

PHARMACOGNOSY-II

UNIT 2 NOTES

- Alkaloids
- Phenylpropanoids and Flavonoids
- Steroids, Cardiac Glycosides & Triterpenoids
- Volatile Oils
- Tannis
- Resins
- Glycosides
- Iridoids, Other Terpenoids & Naphthaquinones



NOTES AVAILABLE AT :



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ALKALOIDS

- Alkaloids are a large group of naturally occurring organic compounds that mostly contain basic nitrogen atoms.
- The term Alkaloid was coined by the pharmacist W. Meissner in 1819.
- They found primarily in plants are known for their potent physiological effects in humans and animals.
- They include well known substances like caffeine, nicotine, morphine, quinine & codeine.
- They often have bitter tastes and are used in medicinal, agricultural & various other industries due to their pharmacological properties, such as pain relief, stimulation & antibacterial effects.

Classification Of Alkaloids

Alkaloids are mainly classified into 3 categories :

- ① True Alkaloids
- ② Proto Alkaloids
- ③ Pseudo Alkaloids

True Alkaloids

- These are the alkaloids that contains Nitrogen atom in its heterocyclic ring and derived from amino acids.
- e.g., Morphine, Nicotine.

Proto - Alkaloids

- They contain nitrogen & derived from amino acids but nitrogen atom is not a part of heterocyclic ring.
- e.g. ephedrine.

Pseudo Alkaloids

- These are the alkaloids not derived from amino acids but have similar structure & biological activities.
- e.g. caffeine

CHEMICAL TEST FOR ALKALOIDS

- | | | | |
|----------------------|----------------------------------|---|----------------------|
| • Dragendorff's Test | : Filtrate + Dragendorff Reagent | → | Brown ppt. |
| • Mayer's Test | : Filtrate + Mayer's Reagent | → | Yellow ppt. |
| • Hager's Test | : Filtrate + Hager's Reagent | → | Yellow ppt. |
| • Wagner's Test | : Filtrate + Wagner's Reagent | → | Reddish - Brown ppt. |

① VINCA

- Synonyms : Vinca Rosea, Catharanthus, Sadabahar
- Biological Sources : It is dried whole plant of Catharanthus Roseus
- Family : Apocynaceae
- Geographical Sources : India, Australia, South Africa, U.S.A., Europe, Australia etc.
- Characteristics :
 - Colour : leaves are green
Roots are pale grey
Flowers are violet -pink coloured.
 - Taste : Bitter
 - Solubility : Soluble in organic solvents like Alcohol
- Chemical Constituents :
 - Vinblastine
 - Vincristine
 - Alkaloidine
 - Serpentine
- Therapeutic Uses :
 - Vinblastine is an anticancer agent used to treat Hodgkin's Lymphoma, Testicular Cancer, Breast Cancer etc.
 - Vincristine is a cytotoxic compound & used to treat leukemia.
 - Alkaloidine used as a hypotensive agent.
 - Serpentine has sedative & antihypertensive agent.

② **RAUWOLFIA**

- Synonyms : Sarpagandha , Chandrika , Chhotachand , Indian Snake Root
- Biological Sources : It is the dried roots of plant Rauwolfia Serpentina .
- Family : Apocynaceae
- Geographical Sources :
 - Pakistan
 - Bangladesh
 - Sri Lanka
 - India
 - Gujarat
 - Maharashtra
 - Karnataka
 - Tamilnadu
 - Bihar
- Characteristics :
 - Colour : Root is yellow to brown & wood is pale coloured
 - Odour : Odourless
 - Taste : Bitter
 - Shape : Roots are cylindrical shaped
- Chemical Constituents :
 - Reserpine
 - Almaline
 - Serpentine
 - Serpentinine
 - tetrahydroserpentine
 - Rauvoscine

- Therapeutic Uses :
 - Hypnotic
 - Sedative
 - Antihypertensive Agent
 - Antiarrhythmic Agent

③ **BELLADONA**

- Synonyms : Belladonna Leaf , Deadly Night Shade Leaf
- Biological Sources : Belladonna consist of dried leaves and flowering tops of *Atropa Belladonna*.
- Family : Solanaceae
- Geographical Sources :
 - Europe
 - North America
 - Canada
 - India
- Chemical Constituents :
 - Atropine
 - Hyoscyamine
 - Scopolamine
- Characteristics :
 - Colour : Green to brownish green
 - Odour : Characteristics
 - Taste : Bitter
 - Solubility : Soluble in Organic Solvents.
- Uses :
 - Anticholinergic Agent
 - Antidote in opium poisoning
 - Sedative & Hypnotics
 - Pain Relief
 - Treatment of Peptic Ulcer , Digestive Disorders etc.

