

RAO MOHAR SINGH COLLEGE OF PHARMACY

PHARMACOGNOSY

D. Pharmacy First Year

Question No. 01 Describe various systems of classification of drug of natural origin with examples.

Question No. 02 Write the identification tests of the following:

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(a) Liquorice (b) Senna (c) Castor oil (d) Opium.

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(a) Rauwolfia (b) Ginger (c) Cinchona (d) Nux- vomica.

Question No. 06 Write biological source, chemical constituent and uses of the following drugs:

(a) Aloe (b) Asafoetida (c) Black pepper (d) Ipecacuanha (e) Catechu

Question No. 07 Write a short note on the uses of following drugs:

(a) Antitumour (b) Diuretics (c) Antirheumatics (d) Antiseptics & Disinfectant (e) Drugs acting on CNS

Question No. 08 (a) Write a note on any two Pharmaceuticals aids.

(b) Discuss the enzymes used in pharmaceutical industry with two examples.

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Question No. 10 Write the complete pharmacognosy of the following drugs:

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Question No. 11 Write short note on the following drugs:

(a) Shatavari (b) Shankpushpi

Question No. 12 Explain the term alkaloids. Write in details about their properties, distribution, and classification.

Question No. 13 What are carminatives? Explain the complete pharmacognosy of clove along with its diagram.

Question No. 14 What are antitussives? Explain any two drugs under this category.

Question No. 15 Write the uses of following drugs:-

(a) Belladonna (b) Garlic (c) Beeswax (d) Chaulmoogra oil (e) Ispagula

Question No. 01. Describe various systems of classification of drug of natural origin with examples.

Ans. Classification of natural drugs: The crude drugs obtain from the different sources are used in treatment of wide spectrum of diseases. For their study it is necessary to arrange them in scientific and systematic manner. For pharmacognostic study, crude drugs can be arranged according to one of the following classes: -

1) Alphabetical classification: Either the latin names or english names of drugs are considered for this purpose of classification. This classification is adopted by following books: -

- a) British Pharmacopoeia (English),
- b) British Pharmaceutical Codex (English),
- c) United States Pharmacopoeia and National Formulary,
- d) Indian Pharmacopoeia.

Disadvantages:

- 1) This type of classification does not help in distinguishing the drugs of plant, animal and mineral sources
- 2) They do not indicate whether the drugs are organised or unorganized.

Examples: Acacia, benzoin, cinchona, dill, ergot and fennel.

2) Taxonomical classification: It is a type of biological classification and restricted mainly to crude drugs, which are found from plant and animals. It indicates the phylum, class, sub-class, order, family, genus & varieties of crude drugs.

Disadvantage:

- 1) It is difficult to recognize the organized and unorganized nature of crude drugs in their morphological studies.

Examples:

Phylum	:	Spermatophyta.
Division	:	Angiospermae.
Class	:	Dicotyledons.
Order	:	Rosales.
Family	:	Leguminosae.
Genus	:	Glycyrrhiza.
Species	:	Glycyrrhiza glabra.

3) Morphological classification: In this type of classification crude drugs are divided into the parts of plant like leaves, fruits, flowers, woods, barks, dried juices, extracts etc.

Advantage:

- 1) This method is more convenient for practical study especially when the chemical nature of the drug is not clearly known.

Examples:	Parts of Plant	Drugs
	Woods	Sandalwood
	Barks	Arjuna
	Flowers	Clove
	Fruits	Lemon
	Leaves	Senna, Eucalyptus
	Seeds	Nux vomica

4) Pharmacological (Therapeutic) classification: This type of classification involves the grouping of crude drug according to their pharmacological action of their chief active constituent or their therapeutic use.

Examples:	Carminatives	:	Coriander, fennel, cinnamon.
	Purgatives	:	Senna, rhubarb, cascara, castor-oil.
	Cardiotonics	:	Digitalis, arjuna.

5) Chemical classification: The crude drugs are divided into different groups according to chemical nature of their most important constituent.

Advantage:

1) It is preferred method of study because pharmacological activity depends on the nature of the chemical constituents. So, crude drug containing alkaloids are grouped together.

Examples:	Glycosides	:	Digitalis, senna, aloe.
	Alkaloids	:	Nux - Vomica, cinchona, datura.
	Volatile oils	:	Clove, eucalyptus.
	Lipids	:	Castor oil, beeswax, cod liver oil.

6) Chemotaxonomical classification: It has been found that certain chemical constituents are characteristic of certain taxonomical classes of plant or groupings.

Example:

Volatile oils are found in plants belonging to the family Umbelliferae and Rutaceae.

Question No. 02. Write the identification tests of the following:

(a) Alkaloids (b) Glycosides (c) Tannins (d) Volatile Oil

Ans. (a) Alkaloids: Alkaloids are the inorganic complex compound generally produced from plant. They are basic in nature and containing one or more nitrogen atom usually present in heterocyclic ring and have pharmacological action on man or animals.

Identification test of alkaloids:

1) Mayer's reagent test (Potassium mercuric iodide solution):

Drug + Potassium mercuric iodine \longrightarrow Creamy solution or pale yellow precipitate

2) Wagner's reagent test (Iodine and potassium iodide solution):

Drug + Aqueous iodine solution \longrightarrow Brown or reddish brown precipitate

3) Tannic acid test (Freshly prepared tannic acid):

Drug + Freshly prepared tannic acid \longrightarrow Precipitates which are soluble in dilute acid or ammonia solution

4) Dragendorff's Reagent test (Potassium bismuth iodide solution):

Drug + Potassium bismuth iodide solution \longrightarrow Brown or reddish brown precipitate

5) Hager's Regent (Saturated picric acid solution):

Drug + Saturated picric acid \longrightarrow Yellow precipitate

Ans. (b) Glycosides: They are the organic compounds from plants & animal sources which on acid hydrolysis give one or more sugar molecules & non-sugar molecules the sugar molecule is called as glycone & non-sugar molecule is called as aglycone or genin.

Identification test of glycosides:

1) **Killer-Killiani test:** Put a sample of drug in a test tube then add 1% Ferric sulphate, 5% glacial acetic acid and 1 or 2 drops of H_2SO_4 . Blue colour represents the presence of glycosides.

2) **Legal test:** Take a small amount of drug in test tube then add few ml of pyridine, 2 drops of nitroprusside and 2 drops of 20% sodium hydroxide solution to it. Presence of deep red color is due to glycosides.

3) **Brontrager's test:** Boil the powdered drug with dilute H_2SO_4 , filtered and cooled, the filtrate is extracted with chloroform or benzene then add dilute ammonia the ammonical layer get change pink to red.

4) **Baljet test:** Glycoside with Sodium picrate gives yellow colour.

Ans. (c) Tannins: It can be broadly defined as the derivatives of polyhydroxy benzoic acid, capable of combining with proteins. Chemically tannins are of two types (i) Hydrolysable tannins (ii) Condensed tannins

Identification test of tannins:

1) **Matchstick test:** Dip the matchstick in aqueous extract of tannin and then dry it. Dried stick in presence of hydrochloric acid will produce pink color on heating.

2) **Gold beater's skin test:** When small membrane of ox intestine is soaked in 2% HCl for five minutes and skin is washed with water and dipped in ferrous sulphate solution results in black or brown color.

3) **Gelatin test:** 1% tannin solution with 10% sodium chloride and 1% gelatin solution will produce buff white colored precipitate.

4) **Phenazone test:** Extract of tannins in presence of sodium hydrogen phosphate and 2% phenazone solution on heating produce bulky precipitate.

