DIVISION – BRYOPHYTA (Gr: Bryon-Moss, Phyton-plant)

HABITAT –

→ Grow – Moist, shady places
→ Monsoon – Dense carpet – damp soil, rock, bark of tree decaying log
↔ Adapted – Grow – soil – copper deposits – Copper masses – Indicator plant
→ Diverse Habitat
- Aquatic – Riccia, Riella
- Saprophyte – Cryptothallus
- Epiphytes – Dendroceros
- Deserts – Tortula desertorum
- Lithophyte – Porella platyphylla

→ BODY FORM –
- Main plant body / Dominant phase of life
- Gametophyte (Gamete producing body) – Thallus – eg liverwort
  leafy erect, arranged around central axis – eg. Moss
- Lack root, have root like rhizoids attach – substratum
  - Unicellular, Unbranched (Liverwort)
  - Multicellular, branched (Moss)

→ Atracheophyte

→ REPRODUCTION – FLOWERLESS

VEGETATIVE REPRODUCTION –

(i) Fragmentation – Thallus or protonema (filamentform) breaks off – wind, animal, decay – each piece – regenerate.

(ii) Gemmae – Multicellular green asexual bude develop – gemmae cup located on thalli

(iii) Tuber / Bulbil – Fleshy structure – Unfavourable condition – Favourable → Gametophyte

(iv) Oldshoot, leaves, sporophyte foot remnant → Free plant.

Vegetative reproduction allows Bryophytes to bypass need for water dependent sexual fertilization, allow colonize new areas, allow to propogate new areas where sexual reproduction fails & quicklyform dense mat.

MITOSPORES - Not formed

→ SEXUAL REPRODUCTION -

Sex organs - Multicellular jacketed
- Antheridia - antherozoids
- Archegonia - egg