④ OPIUM

- Synonym : Poppy, Poppy Latex
- Biological Source : It is obtained from unripe seed pods of *Papaver Somniferum*
- Family : *Papaveraceae*
- Geographical Sources :
 - Turkey
 - Russia
 - India
 - Afghanistan
 - Myanmar
 - China
- Characteristics :
 - Colour : Brown
 - Odour : Characteristic
 - Taste : Bitter
 - Toxicity : Toxic in nature
 - Solubility : Organic Solvents.
- Chemical Constituents :
 - Morphine
 - Codeine
 - Narcoine
 - Papaverine
 - Noscapine
 - Thebaine

Therapeutic Uses

- Analgesic (pain relief)
- Antitussive (cough)
- Sedative
- Muscle Relaxants
- Emetics
- Treatment of Diarrhoea

PHENYLPROPANOIDS & FLAVANOIDS

- Phenylpropanoids are a diverse class of organic compounds derived from amino acid Phenylalanine.
- These compounds are characterized by a phenyl ring (benzene ring) with a three carbon side chain and are commonly found in plants.
- Flavanoids are a class of plant-derived compounds known for their diverse biological activities, nutritional value & potential health benefits.
- Flavanoids consist of Two aromatic rings & a three carbon chain.

① LIGNANS

- Synonyms : Phytoestrogens , Pinorescinol
- Biological Source : They are obtained from wide variety of plant based food including seeds , whole grain fruits & vegetables such as Flaxseeds, Nuts etc.
- Family : Berberidaceae
- Geographical Sources :
 - North America
 - Asia
 - Europe
 - South America

- Characteristics :
 - They are soluble in organic solvents
 - They exhibit strong antioxidant property
 - Also contain estrogenic property
- Chemical Constituents :
 - Pinorescinol
 - Etoposide
 - Metarescinol
- Therapeutic Uses :
 - Used as Anticancer & Antiviral Agent
 - Preservatives in food, Agriculture etc.
 - Anti-inflammatory & Antioxidant Therapy

② TEA

- Synonyms : *Camelia Thea* , *Folia Thea*
- Biological Source : Tea is obtained from prepared leaves & leaf buds of *Thea Sinensis* .
- Family : *Theaceae*
- Geographical Source :
 - India
 - China
 - Japan
 - Sri Lanka
 - Kenya
 - Taiwan
- Characteristics :
 - Types : Black Tea , Green Tea , White Tea , Oolong Tea
 - Odour : Characteristics
 - Antioxidant Rich
- Chemical Constituents :
 - Caffeine
 - Theobromine
 - Theophylline
 - Tannin
- Therapeutic Uses :
 - Stimulant effect on Nervous System
 - Antioxidant
 - Anti - Inflammatory Agent

③ RUTA

- Synonyms : Rue, Herb of Grace
- Biological Source : It is obtained from dried leaves & roots of Ruta Graveolens.
- Family : Rutaceae
- Characteristics :
 - Leaves : Blu-Green Colour
 - Flowers : Yellow
 - Odour : Strong Pungent
 - Stem : Slim, smooth, pale green
- Geographical Sources :
 - North Africa
 - Western Asia
 - Southern Europe
- Chemical Constituents :
 - Rutin
 - Rutarin
 - Rutaecarpine
 - Graveoline
- Therapeutic Uses :
 - Antimicrobial Agent
 - Anti-Inflammatory Effect
 - Anti-Oxidant
 - Anticancer
 - Menstrual Regulation

STERIODS

- Plant Steroids are diverse group of naturally occurring organic compounds and are characterized by their ring like structure
- They are lipids and plays important roles in various biological processes, including:
 - ① Hormone regulation
 - ② Cell membrane structure & function
 - ③ Metabolic Pathways

CARDIAC GLYCOSIDES

- Cardiac Glycosides are a type of secondary metabolite that are derived from plants and have specific biological activity on the heart.
- They are Glycosides, which means they consist of a sugar moiety linked to a non-sugar moiety i.e. Glycon & Aglycon part.
- They are widely used in treatment of Congestive Heart Failure.
- They increase the force of heart muscle contractions.

