Zygomycota: (General characteristics).

(1) The thallus is normally haploid, consisting of coenocytic mycelium and its wall contains chitin and chitosan.

(2) The mycelium contains cell organells like other fungi, except typical golgi bodies and centriole.

(3) Asexual reproduction takes place by aplanospore.

(4) sexual reproduction takes place by gametangial copulation results in the formation of zygospore.

(5)

Rhizopus sp.

Systematic position -

Div	- Fungi
Class	- Phycomycetes
Subclass	- Zygomycetes
order	- Mucorales
Family	- Mucoraceae
Genus	- Rhizopus.
species	- R. stolonifer

Rhizopus is called 'bread mould' as it grows on bread. It also imparts (appears) black colour on the surface of the substratum so it is called 'black mould'.

Vegetative structure - vegetative body of Rhizopus well developed mycelium which consist of much branched hyphae. (The mycelium is coenocytic which is devoid of any septa, so it contains many nuclei.) But septa formation takes place at the base of the reproductive structure. The hyphae are of 3 types -

1) Rhizoidal hyphae - The mycelium produces some hyphae which enters into the substratum. This are called rhizoidal hyphae which serves as anchoring organ. This also absorb nutrients from the substratum.

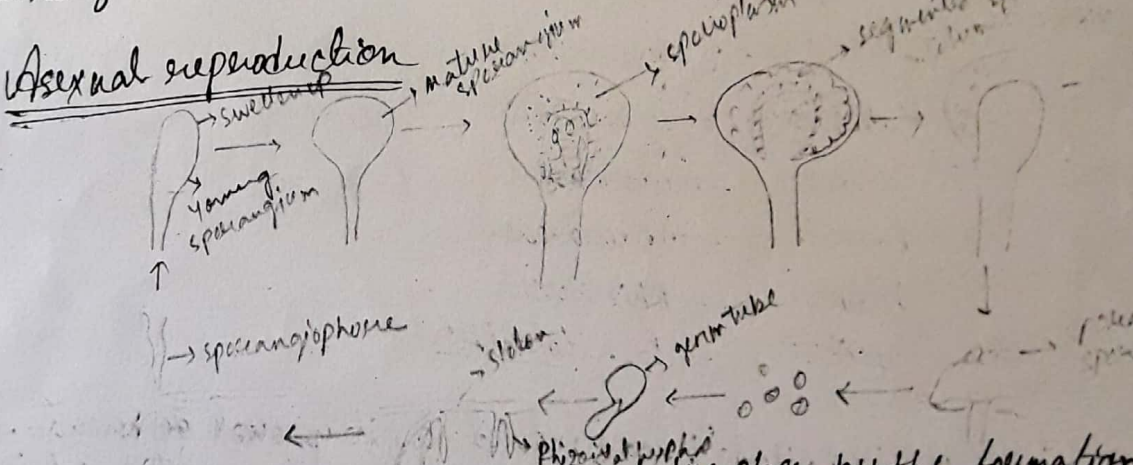
b. Stolon – The aerial hyphae grow parallel with the substratum for a distance and connect two groups of rhizoidal hyphae. This are called stolon.

c. Sporangiophore – These are erect aerial hyphae which develop during asexual reproduction and bear sporangia at their tips.

The hyphal cell wall is composed of microfibrils of chitin. Other polysaccharide like glucosamine, galactose, protein are also present in the cell wall. The hyphal cell contains many nuclei, granular streaming cytoplasm, vacuole and oil droplet.

- Zygospore stage – When Rhizopus grows in liquid media stimulary in presence of high concentration of sugar. The hyphae may be segmented and the segment bud in yeast like fashion. This is called yeast stage or torula stage.

Asexual reproduction



Asexual reproduction of Rhizopus takes place by the formation of sporangia. are in the following way. →

i) Development of sporangiophore – At the time of asexual reproduction one or more upright hyphae are produced in cluster above the rhizoidal hyphae. This upright hyphae form the sporangiophore.

ii) Development of sporangia – At the tip of each sporangiophore swells up to form a globose structure called sporangium. During the development of sporangium a large amount of cytoplasm with many nuclei passes into the young sporangium and accumulate in its periphery. This

