LIVE

CLASS 11th BIOLOGY

BACKLOG MARATHON

SERIES

1. The Living World
2. Biological Classification
3. Plant Kingdom
4. Animal Kingdom
5. Morphology of Flowering Plants

BACKLOG MARATHON SERIES

Next Toppers

The Living World

Chapter-1

The ecological conflict and cooperation among members of a population and among populations of a community or even the molecular traffic inside a cell make us deeply reflect on - what indeed is life?

Marathon

WHAT LIVING IS?

Growth – Living organisms increase in size and mass over time through internal processes.

Reproduction – Ability to produce offspring, either sexually or asexually.

Response to stimuli – Ability to sense environmental changes and respond appropriately.

Metabolism – All chemical reactions (anabolism and catabolism) occurring within the body to maintain life.

Marathon

WHAT LIVING IS?

Self-replication – Ability to make copies of themselves at the cellular or organism level.

Self-organization – Capability to maintain structured and ordered systems internally.

Interaction – Ability to interact with the environment and other organisms.

Adaptation – Capacity to adjust and evolve over time according to environmental conditions.

BIODIVERSITY

Occurrence of the number and types of organisms present on earth, is called biodiversity.

Living

The number of species that are known and described range between 1.7-1.8 million. Each different kind of plant, animal or organism that you see, represents a species

Marathon

LOCAL NAMES AND SCIENTIFIC NAME

(1) Shubhi
(2) Vishu
(3) Appyfizz
(4) Appu

→ Apeksha Singh.

→ Vary from place to place

→ Creates Confusion

Кот
Cat
Gato
kedi
mau
Xiǎo māo
Billi
Felis domesticus

BINOMIAL NOMENCLATURE ★

Two

ex: Apoksho Singh

Always capital

Generic name → represent → Genus

Specific epithet → represent → Species

Small letter.

underline.

Marathon

Each name has two components - the Generic name and the specific epithet.
This system of providing a name with two components is called Binomial nomenclature.
This naming system given by Carolus Linnaeus is being practised by biologists all over the world.

Marathon

EXAMPLE:

First Letter of Genus in Capital Letter

First Letter of Species in Small Letter

Mangifera ***Indica*** ***Linn***

Generic Name

(Specific Epithet)

Citatinn

Biological Name

Other universal rules of nomenclature are as follows:

- Biological names are generally in Latin and written in italics. They are Latinised or derived from Latin irrespective of their origin.
- The first word in a biological name represents the genus while the second component denotes the specific epithet.
- Both the words in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their Latin origin.
- The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter. It can be illustrated with the e.g. of Mangifera indica.

TAXONOMY

classification of organism in different group / Taxa / Category.

(Taxis = arrangement, nomos = law)

- This word was proposed by A.P. de. Candolle in his book "Theories elementaire de la botanique" (Theory of elementary botany). Branch of biology dealing with identification, nomenclature and classification of organisms is called taxonomy.

A. P. de candolle

CONVENTIONAL TAXONOMY

- CHARACTERISATION
- IDENTIFICATION
- CLASSIFICATION
- NOMENCLATURE

Marathon

MODERN TAXONOMY

- MORPHOLOGY
  External feature
- ANATOMY
  Internal structure.
- DEVELOPMENT PROCESS
- CELL STRUCTURE
- ECOLOGICAL INFORMATION

Marathon

CATEGORY	TAXA
Kingdom	Plantae
Division/Phylum	Angiospermae
Class	Dicotyledonae
Order	Sapindales
Family	Anacardiaceae
Genus	Mangifera
Species	indica

Marathon

TAXON (PLURA L= TAXA)

1. Taxon represents the rank of each category and referred to as a unit of classification.
2. Taxon refers to a group of similar, genetically related individuals having certain characters distinct from those of other groupss.

Marathon

SYSTEMATICS

1. The term systematics was given by Linnaeus. The word systematics is derived from Latin word "Systema" which means "systematic arrangement of organisms". Linnaeus used "Systema Naturae" as a title of his publication.
2. The term systematics was referred to study of diversity of organisms and their evolutionary relations.

Systematematics ⟶ Taxonomy + Phylogenetic Relationship.

Marathon

TAXONOMIC HIERARCHY

Example

Principal (top)

Vice Principal

Teachers

Students (bottom)

TAXONOMIC CATEGORIES

- Classification is not a single step process but involves hierarchy of steps in which each step represents a rank or category.

SPECIES
GENUS
FAMILY
ORDER
CLASS
PHYLUM | Division.
KINGDOM

↓ General features
↑ Specific character

↓ Specific character.
↑ General features

TAXONOMIC CATEGORIES

Example

Cat

General Characters (of mammals)

These are the features common to all mammals, including cats:

- Have hair or fur
- Give birth to babies (not eggs)
- Females produce milk for their young
- Warm-blooded

SPECIFIC CHARACTERS (OF CAT):

- Retractable claws
- Meows as a sound
- Sharp eyesight, especially at night
- Licks itself to stay clean
- Walks silently (padded paws)

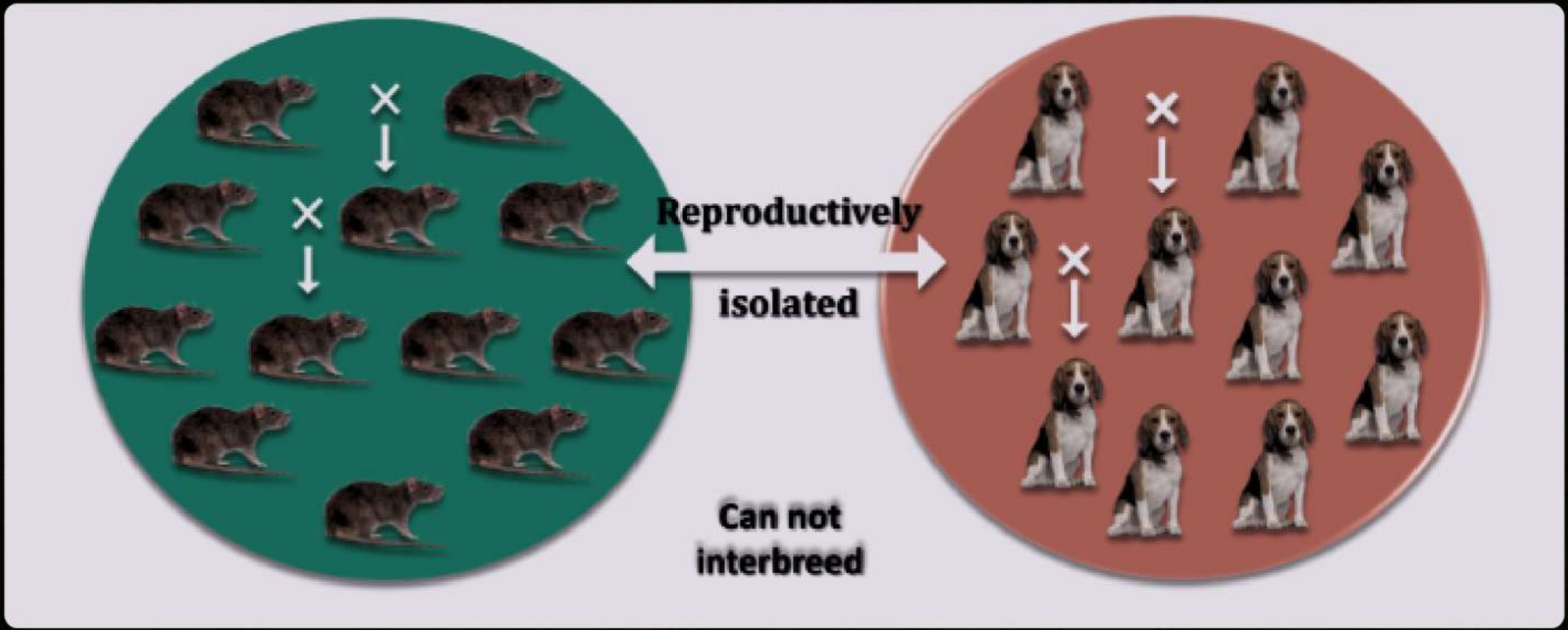
SPECIES

KYA HAI ????

SPECIES CONCEPT

- Biological species concept was given by Ernst Mayr. According to Mayr "species is group of organisms with similar morphology which can interbreed among themselves and produce fertile offspring". It is based on reproductive isolation.

Marathon


Reproductively
isolated
Can not
interbreed

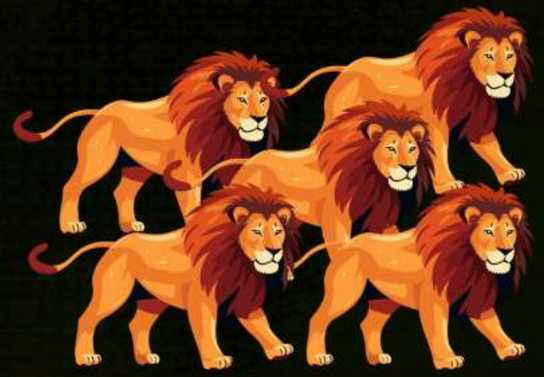
SPECIES:

- group of individual organisms with fundamental similarities as a species.

Marathon

SPECIES:

indica, tuberosum, melongena, nigrum, leo, tigris, pardus, sapiens represent the specific epithets.



Mango- Mangifera indica
Potato - Solanum tuberosum
Brinjal - Solanum melongena
Makoi - Solanum nigrum

Lion - Panthera leo
Tiger - Panthera tigris
Leopard- Panthera pardus
Human - Homo sapiens

GENUS:

- Genus comprises a group of related species .

Marathon

S. nigrum (Makoi)

S. tuberosum (Potato)

S. melongena (Brinjal)

Genus: *Solanum*

P. pardus

P. leo

Genus: *Panthera*

FAMILY

KYA HAI ????

FAMILY:

- Family, has a group of related genera with still less number of similarities as compared to genus and species.

Marathon

Ex:

Potato

Brinjal

Makoi

Solanum

Genus

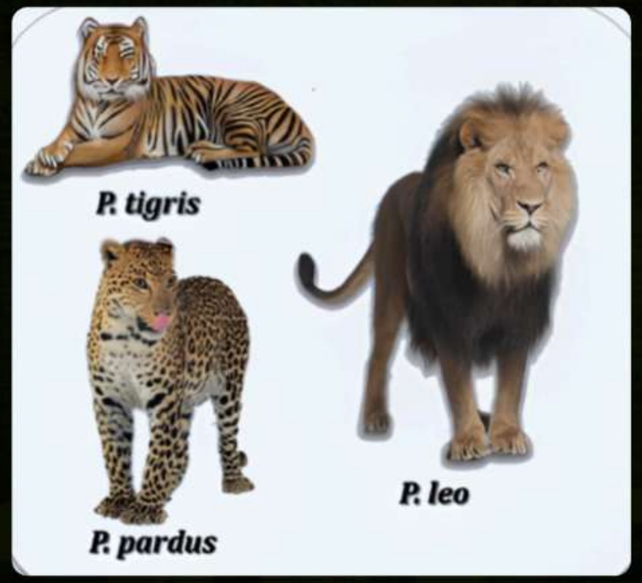
Solanaceae

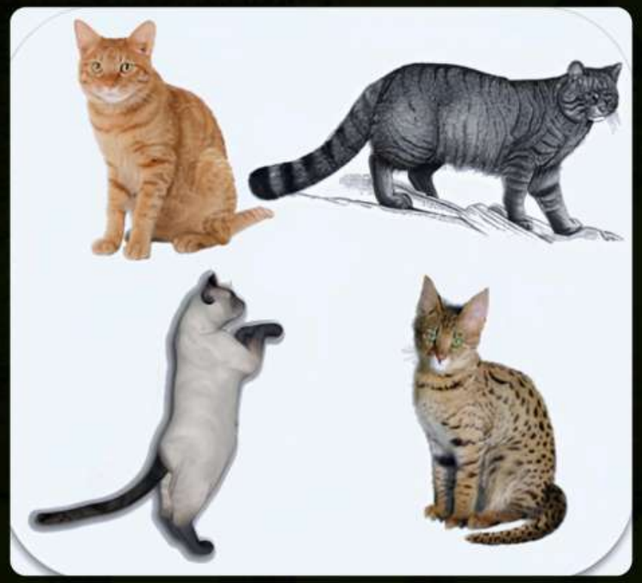
Family

Marathon

Felidae family

- **Panthera** Genus
- **Felis** Genus





ORDER

KYA HAI ????

ORDER:

- Order being a higher category, is the assemblage of families which exhibit a few similar characters.

Marathon

CLASS

KYA HAI ????

CLASS:

This Category include order

Mammalia (Class)
- Carnivora (Order)
- Primata (order)

Dicotyledoneae → Sapindales e.t.c
class (order)

Marathon

PHYLUM

KYA HAI ????

PHYLUM

Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called Phylum. All these, based on the common features like presence of notochord and dorsal hollow neural system, are included in phylum Chordata. In case of plants, classes with a few similar characters are assigned to a higher category called Division.

Chordata (Phylum): Pisces, Amphibia, Reptilia, Aves, Mammalia.

Angiosperm (Division): Dicotyledoneae, Monocotyledoneae.

Class Class

Marathon

KINGDOM

KYA HAI ????

KINGDOM:

All animals belonging to various phyla are assigned to the highest category called Kingdom Animalia in the classification system of animals. The Kingdom Plantae, on the other hand, is distinct, and comprises all plants from various divisions. Henceforth, we will refer to these two groups as animal and plant kingdoms.

Plantae (group of Division)
Animalia Kingdom (group of phylum)

Learn

TABLE 1.1 Organisms with their Taxonomic Categories

Common Name	Biological Name	Genus	Family	Order	Class	Phylum/ Division
Man	Homo sapiens	Homo	Hominidae	Primata	Mammalia	Chordata
Housefly	Musca domestica	Musca	Muscidae	Diptera	Insecta	Arthropoda
Mango	Mangifera indica	Mangifera	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	Triticum aestivum	Triticum	Poaceae	Poales	Monocotyledonae	Angiospermae

BACKLOG MARATHON SERIES

Next Toppers

Biological Classification

Chapter-2

WHY DO WE CLASSIFY ORGANISM ????

