrobial activity, 9–11, 13
 - bioactive fractions, 11

- Bacteria (*cont.*)
- bromophenyl compound, 12
 - genetic and biochemical diversity, 9
 - marine algae, 9
 - medicinal agents, 8
 - metabolism, 7
 - natural compounds and peptides, 9, 10
 - pharmaceutical and biotechnological applications, 9
 - phenolic compounds, 12
 - Pseudoalteromonas* species, 12
 - secondary metabolites, 9, 11
 - strains, 12
 - therapeutic agents, 9
 - 4,4',6-tribromo-2,2'-biphenol, 12
- Bactericidal activity, phlorotannin, 67
- Bacteriosponges, 510
- Benzethonium, 495
- Benzof[a]pyrene, 172
- Beta-chitin, 556
- β -glucanases, 170
- Beta-lactamase inhibitors, 5
- Betaproteobacterium, 517
- Bioactivity
- anticancer, 60
 - anticoagulant and antithrombotic, 59–60
 - anti-inflammatory and immunomodulatory, 58–59
 - antiviral and antibacterial, 55–58
 - in vitro and in vivo, 55
 - seaweed-derived sulfated polysaccharides, 55–57
- Bioassay-guided fractionation techniques, 200
- Biobutanol, 242–243
- Biocatalytic processes, 71
- Biodiesel, 241
- Biodiversity, 265
- Bioethanol, 242
- Biofilm formation, 7
- Biofuels, 169–170
- Biogeochemical cycling, 16
- Biological diversity, 296
- BioLume's business strategy, 298
- Bioprospecting projects, 490
- Biorefinery, 232, 245
- Bioremediation, 171–174
- Biosorption, 174
- Biosynthesis, aminoacyl-tRNAs, 7
- Bipinnapterolide, 19
- Blood coagulation, 59
- Blood-sucking parasites, 27
- Blue biotechnology
- agro-food sector, 270
 - algal biofuels, 295
 - annual growth rate, 269
 - anti-inflammatory and wound-healing agent, 266
 - aquaculture and hydrocolloid segments, 268
 - bio-based chemicals, 282–283
 - biodiversity, 265
 - bio-economic sector, 268
 - biotech sectors, 264
 - business cases, 267
 - classifications, 265
 - colors, 264, 265
 - commercial development, 268
 - cosmetics, 270–274, 290, 311
 - cytarabine, 265
 - definition, 264
 - dietary/cosmetic supplements, 298
 - discoveries/science-based phases, 298
 - drug discovery programs, 276
 - DSM* and *Evonik*, 279, 280
 - energy, 281–282, 290, 311
 - EU and USA, 297
 - food, feed and nutraceuticals, 278–280
 - foster therapy, 313
 - geographical distribution, 269, 289
 - GFPs, 266
 - image enhancer, 312
 - in-depth analysis, 290
 - industry segments, 290
 - international economic and political organizations, 311
 - macro- and microalgae, biofuel production, 268
 - mariculture and aquaculture, 266
 - marine resources, 269
 - marine-derived drugs, 269
 - methodology, 283–288
 - molecular biology, 296
 - multinational corporations, 290–294
 - national and international groups, 290
 - national economic systems, 288
 - natural products, 276
 - OECD, 268
 - organic chemical synthesis, 276
 - organizational and financial companies, 289
 - pharmaceuticals, 274–278, 290
 - product specialization, 296
 - research and industrialization processes, 310
 - seas and aquatic environments, 265
 - soft tissue sarcoma and ovarian cancer, 266
 - spin-offs, 299–310
 - stakeholder analysis, 269, 296
 - technology development, 312

value chain, 299

Blue Growth strategy, 263, 407

BlueGenics Database of Natural Products and Taxonomy (BG-DNPT), 434

BluePharmTrain

- archaea, fungi and viruses, 535–538
- biosynthetic gene clusters, 526
- biotechnological approaches and techniques, 538
- the deep sea, 534–535
- DNA barcoding, 528–529
- genomics and metagenomics, 529–531
- HTS techniques, 527, 529
- marine sponge microbial-associated community, 506, 510
- metabolomics, 533
- metabonomics, 534
- metaproteomics, 533
- metatranscriptomics, 531–532
- objectives, 506
- pederin family compounds, 518
- phylogenetic tree, 508
- proteomics, 533
- research and training, 506
- SCUBA, 534
- secondary metabolites, 506, 517–519
- socio-economic consequences, 538
- sponges
 - bioactive metabolites, 514
 - biotechnology (*see* Sponge biotechnology)
 - clusters, 538
 - explants, 523
 - holobiont roles, 507
 - humans, 513–514
 - isolation and purification, 515–517
 - microbial associations, 508–513
 - origin and structure, 507–508
 - syconoid, 509
 - supply problem, 519–520
 - transcriptomics, 531–532
 - transmission modes, 512

