



## Lecture 3

# Basics of Plant Systematics. Algae, fungi and lichens of medical importance.



# LECTURE PLAN:

- Fundamentals of systematics of living organisms. Modern classification of plants.
- Autotrophic. Heterotrophic and mixotrophic organisms.
- Classification, nomenclature and phylogenetics. taxonomic categories.
- plant biodiversity
- Kingdom Fungi. Lichens.
- Kingdom Protista. Algae.

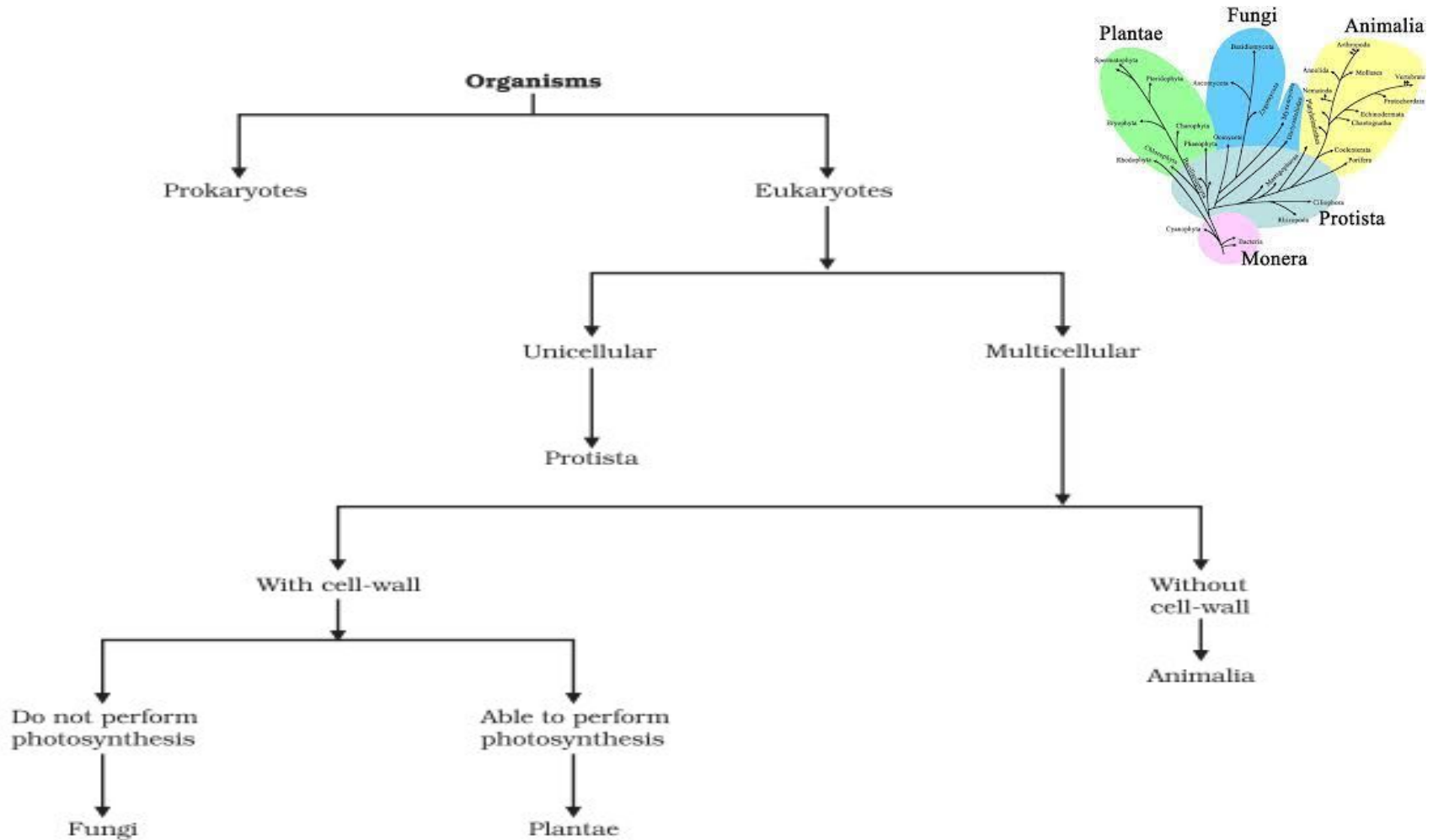


# *It is believed that there are about 3 million living organisms in the world*

- There are numerous living organisms on Earth with different sizes, shapes, habitats, nutrition, reproduction, and more. That depends on their physical features and their habitat. All of them divide into two large groups: the organisms with non-cellular (refers to organisms, such as viruses, that exist without any cells) and organisms with cellular structure. Cellular organisms are also divided in two groups known as **prokaryotes** and **eukaryotes**. The genetic material, deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are arranged into structures called chromosomes. In the eukaryotic cell, the chromosomes are surrounded by a nuclear membrane forming a true nucleus. Prokaryotes( without nucleus) are mainly bacteria.[ Monera (/mə'niərə/) (Greek - μονήρης (monérēs), "single", "solitary") is a biological kingdom that is made up of prokaryotes. As such, it is composed of single-celled organisms that lack a nucleus.]
- Eukaryotes divided into animals, plants, fungi and protists.



