Lecture 2: REPRODUCTION OF FUNGI

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TYPES OF FUNGAL REPRODUCTION

Fungi reproduce by three methods:

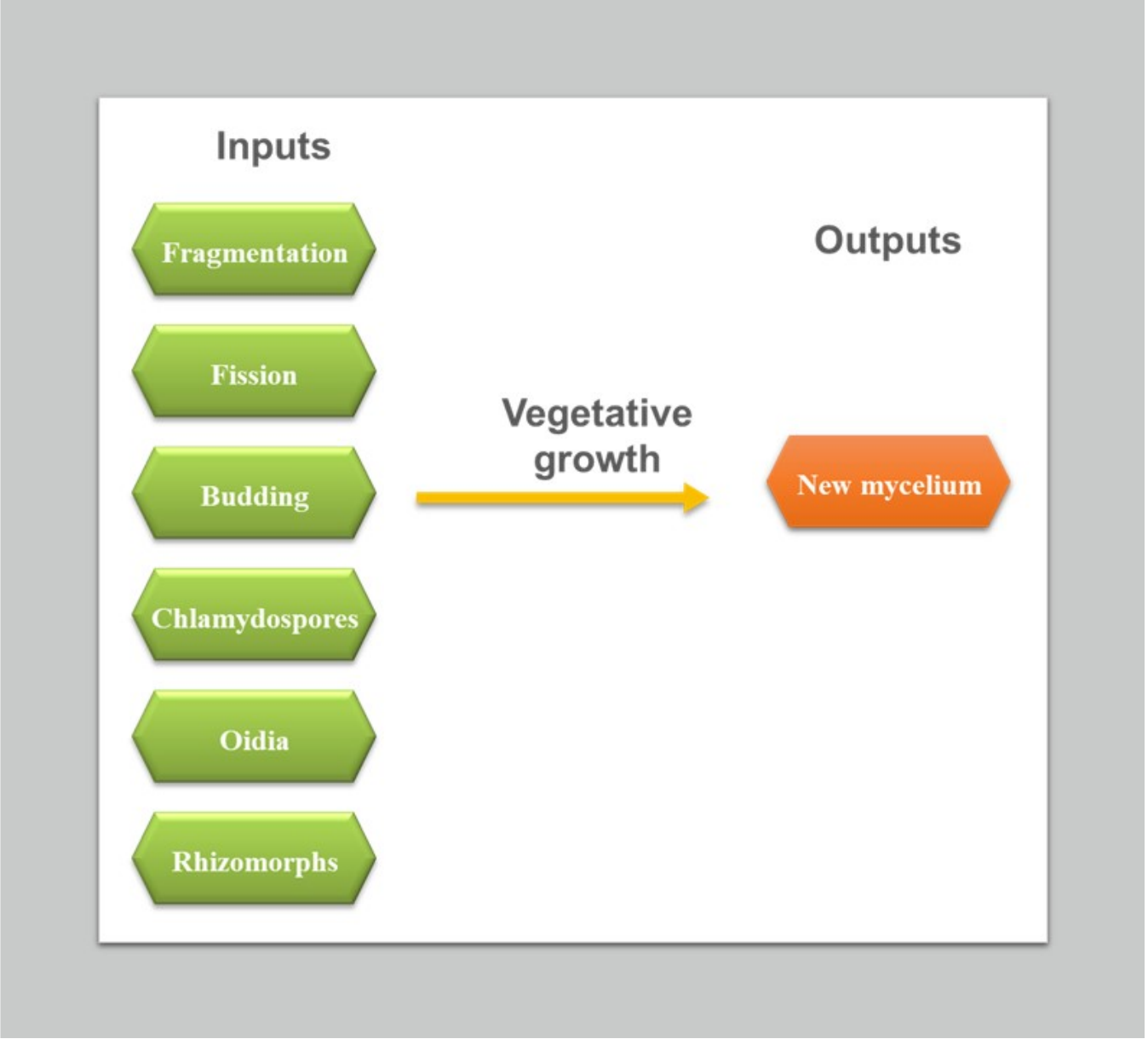
A. Vegetative

B. Asexual

C. Sexual

VEGETATIVE REPRODUCTION

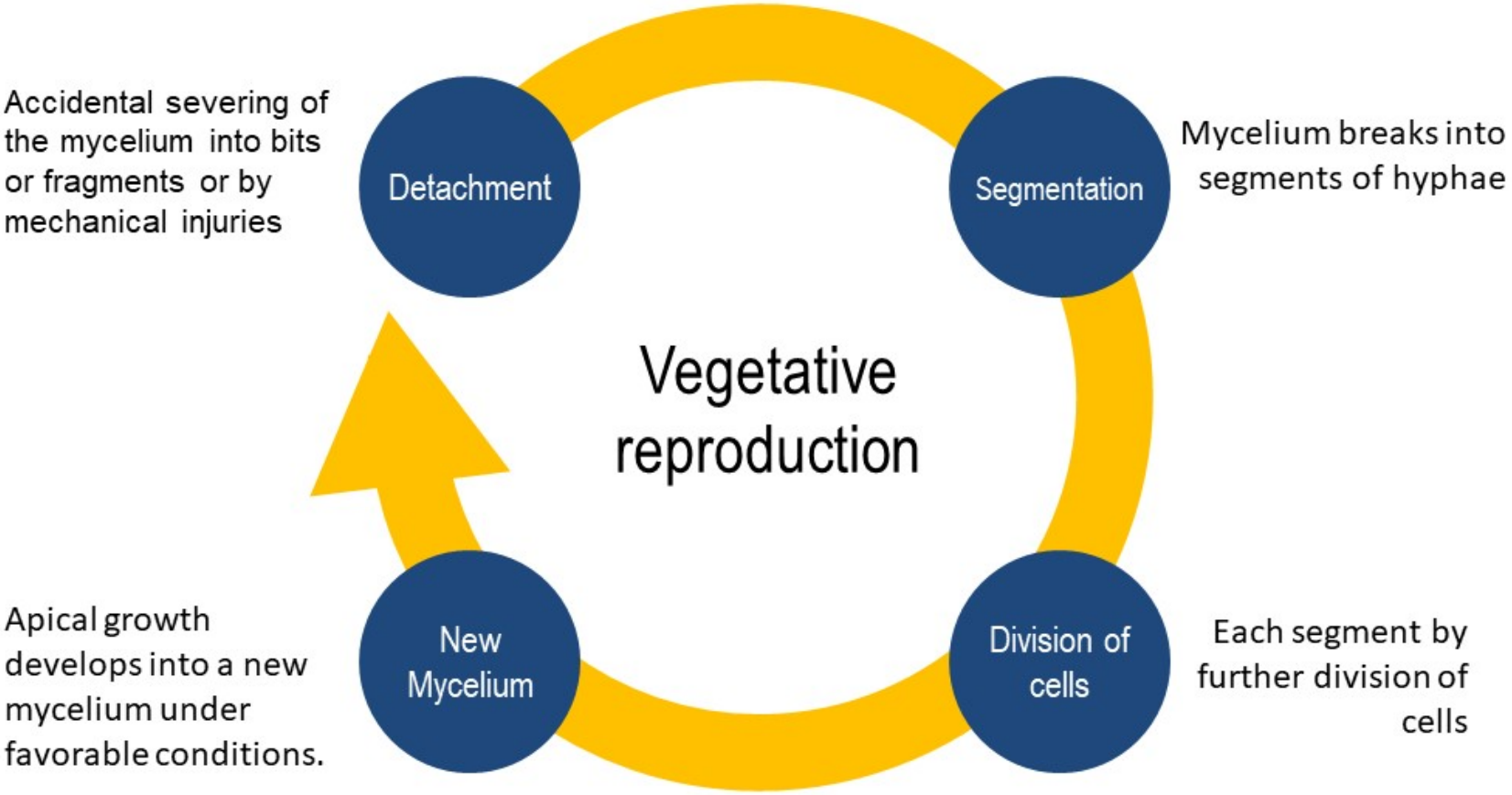
Involves the somatic portion of the fungal thallus



