Zygomycotina – Rhizopus

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Taxonomic position of Rhizopus

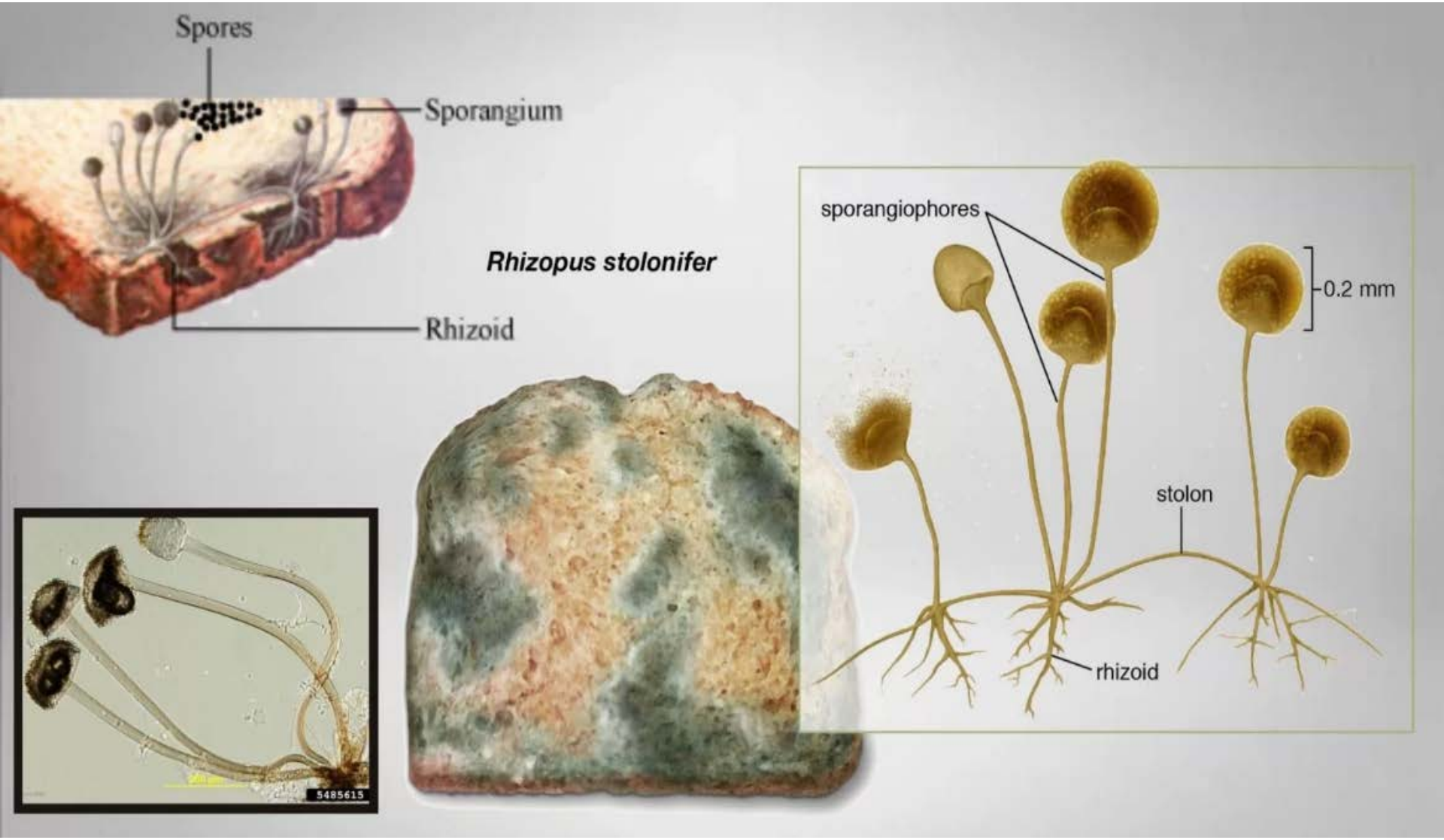
General characters:

1. Common fungi growing on stale bread, therefore, also called Bread mould.
2. Lives as a saprophytes
3. Grows on damp decaying fruit, vegetables, pickles etc.
4. Under certain conditions it lives as facultative parasite on strawberry fruit causing leak and soft rot disease.
5. This widespread genus includes at least eight species.

