

# 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)

# The Common Molds



**What are the characteristics of the common molds?**

Familiar molds that grow on meat, cheese, and bread are called zygomycetes.



**Zygomycetes have life cycles that include a zygospore.**

A **zygospore** is a resting spore that contains zygotes formed during the sexual phase of the mold's life cycle.

## Structure and Function of Bread Mold

Black bread mold, *Rhizopus stolonifer*, is a zygomycete.

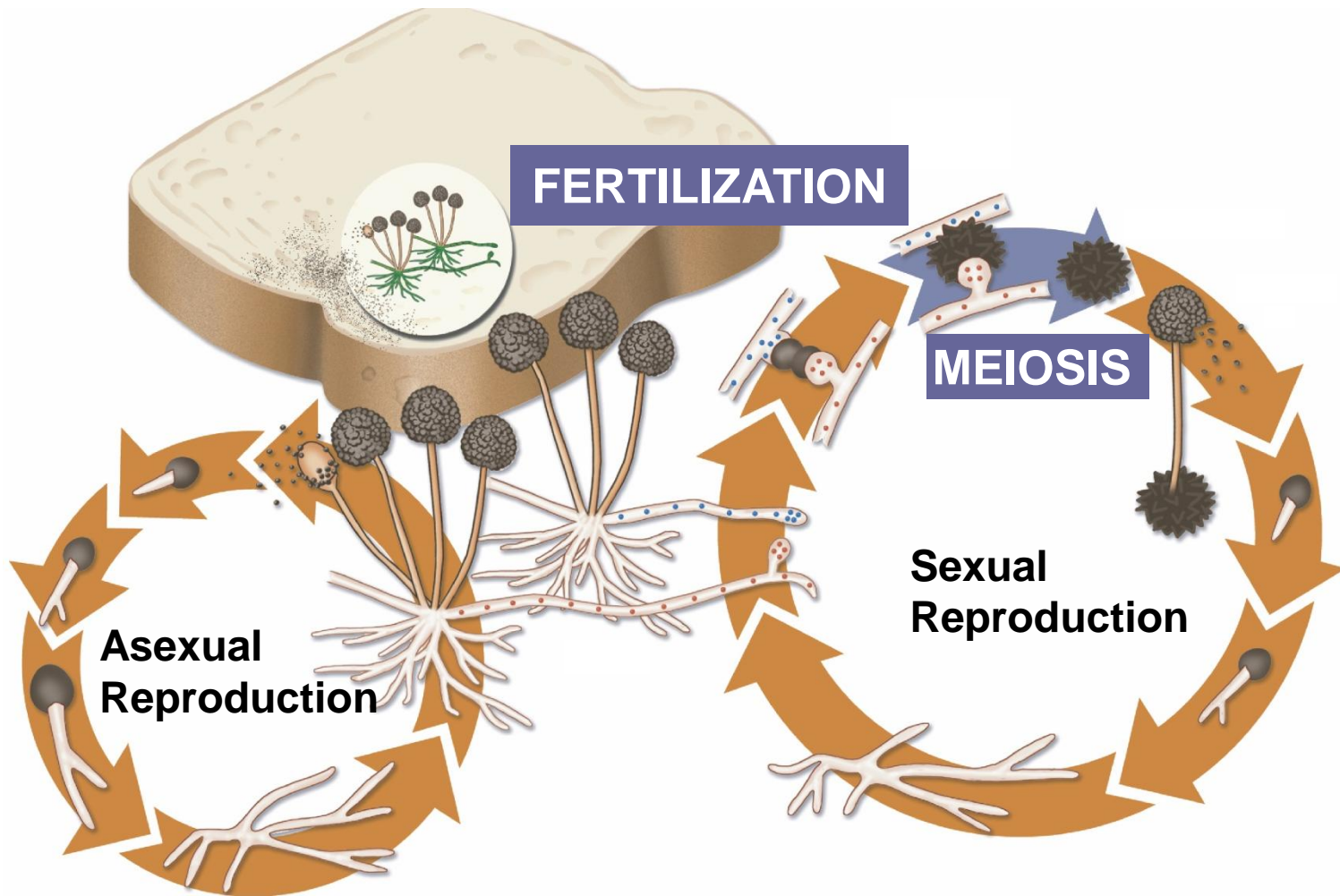
Black bread mold has two types of hyphae:

- **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 Molds

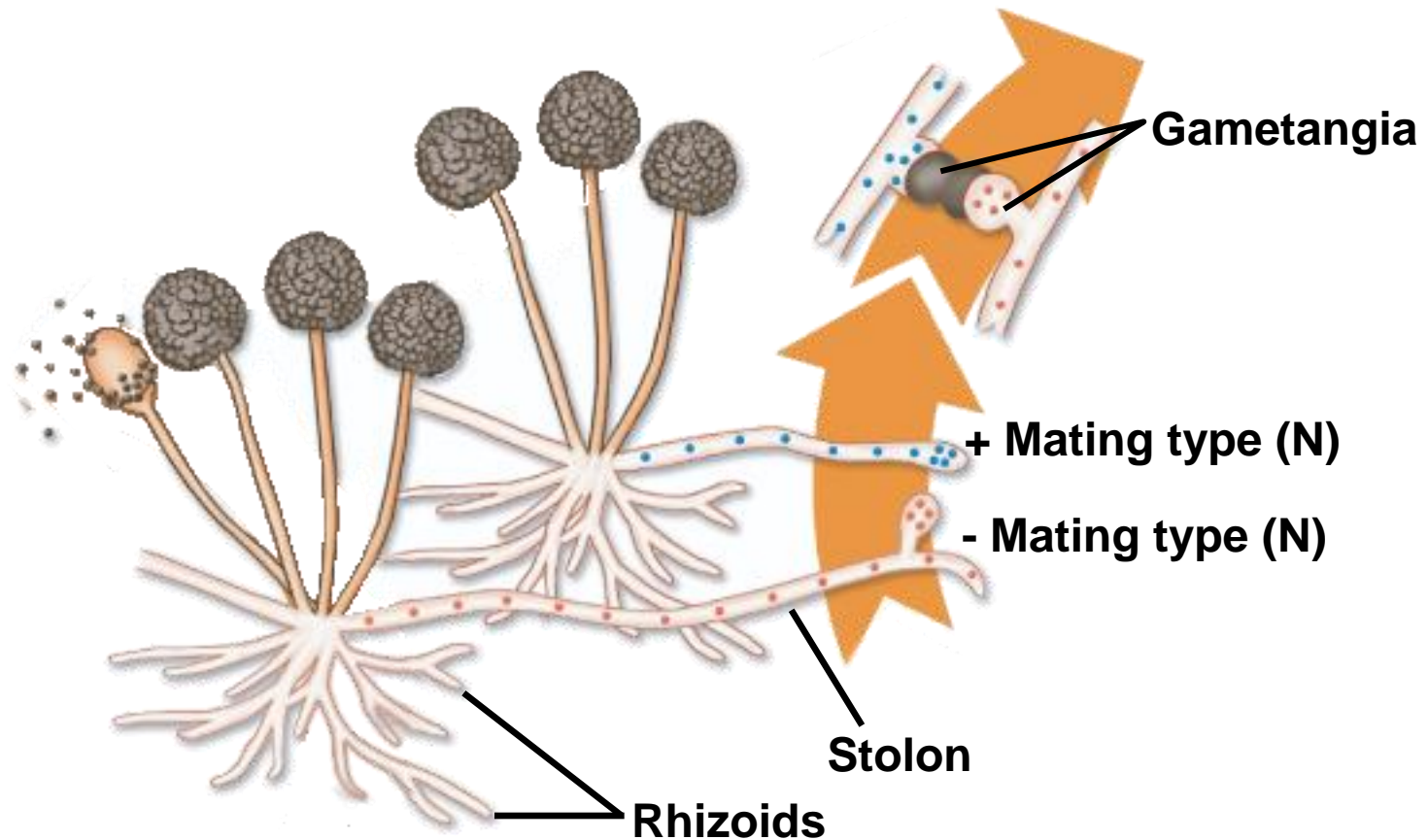
Black bread molds reproduce both sexually and asexually.

