

WELCOME

PVP COLLEGE PRAVARANAGAR

Department of Botany

SYBSC BO 241: Plant Anatomy and Embryology- 2 Credits

Presented By Dr. VIKHE P.S

SEMESTER IV

S.Y.B.Sc. Botany CBCS Pattern (Semester IV, Paper I) 2020-2021

BO 241: Plant Anatomy and Embryology- 2 Credits (30

Lectures)

Credit-I Plant anatomy: (15 Lectures)

1. Introduction

2L

1.1 Definition

1.2 Scope of plant anatomy

2. Epidermal tissue system

3L

2.1 Structure, types and functions of epidermis

2.2 Structure, types and functions of Stomata

2.3 Epidermal outgrowths- non-glandular and glandular

2.4 Motor cells

3. Mechanical tissue system

3L

3.1 Principles involved in distribution of mechanical tissues with one example each

- a) Inflexibility,
- b) Incompressibility,
- c) Inextensibility and
- d) Shearing stress

4. Vascular tissue system:

4.1 a) Vascular tissue system

b. Structure function of xylem, phloem and cambium

5. Normal secondary growth

3L

5.1 Introduction

5.2 Normal secondary growth in dicotyledonous stem

5.3 Development of annual rings, periderm, bark, tyloses and lenticel

6. Anomalous secondary growth

4L

6.1 Introduction

6.2 Causes of anomalous secondary growth

6.3 Anomalous secondary growth in:

- a) Dicotyledonous stem (Bignonia),**
- b) Dicotyledonous root (Raphanus),**
- c) Monocotyledonous stem (Dracaena)**

Credit-II Plant Embryology (15 Lectures)

7. Introduction	1L
7.1 Definition and scope of plant embryology	
8. Microsporangium and male gametophyte	4L
8.1 Structure of tetrasporangiate anther	
8.2 Types of tapetum	
8.3 Sporogenous tissue	
8.4 Microsporogenesis: process and its types	
8.5 Types of microspore tetrad	
8.6 Male gametophyte: structure and development of male gametophyte	

9 Megasporangium and female gametophyte 4L

9.1 Structure

9.2 Types of ovules

9.3 Types of megaspore tetrads

9.4 Female gametophyte: structure of typical embryo sac

9.5 Types of embryo sacs – monosporic, bisporic and tetrasporic

10. Pollination and Fertilization: 3L

10.1 Introduction and definition

10.2 Types of pollination

10.3 Germination of pollen grain

10.4 Entry of pollen tube- porogamy, mesogamy and chalazogamy

10.5 Double fertilization and its significance.

11. Endosperm and embryo 3L

11.1 Endosperm: Types – nuclear, helobial and cellular.

11.2 Structure of Dicotyledonous and Monocotyledonous embryo.

References:

- 1. Plant Anatomy, Chandurkar P J, Plant Anatomy Oxford and IBH publication Co. New Delhi 1971**
- 2. B P Pandey, Plant Anatomy. S Chand and Co. Ltd, New Delhi 1978**
- 3. Greulach V A and Adams J E Plant- An introduction to Modern Biology, Toppen Co. Ltd, Tokyo,**
- 4. Eams and Mc Daniel, An Introduction to Plant Anatomy, McGraw – Hill Book Co. Ltd and Kogakusha Co, Tokyo, Japan**
- 5. Adriance S Foster Practical Plant Anatomy, D Van Nostrand Co. INC, New York**
- 6. Esau, Plant Anatomy, Wiley Toppan Co. California, USA**
- 7. Pijush Roy, Plant Anatomy. New Central Book Agency Ltd, Kolkata**
- 8. Pandey S N and Ajanta Chadha, Plant Anatomy and Embryology, Vikas Publishing House, Pvt, Ltd, New Delhi**
- 9. Bhojwani S S and Bhatnagar S P, An Embryology of Angiosperms**
- 10. Maheshwari P, An introduction to Embryology of Angiosperm**
- 11. Nair P K K Essentials of Palynology.**



