

Contents

Preface — V

A Short Glance on Volume 2 — VII

Abbreviations and Icons — XV

1 Aliphatic Acids and Their Lactones — 1

- 1.1 Monocarboxylic and Dicarboxylic Acids — 1
 - 1.1.1 Monofluoroacetic Acid — 1
 - 1.1.2 Oxalic Acid — 4
 - 1.1.2.1 Chemistry and Metabolism — 4
 - 1.1.2.2 Occurrence — 5
 - 1.1.2.3 Toxicology — 12
 - 1.2 Lactones of Aliphatic Acids — 20
 - 1.2.1 Protoanemonin as Toxin of Buttercup Family (Ranunculaceae) — 20
 - 1.2.2 Parasorbic Acid as Toxin of Rowan Species (Sorbus Species) — 26
 - 1.2.3 Butane-4-olides as Allergens — 28
- References — 36

2 Polyynes and Alkynes — 42

- 2.1 Chemistry and Biogenesis — 42
- 2.2 Occurrence — 42
- 2.3 Pharmacology and Toxicology — 45
- 2.4 Polyynes as Toxins of Umbelliferae Family (Apiaceae) — 46
 - 2.4.1 Cicutoxin as Toxin of Hemlock Species (Cicuta Species) — 46
 - 2.4.2 Oenanthotoxin as Toxin of Water Dropwort Species (Oenanthe Species) — 50
 - 2.4.3 Bupleurotoxin as Toxin of Hare's Ear Species (Bupleurum Species) — 52
 - 2.4.4 Aethusin as Possible Toxin of Fool's Parsley (*Aethusa cynapium*) — 54
 - 2.4.5 Polyynes as Possible Toxins of Other Representatives of Umbelliferae Family (Apiaceae) — 55
- 2.5 Polyynes as Allergens of Aralia Family (Araliaceae) — 57
- 2.6 Polyynes as Possible Toxins of Aster Family (Asteraceae) — 58
- References — 62

3 Polyketides — 65

- 3.1 General — 65
- 3.2 Acylphloroglucinols — 66
 - 3.2.1 Chemistry, Biogenesis and Occurrence — 66

3.2.2	Acylphloroglucinols as Toxins of Worm Fern Species (<i>Dryopteris</i> Species) — 68
3.3	Alkylphenols — 72
3.3.1	Alkylphenols as Contact Allergens of Sumac Family and Cashew Family (<i>Anacardiaceae</i>) — 72
3.3.1.1	Chemistry, Biogenesis, Occurrence and Toxicology — 72
3.3.1.2	Alkylphenols as Contact Allergens of Poison Ivy (<i>Toxicodendron</i> Species) — 73
3.3.1.3	Alkylphenols as Contact Allergens of <i>Anacardiaceae</i> Used as Crops (Cashew Tree, Mango Tree and Brazilian Pepper Tree) — 76
3.3.2	Alkylphenols as Contact Allergens of Ginkgo Tree (<i>Ginkgo biloba</i>) — 79
3.3.3	Alkylphenols as Contact Allergens of <i>Philodendron</i> Species — 81
3.3.4	Alkylphenols as Contact Allergens of Silky Oak (<i>Grevillea robusta</i>) — 83
3.4	Alkylquinones — 84
3.4.1	Primin as Contact Allergen of Primrose Species (<i>Primula</i> Species) — 84
3.4.2	Prenylated Quinones as Contact Allergens of Waterleaf Subfamily (<i>Hydrophyllloideae</i>) — 86
3.4.3	Iris Quinones as Potential Contact Allergens of Iris Species — 87
3.5	Kava Lactones and Flavokavains as Possible Toxins of Kava Kava (<i>Piper methysticum</i>) — 88
3.6	Cannabinoids (Phytocannabinoids) — 91
3.6.1	Chemistry and Biogenesis — 91
3.6.2	Occurrence and Botany — 93
3.6.3	Pharmacokinetics — 96
3.6.4	Pharmacodynamics — 97
3.6.5	Abuse of Cannabis — 98
3.6.6	Acute Toxicity — 99
3.6.7	Chronic Toxicity — 100
3.6.8	Medical Use of Cannabis and Its Products — 102
3.6.9	Regulatory Issues — 102
3.7	Flavane Derivatives — 104
3.7.1	General — 104
3.7.2	Flavonoids — 104
3.7.2.1	Occurrence — 104
3.7.2.2	In vitro Pharmacological Investigations — 105
3.7.2.3	In Vivo Pharmacological Investigations — 107
3.7.2.4	Toxicologically Important Aurons and Chalcones — 108
3.7.3	Isoflavone Derivatives — 110
3.7.3.1	General — 110
3.7.3.2	Phytoestrogens — 110
3.7.3.3	Rotenoids — 114
3.8	Tannins — 116