→ No Confusion

→ East to Understand the subject

→ Evolutionary Relationship

BIOCLASSIFICATION

- First Attempt
- Two Kingdom classification
- Three Kingdom classification
- Four Kingdom classification
- Five Kingdom classification
- Six Kingdom classification

FIRST ATTEMPT

no microscope, no scientific Basis

Uses of organism

- Food
- clothing
- shelter

Aristotle

Aristotle → He was first one to Use scientific Basis:

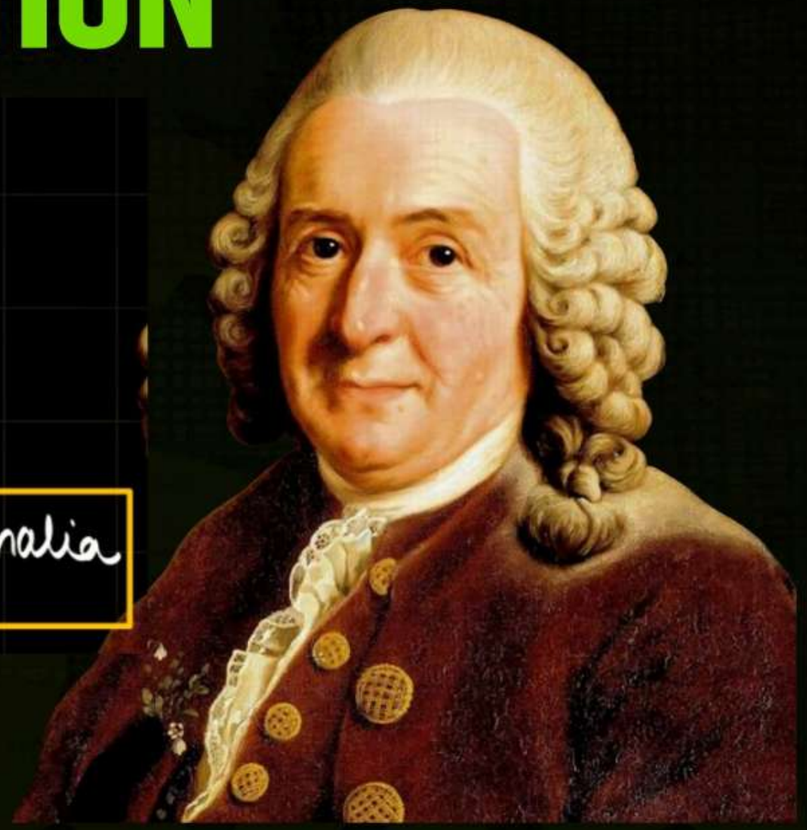
Simple morphological characters

- Plant
  - Basis → Height
  - Herbs
  - Shrubs
  - Trees
- Animal
  - Anaima (RBC's Absent)
  - Enaima (RBC's are present)

TWO KINGDOM CLASSIFICATION

Plantae

Animalia



Carolous Linnaeus

Next Toppers

Basis

C	Cell wall
C	Contractile system
L	Locomotion
M	Mode of nutrition
R	Response to stimuli

PLANT	FEATURES	ANIMALS
Present	Cell wall	Absent
Absent	Contractile System	Present
Absent	Locomotion	Present
Not Eat	Mode of Nutrition	Eat
Slow	Response to stimuli	Fast

DRAWBACKS OF TWO KINGDOM CLASSIFICATION

No Distinction Between

(1) Unicellular & multicellular organism.

(2) Prokaryotes & Eukaryotes.

(3) Photosynthetic & Non-photosynthetic

- Prokaryotes (bacteria, blue green alage) and eukaryotes (fungi, mosses/bryophytes, fern/pteridophytes, gymnospem and angiosperm) are placed in same kingdom.
- Unicellular organism (Chlymydomonas and Chlorella) and multicellular organism (Spirogyra) are placed together under algae in plant kingdom, because they have cell wall.
- No differentiation between the heterotrophic fungi and autotrophic green plants, thoughthey also showed a characteristic difference in their cell wall composition - the fungi had chitin in their wallswhile the green plants had a cellulosic cell wall.
- In two kingdom system Paramecium and Amoeba were placed in animalia kingdom, because cell wall is absent in them.

THREE KINGDOM CLASSIFICATION

- Plantae
- Animalia
- Protista
  - Unicellular,
  - Eukaryotes.

Ernst Haeckel

BACKLOG MARATHON SERIES

Next Toppers

FOUR KINGDOM CLASSIFICATION

- Plantae
- Animalia
- Protista (Unicellular, Eukaryotes)
- Monera (Unicellular, Prokaryotes)

Copeland

BACKLOG MARATHON SERIES

Next Toppers

FIVE KINGDOM CLASSIFICATION

1969 most accepted

- Monera
- Fungi
- Protista
- Animalia
- Plantae

RH Whittaker

CRITERIA USED BY HIM FOR MAKING CLASSIFICATION ARE:

- → Cell type
- → Body organisation
- → Cell wall composition
- → Mode of nutrition
- → Reproduction
- → Phylogenetic Relationship or Evolutionary Relationship

Characters	Five Kingdoms				
	Monera	Protista	Fungi	Plantae	Animalia
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell wall	Noncellulosic (Polysaccharide + amino acid)	Present in some	Present with chitin	Present (cellulose)	Absent
Nuclear membrane	Absent	Present	Present	Present	Present
Body organisation	Cellular	Cellular	Multicellular / loose tissue	Tissue / organ	Tissue / organ / organ system
Mode of nutrition	Autotrophic (chemosynthetic and photosynthetic) and Heterotrophic (saprophytic/parasitic)	Autotrophic (Photosynthetic) and Heterotrophic	Heterotrophic (Saprophytic / Parasitic)	Autotrophic (Photosynthetic)	Heterotrophic (Holozoic / Saprophytic etc.)

LIMITATIONS:

1. In five kingdom classification Virus, Viroid, Prions and Lichens are not mentioned.

2. According to five kingdom classification. Chlamydomonas and Chlorella are placed in kingdom Protista.

Marathon

BACKLOG MARATHON SERIES

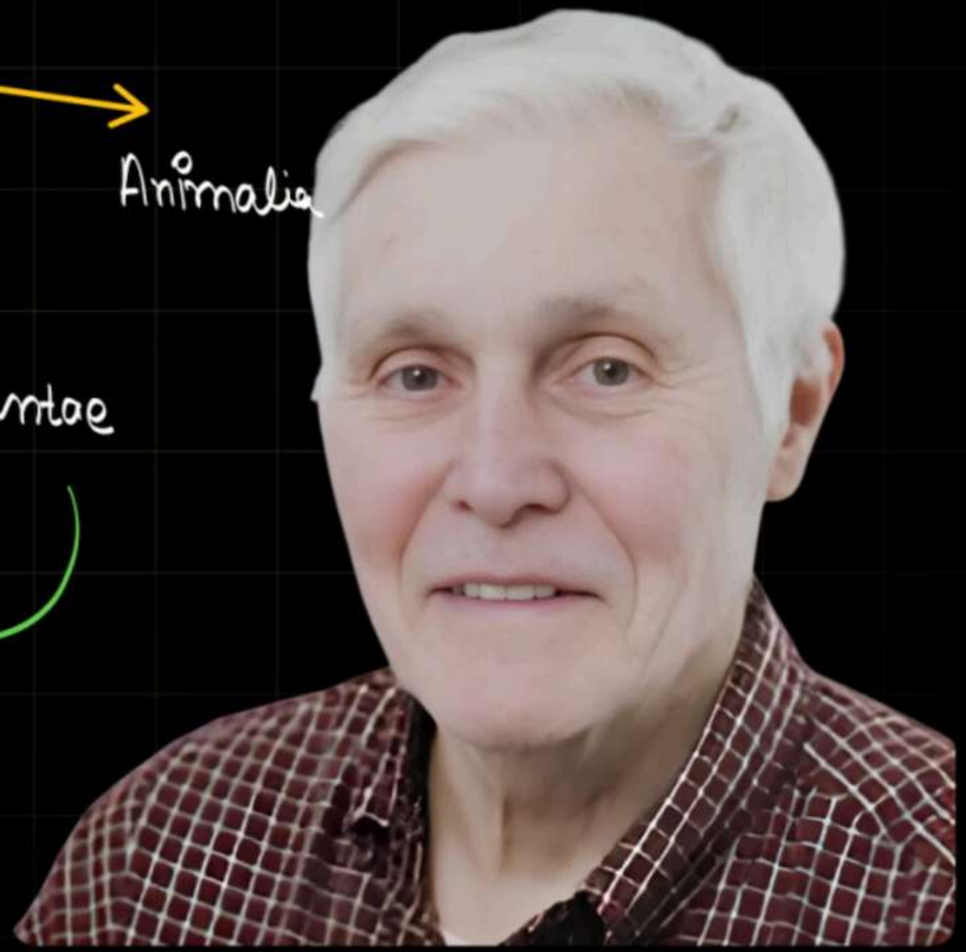
Next Toppers

SIX KINGDOM CLASSIFICATION

16 S rRNA gene sequence

- Archaebacteria → Archae
- Eubacteria → Eubacteria
- Protista
- Fungi
- Plantae
- Animalia

Protista, Fungi, Plantae → Eukarya

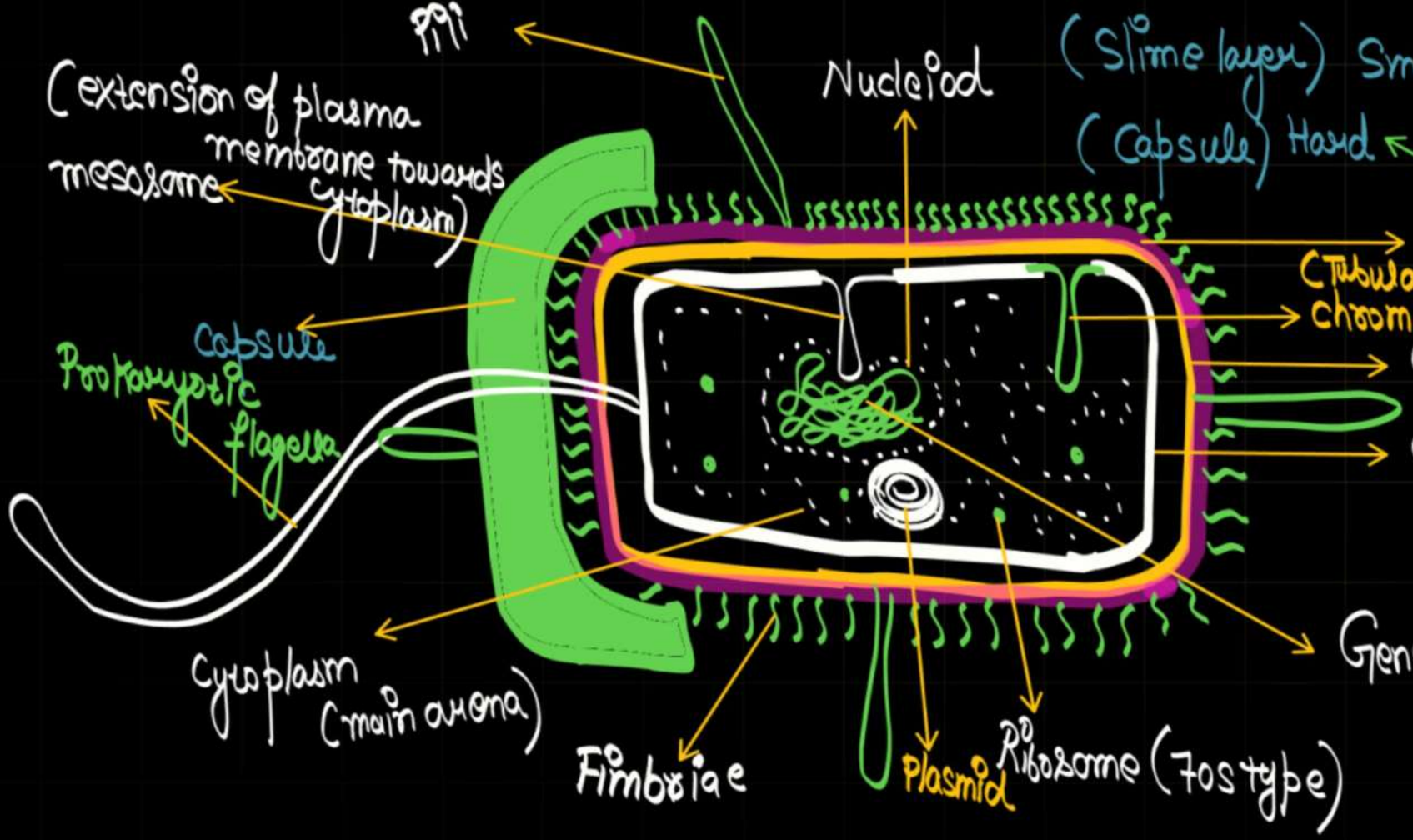


Carl Woese

BACKLOG MARATHON SERIES

Next Toppers

STRUCTURE OF PROKARYOTIC CELL



well-defined nucleus absent

membrane bound organelle Absent

Pilus → ↓ number, long
Fimbriae → ↑ number, small

Attachment

Plasmid → circular dsDNA
(extrachromosomal genetic material)
(may or mayn't be Present)

Glycocalyx + cell wall + cell membrane : outer envelope

Function of Glycocalyx

→ It helps in attachment to substratum (soil, rock)
→ It protects from water, lost Immunity
→ It protects from pathogens (microorganism)

