

Five Kingdom Classification Overview

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System of classification

Aristotle- scientific basis for classification (384–322 BC)

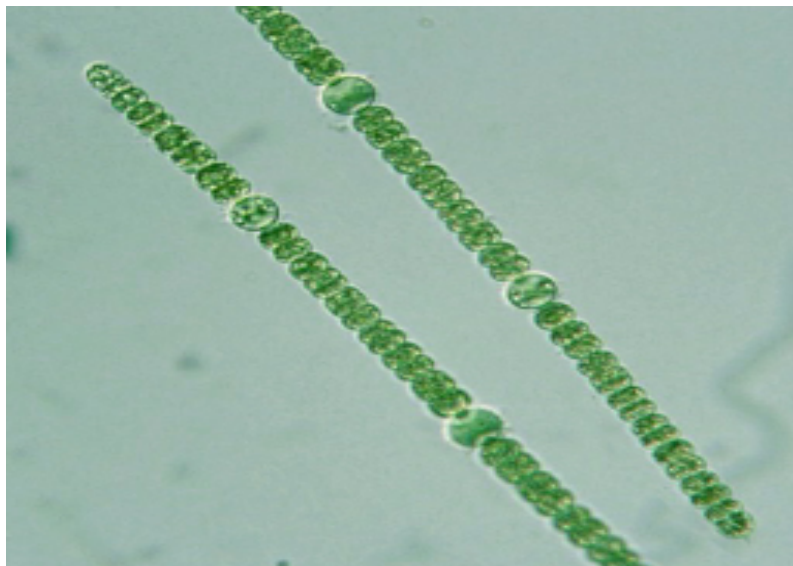
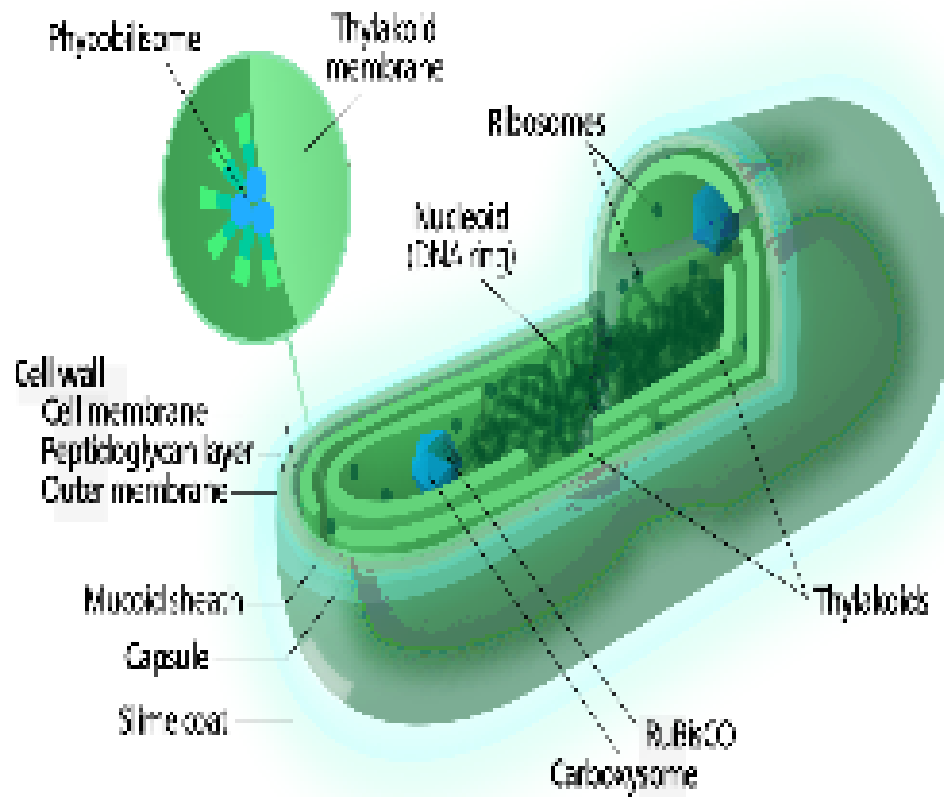
He used simple morphological characters to classify

