

# NEET- 2020- 45 Days Crash Course



Date : 27<sup>th</sup> July 2020



Chapter Name : PLANT KINGDOM



Lecture Outline :  
PTERIDOPHYTA  
GYMNOSPERM

# Pteridophyta

Nonflowering 1st terrestrial

- Pteridophyta are known as reptiles of plant kingdom.
- Pteridophytes are vascular plants i.e. xylem and phloem are present in it. Vessels in xylem and companion cells in phloem are absent.   
only in angio sperms  
↳ Not developed
- Pteridophytes are used for medicinal purpose and as soil binders.   
moist places
- It is not completely successful terrestrial plants because they need water for fertilization.   
imp
- The plant body is completely differentiated in to root, stem and leaves.   
plant like appearance
- Primary root remains alive for short period. After some time replaced by Adventitious roots.

Alternation of generation

Sporophyte

Gametophyte

do not arise from radicle

Dominant

inconspicuous

$2n$

$n$

Spores

Gametes

Spores are produced in spores

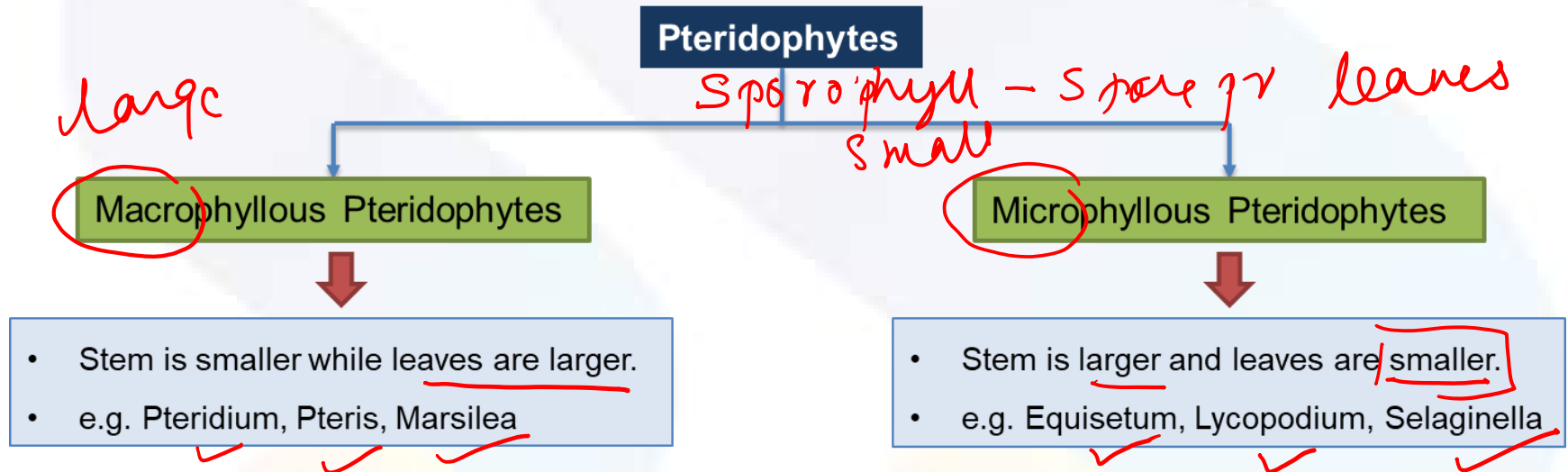
Photosynthesis

"SPOROPHYLL"

"PROTHALLUS"

# PTERIDOPHYTE - SPOROPHYTE *- dominant*

- On the basis of leaves, pteridophytes are of two types.



