Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Pharmacognosy-I

B.Pharma 4 Semester Notes

UNIT-V

Study of biological source, chemical nature and uses of drugs of natural **origin** containing following drugs

Plant Products:

Fibers Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines lor the lollowing Primary metabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids (Waxes, fats, fixed oils): Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

Marine Drugs: Novel medicinal agents from marine sources



Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Plant Products:

Fibers:

- Fibers can be natural or artilicial substances that are longer than they are wide.
- They are olJen used to make other materials, including strong engineering materials like carbon liber and ultra-high-molecular-weight polyethylene.

Some examples of natural libers:

• Cotton, Jute, Hemp

1. COHORT

Biological Source: Cotton is derived from the libers surrounding the seeds of plants in the genus *Gossypium*, belonging to the Malvaceae litmily. The primary species used for cotton production are *Gossypium hirsutum*, *Gossypium barbadense*, *Gossypium arboreum*, and *Gossypium herbaceum*.

Chemical Nature:

- Cotton is mainly contains cellulose, moisture, protein, ash, pectin, oil lift and some pigments.
- The whole cotton libre contains 88 to 96.5% of cellulose, the rest are non-cellulosic polysaccharides constituting upto 10% of the total libre weight.

Uses:

- **Textiles:** Cotton libers are extensively used in the textile industry to produce a wide range of litbrics and garments due to their solJness, breathability, and moisture-wicking properties.
- **Medical Supplies:** Cotton is used in the manulitcture of bandages, dressings, and cotton wool due to its absorbent and hypoallergenic properties.
- **Industrial Applications:** Cotton libers are used in the production of high-quality paper, gunpowder (cellulose nitrate), and in the reinlorcement of composite materials.

Jute:

Biological Source: Jute libers are obtained from the bark of plants in the genus *Corchorus*, primarily *Corchorus capsularis* and *Corchorus olitorius*, belonging to the litmily Malvaceae (previously Tiliaceae).

Chemical Nature:

- **Cellulose:** Makes up about 60-70% of jute liber, contributing to its strength and durability.
- **Hemicellulose:** Constitutes about 20-25%, aiding in the binding of cellulose libers and providing additional structural integrity.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- **Lignin:** Comprises 10-15% of jute, giving the libers rigidity and resistance to microbial attack.
- Pectin and Waxes: Present in smaller amounts, these substances contribute to the flexibility and smoothness of the libers.

Uses:

- **Textiles:** Jute is used to manulitcture hessian cloth, gunny bags, ropes, and carpet backing due to its coarse and strong nature.
- **Agriculture:** Jute libers are used in making agricultural twines and sacks emulsifying storage and transport of agricultural products.
- **Eco-friendly Products:** Increasingly used in making biodegradable and sustainable products like shopping bags, geotextiles, and handicrafts.
- **Paper Industry:** Utilized in the production of high-strength paper and pulp.

3. Hemp

Biological Source: Hemp libers are obtained from the stems *of Cannabis sativa* plants, belonging to the Cannabaceae litmily. The plants are specilically cultivated lor liber production, distinct from those grow+1 lor medicinal or recreational cannabis.

Chemical Nature:

- **Cellulose:** The primary component, making up about 70-75% of hemp libers, providing high tensile strength and durability.
- Hemicellulose: Constitutes approximately 15-20%, contributing to the flexibility and elasticity of the libers.
- Lignin: Comprises about 3-4%, giving the libers rigidity and resistance to decay.
- Pectin and Waxes: These minor components help bind the cellulose libers and provide smoothness.

Uses:

- **Textiles:** Hemp is used in producing durable and eco-liiendly litbrics lor clothing, home textiles, and industrial applications.
- **Paper Production:** Hemp libers are used to produce high-quality, long-lasting paper products.
- **Construction Materials:** Hemp is used in the creation of biocomposites, insulation materials, and hempcrete, a sustainable building material.
- **Automotive Industry:** Utilized in making biodegradable and lightweight composite materials emulsifying vehicle interiors.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

• **Bioplastics:** Hemp libers are increasingly used in the development of biodegradable plastics and other sustainable materials.

Hallucinogens:

- Hallucinogen are the substance that produces psychological efi"ects 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 1"eeling, ranging from distortions of what is sensed (illusions) to sensing objects where none exist (hallucinations).
- Hallucinogens heighten sensory signals, but this is olJen accompanied by loss of control over what is experienced.

Biological Source:

• It consists of dried leaves and flowering tops *oI"Hyoscyamus niger* litmily Solanaceae.

Chemical Nature:

• Hallucinogenic Agents also called psychominetic agents are capable of producing hallucinations, sensory illusions and bizarre thoughts.

Uses:

They have been used emulsifying a variety of purposes:

- Medical Research: There is growing research interest in the potential of hallucinogens to treat medical conditions, including mental health disorders. The U.S. Food and Drug Administration (FDA) has released a statement on clinical trial guidelines lor them.
- 2. Recreational Use: Some people use hallucinogens lor recreational purposes, to improve well-being, or lor spiritual or sell-exploration. They can produce strong emotions ranging from bliss to 1"ear and vast changes in how reality is perceived.
- **3. Religious and Spiritual Practices:** Numerous indigenous cultures around the world have used hallucinogenic plants to induce states of detachment from reality, to precipitate "visions" or mystical insight, as medicines, or as adjuncts to social and religious rituals.
- 4. Stress **Relief:** Some people report using hallucinogens to reduce pain and stress levels.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Teratogens

- A teratogen is a substance know+1 to cause birth de1"ects lollowing exposure during pregnancy. Some teratogens can be drugs (e.g., prescription drugs such as lithium or epilepsy medication or recreational drugs).
- Certain in1"ections, such as rubella (German Measles) or chicken pox can also be teratogens.
- The mother can also unknowingly introduce the 1"etus to teratogens in the womb.
- Alcohol is a common teratogen. Alcohol use during pregnancy can adversely afi"ect the unborn baby. There are many Irectors that influence this e1"1"ect, including the amount of alcohol ingested over time and di1"1"erences 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

Biological Source:

• Thalidomide is a synthetic drug, initially synthesized in the 1950s. While not of natural origin, its development was inspired by naturally occurring compounds, and it has had signilicant historical impact as a teratogen.