# Life Cycle of a Black Bread Mold



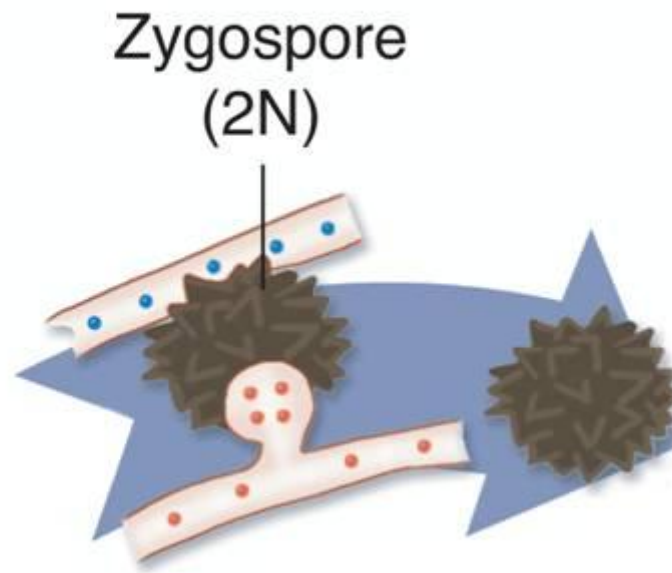


Hyphae from different mating types fuse and produce gamete-forming structures called **gametangia**.

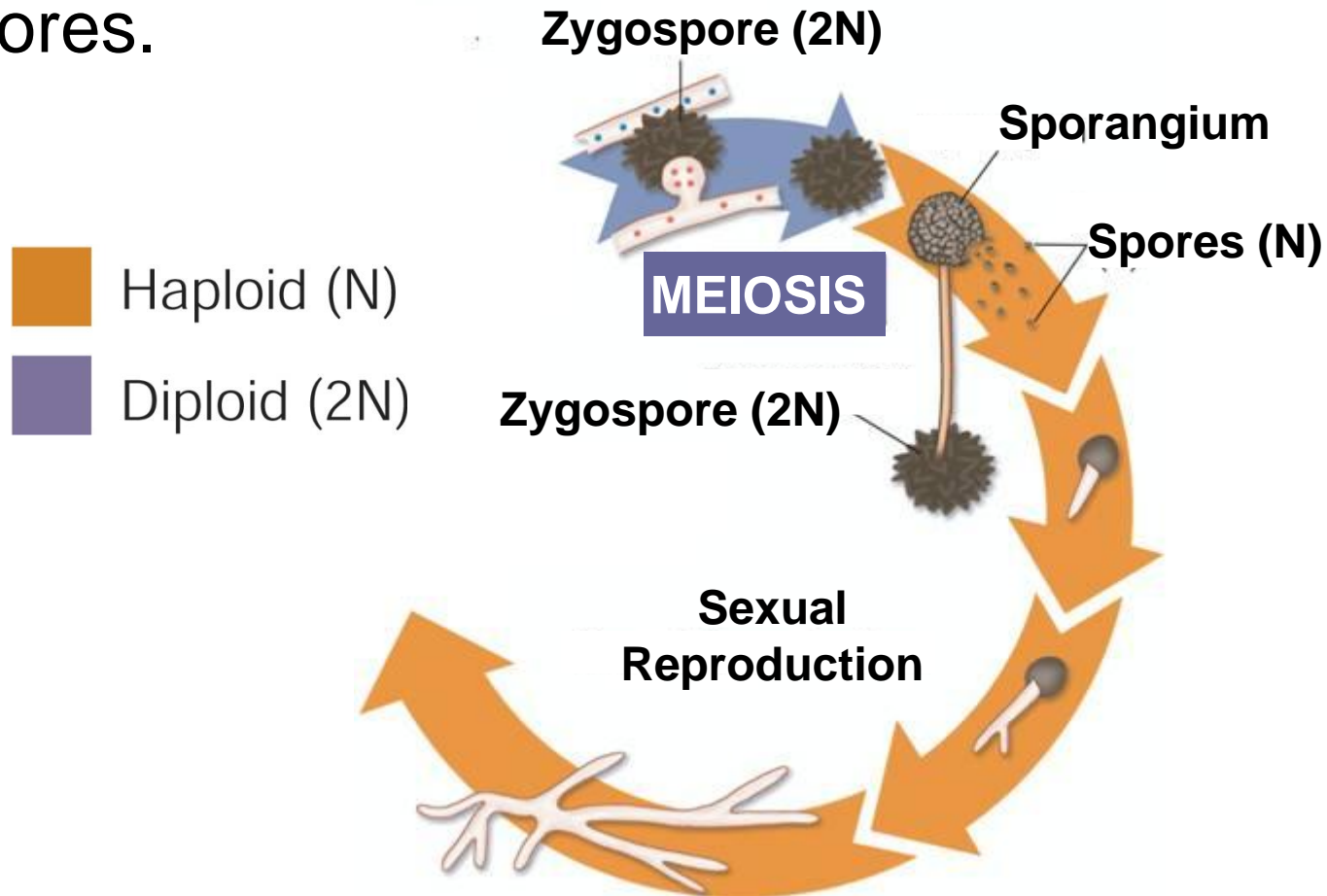


Haploid (N) gametes produced in the gametangia fuse with gametes of the opposite mating type to form diploid (2N) zygotes.

