

# Introduction to Botany. Lecture 29

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# Outline

- 1 Questions and answers
- 2 Life cycles and diversity
  - Systematics
  - Kingdoms and domains
  - Fungi, algae and other protists
  - Kingdom Vegetabilia, land plants



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## Previous final question: the answer

Phylum, ..., order?



## Previous final question: the answer

Phylum, ..., order?

- Class (classis)



# Life cycles and diversity

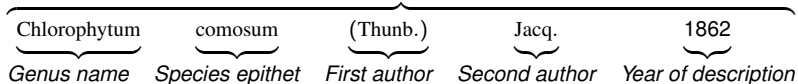
## Systematics



# Examples

English	Latin	Example 1	Example 2
Kingdom	Regnum	Vegetabilia	Animalia
Phylum	Phylum	<u>Spermatophyta</u>	Chordata
Class	Classis	Angiospermae ( <u>Magnoliopsida</u> )	Mammalia
Order	Ordo	<u>Liliales</u>	Primates
Family	Familia	<u>Asparagaceae</u>	<u>Hominidae</u>
Genus	Genus	<i>Chlorophytum</i>	<i>Homo</i>
Species	Species	<i>Chlorophytum comosum</i> (Thunb.) Jacq. 1862	<i>Homo sapiens</i> L.

*Species name*



# Oleasters and buffaloberry



Elaeagnaceae Juss. (oleaster family): 3 genera



*Elaeagnus* L. (oleasters)



*Elaeagnus angustifolia* L. (Russian olive)—**type species** of genus



*Elaeagnus commutata* Bernh. (silverberry)



*Shepherdia* Nutt. (buffaloberries)



*Shepherdia argentea* (Pursh) Nutt. and *Shepherdia canadensis* (L.) Nutt. (buffaloberries), the type species





# Typification

The process of tethering name to sub-taxon or type specimen:

- Initially, oleaster family contained two genera, *Elaeagnus* and *Hippophae* (sea-buckthorn). Second genus included *Hippophae rhamnoides* (Siberian sea-buckthorn, **type species**) and *Hippophae canadensis*.
- Thomas Nuttall decided to split sea-buckthorns and separate *Hippophae canadensis* to the new genus. How to name these two genera?
- Since the first genus still contains *Hippophae angustifolia*, the **type species**, it should keep the name *Hippophae*
- The second genus can be named arbitrarily. Nuttall gave it name “*Shepherdia*”. As a result, the species which had name *Hippophae canadensis*, became *Shepherdia canadensis*.

The same logic is applicable to the situation when you split species into two. However, in this case species name will be tethered to the physical **type specimen**—designated herbarium sample.

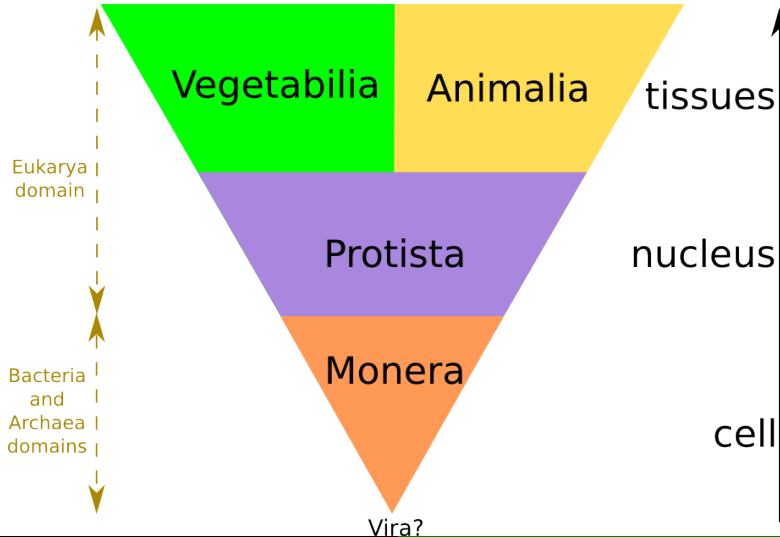


# Life cycles and diversity

## Kingdoms and domains



# Kingdoms and domains

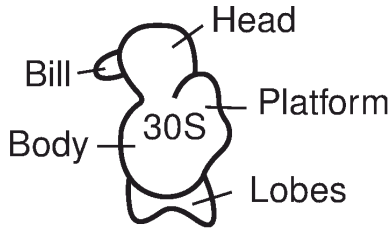


# Domains

- Domain concept was proposed by molecular biologists (Carl Woese and others in 1980s)
- Monera have two radically different molecular systems (e.g., structure of ribosomes), one is bacterial (**Bacteria** domain) and other is archaeal (**Archaea** domain).
- Eukaryotes (**Eukarya** domain) have the molecular system closer to Archaea.



