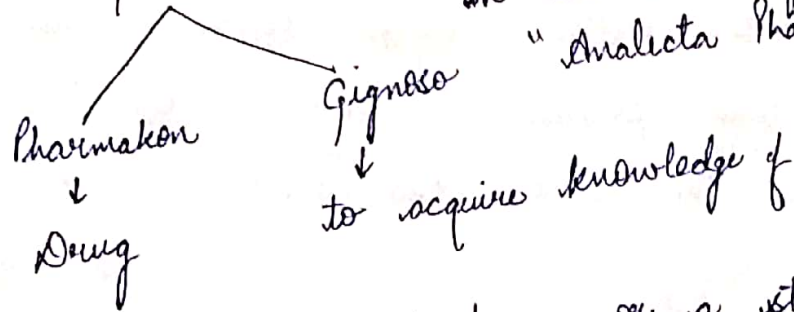


Introduction to Pharmacognosy

Definition:

Pharmacognosy is the study of drugs of natural origin. It is made up from 2 Greek words. coined by Seydler in 1815. in the title of his work "Analecta Pharmacognostica"



This means Pharmacognosy is the science of drugs or a study to acquire knowledge of drugs.

In this we study about natural drugs, crude drugs / natural substances.

Drug can be defined as an agent for the prevention, diagnosis and treatment of a disease.

It can be natural or synthetic.

Pharmacognosy is mainly concerned with drugs of natural origin such as -

- i) Plants → leaf, root, bark, seeds
- ii) Animals → wool, silk, honey, insulin
- iii) Minerals → Chalk, Bentonite
- iv) Micro-organisms → Penicillin, Tetracycline
- v) Marine → fish liver oil, corals, shells

Crude drug → It is the simple drug (plant, animal or their parts) which after collection are subjected only to drying and continue to exist in normal form.
* can be cut into pieces and peeled off.

Historical Development -

Ancient History → Countries like China, India, Egypt and Greece have been using the plants not just for food or shelter but also for their medicinal properties since ancient times.

The oldest written Chinese document stating the use of plants for medicinal purpose is Pent-Tsao [300 B.C.] It is also known as the "Oldest Pharmacopoeia on Earth" and was written by Shen nung.

The oldest document of Egypt was written in 1500 B.C. which contains 876 formulas and information of 700 crude drugs. It was named as Papyrus Ebers and written by George Ebers.

→ Hippocrates, father of medicine (460 - 360 B.C.) described the human anatomy and physiology. Also, he identified the medicinal properties and use of several plants.

→ Aristotle (384 - 322 B.C.) studied the whole animal kingdom and plant kingdom. He recorded the characters of more than 500 plants.

→ Dioscorides (40 - 80 A.D.) wrote a book "De Materia Medica" containing description of 600 medicinal plants and more.

→ Galen (131 - 200 A.D.) discovered the various extraction methods. He was the 1st pharmacist known to have several pain-relieving materials including opium.

Modern Early Era →

- Le'mercier (1645-1715): He explained the importance of extraction method and alcohol as an extractant.
- William Withering (1785): Published an account of some of the medicinal properties of foxglove leaves. (Percolation process → crude drug)
- Serenus (1803): Isolated narcotine from opium.
- Sertuerner (1806): Isolated morphine from opium.
- Stas and Otto (1852): Developed a new extraction process for alkaloids.
- Isolation of nicotine from tobacco leaves: Pöschelt and Reimann (1828); Cocaine by Neumann (1860); Quabain by Hardy and Gallouze (1877); Pilocarpine by Guvraud and Hardy (1875); Ephedrine by Nagai (1887); Podophyllotoxin by Knersten (1891)
- * → Swede Linnæus (1707-1778) → gave a systematic classification of plants and introduced a system of naming plants known as binomial system.

Scope of Pharmacognosy:

Pharmacognosy gives a sound knowledge of the vegetable drugs and animal drugs. It also includes plant taxonomy, plant breeding or plant genetics.

Pharmacognosy is an important link b/w pharmaceutical and basic sciences. It provides a system wherein the active principles of crude drugs derived from natural origin can be dispensed, formulated and manufactured in dosage forms.

Pharmacognosy has a broad scope in the field of pharmacy as:

a) Isolation or Analysis of Phytochemicals -

→ Morphine and other constituents are isolated from Opium and their uses are studied.

b) Structure Activity Relationship -

→ The tranquillising and hypotensive action of reserpine is due to the presence of trimethoxy benzoic acid.

c) Natural products as models for synthesis of new drugs -

→ Morphine is a model of a large group of potent drugs -

i) Cocaine - local anaesthetic

ii) Atropine - spasmolytic

d) Drugs of Direct Therapeutic Uses -

→ Many natural constituents are important groups of several antibiotics, steroids etc. eg. → Vincristine, ergotamine etc.

e) Biosynthetic pathway investigation -

- Important pathway - Glycolysis, Calvin's cycle etc.
- Shikimic acid pathway for aromatic compounds
- Isoprenoid hypothesis for terpenes

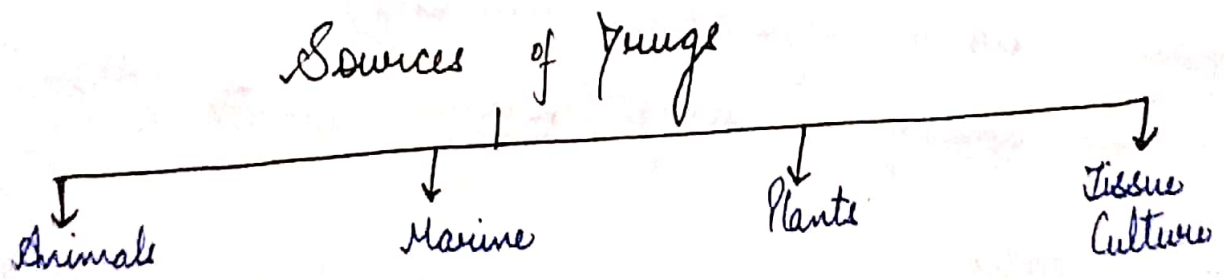
f) Cultivation and collection of Medicinal Plants -

- Eugenol from clove
- Pipterine from black pepper

Good Cultivation → large scale crop prod → Better yield
↓
Rise in economic value

g) Preparation of Herbal formulation -

- The active constituents help in formulation of several herbal products like churnas, tailas, lehas etc.