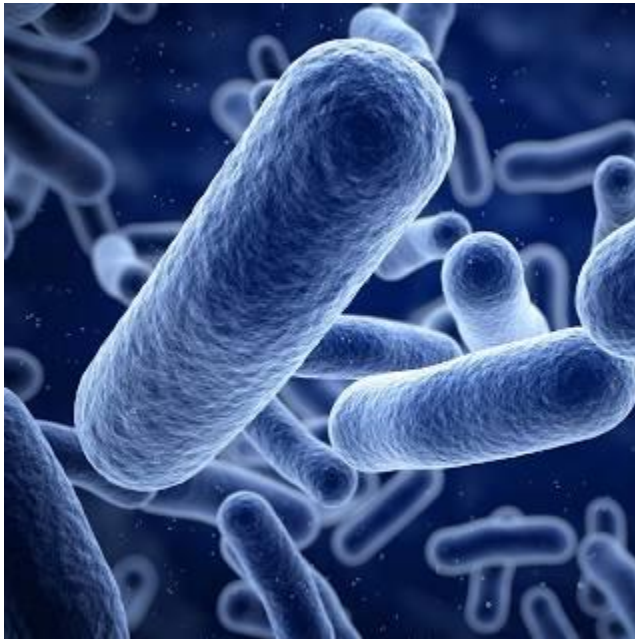
# Classification of living organisms



*The Five Kingdom classification*

# Characteristics of Five Kingdoms(1)

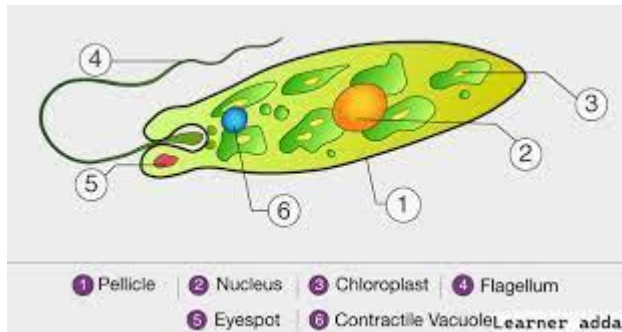
## **KINGDOM MONERA**



- These are unicellular prokaryotes.
- They lack a true nucleus.
- They may or may not contain a cell wall.
- They may be heterotrophic or autotrophic.
- For eg., Bacteria, Cyanobacteria

# Characteristics of Five Kingdoms(2)

## KINGDOM PROTISTA



- These contain unicellular, eukaryotic organisms.
- They exhibit an autotrophic or heterotrophic mode of nutrition.
- They possess pseudopodia, cilia, flagella for locomotion.
- For eg., amoeba, paramecium



Amoeba



Euglena



Slime Mold



Diatom



Paramecium



Dinoflagellate



Macroalga



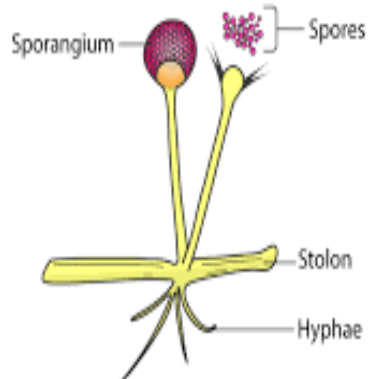
# Characteristics of Five Kingdoms(3)

## KINGDOM FUNGI



- Kingdom Fungi
- These are multicellular, eukaryotic organisms.
- They exhibit a saprophytic mode of nutrition.
- The cell wall is made up of chitin.
- They live in a symbiotic relationship with blue-green algae.
- For eg., Yeast, Aspergillus

### STRUCTURE OF KINGDOM FUNGI



# Characteristics of Five Kingdoms(4)

## Kingdom Plantae



- These are multicellular, eukaryotic organisms.
- The cell wall is made up of cellulose.
- They prepare their own food by means of photosynthesis.
- Kingdom Plantae is sub-divided into-  
Thallophyta, Bryophyta,  
Pteridophyta,  
Gymnosperms,  
Angiosperms.