Chemical Nature:

• **Thalidomide:** Chemically know+1 as alpha-phthalimidoglutarimide, thalidomide is a synthetic compound with the molecular emulsifying mula C13HioN2O4.

Uses:

- Medical Use:
 - **Historical:** Initially marketed as a sedative and anti-nausea medication lor pregnant women.
 - **Current:** Used in the treatment of erythema nodosum leprosum, a complication of leprosy, and multiple myeloma, a type of blood cancer.

• Teratogenic Effects:

• **Birth Defects:** Causes severe congenital defrom ities, including phocomelia (limb malfrom ations), cardiac de1"ects, and ear and eye abnormalities, when taken during pregnancy.

2. Retinoic Acid (Vitamin A Derivatives)

Biological Source: Retinoic acid is derived from vitamin A, which is liiund in both animal sources (such as liver and lish oils) and plant sources (such as carrots and spinach).

Chemical Nature:

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

• **Retinoic Acid:** Chemically know+1 as all-trans retinoic acid, it is a metabolite of vitamin A (retinol) with the molecular lomula C2OI+8O2.

Uses:

- Medical Use:
 - Dermatology: Used in the treatment of severe acne and psoriasis.
 - Oncology: Employed in the treatment of acute promyelocytic leukemia (APL).
- Teratogenic Effects:
 - **Birth** Defects: High doses of retinoic acid during pregnancy can lead to a spectrum of malfrom ations known as retinoic acid embryopathy, which includes craniolitcial abnormalities, heart de1"ects, and central nervous system malfrom ations.

3. Alcohol (Ethanol)

Biological Source: Ethanol, commonly known as alcohol, is a natural product of 1"ermentation of sugars by yeast, particularly *Saccharomyces cerevisiae*.

Chemical Nature:

• Ethanol: A simple alcohol with the chemical formula C2HsOH.

Uses:

- Recreational Use: Consumed in beverages like beer, wine, and spirits.
- Medical Use: Used as a disinfectant and antiseptic. Also used in certain pharmaceutical preparations.
- Teratogenic Effects:
 - **Fetal** Alcohol Spectrum Disorders (**FASD**): Chronic alcohol consumption during pregnancy can lead to a range of e1"1"ects including 1"etal alcohol syndrome (FAS), which is characterized by growth deliciencies, litcial abnormalities, and neurodevelopmental disorders.

4. Nicotine

Biological Source: Nicotine is an alkaloid lound in the nightshade litmily of plants (Solanaceae), predominantly in tobacco plants (*Nicotiana tabacum* and *Nicotiana rustica*).

Chemical Nature:

• Nicotine: Chemically know+1 as (S)-3-(1-Methyl-2-pyrrolidinyl)pyridine, with the molecular emulsifying mula CioH14N2.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Uses:

- Recreational Use: Found in tobacco products like cigarettes, cigars, and chewing tobacco.
- Medical Use: Used in nicotine replacement therapies (NRT) such as patches and gum to aid in smoking cessation.
- Teratogenic Effects:
 - Developmental Issues: Prenatal exposure to nicotine can result in low birth weight, preterm delivery, and long-term developmental and behavioral problems in children.

5. Mycotoxins (Aflatoxins)

Biological Source: Aflatoxins are produced by certain species *oYAspergillus* fungi, particularly *Aspergillus flavus* and *Aspergillus parasiticus*, which can contaminate crops like peanuts, corn, and tree nuts.

Chemical Nature:

• Aflatoxins: A group of structurally related mycotoxins, with atlatoxin Bi being the most potent and prevalent, having the molecular emulsifying mula C17H12O6.

Uses:

- Natural Occurrence: Found as contaminants in improperly stored liiod products, particularly in warm and humid climates.
- Teratogenic Effects:
 - **Birth** Defects **and Cancer:** Exposure to high levels of atlatoxins during pregnancy can result in 1"etal growth retardation and teratogenic e1"1"ects, including liver damage and increased risk of liver cancer later in li1"e.

Natural allergens:

1. Pollen

Biological Source: Pollen is produced by the male gametophytes of seed plants, including a variety of trees (e g., oak, birch), grasses (e g., timothy, Bermuda), and weeds (e g., ragweed).

Chemical Nature:

• **Pollen Allergens:** Pollen contains complex proteins and glycoproteins that can trigger allergic reactions. Common allergenic proteins include Bet v 1 from birch pollen, Amb a 1 from ragweed pollen, and Phl p 5 from grass pollen.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Uses:

- **Pollination:** Pollen is essential emulsifying the 1"ertilization process in plants, leading to the production of seeds and liuits.
- Allergic Reactions: Pollen is a major cause of seasonal allergic rhinitis (hay 1"ever), causing symptoms such as sneezing, itching, nasal congestion, and watery eyes in sensitized individuals.

2. Latex

Biological Source: Latex is a milky fluid produced by the rubber tree (*Hevea brasiliensis*) and several other plants. It is harvested by tapping the tree to collect the latex sap.

Chemical Nature:

• Latex Allergens: The latex from rubber trees contains proteins such as Hev b 1, Hev b 3, and Hev b 6, which can cause allergic reactions in sensitive individuals.

Uses:

- **Medical Supplies:** Latex is used in the production of gloves, catheters, and other medical devices.
- **Consumer Products:** Commonly used in items such as balloons, rubber bands, and household gloves.
- Allergic Reactions: Exposure to latex can cause symptoms ranging from mild skin irritation (contact dermatitis) to severe anaphylactic reactions in individuals with latex allergy.

3. Dust Mites

Biological Source: Dust mites are microscopic organisms belonging to the genus *Dermatophagoides*, including species like *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*. They thrive in warm, humid environments and are commonly lound in household dust.

Chemical Nature:

• **Dust Mite** Allergens: Proteins such as Der p 1 and Der 1" 1 are major allergens liiund in dust mite 1"eces and body liagments.

