Module-5 Plant products and Primary metabolites

Scope- This module includes general description of some fibers, hallucinogens, teratogens, natural allergens and primary metabolites. Also include various drugs obtained from marine sources.

Learning outcomes-

1. Student will able to learn biological source, chemical nature and uses of various fiber drugs along with hallucinogens, teratogens and natural allergens.
2. Student will able to learn the introduction, sources, properties, preparation, preservation, storage, therapeutic uses and commercial utility for a number of primary metabolites like Carbohydrates, Proteins, enzymes and Lipids.
3. Student will get knowledge about various important drugs obtained from marine sources.

Fibers

Long strands of molecules interwoven to form a linear, string-like structure are known as **'Fibers'**. Fibers are natural or man-made such as cotton, silk, jute, etc.

Fibers were discovered when early people realized the need to cover and protect their own hair and skin from the weather. Since early people would live in cold climate they hunted animals with skins (fur and food) that kept them warm. When used continuously this skin becomes harder and made it hard for the early men to hunt and hence later they started to treat this skin to maintain its softness. In a much later time, they started using the bones of animals as needle and nerves as the thread to stitch. And now decades later we finally know how to grow our own fibres and make clothes or fabrics out of them.

Characteristics of Fibers

Fibers used in clothing are used to cover the body, to protect our body, etc. Everyone wears clothes for different reasons. Some of the other characteristics of fibres are:

- Fibers can be repeatedly stretched more than 500% of its original size and can also recover back; immediately to its original size and shape once the tension is relaxed.
- In comparison to rubber, it is stronger and more durable.
- It is lightweight.

Natural Fibers

Fibers obtained from plants and animals that can be spun into filament, thread or rope are termed as 'Natural fibers'. They may be woven, knitted, matted or bonded.

Decades later even though the methods used to make fabrics from fibres may have changed greatly, their functions remain the same:

- Most natural fibers are still used to make clothing and containers.
- To insulate, soften and decorate our spaces.

Ex. Cotton and wool

Cotton

Synonym- Raw cotton, Cotton wool, Purified cotton, Absorbent cotton

Biological source- Cotton consists of the epidermal trichomes or hairs of the seeds of cultivated species of the *Gossypium barbadense*, belonging to the family Malvaceae.

Purified cotton or absorbent cotton is prepared by removing the fatty matter and adhering impurities from raw cotton. It is also bleached and sterilized.

Geographical source- Cotton is produced commercially in USA, Egypt and India. Also cultivated in Africa and South America.

Preparation of Absorbent cotton- Cotton plant after flowering , bears capsule fruits which are 3-5 celled and contains numerous seeds. The seeds are covered with hairs (trichomes) and also called as Bolls. These bolls are collected dried and taken to ginning press, where the trichomes are separated from the seeds using various devices. The short and long hairs are separated. The short length hairs are known as Linters and used for preparation of cloth. After collection, the raw cotton is purified to remove impurities, finally packed in wrappers and sterlised by gamma radiation.

Description- Colour- White (due to bleaching), odour- None, taste- None, Size- 2.5-4.5 cm in length, 25-35 micrometer in diameter.

Chemical constituents- Raw cotton contains about 90% of cellulose, 7-8% of moisture, wax, fat and some protoplasm. Purified or absorbent cotton is entirely cellulose with 6-7% moisture.

Chemical tests-

1. Soak cotton fibres in iodine water, then dried, add few ml of 80% Sulphuric acid. It gives purple-blue or blue-green colour (Distinction from Jute and Hemp).
2. With Ammonical Copper oxide solution (Cuoxam reagent)- Raw cotton dissolves with formation of balloons. Absorbent cotton dissolves completely with uniform swelling.
3. Cotton is insoluble in dil NaOH and HCl and soluble in 66 % Sulphuric acid.

Uses-

1. As filtering medium
2. In surgical dressings
3. As insulating material
4. Absorbent cotton absorbs blood, mucus, pus and prevents from infections.

Applications of Cotton

1. Poplins, voiles are made by using Cotton.
2. Cotton is used in great quantity as a fabric for hot weather wear.
3. The absorbency of cotton makes it an excellent material for household fabrics such as sheets and towels.

4. Cotton is widely used in making rainwear fabrics. It can be woven tightly to keep out the driving wind arid rain, yet the fabric will allow perspiration to escape.
5. Ventile fabrics, for example, are close-woven cotton materials of this sort which are given additional water resistance by a chemical proofing.
6. It goes into clothing (shirts, T-shirts, trousers, denim, etc.), undergarments, boots and shoes, carpets and curtains, hats, etc.
7. Heavy cotton yarns and materials are used for tyre cords and marquees, tarpaulins and industrial fabrics of all descriptions.
8. Cotton can be blended with other fibres like polyester, rayon to manufacture fabric for different applications.

Jute

Synonym- Gunny

Biological source- It consists of phloem fibersof the stem of various species of the *Corchorus olitorius* and *Corchorus capsularis*, family Tiliaceae

Preparation-Phloem fibers are separated from stem by a process called Retting. After it, fibers are cleaned, dried and bleached by hanging in sun light. The jute is graded according to colour, glossiness and length.

Geographical source- Cultivated in West Bengal, Assam and Delta regions of Ganga.

Description- Colour- yellow-green, no odour and no taste, individual fiber length 0.8-5 mm, diameter 10-25 micrometer, great tensile strength and hygroscopic.

Chemical constituents- Cellulose 53%, Hemicellulose 20-22%, Lignin 10-11%

Chemical test- with phloroglucinol and HCl- give red colour due to Lignin.

Uses-

1. As filtering and straining medium
2. Manufacturing of padding splints
3. Preparation of gunny bags

Hemp

Biological source- Hemp is prepared from pericyclic fibers of the stems of *Cannabis sativa*, family- Cannabinaceae

Geographical source- In Russia, USA, Italy and France.

Preparation- By retting process

Description- Average length- 35-40 mm, average diameter- 22 micrometer, the fibers ends are bluntly rounded and some are forked due to injuries to stem.

Constituents- Mainly composed of cellulose, and some Lignin is present.

Uses- For manufacture of rope, twin and sail- cloths etc.

Hallucinogen are the substance that produces psychological effects that tend to be associated with phenomena such as dreams or religious exaltation or with mental disorders such as schizophrenia. Hallucinogens produce changes in perception, thought, and feeling, ranging from distortions of what is sensed (illusions) to sensing objects where none exist (hallucinations). Hallucinogens heighten sensory signals, but this is often accompanied by loss of control over what is experienced.

Psychopharmacological Drugs

The psychopharmacological drugs that have aroused widespread interest and controversy are those that produce marked aberrations in behaviour or perception. Among the most prevalent of these are D-lysergic acid diethylamide, or LSD-25, which originally was derived from ergot (*Claviceps purpurea*), a fungus on rye and wheat; mescaline, the active principle of the peyote cactus (*Lophophora williamsii*), which grows in the southwestern United States and Mexico; and psilocybin and psilocin, which come from certain mushrooms (notably two Mexican species, *Psilocybe mexicana* and *P. cubensis*).

