

Unit-V

► Plant products

Fibers : The fibers are elongated thick walled cells with pointed ends.

- The cell wall consist of cellulose & are obtained from both natural & artificial sources.
- The natural fibers are obtained from plants, minerals or from animals.
- The natural fibers are long chain carbohydrate or protein molecules while the artificial fibers are prepared from long chain polymer molecules.

● Fibers obtained from various sources :

<u>Fiber source</u>	<u>Examples</u>
① Plant fibers	Jute, flax, Banana, Cotton.
② Animal fibers	Silk, wool
③ Synthetic fibers	Nylon, Terylene, rayon
④ Mineral fibers	Glass, Asbestos.

● Identification test of fibers :

- ① Fibers when treated with Molisch reagent gives violet colour.
- ② Fibers are not stained when heated with aqueous picric acid.
- ③ Fibers do not produce red colour when boiled with millon's reagent.
- ④ Fibers when treated with chlor-zinc iodide it gives blue colour.

Cotton

- Synonyms - Raw cotton, Purified cotton, Absorbent cotton, kapas (Hindi).
- Bio. Source - It is obtained from epidermal trichomes (hair) of seeds of - Gossypium hirsutum
- Gossypium barbadense.
- Family - Malvaceae.
- Geo. source - U.S.A., Egypt, Africa & India.
- Macroscopical Characters -
Colour - white
Odour - Odourless
Taste - Tasteless
Size - 2.2 to 4.5 cm (length)
- Chemical constituents - 90% cellulose, 7-8% of moisture, wax, fat & oil (0.5%).
- Uses - used in surgical dressings.
- used as a filtering medium.
- used to absorb blood, pus, mucus, etc.

Jute

- Synonyms - Gunny.
 - Bio. Source - It consists of phloem fibers from stem of
 - Corchorus capsularis
 - Corchorus olitorius
 - Family - Malvaceae / Tiliaceae.
 - Geo. Source - West Bengal & in Assam.
 - Chemical constituents - Jute is composed of 50-53% cellulose, 20% hemicellulose & 10-11% of lignin.
 - Uses - To make cloth for wrapping bales of cotton,
 - They are also woven into curtains, chair coverings, carpets.
 - In the preparation of bags.
-

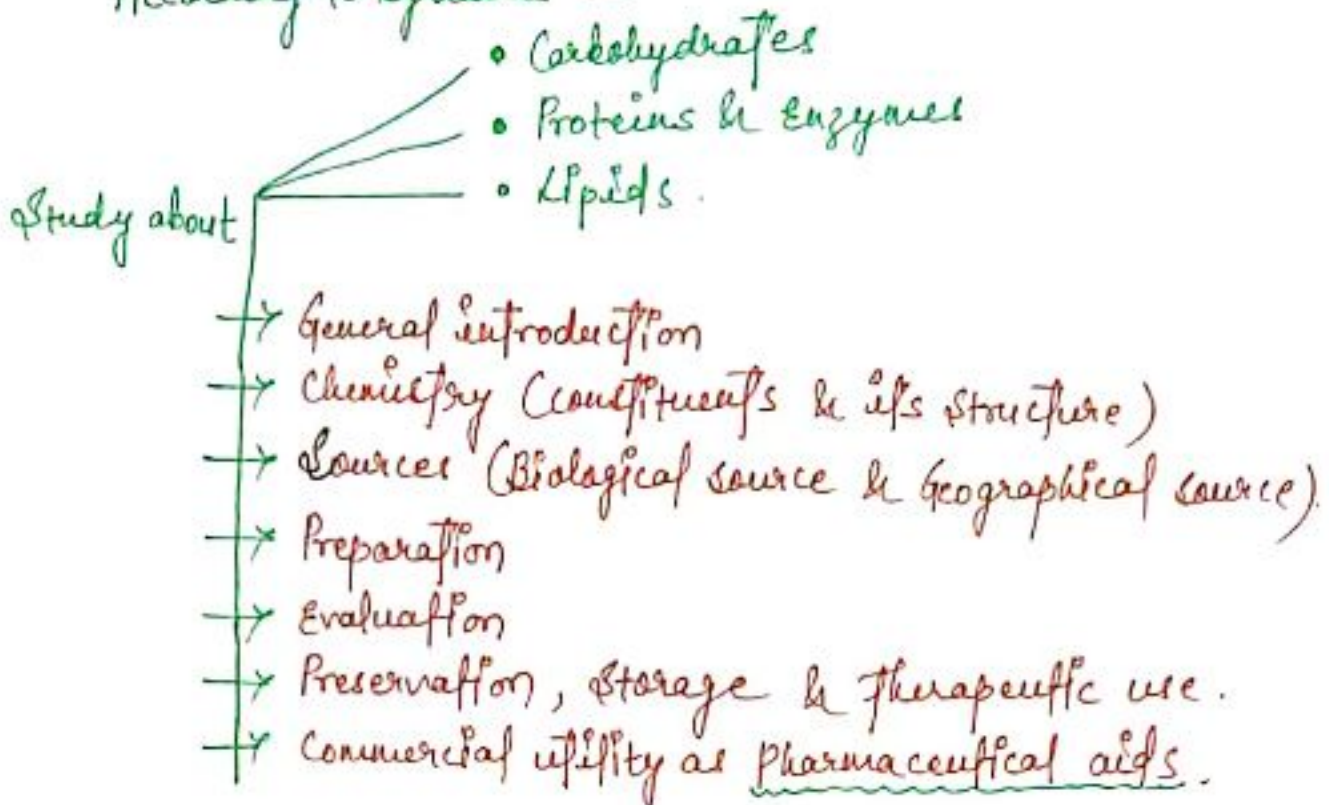
Hemp

- Synonyms - Marijuana, Charas, Ganja, Bhang, Cannabis.
- Bio. Source - It is a pericycle fiber obtained from *Cannabis sativa*.
- Family - Cannabinaceae.
- Geo. Source - China, America, Germany, Switzerland, Australia, Canada, France, Norway, Canada, India.

