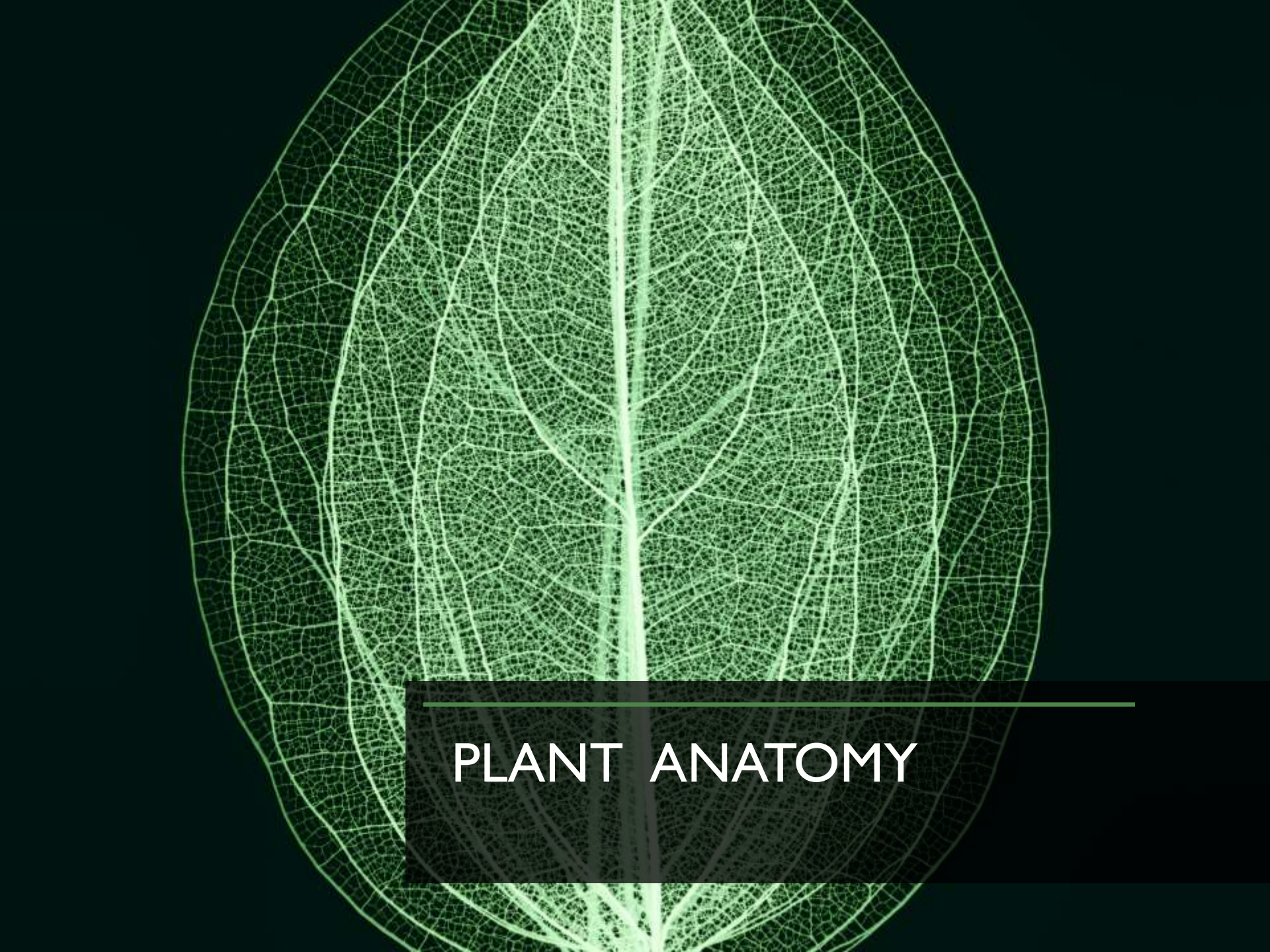
