

common eg → mushroom  
toadstool

Date: \_\_\_\_\_

## KINGDOM FUNGI

• unique kingdom of Heterotrophs

→ mainly saprophytic / Absorptive

absorb their nutrients / soluble organic molecules from dead decaying organic matter / detritus.

mushroom

digestive enzymes / hydrolytic enzymes secreted outside the body.




detritus  
(dead leaf)

absorbed  
by general  
body surface

releases  
complex organic

simple soluble organic  
matter formed  
(due to digestive enzymes)

They need large body surface for maximum absorption hence their basic structure is elongated in shape and size  hence known hyphae.  
basic str & functional unit.

→ parasitic :- dep on living plants / animals.  
{ ie Puccinia }  
↳ can cause disease.

→ symbiotic :-  
    Lichens :- fungi + algae  
    mycorrhiza :- fungi + roots of ~~some~~ higher plants

Fungi shows a great diversity in morphology and habitat.

dark ; moist ; warm

• Cosmopolitan

→ +nt everywhere

water  
air  
soil

on and in plants ; animals.

→ mainly Terrestrial

Stored food → glycogen + Fat (oil)

Fungi can be defined as:-

★ ★ achlorophyllous ; heterotrophic ; spore producing non vascular euk.org.

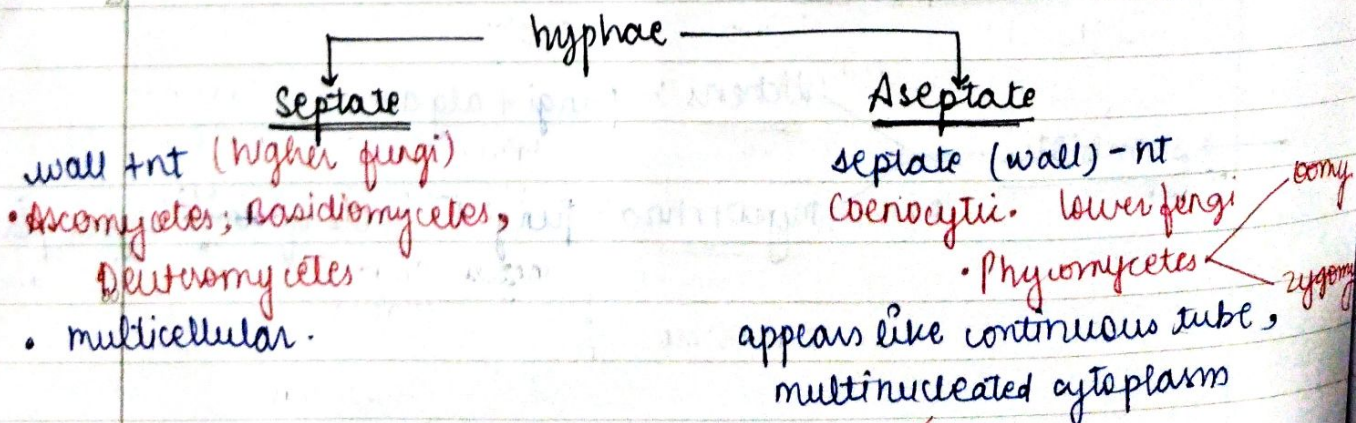
Somatic structure

with exception of yeast  
~~euk~~ unicellular.

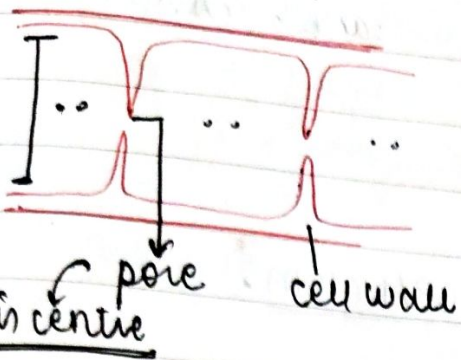
- Body is made up of network of hyphae "Mycelium"
- filamentous.

basic structural & functional unit = Hyphae

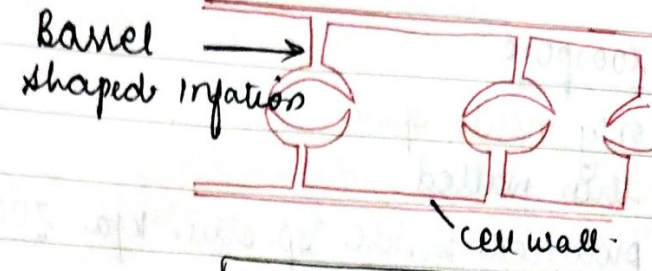
long, slender, thread like str.  
cell wall : chitin + polysaccharides.