Other hallucinogens include bufotenine, originally isolated from the skin of toads; harmine, from the seed coats of a plant of the Middle East and Mediterranean region; and the synthetic compounds methylenedioxyamphetamine (MDA), methylenedioxymethamphetamine (MDMA), and phencyclidine (PCP). Tetrahydrocannabinol (THC), the active ingredient in cannabis, or marijuana, obtained from the leaves and tops of plants in the genus *Cannabis*, is also sometimes classified as a hallucinogen.

Potential Side Effects of Hallucinogen Abuse

Hallucinogenic drugs can be highly unpredictable, sometimes offering individuals a pleasant sensation and other times a "bad trip," characterized by psychosis, high levels of anxiety, paranoia, and fear. The "trip" from a hallucinogenic drug can last for several hours, with no relief or control over the symptoms. Adding alcohol or other drugs can increase the possible risks and dangers as well.

Individuals can overdose on a hallucinogen when toxic levels build up in the body, resulting in hyperthermia, high blood pressure, impaired respiratory levels, and a racing heart rate. Seizures, extreme confusion, delirium, nausea, vomiting, and a loss of consciousness may be the result of a hallucinogenic drug overdose, which may lead to coma or even death.

Accidents due to poor motor control, lack of depth perception, distortion of the size and shape of objects, and feelings of invincibility, fear, or aggression brought on by a hallucinogenic drug are significant risks when taking these kind of drugs.

Increased libido and sexual arousal may lead to potentially hazardous sexual liaisons that may have long-reaching side effects, like unwanted pregnancy or the transmission of a sexually transmitted disease.

Hallucinogenic drugs may also have long-lasting side effects, especially when they are used regularly. Individuals may suffer from "flashbacks" days, months, or even years after using a hallucinogenic drug, and some may even develop hallucinogen persisting perception disorder (HPPD). Hallucinogenic drugs impact levels of dopamine and serotonin in the brain, which can alter moods and the ability to regulate emotions.

Allergy and Allergens

Allergies are hypersensitive responses from the immune system to substances that either enter or come into contact with the body.

These substances commonly include materials such as pet dander, pollen, or bee venom. Anything can be an allergen if the immune system has an adverse reaction.

A substance that causes an allergic reaction is called an **allergen**. Allergens can be found in food, drinks, or the environment.

Many allergens are harmless and do not affect most people.

If a person is allergic to a substance, such as pollen, their immune system reacts to the substance as if it was foreign and harmful, and tries to destroy it.

Research indicates that 30 percent of adults and 40 percent of children in the United States have allergies.

Fast facts on allergies

- Allergies are the result of an inappropriate immune response to a normally harmless substance.
- Some of the most common allergens are dust, pollen, and nuts. They can cause sneezing, peeling skin, and vomiting.
- Anaphylaxis is a serious allergic reaction that can be life-threatening.
- To diagnose an allergy, a clinician may take a blood sample.
- The symptoms of an allergy can be treated with drugs. However, the allergy itself requires desensitization.
- Anaphylaxis requires emergency treatment. Epinephrine injectors can help reduce the severity of an anaphylactic reaction.

What is an allergy?

Allergies occur when the immune system overreacts to ordinarily harmless substances.

Allergies are a very common overreaction of the immune system to usually harmless substances.

When a person with an allergy comes into contact with an allergen, the allergic reaction is not immediate. The immune system gradually builds up sensitivity to the substance before overreacting.

Symptoms

An allergic reaction causes inflammation and irritation. The signs and symptoms depend on the type of allergen. Allergic reactions may occur in the gut, skin, sinuses, airways, eyes, and nasal passages.

Allergic reactions may be confused for other conditions. Hay fever, for example, creates similar irritations to the common cold but the causes are different.

Recognizing these symptoms can be crucial to receiving timely treatment.

Causes

A particular antibody called immunoglobin (IgE) causes allergic reactions. Antibodies are released to combat foreign and potentially harmful substances in the body.

IgE is released to destroy the allergen and causes the production of chemicals that trigger the allergic reaction.

One of these chemicals is called histamine. Histamine causes tightening of the muscles in the airways and the walls of blood vessels. It also instructs the lining of the nose to produce more mucus.

Risk factors

The following can be risk factors for developing allergies:

- a family history of asthma or allergies
- being a child
- having asthma
- not being exposed to enough sunlight
- having a different allergy
- birth by Caesarean section

The most common allergens

Share on PinterestAnimal dander is a very common allergen.

Potential allergens can appear almost anywhere.

Any food can theoretically cause an allergy. Specific components of food can also trigger allergic reactions, such as gluten, the protein found in wheat. The eight foods most likely to cause allergies are:

- eggs, especially egg-white
- fish
- milk
- nuts from trees
- peanuts
- wheat
- soy
- shellfish

Other allergens include:

- animal materials, such as dust mite excrement, wool, fur, dander, or skin flakes, a protein found in cat saliva
- medications, such as penicillin, salicylates, and sulfonamides
- foods such as corn, celery, pumpkin, sesame, and beans
- insect stings, including wasp and bee sting venom, mosquito stings, and fire ants.
- insect bites from horseflies, blackflies, fleas, and kissing bugs
- cockroaches, caddis and lake flies, midges, and moths
- plant pollens from grass, trees, and weeds
- household chemicals
- metals, such as nickel, cobalt, chromium, and zinc
- latex

Diagnosis

The doctor will ask the patient questions regarding symptoms, when they occur, how often, and what seems to cause them. They will also ask the person with symptoms whether there is a family history of allergies, and if other household members have allergies.

The doctor will either recommend some tests to find out which allergen is causing symptoms or refer the patient to a specialist.

Below are some examples of allergy tests:

- **Blood test**: This measures the level of IgE antibodies released by the immune system. This test is sometimes called the radioallergosorbent test (RAST)
- **Skin prick test**: This is also known as puncture testing or prick testing. The skin is pricked with a small amount of a possible allergen. If the skin reacts and becomes itchy, red, and swollen, it may mean an allergy is present.

- **Patch test**: A patch test can identify eczema. Special metal discs with very small amounts of a suspected allergen are taped onto the individual's back. The doctor checks for a skin reaction 48 hours later, and then again after a couple of days.

Treatment

The most effective treatment and management of an allergy is avoidance of the allergen.

However, sometimes it is not possible to completely avoid an allergen. Pollen, for example, is constantly floating in the air, especially during hay fever season.

Medications

Drugs can help treat the symptoms of an allergic reaction, but they will not cure the allergy. The majority of allergy medications are over-the-counter (OTC). Before taking a particular type of medication, speak to a pharmacist or doctor.

