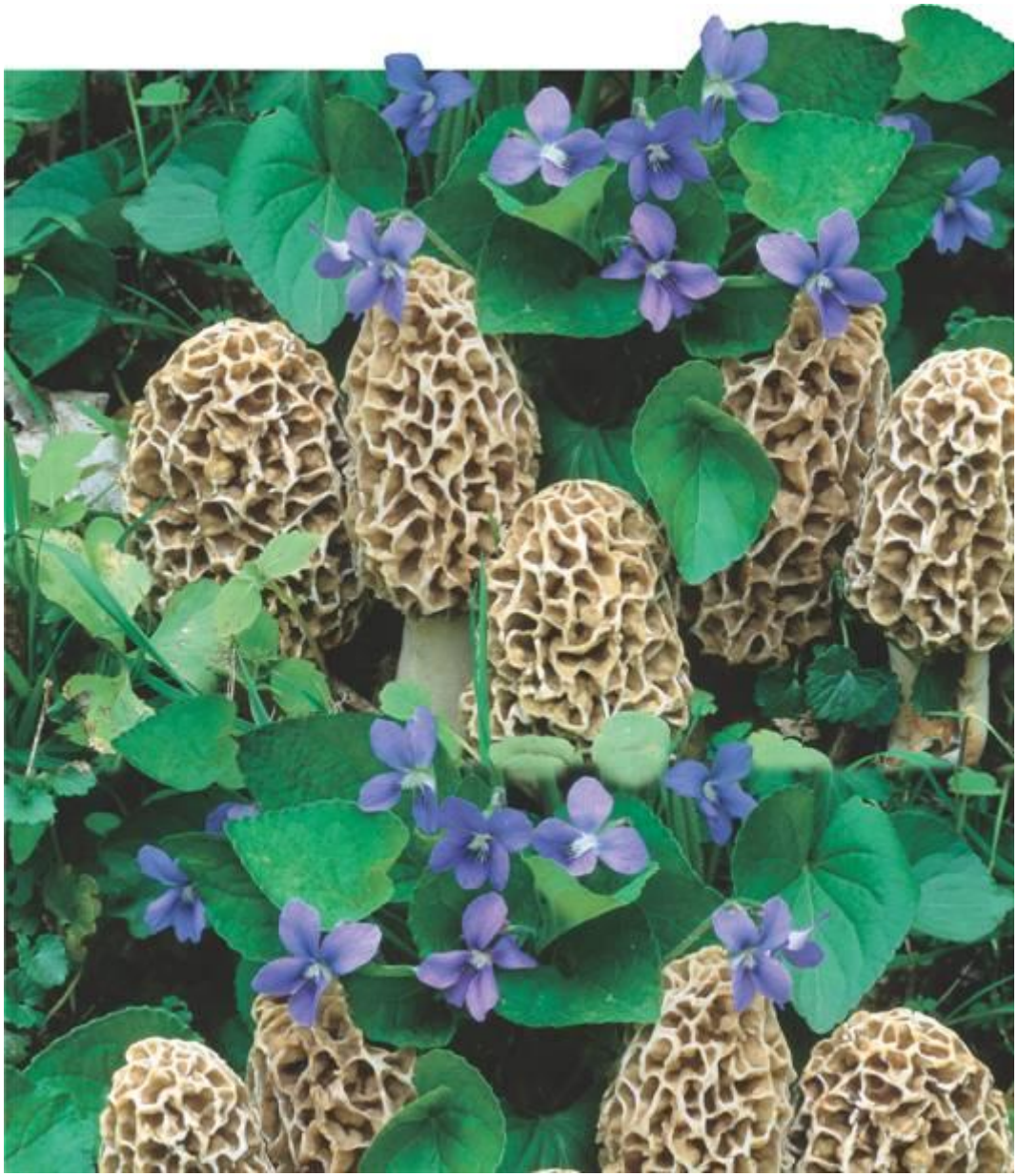
21-2 Classification of Fungi



Fungi are classified according to their structure and method of reproduction.

The four main groups of fungi are:

- Common molds (Zygomycota)
- Sac fungi (Ascomycota)
- Club fungi (Basidiomycota)
- Imperfect fungi (Deuteromycota)

Zygomycetes have life cycles that include a zygospore.