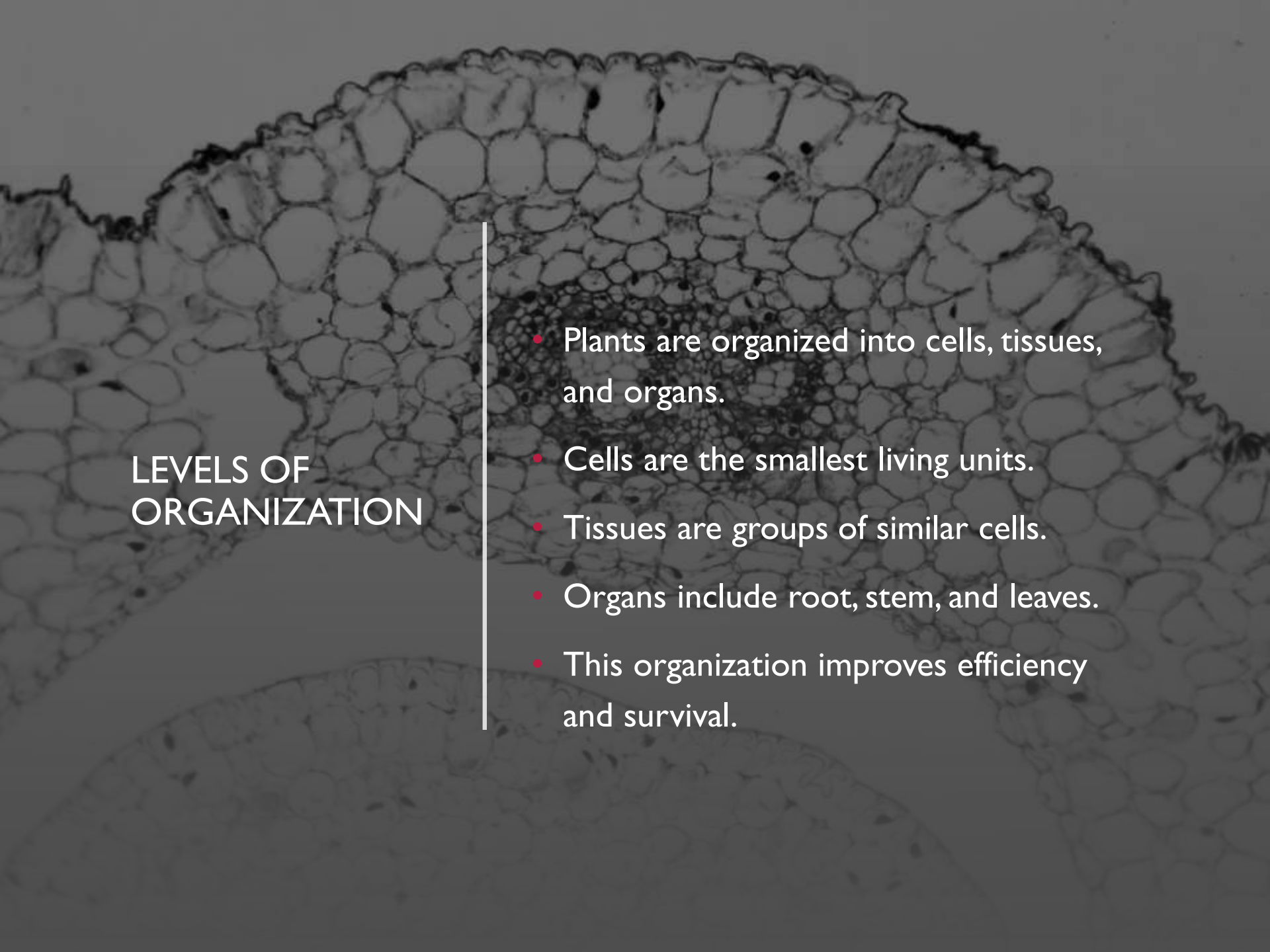