TRITERPENOIDS

- Triterpenoids are a class of secondary metabolites that are derived from plants and are characterized by their terpenoid structure.
- They are composed of six isoprene units (C₃₀) & have diverse range of biological activities.
- They have various pharmacological activities, including
 - ① Anti-Inflammatory Agent
 - ② Antimicrobial Agent
 - ③ Antioxidant
 - ④ Anticancer Agent

① LIQUORICE

- Synonyms : Mulethi , Sweet Root
- Biological Source : Liquorice is derived from the roots of 'Glycyrrhiza Glabra Plant'.
- Family : Leguminosae
- Geographical Sources :
 - India
 - China
 - Iran
 - Russia
 - Spain
- Characteristics :
 - Colour : Greyish brown to dark brown
 - Taste : Sweet
 - Odour : Characteristic
 - Shape : long, straight nearly cylindrical
- Chemical Constituents :
 - Glycyrrhizin
 - Iiquiritin
 - Isoliquiritin
- Therapeutic Uses :
 - Sweetening Agent
 - Expectorant
 - Anti-inflammatory Agent
 - Antiviral & Antimicrobial Agent
 - Flavouring Agent for tobacco

② DIOSCOREA

- Synonyms : Yam, kins , Singli - Mingli
- Biological Source : It is obtained from several species of Dioscorea like Dioscorea Deltoidea , Dioscorea composita
- Family : Dioscoreaceae
- Geographical Sources :
 - North America
 - Japan
 - China
 - India
 - Nepal
- Characteristics :
 - Leaves : Green Heart Shaped
 - Colour : Slightly brown
 - Odour : Odourless
 - Taste : Bitter
 - Shape : Cylindrical
- Chemical Constituents :
 - Diosgenin
 - Epismilagenin
 - Yamogenin
- Uses :
 - Precursors for synthesis of corticosteroids , sex hormones & oral contraceptives .
 - Anti - inflammatory Agent
 - Treatment of Rheumatoid Arthritis

③ **DIGITALIS**

- Synonyms : Foxglove
- Biological Source : It is obtained from dried leaves of plant
Digitalis Purpurea & *Digitalis lanata*
- Family : Scrophulariaceae
- Geographical Sources :
 - England
 - France
 - Germany
 - North America
 - India
- Characteristics :
 - Colour : Greyish Green
 - Odour : Characteristics
 - Taste : Bitter
 - Flowers : Purple , Pink or white Coloured
- Chemical Constituents :
 - Digoxin
 - Digitoxin
- Uses :
 - Primarily used in treatment of CHF.
 - Treatment of Atrial Fibrillation
 - Helps control Heart Rate

VOLATILE OILS

- Volatile oils, also known as Essential Oils, are aromatic compounds extracted from plants.
- They are called 'volatile' because they evaporated easily when exposed to air, giving off strong fragrances.
- These oils are typically found in specialized plant tissues & are stored in various parts like flowers, leaves, seeds, roots etc.
- They are complex mixture of terpenoids, phenols, aldehydes, ketones & other organic compounds, each contributing to their unique odour & medicinal properties.
- They are used in pharmacognosy for their therapeutic effects, such as antimicrobial, anti-inflammatory, analgesic and sedative properties.

Drugs

- Mentha
- Clove
- Cinnamon
- Fennel
- Coriander

① MENTHA

- Synonyms : Mint , Mentha Oil , Peppermint , Water Mint
- Biological Source : The oil is obtained by the steam distillation of fresh flowering tops of the plant 'Mentha Piperita'.
- Family : Labiatae
- Geographical Sources :
 - Japan
 - England
 - France
 - Italy
 - U.S.A.
- Characteristics :
 - Colour : Colourless to Yellow
 - Odour : Characteristics & Pleasant
 - Solubility : Soluble in 70% alcohol , ether and chloroform
 - Cooling Effect
- Chemical Constituents :
 - Menthol
 - Menthone
 - Isomenthone
 - Luteoline
 - Limonene
 - Rosmarinic Acid
 - Carvone

- Therapeutic Uses :
 - Helps relieve indigestion & gas .
 - Analgesic Agents
 - Antimicrobial Effects
 - Commonly used for stress relief
 - Used as Flavouring Agents .

