

Plant Kingdom

Basic Important Points :-

1. ♂ gamet x ♀ gamet

fertilize

zygote

If undergo meiosis

zygote will not develop into Embryo

These plants are called non-Embryophytes

Eg:- Thallophyte / Algae

note:-

Gametes are:-

- Unicellular
- non Jacketed

If undergo mitosis

zygote will develop into Embryo

These plants are called Embryophytes

Eg:- Bryophytes

Pteridophytes

Gymnosperms

Angiosperms

Gametes are multicellular and Jacketed

2. Types of meiosis in plants

→ zygotic meiosis ⇒ Ex:- Thallophyte

→ sporic meiosis ⇒ Ex:- Bryophyte, Pteridophytes

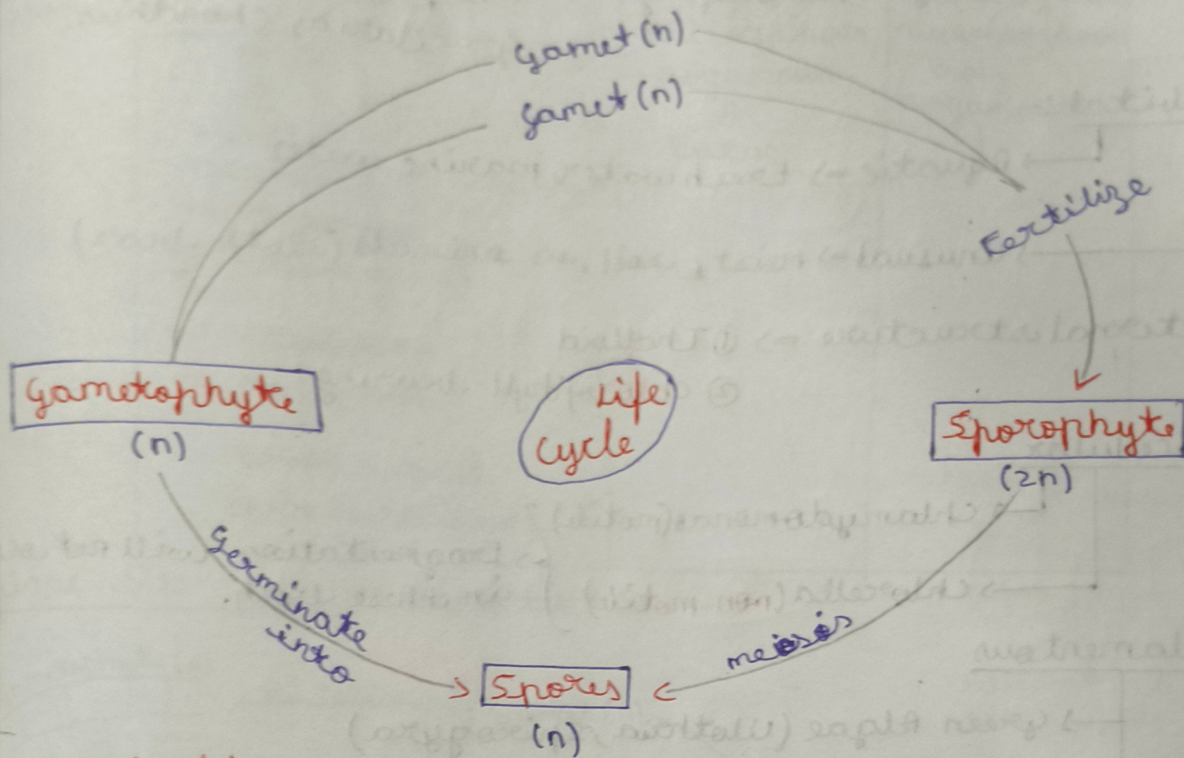
→ gametic meiosis ⇒ Ex:- Gymnosperms, Angiosperms

3.