PLANT ANATOMY

INTRODUCTION

- Plant anatomy studies the internal structure of plants.
- It explains how different plant parts are organized.
- It helps understand plant growth and functioning.
- It is important for biology, agriculture, and medicine.
- It forms the base for advanced plant sciences.



LEVELS OF ORGANIZATION

- Plants are organized into cells, tissues, and organs.
- Cells are the smallest living units.
- Tissues are groups of similar cells.
- Organs include root, stem, and leaves.
- This organization improves efficiency and survival.

PLANT CELL STRUCTURE

- Plant cells are eukaryotic with a true nucleus.
- They have a rigid cell wall made of cellulose.
- A large central vacuole maintains pressure.
- Chloroplasts help in photosynthesis.
- They differ from animal cells in structure and function.

CELL WALL

- The cell wall is a non-living outer covering.
- It provides strength and protection.
- Composed mainly of cellulose.
- Prevents cell bursting due to water intake.
- Maintains plant shape.

CYTOPLASM AND PROTOPLASM

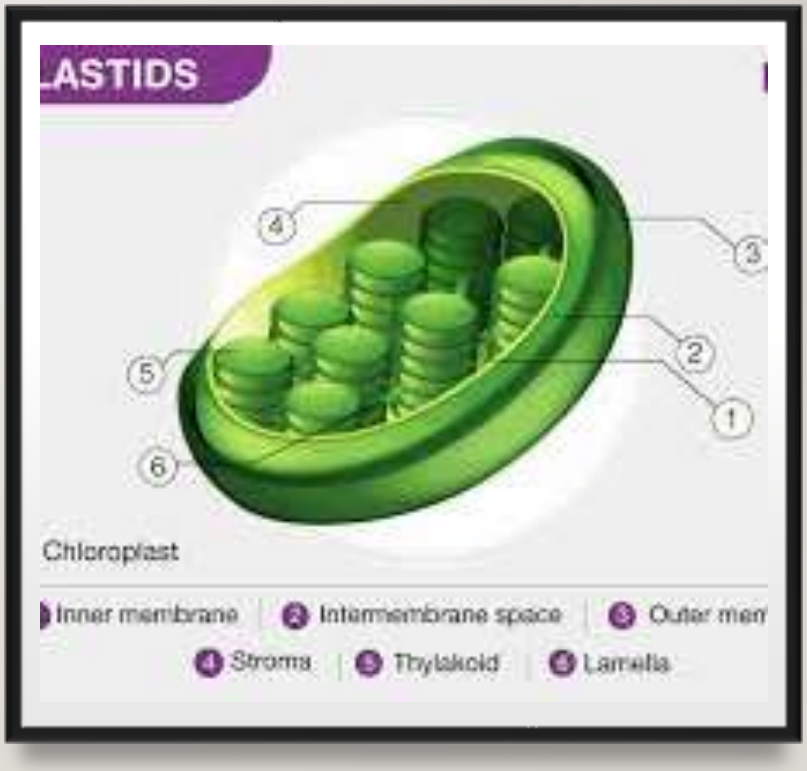
- Cytoplasm is the jelly-like substance inside the cell.
- Protoplasm includes cytoplasm and nucleus.
- It is the site of metabolic activities.
- Supports organelles.
- Helps in transport within cell.

NUCLEUS

- Nucleus controls all activities of the cell.
- It contains genetic material (DNA).
- It regulates cell division.
- Surrounded by nuclear membrane.
- Important for heredity.

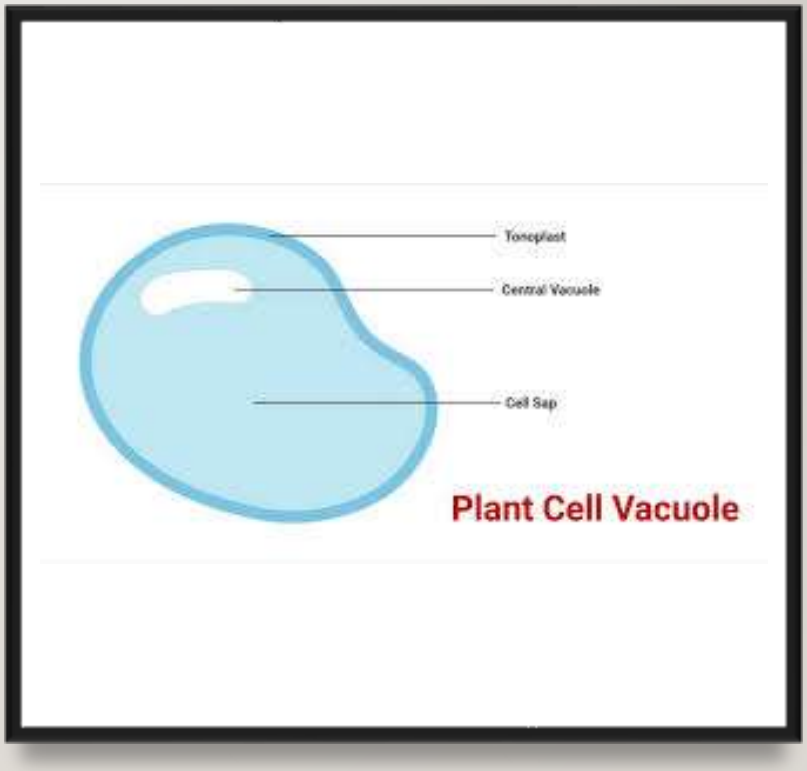
PLASTIDS

- Plastids are plant-specific organelles.
- Chloroplasts perform photosynthesis.
- Chromoplasts give color to fruits and flowers.
- Leucoplasts store food.
- Essential for plant metabolism.



VACUOLE

- Large central vacuole stores cell sap.
- It maintains turgor pressure.
- Helps in storage of nutrients and waste.
- Supports cell structure.
- Important for plant growth.