Uses:

- **Natural Occurrence:** Dust mites play a role in breaking dow+1 and recycling organic material in the environment.
- Allergic Reactions: Exposure to dust mite allergens can cause allergic rhinitis, asthma, and atopic dermatitis in sensitized individuals.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

4. Animal Dander

Biological Source: Animal dander consists of tiny, even microscopic, flecks of skin shed by cats, dogs, rodents, birds, and other animals with lilr or 1"eathers. It also includes proteins lound in the animal's saliva, urine, and feces.

Chemical Nature:

• **Dander** Allergens: Proteins such as Fel d 1 from cats and Can f 1 from dogs are potent allergens that can trigger immune responses in susceptible individuals.

Uses:

- **Natural Occurrence:** Animal dander is naturally produced by pets and other animals as part of their normal skin and bodily functions.
- Allergic Reactions: Exposure to animal dander can lead to symptoms of allergic rhinitis, asthma, and allergic conjunctivitis in individuals with pet allergies.

5. Mold Spores

Biological Source: Molds are fungi that grow both indoors and outdoors, with common species including *Aspergillus, Penicillium, Cladosporium,* and *Alternaria*.

Chemical Nature:

• **Mold** Allergens: Mold spores contain proteins that can act as allergens, such as Alt a 1 from *Alternaria alternata* and Asp f 1 from *Aspergillus fumigatus*.

Uses:

- Natural Occurrence: Molds play a crucial role in decomposing organic matter and recycling nutrients in the environment.
- Allergic Reactions: Inhalation of mold spores can cause allergic reactions, including nasal congestion, sneezing, and asthma exacerbations in sensitized individuals.

6. Insect Venoms

Biological Source: Insect venoms are secreted by various insects, including bees (*Apis mellifera*), wasps (*1'espula species*), and lire ants (*Solenopsis invicta*).

Chemical Nature:

• Venom Allergens: Insect venoms contain proteins and peptides that can act as allergens, such as phospholipase A2, hyaluronidase, and melittin in bee venom.

Uses:

• Defense Mechanism: Venoms are used by insects as a del"ense mechanism against predators and threats.

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

• Allergic Reactions: Stings from these insects can cause local reactions like swelling and redness, and in some individuals, systemic allergic reactions, including anaphylaxis, which can be li1"e-threatening.

Primary metabolites:

A primary metabolite is a kind of metabolite that is directly involved in normal growth, development, and reproduction. It usually perfrom s a physiological lilnction in the organism (i.e. an intrinsic lilnction). A primary metabolite is typically present in many organisms or cells.

Example:

- Carbohydrates
- Protein
- Enzymes
- Lipids

Carbohydrates:

- Carbohydrates (CHO) are organic compounds (also called hydrated carbon) or polyhydroxy aldehydes or polyhydroxy ketones. Containing carbon, hydrogen, and oxygen.
- Carbohydrates are widely distributed in plants and animals; they have important structural and metabolic roles.
- In plants, glucose is synthesized from carbon dioxide and water by photosynthesis.

Classification of Classification:

- 1. Monosaccharides are those carbohydrates that cannot be hydrolyzed into simpler carbohydrates i.e. it composed from one unit.
- 2. Disaccharides are condensation products of two monosaccharide units.
- 3. Oligosaccharides are condensation products of two to ten monosaccharides. Example maltotriose (a trisaccharide of glucose).
- 4. Polysaccharides are condensation products of more than ten monosaccharide units; example starches.

Chemical tests:

1. *Moñsch's test* — Given sample food + Molisch's reagent —Purple or violet ring conlirms the presence of carbohydrate.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- 2. *Fehñng's test* Given sample liiod +Fehling's reagent → Red precipitate conlirms the presence of carbohydrates
- 3. *Benedict's test* Given sample lood + Benedict's reagent \rightarrow Red precipitate conlirms the presence of carbohydrates.
- 4. *Toñen's test* Given sample lood +Tollen's reagent → Silver mirror conlirms the presence of carbohydrates.
- 5. *Iodine test* Given sample lood + Iodine solution → Blue colour solution conlirms the presence of starch.

Carbohydrates:

Acacia

Sources:

- Acacia is the dried gummy exuda-tion obtained from the stems and branches *oYAcacia senegal* (L.)
- Willd or other Aliican species of Acacia. In India, it is liiund as dried gummy exudation obtained from the stems and branches *oYAcacia arabica* Willd, belonging to family Leguminosae

Preparation:

For collecting gum 6-8 year old trees and prel"erred

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

The gum exudates atler 6-8 weeks

The gum is collected and dried in sunlight lor 3 weeks

This bleaches the gum and turns in white colour

Now The obtained gum is collected and packed.

Evaluation:

1. **Lead** Acetate **Test:** An aqueous solution of acacia when treated with lead acetate solution it yields a heavy white precipitate.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

2. **Borax Test:** An aqueous solution of acacia affords a stiff translucent mass on treatment with borax.

Preservation and Storage:

- Stored in well closed containers protected from light and in cool dry place.
- It does not deteriorate due to long storage under such favorable conditions.

Therapeutic Used:

- The mucilage of acacia is employed as a demulcent.
- It is used extensively as a vital pharmaceutical aid lor emulsification and to serve as a thickening agent
- It lindsits enormous application as a binding agent lor tablets cough lozenges.
- It is employed as colloidal stabilizer.
- It is used extensively in making of candy and other food products.

Agar:

Sources:

• It is dried gelatinous substance obtained from *Gelidium amansii* family Galidaceae.

Preparation:

The collection of the material is done in may and October.

Sea weeds are scrapped from the bamboos (dried and bleached)

To remove foreign materials like shells, sand, etc.

The entire material is taken to the high altitudes where it is washed and bleached by sun.

Boiled lor 5 to 6 hrs with large quantity of dil. Acidified water (About 1 part of algae with 6 parts of water)

This extract is then strained while hot through the cloth.

Transferred to wooden thoughts

On cooling jelly is produced. Rectangular solid pieces of jelly are then passed through the netting under pressure For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Narrow strips thus formed are allowed to melt during the day time in the sun which removes the excess of water.

