Toppersnotes
Unleash the topper in you

RAJASTHAN PHARMACIST

Rajasthan Subordinate & Ministerial Services Selection Board

Part – B
Volume – 4

Pharmacognosy, Biotechnology and Clinical Pathology

SIERRA INNOVATIONS

RAJASTHAN PHARMACIST

CONTENTS

Pharmacognosy

Biotechnology

Clinical Pathology

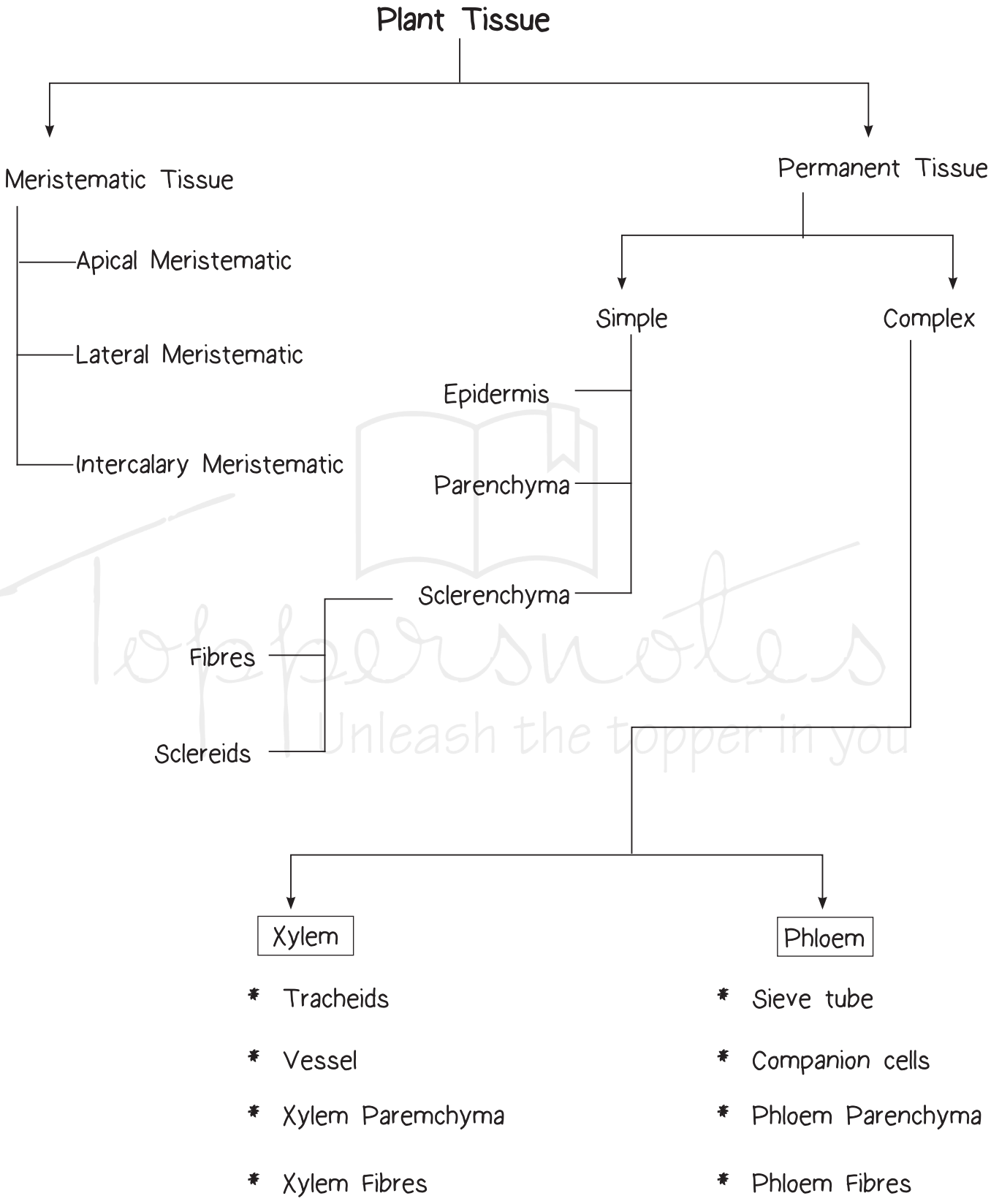
Pharmacognosy, Biotechnology and Clinical Pathology

Pharmacongnosy

- Pharmacongnosy: Pharmokon (drug) + Gnosis (knowledge)
- Pharmacongnosy is defined as the scientific study of the structural, physical, chemical & biological characters of crude drugs along with their history, cultivation collection, preparation for the market & preservation.