Spores

↓

Sporophyll  
not compactly  
arranged

↓

Cone / Strobilus  
Sporophyll form a  
compact strob

# Some Examples



**Selaginella**

microphyllous



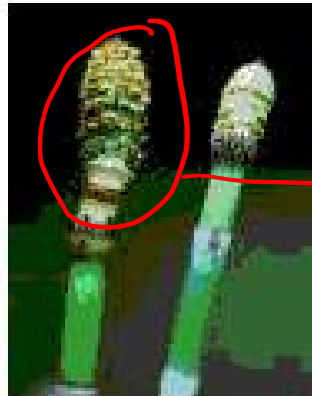
**Pteris**

Macrophyllous



**Adiantum**

walking fern



**Equisetum**

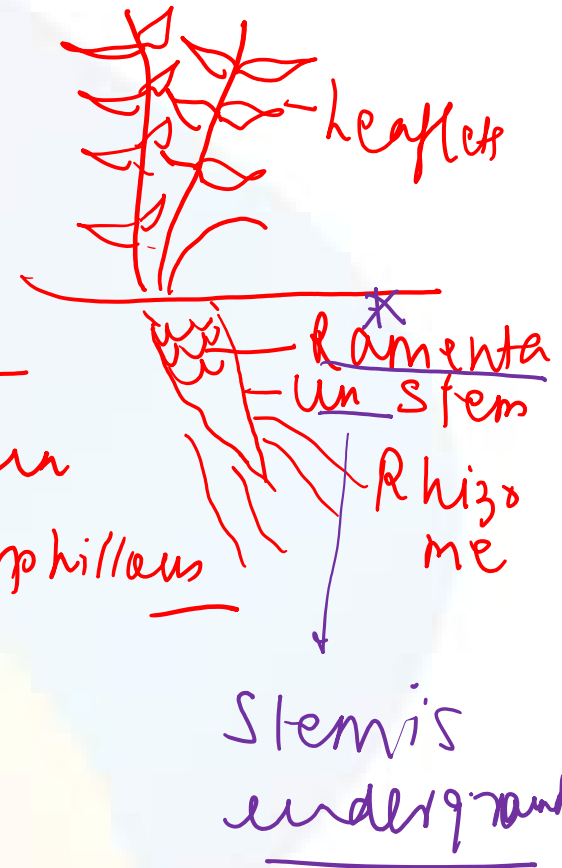
Horse tail  
Cone present



**Dryopteris**

fern  
Macrophyllous

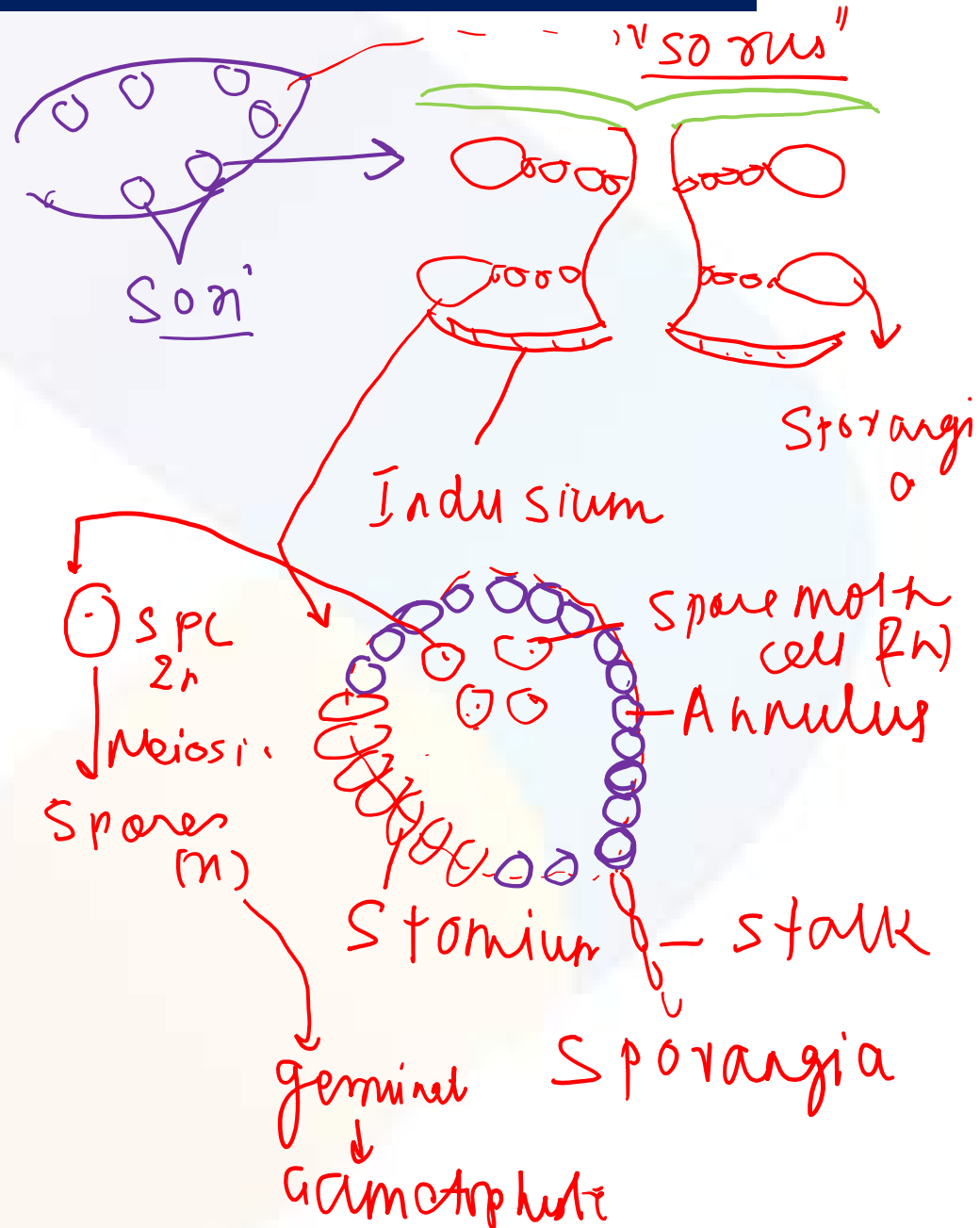
Cone



# SPOROPHYLL- SORI



leaf bearing sori

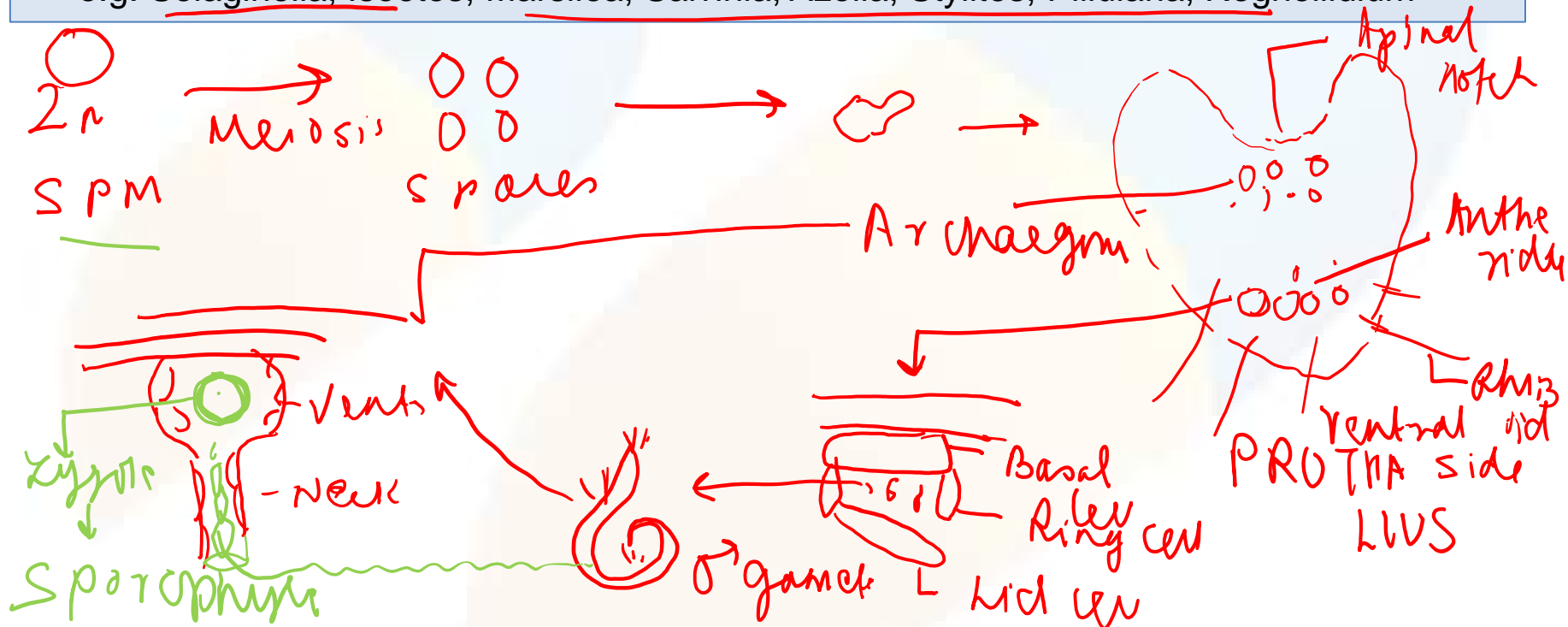


# Life cycle of pteridophytes

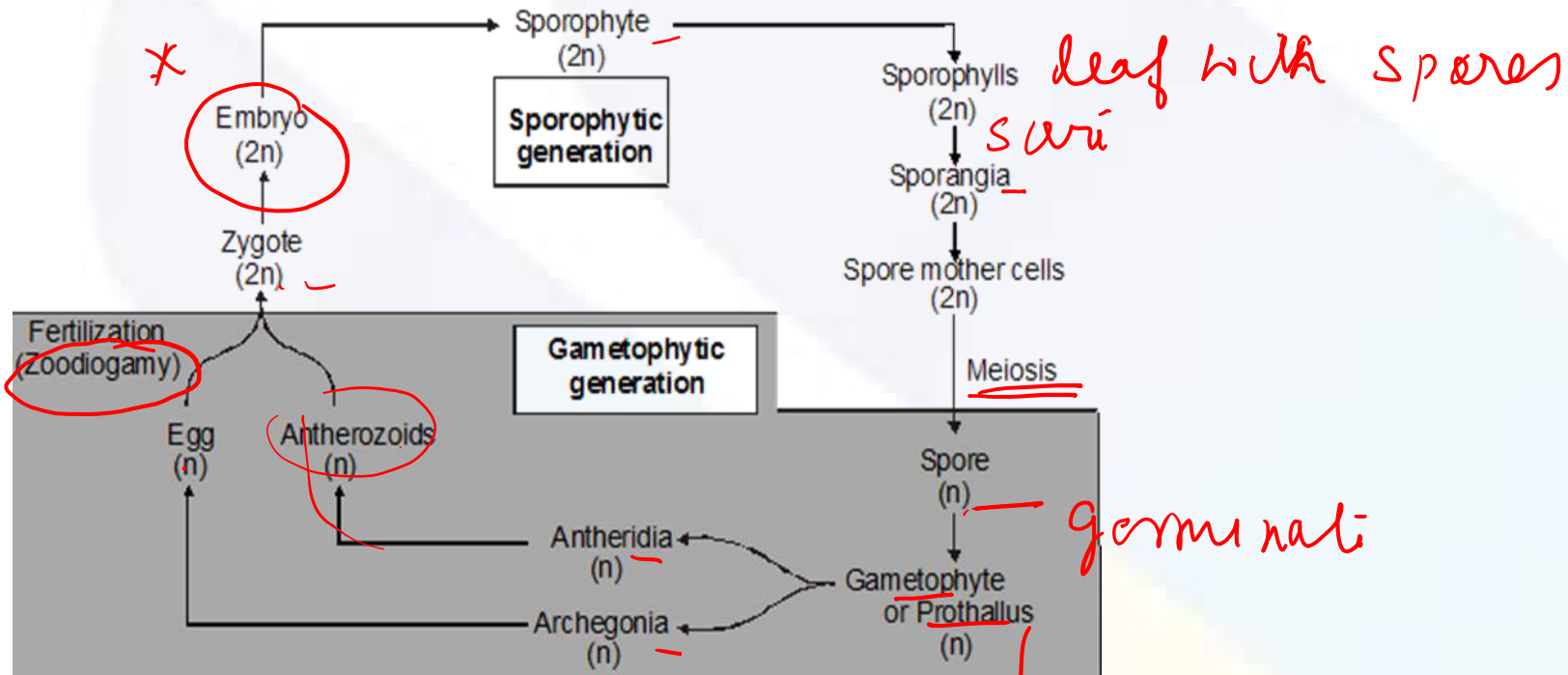
- Plant is sporophyte. i.e. diploid.
- Most of the pteridophytes are homosporous i.e. only one type of spores are formed during reproduction.
- e.g. Psilotum, Lycopodium, Equisetum, Pteridium, Dryopteris, Adiantum, Pteris
- Some pteridophytes are heterosporous i.e. two types of spores microspores and megaspores.
- e.g. Selaginella, Isoetes, Marsilea, Salvinia, Azolla, Stylites, Pillularia, Regnellidium

Homosporous

\* CYCLET



# LIFE CYCLE OF PTERIDOPHYTE



Pteridophyte  
Embryophyte  
Tracheophyte

hide,  
 PS, bears Anther &  
 Archegonia

# Pteridophyta Classification

Pteridophyta is divided into 4 classes

## Pteridophyta

### Psilopsida



*Psilophyta*

*✓ T only stems*

- Most ancient vascular plants are placed in this class.
- Plant body is differentiated into stem (rhizome), scaly leaves and rhizoids.
- 1 living genus is present – *Psilotum*

*✓ sp. 11 min*  
*Rhynia*

### Lycopsida



*Lycophyta*

- Club mosses are placed in this class.
- plant body is differentiated into root, stem and leaves. *(small & thin)*
- Sporophylls are present at the tip of plant.

*Lycopodium*  
*Selaginella*

### Sphenopsida



*Arthropophyta*

- In this class Horse tails are included.
- Plant body is differentiated into root, stem or rhizome & scaly leaves
- Silica is present in the epidermis of stem and leaves.

*✓ Equisetum*

### Pteropsida



- This is the largest group of pteridophytes (Ferns).
- Ferns are megaphyllous
- Every leaf of fern forms sporangia at the time of reproduction.