1. Fragmentation

- Mycelium breaks into two or more fragments
  - either *accidentally* or due to *some external force*
- Each fragment grows into a new mycelium

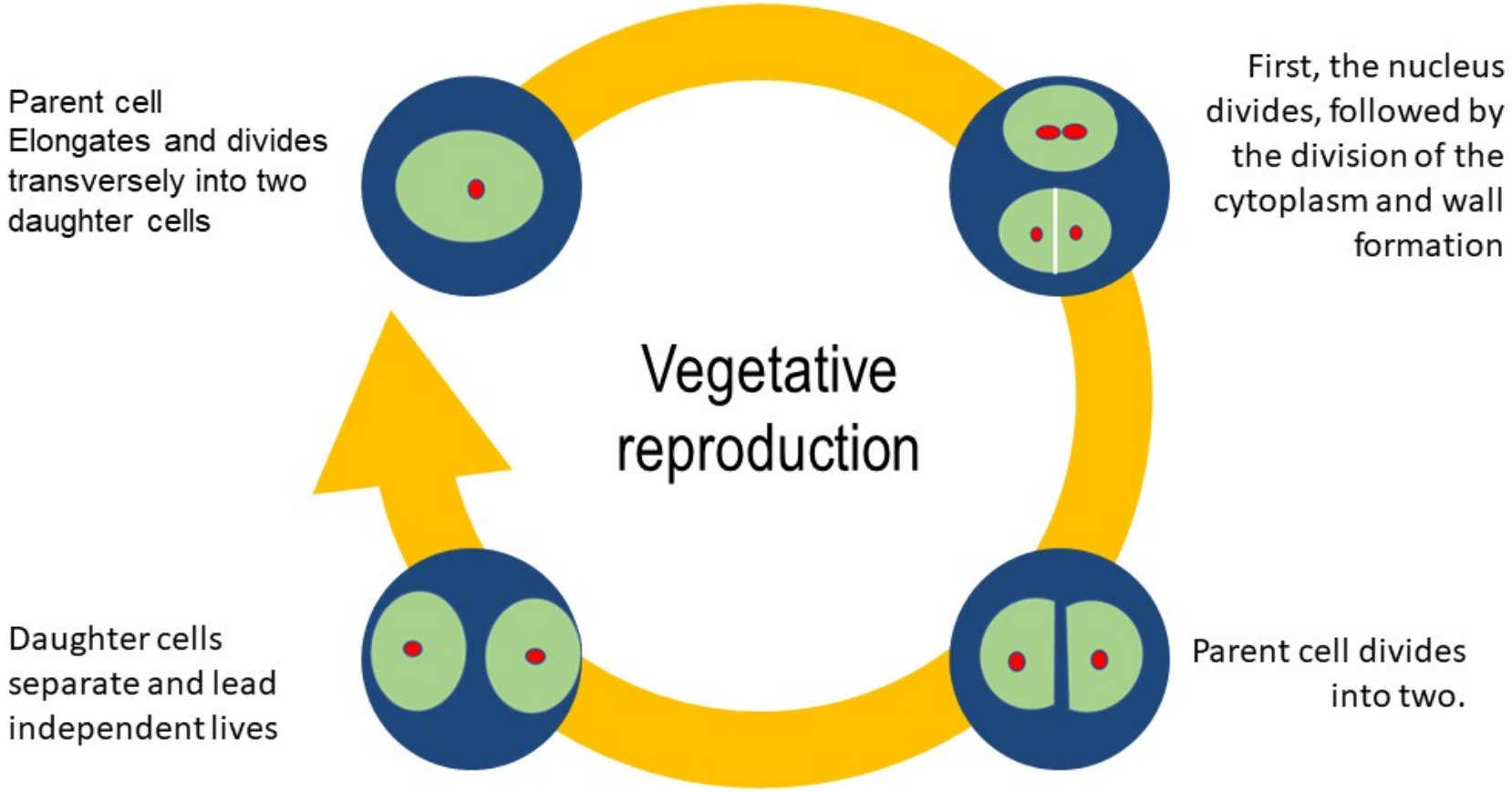
Fragmentation



2. Fission

- Parent cell splits into two equal halves
- Each part develops into a new individual.
- Common in yeast