② CLOVE

- Synonyms : Clove Flower , *Eugenia Caryophyllata*
- Biological Source : It is the dried flowers obtained from the plant '*Eugenia Caryophyllus*'.
- Family : *Myrtaceae*.
- Geographical Sources :
 - India
 - Sri Lanka
 - Zanzibar
 - Indonesia
- Characteristics :
 - Colour : Dark brown or dusky red
 - Odour : Strongly Aromatic
 - Taste : Pungent & Aromatic
- Chemical Constituents :
 - Eugenol
 - Tanning
 - Vanillin
 - Eugenol Acetate
- Uses :
 - Analgesic Properties
 - Antimicrobial Activity
 - Anti- Inflammatory Agent
 - Digestive Aid
 - Antioxidant
 - Aromatic & Antiseptic

③ CINNAMON

- Synonyms : Dalchini , Cinnamon Bark , Ceylon Cinnamon
- Biological Source : It is obtained from dried inner bark of 'Cinnamomum Zeylanicum'
- Family : Lauraceae
- Geographical Sources :
 - Sri Lanka
 - India
 - Indonesia
 - Brazil
 - China
- Characteristics :
 - Colour : Dull yellowish brown
 - Odour : Fragrant
 - Taste : Sweet & Spicy
- Chemical Constituents :
 - Cinnamaldehyde
 - Eugenol
 - Benzaldehyde
 - Cuminaldehyde
 - Quercetin
- Uses :
 - Antiinflammatory Agent
 - Antidiabetic Agent
 - Antioxidant
 - Antimicrobial Agent
 - Digestive Aid

④ FENNEL

- Synonyms : Sweet fennel , fennel fruit , Saunf .
- Biological Source : It is the dried fruit obtained from the plant ' *Foeniculum Vulgare*'
- Family : Umbelliferae
- Geographical Sources :
 - India
 - France
 - Russia
 - Japan
- Characteristics :
 - Colour : Greenish Brown
 - Odour : Aromatic
 - Taste : Distinct Sweet
 - Shape : Slightly Curved & Oval
- Chemical Constituents :
 - Limonene
 - Anethole
 - Fenchone
 - Estragole
- Uses :
 - Digestive Aid
 - Anti- Microbial Agent
 - Anti- Inflammatory Agent
 - Antioxidants
 - Stimulants
 - Expectorants

⑤ CORIANDER

- Synonyms : Coriander Sativum, Dhania, Chinese Parsley
- Biological Source : It is dried fruit obtained from plant 'Coriandrum Sativum'
- Family : Umbelliferae
- Geographical Sources :
 - India
 - Egypt
 - Morocco
 - Russia
 - Holland
- Characteristics :
 - Colour : Yellowish brown
 - Odour : Aromatic
 - Taste : Spicy
 - Shape : Round
- Chemical Constituents :
 - Linalool
 - Quercetin
 - Geraniol
- Uses :
 - Digestive Aid
 - Antimicrobial Agent
 - Anti-inflammatory Agent
 - Antidiabetic Agent
 - Flavouring Agent

TANNINS

- Tannins are class of naturally occurring compounds found in many plants, characterized by their astringent, bitter & complexing properties.
- They are polyphenolic compounds that precipitate proteins, alkaloids & other organic compounds, forming insoluble complexes
- Their therapeutic potential is explored in various traditional & modern medicine application, particularly for their role in wound healing, gastrointestinal health & as astringents.