- **Antihistamines**: These block the action of histamine. Caution is recommended, as some antihistamines are not suitable for children.
- **Decongestants**: These can help with a blocked nose in cases of hay fever, pet allergy, or dust allergy. Decongestants are short-term medications.
- **Leukotriene receptor antagonists, or anti-leukotrienes**: When other asthma treatments have not worked, anti-leukotrienes can block the effects of leukotrienes. These are the chemicals that cause swelling. The body releases leukotrienes during an allergic reaction.
- **Steroid sprays**: Applied to the inside lining of the nose, corticosteroid sprays help reduce nasal congestion.

Various types of natural allergens-

1. **Infestant Allergens**: Parasitic microorganisms in or on the body.
2. **Infectant Allergens**: Represented by the metabolic wastes and growth products of pathogenic microorganisms.
3. **Contactant Allergens**: Those that come into direct contact with epithelium.
4. **Injectant Allergens**: Those that may be present in the solutions intended for parenteral administration are known as injectants.
5. **Ingestant Allergens**: Those that occur in the foodstuffs and are swallowed are known as ingestants.
6. **Inhalant Allergens**: Substances that are distributed in the atmosphere and contact the nasal or buccal mucosa during respiration are called inhalant allergens.

Teratogens

A teratogen is a substance known to cause birth defects following exposure during pregnancy. Some teratogens can be drugs (e.g., prescription drugs such as lithium or epilepsy medication or recreational drugs). Certain infections, such as rubella (German Measles) or chicken pox can also be teratogens. The mother can also unknowingly introduce the fetus to teratogens in the womb.

Alcohol is a common teratogen. Alcohol use during pregnancy can adversely affect the unborn baby. There are many factors that influence this effect, including the amount of alcohol ingested over time and differences in the way the mother metabolizes alcohol. There is also evidence that variations in a person's genetic makeup can affect the baby's susceptibility to alcohol while in utero.[1]

Teratogenicity or reproductive toxicity broadly refers to the occurrence of biologically adverse effects on the reproductive system that may result from chemical exposure to several environmental agents. The adverse effects may be alterations to female or male reproductive organs related to endocrine system or pregnancy outcomes. Teratogenesis signifies the structural malformations during fetal development.

Teratogenic substances when ingested by the mother, can cause abnormalities in the developing fetus. The human teratogen is a chemical drug, metabolic state, physical agent or psychological alteration during development that produces a permanent pathologic or pathophysiologic alteration in fetus.

Teratogens generally have the ability to inhibit cell division and kill embryo during cell dividion.

Various types and examples of teratogens are-

Drugs- Angiotensin converting enzyme inhibitor, antiepileptics, penicillamine, warfarin, thalidomide, caffeine, pesticides, etc..

Chemicals- Alcohol, Cocaine, Methyl mercury

Physical agents- Cigarette smoke, ionizing radiations

Biological agents- Rubella infection

Maternal disease- Diabetes, Epilepsy

Phytochemicals- various alkaloids

Examples of plant teratogens are-

1. Pyrrolozidine alkaloids- Senecio sp from Compositae family
2. Pyridine alkaloids from Nicotiana sp Solanaceae and Lobelia sp Campanulaceae family
3. Quinolozidine alkaloids- from Lupinus sp Leguminosae
4. Steroidal alkaloid from Veratrum sp Liliaceae
5. Purine alkaloid- Caffeine from Coffea Arabica family Rubiaceae

Proteins

These are complex nitrogenous organic substances of plant and animal origin. These are essential food stuffs like carbohydrates and fats. They provide very imp. group of therapeutically active compounds such as hormones, enzymes, antitoxins etc.

→ Easily extractable from plant sources and generally stored in form of aleurone grains in plants.

→ In animals, present as structural material in form of Collagen (connective tissue), Keratin (hair, wool, Nail, feathers), Casein (milk) and plasma proteins.

→ Protein contain C, H, O, N and rarely S.

→ The hydrolysis products of proteins are amino acids.

→ high mol. wt. compounds, form colloidal sol^n in water.

- Amphoteric in nature and easily denaturated by heat, ph change, or by UV radiation.

- Depending on the product of hydrolysis, classified as -

(1) Simple - Contains amino acids only.

Ex. Albumins, Globulins, Glutelins, Histones, Protamines.

(2) Conjugated - Contains amino acid & non-amino acids. (Prosthetic group)

Ex = (1) Chromoproteins - with Hb
(2) Lipoprotein - Combination with lipids → Lecithin
(3) Metalloproteins - with heavy metals - Fe, Co, Mn, Zn, Cu.
(4) Mucoproteins = with mucopolysaccharides - in serum, albumin, urine
(5) Nucleoproteins - Proteins with Nucleic acid - RNA, DNA
(6) Phosphoprotein - Contains phosphoric acid - ex. Casein.

Casein

→ Principal phospho protein of in milk and constitutes 3% of milk. It comprises about 80% total protein content of milk.

→ Casein → of two types

Acid casein
↓
Warm skimmed milk
↓
Acidified with dil. acid
↓
Whey is separated and curd is washed several times
↓
Dried & pulverised

Rennet Casein
↓
Skimmed milk
↓
Treated with an enzyme → Rennet ~~extract~~
↓
Coagulation occurs
↓
Product is separated ← Whey separated
↓
Purified.

★ **Chemistry** - It is a phosphoprotein containing about 0.85% of Phosphorus and 0.75% Sulphur. Contains about 15 amino acids. Mol. wt. = 75,000-3,70,000
Nitrogen content = 15-16%.

Uses - 1) Dietary supplement
2) Source of protein in pre and post-operative care.
3) As emulsifying agent.
4) As a base in standardisation of proteolytic enzymes.

★ **Description** - Colour: White - slight yellow
No odour, No taste.
Amorphous solid, hygroscopic, Stable when dry and deteriorates rapidly upon contact with moisture.
- Insoluble in water, soluble in dil. alkalies & conc. acids.
But precipitates from dil. acid solutions.

Skimmed milk - Fat removed from milk
Whey - Liquid separated from milk containing very less amt of protein
Rennet - Enzyme obtained from plant & animal
Contains ~~G~~ (Chymosin) / Chymotrypsin

Gelatin

Synonym - Gelatina, Gel foam, Puragel

Biological source - Gelatin is a protein extracted by partial hydrolysis of collagenous tissue like skins, tendons, ligaments & bones with boiling water.

Description -

→ Gelatin is available in form of flakes, sheets, shreds or coarse or fine powder.

→ Colour = faint yellow to amber → Odour = Characteristic

→ Insoluble in cold water, fixed and volatile oils, alcohol, CHCl3 & ether.

→ Soluble in hot water and forms a jelly on cooling.

→ Gelatin remains stable in air in dried condition, but degrades due to microbial attack when moist.

→ The quality of gelatin is expressed as "Bloom strength". Higher jelly strength is required for capsule manufacture & microbial culture media.

Preparation of gelatin -

Bones → Defatted by organic solvent → Decalcified with mineral acid → Treated with water at 85°C → Collagen dissolves into gelatin → Bleached → Concentrated under reduced pressure → Allowed to set in shallow trays → Dried to eliminate moisture

Chemical constituents :- Contains different Amino acids, Major is Lysine (an essential amino acid) but does not contain tryptophan. Gelatin is composed of Glutin protein.