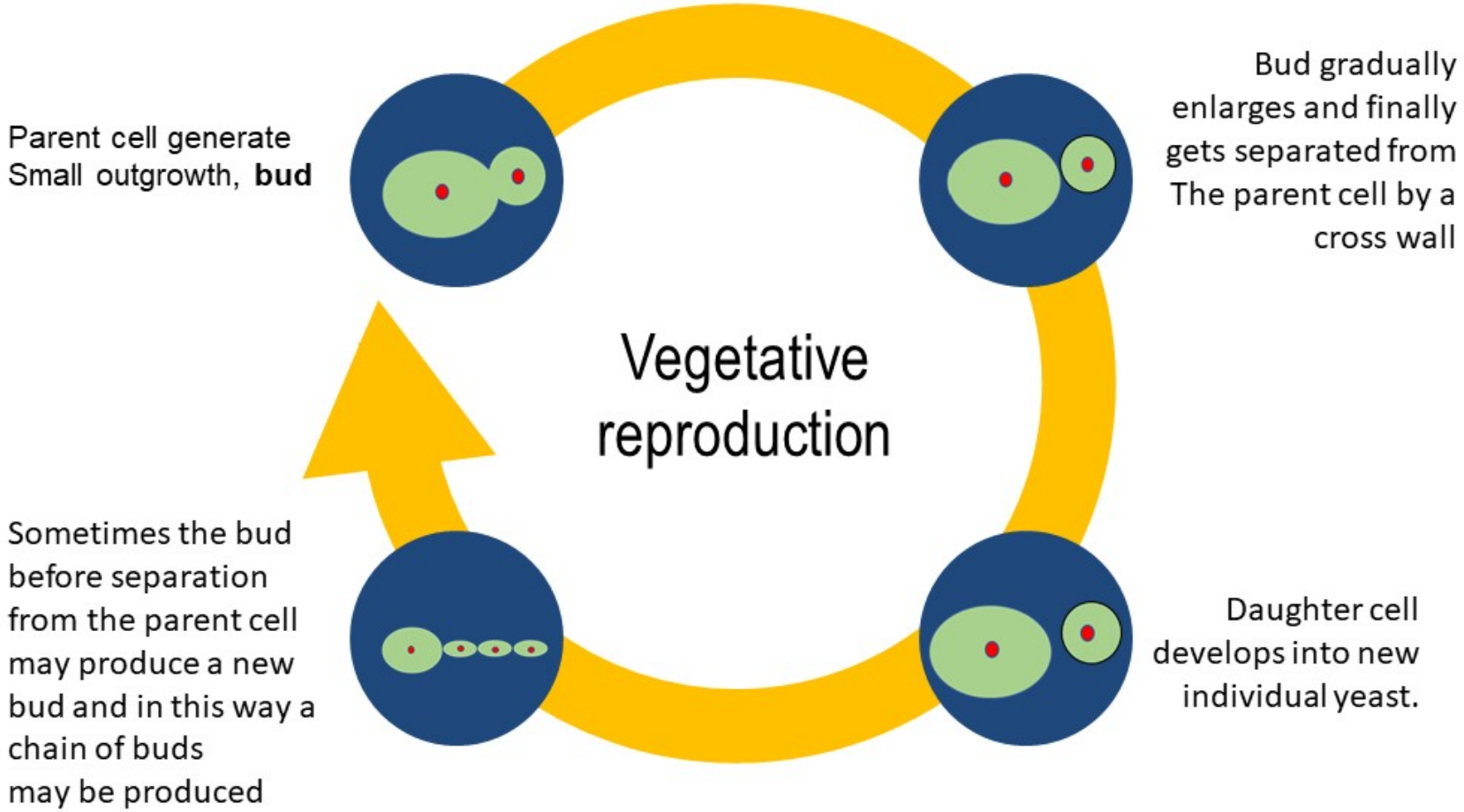
Fission


Parent cell
Elongates and divides transversely into two daughter cells
First, the nucleus divides, followed by the division of the cytoplasm and wall formation
Vegetative reproduction
Daughter cells separate and lead independent lives
Parent cell divides into two.

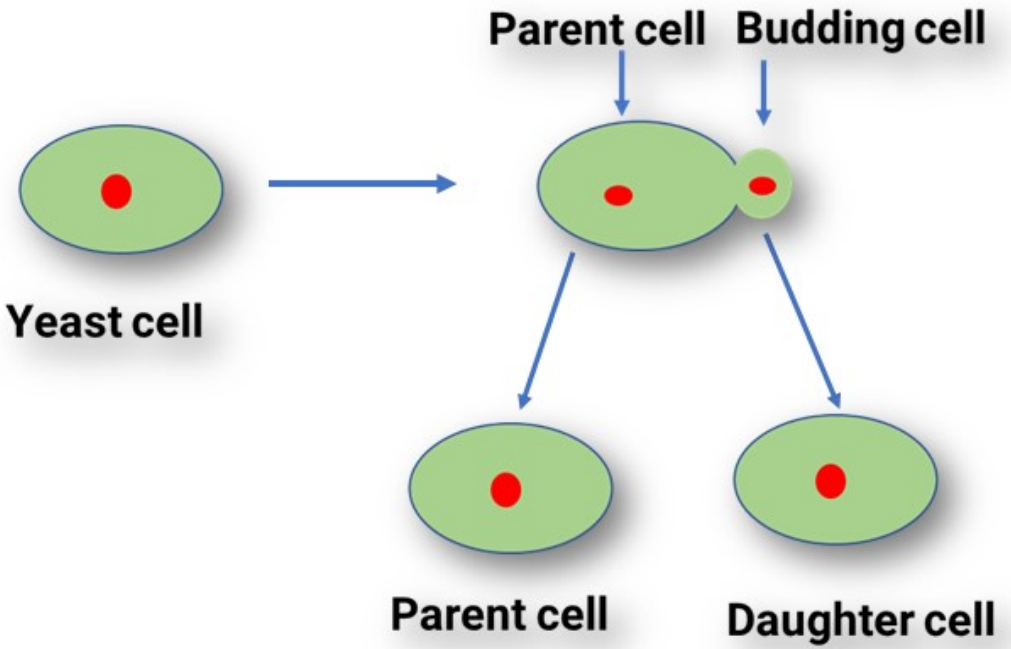
3. Budding

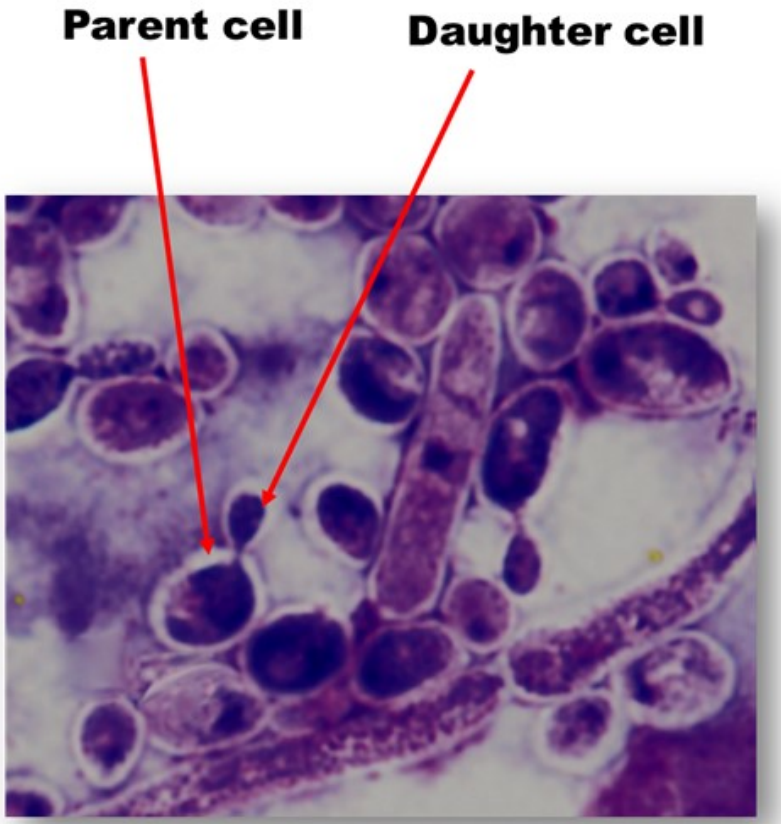
- Parent cell produces one or more projections called buds
- Bud detach and to grow into new individuals

Budding


Parent cell generate
Small outgrowth, **bud**
Bud gradually
enlarges and finally
gets separated from
The parent cell by a
cross wall
Vegetative
reproduction
Sometimes the bud
before separation
from the parent cell
may produce a new
bud and in this way a
chain of buds
may be produced
Daughter cell
develops into new
individual yeast.