Ans. (d) Volatile oils: These are the polymer of isoprene unit. Volatile oils have following characteristics:-

- 1) They evaporate at room temperature.
- 2) Volatile oils do not glyceryl ester.
- 3) Volatile oils do not saponify with alkali.
- 4) They distillate from with natural source.
- 5) They are not rancid on atmosphere exposure but from resins on oxidation.

Identification test

- 1) Put a drop of drug on filter paper. It will leave no spot.
- 2) On hydrolysis with water drug will give 2-methyl-1-3-butadine.
- 3) Drug with alcoholic solution of Sudan III will give red color.
- 4) In small sample of drug put a drop of tincture alkana it will give red color.

Question No. 03. Write a short note on Drug adulteration and evaluation

Ans. (a) Drug adulteration: It is broadly defined as admixture or substitution of original articles with defective, inferior or harmful substances. The reasons for adulteration are:

- 1) Scarcity (shortage) of the drug.
- 2) High price of original drug.

Following are the various methods used for drug adulteration:

- 1) Replacement by exhausted drug: This is observed in case of costly drugs such as cloves, tea.
- 2) Substitution with superficially similar but inferior drug: The common example of substitution is adulteration of cloves by mother cloves.
- 3) Substitution by artificially manufactured substances: For example artificial invert sugar is mixed with honey.
- 4) Substitution by sub-standards commercial varieties: Nux-vomica seeds are adulterated with strychnos nux-blanda.
- 5) Presence of organic matter obtained from the same plant: For example cloves are mixed with cloves stalks.
- 6) Adulteration with non-plant material: Many a times waste from the market like amber colour glass is mixed in colophony.

Evaluation: It means confirmation of its identity and determination of its quality & purity and detection of nature of adulteration. Evaluation of a drug is mainly done through five types:

- a) Morphological (Organoleptic) evaluation.
- b) Microscopic evaluation.
- c) Chemical evaluation.
- d) Physical evaluation.

e) Biological evaluation.

a) Morphological (Organoleptic) evaluation: This type of evaluation involves test carried with the help of sense organs. It refers to evaluation of drug by colour, odour, taste, size, shape and special features like touch, texture etc.

1) Color: Some drugs are green in colour when dried in shade but become pale exposure to sunlight.

2) Smell: Some drugs have characteristic smell which help in their easy identification, example: Cardamom, cinnamon, clove i.e., the drugs that contain volatile oil.

3) Taste: Drug can be evaluated by taste also, example, liquorice sweet in taste, ginger and capsicum has a pungent taste.

b) Microscopic evaluation: This evaluation is very useful in identification of different varieties of drug and its adulterants. The drug is examined under microscope which can be done after powdering or cutting a thin section of drug, i.e., cell contains starch grains, calcium oxalate, trichomes, fibers, vessels that can be studied in this evaluation. For examples: lignified trichomes in nux-vomica, glandular trichomes of mint.

This evaluation has significant role in the study of qualitative & quantitative evaluation of crude drugs. This can be achieved by specific feature such as stomatal index, stomatal number, vein islet number, palisade ratio, vein termination number. Lycopodium spore methods are used for the determination of starch grains in wheat or ginger powder.

c) Physical evaluation: It is very essential for the determination of quality and purity of drug. In this evaluation physical constants are determined, example, viscosity for drug containing gum and swelling factors for mucilage containing drugs. The various parameters used for physical evaluation of drug are:

1) Moisture content: The presence of excessive moisture content in a drug will destroy its quality due to growth of micro-organism. For example digitalis should not contain moisture content more than 5%.

2) Melting point: It is a useful parameter for determining the purity of crude drug. It is very helpful for the evaluation of solid fixed oil and waxes, example, the melting point of coca butter should be in between 30–33⁰C.

3) Refractive index: It is a ratio of velocity of light in vacuum to velocity in the substance. It is a physical constant and very useful for standardization of volatile and fixed oil.

4) Volatile oil content: Volatile oil content present in the crude drugs like clove, cardamom, rose, cinnamon etc. is determined, example, clove contains not less than 15% volatile oil.

d) Chemical evaluation: It is determination of active constituents in drug by chemical methods. The following are various methods used in chemical evaluation of crude drugs:

1) Instrumental Methods: Various types of instruments are used for evaluation of crude drugs like colorimetry, fluorimetry & spectrophotometry etc.

2) Chemical constants: Some chemical constants like acid value, iodine value & ester value are also used for the identification of fixed oil and fats etc.

3) Individual chemical test: Chemical test are also used for identifying particular drugs, example, various tests are done to detect alkaloids i.e., Mayer's reagent test, Hager's reagent test etc, Iodine test is done for detection of starch.

e) Biological evaluation: When physical or chemical means are not able to produce satisfactory result in crude drugs then the drugs are evaluated by biological methods. In this evaluation the tests are performed on living animals, animal preparations, isolated living tissues, microorganisms and intact organs and this method is known as bioassay. For example Antibiotics and vitamins are microbiologically evaluated on yeast, mold and the living bacteria. Biological evaluation is expensive, time consuming and less precise than chemical evaluation.

Question No. 04. Write biological source, chemical constituent and uses of the following drugs:

(a) Liquorice (b) Senna (c) Castor oil (d) Opium.

Ans. (a) Liquorice:

Synonym: Mulethi.

Biological source: Liquorice consists of dried peeled or unpeeled roots and stolons of *Glycyrrhiza glabra*.

Family: Leguminosae.

Chemical constituents:

- 1) It contains triterpenoid saponin known as glycyrrhizin (glycyrrhizinic acid).
- 2) It also contains asparagine, sugar, resins and fats.
- 3) It also contains starch.

Uses:

- 1) It is used as an expectorant and demulcent.
- 2) It is also used for gastric ulcers.
- 3) It is used as sweetening agent.
- 4) It is used as antispasmodic and anti-inflammatory.

(b) Senna:

Biological source: It consists of dried leaflets of *Cassia angustifolia*.

Family: Leguminosae.

Chemical constituents:

- 1) It mainly contains anthraquinone glycosides.
- 2) It also contains sennoside A, B, C, D about (2-3%).

- 3) It also contains aloe emodine, rhein, emodine.
- 4) It contains mucilage, resin and calcium oxalate.

Uses:

- 1) Senna leaves are used as laxative and cathartic.
- 2) It acts as an irritant purgative.
- 3) Powdered senna mixed with vinegar and then it used to cure skin disease.

(c) Castor oil:

Biological source: It is fixed oil obtained by cold expression of the kernels of seeds of *Ricinus communis*.

Family: Euphorbiaceae.

Chemical constituents:

- 1) It mainly contains triglyceride of ricinoleic acid (about 80 %).
- 2) Other fatty acids are isoricinoleic, linoleic, stearic & isostearic acids.
- 3) The viscosity of castor oil is due to ricinoleic acid.

Uses:

- 1) It is a well purgative & emollient in lipstick.
- 2) It is useful in ointment bases, hair fixes & perfumed hair oil.
- 3) It is used in the preparation of paints, enamel, varnishes, grease, polishes.
- 4) It is used in the contraceptive creams & jellies.

(d) Opium:

Biological source: Opium is dried latex obtained by incising of unripe capsule of *Papaver somniferum*.

Family: Papaveraceae.

Chemical constituents:

- 1) It contains more than 25 different alkaloids.
- 2) It contains morphine, codeine, thebaine, noscapine and papaverine.
- 3) It also contains other constituents like citric acid, acetic acid, tartaric acid.
- 4) It also contains protein, colouring matter and sugar.

Uses:

- 1) It causes depression action on CNS.
- 2) It is also used as sedative, analgesics and hypnotic.
- 3) It is also used as antispasmodic.
- 4) It has smooth muscle relaxant action.
- 5) It is also used in diarrhoea & dysentery.
- 6) It is used as antitussive agent.

