

Lec ① 2

Object plant * Systematic

Date / /

- Plant Systematics deals with the classification of the plant kingdom into groups ~~as~~ the five kingdoms classification according to

① Complexing of cell structure → prokaryotic
→ eukaryotic

② body organization → unicellular
→ multi-cellular

③ mode of nutrition [autotrophic - heterotrophic]

④ phylogenetic or evolutionary relationship
parasite → Heterotrophic → saprophytic

* Monera

① prokaryotic → mycoplasma

→ bacteria

→ Actinomycetes "filamentous bacteria"

→ cyanobacteria "blue green algae"

② don't have true nucleus and membrane bound organelles.

③ mode of nutrition "autotrophic - heterotrophic"

④ some Monera → Archaeobacteria live "extreme environment condition (Temperature above 80°C)"

⑤ motile or non-motile

⑥ high salt concentration

⑦ high acidic soils

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Kingdom protista

- They have atypical Eukaryotic cell organization
- They have cilia or flagella for locomotion
- Most of them are photosynthetic "autotrophic"
- They form the fresh producers of food in "oceans - fresh water"
- * All unicellular plants are called "phytoplanktons" - have cell wall and photosynthetic.

* Kingdom fungi

- * includes → moulds - mushrooms - Toadstools - puffballs - bracket fungi.

* Eukaryotic

- * They are unicellular or multicellular
- * Mode of nutrition is heterotrophic "they lack the green pigment chlorophyll"

e.g. Puccinia → parasites

Rhizopus → saprophytic

- * Cell wall is made up of Chitin
- * Their body is made up of numerous filaments

Structure called hyphae

* Kingdom plantae

- include major groups [Pteridophytes - Angiosperms - gymnosperms - Angiosperms]
- include all multicellular plants of land and water

Object

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→ the cells have a rigid cell wall of cellulose.

→ Most of them are autotrophic.

Kingdom Animalia:-

includes all multicellular eukaryotic organisms.

• Species are the basic unit of classification.

• Seven level system

Kingdom

Phylum or division

Class

order

Family

Genus

Species

• virus

Living:- they multiply within host cells

they possess genetic material (DNA or RNA)

they exhibit mutations

تبدلها

they are definite races or strains.

Non-living

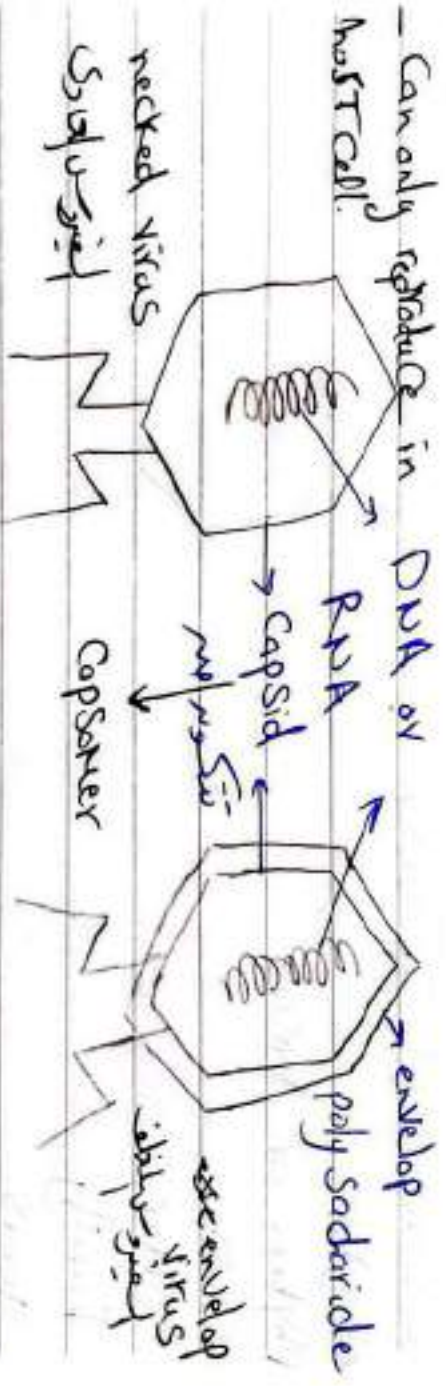
Can be crystallized - Can be precipitated
outside the cell they behave like inert chemicals
don't show growth, development, mutation

Object

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General Characters of virus

- is an infection agent
- is an obligate parasite inside the host
- Small Size [20-300 nm]
- Can't be seen by light microscope.
- Completely virus is called virion
- viral genomes are very small and consist of DNA or RNA.



