

Bryophyta

- The word **bryophyte** is the collective term for mosses, hornworts and liverworts and **bryology** is the study of bryophytes. While there are marked differences between these three groups of organisms, they are related closely enough to warrant a single term that includes all three. So a moss is a bryophyte, a liverwort is a bryophyte and a hornwort is a bryophyte.
- These are all plants, scientifically classified within the Plant Kingdom. They are spore-producing, rather than seed-producing, plants and they are all without flowers. Like any living organisms bryophytes are classified hierarchically. Related species are grouped into genera, related genera are grouped into families and so on

- More than 25,000 species of bryophytes thrive in mostly-damp habitats, although some live in deserts. They constitute the major flora of inhospitable environments like the tundra where their small size and tolerance to desiccation offer distinct advantages. They generally lack lignin and do not have actual tracheids (xylem cells specialized for water conduction). Rather, water and nutrients circulate inside specialized conducting cells. Although the term non-tracheophyte is more accurate, bryophytes are commonly called non-vascular plants.

Liverworts

- Liverworts (Hepaticophyta) are viewed as the plants most closely related to the ancestor that moved to land. Liverworts have colonized every terrestrial habitat on earth and diversified to more than 7000 existing species. Liverwort gametophytes (the dominant stage of the life cycle) form lobate green structures. The shape of these leaves are similar to the lobes of the liver; hence, providing the origin of the name given to the phylum. Openings that allow the movement of gases may be observed in liverworts. However, these are not stomata because they do not actively open and close. The plant takes up water over its entire surface and has no cuticle to prevent desiccation.

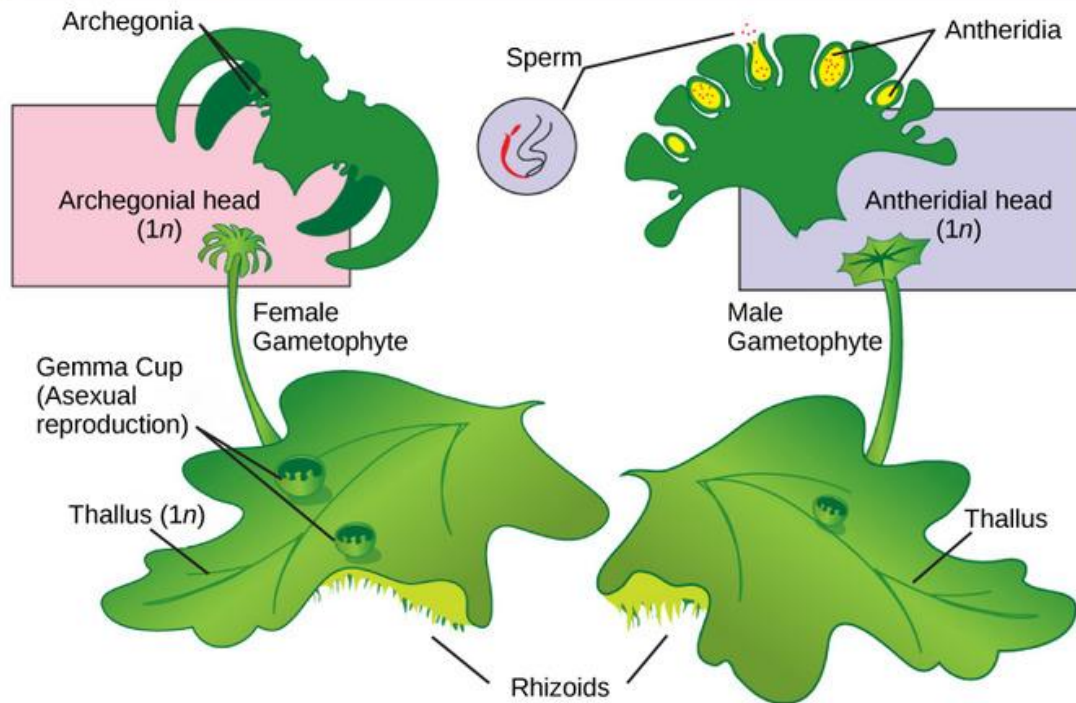
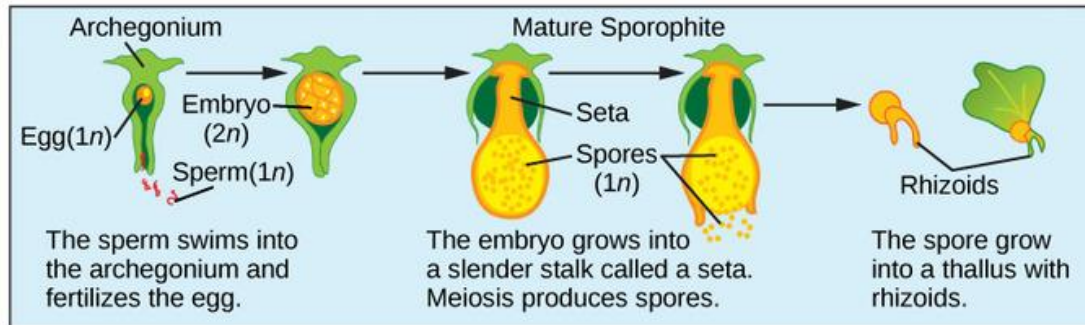