Question No. 05. Give a detail about biological source, chemical constituent and uses of the following drugs: (a) Rauwolfia (b) Ginger (c) Cinchona (d) Nux- vomica. Ans: (a) Rauwolfia:

Biological source: It consists of dried roots & rhizomes of Rauwolfia serpentina.

Family: Apocynaceae.

Chemical constituents:

- 1) It mainly contains indole alkaloids (about 0.7 to 1.4%).
- 2) It contains reserpine, reserpinine, serpentine, serpentinine and rescinnamine.
- 3) It also contains ajmaline, ajmalicine.
- 4) It also contains fatty acid, unsaturated alcohol and sugars.

Uses:

- 1) It is used as hypotensive agent.
- 2) It is used in neuropsychiatric disorder.
- 3) It is used to increase uterine contraction.
- 4) It is also used for intestinal disorder and for cardiac arrhythmias.

(b) Ginger:

Biological source: It consists of rhizomes of Zingiber officinale.

Family: Zingiberaceae.

Chemical constituents:

- 1) Ginger contains 1 to 2% of volatile oil, 5 to 8% resinous matter, starch 56% and protein.
- 2) It contains three sesquiterpenes bisabolene, zingiberene and zingiberol.

Uses:

- 1) Ginger is used as condiment.
- 2) Ginger is used as an aromatic, carminative, flavouring agent, stimulant and stomachic.
- 3) Ginger oil is used in mouth washes, ginger beverages and liquor.

(c) Cinchona:

Biological source: It contains of dried bark of Cinchona officinalis and Cinchona calisaya.

Family: Rubiaceae.

Chemical constituents:

- 1) It contains quinoline group of alkaloids.
- 2) The most important alkaloids are quinine, quinidine, cinchonine and cinchonidine.

Uses:

- 1) It is used as antimalarial.
- 2) It is used in rheumatism.
- 3) It is used as antipyretic.
- 4) It is used as stomachic and bitter tonic.

(d) Nux-Vomica:

Biological source: It consists of dried ripe seeds of *Strychnos nux-vomica*.

Family: Loganiaceae.

Chemical constituents:

- 1) Nux Vomica contains about 1.8 to 5.3 percent of indole alkaloids.
- 2) The main alkaloids are strychnine and brucine.
- 3) It also contains minor alkaloids like vomicine, isostrychnine.
- 4) It also contain chlorogenic acid and about 3% of fixed oil.

Uses:

- 1) It is used as bitter tonic and stimulant.
- 2) It is mainly used as rodent-killer.
- 3) It is used as powerful CNS stimulant and produce convulsions.

Question No. 06 Write biological source, chemical constituent and uses of the following drugs:

(a) Aloe (b) Asafoetida (c) Black pepper (d) Ipecacuanha (e)

Catechu Ans: (a) Aloe:

Biological source: It consists of dried juice of leaves of plant known as *Aloe barbadensis* (Curacao aloes), *Aloe perryi* (Socotrine aloes), and *Aloe ferox* (Cape aloes).

Family: Liliaceae.

Chemical constituent:

- 1) It contains to 10 to 30% aloin.
- 2) It also contains barbaloin, beta- barbaloin and isobarbaloin.
- 3) It also contains aloe-emodin, and resin.

Uses:

- 1) It is used as irritant purgative.
- 2) It stimulates the growth of hairs and prevents wrinkles.
- 3) It is used in the cosmetic industry as a protective.

(b) Asafoetida:

Biological source: Asafoetida is an oleo gum resin obtained by making by incision from living rhizomes and roots of ferula foetida.

Family: Umbelliferae.

Chemical constituents:

- 1) Asafoetida contains resin (40-65%), gum (20 to 25 %) and volatile oil (4-20%).
- 2) The chief constituent of resin is ferulic acid.
- 3) The chief constituent of volatile oil is secondary butyl propanyl disulphide. Other constituent of oil are di and trisulphide, pinene, terpene.
- 4) Umbelliferone is absent in free form. Ferulic acid on treatment with HCL is converted into umbellic acid which loses water to form umbelliferone.

Uses:

- 1) It is used as carminative, diuretic, expectorant, antispasmodic and anthelmintic.
- 2) It is also used in veterinary practice.
- 3) It is used as flavoring agent in sauces and pickles.

(c) Black pepper:

Biological source: It consists of dried, unripe fruits of Piper nigrum.

Family: Piparaceae.

Chemical constituents:

- 1) Black pepper contains alkaloids like piperine, piperidine.
- 2) It also contains volatile oil, phellandrene, caryophyllene, and camphene.
- 3) It also contains α -pinene, β -pinene, resin and starch.
- 4) It also contains arginine & ascorbic acid.

Uses:

- 1) It is used as carminative.
- 2) It is used as stomachic.
- 3) It is used as condiment.
- 4) It is also useful in sore throat, dyspepsia and in skin disease.

(d) Ipecacuanha:

Biological source: It consists of dried rhizomes and roots of Cephaelis ipecacuanha.

Family: Rubiaceae.

Chemical constituents:

- 1) It contains about 2 - 2.5 % of total alkaloids such as emetine, cephaeline and psychotrine.
- 2) It also contains glucosidal tannin, ipecacuanhin and a glycoside, ipecoside.

3) It also contains starch and calcium oxalate.

Uses:

- 1) It is used as an expectorant and emetic.
- 2) It is also used in the treatment of amoebic dysentery.
- 3) Ipecac with opium (Dover's powder) is given as a diaphoretic.

(e) Catechu:

Biological source: It is a dried extract prepared by boiling the heart wood of Acacia catechu wild.

Family: Leguminosae.

Chemical constituents:

- 1) It contains 4 – 10 % of catechins, catechutannic acid and flavonoids like quercetin.
- 2) Gummy material (20 - 30 %) is also present in catechu.

Uses:

- 1) It is used as astringent in diarrhea.
- 2) It is used for cleaning mouth and gums.

Question No. 07. Write a short note on the uses of following drugs:

(a) Antitumour (b) Diuretics (c) Antirheumatics (d) Antiseptics & Disinfectant (e) Drug acting on nervous system:

Ans. (a) Antitumour drugs: The drugs used for treatment and cure of cancerous tissues are known as Antitumour drug. Various radioactive substances, metal compounds and chemotherapeutic drugs are used to cure cancer. The following plants are reported as anti-tumour for antitumor activity.

- (1) Colchicum (2) Podophyllum (3) Taxol (4) Vinca

Vinca:

Synonym: Catharanthus, Vinca rosea, periwinkle

Biological source: It is a dried whole plant of Catharanthus roseus.

Family: Apocynaceae

Morphology:

Colour: - The leaves are green, flowers are violet, roots are pale grey.

Odour: - Characteristic.

Taste: - Bitter.

Shape: - Leaves are simple, petiolate and ovate with acute apex.

Chemical Constituents:

- 1) Vinca contains wide varieties of chemicals including the glycosides and alkaloids.

- 2) The important alkaloids with anticancer property are vincristine and vinblastine.
- 3) The other alkaloids are ajmalicine and serpentine.

Uses:

- 1) It also exhibits hypotensive and antidiabetic activity.
- 2) Vincristine is used in leukemia while vinblastine is used in Hodgkin's disease.

(b) Diuretic: Diuretics are the drugs that increase the volume of urine by promoting the excretion of salts and water. The diuretics are used in the treatment of glaucoma, regulation of osmotic pressure and prophylaxis of acute renal failure. Various plants are used as diuretics like gokhru, punarnava, tea, coffee.

Diuretics are classified as: 1) Acidifying diuretics 2) Alkaline diuretics 3) Cardiac diuretics 4) Saline diuretics 5) Purine diuretics

Gokhru

Biological source: The drug consists of dried fully ripe fruits of *Tribulus terrestris*.