This operation is continued lor several days

Final Product

Evaluation:

- 1. Agar responds positively to Fehling's solution test.
- 2. Agar gives positive test with Molisch reagent.
- 3. Aqueous solution of agar (1%) is hydrolysed with con-centrated HCl by heating lor 5-10 min. On addition of barium chloride solution to the reaction mixture, a white precipitate of barium sulphate is formed due to the presence of sulphate ions. This test is absent in case of starch, acacia gum and tragacanth.
- 4. To agar powder a solution of ruthenium red is added. Red colour is formed indicating mucilage.
- 5. Agar is warmed in a solution of KOH. A canary yellow colour is formed .
- 6. An aqueous solution of agar (1%) is prepared in boiling water. On cooling it sets into a jelly.
- 7. To agar solution an N/20 solution of iodine is added. A deep crimson to brown colour is obtained (distinctive from acacia gum and tragacanth).
- 8. To a 0.2% solution of agar an aqueous solution of tannic acid is added. No precipitation is formed indicating absence of gelatin.
- 9. Agar is required to comply with tests lor the absence of E. coli and Salmonella, and general microbial contamination should not exceed a level of 103 microorganisms per gram as determined by a plate count. It has a swelling index of not less than 10.

Preservation and Storage:

• Stored in well closed containers protected from light and in cool dry place.

Therapeutic Used:

- It is used as an emulsifying agent, bulk laxative, and a suspending agent.
- It is used lor preparing bacteriological culture medium.
- It is used in the production of ointments and medicinal encapsulations.
- It is also used as a dental impression mold base.

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Tragacanth

Sources:

• It is the air dried gummy exudates, flowing naturally or obtained by incision, from the stems and branches *of "Astra-gaM gMmniifer* Labill and certain other species of Astragdus, belonging to litmily **Leguminosae**.

Preparation:

Incisions are made on the stem of 2 year old plant

Gum exudes out and Dried

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

These gums were collected and packed.

Evaluation:

- An aqueous solution of tragacanth on boiling with conc. HCl does not develop a red colour.
- It does not produce red colour with ruthenium red solution.
- When a solution of tragacanth is boiled with 1"ew drops of FeCl3 [aqueous 10% (w/v)], it produces a deep-yellow precipitate.
- It gives a heavy precipitate with lead acetate.
- When tragacanth and precipitated copper oxide are made to dissolve in conc. NH4OH, it yields a meager precipitate.

Preservation & Storage:

• Stored in well closed containers protected from light and in cool dry place.

Therapeutic Used:

- It is used as a demulcent in cough and cold preparations and to manage diarrhoea.
- It is used as an emollient in cosmetics.
- Tragacanth is used as a thickening, suspending and as an emulsifying agent.
- It is used along with acacia as a suspending agent.
- Mucilage of tragacanth is used as a binding agent in the tablets and also as an excipient in the pills.
- Tragacanth powder is used as an adhesive.
- It is also used in lotions emulsifying external use and also in spermicidal jellies.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Honey

Sources:

• It is a saccharine liquid preparation obtained from *—Apis mellifera*

Apis Indica

Preparation:

- The nectar of the flowers is a watery solution containing 25% sucrose and 75% water. The worker bee sucks this nectar through its hollow tube of mouth (proboscis) and deposits in honey-sac located in abdomen.
- The enzyme invertase present in saliva of the bee converts nectar into invert sugar, which is partially utilized by the bee and the remaining is deposited into honey comb.
- Honey comb is smoked to remove the bees and honey is obtained by applying the pressure to it or allowing it to drain naturally.
- The honey of commerce is heated to 80°C and allowed to stand. The impurities which float over the surlitce are skimmed of i"and the liquid is diluted with water to produce honey of 1.35 density.
- Natural honey has the density of 1.47. Many-a-time, honey is extracted from the comb by centrililgation.
- It must be liee from loreign substances. Honey is liable to 1"ermentation, unless it is suitably processed.
- Honey is heated to 80°C be emulsifying e it is sent to the market, so as to avoid 1"ermentation. It should be cooled rapidly or else it darkens in colour on keeping.
- II"necessary (and i1" not prepared by centrililgation method), honey is required to be liltered through wet cloth or funnel.

Evaluation:

- 1. **Fiehe's Test for Artificial Invert Sugar:** Honey (10 ml) is shaken with petroleum or solvent ether (5 ml) lor 5-10 min. The upper ethereal layer is separated and evaporated in a china dish. On addition of 1% solution of resorcinol in hydrochloric acid (1 ml) a transient red colour is formed in natural honey while in artilicial honey the colour persists lor sometime.
- 2. **Reduction of Fehling's Solution:** To an aqueous solution of honey (2 ml) Fehling's solutions A and B are added and the reaction mixture is heated on a steam bath lor 5-10 min. A brick red colour is produced due to the presence of reducing sugars.
- **3.** Limit Tests: The limit tests of chloride, sulphate and ash (0.5%) are compared with the pharmacopoeial specilications.

Preservation & Storage:

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

Therapeutic Used:

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- It used as a laxative
- It also used in treatment in cold and cough.

Proteins and Enzymes:

Proteins:

- Proteins are naturally occurring polymers made up of amino acids.
- Almost everything that occurs in the cells involves one or more Proteins.
- Proteins provide structure, cellular reaction and carried out the tasks.
- 20 amino acids are lound in protein and they are called standard amino acid. These amino acids contain the carboxyl group and the amino group attached to a carbon.

Classification of Proteins:

- 1. **Simple Proteins:** Simple protein contain only amino acid reduce and other intimately bound material. Ex- Albumins, globulins, glutelin etc.
- 2. **Conjugated Proteins:** Conjugated proteins contain in addition to polypeptide chain others substance or groups which impart characteristics properties. Ex-Nucleoproteins, Glycoproteins, Haemoglobin, Phosphoproteins etc.
- 3. **Derived Proteins:-** Derived protein are derived from partial to complete hydrolysis from the simple or conjugated proteins by the action of acids, alkalis or enzymes. Ex-Peptones, peptides, proteoses etc.