③	Algae	Bryophyte	Pteridophyte	Gymnosperm	Angiosperm
Embryo	X	✓	✓	✓	✓
Life Cycle	H	HD	~~HD~~ HD	D	D
main plant body or photosynthesis done by	Gametophyte	Gametophyte	Sporophyte Both g and s are free living	Sporophyte	Sporophyte
First time	zygote	Embryo	Vasculature	Seed	Fruit
Tower, roots, stems, leaves	X	Root like, stem like, leaf like	✓	✓	✓

④

	♂ sex organs	♀ sex organs
Algae		
Bryophyte	Antheridium	Oogonium
Pteridophyte	-	Archegonium
Gymnosperms	Callus	-
Angiosperms	Androecium	Gynoecium



Introduction

- Classification of angiosperms within the plantae is called system of classification.

<u>Artificial</u>	<u>Natural</u>	<u>Phylogenetic</u>
- Described by Linnaeus. - Used gross superficial morphological characters (Habit, Colour, size, no. of leaves). - Based on vegetative and androecium structure.	- Used natural affinities (both internal & external). - Centherm & Hooker - Ultrastructure - Anatomy - Embryology - Phytochemistry	- Engler & Prantl - Used evolutionary relationship b/w organisms. - organisms having same taxa having common ancestor - If fossils are not available then we depend on 3 types of taxonomy
<u>Drawbacks:-</u> - Closely related species are separated. - Given equal importance for both vegetative and reproductive characters.	<u>Numerical taxonomy</u> - Use computers - Based on morphological characters - Number & codes are given for all characters - All characters are given equal importance	<u>Cyto-taxonomy</u> - Based on cytological information - Depends on chromosomal number, structure <u>Chemo-taxonomy</u> - Deals with the chemical constituents of plants to resolve confusions.

many characters can be considered at a time

and behaviour

Thallophyta / Algae :- (haplontic life cycle)

- green algae / chlorophyceae → Chlamydomonas, Chlorella, Spirogyra, Ulothrix, Eudorina, Cladophora, Chara
- Brown algae / phaeophyceae → Sargassum, Ectocarpus, Laminaria, Eucus, Dictyota, Macrocystis (kelp)
- Red algae / Rhodophyceae → Porphyra, Gelidium, Polysiphonia, Gracilaria, Chondrus.

Habitat :-

- Aquatic → Fresh water, marine water
- Unusual → moist soil, on animals (sloth bear)

External structure ⇒ ① Thalloid

② Chlorophyll bearing

Unicellular

- Chlamydomonas (motile)
 - Chlorella (non-motile)
- Fragmentation will not occur in these both.

Filamentous

- Green Algae (Ulothrix, Spirogyra)
- Brown algae
- Red algae

- Brown Algae produce → Algin
 - Red algae produce → Carrageen
- Both are hydrocolloid

- Red algae (Eg: Gelidium & Gracilaria) } produce → Agar
- (used in making ice creams & jellies.)

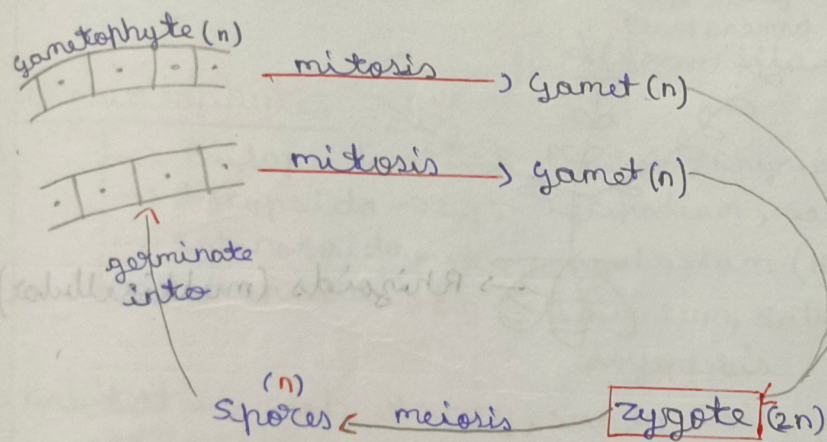
Space travellers eat

- Chlorella (green algae)
- Spirulina (blue green algae)

