# PHYLOGENY OF HELOBIALES

Dr.Shaveta Chauhan
Botany Dept.,
HRMMV,Jalandhar

# INTRODUCTION

- Engler gave the name Helobieae
- Order is also known as Najadales
- Engler defined this as an unnatural order
- Engler include 8 families in order Helobiales

1. Potamogetonaceae
2. Najadaceae
3. Aponogetonaceae
4. Scheuchzeriaceae
5. Lilaeaceae
6. Alismataceae
7. Butomaceae
8. Hydrocharitaceae

- Hutchinson (1969) placed them in six orders

1. Butomales
2. Alismatales
3. Juncaginales
4. Aponogetonales
5. Potamogetonales
6. Najadales

- Takhtajan(1980) included Alismataceae, Butomaceae and Hydrocharitaceae in the order Alismatales while the other families have been segregated into a seperate order Najadales
- Cronquist kept them in three orders

1.Alismatales

2. Hydrocharitales

3. Najadales

# General Characteristics of the Order

- Plants mostly of aquatic or marshy habitats,often almost completely submerged
- Seeds exalbuminous
- Plants possess minute scales
- Helobial endosperm

# Potamogetonaceae

- Fresh water or brackish water submerged or free floating perennial herbs.
- Stems often jointed and nodose,the lower nodes root bearing, upper ones leafy
- Leaves sheathing basally,blades submerged or floating, 2-ranked
- Flowers bisexual or unisexual
- Perianth in single whorl of 4 tepals
- Stamens 1-4
- Ovary unicarpellary,unilocular with a single ovule on apical or parietal placentation
- Fruit indehiscent nutlets or drupelets
- Seeds exalbuminous
- Engler include 8 genera- *Potamogeton,Posidonia,Zostera,Cymodocea,Zannichellia,Phyllospadix, Althenia and Ruppia*
- *Hutchinson,Cronquist and Takhtajan Zostera,Cymodocea,Zannichellia,Phyllospadix, Posidonia and Ruppia*
- Zosteraceae is highly advanced submerged marine plants.

# Najadaceae

- Fresh water submerged small annual plants with slender stems rooting from lower nodes
- Leaves linear,toothed,sheathing at base.
- Flower unisexual
- Male flowers with a single stamen enclosed in a membranous bract, 2-lipped at apex
- Female flower naked or surrounded by a membranous perianth-like organ
- Ovary unicarpellary and unilocular with a single ovule on basal placentation
- Fruit an indehiscent nut.
- seeds exalbuminous
- embryo straight
- Pollination occurs under water,pollen grains spherical and 3-celled at anthesis
- Family consist of single genera *Najas* with 50 species
- Cosmopolitan in distribution
- Najadaceae is the most advanced family of the order Najadales

# Aponogetonaceae

- Aquatic perennials with sympodial tuberous rhizomes.
- Leaves basal,usually floating,long petioled
- The whole tissue between the veins breaks up as the leaf grows,leaving a network of veins with holes between (Fenestrate)
- Flowers bisexual,actinomorphic
- Perianth usually 2, sometimes 3 pr even 1
- Stamens usually 3+3 or many
- Ovary 3-6 carpellary,unilocular with 2 or more ovules on basal placentation
- Fruit leathery dehiscent multifolliculus
- Seeds exalbuminous, embryo straight
- Monocolpate pollen grains
- Family consist of single genera(*Aponogeton*) with 30 species
- Distributed in paleotropical and South Africa

# Scheuchzeriaceae

- Slender perennial herbs of *Sphagnum* bogs.
- Leaves linear,sheathing basally,ligulate
- Flower bisexual, regular in terminal bracteate racemes
- anemophilous
- Perianth in 2 whorls of 3 each, homochlamydeous
- Stamens six in 2 series of 3 each
- Pollen grain inaperturate
- Ovary 3 or 6 carpellary, shortly united below
- 2-few ovules per carpel on basal placentation
- Fruit a schizocarp with free divaricate 1-2 seeds
- Seeds exalbuminous
- Family consist of single genus(*Scheuchzeria*) with 2 species
- Distributed in north temperate zone

# Lilaeaceae

- Perennial stemless marsh herbs
- Leaves radical,tufted, linear,terete,sheathing basally
- Flowers unisexual,monoecious or a few bisexual,in dense bracteate spikes
- Lower flowers female,upper male,intermediate sometimes bisexual
- Flowers all without perianth,usually subtended by a bract,male flower of single stamen
- Female flowers consisting of naked sessile ovary
- Unicarpellary,uniocular with a single ovule on basal placentation
- Fruit a compressed ribbed indehiscent nut,angled or winged
- Seed exalbuminous
- Family consist of single monotypic genus *Lilaea scilloides* in pacific America

# Alismataceae

- Perennial,rhizomatous,aquatic or marsh herbs
- Leaves radical,erect,floating or submerged,long petioled,sheathing basally,the blades very variable from linear to ovate or the bases sagittate or hastate
- Inflorescence usually much branched,primary branching racemose,secondary often cymose
- Flowers bisexual or unisexual( Sagittaria),regular,the perianth of 6 free segments in 2 series, the outer 3 green and sepal like,persistent,inner 3 larger petaloid,deciduous,stamens 6 or more
- Ovary superior,6-many carpellary,apocarpous,with 1(rarely 2 or more) ovules in each locule on basal placentation
- Family consist of 13 genera,90 species
- Cosmopolitan in distribution
- Example:*Alisma,Sagittaria,Echinodorus,Damasonium,Ranalisma, Limnophyton* etc.

*Ranalisma* is thought to be connecting link between Ranales and monocots,It differs from Ranales only in possession of a single cotyledon and lack of endosperm

# Butomaceae

- Aquatic perennials
- Leaves basal or cauline,ensiform or flat or petioled with orbicular or elliptic blades.
- Inflorescence a scapose cymose umbel,with involucre of bracts
- Flowers bisexual,regular,perianth of 6 segments in 2 series
- Stamens mostly 6-9 or more
- Ovary of 6 or more carpels,apocarpous,with numerous ovules on lateral-laminar placentation
- Fruit a group of follicles
- Seeds exalbuminous
- Engler included 5 genera : *Butomus,Limnocharis,Hydroclays,Tenagocharis* and *Ostenia* in Butomaceae while Cronquist and Takhtajan included only *Butomus* in Butomaceae

# Hydrocharitaceae

- Partially or completely submerged,rarely floating,fresh water or marine plants
- Leaves basal or cauline,usually sessile,very variable in shape and size
- Inflorescence subtended by abifid spathaceous bract or by a pair of opposite bracts.
- Flowers unisexual,monoecious or dioecious, rarely bisexual,usually regular,perianth usually in two heterochlamydeous whorls of three each,free
- Male florwes with stamens 3-many
- Female flowers-ovary inferior, unicarpellary,unilocular,with numerous ovules on lateral-laminar placentation
- Fruit berry like,indehiscent, submerged
- Seeds many , exalbuminous
- Family consist of 16 genera,80 species
- Distributed in tropical waters
- Example: *Hydrilla,Vallisneria,Blyxa,Thallassia*,and *Halophila*

# THANK YOU