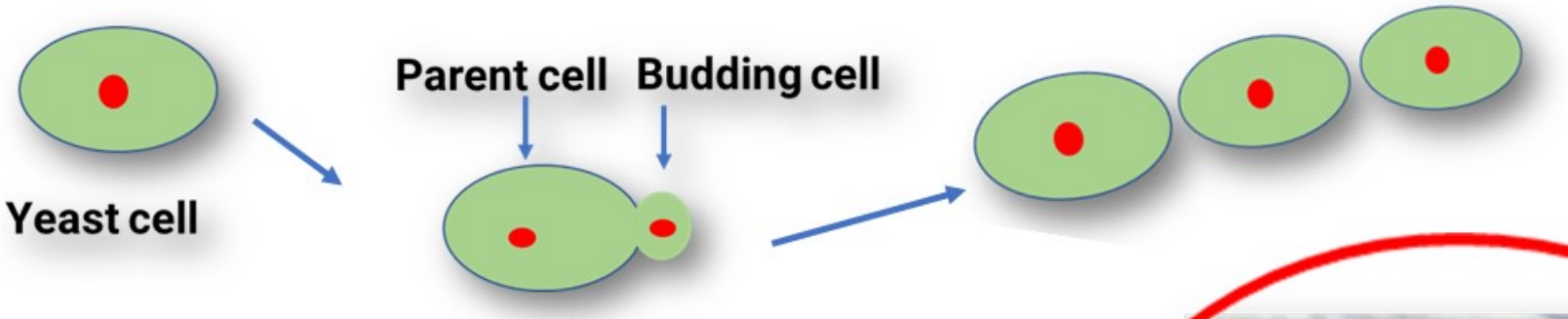
Budding





Budding in yeast

Pseudohyphae formation



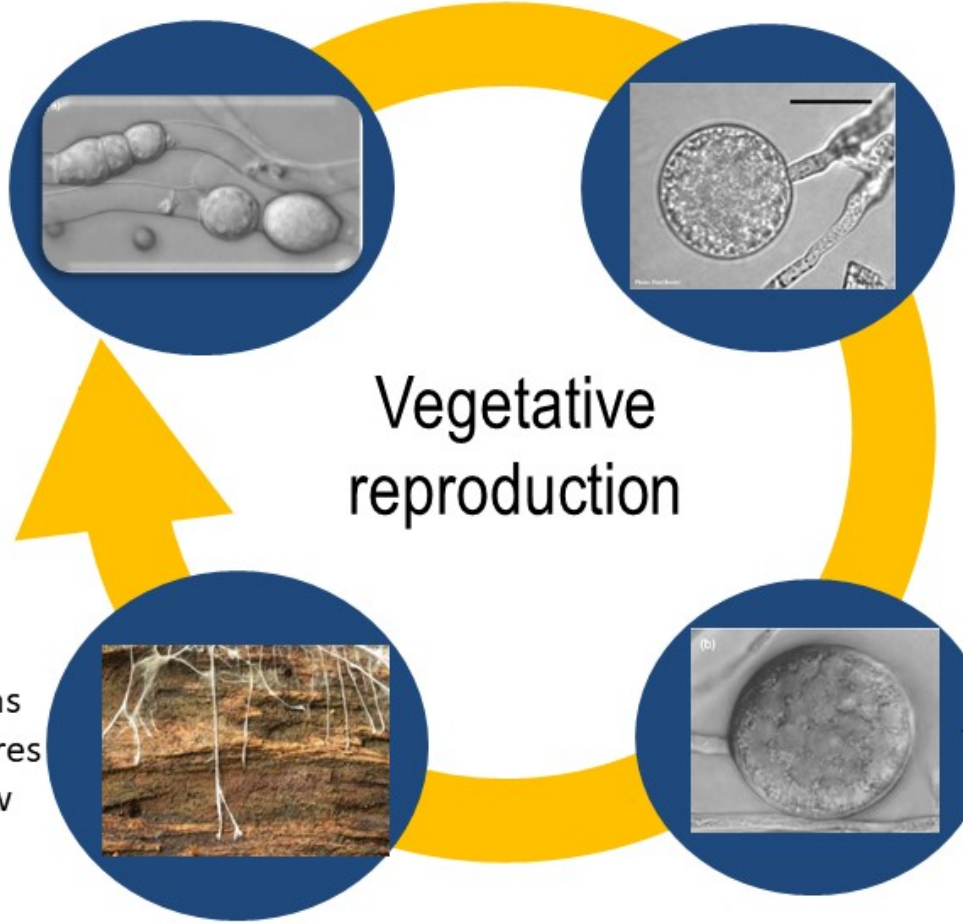
4. Chlamydospore

- Enlarged, thick-walled vegetative cells with varied forms
- Formed by thickening of the cell wall of a hyphal compartment forms a chlamydospore
- Condensed cytoplasm that form within hyphae or at hyphal tip
- Functions like spore
  - E.g. *Cryptococcus* spp., *Candida* spp.

Chlamydospores

Many fungi forms banana-shaped macroconidia, smaller microconidia, and thick-walled chlamydospores (E.g. *Fusarium*)

Formed either singly or in chains in the vegetative hyphae



chlamydospores develop thick, resistant walls and accumulate food materials and thus help the fungus to tide over unfavorable conditions.

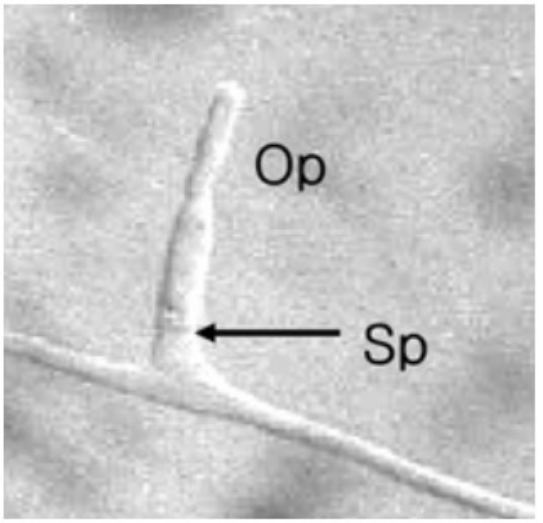
Remains dormant till favourable conditions returns..

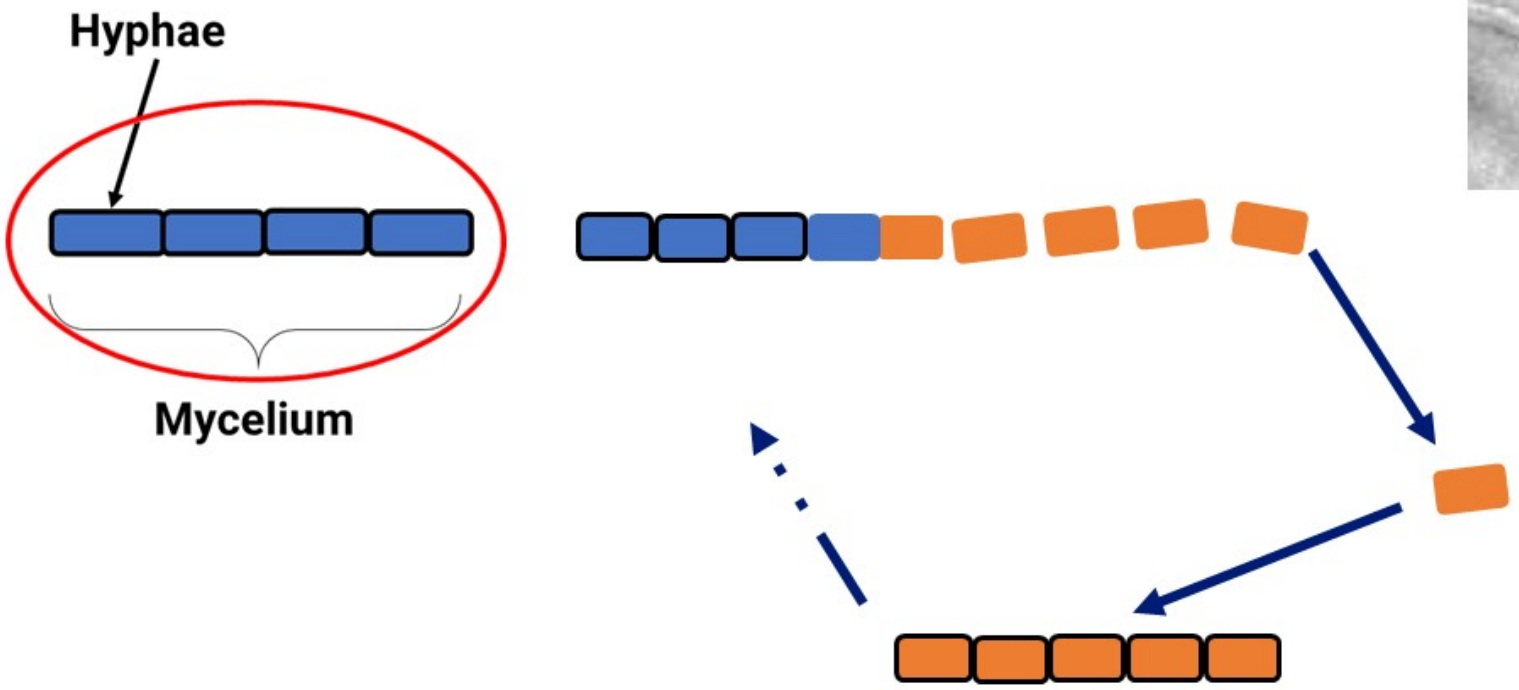
With the return of favorable conditions each chlamydospores develops into a new mycelium..