• simple septate



• Dolipore

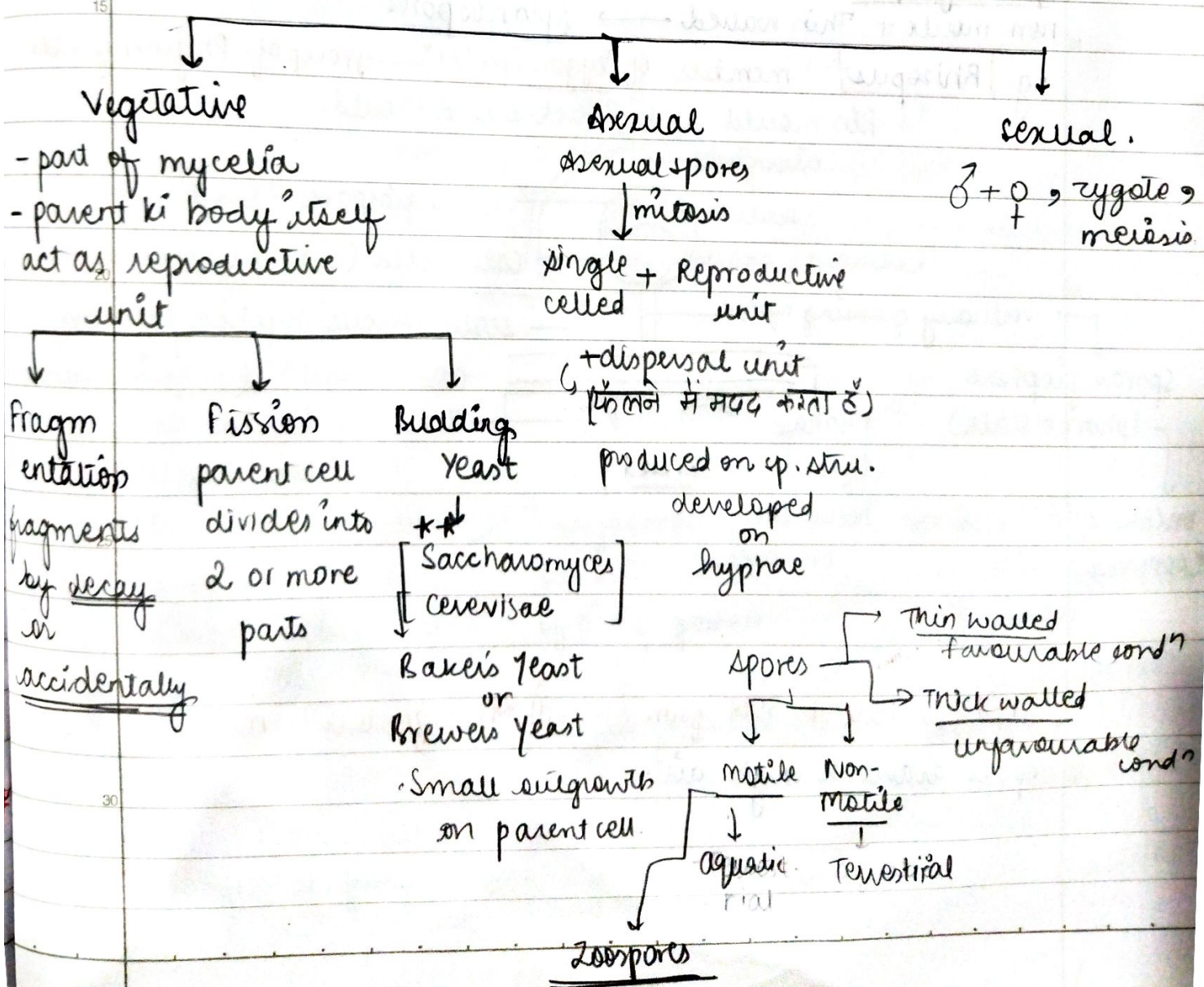


**Basidiomycetes**  
\* most advanced \*

every compartment can contain 1 or more nuclei.

**Ascomycetes**  
**Deuteromycetes**

Reproduction



→ Asexual Reproduction

• spores

a) Zoospore

only motile spore  
thin walled

produced inside sp. str. k/a ZOOSPORANGIUM.

∴ Indigenous

only some members of phycomycetes.

some ~~other~~ oomycetes  
only aquatic ones  
Algal fungi

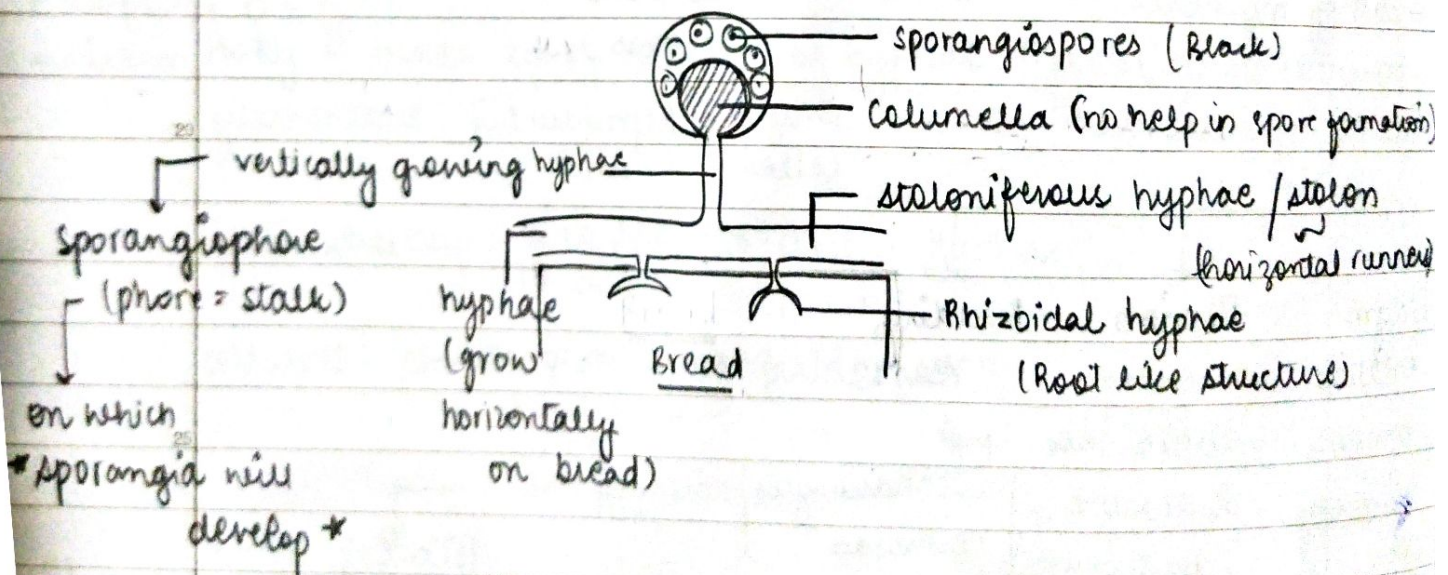
only fungi with  
cellulosic cell wall  
no chitin