Brackish-water, 21

Brentuximab vedotin, 350, 351

Bromoageliferin, 17

5-Bromoaplysinopsin, 209

5-Bromo-2'-de-*N*-methylaplysinopsin, 195

5-Bromo-8-methoxy-1-methyl-carboline, 21

Brown algae, 50, 65, 114

Bryozoa, 21–23, 37

Business-to-business (B2B) dimension, 296

Buswell equation, 247

Butylated hydroxytoluene (BHT), 63

C

Ca²⁺-polyphosphate (Ca-polyP), 434

Calcarea and calcareous sponges, 507

Calcispongiae sponges, 17

Capnophilic lactic fermentation (CLF), 218, 222–224, 231

Carbapenems, 5

Cardiovascular disease-related mortality, 72

Carotenoids, 61, 63, 362, 363

Carrageenan, 52, 53, 55, 362

Carragelose, 351

Carragens, 326

Carragenates, 323

Cell defense mechanisms, 62

Cell division, 7

Cell wall polysaccharides, 50

Cembranoid sarcophytolide, 20

Central nervous system (CNS), 192

Centrocins, 33

Cephalopods, 26, 27

Cephalosporins, 5, 165

Cephems, 5

Ceramides, 21

Champions of innovations, 267

Chemolithoautotrophic organisms, 463, 464

ChiBio project

- bio-refinery process, 565
- chemical structures, 556
- chitin active enzymes, 568
- chitin bio-refinery, 564–571
- chitin and chitosan
 - agriculture, 557–558
 - crustacean shells (*see* Crustacean shells, chitin and chitosan production)
 - food and cosmetics, 558
 - medicine and pharmacy, 557
 - properties, 557
 - protein-chitin-calcium carbonate structure, 558
 - shell waste material, 559
 - wastewater treatment, 558
- enzymatic chitin depolymerization (*see* Chitin depolymerization)
- marine chitin, 555–556
- physical mechanical data, 571
- pretreatment, 565–567

Chick anxiety-depression model, 209, 211

Chitin depolymerization

- chitin-degrading enzymes, 568–569
- chitinolytic enzyme cocktails, 567–568
- life cycle analysis, 571
- monomer synthesis, 569–570
- novel bio-based polymers, 570–571

- Chitin depolymerization (*cont.*)
 yield enzyme systems, 567
- Chitin-rich crustacean shell waste, 565
- Chitoooligosaccharide (COS), 335, 369
- Chitosan oligomers, 335
- Chloramphenicol, 3
- Chloroaliphatics, chlorolignins and
 chlorophenols, 170
- Chlorophycean photosynthetic microalgae, 432
- Chlorophylls, 61
- Chlorophyta, 162, 336
- Chromodorolide A, 24
- Cirsimaritin, 12
- Clitellata class, 27
- Clustered Regularly Interspaced Short
 Palindromic Repeats (CRISPR), 469
- Cnidaria
 antimicrobial activity, 21, 22
 arminin, 21
 aurelin, 20
 bipinnapterolide B, 19
 cembranoid sarcophytolide, 20
 classes, 19
 diterpene, 20
 diterpenoids, 19
 embryonic cell layers, 19
 external structure, 19
 homopseudopteroxazole, 20
Hydra magnipapillata, 20
 hydramacin-1, 20
 kazal-2, 21
 natural compounds and peptides, 21, 22
 periculin-1, 21
 phenolic bisabolane-type
 sesquiterpenoids, 20
 pseudopterossins, 20
 radial symmetry, 19
 reef-building corals, 19
 secondary metabolites, 19
 soft corals, 20
 terpenes, 19
 venomous properties, 19
 warm waters, 19
 xeniolide I, 19
- Coelomic fluid, 28
- Colonial filter feeders, 21
- Common sponges, 507
- Competent national authorities (CNA), 585,
 592
- Compound annual growth rate (CAGR),
 269, 330
- Conference of Peripheral Maritime Regions
 (CPMR), 409
- Consortium for Algal Biofuel
 Commercialization (CAB-Comm),
 248
- Convention on Biological Diversity (CBD),
 520, 580, 581
- Copiotrophic bacteria, 524
- Cortistatin A, 278
- Cosmeceutical MNP development, 385
- Cosmetics, 263, 270–274
- Crustacean shells, chitin and chitosan
 production
 biotechnological processing, 560–564
 chemical processing, 559–560
 co-fermentation, 563–564
 lactic acid fermentation, 561
 non-lactic acid fermentation, 561
- Culture Collection of Algae and Protozoa
 (CCAP), 463, 466
- Culture Collection Yerseke (CCY), 430
- Cyanobacteria, 8
- Cycloheptanamine, 138
- Cyclooxygenase-2 (COX-2), 59
- Cymodoceaceae, 162
- Cysteine-rich peptides, 32
- Cytarabine, 266, 341
- Cytochrome P-450 monooxygenase system, 172
- Cytosar-U[®], 514
- D**
- Dark fermentation (DF), 218, 220–222
- Deep-sea habitats, 14
- Dehydrodidemin B, 354
- Dehydrodolichyl pyrophosphate (DedolPP), 108
- 1,2-Dehydropseudodehydrothyriferol, 437
- Demospongiae, 17, 507, 530
- Denaturing gradient gel electrophoresis
 (DGGE), 528
- Dengue virus, 55
- Deproteinization (DP), 559
- Depsipeptides, 13
- Dereplication, 6
- Desk-based research approach, 285
- Deutsche Sammlung von Mikroorganismen und
 Zellkulturen GmbH (DSMZ), 430
- Diabetes mellitus, 68
- Diaminoacrylic acid (DAA), 117
- Dibenzodioxin, 65
- Di-bromo-dihydroxylated-benzaldehyde, 495
- Dibromoscepterin, 17
- Dictionary of Natural Products (DNP), 481
- Didemnins, 24, 36
- Diet therapy, 72