- Chemical constituents - It is mainly consist of cellulose & lignin.
 - Uses
 - Canadian hemp is used for arthritis, asthma, coughs, etc.
 - It is also used for heart problems.
 - Hemp fibers are used in the preparation of tea bags, industrial filters, currency ~~or~~ & cigarette papers.
-

Primary metabolites

According to syllabus —



▶ Pharmaceutical aids :

→ Pharmaceutical aids are the drugs/substances which have no or little pharmacological effect but they are used in the preparation of pharmaceutical dosage form (like tablet, injection, capsule, emulsion, etc.)

→ Classification :-

- ① Binders — e.g. Acacia, Tragacanth.
- ② Disintegrating agents — e.g. Starch
- ③ Colouring agents — e.g. Turmeric, Carmine
- ④ Preservatives
- ⑤ Sweeteners, etc.

Acacia :

- Synonyms - Gum acacia, Babul (Hindi)
- Bio. Source - It is the dried gummy exudation obtained from the stem & branches of Acacia arabica.
- Family - Leguminosae
- Geo. Source - India, Sri Lanka, Africa.
- Macroscopical characters - Colour - cream brown to red
Odour - Odourless
Taste - tasteless
Shape - tear shape
Size - varies
Solubility - soluble in water
& Insoluble in alcohol.
- Chemical constituents - It contains Arabin (mixture of calcium, magnesium & potassium salts of Arabic acid).
- It also contains enzyme oxidase.

Evaluation - ① Borax test :
Aqueous acacia solution + Borax
↓
Translucent mass formed.

② Lead acetate test :
Aqueous solⁿ of Acacia + Lead acetate solⁿ
↓
white precipitate formed.

• Collection & preparation :

→ For collecting gum 6-8 year old trees are preferred.



Incision is made on stem at the time of winter (November)



The gum exudates after 6-8 weeks



The gum is collected & dried in sunlight for 3 weeks



This bleaches the gum & turns in white colour



now, the obtained gum is collected & packed.

• Preservation & storage :

→ Acacia is stored in air tight container in cool & dry place.

- Uses : - Used as an emulsifying agent.
- Act as a demulcent
- Used as a binding agent.
- Used in making candies, etc.

Agar :

- Synonyms - Agar agar, Gelose, Vegetable gelatin.
- Bio. source - It is the dried gelatinous substance obtained from Gelidium amansii.
- Family - Gelidaceae.
- Geo. source - Japan, New Zealand, Korea, South Africa, USA, Chile, Spain, Portugal, India, etc.
- Macroscopical characters -
 - Colour - yellowish white to grey.
 - Odour - odourless
 - Taste - mucilaginous
 - Shape - strips, flakes or coarse powder
 - Solubility - Insoluble in organic solvents, cold water
- Soluble in hot water.
- Chemical constituents - It contains 2 different polysaccharides i.e., agarose & agarosectin.
- Evaluation - Agar is evaluated by chemical tests :-
 - ① Powdered drug + ruthenium red
↓
gives red colour.
 - ② Incinerated ash of agar + dil. HCl
↓
In microscope skeletons & sponge are seen

• Preparation & collection :

- The algae is collected in the between may to october & manufacturing is done in winter.
- The algae is collected, dried, beaten & shaken to remove shell & sand.



The algae is bleached by the exposure in the sunlight or washing with water



These are boiled with acidulated water for few hours



after this mucilaginous mass is formed which is filtered in hot & then cooled.



now, they are cutted into bare & make them into strips.



lastly, they are dried in sunlight, removing moisture at 35°C .

- Uses - Used as a culture medium.
 - as an emulsifying agent.
 - used in the preparation of jellies.

Tragacanth :

- Synonyms - Gum Tragacanth, Anjira (Hindi).
- Bot. source - It is the dried gummy exudation obtained by making incision on stem & branch of Astragalus gummifer.

• Family - Leguminosae.

• Geo. source - Iran, Turkey, Syria, India.

• Preparation
in
collection

- Incisions are made on the stem of 2 year old plant

↓

Gum exudes out & dries

↓

depending on the type of incisions, shape of the gum may be flat, ribbon like, etc.

↓

These gums were collected & packed.

- Macroscopical characters -
 - Colour - white, slight yellow
 - Odour - Odourless
 - Taste - mucilaginous
 - Shape - flat or curved
 - Solubility - soluble in water
- Insoluble in alcohol.

• Chemical constituents - It contains Tragacanthin (water soluble), Baccarin (water insoluble), sugars, etc.

• Evaluation - ① Tragacanth solⁿ + Iodine solⁿ

↓
green colour produced.

② Tragacanth solⁿ + 10% aqueous FeCl₃ solⁿ (few drops)

↓
deep yellow precipitate is formed.

• Preservation & Storage - Tragacanth is stored in a well closed st^o normal room temperature.

• Uses - Used as demulcent, suspending agent, binding agent in tablets & pills.

Honey :

- Synonyms - Madhu, Sahed, Madh.
- Bio. Source - It is a saccharine liquid preparation, obtained from - Apis mellifera
- Apis indica.
- Family - Apidae.
- Geo. Source - It is produced in west Indies, Australia, New Zealand, California, Africa & in India.

• Preparation
(collection) - Nectar of the flowers mainly contains 25% sucrose & 75% water



The bee sucks the nectar from the flowers



The enzyme invertase present in the saliva of bee hydrolyse sucrose into invert sugar.



The bee reaches the honey comb & deposit invert sugar into a special cell



Invert sugar present in the honey comb is converted into honey in the next 3 days.



water is lost from this by evaporation



At this stage the honey contains about 80% invert sugar & 20% water



Bee closes the honey comb with the help of cap of wax



The honey combs are collected & cap of wax is removed & honey is collected by centrifugation.

• Macroscopical characters -

Colour - Brown/pale yellow

Odour - Pleasant

Taste - Sweet

Nature - Viscous & translucent liquid

• Chemical constituents -

It contains glucose, fructose, sucrose, dextrin, volatile oil, enzymes, etc.

• Uses

- Used as a Laxative.

- in the therapy of cold & cough.

- It is also having antiseptic property.

• Preservation & storage

- It is stored in room temperature in a well-closed container.