## Psilophyta

Most primitive  
Rootless with rhizoids  
Dichotomously branched photosynthetic stem  
Leaves often absent  
Protostele  
Homosporous synangium  
Eg: Fossil genera: *Rhynia* and *Horneophyton*  
Living genera *Psilotum* and *Tmesipteris*



*Psilotum*

## Lycophyta (Club moss or spike moss)

Differentiated plant body  
Microphyllous leaves  
Protostele sometimes siphonostele  
Sporophylls aggregate to form strobili or cones  
Homosporous (*Selaginella*)  
*Lycopodium*) or heterosporous  
Gametophyte depends on fungus for food



*Selaginella*

## Sphenophyta (Horse tail)

All are fossils except *Equisetum*  
Differentiated plant body  
Stem joined with nodes and internodes  
Scaly leaves seen as whorl around the node  
Sporangia forming strobili or cones  
homosporous,



*Equisetum*

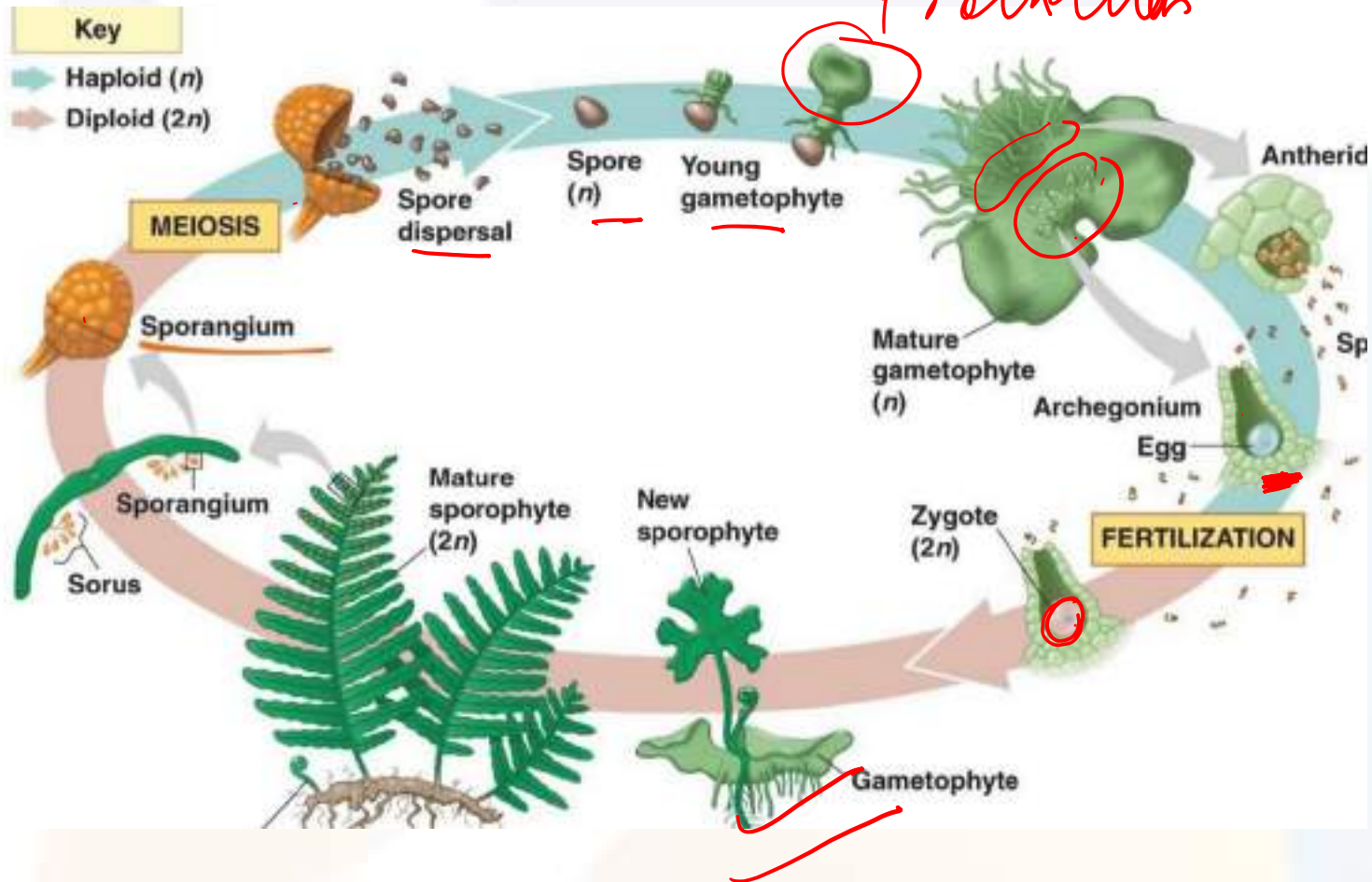
## Pterophyta (Ferns or Filicophyta)

Most widely distributed vascular cryptogams  
Differentiated plant body stem mostly rhizomatous  
Leaves macrophyllous called as fronds  
Young leaves show circinate vernation (spirally coiled)  
Stele: protostele, siphonostele or dictyostele  
Sporangia form sori on abaxial side of the leaf  
Sporocarp in *Marselia*  
Indusium may be true or false  
True indusium and false indusium  
Homosporous (*Pteris*) or heterosporous (*Marselia*)  
Antherozoids multiflagellated



*Pteris*

# FERN – LIFE CYCLE



Name the kind of life cycle  
in Pteridophyta!

Haplo Diplontic life cycle

Both haploid & diploid  
stage present

# Gymnosperm

*No ovary, no fruit*

- The gymnosperms (gymnos = naked, sperma = seed) are plants in which the ovule are not ~~enclosed~~ by any ovary wall and remain exposed, both before and after fertilization.
- Main plant body of Gymnosperm is divided into Root, Stem and leaves.
- The roots are generally tap roots.
- Gymnosperms are naked seeded plant i.e. no fruit formation takes place in these plant.
- In India Gymnosperms are found on Himalayan mountains. *low temp*
- They occur on slopes of mountain in cold region therefore gymnosperms are xerophyte
- All gymnosperm are vascular plants.