Family: Zygophyllaceae

Morphological characters

Colour: - Fruits are greenish to grey

Odour: - Odourless

Taste: - Bitter

Size: - 1.0 cm to 1.5 cm

Shape: - Fruits are globose

Chemical constituents:

- 1) It contains traces of alkaloids harmine and harman.
- 2) It also contains saponin which on hydrolysis gives diosgenin.
- 3) The other chemical constituents are fixed oils, traces of resins, mucilages and vanillin.

Uses:

- 1) It is used as diuretic.
- 2) It is used as demulcent and common ingredient of ayurvedic preparations.
- 3) It is used as antiseptic and toxic.
- 4) It is used in gonorrhoea, impotency and kidney stones.

(c) Antirheumatics: The drugs used to relieve or used in the treatment of rheumatism are known as antirheumatics. E.g. Guggul, colchicum

Guggul:

Synonym: Guggul, gum guggul

Biological source: Guggul is oleo-gum-resin obtained by the incision of the bark of the plant *Commiphora weightii*.

Family: Burseraceae

Morphological characters

Colour: - Brown to pale yellow or dull green

Odour: - Agreeable, aromatic and balsamic

Taste: - Characteristic bitter

Size: - 0.5 to 1.00 to 2.5 cm in diameter.

Shape: - Rounded or irregular masses

Chemical constituents: It contains 60% of gums, 30% of resin, and 0.5 to 1.5% of volatile oil. Volatile oil of the guggul contains myrcene, dimyrcene and caryophyllene.

Uses: It is used as anti-inflammatory antirheumatic, hypolipidemic and hypo cholesteremic drug.

Colchicum:

Biological source: Colchicum consists of dried seeds of the plant *Colchicum luteum*.

Family: Liliaceae

Morphological characters

Colour: - Dark reddish-brown pitted and sturdy.

Odour: - None

Taste: - Bitter and acrid

Size: - 2 to 3 mm in diameter

Shape: - Seed are globular with strophiole at one side and raphe on the other.

Chemical constituents: It contains 0.2% to 1% of total alkaloids calculated as colchicine. The alkaloids present in the drug are colchicines and demecolcine.

Uses: Colchicum seeds are used in gout and rheumatism. Colchicum seeds can control the malignant tumour.

(d) Antiseptics and Disinfectants:

Antiseptics: These are the agents that sterilize the living surface used to kill all the bacteria over living organisms. The volatile oils, resins, etc. are used as antiseptic. These agents should be non-toxic, non-irritant and does not cause allergic reactions.

Disinfectants: These are the agents used to kill bacteria and spores present on non-living surface. These agents are used for decontaminating drains, fecal matter and also for sterilization of instruments and apparatus.

The drugs which are used as antiseptic and disinfectant are Benzoin, Myrrh, Neem, and Curcuma

Curcuma:

Biological source: It consists of fresh, dried rhizomes of *Curcuma longa*.

Family: Zingiberaceae.

Morphological characters:

Colour – Yellowish to Yellowish- brown (External)

Odour – Characteristic

Taste – Slightly bitter

Size – 2 to 5 cm in length and 1 to 2 cm in thickness

Shape – Round turmeric rhizomes are ovate or oblong

Chemical constituents:

- 1) Turmeric contains yellow coloring substance known as curcumanoids.
- 2) The curcumanoid contains curcumin-I, curcumin-II and curcumin-III and it contains about 5% volatile oil.
- 3) It also contains sesquiterpenes, alcohol and ketone.
- 4) It contains zingiberone, cineole and turmerone.

Uses:

- 1) It is a colouring agent and condiment in curry powders.
- 2) It is also used to stimulate biliary secretion and to treat gallstones.
- 3) It has anti-inflammatory activity.

(e) Drug acting on nervous system: (1) Hyoscyamus (2) Belladonna (3) Aconite (4) Aswagandha (5) Ephedra (6) Opium (7) Cannabis (8) Nux-Vomica

Ephedra:

Biological source: It consists of the dried young stems of Ephedra gerardiana.

Family: Ephedraceae

Morphological characters:

Colour- Greenish Yellow

Odour- Aromatic and pine like

Taste- Astringent

Shape- Cylindrical, elongated

Size- The stems are about 30 to 35 cm in length and 5 mm in diameter

Chemical constituents:

- 1) Ephedra contains phenylethyl amine type of alkaloids in which ephedrine is main constituent.
- 2) Other alkaloids are pseudoephedrine, 1-methyl ephedrine, dimethyl ephedrine and nor ephedrine.

Uses:

- 1) Ephedrine is used in asthma, bronchitis.
- 2) It is used in hay fever and whooping cough.

3) It is also used as anti-inflammatory drug.

Ashwagandha:

Biological source: It consists of dried roots and stem bases of Withania somnifera.

Family: Solanaceae

Morphological characters:

Colour - Buff to grey yellow, stem bases are green

Odour - Strong

Taste – Mucilaginous, bitter and acrid

Size – 10 to 17.5 cm in length, 6 to 12 mm in diameter

Shape – Straight, unbranched and conical

Chemical constituents:

- 1) The main constituents of ashwagandha are alkaloids and steroidal lactones.
- 2) It contains withanine, somniferine, vasamine.
- 3) It also contains tropine, pseudotropine.

Uses:

- 1) It has action on smooth muscles.
- 2) It is also used in asthma.
- 3) It is used in the treatment of rheumatism and gout.
- 4) It is used in hypertension and depression.

Question No. 08. (a) Write a note on any two pharmaceutical aids.

(b) Discuss the enzymes used in pharmaceutical industry with two examples.

Ans. (a) Pharmaceutical aids: The compounds which are therapeutically inert or have little therapeutic value but are used in manufacturing of various pharmaceutical dosage forms such as tablet, capsule and syrup etc are known as pharmaceutical aids. Some pharmaceutical aids used in pharmacy are as follows:

- 1) Diluent – Glucose, Lactose
- 2) Disintegrating agent – Starch, Cellulose
- 3) Lubricants – Magnesium stearate, Talc
- 4) Sweetening agent - Glycyrrhiza and Honey

Honey:

Biological source: It is a saccharine substance deposited by the honeybees, Apis mellifera.

Family: Apidae.

Morphological characters:

Colour – Pale yellow to yellowish brown

Odour – Characteristic, pleasant

Taste – Sweet and faintly acrid

Chemical constituents:

- 1) It consist chiefly a mixture of dextrose and levulose and water.
- 2) It also contains source, dextrin, volatile oil, pollen grains enzymes.
- 3) It also contains vitamins, amino acids, proteins & colouring matter.

Uses:

- 1) It is used in cough mixtures.
- 2) It is a sweetening agent.
- 3) It is also used as demulcent, mild laxative.
- 4) It is also used as antiseptic and applied to burns and wounds.

Starch:

Biological source: It consists of polysaccharide granules obtained from the grains of maize Zea mays.

Family: Gramineae.

Morphological characters:

Colour – Maize starch grains are white

Odour – Odourless

Taste – Mucilaginous

Size and shape: - Maize starch grains are rounded, 5 to 30 micron in diameter

Chemical constituents:

- 1) Starch contains chemically two different polysaccharides amylose and amylopectin.

Uses:

- 1) It is used as mild astringent.
- 2) It is useful as disintegrant.
- 3) It is used as demulcent, protective and absorbent.
- 4) It is used as antidote in the treatment of iodine solution.

Ans. (b) Enzymes: These are biological catalyst, proteinous in nature, non-living, high molecular weight substances produced by living organism. It serves as catalyst in many complex chemical reactions that make up life processes. The enzymes contain several common properties

- 1) Enzymes are colloidal in nature, soluble in water and dilute salt solutions.
- 2) These are most active at temp between 35° to 40°C.
- 3) These are destroyed at temp above 65° and it becomes inactive at 0°C.

