

Introduction to Botany. Lecture 3

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Outline

- 1 Questions and answers
- 2 More on the definition of plants
- 3 Plant cell
 - Structure of cell
 - Cell boundaries

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Previous final question: the answer

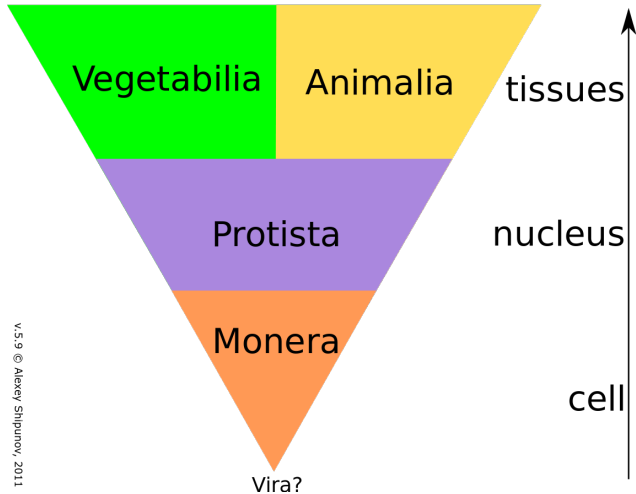
Please give two definitions of plants.

Previous final question: the answer

Please give two definitions of plants.

- Plants₁: Primarily photosynthetic organisms
- Plants₂: Multi-tissued green terrestrial eukaryotes

Taxonomic pyramid



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Parasitic plants

- Half-parasites (like *Comandra*, bastard toad-flax or mistletoe) have chlorophyll, mycoparasites (like *Pterospora*) interact with fungi
- Full parasites may be root (like *Hydnora*), stem (like dodders) or internal (only flowers will appear on surface, like *Pilostyles*)
- Stem parasites like dodder (*Cuscuta* spp., Convolvulaceae) and *Cassytha* (Lauraceae) are harmful for many cultivated plants, especially from legume and aster families

Bastard toadflax



Pterospora



Hydnora



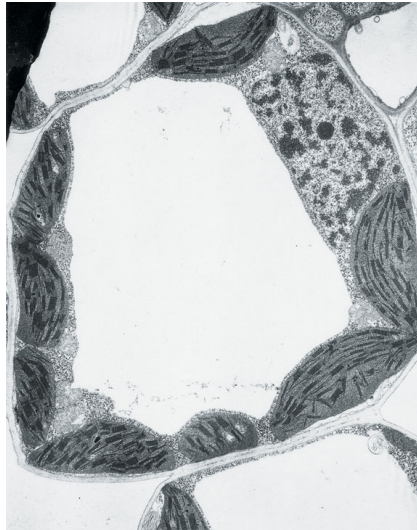
Pilostyles



Dodder

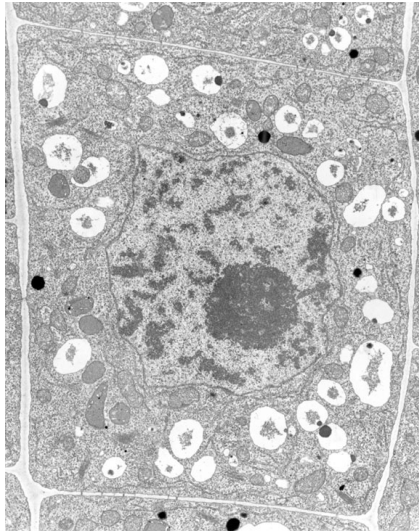


Leaf cell (TEM)



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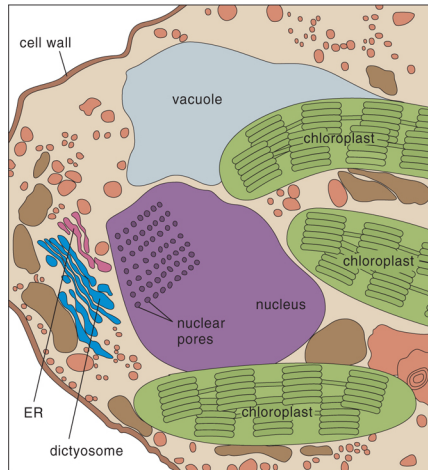
Root cell (TEM)



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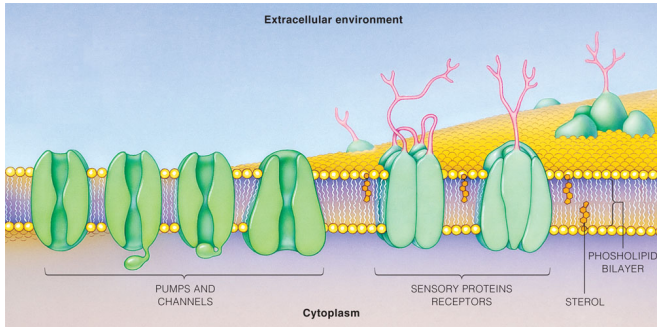
Interpretation of electronic micro-photograph