- Capsid "protein Coat" → Composed of subunit of protein called Capsomer.

- ~~We can recognize the virus by its capsids~~

Function of Capsomer

- recognize the attachment of recipients
- protects the viral genome

* virus Symmetry

* ~~icosahedral~~ → spherical شبه كروي

* Helical Symmetry - rod shaped عصا

* Complex

→ may have complex outer wall or head-tail morphology بنية معقدة للجدار أو الرأس-ذيل

Bacteria

أحياء خلية

- are Commensal
- they are found in all environments
- they may live in Colony
- maybe harmful
- harmless - beneficial

very small -
[0.5 to 1 micron in
diameter and 3-5
micron in length]

unicellular - prokaryotic

it classify according to shape

Coccus

Bacilli

rod-shape ()



Monococcus



diplo

Spirillum

diphococcia



Strept

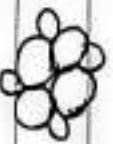


Streptococci



Tetrad cocci

Spiral bacteria



Sarcina (Cubical Shape)



Staphylococci

Al-Haramien

Object Lec ② plant systematic

Date / /

Algae → Alga

are chlorophyll-bearing, simple, thalloid, autotrophic, eukaryotic, largely aquatic "fresh water and marine"

* general characters of algae:-

- Belong To kingdom protista.
- eukaryotic except - ~~Cyano~~ Cyanophyta & Cyanobacteria,
- blue green algae.
- have chlorophyll, Autotrophic
- has no roots, stems and leaves "Algal body is called 'Thallus'"
- unicellular or multicellular
- most algae are aquatic, few are terrestrial.
- Sex organ aren't surrounded by sterile cells.
- Reproduce by vegetative, Asexual, Sexual methods.
- Size: micro to macro

* Science that deals with the study of algae
Called:- Phycology.

* microscopic unicellular → ~~Chlamydomonas~~ Chlamydomonas

* Colonial forms like → Volvox

* Filamentous forms like → ulothrix and Spirogyra.

* few marine → like kelps.

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types of algae :-

* Phylophytion :- photosynthetic - float freely on water surface - sunlight layer.

* Benthic :- attached to some substratum in the bottom of water (eg) :- almost all of brown algae & phaeophyceae.

* Lichens :-

Composite organisms, arise from a symbiotic relationship between alga & fungus.

* Epiphytes :- are found upon other plants and algae.

* Lithophytes :- found on rocks.

* Reproduction :-

1) Vegetative reproduction :-

A) Fission :- cell divide into 2 cells

B) Fragmentation :- each fragment develops into a thallus.

2) Asexual reproduction :-

- by produce spores $\rightarrow$ (zoospores)

- are motile "flagellated" $\rightarrow$ rise to new plant

3) Sexual reproduction :-

by fusion of two gametes can be

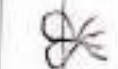
"similar in size" 1) flagellated, 2) non-flagellated, similar in

size (as in Spirogyra)

$\rightarrow$ isogamous :- similar $\rightarrow$ gametes, form zygote

Object

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Zygote.

isogametes uniting gametes

→ anisogamous 2- gametes → dissimilar
"as in Chlamydomonas"

→ oogamous 2- large, non motile "female"
small, motile "male"

[as in Volvox, Fucus]

~~Algae~~ Algae are useful to human 2

① absorb CO_2 "At least a half of Total"

② form O_2

③ I_2 is obtained by kelps "especially from
"Laminaria"

④ 70 Species of marine algae used as food:
"porphyra - Laminaria - Sargassum"

⑤ Source of commercial products like algin, Carrageen,

agar

⑥ used in food industry

⑦ Chlorella is protein rich food. Supplement →
For Astronauts.