Function of Mesosome

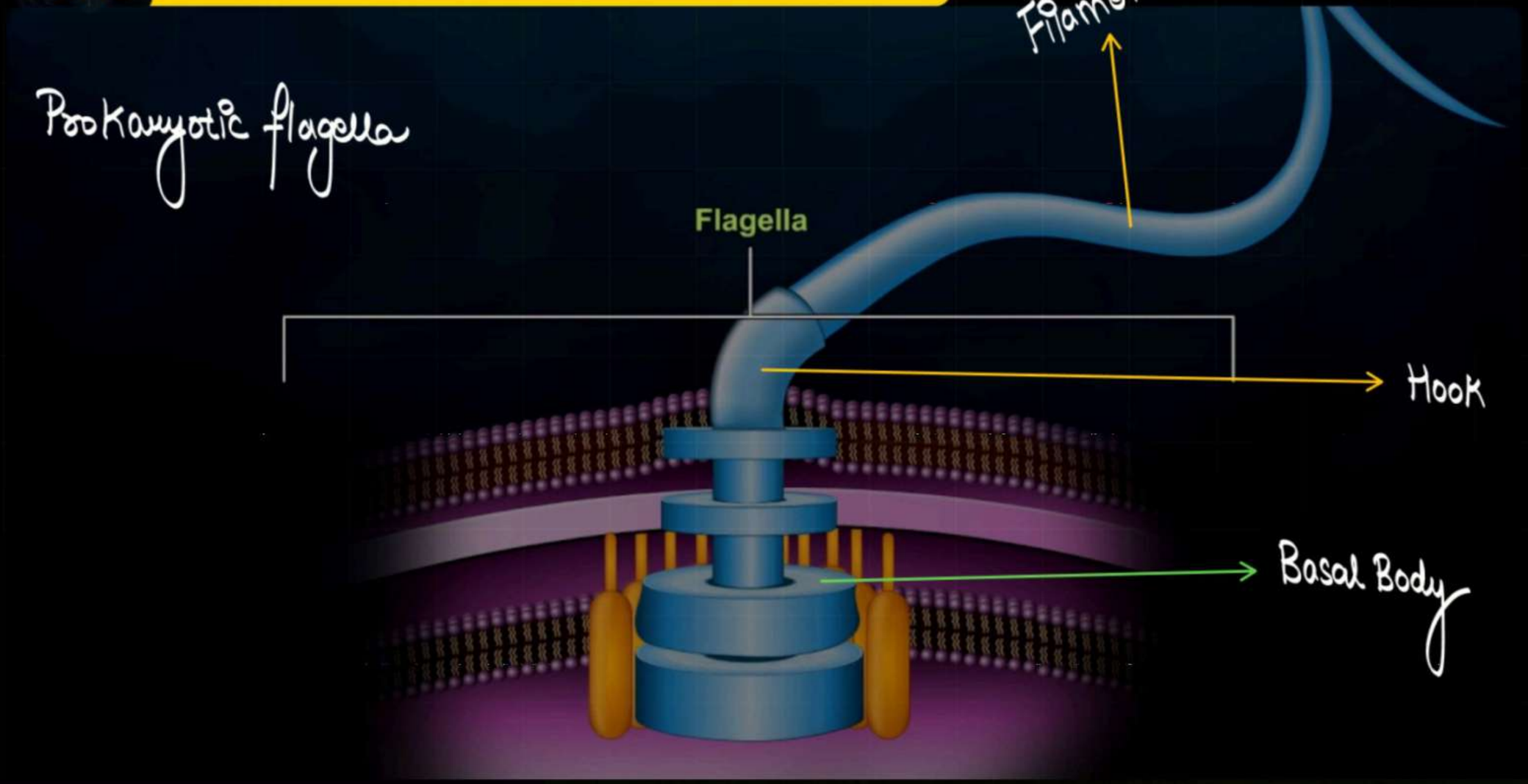
(extension of P.M)

→ Cell wall Formation
→ Respiration
→ Reproduction
→ DNA Replication

BACKLOG MARATHON SERIES

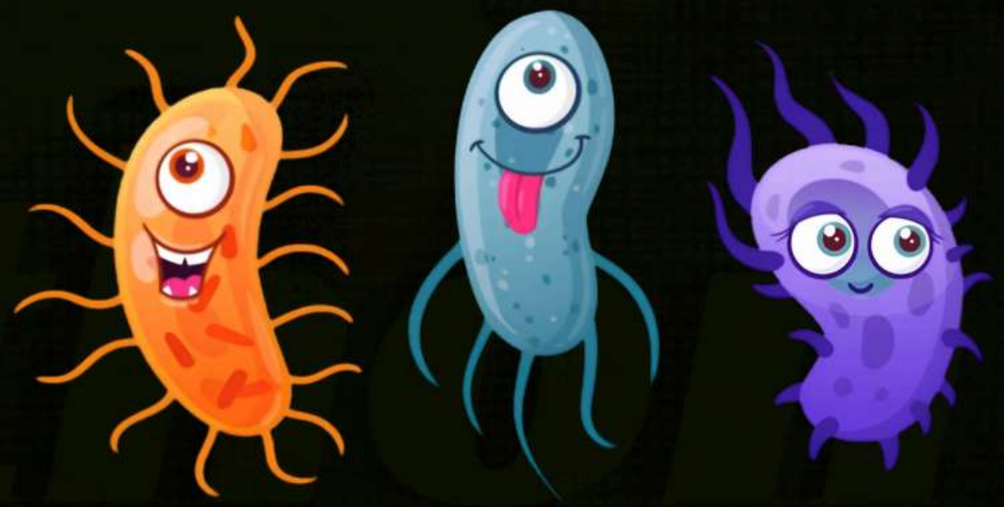
Next Toppers

STRUCTURE OF FLAGELLA



MONERA

Bacteria are the sole members of the Kingdom Monera.



FEATURES OF MONERA

simple organism but they have complex behaviour

- → Unicellular
- → Prokaryotic (well defined & membrane bound organelles Absent)
- → 70s type Ribosome
- → They can survive in harsh or Adverse conditions
- → Cosmopolitan (present everywhere)

BACKLOG MARATHON SERIES

Next Toppers

SHAPES OF BACTERIA

(pl. Cocci)

Coccus

Oval, spherical round

eg: Streptococcus

Rod shaped

pl. Bacilli

Bacillus

eg:- Lactobacillus

Vibrio pl.

Comma shaped

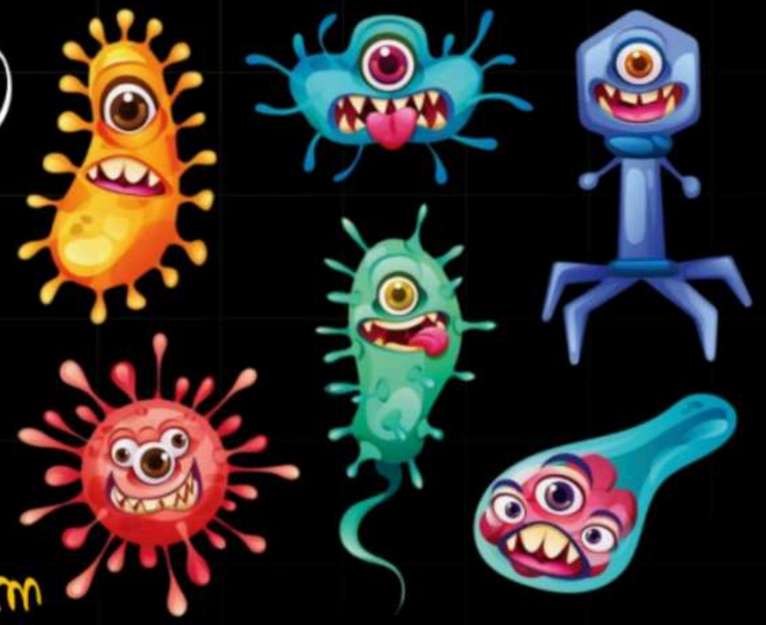
eg:- Vibrio cholerae

(Spiral shape)

Spirilla pl.

Spirillum sing.

eg:- Rhodospirillum



NUTRITIONAL DIVERSITY

(maximum nutritional Diversity)

- Autotrophic
  - Chemosynthetic (Use chemical energy)
  - Photosynthetic (Uses sunlight)
- Heterotrophic
  - Saprophytic
  - Parasitic

MONERA

- Archaebacteria
- Eubacteria or True bacteria

FEATURES OF ARCHAEBACTERIA

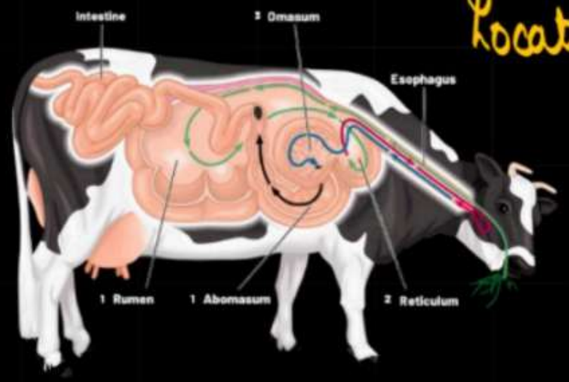
→ Primitive Bacteria

→ They can survive in extremely adverse or harsh condition (due to presence of Rigid cell wall & cell membrane)

→ oldest living fossil

ARCHAEBACTERIA

- **Methanogens**
  (methane producing Bacteria)
  Location :- Rumen of cattle
- **Halophiles**
  (extremely salty areas)
- **Thermoacidophiles**
  ↑ Temperature
  Acidic



EUBACTERIA or True bacteria

→ Rigid cell wall
→ If motile (flagella present)

Cynobacteria (Blue-green algae)
→ Prokaryotic
→ Unicellular
→ chlorophyll a & phycobilin (Autotrophic)
similar to green plants

→ Absence of flagella

→ Cell wall ⟶ covered with mucilagenous sheath (slimer, smooth)
or
gelatinous sheath (Thick, firmer)
(It reduce water loss)

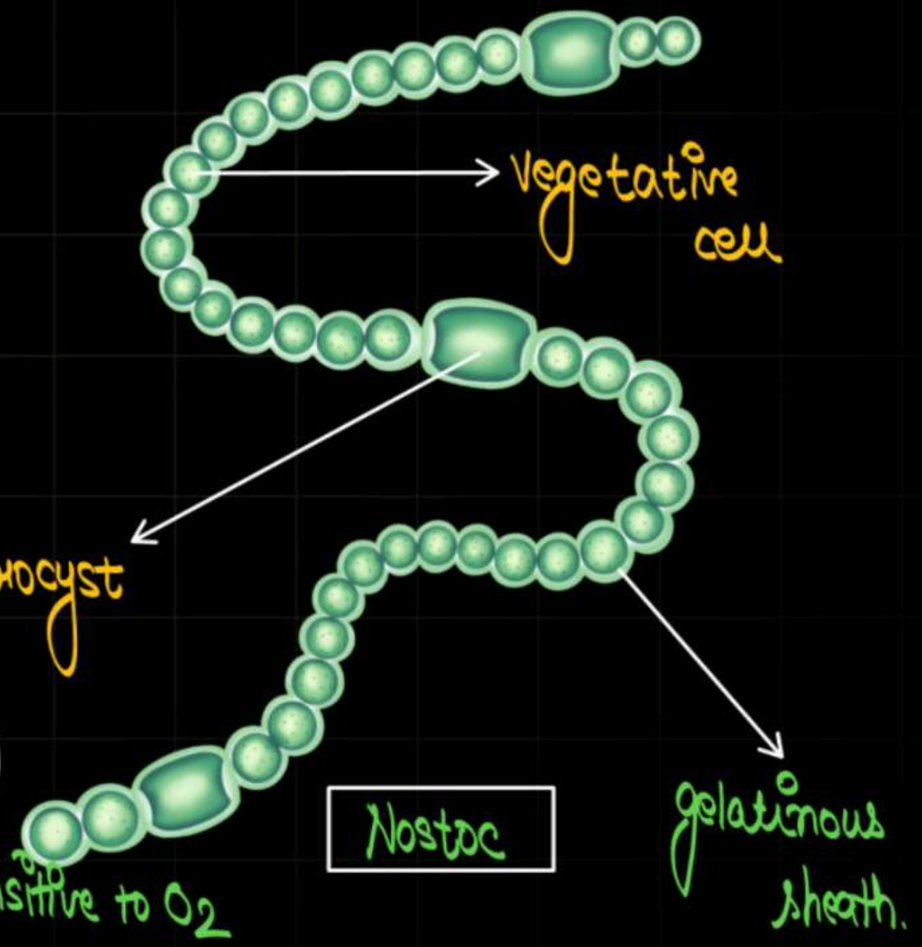
→ They form bloom in polluted water.

Colonial → Anabaena

Unicellular → Spirulina

Filamentous → Nostoc

Nostoc
- → vegetative cell → photosynthesis
- → Heterocyst → N_2 fixation (enzyme → nitrogenase)
  - → Thick walled → Sensitive to O_2



Chemosynthetic Bacteria → Use chemical energy to produce sugar

Inorganic molecules (H_2S (Hydrogen sulphide, Ammonia)

eg:- Nitrifying bacteria , Sulphur oxidising Bacteria (H_2S) , Iron oxidising Bacteria Iron

Ammonia → nitrate & nitrite

HETEROTROPHIC BACTERIA

most abundant

The majority are important decomposers.

