

Plant Physiology

Topic 1: Introduction to Plant Physiology

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Topic outline

- Science of Plant Physiology
- Plant Cell Structure and Function
- General Information on Plant Cell



Science of Plant Physiology

- Plant physiology is a sub discipline of botany
 - The functioning or physiology of plants
- Related fields are:
 - plant morphology
 - plant ecology
 - phytochemistry
 - cell biology
 - molecular biology



Science of Plant Physiology cont.

- Human depend on the higher vascular plants for the necessities of life
- Thorough knowledge of the science of plant physiology must be gained
- A study of vital phenomena in plants, concerned with:
 - **processes** and **functions**
 - responses of plants to changes in the environment
 - growth and development that resulted from the responses



- **Process** = a natural continuing sequence of events occurring in plants:

Photosynthesis

Respiration

Ion Absorption

Uptake of
Mineral Salts

Translocation

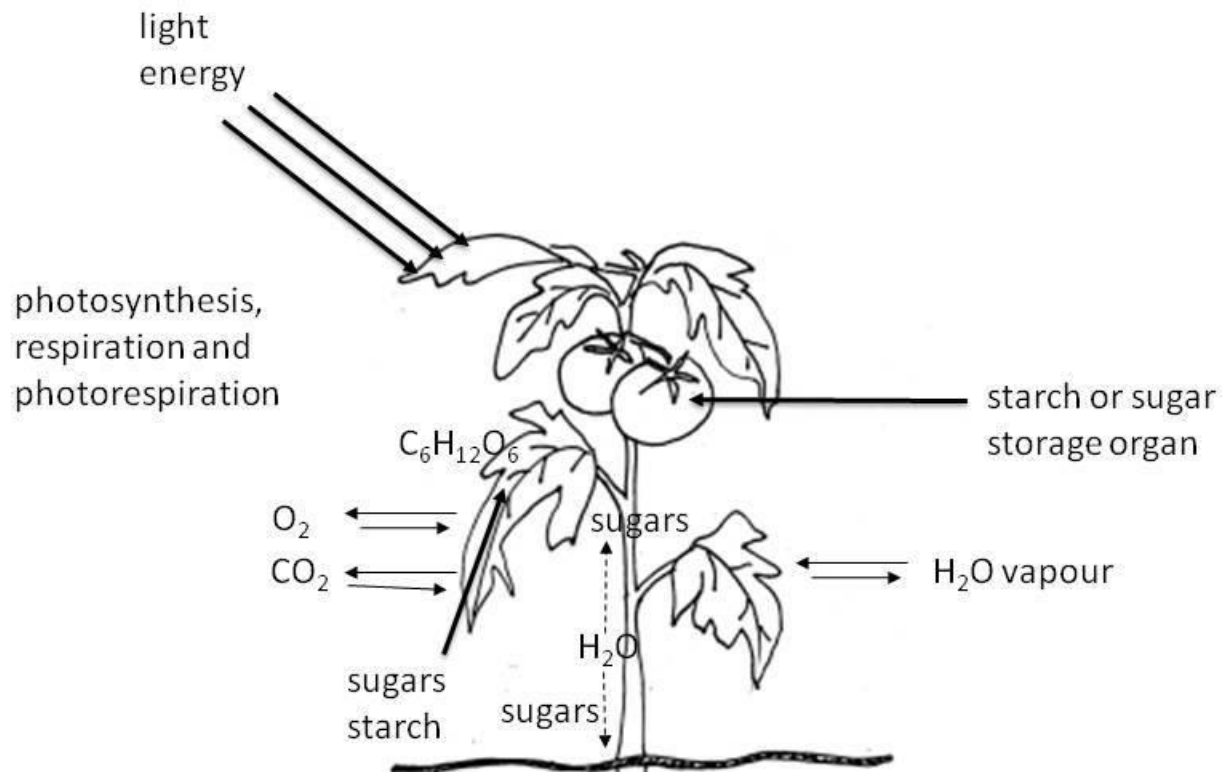
Transpiration

Stomata
Opening and
Closing

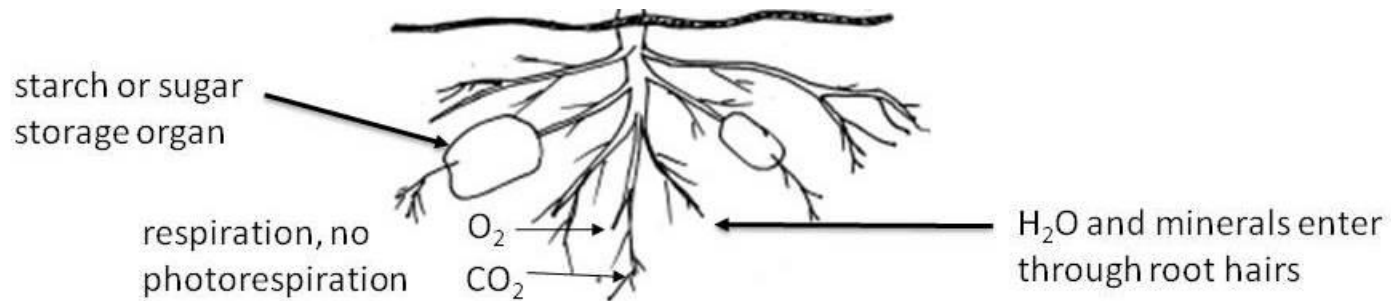
Assimilation

Flowering

Seed
Formation



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Science of Plant Physiology cont.

- **Function** = natural activity of a thing, whether
 - cell, tissue, organ, chemical substance
 - or whatever that takes place in the plant
- This include description and explanation of the function of:
 - Organ, tissue, cell, cellular organelle in plants, and chemical constituent



Science of Plant Physiology cont.

- **Processes** and **functions** are influenced by external factors such as light and temperature
- It is important to understand processes and functions respond to changes in the environment



Plant Cell Structure and Function

- Organ and tissue systems are multi-cellular structures
- Their complexity reflects:
 - diversity and complexity of the individual cells of which they are composed
- Cell is the **basic unit** of structure and function

Plant Cell Structure and Function cont.

- Cell is the **smallest biological unit** having those attributes characteristic of the following:
 - living matter-unique chemical composition
 - Metabolism
 - Growth
 - Reproduction
 - organization