A **zygospore** is a resting spore that contains zygotes

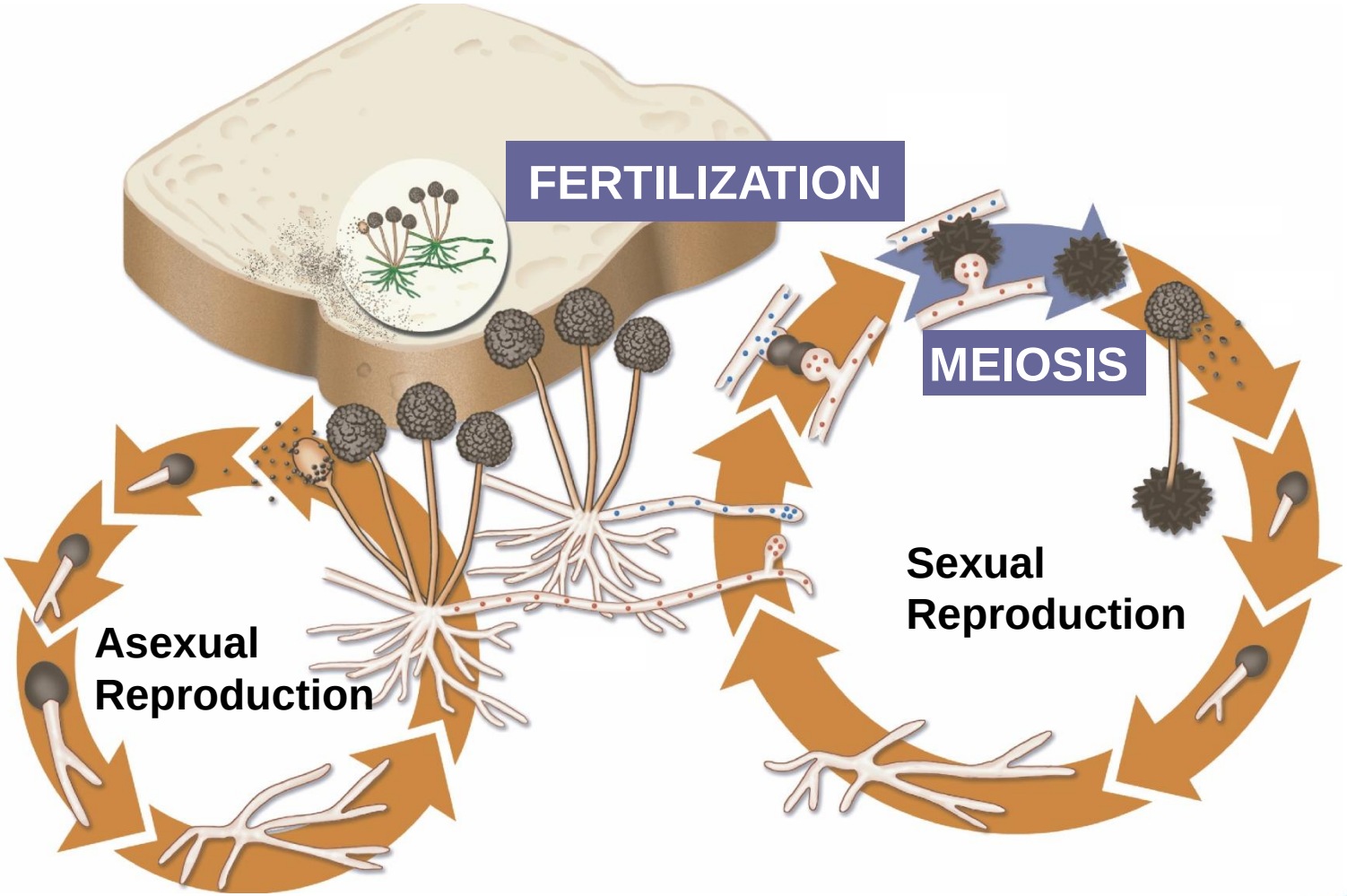
Structure and Function of Bread Mold

Black bread mold, *Rhizopus stolonifer*

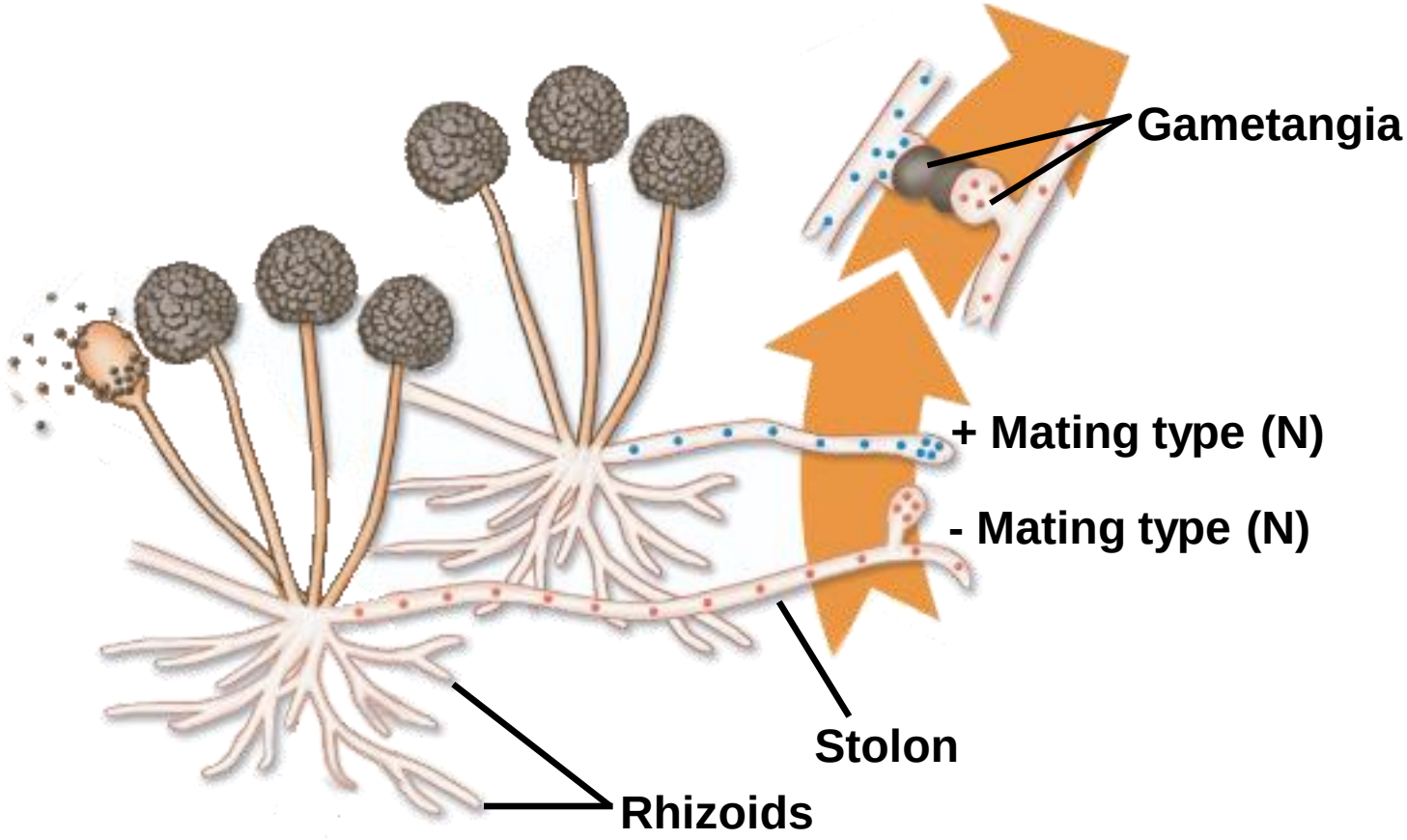
→two types of hyphae:

- **Rhizoids** are rootlike hyphae that penetrate the bread's surface.
- **Stolons** are stemlike hyphae that run along the surface of the bread.

Life Cycle of a Black Bread Mold

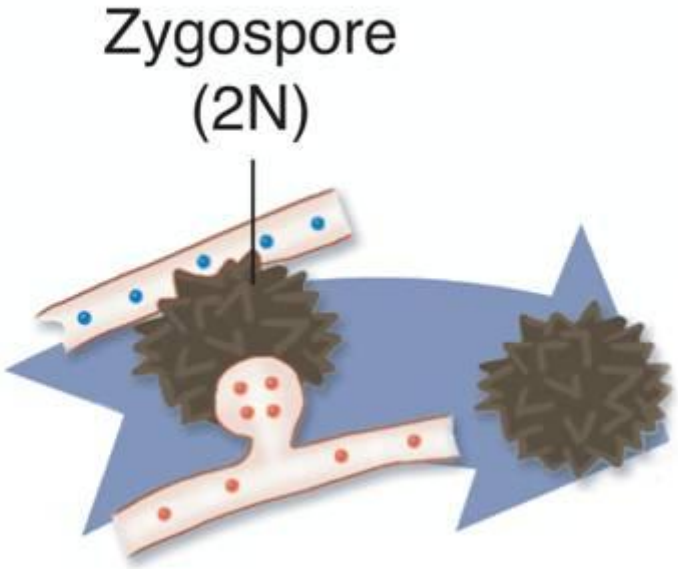


Hyphae from different mating types fuse and produce gamete-forming structures called **gametangia**.

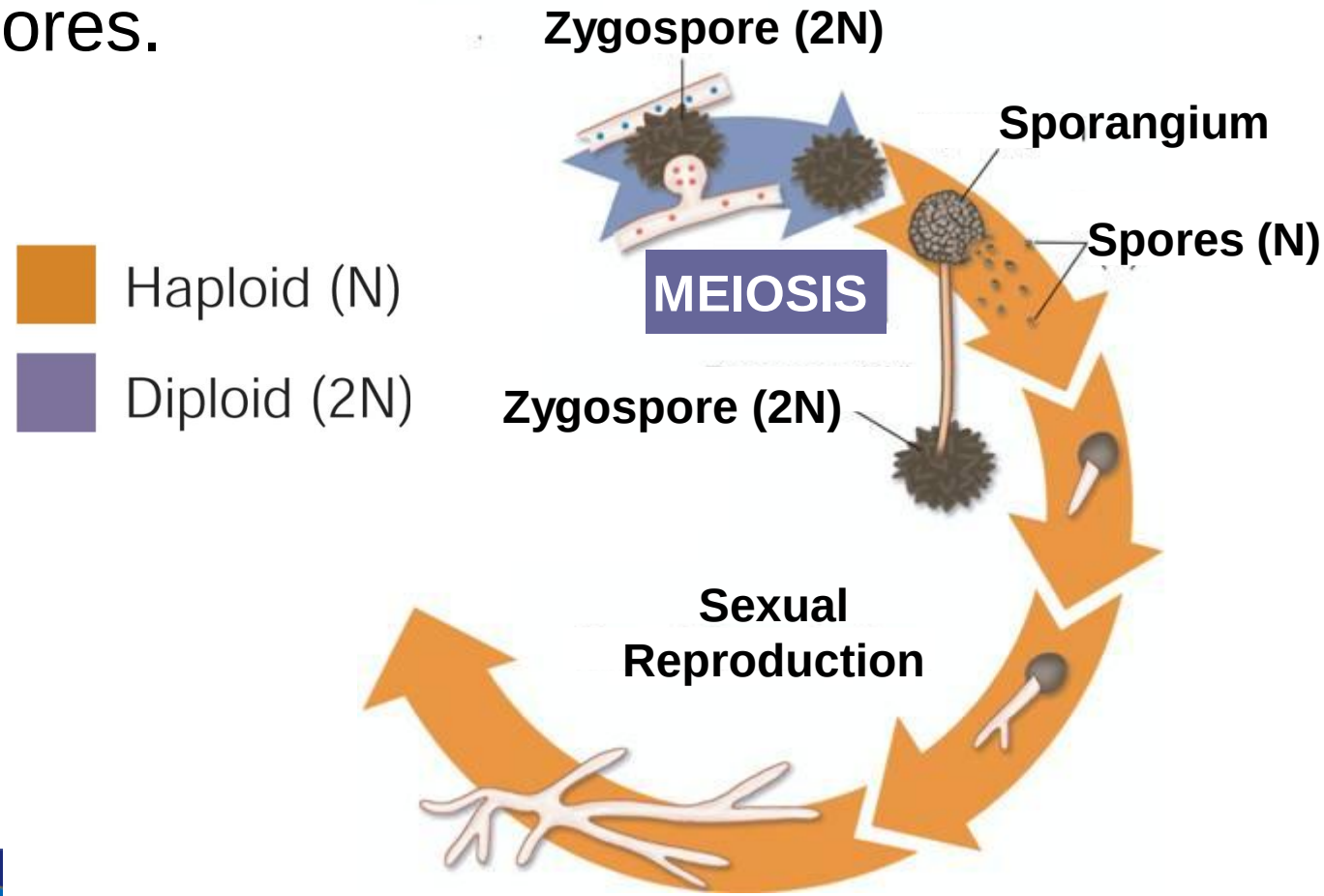


Haploid (N) gametes produced in the gametangia fuse with gametes of the opposite mating type to form diploid (2N) zygotes.

