A Short Glance on Volume 2

Whereas Volume 1 of the book series 'Natural Poisons and Venoms' focused on general aspects of toxicology and on poisonous terpenes and steroids from plants, this Volume 2 deals with toxic representatives of other N-free substance classes: aliphatic acids, polyynes, polyketides, phenylpropane derivatives, naphthalene, and anthracene derivatives. It is completed by chapters on several N-containing groups of compounds: amino acids, amines, cyanogenic compounds, glucosinolates, and nitro compounds. Volume 3 will cover toxic alkaloids and lectins, representatives of the other important groups of N-containing compounds produced by plants.

Among the aliphatic acids, monofluoroacetic acid is very dangerous for animals in tropical regions. Oxalic acid, produced by several food plants or in the metabolism of human beings, can promote the formation of kidney stones. Lactones of aliphatic acids, e.g., the toxins of the buttercup family, irritate the skin and mucous membranes, and butane-4-olides from tulips act as allergens.

Polyynes are the toxins of some very famous poisonous plants, e.g., from water hemlock. The C_{17}-dien-alcoholes of this plant and some other Apiaceae inhibit the action of the neurotransmitter γ-aminobutyric acid (GABA) and may lead to deadly epileptic convulsions. Noteworthy are allergenic polyynes of some Asteraceae and Araliaceae and phototoxic thiophen derivatives of marygold species.

Polyketides are a very large class of substances that have a high structural and pharmacological diversity. The following should be highlighted: strong allergens of the sumac family; compounds from Kava-Kava whose hepatotoxicity is questionable; phytoestrogens as ingredients of widely used soy and tannins that can impair the digestion and thus the growth of farm animals. In connection with the broad discussion about the possible legalization of Cannabis, the active ingredients of hemp are of particular interest.

The toxicological relevance of some phenylpropane derivatives found in essential oils, e.g., of estragole, is currently the subject of intense debate. Coumarin is probably more toxic to rodents than it is to people. Furocoumarins are highly phototoxic. After contact of the skin with the plants containing such compounds, severe burns can occur with simultaneous exposure to sunlight. Lignans are of low acute toxicity. Some lignan containing preparations may lead, chronically used, to hepatotoxicity.

Among the naphthalene derivatives, hemerocallin, isolated from underground parts of day lilies, has strong neurotoxic effect.

Plants containing 1,8-dihydroxyanthracen glycosides, e.g., Senna species, are often used laxatives. Because of toxicological reasons it is necessary to avoid overdoses and longtime use. St. John's wort is not only interesting because of its antidepressive activities but also because of possible interactions with some drugs with a narrow therapeutic index. The phototoxic effects of the naphthodianthrone hypericin contained in the plants particularly affect grazing animals. Neurotoxic anthracene derivatives have been isolated from *Karwinskia humboldtiana*, known as tullidora.

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Some amino acids have the character of secondary substances and are toxicologically significant. Worth mentioning are, e.g., the lathyrogenic amino acids of Lathyrus species, vetchling, caramboxin from star fruits, and hypoglycin A from the fruits of *Blighia sapida*, akee, that caused hypoglycemic encephalopathy in children. Hypoglycin A has also been found in unripe litchee fruits.

Amines include many pharmacologically highly active representatives, e.g., the psychoactive compounds cathinone from khat, mescaline from peyotl, or ingredients of the South American preparation Ayahuasca. Ephedrine from Ephedra species and the capsaicinoids from paprika also belong to this class of substances. Some amines in our nutrition can cause migraine attacks (tyramine, phenylethylamine) or food intolerances (histamine).

The occurrence of cyanogenic glycosides in the seeds of the rose family and their mechanism of action is widely known. We inform also about chronic poisonings due to not sufficiently detoxified crops, like cassava tubers, and about the dangers from cyanogenic glycosides in grasses and other forage crops for animals.

One chapter of this volume covers glucosinolates and their cleavage products. While the intact compounds are pharmacologically inactive, the very different cleavage products exhibit a variety of both toxicologically significant and health-promoting effects. In addition to the long-known irritant effects on skin and mucous membranes, digestive and antimicrobial activities, effects on the thyroid gland and anticarcinogenic effects, e.g., of sulforaphane, have been found and their mechanisms clarified.

This and other examples underscore that many substances originally noticed as poisons can have interesting health-promoting and therapeutically valuable properties.