- Evaluation: 2 ml aqueous solⁿ of honey + Fehling solⁿ
↓ heated for 5 mins.
Brick red colour appears.
(Confirms the presence of reducing sugar)
-

(II) Proteins & Enzymes

• Proteins :-

These are the complex organic compounds which have a long chain of amino acid & consists of C, H, O, N, S, P & many essential compounds.

• Classification of proteins :-

(a) Simple proteins

eg. - Albumin
- Globulin

(b) Conjugated proteins

eg. - Nucleoproteins
- Glycoproteins
- Mucoproteins

• Identification test for protein :

- Ninhydrin test
- Biuret test
- Xanthoproteic test
- Millon's test
- Sodium nitroprusside test.

• Role of protein in plants:

- in growth & development
- Catalysing reaction
- forms cellular structure of plant cells.

Gelatin :-

• Synonyms - Gelfoam, Puragel.

• Bio. Source - It is obtained by the partial hydrolysis of collagen, derived from the skin, tissue & bones of -

ox - *Bos taurus*

sheep - *Ovis aries*.

• Family - Bovidae.

• Preparation - Bone taken as raw material

↓
finely grounded & then treated with organic solvent

↓
Now, treated with HCl

↓
the treated material is then heated under pressure

↓

The fluid obtained is evaporated to get gelatin



The concentrated gelatin is spreaded on glass tray to form jelly.



Now, the obtained product is dried at various temperature to get dried gelatin.

• Macroscopical characters -

Colour - Yellow

Odour - Odourless

Taste - Tasteless

Nature - hard & brittle

Solubility - Soluble in hot water, acetic acid & in glycerin.

- Insoluble in alcohol, ether, etc.

• Chemical constituents -

Glut in (Chief constituent)

• Evaluation -

① Gelatin solⁿ + sodaline $\xrightarrow{\text{heat}}$ ammonia gas evolves.

② Gelatin solⁿ + Tannic acid solⁿ \longrightarrow white precipitate formed.

• Preservation & storage -

Gelatin is stored in air tight container at room temperature.

- Uses - In the manufacturing of hard & soft gelatin shell of capsule.
- In the preparation of culture media.
- Used as a suspending agent, thickening agent, coating agent, binding agent, etc.

Casein ?

- Source - It is a phosphoprotein found in milk at the extent of about 3%.
- Preparation - Milk is treated with acetic acid
 - ↓
 - The acid treatment removes calcium cation
 - ↓
 - It leaves a water insoluble phosphoprotein
 - ↓
 - dried, grounded & packed.
- Chemical constituents - It contains all of the common amino acids like globulin, albumin, etc.
- Macroscopical characters -
 - Colour - white / slight yellow
 - odour - odourless
 - Taste - Tasteless
 - nature - Amorphous & hygroscopic solid.
 - Solubility - soluble in acids & dil. alkali
 - insoluble in water.

• Evaluation - Bioassay

1-2 ml of test solⁿ + biuret reagent

↓ shake well & stand for 5 mins.

observe for any colour change

(if solⁿ turns from blue to violet, means proteins are present)

• Uses - in making cheese.

- to make dietary & protein supplements.

- also used as coagulating agents, binding agents.

- used in cosmetics, medicines, etc.

• Enzymes !

→ These are the macromolecules which is made up of protein that can accelerate chemical reactions.

→ To carry out the biological processes of a cell, enzymes are required.

• Classification of enzymes :

(1) On the basis of site of activity on cell :

(a) Intracellular enzymes - in this, the enzyme functions within the cell.

eg. Enzymes involved in TCA cycle.

(b) Extracellular enzymes - in this, enzyme functions outside the cell.

eg. Digestive enzymes like - pepsin, amylase, etc.

(2) On the basis of functions :

e.g. - Transferase - lyase
- Oxidoreductase - ligase
- Hydrolase - Isomerase.

• Applications of enzymes :-

- ① α -amylase - used in food industry to convert starch into glucose.
- ② Streptokinase - Removes blood clot.
- ③ Asparaginase - Used in cancer therapy.
- ④ Renin - Used in cheese preparation.

Proteolytic enzymes :-

- These are the enzymes that breakdown the protein molecules into amino acids.
- They are found in plants, animals & in micro-organisms (bacteria, algae, viruses, etc).

① Papain : It is a digestive enzyme which is found in papaya.

- Bio. source - It is a dried & purified latex, obtained from the fruits & leaves of Carica papaya.
- Family - Caricaceae.

• Geo. source - America, Sri Lanka, Tanzania, Florida, South Africa, Australia, India, etc.

• Preparation - incisions are made on the mature & green fruit



Latex comes out & collected



dried & purified with water & precipitated with alcohol



creamy white product is obtained



sealed & product.

• Macroscopical character

- colour - white / greenish white

odour - odourless

taste - tasteless

nature - slightly hygroscopic

solubility - soluble in water

- insoluble in organic solvent.

• Evaluation

- Papain decolorises aqueous potassium permanganate solution.

- Papain causes curdling in milk.

• Preservation & storage

Papain powder is stored at -20°C in a well closed container.

• Uses

- It is used for intestinal & gastric disorders.
 - It is used in ointment preparation & liver tonics.
 - Used to reduce tendons.
-