E.g of Gymnosperms

Conifers - Pinus

Cycadales - Cycas

Gnetales - Gnetum

Ginkgoales - Ginkgo biloba

# PINUS

→ Monocotyledonous



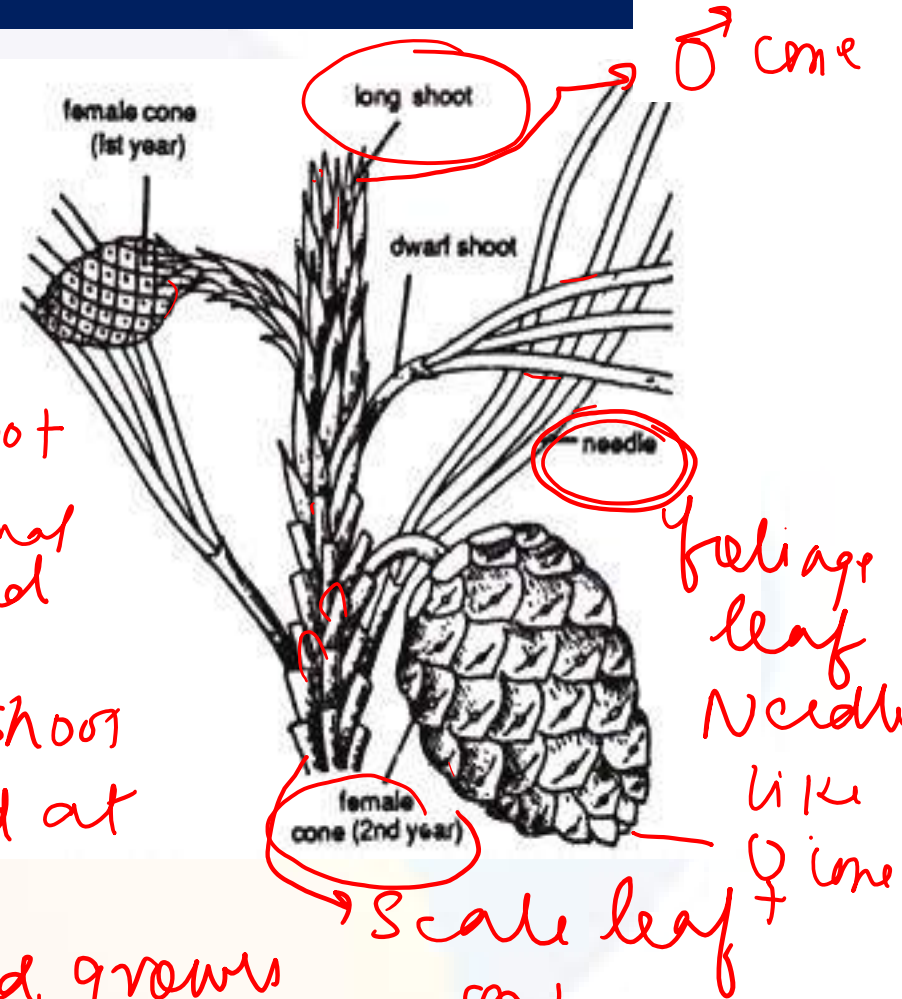
Acropetal  
branching

Tap Root

## Stem

Long shoot  
- Terminal Bud

Dwarf shoot  
No bud at tip



needle  
leaf  
Needle  
like  
♀ cone

Scale leaf

on long  
shoot  
♂ cone

♀ cone

limited grows

Microsporophyll →

Scaly leaf  
Needle like leaf  
Sporophyll →

cone

Macrosporophyll →

# PINUS CONE



## Male cone / Strobilus

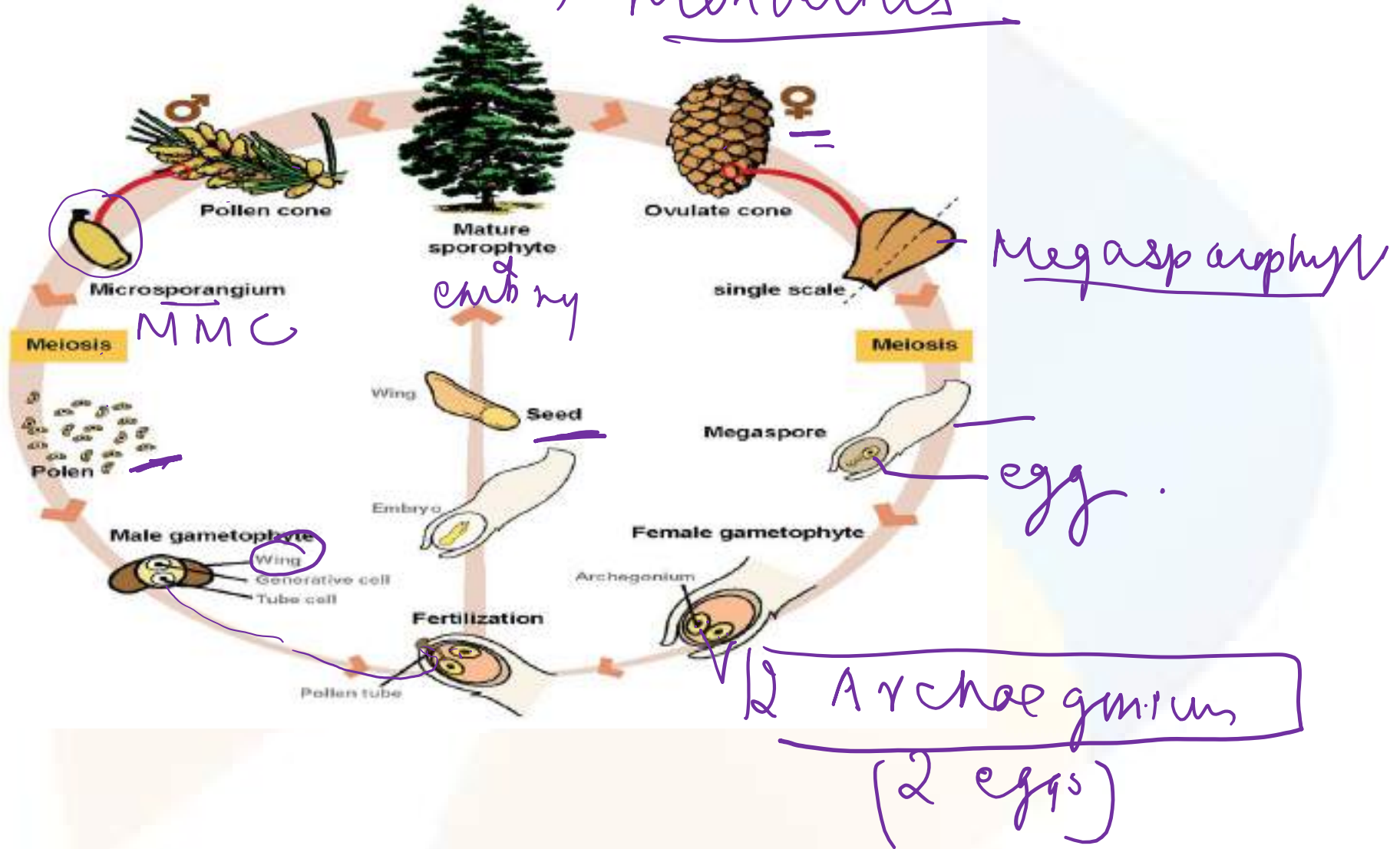
- Grow in clusters
- apical
- at tip of long <sup>\*</sup> Short