Plants (trees, shrubs and herbs) & animals (with red blood and without)

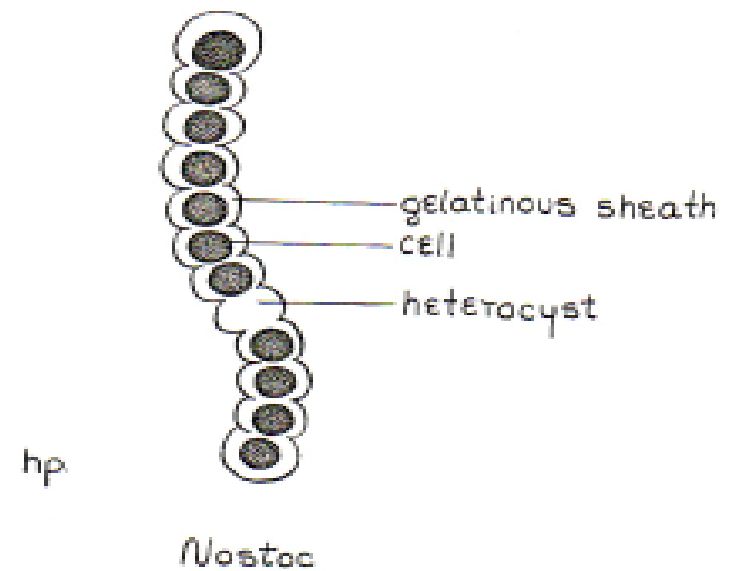
Two Kingdom (Linnaeus) (1707–1778)

Plantae (includes all plants) and **Animalia kingdoms** (includes all animals)