	Green Algae	Brown Algae	Red algae
Cell wall is made up of	Cellulose (inner layer) + Pectose	Cellulose + Algin	Cellulose + Pectin + Polysulphate Esters
Other pigments	X	Eucoranthin	Chycoerythrin
Flagella	Present in Apical Position 	Present laterally 	Absent

gametes & spores	Both gametes & zoospores are motile	Both gametes & zoospores are motile	Both gametes & aplanospores are non motile
Pigments present are	chl - a, b	chl - a, c	chl - a, d
Vegetative reproduction	Fragmentation	Fragmentation	Fragmentation
Asexual reproduction	zoospores (motile)	zoospores (motile)	aplanospore (non motile)
Sexual Reproduction	<u>I) Isogamous</u> ↓ motile non motile ↓ ↓ - Ulothrix - Chlorella - Chlamydomonas <u>II) Anisogamous</u> ↓ Eudorina <u>III) aogamous</u> ↓ Volvox (colonial) Chara (multicellular) - Isogamous - Anisogamous - aogamous ↓ Eucus - no Isogamous - no Anisogamous - only aogamous		

Algae life cycle ⇒ Haplontic



Bryophytes

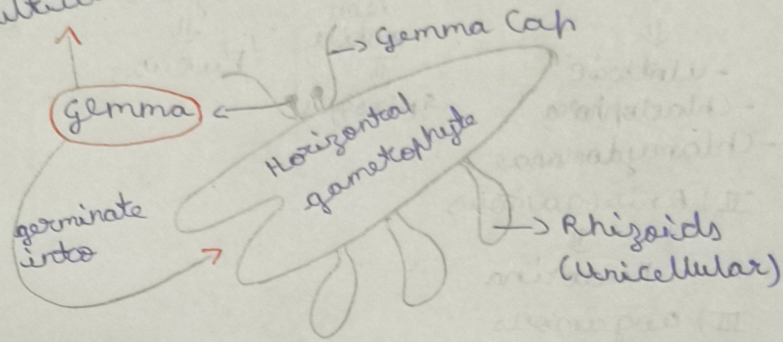
- Liverworts ⇒ Eg:- *Marchantia*, *Riccia*, *Porella*
- Mosses ⇒ Eg:- *Sphagnum*, *Polypodium*, *Funaria*
- Hornworts ⇒ Eg:- *Anthoceros*
- Habitat ⇒ moist, shady (Humid)
- Amphibians
- main plant body is well differentiated than algae.

Asexual Reproduction

⇒ green/photosynthetic multicellular

Marchantia ⇒

Diocious



Secondary Protonema.