Anemophily



# PINUS – LIFE CYCLE

→ Monocerus

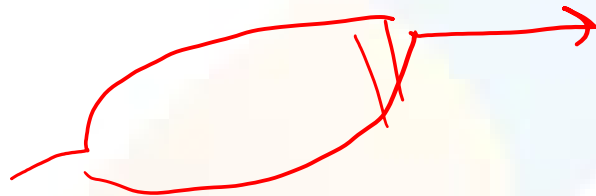


# PINUS – LIFE CYCLE

Female cone of Pinus → 3 years to mature  
 Much larger than ♂

→ a pair of scale leaf

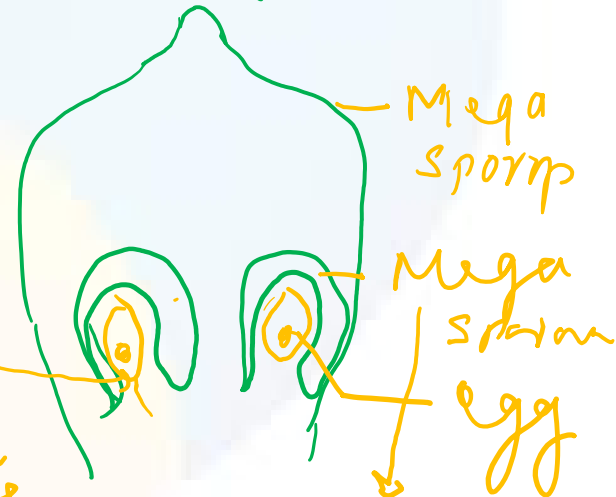
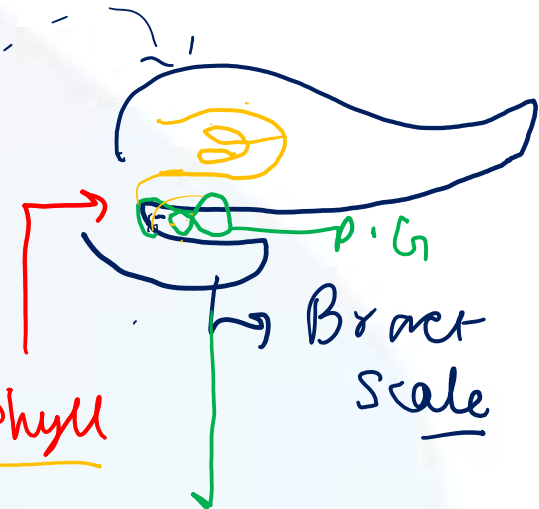
→ grow singly



