

# Morphology and Life cycle of a Mushroom

## General Characters

1. Mushrooms are multicellular filamentous fungi.
2. They generally grow in moist, humid and dark places, on rotten logs of wood, tree trunks, soil rich in organic matter, dung cakes, decaying organic matter, etc.
3. Mushrooms belong to the kingdom Fungi or Mycota.
4. They are **achlorophyllous** (lack chlorophyll) and hence cannot prepare their own food.
5. They get their food from decomposing, dead and decaying organic matter. So, mushrooms are also called saprophytic fungi, which is a type of heterotrophic mode of nutrition.
6. Mushrooms may either be edible or non-edible (toxic or poisonous).

## Morphology of Mushroom

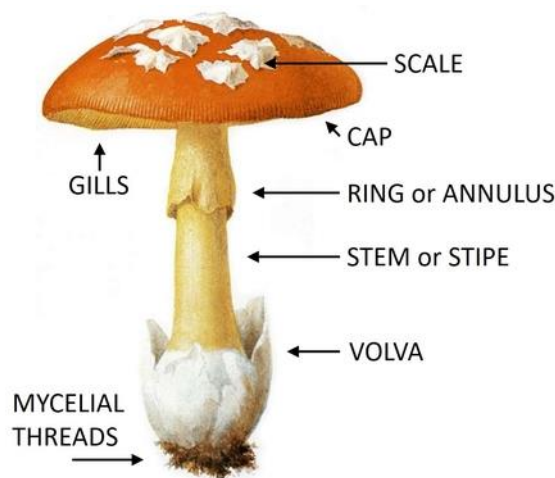


Fig. Different parts of Mushroom

The body of mushrooms can be divided into two major parts-

### **Mycelium or the vegetative body:**

It is comprised of profusely branched thread like septate (segmented) hyphae growing in the substratum. It remains hidden under the soil. Hypha is an individual thread-like filament that is the structural and fundamental unit of multicellular fungi. The network of hyphae forms the vegetative body called mycelium and also the fruiting body (reproductive body). The mycelium helps in the anchorage of the mushroom on the substratum and also in the absorption of soluble food from the substratum.

Mycelium is of two types;

**Monokaryotic primary mycelia:-** They consist of network of uninucleate septate hyphae. They are short lived and give rise to long-lived secondary mycelia through somatogamy or plasmogamy. Plasmogamy is the fusion of cytoplasm of two compatible (opposite strains) hyphae without their nuclei getting fused.

**Dikaryotic secondary mycelia:-** They produce the aerial fruiting bodies called **basidiocarps** (matured mushrooms). Basidiocarp is also known as a spawn.

### **Fruiting body or the reproductive body:**

The fruiting body or basidiocarp has the following parts:

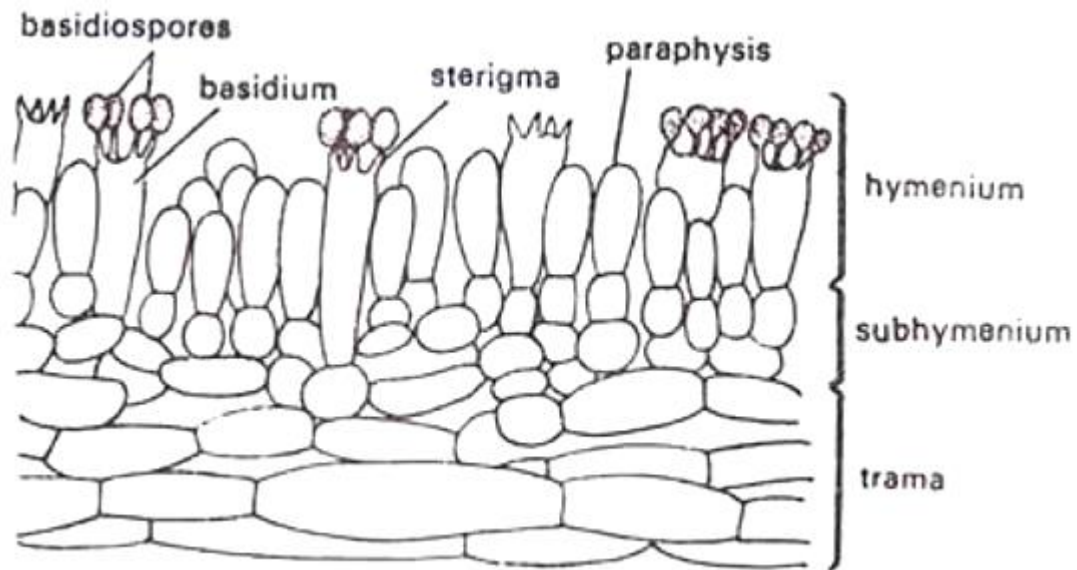
**Pileus:-** It is also known as a roof or cap. It is umbrella or parasol shaped and protects the gills or lamellae located on its ventral surface. The pileus may be white or bright and colorful with scales on its upper surface.