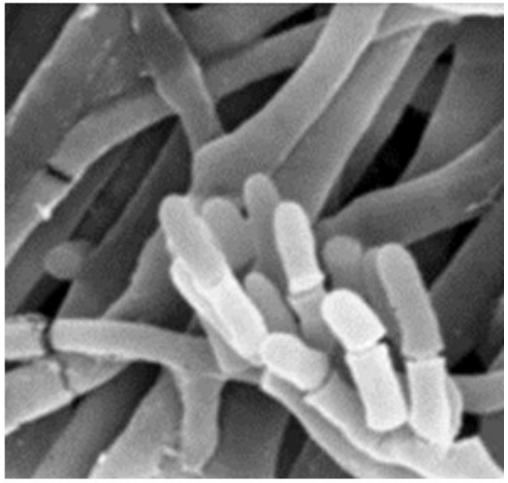
5. Oidia/Arthrospore

- Disarticulation or fragmentation of fungal hyphae into compartments separated by septa
- E.g. *Geotricum* and *Trichosporon*

Arthrospore

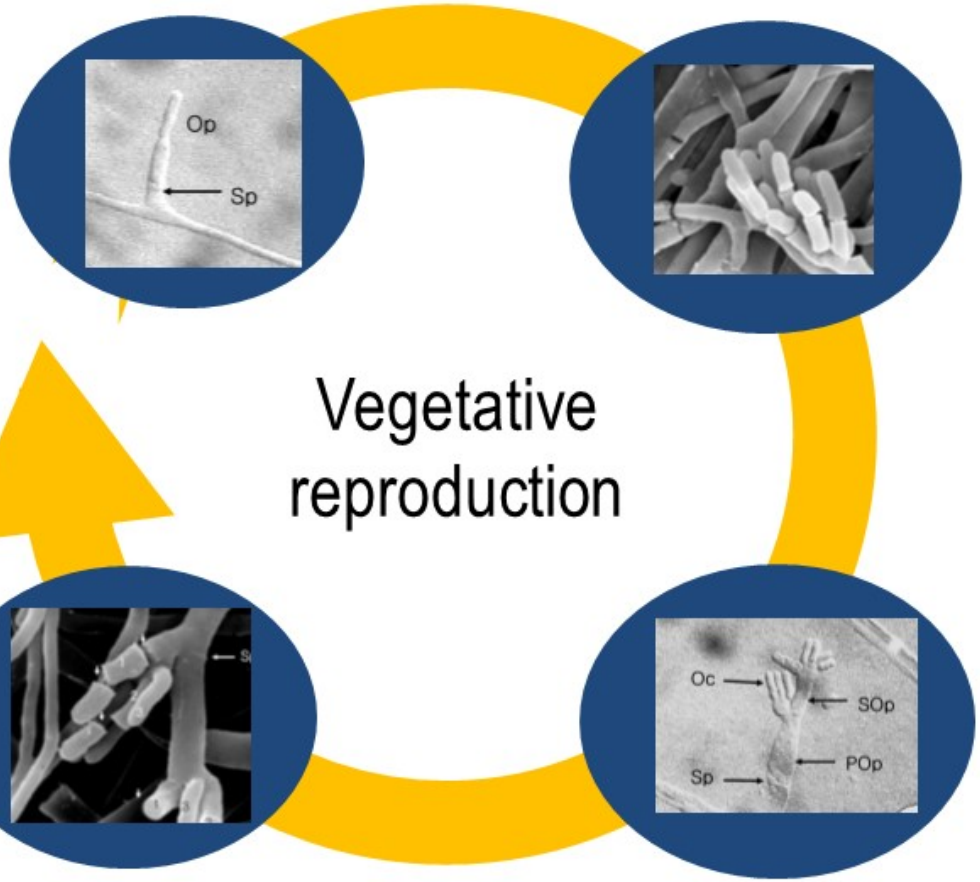






Oidia or arthrospore

Oidiophores sprouted out from hyphae



Fission of oidial cells Into oidia. Note that each oidial cell

Formations of a group of oidial cells in tandem.

Oidia or Arthrospores detach from parent cell and grows into independent thallus .