b) Sporangiospores

non-motile + thin walled → aplanspores

eg Rhizopus → member of zygomycetes — group of Phycomycetes.

↳ Pls mould and Black Bread Mould.



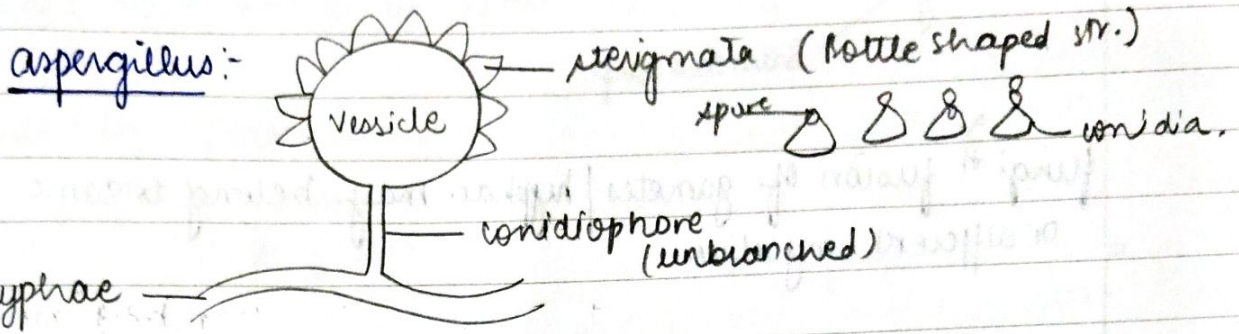
• किसी structure के अंदर form होगा, ती “Indigenous formation”  
• spores travel through air.

c) Conidia

found in penicillin

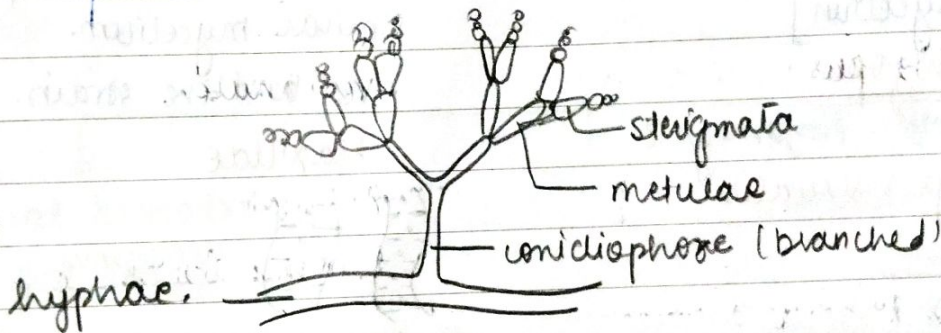
non motile + thin walled  $\rightarrow$  aplanospores

eg: Ascomycetes  $\rightarrow$  aspergillus, penicillium  
Deuteromycetes



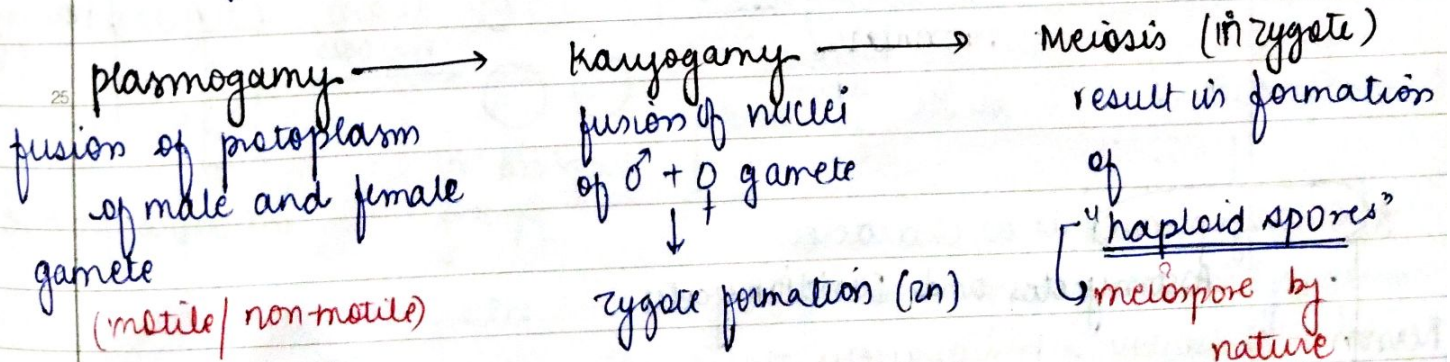
conidia are born in basipetal order  $\rightarrow$  सबसे पहले बना spore