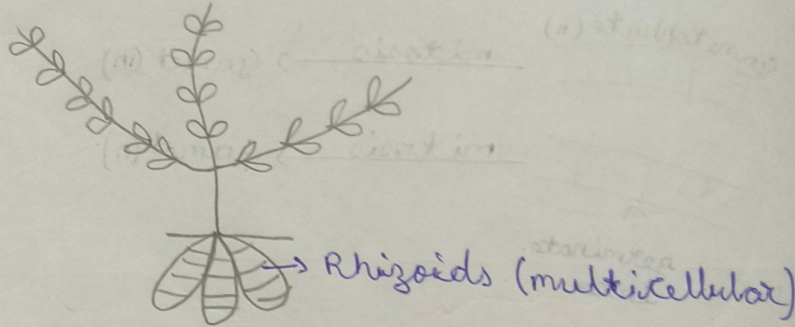


secondary Protonema
green/filamentous

germinate into

Leafy Gametophyte

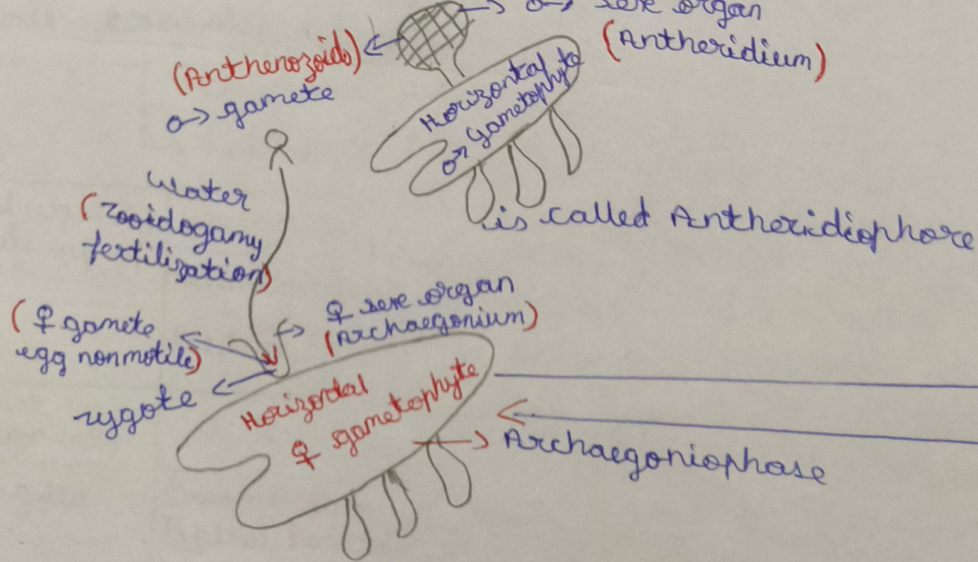
Mosses ⇒ *monoecious*

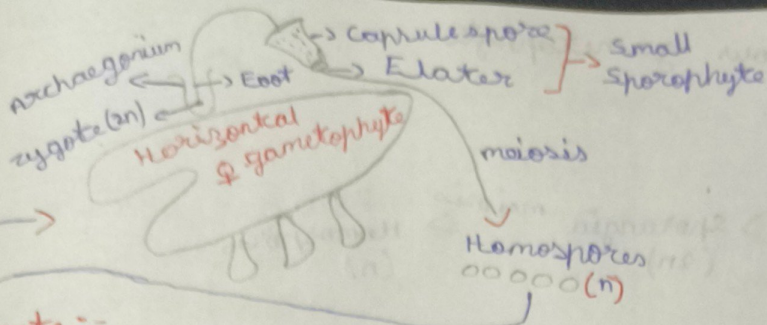


Sexual Reproduction

Marchantia ⇒

Diocious

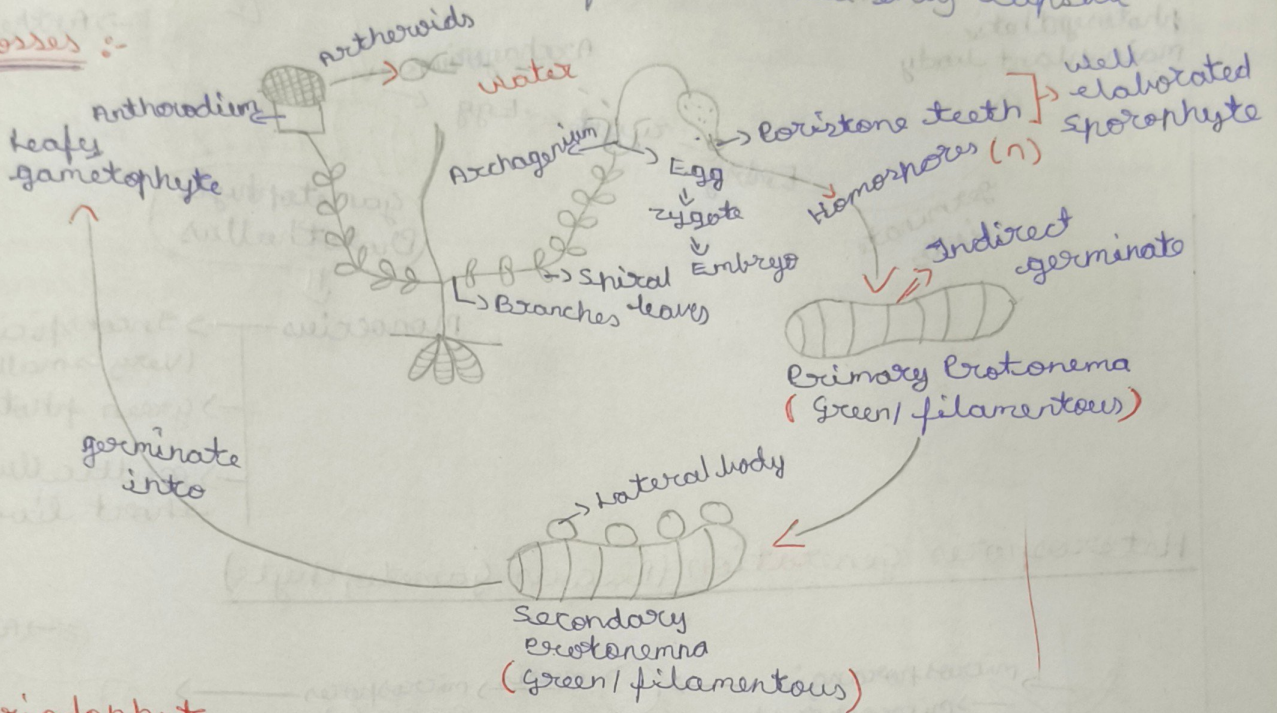




Note :-

In Riccia, sporophyte not have foot and seta only capsule present.

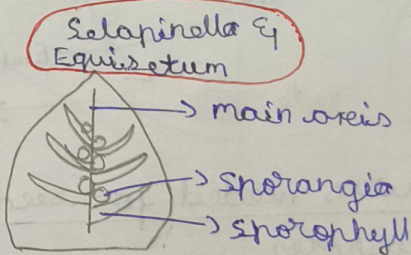
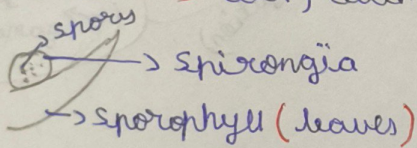
Mosses :-



Pteridophytes

- Psilopsida ⇒ Eg :- Psilotum, Rhytia
- Lycopsidea ⇒ Eg :- Lycopodium, Selaginella
- Sphenopsida ⇒ Eg :- Equisetum (Horse tail)
- Pteropsida ⇒ Eg :- Adiantum, Salvinia, Azolla, Marsilea, Pteris, Dryopteris