Qualitative tests of Proteins:-

1. Heat test:-

- When protein solution is heated in boiling water both the protein get co-angulated and lose their biological activity.
- This is called thermal denaturation of proteins
- e.g. Boiling water.
- 2. Test with trichloroacetic acid (TCA)-
 - TCA is normally used to precipitate proteins from their solution. TCA denatures the proteins.

3. Biuret Test:-

• Biuret reagents consists of copper sulphate in an alkaline medium when proteins are treated with Biuret reagent it's shows a violet colour.

4. Hydrolysis Test:-

• Proteins on hydrolysis gives liee amino acids Hydrolysis can be carried out by acids like HCL, H2So4, etc. Or Alkalis like — NaOH, KoH etc.

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

5. Xanthoprotic test:-

• Nitration of aromatic amino acids of protein give yellow colour concentrated nitric acid is used lor Nitration.

6. Millon's Test:-

• Phenolic group of tyrosine of proteins react with mercuric sulphate in the presence of sodium nitrate and sulphuric acid to give red colour.

Gelatin

Sources:

• Gelatin is a protein derivative obtained by evaporating an aqueous extract made from bones, skins, and tendons of various domestic animals. Some important sources are: *Ox, Bos taurus, and Sheep, Ois aries* belonging to litmily Bovidae

Preparation:

Bone taken as row material

Firstly grounded and 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 from jelly

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

Evaluation:

1. *BiMret reaction:* To alkaline solution of a protein (2 ml), a dilute solution of copper sulphate is added. A red or violet colour is formed with peptides containing at least two peptide linkages. A dipeptide does not give this test.

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- 2. *Xanthoproteic reaction:* Proteins usually emulsifying m a yellow colour when warmed with concentrated nitric acid. This colour becomes orange when the solution is made alkaline.
- 3. *Millon's reaction:* Millon's reagent (mercuric nitrate in nitric acid containing a trace of nitrous acid) usually yields a white precipitate on addition to a protein solution which turns red on heating.
- 4. *Ninhydrin test:* To an aqueous solution of a protein an alcoholic solution of ninhydrin is added and then heated. Red to violet colour is formed .

Preservation & Storage:

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

Therapeutic Used:

- Gelatin is used to prepare pastilles, pastes, suppositories, capsules, pill-coatings, gelatin sponge.
- It from s glycerinated gelatin with glycerin which is used as vehicle and emulsifying manulitcture of suppositories.
- Combined with zinc, it from s zinc gelatin which is employed as a topical protectant.
- As a nutrient, Gelatin is used as commercial food products and bacteriologic culture media.

Casein

Sources:

• It is a phosphoprotein lound in milk at the extent of about 3%.

Preparation:

Milk is treated with acetic acid

The acid treatement removes calcium cation

It leaves a water insoluble phosphoprotein

Dried grounded and packed

Evaluation:

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Biuret test:

- 1-2 ml of test solution * biuret reagent
- } (Shake well and stand emulsifying 5 mins)
- Observe lor any colour change
- (II" solution from blue to violet, means proteins are present)

Preservation & Storage:

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

Therapeutic Used:

- It is used in the manulitcture of binders, adhesives, protective coatings, plastics (such as lor kni1"e handles and knitting needles), litbrics, lood additives, and many other products.
- It is commonly used by bodybuilders as a slow-digesting source of amino acids.
- There is growing evidence that casein may be addictive for some individuals, particularly those on the autism spectrum or having schizophrenia.

Enzymes:

• An enzyme is a bfromolecule that can be synthesized biologically (naturally occurring) or through other processes (synthetically). Its main lilnction is to act as a catalyst to speed up a reaction without itself being changed in the process.

Classification of Enzymes:

1. Classification of Enzymes by IUB System

Enzymes are classilied by complex system, suggested by commission on enzymes of International Union of Biochemistry (IUB). Based on their action they are divided into 6 major classes.

- 1. **Oxido-Reductases:** Enzymes in this class are involved in Dxidation-Reduction reactions. Example: Alcohol Dehydrogenase.
- 2. Transferases: Enzymes that catalyze transl"er of Functional groups are called as Transferases. Example: Phosphorylases
- 3. **Hydrolases:** These are enzymes that bring about hydrolysis of various compounds. Example: Lipase
- 4. Lyases: Enzymes specialized in addition or removal of water. Example: Aldolase
- 5. Isomerases: The Isomerases enzymes catalyze the structural shitls present in a molecule, thus causing the change in the shape of the molecule.
 - Enzymes involved in all isomerization reactions. Example: Phosphotriose Isomerase.
- 6. Ligases: The Ligases enzymes are know+1 to charge the catalysis of a ligation process.

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

2. On the basis of Site of activity on cell:

- a. **Intracellular enzymes:** In this the enzyme lilnctions within the cell. Eg: Enzymes involved in TCA Cycle.
- b. **Extracellular Enzymes:** In this enzyme lilnctions outside the cell. Eg. Digestive enzymes like pepsin, amylase, etc.

Proteolytic enzymes:

- Enzymes are proteins that catalyze biochemical lilnctions. They are required emulsifying various physiological processes.
- They are also known as protease that digest proteins, breakdown of long chain of protein molecules into shorter peptides and their components such as amino acids.
- They act as digestive aids, blood cleansers, rebalance immune system and reduce oedema in inflamed region.
- Papain is an enzyme liiund in the white, latex-like fluid (also called sap) of papaya liuit .
- It is a protease, which means it breaks down proteins into smaller molecules called amino acids.
- This process is similar to what happens to proteins during digestion.

Sources:

• Papain is the dried and purified latex of the green liuits and leaves of *Carica papaya* L., belonging to litmily Caricaceae.

Preparation:

Incisions are made on the mature and green liuits

Latex comes out and collected

Dried and purilied with water and precipitated with alcohol

Creamy white product is obtained

Sealed and product

For more information – mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Evaluation:

- Papain is reacted with a gelatin solution at 80°C in the presence of an activating cysteine chloral hydrate solution lor an hour.
- The solution is cooled to 4°C emulsifying long time. The treated solution must not regel in comparison to a blank solution under identical con-ditions.