Scientist & its contribution

1.	Hippocrates	→	Father of medicine
2.	Aristole	→	Father of natural science
3.	Galen	→	First pharmacist
4.	Seydler	→	Coined the term Pharmacognosy
5.	Sertuner	→	Isolated morphine from opium
6.	Pelletier	→	Isolated strychnine & quinine
7.	Stas & otto	→	Develop new process of extraction of alkaloid.
8.	Shen Nung	→	Written pent-so (oldest herb)
9.	Charka	→	50 group of 10 herb
10.	Suchruta	→	Arranged 760 herb in 7 distinct set


Plant Tissue
Meristematic Tissue
Apical Meristematic
Lateral Meristematic
Intercalary Meristematic
Permanent Tissue
Simple
Complex
Epidermis
Parenchyma
Sclerenchyma
Fibres
Sclereids
Xylem
Phloem
* Tracheids
* Vessel
* Xylem Paremchyma
* Xylem Fibres
* Sieve tube
* Companion cells
* Phloem Parenchyma
* Phloem Fibres

Various system of medicine

A. Ayurveda system of medicine"

* It is the science of life main objective to maintain & promotion of positive health & cure of disease.
* It Involve two theories
  - Panchamahabhuta→ (1) → Prithvi
    (2) → Jala
    (3) → Teja
    (4) → Vayu
    (5) → Aakash
  - Tridosha → (1) → Vata
    (2) → Pitta
    (3) → Kafa
* Human Body are composed of 5 bodies elements
  - Earth
  - Water
  - Fire
  - Air
  - Ether

B. Unani system of Medicine:

Also known as Islamic

Loniah

Oriental

& Arab Medicine

Uniani system of medicine Based on two theories:

* Hippocratic Theory of four humors:- in body: Dan (blood)
  Balgham (phlegm)

Safram (Yellow bile)

Sauda (Black bile)

* Phythagorian theory of four proximate qualities
  - Hot
  - Cold
  - Dry
  - Moist

C. Homeopathy system of medicine:

* Developed by Hohnemann
* Hohnemann low of similarity (fundamental principle of homeopathy) " Like can be cured by like"
* In homeopathy the drug treatment depend upon the system as describe by patient.

D. Sidha system of Medicine

* It is one of the oldest known system
* Capable of treating all type of disease other than emergency cases.
* Identification of disease- through examination of pulse, urine, eyes, colour of body, study of voice, tongue & status of digestive system.
* It is similar to Ayurveda
* In this system use of metal & mineral is very recommended.

Classification of crude drug

A. Organised crude drug (cellular)"

* Represent the parts of the plant & made up of cell

  Example

  (i) Leave: Digitalis

  Datura

  Senna

Vasaca

Hyoscyamus

(ii) Fruit: Fennel

Dill

Coriander

Cardamon

Beal

(iii) Bark: Kurchi

Cinchona

Cinnamon

Cassia

Cascara

(iv) Root: Senega

Rauwolfia

Ipecac

Jalap

Aconite

(v) Seed: Nuxvomica

Mustard

Linseed

Isapgula

Castor

(vi) Flower: Rose

Clove

Artemisia

Pyrethrum

(vii) Rhizomes: Turmeric

Rhubarb

Podophyllum

Ginger

(viii) Wood: Quasia

Sandal wood

(xi) Entire plant: Tulsi

Ergot

Vinca

Ephedra

Belladonna

B. Unorganised Drug: (acellular)

* Does not contain plant part, but it is obtained by varieties of extraction procedures.