① CATECHU

- Synonyms : katha, Cutch, Black Catechu
- Biological Source : Catechu is derived from the heartwood of the tree *Acacia catechu*
- Family : Leguminosae
- Geographical Sources :
 - India
 - China
 - Bangladesh
 - Myanmar
 - Thailand
 - Indonesia
 - Egypt

- Characteristics :
 - Colour : Dark reddish- brown colour
 - Odour : Odourless
 - Taste : Bitter
 - Solubility : Water & Alcohol
- Chemical Constituents :
 - Catechin
 - Quercetin
 - Fluoroscein
 - Catechu Tannic Acid
- Uses :
 - Antimicrobial Agent .
 - Wound Healing .
 - Anti- inflammatory Agent .
 - Treatment of Diarrhoea .

② PTEROCARPUS

- Synonyms : Indian Kino Tree, Red Sandalwood
- Biological Source : Pterocarpus is the dried Juice of plant ' Pterocarpus Marsupium '.
- Family : Leguminosae
- Geographical Sources :
 - India
 - Myanmar
 - Thailand
 - Africa
- Characteristics :
 - Colour : Ruby-red
 - Odour : Odourless
 - Taste : Astringent
 - Solubility : Alcohol
- Chemical Constituents :
 - kinotannic acid
 - Gallic Acid
 - Quercetin
 - kaempferol
- Uses :
 - Anti-inflammatory Agent
 - Anti-oxidant
 - Anti-microbial Agent
 - Treatment of Diarrhoea
 - Wound Healing

RESINS

- Resins are a class of naturally occurring, viscous and amorphous substances produced by plants and characterized by their sticky, adhesive & protective properties.
- They are complex- high-molecular weight mixtures of organic compounds, primarily composed of terpenes, phenols, fatty acids, secreted by plants in response to injury, infection and environmental stress

Drugs

- Benzoin
- Guggul
- Ginger
- Asafoetida
- Myrrh
- Colophony

① **BENZOIN**

- Synonyms : Loban , Gum Benzoin , Benzoic Resin
- Biological Source : Benzoin is derived from resins of trees belonging to *Styrax benzoin* tree .
- Family : *Styracaceae*
- Geographical Sources :
 - Thailand
 - Indonesia
 - Malaysia
 - Vietnam
- Characteristics :
 - Colour : Yellowish brown
 - Odour : Vanilla like
 - Taste : Sweet
 - Solubility : Alcohol
- Chemical Constituents :
 - Cinnamic Acid
 - Benzoic Acid
 - Vanillin
 - Phenolic Acids
 - Styrol
 - Styracin
- Uses :
 - Antiseptic
 - Expectorant
 - Wound Healing
 - Anti-inflammatory Agent

② GUGGUL

- Synonyms : Devadhupa, Guggulsterone, Mukul Myrrh
- Biological Source : It is derived from resin of plant 'Commiphora Mukul'.
- Family : Burseraceae
- Geographical Sources :
 - India
 - Pakistan
 - Bangladesh
 - Africa
- Characteristics :
 - Colour : Yellowish brown
 - Taste : Bitter
 - Odour : Aromatic
 - Solubility : Alcohol
- Chemical Constituents :
 - Guggulsterones
 - Commiphoric Acid
 - Mukulol
 - Farnesol
- Uses :
 - Treatment of Arthritis
 - Anti-inflammatory Agent
 - Antioxidant
 - Weight Management
 - Cholesterol - lowering agent.

③ **GINGER**

- Synonyms : Zingiber , Adrak , Sheng Liang
- Biological Source : Ginger is derived from rhizome of plant ' Zingiber officinale '
- Family : Zingiberaceae
- Geographical Sources :
 - India
 - China
 - Nigeria
 - Indonesia
 - Japan
- Characteristics :
 - Colour : Yellowish- brown
 - Odour : Aromatic
 - Taste : Spicy
- Chemical Constituents :
 - Gingerols
 - Shogaol
 - Zingiberene
 - bisabolol
- Uses :
 - Anti - inflammatory Agent
 - Digestive Aid
 - Antioxidant
 - Antimicrobial Agent
 - Pain Relief

④ **ASAFOETIDA**

- Synonyms : Hing, Devil's Dung, Asafetida
- Biological Source : It is derived from the resin obtained from the roots of plant 'Ferula Asafoetida'
- Family : Umbelliferae
- Geographical Sources :
 - India
 - Iran
 - Afghanistan
 - Pakistan
- Characteristics :
 - Colour : Yellowish- white
 - Odour : Intense Strong, pungent
 - Taste : Bitter, Acidic
- Chemical Constituents :
 - Ferulic Acid
 - Quercetin
 - Asafoetidic Acid
 - Essential Oils
- Uses :
 - Digestive Aid
 - Anti - Inflammatory Agent
 - Antimicrobial Agent
 - Menstrual Relief