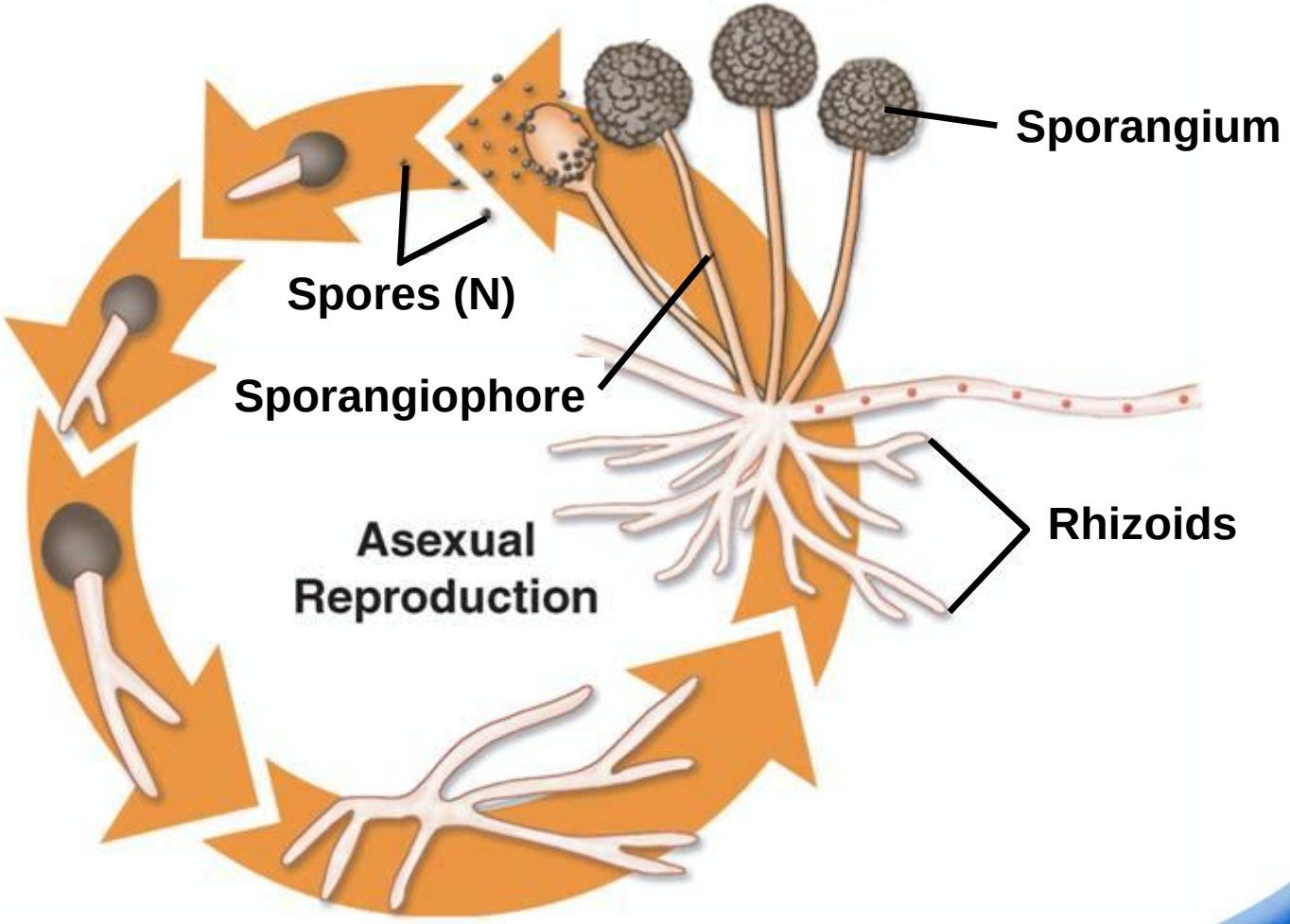
Zygotes develop into thick-walled zygospores.



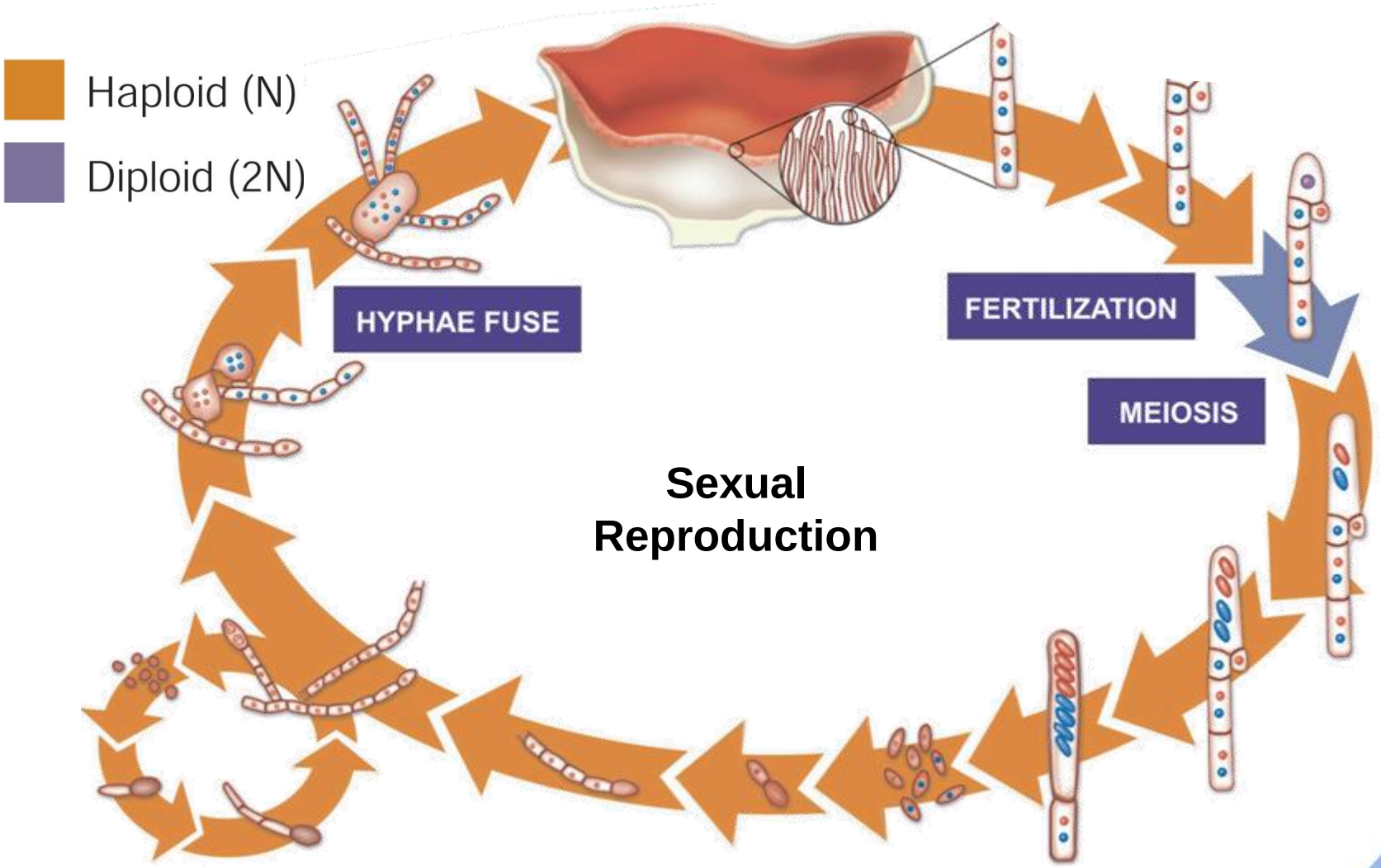
In favorable conditions, the zygospore germinates, undergoes meiosis, and releases new haploid spores.



The sporangium reproduces asexually by releasing haploid spores produced by meiosis.