Habitat ⇒ Cool, dampy, Sandy Soil



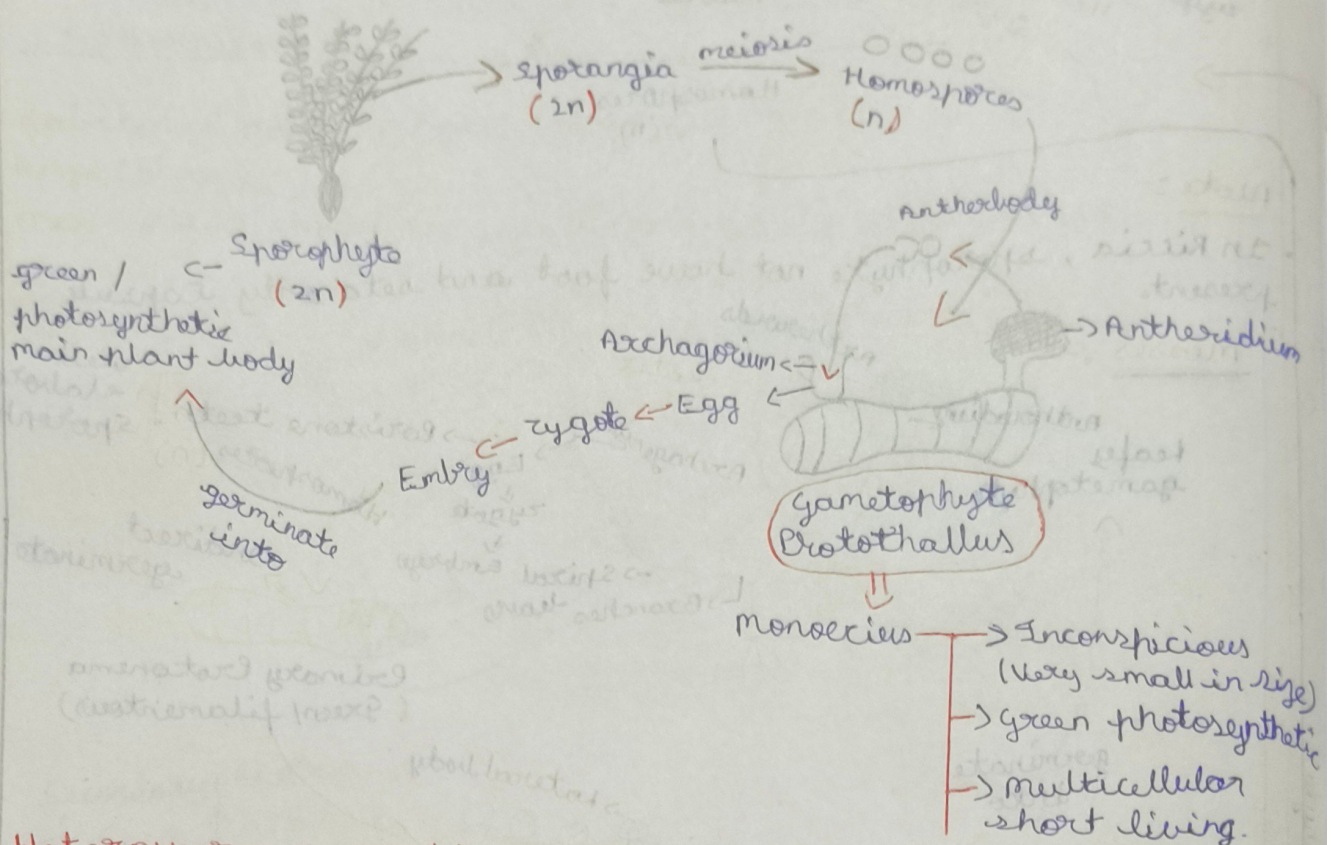
Cone / Strobili
(compact arrangement of sporophyll)

- Spores
 - majority Homospores → monoecious gametophyte
 - Heterospores → dioecious gametophyte