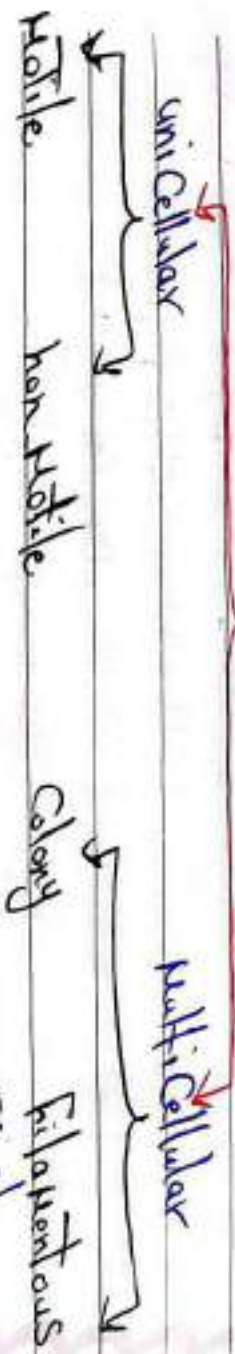
Alkalla

Object

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* Shapes of chloroplast in algae :-
Cup like ribbon like star like

* organization of thallus in algae :-



* Attached To substrate by a holdfast.

* Structure of Flagella :-
"9+2 pattern"

2 Single Central microtubules surrounded by 9 doublet peripheral microtubules.

* basis of classification of algae :-

- ① Major photosynthetic pigments present
- ② form of store food
- ③ cell wall composition
- ④ Number of flagella, position of insertion
- ⑤ habitat

Algae :- divide into ③ main phyla
Chlorophyta - Chromophyta - Rhodophyta.

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Divisions property	Chlorophyta	Chromophyta	Rhodophyta
Common name	green algae	grouped into several classes Yellow → Xanthophyceae golden-brown → Chrysophyceae diatoms → Bacillariophyceae brown → Phaeophyceae	red algae
Habitats	Freshwater / Marine	Freshwater / Marine Phaeophyceae mostly marine	mostly marine
Pigments	Chlorophyll a & b Carotenoids & Xanthophylls	Chlorophyll a & c (Carotenoids) & Xanthophylls	Chlorophyll a & d Red phycoerythrin (high) blue phyocyanin (phycoobilins)
Stored Food	Starch	Laminarin & Mannitol	Floidean starch
Chloroplasts	discoid plate-like, reticulate, cup-shaped, spiral, ribbon-shaped	present	present

Al-Haramien

Object

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pyrenoids (storage body)	in chl.oplasts	usually in chloroplasts	absent (no pyrenoid)
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Cell wall	Cellulose, outer layer of pectose	cellulose, outer layer of algin	Cellulose, outer layer of pectose Corragenen, agar
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diatoms → has silica

