

# Index

- Abbey, Edward 97  
Abraham, Edward 30  
acetylcholine 2  
acetylcholinesterase 76  
acetyl coenzyme A 36  
acetylsalicylic acid 63  
*Acrimonium* 70  
acupuncture 20, 25  
ADME 32, 61, 62  
African trypanosomiasis 46  
AIDS 44, 45, 48, 95, 107  
Alexander the Great 45  
alkaloids 37  
alpha-amanitin 10  
Amanita 9  
American trypanosomiasis 47  
amino acids 36  
aminoglycoside antibiotics 85  
aminoglycosides streptomycin 70  
6-aminopenicillanic acid 69, 70  
amodiaquine 92  
amphotericin 79  
*Andrographis paniculata* 22, 29  
andrographolide 22, 29  
*Anopheles* 6, 45, 46  
anthrax 98  
antibiotics 16, 36, 49, 68, 80, 88, 94, 98  
antibodies 2, 10  
antibody-antigen interaction 12  
antigens 10  
antihelmintic 5  
antimalarials 6  
antivenoms 2  
Ara-A 29  
Ara-C 29  
*Aristolochia* 23  
aristolochic acid 23  
Artemis 6, 105  
*Artemisia* 69  
*Artemisia annua* 38, 72  
artemisinic acid 72  
artemisinin 5, 6, 38, 92  
aspirin 5, 14, 63  
ATP 35  
ATPase 57  
*Atropa belladonna* 26  
atropine 26, 37  
Augmentin 93  
avian influenza 98  
Avicenna 20  
Ayurvedic medicine 20  
Bactrim 94  
BCG 49  
beta-lactam 69, 88  
beta-lactamase 93  
biopiracy 40, 104  
bioprospecting 41  
bioterrorism 98  
bird flu 48  
blister beetle 3, 9  
blood flukes 4  
Brazilian pit viper 2  
bubonic plague 45  
butterflies 9  
caffeine 5  
calcitonin 26  
cantharidin 9  
capsaicin 22  
capsicum 22  
Captopril 26  
Carson, Rachel 81, 104  
catalysis 53  
*Catharanthus roseus* 26

- Celebrex 64
- cell–cell interaction 12
- cephalosporins 37
- Chagas disease 47, 103
- Chain, Ernst 30
- Chauvin, Yves 77
- chemical genetics 57
- chemical genomics 43, 58
- chemical libraries 65
- chemical space 65
- chemotherapy 51
- Chinese traditional medicine 20
- chlorofluorocarbons 100
- chloroplast 4
- chloroquine 6, 83, 92
- cholesterol 27
- cinchona tree 6
- classical genetics 57, 58
- click chemistry 75
- climate change 99
- clinical trials 33
- cobra 2
- combinatorial biosynthesis 67, 79
- combinatorial synthesis 73
- community health 102
- compactin 27
- computational chemistry 62
- computer-based modelling 61
- cone snails 28
- conotoxins 28
- corals 28
- coumarins 37
- COX 63
- Cryptotethia crypta* 29
- Curcuma longa* 22
- curcumin 22
- cycloguanil 90
- cyclooxygenase 57
- cytokines 10
- Dante 45
- dart poison 26
- Darwin, Charles 82
- dengue haemorrhagic fever 49
- deoxythymidine 54
- desethylchloroquine 80
- DHFR 90, 94
- digestion 13
- Digoxin 5
- dihydrofolate 54, 55
- dihydrofolate reductase 54, 84
- dihydropteroate synthase 94
- diseases of poverty 47
- diversity-oriented chemical synthesis 67
- diversity-oriented synthesis 75
- DNA 38, 52
- DOTS 92
- drug combinations 92
- druggable 58, 77
- drug pressure 86
- drug–receptor interactions 12
- drug resistance 83
- drug targets 52
- drug tolerance 83
- dynamic combinatorial chemistry 74
- Earth Summit 40, 107
- Ebola virus 98
- ebony tree 6, 7
- ecohealth 102
- ecosystem 11
- efavirenz 92
- Eflornithine 60
- Ehrlich, Paul 51
- elemental analysis 31
- emerging diseases 95
- emtricitabine 92
- Endo, Akira 27
- enthalpy 61
- entropy 61
- environmental health 102
- enzyme 12, 52
- Ephedra sinica* 26
- ephedrine 26
- erythromycin 79
- Escherichia coli* 83

- ethnobotany 23
- ethnomedicine 23, 24
- ethnopharmacology 23
- ethnopharmacy 7
- extremophiles 28
  
- Fansidar 6, 94
- Feb-A 80
- febrifugine 80
- Fischer, Emil 12
- flavonoids 37
- Fleming, Alexander 10, 30, 59
- Florey, Howard 30
- foxglove 5
- fragment-based drug discovery 67
- fragment library 78
- freshwater snails 47
  