♂  
 ↓  
 Zygote

Sporophyte

↓  
 Embryo



♂ Throtrop  
 unicentric

# CYCAS

Living fossil

Sago Palm

Dioecious

diff from  
Pinus

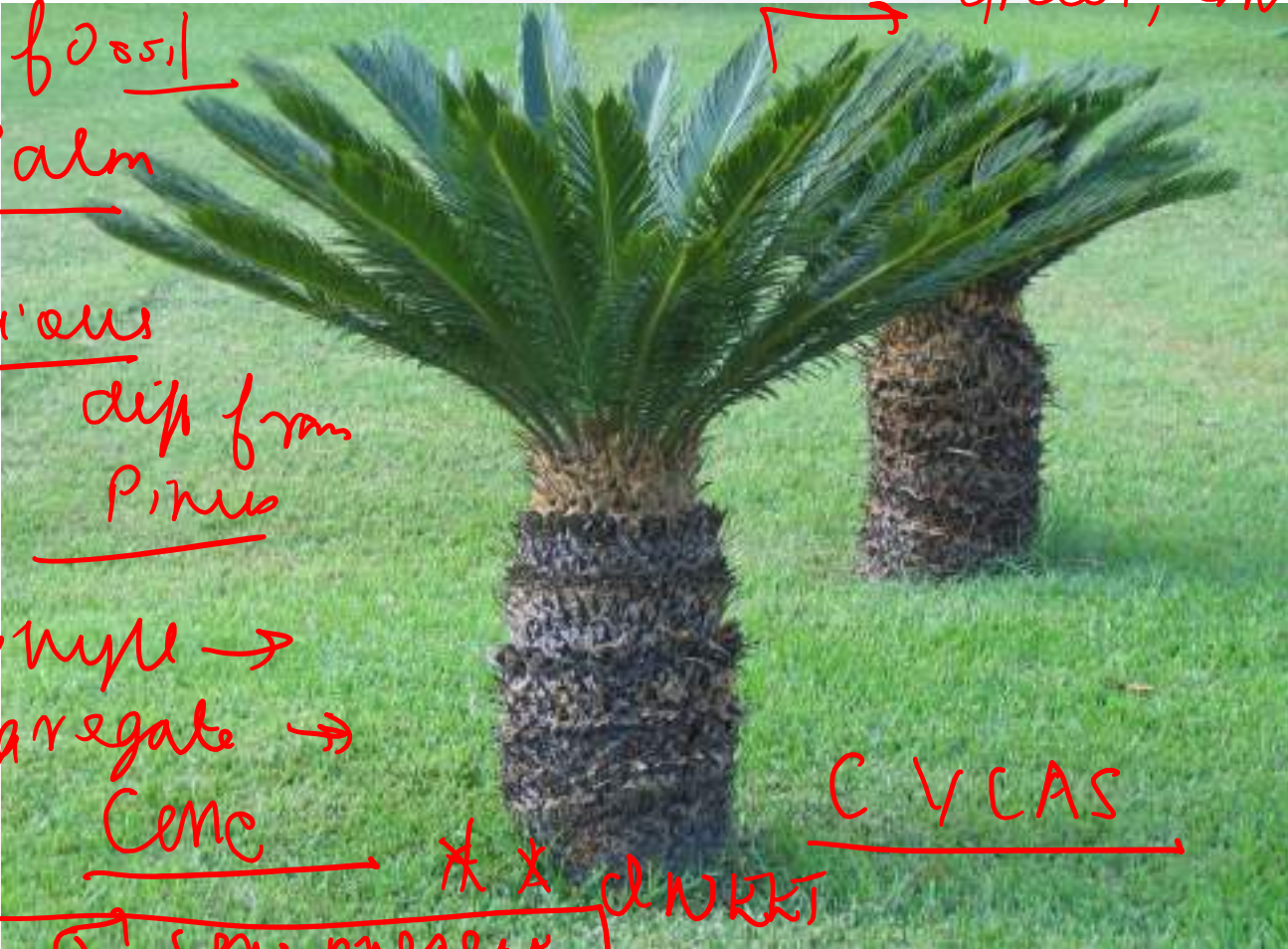
Strobili →  
aggregate →

Cone

Only ♂ cone present

\* \* \*  
CLUBMOSSES

green, compound



CYCAS



Largest  
cone, largest  
♂, male

Cone



Microsporophyll



Microspore



MMC

↓ Meiosis  
male  
spores

Pollen  
gran



# Life Cycle of Gymnosperm – I

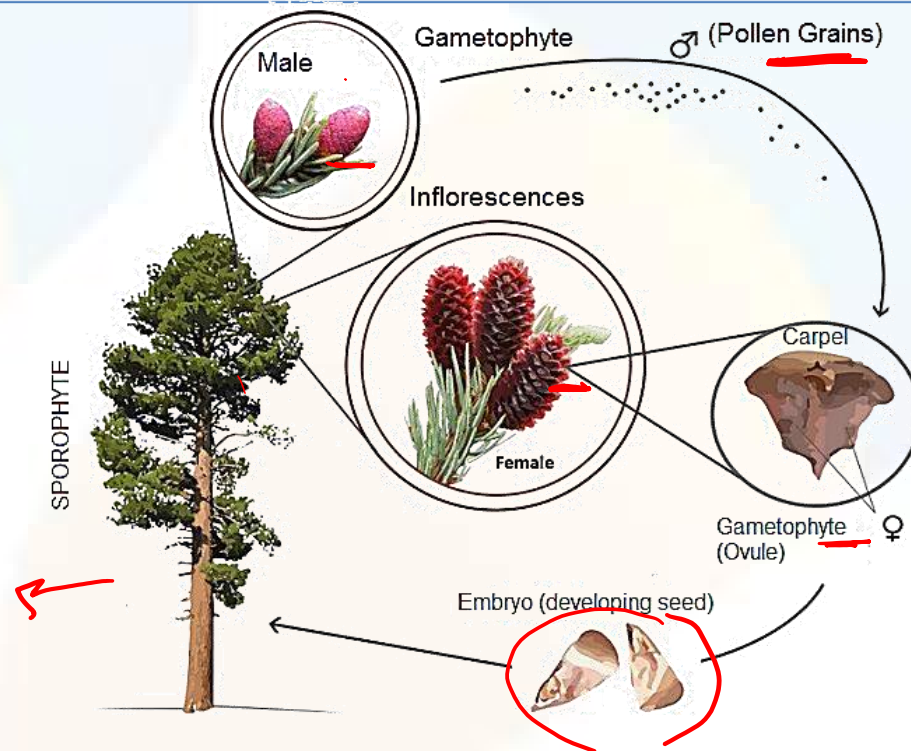
- Gymnosperms reproduce with an alteration of generations, meaning their reproductive cycle has both haploid and diploid phases.

- The female ovulate cone, or megasporophyll, bear the megasporangium, diploid cells, which undergo meiosis to produce four haploid spores. *out of 4 only 1 survive*
- Of these haploid spores, only one survives as the megaspore. The surviving megaspore then, through mitosis, develops into the female gametophyte. [*ovule*] \* *present before fertilization*
- Within the female gametophyte there is an egg and an endosperm mother cell; the endosperm mother cell creates endosperm, which eventually 'feeds' the embryo.

- The male cone, called the microsporophyll, is a small, spongy, leaf-like organ which bears the microsporangium. *MMC*
- The microsporangium contains the male microspores, which undergo meiosis to generate the male gametophyte, pollen.
- The pollen grain contains the pollen tube cell and the generative cell (which contains two sperm, although one dies). *2 male gametes, one dies*

## Life Cycle of Gymnosperm – II

- When the pollen reaches the egg cell, the pollen grain releases the single sperm. \* *only 1*
- The nuclei of the female and the male gametophytes then fuse to create a diploid zygote.
- The endosperm, is released from the endosperm mother cell, and surrounds the zygote to form a seed.
- The seeds appear as the 'scales', which are visible on the cones of gymnosperms; these scales are then dispersed to form a new sapling sporophyte, which grows into a mature sporophyte, and the cycle continues



# Life Cycle of Gymnosperm – II

## CYCAS

- Dioecious ✓
- Only ♂ cone ✓
- Unbranched, Sago palm like ✓
- Monocotyl\*  
few tracheid,  
plenty of Parenchyma  
- 1x cortex - starch stored  
- Not durable, compact

↙  
"Sago"

