Tutorial 2a

Study Unit 4

Thanks for your involvement in making this group an interactive one. If you are yet to participate, Please do.

As it has been mentioned in my welcome address that all the tutorials will be based on what the Lecturer has designed. Even though, I tried (and will try in subsequent ones) to simplify the module for the purpose of your understanding, I would like to say that ***IT IS NOT EXHAUSTIVE IN ITSELF****. Hence, onus lies on you to study and study to ensure maximum achievement. To this effect, only highlight excerpt are presented here. This also will cut across all tutorials that I would be pasting on myunisa.*

The land plants evolved from charophycean algae

- chloroplasts with chlorophyll a and b are present in both and in green algae, euglenid and few dinoflagellates
- Land plants and charophytes have rings of cellulose synthesizing proteins but the non charopytes protein is linear but also synthesizes cellulose.
- Peroxisome: they both has peroxisome which produce enzyme that help to minimize loss of organic product resulting from photorespiration
- Sperm: The land plant with flagellated sperm resemble the charophyte sperm
- Phragmoplast: in land plants and some charopyte, there is formation of phragmoplast between the two daughter cells in cell division. the cell plate develops in the middle of the phragmoplast and gives rise to a new cross wall which separates the daughter cells

Alternation of generation

The life cycle of all land plants alternates between two mulkticellular organisms: the gametophytes and the sporophytesthe each generation gives rise to the other generation. The difference between sexual reproduction and alternation of generation is that the gamete in sexual reproduction life cycle is haploid unicellular and the zygote is diploid multicellular but in alternation of generation both the gametophyte and sporophytes are multicellular.

Gametophyte through mitosis produces the haploid gametes eggs and sperm which fuses in fertilization forms diploid zygotes. Mitotic division of zygote produces diploid sporophyte . Meosis occur in matured sporophyte to produce haploid spores which can develop into new haploid organism. Mitotic division in the haploid organism forms a new gametophyte and the cycle continues.

Spores in land plant through mitosis grow into multicellular haploid gametophyte which is protected by wall containing sporopollenin. The sporocytes contain sporangia that produce the spores. Algae lack both sporangia and sporopollenin

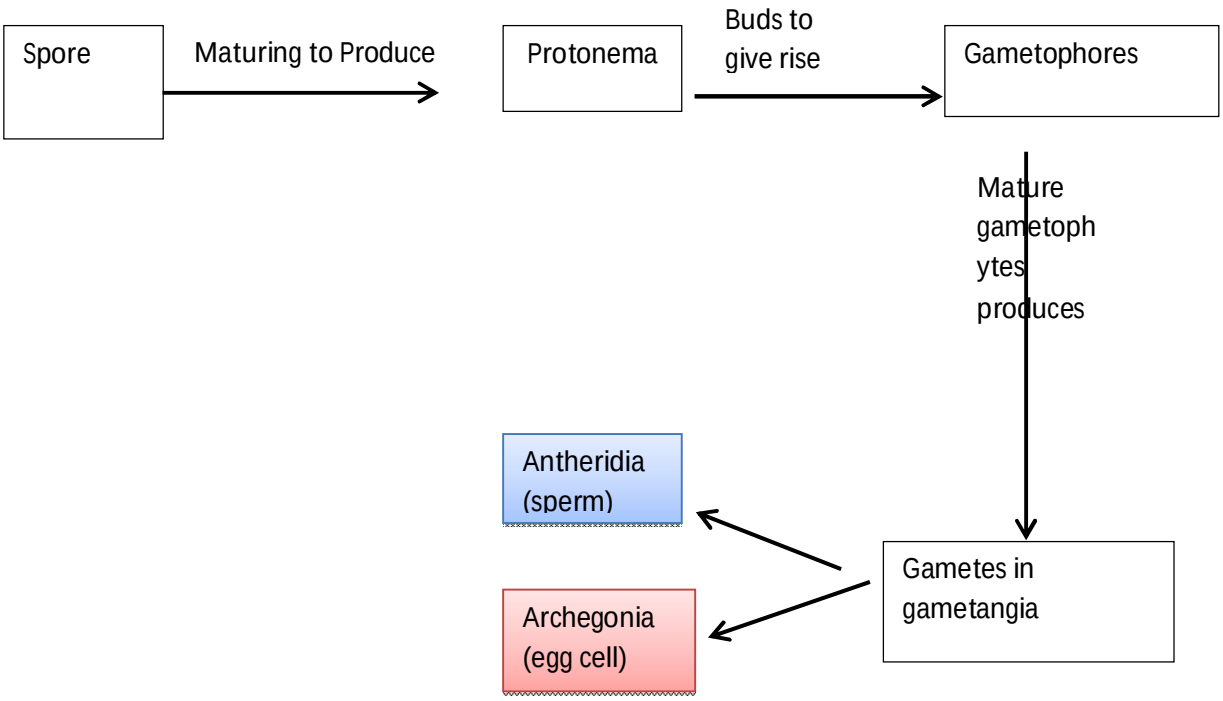
Apical meristem is the localized regions of cell division in the shoot and stem that enable the plant root and shoot to reach to the resources in its environment. The root's apical meristem has an outer