- Dietary Reference Intakes (DRIs), 77
Diketopiperazine (DKPs), 12, 111
Diode array detector (DAD), 516
2,2-Diphenyl-1,2-picrylhydrazyl (DPPH),
62, 66
Diphlorethohydroxycarmalol (DPHC), 68, 69
Diterpenoids, 19
Docosahexaenoic acid (DHA), 327, 345,
431, 569
Down syndrome, 434
- E**
- Eastern Mediterranean Sea collections, 453
Echinodermata
antimicrobial activity, 30
antistaphylococcal biofilm, 33
categorization, 30
chordates and hemichordates, 30
coelomic fluid, 30
coelomocyte extracts, 33
environment, 30
heterodimeric structure, 33
human erythrocytes, 31
marine organisms, 30
morphology, 30
sea stars, 31
starfish, 33
Economic exclusive zone (EEZ), 497
Ectoprocta phylum, 21, 23
Eicosadienoic acid (EDA), 570
Eicosapentaenoic acid (EPA), 345, 569
Eleutherozoa, 30
Elisabethins, 19
Embden-Meyerhoff glycolytic pathway
(EMP), 221
Emerixanthones, 14
Endophytism, 162
Energy return on investment (EROI), 240
Ent-eusynstyelamide B, 23
Environmental DNA (eDNA), 435
Epitaondiol, 128
ERA-NET MarineBiotech (ERA-MBT),
439, 440
Eribulin mesylate, 348, 349
Erlenmeyer-Plochl reaction, 200
Erythromycin, 120
EU FP7 programme
achievements, 442
activities, 425, 426
bio-economy, 443
clinical use, 427
food products, 425
EU-funded projects, 428
exploration and analytical techniques, 427
and H2020 marine biotechnology, 429
Marine Board in 2010, 442, 443
pharmaceutical, nutraceutical and
cosmeceutical applications, 428
preclinical and clinical development, 443
terrestrial plants, 427
transcriptomes, 428
EU-funded projects
BAMMBO, 429–431
BlueGenics, 433–436
ERA-NET MarineBiotech, 439–440
GIAVAP, 431–433
Horizon 2020 Projects, 440–442
LIPOYEASTS, 433–436
MaCuMBA, 429–431
MAMBA and PolyModE, 433–436
MAREX, 436–439
PharmaSea, 436–439
SeaBioTech, 436
SUNBIOPATH, 431–433
European Algae Biomass Association
(EABA), 285
European Food Safety Authority (EFSA), 324
European Marine Biological Resource Centre
(EMBRC)
distribution, 409
genesis and scope, 407–408
innovation clusters, 417
maritime regions, 409–410
European Marine Biological Research
Infrastructure Cluster (EMBRIC)
blue bioeconomy development, 410–412
innovation clusters, 415–417
innovation ecosystems, 419
laboratory distribution, 411
multiregional challenge, 419
objectives and scope, 412–414
organization, 413
project legacy, 419, 420
public and private investments
European scale, 418, 419
national scale, 417, 418
regional scale, 417
socio-economic development, 419
strategies, 420
workflows, 414
European Medicine Agency (EMA), 324
European Research Infrastructure Consortium
(ERIC), 408
European Society for Marine Biotechnology
(ESMB), 285

European Strategy Forum on Research
Infrastructures (ESFRI), 408
European Structural and Investment Funds
(ESIF), 418
Eusynstyelamide F, D and E, 21, 23
Euthyroideones, 21
Extended spectrum beta-lactamase (ESBL),
5, 111
Extracellular polysaccharides (EPS), 484

F

Farnesyl pyrophosphate (FPP), 108
Fat-soluble vitamins, 73
Fenfluramine/phentermine, 203
Ferric thiocyanate (FTC), 62
Fibronectin-binding protein B (FnBPB), 441
Fischer-Tropsch process, 244
Fish protein hydrolysates (FPHs), 332, 333
Flavipesins A, 14
Fludarabine, 343
Fluidized bed reactor (FBR), 231
Food and Drug Administration/EMA
(FDA/EMA), 100
Fructooligosaccharides, 337
Fucoidans, 53–54, 58, 362
Fucols, 65
Fucoxanthin, 39, 61, 63, 64, 337
Fuhalsols, 65

Fungi

- antibacterial activity, 14
- antibiofilm activity, 14
- antimicrobial activity, 14, 15
- antituberculosis agents, 14
- bioremediation, 171–174
- carbon dioxide emissions, 175
- chemical structures of emerixanthones,
14, 16
- chevalone E, 14
- classification, 13
- cultural antinomy, 158
- decomposers of woody, 13
- deep-sea habitats and conditions, 14
- DNA sequencing, 158
- drugs, 165
- endophytes, 159, 175
- enzyme
 - biocatalysts, 167
 - biofuels, 169–170
 - biotechnology, 167
 - environmental applications, 170–171
 - industrial sectors, 167
 - pharmaceutical, cosmetic and food
industries, 167–169