## PINUS

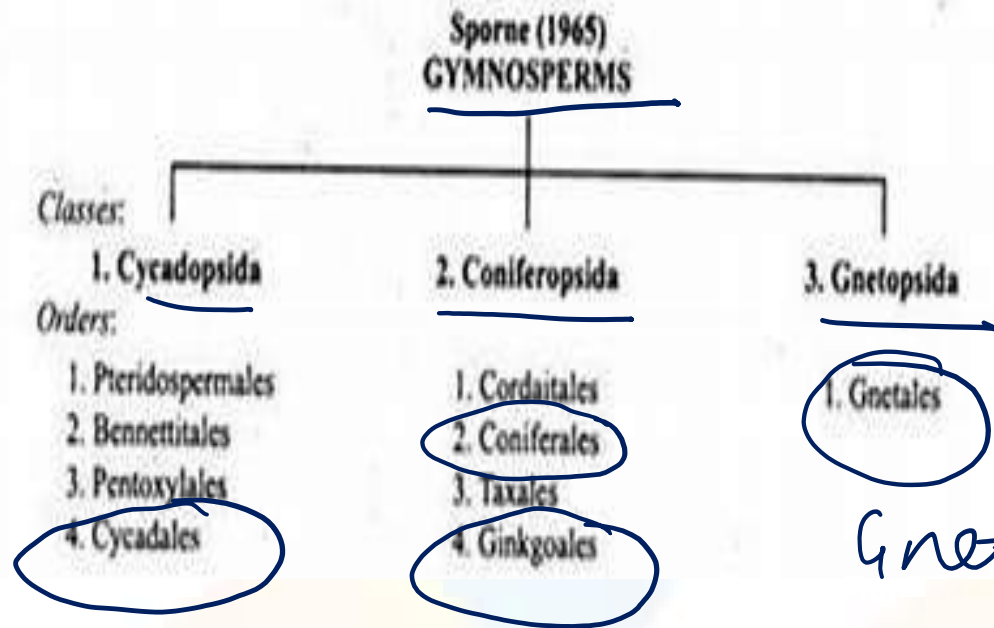
Monocious ✓

Both ♂ & ♀ cone ✓

Branched, conifer like ✓

Pachymerist\*  
Plenty of tracheid  
v. few cortical  
cells, less/no reserve  
food  
Durable, compact

# CLASSIFICATION



Cycas

Pinus  
Ginkgo

Ex Imp of  
Gymnosperm

Pinus gerardiana →  
Chilgoza

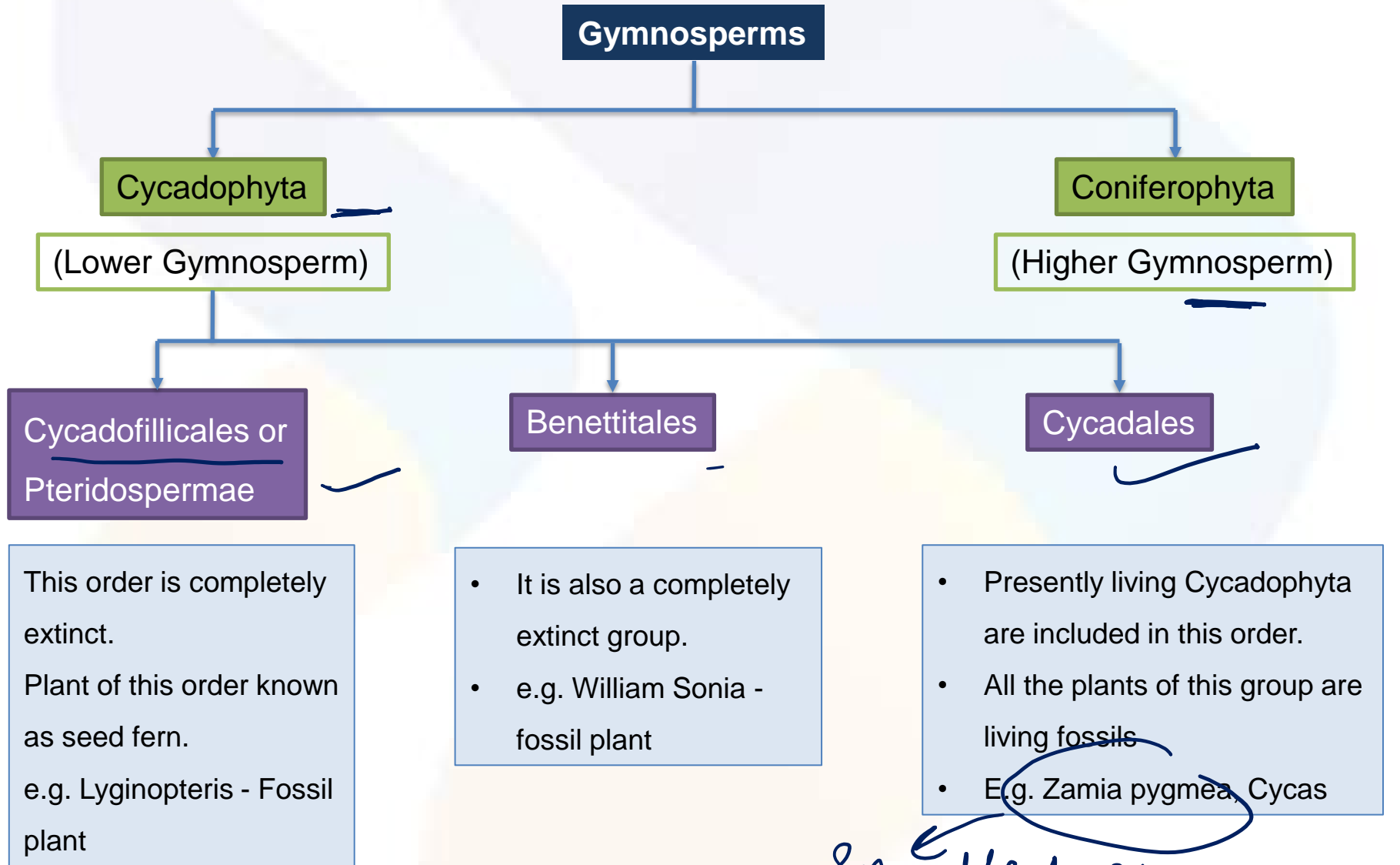
Softwood - matches  
rich light for -  
Paper

Gnetum →

Ephedra<sup>\*\*</sup> →  
respiratory  
diseases -  
Asthma

# Classification of Gymnosperms

Gymnosperms are divided into two groups



*Smallest gymnosperm*