Mycota
Eumycotina
Zygomycetes
Mucorales
Mucoraceae
Rhizopus stolinifer

Structure of Thallus

- *Rhizopus stolonifer* grows primarily as mycelia, which consists of long filamentous cells, or hyphae, that lack cross walls, known as septa.
- The lack of septa enables the mold to be named coenocytic. Coenocytic means that the mold is a multinucleate cell enclosed by one cell wall that contains chitin.
- The mycelial plant body is differentiated into nodes and internodes.
- The internodal region is the aerial and arching hyphae, known as stolon, which when touches the substratum forms the nodal region.
- The nodal region bears much branched rhizoid grows downward, inside the substratum for anchorage and absorption of food.
- The hyphal wall is microfibrillar and consists mainly of chitin-chitosan.
- In addition to chitin- chitosan, other substances like proteins, lipids, purines and salts like calcium and magnesium are also present in the hyphal wall.
- Inner to the cell wall, cell membrane is present which covers the protoplast.
- The protoplast contains many nuclei, mitochondria, endoplasmic reticulum, ribosome, oil droplets, vacuoles and other substances.
- The size of the vacuole enlarges with age by coalescence of smaller vacuoles.


Spores
Sporangium
Rhizoid
Rhizopus stolonifer
sporangiophores
0.2 mm
stolon
rhizoid
5485615

Reproduction in *Rhizopus*

- *Rhizopus stolonifer* reproduces by vegetative, asexual and sexual mode.

1. Vegetative reproduction: It takes by fragmentation.

- Due to accidental breakage the stolon may break into two or more small units.
- Each unit is capable of growing as mother mycelium.

Asexual Reproduction

- The favorable environmental condition triggers the Asexual reproduction in Rhizopus.
- During asexual reproduction, the aerial hyphae is produced from the internode and rise to a definite height.
- The nuclei and cytoplasm shift deeper and deeper towards the apical side, consequently, the apex of the aerial hyphae puffs up.
- The swollen portion is expanded and develops into a huge round sporangium.
- Then the Sporangium separates into two regions such as multinucleated sporoplasm and vaculated columellaplasm.
- Nucleus within the sporoplasm divides immediately, and all nuclei find some cytoplasm and convert into spongiospore.
- After certain development columella deflated releasing sporangiospores in the atmosphere.
- Now, the Sporangiospore associated with the substratum and germinates to give rise mycelium.
- **In presence of the adverse conditions, septum synthesis occurs within the mycelium and each intercalary mycelium forms a thick resting spore called chlamydospore.**

Sexual reproduction

- The Sexual reproduction of *Rhizopus stolonifer* occurs in presence of unfavorable conditions by means of gametangial copulation.
- Most of the Rhizopus are heterothallic in nature.
- When two mycelium of different strain come in contact, each mycelium forms a small out-growth, termed progametangia.
- The apical area of the two progametangia aggregates and the cytoplasm of each progametangium pushes deeper and deeper towards the apical area which swells up with compact protoplasm.
- The apical region is called gametangia while the basal region is called as suspensor.
- The protoplasm in gametangia fuses and develops a resting spore known as Zygospore.

...Sexual Reproduction

- The nuclei of opposite gametangia fuse together to form diploid (2n) nuclei and unpaired nuclei gradually degenerate.
- The young zygospore enlarges and secretes five layered (two in exospore and three in endospore) thick wall, which undergoes a period of rest .
- After resting period, the zygospore germinates.
- On returning favorable condition, spore wall break and develops germ tube which extends to form promycelium.
- The Promycellium contain two region such as germsporangiophore and germsporangium.
- The nucleus in germsporanium is separated by meiosis developing haploid nuclei, which gather cytoplasm and acts as spores. The haploid spore is discharged and grows to give rise a new mycelium.