**Gills or lamellae:-** The ventral or under surface of the pileus is flat and has a number of radiating rows of vertical plates called lamellae or gills. It is the reproductive part of a fruiting body which produces brown colored reproductive spores called **basidiospores**.

**Stalk or stipe:-** It is a fleshy structure which acts like a stem and supports the umbrella shaped heavy pileus.

**Annulus:-** It is a membranous ring like structure that is present around the upper part of the stipe just beneath the pileus.

**Volva:-** It is a cup-like structure at the base of stipe. Volva is a remnant of the veil. Veil of velum is a very thin membrane that covers a young basidiocarp. When the mushroom is matured, its velum ruptures and leaves its remnant as volva (near the base of the stalk) and annulus (near the pileus on the stalk).



**Fig. Internal structure of pileus through gills**

A vertical section of the pileus through the gills shows three distinct regions:

**Trama:-** Trama is the innermost spongy portion of the gills. It is formed by a mass of elongated hyphae.

**Sub-hymenium:-** It lies outside the trama and is a compact layer of short branches of hyphae.

**Hymenium:-** It is the outermost fertile portion of a gill and consists of two types of cells:

**Basidia:-** They are larger club-shaped cells and are bi-nucleated. They are fertile cells and later produce basidiospores.

**Paraphyses:-** They are also bi-nucleated but are shorter and slender. They are sterile cells and can't produce basidiospores.

### **Life cycle of a mushroom**

Mushroom usually reproduces sexually but the development of sex organs is absent. Life cycle starts with the production of the reproductive spores called basidiospores.

**1. Formation of a zygote:-** The two nuclei of each basidium get fused by a process called karyogamy to form a diploid ( $2n$ ) nucleus. The basidium represents a zygote and is the only diploid stage in the life cycle.

**2. Meiotic division of a zygote:-** The zygote immediately undergoes meiosis to form four haploid ( $n$ ) nuclei. Each basidium develops four slender outgrowths called sterigmata on its free end.