Identification tests :-

1) When heated with sodalime → evolves NH_3.
2) Precipitated by trinitrophenol and sol^n of tannic acid but not precipitated by alum, lead acetate or acids, it indicate that it does not contain Chondrin.
3) With Mercuric nitrate → Give white precipitate.

Uses

1) Mainly used in manufacture of hard & flexible capsule shells.
2) As haemostatic in the form of absorbable gelatin.
3) Used for microencapsulation of drugs, perfumes, flavours and some industrial materials.
4) Used for vehicle for some injections.
5) Also used in preparation of bacteriological culture media, absorbable gelatin sponge and gelatin film.

Absorbable gelatin sponge

It is a sterile, white, tough and finely porous spongy material which is absorbable and water insoluble. It can absorb Not less than 30 times its weight of water. It is used as haemostatic. when put within a surgical incision with sterile NaCl sol^n, it gets absorbed in 4-6 weeks.

Absorble gelatin film

It is sterile, light amber colour, non-antigenic gelatin film obtained from a specially prepared gelatin formaldehyde solution by drying followed by sterilisation.

Used as mechanical protective, replacement matrix and temporary supportive structure.

Test for Proteins

1) Biuret test - Test solution (3ml) + 4% NaOH + few drops of 1% $CuSO_4$ solution → Violet / Pink colour appears.
2) Millon's test - Test solution (3ml) + 5 ml. Millon's reagent → White ppt

Other tests are -
Xanthoprotein test, Precipitation test.

Lipids

Lipids are the substances of animal or plant origin and comprise of fixed oils, fats and waxes. The basic function of oils and fats is storage of energy. These are obtained by expression or extraction methods.

Fixed oil or Fatty oils - The oils which are liquid at 15.5° to 16.5°C are called fixed oil. These are reserve food materials of plants and animals. In plants, generally occur in seeds. and which are solid or semi-solid at this temperature, called as Fats.

→ Fixed oils are thick, viscous, yellow-coloured liquid with characteristic odour.
→ Non-volatile and cannot be distilled.
→ These have good value & can be saponified.
→ These turn rancid on storage due to free acidity.
→ Insoluble in water and ethyl alcohol and soluble in organic solvents.
→ Fat and oils are esters of glycerol (three carbon trihydric alcohol) and various straight chained monocarboxylic acids, known as fatty acids. These fatty acids may be saturated, monounsaturated, polyunsaturated or cyclic saturated.
→ Physiologically, they are emmolients and demulcents.
→ Examples - Fixed oil from vegetable source - Arachis oil, Castor oil, Sesame oil.
" from Animal source - Cod liver oil & Shark liver oil.

→ Chemical test for identification of fixed oil & fats -

1) Using Sodium hydroxide :- Mix 1 ml. of 1% $CuSO_4$ + 5 drops of oil or fat + 5 drops of 10% NaOH → Clear Blue solution due to Glycerine.

(2) Using Sodium hydrogen sulphate :- 5 drops of oil or fat + add a pinch of $NaHSO_4$ → Pungent odour due to glycerine

Waxes:- → These are viscous solid, fusible substances, with characteristic waxy lustre.

→ Chemically these are esters of fatty acids with high weight monohydric alcohol, such as cholesterol, cetyl alcohol etc.

→ Insoluble in water and soluble in most organic solvent.

→ Obtained from vegetable and animal sources:-

Vegetable - Carnauba wax, Japan wax, Bayberry wax

Animal - Spermaceti, Bees wax, Wool fat.

→ Difference between fat and wax:- fats may be saponified by either aqueous or alcoholic alkali but waxes are only saponified by alcoholic alkali.

→ Wax are not suitable for internal consumption because human body does not have any enzyme to hydrolyse wax.

Analytical evaluation parameters for lipids.

1) Iodine value
2) Saponification value
3) Hydroxyl value
4) Acetyl value
5) Acid value
6) Peroxide value
7) Ester value
8) Unsaponifiable matter.

Castor oil

Synonym - Ricinus oil

Biological source - It is the fixed oil obtained by cold expression of the seeds of Ricinus communis, family = Euphorbiaceae.

Geographical source - Castor seeds are produced in almost all tropical and sub-tropical countries. India, is the second largest producer of castor seeds in world. In India, it is largely grown in Andhrapradesh, Gujarat, and ~~Kerala~~ Karnataka. From India, Castor oil is exported in three forms Medicinal, hydrogenated and dehydrated.

Composition of seeds -

Castor seeds consist of 75% Kernel and 25% of hull. Hull is rich in mineral and also contains an alkaloid ricinine, resin, pigment etc. The kernal contain oil and oil content varies from 36 – 60%.

Castor seeds contain several enzymes including Lipase, Maltase and Invertase. Also contains proteinaceous toxic principle Ricin (3%) it is ~~toxic~~ poisonous in nature.

Preparation of Medicinal Castor oil:-

Preparation done by two methods:-

1. Crushing the whole or decorticated seeds in power driven hydraulic press. It is prefered method.
2. Second method is known as Ghani, it consist of manually operated screw press driven by bullocks.

Procedure - Castor seeds → Graded & free from impurities like metallic pieces of iron and sand

↓

Seeds are decorticated & hulls are removed

↓

Pressed under hydraulic press with a pressure of 2 tonnes/sq. inch

↓

30% of oil extracted at Room temperature it is known as Cold drown Oil.

Cold drown oil → Steamed at 80°C to destroy lipase enzyme & Ricin → Bleached → Deodorized → Treated with Charcoal → Stored in containers

Rest of the oil is removed by further increasing the pressure. → It is not suitable for medicinal uses

Castor oil continue...

Description -

Colour = Pale yellow to almost colourless liquid
Odour = Slight & characteristic
Taste = Slight acrid and nauseating

- Viscous and transparent liquid.
- Soluble in alcohol (an exception to fixed oil), Miscible in $CHCl_3$, Solvent ether, glacial acetic acid & pet. ether.
- Insoluble in mineral oil.

Chemical constituents -

- Mainly contains triglyceride of ricinoleic acid (about 80%).
- Fatty acid present are = Isoricinoleic, linoleic, stearic, Isostearic acid
- Viscosity of oil is due to ricinoleic acid.
- Also contain heptaldehyde, undecenoic acid & sebacic acid.

Identification -

1) If mixed with half its volume of light Petroleum ether (40-60°)
2) Oil + equal volume of ethanol → clear liquid obtained. On cooling at 0°C and on storage for 3 hrs → the liquid remains clear (Distinction from other fixed oils).