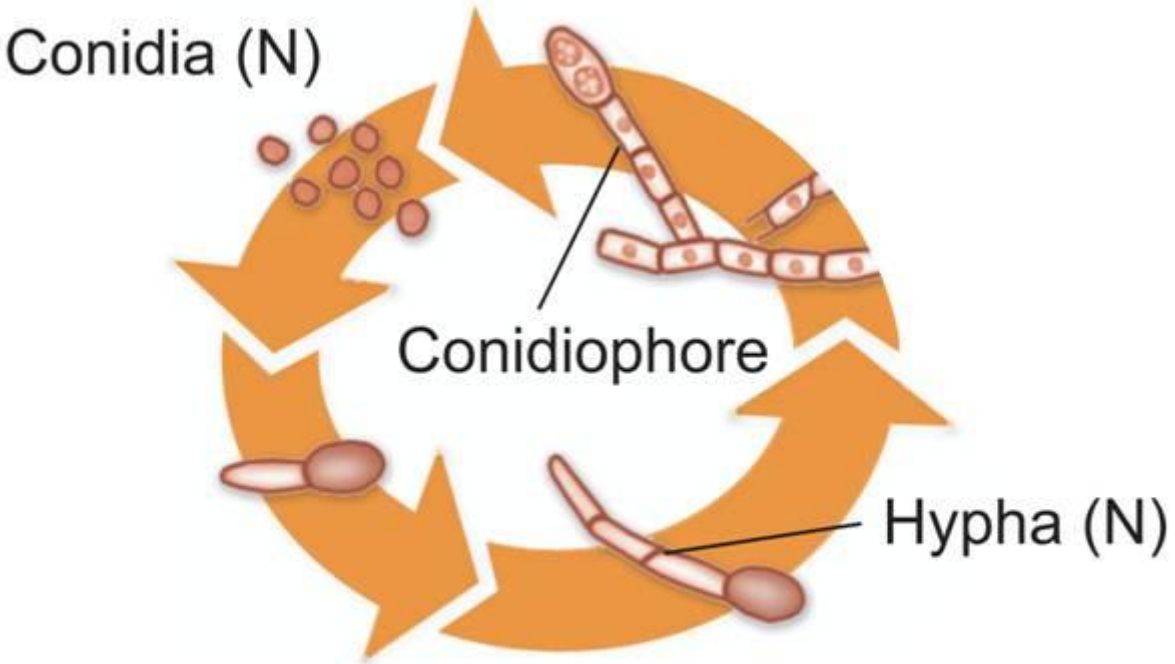


The phylum Ascomycota is named for the ascus, a reproductive structure that contains spores.



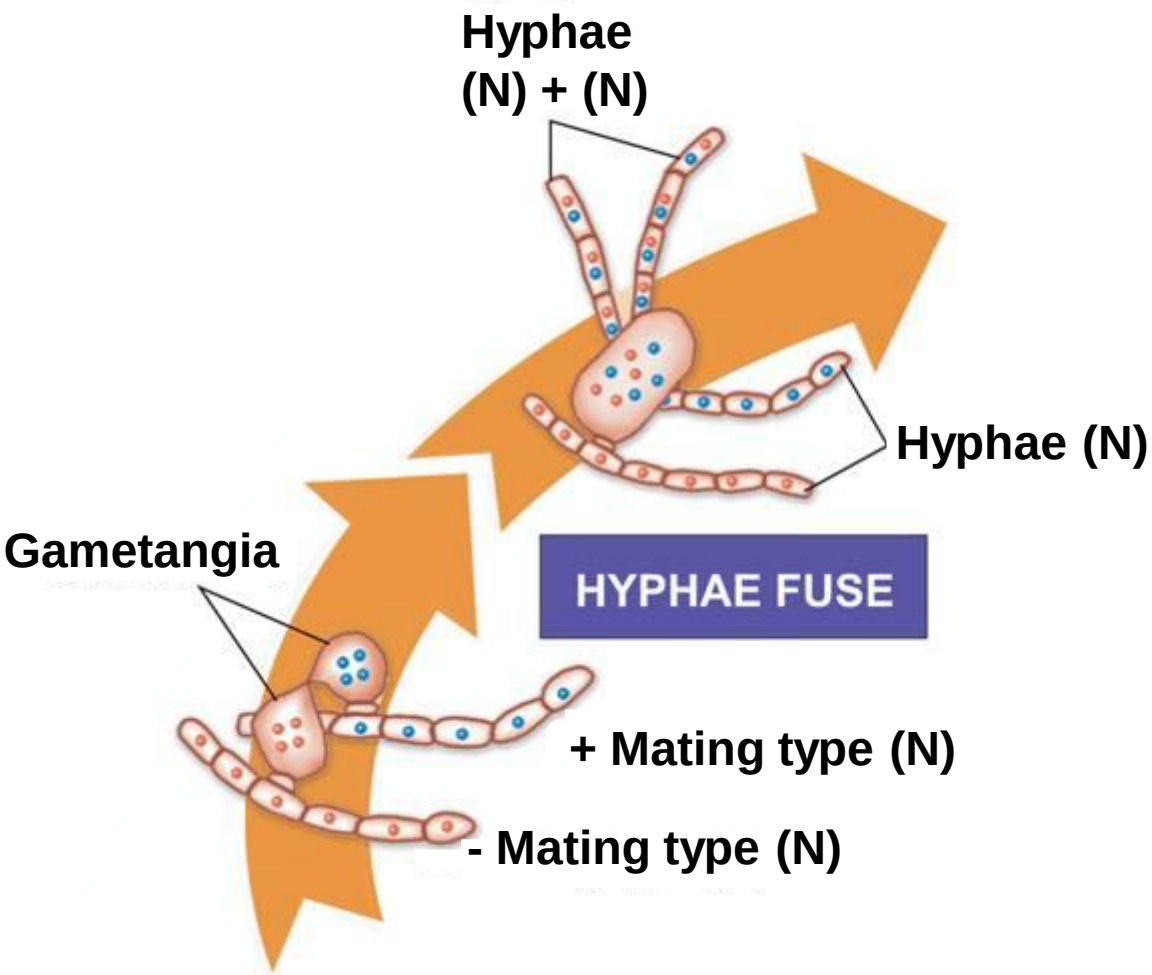
In asexual reproduction, spores called **conidia** form at tips of conidiophores.

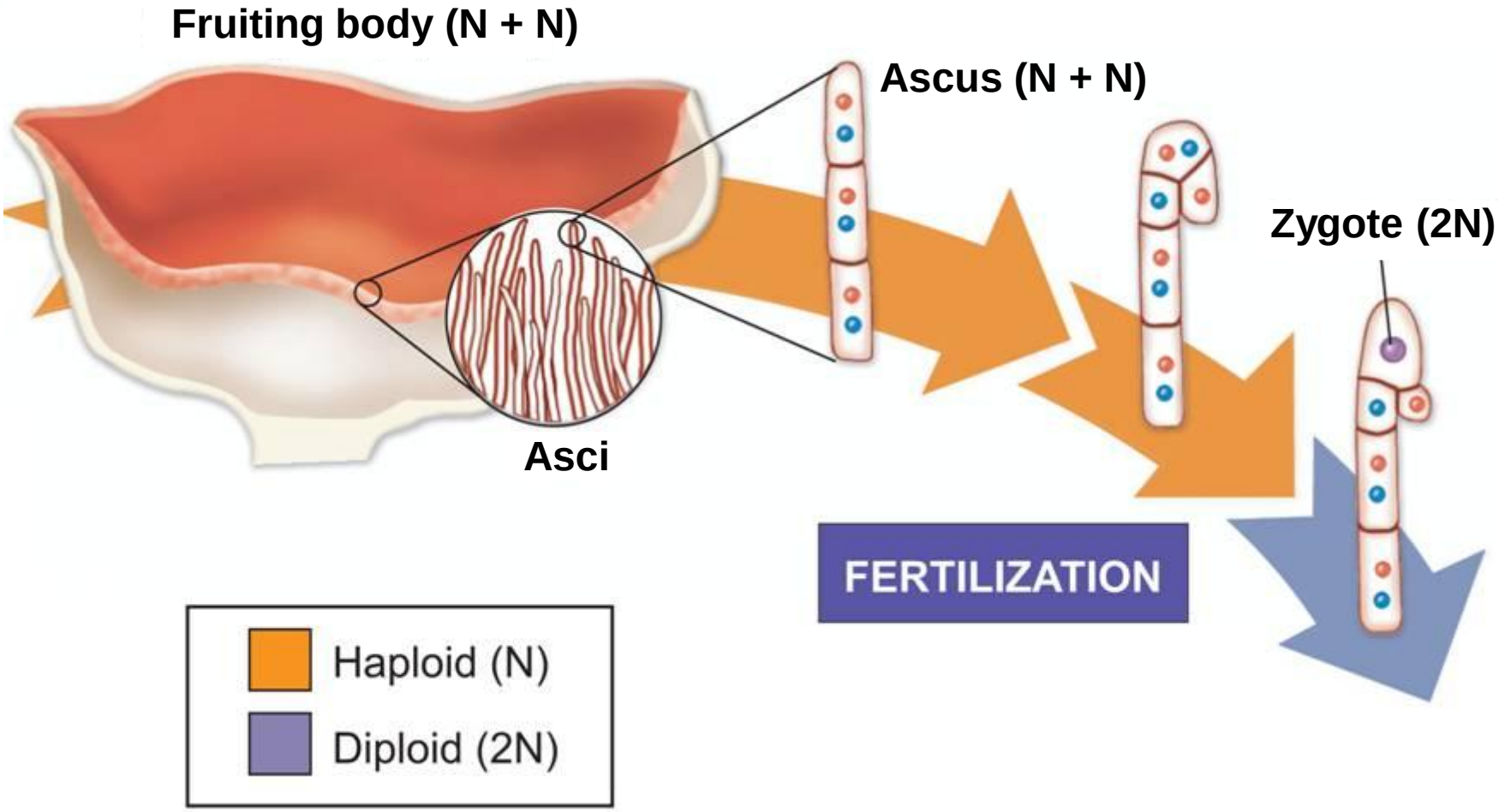
Conidiophores are specialized hyphae.