Thallus organization	unicellular, colonial unicellular, multi-cellular or Filamentous	complex thallus & holdfast, stipe (stalk), and fronds (leaf-like)	uni or multi-cellular, complex
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vegetative rep	by fragmentation or fission	by fragmentation (diatoms by fission)	by fragmentation
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Asexual rep	by aplanospores or zoospores	by zoospores aplanospores	by aplanospores
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Sexual rep	isogamous, oogamous or oogamous	isogamous oogamous	oogamous
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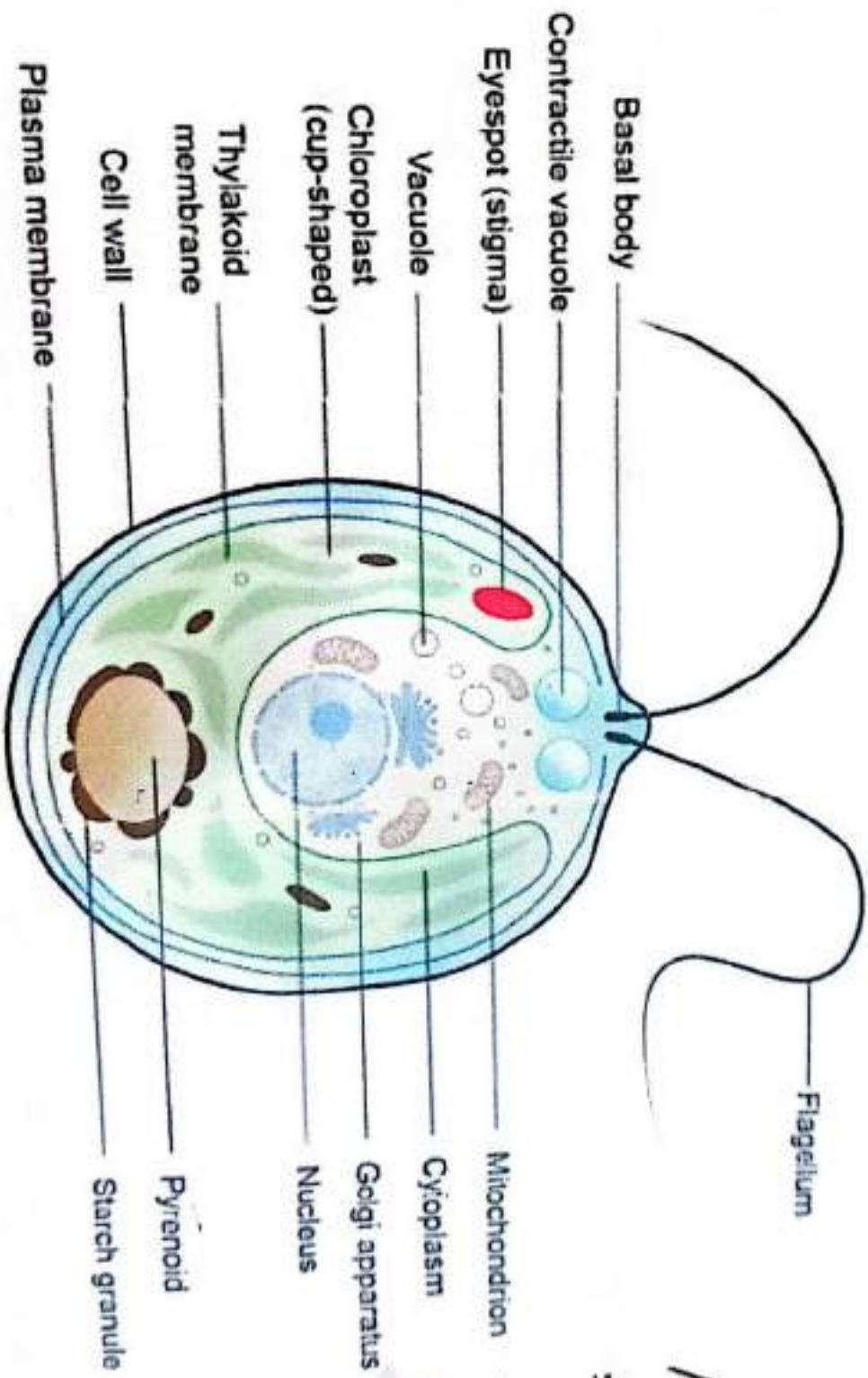
Ex	Spiralgella, Volvox, Chlorella, Ulva, Chara	Fucus, Sargassum, Laminaria, Ectocarpus	Polysiphonia, Porphyra, Gracilaria and Gelidium
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Al-Haramien

Chlamydomonas

Call Brown algae

Chlamydomonas sp.



nd

Site

am

reproduction in diatoms →

① two rigid ~~ex~~ halves of each cell separate and a new rigid formed

② at one point, the diploid nucleus of a reduced-size cell undergoes meiosis — 4 gametes are formed.

③ Zygote produced when two gametes unite and become enlarged.

④ the enlarged cell called → auxospore, develops into a diatom of the same size as the original diatoms.

life cycle of a red algae (prophyta)

① haploid gametes forming body is sheet like

② gametes form at its edges

③ fertilization produces a diploid zygote.

④ zygote ~~form~~ develop into → a diploid spore forming body (by meiosis)

⑤ Spores germinate and developed into a new gamete forming body

Nutrition in Bacteria

* ① Autotrophic Bacteria

photo autotrophic Bacteria

- Sunlight → Source of energy.
- don't Split water To obtain reducing power. So, O_2 Isn't evolved during bacterial photosynthesis.

→ photolithotrophs

H_2 is donor is an inorganic substance $[H_2S]$
 e.g / Chlorobium [green Sulphur bacteria]
 Chlorophyll is [bacteriochlorophyll]

→ photo-organolithotrophs

H_2 donor is an organic acid or alcohol.

e.g / Rhodospirillum
 [purple non Sulphur bacteria]

chemo-autotrophic

- don't have photosynthetic pigments.

- obtain energy from ATP by oxidising inorganic or organic compound.

energy → used To reduce CO_2

→ Chemolithotrophs

Inorganic Compound is oxidised To release energy
 ex / Thiobacillus

Nitrosomonas

→ Chemo-organotrophs

organic Compound is oxidised To release energy
 ex / Methane bacteria

② Heterotrophic bacteria

- depend on other organisms [Living or dead]

- Maybe → Saprotrophic e.g / Bacillus subtilis

→ parasitic plant parasitic Xanthomonas citrii

animal parasite - Bacillus anthracis

- Human parasite e.g. *Vibrio cholerae*.
 * Symbiotic association with roots of the leguminosae.
 e.g. *Rhizobium*.