Benefits :

- curd from milk : Lactobacillus
- Production of antibiotics: Streptomyces
- fixing nitrogen in legume roots : Rhizobium & Azotobacter

Diseases caused by Bacteria:

- Cholera: Vibrio cholerae
- Typhoid: Salmonella typhi
- Tetanus: Clostridium tetani
- Citrus canker: Xanthomonas citri

REPRODUCTION

- Bacteria reproduce mainly by fission. Sometimes, under unfavourable conditions, they produce spores. They also reproduce by a sort of sexual reproduction by adopting a primitive type of DNA transfer from one bacterium to the other

Parasexuality → Sort of sexual Reproduction
→ Transduction
→ Transformation
→ Conjugation

MYCOPLASMA

aka PPLO (Pleuro pneumonia like organism)

→ Cell wall Absent (highly pleuromorphic)

→ Smallest bacteria (0.1 – 0.3 μm) – Diameter — Joker of microbiology

→ Fried egg like colonies

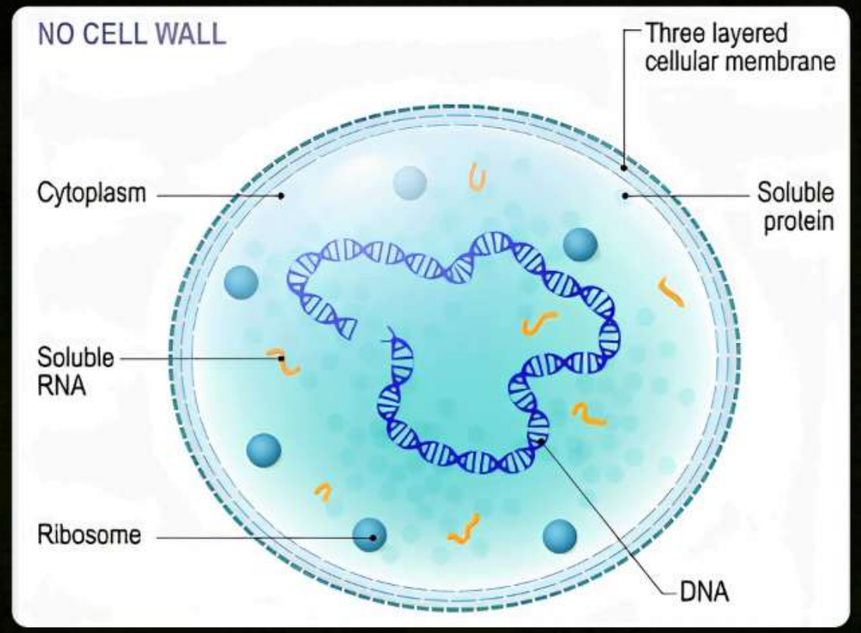
→ They can survive without oxygen

→ dsDNA → linear

→ Resistant to Penicillin (Antibiotic)

→ Pathogenic to both plants & animals

Bacteria discussing about their cell wall properties

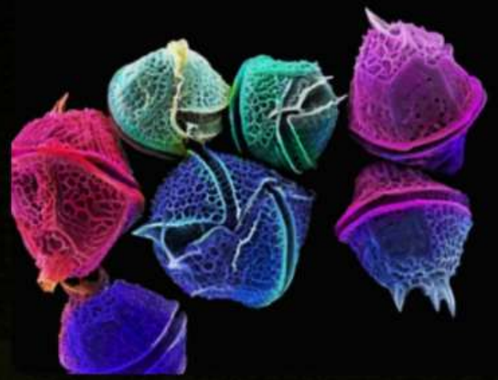

NO CELL WALL
Three layered cellular membrane
Cytoplasm
Soluble protein
Soluble RNA
Ribosome
DNA

PROTISTA

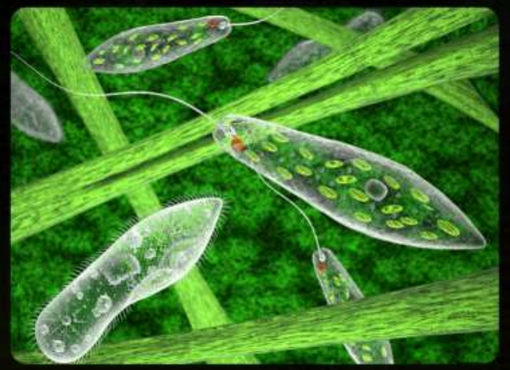
- Chrysophytes
- Dinoflagellates
- Euglenoids
- Slimemoulds
- Protozoans

Marathon

Chrysophytes

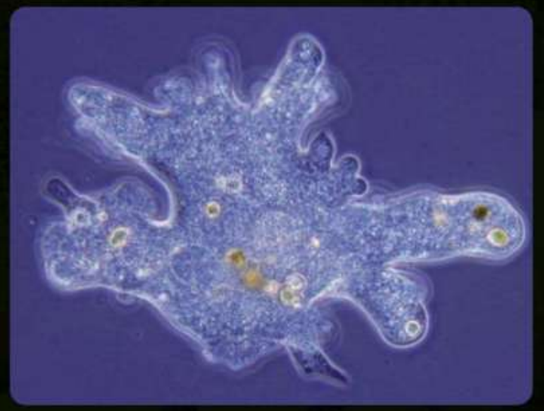


Dinoflagellates



Euglenoids

Slime mould



Protozoans

GENERAL FEATURES

- Unicellular eukaryotes.
- The members of Protista have characters of plants, animals and fungi also hence the boundary lines of this kingdom are not well defined.
- Primarily aquatic
- Some have flagella or cilia.

Marathon

NUTRITION

- Photosynthetic
  - → Chrysophytes
  - → Dinoflagellates
- Heterotrophic
  - Holozoic
    - eg: Amoeba
  - Saprophytic
    - eg: slime moulds
- Mixotrophic
  - eg:- Euglenoids

REPRODICTION

Sexual

By fusion of gametes

Asexual

No Fusion of gametes

- Binary Fission

Marathon

CHRYSOPHYTES

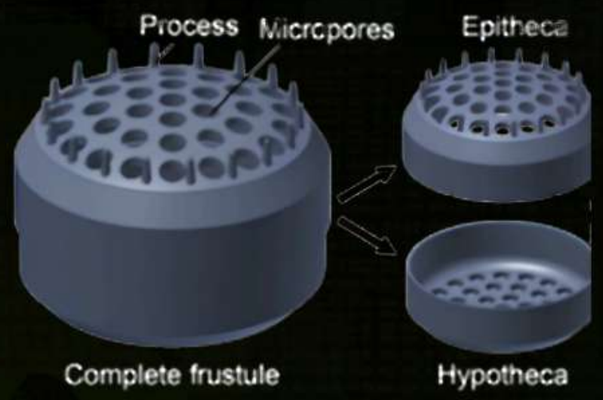
- Diatoms
- Golden algae (Desmids)

Marathon

DIATOMS

- They are found in fresh water as well as in marine environments
- photosynthetic
- Diatoms have pigments Chlorophyll 'a', Chl 'c ', and xanthophyll (fucoxanthin). Due to these pigments it they appear golden Brown coloured.
- They are chief producers in the ocean

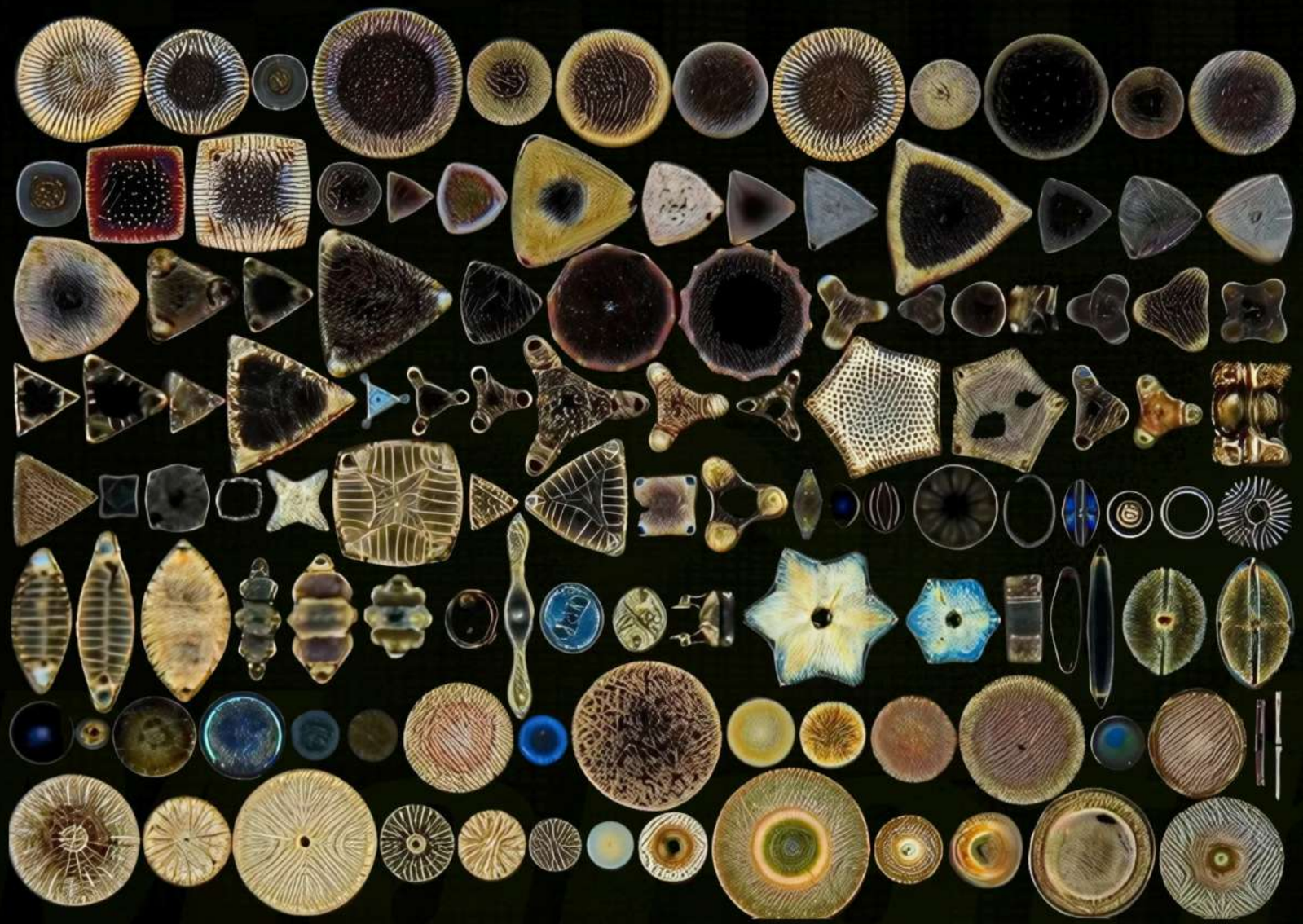
- In diatoms the cell walls form two thin overlapping shells, which fit together as in a soap box.



- The walls are embedded with silica and thus the walls are indestructible. Thus, diatoms have left behind large amount of cell wall deposits in their habitat; this accumulation over billions of years is referred to as ‘diatomaceous earth’.

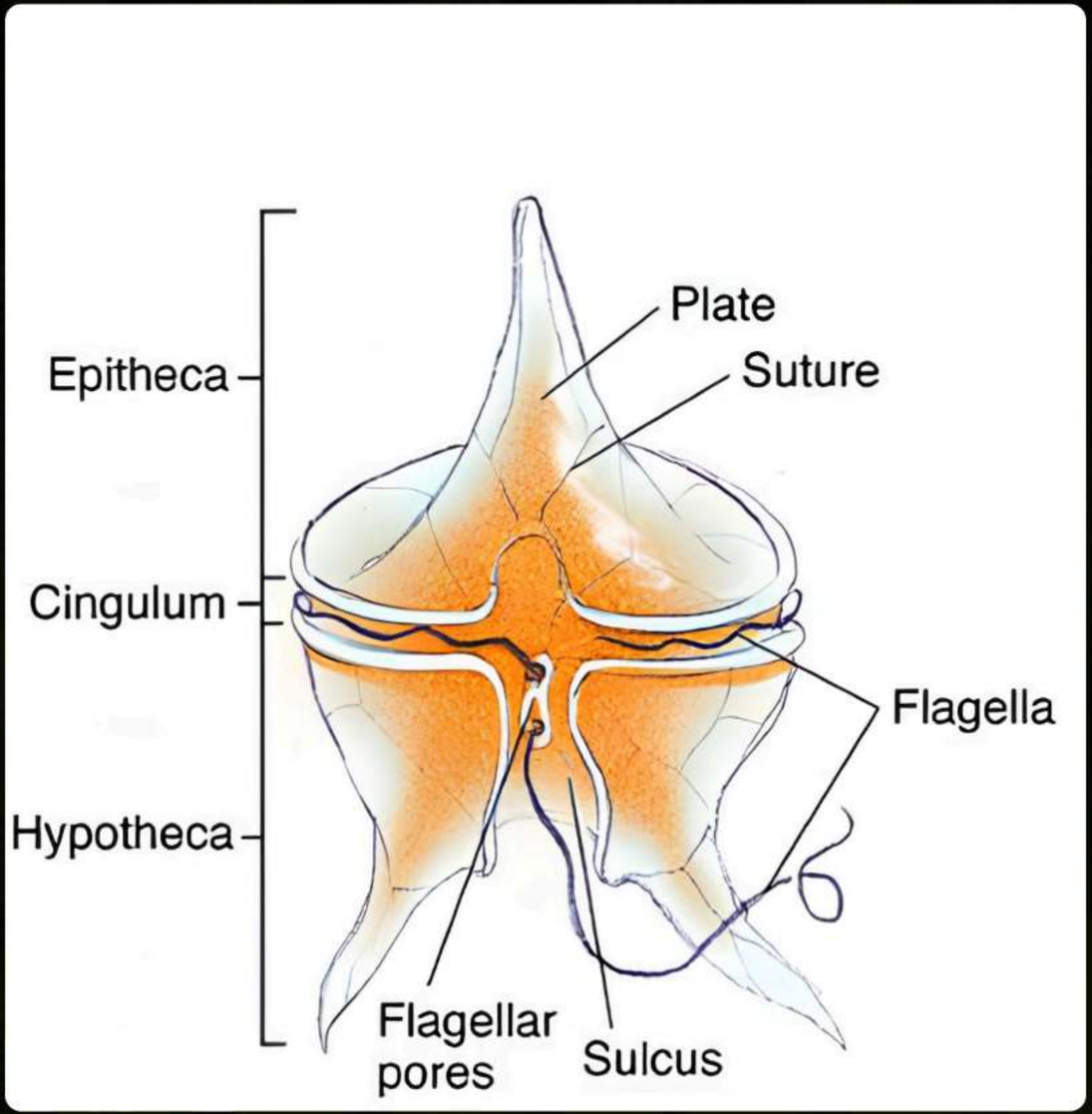
- They are microscopic and float passively in water currents (plankton).