Uses -

1) As Cathartic (due to irritant action of ricinoleic acid)
2) As lubricant.
3) As emollient in preps of lip-sticks
4) Used in Cosmetic preparation
5) For commercial manufacture of sebacic acid.
6) Castor cake is used as a source of enzyme lipase.
7) Give transparency to soaps.
8) Its other forms like dehydrated Castor oil & Hydrogenated castor oil are used industrially for several purposes. (It is decolourised, deodourised, bleached & refined Castor oil)

Chaulmoogra Oil

Synonym - Hydnocarpus oil

Biological source - It is fixed oil obtained by cold expression method from ripe seeds of the plant Hydnocarpus anthelmintic & Hydnocarpus heterophylla, Family - Flacourtiaceae.

Geographical source -
It is native of Myanmar, Thailand & East India (Assam & Tripura) Also in Sri Lanka & Bangladesh.

Method of preparation -
Seeds contain 40-45% oil. Seeds are decorticated by machine after grading the kernels → Pressed with hydraulic press → Obtained oil is filtered & stored.

Description - Colour = Yellow to Brown-yellow
Odour = Characteristic Taste = Acrid

→ Slightly soluble in alcohol, soluble in $CHCl_3$, Ether, Benzene & CS_2.

Chemical constituents - It contains chemical esters of unsaturated fatty acids of Chaulmoogric acid (27%) and ~~Gor~~ Hydnocarpic acid, Gorlic acid, Cyanophoric glycosides and glycerides of Palmitic acid and Oleic acid.

Uses - 1) Bactericidal against Mycobacterium leprae & M. tuberculosis.
2) Used in treatment of tuberculosis, leprosy, psoriasis and rheumatism.
3) Not intended for external use.

Storage:- Stored in closed containers away from light & in cool place.

Wool fat (Hydrous Wool fat)

Synonym - Lanolin

Biological source - It is purified fat like substance obtained from the wool of the sheep Ovis aries, Family = Bovidae. It is the secretion of sebaceous glands of sheep deposited onto the wool fibres.

wool fat continue...

Geographical source - Commercially manufactured in USA, and less in India & Australia

Method of Preparation -

Raw wool contains → 31% wool fibres, 32% earthy matter and 25% of crude lanolin. Crude lanolin is separated by washing with H_2SO_4 or suitable organic solvent or soap solution. Further purified and bleached. This product is known as anhydrous lanolin or wool fat. To make hydrous wool fat, it is mixed with 30% of water.

Description -

Colour = White-yellow Odour = faint & characteristic Taste = Bland

→ Practically Insoluble in water and soluble in $CHCl_3$ and solvent ether.

Chemical constituents → It is complex mixture of esters and polyesters of high molecular weight alcohol (33) and fatty acids (36).

Hydrous wool fat contains mainly esters of Cholesterol and isocholesterol with oleic, myristic, palmitic, carnaubic and lanopalmitic acids. Also contains 50% of water

Identification test - 0.5 g of hydrous wool fat → Dissolved in $CHCl_3$ → Add 1 ml. acetic anhydride & 2 drops of H_2SO_4 → Deep green colour showing the presence of Cholesterol.

Uses - 1) Water absorbable ointment base;
2) Common ingredient and base for several water soluble creams and cosmetic preparations.

Beep wax

Synonym - Yellow Bees wax

Biological source - It is purified wax obtained from the honey comb of the bees Apis mellifera, Family = Apidae.

Geographical source - Commercially produced in France, Italy, West Africa and India.

Bees wax continue

Preparation - The combs and cappings of honey combs are broken and boiled in soft water after enclosing in a porous bag.

↓

Due to boiling, wax oze out and collected outside the bag and form a cake after cooling.

↓

The debris on outer surface is removed

↓

The bees wax is purified by heating in boiling water/dil. H_2SO_4 for several times.

↓

Bleaching done by different methods

↓

Bees wax collected & stored

Description - Colour = Yellow to Yellow-Brown

Odour = Agreeable & honey like.

→ Non-crystalline solid.
→ Soft to touch and crumbles under the pressure of fingers to plastic mass.
→ Breaks with granular surface.
→ It can be given any desired shape in melted condition.

Solubility - Insoluble in water and soluble in hot alcohol, ether, $CHCl_3$, fixed and volatile oils.

Chemical constituents - Contains esters of straight chain monohydric alcohol with straight chain acids. Main constituent is Myricin ie. Myricyl palmitate (about 80%). Others are- Cerotic acid, Melissic acid and Cerolein.

Chemical test -
Boil 0.5 g. of wax with 20 ml. of aqueous caustic soda solution for 10 minutes → No turbidity produced.

Uses - 1) In preparation of ointment, plaster & polishes.
2) In manufacture of candles, moulds, in dental & electronic industry.
3) Also used in cosmetics for preparation of lip-sticks & face cream.
4) It is an ingredient of Paraffin ointment IP.

Carbohydrates

→ These are group of compounds composed of C, H & O. Also called "hydrates of Carbon" $(C(H_2O))_n$ because H & O are in same proportion as in water.

Exception - Acetic acid - $C_2H_4O_2$ (CH_3COOH)

Lactic acid - $C_3H_6O_3$ ($CH_3-\underset{OH}{CH}-COOH$)

have same formula but not carbohydrates.

→ So defined as Polyhydroxy aldehydes or polyhydroxy ketones.

→ Classification -

Carbohydrates

- Simple sugars (Saccharides)
  - Crystalline, sol. in water & sweet in taste
    - Monosaccharides
      - Not hydrolysed in simple sugars
      - On basis of No. of C atoms
        - Trioses
        - Tetroses (Erythrose) ← (Glyceraldehyde)
        - Pentoses (Xylose, Ribose)
        - Hexoses
          - Aldoses - Glucose
          - Ketose - Fructose, Rhamnose
        - Heptoses
    - Di
      - On hydrolysis give two molecules of sugar
      - Ex. Sucrose
    - Tri
      - → 3 mol. of sugars
      - Ex. Raffinose
    - Tetra → Stachyose
- Polysaccharides
  - Amorphous, tasteless and relatively less soluble in water.
  - Give more numbers of monosaccharides on hydrolysis
  - Ex. - Gums, mucilages, Cellulose, Starch

Chemical test - 1) Molisch test

Dry + ~~Naa~~
α-naphthol
+ Conc. H_2SO_4
↓
Purple colour

2) Fehling test

Dry solution
+
Equal quantity of Fehling A+B
↓
heat → Brick Red ppt

Acacia gum

Synonym – Indian Gum, Gum arabic

B.S. - It is dried gummy exudation obtained from stem & branches of Acacia arabica, family = Leguminosae.

G.S - Found in India, Sri Lanka, Sudan, Africa. In India → Punjab, Rajasthan, western ghats.

C & C - Evergreen tree with short trunk. Gum is collected from wild grown plants, then made free of bark & FOM, dried in sun. It results in partial bleeding of gum.

Description –

Colour – Cream-Brown to Red
Powder → Light Brown

Odour = No, Taste = Bland & mucilaginous

Size & Shape = Irregular-brown tears of varying size
– Brittle in nature.
– Soluble in water and aq. solution is viscous & acidic, Insol. in alcohol.
– Should not contain tannin, starch & dextrin.

