h4 How does pollen differ from spore? < dormant gametophyte >

> ... what may be the most provocative comment pertaining to the fundamental role of limits, trade-offs and compromises. According to his biographer, Abraham Pais, when Niels Bohr [pondering inscrutable quantum clouds or untenable electron orbits] was asked to specify what was complimentary [in the sense of ying and yang] to truth [*Wahrheit*], he replied: clarity [*Klarheit*].
>
> —Neil S. Greenspan.[1]

A pollen grain is an already growing haploid gametophyte that has gone dormant. It begins as a male spore, which is a single cell and is the product of meiosis of a diploid cell of the parent plants's anther. It grows in place in the anther, which keeps it moist, to become a pollen grain (a male haploid plant). Growth is by thickening of the spore cell-wall (to be the pollen coat) and one mitotic division within it that produces a male-generative nucleus and a tube nucleus. This two-cell male gametophyte goes dormant and is a single grain of pollen ready to be shed from the parent sporophyte plant. Further growth of the pollen to maturity (***Figure h4.1***) can resume only after it has been shed, transferred, and deposited on the stigma of a mature pistil of a same-species flower. The transference mechanism can be broadcasting by the wind as is so for gymnosperms such as pine trees (from the male cone) and angiosperms such as grasses, or selective, requiring co-adapted animal pollinators such as bees, butterflies, moths, wasps (as for figs), flies, beetles, and other invertebrates, and vertebrates such as geckos, possums, lemurs, flying foxes, fruit bats, hummingbirds, and perching birds.

The female gametophye (maternally derived haploid tissue) begins as a female spore (a single haploid cell) that lives parasitically on the parent plant and grows to maturity (a female haploid plant that has produced an egg) housed at the base of the pistil. It is not shed.

On arrival on a stigma (the top of the pistil), a pollen undergoes further minimal growth to produce two sperm cells that travel down the interior of the pistil. One of these sperms fertilizes the egg cell of the female gametophyte. At the time of this sperm and egg fusion that forms a zygote, a second fertilization by the other sperm results in biparental diploid endosperm, which tissue continues to transfer nutrients from the maternal diploid to (and to humans, as two thirds of human caloric intake derives from endosperm!) the zygote for its growth to a seed (a dormant diploid sporophyte plant with a dowery yet of endosperm tissue that will afford the seed the wherewithal when shed and planted to put down a root and sprout its first leaf if it a monocot or its first two leaves if it is a dicot).[2] ❑

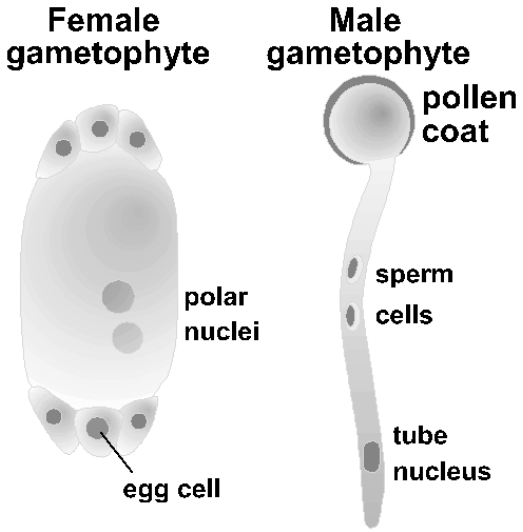

Figure ***h4.1*** [3]
The female (haploid) gametophyte has grown to maturity and has produced an egg cell.

The male (haploid) gametophyte is shed from the parent plant as pollen. At that stage of its growth it is a cell with two nuclei. The pollen (right) has started its further growth that occurs when it has been deposited on the stigma of a flower's pistil. This growth is the lengthening of a tube into which its two nuclei move, and the mitotic division of the generative nucleus into two sperm cells.