② Bromelain :-

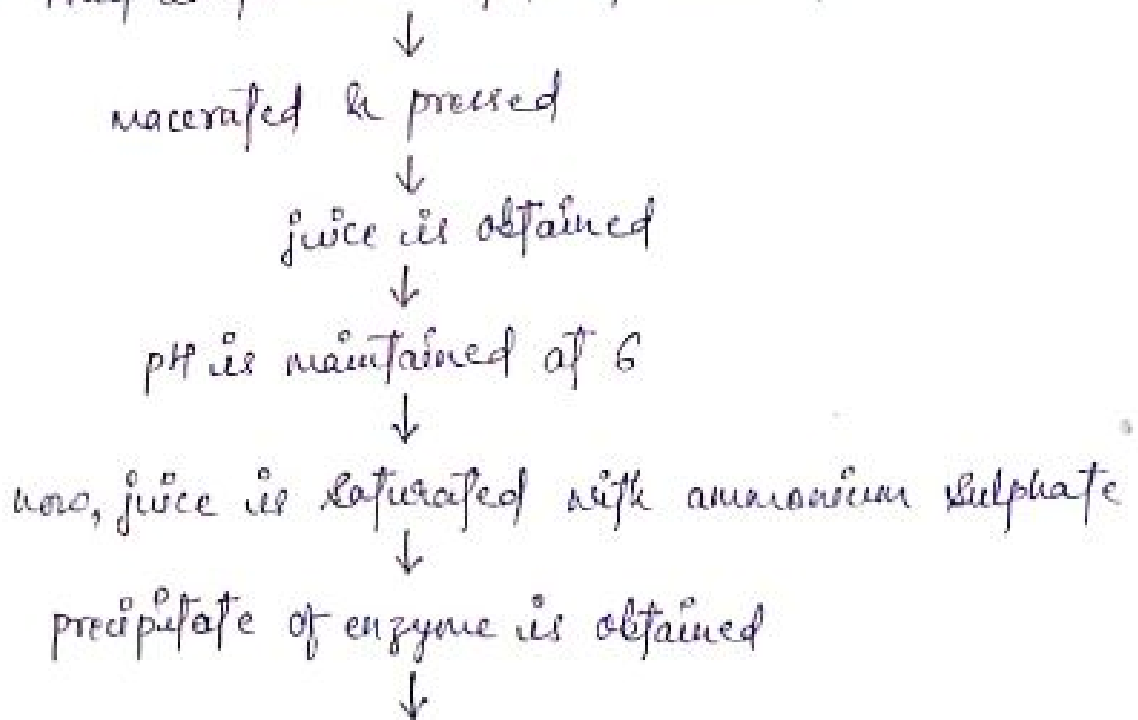
→ It is a chief protease enzyme found in stem & fruits of pineapple plant.

• Biological source - This proteolytic enzyme is isolated from juice of Ananas comosus.

• Family - Bromeliaceae.

• Geo. source - America, India, Ireland, China, U.S., Brazil, Mexico, etc.

• Preparation - Fruit is taken & cutted into small pieces



-the precipitate is separated & washed with acetone



lastly, the product is dried & packed.

- Macroscopical Characters -
 - Colour - light brown
 - odour - Odourless
 - pH - 5.0 to 8.0
 - Solubility - Soluble in water

• Evaluation - sample + Na_2CO_3 (sodium carbonate)



mixture is heated & cooled



5ml water added & filtered



now, filtrate is acidified with dil. HNO_3 & heated for 5 mins



cooled & AgNO_3 is added



precipitate forms & treated with ammonia



separated & acidified



white turbid solⁿ obtained.

• Preservation & Storage - At pH 3-6, temperature upto 60°C , Brunelain remains stable.

- Uses
 - in the therapy of inflammation, arthritis.
 - It facilitates tissue repairing.
 - It is having diuretic & anti-platelet activity.
 - It is used topically for cleaning wounds.

③ Serratiopeptidase :

→ It is also a proteolytic enzyme, which is obtained from silkworm.

• Source - Serratiopeptidase is isolated from the intestine of silkworm (*Bombyx mori*).

• Preparation - The enzyme is present in the intestine of silkworm

↓
Isolated & purified from intestine.

• Preservation & Storage - It is stored below 30°C in a well closed container & away from sunlight.

- Uses
 - It helps in quick healing of wounds.
 - It is used in pain & inflammation.
 - In the treatment of diabetes, asthma & pus accumulation.

④ Urokinase :

→ It is a serine protease present in humans & animals.

• Source - The enzyme is isolated from human urine & kidney cells.

• Preparation - Urokinase is separated from human urine.

↓
treated with heat for 10 hrs at 60°C

↓
It is free of thromboplastic activity

↓
This preparation is used to prepare fibrinolytics for humans

• Preservation & Storage - Urokinase should be stored in 4°C for ~~2-7~~ in a well closed container.

• Uses - Used to treat blood clots in the lungs.
- also used to treat deep vein thrombosis (blood clot in the deep veins of the body).

⑤ Papain :

- It is a digestive enzyme, found in gastric juice.

• Source - It is an enzyme which is obtained from the stomach of pig. (*Sus scrofa*).

• Family - Sulidae.

• Preparation - Mucous membrane of stomach is separated & taken



Placed in acidified water at 37°C for 2 hours



filtered & sodium salts are added



precipitate obtained



separated & alcohol is added to remove salts.



filtered & dried at low temperature

• Macroscopical characters -

Colour - Pale yellow

Odour - Odourless

Taste - slightly bitter

Solubility - soluble in water, acids & sodium chloride

• Preservation & storage - Pepsin is stable at 4.4 pH at -20°C for 2-3 months in a well closed container.

• Uses - in cheese preparation.
- in leather industries.
- generally used to digest proteins.

► Lipids: The lipids are the organic compounds which are made up of heterogeneous compounds like - fats, oil, waxes, etc.

→ These are soluble in oils, fats, alcohols.

→ Functions - It provides energy to cell.

- acting as a structural component of a cell membrane & protects it from external environment.

• Classification of lipids :-

(a) Simple lipid

eg. fat, wax.

(b) Compound lipid

eg. - phospholipid

- Glycolipid

- Lipoprotein

• Evaluation of lipids :

① Salkowski test -

Sample dissolved in chloroform



add equal vol^m of conc. H_2SO_4



Cherry red colour produced.

② Liebermann Burchard test -

Sample dissolved in chloroform



add few drops of acetic anhydride + few drops of conc. H_2SO_4



Solution becomes red, then blue & finally bluish green in colour.

① Castor oil :

- Synonyms - Castor bean, Ricinus oil, Arandi (Hindi).
- Bot. source - It is a fixed oil, obtained from the seeds of Ricinus communis.
- Family - Euphorbiaceae.
- Geo. source - It is distributed in Brazil, Thailand, Romania & in India.

• Preparation :

- Castor oil is obtained from castor seeds.
- firstly, seed coats are removed by crushing under grooved rollers



now, they are placed under air current to blow or remove testas



The kernels are placed in oil expellers at room temperature & applying 1-2 tones of pressure



oil is filtered & steamed at $80^{\circ}\text{C} - 100^{\circ}\text{C}$ to remove rosin (poison substance).



oil is filtered again



castor oil with 1% acidity is used for medicinal purpose.