Mainly based on gross morphology

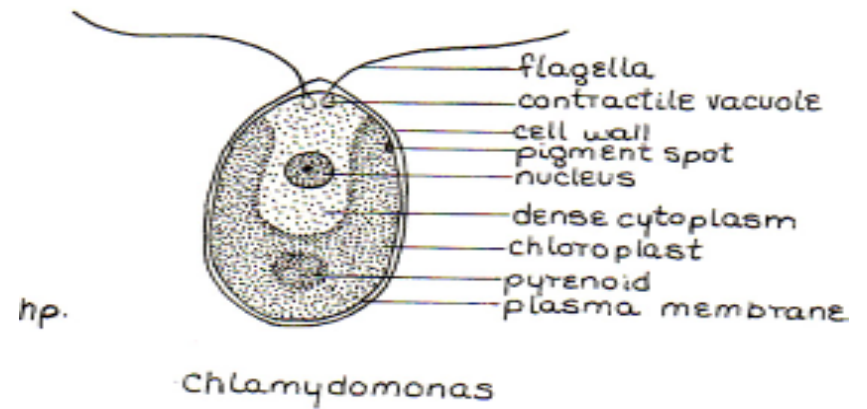


A STUDY OF BLUE-GREEN ALGAE

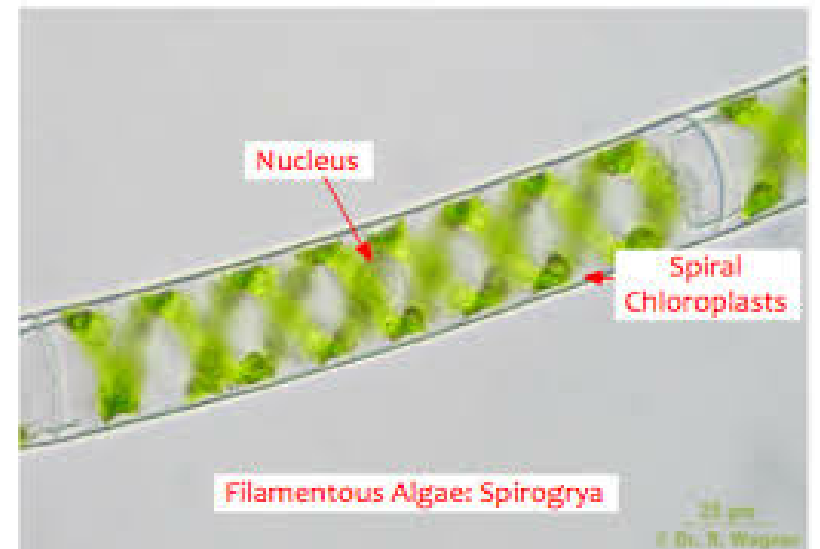
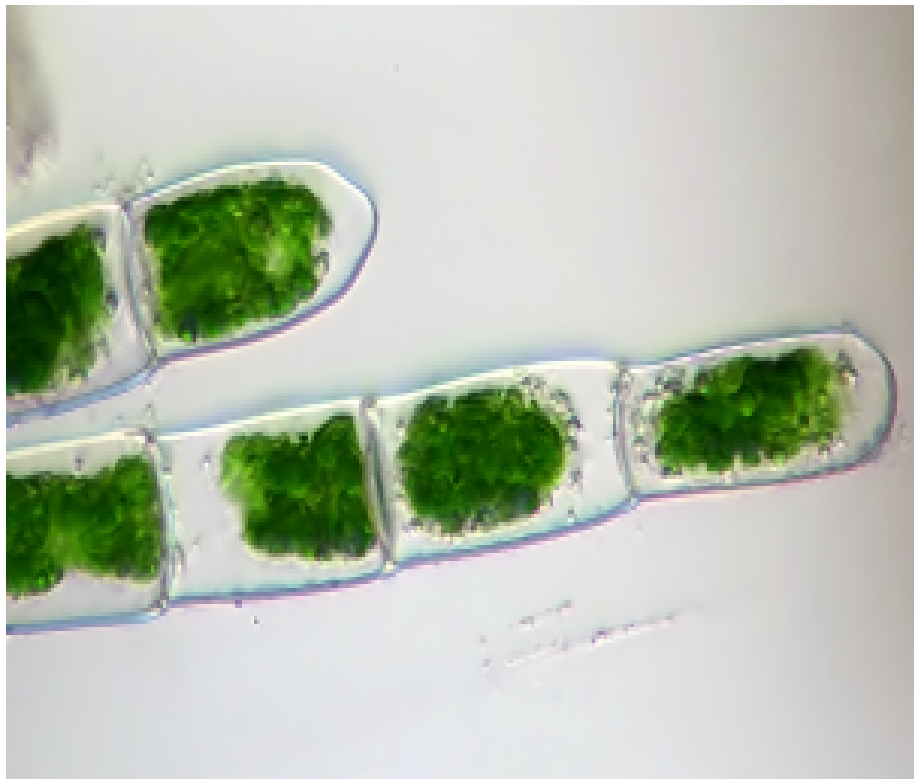


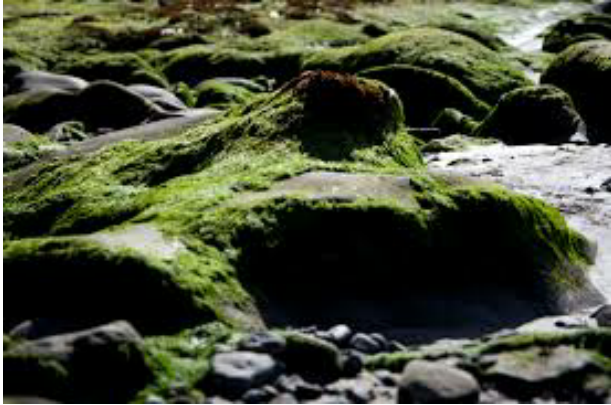


A STUDY OF GREEN ALGAE



Chlamydomonas moewusii Gerloff





Mosses



Ferns

GYMNOSPERM EXAMPLES

- Cedar trees
- Redwood trees
- Spruce trees



ANGIOSPERM

- A plant with flowers
- May produce fruits
- Very abundant



It brought together the prokaryotic bacteria and the blue green algae with other groups which were eukaryotic.

All the organisms included had a cell wall in their cells.

- Showed a characteristic difference in their walls composition

 - Bacteria ----- cell wall

 - Fungi had ----- in their walls

 - Green plants had a ----- cell wall

This placed together groups which widely differed in other characteristics.

