

# Introduction to Botany

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Lecture 4

1 Ways of life

- Energy and food

2 Basics of life

- Chemistry of life

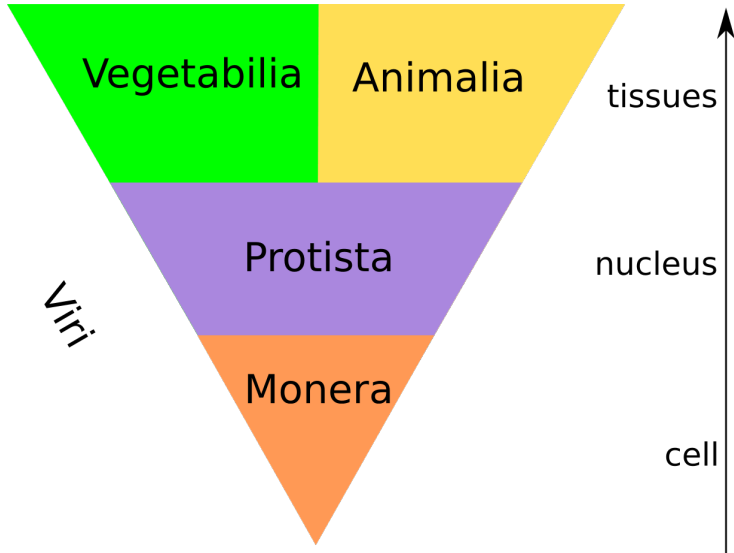
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# Pyramid of life



# Questions about pyramid

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

**What is Protista?** Eukaryotes without tissues

**Where are eukaryotes?** Protista, Vegetabilia and Animalia

**Where are fungi?** They belong to different protists

**Where are plants<sub>2</sub>?** Vegetabilia

**Where are plants<sub>1</sub>?** Here it is not applicable

**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**.

# Ways of life

## Energy and food

# Ways of life

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

# Six life styles and taxonomy

|                     | <b>Phototrophs</b>  | <b>Lithotrophs</b> | <b>Organo-trophs</b>                               |
|---------------------|---|--------------------|--|
| <b>Autotrophs</b>   | Plants <sub>1</sub> : some Monera, some Protista, most of Vegetabilia | Some Monera        | Some Monera  |
| <b>Heterotrophs</b> | Some Monera   | Some Monera        | Majority of Animalia and many Protista and Monera* |

\* Note that green plant cells do both photoautotrophy and organoheterotrophy.



# Plants<sub>1</sub>, plants<sub>2</sub> and life styles

- Plants<sub>1</sub> are **photoautotrophs**
- Plants<sub>2</sub> are photoautotrophs too but there are exceptions: **fully parasitic plants**. Formally, many parasitic plants are plants<sub>2</sub> but not plants<sub>1</sub>
- Carnivorous plants (like sundew or Venus flycatcher) are all photoautotrophs! They “eat” animals to obtain fertilizers: nitrogen and phosphorous.

# Basics of life

## Chemistry of life

# Very basics of chemistry

- Atoms
  - Protons
  - Neutrons
  - Electrons
- Atomic weight
- Isotopes
- Elements
- Periodic table: rows and columns
- Chemical bonds: ionic, covalent, hydrogen
- Valence and group
- Molecules
- Molecular weight

# Final question (3 points)

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How many protons, electrons and neutrons are in niobium atom?

# Summary

- “Carnivorous” plants are not carnivores

# For Further Reading



A. Shipunov.

*Introduction to Botany* [Electronic resource].

Mode of access:

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