- salt-tolerant, 168
- textile and paper industries, 170

eukaryotes, 158
food manufacturing, 157
habitats and diversity

- anoxic zones, 161
- carbon and nitrogen metabolism, 163
- deep-sea fungal group, 160
- immunofluorescence staining, 160
- mannitol and polyols, 161
- microorganisms, 159
- mutualistic adaptation, 162
- oligotrophic condition, 159
- osmolytes, 159
- osmotrophy, 160
- pH values, 159
- Phoma* pattern, 159
- plankton, 160
- saprotrophs and symbionts, 159
- seagrasses, 161, 162
- taxa, 163
- tolerance, 161

herbaceous substrata, 13
ligninolytic activities, 159
mangroves, 14
metallic nanoparticles, 175
molecular biology, 159
nanotechnologies, 174–175
natural compounds, 14, 15
organic materials, 157
physico-chemical properties, 157
polysaccharides, 166
secondary metabolites, 163–166
terphenyl, 14
terrestrial environments, 157
yeast and molds, 13

Furanones, 38

G

Gallic acid, 167, 249
 γ -aminobutyric acid, 166
 γ -linolenic acid (GLA), 327
Gasification

- and AD, 245
- dry lignite and woody biomass, 244
- enthalpy, 245
- gas turbine systems, 244
- macroalgae, 245
- SCWG, 244
- stages, 244
- syngas, 244
- thermochemical process, 245
- water-gas shift equilibrium, 245

- Gelatinous matrix, 16
- General Secretariat for Research and Technology (GSRT), 418
- Genetic resources (GRs)
- ABS compliant, 580
 - access and benefit-sharing arrangements, 585
 - change of intent, 586
 - definitions, 582–584
 - prior informed consent, 585
 - third-party transfer, 586
- Antarctic Treaty area, 594
- biological diversity, 581–586
- commercial users, 580
- EU ABS regulation, 586–589
- EU legal framework, 581
- EU regulation, 595–597
- ex situ, 594–595
- in internal waters/territorial seas, 592–594
- in situ, 592–595
- LOSC, 580
- marine scientific research, 587–588
- Nagoya protocol, 581–586
- national jurisdiction, 588–589, 594
- practitioners, 598
- preliminary considerations, 590–591
- Genetically modified organism (GMO), 279
- Genome mining, 470–473
- Genome sequencing, 406
- Genomics, 529–531
- GIAVAP project, 431
- Glass sponges, 17, 507
- Global industry analysts, 268
- Global market, 272
- Global ocean economy, 407
- Glucosamine, 556
- Glucosyltransferases catalyse, 485
- Glycomar, 312
- Glycopeptides, 5
- Google search engine, 286
- Gram-negative/positive bacteria, 28, 99
- Green algae, 50
- Green fluorescent proteins (GFPs), 266
- Greenhouse gas emissions, 281
- Gross value added (GVA), 407
- H**
- H2020 TASCAR project, 441
- Halaven[®], 519
- Halichondrin B, 348, 349
- Halocidin peptide, 35
- Halosphaerales, 158
- Haouamines, 277
- Hedistin, 29
- Hellenic Centre for Marine Research (HCMR), 464
- Hemagglutination inhibition, 127
- Hemicellulolytic xylanases, 170
- Heparin (glycosaminoglycan), 59, 60
- Herpes simplex virus (HSV), 55, 126
- Heteronuclear multiple bond correlation (HMBC), 516
- Heterotrimeric [FeFe]-hydrogenase, 221
- Hexactinellida, 17, 507
- Hierarchical clustering (HCA), 494
- Higher heating value (HHV), 239, 240
- High-performance liquid chromatography (HPLC), 479
- High-throughput amplicon sequencing, 529
- High-throughput screening (HTS), 275, 474
- Hirudinea, 27
- Histochole, 32
- Hizikia fusiformis, 63
- Homopseudopteroxazole, 20
- Homoscleromorpha, 17, 507
- Horizon 2020 programme, 440
- Human African trypanosomiasis (HAT), 144
- Human cytomegalovirus (HCMV), 55, 132
- Human genetic code, 261
- Human immunodeficiency virus (HIV), 55
- Human metapneumovirus (HMPV), 128
- Human papillomavirus (HPV), 55
- Hyalospongiae, 17
- Hyaluronidase (HAase), 69
- Hydramacin-1, 20
- Hydraulic retention time (HRT), 231
- Hydrogen (H₂)
- biological transformations, 217
 - capnophilic conditions, 218
 - carbon sequestration strategies and transition, 217
 - DF and CLF, 218, 231
 - energy-consuming and polluting, 217
 - exogenous substrate, 231
 - ferredoxin-NADH knob, 231
 - flux electrons, 231
 - glycolysis, 231
 - lignocellulosic/agricultural and food residues, 230
 - mesophilic processes, 218
 - peptide vs. glucose metabolism, 231
 - petrochemicals and industrial wastes, 232
 - thermodynamics, 230
 - thermophilic and hyperthermophilic bacteria, 232

Hydrothermal liquefaction, 243
 Hydroxy fatty acids (HFAs), 434
 Hydroxyl radical scavenging assays, 62
 Hypertriglyceridemia, 328, 335, 345
 Hypoxia-inducible factor 1 (HIF-1 α), 146

