

LIFE CYCLES OF VASCULAR PLANTS

The life cycle of all sexually reproducing organisms involves an alternation of generations, that is, a cycle between a haploid ($1n$) phase and a diploid ($2n$) phase. **Haploid** refers to a condition in which there is only one set of chromosomes per cell (from one parent), while **diploid** indicates there are two sets of chromosomes per cell (one from each parent). The duration of each phase of the life cycle depends on the type of organisms. The dominant phase (observable organism) may be either haploid (many algae, mosses) or diploid (ferns, seed plants, and most animals) or, in a few instances, the haploid and diploid phases may be co-dominant (some algae). In plants we denote the haploid phase as the **gametophyte** and the diploid phase as the **sporophyte**.

Fertilization (syngamy) and **meiosis** are the two unifying features of all sexual reproductive systems in plants and animals. **Fertilization occurs when two haploid ($1n$) gametes or sex cells fuse to form a diploid ($2n$) zygote. Meiosis (also called reduction division, see accompanying Table) occurs in sporangia and is a nuclear division in which a diploid nucleus undergoes two divisions, resulting in four haploid nuclei.** Subsequently, cytoplasm and a cell wall forms around each haploid nucleus, giving rise to four spores ($1n$). In some organisms, the spore is the sex cell or gamete, while in others, it divides mitotically to form a gametophyte. In vascular plants, spores develop into haploid gametophytes, which are multicellular structures that form the $1n$ sex cells or gametes. For a nice web site with details of life cycles for various kinds of plants, go here. <http://zygote.swarthmore.edu/phyto1.html>

Growth in an organism occurs by mitosis, which is the formation of new cells by a single division of a nucleus (either haploid or diploid) followed by separation of the cytoplasm. **The end product of a single mitotic division is two new cells that have the same chromosome complement as the parent cell.** Mitosis facilitates growth of a zygote into an embryo as well as further increases in size and growth to form an adult organism.

Generalized Life Cycle of Vascular Plants