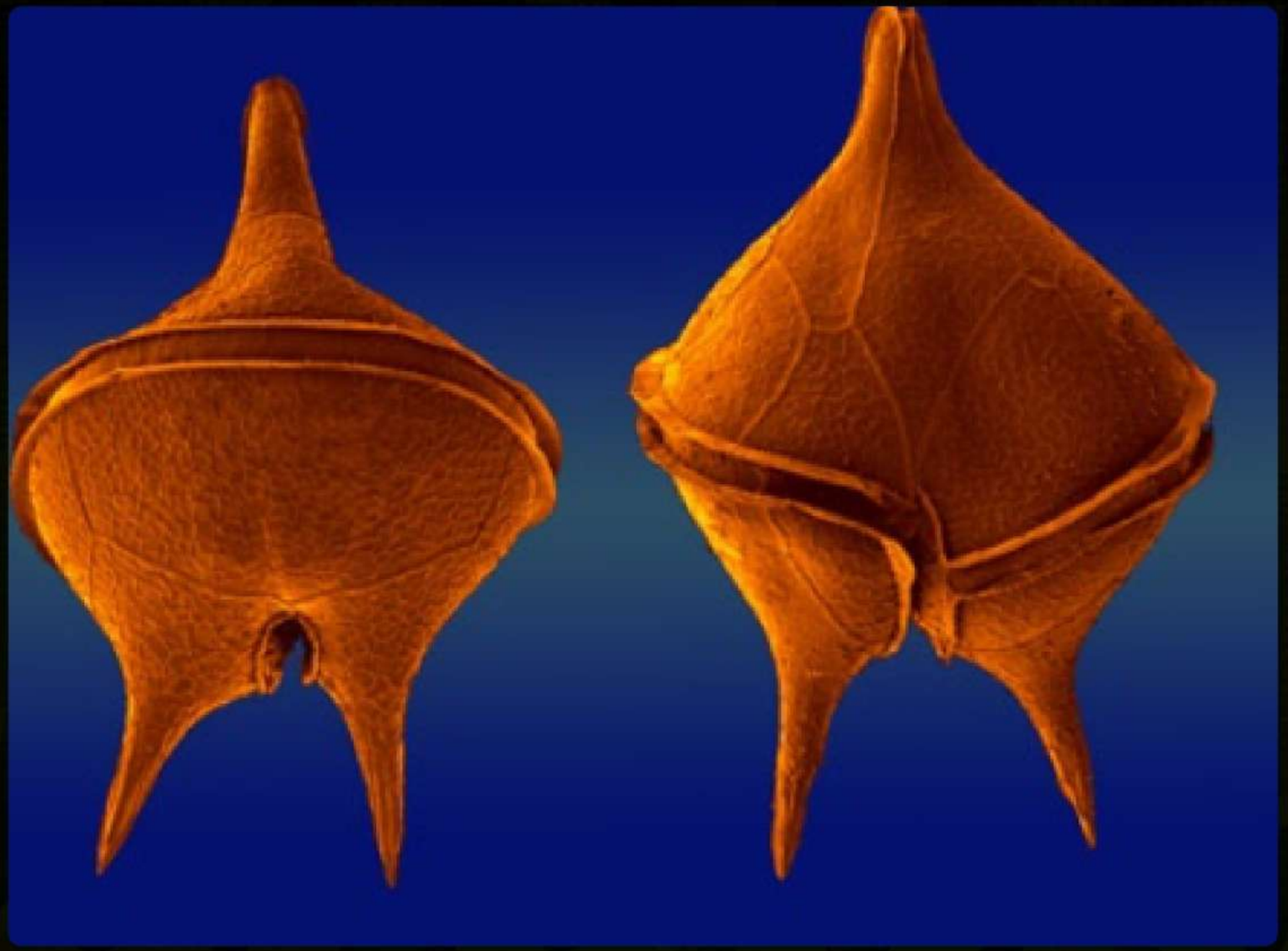
- Being gritty this soil is used in polishing, filtration of oils and syrups.



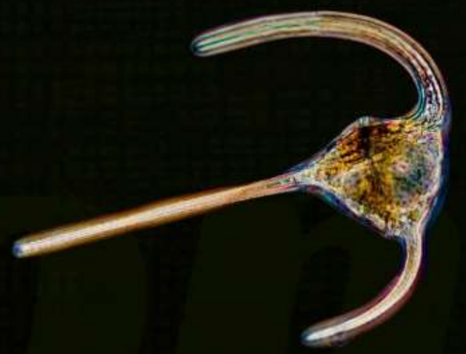
DINOFLAGELLATES

- These organisms are mostly marine
- Photosynthetic.
- Their cell wall is divided in to plates, which is made up of cellulose.





- Dinoflagellates have two flagella - one is transverse and other is longitudinal.
- Dinoflagellates are yellow-brown or golden brown in colour due to the pigments present in them - Chlorophyll 'a', Chl. 'c' and Xanthophylls.



BACKLOG MARATHON SERIES

Next Toppers

③ Dinoflagellate release toxin ⟶ Saxitoxin

rapid multiplication of Dinoflagellates

① Bioluminescence :- property of living organism to emit light

eg:- noctiluca

② Red tides. eg :- Gonyaulax & Gymnodinium

Red sea ⟶ Trichodesmium erythrium

cyanobacteria

Dinoflagellate (Saxitoxin) → Fish → Human → Shell fish Paralysis

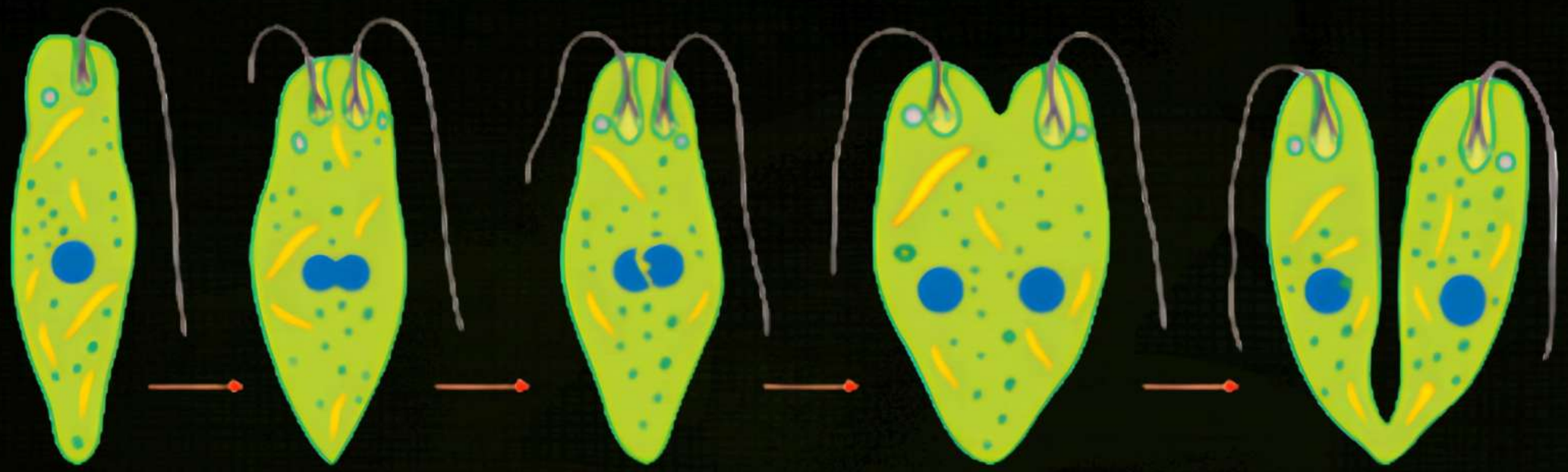
EUGLENOIDS

- Earlier placed in plants : perform photosynthesis
- Some scientists placed them in animals : no cell wall + heterotrophic (animal-like) nutrition
- Show both plant and animal features : called mixotrophic
- In five-kingdom classification : grouped under Protista

Marathon

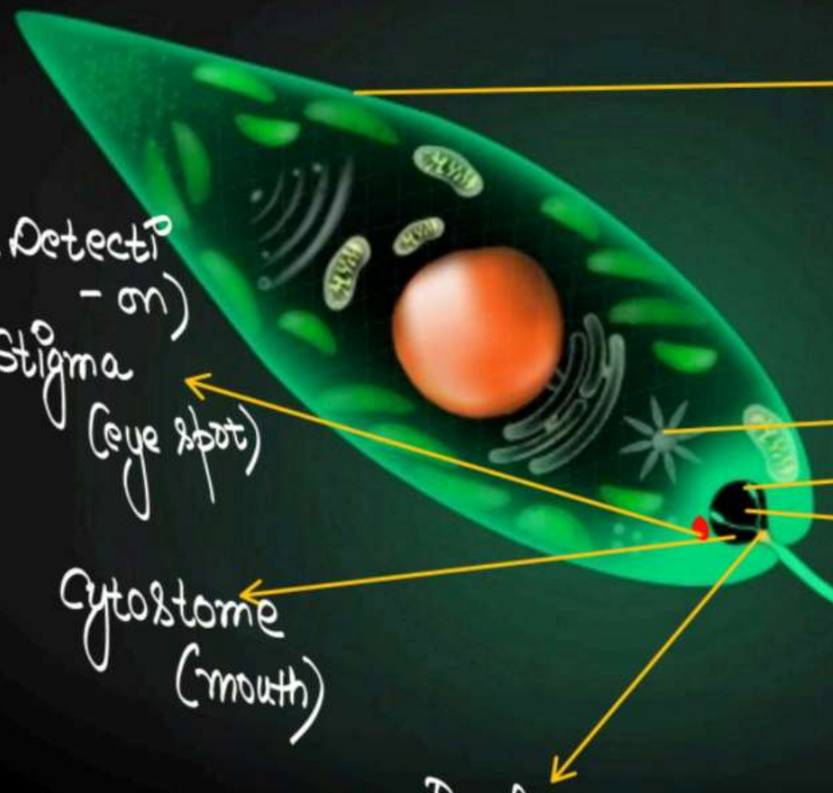
- Majority of them are fresh water organisms found in stagnant water
- Though they are photosynthetic in presence of sun light,when deprived of sunlight they behave like heterotrophs by predating on other smaller organisms. e.g. Euglena
- Chl. 'a' , Chl. 'b' and Xanthophyll - These pigments are identical to higher plant
- cell wall is absent
- cell membrane is covered with pellicle.

- Reproduction - Asexual reproduction by longitudinal binary fission.