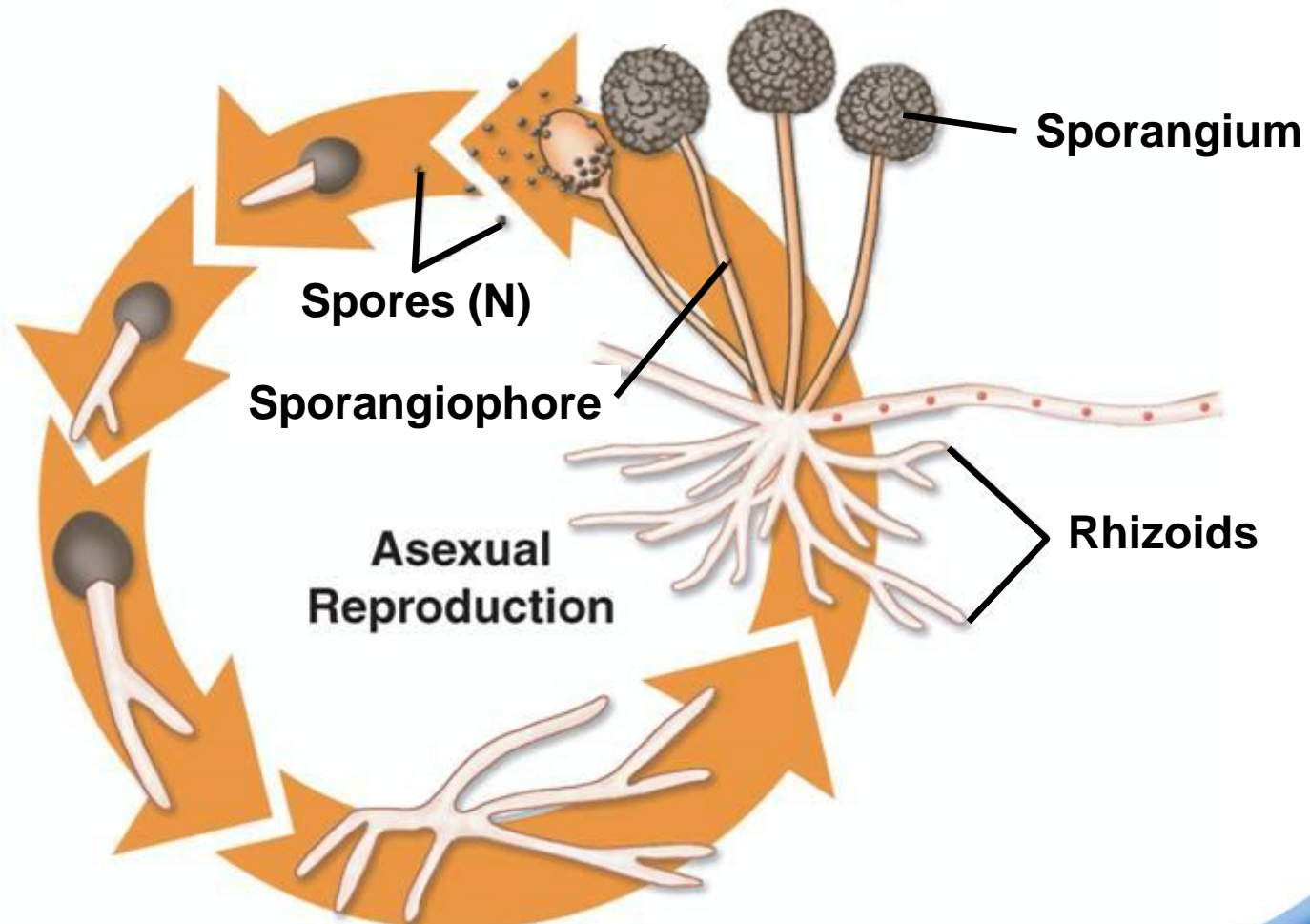
Zygotes develop into thick-walled zygosporangia.



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 Sac Fungi



**What are the characteristics of the sac fungi?**

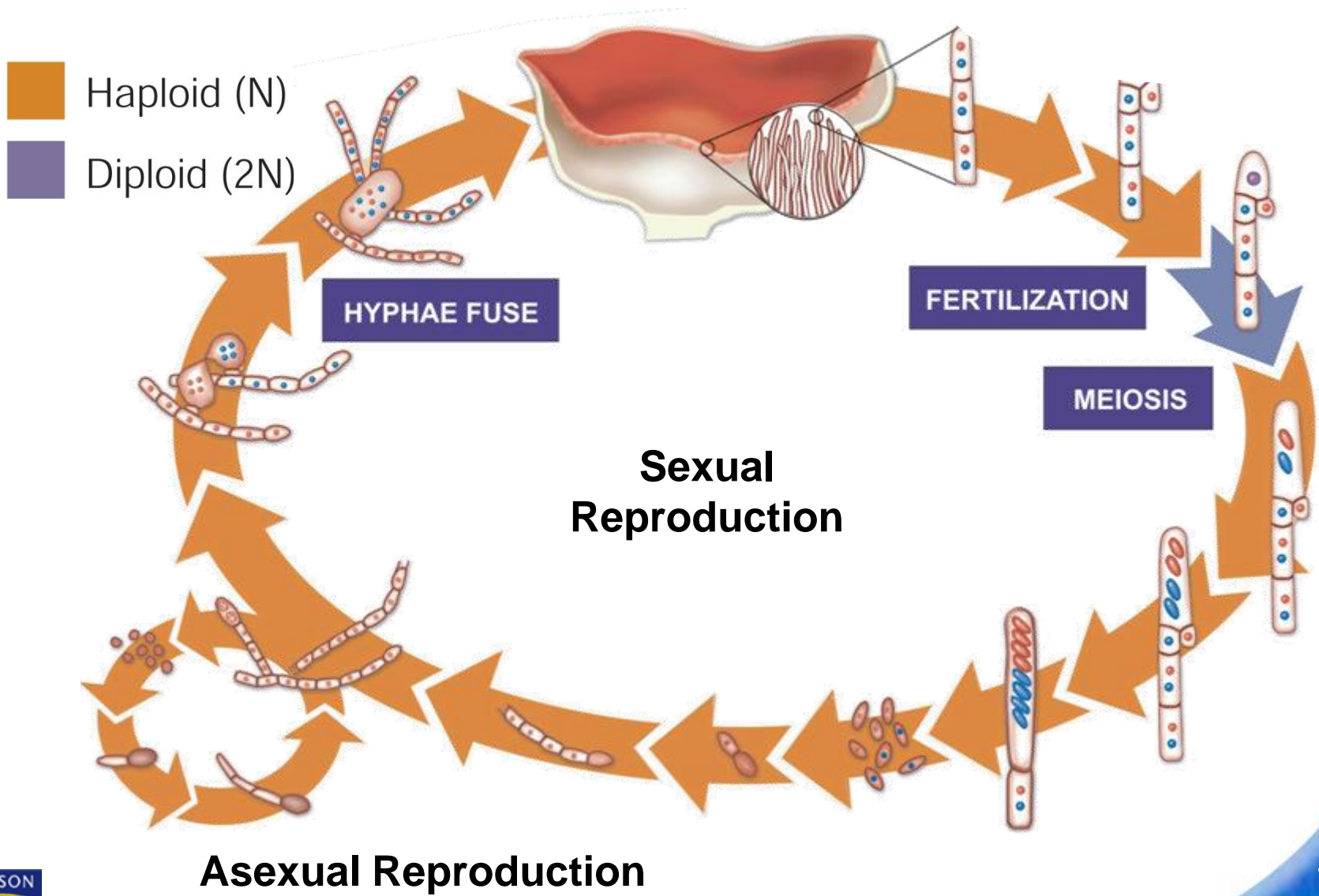


**The phylum Ascomycota is named for the ascus, a reproductive structure that contains spores.**

## Life Cycle of Sac Fungi

The life cycle of an ascomycete usually includes both asexual and sexual reproduction.

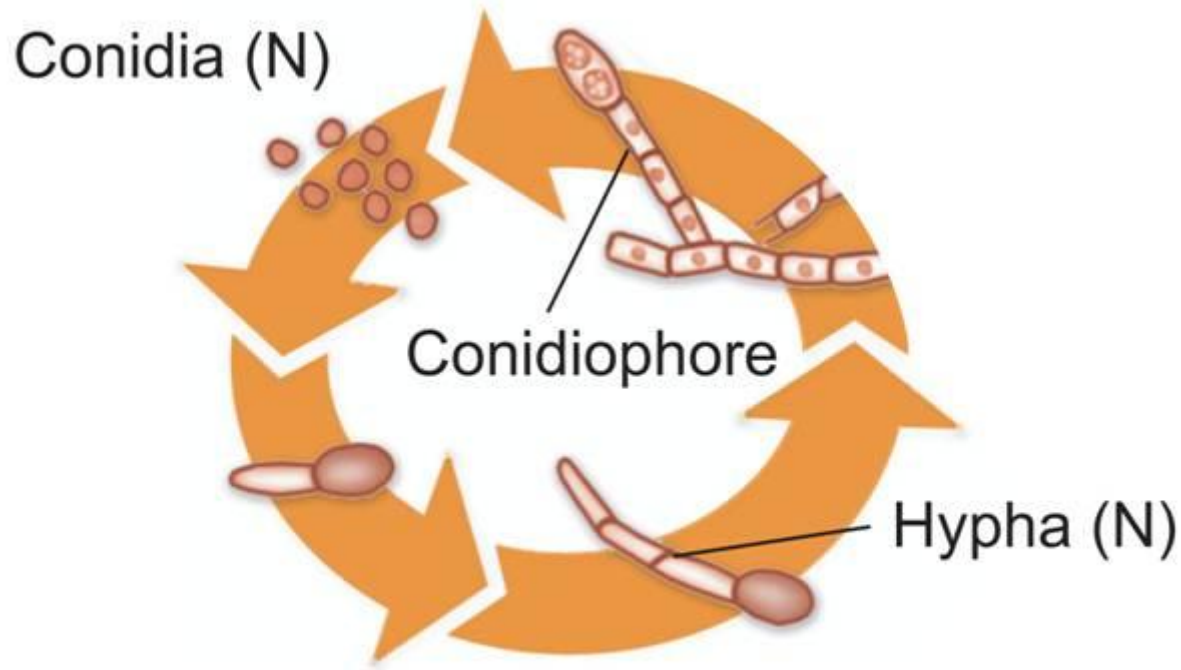
# 21-2 Classification of Fungi → The Sac Fungi