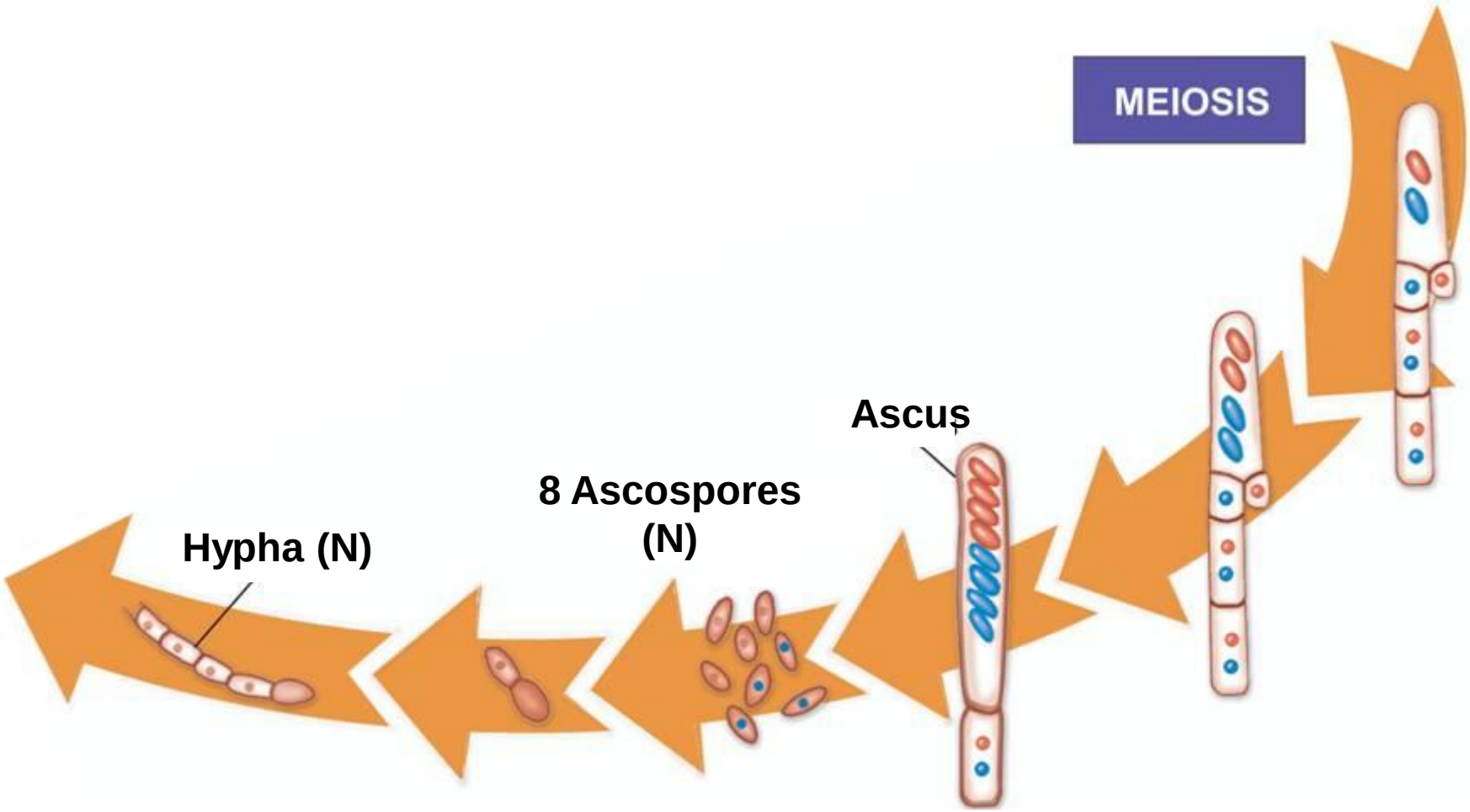


Asexual Reproduction

During sexual reproduction, haploid hyphae of two different mating types (+ and -) grow close together.