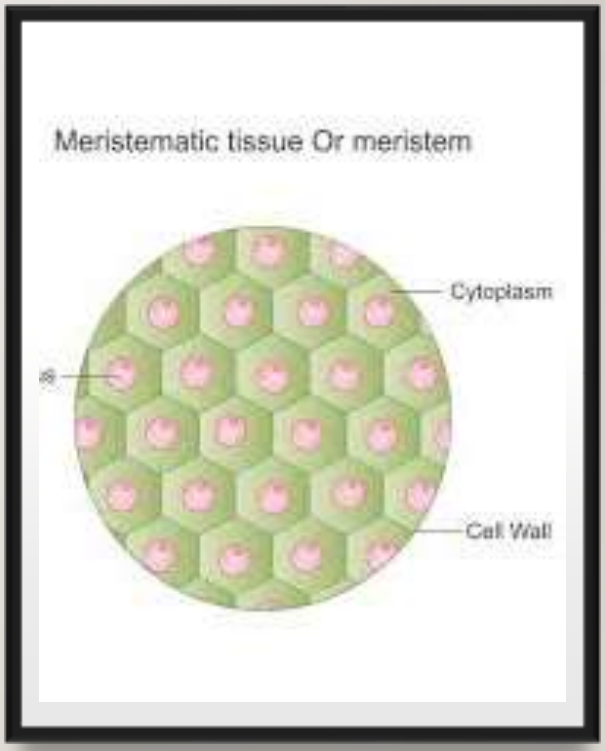


PLANT TISSUES

- Tissues are groups of similar cells.
- They perform specific functions.
- Two types: meristematic and permanent.
- They help in growth and support.
- They form plant structure.

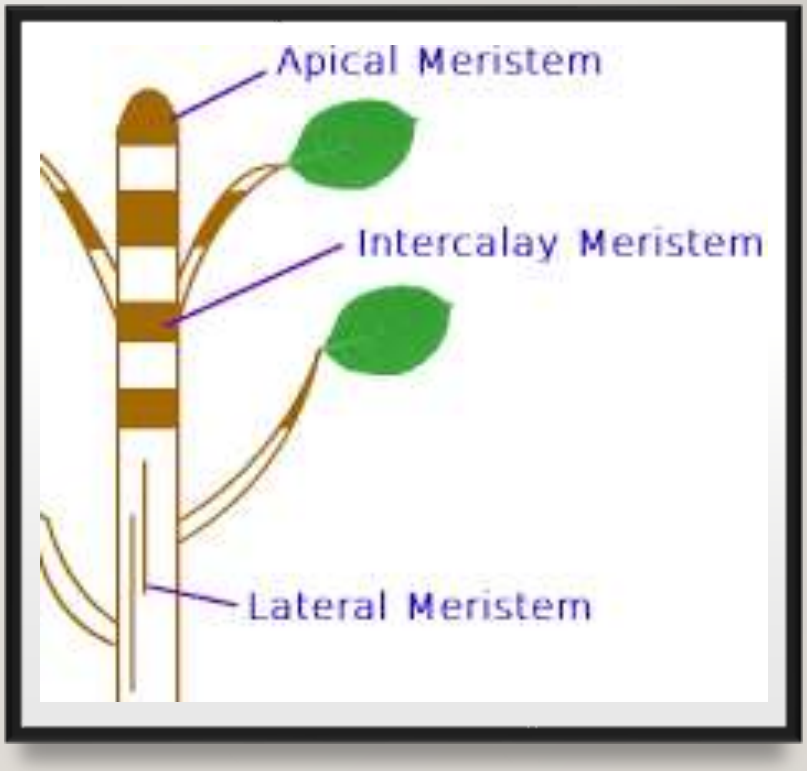
MERISTEMATIC TISSUE

- Cells actively divide in this tissue.
- Responsible for plant growth.
- Cells are small with dense cytoplasm.
- No vacuoles present.
- Found in growing regions.