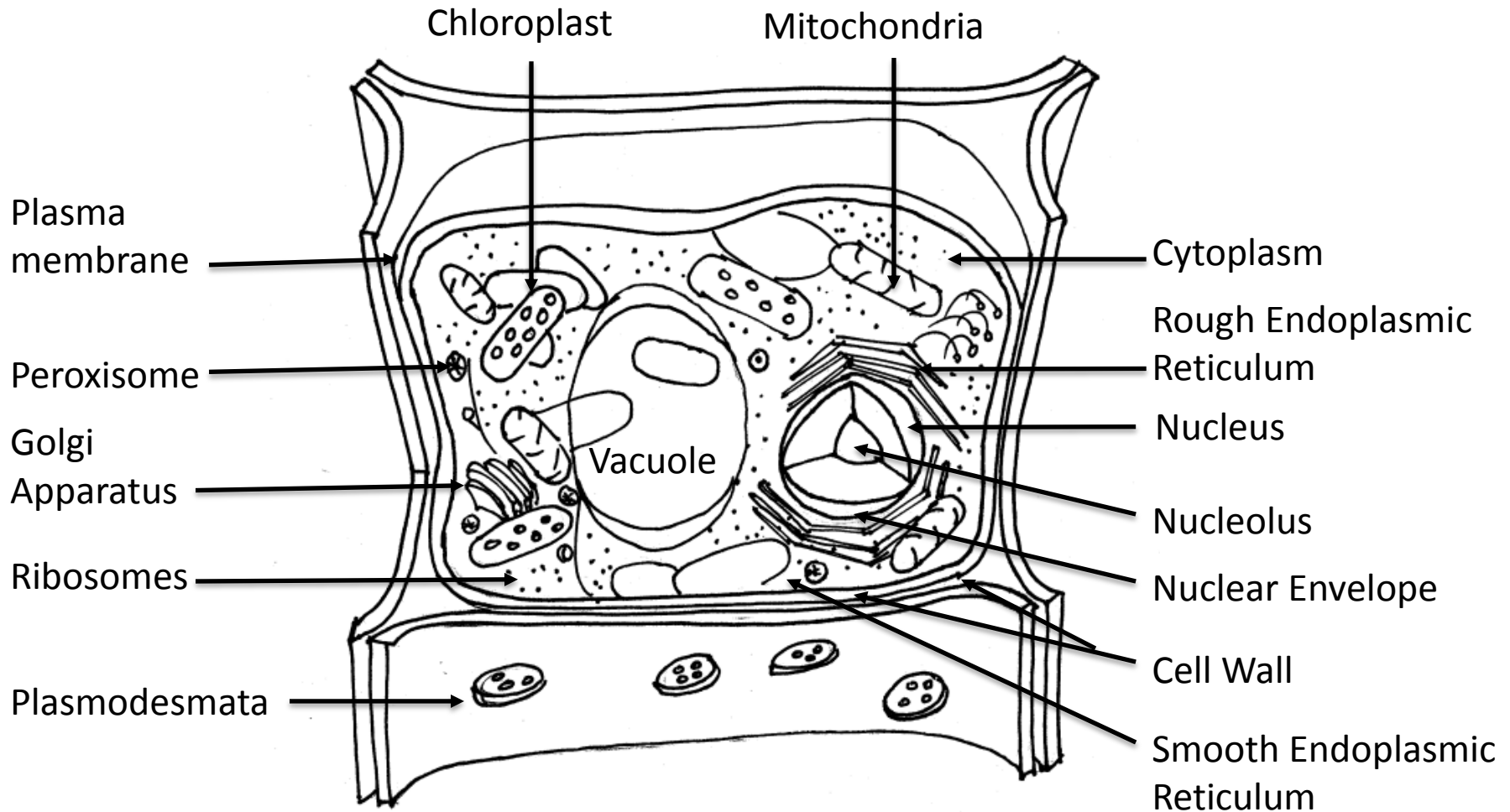


Plant Cell Structure and Function cont.

- Cells:
 - interact with each other
 - modify their environment
 - give rise to the multi-cellular organism with its characteristic structure and function

General Information on Plant Cell

- Plants contain chlorophyll and use it to manufacture their own food
- Cell walls are more or less rigid and support both the individual cells and the whole structure
- When plants have reached what we regard as their full, mature size;
 - they continue to expand and develop new leaves, flowers, fruit and shoots



Anatomy of the Plant Cell

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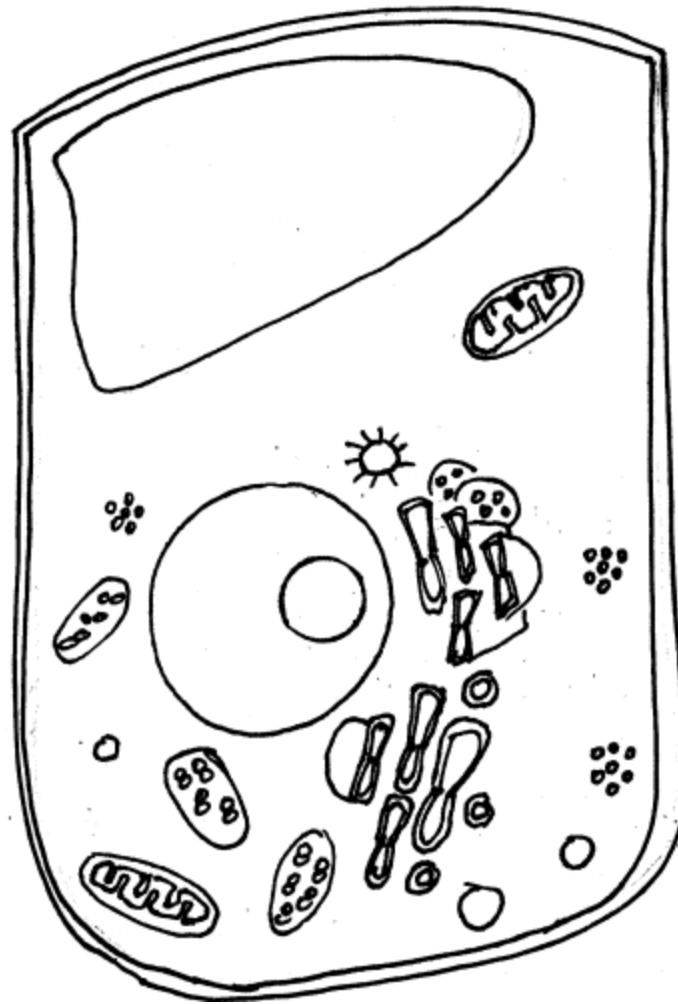
General Information on Plant Cell cont.

- The cellular fraction-protoplasm is surrounded by the primary cell wall
- Protoplasm is divided into two components; nucleus and cytoplasm
- The separation emphasizes the crucial importance of the cytoplasm and nucleus in cellular activity

General Information on Plant Cell cont.

- Emphasis must be made on the molecular structure and functions of mitochondria and chloroplast
- Note the importance and functions of other major organelles present in the cytoplasm and nucleus
- Note the importance of plasmodesmata as transport mechanism in relation to the processes and functions of the cell

Can you name and label the structures of a plant cell?



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Cross section of a Plant Cell



Further reading

Taiz, L. and Zeiger, E. (2010) Plant physiology 5th ed. Sunderland, MA : Sinauer Associates.



End of Topic 1

Thank you