Respiration in Bacteria:

① Aerobic bacteria:

- * They require oxygen as terminal acceptor of electrons and will not grow under anaerobic conditions.

② Anaerobic bacteria:

- * they don't use oxygen for growth, and obtain energy from fermentation reactions.

③ Facultative anaerobes: بكتريا لا تحتاج اختيارى

- * Can grow either aerobically or anaerobically.

④ Capnophilic:

- * They require CO_2 for growth.

Capnophilic
 Capnophilic $\rightarrow \text{CO}_2$ growth

* Reproduction

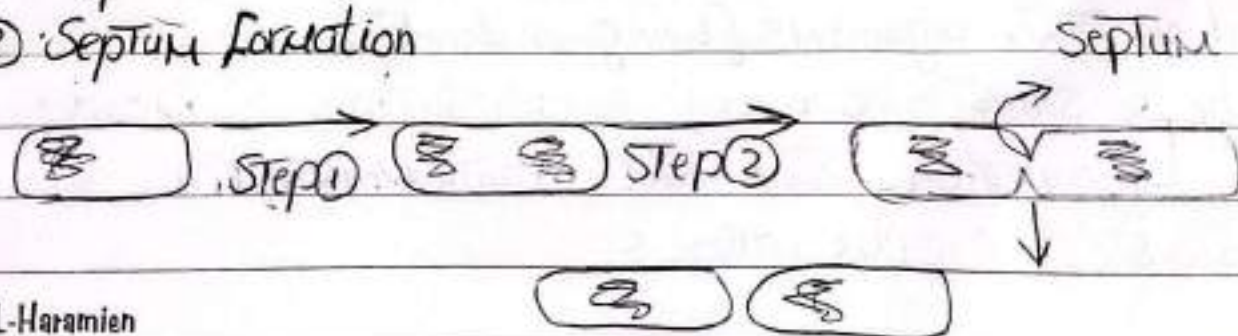
① Asexual reproduction:

- by binary fission, which is a semi-conservative method.

- takes place through 2 steps:

① Replication of chromosomes

② Septum formation



② Sexual Reproduction 2

It's carried out through 3 methods

① Conjugation ② Transduction ③ Transformation

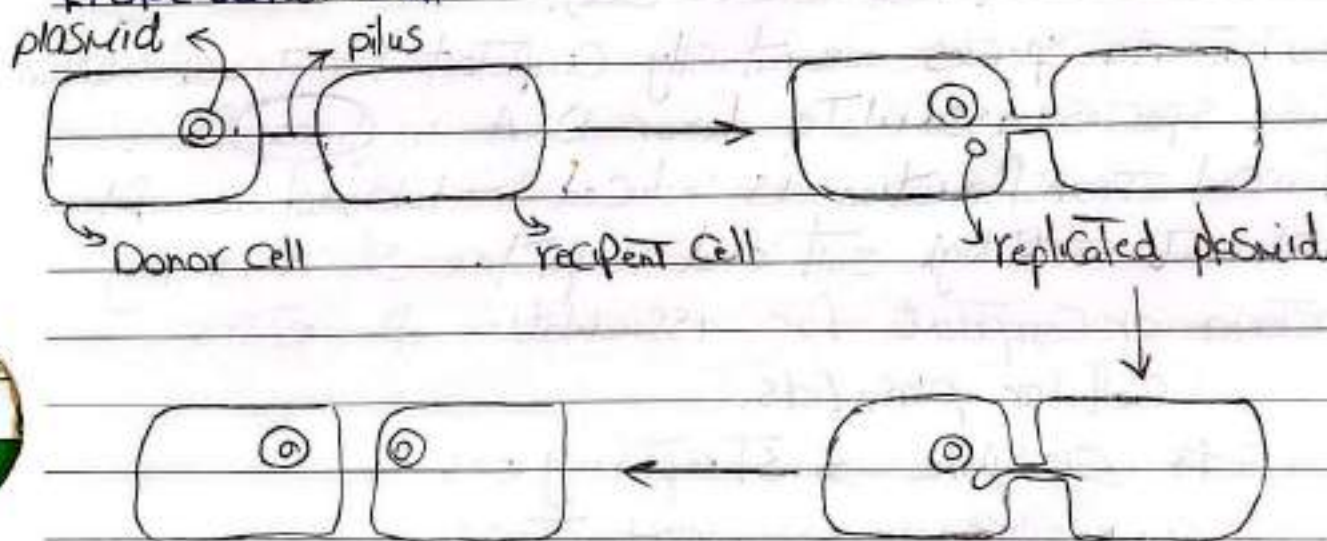
* Conjugation

- the donor cell gets attached to the recipient cell with the help of pili

- The sex pili grow in size and form the conjugation tube

- the plasmid of donor cell replicates and transfer

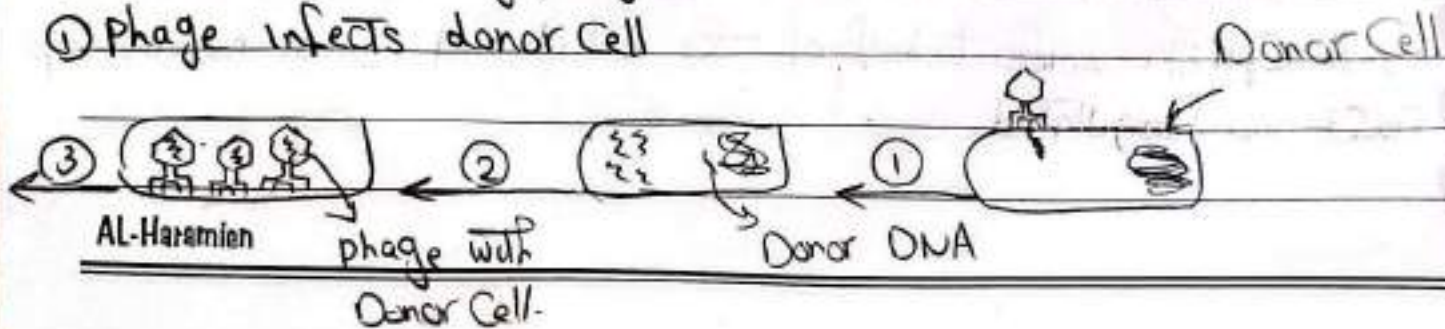
- The recipient completes the structure of the received DNA from donor cell.

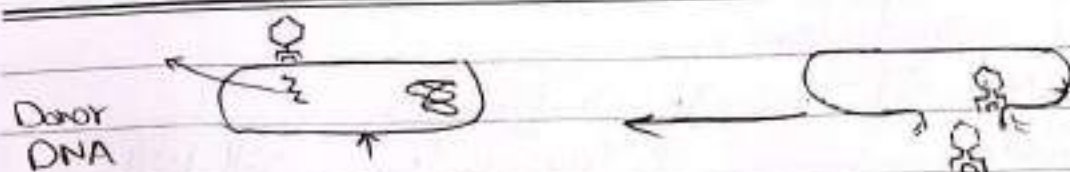


* transduction

donor DNA is carried in a phage coat and is transferred into a recipient by phage.

① Phage infects donor cell





recipient cell.

- ② - During replication, Donor DNA is transferred to a phage
- ③ - Donor cell lysis and phages are released out of the cell.
- ④ - Transducing phage infects recipient cell and the Donor DNA is injected.

③ Transformation :-

direct uptake of donor DNA by recipient cell may be (Natural - forced).

- Few bacteria species are naturally competent for transformation
- These species assimilate donor DNA in linear form
- Forced transformation is induced in lab, where after treatment with high salt and temperature shock, many bacteria are competent for assimilation of extra-cellular plasmids.

~~Endo~~ Exospore → Streptomyces

veg xospore → agrobacteria

Note 2

endospore → structure formed in Bacillus bacteria during unfavourable conditions.

All Spirilla, about half of the bacilli and small number of cocci are flagellated.

- ① in polar arrangement :
Flagella are attached at one or both the ends of the cell
- (A) Monotrichous : Single
- (B) Lophotrichous : small bunches or tufts of flagella emerging
- (C) Amphitrichous : at both poles } from one end
- ② in peritrichous → dispersed randomly over the surface
- ③ Atrichous → lack flagellum

Function → Can detect and move in response

positive chemotaxis → Movement of cell in the direction of a favourable chemical stimulus.