⑤ **MURRH**

- Synonyms : Myrrh Gum, Arabian Myrrh
- Biological Source : It is derived from resins of tree *Commiphora Molle*
- Family : Burseraceae
- Geographical Sources :
 - Africa
 - Middle East (Yemen, Oman)
 - Southern Arabia
- Characteristics :
 - Colour : Yellowish brown to reddish brown
 - Taste : Bitter
 - Odour : Aromatic
- Chemical Constituents :
 - Myrrhenol
 - Commiphoric Acid
 - Eugenol
 - Quercetin
- Uses :
 - Antimicrobial Agent
 - Anti-inflammatory Agent
 - Wound Healing
 - Digestive Aid

⑥ **Colophony**

- **Synonyms :** Rosin , Amber Resin , Colophonia
- **Biological Source :** Colophony is derived from resin of pine trees, particularly species of genus *Pinus*
- **Family :** Pinaceae
- **Geographical Sources :**
 - France
 - Germany
 - Italy
 - Turkey
 - India
 - Canada
- **Characteristics :**
 - Colour : Yellowish brown
 - Odour : Pine like
 - Sticky when heated
- **Chemical Constituents :**
 - Resin Acids
 - Resenes
 - Pimaric Acid
- **Uses :**
 - Antiseptic
 - Adhesive
 - Antimicrobial Agent
 - Antifungal Agent

GLYCOSIDES

- Glycosides are naturally occurring compounds formed by a sugar part (Glycone) bonded to a non-sugar part (aglycone) through glycosidic linkage.
- They are commonly found in plants, where they serve as secondary metabolites with a range of pharmacological properties, including anti-inflammatory, antimicrobial & anticancer properties.

DRUGS

- Senna
- Aloes
- Bitter Almond

① **SENNA**

- Synonyms : Cassia Senna , Indian Senna , Folia Senna
- Biological Source : Senna is obtained from dried leaflets of Cassia angustifolia (Indian Senna) & Cassia Acutifolia (Alexandrian Senna).
- Family : Leguminosae
- Geographical Sources :
 - India
 - Egypt
 - Sudan
 - China
 - Africa
 - Australia
- Characteristics :
 - Colour : Yellowish Green
 - Odour : Characteristics
 - Taste : Bitter
 - Leaves : Long & Thin
- Chemical Constituents :
 - Anthraquinone Glycosides
 - Sennosides A
 - Sennosides B
 - Rhein
 - Aloe- emodin
 - Chrysophanol
- Uses :
 - Laxatives & Purgative .
 - Antiinflammatory & Antioxidants .

② ALOE

- Synonyms : Aloevera, Ghritkumari, Musabab
- Biological Source : Aloe is dried juice obtained from leaves of various species of Aloe like :
 - Aloe barbadensis Miller
 - Aloe ferox miller
 - Aloe perryi miller etc.
- Family : Liliaceae
- Geographical Sources
 - India
 - Africa
 - Southern America
 - China
 - Mexico
- Characteristics :
 - Leaves : Thick & gel filled
 - Odour : Mild & Characteristics
 - Taste : Bitter
 - Colour : Brownish Yellow
- Chemical Constituents :
 - Aloin
 - Barbaloin
 - Isobarbaloin
 - Acemannan
 - Glucomannan

- Uses :
 - Skin Care
 - Wound Healing
 - Digestive Aid
 - Antiinflammatory
 - Antibacterial
 - Antifungal
 - Digestive Aid

③ BITTER ALMOND

- Synonyms : Amygdala Amara , Badam
- Biological Source : It is obtained from dried ripe seeds of plant *Prunus amygdalus* & *Prunus Communis*.
- Family : Rosaceae
- Geographical Sources :
 - India
 - Africa
 - United States
 - Spain
 - Italy
- Characteristics :
 - Colour : Brown
 - Odour : Odourless
 - Taste : Bitter
 - Shape : Flattened
- Chemical Constituents :
 - Amygdalin
 - Benzaldehyde
 - Hydrocyanic Acid
- Uses :
 - Pain Relief
 - Flavouring Agent
 - Digestive Aid
 - Antiseptic

IRIDOIDS

- Iridoids are a specific class of bioactive, naturally occurring compounds primarily derived from plants.
- They are monoterpenoid compound that includes an iridoid ring.
- Iridoids are often known for their pharmacological activities, which include anti-inflammatory, antioxidant, antimicrobial & analgesic effects.