Animals: Animal parts/products are used

- Pancreas of pig → Insulin → Diabetes Mellitus
- Blood → formation of vaccines
- Cod Liver oil → as a source of vitamin A & D
- Human Plasma → Fibrinolytic → Treatment of Thrombosis

Plants :

	Drug	Const.	Treats/Action
Leaves :	Digitalis	→ Digitoxin	→ Cardiotonic
	Senna	→ Sennosides	→ Laxative
Flowers :	Clove	→ Eugenol	→ Dental analgesic
Fruits :	Amla	→ Vit. C	→ Antioxidant
Seeds :	Castor oil	→ Ricinimic acid	→ Laxative
Roots :	Rauwolfia	→ Reserpine	→ Anti-hypertensive

Marine sources : Drugs obtained from sea/ocean (sea weed, fish, sponges, corals etc.)

1) Anti-microbial agents

→ Cephalosporin - from marine fungus (Cephalosporium acremonium)

2) Anti-viral agents

→ Ara A (Vidarabine) - Caribbean sponge (Tethya crypta)

→ Fucoidan - Brown algae (Fucus vesiculosus)

→ Squalol and Squalone - sponge (Disidea ovata) → AIDS

3) Anti-parasitic

→ Domoic acid - Red algae (Chondria armata)

→ α -kainic acid - "

4) CNS agents

→ Laminine - Marine algae

→ Octopamine - Octopus vulgaris

5) Anti-cancer agents

→ Ara C (cytarabine) - Caribbean sponge (Tethys crypta)

6) Analgesics

→ Ziconotide - venom of marine snail (Conus mague)

Plant Tissue Culture:

In vitro cultivation of plant cell/tissue/organ in nutrient medium under aseptic conditions and controlled env.

Explant → Nutrient medium → Callus formation → Plant regeneration

Organized and Unorganized Crude Drugs

Organized Drugs

1. These are of plant/animal origin.
2. Direct part of plants or animals (leaves, fruits, seeds, organs)
3. These have cellular structure.
4. Solid in nature
5. Microscopic character is imp. for identification.

Eg. → Digitalis leaf
Clove buds
Sinnamon bark
Mustard seeds
Silk fibres

Unorganized Drugs

1. Plant/Animal/Mineral Origin
2. Derived from plant part and animal by some process (extraction, incision etc.)
3. Do not have cellular structure
4. Solid, semi-solid or liquid
5. Identified by chemical tests along with organoleptic properties.

Eg. - Agar
Gelatin
Honey
Gum Acacia

Classification:-

The unorganised drugs are classified based upon their origin and nature.

- a) Dried latex → The latex is a product contained in special secretory tissue of certain plants. It is usually a white aqueous suspension in which small particles of oil globules are suspended. It is of milky consistency and may contain proteins, sugars, minerals, alkaloids etc. Eg. → Opium, Papain
- b) Dried Juices → The juices are obtained from fleshy leaves or from stems of the trees. Incisions are made on the respective part of the plant and juice is collected and dried. Eg. → Aloe
- c) Dried Extracts → It includes drugs prepared by evaporating aqueous decoction of whole or parts of certain plants/animals. Eg. → Agar, gelatin, sodium alginate
- d) Gums → These are translucent and amorphous substances, produced by plants. They are obtained as pathological products in response to injury or unfavorable conditions. They are soluble or partly soluble in water. Eg. → Gum acacia, gum tragacanth, guar gum
- e) Mucilages → They are generally normal products of metabolism and formed within the cell. They form slimy masses with water, but do not dissolve. Mucilages are esters of

Sulphuric acid

Functions:

- Storage material
- Water storage mechanism

f) Resins → Amorphous solid or semi-solid substances.
These upon heating get softened and melt.

These are of 2 types:

- Natural resins: They are obtained from plants as well as animal sources. They are solids, liquids or semi-viscous materials. Chemically, they are organic compounds without nitrogen.
- Synthetic resins: Not obtained naturally but by the addition of certain substances in the laboratory.

→ Oleo-resins - Resins + Volatile oil
Eg. → Capsicum, Ginger

→ Oleo-gum resins - Resins + Volatile oil + Gums
They also contain other substances like enzymes.
Eg. → Myrrh, Asafetida

Resources

- 1) Textbook of Pharmacology by C.K. Kokate [Chapter-1]
- 2) Essentials of Pharmacology by S.H. Ansari [Chapter-1]
- 3) <https://www.slideshare.net/mobile/SudheerKandibanda/introduction-to-pharmacology-and-scope-of-pharmacology> (cited on 2nd April 2020)
- 4) <https://www.slideshare.net/mobile/UBrinivasa/introduction-and-scope-of-pharmacology-by-dubrinivasa-professor-srinivas-college-of-pharmacy-mangalore> (cited on 2nd April 2020)
- 5) <https://www.slideshare.net/HamzaFayed/unorganised-drug-drug-sadat-2018?gid=a7b6dd08-d95d-44f4-9437-2775f139e1f1&n=4&b=4&from-search=12> (cited on 4th April 2020)