- 3.8.1 General — **116**
- 3.8.2 Toxicology — **119**
- References — **121**

4 Phenylpropane Derivatives — 130

- 4.1 Chemistry, Biogenesis and Occurrence — **130**
- 4.2 Methoxyphenylprop-1-ene and Methoxyphenylprop-2-ene Derivatives — **131**
 - 4.2.1 Toxicology — **131**
 - 4.2.2 Methyleugenol — **134**
 - 4.2.3 Estragole — **136**
 - 4.2.4 Safrole — **137**
 - 4.2.5 Myristicin — **140**
 - 4.2.6 Apiole — **144**
 - 4.2.7 α - and β -Asarone — **145**
- 4.3 Coumarin and Coumarin Derivatives — **148**
 - 4.3.1 Chemistry, Biogenesis and Occurrence — **148**
 - 4.3.2 Coumarin — **149**
 - 4.3.3 Dicoumarol — **155**
 - 4.3.4 Furocoumarins — **157**
 - 4.3.4.1 Chemistry and Biogenesis — **157**
 - 4.3.4.2 Occurrence — **159**
 - 4.3.4.3 Pharmacology and Toxicology — **164**
- 4.4 Lignans — **171**
 - 4.4.1 Chemistry and Occurrence — **171**
 - 4.4.2 *meso*-Nordihydroguaiaretic Acid (NDGA) — **172**
 - 4.4.3 Podophyllotoxins — **174**
 - References — **178**

5 Naphthalene and Anthracene Derivatives — 185

- 5.1 Naphthalene Derivatives — **185**
 - 5.1.1 Chemistry, Biogenesis, Occurrence and Pharmacology — **185**
 - 5.1.2 Lawsone as Naphthoquinone Dye of Henna (*Lawsonia inermis*) — **187**
 - 5.1.3 Isohexenylnaphthazarines as Allergens of Roble and Teak Tree Species (Tabebuia and Tectona Species) — **189**
 - 5.1.4 Hemerocallin, a Naphthalene Dimer as Toxin of Day Lily, Nodding Blue Lily and Blue-Flax Lily Species (Hemerocallis, Stypantra and Dianella Species) — **189**
- 5.2 Anthracene Derivatives — **190**
 - 5.2.1 Chemistry and Biogenesis — **190**
 - 5.2.2 Occurrence — **194**
 - 5.2.3 Importance of Anthracene Derivatives — **195**

- 5.2.4 Laxative Anthracene Derivatives — **196**
- 5.2.4.1 Pharmacology and Toxicology — **196**
- 5.2.4.2 Anthracene Derivatives of Buckthorn Species (*Frangula* and *Rhamnus* Species) — **200**
- 5.2.4.3 Anthracene Derivatives of Rhubarb Species (*Rheum* Species) — **203**
- 5.2.4.4 Anthracene Derivatives of Aloe Species — **207**
- 5.2.4.5 Anthracene Derivatives of Senna Species — **209**
- 5.2.5 Anthracene Derivatives of Knotweed Species (*Polygonum* s.l. Species) and Related Polygonaceae (*Aconogonon*, *Bistorta*, *Fallopia*, *Persicaria*, *Polygonum* and *Reynoutria* Species) — **211**
- 5.2.6 Anthracene Derivatives of Dock Species (*Rumex* Species) — **214**
- 5.2.7 Photosensitizing Anthracene Derivatives — **216**
- 5.2.7.1 Anthracene Derivatives of St. John's Wort Species (*Hypericum* Species) — **216**
- 5.2.7.2 Anthracene Derivatives of Buckwheat Species (*Fagopyrum* Species) — **221**
- 5.2.8 Anthracene Derivatives as Toxins of Madder, Noni Tree and Cegadera Species (*Rubia*, *Morinda* and *Heterophyllaea* Species) — **223**
- 5.2.9 Neurotoxic Anthracene Derivatives of *Tullidora* Species (*Karwinskia* Species) — **226**
- References — **228**