epidermis to protect the body and the internal tissues. Shoot apical meristem generates leaves in most plants.

Bryophytes are the non-vascular plants which consist of three phyla:

- Liverworts
- Mosses
- Hornworts

The gametophyte generation is dominant in mosses life cycle. The germinating mosses spore form the protonema which buds and gives rise to gametophore. The gametophyte produces gametes in gametangia which may be antheridia for male containing sperm and the archegonia female containing the egg cell.



NOTE: This diagram is for the purpose of your understanding. Check for diagrams in prescribed text book.

Sporophyte is dependent on gametophyte. The matured sporophyte consists of three structural parts:

- The capsule or sporangium which has teeth like peristome. The peristome open when dry and closes when wet
- Seta: a long stalk which supports the capsule. It conducts nutrients from the gametophyte to the capsule. It is usually long to elevate the capsule and enhance spore dispersal
- Foot: it is embedded in archegonium and it absorbs nutrients from the gametophyte

Mosses and hornwort sporophyte has stomata which is also found in vascular plants

Vascular plants have two types of vascular tissues:

Xylem: conduct most of the water and minerals. It mostly includes the tracheids- these are tube shaped cells that carry water and minerals up from the roots. Tracheids cell wall are strengthened by polymer lignin

Phloem: has cells arranged into tubes. They distribute sugar, amino acids and other organic products.

Lignified vascular tissue gives the stem its strength to grow tall against the gravity.

Roots: instead of rhizomes in bryophytes, vascular plants have roots evolving from the sporophyte. Roots are organs that absorb water and nutrients from the soil. It also serves as anchor.

Leaves: it is the primary photosynthetic organ of the vascular plants. Leaves can be classified as:

- **microphylls-** the leaves are small, spine shaped leaves supported by single vascular tissue. This type of leaf is found in the lycophytes (oldest lineage of present vascular plant)
- **Megaphylls** these are leaves with highly branched vascular system. It supports photosynthesis more than microphyll. It is named megaphylls because of its size.

Sporophylls and different types of spores: sporophylls are modified leaves that bear the sporangia.

In ferns sporophyll produces cluster sporangia known as sori

In most gymnosperm and lycophytes groups of sporophyll form cone structure called strobili.

Spore production in vascular plants can be of two types:

i. **Homosporus spore production** and
ii. **heterosporus spore production**.

Most seed plants are heterosporus

- Most **seedless vascular plants are Homosporus**- they have one type of sporangium that produces one types of spore
- **Heterosporus**- they have two types of sporangiaand produces two kinds of spore:
    a. **Megasporangia** on **megasporophylls** to produce **megaspore** which develops into **female gametophytes**
    b. **Microsporangia** on **microsporophylls** to produce **microspore** which develops into **male gametophyte**

Pteridophytes have true roots with lignified vascular tissues they have rhizome with leaves and clusters of sporangia. It is well adapted to land life because of its branched lignified vascular system and spores are protected by sporopollenin