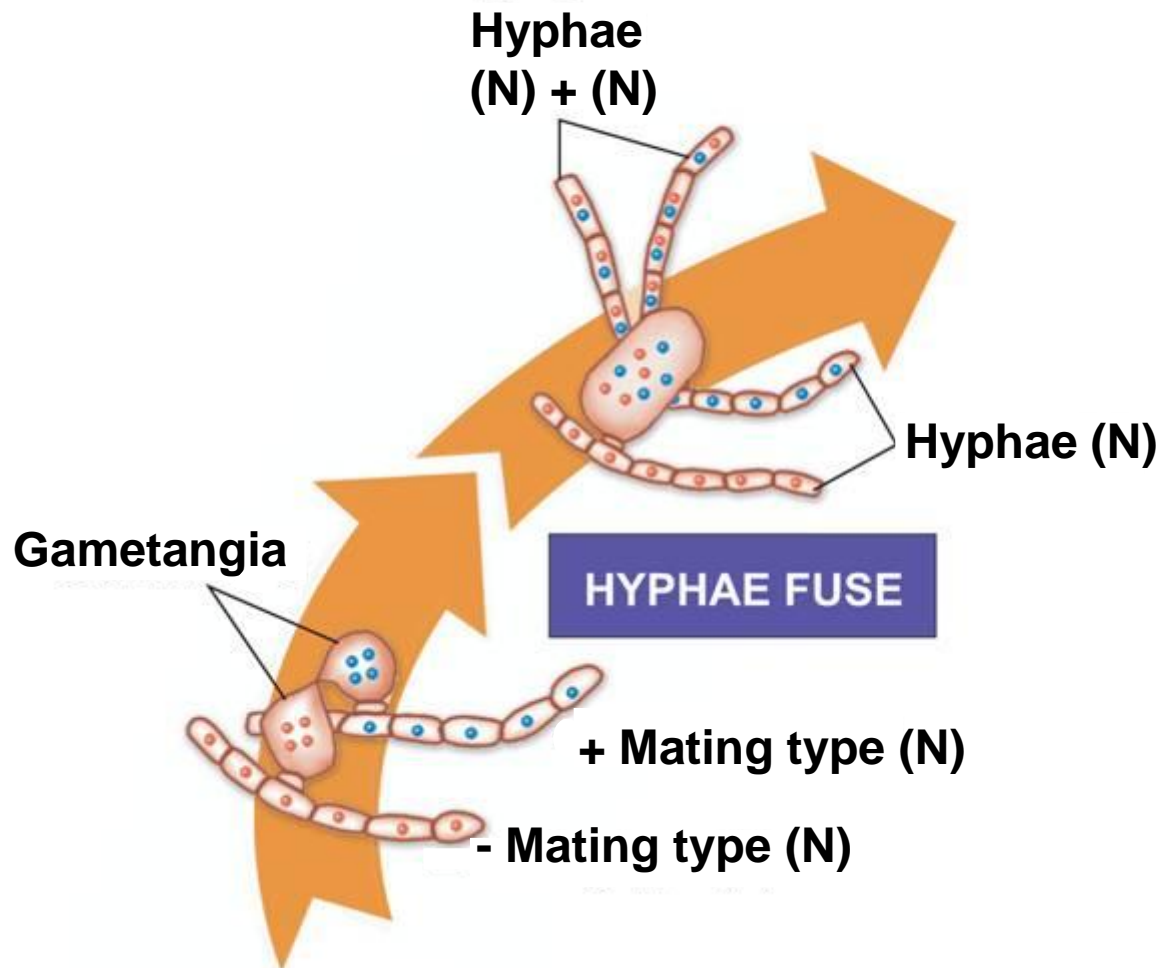
In asexual reproduction, spores called **conidia** form at tips of conidiophores.

Conidiophores are specialized hyphae.



## Asexual Reproduction

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



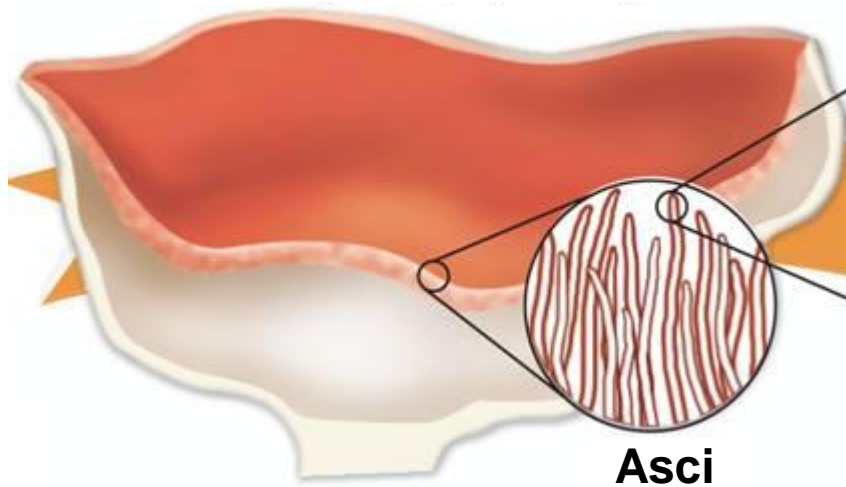
The  $N + N$  hyphae then produce a fruiting body in which sexual reproduction continues.

The ascus forms within the fruiting body.

Within the ascus, two nuclei of different mating types fuse to form a diploid zygote ( $2N$ ).