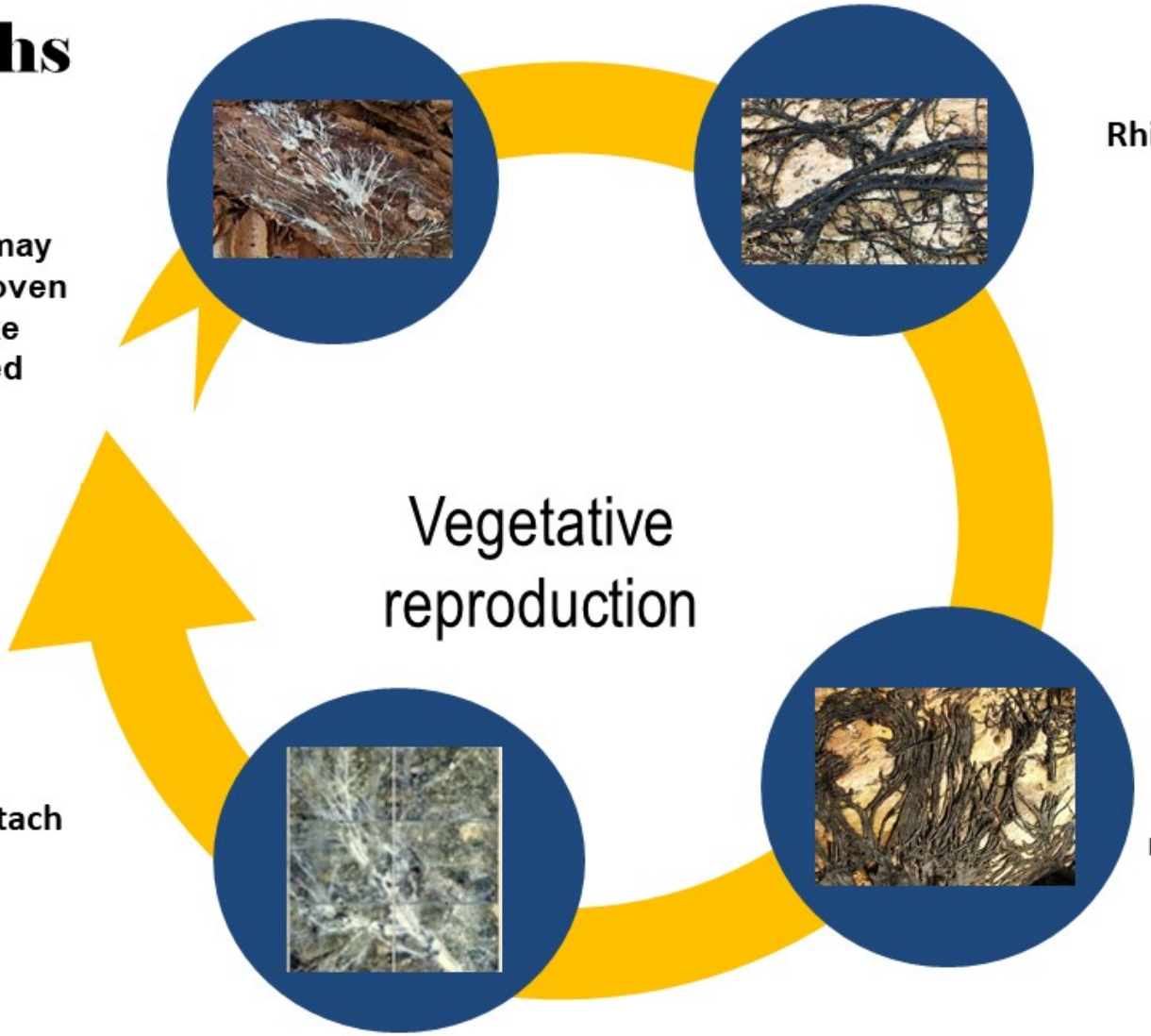
Rhizomorph formation

Some higher fungi form several interwoven Hyphae (rope-like structures - **Rhizomorphs**

Under favourable conditions- resume growth to give rise to **new mycelia**
E.g. Armillaria spp.

Rhizomorphs

In some higher fungi, hyphae may become interwoven to form rope-like structures called rhizomorphs



Rhizomorphs serve as a means of Perennation

Under favourable conditions, they resume growth to give rise to new mycelia.

Oidia or Arthrospores detach from parent cell

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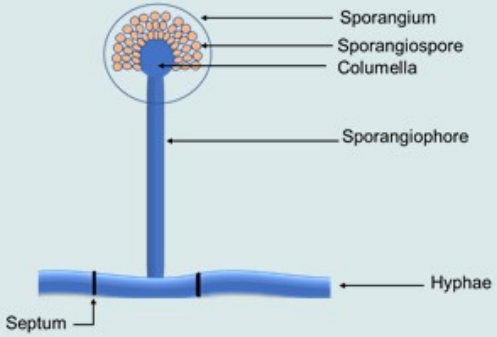
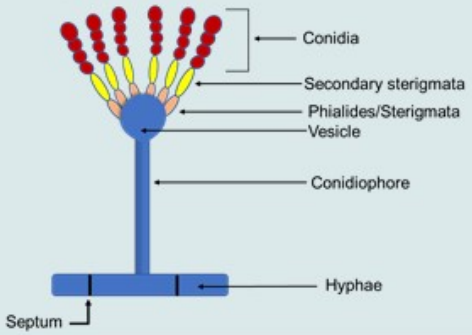
Asexual reproduction

- Asexual spores are formed after mitosis (mitospores) without the involvement of meiosis.
- Fungi produce an enormous variety of asexual spores.

  Fungi reproduce by three asexual methods:
- The asexual reproduction in fungi occurs by producing :
  1. **Sporangiospores**
  2. **Zoospores**
  3. **Conidiophores**

Asexual reproduction (Sporangiospores)