Chemical con. – Contains Arabin, it is a complex mixture of Calcium, Magnesium & Potassium salts of Arabic acid. Arabic acid on hydrolysis gives L-arabinose, L-rhamnose, D-galactose & D-glucuronic acid. It also contains an enzyme Oxidase & peroxidase.

Identification test –

1) Sol^n of Lead acetate gelatinises the aq. sol^n of Indian gum,
2) Not give Pink colour with Ruthenium Red.
3) On addition of sol^n of H_2O_2 & Benzidine in alcohol → to aqueous sol^n of gum → Blue colour produce due to Oxidase enzyme.

Test for Purity –

1) 1 ml. sol^n of gum + 10 ml. H_2O → keep for few hrs. → No sedimentation.
2) 1 ml. Gum sol^n + 4 ml. water → Boil → cool → add 2 drops of N/10 Iodine.
Brown colour indicates → Presence of Dextrin &
Blue colour " → " " Starch
3) 1 ml. Gum sol^n + 0.1% of $FeCl_3$ → " Blue – Black colour → Presence of Tannins

Acacia gum

Uses -

1) As demulcent.
2) As suspending agent, Emulsifying agent, Binding agent
3) It is gum of choice because it is compatible with other plant hydrocolloids.

Tragacanth gum

Synonym - Tragacanth gum.

B.S. - Dried gummy exudation obtained by incision from stem & branches of Astragalus gummifer, Leguminosae.

G.S. Indigenous to Iran, Greece, Turkey, Iraq & Syria.
In India - Garhwal, Kumaon, Central Punjab.

Collection - The mode of tragacanth formation is entirely different from that of Acacia. The gum exudes out immediately after an incision. It is collected after drying. Month of collection = April - Nov.

Description - Colour = White to pale yellow, Odour = No, Taste = Mucilaginous

Shape = Tragacanth occur in form of thin, flat ribbon like flakes, more or less curved. Size - 25 (l) × 12 (w) × 2 (d) mm. in size.

→ Short fracture. Gum is translucent and partly soluble in water. In water, it swells and form adhesive, homogenous & gelatinous mass. Insoluble in alcohol.

Chem. const. -

Tragacanth divides in two portion

- Water soluble → Tragacantin (8-10 % gum)
- Water insoluble → Bassorin (60-70 % of gum)

→ Also contains 15 % of methoxy group which swells in water, and responsible for high viscosity.

→ On hydrolysis, tragacanth form - Galacturonic acid, D-galactopyranose, L-arabino-rhamnose & D-xylopyranose.

Identification test - (1) Solution of gum + few drops of 10 % aq. $FeCl_3$ → Deep yellow ppt.
(2) When warmed with NaOH → Yellow colour
(3) Gum sol^n + Strong I_2 sol^n → Green colour

Tragacanth uses.

1) Demulcent
2) Emollient in cosmetics.
3) Thickening agent, suspending agent, emulsifying agent.
4) Powder used as adhesive.
5) Also stabiliser in ice-cream & sauces in conc. 0.2–0.3%.
6) Also used in lotions for external use.

Indian tragacanth

Gum karaya, Sterculia gum.

B.S - It is dried gummy exudate from the tree Sterculia urens, S. villosa, S. tragacantha, family - Sterculiaceae.

Uses - Swells 80-100 times in water.
- Neither digested nor absorbed by the body.
- Used as good bulk laxative.
- As emulsifier, thickener & stabiliser.
- Also listed in food chemical codex.

AGAR

Synonym - Agar-Agar, Japanese-Isinglass, vegetable gelatin.

B.S - It is dried gelatinous substance obtained from Gelidium amansii family - Gelidiaceae and several sp. of Red algae like - Gracilaria fam - Gracilariaceae.

G.S - Commercially produced in Japan, Australia, New Zealand, USA, & India.

Preparation - In Japan, Red algae grown on bamboos spread in ocean.
↓
In month of May & Oct. Sea weeds scrapped from bamboos
↓
Dried & shaken → results in bleaching of the product & removal of foreign material like sand & shells
↓

Agar prep^n continues

↓

The entire material is taken to high altitude where it is washed & bleached by exposing to sun.

↓

Boiled for 5-6 hr. with large quantity of dil. acidified water

↓

Strained while hot through the cloth & transfersed to wooden troughs.

↓

On cooling, jelly is produced.

↓

Rectangular solid pieces of jelly

↓

Passed through netting under pressure

↓

Narrow strips are formed

↓

Allowed to melt during day time to remove excess of water.

(Moisture is removed by successively freezing, thawing & drying at 35°C)

Description -

Colour = Yellow-grey / white / colourless → Depends upon the shaped form

Odour = No. Taste = Mucilaginous

Shapes = Various forms like strips, sheets, flakes or coarse powder.

Size - Sheets = 45-60 cm. length, 10-15 cm. width.

Strips = 4 mm. in width

⇒ Insoluble in cold water, form a gelatinous mass after cooling hot solution. Soluble in boiling water & insoluble in organic solvent.

Chemical constituents - Agar consist of two different polysaccharides Agarose & Agaropectin. Agarose responsible for gel strength and Agaropectin for viscosity of Agar soln.

Agar Continue..

Agarose – composed of D-galactose & anhydro-L-galactose units.
Agaropectin – sulphonated polysaccharide → Galactose & Uronic acids are partly esterified with H_2SO_4.

Identification –
1) Boil 1.5g. Agar with 100 ml H_2O → Cool at RT → Stiff jelly.
2) With Ruthenium Red → Pink clear particles when observed under microscope.
3) ~~0.02%~~, 0.2% solution of Agar in water → add tannic acid solution → No ppt.

Uses – 1) As emulsifying agent
2) Bulk laxative
3) Prep^n of jellies, confectionary items
4) In prep^n of culture medium as solidifying agent.

Honey

Synonym – Madhu, honey purified

B.S. – It is a sugar secretion deposited in honey comb by the bees Apis mellifera, Apis dorsata, Family = Apidae.

G.S. – Produced in Africa, Australia, New-Zealand, California & India.

Preparation – The nectar of the flowers is a watery solution containing 25% Sucose & 75% water.

honey bees sucks the nectar → Deposits in honey sac (located in bee abdomen) → Invertase enzyme present in saliva of bee converts nectar into invert sugar.

Partially utilised by the bee and remaining deposited into honey comb.

Honey comb is smoked to remove the bees ← Honey obtained by applying pressure or allowing to drain naturally ← Honey is heated to 80°C and allowed to stand ← Impurities are removed ← Diluted with water to produce honey of 1.35 density (Natural honey density is 1.47)

Honey

Description - Colour - Pale yellow to yellow-Brown
Odour = Characteristic, pleasant
Taste = Sweet &
- Syrupy thick liquid, translucent when fresh and, becomes opaque and granular due to crystallisation of glucose (on ↑ keeping)
- Soluble in water & insoluble in alcohol.