4) They are sensitive to pH and presence of other substances in medium. The enzymes used in pharmaceutical industry are

Papaya:

Biological source: Papain is a proteolytic enzymes obtained from the dried and purified latex of the unripe fruit of *Carica papaya*.

Family: Caricaceae.

Description:

- 1) It occurs as light brown or white coloured amorphous powder.
- 2) It is soluble in water and insoluble in alcohol chloroform and ether.
- 3) This enzyme shows maximum proteolytic activity at pH 5 and temp. between 60 to 90°

Chemical constituents: Papaya contains several enzymes like papain and chymopapain which on hydrolysis gives polypeptides, amides and esters.

Uses:

- 1) It is used as protein digestant and an anti-inflammatory agent.
- 2) It is used in clearance of protein from the surface of contact lenses and in clarification of beverages.

Diastase:

Biological source: Diastase is an amylolytic enzyme found in saliva or pancreatic juice of animals so it is also known as animal diastase. Malt diastase is found in germinated barley grains *Hordeum vulgare*. *Family:* Gramineae

Description: It is yellowish white, amorphous powder obtained from the infusion of malt. Diastase has faint characteristic odour. It is thermolabile and sensitive to a temperature more than 45°C. Diastase is active at 35-40°C in solution having pH range of 6-7.

Uses:

- 1) Diastase from various sources is used as digestant.
- 2) It is used in the production of predigested starchy food and also for the conversion of starch to fermentable sugars.
- 3) It is used in brewing industries.

Question No. 09. Write the biological source and preparation of fibres used in sutures and surgical dressings: (a) Cotton (b) Silk

Ans. Fibres: These are used in pharmacy as filtering media and also used for making surgical dressings and surgical ligatures and sutures. They are classified into four categories:

1. Natural Fibres: Natural Fibres are obtained from two sources such as vegetable origin, examples are cotton, hemp and from animal source such as wool and silk.

2. Artificial Fibres: Rayon, alginate yarn.
3. Synthetic Fibres: Nylon, terylene.
4. Mineral Fibres: Glass, asbestos.

(a) Cotton

Biological source:- It consists of epidermal trichomes (hairs), of the seeds of cultivated species of Gossypium herbaceum. *Family:* - Malvaceae.

Preparation of surgical cotton: Surgical absorbed cotton wool is prepared from linters and cotton waste.

Step I - The impurities are removed from cotton hairs and boiled with 5% caustic soda for 15 hours.

Step II - Then it is washed with water & bleached by soaking in 5% chlorinated lime solution for 10-18 hours.

Step III - Bleached cotton is then washed with water and soaked in dilute HCl for four hours.

Step IV - Acidified cotton is then washed, dried and combined to form a fleecy white mass of soft white filament consisting almost entirely cellulose.

Step V - This thin layer is placed one above the other packed and sterilized by gaseous or radiation method of sterilization.

Chemical constituents: Absorbent cotton contains pure form of cellulose and 6 to 7% of moisture.

Uses:

- 1) It is used as surgical dressing.
- 2) It gives mechanical support to absorb blood, mucous, pus and protects the wound from bacterial infection.
- 3) It is also used as filtering media.

(b) Silk

Biological source: Silk fibres are prepared from the cocoons of Bombyx mori.

Family: Bombycidae.

Preparation of silk:

Step I - The larvae of the silkworm produce silk fibroin fibres from the glands in their mouth.

Step II - The fibroin gets united with a gum-like secretion known as sericin and forms cocoon.

Step III - These cocoons are not allowed to grow further into an insect but are heated to 60-80⁰c by exposing them to steam.

Step IV - The exposed cocoons are put into hot water to dissolve the gum and to separate the fibres.

Chemical constituents:

- 1) Silk contains a protein known as fibroin.
- 2) Fibroin on hydrolysis yields amino acids glycine and alanine.

Uses: Special types of sutures, sieves and ligatures are prepared from silk.

Question No. 10. Write the complete pharmacognosy of the following drugs:

(a) Rhubarb (b) Coriander (c) Digitalis (d) Ergot (e) Fennel

Ans. (a) Rhubarb

Biological source: It consists of rhizome and roots of *Rheum officinale*.

Family: Polygonaceae.

Geographical source: The plant is grown at an altitude of 3000 meters. Chinese rhubarb is found in China, Tibet, Nepal, Europe and Germany. In India the plant is available in the Himalayan region from Kashmir to Sikkim and is cultivated in Assam.

Cultivation & collection: The plant is a perennial herb containing very stout and thick roots and rhizomes. The drug rhubarb is collected from 6-8 years old plants by digging out rhizomes during September to October. The rhizomes are cut in transverse slices and drugs are dried in shade or by artificial heat.

Morphology: - *Colour* - Brown or yellow

Odour - Fragrant

Taste - Bitter and astringent

Size - Pieces of rhubarb are 2 to 20 cm in length and 2 cm in diameter

Shape - Rhizomes are sub-cylindrical

Chemical constituents:

- 1) It contains anthraquinone derivatives.
- 2) It contains rhein and its glycoside emodin and aloe-emodin.
- 3) It also contains free gallic acid, starch and calcium oxalate.

Uses:

- 1) It is used as a mild purgative in larger doses.
- 2) It is used as bitter stomachic and powder roots applied externally in ulcer.
- 3) It contains tannins hence it is associated with the astringent effect after purgation.

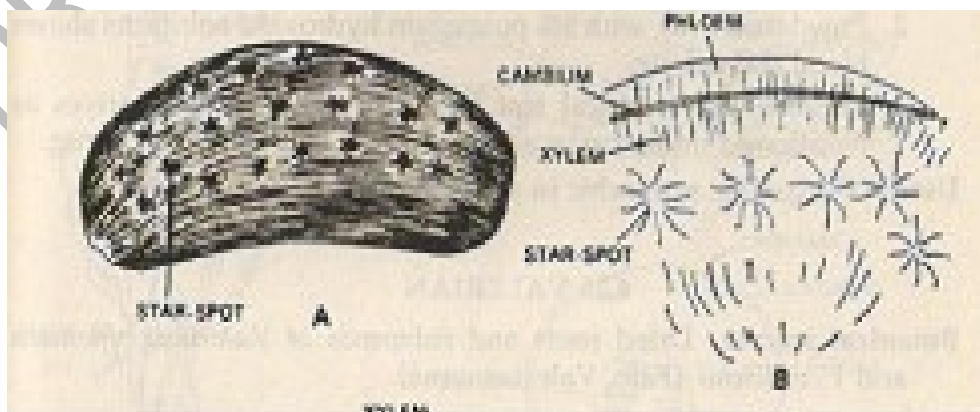


Fig. A : Rhubarb rhizomes, Fig B ; Transverse section of rhubarb.

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Chemical test:

- (1) When powdered drug is kept with ammonia for 15 minutes it produces pink colour.
- (2) Brontrager's Test → Boil the drug with dilute H₂SO₄, Filter and cool the filtrate and add organic solvent followed by ammonia solution will turn the colour of solution to pink.

(b) Coriander:

Biological source: It is the dried ripe fruits of Coriandrum sativum.

Family: Umbelliferae.

Geographical source: The plant coriander is indigenous to Italy. The plant is widely cultivated in India, Egypt, China & Russia. In India the plant is cultivated throughout the country.

Collection & preparation: The plant is annual herb, about 0.7 to 1 meter height containing small white and pinkish flowers. The green plant and unripe fruits give unpleasant odour like bug but odour disappears during ripening and changes to an aromatic odour. Plants are cut and collected when the fruits are ripen. After drying fruits are separated.