Preservation & Storage:

• They are stored at 20°C in a well closed container.

Therapeutic Used:

- It is used in digestive mixtures, liver tonics, lor reducing enlarged tonsils, in prevention of postoperative adhesions, curbuncles, and eschar burns.
- It is an allergic agent causing severe paroxysmal cough, vasomotor rhinitis and dyspnea. It is a powerlill poison when injected intravenously.
- In industry it is used in the manulitcture of proteolytic preparations of meat, lever, and casein, with dilute alcohol and lactic acid as meat tenderizer, as a substitute lor rennet in cheese manulitcture.

Bromelain

Sources:

• Bromelin is a mixture of proteolytic enzymes isolated from the juice of Ananas comosus (pineapple), belonging to family Bromeliaceae.

Preparation:

- Bromelin is found in pineapple liuit juice and stem. Pine-apple is perennial, and it does not have a natural period of dormancy.
- It is propagated through suckers, slips, and crow+1s. In India it is planted in August, the plant generally flowers in February—March, and the liuit ripens during July—October.
- The liuits must be letl on the plant to ripen lor the lill flavour to develop. Dark green unripe liuits gradually change to yellow and linally to deep orange.
- The liuits are cut of i". The enzyme bromelin does not disappear as the liuit ripens. The enzyme from liuit and stem are know+1 as liuit bromelin and stem bromelin, respectively.
- It is isolated from pineapple juice by precipitation with acetone and also with ammonium sulphide

Preservation & Storage:

• At pH 3-6 temprature upto 60°C.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Therapeutic Used:

- Bromelain is promoted as a dietary supplement emulsifying reducing pain and swelling, especially of the nose and sinuses, gums, and other body parts atler surgery or injury.
- It is also promoted lor osteoarthritis, cancer, digestive problems, and muscle soreness.

Serratiopeptidase

Sources:

• Serratiopeptidase is a proteolytic enzyme isolated from nonpathogenic enterobacteria *Serratia* E 15. It is also produced by the larval from of the silk moth.

Preparation:

- Serratiopeptidase is produced by 1"ermentation technology by using nonpathogenic enterobacteria species such as *Serratia* E 15.
- The larvae of silk moth produce this enzyme in their intestine to break down cocoon walls. It can thus be obtained from the silk moth larvae.

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

- Serratiopeptidase is the most widely prescribed anti inflammatory enzyme in developed countries and also in India.
- It eliminates inflammatory oedema and swelling, accelerate liquefaction of pus and sputum, and enhance the action of antibodies.
- It is also used as a Inst wound healing agent. It is proving to be a superior alternative to the nonsteroidal anti inflammatory drugs traditionally used to treat rheumatoid arthritis and osteoarthritis.
- It has wide ranging applications in trauma surgery, plastic surgery, respiratory medicine, obstetric and gynaecology.

Urokinase

Sources:

• Urokinase is serine protease enzyme isolated from human urine and from human kidney cells by tissue culture or by recombinant DNA technology.

Preparation:

• Urokinase is a fibrinolytic enzyme produced by recombinant DNA using genetically manipulated E. coli cells.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- It is produced firstly as prourokinase q.v. and then converted to active from by plasmin or kallikrein. Urokinase used medicinally is also purified directly from human urine.
- It binds to a range of adsorbents such as silica gel or kaolin which can be use to initially concentrate and purify the product.
- It can be further purified by precipitation with sodium chloride or ethanol or by chromatography.
- Human urokinase needs sterile filtration, a septic filling and freeze drying.

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

- Urokinase is used in the treatment of pulmonary embolism, coronary artery thrombosis and emulsifying restoring the potency of intravenous catheters.
- It is generally administered intra-venously in a dose of 4,400 units/kg body weight per hour emulsifying twelve hours.

Streptokinase

Sources:

• Estreptokinase, plasminokinase is a purified bacterial protein produced from the strains of group C §-haemolytic S. griseus.

Preparation:

The enzyme is present in the intestine of silkworm

Isolated and purified from intestine

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

- Streptokinase is used to dissolve blood clots that have formed in the blood vessels.
- It is used immediately atler symptoms of a heart attack occur to improve patient survival.
- This medicine may also be used to treat blood clots in the lungs (pulmonary embolism) and in the legs (deep venous thrombosis)

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Pepsin

Sources:

- It is the enzyme prepared from the mucous membrane of the stomach of various animals like pig, sheep, or call".
- The commonly used species of pig iS *SMs scrof a* **Linn**, belonging to litmily Suidae.

Preparation:

- The mucous membrane is separated from the stomach either by the process of stripping or it is scrapped of i, and it is placed in acidified water lor autolysis at 37°C lor 2 hours.
- The liquid obtained after autolysis consist of both pepsin and peptone.
- It is then filtered and sodium or ammonium salts are added to the liquid till it is hall" saturated. At this point only the pepsin separates out, and the peptone remains in the solution.
- The precipitates are collected and subjected to dialysis lor the separation of salts. Remaining amount of pepsin i1" any in the aqueous solution is precipitated by the addition of alcohol into it.
- The pepsin is collected and dried at low temperature.

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

- It is used in the deliciency of gastric secretion.
- Pepsin is also used in the laboratory analysis of various proteins; in the preparation of cheese, and other protein-containing foods.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Lipids

- Lipids are chemically delined as a substance that changed in soluble in water and soluble in organic compound like chlorofrom , ether, benzene, etc.
- Lipids are the main constituents of plant and Animal cells.
- Leopard is a type of organic molecules found in a living thing. It is oily or waxy.



Chemical Test:

1. Acrolein Test:

- In the acrolein test, we take the given lood sample, prepare the extract of the given food sample. Then add potassium bisulphite to the above extract.
- A Pungent irritating odour evolves to form the solution conlirms the presence of Fats in the lood.