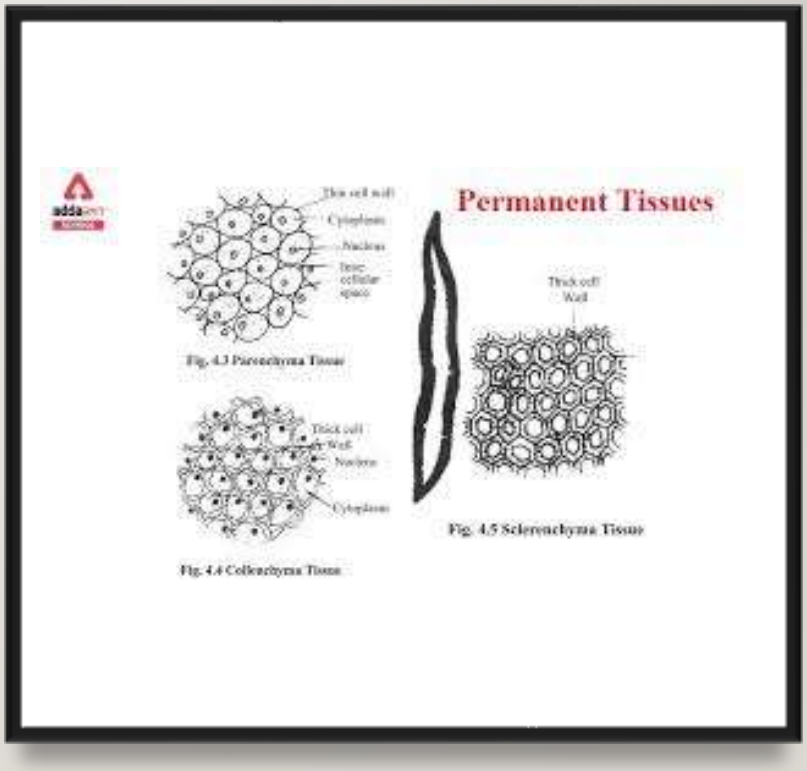
TYPES OF MERISTEM

- Apical meristem increases length.
- Intercalary meristem helps rapid growth.
- Lateral meristem increases thickness.
- Important for continuous growth.
- Helps regeneration.



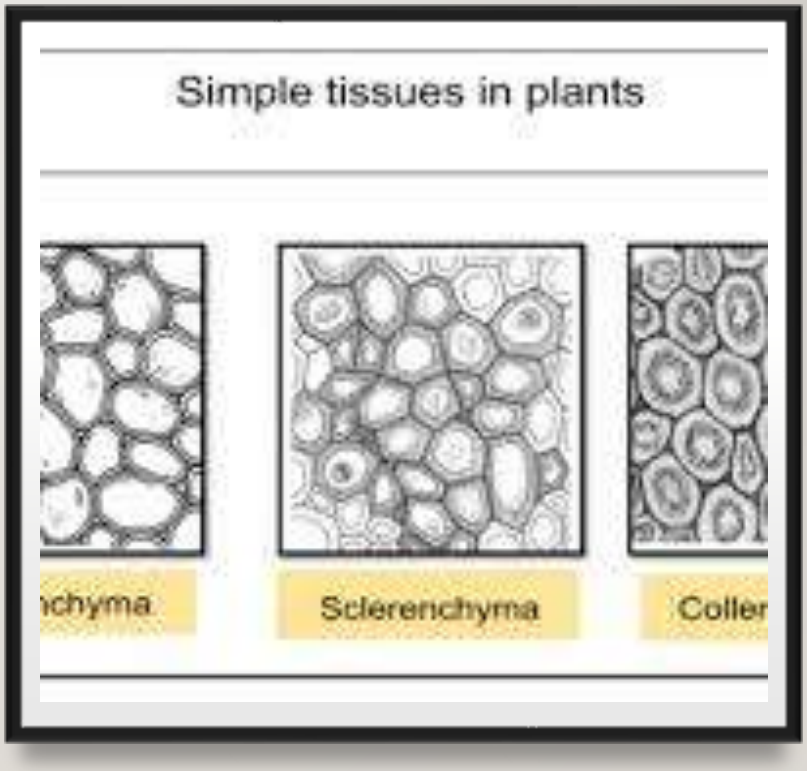
PERMANENT TISSUE

- Cells lose ability to divide.
- They perform specific functions.
- Cells are larger with vacuoles.
- Derived from meristematic tissue.
- Includes simple and complex tissues.



SIMPLE TISSUE

- Made of similar cells.
- Includes parenchyma, collenchyma, sclerenchyma.
- Functions include storage and support.
- Found in different plant parts.
- Each type has unique role.



PARENCHYMA

- Living cells with thin walls.
- Store food and water.
- Help in photosynthesis.
- Provide basic support.
- Found in leaves and fruits.