- G-protein-coupled receptors 52
- Galen 20
- gene clusters 95
- gene knockouts 43
- genetically modified organisms (GMOs) 40
- genetic traits 8
- genome 37
- gentamycin 70
- Geysen, Mario 74
- good manufacturing practices (GMPs) 33
- Gossypium* 26
- gossypol 26
- greenhouse gases 99
- Grubbs, Robert H. 77
  
- haemorrhagic fever 98
- haemotoxins 2
- healers 23
- hepatitis B 48
- herbal drugs 7, 20, 25
- Hitchings, George 54
- HIV 95
- HIV/AIDS 83, 98
- Hodgkin, Dorothy 30
  
- hormone receptors 52
- hormones 37
- human immunodeficiency virus 89
- 3-hydroxy-3-methylglutaryl-coenzyme A reductase (HMG-CoA reductase) 27
  
- immune systems 10
- immunomodulating properties 10
- infectious diseases 3
- influenza 44
- influenza virus 4, 63
- inhibitors 53, 92
- ion channels 52
- Isofeb-A 80
- isoniazid 92
- isoprene 37
  
- kissing bug 47
- Kitasato, Shibasaburo 45
- Klebsiella pneumoniae* 83
- Koch, Robert 12, 44
- Koch's postulates 12
- Krebs cycle 35
  
- L-DOPA 26
- lactam 59, 93
- lancehead viper 26
- Laveran, Charles 45
- leguminous plants 4
- Leptospira* 44
- licorice 7
- ligands 15
- Lipinski 78
- liver fluke 102
- lock-and-key theory 12
- lumifantrine 92
  
- macrolide 36
- magic bullet 51, 99
- malaria 5, 6, 44, 47, 54, 83, 90, 93, 103, 107
- Malayan pit viper 2

- mass spectrometry 31
- MDGs 107
- MDR-TB 83
- measles 48
- medicinal plants 7
- meditation 25
- mefloquine 92
- melarsoprol 60
- melittin 9
- MERS 98
- metabolites 52
- metagenomics 80
- metagenomics 37
- metathesis 75
- methicillin-resistant
  - Staphylococcus aureus* 83
- methionine 36
- methotrexate 84
- methylene blue 51
- mevalonate 36
- microarrays 57
- Middle East respiratory syndrome (MERS) 95, 98
- millennium development goals 107
- Millennium Summit 107
- mitochondria 4
- molecular diversity 67
- molecular recognition 13
- molluscs 28
- Monod, Jacques 8
- morphine 5, 37, 60
- moxibustion 20
- MRSA 83
- Mucuna pruriens* 26
- multidrug resistance 85
- multidrug-resistant tuberculosis 83
- mutation 84
- NADH 35
- Nagoya Protocol 40
- natural products 35
- neglected diseases 47
- Negleria* 44
- neuraminidase 63
- neurotoxins 2
- neurotransmission 13
- nicotine 37, 60
- nitric oxide 11
- nonnatural natural products 38, 67
- nuclear magnetic resonance 31
- opioid receptors 60
- opium 5
- ornithine decarboxylase 60
- ouabain 26
- P-glycoprotein 85
- P. vivax* 6
- P218 90
- Pacific yew tree 71
- paclitaxel (Taxol) 69, 71
- papain 5
- papaya 5
- Paracelsus 19, 53
- Pasteur, Louis 44
- pathogens 4
- penicillin 10, 30, 37, 59, 68
- penicillin-binding proteins 70
- Penicillium* 68
- Penicillium citrinum* 27
- peptides 37
- phallotoxin 10
- pharmacodynamics 32
- pharmacognosy 33
- pharmacokinetics 32, 94
- pharmacophore 31
- pharmacophores 14
- pharmacopoeia 21
- pharmacy 33
- phenotypic screening 66
- phenylpropanoids 37
- pheromones 9
- Pirsig, Robert M. 67
- plague 98
- Planaria* 10

- plasmids 86
- Plasmodium falciparum* 6, 84, 90
- pneumococcal pneumonia 48
- poison mushroom 3
- poliomyelitis 48, 104
- polyene 36
- polyketides 36, 79
- polyketide synthase 79
- predator 3
- prey 3
- primary metabolism 35
- prophylactics 49
- prostaglandins 57, 63
- protein profiling 57
- proteins 37
- proteomics 56, 57
- public health system 87
- pufferfish 3
- pyrazinamide 92
- pyrimethamine 54, 84, 90, 92, 94
- pyrimethamine-sulfadoxine 6, 83
  
- quinine 6
- quinine 37
- quinolones 70
  
- raltegravir 92
- Ramayana 50
- random screening 65
- receptors 52
- Relenza (zanamivir) 63
- resistance surveillance 87
- reverse pharmacology 56
- reverse transcriptase 92
- rhinoceros horns 8
- Rhizobium* 4
- ribosomes 52
- rifampicin 92
- rifamycin 79
- Rio+20 107
- ritonavir 92
- RNA 52
- Ross, Ronald 45
  