Hornworts

- The hornworts (Anthocerotophyta) belong to the broad bryophyte group that have colonized a variety of habitats on land, although they are never far from a source of moisture. The short, blue-green gametophyte is the dominant phase of the lifecycle of a hornwort. The narrow, pipe-like sporophyte is the defining characteristic of the group. The sporophytes emerge from the parent gametophyte and continue to grow throughout the life of the plant. Stomata appear in the hornworts and are abundant on the sporophyte. Photosynthetic cells in the thallus contain a single chloroplast. Meristem cells at the base of the plant keep dividing and adding to its height. Many hornworts establish symbiotic relationships with cyanobacteria that fix nitrogen from the environment.

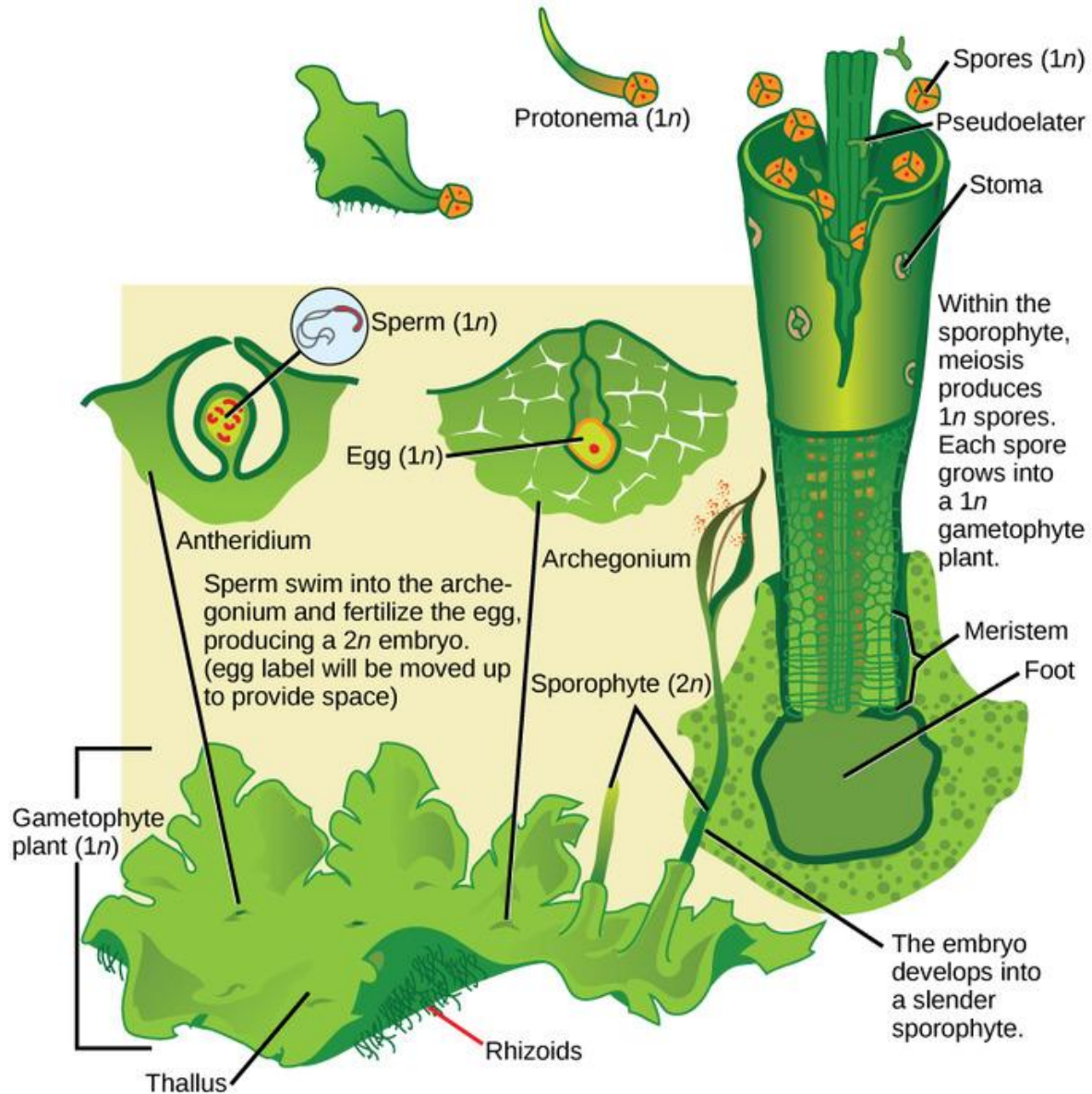


Liverwort life cycle



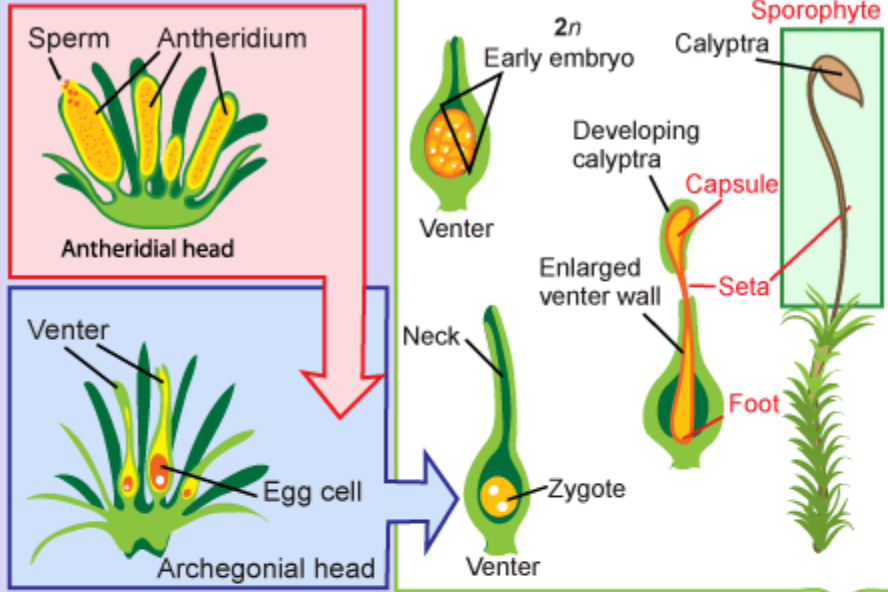
Liverwort Life Cycle

Hornwort life cycle

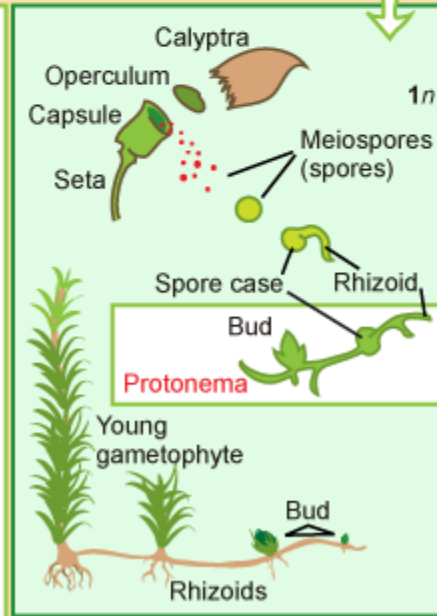
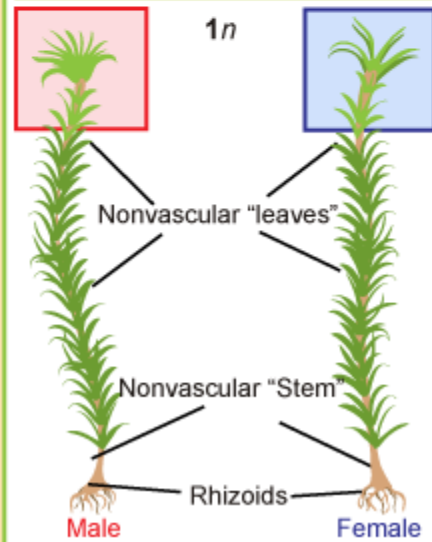