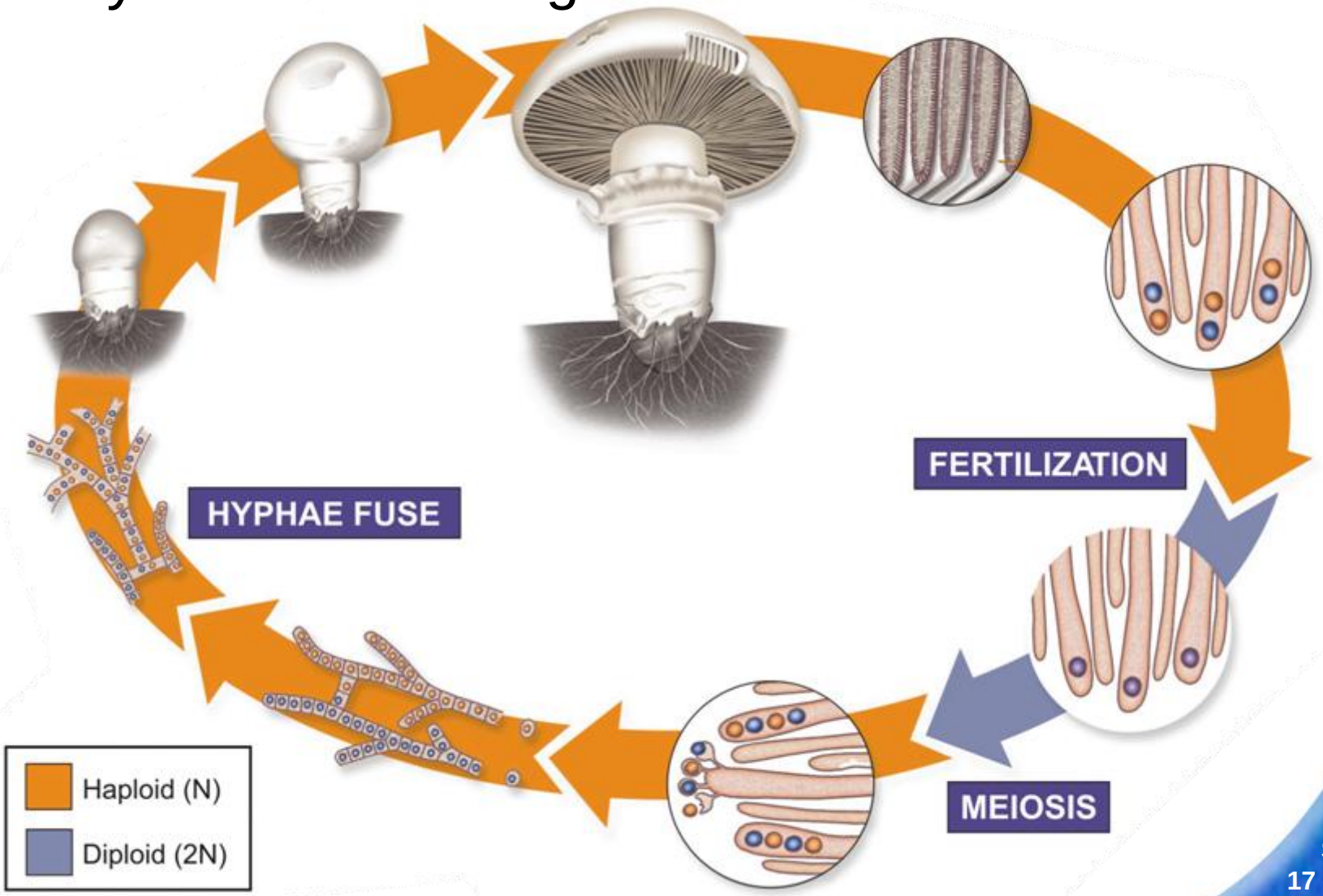




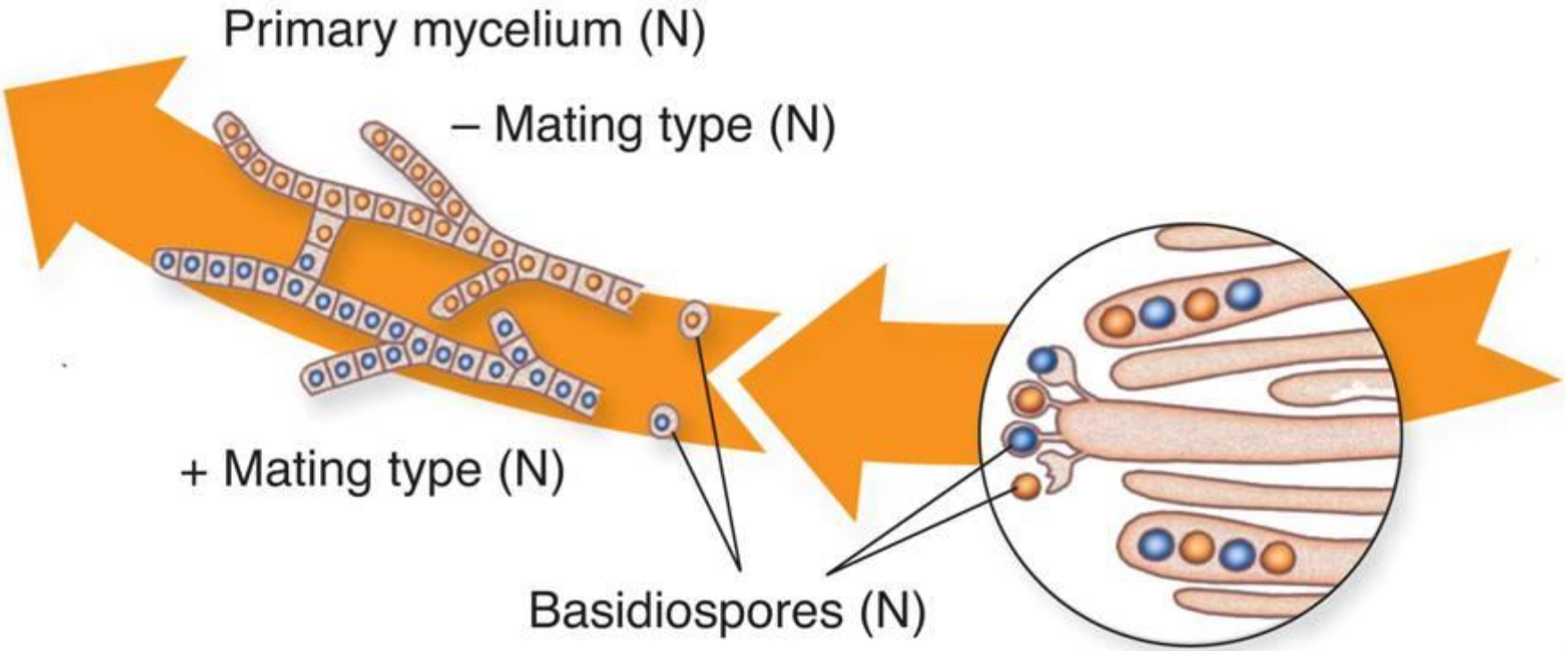
The phylum Basidiomycota, or club fungi, gets its name from a specialized reproductive structure that resembles a club.

The spore-bearing structure is called the **basidium**.

Life Cycle of Club Fungi

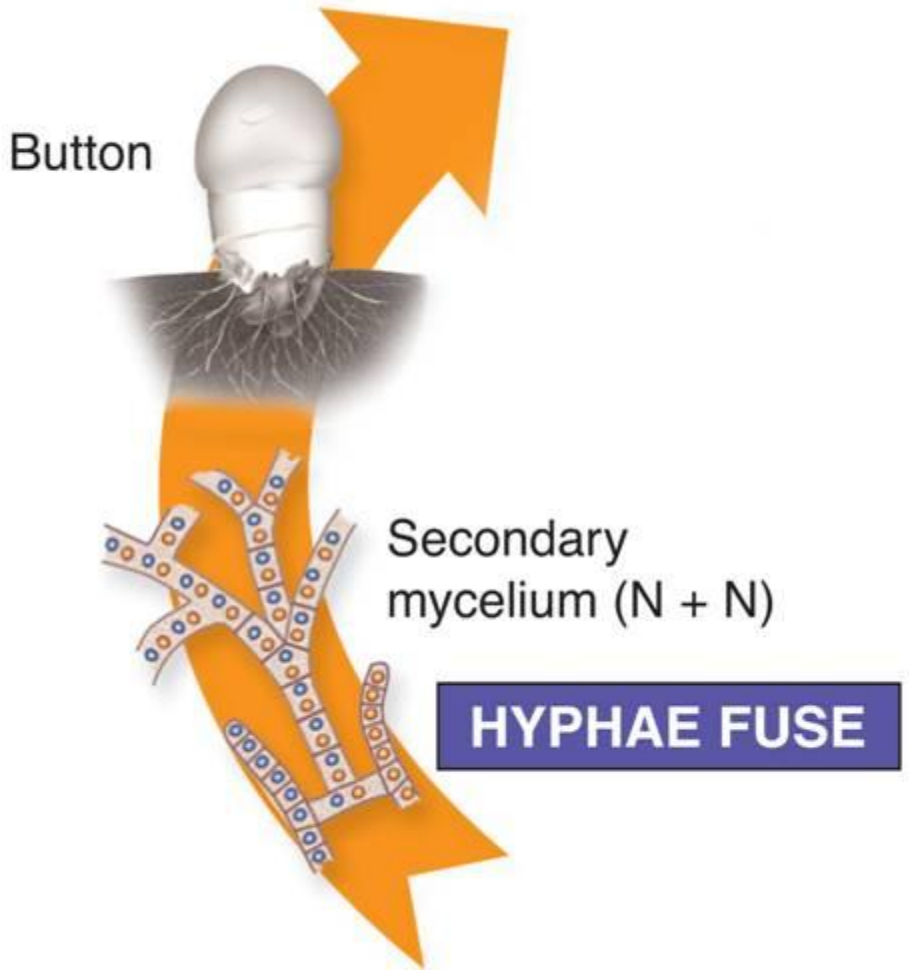


A basidiospore germinates to produce a haploid primary mycelium.

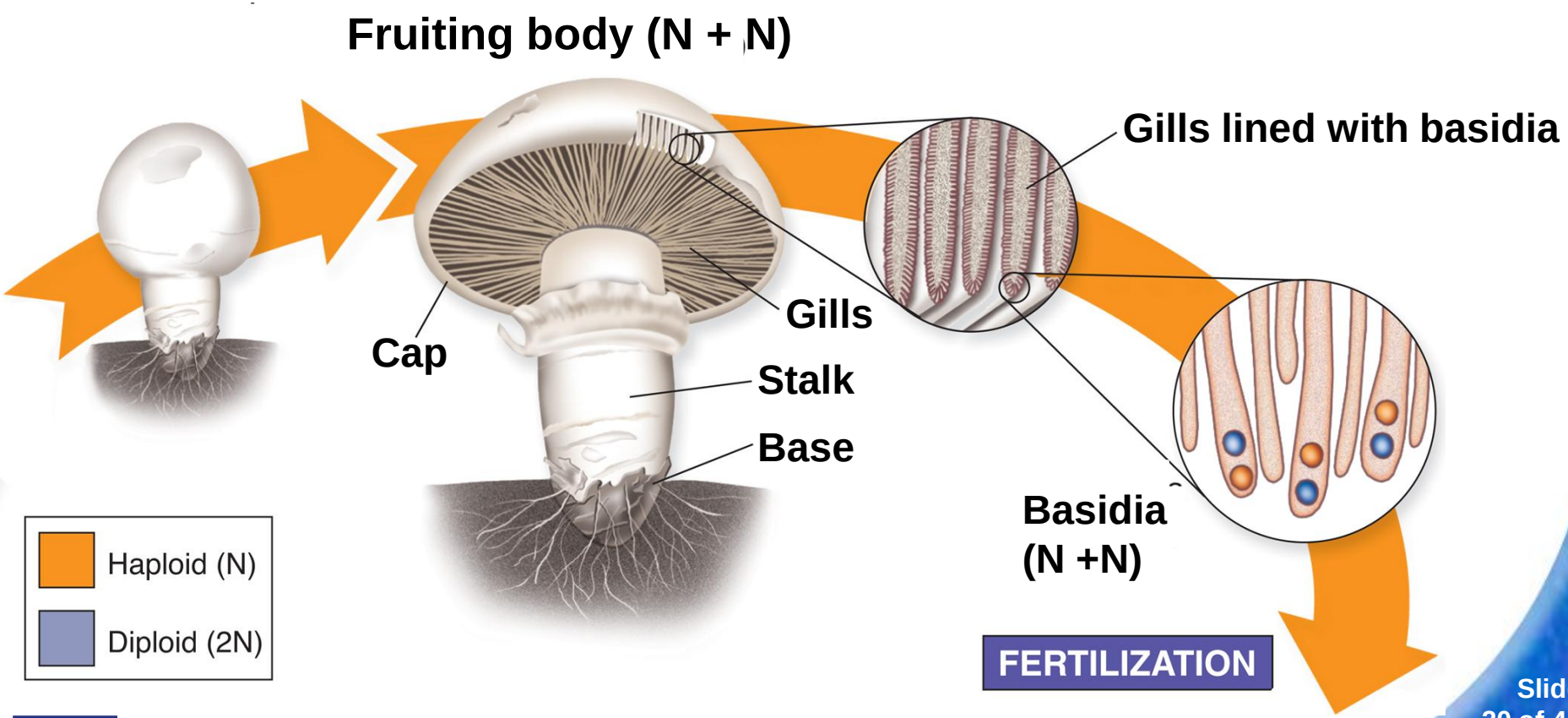


The mycelia of different mating types fuse to produce a secondary mycelium.