- Heterotrophic group – fungi

- Autotrophic green plants

Disadvantages:

Did not distinguish between

- Eukaryotes and prokaryotes,

- Unicellular and multicellular organisms

- Photosynthetic (green algae) & non-photosynthetic (fungi) organisms

large number of organisms did not fall into either category-inadequate

Classification systems for the living organisms undergone several changes over time.

Besides gross morphology, other characteristics like

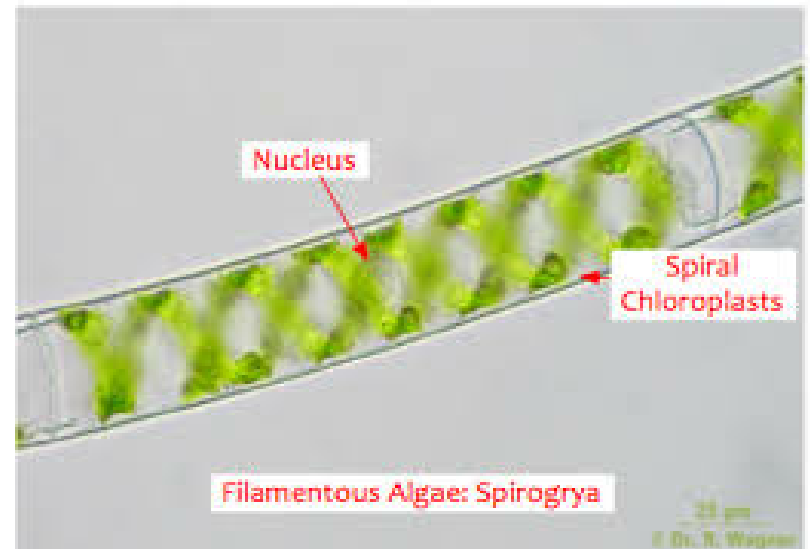
- Cell structure,
- Nature of cell wall,
- Mode of nutrition,
- Habitat,
- Methods of reproduction,
- Evolutionary relationships

In 1866, Ernst Haeckel proposed a third kingdom of life, the Protista,

→ "neutral organisms" which were neither animal nor plant.

Based on whether organisms were unicellular (Protista) or multicellular (animals and plants).

It also grouped together the unicellular organisms (*Chlamydomonas*) and the multicellular ones (*Spirogyra*) together under algae.



The invention of the electron microscope by Max Knoll and Ernst Ruska in 1931

Revealed important distinctions between those

- unicellular organisms whose cells do not have a distinct nucleus (prokaryotes)
- vs
- unicellular and multicellular organisms with distinct nucleus (eukaryotes).

In 1938, Herbert F. Copeland proposed a **four-kingdom classification**, elevating the protist classes of bacteria and blue-green algae to phyla in the novel Kingdom Monera.

R.H. Whittaker (1969) proposed a **Five Kingdom Classification**.

Robert Whittaker recognized an additional kingdom for the Fungi.

The kingdoms defined by him were named Monera, Protista, Fungi, Plantae and Animalia.

The main criteria for classification used by him include cell structure, thallus organization, mode of nutrition, reproduction and phylogenetic relationships.

Classification of Living Things

DOMAIN	Bacteria	Archaea	Eukarya			
KINGDOM	Eubacteria	Archaeobacteria	Protista	Fungi	Plantae	Animalia
CELL TYPE	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
CELL STRUCTURES	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cell walls of cellulose in some; some have chloroplasts	Cell walls of chitin	Cell walls of cellulose; chloroplasts	No cell walls or chloroplasts
NUMBER OF CELLS	Unicellular	Unicellular	Most unicellular; some colonial; some multicellular	Most multicellular; some unicellular	Multicellular	Multicellular
MODE OF NUTRITION	Autotroph or heterotroph	Autotroph or heterotroph	Autotroph or heterotroph	Heterotroph	Autotroph	Heterotroph
EXAMPLES	<i>Streptococcus</i> , <i>Escherichia coli</i>	Methanogens, halophiles	<i>Amoeba</i> , <i>Paramecium</i> , slime molds, giant kelp	Mushrooms, yeasts	Mosses, ferns, flowering plants	Sponges, worms, insects, fishes, mammals

Classification Tree