penicillium:-

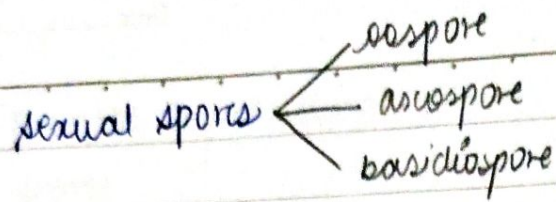


Sexual Reproduction

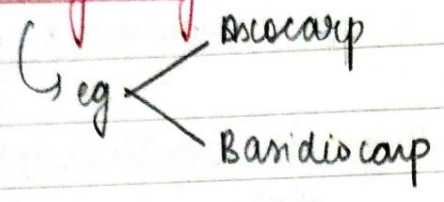
3 steps followed:-



life cycle of fungi - usually haplontic



various spores are produced inside special structures like fruiting Body.



fungi <sup>in</sup> fusion of gametes / hyphae may belong to same mycelium or different mycelium.

HOMOTHALLISM

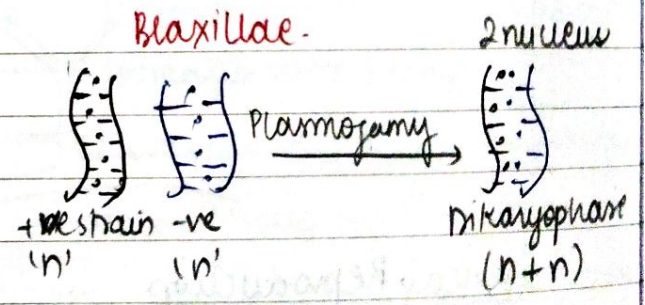
fusing hyphae / gametes belong to same mycelium.  
[or genetically identical / similar mycelium]

eg Rhizopus  
Ascomycete - Phycomycete  
"Rhizopus sexualis"

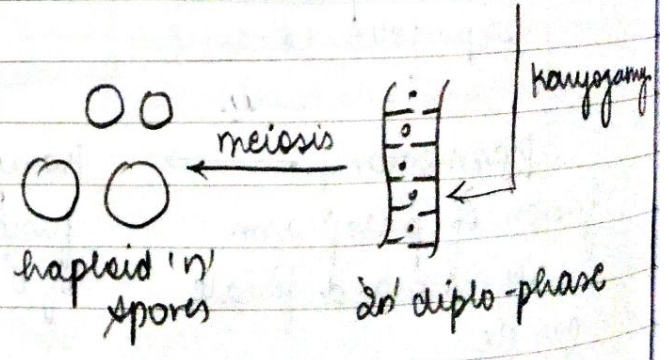
HETEROTHALLISM

fusing gametes / hyphae belongs to genetically / physiologically dissimilar but morphologically similar mycelium.  
-ve and +ve strain.

Basillae



will grow in hyphae under fav cond.



\* Dikaryophase is a character of Ascomycetes and Basidiomycetes  
Reason: absent in Phycomycetes

immediate fertilisation.  
delayed karyogamy.

# Fungicide

Grape wine → powdery / downy mildew disorder.

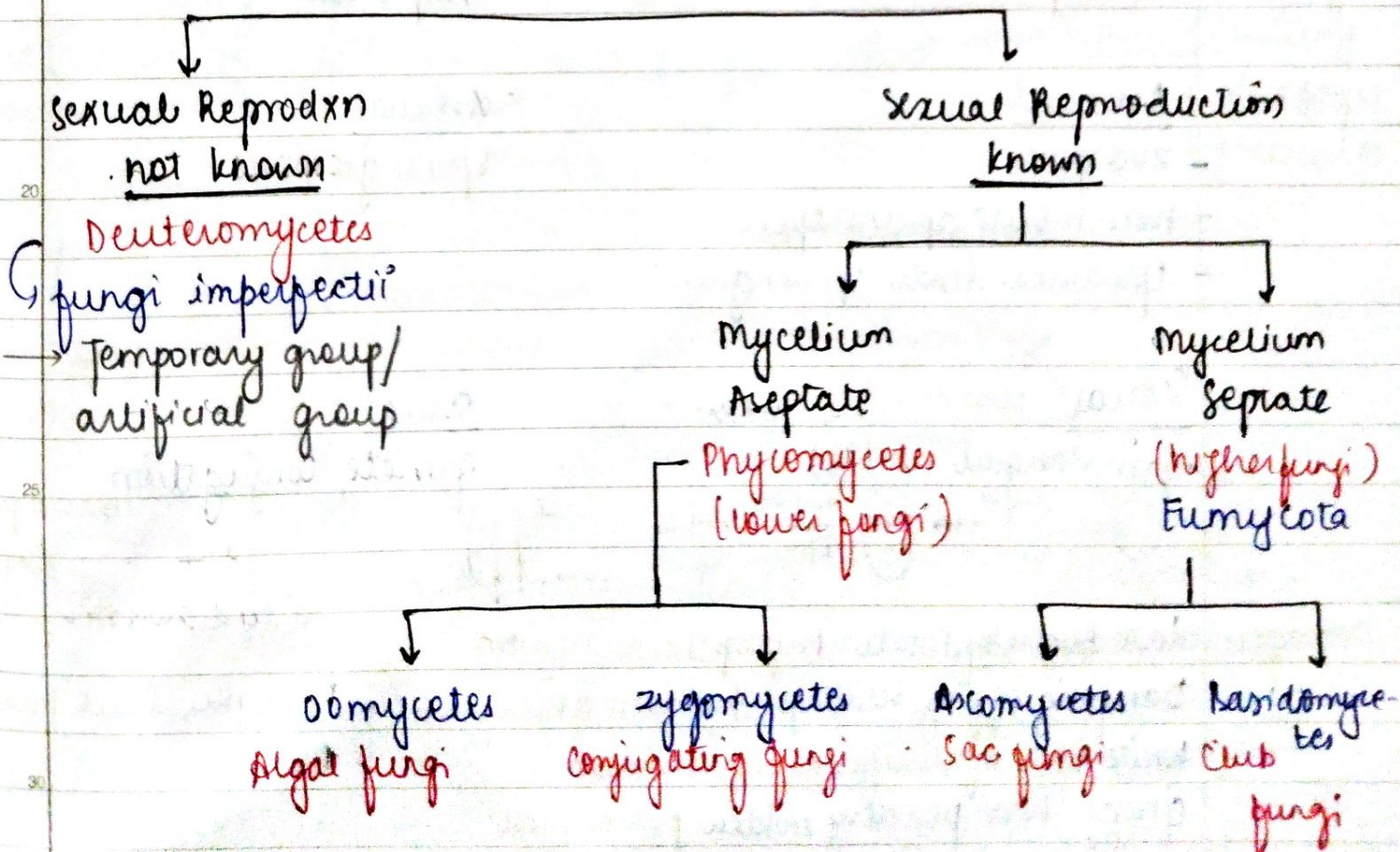
↳ Millardet  
↳ 1<sup>st</sup> fungicide