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Cell

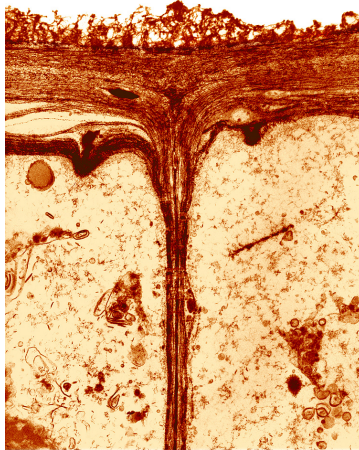
Plasma membrane



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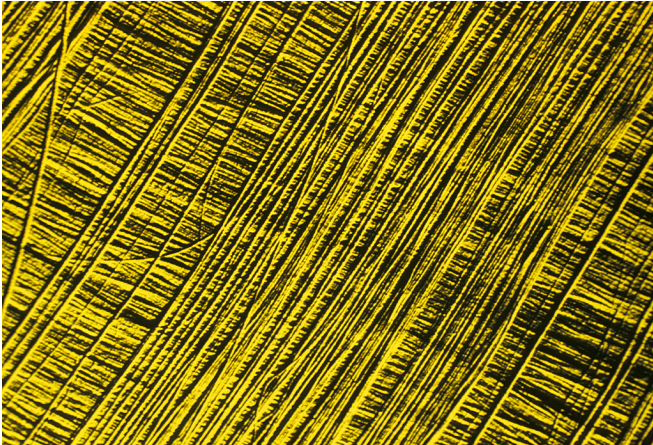
Phospholipids, sterols, proteins: pumps, receptors, channels

Cell wall 1



Root cells of an onion showing the cell wall (TEM $\times 47,000$)

Cell wall 2

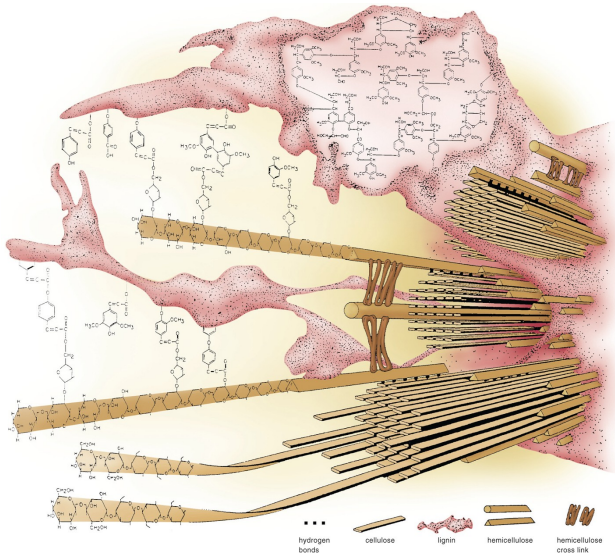


Cellulose fibers in the plant cell wall (SEM)

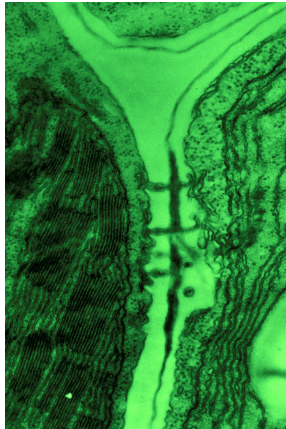
Primary and secondary cell walls

- **Primary cell wall** consists mostly of cellulose and proteins, they are thin and flexible
- **Secondary cell wall** includes hydrophobic lignine and suberine; this inclusion leads to the death of cell. However, dead cells are very useful for plants

Secondary cell wall: molecules

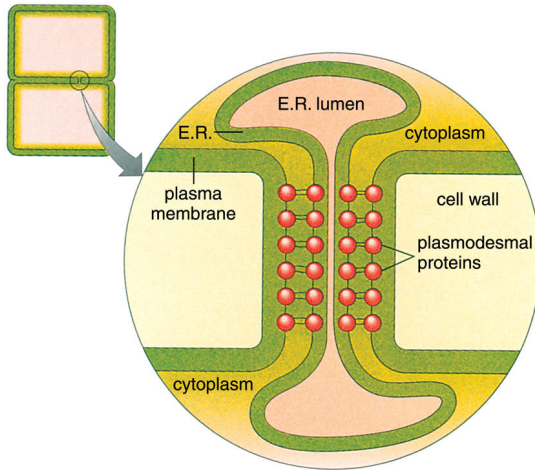


Plasmodesmata 1



Plasmodesmata in a corn leaf between a mesophyll cell and a bundle sheath cell (TEM)

Plasmodesmata 2



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E.R. = endoplasmic reticulum (endoplasmic network)

Vacuoles, osmosis and turgor pressure

- If cell vacuoles contain more concentrated solution of salts than water surrounding cell (i.e., water outside is *hypotonic*), water will flow inside a cell. It is called **osmosis**
- Cell wall prevents cell from explosion due to high **turgor pressure**
- When water flows outside a cell, cell content will shrink: this is **plasmolysis**

Final question (2 points)

What is the difference between primary and secondary cell walls?

Summary

- **Plasma membrane** controls movement of material into and out of the cell
- **Cell wall** limits cell expansion

For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 3.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapters 3.1–3.6.