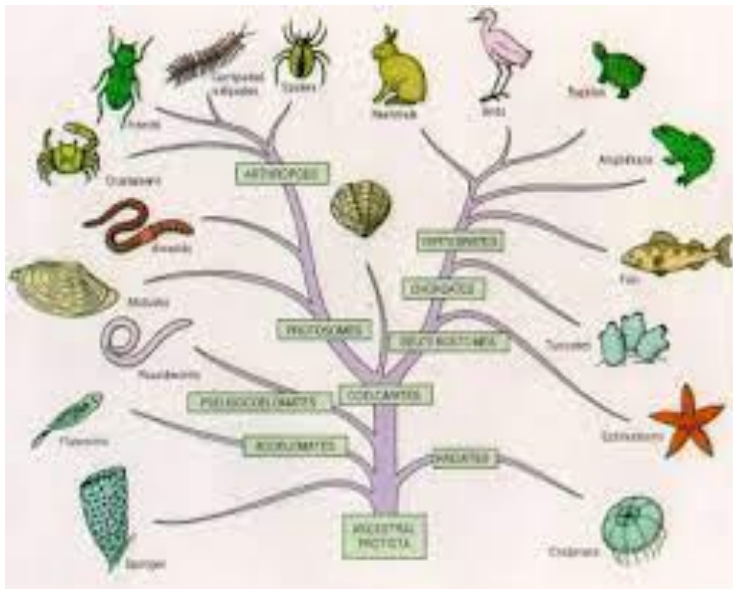


# Characteristics of Five Kingdoms(5)

## Kingdom Animalia



- These are multicellular, eukaryotic organisms without a cell wall.
- They are heterotrophs.
- The organisms in kingdom Animalia can be simple or complex.
- They are genetically diverse.
- They exhibit an organ-system level of organization.
- It is sub-divided into different phyla such as Porifera, Coelenterata, Echinodermata, Chordata, etc.



# Classification living organisms according their nutrition ways

- **Autotrophs** are known as producers because they are able to make their own food from raw materials and energy. Examples include plants, algae, and some types of bacteria. **Heterotrophs** are known as consumers because they consume producers or other consumers. Dogs, birds, fish, and humans are all examples of heterotrophs. **Mixotrophic** organisms (such as some plants, like *omela*) combine photosynthesis and heterotrophic nutrition.



## PLANT SYSTEMATICS

Systematics is a science that studies the diversity of organisms on the Earth, their classification and evolutionary relationships.

### **Main sections:**

TAXONOMY (system of taxon classification)

NOMENCLATURE (system of nomenclature of taxons)

PHYLOGENETICS (system of establishing of between taxons)

**Particular chapters:** Mikologiya- is systematics of fungi, algologiya- of algae, lichenology – of lichens dendrologiya– of r trees. Chemosystematics-the comparative chemical composition of taxons and etc.

**To the systematic methods refer:** comparative morphological , comparative anatomical, comparative embryological, palynological, karyological, ecological- genetical, geographical, paleobotanical, ecological, histological and cytological, biochemical metod etc.

**The types of systematics systems:** artificial natural and genealogical

**Artificial** biological systems are built on the basis of any one or a few morphological characters. They were popular from the IV to the XVIII century. The most famous artificial system is Linnaeus system (1735).

Unlike artificial in **natural**, the similarity and difference are taken into account by many features. They have more biological information. The first natural system was A. Jussie' s system. Genealogical systems appeared by the end of XIX century. In addition to similarities and differences, relationships between organisms is taken into these systems . Many phylogenetic systems are known, the most famous is Engler's system.