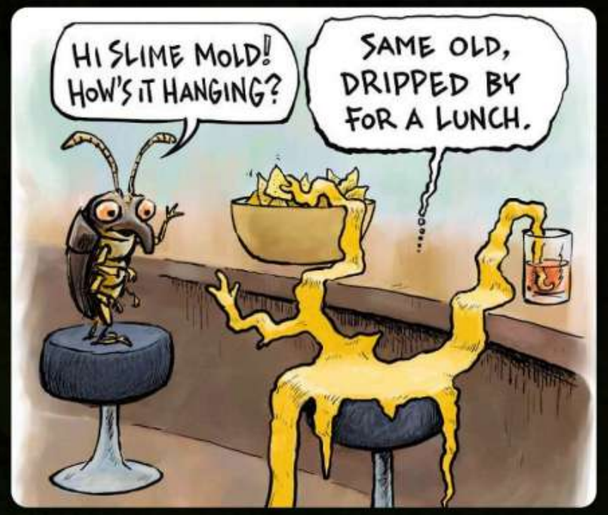


Marathon

BACKLOG MARATHON SERIES
Next Toppers



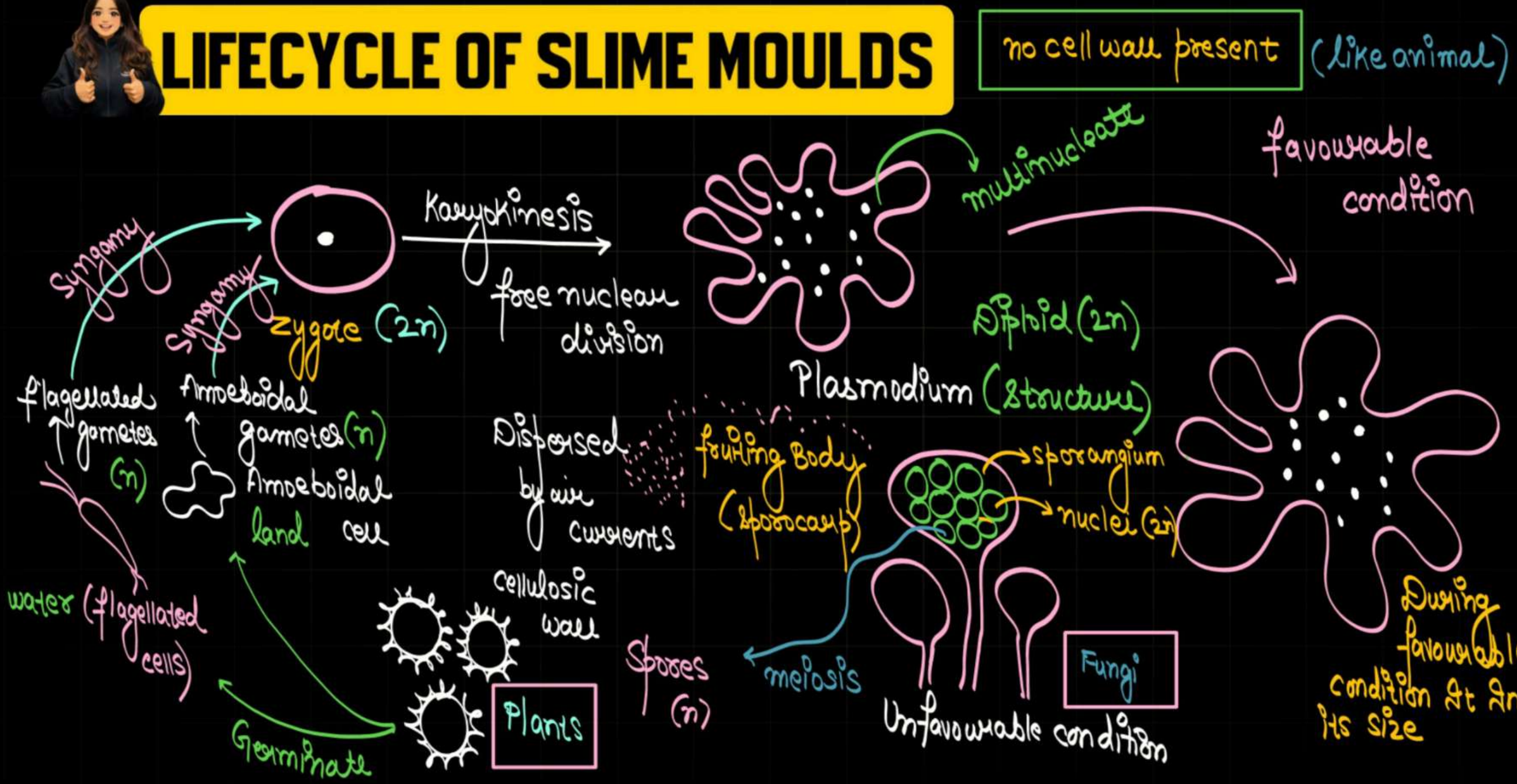
SLIME MOULDS

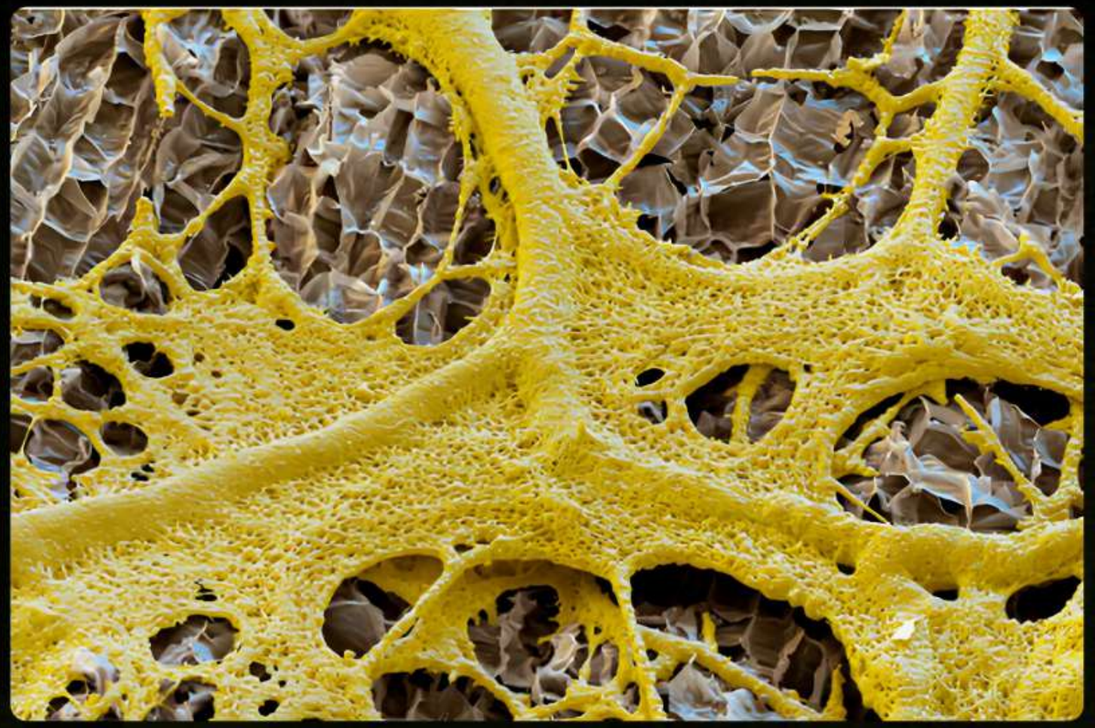


- Slime moulds are saprophytic protists.
- The body moves along decaying twigs and leaves engulfing organic material. Under suitable conditions, they form an aggregation called plasmodium which may grow and spread over several feet.
- During unfavourable conditions, the plasmodium differentiates and forms fruiting bodies bearing spores at their tips.
- The spores possess true walls. They are extremely resistant and survive for many years, even under adverse conditions. The spores are dispersed by air currents

BACKLOG MARATHON SERIES
Next Toppers

LIFECYCLE OF SLIME MOULDS





Plasmodium

Fruiting Bodies.

PROTOZOANS

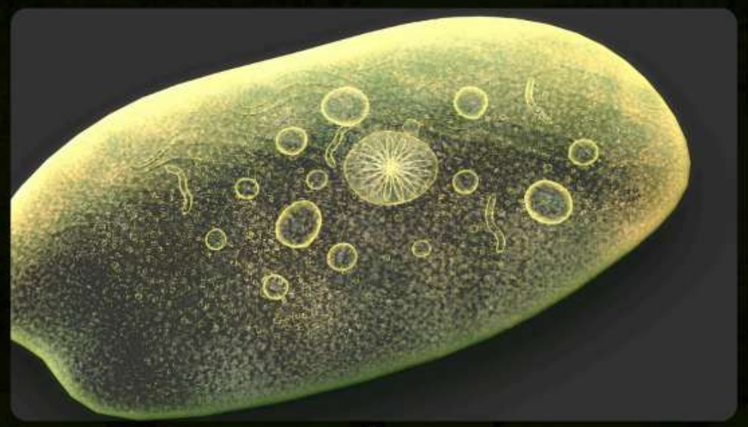
- Amoeboid protozoans
- Flagellated protozoans
- Ciliated protozoans
- Sporozoans

Marathon

AMOEBOID PROTOZOANS

- These organisms live in fresh water, sea water or moist soil.
- They move and capture their prey by putting out pseudopodia (false feet).
- Marine forms have silica shells on their surface.
- Example: Amoeba and Entamoeba

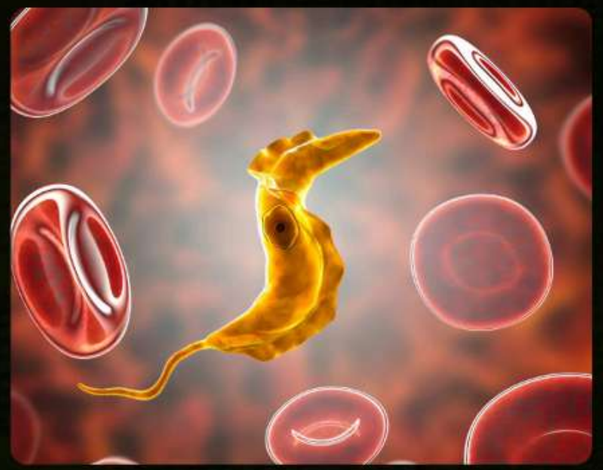
Amoeba



Entamoeba

FLAGELLATED PROTOZOANS

- The members of this group are either free-living or parasitic.
- They have flagella.
- The parasitic forms cause diasease ssuch as sleeping sickness. Example: Trypanosoma.



Marathon

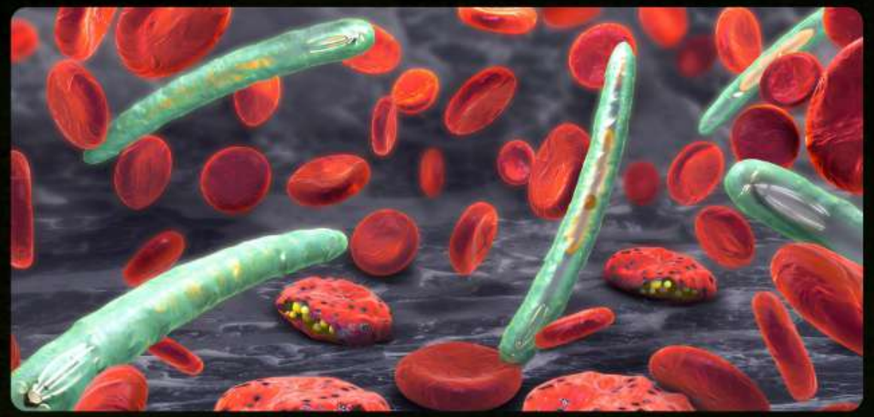
CILIATED PROTOZOANS

- These are aquatic, actively moving organisms because of the presence of thousands of cilia.
- They have a cavity (gullet) that opens to the outside of the cell surface.
- Example: Paramecium

Marathon

SPOROZOANS

This includes diverse organisms that have an infectious spore-like stage in their life cycle. The most notorious is Plasmodium (malarial parasite) which causes malaria



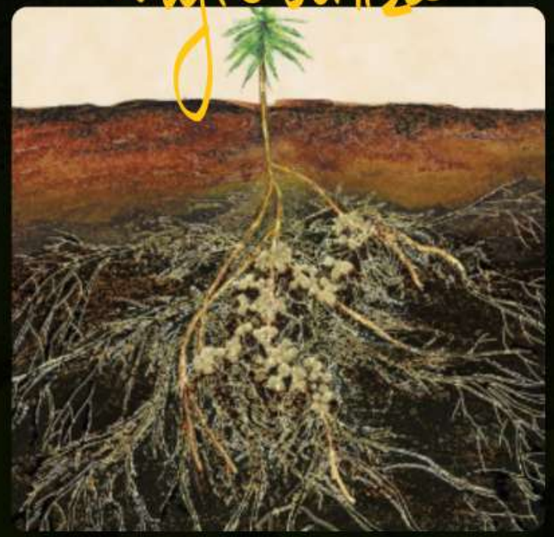
KINGDOM FUNGI

- Heterotrophic organisms
- They show a great diversity in morphology and habitat.
- Fungi do not have chlorophyll and chloroplast.
- Fungi prefer to grow in warm and humid places
- The cell walls of fungi are composed of chitin and polysaccharides.

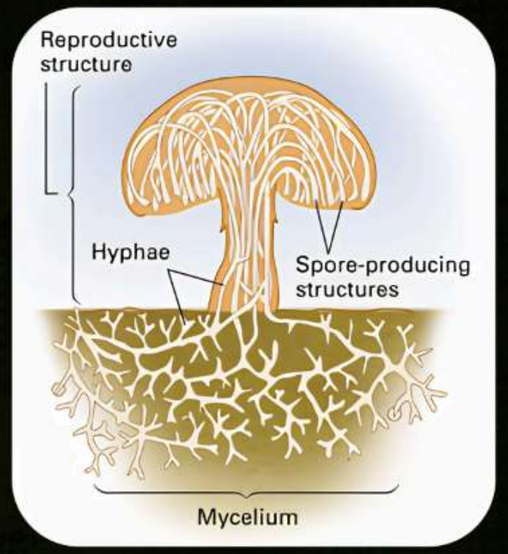
- Unicellular fungi, e.g., yeast are used to make bread and beer.
- Fungi cause diseases in plants and animals; wheat rust-causing Puccinia is an important example
- Source of antibiotics, e.g. Penicillium.
- Symbionts – in association with algae as lichens and with roots of higher plants as mycorrhiza.

lichen

mycorrhiza



- Their bodies consist of long, slender thread-like structures called hyphae. The network of hyphae is known as mycelium

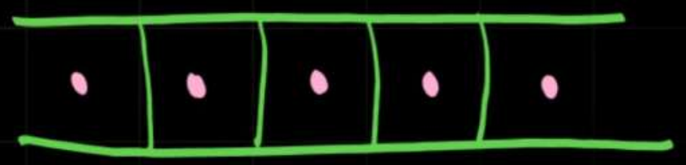


TYPES OF HYPHAE

Aseptate Hyphae (Septa Absent)

multinucleate cytoplasm (coenocytic hyphae)

Septate Hyphae (Septa present)



REPRODUCTION

Asexual Reproduction

→ Vegetative propagation

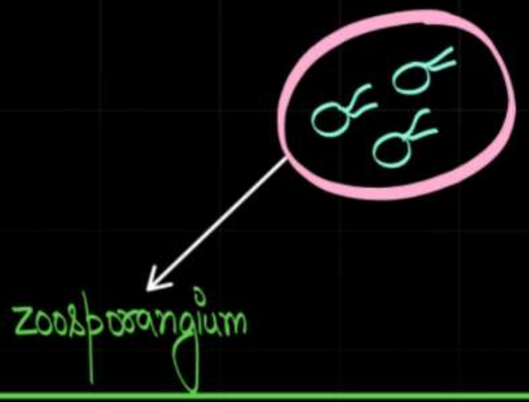
Sexual Reproduction

ASEXUAL REPRODUCTION

Favourable condition

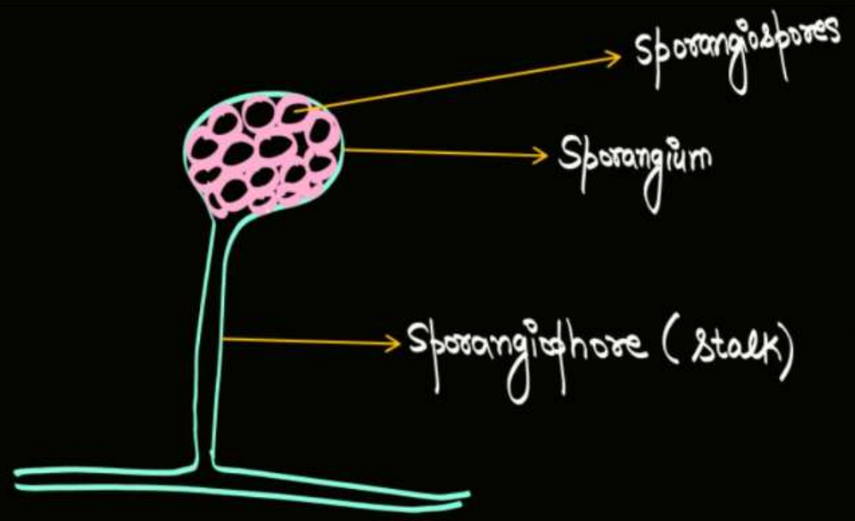
Different type of spores are formed ⟶ Asexual spores

1. Zoospores



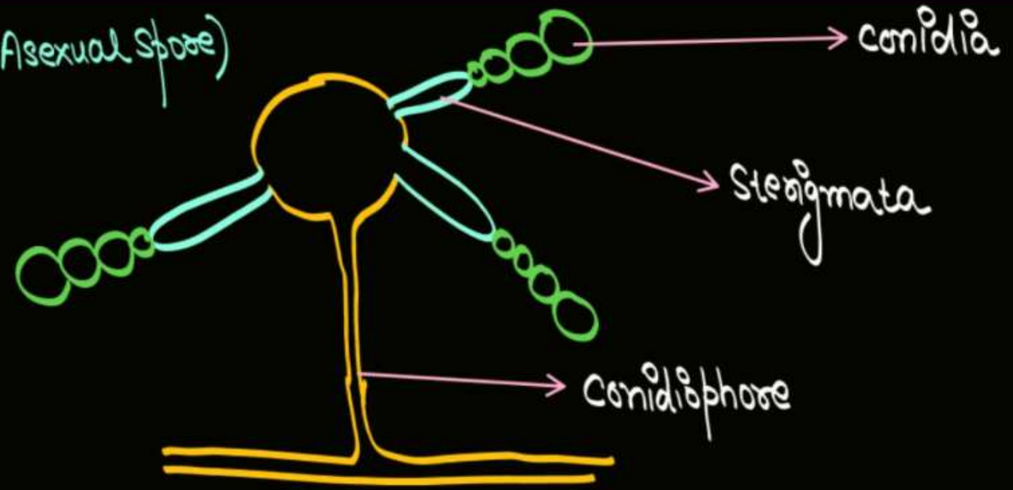
→ Motile
→ Biflagellated
→ Endogenous in origin