I

Imidazolidinone, 192, 195
 Immunomodulatory activity
 polysaccharides, 58–59
 seaweed-derived peptides, 73
 inABLE® system, 460, 471
 Indole-3-carbaldehydes, 196
 Industrial Applications of Marine Enzymes
 (INMARE), 441
 Ingenza (IGZ), 459–460
 Integrated multitrophic aquaculture (IMTA), 373
 Intellectual property (IP), 416
 Intercellular adhesion molecule 1 (ICAM-1), 366
 International Energy Agency (IEA), 281, 282
 Internationally recognised certificate of
 compliance (IRCC), 585
 Inulinases (β -fructan fructanohydrolases)
 catalyse, 169
 Isocitrate lyase (ICL), 120

K

Kapakahines, 278
 Kappa opioid receptor (KOR), 210
 Kazal-2, 21
 Kelleltinin I–II, 24
 Ketolides, 5
 Knowledge-Based Bio-Economy (KBBE), 426
 Koralionastetales, 158

L

Lactate dehydrogenase (LDH), 221
 Lactic acid fermentation, 561
 Lactic acid vs. acetic acid (LA/AA), 229, 230
 L-alanine, 227
 Laminaran, 53–54
Laminaria sp.
 L. digitate, 249
 L. hyperborea, 249
 L. ochroleuca, 272
 Land-based energy crops, 283
 Law of the Sea Convention (LOSC), 590
 Leishmaniasis, 135
 Libertellenones, 164
 Lifestyle modifications, 72

Lipid peroxide inhibition, 62
 Lipopeptides, 13
 Lipopolysaccharides (LPS), 64
 LIPOYEASTS project, 434
 Litosterol, 20
 Long-chain polyunsaturated fatty acid
 (LC-PUFA), 431
 Long-range heteronuclear single-quantum
 multiple-bond correlation
 (LR-HSQMBC), 146
 Lower heating value (LHV), 241
 Lulworthiales, 158
 Lurbinctedin, 354

M

Macroalgae, 237
 MacroBioCrude, 243
 Macrolactins, 12
 Macrolides, 3, 12
 Macrophages, 58, 63
 Madin-Darby canine kidney (MDCK) cells,
 126
 Magnetic resonance (MR) protocol, 6
 Malondialdehyde (MDA), 62
 MAREX project, 436, 438
 Maribasins, 13
 Marie Curie Initial Training Network, 505
 Marine bioactive molecules, 329
 Marine Biopolymers Ltd (MBL), 455, 459
 Marine bioresources, 406, 412, 417, 420
 Marine biotechnology
 analysis, 406
 applications and services, 406
 biological resources, 407
 EMBRC (*see* The European Marine
 Biological Resource Centre
 (EMBRC))
 goals, 407
 OECD, 407
 Marine genetic resource (MGR), 370, 496
 Marine habitats, 6
 Marine hydrocarbonoclastic bacteria, 434
 Marine macroalgae, 49
 Marine metagenomics for new biotechnological
 applications (MAMBA), 435
 Marine natural products (MNPs)
 bioactive peptides, 333–334
 biodiscovery, 318
 biodiversity, 318, 372
 biorefinery-like approach, 388
 biotechnological valorization, 390
 brentuximab vedotin, 350–352

- carotenoids, 337–338
 - CBD, 370
 - challenges
 - cosmeceutical, 384–388
 - nutraceutical, 374–380
 - pharmaceutical, 380–384
 - chitin and chitosan compounds, 334–336
 - cnidarians and ascidians, 373
 - consumers, 390, 391
 - cosmeceutical, 355–370
 - cytarabine, 341–343
 - development, 323–325, 353–355
 - ecosystem services, 317
 - eribulin mesylate, 348–350
 - fish n-3 fatty acid derivatives, 345–346
 - fish proteins, 331–332
 - FPHs, 332, 333
 - high-value products, 390
 - historical and taxonomic perspective, 319–323
 - HTS technologies, 373
 - iota carrageenans, 351–353
 - lipids, 327–331
 - low-value products, 390
 - lurbinctedin, 346–348
 - macroalgae, 338
 - macroanalysis, 370
 - metabolites, 318
 - metagenomic techniques, 373
 - minerals, 338
 - Nagoya Protocol, 371
 - nelarabine, 341–343
 - omics technologies, 372
 - pharmaceutical, 339–355
 - phlorotannins, 338
 - phytosterols, 339
 - polysaccharides, 336–337
 - seaweed-based ingredients (*see* Seaweed-based ingredients)
 - societal challenges, 391
 - squalamine, 338
 - stages, 373
 - submersible technologies, 371
 - trabectedin, 346–348
 - valorization process, 389
 - and value chains, 326–370
 - vidarabine and fludarabine phosphate, 341–343
 - vitamins A, D and E, 338
 - ziconotide, 343–345
- Material transfer agreement (MTA), 496, 593
- Mediterranean sponge, 512
- Melanoidins, 171
- Meningeal leukemia, 265
- Meroditerpenes, 128
- Metabolites, 6, 7
- Metabolomics, 533
- Metabonomics, 534
- Metagenomics, 468, 529–531
- Metamerisms, 27
- Metaproteomics, 533
- Metatranscriptomics, 431, 531–532
- Methicillin-resistant *S. aureus* (MRSA), 5, 36, 67, 103, 118
- Microalgae, 7, 36, 279
- Microwave irradiation method, 199
- Miltefosine, 201
- Minerals, 75–77
- Minimal bactericidal concentration (MBC), 38
- Minimum inhibitory concentration (MIC), 12, 67, 101
- Mitogen-activated protein kinases (MAPKs), 64
- Molecular biology, 263
- Mollusca
 - antibacterial activity, 24
 - antimicrobial activity, 24–26
 - cephalopods, 26, 27
 - chromodorolide A, 24
 - classes, 24
 - compounds, 24
 - crude whole body extracts, 24
 - description, 24
 - diemensen A–B, 24
 - features, 24
 - gastropod of Asiatic origin, 26
 - hexadecylglycerol, 24
 - and humans, 24
 - kelletin I–II, 24
 - marine and estuarine ecosystems, 24
 - marine invertebrates, 24
 - novel and uncharacterized mechanisms, 25
 - polysaccharides, 27
 - proline-rich peptides, 26
 - range of habitats, 24
 - SDS-PAGE, 25
 - TLC, 25
 - types, 24
- Monoamine oxidase (MAO), 202, 204–205
- Monoamine oxidase inhibitors (MAOIs), 204
- Monocyclic beta-lactams, 5
- Monomethyl auristatin E (MMAE), 350
- Mosher's method, 101
- Mucopolysaccharides, 27, 50
- Mumps virus, 55
- Mycophycobioses, 162