# 21-2 Classification of Fungi → The Sac Fungi

Fruiting body (N + N)

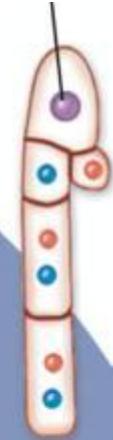


Asci



Ascus (N + N)



Zygote (2N)



FERTILIZATION

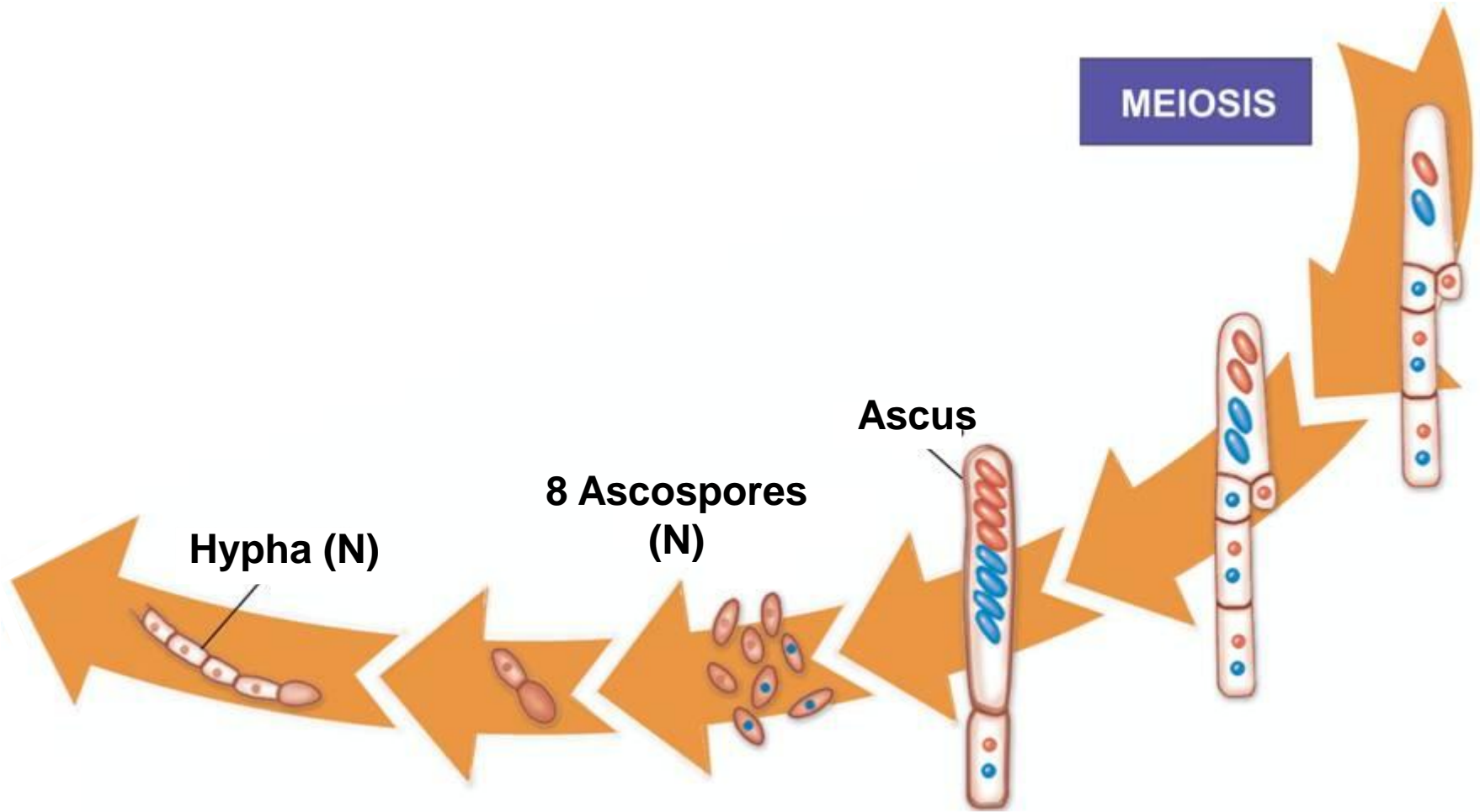
	Haploid (N)
	Diploid (2N)

The zygote divides by meiosis, producing four haploid cells.

In most ascomycetes, meiosis is followed by mitosis, so that eight cells called **ascospores** are produced.

An ascospore can germinate and grow into a haploid mycelium.

# 21-2 Classification of Fungi → The Sac Fungi



## Yeasts

Yeasts are unicellular fungi.

Yeasts reproduce asexually by budding.

Dry granules of yeast contain ascospores, which become active in a moist environment.

# The Club Fungi



**What are the characteristics of the club fungi?**





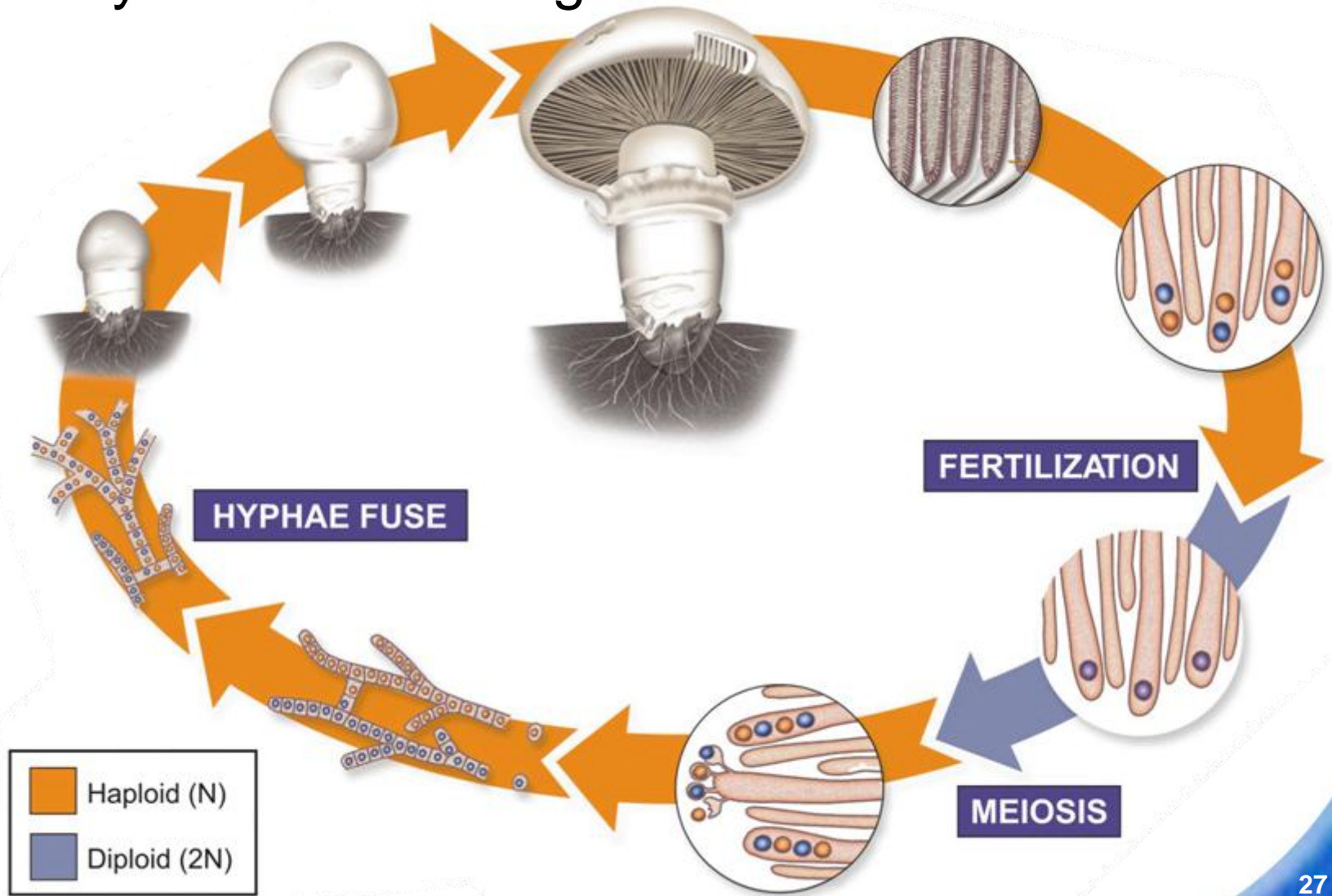
The phylum **Basidiomycota**, or club fungi, gets its name from a specialized reproductive structure that resembles a club.