• Macroscopical characters

Colour - pale yellow

odour - slight

Taste - Nauseating

Nature - Viscous & transparent liquid.

Solubility - Soluble in alcohol, chloroform, etc.

• Chemical constituents - it contains Ricinoleic acid, isoricinoleic acid, linoleic acid, stearic acid, etc.

• Evaluation - Castor oil + equal vol^m of alcohol
↓
clear solution forms.

• Preservation & storage - It is stored at temperature around 55° to 75° F.

• Uses - in soap industry.
- used as lubricant.
- in the preparation of cosmetics.
- also having mild purgative activity.

② Chaulmogra oil :

• Synonyms - Hydrocarpus oil, Gyacardia oil.

• Bio. source - It is a fixed oil, obtained from the seeds of Hydrocarpus anthelmintica.

• Family - Flacourtiaceae.

• Geo. source - Myanmar, Thailand, Sri Lanka, Bangladesh, & in India (Assam & Tripura).

• Preparation:

seeds are taken
↓
cleaned, washed & dried
↓
seeds are removed
↓
kernels are crushed under pressure
↓
oil is obtained.

• Macroscopical characters -

colour - yellow to brownish yellow
odour - characteristic
taste - acid
solubility - soluble in alcohol, chloroform, ether, benzene, etc.

• Chemical constituents

- Camphoric acid, hydrocarpic acid, palmitic acid, etc.

• Use

- used in leprosy, tuberculosis, rheumatism, etc.
- It is also having bactericidal activity

• Preservation & Storage

- It is stored in cool & dark place, in a well closed container.

③ Wool Fat :

- Synonym - Lanolin, Agnol, Alapurin.
- Bio. Source - it is a purified wax, obtained from the wool of the sheep (Ovis aries).
- Family - Bovidae.
- Geo. Source - Commercially manufactured in Australia, U.S.A & very less extent in India.
- Preparation - wool is cut & washed with a soap.

↓
an emulsion of wool fat (called as wool grease) takes place in water

↓
now, cracking the emulsion with sulphuric acid & raw lanolin is separated

↓
lanolin (wool grease) floats on the upper layer & fatty acids are dissolved in the lower layer

↓
lanolin is purified by treating with sodium peroxide

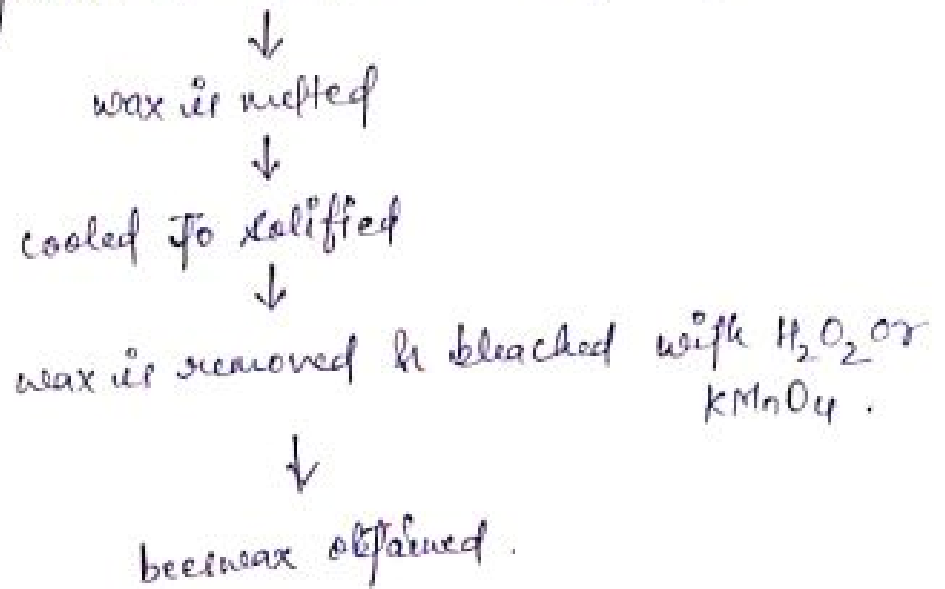
↓
bleaching is done.

• Macroscopical Characters

colour - whitish yellow
odour - faint
taste - bland (flavourless)
solubility - Insoluble in water
- Soluble in organic solvents.

(4) Bees wax :

- Synonyms - Mom, white bees wax, yellow beeswax.
- Bio. source - It is a purified wax, obtained from the honey comb of bees (Apis mellifera).
- Family - Apidae.
- Geo. source - Beeswax is prepared in California, Africa, France, Italy, India, etc.
- Preparation - Honey comb is melted in boiling water



Macroscopical characters -

colour - white / yellow
odour - Honey like
Taste - waxy

Solubility - soluble in organic solvents
- insoluble in water.

• Chemical components - it contains cerotic acid, cerolin, palmitate.

• Evaluation - wax + caustic soda solution

↓
for 10 minutes cool it

↓
No turbidity is produced.

• Uses - in the manufacturing of candles.

- Preparation of ointments

- used in cosmetics for the preparation of lipsticks & face creams.

Natural allergens

• Definition - The agents or substances that can cause allergic reactions are called as allergens.

- An allergen is an antigen, which is capable of stimulating Type-I hypersensitivity reaction in individuals through IgE response.

- When an allergen enters to the body of an individual, antibodies were produced by immune system & an antigen-antibody reaction occurs, which results in the release of histamine (gives allergic reactions).

• Types of allergens -

- ① Inhaled allergens
- ② Injected allergens
- ③ Ingested allergens.
- ④ Contactant allergens

- ⑤ Infectant allergens
- ⑥ Infestant allergens (Parasitic).

① Inhaled allergens -

- By this allergens, allergies are caused by the inhalation of air borne substances like pollens, dust, mites, moulds, etc.
- They can cause respiratory diseases, inflammation in nose & lungs.

② Ingestant allergens -

- These are the food allergens (present in food stuff), which are ingested / swallowed by mouth.
- When foods are digested, the nutrients are absorbed & the allergens stimulate allergic response.
- They give rise to gastro-intestinal symptoms, skin rashes, puffed lips & tongue, etc.