e.g. (i) Dried juice Aloe

Kino

(ii) Fat Lard

(iii) Gum Tragacanth

Guargum

Acacia

(iv) Resin & Resin combination: Jalap

Colophony

(v) Waxes:	Beewax
	Spermacati
(vi) Dried latex	Papain
	Opium
(vi) Dried Extract:	Gelatin
	Catechu
	Agar

Drug from mineral source:

- Kaolin
- Talc
- Diatomine
- Bentonite
- Fuller earth
- Shilajit
- Asbestos

Drug from Marine source:

♦ Anti microbial agent:	Cephalosporine
	Variabilin
♦ Antiviral agent:	Ara-A
	Avarol
♦ Anticancer agent:	Sinularin
	Ara-C
	Asperidal
	Halitoxin
	Crassinacetate

- Anticagulant agent: Carrageenan
  Fucoidan
- Cardivascular agent: Sexitoxin
  Laminine
  Eledoisin
- Anti-inflammatory agent: Manoalide
  Flaxibilide
  Tetradoxin

Plant Belonging to Family

1. Apocynaceae: Kurchi
   Vinca
   Rauwolfia
   Strophanthus
   Thevetia
   Yohimbin
2. Leguminaceae: Ashoka
   Senna
   arachis oil
   Black catachu
   pterocarpus
   psoralea
   Tonka bean
   Liquorice
   Tragacanth

	Acacia
	Guar Gum
	Balsam of tolu
	Physostigma
3. Labiatae:	Tulsi
	Peppermint
	Spermint
4. Umbeliferae:	Fennel
	Ammi
	Ajwan
	Asafoetida
	Coriander
	Caraway
5. Scrupulareaceae:	Digitalis
	picrorrhiza (Indian gentian)
	Brahmi
	Isapgol seeds.
6. Rubiceae:	Ipecacunha
	Pale catachu
	Cinchona
	Coffee
7. Comrataceae:	Myrobalam
	Bahera
	Arjuna

	Gum ghatti
8. Solanaceae:	Atropine
	Hydrine
	Aswagandha
	Hyoscamus
9. Rosaceae:	Bitter almond,
	Sweet almond,
	Wild cherry Bark
10. Liliaceae:	Shatavari
	Indian squill (all squill)
	Safed musil
	Aloe
	Colchicum
	Varatrum
11. Rutaceae:	Lemon
	Beal
	Pectin
	Pilocarpine
12. Zinziberaceae :	Gingers
	Cardamom
	Turmeric
13. Acanthaceae:	Kalmegh
	Vasaka

14. Myrtaceae:	Clove
	Eucalyptus
15. Euphorbiacege:	Amla
	Caster oil
16. Cruciferae:	Black Catachu
17. Graminae:	Starch
	Dextrin
18. Polygonaceae:	Rhubarb
19. Rhamnaceae:	Cascara
20. Plantaginaceae:	Isapgol
21. Compositae:	Inulin
22. Clavicipitaceae:	Ergot
23. Bursaraceae:	Guggulipid
24. Myristacae:	Nutmeg
25. Lauraceae:	Cinnamon
26. Gnetacae:	Ephedra
27. Santalaceae:	Sandalwood
28. Theaceae:	Tea
29. Erythroxylaceae:	Coca leaf
30. Aralicae:	Ginseng
31. Ranunculaceae:	Aconite
32. Curbitaceae:	karela
33. Loganiaceae:	nux vomica
34. Fobaceae:	Cassia

35. Gentianaceae: Gentia

Quassia

Quality Control & Standardization of Herbal drug

Microscopic Evaluation

A. Cellulose cell wall $\xrightarrow[I_2]{ZnCl}$ Blue to violet colour

B. Lignified cell wall $\xrightarrow[+HCl]{\text{Phloroglucinol}}$ Red colour

C. Suberised cell wall $\xrightarrow{\text{Sudan Red}}$ Organe Red colour

D. Inulin (polysaccharide fibre)

$+H_2SO_4$

Naphthol

→ Brownish Red & dissolve

E. Starch $\xrightarrow{I_2}$ Blue

F. Tannin $\xrightarrow{FeCl_3}$ Bluish Black

G. A mixture of equal amount of ether & ethanol → Removal of fixed oil & fat.

Determination of Ash

Ash is the material left ignition of the medicinal plant material.

