

# MJF COLLEGE OF VETERINARY & Animal Sciences, chomu

Topic - Sources & nature of drug  
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## :Pharmacology:

It is a science of drugs. It covers all aspects of knowledge of drugs.

**Drug:** Any substance or product that is used or intended, to be modify or explore physiological systems or pathological states for the benefit of the recipient.  
(Wld.Hlth.Org.Tech)

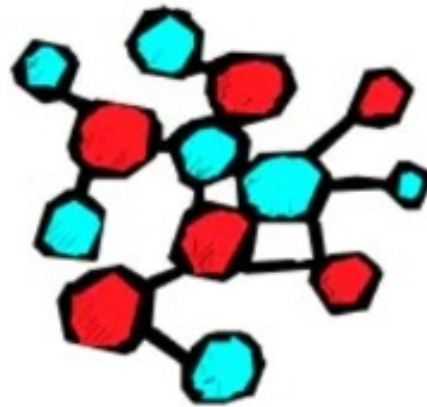
# Drug Nomenclature



- Every drug has three of names.
  1. Chemical Name
  2. Nonproprietary Name (Generic Name)
  3. Proprietary name (Trade/Brand Name)

**Chemical name:** These are given according to the chemical constitution of drug

- Chemical
  - Gives exact chemical composition of the drug
  - Places atoms or molecular structure



**Nonproprietary name:** (Official Name) It is assigned by the United States Adopted Name (USAN) council. It is uniform all over world.

**Generic Name:**

- Typically derived from chemical name
- Usually shorter

**Proprietary name:** It is given by the pharmaceutical manufacture.

- **Trade Name**

- Name registered by the manufacturer
- trademark symbol®
- only be used by the single manufacturer
- Same drug May have several trade names (depending on number of manufacturers)
- The first letter of the name is Capitalized

**Chemical Name**

**Acetyl  
Salicylic acid**

**Non proprietary**

**ASPIRIN**

**Trade Name**

**Disprin (India)  
Bayer's Asprin (USA)  
Ecospirin (India)**

# Source of Drugs

- Natural

- Plants
- Animal
- Micro organisms
- Mineral

- Synthetic

- Semi synthetic
- Synthetic



# PLANT SOURCE



Source	Plant	Drug	Use
Leaf	Digitalis	Digoxin	CHF
Bark	Cinchona	Quinine	Malaria
Fruit	Opium	Morphine	Analgesic
Seed	Eserin	Anticholinestrerase	M.G

Contd.,

# PLANT SOURCE



- Plants

<u>Example</u>	<u>Trade Name</u>	<u>Classification</u>
Chinchona Bark	Quinidine	Antiarrhythmic, Malaria
Purple Foxglove	Digitalis	Cardiotonic
Poppy Plant (Opium)	Paregoric, Morphine, Codeine	Antidiarrheal, Analgesic, Analgesic, Antitussive

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- *Nicotiana tabacum*
- Nicotinic receptor stimulant







***Atropa belladonna***  
**Anti cholinergic**  
**drug used in OP**  
**Poision**



***Opium seed***  
**Morphine Analgesic**

# Morphine preparation

Description	Example
Natural source	Opium poppy 
Crude drug preparation	Opium (dried juice of the poppy seed capsule) 
Pure drug compound	Morphine (extract of pure drug) 
Pharmaceutical preparations	Morphine sulfate tablets, oral solution, and solution for injection 



*Vinca rosea* Vinka alkaloids  
Anti cancer



***Digitalis purpurea***  
(foxglowe) Digitalis CHF



***Cinchona pubescens***  
Quinine Malaria



***Rauwolfia serpentina (INDIA)***  
Reserpidine Antihypertesive agent

Important Pharmacological active principles  
in plants are:

- 1) Alkaloids
- 2) Glycosides
- 3) Oils
- 4) Resins
- 5) Gums
- 6) Tannins

# 1. ALKALOIDS

- Nitrogenous heterocyclic bases.
- Insoluble in water.
- Form salts with acids, which are soluble in water.