Morphological characters:

Colour - Yellowish brown to brown

Odour - Aromatic

Taste - Spicy and characteristic

Size - Fruits are 2 to 4 mm in diameter and 4-8 mm in length

Chemical constituents:

- 1) It contains volatile oil (about 0.3 to 1%).
- 2) It also contains camphor, borneol, fixed oils & tannin. Coriander leaves also contain vitamin A.

Uses: 1) It is used as carminative.

- 2) It is used as aromatic and flavoring agent.
- 3) It is also used as diuretic and stimulant stoma
- 4) It is also used as diuretic and stimulant stomachic.

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Fig. A: Coriander fruit, Fig B: Transverse section (T.S) of fruit of coriander (Cremocarp).

(c) Digitalis:

Biological source: It consists of leaves of *Digitalis purpurea*.

Family: Scrophulariaceae.

Geographical source: It is cultivate and collected in England, other parts of Europe, United States and India.

Cultivation & collection: Digitalis is a biennial or perennial herb. It is about 1 to 2 metre in height. The seeds of digitalis are small in size, so they are mixed with sand for sowing. Leaves are collected in both the years but the leaves collected in the first year have highest glycoside content. Leaves are collected when 2/3 of the flowers are fully developed. The seedling is then transplanted into the field. Generally the leaves are collected in the early afternoon, with a belief that maximum cardio-active glycosides are present at the time. The leaves are immediately dried after collection below 60⁰C in vacuum dryer and dried leaves are stored in air tight containers. The dried leaves should not contain more than 5% moisture, since it promotes hydrolysis of cardiac

glycosides resulting in loss of cardiac activity.

Morphological character:

Colour - Dark grayish-green

Odour - Slight

Taste - Bitter

Size - 10-30 cm long and 4-10 cm wide

Shape – Ovate-lanceolate to broadly ovate

Chemical constituents:

- 1) It mainly contains cardiac glycoside (about 0.2 to 0.45%).
- 2) It contains purpurea glycoside A and purpurea glycoside B.
- 3) It also contains digitoxin, gitoxin, digitoxigenin, gitoxigenin, digitose, gitaloxin.
- 4) It also contains saponin, flavanoids, tannins and pectin.

Uses:

- 1) It is a cardiac stimulant and tonic.
- 2) It also used as a diuretic.
- 3) It is used in the treatment of congestive heart failure.

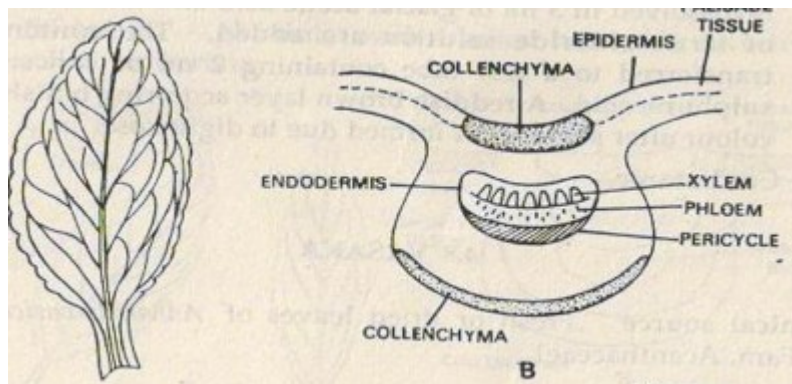


Fig.A: Leaf of *Digitalis purpurea*, Fig B: Transverse section of *Digitalis* leaf.

(d) Ergot:

Biological source: It is a dried sclerotium of fungus *Claviceps purpurea*.

Family: Clavicipitaceae

Geographical source: It is found in Yugoslavia, Spain, Germany, Switzerland, Russia and India.

Cultivation and collection: Ergot is cultivated in sandy soil. The ascospores are developed on different colonies in the presence of nutrient medium in petridishes. For the development of large number of spores the colonies are cut and transferred to a liquid medium in large flask. The spores are then diluted with water and sprayed on rye crop at flowering state. A large number of sclerotia are produced on each spike of rye that is collected either by hand or by threshing the crops. After separation and collection, the sclerotia are dried thoroughly and stored in suitable containers.

Life cycle of ergot:

- Spore of the fungus carried by wind or insects comes in contact with the ovary of a grass frequently rye in the spring or early summer.
- At the base of ovary the spore germinate forming filamentous hyphae which eventually form mycelium.
- Sometimes hyphae produce conidiospores which become honeydew.
- The honeydew attracts insects which carry conidiospores to other plants and this stage is called sphacelia stage.
- Furthermore, the mycelium penetrates deeper and finally replacing it by a compact dark purple tissue and this second stage is called as sclerotium or resting stage.
- The sclerotium grows during the summer and projects from the ear of the rye. Ergot is either collected by hand or separated from the rye by special machines.

Morphological characters:

Colour - Dark violet to Black

Odour - Disagreeable

Taste - Unpleasant

Size - 1 to 3 cm in length and 1 to 5 mm in width

Shape - Fusiform & triangular

Chemical constituents:

- 1) It contains about 0.1 to 0.25% of indole alkaloids.
- 2) Water soluble indole alkaloids are ergometrine and water insoluble are ergotamine and ergotoxine.
- 3) It also contains ergocryptine, ergocristine, ergocornine and methylergometrine.

Uses:

- 1) It produces oxytocic effect.
- 2) It is used in the treatment of migraine.
- 3) 3) It is used in labour pain to assist delivery.
- 4)

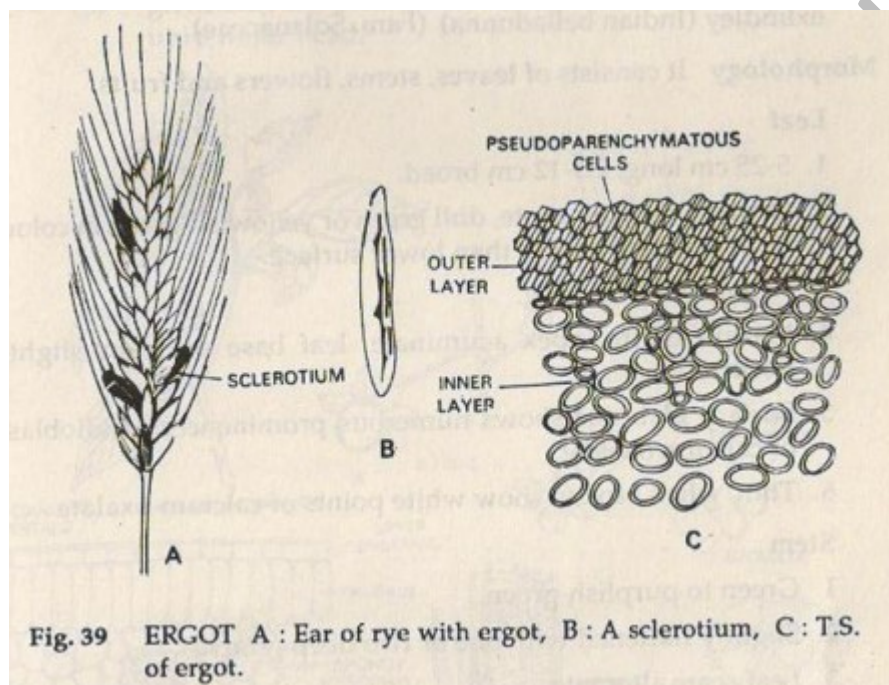


Fig. 39 ERGOT A : Ear of rye with ergot, B : A sclerotium, C : T.S. of ergot.

(e) Fennel (Saunf)

Biological source: It consists of dried ripe fruits of *Foeniculum vulgare*.