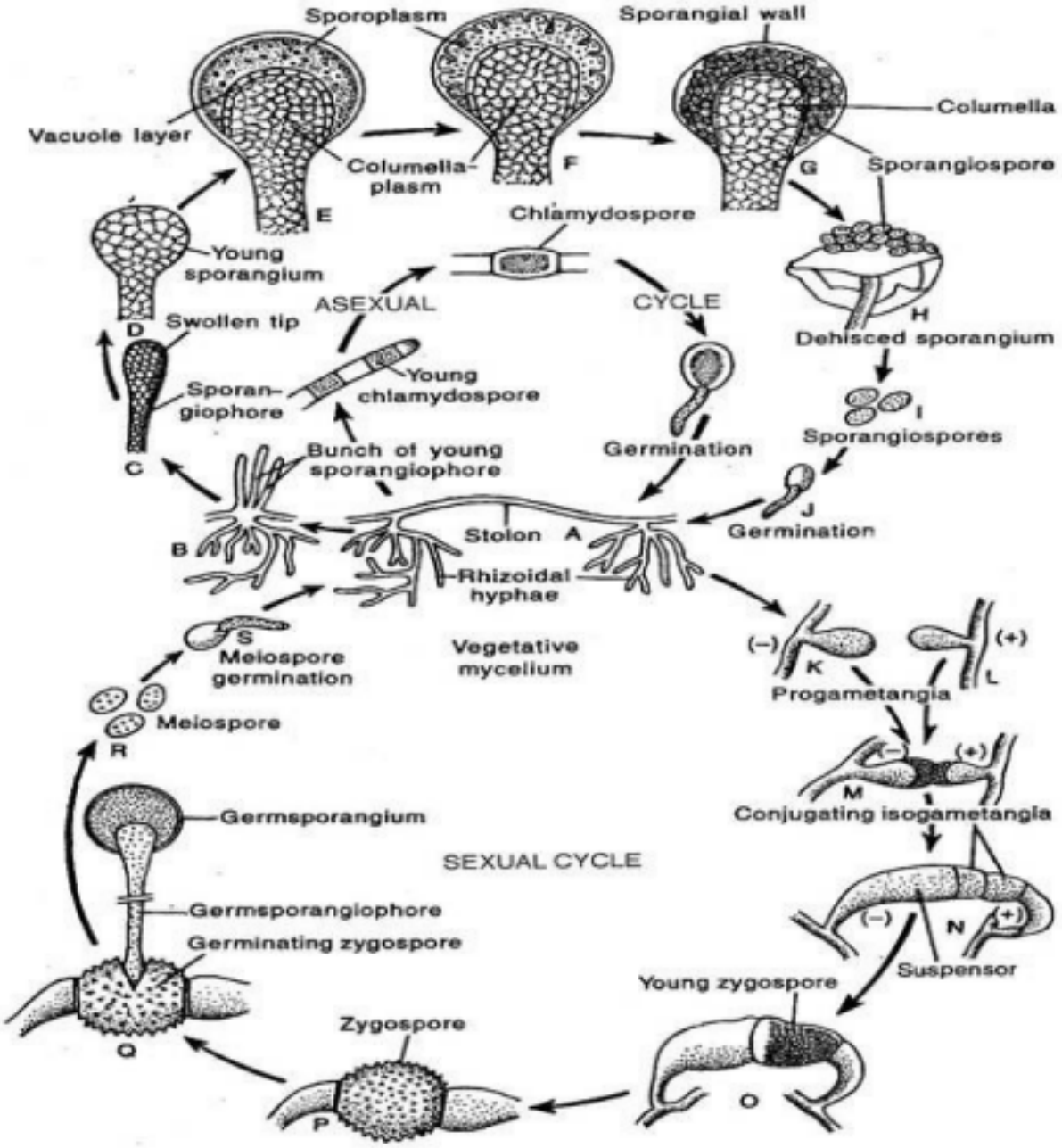


Fig. 4.26 : Life cycle of *Rhizopus stolonifer*