PLANT ANATOMY

Definition and meaning

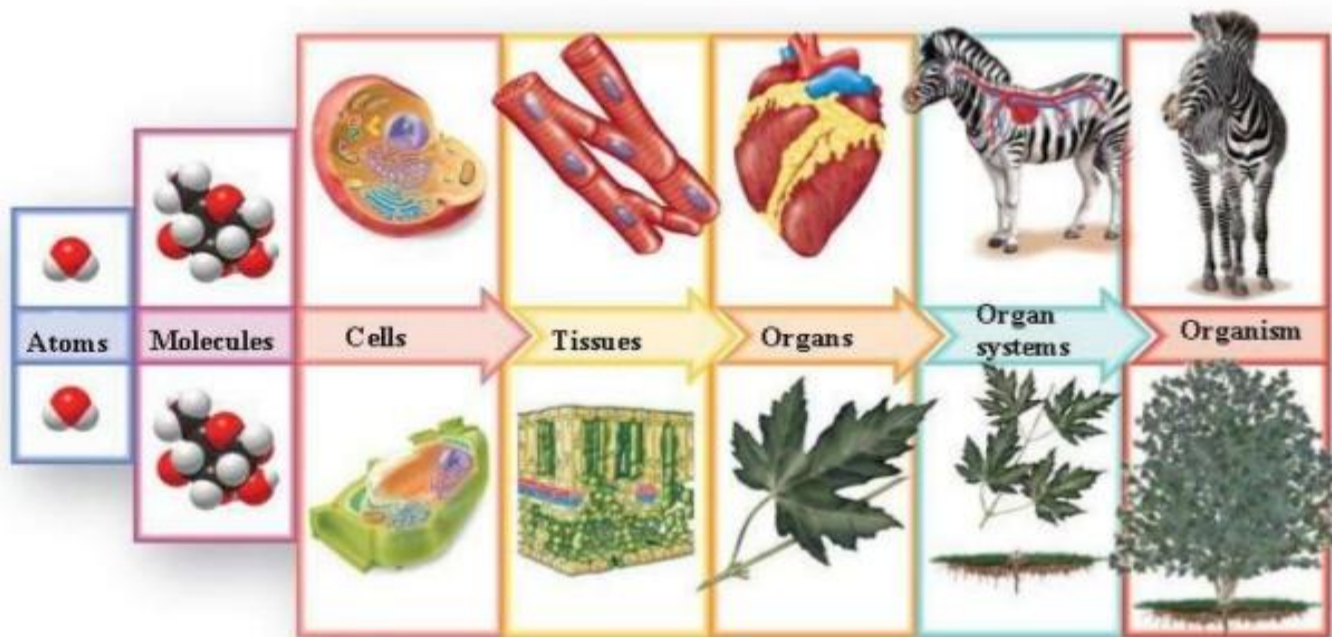
- **Anatomy meaning the branch of science concerned with the bodily structure of humans, animals, and other living organisms, especially as revealed by dissection and the separation of parts.**
- **a study of the structure or internal workings of something.**
- **Plant anatomy or phytotomy is the general term for the study of the internal structure of plants.**
- **Originally it included plant morphology, the description of the physical form and external structure of plants, but since the mid-20th century plant anatomy has been considered a separate field referring only to internal plant structure.**