Ex:    **Drug**            **Plant**  
      Atropine    *Atropa belladonna*  
      Quinine     *Cinchona bark*

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## Drug

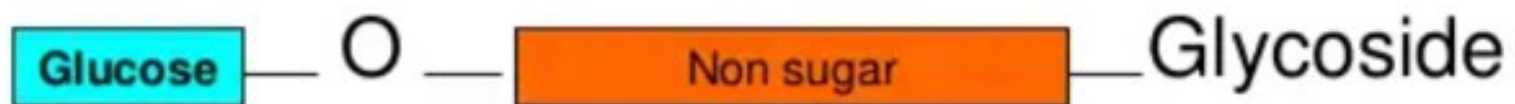
## Plant

- Morphine      *Papavaram somniferum*(Poppy)
  - Reserpine      *Rauwolfia serpentina*
  - Nicotine      *Tobaco leaves*
- 
- Alkaloids names usually end with “ine”.



## 2. Glycosides

- These are combinations of sugar with other organic structures.



Sugar portion governs the pharmacokinetic characteristic of glycoside.

Contd.,

- On hydrolysis with mineral acids all glycoside split up into sugar and non sugar residues.

Ex: Cardiac glycosides **Digitoxin, Digoxin** are obtained from Fox glove leaves (*Digitalis purpurea*).

## 3.OILS

- Generally 3 types of oils are used for medical purposes.
  - i) Essential oils (Volatile oils)
  - ii) Fixed oils.
  - iii) Mineral oils

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## i) Essential oils (Volatile oils)

- Obtained from leaves or flower petals by steam distillation.
- Terpene derivative so these have aroma
- Steam volatile
- No food value (caloric)
- Do not form soaps with alkaloids
- They do not become rancid (Foul smell) on prolonged stay

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## Uses:-

- **Carminatives**:- For expulsion of gas from stomach. Ex:-Ginger, eucalyptus oil. (act as irritant to gastric mucosa)
- **Antiseptic**:- Mouth washes.
- **Flavouring agents**:- Peppermint oil
- **Pain relieving agents**:- **Clove oil for toothache**  
**Acts as counter irritant**

**Contd.,**

## ii) Fixed oils

- Obtained by solvent extraction of crushed seeds.
- Triglycerides.
- Saturated from Animal
- Unsaturated from Plant
- Non volatile
- Have caloric value
- Form soaps with alkaloids
- Become rancid on prolong stay

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- Ex: Ground nut oil  
Coconut oil  
Olive oil

Uses:

- Castor oil as a purgative

Contd.,

### iii) Mineral oils

- Obtained by dry distillation of wood.

Ex:- Liquid paraffin (hydrocarbon derived from petroleum)

**Uses:-**Lubricant laxative for promote defecation.



## 4) Resins

- These are polymers of volatile oils and insoluble in water.
- Ex: Benzoin

### Use:

- Used as inhalational in common cold
- Treatment in cough

## 5) Gums

- Secretory products of plants
- These are dispersible in water and form adhesive mucilaginous colloids

Ex:- Gum acacia

Uses:-

Emulsifying or suspending agents.

## 6) Tannins

- Non nitrogenous phenolic derivatives from plant.
- Soluble in water.
- Ex:- Astringents (precipitate surface proteins)

## ANIMAL SOURCE

- Obtained from animal

### Drug

Heparin

Insulin

Thyroxin

Vit. B<sub>12</sub>

Cod liver oil

Anti toxic sera

### Animal

Leech

Pork pancreas

Thyroid

Liver extract



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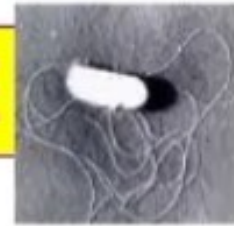
## ANIMAL SOURCE



- **Animals**

<u>Example</u>	<u>Trade Name</u>	<u>Classification</u>
<b>Pancreas of Cow, Pancreas of pork</b>	<b>Insulin; regular,</b>	<b>Antidiabetic Hormone</b>
<b>Stomach of Cow,</b>	<b>Pepsin</b>	<b>Digestive Hormone</b>
<b>Thyroid Gland Of Animals</b>	<b>Thyroid, USP</b>	<b>Hormone</b>

## MICROORGANISM SOURCE



- Bacterial, Fungi, Moulds imp source of many life saving drugs.
- These obtained from MO and used to kill Microorganisms.