# Structure of ribosomes



*Bacteria*



*Archaea*



*Eukarya*



# Life cycles and diversity

## Fungi, algae and other protists

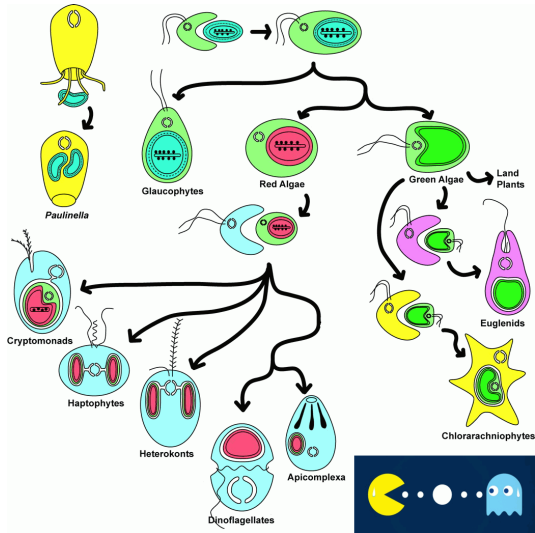


## Two most significant lifestyles

- Fungal lifestyle—organisms develop hyphae and mycelium in order to adapt for external nutrition
- Algal lifestyle—in order to perform photosynthesis, organisms include chloroplasts from cyanobacteria or other algae via endosymbiosis



# Endosymbiosis Pacman game





# Life cycles and diversity

## Kingdom Vegetabilia, land plants



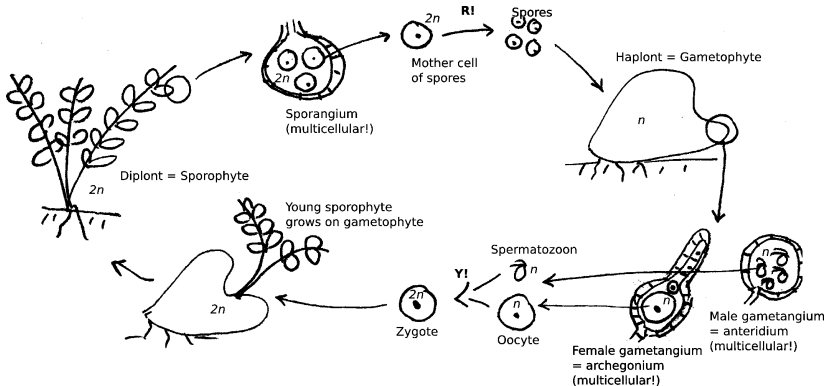
# Life cycle of land plants

## Terms covered:

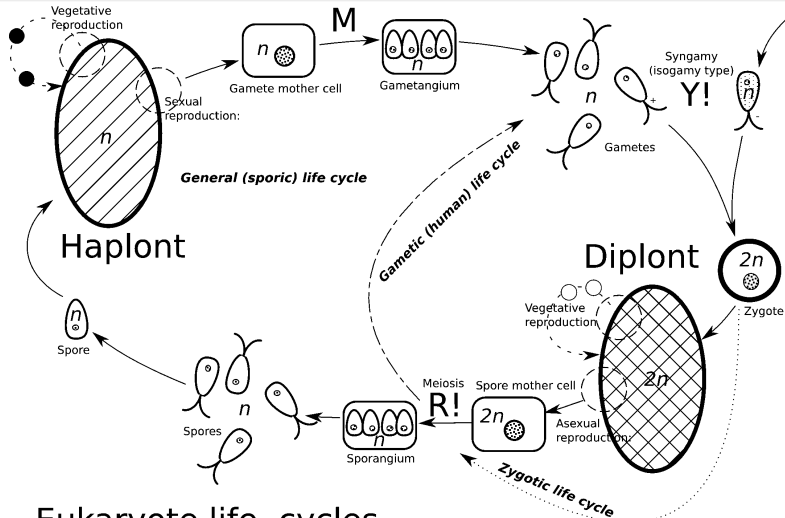
- Sporophyte and gametophyte
- Archegonium and antheridium
- Spermatozoa and oocyte (egg cell)
- Embryo
- Predominance of sporophyte and/or gametophyte



# Life cycle of land plants



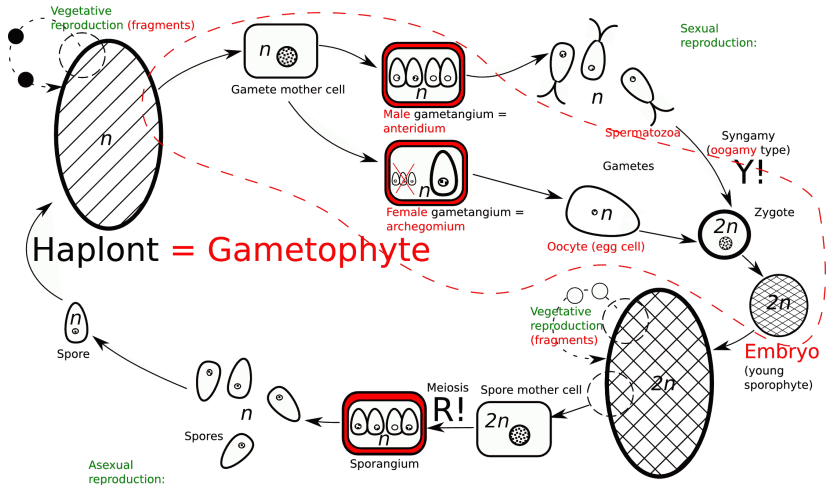
# General life cycle



## Eukaryote life cycles



# Life cycle of land plants: differences



Diplont = Sporophyte



## Final question (2 points)



## Final question (2 points)

What is typification?



# Summary

- Typification is the tethering of name to the sub-taxon or type specimen (designated herbarium sample)
- 4 kingdoms could be grouped in 2 domains.
- Algae and fungi are **protists**.
- Land plants have a sporic life cycle with multicellular gametangia and sporangia, oogamy and embryo.





## For Further Reading



J. E. Bidlack, Sh. H. Jansky.  
*Stern's introductory plant biology*. 12th edition.  
McGraw-Hill, 2011.  
*Chapters 16 and 20.*



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.  
*Plant Biology*. 2nd edition.  
Thomson Brooks/Cole, 2006.  
*Chapters 18 and 22.*