→ Copper sulphate + lime mixture ⇒ Bordeaux mixture  
aka HOLY WATER OF PLANT PATHOLOGY.

caused by Plasmopora  
↳ viticola  
↳ Oomycetes

classification :- (fungi)

- morphology of mycelium
- sexual reprodxn
- mode of spore formation and fruiting body
- life cycle.



# Phycomycetes

## DOMYCETES

*Algal fungi*

## ZYGOMYCETES

*Conjugating fungi*

Common name:

Habitat: some members are aquatic  
 i.e. decaying wood  
 (moist/damp)

- obligate parasite on plants
- can be free-living

- terrestrial
- mostly saprophytic (free-living)
- few members are parasitic

mycelium: Aseptate + coenocytic cell wall - cellulose

A septate + coenocytic cell wall - chitin.

life cycle: ~~haplontic~~ diplontic

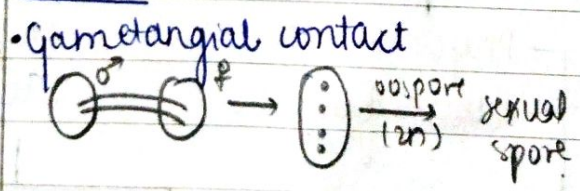
haplontic

reprodxn: Asexual

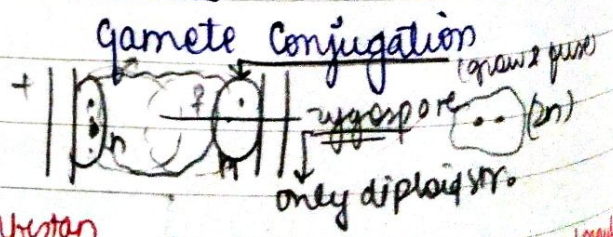
- zoospores
- non-motile aplanospores
- (produced inside sporangium)

Asexual  
*Sporangiospores*

### Sexual



### Sexual



examples:

late blight of potato	<i>Phytophthora infestans</i>	
damping off of seedlings	<i>Pythium debaryanum</i>	<i>Rhizopus</i> Black bread mold
white rust of crucifer	<i>Albugo candida</i>	<i>Mucor</i>
grape wine powdery mildew	<i>Plasmopara viticola</i>	



Ascomycetes

common name:- **Sac fungi**

habitat:- Terrestrial

mostly saprotrophic / decomposers / coprophilous form  
some parasitic.

→ grow on cow dung.

mycelium:- septate

simple central pore

every cell / compartment may have 1 nuclei or 2 or more.

1<sup>st</sup> antibiotic ← penicillium (uninucleated)

usually multicellular, filamentous, exception yeast.

Reproduction:-

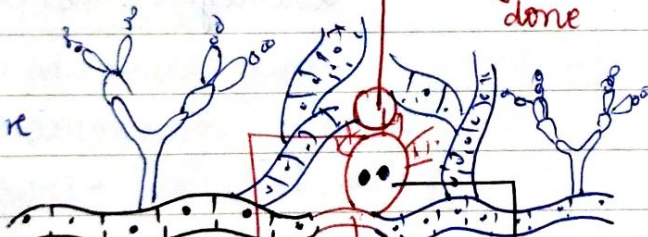
asexual reproduction = conidia

Sexual reproduction:-

endogenous

**ascocarp** :- fruiting body

+ve ascospore



only plasmogamy

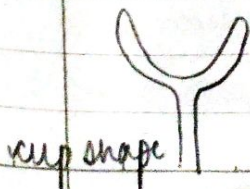
ie. dikaryon stage (2 nucleus) (n+n)

ascus with cell germinal contact  
some cells decide to show karyogamy

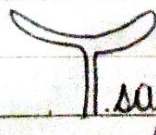
Types of ascocarp

• Apothecium

open fruiting body



cup shape



saucer shape

Periza cup shape

Morels (edible ascocarp)


Morchella - delicacies food items.