- Mycotechnology, 157
 Myeloid leukemia, 265
 Myocardial infarctions (MI), 72
- N**
- N-acetylglucosamine, 28, 334, 556–558, 568
 Nagoya Protocol, 580, 584–587, 589, 590, 592, 595, 597, 598
 access obligations, 581
 benefit-sharing obligations, 582
 compliance obligations, 582
 National Alliance for Advanced Biofuels and Bioproducts (NAABB), 285
 National focal point (NFP), 592
 Natural ecteinascidins, 347
 Natural products (NPs), 98, 149, 191
N-benzyl aplysinopsin, 205, 206
 Nelarabine, 343
 Neoechinulin B, 126
 Nephasterols B and C, 20
 Neuraminidase activity (NA), 124
 Neuroprotective activity, 64–65
n-3 fatty acids, 345, 346
n-3-PUFA nutraceutical products, 326–328, 330, 331
 Nicotinamidases, 435
 Nitric oxide synthase-2 (NOS-2), 59
 NoMorFilm project, 7, 8, 441
 Non-Hodgkin's lymphoma, 265
 Non-insulin-dependent diabetes mellitus, 68
 Non-lactic acid fermentation, 561
 Nonrenewable resources, 281
 Non-ribosomal peptide synthetase (NRPS), 7, 471
 Nuclear factor- κ B (NF- κ B), 64
 Nuclear magnetic resonance (NMR), 262
 Nutraceutical MNP development, 375
- O**
- Ocean Sunrise Project, 242
 Octaprenyl pyrophosphate (OPP), 108
 2',5'-Oligoadenylates, 519
 Oligosaccharide, 359, 366, 368
 Olmix, 298
 Omega-3 fatty acids, 279, 280
 Omics techniques, 410
 One-strain-many compounds (OSMAC), 494
 Organic loading rate (OLR), 231
 Organization for Economic Cooperation and Development (OECD), 268, 406
 Orthogonal partial least square-discriminant analysis (OPLS-DA), 494
 Osculum, 508, 509, 525
- Osmoprotectants, 225
 Over-the-counter (OTC), 274
 Oxazolidinones, 5
 Oxazolones, 200
 Oxoaplysinopsin, 207
 Oxytetracycline, 173
- P**
- P388 lymphocytic leukemia, 200
 PacBio RSII genome sequencing, 471
 Packed bed reactor (PBR), 231
 Paper-agar disk diffusion assay, 13
 Parainfluenza virus (PIV), 128
 Pelmatzoa, 30
 Penicillin, 3
 Peniphenones A–D, 14
 Pentamidine-aplysinopsin synthesis, 197–199, 201
 Periculin-1, 21
 Perinerin, 28
 Peroxisome proliferator-activated receptor gamma (PPARG), 368
 Peroxyl and alkoxy radicals, 62, 63
 Phaeophyta, 162
 Pharmaceutical MNP development, 381
 PharmaSea project, 438
 Phenocymycin, 495
 Phenolic bisabolane-type sesquiterpenoids, 20
 4-Phenyl-2-aminoimidazole, 438
 Pheochromocytoma (PC12) cells, 64
 Pheophytin, 64
 Phloretols, 65
 Phlorofucofuroeckol-B, 69
 Phloroglucinol, 65, 66, 249
 Phlorotannins, 129, 249, 361, 362
 antiallergic activity, 69–70
 anticancer activity, 67–68
 antidiabetic activity, 68–69
 anti-inflammatory activities, 70
 antioxidant activity, 66
 bactericidal activity, 67
 in brown algae, 65
 classes, 65, 66
 fucols, fuhalols and phloretols, 65
 phloroglucinol subunits, 65
 physodes, 65
 soluble, 65
 Phosphatidylcholines, 483
 Phycobilin pigments, 63
 Phycocolloids, 248
 Physodes, 65
 Phytase, 168
 Phytoplankton, 262
 Phytosterols, 339