Family: Umbelliferae.

Geographical source: It is cultivated in many parts of Europe, China, Egypt and India.

Collection & preparation: The plant is biennial or perennial tall herb. Seeds are sown in spring, ripen fruits with stem are collected in autumn. They are dried in sun and thrashing is done for separation of fruits.

Morphological characters: *Colour* - Green to Yellowish-brown

Odour - Sweet Aromatic

Taste - Sweet aromatic and mucilaginous

Size - 5-10 mm long and 2-4 mm broad

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Shape – Straight

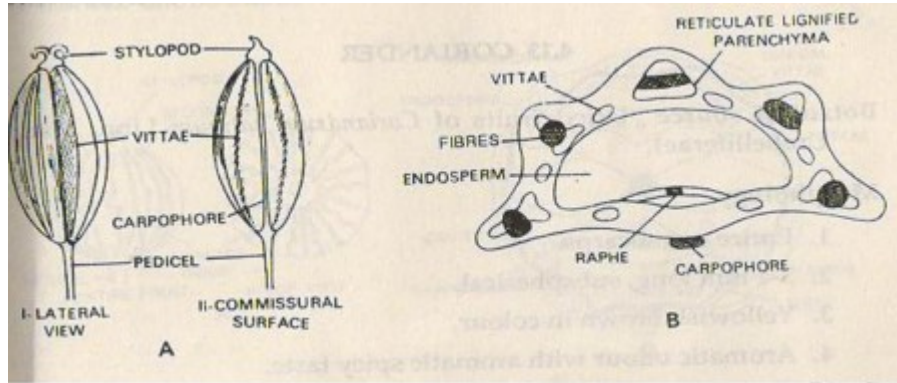


Fig A: Fruits of fennel, Fig B: Transverse section of mericarp of fennel.

Chemical constituents:

- 1) It contains volatile oil, fixed oil and proteins.
- 2) The main constituent of fennel is fenchone and phenolic ether anethole.
- 3) It also contains ascorbic acid, citral.

Uses: 1) It is used as flavoring agent.

2) It is used as carminative.

3) It is used as expectorant, stimulant & stomachic.

Question No. 11. Write short note on the following drugs:

(a) Shatavari (b) Shankpushpi

Ans (a) Shatavari:

Biological source: It consists of dried leaves and tuberous roots of *Asparagus racemosus*.

Family: - Liliaceae

Morphological characters: It is a perennial-climbing shrub. The stem is covered with recurved spines. The leaves are linear, green and needle like. Roots occur in a cluster at the base of stem. *Chemical constituents:* It contains steroidal saponin. It contains shatavarin I to IV (0.1-0.2%)

Uses:

1) Shatavari roots are used as galactagogue.

2) Shatavarin I has antioxytotic activity.

(b) Shankpushpi:

Biological source: This consists of the aerial parts of the plant known as *Canscora decussata*.

Family: - Gentianaceae

Morphological characters: The plant is a small shrub, stem is woody at base, and leaves are linear, lanceolate. Flowers are small, funnel shaped & pale colored. Fruits are small, smooth and ellipsoidal.

Chemical constituents: It contains alkaloids-shankhpushpine, volatile oil-Betasitosterol, glucose-rhamnose, oleo-resins, triterpens, xanthones and starch.

Uses:

- 1) It is used as brain tonic and very useful in improving & strengthening memory.
- 2) Alcoholic extract possess antiviral activity.

Question No. 12. Explain the term alkaloids. Write in details about their properties, distribution, and classification.

Ans. Alkaloids are chemically heterogeneous organic compound of natural or synthetic origin which are basic in nature and contain one or more nitrogen atoms. They also possess specific physiological actions on human body.

Properties of alkaloids:

- 1) Alkaloids are present in the plant as: Salt, ester, N-oxide, quaternary compound.
- 2) They are generally very toxic compounds.
- 3) They have bitter taste. They are unstable compounds in heat and light.
- 4) They are generally solid crystalline compounds (exceptions are: coniine and Nicotine are liquid).
- 5) Alkaloids are colorless compounds but exceptions are berberine (yellow) and betaine (red).
- 6) Alkaloids have sharp melting point because its pure compound is present in crystal form.
- 7) They can be 1°, 2°, 3° or 4° alkaloids.
- 8) Alkaloids are basic in nature and their basicity depends on availability of lone pair of electrons.

Distribution in nature:

Alkaloids are generated by various living organisms, especially by higher plants – about 10 to 25% of those contain alkaloids. Therefore, in the past the term "alkaloid" was associated with plants. The alkaloids content in plants is usually within a few percent and is homogeneous over the plant tissues. Depending on the type of plants, the maximum concentration is observed in the leaves (black henbane), fruits or seeds (Strychnine tree), root (*Rauwolfia serpentina*) or bark (*Cinchona*). Furthermore, different tissues of the same plants may contain different alkaloids.

Beside plants, alkaloids are found in certain types of fungi, such as psilocybin in the fungus of the genus *Psilocybe*, and in animals, such as bufotenin in the skin of some toads. Many marine organisms also contain alkaloids. Some amines, such as adrenaline and serotonin, which play an important role in higher animals, are similar to alkaloids in their structure and biosynthesis and are sometimes called alkaloids.

Classification:

Alkaloids are classified into following four types, namely:

(a) Biosynthetic classification: This method gives significance to the precursor from which the alkaloids are biosynthesized in the plant.

Examples:

- 1) Indole alkaloids derived from tryptophan.
- 2) Piperidine alkaloids derived from lysine.
- 3) Pyrrolidine alkaloids derived from ornithine.
- 4) Phenylethylamine alkaloids derived from tyrosine.
- 5) Imidazole alkaloids derived from histidine.

(b) Chemical classification: It is accepted and common mode of classification of alkaloids for which the main criterion is the presence of the basic heterocyclic nucleus (i.e., the chemical entity or fundamental ring structure).

Examples: (1) Pyrrolidine alkaloids: Hygrine. (2) Piperidine alkaloids: Lobeline. (3) Pyrrolizidine alkaloids: Senecionine.

- (4) Tropane alkaloids: Atropine
- (5) Quinoline alkaloids: Quinine
- (6) Isoquinoline alkaloids: Morphine.
- (7) Aporphine alkaloids: Boldine
- (8) Indole alkaloids: Ergometrine
- (9) Imidazole alkaloids: Pilocarpine.
- (10) Diazocin alkaloids: Lupanine
- (11) Purine alkaloids: Caffeine
- (12) Steroidal alkaloids: Solanidine.
- (13) Amino alkaloids: Ephedrine
- (14) Diterpene alkaloids: Aconitine.

(c) Pharmacological classification: Depending on the physiological response, the alkaloids are classified under various pharmacological categories. This method does not take into account the chemical nature of crude drugs.

Examples: Morphine is narcotic analgesic, while codeine is mainly antitussive.

(d) Taxonomic classification: The taxonomic classification based on their respective distribution in a variety of plant families.

Examples:

- 1) Cannabinaceous Alkaloids: Cannabis sativa Linn. (Hemp)
- 2) Solanaceous Alkaloids: Atropa belladonna

Question No. 13. What are carminatives? Explain the complete pharmacognosy of clove along with its diagram.

Ans. Carminatives: An agent that prevents or relieves flatulence (gas in the gastrointestinal tract) and, in infants, may help in the treatment of colic. Examples: Coriander, Fennel, Ginger, Black paper, Cinnamon, Nutmeg, Clove, Asafoetia.

Clove:

Biological source: It consists of dried flower buds of *Eugenia caryophyllus*.

Family: Myrtaceae.

Geographical source: It is indigenous to Molucca Island but cultivated in islands of Madagascar and panang.