negative chemotaxis → Movement away from a repellent

Objectec ⑤ Systematic

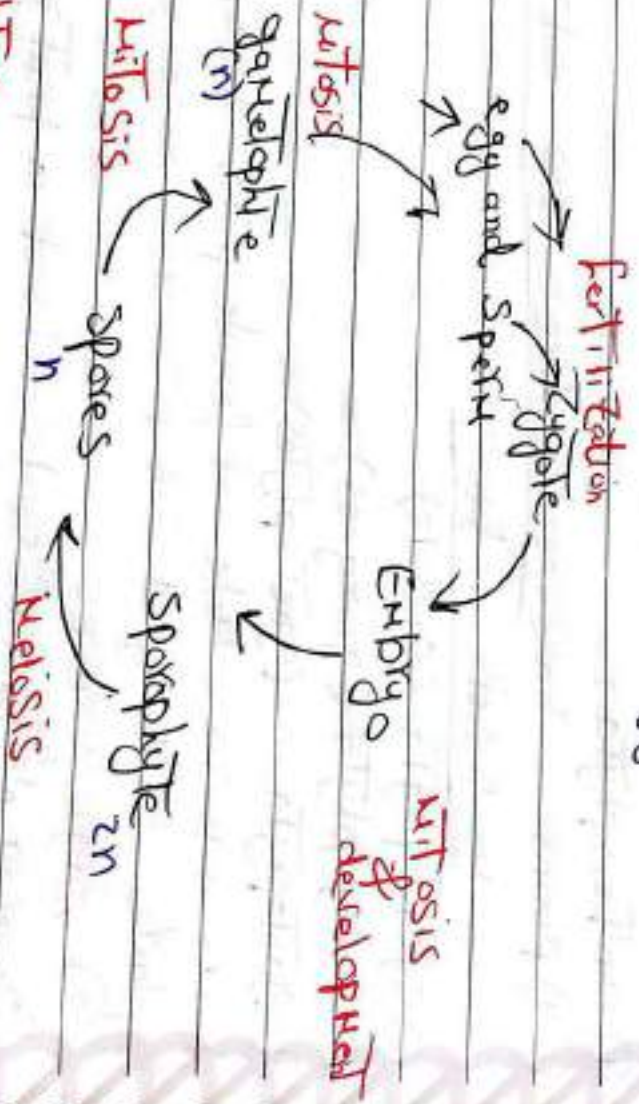
Date / /

Kingdom: plantae

alternation of generation: (Sex organs)

Male gametangium
antheridium
Male ♂ (Sex cell)
Sperms or antherozoids

Female
archegonium
Female ♀ (Sex Cell)
egg



Bryophytes:

→ Mosses (True Bryophytes)

→ Liverworts (hepatophyta)

→ Hornworts (Anthocerotophyta)

Zygote → the first stage of Sporophyte

Spores → the first stage of gametophyte

بند نمو و نمو الماد و نمو الخواص في النبات البرية (أول النبات البرية)

Monoclaus → يتم الخصوبة في وادي وادج (الحدود و وادي وادج)

Diclaous → جعل أول الخصوبة للتأنيث أو التذكير

Al-Haramian → جبل الإثني

Object

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Vascular Seed bearing plants

① Gymnosperms - (non-flowering with naked seeds)

- produce seeds and pollen, but no flower or fruits
- seeds aren't enclosed within a structure (naked)
- have vascular tissue

include four main phyla.

① Coniferophyta -

(e.g) Pinus - have needle like leaves and Tracheids,
No vessels or fibers.

② Cycadophyta (Cycads)

③ Ginkgoophyta (Ginkgoes)

④ Gnetophyta (Gnetophytes)

* Monocots - male and female parts are on the same
plant. reproductive parts are in cones (strobili)

② Angiosperms -

Flowering plants with seeds enclosed in fruit

Reproduction occurs in flowers, composed of sepals, petals,

stamens (male) and pistils (female)

male reproductive organ female reproductive organ

Pollen germinates on the stigma [not directly on ovule like in
gymnosperms]

Female gametophytes → megagametophytes

male gametophytes → microgametophytes

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homospores → زائغ
heterospores → زائغ

gemma cup? زائغ
structure used for ~~asexual~~ asexual reproduction.
ساختار من أجل التكاثر اللاجنسي