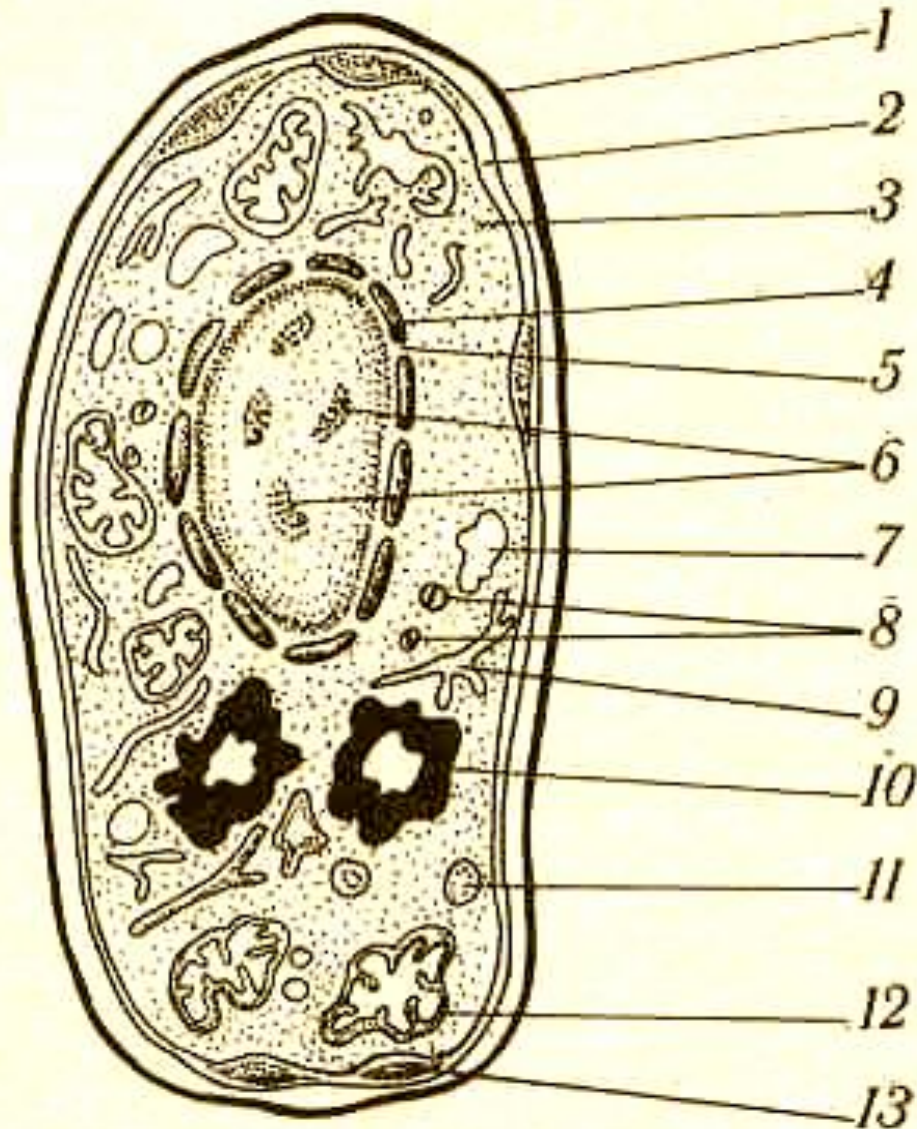
Azerbaijan known taxonomist- botanists are Grossheim A, A Prilipko, M.Qasimov, Q. Qadirov, S Musayev and etc.



# KINGDOM FUNGI(MYCOBIONTA)

- There are about 100 000 species of mushrooms. They belong to living organisms and can exist under any conditions of nature (on soil, on trees and leaves, spoiled foods, on animal dead animals and even in the body of man and animal). The science of fungi is called mycology.
- Main divisions of fungi following are:
  - - [Myxomycota](#)
  - [Oomycota](#)
  - [Glomeromycota](#)
  - [Hyphochytriomycota](#)
  - [Labirinthulomycota](#)
  - [Chytridiomycota](#)
  - [Zygomycota](#)
  - [Ascomycota](#)
  - [Basidiomycota](#)
  - [Deuteromycota](#)





- **SPECIFIC PROPERTIES:**
- Fungi are heterotrophs, Their body consists of a mycelium. They synthesize various acidic compounds (citric, oxalate, acetic, etc.). They have an absorption method of nutrition.

**Structure of fungal cells: one cell wall; 2-plasmalemma; 3- cytoplasm 4- nuclear membrane; 5-pores of the nuclear membrane; 6-nucleolus; 7-vacuole; 8-ribosomes; 9-endoplasmic reticulum; 10-fatty compounds of 11-lysosome; 12-mitochondria; 13 liposomes.**



# INONOTUS OBLIQUUS(ÇAGA)

The medical member is Chaga, (*Inonotus obliquus*), also known as cinder conk, is a fungus from Basidiomycota division. It is a parasitic fungus on Birch and other trees. The sterile conk is irregularly formed and has the appearance of burnt charcoal. Chaga infuse is used in oncology.