(Tuber astivum)

Truffle - edible underground ascocarp.

explanis.

Perithecium  
 perifer  
 ostia / opening



pear shape  
 fruiting body

Neurospora  
 • pink mould  
 • extensively used in genetic & biochemical experiments

Claviceps  
 C. purpurea  
Ergot of rye  
 mycelium:-  
SCLEROTIA  
 source of lysergic acid  
 LSD (lysergic acid diethylamide)  
 Hallucinogen


Cleistothecium  
 closed fruiting body

penicillium aspergillus  
 • 1<sup>st</sup> antibiotic was obt.  
 earliest obt from:- Penicillium notatum  
 now:- P. chrysogenum  
 • usually on citrus fruits  
 • Blue green mould.

lab. weed  
 grow on stored grains & groundnuts  
 • Toxin:- Aflatoxin  
 ↓  
 Carcinogenic (cancer causing)

Gibberella fujikuroi  
 perfect stage of Fusarium moniliforme  
 foot rot of rice seedling disease.

Yeast / Saccharomyces  
 sugary conditions / favourable conditions.



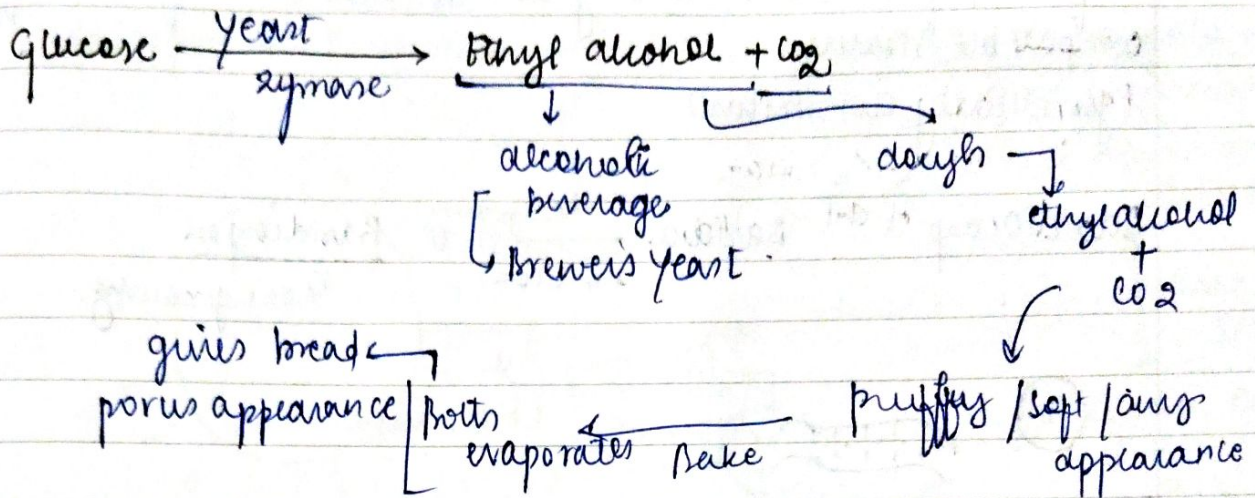
extensive budding

pseudomycelium

temporary chain formed

Fragmentation can be seen in  
even & every fungi :-  
Date: \_\_\_\_\_

## are facultative anaerobe



reproduction :-

asexually :- Budding  $\rightarrow$  *Saccharomyces cerevisiae*  
Fission

Halobial-character of both budding and fission

## BASIDIOMYCETES

most advanced fungi  
best decomposer of wood  
habitat  $\rightarrow$  soil, tree stump

wooden log

mycelium :- septate + ~~two~~ holipore septum

life cycle + haplontic life cycle + chitinous wall

reprod xn :-

asexual :- generally absent (only fragmentation)

sexual :- sex organs absent

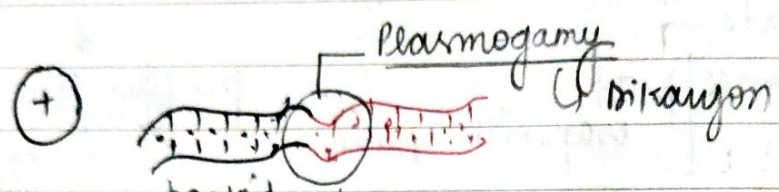
no gamete formation

"they show reduction in sexuality".