COLLENCHYMA

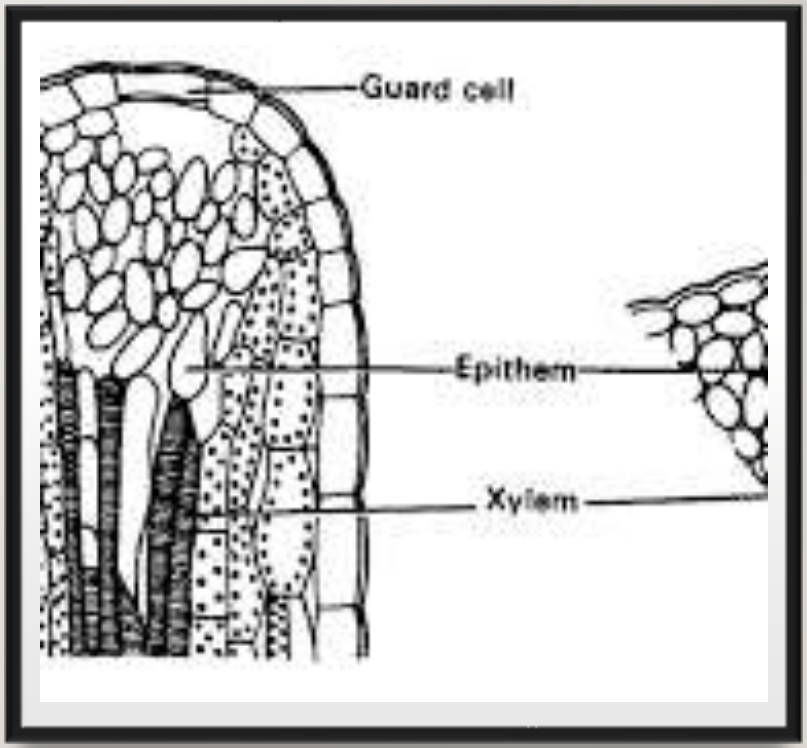
- Living cells with uneven thickening.
- Provide flexible support.
- Found in stems and petioles.
- Allow bending without breaking.
- Important in growing parts.

SCLERENCHYMA

- Dead cells with thick walls.
- Provide strength and rigidity.
- Found in seed coats.
- Include fibers and sclereids.
- Protect plant parts.

COMPLEX TISSUE

- Made of different types of cells.
- Includes xylem and phloem.
- Responsible for transport.
- Forms vascular system.
- Essential for survival.

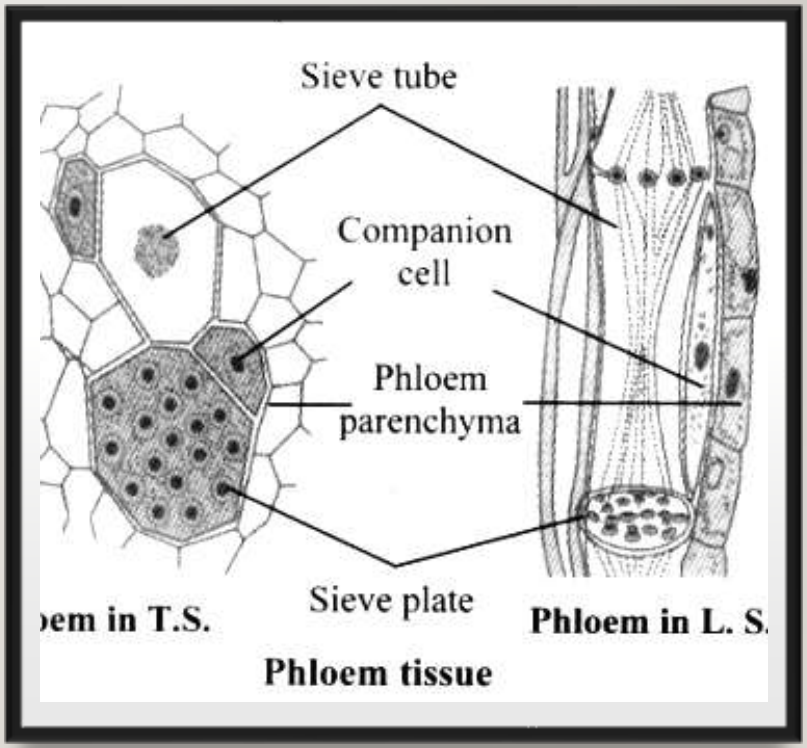


XYLEM

- Transports water and minerals.
- Moves substances upward.
- Composed of vessels and tracheids.
- Provides support.
- Mostly dead cells.