Feature	Bryophyta	pteridophyta	Gymnosperms	Angiosperms
(root, stem, ...) vascular tissue	No	yes	yes	yes
reproduction	spores	spores	Naked seeds	Seeds in Fruits
water need	High	Moderate	low	low
Size	Tiny (<1cm)	medium (1-5M)	large (Trees)	Tiny To huge
Dominant stage gametophyte	sporophyte	sporophyte	sporophyte	sporophyte
Seeds/flower	absent	absent	present	present
Spores	present	present	present (heterospores)	present (heterospores)
Fertilization	spore swim to egg (water dependent)		pollen carried by wind	pollen carried by wind or animal
evolutionary origin Al-Hizami	most primitive plant	first vascular plant	more adapted to Terrestrial life	more diverse and highly adapted plant

general characteristics of Fungi

- Cell wall made up of Chitin, a biopolymer made up of n -acetyl glucosamine units.
- No Chlorophyll, they are heterotrophic [Saprotrophs - parasitic, symbiotic]
- Absorb food by hyphae usually non motile.
- Their storage product is Starch, but oil and glycogen.
- They reproduce mostly asexually by spore formation.
- unicellular or multicellular
- Humus is a layer of decayed organic matter contain many nutrient

(A) Saprotrophs - تغذية الجراثيم

- is considered decomposers or scavengers of nature
- produce humus for animal and plants remains
- Humus ~~play~~ → التربة الغنية بالمغذيات

(B) parasitic - (الطفيل)

- is an organism that lives in or on another organism (host) from which it obtains its food and shelter by [HauStaria]
- HauStaria → modified hyphae which penetrate tissue and absorb food from host.

(C) Symbiotic

2 types: (1) Lichens (2) Mycorrhizae)

(1) Lichens

A symbiotic association between algae and fungi.
[green algae or blue green algae]

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[The fungus is an Ascomycete or a Basidiomycete]

- algae → contribute organic food from photosynthesis

- fungi → absorb water and mineral salts.

- lichens can grow in extreme dry condition because fungi can conserve water.

② Mycorrhizae :-

A symbiotic association between fungi and roots of higher plants.

ECTOTROPHIC

Fungi form a sheath around the center of roots

- found in many forests trees

as pines and oak

(Basidiomycetes)

Endotrophic

Fungi penetrate the host tissue

Carbohydrate / vitamins

Tree

Fungi

- break down protein to amino acid

- provide greater surface area for absorption of ions as phosphate.

Classification of Fungi

(1) Myxomycota

(2) Eumycota [True Fungi]

Classification of fungi according to - Cell wall presence

① Myxomycota - diagnostic

Acanthamoeba

Plasmodium

Microsporidia

② Eumycota

diagnostic

Ascomycota

Zygomycota

Basidiomycota

Deuteromycota

① Myxomycetes

- lack cell wall, show amoeboid movement or pseudoplasmodium, slimy moulds (acellular)

② Eumycota

True fungi with cell wall of chitin, includes (5) phyla

④ Ascomycota

Zoospore fungi, mainly aquatic

③ Zygomycota

Vegetative body is haplophase (n)

asexual spores are non-motile

asexual reproduction takes place by complete fusion of 2 multinucleated gametangia producing zygospores.

Also known as "Conjugation fungi"

Rhizopus and Mucor belong to this group.

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③ Ascomycota (Sac Fungi)

- Sexual reproduction take place by gametangial Copulation e.g. yeast, can also occur by gametangial Contact e.g. penicillium or by Somatogamy e.g. (Morchella)
- form ascospores, are enclosed in sac like structure called the (Ascus)
- vegetative body & haplophase (n)
- Septated hyphae
- Asexual reproduction occurs by Asexual spore called Conidia

Note:

(non motile spores)

in primitive ascomycetes the asci occur single while advanced ascomycetes the asci aggregated to form

fruiting body called Asco carp

types of Asco carp:

① Cleistothecium

cleistothecium
closed / spherical

closed & spherical ascocarp

perithecium

② Perithecium

flask / shape

flask - shape ascocarp

③ Apothecium

cup - shape ascocarp

~~Ascom~~ Ascospore usually in ⑧ number - rounded in

④ Basidiomycota

shape

vegetative body (2n) - with septated hyphae - club

shaped structure called basidium which carry 4 basidiospores at the top

Al-Haramien

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in advanced Basidiomycota Basidium aggregate in fruit body called Basidiocarp.

ex → Mushroom - Agaricus ^{عيش الفطر}

⑤ Deuteromycota

(imperfect fungi) eg → Alternaria

Reproduction → Asexual only (imperfect or anamorphic)

or mycelial state

Sexual [perfect or teleomorphic] unknown or possibly be lacking altogether.

Role of Fungi in ecosystems:-

- Decompose organic matter
- Fove symbiosis
- Help plant growth
- used in food eg (Mushrooms, Fermentation)
- Source of medicine (antibiotics)
- Model organisms in genetics