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

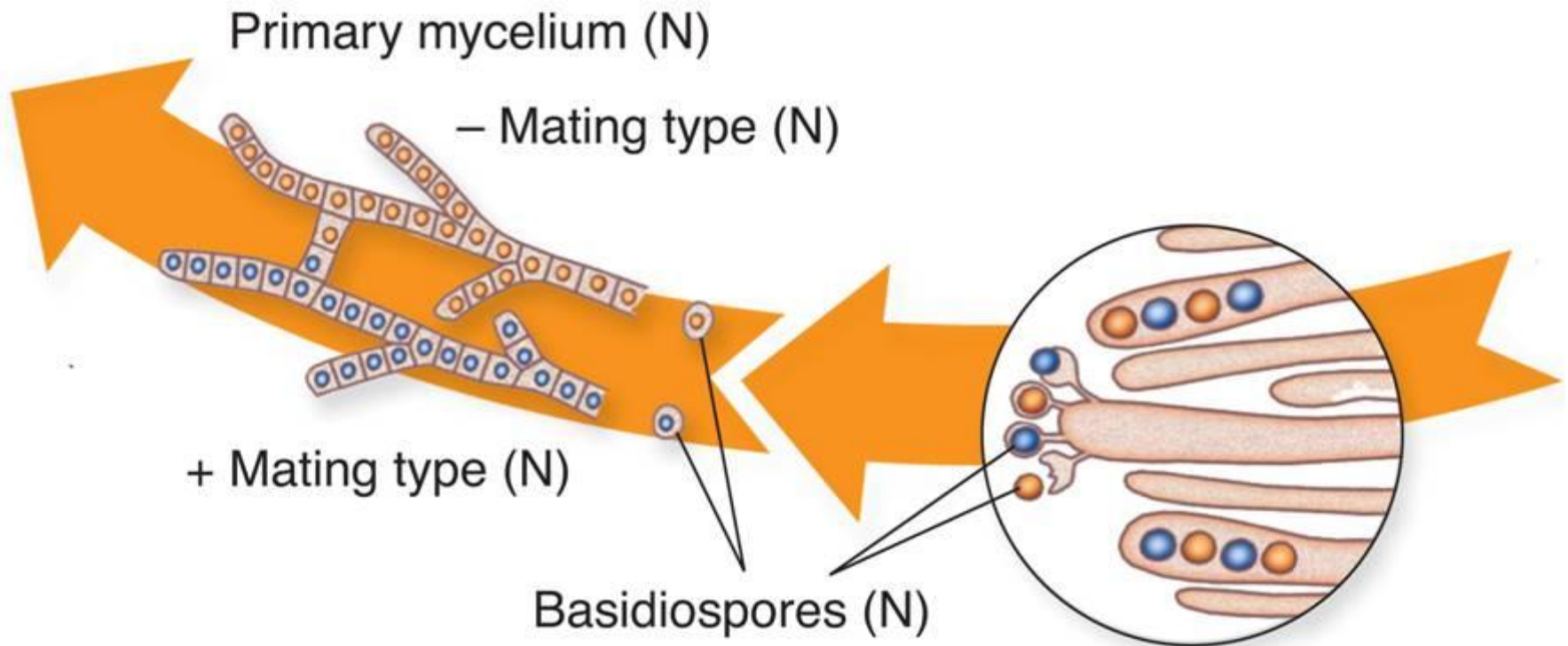
## Life Cycle of Club Fungi

Basidiomycetes undergo an elaborate life cycle.

# Life Cycle of Club Fungi

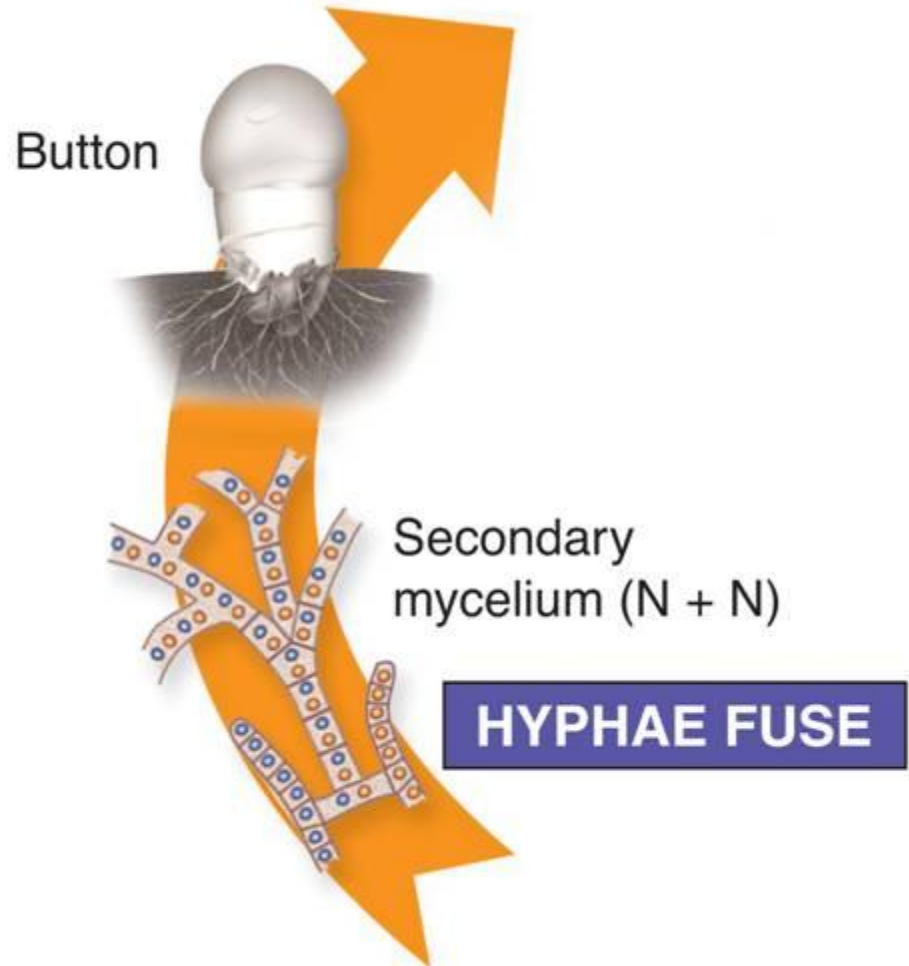


A basidiospore germinates to produce a haploid primary mycelium.