6 Amino Acids — 235

- 6.1 General — **235**
- 6.2 Toxicology of Proteinogenic Amino Acids and Their Metabolites — **236**
- 6.2.1 L-Amino Acids — **236**
- 6.2.2 D-Amino Acids — **237**
- 6.3 Toxic Amino Acids with Aliphatic Base Body — **238**
- 6.3.1 Toxic Amino Acids of Vetchling Species (*Lathyrus* Species) — **238**
- 6.3.2 L-Canavanine — **242**
- 6.3.3 L-Indospicine — **246**
- 6.4 Toxic Amino Acids with Aromatic Ring — **247**
- 6.4.1 Caramboxin — **247**
- 6.5 Toxic Amino Acids with Cyclopropane Ring — **248**
- 6.5.1 Hypoglycin A — **248**
- 6.6 Toxic Amino Acids with Four-Membered Heterocyclic Ring System — **251**
- 6.6.1 L-Azetidine-2-carboxylic Acid — **251**
- 6.7 Toxic Amino Acids with Five-Membered Heterocyclic Ring System — **252**
- 6.7.1 Pyrrolidine and Oxadiazolidine Derivatives — **252**
- 6.8 Toxic Amino Acids with Six-Membered Heterocyclic Ring System — **254**
- 6.9 Toxic Amino Acids Containing Sulfur or Selen — **257**
- References — **262**

7 Amines — 268

- 7.1 General — **268**
- 7.2 Amines in Food — **268**
- 7.3 Aliphatic Amines — **272**
- 7.3.1 Guanidine Derivatives of Goat's Rue (*Galega officinalis*) — **272**
- 7.3.2 Glycosides of Methylazoxymethanol and α -Amino- β -Methylamino-Propionic Acid of Cycads (Cycadales) — **273**
- 7.4 Phenylalkylamines — **277**
- 7.4.1 Phenylalkylamines of Peyotl (*Lophophora williamsii*) — **277**
- 7.4.2 Phenylalkylamines of Khat (*Catha edulis*) — **279**
- 7.4.3 Phenylalkylamines of Ephedra Species — **282**
- 7.4.4 Amids of Vanillyl Amine as Neurotoxins of Paprika (Capsicum Species) — **285**
- 7.4.5 Phenylalkylamines of Banana (Musa Species) — **288**
- 7.5 Indolylalkylamines — **290**
- 7.5.1 Indolylalkylamines as Components of South American Narcotic Drugs — **290**
- 7.5.2 Indolylalkylamines of Other Plants — **293**
- 7.6 Imidazolylalkylamines — **293**
- References — **295**

8 Cyanogenic Compounds — 300

- 8.1 Cyanogenic Glycosides — **300**
- 8.1.1 Chemistry — **300**
- 8.1.2 Biogenesis — **303**
- 8.1.3 Occurrence — **304**
- 8.1.4 Toxicology — **305**
- 8.1.5 Cyanogenic Glycosides as Toxins of Rose Family (Rosaceae) — **307**
- 8.1.6 Cyanogenic Glycosides as Toxins of Legume Family (Fabaceae) — **316**
- 8.1.7 Cyanogenic Glycosides as Toxins of Sweet Grasses (Poaceae) — **318**
- 8.1.8 Cyanogenic Glycosides as Toxins of Spurge Family (Euphorbiaceae) — **319**
- 8.1.9 Cyanogenic Glycosides as Toxins of Seed Flax (*Linum usitatissimum*) — **322**
- 8.1.10 Cyanogenic Glycosides as Toxins of Caprifoliaceae, Aquifoliaceae, Araceae, Juncaginaceae, Ranunculaceae and Passifloraceae — **323**
- 8.2 Cyanolipids — **326**
- References — **329**

9 Glucosinolates — 334

9.1 Chemistry and Metabolism — **334**

9.2 Biogenesis — **339**

9.3 Occurrence — **340**

9.4 Pharmacology and Toxicology — **341**

9.5 Health Benefits — **344**

9.6 Breakdown Products of Glucosinolates as Possible Toxins of
Cruciferous Plants (Brassicaceae) — **347**

9.7 Breakdown Products of Glucosinolates as Possible Toxins of Caper
Family (Capparaceae) and of Tropaeolaceae — **355**
References — **356**

10 Aliphatic Nitro Compounds — 360

10.1 Chemistry and Biogenesis — **360**

10.2 Occurrence — **361**

10.3 Toxicology — **365**

References — **366**

Cross-Chapter Literature and Further Reading — 369

Poison Information Centers — 377

Index — 379