

# Systematic Botany. Lecture 16

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# Outline

## Questions and answers

Water plants: Lemnaceae—duckweed family

Potamogetonaceae—pondweed family

Nymphaeaceae—water-lily family

Characeae—chara family

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## Previous final question: the answer

How to distinguish between grasses and sedges?

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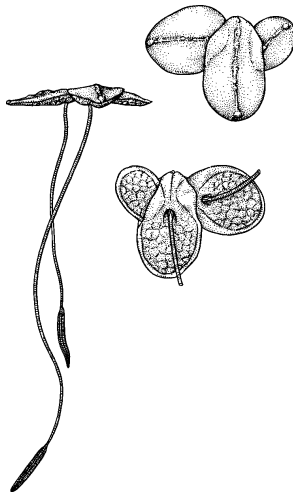
- ▶ Rounded vs. triangular stem
- ▶ No perigynium in grasses (but it is also absent in non-*Carex* Cyperaceae)
- ▶ Spikelets with glumes (usually in more complicated inflorescences) in grasses
- ▶ Lateral embryo



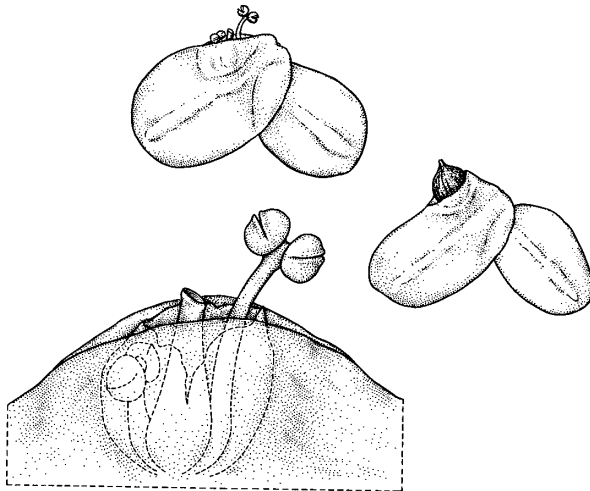
## Lemnaceae—duckweed family

- ▶  $\approx$  30 species, now often included as a subfamily in Araceae, arum family
- ▶ Distributed worldwide, inhabit places with still fresh water
- ▶ Life forms: floating, thalloid plants
- ▶ Leaves and stems are reduced to the frond (thalloid shoot)
- ▶ Flowers appear very rarely, in pouches containing one female and several male flowers; all flowers are naked and monomerous
- ▶ Fruit is capsule with several seeds

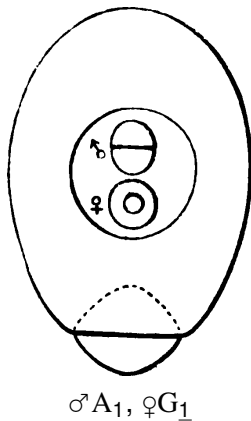
## *Lemna*



## *Lemna* flowers



## Lemnaceae flower



## Representatives of Lemnaceae

Importance: sometimes using as forage plants for ducks, high ecological importance

- ▶ *Lemna*—duckweed
- ▶ *Spirodela*—many-rooted duckweed
- ▶ *Wolffia*—rootless duckweed, smallest angiosperm

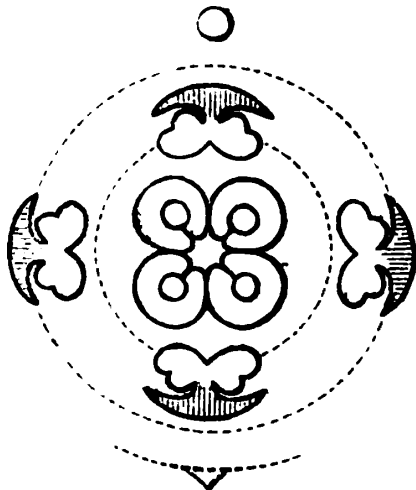
## *Wolffia arrhiza*



## Potamogetonaceae—pondweed family

- ▶  $\approx$  100 species
- ▶ Distributed worldwide
- ▶ Life forms: floating herbs
- ▶ Leaves alternate, with sheath, ligule and intrapetiolar stipule
- ▶ Flowers in spikes, 4-merous, with stamens attached to tepals
- ▶ Pistil with 4 distinct carpels
- ▶ Fruit is an achene, seed without endosperm