The cells of the secondary mycelium contain haploid nuclei of each mating type.

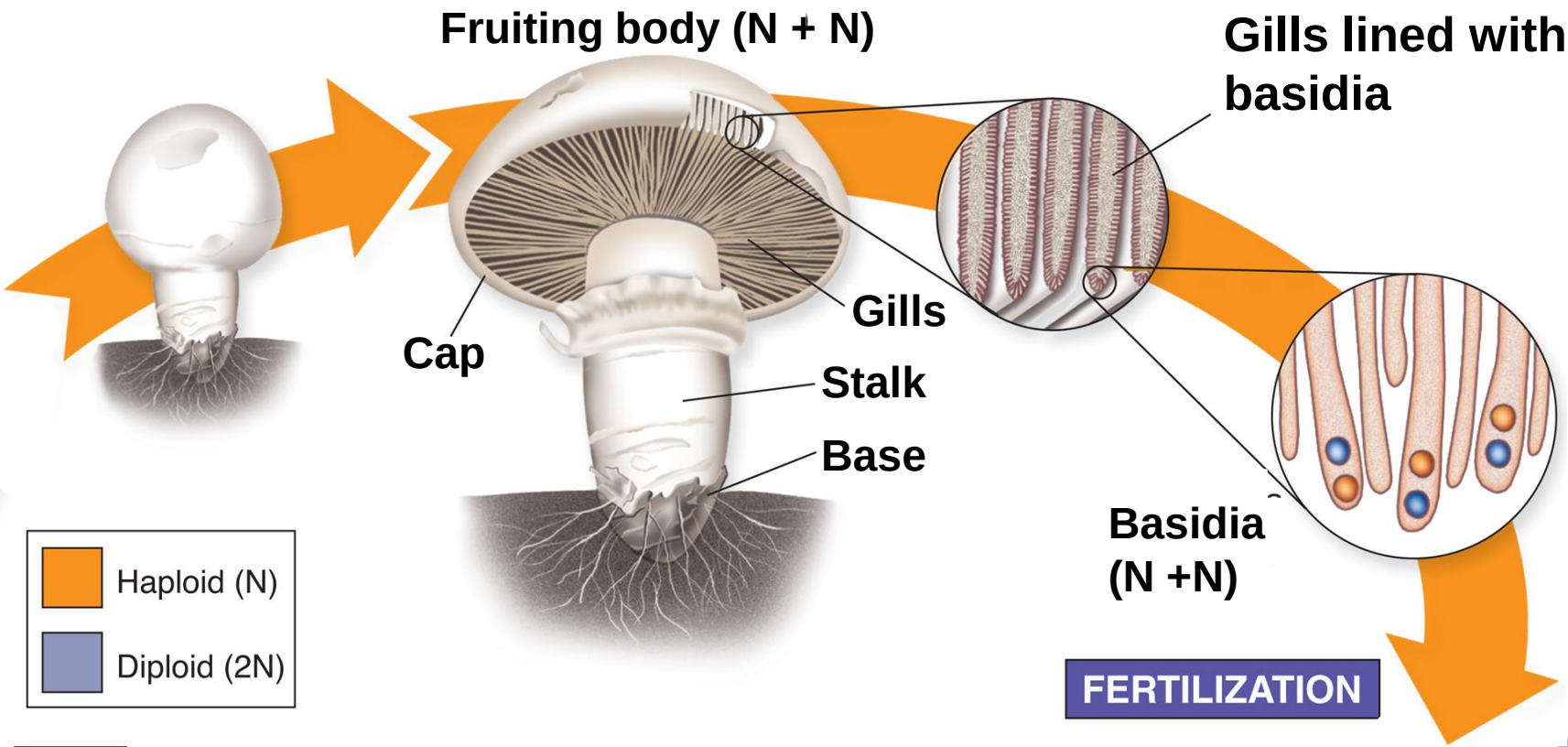


When the right combination of moisture and nutrients occurs, spore-producing fruiting bodies push above the ground.

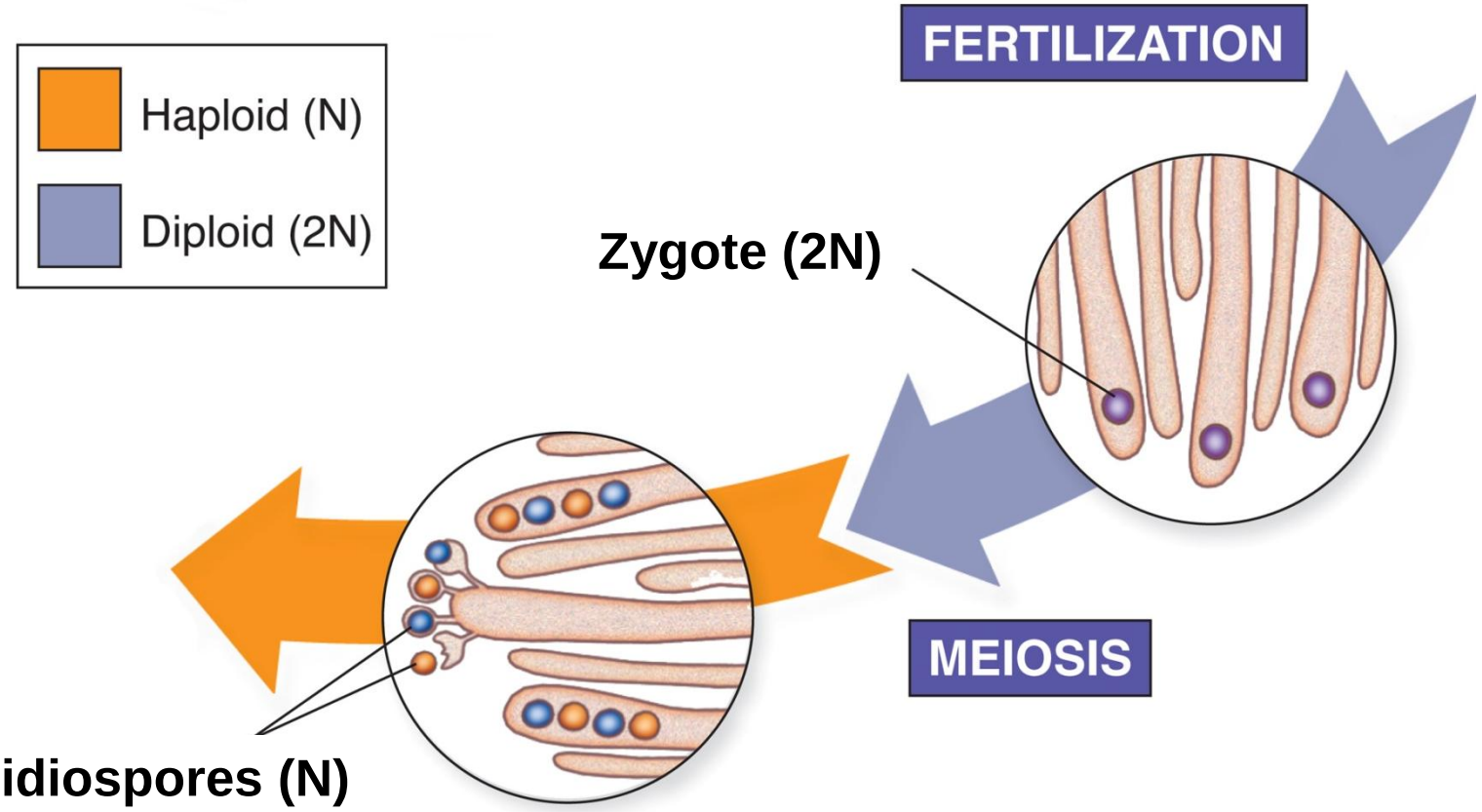


When the mushroom cap opens, it exposes hundreds of tiny gills on its underside.