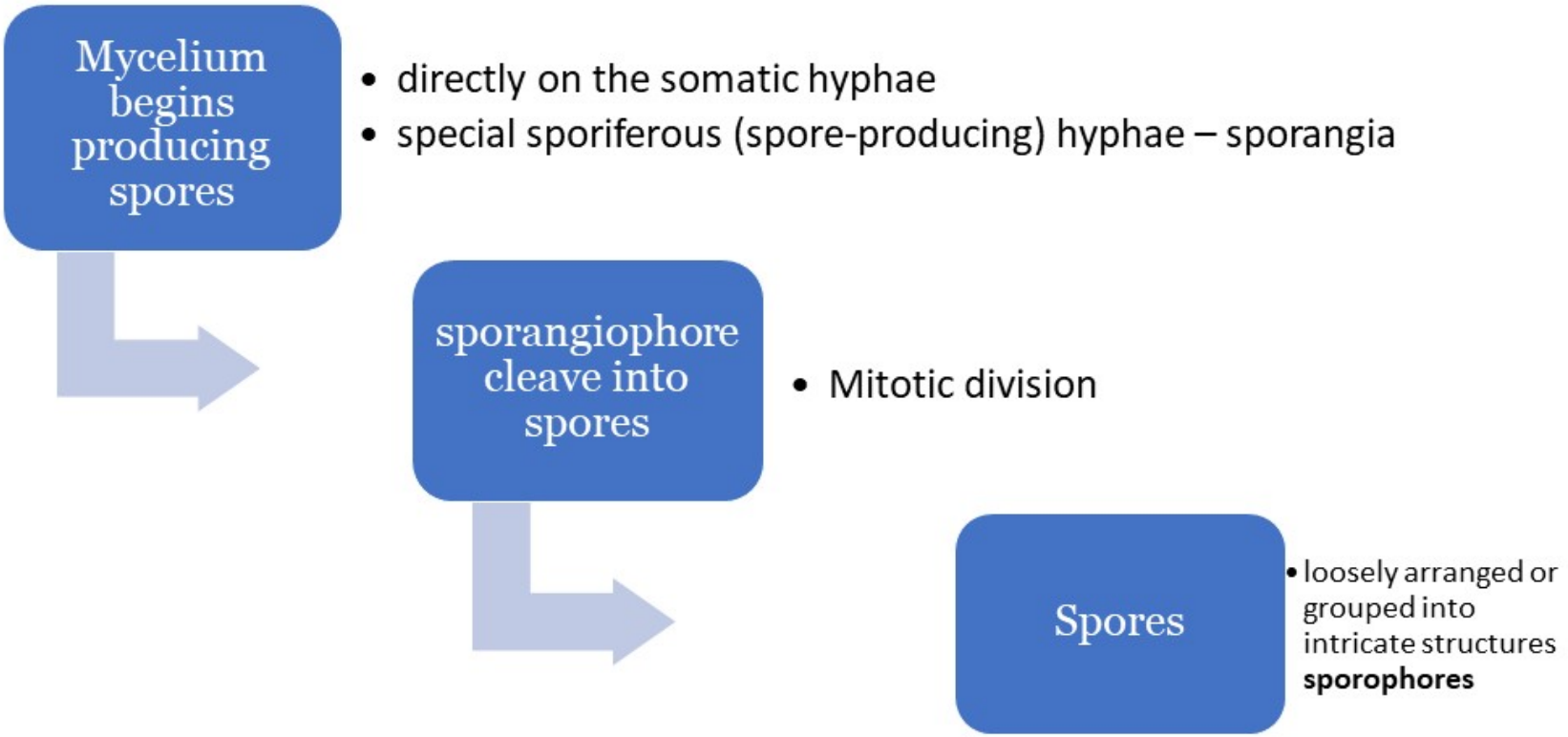


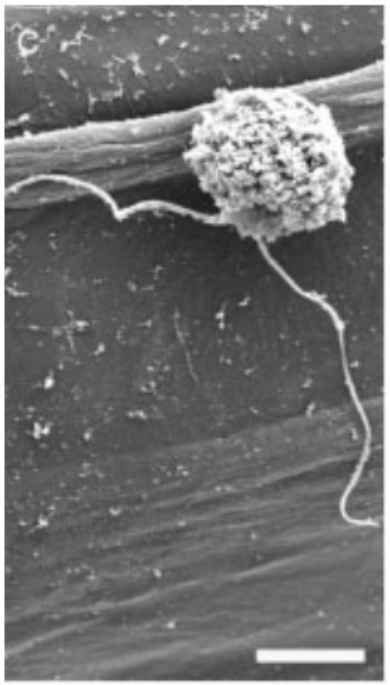
Sporangiospores are formed endogenously in a sporangium via cytoplasmic cleavage in the zygomycetes.

Fungi reproduce by three methods:

- The asexual reproduction in fungi occurs by producing
- Sporangiospores produced inside a sac-like structure - sporangium.
- Hypha bearing a sporangium - sporangiophore., Characteristically branched.
- Sporangiospores - motile or non-motile.
- Non motile spores - conidium
- Characteristic feature of terrestrial species - mucor and rhizopus.
- In contrast to zoospores, the aplanospores have a definite spore wall and are dispersed by wind and insects.

Formation of spores





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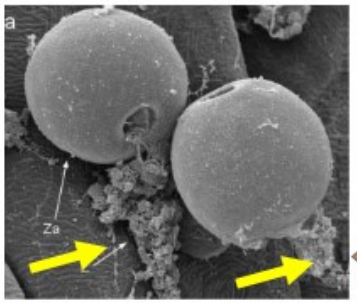

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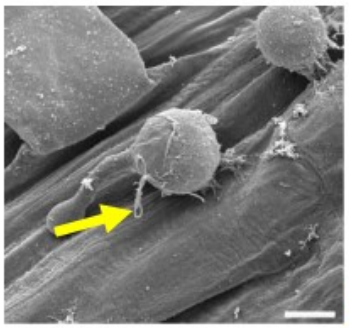

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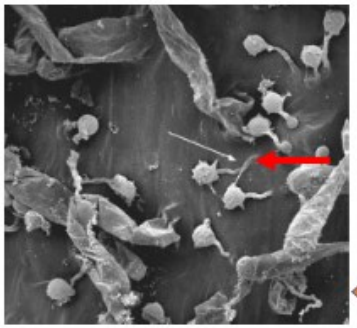

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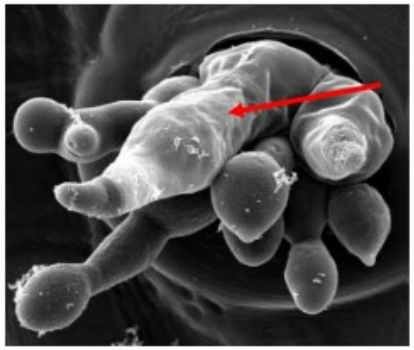

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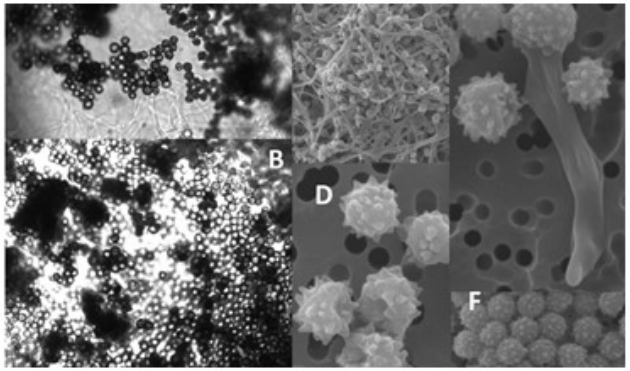
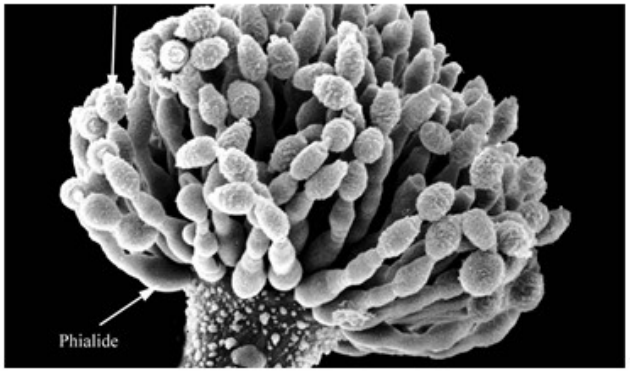
Asexual reproduction (Zoospores)

1. Division Oomycota/terrestrial fungi produce motile biflagellate sporangiospores - **zoospores**
2. sporangium bearing zoospore - **zoosporangium.**
3. Zoospore - motile spore lacking a cell wall.
4. Released after a rain from the sporangia
5. After a swarming period it secretes a wall and germinates to form a germ tube.