③ Injectant allergens -

- The injectants (injectable preparations & insects) can cause allergy in an individual.
- Symptoms of injectant allergens are :-
 - Itching
 - Peeling of skin.
- e.g. Generally Penicillin injection causes allergy, so that physicians are using cephalosporins & semi-synthetic preparation of Penicillin.

④ Contactant allergens -

- These allergens produce allergic reactions by getting contact of substances / chemicals like poisons & other chemical products.

⑤ Infectant allergens -

- In this, allergy is caused by the micro-organisms, may cause / lead to infectious disease.
- Infection is caused by microbes like - bacteria, moulds, protozoa, virus, etc.

⑥ Parasitic allergens -

- These type of allergens are similar to infectant allergens, parasitic organisms like hookworms, tapeworms, threadworms, dermatophytes, etc. that can cause allergic response & create disease.

• Examples of natural allergens :

① Arnica

- Synonyms - Mountain tobacco.
- Bot. Source - Arnica montana.
- Family - Compositae.

→ It contains sesquiterpene lactones which are sometimes act as allergens.

- Uses - It is used in sprains, bruises & in wounds.

② Asparagus

- Bio. Source - *Asparagus officinalis* / *Asparagus racemosus*.
 - Family - Liliaceae / Asparagaceae.
- it contains asparagin, coniferin that may be act as allergens.

③ Naffodil

- Bio. Source - *Narcissus pseudonarcissus*.
- Family - Amaryllidaceae.
- Use - it is an ornamental flower, its oil is used in perfume manufacturing.

④ Garlic

- Bio. Source - *Allium sativum*
 - Family - Liliaceae
- it contains allicin that can be act as allergen.

⑤ Ginkgo

- Bio. Source - *Ginkgo biloba*.
 - Family - Ginkgoaceae.
- it contains ginkgolic acid as an allergen.

Marine drugs :

①

► Definition - The drugs which are obtained from marine organisms are called as marine drugs.

- Major part of earth is covered with water bodies.
- The bioactive compounds are also obtained from marine flora & fauna used for the treatment of many diseases

- Marine - relating to sea.
- Flora - the plant life present in a particular region.
- Fauna - Animal life

► Novel medicinal agents from marine source :

(means something new)

The novel medicinal agents which are obtained from marine sources are as follows :-

- (a) Cardiovascular agents
- (b) Anti-cancer agents
- (c) Anti-viral agents/compounds
- (d) Anti-microbial agents
- (e) Anti-parasitic agents
- (f) Anti-spasmodic agents
- (g) Anti-inflammatory agents

(a) Cardiovascular agents :

→ These are the drugs that are used to treat heart disorders.

→ Examples -

(i) Laminine - it is obtained from marine algae Laminaria angustata.

- it provides hypotensive effects.

(ii) Octopamine - it is obtained from - Octopus vulgaris
- Octopus macropus

- it exhibits adrenergic effect & also provides effect in heart muscles.

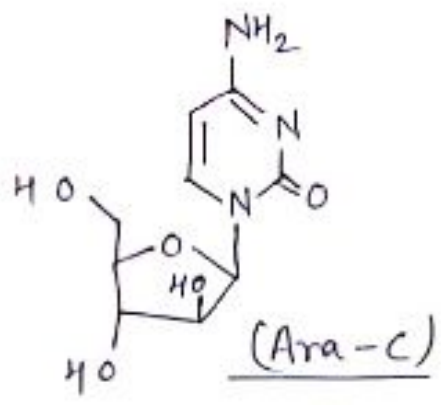
(iii) Saxitoxin - It produces hypotensive effect.

(b) Anti-cancer agents :

→ These are the drugs which are used in the treatment of cancer.

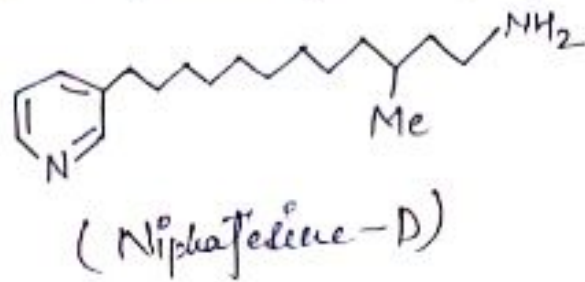
→ Examples -

(i) Ara-C - Used in the treatment of leukemia.



(ii) Crasium acetate - It is obtained from Caribbean gorgonian ⁽²⁾.

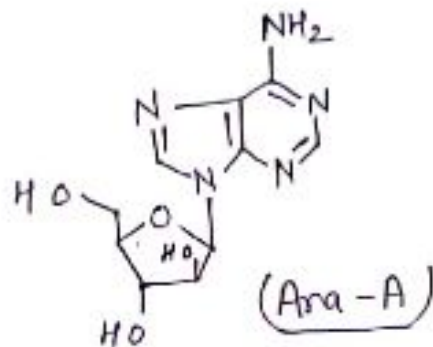
(iii) Niphateline D - Obtained from sponges of Niphates species.



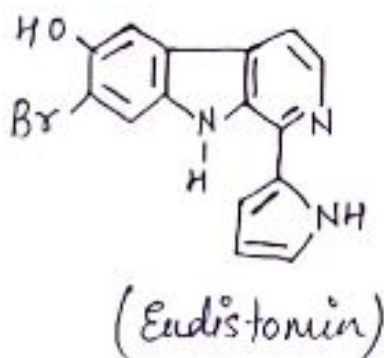
(C) Anti-viral agents: These are the agents which are used in the treatment of viral diseases.

→ Examples -

(i) Ara-A - It is obtained from marine sponge Tethya crypta.



(ii) Eudistomin - It is obtained from marine sponges Eudistoma olivaceum.

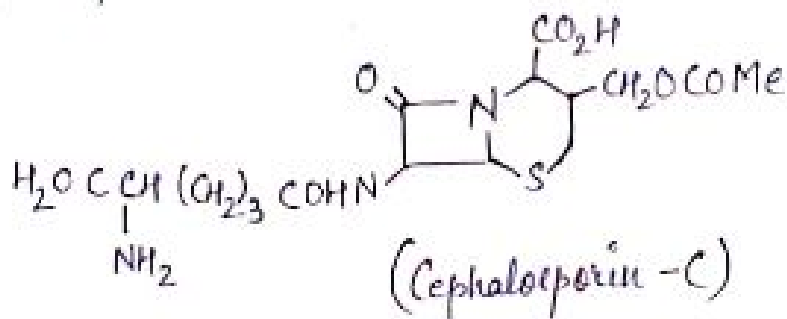


(iii) Avarol & Avaron - It is obtained from *Disidea avara*.
- They are having anti-HIV activity.