Fertilization - Zygote
- Embryo → Sporophyte < Foot, Seta, Capsule

Capsule | Meiosis

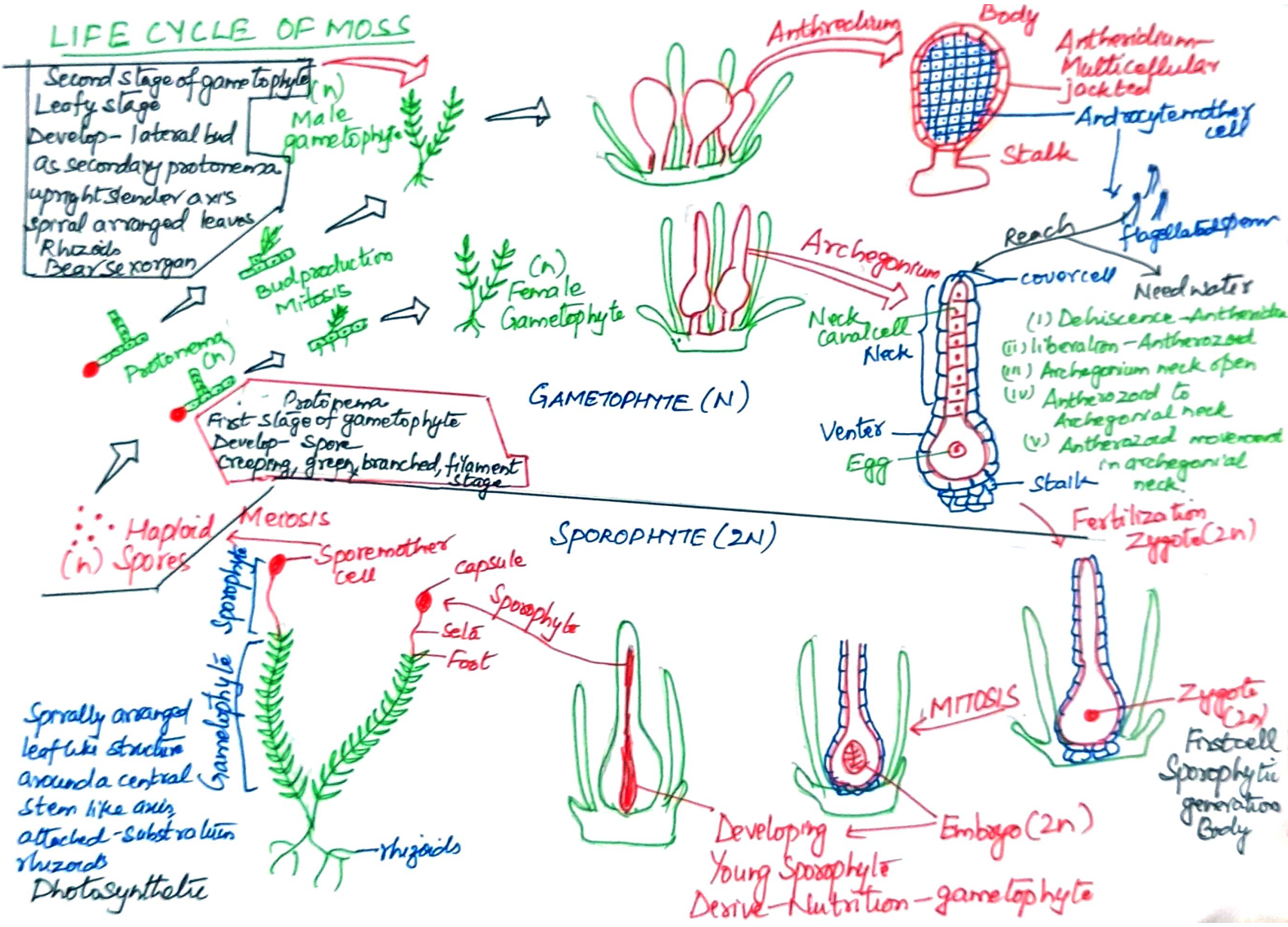
Gametophyte ← Mitosis — Spores

Amphibian - Plant kingdom

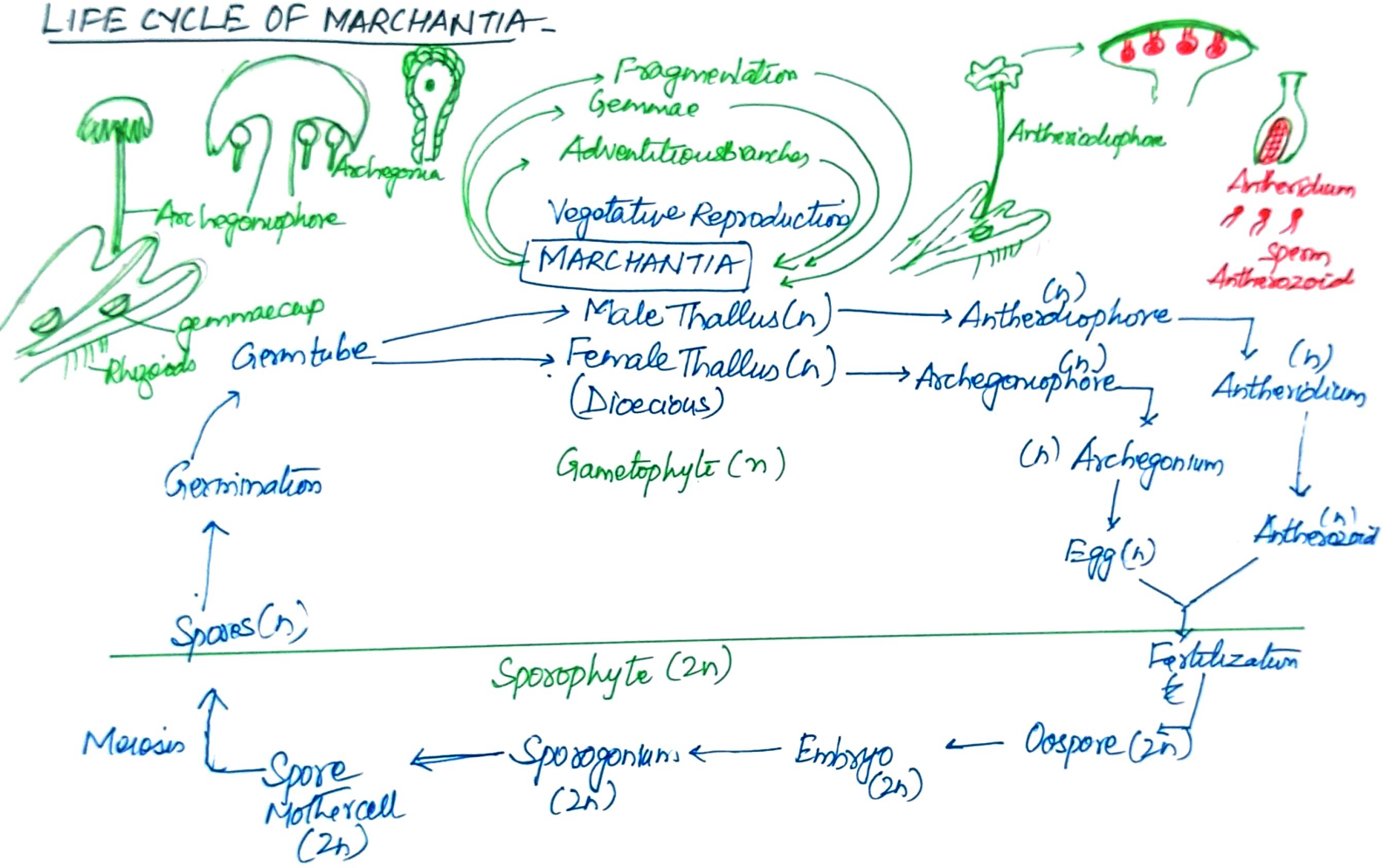
→ Life cycle of Bryophytes -
- Haplodiplontic
- Alternation between gametophyte & sporophyte (Multicellular - both)