Chemical const- Honey is an aqueous solution of glucose (±3%), Fructose 45% and 35%. Sucrose about (2%). Other constituents are - Maltose, gum, traces of succinic acid, acetic acid, Dextrin, formic acid, colouring matter, enzyme (Invertase, diastase, inulase) and traces of vitamins.

⇒ Honey is saturated solution of sugar, on keeping it starts crystallization.

→ Granulated honey - A product which contains crystallised Dextrose.

→ Adulterant - Artificial invert sugar. → it contains furfural which is detected by Fiehe's test. (It gives instant red colour with resorcinal in HCl).

Uses -- As demulcent, Sweetening agent.
- Nutrient to infants & patients.
- Antiseptic and applied to burns & wounds.
- Common ingredient of cough mixture, cough drops and vehicle for ayurvedic formulations.

Enzymes

→ Enzymes are proteins which act as biological catalyst and play vital role in the function of cells and activities of an organism.

→ Show maximum activity ~~between~~ between 35°C to 40°c. Practically inactive at 0°c and beyond 65°c get denaturated.

→ Soluble in water and dil. alcohol.

→ Specificity is one of the most important characters of enzymes. It means enzyme catalyse only a specific range of reactions.

→ As a group, they are exceptionally versatile catalyst and can catalyse hydrolytic reaction, dehydration, oxidation, reduction, polymerisation etc.

→ Enzymes are efficient under optimal conditions and can proceed a reaction 8–10 times more rapidly than non-enzymatic reactions.

→ Classification - [A] On the basis of their activity →

1) Hydrolases - Catalyse hydrolytic reaction.
2) Transferases - Transfer of a chemical group from one to another.
3) Oxido-reductases - Catalyse oxidation-reduction reaction.
4) Lyses - Catalyse addition or removal of groups to double bonds.
5) Isomerases - Responsible for intramolecular rearrangements.
6) Synthetases - Catalyse condensation of two molecules coupled with the cleavage of pyrophosphate bond of ATP.

[B] On the basis of site of action -

1) Endoenzymes - which act inside the cell. Also called intracellular enzymes. Ex. - Synthetases, Isomerases, Phosphorylases.

2) Exoenzyme - Enzyme which are secreted outside the cell. Also called extracellular enzymes. Ex. - Proteases, Lypases, amylases.
(for digestion of Protein, Lipids, Starch)

→ Enzyme composed of →

- A protein component → Called Apoenzyme
- a Non-protein group → Called Prosthetic group / Co-factor or Co-enzyme. Ex. Metals & Vitamins

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Pepsin

It is a proteolytic enzyme and present in gastric juice of animals.

B. source - Obtained from the glandular layer (mucous membrane) of fresh stomach of hog, *Sus scrofa*, family = Suidae.

Description -
Colour = Light buff or white
Taste = Little acidic or saline
Odour = Slightly meat like

- Occur in form of translucent scale and amorphous powder.
→ Soluble in water but insoluble in alcohol, ether & chloroform.
→ Maximum activity at ph = 1.8
→ It has the capacity to digest 2500 times its weight of coagulated egg albumin.

Preparation: - Stomach linings → Minced (Cut into very small pieces)
↓
Digested with HCl
↓
Clarification
↓
Controlled evaporation
↓
Dialysis
↓
Concentrate the digested solution by vacuum evaporation
↓
Spongy Pepsin is obtained

Use - Pepsin degrades Protein into Peptones & Proteoses.

Urokinase

Source - It is a enzyme produced by kidney and obtained from human urine or kidney tissue culture.

Description - ① It is a lyophilised white powder.

② Soluble in water

③ It is an activator of endogenous fibrinolytic system which converts plasminogen to plasmin and degrades fibrinogen, fibrin clots and other plasma proteins.

Use - 1) It is used to dissolve fibrin or blood clots in anterior chamber of eye and in acute massive pulmonary emboli.

2) As it is derived from human source, it is less antigenic than enzymes with similar actions like streptokinase.

Streptokinase

It is an enzyme obtained from culture filtrates of beta-hemolytic Streptococci group. It has the property of activating human plasminogen to plasmin.

Description -

1) Available as sterile, friable solid or white powder.
2) Soluble in water.
3) Max. activity at pH=7.
4) Its dilute solutions are unstable.

Use - Used in treatment of thromboembolic disorders for the lysis of pulmonary emboli, arterial thrombus and acute coronary artery thrombosis.

Bromelain (Bromelin)

Biological source. It is a mixture of proteolytic enzymes from the ste and ripen fruits of pineapple plant *Ananas comosus*, Family = Bromeliaceae

Description: Odour = No
Colour = Slightly putrid buff [Putrid = Rancid, Decomposing]
Taste = Irritating

Solubility - Slight soluble in water. Insoluble in organic solvent like ether, $CHCl_3$, alcohol etc.

Uses - Used in treatment of soft tissue inflammation and oedema due to surgery and injury.

Papain

Biological source - It is a mixture of proteolytic enzymes derived from the latex of unripe fruit of tropical melon tree *Carica papaya*, from family = Caricaceae.

Method of preparation -

Fruit latex, is collected in Aluminium trays → Add Potassium metabisulphite (5g/kg of latex)

↓

The extraneous matter is cleared out by passing through sieves

↓

Latex is dried in vacuum shelf dryer at 55-60°C

↓

Dried Latex → Papain

Description - Colour = Light Brown – White
Taste & Odour = Characteristic

→ Available in form of amorphous powder.
→ Shows maximum proteolytic activity between ph 5-6.
→ Soluble in water & Glycerine.

Chemical nature - Papain is a mixture of proteolytic enzyme Papain & Chymopapain. It act on polypeptides and amides.

Papain continue --

Identification -

1) It decolourises aqueous potassium permanganate solution.
2) It causes curdling of milk.

Uses - 1) Used in clarification of beverages and as a meat ~~tender~~ tenderiser.
2) Used in manufacturing of cheese.
3) Used in textile industry for degumming of silk fabrics.
4) Used in leather industry for dehairing of skins and hides.
5) Also used as an ~~antiin~~ anti-inflammatory agent.

Serrapeptidase

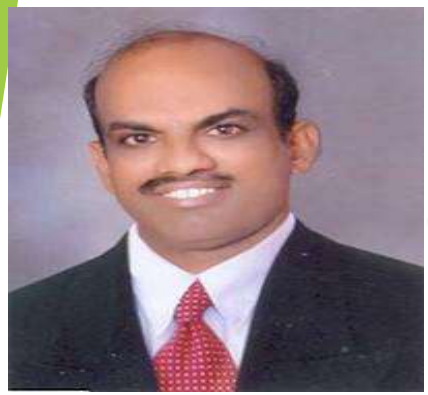
→ It is a proteolytic enzyme, derived from the bacteria belonging to genus Serratia, present in the gut of silk worm.
→ Now-a-days, it is produced by fermentation bio-technology.
→ It is found to have better effects than trypsin and chymotrypsin, with negligible toxicity and side effects.
→ It has very less allergic reactions.
→ Therapeutic applications -

1) Resolution of inflammation
2) Liquification of sputum due to lysis of various proteins in sputum and lowering the viscosity.
3) Increases antibiotic transfer to injured areas.