What is plant anatomy

PHYTOTOMY

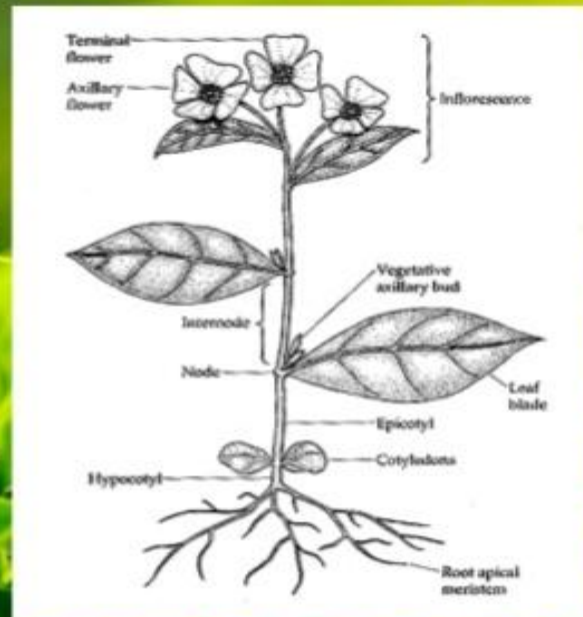
- Branch of biology concerned with the study of internal structure of plant and their parts.

Level of organization



The Four Basic Parts of Plants

- Leaves
- Stems
- Roots
- Flowers



INTRODUCTION

- A plant is a complex structure that consists of a number of parts which constitute the whole plant. If you learn to identify each individual part, you will gain a much greater understanding as to how the plant works as a whole.
- This can be helpful to aromatherapists who need to be aware of the part of the plant an essential oil was derived from because there is often a connection between the oils location in a plant and its therapeutic action.
- Understanding plant anatomy also helps everyone appreciate the art of distillation and extraction.
- Plant anatomy is the study of plant tissues and cells in order to learn more about the way these organisms are constructed and how they work.
- These studies are very important because they lead to a better understanding of how to care for plants and fight plant diseases. Plant anatomy is also known as phytotomy.



PLANT ANATOMY

- The study of internal structure and organization of plant is called plant Anatomy (Greek: Ana = as under; temnein = to cut).
- Father of Plant Anatomy - Nehemiah Grew
- **Plant anatomy** or **phytotomy** is the general term for the study of the internal structure of plants

The science of the structure of the organized plant body learned by dissection is called **Plant Anatomy**.

In general, Plant Anatomy refers to study of internal morphology, pertaining to different tissues. the study of plant cell and tissue structure

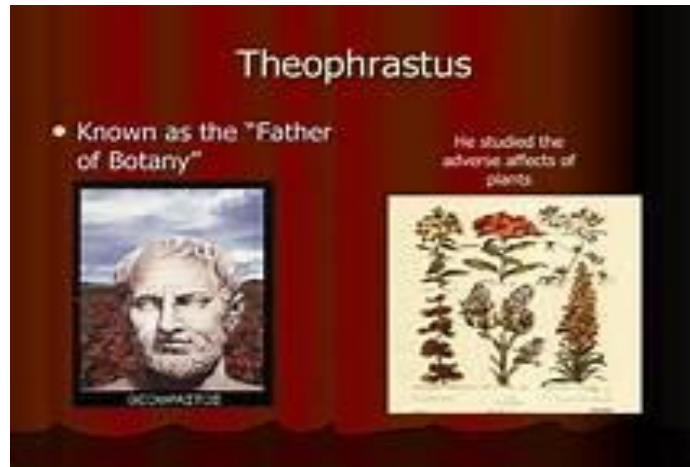
The anatomy is one of branches of appearance **Morphology** where he teaches a plant form of the study of plant form apparent (abroad) is attributable to the taxonomy

(Taxonomy= internal morphology)

(Anatomy = internal morphology)

HISTORICAL WORKS IN PLANT ANATOMY

Theophrastus



- 371-285 BC
- Founder of Plant anatomy
- Coined term xylem and phloem

Robert Hooke



- I In 1668 Observed bottle cork
- II under microscope noted cellular nature of plant

Marcello malphigi



(10 March 1628 – 1694)

was an Italian biologist and physician
structure of the "Founder of microscopical anatomy"
histology discovered spiral vessels published
Anatome platarum

HUGO VAN MOHL



(1805-1872) Worked on imp of protoplasm
plant cell nature of formation of vessel
, epidermis cork and bark etc.

Carl von Nageli



1817-1891 Worked on the developmental aspects of secondary primary meristem cellular details of xylem phloem he was Founder of modern plant anatomy .