## Potamogetonaceae flower



\*P<sub>4</sub>A<sub>4</sub>G<sub>4</sub>



# Representatives of Potamogetonaceae

Importance: ecologically important group

- ▶ *Potamogeton*—pondweed

## *Potamogeton lucens*

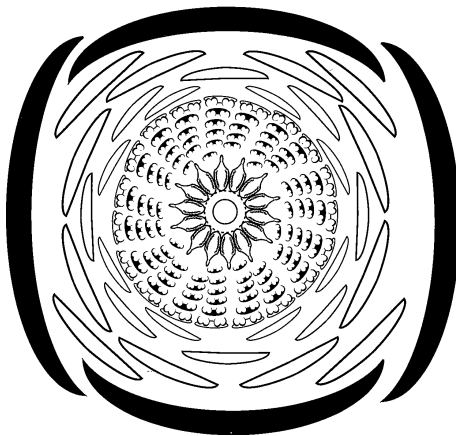


## Nymphaeaceae—water-lily family

- ▶ 6 genera and  $\approx$  100 species of water plants
- ▶ Distributed across all Earth (except Arctic and Antarctic)
- ▶ Very old group, first fossils appear in lower Cretaceous

## Nymphaeaceae morphology

- ▶ Underground **rhizome** with spirally arranged shield-like (surface) or lanceolate (underwater) leaves with actinodromous or pterodromous venation
- ▶ **Flowers** solitary, with double perianth: 4 sepals and multiple petals originated from stamens
- ▶ Petals and stamens are **spirally arranged**
- ▶ Multiple **carpels united** in pistil which is sometimes half-inferior
- ▶ Carpels have styler canal (like *Amborella*)
- ▶ **Pollinated** with weevils which attracted by odor, temperature and pollen
- ▶ **Fruit indehiscent**, floating

*Nymphaea* sp., diagram and formula

$$*K_{4-6}C_{\infty}A_{\infty}\underline{G_{(\infty)}}$$

## Nymphaeaceae representatives

- ▶ *Nymphaea*, white water-lily
- ▶ *Nuphar*, yellow water-lily
- ▶ *Victoria*, tropical plant with leaves 2 m in diameter

# *Nymphaea*



## *Nuphar*





## *Victoria*



## Characeae—chara family

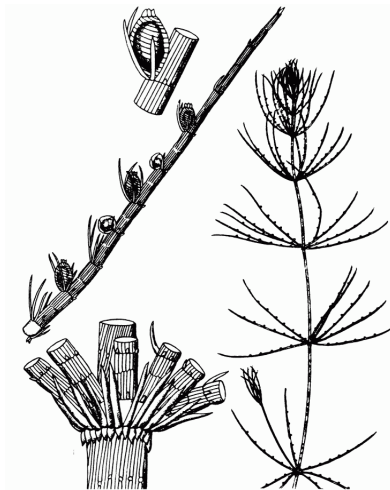
Characeae are not flowering plants, not even plants, they are green protists (“algae”) without true tissues!

- ▶  $\approx$  400 species
- ▶ Distributed in fresh waters worldwide
- ▶ Life forms: floating algae, often accumulate  $\text{CaCO}_3$
- ▶ No leaves or stems, but they have their body differentiated (unlike most of algae) into multicellular branches of different kinds developed from apical cell
- ▶ Haploid generation is prevalent (zygote goes into meiosis), sexual process is oogamy
- ▶ Oogonia contain the egg and covered with spiral cells (coronula)

## *Chara fragilis*



# *Chara*



## Representatives of Characeae

Importance: ecologically important freshwater algae, sometimes present in high biomass

- ▶ *Chara*—5 coronula cells
- ▶ *Nitella*—10 coronula cells

*Questions before the exam?*

## Final question (3 points)

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Please invent a multiple choice question for the second exam  
(**subject**: families from Caryophyllaceae to Characeae).  
There should be at least **three** exclusive choices.



# For Further Reading



O. A.Stevens.

*Handbook of North Dakota plants.* 3rd edition.

NDSU, 1963.