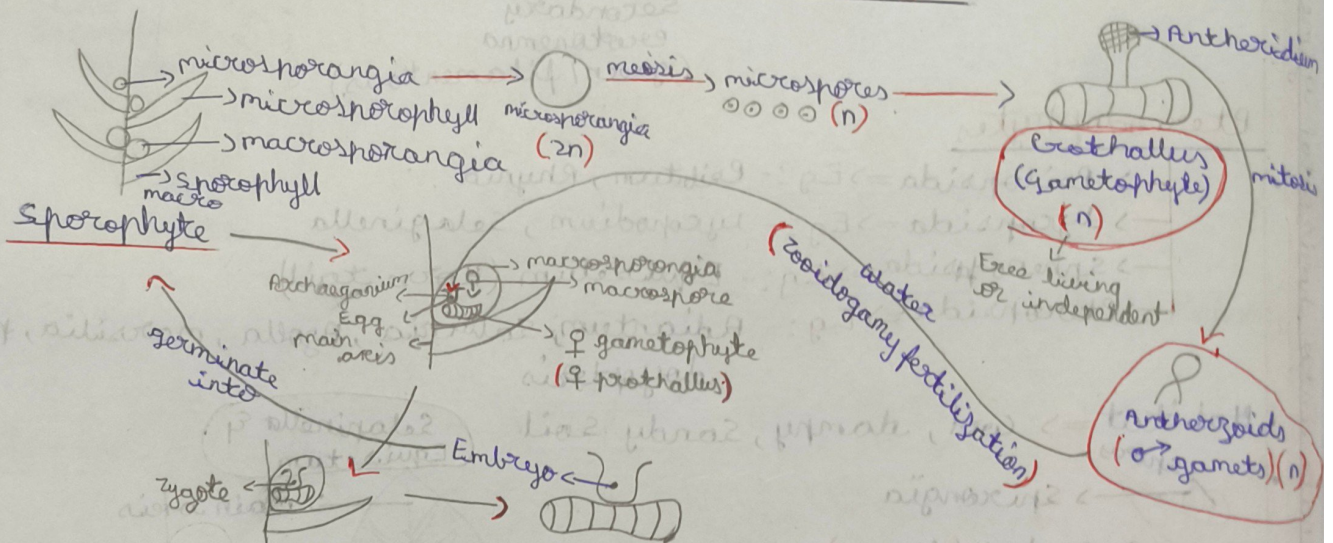
Eg :-
Selaginella
Salvinia
Azolla
Marsilea

directly germinate into horizontal gametophyte

Homospores germination → monocious gametophyte



Heterospores Generation (Dioecious gametophyte)



Features needed for seed formation

- Heterospores
 - development of ♀ gametophyte inside the sporophyte } happened
 - Integuments are not formed. } Not happened
 - no embryo dormancy
- Eg:- *Selaginella*, *Salvinia*

Gymnosperms :-

- Ginkgoales ⇒ Ex:- Ginkgo, biloba
- Gnetales ⇒ Ex:- Gnetum, Ephedra, Welwitschia
- Cycadales ⇒ Ex:- Cycas
- Coniferales ⇒ Ex:- Pinus, Cedrus, Sequoia (Red wood tree of California)
or
conifers

- ① in hilly areas
- ② Trees, shrubs, ~~herbs~~

Cycas

- Root → Tap Root + Cyanobacteria (coralloid root)
- Stem → Unbranched
- Leaf → pinnately compound
- Diocious