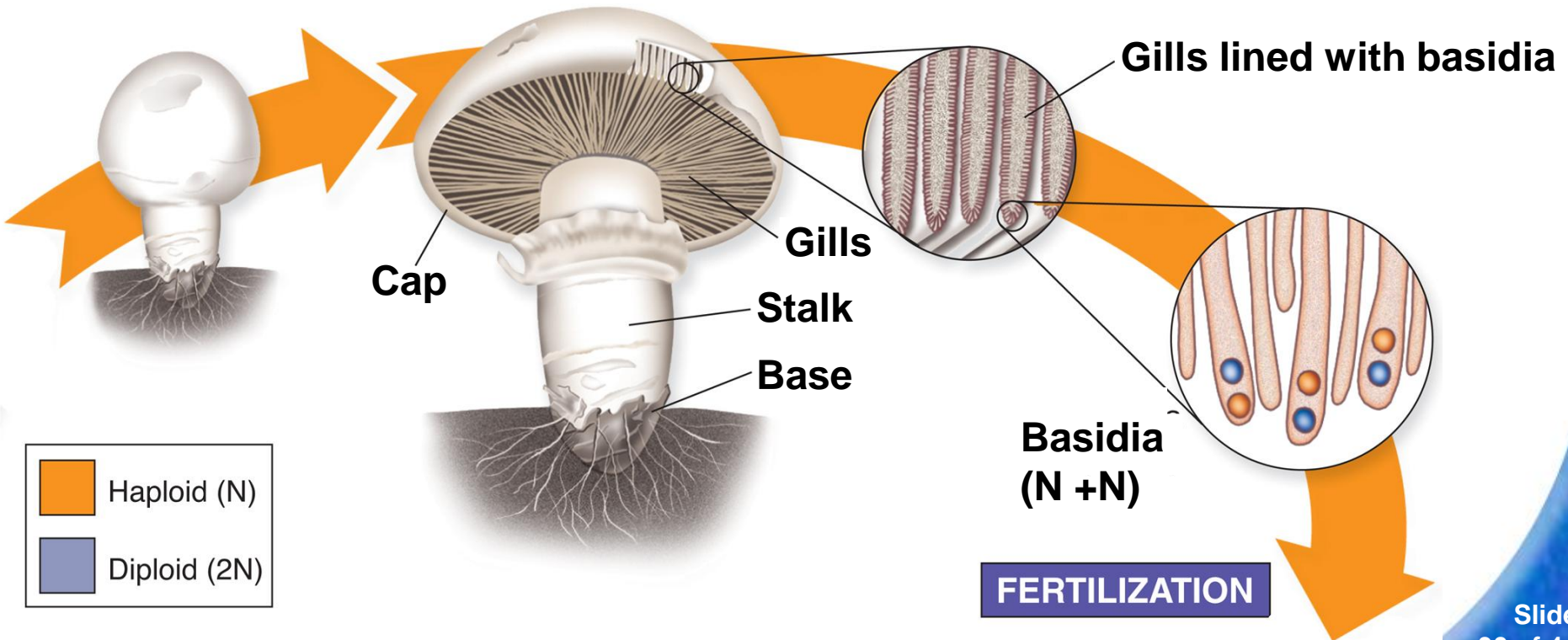
The mycelia of different mating types fuse to produce a secondary mycelium.

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



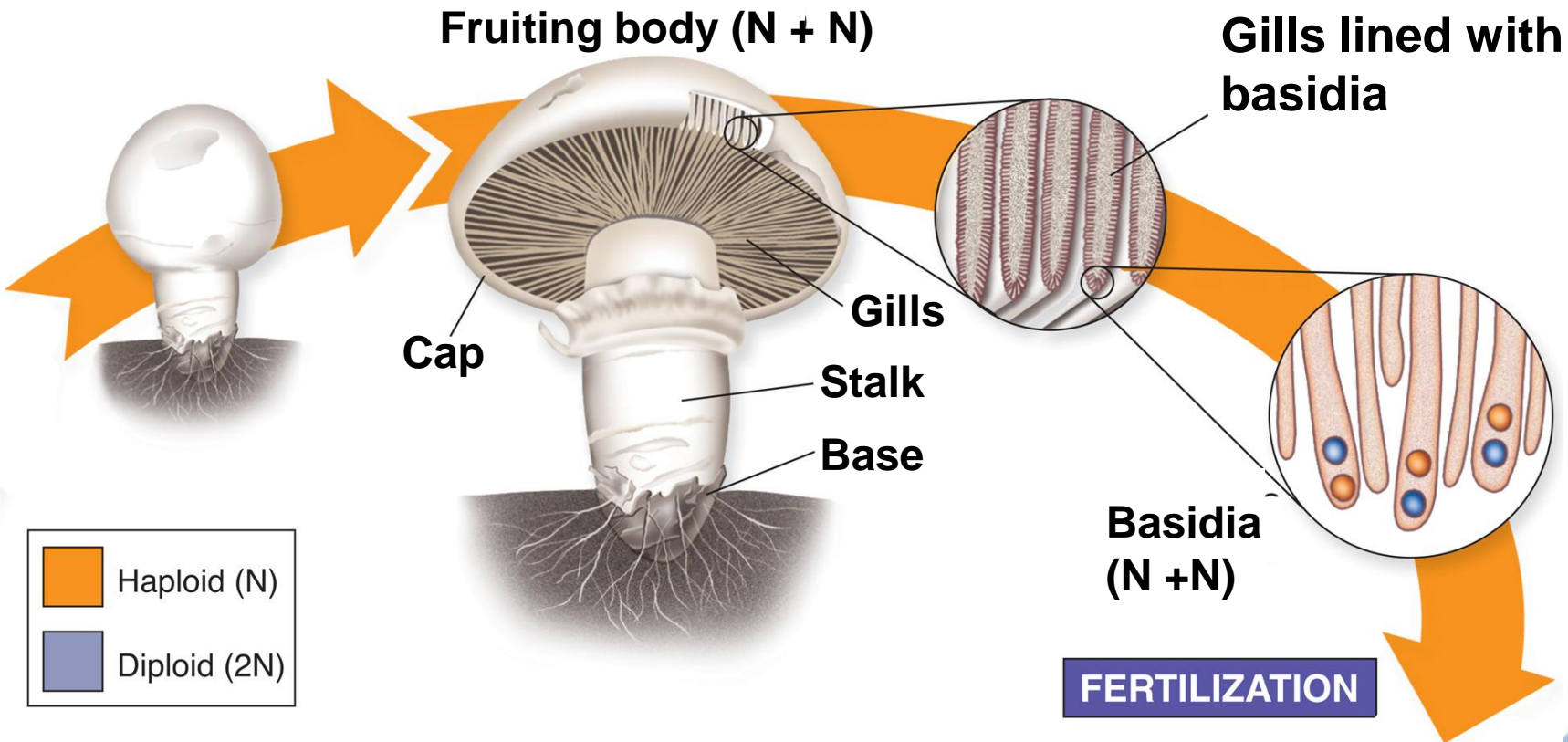
When the right combination of moisture and nutrients occurs, spore-producing fruiting bodies push above the ground.

Fruiting body ( $N + N$ )