2. Baudouin Test:

- This test is used to identify the adulterant (vanaspati ghee) in the desi ghee.
- The lood sample is treated with the mixture, containing 5 ml hydrochloric acid, 2% lillial solution in the alcohol.
- A rose-red colour appears añer some time (around 5-10 minutes) in the solution conlirms the presence of vanaspati in the desi ghee.

3. Solubility Test:

- Take the given lood sample, prepare the extract of the given liiod sample.
- For more information mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- Then add the above extract to the chlorofrom solution or alcohol solution.
- If the extract gets dissolved into the solution, it confirms the presence of Fats in the food.
- By using the above methods, the analysis of 1itts and oils can be done.

Castor oil:

Sources:

• Castor oil is a vegetable oil derived from the seeds of the *RicinMs comments* plant, native to tropical areas of A1iica and Asia

Family Euphorbiaceae

Preparation:

- Castor seeds are used to make castor oil. There are two methods to get the oil: either with the seed coat still on, or atler it has been removed.
- The process of removing seed coverings involves smashing the seeds beneath the grooved rollers and then blowing the testas out with an air current. When the kernels are put into oil expellers, they are expressed with one to two tons of pressure per square inch at room temperature, until around thirty percent of the oil is extracted.
- To aid with the coagulation and precipitation of the oil's proteins, the lipase enzyme, and the toxic ingredient ricin, it is filtered and heated to 80-100°C. Atler filtering, 1% acidity oil is utilized lor medicinal purposes.
- The remaining oil cake is composed of around 20% oil, lipase, and ricin.
- The cake is crushed, steam-cooked between 40 and 80 degrees Celsius, and subjected to three tons of pressure per square inch. This produces oil of the second quality, which has an acidity of 5% and is utilized in industry.
 Atler the second quality oil is expressed, there is still 8-10% oil left in the leftover cake.
- This oil is prepared by extracting it using lipid solvents in a soxlet. Additionally, industry uses this acquired oil. Because it contains ricin, the leftover cake is utilized as manure rather than being given to animals. The cake is also employed in the lipase synthesis process.

Evaluation:

• About 5 ml of light petroleum (50° to 60°) when mixed with 10 ml of castor oil at 15.5° shows a clear solution, but i1"the amount of light petroleum is increased to 15 ml, the mixture becomes turbid. This test is not shown by other oils.

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

• It is used as lubricant.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- It is also used in cosmetics industry.
- They are used in the preparation of soap.

Chaulmoogra oil:

Sources:

• Chaulmoogra oil is the lixed oil obtained by cold expression from ripe seeds oY Taraktogenos kurzii King, (syn. Hydnocarpus kurzii (King) Warb.), Hydnocarpus wightiana Blume, H. anthelminticta Pierre, H. heterophylla, and other species of Hydnocarpus, belonging to litmily Flacourtiaceae.

Preparation:

- 1. **Harvesting the** Seeds: The trees bear liuit usually in August and September. The liuits are brown berries containing 10-16 seeds within the pulp.
- 2. **Seed Preparation:** The seeds are cleaned, washed, and dried. The testa (seed coat) is cracked and removed.
- 3. **Oil Extraction:** The kernels are then turned into a paste, otlen kept in jute bags. This paste is then subjected to a hydraulic press, expressing the oil. The lixed oil content of ripe seeds ranges from 40 to 45 percent.

Preservation & Storage:

• It is stored below 30°C in a well closed container and away from sunlight.

Therapeutic Used:

- The oil is uselill in leprosy and many other skin diseases.
- The cyclopentenyl litty acids of the oil exhibit specilic toxicity lor Mycobaeterium leprae and M. tuberculosis.
- The oil has now been replaced by the ethyl esters and salts of hydnocarpic and chlumoogric acids.
- At present organic sulphones have replaced Chaulmoogra oil in therapeutic use.

Wool Fat (Lanolin)

Sources:

• Lanolin is the lift-like purilied secretion of the sebaceous glands which is deposited into the wool libres of sheep, *Otis aries* Linn., belonging to litmily Bovidae.

Preparation:

• Wool is cut and washed with a soap or alkali. An emulsion of wool lift, called as wool grease, takes place in water.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

- Raw lanolin is separated by cracking the emulsion with sulphuric acid. Wool grease floats on the upper layer and littly acids are dissolved in the lower layer.
- Lanolin is purilied by treating with sodium peroxide and bleaching with reagents.

Evaluation:

- Dissolve 0.5 g of lanolin in chlorofrom , and to it add 1 ml of acetic anhydride and two drops of sulphuric acid.
- A deep green colour is produced, indicating the presence of cholesterol.

Preservation & Storage:

• It is stored in a well closed container and away from sunlight

Therapeutic Used:

- Lanolin is used as an emollient, as water absorbable ointment base in many skin creams and cosmetic and emulsifying hool"dressing.
- Wool lift is readily absorbed through skin and helps in increasing the absorption of active ingredients incorporated in the ointment.

Bees Wax

Sources:

• It is a purilied wax obtained from the honey comb of bees (Apis meñifera)

Preparation:

Honey comb is melted in boiling water

Wax is melted

Cooled to solilied

Wax is removed and bleached with H2O2or KMnO4

Beeswax Obtained

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Evaluation:

Wax * Caustic soda solution

For 10 minutes cool it

No turbidity is produced

Preservation & Storage:

• It is stored in a well closed container and away from

sunlight Therapeutic Used:

- Preparation of ointments
- Used in cosmetics lor the preparation of lipstick and lice creams.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Marine Drugs:

It is a branch of Pharmacognosy which deals with the isolation and identilication of bioactive molecules from marine organism. That means study of chemicals that derived from marine sources.

Sources are Bioactive molecules obtained from microbes, sponges, seaweeds and other marine organisms.

Novel medicinal agents from marine sources:

The novel medicinal agents which are obtained from marine source are as lollo

Anti inHarnmatory & anti spasmodic	Manoalide, Tetrado toxin
Cardiovascular active compounds	Anthopleurins, Laminine, Eptatretin, saxitoxin, spongosine, eledosin, ATX-II, Autonomium
Marine toxins compounds	Ciguatoxin, Palytoxin, Saxitoxin, Brevetoxin

Antibiotic Compounds

Antibiotic compounds from marine sources have been lound to inhibit the growth of bacteria, lilngi, and other microorganisms.