Total Ash = Physiological Ash + Non physiological Ash (extraneous matter)

Acid Insoluble Ash:

Total Ash $\xrightarrow{\text{Dil. HCl}}$ Filter & Boil

↓

Insoluble Matter

↓ Ignite to constant wt

Acid Insoluble Ash

It represent the amount of silica present in soil.

Water soluble Ash:

Total Ash $\xrightarrow{\text{Water}}$ Fitter $\rightarrow$ Insoluble matter

Insoluble matter | Ignite to constant wt

Determination of water and volatile oil: Two method

(i) Azeotropic distillation (Toluene distillation)

(ii) Gravimetric method (loss on drying)

- Determination of Bitterness value:
  - 1gm quinine HCl in 2000 ml water
- Determination of Hemolytic. Index:
  - Reference material $\rightarrow$ saponin R which has a hemolytic value 1000 unit per gram.
- Determination of Tannin:
  - Tannin React with protein to form insoluble tannin which are resistant to action of proteolytic enzyme (Astringent action).
- Determination of swelling Index:
  - 1 gm drug +25 ml water

    ↓ 1 hr shake

    Allow for stand for 3 hr

    ↓

    Measure volume

- Determination of Foaming Index: 1g plant material + 100gm of water

  shake for 15 sec

  ↓

  stand For 15 min

  - The Hight less than 1 cm in all tube the Foaming index (FI) is <100
  - If foam hight is 1 cm in any tube than $F.I = \frac{100}{a}$

- Where a = Vol. in ml of decoration in the dilution in which 1 cm foam hight is observed.

- Determination of Heavy metal:
  - maximum amount of Heavy metal should be
  - Lead (pb) = 10 mg /kg
  - Cadmium = 0.3 mg /kg
- Determination of pesticide:
  - Not more than 1 %
- Determined by
  - Gas chromatography
  - Column chromatography
- Determination of microbial contamination & aflatoxin (Carcinogenic mold)
  - For Crude plant material intended for further processing → E.coli -10^4 / gm
  - For pretreated plant materials → Aerobic bacteria - 10^5 / gm
  - For plant material intended for topical use → salmonellae → None
  - For plant material for internal use → E.coli → 10 /gm
    → Salmonela → None

Imp Term in pharmacognosy

1. Palisade ratio → number of palisade cell under each epidermal cell
2. Vein Islet Number → Number of vein is let per sq. mm of the leaf surface between midrib & margin
3. Stomatal Number → Avg. number of stomata per sq. mm of epidermis
4. Stomatal Index (S.I.)

$$\text{S.I.} = \frac{S}{E+S} \times 100$$

5. Aril → succulent growth from hilium covering the entire seed.

   E.g. Nutmeg

6. Arilode → Outer growth of origin form the micropyl & covering the seed.

   E.g. Cardamom.

7. Arista → Stiff bristle like appendages with many flowering glumes of green.

   e.g. stropanthurs

8. Caruncle → It is warty outer growth from micropyle.

   E.g. Castor, Croton

9. Strophiole → Enlarged funicle

   E.g. Datura fastuosa

   Colcicum

10. Hilum → This is the point of attachment of seed to stalk.

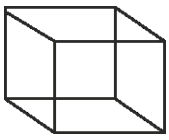
11. Micropyle → It is minute opening of the tubular structure where from water is provided for germination.

12. Raphe → Raphe is described as longitudinal marking of adherent stalk of anatropous ovule.

13. Hydathodr → Plant organ used for secretion of water.

Type of Calcium Oxalate Crystal

1. Prismatic or cubic/ Singal crystal



e.g. Senna,

Glycerrhiza

Hyoscyamus

Coriander

Rauwolfia

Cascara

Cardamom