

# Active Principles of Medicinal Plants

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# Alkaloids

- **Basic, nitrogenous** substances.
- **Insoluble in water**, less soluble in alcohol, soluble in ether, chloroform and oils.
- Form water soluble crystalline salts with acids.
- Mostly derived from plants. Exception - Epinephrine (obtained from adrenal medulla).

# Alkaloids

contd...

<b>Alkaloid</b>	<b>Source</b>	<b>Action</b>
Atropine	<i>Atropa belladonna</i>	Anticholinergic
Arecholine	<i>Areca catechu</i>	Cholinergic
Caffeine	<i>Coffea arabica</i>	Cortical & CVS stimulant
Cocaine	<i>Erythroxylon cocoa</i>	Local anaesthetic & CNS stimulant
Emetine	<i>Cephalis ipecacuanha</i>	Reflex emetic
Morphine	<i>Papaver somniferum</i>	Narcotic analgesic
Nicotine	<i>Nicotiana tabacum</i>	Ganglionic stimulant/ blocker
Physostigmine	<i>Physostigma venenosum</i>	Anti-AChE
Reserpine	<i>Rauwolfia serpentina</i>	Antihypertensive
Strychnine	<i>Strychnos nuxvomica</i>	Spinal stimulant/ convulsant

# Glycosides

- Compounds containing a sugar (**glycone**) and a non-sugar (**aglycone or genin**) part joined together through an **ester linkage**. So, these are sugar esters.
- The **pharmacological action** resides in the **aglycone/genin**.
- **Glycone** part determines **solubility, tissue permeability and duration of action** of aglycone.
- Glycosides do not form salt with acids. On acid, alkali or enzyme **hydrolysis**, the glycosides **break into two parts** i.e. glycone and aglycone.

# Glycosides

contd...

Category	Glycoside	Source
Cardiac glycosides	Digitoxin, Gitoxin,	<i>Digitalis lanata/ purpurea</i>
	Digoxin & Gitalin	(leaves)
	Strophanthin	<i>Strophanthus gratus</i> (seeds)
	Ouabain	<i>Urginea maritima</i> (bulb)
Cyanogenic glycosides	Amygdalin	<i>Prunus amygdalus</i>
	Dhurrin	<i>Sorghum vulgare</i>
	Linamarin	<i>Linum usitatissimum</i>
Miscellaneous glycosides	Mangeferin (Hepatoprotective/ Antioxidant)	<i>Manifera indica</i> (Leaves, fruit)
	Swertiamarin (Cardiotonic/ Hepatoprotective)	<i>Swertia chirata</i> (Stem, leaves)

# Glycosides

contd...

Glycoside	Genin	Sugar (s)
Digitoxin	Digitoxigenin	3 molecules of digitoxose
Gitoxin	Gitoxigenin	3 molecules of digitoxose
Gitalin	Gitalligenin	3 molecules of digitoxose
Digoxin	Digoxigenin	3 molecules of digitoxose
Digitalin	Gitoxigenin/ Digitaligenin	1 molecule of digitalose + 1 molecule of glucose
Digitonin	Digitogenin	4 molecules of galactose + 1 molecule of xylose
Gitonin	Gitogenin	3 molecules of galactose + 1 molecule of pentose

# Oils

These are of two types: Fixed oils and Volatile oils.

## Fixed oils:

- These are **glycerides of oleic, palmitic and stearic acids**.
- Many fixed oils have **food value (i.e. cooking oils)**. e.g. corn, ground nut, sunflower, mustard, soybean, coconut, palm oils etc.
- Cooking oils are pharmacologically inert and serve as vehicle for fat soluble vitamins.
- Some others have pharmacological actions.

Fixed oils	Source	Pharmacological action
Castor oil	<i>Ricinus communis</i>	Purgative
Linseed oil	<i>Linum usitatissimum</i>	Demulcent, vehicle, purgative
Croton oil	<i>Croton tiglium</i>	Drastic purgative

# Oils

contd...

## Volatile oils:

- Also known as **Aromatic, Essential, Ethereal** or **Flavouring oils**.
- These have no food value.
- These are volatile and emit characteristic odour while evaporation.
- Most of these have medicinal values.

### Volatile oils

Eucalyptus oil

Ginger oil

Turpentine oil

Clove oil

Pippermint oil

Asafoetida oil

### Source

*Eucalyptus globulus*

*Zingiber officinale*

*Cedrus deodara*

*Eugenia caryophyllus*

*Mentha piperata*

*Ferula foetida*

### Pharmacological action

Expectorant, Rubefacient

Stomachic, Carminative

Counterirritant, Astringent

Analgesic, Antiseptic

Antiseptic, Antiemetic

Carminative, Anthelmintic



# Resins

- These are brittle, amorphous compounds formed from oxidation or polymerization of terpene components of volatile oils.
- These are insoluble in water, soluble in alcohol and other organic solvents.
- Form soap with alkali.

Resin	Source	Pharmacological action
Colophonium	Residue left after distillation of crude turpentine	Antiseptic, styptic, astringent
Podophylline	Dried rhizome & root of <i>Podophyllum emodi</i> .	Purgative, sialic, cholagogue, antimitotic (anticancer).

# Oleoresins

## Oleoresins:

✓ These are mixtures of volatile oils, gums and resins.

Oleoresin	Source	Pharmacological action
Asafoetida	Secretion from root of <i>Ferula foetida</i>	Carminative, antispasmodic

## Balsams:

✓ **These** are also considered as oleoresins. These contain an aromatic acid, resin and volatile oil.

Balsam	Source	Pharmacological action
Balsam of Tolu	Secretion from trunk of <i>Myroxylon toluiferum</i>	Expectorant, antiseptic
Balsam of Peru	Secretion from trunk of <i>Myroxylon pereoi</i>	Antiseptic, acaricide

# Gums

- These are **polysaccharide secretory products** of plants capable of forming **thick mucilaginous colloids** when mixed with water.
- Gums are **pharmacologically inert** with no systemic effects, but **exert demulcent action** on surfaces and are mainly used as **suspending or emulsifying agents in pharmacy**.

Gum	Source	Pharmacological action
Agar	Colloidal carbohydrate from sea weeds	Bulk purgative
Gum acacia	<i>Acacia senegal</i>	Demulcent, emulsifier
Gum arabica	<i>Acacia arabica</i>	Demulcent, emulsifier
Gum tragacanth	<i>Astragalus gummifier</i>	Demulcent, emulsifier

# Saponin

- These are non-nitrogenous substances soluble in water which form foam or froth when shaken with water.
- Saponins upon hydrolysis, split into a sugar and a non-sugar (sapogenin), hence considered as a subclass of glycosides.
- Saponins cause haemolysis of blood.
- Examples - Quillaris, Senega etc.

# Tannins

- These are **water soluble, non-nitrogenous** plant constituents having characteristic **astringent** action (precipitation of protein) upon mucous membrane.
- These exert a **protective action on the mucosa (GI) against irritants**.
- Tannins also **inactivate alkaloidal poisons**.

Tannin	Source	Pharmacological action
Catechu	<i>Uncaria gambier</i>	Astringent, Precipitates alkaloids
Kino	<i>Pterocarpus marsupium</i>	Astringent, Precipitates alkaloids
Galla (Galls)	<i>Quercus infectoria</i>	Astringent, Antiseptic, Antisialic.

**Thank You**