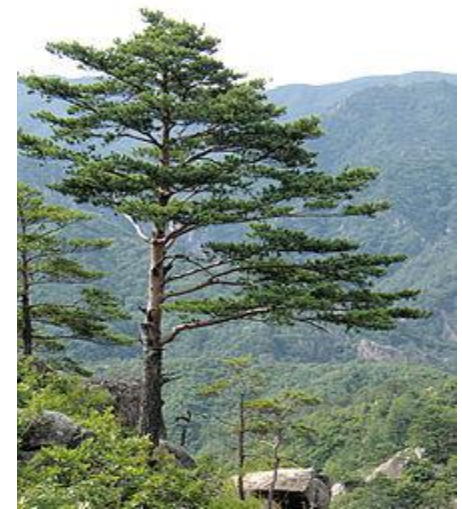
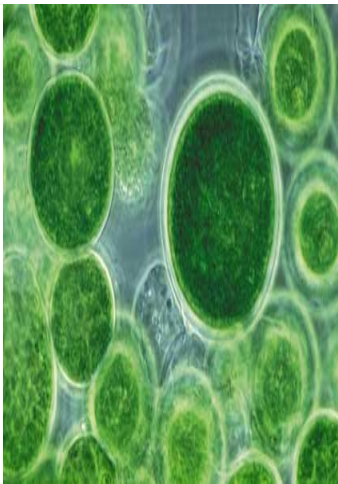
Theodor Schwann, (1810-1882, German physiologist who founded modern histology by defining the cell as the basic unit of animal structure.

Historical work in plant anatomy

- **Foster A.S published important work on comparative morphology and anatomy of plants**
- **Anton de Barry (1831-1888) extensively worked on plant anatomy published his work on Comparative anatomy of phanerogams and ferns 1877.**
- **M.J Scheleiden (1804-1881) postulated cell theory commented that all living things are cellular in nature.**
- **Robert Brown (1773-1858)He discovered nucleus in skin of orchid leaves.**

Scope of plant anatomy

Plants have greater diversity with reference to the structure of plant body from single celled organism *Chlorella*, *Chlymadomonas* etc. to a big Banyan tree or Bamboo to Giant sequoia, pinus, cedrus. Thus to understand taxonomy, anatomy is one instrument.



Scope of plant anatomy

- Plants have a complexity in cellular details due to the whole internal set up plant performs the function of photosynthesis respiration, absorption, transpiration, transport of food and minerals fat nitrogen metabolism, carbon utilization formation of flowers etc is a part of study of plant physiology.
- Anatomy helps in understanding functional internal set up cellular tissue level tissue system and coordination between organs of plant for success of plant life.

Scope of plant anatomy contd....

- **Plants have a long evolutionary history called as phyllogeny of plants .To study the evolution at cellular level tissue level knowledge of anatomy plays major role. It helps us to know how plants from single cell to highly complex structure developed in process of evolution.**
- **Plants adapt in various environmental conditions.The anatomical studies helps us to know the characters required for the adaptation at external,internal morphological levels of plants like hydrophytes ,xerophytes,mesophytes adapted to local environment from fresh to marine water bodies most beautiful environment to harsh environment because of special tissue present in them.Anatomy helps to understand the relation of environment with that plant.**

Scope of plant anatomy contd....

- **The study of various macroscopic and microscopic characters of Ayurvedic drugs from plants production of primary and secondary metabolites valuable in making drugs can be understood by internal details of where anatomy has its significance.**
- **The identification of wood is possible by detail anatomical studies as every wood species has particular cellular detail.**
- **Cytology of plants cellular details cell organelles, cell functions, parenchyma sclerenchyma, collenchyma xylem phloem their coordinated functions is a part of study of anatomy. Thus plant anatomy has more scope in knowing details of plant lie and functions at micro levels.**



*Thanks
For Watching*

- LISTENING ONLINE LECTURE OF PLANT ANATOMY.