- salamanders 10
- salvarsan 51
- SARS 48, 98
- schistosomes 4, 47
- schistosomiasis 47
- Schopenauer, Arthur 43
- Schrock, Richard R. 77
- SDGs 107
- sea squirts 29
- secondary metabolism 36
- secondary metabolite 79
- semisynthetic drugs 59
- Senna* 6, 7
- severe acute respiratory syndrome (SARS) 95, 98
- Sharpless, Barry 75
- skunks 9
- sleeping sickness 46, 47, 60
- smallpox 48, 98, 104
- snake venoms 2, 9
- solid-phase peptide synthesis 73
- South American frogs 3
- spiroindolones 57, 75
- sponges 28
- spongothymidine 29
- spongouridine 29
- statins 27
- steroids 37
- stevioside 26
- Stewart, William 98
- Streptococcus faecium* 54
- Streptomyces* 69, 70, 95
- streptomycin 30
- Strophantus gratus* 26
- structure–activity relationships 62
- substrate 12, 52
- suicide substrate 60
- sulfadoxine 94
- sustainable development goals 107
- sweet wormwood 5, 6, 7
- symbiosis 4, 10
- symptoms 46

- Tamiflu (oseltamivir) 63
- target 11, 15, 84
- target-based screening 66
- taxol 26, 59, 71
- Taxus* 71
- Taxus brevifolia* 26
- Tennyson, Alfred Lord 2
- tenofovir 92
- terpenoids 37
- tetracyclines 36, 79
- tetrahydrofolate 54
- Thoreau, Henry David 1, 5
- thromboxanes 63
- tiger bones 8
- toxicology 62
- toxins 11, 14
- trabectedin 28
- traditional medicine 19
- transpeptidases 59, 70
- transport proteins 52
- triatomid bugs 103
- tricarboxylic acid cycle 35
- Trypanosoma* 46
- Trypanosoma brucei* 46
- tsetse flies 46
- tuberculosis (TB) 44, 48, 107
- tularemia 98
- tunicates 28
- turmeric 22
- ultraviolet spectroscopy 31
- UNCED 107
- UN Conference on Sustainable Development 107
- unnatural natural products 79
- vaccination 48
- vaccines 49
- vancomycin 59
- Veber, D. F. 78
- vector-borne diseases 103
- vectors 101
- vincristine 26
- virtual screening 65
- Waksman, Selman 30, 69
- Wallace, Alfred Russell 82
- whole-genome sequencing 57
- willow bark 5
- X-ray diffraction 61
- X-ray spectroscopy 31
- Yersin, Alexandre 45
- zoonotic diseases 101, 102

*"I very much like the idea of writing something that's technically correct but intended for a general audience. I'm very impressed with the variety of topics the writer has managed to touch upon and with how technically accurate the handling of these topics has been."*

**Prof. Jon Clardy**

Harvard Medical School and Broad Institute, USA

*"This pioneering book is a powerful source of enlightenment on the vital connections between the diversity world's biological splendour and advancement of scientific knowledge. I recommend it to anyone who has an interest in sustainable development in general and environmental protection in particular."*

**Prof. Calestous Juma**

Harvard Kennedy School, USA

*"This is an excellent reading not only for researchers and students but also for general readers. The whole book is woven around the key term 'wilderness'. It covers a wide area of subjects, from ancient myth to modern molecular biology and drug design. The book is not only educational but also highly entertaining."*

**Prof. Hisao Masai**

University of Tokyo, Japan

*"Coming at the moment when the world is embarking on a new set of Sustainable Development Goals, which also must embrace both science and nature, this book can be widely recommended for anyone who wishes to think more deeply about these goals—and the future of our world."*

**Prof. Peter Singer**

University of Toronto, Canada

This book is for readers with some background in science, concerning the search for drugs, starting from molecular diversity in nature, or molecular wilderness. Natural drug molecules may be used as such, or as starting points for improved drugs through modification. Nature also provides the targets, such as essential enzymes from infectious microorganisms, from which synthetic drugs can be designed. The mechanisms of action of drugs can be discerned by studying target–drug interactions. Nature may fight back, as when microorganisms become resistant to drugs, but we can use the chemistry–biology–biodiversity interface to obtain drugs which overcome the resistance. The battle goes on, hopefully with victory for both humans and balance of nature.

This book differs from others on natural products and drugs derived therefrom in providing a broad picture on how materials and organisms from nature affect our health and how we can promote wellness from sustainably "tapping molecular wilderness". It is suitable, not only for readers interested in science and medicine but also for those with interest in policy issues concerning sustainable development, environment, and interaction of science and society in general.



**Yongyuth Yuthavong** received a first-class honours bachelor's degree in chemistry from London University and a doctoral degree in organic chemistry from Oxford University. He worked at Mahidol University and was given the "Outstanding Scientist of Thailand" award (1984) and the Nikkei Asia Prize for Science, Technology and Innovation from the Nihon Keizai Shimbun, Japan (2004) for his outstanding work on antimalarial drug targets and antimalarial development. Dr. Yuthavong is former minister of science and technology and presently deputy prime minister of Thailand.