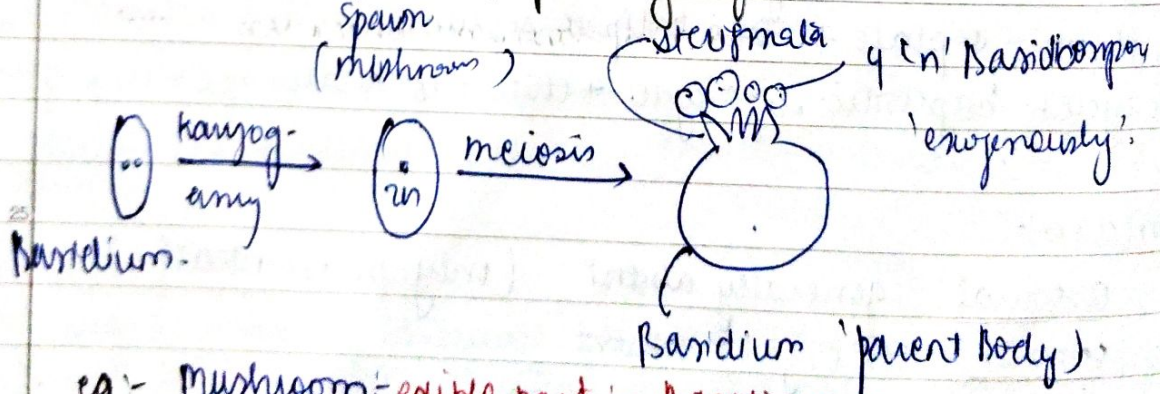
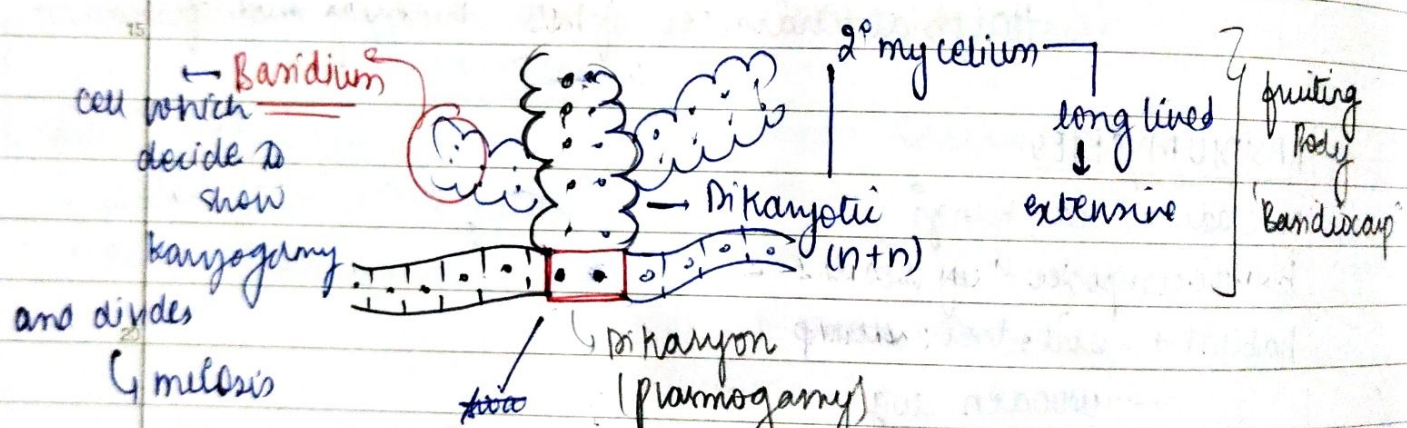
As we move from lower to higher fungi, there is a gradual reduction in sexuality.

Somatogamy  
 ↳ fusion / fertilisation among two somatic cells of two different compatible strains.  
 (genetically dissimilar)

Basidiocarp  $\xrightarrow[\text{meiosis}]{\text{karyogamy}}$  Basidia  $\rightarrow$  Basidiospore  
 ↳ exogenously.



Basidiospore: haploid monokaryotic  $\rightarrow$  1<sup>o</sup> mycelium  
 ↳ arising from Basidiospore  
 ↳ named 1<sup>o</sup> mycelium  $\rightarrow$  short lived



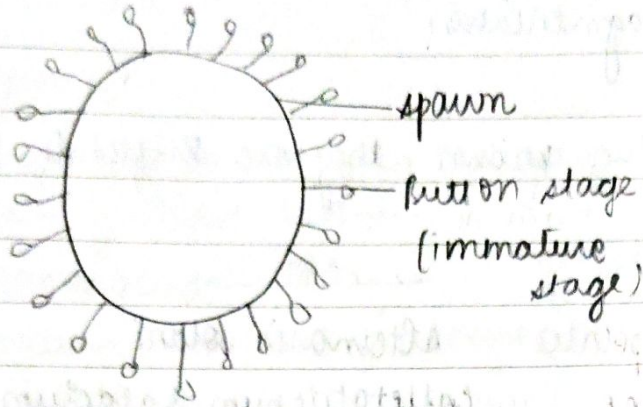
eg:- mushrooms - edible part - Basidiocarp  
 Toadstool  $\rightarrow$  Amanita muscaria - hallucinogen  
 — Phalloid - death cap