Collection and preparation: The flower buds are collected from the stems by hand when their lower parts turns to crimson from green. The collected cloves are dried in thre open on coconut mats.

Organoleptic characters:

Colour: Crimson to dark brown

Oduor: Slightly aromatic

Taste: Pungent and aromatic followed by numbness

Size: About 10-17.5 mm in length, 4 mm in width, 2 mm thick

Shape: Hypanthium is surmounted with 4 thick acute divergent sepals surrounded by dome shaped corolla. The corolla consists of unexpanded membranous petals with several stamens and single stiff prominent style. Clove is heavier than water.

Microscopic characters: The epidermis of clove is covered with thick cuticle. The epidermis itself consists of straight walled cells and large anomocytic stomata. The oil glands, which are ovoid and schizolysigenous are found in all parts of the drug. Phloem fibres, which are isolated, are occasionally found in the spongy tissues. Cluster crystals of calcium oxalate and small number of stone cells are found in the drug. Clove does not contain starch

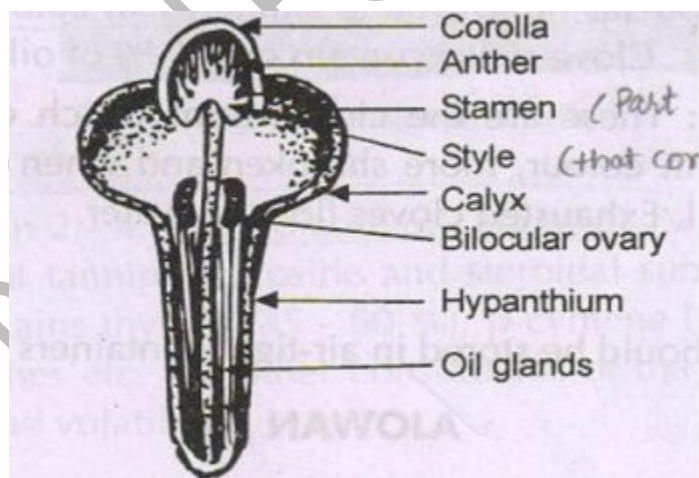


Fig A: Vertical section of clove

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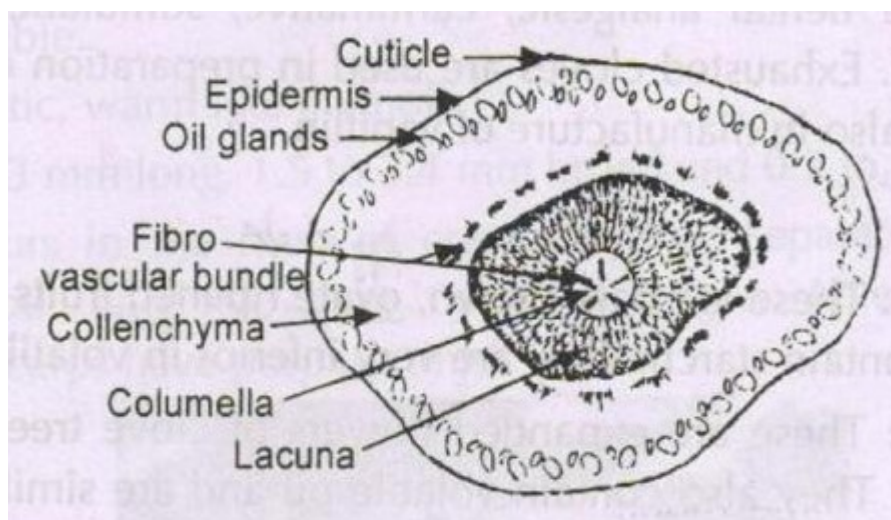


Fig B: T.S of Clove passing through hypanthium (diagrammatic)

Chemical constituents:

- 1) Clove contains about 15 to 20% of volatile oil, 10 to 13% of tannin, resin, eugenin.
- 2) The volatile oil of drug contains eugenol, eugenol acetate, esters, ketones and alcohols.

Uses:

- 1) It is used as dental analgesic, carminative, stimulant, flavouring agent, aromatic and antiseptic.
- 2) It is used in the preparation of cigarettes.
- 3) It is useful in perfumery.

Question No. 14. What are antitussives? Explain any two drugs under this category.

Ans. Antitussives: Antitussives are the agents having ability to suppress or relieve coughing. They are used only for dry unproductive cough. They may alter or hasten the expectoration by acting upon pulmonary membranes. Examples- Opium, Vasaka, Codeine and Tolu Balsam.

(a) Vasaka:

Biological source: It consists of the fresh and dried leaves of *Adhatoda vasica*.

Family: Acanthaceae.

Geographical source: Plains of India and Himalayan ranges upto 3000 m, Sri Lanka and Malaya.

Chemical constituents: Vasaka contains a number of alkaloids. Vasicine and vasicinone are two major alkaloids isolated from the drug.

Uses:

- 1) It is used as an expectorant, bronchodilator and as mild bronchial antispasmodic.
- 2) The alkaloid vasicine has an abortifacient effect and has oxytocic action.

(b) Tolu Balsam:

Biological source: It is obtained by incision from the trunk of *Myroxylon balsomum*.

Family: Leguminosae.

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Geographical source: The tolu balsam trees are large and grow abundantly in Columbia and Vanezuela. The trees are cultivated in the West Indies, articularly in Cuba.

Chemical constituents: The drug contains about 80% o the resin esters chiefly as toluresinotannoll cinnamate with small quantity of benzoate. It also contains benzyl benzoate, benzyl cinnamate, vanillin and free cinnamic and benzoic acids.

Uses:

- 1) It is an expectorant and antiseptic.
- 2) It is common ingredient of cough mixtures. It is also used as a flavouring agent in medicinal syrups, confectionary and chewing gums. It is an ingredient of compound benzoin tincture.

Question No. 15. Write the uses of following drugs:-

(a) Belladonna (b) Garlic (c) Beeswax (d) Chaulmoogra oil (e) Ispagula

Ans. (a) Belladonna: 1) Belladonna acts as a parasympathetic depressant. It is used for the control of spasms.

2) It has anticholinergic actions for which the drug is used to control excess motor activity of the gasterointestinal tract and spasms of urinary tract.

3) The drug is commonly administered as belladonna tincture and used for making preparations for external use.

4) It reduces the secretion of sweat, saliva and gastric juice.

(b) Garlic: 1) Garlic is used as a common spice and is useful in intestinal infections. 2) Garlic is also used as strong bacteriostatic.

3) Dehydrated garlic has been recommended in high blood pressure and atherosclerosis.

4) It is also used as carminative, aphrodisiac, expectorant and disinfectants.

(c) Beeswax: 1) Yellow beeswax is used as a hardening agent for the preparations of ointments, candle and plaster.

2) It is also used in cosmetics for the preparation of lipsticks and face creams.

3) It is also used as base for ointments, creams, polishes.

(d) Chaulmoogra Oil: 1) The fatty acids present in the oil possess strong bactericidal effect on micrococcus of leprosy. Esterification of this acid enhances the bactericidal action and thus ethyl esters and salts of chaulmoogric acid have been used in the treatment of leprosy, psoriasis and rheumatism.

2) Esters of the derived acids are also employed only for external application.

(e) Ispagula (Isapgol): 1) it is used as laxative.

2) The major use of seeds and husks is as a bulk forming laxative.

- 3) It is also used for its emollient and demulcent properties and to treat irritation of the colon caused by amoebic and bacillary dysentery and diarrhea.
- 4) Ispagula husk contain more mucilage having swelling factor up to 90 which help in the expulsion of intestinal contents.
- 5) Ispagula's seeds are given in the gastric and duodenal ulcers.

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