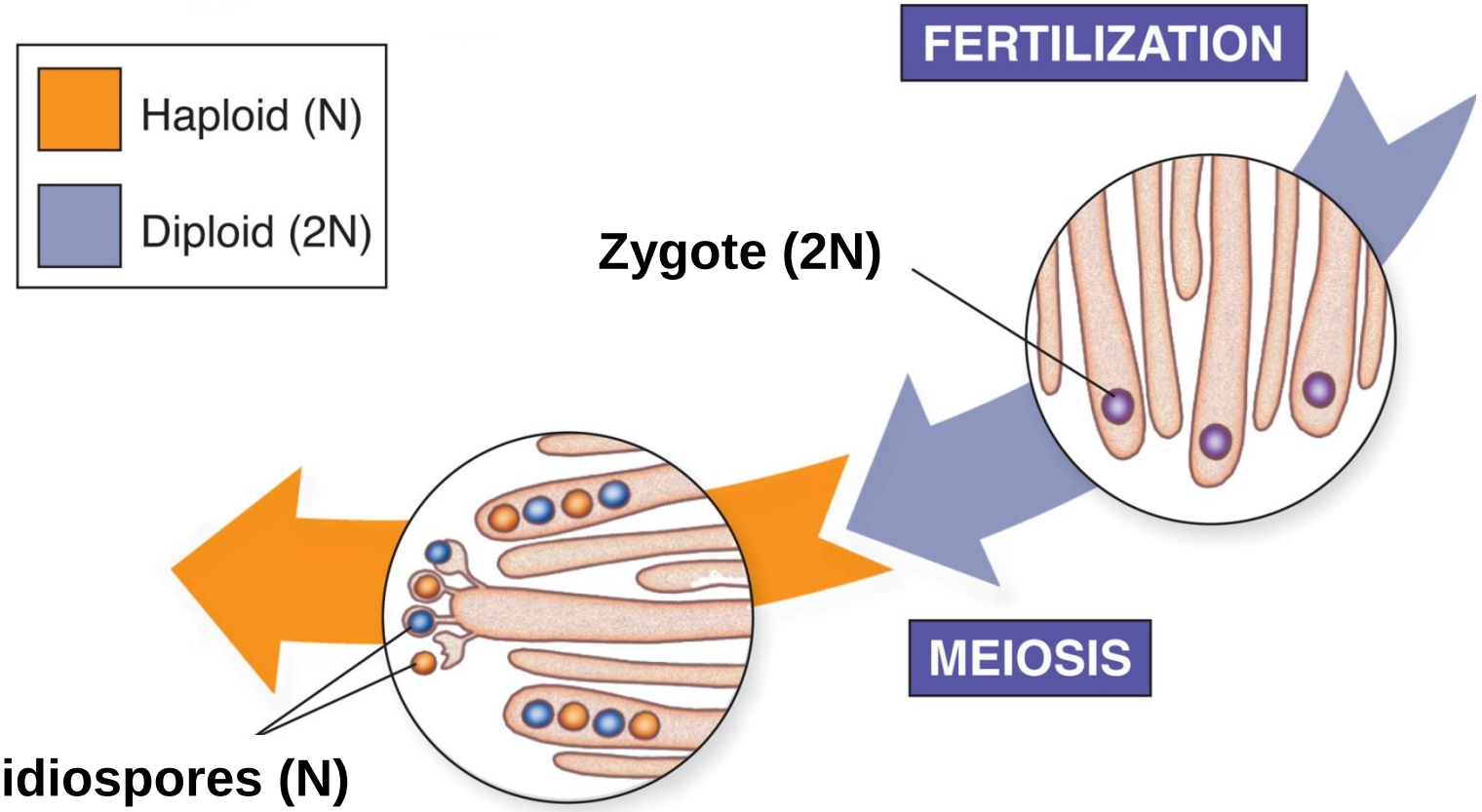
Each gill is lined with basidia.



Nuclei in each basidium fuse, forming a diploid zygote, which undergoes meiosis, forming clusters of haploid **basidiospores**.



Basidiospores form at the edge of each basidium and are ready to be scattered.



Imperfect fungi, or Deuteromycota, are fungi that cannot be placed in other phyla because researchers have never been able to observe a sexual phase in their life cycles.

A well-known genera of the imperfect fungi is *Penicillium*.

Penicillium notatum is a mold that is the source of the antibiotic penicillin.

The oldest known fungi fossils are about 230 million years old.

Fungi may have helped early plants obtain nutrients and may have been essential to plants' colonization of the land.

All Fungi Are Heterotrophs

- Many are **saprobes**, which are organisms that obtain food from decaying organic matter.
- Other fungi are parasites, which harm other organisms while living directly on or within them.
- Other fungi are symbionts that live in close and mutually beneficial association with other species.

Plant Diseases

- Fungal diseases are responsible for the loss of approximately 15% of the crops grown in temperate regions of the world.
- In tropical areas, where high humidity favors fungal growth, the loss of crops is sometimes as high as 50%.

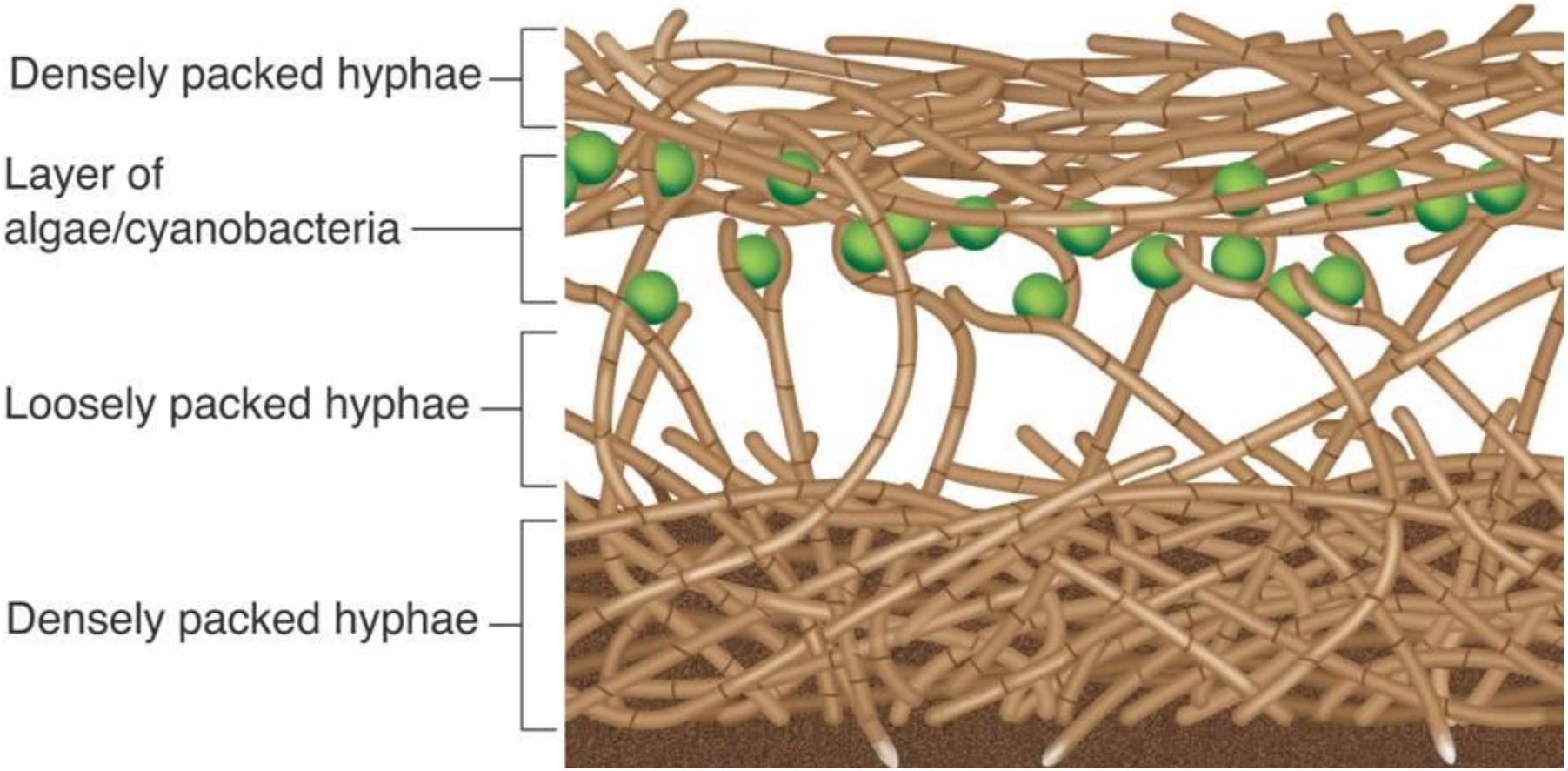
Some fungi form symbiotic relationships in which both partners benefit.

Two such mutualistic associations, lichens and mycorrhizae, are essential to many ecosystems.

Lichens

- **Lichens** are symbiotic associations between a fungus and a photosynthetic organism.
- The photosynthetic organism is either a green alga or a cyanobacterium, or both.

Structure of a Lichen



Mycorrhizae

- Fungi also form mutualistic relationships with plants. The associations of plant roots and fungi are called **mycorrhizae**.
- Mycorrhizae is essential for the growth of many plants.

END OF SECTION