

Introduction to Botany. Lecture 2

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Outline

- 1 Questions and answers
- 2 Course in general
 - Grading
- 3 Plants: definition
 - Plants₁ and plants₂
- 4 Plants in general
 - Levels of organization
 - Taxonomy
- 5 Ways of life
 - Energy and food



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Previous final question: the answer

Why plants are important?



Previous final question: the answer

Why plants are important?

- Oxygen
- Food and food chains
- Medicine
etc.



Course in general

Grading



Exams

- Normally, exam is based on the question sheet and takes 50 minutes.
- However, several slots will be available for the other type of exam based on electronic essay.



Plants: definition

Plants₁ and plants₂



Plants₁ and plants₂

- Plants₁ are all photosynthetic organisms
- Plants₂ are organisms with stem and leaves (better definition will follow)



The nature of two definitions

- Plants₁—ecological definition (based on the role in nature)
- Plants₂—taxonomic definition (based on the evolution)



Plants₁ is about ecology

Plants₁ are *photosynthetic organisms*:



Some plants₁ could taxonomically be bacteria or even animals!



Green slugs



Green slugs obtain chloroplasts from algae, but keep them all their life, feed from them and even use chloroplast genes.

Green *Hydra*



No mouth!

Plants in general

Levels of organization

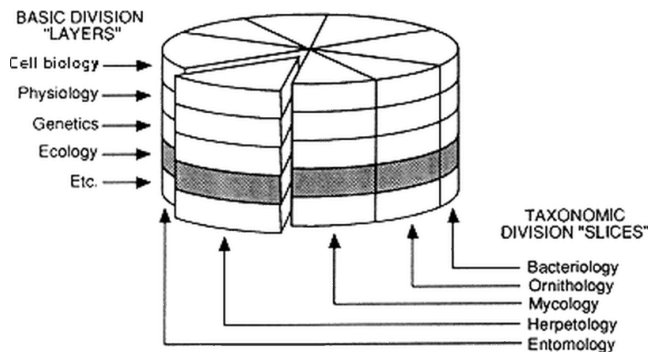


Levels of organization

- Ecosystems OR Taxa
- Populations
- Organisms
- Organs
- Tissues
- Cells
- Organelles
- Molecules



Place of botany



Layered cake of biology (Odum, 1971): botany is a "slice science"

Plants in general

Taxonomy



Ranks

Most scientists accept seven main ranks:

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

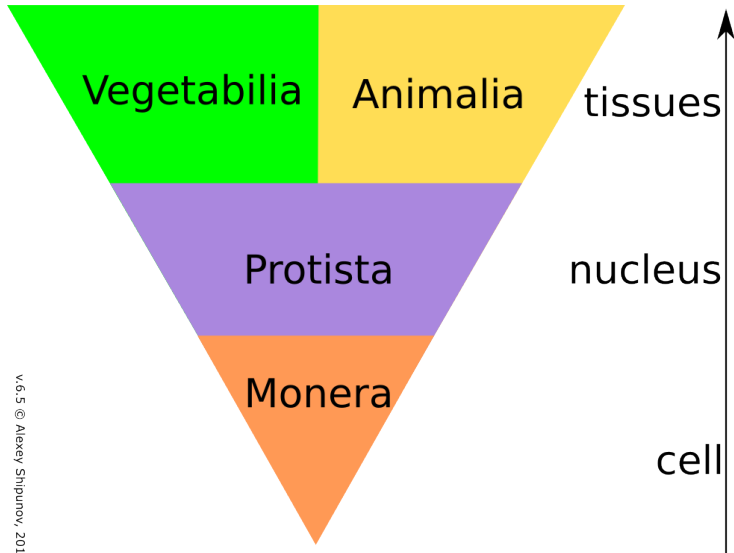


Names

- Names of species are binomials like *Solanum tuberosum* (potato)
- Names of other ranks are uninomials like **Vegetabilia** (plant kingdom)



Pyramid of life



Questions about pyramid

What is Monera? Prokaryotes: (1) Bacteria and (2) Archaea

What is Protista? Eukaryotes without tissues

Where are viruses? They are not a group but “shatters of evolutionary explosions”

Where are eukaryotes? Protista, Vegetabilia and Animalia

Where are fungi? They belong to different protists

Where are plants₂? Vegetabilia

Where are plants₁? It is not applicable here

Why are two groups on one level? Vegetabilia and Animalia both have tissues but obtained them for the radically different purposes. Animals acquired *kinoblast* and *phagocytoblast* **to hunt and digest**, and plants have *epidermis* and *photosynthetic tissue* **to survive on land**.



Plants₁ and plants₂ (updated)

- Plants₁ are all photosynthetic organisms
- Plants₂ are **Vegetabilia**: multi-tissued, terrestrial, primarily photosynthetic eukaryotes



Ways of life

Energy and food



Ways of life

- How to obtain energy?
 - 1 From sun light: **phototrophy**
 - 2 From chemical reactions with inorganic matter (“rocks”): **lithotrophy**
 - 3 From breaking organic molecules into inorganic (typically, carbon dioxide and water): **organotrophy**
- How to obtain building blocks?
 - 1 From assimilation of carbon dioxide: **autotrophy**
 - 2 From other living beings: **heterotrophy**



Six life styles and taxonomy

	Phototrophs	Lithotrophs	Organotrophs
Autotrophs	Plants ₁ : some Monera, some Protista, most of Vegetabilia	Some Monera	Some Monera
Heterotrophs	Some Monera	Some Monera	Majority of Animalia and many Protista



Final question (1 point)



Final question (1 point)

What is the difference between plants₁ and plants₂?



Summary

- “Plants” have **two definitions**
- **Botany** as a “slice science” covers multiple levels of organization



For Further Reading



A. Shipunov.

Introduction to Botany [Electronic resource].

2010—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_154



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.

Plant Biology. 2nd edition.

Thomson Brooks/Cole, 2006.

Chapter 1.