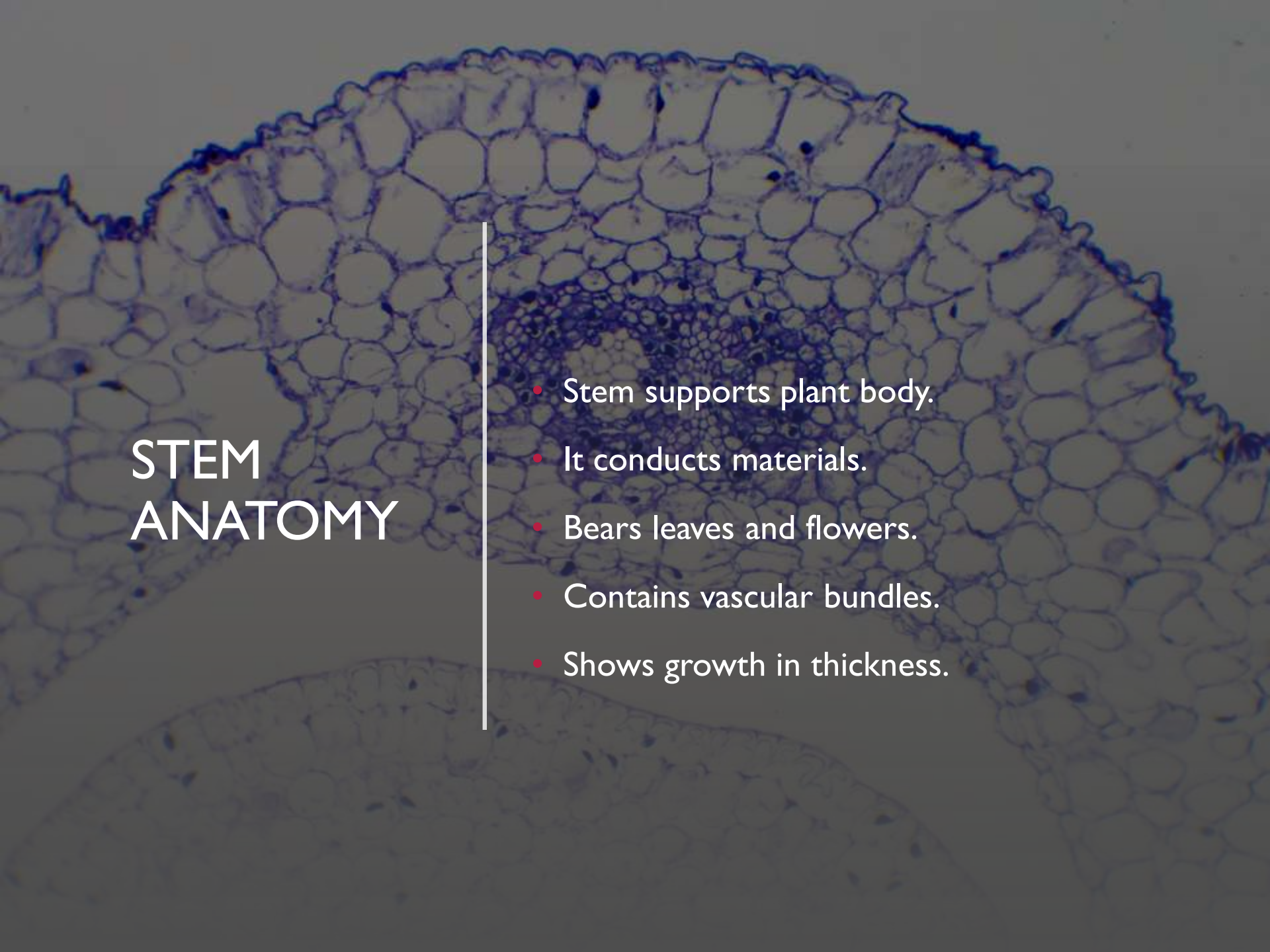
PHLOEM

- Transports food materials.
- Movement is bidirectional.
- Contains sieve tubes and companion cells.
- Mostly living cells.
- Distributes nutrients.



ROOT ANATOMY

- Roots absorb water and minerals.
- They anchor the plant.
- They store food.
- Contain vascular tissues.
- Structure differs in monocots and dicots.



STEM ANATOMY

- Stem supports plant body.
- It conducts materials.
- Bears leaves and flowers.
- Contains vascular bundles.
- Shows growth in thickness.

LEAF ANATOMY

- Leaves perform photosynthesis.
- They contain chlorophyll.
- They allow gas exchange.
- They help in transpiration.
- Thin structure aids sunlight absorption.

STOMATA

- Small pores on leaf surface.
- Control gas exchange.
- Regulate water loss.
- Guard cells control opening.
- Important for respiration.

SECONDARY GROWTH

- Increase in thickness of plant.
- Occurs in dicots.
- Due to cambium activity.
- Forms wood and bark.
- Provides strength.

ANNUAL RINGS

- Rings formed due to growth cycles.
- Indicate plant age.
- Seen in cross-section.
- Used in studies.
- Reflect environmental conditions.