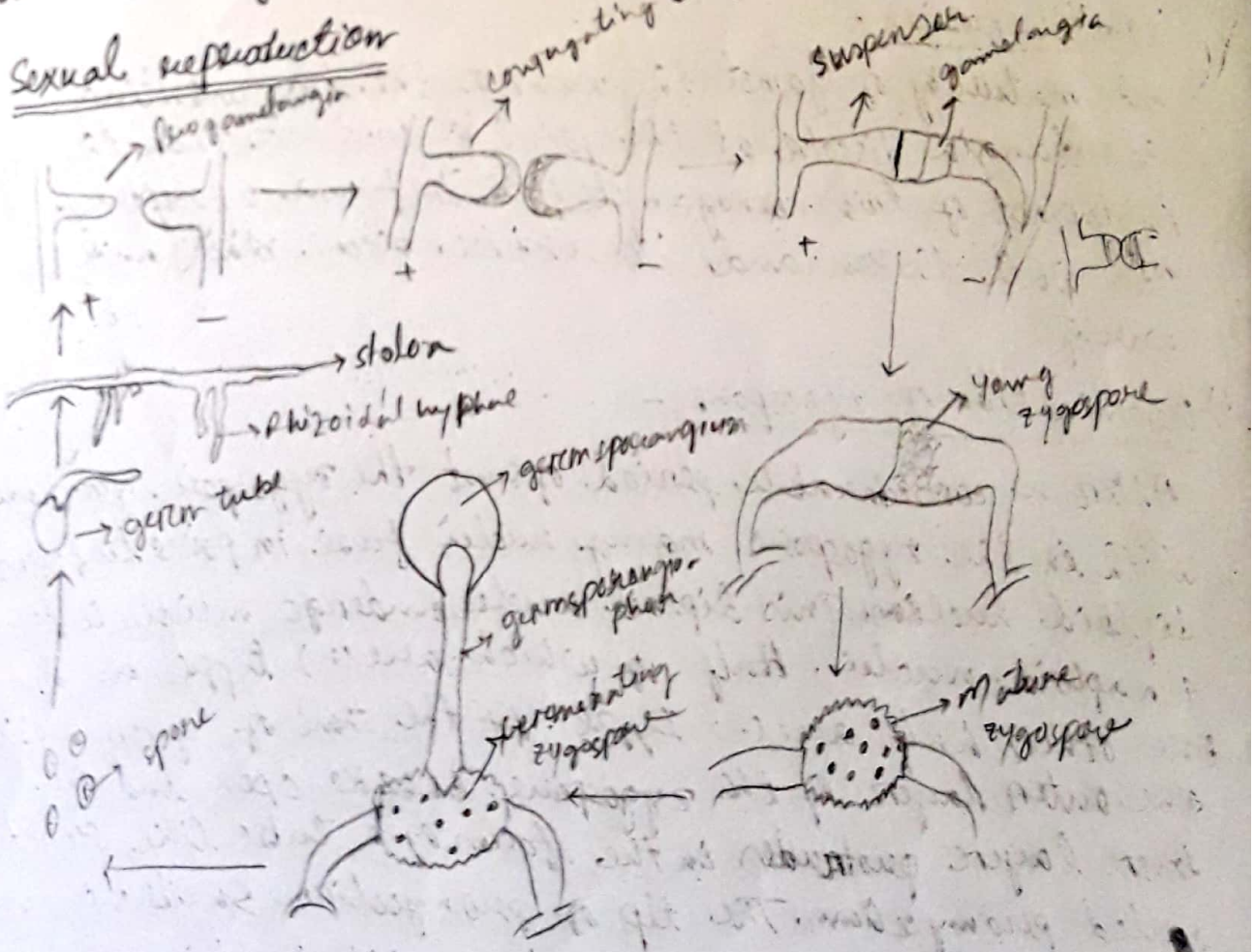
peripheral protoplasmic zone is called sporoplasm. The central highly vacuolated portion of the sporangium constitute the columellaplasm which constitute the central sterile columella.

b) Formation of sporangiospore. - The sporoplasm divide into a large number of multinucleate segments. Each of this segment rounds off and being surrounded by a cell wall is metamorphosed into a sporangiospore.

c) Liberation of spore - ↑ Aggravation of spore As this sporang. un dergoes the col mela collapses so that it looks like an inverted bowl balanced at the end of a sporangiophore. Associated with this change the sporangial wall breaks up into many fragment liberating the spores.

d) Germination of the spore - Under favourable condition on suitable substratum each spore germinates by putting forth a germ tube. The germ tube ultimately form much branched aerial mycelium.

Sexual reproduction



Sexual reproduction of Rhizopus takes place by gametangial copulation method. R. Stolonifer is heterothallic so it require two physiologically distinct and compatible mycelium (+) & (−) for sexual reproduction. The sexual reproduction takes place in the following way —

a) Formation of gametangia —

When hyphae of opposite strain come in close contact with each other copulating branches called pro-gametangia, are formed. A large amount of cytoplasm together with many nuclei pass into the progametangia. As a result they enlarge in size. Then a septum is formed behind the tip of each progametangium which separate it into two cell. The terminal cell constitute the gametangium while the basal cell forms the suspensor.

b) Formation of gamet —

The dence multinucleate protoplast of the gametangia form multinucleate gamet known as coenogamete.

c) Gametic fusion —

At maturity of gamet the walls of the two contacting gametangia dissolve at the point of contact. Then the protoplast of two coenogamete fuse to form a zygospore. Its wall thiken and its surface become black and warty.

d) Germination of zygospore —

After a considerable period of rest the zygospore germinate. With in the zygospore many nuclei fuse in pairs to form diploid nucleus. This diploid nucleus undergo meiosis to form 4 haploid nuclei, half of which are (+) type and the other half are (−) type. At the time of germination the outer layer of the zygospore breaks open and the inner layer protrudes in the form of a tube like structure called promycelium. The tip of promycelium swells up to form a spherical germ sporangium. With in this sporangium both the (+) and (−) nuclei pass together with cytoplasm.

Each of these nucleus being surrounded by cell wall constitute a spore. But according to Granger (1961) the germsporangium contains either (+) or (-) type of germspore or both types of germspore. Each germspore after liberating from the germ sporangium germinates to form a new mycelium.