→ Classification - Bryophytes
Hepaticopsida (Liverwort)
Anthocerotopsida (Hornwort)
Bryophytes (Moss)

→ Could not become successful land plants
Atracheophytes - lack vascular tissue
- lack deep penetrating root system for
- absorption of water & minerals
- Cuticle to resist desication
- Need water for fertilization


LIFE CYCLE OF MOSS
Second stage of gametophyte
Leafy stage
Develop - lateral bud as secondary protonema
upright slender axis
spiral arranged leaves
Rhizoids
Bear sex organ
(n) Male gametophyte
Antheridium
Body
Multicellular jacketed
Androcyte mother cell
Stalk
Flagellated sperm
Reach
Need water
Archegonium
Bud production Mitosis
(n) Female Gametophyte
Protonema (n)
Protonema
First stage of gametophyte
Develop - Spore
creeping, green, branched, filament stage
GAMETOPHYTE (N)
Neck canal cell
Neck
Venter
Egg
Stalk
(i) Dehiscence - Antheridia
(ii) liberation - Antherozoid
(iii) Archegonium neck open
(iv) Antherozoid to Archegonial neck
(v) Antherozoid movement in archegonial neck
Haploid (n) Spores
Meiosis
Sporemother cell
capsule
Sporophyte
Seta
Foot
Sporophyte
Gametophyte
Fertilization
Zygote (2n)
SPOROPHYTE (2N)
Spirally arranged leaf like structure around a central stem like axis
attached - substratum
rhizoids
Photosynthetic
rhizoids
MITOSIS
Zygote (2n)
First cell Sporophytic generation
Body
Developing Young Sporophyte
Desire - Nutrition - gametophyte
Embryo (2n)

LIFE CYCLE OF MARCHANTIA



PTERIDOPHYTA – Flowerless, seedless spore bearing Vascular plants

(Gr: Petoon – feather, phyta – plant)

Seedless Vascular plants

→ Sporophyte – Independent plant body

→ Differentiate – Root, stem and leaves

→ Primary root – short lived, replaced by adventitious roots

→ Stem – usually herbaceous & branched monopodially (plant growth pattern – plant with single continuous main stem grows indefinitely from one main top bud, produces small branching without stopping its upward growth.

→ Leaves – small microphyllous
- Eg – Lycopodium, Equisetum
- large macrophyllous
Eg – Pteridium, Pteris

→ All vegetative parts – Vascular bundle (Xylem lack vessels, phloem lack companion cells)

→ Reproduction – Spores produced within sporangia. The sporangia are borne on ventral surface of leaves called SPOROPHYLL.

→ Plants may be Homosporous – One type of spores (Lycopodium, Pteridium) OR Heterosporous (Small microspore, large macrospore)

Eg – Salaginella, Marsilea, Salvinia

Spore → Prothallus (haploid gametophyte)

Homosporous → Monoecious prothallus (Bisexual)

Heterosporous → Dioecious prothallus (Unisexual)

→ Sexual reproduction – Oogamous

Male sex organ – Antheridia, Female sex organ – Archegonia –

→ Sex organs are borne on prothalli

→ Water is required for fertilization

→ Evolutionary events precursor to seed habitat

(I) Heterospory – small microspore
– large megaspore

(II) Develop to gametophyte, female gametophyte are retained on parent sporophyte for variable period

(III) Development of zygote to young embryo takes place in female gametophyte

PTERIDOPHYTA - (Gr-Petros-feather, phyta-plant - feather like plant - Ferns)

Seedless Vascular plants - Tracheophyte but reproduce - spore.

Main plant body - Sporophyte

Sporangia - Spore Mother cell

MEIOSIS

(n)

Spores

(n)

First cell of gametophyte

MITOSIS

germination

MITOSIS

Prothallus

Homosporous

Gametophyte - Prothallus

Apical Notch

Multicellular, green autotrophic

Monoecious

Archegonia - Near apical notch

Antheridia - posterior end

GAMETOPHYTE

Antheridia

Water

Antherozoids

Neck canal cell

Egg

Venter

Archegonia

Fertilization

Sporophyll leaves with sori - cluster of sporangia

SPOROPHYTE

Zygote (2n)