Bracket fungi  
 Puff ball puff fungi

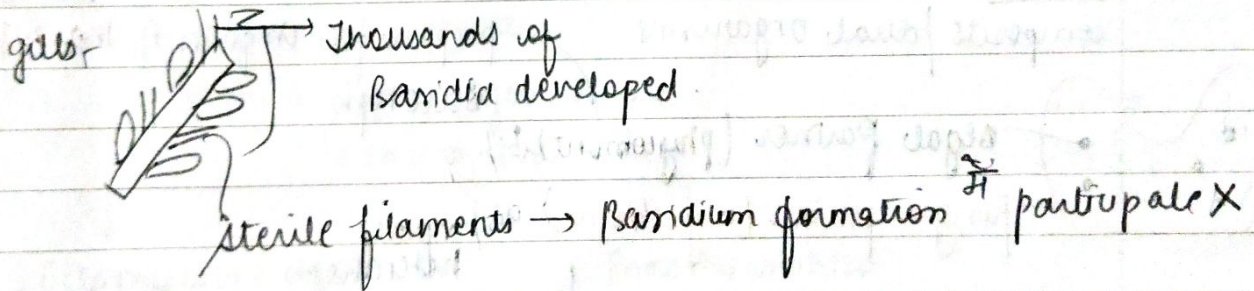
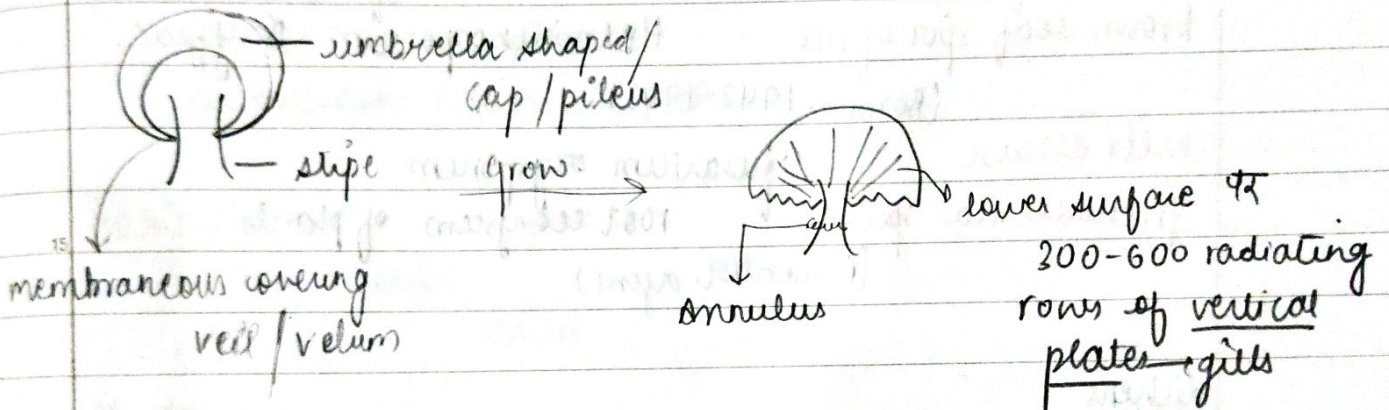
ricease causing: Ustilago - smut disease  
 Puccinia - rust disease of wheat

Agaricus / mushroom

- Basidiospore → 1<sup>st</sup> mycelium → plasmogamy (spawn) → dikaryotic hyphae grow peripherally which appears like circle.



↓ Rainy season  
favourable envt.  
↓  
compact hyphal mass



Deuteromycetes

fungi imperfecti  
sexual reproduction (perfect stages) not found.

Terrestrial   
 { few parasitic  
 mostly decomposes of litters & help in recycling of minerals.

mycelium — septate branched

- vegetative phase known
- can show sexual rep. thr → conidia
- asexual - fragmentation

on their sexual stage known, they are shifted to asco or basidi

eg-

Early blight of potato  
Red rot of sugarcane  
Brown leaf spot of rice

*Alternaria solani*  
*Colletotrichum falcatum*  
*Helminthosporium oryzae*

(Bengal 1942-1943)

wilt disease

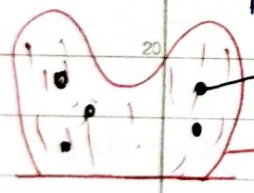
*Trichoderma* species

*Fusarium oxysporum*  
root rot systems of plants  
(biocontrol agent)

Lichens

composite / dual organisms

prepare food in form of marrital autotroph



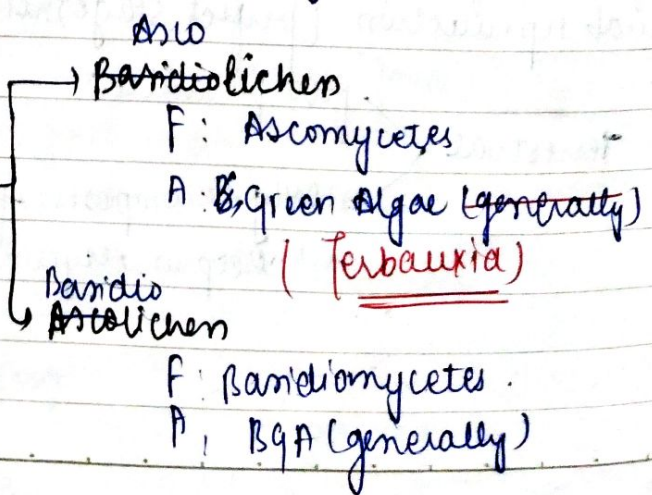
algal partner (phytobiont) 5%

fungal partner (mycobiont) 95%

heterotroph  
absorb minerals + H<sub>2</sub>O + provide shelter to algae.

- symbiotic relationship
- obligate partners.

Classification:-  
(on the basis of fungal partner)



growth - lichens are slowest in growth

- Crustose
- foliose foliose
- fruticose / filamentous.

importance

- Xerosere :- pioneer + help in soil formation
- Usnea :- fruticose lichens. 'on tree branches'

old man beard ← aka



- inflammable → forest fire responsible.

pollution indicator

absence indicates pollution  
 air pollution (sensitive to SO<sub>2</sub>)

Habitat

humid + cold   
 ↙ alpine   
 ↘ arctic.

Mycorrhiza

fungi + roots of higher plants.  
 ↳ + in upper layer of soil.  
 ↳ + rich of org matter.

Ectomycorrhiza

Hartig's net

fungi p = Basidiomycetes  
 plant = Pinus }  
 obligate

Endomycorrhiza

VAM / vesicular Arbuscular Mycorrhiza

fungi p = Zygomycetes  
 plant = orchid  
 eg Glomus