Pinacocyte cells, 16
Pinacoderm, 16, 507
Plakinidae, 141
Platotex™, 441
Pleuromutilins, 5
Polychaeta class, 27
Polychaetes, 28
Polychlorinated biphenyls (PCBs), 330
Polyene δ -lactone, 12
Polyhydroxyalkanoates (PHAs), 282, 434
Polykaryon assays, 127
Polyketide synthase (PKS), 7, 433, 469–471
Polylactic acid (PLA), 282
Polymerase chain reaction (PCR), 105
PolyModE project, 435, 436
Polymyxins, 5
Polyphenolic antioxidants, 338
Polyphenols, 249
Polyunsaturated fatty acids (PUFAs), 369
Porsolt forced swim test, 208
Portuguese national roadmap, 418
Prebiotics, 169
Pregnane-X-receptor (PXR) modulators, 437
Principal component analysis (PCA), 494
Prokaryotic phyla, 509
Prokaryote (PKZ), 458
Proline-rich peptides, 26
Prostaglandin E2 (PGE2), 59
Protein fibers, 17
Proteobacteria, 103
Proteomics, 533
Provitamin function, 61
Pseudopterosins, 19, 20, 266, 366, 367
Pterocellins, 21
PubChem BioAssay database, 490
Pyrazinamidases, 435
Pyruvate:ferredoxin oxidoreductase (PFOR),
224

Q

QikProp data, 209
Quinolones, 5
Quinone pigments, 32
Quorum sensing, 7

R

Reactive nitrogen species (RNS), 62
Reactive oxygen species (ROS), 62, 63
Recommended daily intake (RDI), 77
Red algae, 50
Reef-building corals, 19

Remotely operated vehicles (ROV), 263, 534
Renal disease, 72
Rennin-angiotensin system (RAS), 72
Research infrastructures (RIs), 411
Research, Technology Development and
Innovation (RTDI), 407, 439
Resilience, 272
Respiratory syncytial virus (RSV), 55, 128
Rhamnazin, 12
Rhodophyta, 162, 336
Ribosomal peptides, 7
Rifamycins, 107
Rizatriptan, 192
Roscoff Culture Collection (RCC), 430
Rothwell's coupling model, 455

S

Salinosporamide, 354
Saponins, 31
Sceptrin, 17
SCUBA techniques, 191
SeaBioTech project
Australian Institute of Marine Sciences, 462
bioactive pharmaceuticals, 451
bioactivity screening, 474–478
biobank repository, 492, 497–498
biopolymers, 474
challenges, 452
coastal sites in Scotland, 465–466
concept, 452
culture collections, 466
deep-sea environments, 462
deep-sea oligotrophic basins, 464–465
drug discovery, 493–495
extremophiles, 462
genome mining, 470–473
geothermal intertidal biotopes, 463–464
HDL, 460
hydrothermal vent fields, 464–465
IGZ, 459–460
industrial scale, 487–488
industry-driven, 454, 455
marine bioprospecting, 496–497
marine bioresources, 474, 489–491
MBL, 459
metabolic engineering, 478–487
metagenomic bioprospecting, 469–470, 474
microbial symbionts, sponges, 466
PHARMAQ, 458
PKZ, 458
quality of marine resources, 491–493
raw materials, 483–488, 495–496

- SeaBioTech project (*cont.*)
 sampling, 467–469
 scientific, technical and technological
 challenges, 453, 454
 SME partners, 457–462
 work packages, 456
- Seaweed-based ingredients
 Abyssine[®], 365–366
 biotechnology, 362–364
 classical, 361–362
 microalgae biotechnology, 364–365
 Nocturshape[®], Cellynkage[®] and SeaCode[®],
 367–369
 non-premium, 369–370
 Resilience[®], 366–367
 specialty biotechnology, 365–369
- Seaweed-derived peptides
 antihypertensive activity, 72
 antioxidant activity, 71
 biocatalytic processes, 71
 and bio-functionalities, 70
 immunomodulatory effects, 73
 inner food-protein sources, 70
 natural bioactive components, 70
 red and green, 70
- Seaweeds
 AD (*see* Anaerobic digestion (AD))
 algae, 237
 algal-derived fuel production, 238
 bioactive peptides (*see* Seaweed-derived
 peptides)
 biofuels
 biobutanol, 242–243
 biodiesel, 241
 bioethanol, 242
 categorisation, 238
 dewatering and drying macroalgae,
 240–241
 direct combustion, 241
 feedstock, 239–240
 hydrothermal processing, 243
 characterization, 49
 energy extraction, 238, 239
 gasification (*see* Gasification)
 identification, 49
 iodine contents, 76
 macroalgal nonfuel industry, 237
 macroelement contents, 78
 and marine macroalgae, 49, 238
 minerals, 75–77
 phlorotannin (*see* Phlorotannin)
 pigments
 anti-inflammatory activity, 63–64
 antioxidant activity, 62–63
 carotenoids, 61
 chlorophylls, 61
 fucoxanthin, 61
 ingredients, 60
 neuroprotective activity, 64–65
 non-animal, 61
 photosynthesis, 61
 types, 61
 polysaccharides
 agars, 52–53
 alginate, 53–54
 bioactivity and pharmaceutical value,
 55–60
 capping agents, 50
 carrageenans, 52, 53
 cell wall, 50
 classification, 50
 commercial applications, 50
 drug delivery, 50
 exploration, 50
 fucoidan, 53–54
 laminaran, 53–54
 metal-reducing agents, 50
 molecular weights, 50
 physiological characteristics, 50
 properties, 50
 storage, 50
 structural parameters, 50
 sugar molecules, 50
 ulvan, 50–52
 unbranched, 50
 trace element contents, 77
 vitamins, 73–75
- Serotonin receptor activity, 202–204
- Severe acute respiratory syndrome (SARS), 129
- Siliceous/calcareous elements, 17
- Silver nanoparticles (AgNPs), 68
- Singlet oxygen quenching activity, 62
- Size exclusion chromatography (SEC), 516
- Small and medium enterprises (SMEs),
 290, 298
- Smart Specialization Strategies (S3), 409
- Solid phase extraction (SPE), 516
- Spectroscopy, 275
- Spicules, 17
- Spinochromes, 32
- Sponge biotechnology
 aponge-associated microorganisms,
 524–525
 legal aspects, 520–522
 marine sponge cultivation, 522
 natural products, 528