### Drug

- Penicillin
- Chloramphenicol
- Griseofluvin
- Streptomycin
- Neomycin

### Microorganism

- Penicilium notatum*
- Streptomyces venezuelace*
- Pencillin grisofullivum*
- Streptomyces griseus*
- Streptomyces fradiae*

## MINERAL SOURCE



- Use in pharmacotherapy

### Mineral

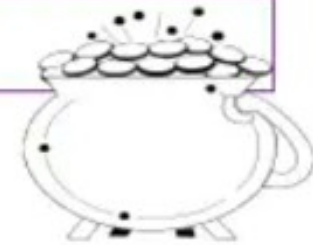
- Ferrous sulfate( $\text{FeSO}_4$ )
- Magnesium sulfate( $\text{MgSO}_4$ )
- Sodium bicarbonate ( $\text{NaHCO}_3$ )
- Aluminum Hydroxide

### Use

Anaemia  
Purgative  
Antacid  
Antacid

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## Mineral Sources

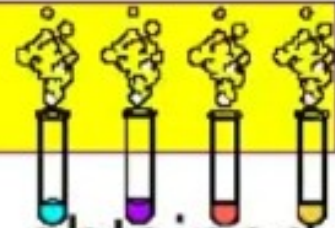


- Minerals

<u>Example</u>	<u>Trade Name</u>	<u>Classification</u>
Magnesium	Milk of Magnesia	Antacid, Laxative
Zinc	Zinc Oxide Oint.	Sunscreen, Skin Protectant
Gold	Solganal, Auranofin	Anti-inflammatory; Used in tx of Rheumatoid Arthritis



# SYNTHETIC

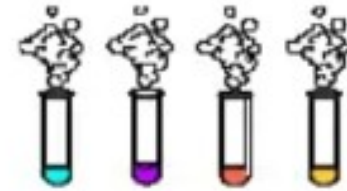


- Presently majority of drugs are obtained synthetically
- Some of drugs which are earlier obtained from plant today synthesized in lab.

## Advantage

- Quality can be controlled
- Process is easier and cheaper
- More potent and safer
- Large scale production

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<u>Example</u>	<u>Trade Name</u>	<u>Classification</u>
Meperidine	Demerol	Analgesic
Diphenoxylate	Lomotil	Antidiarrheal
Co-Trimoxazole	Septra	Anti-Infective Sulfonamide; Used in the treatment of UTI's

## Semi Synthetic

- These are mainly obtained by changing the chemical structure of natural obtaining drugs.
- Ex: Atropine bromide
- Penicillin substrates.( by changing –R side chain)

## Human Source

- HCG                      Pregnant women
- Menotrophin        Post Menopausal women urine
- Regular insulin    Human
- Urokinase            Human kidney cells
- rh GH                 Human

# GENTICALLY ENGINEERING

- Relatively new methodology involves the blending of discoveries from molecular biology, rDNA technology, DNA alteration, Gene splicing, immuno pharmacology.

Ex:-

Hepatitis-B

Insulin (Human insulin of rDNA techniques)

Contd.,

## **Formation of genetically engineered Hepatitis-B Vaccine**

**Genetic material (DNA) is first extracted from hepatitis virus**



**The gene that direct the production of surface protein is located**



**These gene is removed from viral DNA and inserted into plasmid**



**The plasmid are then inserted into yeast cells**



**Yeast is grown by fermentation.**

**(Cells produce large amount of surface proteins)**



**After 48hr, yeast cells are ruptured then extracted surface proteins**



**Purified and stabilized with preserving agents**



**HEPATITIS-B vaccine ready to use**

**THANK YOU**