(d) Anti-microbial agents: These are the agents, which are used in the treatment of infectious diseases caused by microbes.

→ Examples -

(i) Cephalosporin-C - Isolated from fungus *Cephalosporium acremonium*.



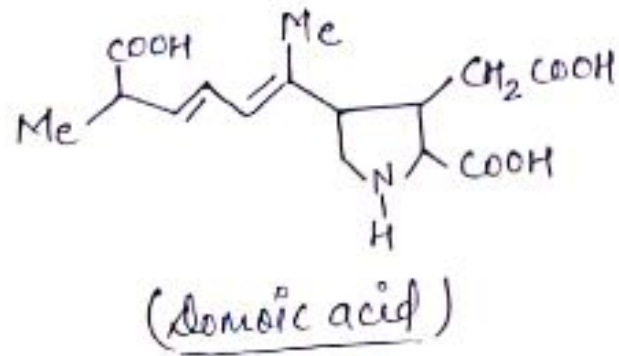
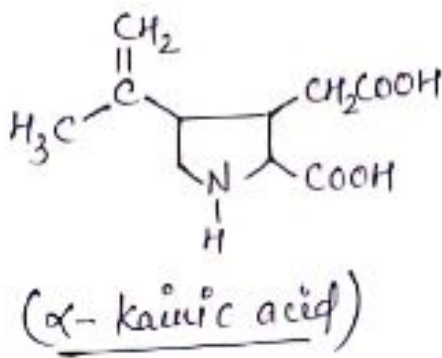
(ii) Halobornin A, B & C - Obtained from sea cucumber, *Stichopus japonicus*.
- It is an anti-fungal compound.

(e) Anti-parasitic compounds: These are the agents, that are used to kill parasites & to cure parasitic disorders.

→ Examples -

(i) α -kainic acid - It is obtained from red algae *Bigenia simplex*.
- It is used against tapeworms, round worms, etc.

(ii) Domoic acid: It is obtained from Chondria armata.
- It posses antihelminthic activity.



(iii) Laminine

(iv) Bengamide F.

(f) Anti-Spasmodic agents: These are the substances which are used to treat spasm.

→ Examples -

(i) Tetrodotoxin - It is obtained from liver & ovary of puffer fishes.

(ii) Agelasidine.

(g) Anti-inflammatory agents: They are used to treat inflammation.

→ Examples -

(i) Manoalide - It is obtained from Luffariella variabilis.
- It shows analgesic & anti-inflammatory effect.

(ii) Flustramine A & B - It is obtained from Flustra foliaceae.
- It is having muscle relaxant action.

HALLUCINOGENS

❖ **Definition:**

- **Hallucinogens** are natural and synthetic psychoactive substances, when ingested causes **Hallucination** (alter one's state of consciousness).
- Psychotropic substances acts on the nervous system that affects/ changes temporary mental processes and behaviour.

❖ **Hallucination:**

- Hallucinations are sensations that appear to be real but are created within the mind.
- Example: - Seeing things that are not there
 - Hearing voices or other sounds
 - Experiencing body's sensations like crawling feeling on the skin
 - Smelling odor that are not real.



❖ **How Hallucinogens work:**

- Hallucinogens can be used in many different ways. An individual can take it in a pill form, smoke it, eat it, or drink it.
- Once the hallucinogen gets inside the body, hallucinogen affects neurotransmitter **Serotonin**. **Serotonin** is a neurotransmitter that helps control functions such as behavior, mood and perception.
- A hallucinogen can lasts little as 30 minutes and as long as 4 hours.

• **Applications of Hallucinogens:**

- In the treatment of mental illness.
- Withdrawal of alcoholism and addiction of drugs.

- **Natural Hallucinogens:**

Some examples of natural hallucinogens are:

1. **Nutmeg:**

- **Biological source:** It consists of dried seeds of *Myristica fragrans*.
- **Family:** Myristicaceae
- On administering more than 1 teaspoonful of nutmeg via oral route hallucination occurs.
- It contains **myristicin** that causes hallucination.

2. **Belladonna:**

- **Biological source:** *Atropa belladonna*
- **Family:** Solanaceae
- It contains **scopolamine** which is a psychoactive substance.
- **Constituents:** Atropine, Scopolamine, Atropamine, Belladonnine, Hyoscine.
- **Medicinal Uses:** It is as diuretic, sedative, antispasmodic, and mydriatics (dilating the pupil).

3. **Datura:**

- **Biological source:** *Datura metel*
- **Family:** Solanaceae.
- It contains **scopolamine** which is a psychoactive substance and shows hallucination effect.
- **Constituents:** Atropine, scopolamine, scopolamine.
- **Medicinal uses:** It is used as antiasthmatic, antispasmodic, antitussive, bronchodilator, hallucinogenic, hypnotic and mydriatic.

4. **Fennel:**

- **Biological source:** *Foeniculum vulgare*
- **Family:** Umbelliferae
- **Constituents:** It contains fenchone, anethole, camphene etc.
- **Medicinal uses:** The plant is analgesic, anti-inflammatory, antispasmodic, aromatic, carminative, diuretic, expectorant, hallucinogenic, laxative, stimulant and stomachic.

5. **Cannabis:**

- **Biological source:** *Cannabis sativa*, *Cannabis indica*
- **Family:** Cannabaceae
- **Constituents:** cannabidiol, cannabichromene, cannabigerol, terpenoids, etc.
- This constituents exhibits euphoric (feeling of pleasure, excitement and happiness) activity.

- **Medicinal uses:** The use of *Cannabis* as a mind-altering drug (Hallucinogen), used to reduce nausea and vomiting during chemotherapy, to improve appetite in people with HIV/AIDS, and to treat chronic pain and muscle spasms.