2. Sporangiospores



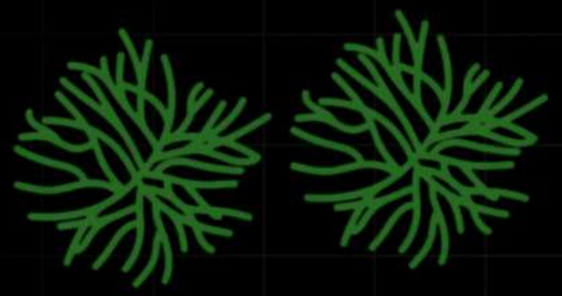
→ Endogenous in origin
→ Non-motile
→ Flagella Absent

3. Conidia (most common Asexual Spore)

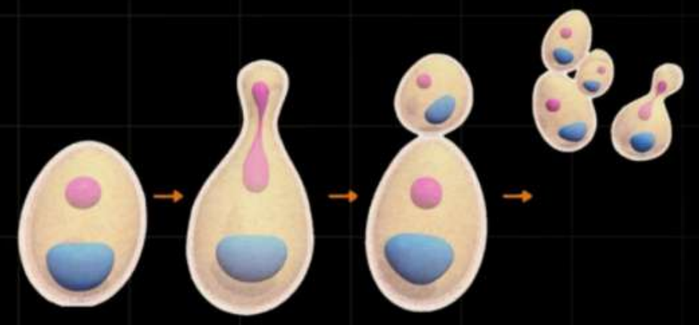


→ Exogenous in origin
→ Non-motile

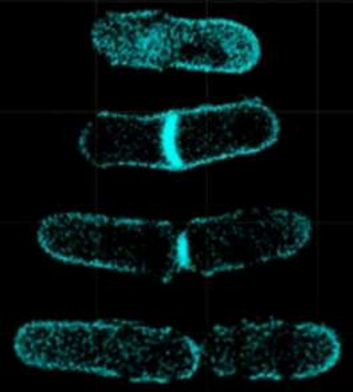
VEGETATIVE PROPAGATION



Fragmentation



Budding (yeast)



Fission (yeast)

SEXUAL REPRODUCTION

Unfavourable Condition

Fungi → haploid Compatible hyphae fuses (mating types +/-)

n n
(n+n)

- Plasmogamy : Fusion of cytoplasm

- Karyogamy : Fusion of nuclei (majority) n+n → 2n (zygote diploid nucleus)

  But in case of Basidiomycetes & Ascomycetes (n+n) Dikaryotic stage long-lived → 2n zygote Diploid nucleus

  Condition → Dikaryon

  Phase → Dikaryon phase

- Meiosis : Zygote (2n) Diploid nucleus —meiosis→ Haploid sexual spores (n)

- True fungi are divided into following classes on the basis of morphology of mycelium, mode of spore formation and fruiting bodies during sexual reproduction –

- Phycomycetes
- Ascomycetes
- Basidiomycetes
- Deuteromycetes.

BACKLOG MARATHON SERIES

Next Toppers

CLASSES OF FUNGI

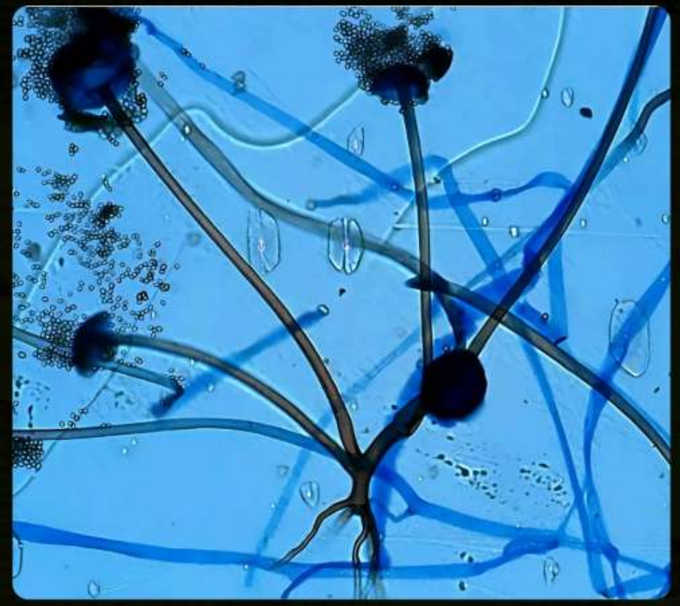
Coenocytic ⟶ multinucleated cytoplasm

Characters	Phycomycetes	Ascomycetes	Basidiomycetes	Deuteromycetes
Mycelium	Aseptate & Coenocytic	Septate & Branched	Septate & Branched	Septate & Branched
Common Name	— obligate parasite on plant	Sac fungi	Club fungi or Puffballs & Bracket	Imperfect fungi
Habitat	humid & Dry place, Aquatic (fresh), Terrestial (majority)	coprophilous (grow on dung)	tree logs, tree stamps, soil	Decomposer of litter, mineral cycling
Asexual spores	Zoospores (aquatic), Aplanospores / Sporangiospores	Conidia	Absent	Conidia

Characters	Phycomycetes	Ascomycetes	Basidiomycetes	Deuteromycetes
Sexual Spores	Zygospores	Ascospores	Basidiospores	Absent
Sexual Reproduction	Present	Present	Present	Absent
Fruiting Bodies	Absent	Ascocarp	Basidiocarp	Absent

PHYCOMYCETES

Mucor

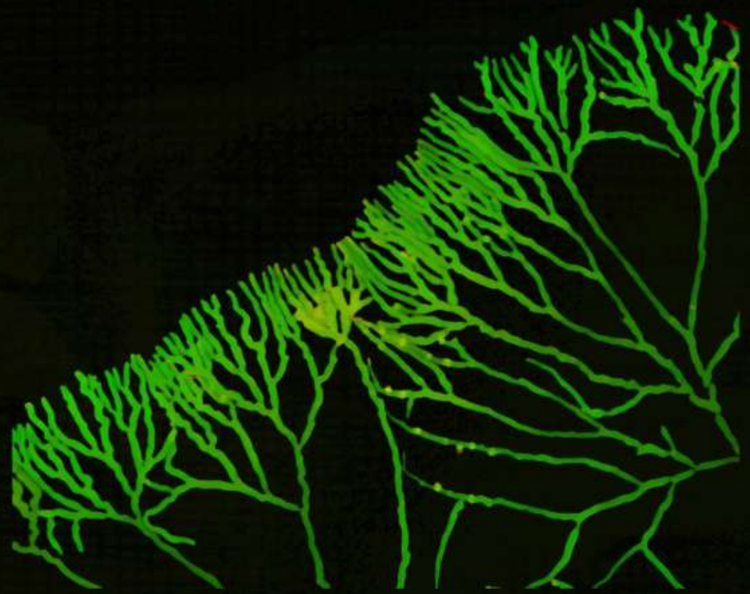


Rhizopus
(the bread mould)

Albugo (the parasitic fungi on mustard).

ASCOMYCETES

Aspergillus



Neurospora

Claviceps

Morels

Truffles

BASIDIOMYCETES

Agaricus (mushroom)

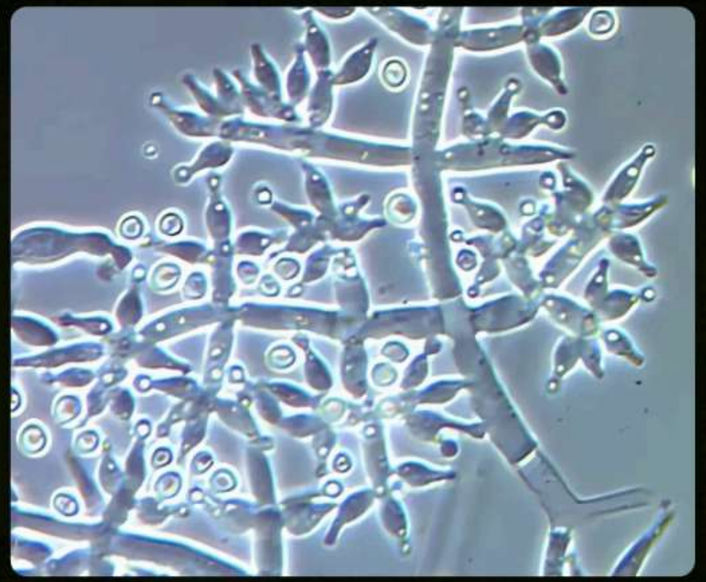
Ustilago (smut)

Puccinia (rust fungus)

DEUTEROMYCETES

Alternaria

Colletotrichum



Trichoderma

VIRUSES

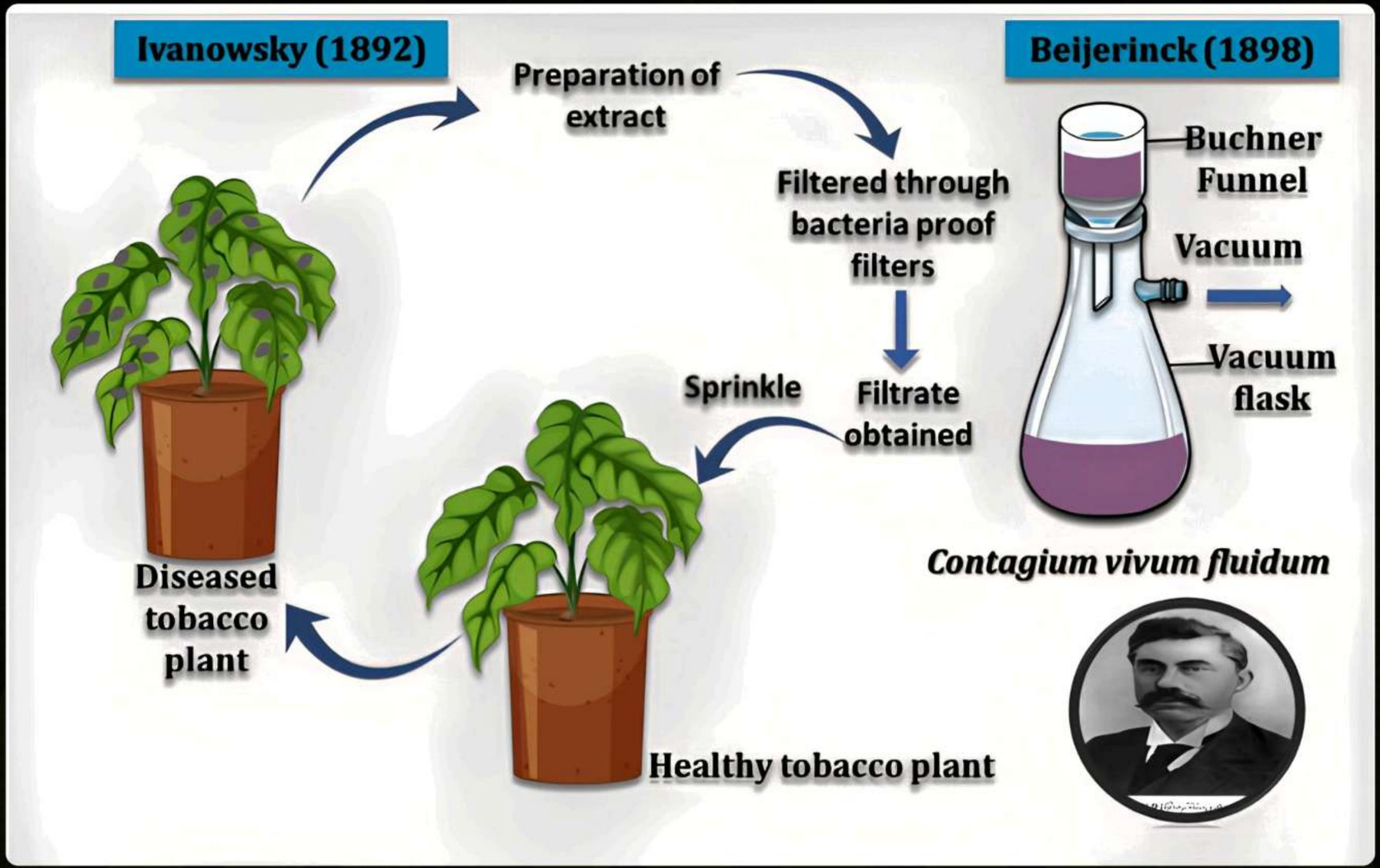
- Virus : Latin word, which means "poisonous fluid" or "venom" or "secretion"

HISTORY

- Dmitri Ivanowsky (1892) separated a microorganism from the sap of infected tobacco plant and named "TMV".
- He reported that viruses are smaller than bacteria and they can pass through the bacterial proof filters.
- M.W. Beijerineck (1898) demonstrated that the extract of theinfected plants of tobacco could cause infectionin healthy plants and called the fluid as"contagium vivum fluidum (Infectious living fluid)".
- W.M. Stanley (1935) crystallized TMV first time and Nobel prize was awarded to him.

BACKLOG MARATHON SERIES

Next Toppers



1. These are sub microscopic & non-cellular organisms.
2. They are obligate parasites.
3. They have either RNA or DNA. No virus contains both DNA and RNA.
4. They are inert outside their specific host cell in crystalline form.