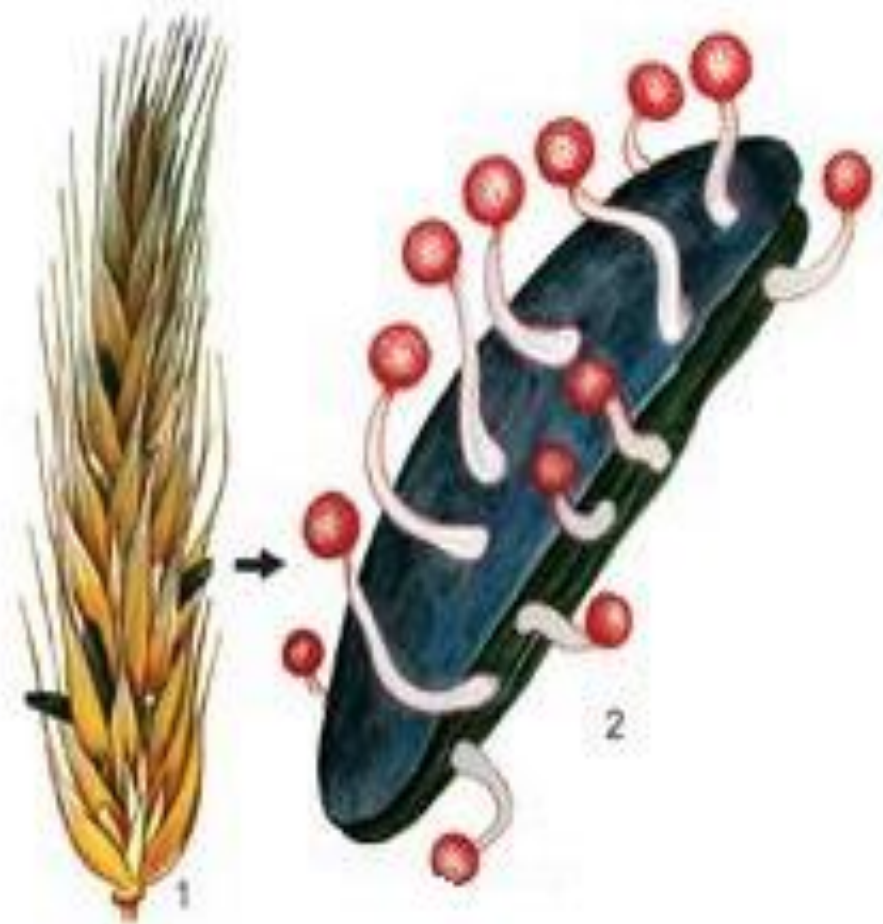


<http://www.liveinternet.ru/users/3298006/>



# Claviceps purpurea (ERGOT)

- Refers to Ascomycetes, parasitizes on rye, mainly mycelium affects the peduncle, forming candidiasis and unicellular transparent candida. This period is called sphacelia. The affected parts of the plant begin to give off a sweet secret that attracts insects, which promotes the spread of the fungus to other plants. Ergot has great practical importance. This fungi produces poisonous substances (alkaloids) that reduce the muscles of the uterus and stop its bleeding, which is important for its application in medicine. But it can cause a strong poisoning, called ergotism in medicine.



## Erqotism (Antonov' s disease)



# LICHENES(Phycomycota)= FUNGI+ALGAE OR CIANOBACTERIA

Xanthoria



Cladonia



- This group includes 13000-17000 species related to 400 genera.
- Lichens are very widespread in nature. They are common in all geographical areas. Especially in temperate and cold areas. There are wide ranges of them in the tundra. They are widespread in the mountains, rocks, trees. In general, they live in places where other plants can not live and sometimes completely cover rocks and rocks. After their death, favorable conditions for the life of mosses and plants are created. Therefore, it is believed that they create primary conditions for the spread of other plants.

**Morphological types:**  
**Scale (cortical), foliose , and bushy**



Algae (lat. Algae) belong to the kingdom protoktists . They mostly live in an aquatic environment.



Рис. 95. Ламинария японская.

*Laminaria japonica* Aresch .;

*Laminaria saccharina* (L.)  
Lamour

Family: Laminariaceae

It mainly inhabits the White Sea, in all the northern and eastern seas at a depth of 20 meters. Tallums are rich in iodine and other trace elements, contains polysaccharides. It is used as a laxative, in goiter, with diabetes, and atherosclerosis.