MONOCOT VS DICOT

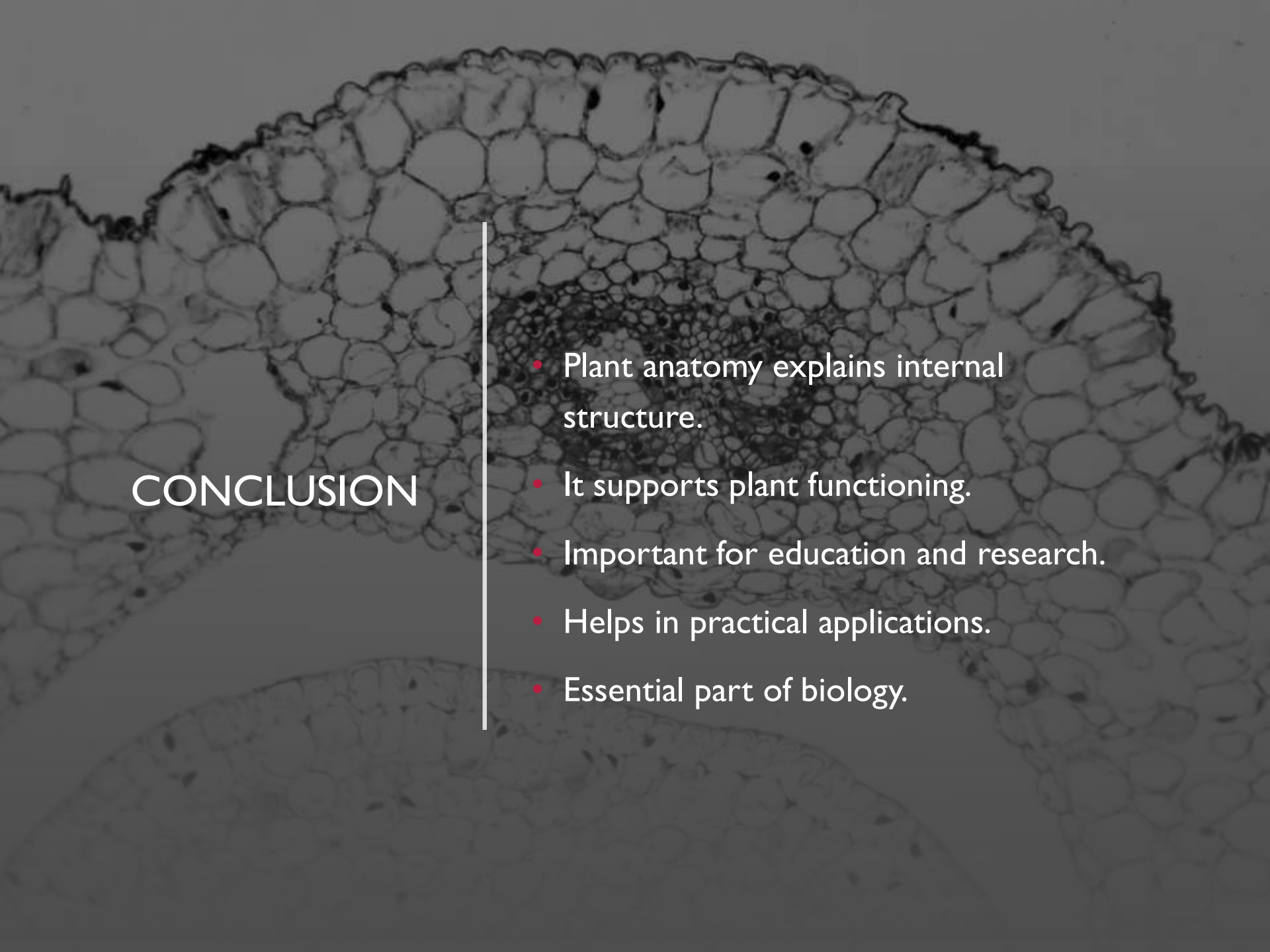
- Monocots have scattered bundles.
- Dicots have ring arrangement.
- Monocots lack secondary growth.
- Dicots show secondary growth.
- Useful for classification.

IMPORTANCE

- Helps identify plants.
- Useful in agriculture.
- Aids research.
- Helps understand diseases.
- Supports environmental studies.

APPLICATIONS

- Used in medicine.
- Improves crop yield.
- Helps genetic engineering.
- Supports ecology.
- Useful in breeding.



CONCLUSION

- Plant anatomy explains internal structure.
- It supports plant functioning.
- Important for education and research.
- Helps in practical applications.
- Essential part of biology.

THANK YOU

SHAMNA SUBAIDA KHALID

shamnaplpy@gmail.com