Life Cycle of a Typical Moss

Fertilization



Mature Gametophytes



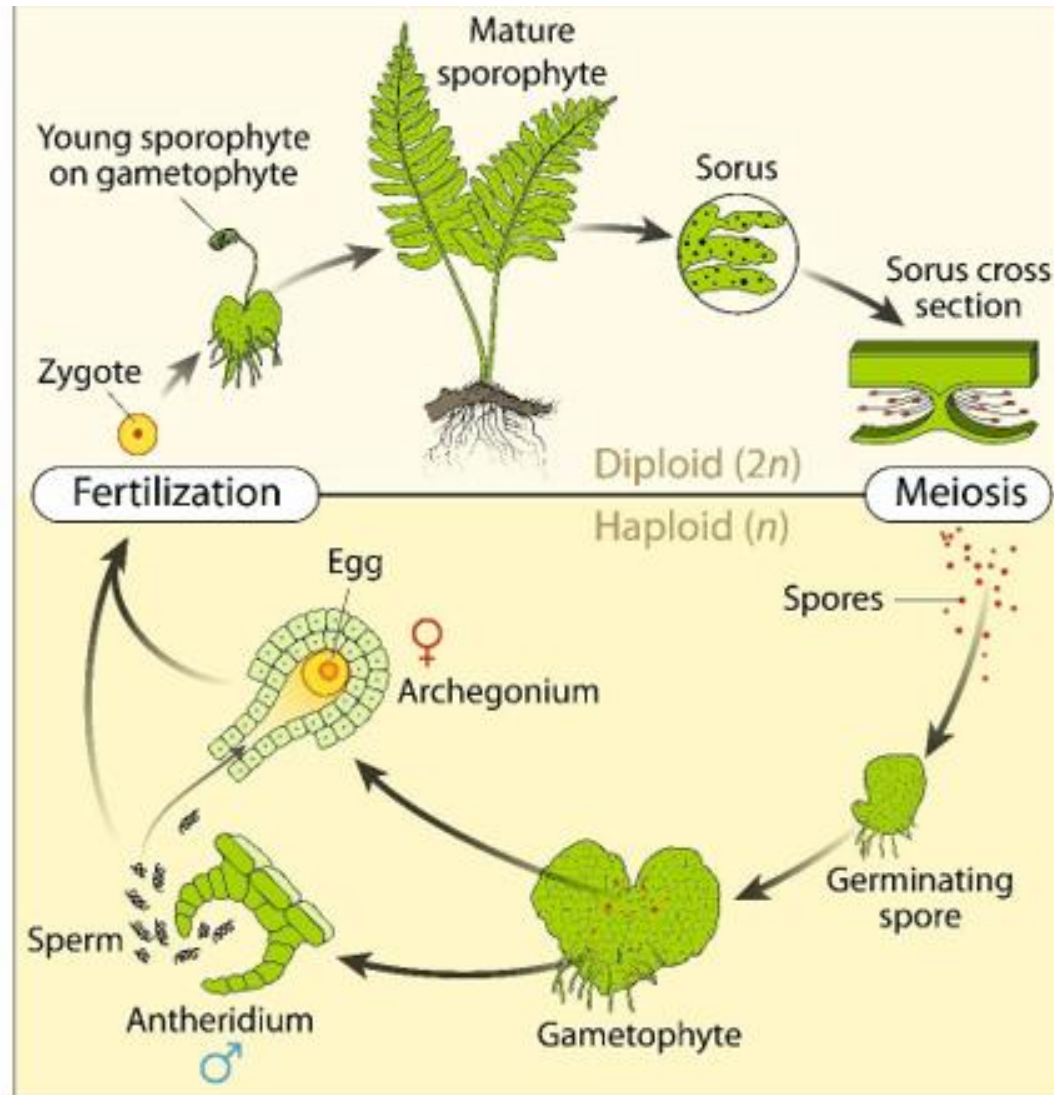
Meiosis

Pteridophyte

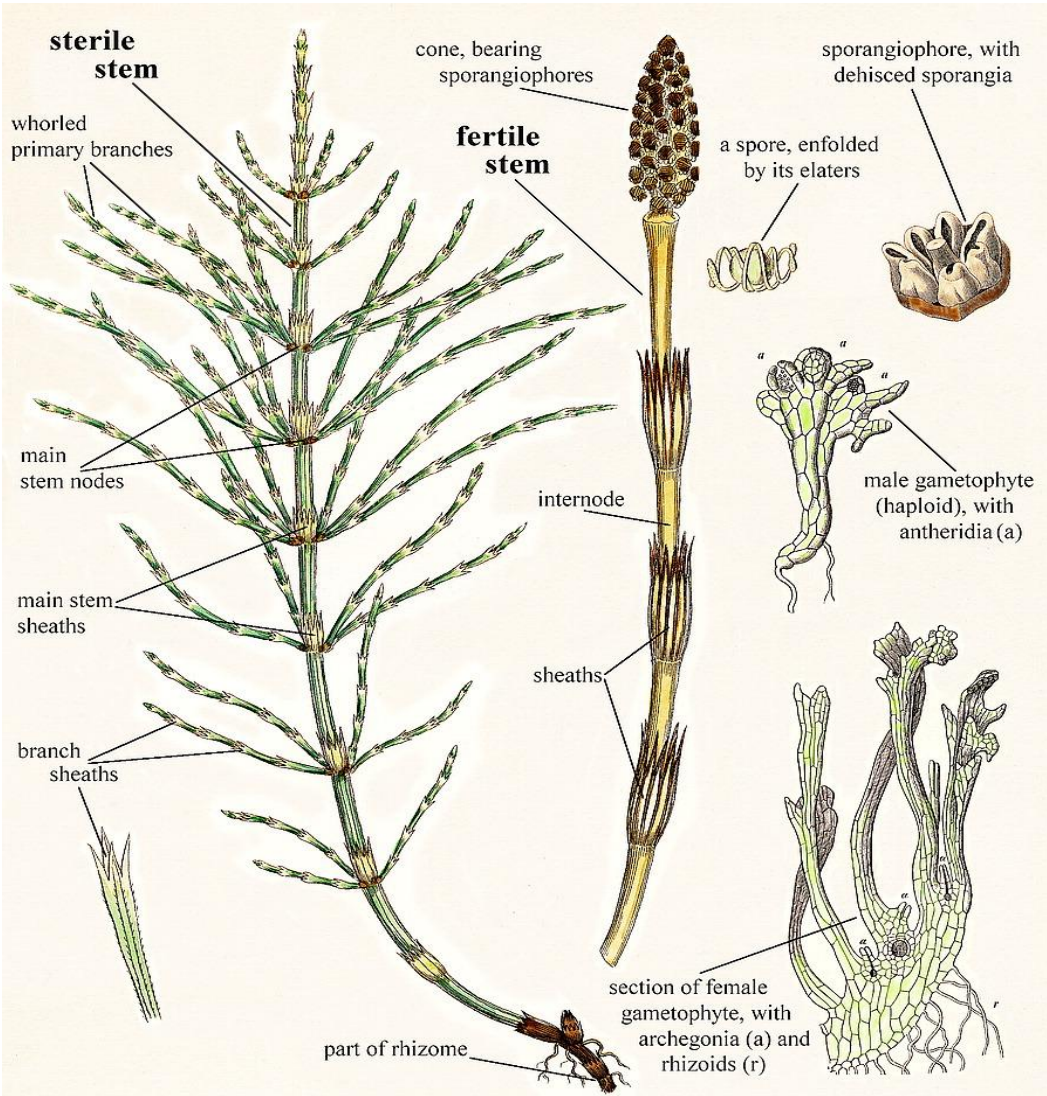
- A **pteridophyte** is a vascular plant (with xylem and phloem) that disperses spores. Because pteridophytes produce neither flowers nor seeds, they are sometimes referred to as "cryptogams", meaning that their means of reproduction is hidden. Ferns, horsetail (often treated as ferns), and lycophytes (clubmosses, spikemosses, and quillworts) are all pteridophytes. However, they do not form a monophyletic group because ferns (and horsetails) are more closely related to seed plants than to lycophytes. "Pteridophyta" is thus no longer a widely accepted taxon, but the term *pteridophyte* remains in common parlance, as do *pteridology* and *pteridologist* as a science and its practitioner,



Pteridophyte life cycle



Equisetum



Gymnosperms

- The **gymnosperms** (lit. revealed seeds), also known as **Acrogymnospermae**, are a group of seed-producing plants that includes conifers, cycads, *Ginkgo*, and gnetophytes. The term *gymnosperm* comes from the composite word in Greek: γυμνόσπερμος (γυμνός, *gymnos*, 'naked' and σπέρμα, *sperma*, 'seed'), literally meaning 'naked seeds'. The name is based on the unenclosed condition of their seeds (called ovules in their unfertilized state). The non-encased condition of their seeds contrasts with the seeds and ovules of flowering plants (angiosperms), which are enclosed within an ovary. Gymnosperm seeds develop either on the surface of scales or leaves, which are often modified to form cones, or solitary