TERPENOIDS

- Terpenoids are a large & diverse class of naturally occurring compounds derived from Terpenes, built from isoprene units.
- Terpenoids are characterized by their distinct odour and are responsible for the fragrance of many plants, including herbs, spices & flowers.
- Terpenoids play a significant role in plant defense mechanism & have a wide range of biological activities, making them important in pharmacognosy for their medicinal properties.

NAPTHAQUIONONES

- Naphthaquinones are a class of naturally occurring compounds characterized by a naphthaquinone structure, which consist of a Naphthalene Ring attached to a quinone group.
- The most common type of naphthaquinones include 1,4-naphthaquinones & 2,3-naphthaquinones.
- These compounds are often found in plants, fungi & some bacteria, & they have been recognized for their broad range of biological & pharmacological activities.

Drugs

- Gentian
- Artemisia
- Taxus
- Carotenoids

① **GENTIAN**

- Synonyms : Gentian Root, Radix, Gentianae
- Biological Source : Gentian is derived from dried partially fermented rhizome & root of yellow gentian i.e., *Gentiana Lutea*
- Family : Gentianaceae
- Geographical Sources :
 - Europe
 - Serbia
 - North America
 - China
- Characteristics :
 - Colour : Whitish Roots
 - Odour : Odourless
 - Taste : Bitter
- Chemical Constituents :
 - Gentiopicroside
 - Gentianine
 - Quercetin
 - kaempferol
 - Gentioside
- Therapeutic Uses :
 - Treatment of Indigestion, Bloating
 - Loss of Appetite
 - Anti-inflammatory Agent
 - Antioxidant
 - Antifungal

② ARTEMISIA

- Synonyms : Santonica, Wormwood, Tarragon
- Geographical Source :
 - China
 - Europe
 - North America
 - India
 - Africa
 - Russia
- Biological Source : Artemisia species are flowering plants of Artemisia brevifolia, Artemisia Maritima.
- Family : Asteraceae
- Characteristics :
 - Colours : Flowers are yellow in colour
 - Odour : Aromatic
 - Taste : Bitter
- Chemical Constituents :
 - Artemisinin
 - Quercetin
 - Rutin
 - Umbelliferone
 - Sterols
- Uses :
 - Digestive Issues
 - Anti - Inflammatory
 - Sedative

③ **TAXUS**

- Synonyms : Yew, English Yew
- Biological Source : It consist of dried leaves , bark & roots of various species of Taxus such as
 - Taxus baccata
 - Taxus brachifolia
 - Taxus Canadensis
 - Taxus cuspidate
- Family : Taxaceae
- Geographical Sources :
 - Europe
 - Bhutan
 - China
 - Korea
 - Nepal
- Chemical Constituents :
 - Taxanes
 - Terpenoids
 - Quercetin
 - Rutin
- Uses :
 - Anticancer Agent

④ **CAROTENOIDS**

- **Synonyms :** Natural Pigments, Tetraterpenoids
- **Biological Source :** They are natural plant pigments such as red, yellow and orange coloured which are abundantly available in fruit and vegetables even in fungi & bacteria.
- **Family :** They are not from biological family, as they are a class of organic compounds.
- **Geographical Sources :**
 - India
 - China
 - Japan
 - South America
- **Characteristics :**
 - Colour: Red, Yellow, Orange pigments
 - Solubility: Lipid Soluble
 - Stability: Sensitive to Heat & Light
- **Chemical Constituents :**
 - Carotenes
 - Xanthophylls
- **Uses :**
 - Vitamin A Source
 - Eye Health
 - Antioxidant
 - Skin Health

THANK YOU

FOR CHOOSING IMPERFECT PHARMACY AS YOUR STUDY PARTNER



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