

Mosses-Bryophytes

<http://tolweb.org/Bryophyta>

Mosses are Bryophytes (land plants) that do not have true vascular tissue (hollow tube cells that conduct fluids like hoses) and are therefore called "non-vascular plants". Bryophytes have sperm and egg producing reproductive structures called an antheridium and archigoneum respectively (see figure). Both of these structures are haploid, meaning all the cells have only one set of chromosomes in each of their nuclei. The symbol for haploid is the letter n (1n and n are the same...we often skip the 1 before the n). When a sperm that contains n chromosomes combines with an egg with n chromosomes it forms a single celled fertilized egg with 2n chromosomes called a zygote. Humans inherit 1n from each of their parents...the fathers sperm provides 1n and the mother's egg provides 1n. $1n + 1n = 2n$. The n stands for the number of chromosomes for that species. Humans have 23 different types of chromosomes. Each person has 23 pairs of chromosomes in everyone of their non-reproductive nucleated cells. One of each pair comes from you mother and the match to each of the pairs comes from your father. We will go through this in great detail later in the year. It is covered in a variety of instructional lessons...for example in "Gametophyte Development" → <https://www.youtube.com/watch?v=vLq5Os8oOpc>

Mosses produce neither flowers nor seeds. They reproduce through spores. The term bryophyte comes from Greek βρύον, bryon, "tree-moss, oyster-green" + φυτόν - phytón "plant".

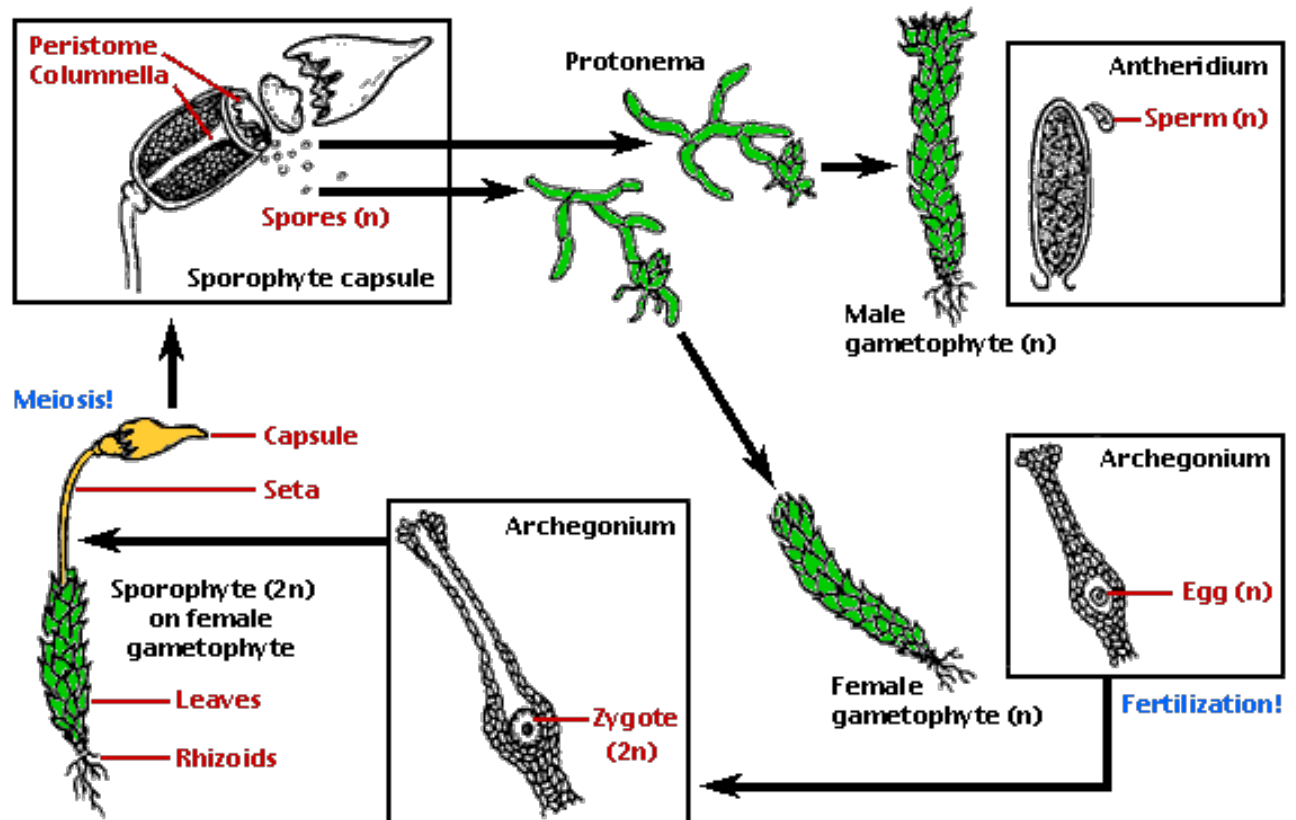


Figure 1. Life cycle of a moss. Modified from original drawings by Ivy Livingstone. © 1997 [BIODIDAC](http://www.biodidac.com) Modified from original drawings by Ivy Livingstone.

The life cycle of a moss alternates between a green leafy gametophyte and a stalked sporophyte that grows on the gametophyte. The sporophyte is $2n$ and produces $1n$ spores through a process called meiosis.

Protonema. Spores with n chromosomes germinate and produce two kinds of protonema. The protonema are either female or male.

Gametophyte. The leafy green plant part of the moss that will either produce sperm or eggs. The leaves are spirally arranged. Leaves are sessile (attached directly at their bases and not by a stem), unlobed, and often with a thickened midrib. A gametophyte is the haploid multicellular stage in the alternation of generations during the life cycle of land plants and algae. It is produced from cell division of spores, which are produced by [meiosis](#) in sporophytes. [Meiosis](#) is a complex process where the organism produces $1n$ haploid egg and $1n$ (haploid) sperm from $2n$ (diploid) cells. Gametophytes produce haploid male or female gametes (or both) by a process called [mitosis](#) that we will cover in detail later. This is quite different from how mammals reproduce and is an example of the complexity of life.

The female and male gametes are also called, respectively, egg cells and sperm cells. The fusion of male and female gametes produces a diploid zygote, which develops by repeated cell divisions into a multicellular sporophyte. Because sporophytes are the product of the fusion of two haploid gametes, these sporophyte cells are normally diploid, containing two sets of chromosomes. The mature sporophyte produces spores by a process of cell division called meiosis, or reduction division, in which the chromosome pairs are separated once again to form single sets. The spores are therefore once again haploid and develop into haploid gametophytes.

Sporophyte. The $2n$ sporophyte consists of the foot where it attached to the female gametophyte, a seta or stalk, and a capsule that encloses the $1n$ spores. The foot is embedded within the apex (top end) of a stem or branch.

Peristome. In the majority of mosses, the apex of the capsule (operculum) falls off at maturity and reveals a structure called the peristome (see picture). This is a ring of narrow triangular segments surrounding the mouth of the capsule. Changes in moisture conditions cause movements of the peristome and facilitate the dispersion of spores in favorable dry conditions. Two basic types of peristomes are found in mosses: arthrodontous and nematodontous. In **arthrodontous** peristomes, at the level of the capsule mouth and above, three innermost rings of cells of the amphithecium are involved in the formation of teeth in most taxa.