Zygote - Mitosis

Sporophyte

First leaf above sporophyte & leaf below soil

circinately coiled

Aerial shoot - leaves - compound/simple

Macrophyllous

Alternate phyllotaxy

Rachis

Dominant sporophyte

True root, stem, leaves

Stem - Rhizome. perennation

Ramenta - hair scale protection

Primary root short lived

Replaced - Adventitious root

GYMNOSPERM (Seeded Vascular plants)

Naked Seed – Ovules not enclosed in ovary

→ Dominant – Cold regions, hilly areas
Few like cycads – warm weather

→ All are woody trees, bushy shrubs that are perennial.
Some very large, live thousands of years – Sequoia Sempervirens

→ Roots – taproot system
- Mycorrhiza – fungal association (Pinus)
- Coralloid roots – N_2 fixing cyanobacteria (Cycas)

→ Stem – Erect, woody, branched (Pinus)
Unbranched (cycads)

→ Tracheophytes – Xylem – Vessels absent except (Gnetales)
(Secondary growth)
– Phloem – Lack companion cells

→ ~~Re~~ Leaves – Pinnately Simple compound, needle like

→ Reproduction – Gymnosperms – All heterosporous
– Produced in Microsporangia → Microsporophyll → Male cone
Megasporangia → Megasporophyll → Female cone
(No flower Aggregate as CONE)

→ Leaves – Adapted – extreme temp., humidity & wind, Needle like leaf reduces surface area, ~~for~~ thick cuticle, Sunken stoma – ↓ water loss

Reproduction – Microspore mother cell Meiosis
→ Microspore ← develop → Male gametophyte
Highly reduced to few cells
known as pollen grain
Development – in microsporangia

→ Megaspore mother cell Meiosis 4 megaspore
– 3 desintegrate
– 1 megaspore within megasporangia
↓ Develop
Female gametophyte
(Bears 2 or more archegonia (female sex organ))
– Retained in megasporangium

→ Pteridophyte – Male gametophyte, Female gametophyte
– No independent existence
– Remain – sporangia retained
– Sporophyte

→ Pollen grains → Air → opening – ~~Mega~~ Ovule
– Pollen tube with male gamete
– Grow towards archegonia
– discharge – content
– fertilization, zygote, embryo
– Ovule develops into seeds
– seeds not covered within ovary (fruit)

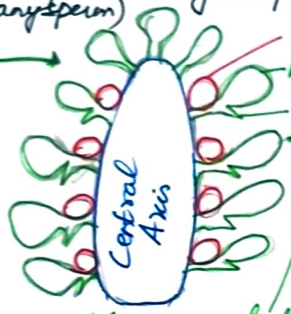
GYMNOSPERMS

Reduced gametophyte
Heterospory – Megasporangium – megaspore – (One Egg) → Female gametophyte
Microsporangium – microspore – (Many sperm) → Male gametophyte

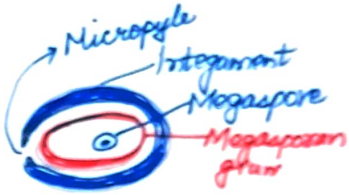
SPOROPHYTE (2n)

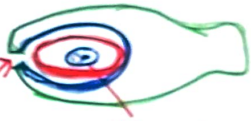
Ovulate cone
Megastrobili

Male (Pollen cone)



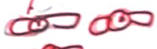
Ovule – 2 in number
Woody scale (Bear ovule)
Bract scale
Mastur types of Scales
Megasporophyll – spiral arranged



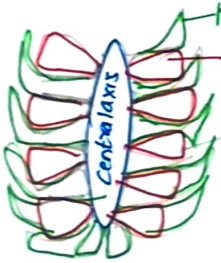


Megasporocyte (2n)
↓ Meiosis
Megaspore (n)
1 Survive

Pollination
Wind



Pollen grain
Develop Male gametophyte (Reduced 3/2 male gametes)

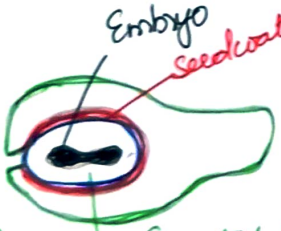


Microsporophyll – around central axis
Microsporangium

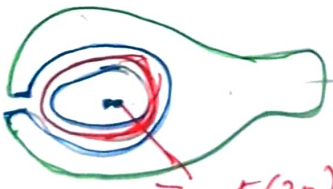
Microsporocyte (2n)
Meiosis

Develop other place

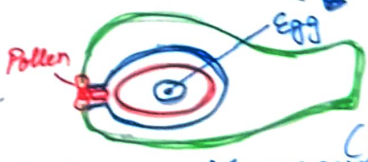
Seedwings



Food Embryo
Gametophytic tissue



Zygote (2n)



1 Egg fertilize
3 – Develop Archegonia Produce Egg

Megaspore (n)
↓ Mitosis
Female (n) Gametophyte