Pharmaceutical aids - (Excipients)

These are the substances which are of little or no therapeutic value but are essentially used in manufacture or compounding of various pharmaceutical dosage form.

Ex- Anti-oxidants, Binding agent, Colourants, Desiccants, Diluents, Emulsifying agents, Glidants, Lubricants, Suspending agent, Thickening agent.



STUDY ON MARINE DRUGS

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INTRODUCTION

- Marine Drugs: -
- The drug obtained from marine organisms which are being conventionally used like shark and cod-liver oils, sodium alginate, agar-agar, chitin etc.

Importance of Marine Drugs

- Marine organisms are potential source for drug discovery.
- Life has originated from the oceans that cover over 70% of the surface of earth and contain highly ecological, chemical and biological diversity starting from micro-organisms to vertebrates.
- This diversity has been the source of unique chemical compounds, which hold tremendous pharmaceutical potential.

- Because of the highly chemical and physical harsh conditions in marine environment, the organisms produce a variety of molecules with unique structural features and exhibit various types of biological activities.

- Majority of the marine natural products have been isolated from sponges, coelenterates (sea whips, sea fans and soft corals), tunicates, echinoderms (starfish, sea cucumbers, etc) and bryozoans and a wide variety of marine micro-organisms in their tissues.

Classification of drugs from marine organisms

The enormous quantum of newer and potent drug molecules derived from the wide spectrum of marine organisms across the world has been classified based on their specific pharmacologic actions as stated below:

- CYTOTOXIC/ANTINEOPLASTIC AGENTS
- CARDIOVASCULAR ACTIVE DRUGS
- MARINE TOXINS
- ANTIMICROBIAL DRUGS
- ANTIBIOTIC SUBSTANCES
- ANTI-INFLAMMATORY AND ANTISPASMODIC AGENTS
- MISCELLANEOUS PHARMACOLOGICALLY ACTIVE SUBSTANCES.

ANTIMICROBIAL

1. ZONAROL AND ISO - ZORANOL

Biosource:

Zonarol and Iso-zonarol are both obtained from *Dictyopteris zonaroides* (Brown algae).

Chemistry - Flavonoid

Use : Antimicrobial

ANTIMICROBIAL

(2)TETRABROMO-2-HEPTANONE

Biosource: It is obtained from another species of *Bonnemaisonia hemifera*. (Red algae)

- Chemistry – Bromophenol compound
- Use - Antimicrobial

ANTIMICROBIAL

(3) 2-CYANO-4,5-DIBROMOPYRROLE

It is perhaps one of the rarest examples of a chemical entity isolated from a marine organism which contains a cyano(-CN) function group.

Biosource:

It is obtained from Agelas oroides, a specific type of sponge found in marine sources.

Use -Antimicrobial

ANTIMICROBIAL

(4) EUNICIN

Biosource: It is obtained from Gorgonian corals , *Eunicia mammosa.*

Chemistry – Diterpene

Use - Antimicrobial

ANTI CANCER

- 1. SIMULARIN
- Source – Soft coral *Sinularia fleibilis*
- Chemistry – Cembranoids (14 C cyclic diterpenoid with eocyclic lactone
- Use - Anticancer

ANTI CANCER

- 2. ASPERDIOL
- Source – From gorgonian coral *Eunicea knighti*
- Chemistry - Non lactone cembranoid
- Use - Leukemia

ANTI CANCER

- 3. GERANYL HYDRO –QUINONE
- Source – *Aplidium* species
- Chemistry – Quinone
- Use - Anticancer

ANTIBIOTICS

- 1. CYCLOEDUDESMOL
- Bio source – Red algae *Chondria oppositiclada*
- Chemistry – Eudesmol (Sesquiterpenoid)
- Use - Antibiotic

ANTIBIOTICS

- 2. VARIABILIN
- Chemistry – Furanose ester terpene
- Use - Antibiotic
- Bio source - Sponge , *Ircinia oros*

ANTICOAGULANT

1.) Organism- Iridae laminarioides

Chemical compound- Galaxtan sulphuric acid

Use- Anticoagulant

2.) Organism - Codium fragile ssp. leo mentosides

Chemical compound -associated with an unknown plasma factor.

Use- Antithrombin activity

3.) Organism- C.fragile ssp. Atlanticum

Chemical compound-High molecular wt. proteoglycans;

Use-Anticoagulant activity.

ANTIPARASITIC

1) Organism - Digenia simplex (Red algae)

Chemical compound -alpha-kainic acid

Use- Broad spectrum anthelmintic.

Effective against parasitic round worms, whipworm

and tapeworm.

2) Organism- Laminaria angustala

Chemical compound -Laminine

Use- Anthelmintic as well as smooth muscle

relaxant and hypotensive;

3) Organism- Sea cucumber

Chemical compound- Cucumechinoside F.

Use-Antiprotozoal.

CARDIOVASCULAR AGENS

1. EPTATRETIN

Bio-source – It is found in the bronchial hearts of pacific hogfish i.e. Eptatretus stoutii

Use – It is a potent Cardiac stimulant with direct stimulant action on mammalian myocardium.

CARDIOVASCULAR AGENS

2. LAMININE

Biosource- It is obtained from Marine algae , Laminaria angustata

Use – Hypotensive agent

3. ANTHOPLEURINS

Biosource – It is obtained from Coelenterates- Anthropleura xanthogrammica

Use – Cardiotonic (35 times more potent as compared to digitoin)

MARINE TOXINS

1. CIGUATOXIN

   Biosource – It is found in red tide dinoflagellate i.e. Gambier discus-toxicus

   Toxic Symptoms –

   Neurological, cardiovascular, G.I.T disorders

MARINE TOXINS

2. PALYTOXIN

Biosource - It is present in Palythoa species

Toxic Symptoms –

On coronary arteries

ANTISPASMODIC AGENTS

AGELASIDINE A

Biosource – It is obtained from Okinawa sea sponge Agelas spp

Chemical compound – Agelasidine A is the first marine natural products containing Guanine andsulfone units.

Use – Antispasmodic agent

ANTIINFLAMMATORY

BIO-INDOL

Biosource – It is obtained from marine cyanobacterium Rivularia firma

Chemical compound – Bio Indol derivative

Use – Anti-inflammatory agent

ANTIINFLAMMATORY

BUTANOLIDE

Biosource - It is obtained from marine Euplexaura flava

Chemical compound – Butanolide derivative

Use – Anti-inflammatory agent

(Question bank RGUHS)

- **Marine Pharmacognosy:**
- **Short answers:**
- Define Marine Pharmacognosy.
- Anti-cancer drugs derived from marine source.
- Anti-microbial drugs from marine origin.
- Classify marine source drugs with examples.
- Cardiovascular drugs of marine source.
- Marine derived antibiotics.
- Marine toxins.
- Anti-inflammatory and anti-spasmodic agents of marine origin.

THANK YOU.