

# Introduction to Botany. Lecture 18

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## Tissues

- Origin of tissues
- Tissues basics
- First tissues: parenchyma and epidermis



# Tissues

## Origin of tissues



*Origin of tissues and organs of plants: first steps*



## *Origin of tissues and organs of plants: first steps*

*Why did plants go to the land? Which problems did they meet and how did they resolve them? What was the plant way of acquiring tissues comparing with animals?*



# Tissues

## Tissues basics



# Definition of tissues and organs

- **Tissue** is a union of cells which have common origin, function, and similar morphology
- **Organ** is a union of different tissues which have common function(s) and origin



# Simple and complex tissues

- **Simple tissues** have only one kind of cells
- **Complex tissues** have more than one cell type. This tissue type is unique for plants





# Tissues

## First tissues: parenchyma and epidermis

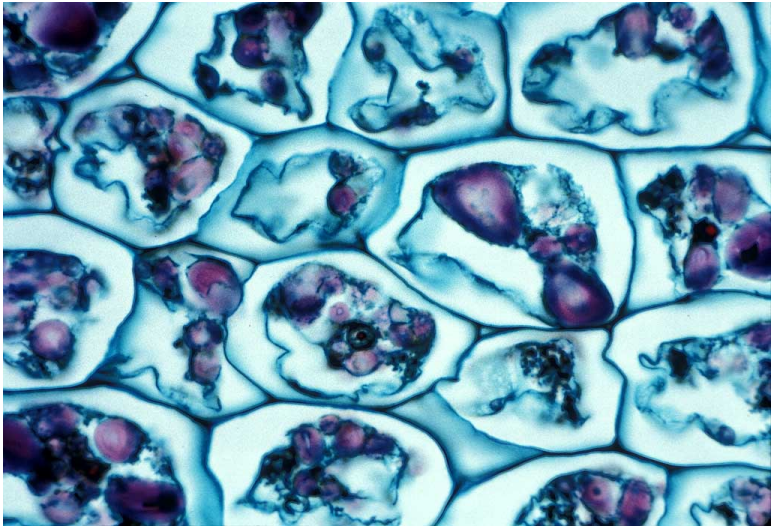


# Parenchyma (ground, main tissue)

- Spherical or elongated cells
- Thin primary cell wall
- Sometimes, crystal inclusion bodies
- Main functions: photosynthesis and storage



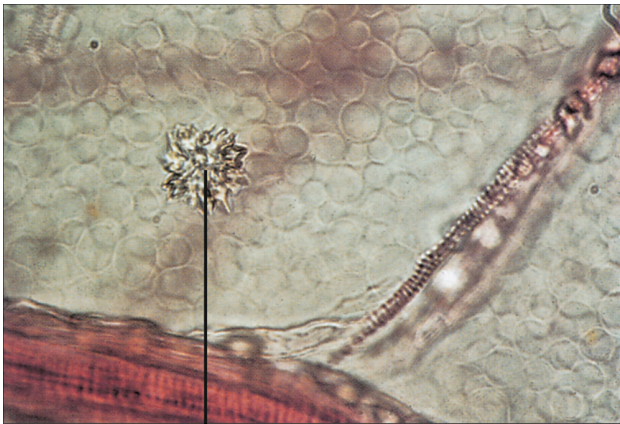
# Parenchyma cells of a potato



Parenchyma cells of a potato; the central cell shows obvious nucleus with starch stained purple (LM  $\times 83$ )



# Parenchyma with crystals



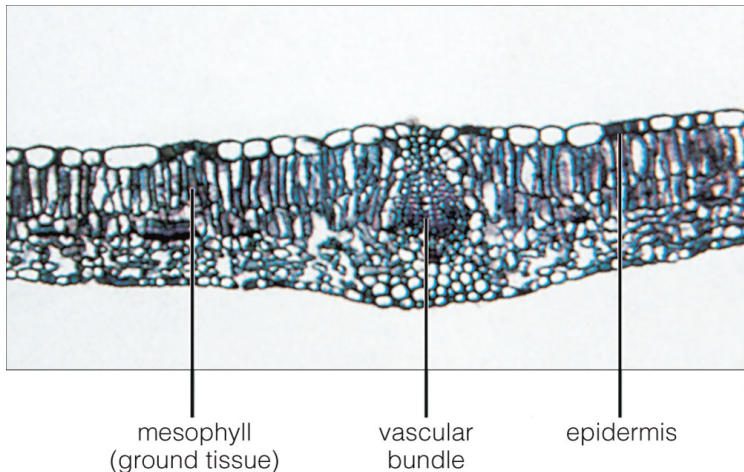
crystal

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Parenchyma cells often include crystals (e.g., of calcium oxalate)



# Photosynthetic parenchyma



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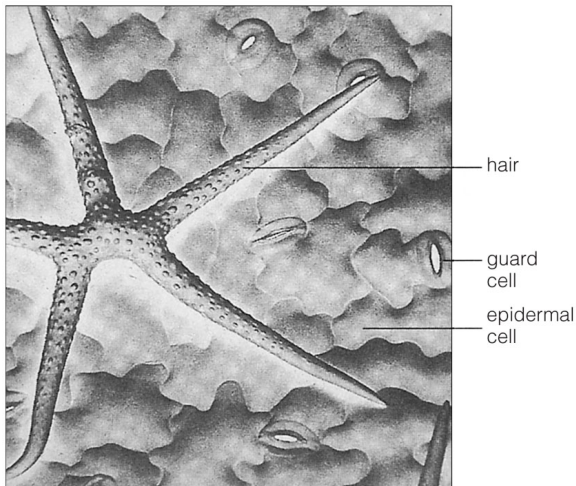
Photosynthetic parenchyma (mesophyll) in lilac (*Syringa vulgaris*) leaf 

# Epidermis: the complex tissue

- Complex tissue of different cell types:
  - ① Epidermal cells
  - ② Stomata cells:
    - Guard cells
    - Subsidiary cells
  - ③ Trichomes
- Shapes and chemical compounds vary
- Main functions: gas exchange, transpiration, defense



# Epidermal cells



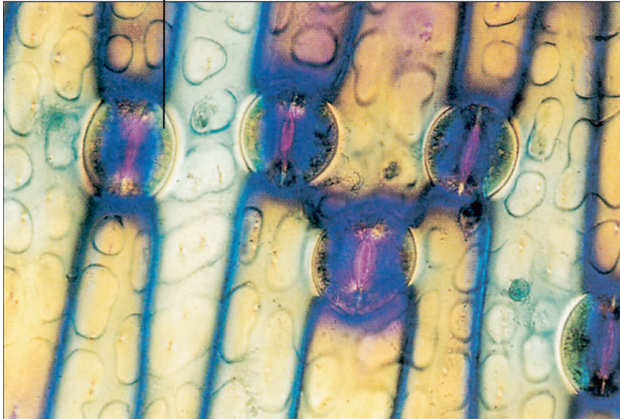
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Three kinds of Shepard's purse (*Capsella bursa-pastoris*) epidermal cells



# Stomata

guard cell



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Stomata with guard cells and pores (*Iris* sp.)





# Summary

- The structure of plant body, its organs and tissues is a result of land colonization
- **Complex tissues** have different cell types, **secondary tissues** originate from lateral meristems (i.e., cambium)
- **Parenchyma**, or ground tissue, is a main component of young plant organs
- **Epidermis** is a complex tissue which includes stomata



# Final question (2 points)



# Final question (2 points)

What is the temperature/gase conflict?



# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

2016.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_154](http://ashipunov.info/shipunov/school/biol_154)