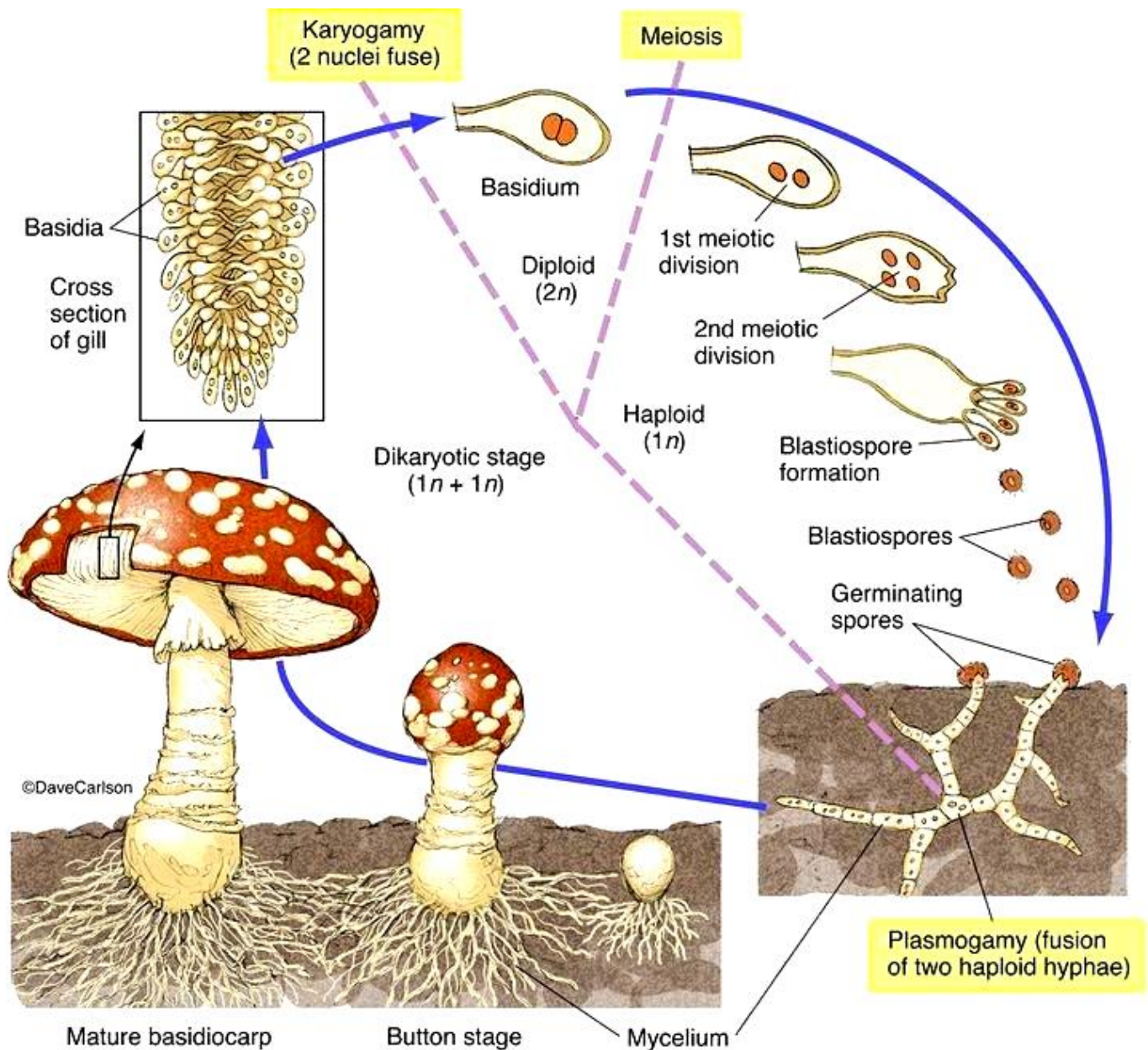
**3. Migration of haploid nuclei into sterigmata:-** Each of the four haploid nuclei with cytoplasm migrates into each sterigma. The tip of the sterigmata finally develops into microscopic basidiospores. In this way, each basidium produces four basidiospores. Among four, two basidiospores are of one mating type or positive strain (+ve) and other two are of another mating type or negative strain (-ve).

**4. Release of basidiospores and their germination:-** On maturity, basidiospores are pinched off and blown away by wind. Mature mushroom releases hundreds of millions of spores upon arrival of favorable conditions. On falling on suitable substratum, all the basidiospores germinate and form four primary mycelia or uninucleate primary hyphae or monokaryons (two +ve strains and two -ve strains).

**5. Fusion of monokaryons to form a dikaryon:-** The two primary hyphal cells between compatible monokaryons or opposite mating types (+ve and -ve) fuse together by a process called plasmogamy to form a dikaryon or dikaryotic hyphal cell. The dikaryon develops the secondary mycelium which is long and branched. The secondary mycelium contains the nuclei of both the mating types, hence called a dikaryon.

**6. Development of Button stage and the matured basidiocarp:-** Under suitable temperature and humidity, several secondary mycelia are twisted forming a cord-like structure called the rhizomorph. The rhizomorph grows and develops many small spherical or rounded structures called 'button' in the substratum. These buttons later grow in an umbrella shaped large mushrooms called the basidiocarps.

Thus, once mature, mushrooms produce basidiospores, releasing them to the suitable environment and continuing the life cycle of mushroom.



**Fig. Different stages of the Life cycle of Mushroom (diagrammatic)**