1. Cycloeudesmol:

Source: Marine sponges.

Activity: Exhibits antibacterial properties by interl"ering with bacterial cell wall synthesis or protein synthesis.

2. Variabilin:

Source: Marine sponges, specilically Ircinia species.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

o Activity: Shows broad-spectrum antibiotic activity, potentially disrupting bacterial cell membranes or inhibiting bacterial enzymes.

3. Ircinin-1:

- o Source: Marine sponges.
- Activity: Possesses antibacterial and antililngal properties, inhibiting the growth of various pathogenic microorganisms.

Anti-inHarnmatory & Antispasmodic Compounds

These compounds help reduce inflammation and muscle spasms, providing therapeutic benelits lor inflammatory diseases and conditions involving muscle spasms.

1. Manoalide:

- o Source: Marine sponge Luffariella variabilis.
- Activity: Inhibits phospholipase A2, reducing the production of inflammatory mediators and showing signilicant anti-inflammatory elTects.

2. Tetrodotoxin:

- o Source: Pufi"erlish and other marine animals.
- Activity: Acts as a potent neurotoxin that blocks sodium channels, reducing neuronal excitability and having potential antispasmodic efi"ects.

Antimicrobial Compounds

These compounds exhibit broad-spectrum activity against various microorganisms, including bacteria, lilngi, and viruses.

1. Holotoxin ABC:

- o Source: Sea cucumbers.
- Activity: Exhibits strong antimicrobial activity by disrupting microbial cell membranes or interl"ering with their metabolic processes.

2. Tholepin:

- o Source: Marine sponges.
- Activity: Shows potent antimicrobial efi"ects against a range of pathogens, possibly by inhibiting critical enzymes or pathways in microorganisms.

3. Eunicin and Acanthelin:

- o Source: Marine polychaetes (bristle worms).
- Activity: These compounds demonstrate antimicrobial properties, likely through disruption of microbial cell structures or inhibition of vital microbial lilnctions.

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Cardiovascular Active Compounds

These compounds afi'ect the cardiovascular system, potentially of i'ering benelits lor treating heart-related conditions.

1. Anthopleurins:

- o Source: Sea anemones.
- Activity: Act as potent cardiotoxins that modily ion channel lilnction, specilically sodium channels, influencing heart muscle contraction.

2. Laminine:

- o Source: Marine algae.
- Activity: Exhibits cardiovascular activity by potentially influencing blood pressure regulation and heart lilnction.

3. Eptatretin:

- o Source: Haglish.
- Activity: Shows potential in modulating cardiovascular lilnctions, though its exact mechanisms are still under investigation.

4. Saxitoxin:

- o Source: Marine dinotlagellates and cyanobacteria.
- Activity: A potent neurotoxin that blocks sodium channels, afi"ecting nerve transmission and potentially influencing heart rhythm.

5. Spongosine:

- o Source: Marine sponges.
- Activity: Exhibits cardiovascular efi"ects, potentially through modulation of heart muscle contractility.

6. Eledoisin:

- o Source: Octopus.
- Activity: Acts on smooth muscles and blood vessels, causing vasodilation and influencing cardiovascular lilnctions.

7. ATX-II:

- o Source: Sea anemones.
- Activity: Modulates sodium channels, a1"1"ecting heart muscle contraction and potentially of i"ering therapeutic benelits lor heart conditions.

8. Autonomium:

o Source: Marine organisms.

For more information - mauryapharma.in & +91-7268032463

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

• Activity: Potentially influences the autonomic nervous system, which regulates cardiovascular lilnctions.

Anticancer (Cytotoxic) Compounds

These compounds exhibit cytotoxic properties, making them potential candidates lor cancer treatment.

1. Ara-C (Cytarabine):

- o Source: Marine sponge Tethya crypta.
- Activity: A chemotherapy agent used to treat leukemia, it inhibits DNA synthesis in rapidly dividing cancer cells.
- 2. Crassin Acetate:
 - o Source: Marine gorgonian corals.
 - Activity: Shows cytotoxic activity against cancer cells, potentially inducing apoptosis or inhibiting cell prolil"eration.

3. Simularin:

- o Source: Marine organisms.
- Activity: Exhibits potent anticancer effects, possibly through mechanisms like DNA intercalation or inhibition of key enzymes in cancer cells.

Marine Toxin Compounds

These compounds are highly toxic but provide insights into neurological and physiological processes, and some have therapeutic potential in controlled doses.

1. Ciguatoxin:

- o Source: Marine dinof lagellates and lish.
- Activity: A potent neurotoxin that afi"ects ion channels, causing neurological and gastrointestinal symptoms.

2. Palytoxin:

- o Source: Zoanthid corals.
- Activity: One of the most potent toxins know+1, it a1"1"ects the sodiumpotassium pump in cells, leading to severe physiological efi"ects.

3. Saxitoxin:

- o Source: Marine dinof lagellates and cyanobacteria.
- Activity: A neurotoxin that blocks sodium channels, leading to paralysis and other severe symptoms.

4. Brevetoxin:

Mr Chandresh Maurya (M.Pharm Pharmacognosy)

Unit - 5

Source: Marine dinoilagellates.

Activity: A neurotoxin that a1"1"ects sodium channels, causing neurological and respiratory symptoms.

Miscellaneous Compounds

These compounds have various therapeutic and biological activities.

Kninic Acid:

Source: Red algae Digenea simplex.

Activity: An excitatory neurotransmitter analog used in neurological research to study excitotoxicity.

2. Domoic Acid:

Source: Marine diatoms.

Activity: A neurotoxin that causes amnesic shelllish poisoning, providing insights into glutamate receptor lilnction.

3. Aplysinopsin:

Source: Marine sponges and mollusks.

Activity: Exhibits neuroprotective and antitumor activities, potentially through modulation of neurotransmitter systems or inhibition of tumor growth.