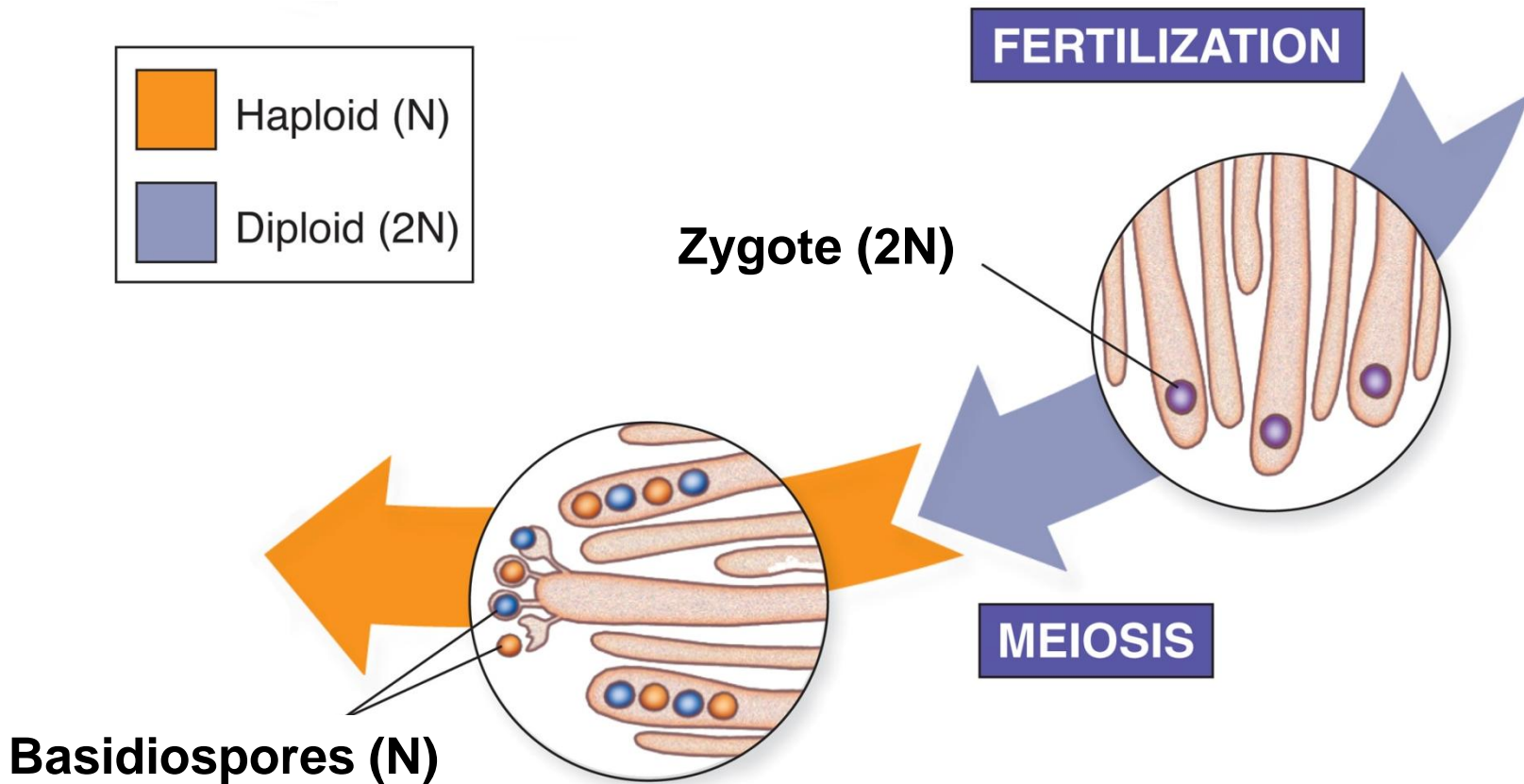


When the mushroom cap opens, it exposes hundreds of tiny gills on its underside.

Each gill is lined with basidia.

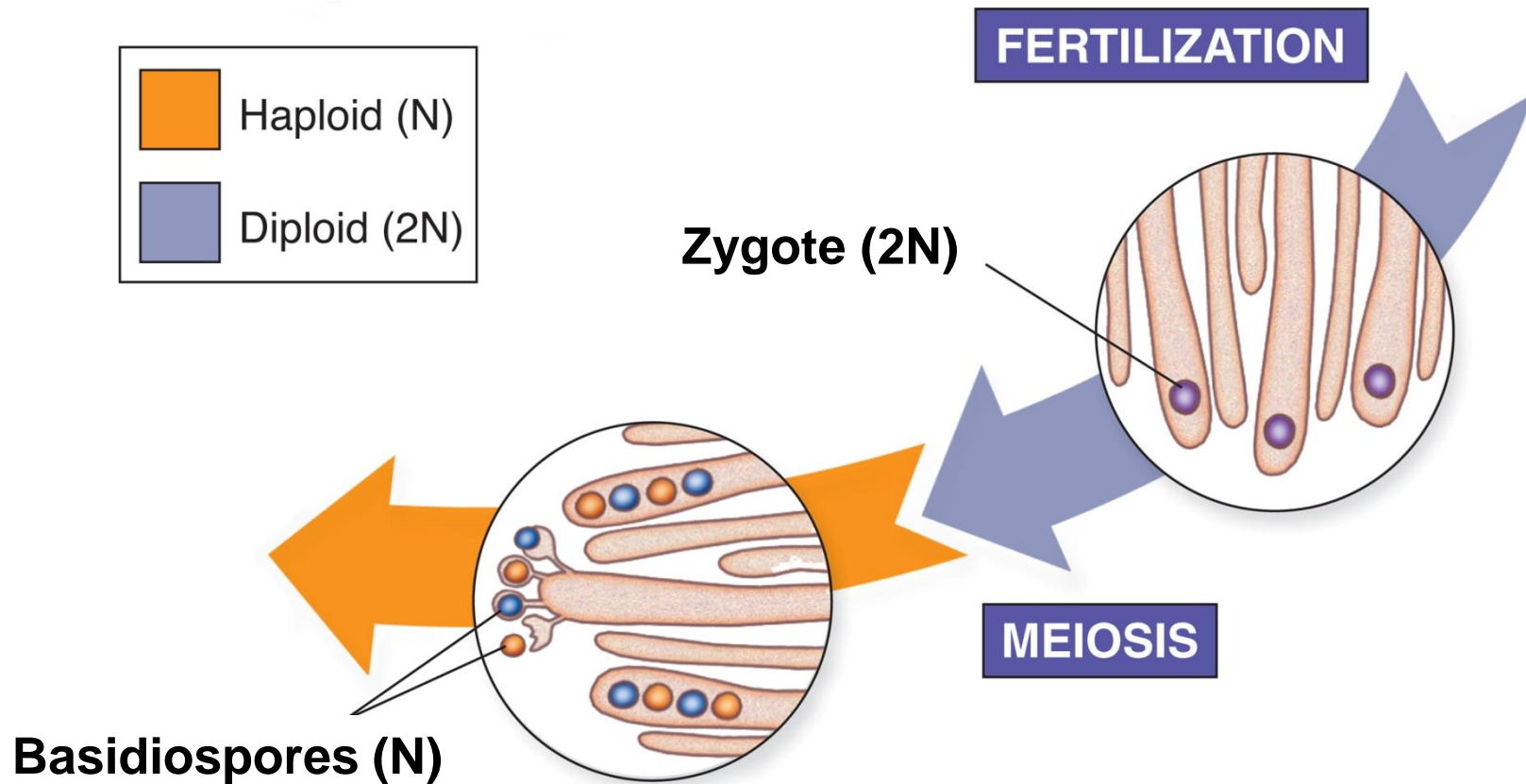


Nuclei in each basidium fuse, forming a diploid zygote, which undergoes meiosis, forming clusters of haploid **basidiospores**.





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



## Diversity of Club Fungi

Basidiomycetes include shelf fungi, puffballs, earthstars, jelly fungi, and rusts.

# The Imperfect Fungi



**What are the characteristics of the imperfect fungi?**



**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.

## 21-2 Section QUIZ

Continue to:

**Section QUIZ**

- or -

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## 21-2 Section QUIZ

1 Fungi grow best in an environment that is

a. cool.

A b. moist.

c. dry.

d. salty.

## 21-2 Section QUIZ

2 Yeasts are

- A
- a. ascomycetes.
  - b. zygomycetes.
  - c. basidiomycetes.
  - d. deuteromycetes.



## 21-2 Section QUIZ

3 *Penicillium* is a(an)

- a. ascomycete.
- b. basidiomycete.

A c. deuteromycete.

d. zygomycete.

## 21-2 Section QUIZ

**4** Sac fungi have a characteristic reproductive structure called a(an)

**A** a. ascus.

b. basidium.

c. budding capsule.

d. sporophyte.

## 21-2 Section QUIZ

- 5** The basidiospores of club fungi are produced on thin structures called
- a. fruiting bodies.
  - b. buttons.
  - A** c. gills.
  - d. stalks.

**END OF SECTION**