Conidiospores





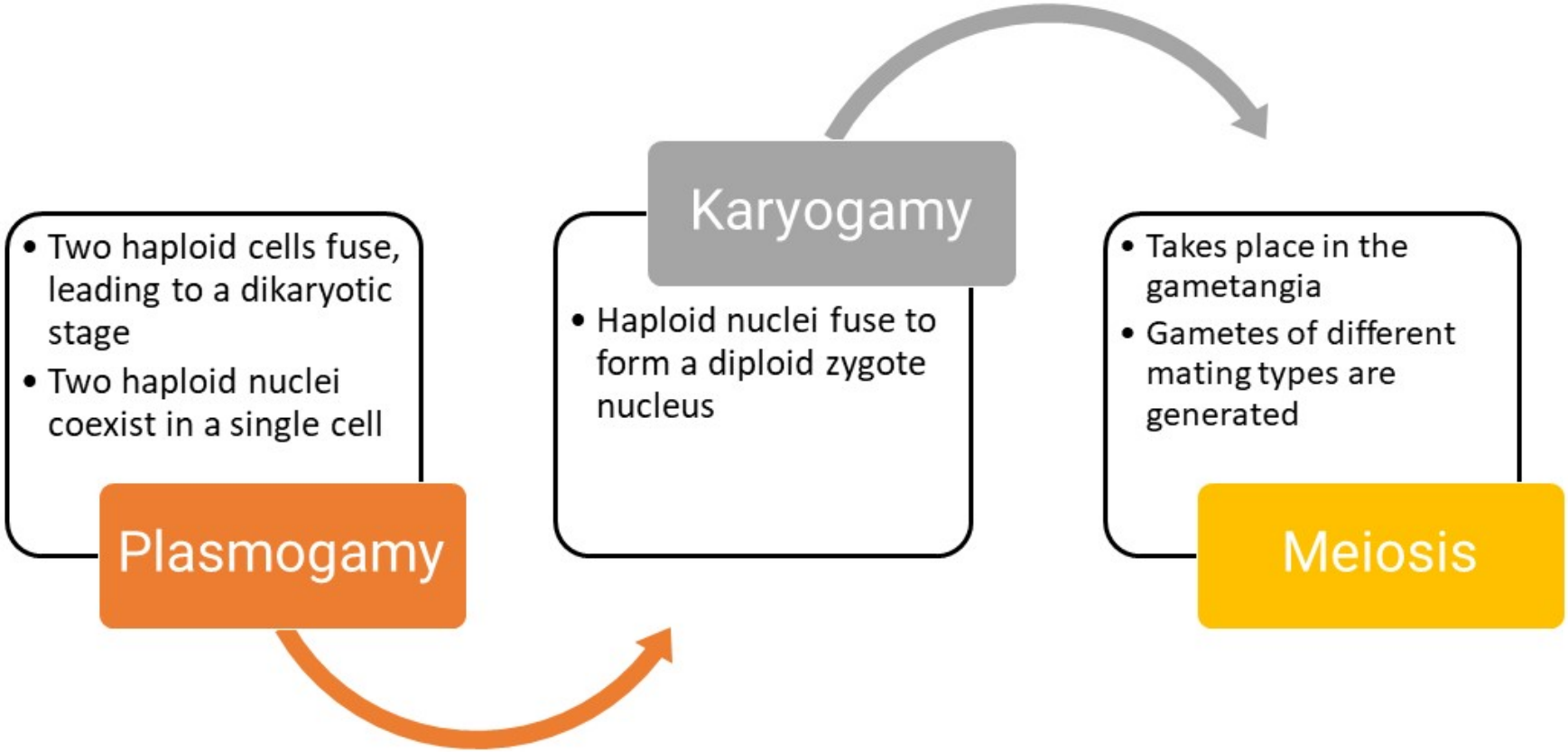
- Advanced fungi asexually produce conidia
- Conidia are non-motile, deciduous mitospores
- Formed externally as single separate cells.
- Develop either directly on the mycelium or on morphologically differentiated hyphae called **conidiophores.**
- The conidiophores may be simple or branched, septate or aseptate.
- The conidia are produced singly or in chains at the tips of the conidiophores e.g. ***Aspergillus*** or at the tips of their branches e.G., ***Penicillium.***

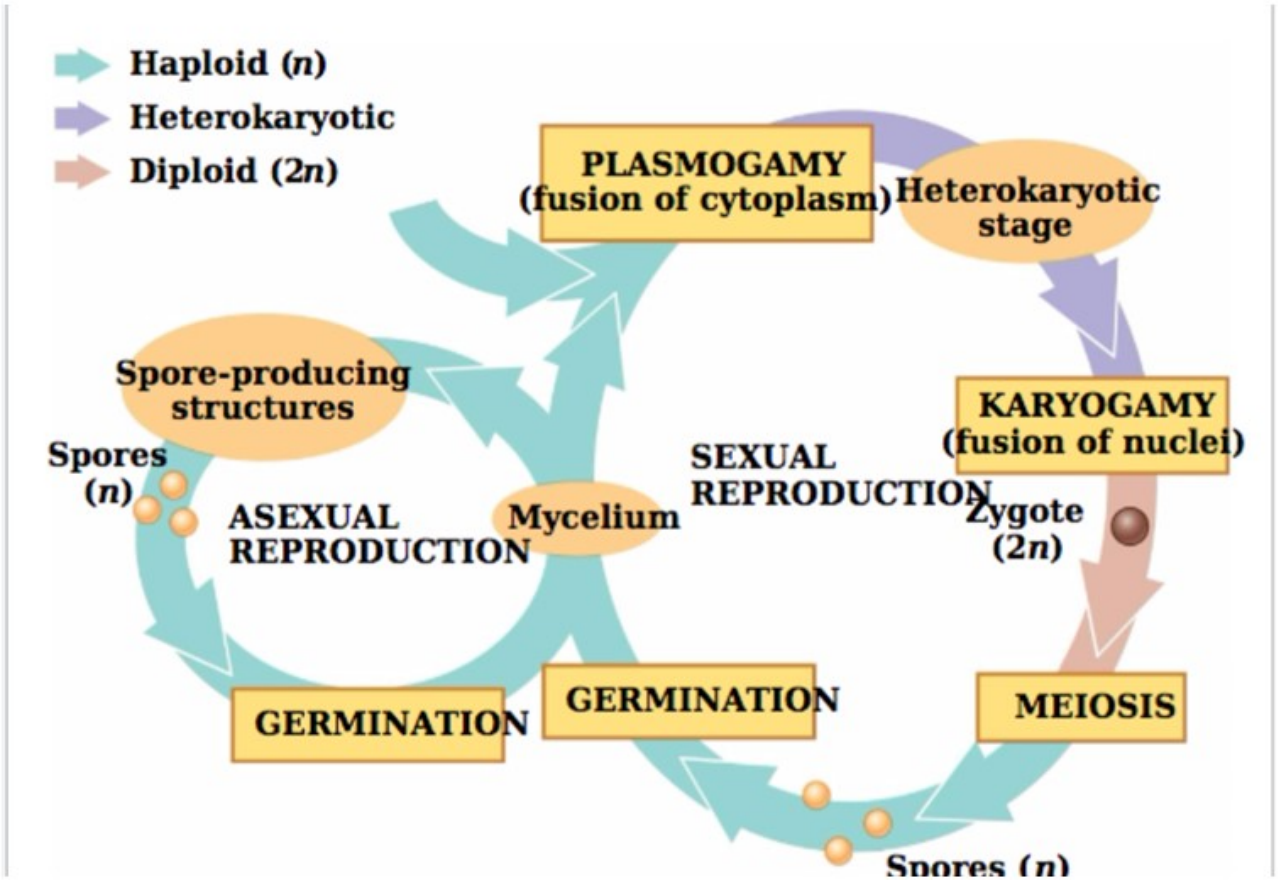
Sexual Reproduction

Importance of sexual reproduction in fungi

- Several species of fungi exist as both haploid and diploid forms
- Dicaryotic fungi reproduce by sexual method
- Meiosis serves as a means of DNA damage repair

Stages of sexual reproduction



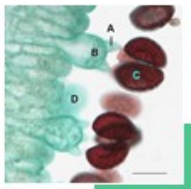


Sexual reproduction of fungi

Sexual spore

ASCOSPORE

- Produced in sac like cylindrical structure - **Ascus**
- Group producing ascospore – Ascomycota
- E.g. *Saccharomyces cerevisiae*



BASIDIOSPORE

- Produced in a club-shaped spore-producing structure - **Basidium**
- Group producing basidiospore – Basidiomycota
- E.g. *Cryptococcus neoformans*, *Agaricomycotina* (mushrooms)

ZYGOSPORE

- Produced in Zygosporangium
- Group producing zygospore – Zygomycota
- E.g. Black bread mold (Rhizopus stolonifera)

Acknowledgement

Photographs has been taken from google.com for study purpose

Thanks