6. **Peyote: Spineless cactus**

- **Biological source:** *Lophophora williamsii*
- **Family:** Cactaceae
- **Constituents:** Mescaline, Peyocactin
- **Medicinal uses:**
 - Mescaline is a hallucinogenic drug.
 - Used to treat toothache, pain in childbirth, fever, breast pain, skin diseases, rheumatism, diabetes, colds, and blindness.

7. **Hyoscyamus: Henbane**

- **Biological source:** *Hyoscyamus niger*
 - **Family:** Solanaceae
 - **Constituents:** Hyoscyamine, Scopolamine
 - **Medicinal uses:** Produce hallucinations, dilated pupils, restlessness, increases BP and flushed skin.
-

TEROTOGENS

- **Definition:**

The teratogens are the chemical, physical, or biologic agents which on exposure to the pregnant mother may cause birth defects to the developing fetus or developmental abnormalities.

e.g. Alcohol, Nicotine, Mercury, Phenytoin, Radiation, etc.

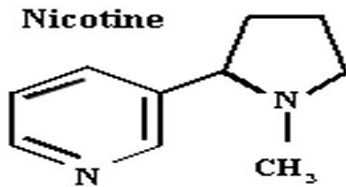
- **Teratogenesis:** The formation of an abnormal embryo.

- **Teratology:** Study of abnormal development in embryos and the causes of birth defects.

- **Natural Teratogens:** These drugs are contraindicated during pregnancy-

1. **Tobacco:**

- **Biological source:** Nicotiana tobacum
- **Family:** Solanaceae
- **Constituents:** Nicotine, Nor- nicotine, Nicotianine

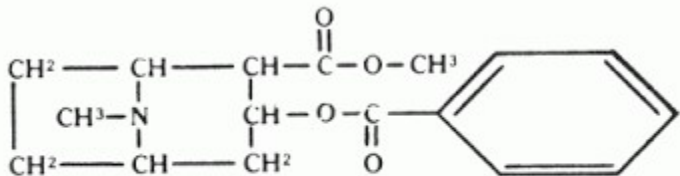


- **Uses:** Shows CNS stimulant effect, used as an insecticide, used in preparation of cigarette (Cigarette smoking during pregnancy may raise the cause of teratogenesis).

2. **Coca:**

(Cocaine produces teratogenic effect on fetus)

- **Biological source:** Erythroxylum coca
- **Family:** Erythroxylaceae
- **Constituents:** Cocaine (Teratogen), α & β truxilline, ecognine.



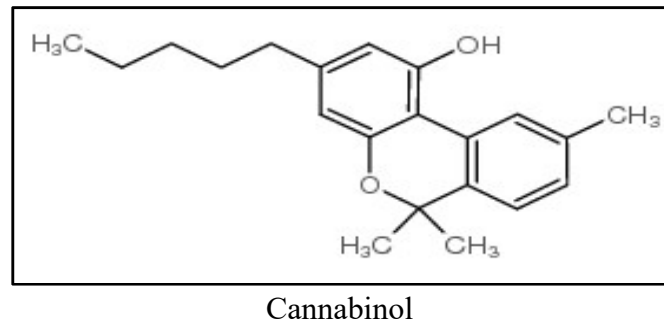
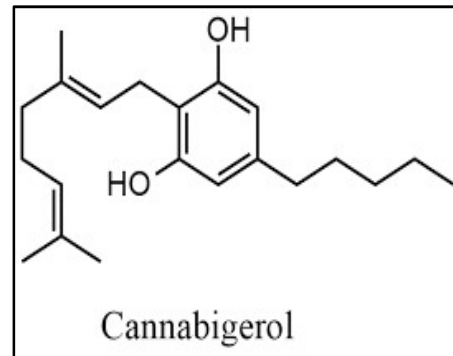
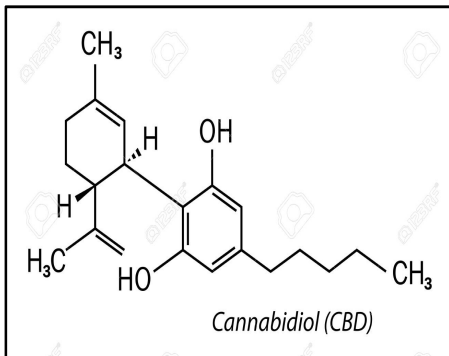
Cocaine

- **Uses:** It shows CNS stimulant effect, coca extract is used for stimulant stomach, treating asthma, etc.

3. **Marijuana:** Cannabis/ Hemp.

(Growth retardation and malformations are reported after marijuana use during pregnancy)

- **Biological source:** Cannabis sativa
- **Family:** Cannabaceae
- **Constituents:** Cannabidiol, cannabigerol, cannabinol



- **Uses:**
 - Produces hallucination effect.
 - Cannabis can be used to reduce nausea and vomiting during chemotherapy.
 - To improve appetite in people with HIV/AIDS.
 - To treat chronic pain and muscle spasms.

4. **Ergotamine:** It is a natural alkaloid obtained from ergot fungus.

- **Biological source:** *Claviceps purpurea*.
- **Family:** Clavicipitaceae
- **Uses:** Used to treat migraine and headache.

5. **Asparagus:** Shatavari

- **Biological source:** *Asparagus racemosus*
- **Family:** Asparagaceae

- **Constituents:** It contains Asparagine, resin, tannin, flavonoids, etc.
- **Uses:** In the treatment of joint pain (Rheumatism), Constipation, to prevent stones in kidney and bladder.

6. **Vinca:** Sadabahar, Sadaphuli

- **Biological source:** *Cantharanthus roseus*
- **Family:** Apocynaceae
- **Constituents:** it contains Vincristine, Vinblastine, etc.
- **Uses:** In the therapy of Cancer.

7. **Colchicum**

- **Biological source:** It constitutes of dried ripe seeds of *Colchicum luteum*.
- **Family:** Liliaceae
- **Constituents:** Colchicine, demecolcine, colchicoside, starch, gum, tannin, etc.
- **Uses:** In the treatment of Gout and Cancer.

Prepared by:

Ms. Garima Sahu

(Asst. Professor)

School of Pharmacy

BIT- Meerut