- putative pathways, 527
 - secondary metabolites, 528
 - sponge cell culture, 523–524
 - Sponge-associated phyla, 510
 - Sponges, 16–18
 - Spongothymidine and spongouridine, 342
 - Spontaneously hypertensive rats (SHR), 72
 - Squalamine, 354
 - Station Biologique de Roscoff (SBR), 417
 - Steroids, 19, 20
 - Sterols, 21
 - Strategic Research and Innovation Agenda (SRIA), 439
 - Strathclyde Institute of Pharmacy and Biomedical Sciences (SIPBS), 466
 - Stroke-prone spontaneously hypertensive rats (SHRSP), 64
 - Strongylocins, 32
 - Structure activity relationship (SAR), 102, 202
 - SUNBIOPATH project, 432
 - Supercritical water gasification (SCWG), 244
 - Surface plasmon resonance, 127
 - SustainCycle system, 433
 - Syconoid sponge, 509
- T**
- Tauramamide, 13
 - T-cell acute lymphoblastic leukaemia, 343
 - Technology readiness level (TRL), 416
 - Temporal and geographical distribution, 264
 - Terpenes, 7, 19, 21
 - Terpenoids, 17, 164
 - Tetracyclic cytotoxic meroterpenes, 434
 - Tetracycline, 3, 5, 120
 - Tetrahydroisoquinoline rings, 347
 - Tetratric peptide repeats (TPRs), 530
 - Tetrodotoxin, 354
 - Thauer rule, 218
 - Thermotoga neapolitana*
 - CLF, 222–224
 - culture conditions, 219–220
 - DF, 220–222
 - fermentation pathways, 220
 - gram-negative bacterium, 220
 - strain origin, 219
 - taxonomy, 218–219
 - Thin-layer chromatography (TLC), 25
 - Thioaplysinopsin analogs, 197
 - Thiobarbituric acid (TBA), 62
 - Thiopeptides, 13
 - Thraustochytrids, 328
 - Total correlated spectroscopy (TOCSY), 516
 - Trabectedin, 346, 347
 - Trade-Related Aspects of Intellectual Property (TRIPS), 521
 - Transcriptomics, 531–532
 - Transient thermal transfer (TTT), 363
 - Triacylglycerols, 329
 - 2,2',3-Tribromo-biphenyl-4,4'- dicarboxylic acid, 12
 - Tropodithetic acid (TDA), 12
 - Tubercmycin, 495
 - Tunicata phylum
 - alkaloids, 35
 - antibacterial compounds, 34
 - antibiotic kirromycin, 36
 - ascidians, 34
 - classes, 34
 - immune system, 34
 - marine animals, 33
 - symbiotic association, 36
- U**
- UBO-Fungi Laboratoire Universitaire de Biodiversité et d'Ecologie Microbienne (LUBEM), 430
 - Ulvabiouronic acid, 51
 - Ulvan, 50–52, 58, 362
 - Undecaprenyl pyrophosphate (UPP), 108
 - United Nations Convention on the Law of the Sea (UNCLOS), 497, 521
 - Université de Bretagne Occidentale Culture Collection (UBOCC), 430
 - US Food and Drug Administration (USFDA), 337
 - Ute Hentschel at the University of Wuezburg (UWUERZ), 466
- V**
- Vancomycin-resistant enterococci (VRE), 13, 105, 120
 - Very-long-chain omega-3 (ω -3) polyunsaturated fatty acids (VLC-PUFAs), 569
 - Very-low-density lipoprotein (VLDL) synthesis, 346
 - Vidarabine, 266, 342
 - Viridicatumtoxins, 108
- W**
- Wallemiomycetes, 161
 - Waskman platform, 6

Water-soluble vitamins, 73
White spot syndrome virus (WSSV), 166
Whole-genome shotgun method, 261

X

Xeniolide, 19
Xylooligosaccharides, 337

Z

Ziconotide (ω -conotoxin MVIIA), 343, 344
Zippertex™, 441
Zolmitriptan, 192
Zooids, 21
Zopfiellamide, 14