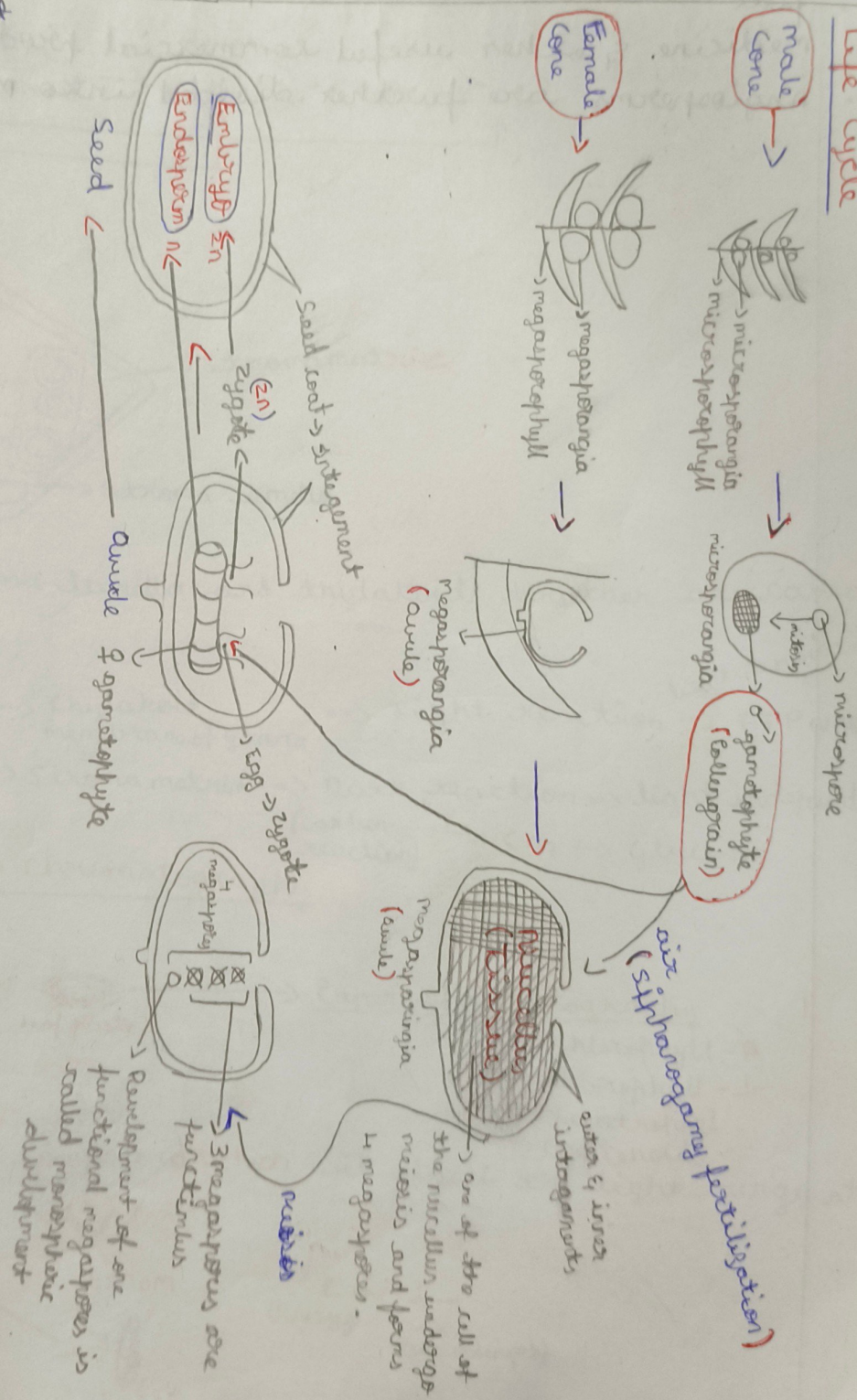
Cones → ① ♂ cone present on ♂ tree
 ② Instead of ♀ cone, the megastrophyll present in ♀ tree.

Secoia is a tallest gymnosperm.

Pinus

- Tap root + Fungi (mycorrhiza)
- Stem → Branched
- Leaf → Needle like leaves
- Monoecious
 - Thick cuticle
 - Sunken stomata } to prevent water loss
- Cones → Both ♂ & ♀ cones present in different branches of same tree

Life cycle



Angiosperms

- These are the flowering plants
- The cones of gymnosperms are modified into flowers of angiosperms
- In gymnosperms haploid endosperm is formed from female gametophyte before fertilization and whereas in angiosperms triploid endosperm is formed as a result of triple fusion after fertilization.
- Double fertilization is the unique feature of angiosperms
- Smallest angiosperm tree is *Wolffia*
- Largest angiospermic tree is *Eucalyptus*

Uses of angiosperm

- Food
- fodder
- fuel
- medicine & other useful commercial product
- Angiosperms are further divided into monocot & dicots.