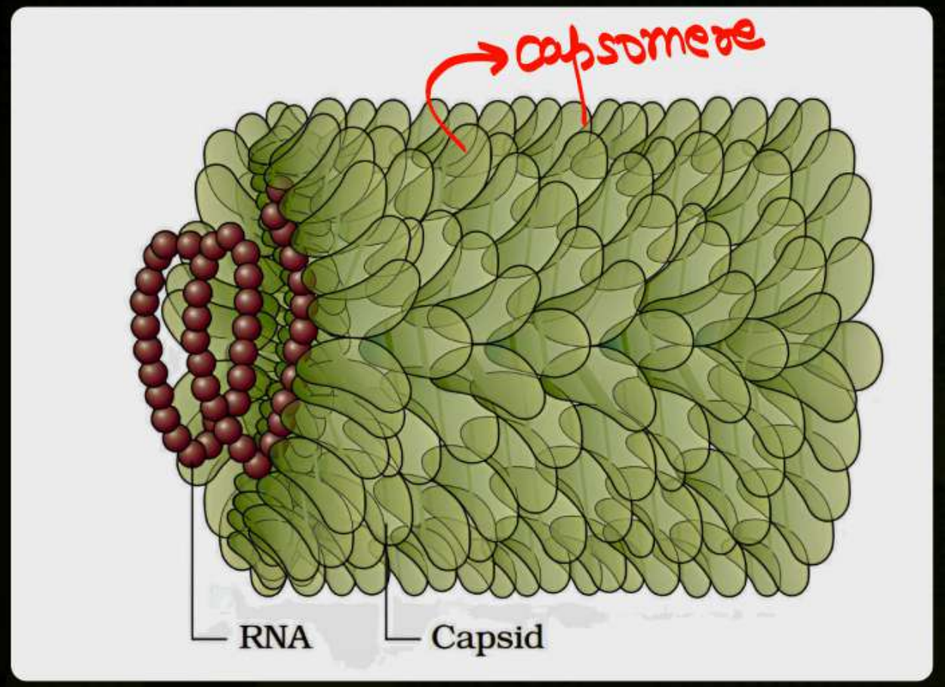
Marathon

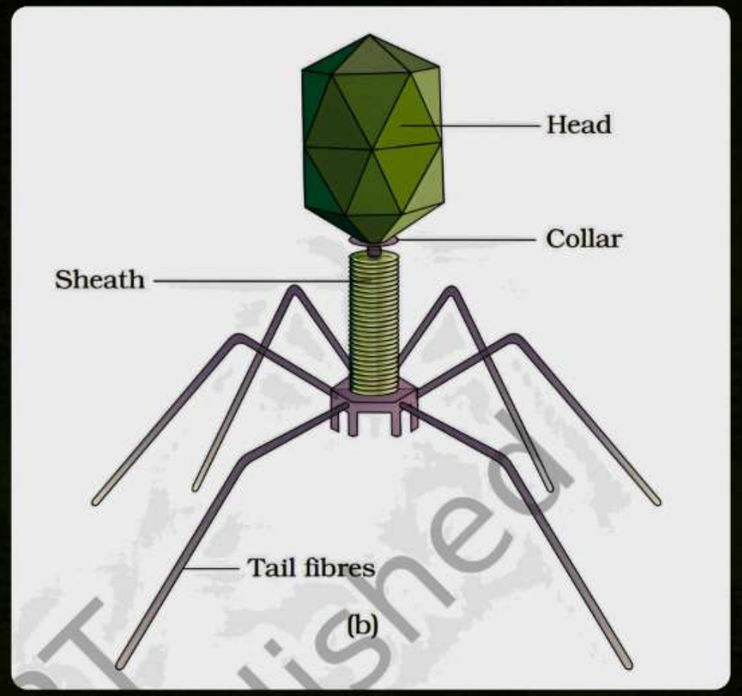
5. viruses that infect plants have single stranded RNA
6. viruses that infect animals have either single or double stranded RNA or double stranded DNA.
7. Bacterial viruses or bacteriophages (viruses that infect the bacteria) are usually double stranded DNA viruses

Marathon

STRUCTURE OF VIRUSES

- Envelope (may or mayn't be present)
- Protein coat
- Genetic material


capsomere
RNA
Capsid


Head
Collar
Sheath
Tail fibres
(b)

HUMAN DISEASE CAUSED BY VIRUS: -

1. Influenza → SSRNA
2. Mumps → SSRNA
3. Small pox → dsDNA
4. Herpes disease → dsDNA
5. AIDS → SSRNA

In plants, the symptoms can be mosaic formation, leaf rolling and curling, yellowing and vein clearing, dwarfing and stunted growth.

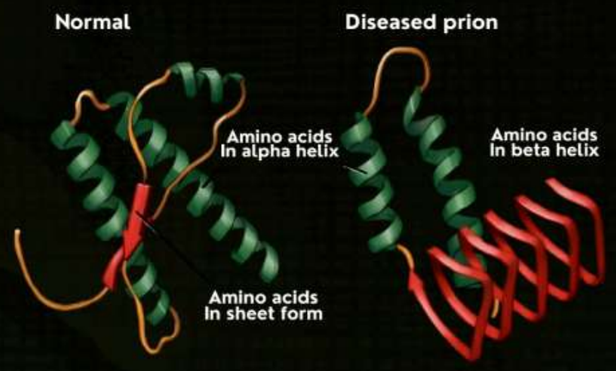
Marathon

VIROIDS

- T.O. Diener (1971) discovered some new infectious agents,which are smaller than viruses, called viroids.
- Viroids contain only very low mol. wt. RNA (ss RNA) and not the protein coat.
- Viroids cause Potato spindle tuber disease.

~~VIROIDS~~ PRIONS.

- Prions are infectious agents made only of abnormally folded proteins (no DNA or RNA).
- Prions are very small, similar in size to viruses .
- They mainly affect the nervous system, especially the brain.
- Prion diseases lead to neurodegeneration (brain tissue damage and loss of function). These diseases are usually fatal and have no effective cure.



Examples:

- Bovine Spongiform Encephalopathy (BSE): Affects cattle , Causes abnormal behavior, lack of coordination
- Creutzfeldt–Jakob Disease (CJD): Affects humans , Leads to rapid memory loss, dementia, and death.
- Humans can get a variant form (vCJD) by consuming infected beef.

LICHENS

- Lichen is composed of algae and fungi
- Lichen is a composite thalloid structure of algae & fungi.
- The algal part of lichen is called phycobiont and the fungal part is called mycobiont.
- Both algae & fungi remain in symbiotic association i.e. they are beneficial for each other.
- The algal part makes carbohydrates through photosynthesis and provides nutrition to fungus & itself.
- The fungal partner absorbs water and minerals and provides them to algal partner also.

BACKLOG MARATHON SERIES

Next Toppers

Plant Kingdom

Chapter-3

ALGAE

BRYOPHYTES

PTERIDOPHYTES

GYMNOSPERMS

ANGIOSPERMS

CLASSIFICATION OF PLANT KINGDOM

- Artificial System of Classification
- Natural System of Classification
- Phylogenetic System of Classification

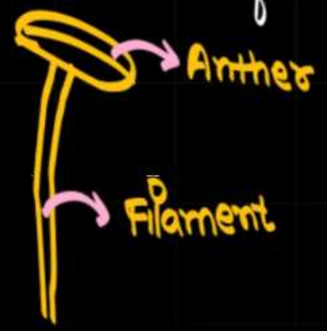
Marathon

ARTIFICIAL SYSTEM OF CLASSICATION

→ It was given carolous linnaeus.

→ classification of plants was Based on few superficial morphological characters of plants & also the Androecium number & structure.

(whorl of stamen)



Drawback:

→ Equal weightage was given to vegetative character & Reproductive (root, stem, leaves) character.

Any changes in environment will affect vegetative characters first.

NATURAL SYSTEM OF CLASSICATION

→ It was given by Bentham & Hooker

→ In this classification complete (gross) morphology of plants was considered & also

Internal features: Ultrastructure (structure of cell), Anatomy (Internal structure), Embryology, Phytochemistry.

External features + Internal features: Natural System of classification

PHYLOGENETIC SYSTEM OF CLASSIFICATION

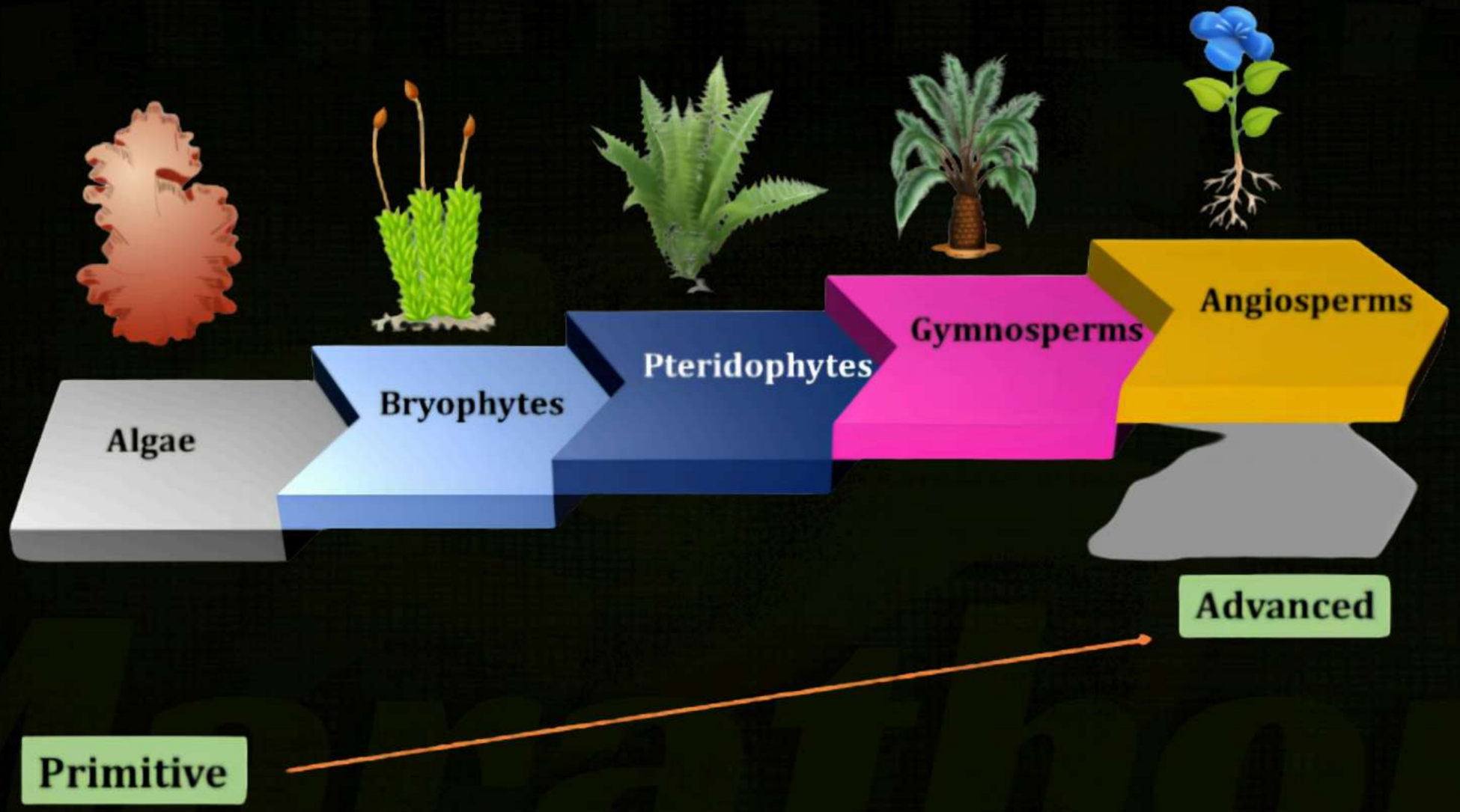
- In phylogenetic classification, the plants are arranged on the basis of their evolution (organisms belong same taxa have a common ancestor.)

→ It was given by Engler

→ most accepted classification system

BACKLOG MARATHON SERIES

Next Toppers



ADVANTAGES

Artificial System of Classification

- Easy to use
- Easy to change

Natural System of Classification

- Avoid heterogenous grouping of unrelated organism
- Indicate natural relationship among organisms

Phylogenetic System of Classification

- Clear view of organisms evolutionary relationship

Marathon

BRANCHES OF TAXONOMY

- Numerical Taxonomy or Phenetics
- Cytotaxonomy or Karyotaxonomy
- Chemotaxonomy

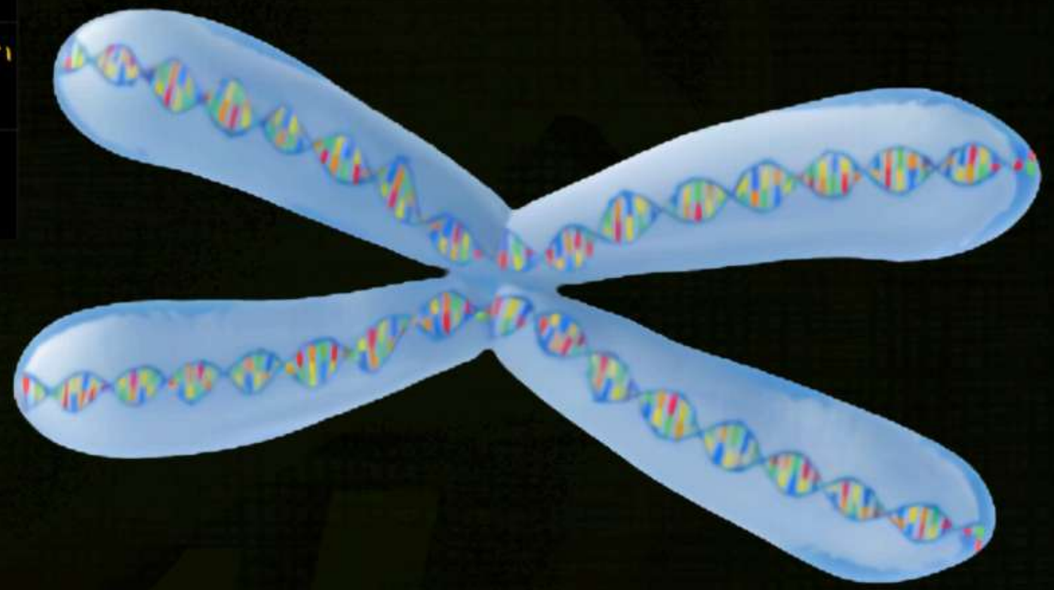
Marathon

PHENETIC CLASSIFICATION OR NUMERICAL CLASSIFICATION:

- This classification is easily carried out by using computers and it is based on all observable characteristics.
- In this classification number and codes are assigned to all the characters and the data are prepared and then processed.
- Those organisms which have maximum similarities are placed in same group.
- In this way each character is given equal importance and at the same time hundreds of characters can be considered.

CYTOTAXONOMY

Classification on the Basis of chromosome number, structure, Behaviour



Marathon

CHEMOTAXONOMY:

- It is based on the chemical constituents of plants.

- The basic chemical compounds used in chemotaxonomy are alkaloids, carotenoids, tannins, polysaccharide, nucleic acids, fatty acids, amino acids, aromatic compounds etc.

Marathon

TERMINOLOGY

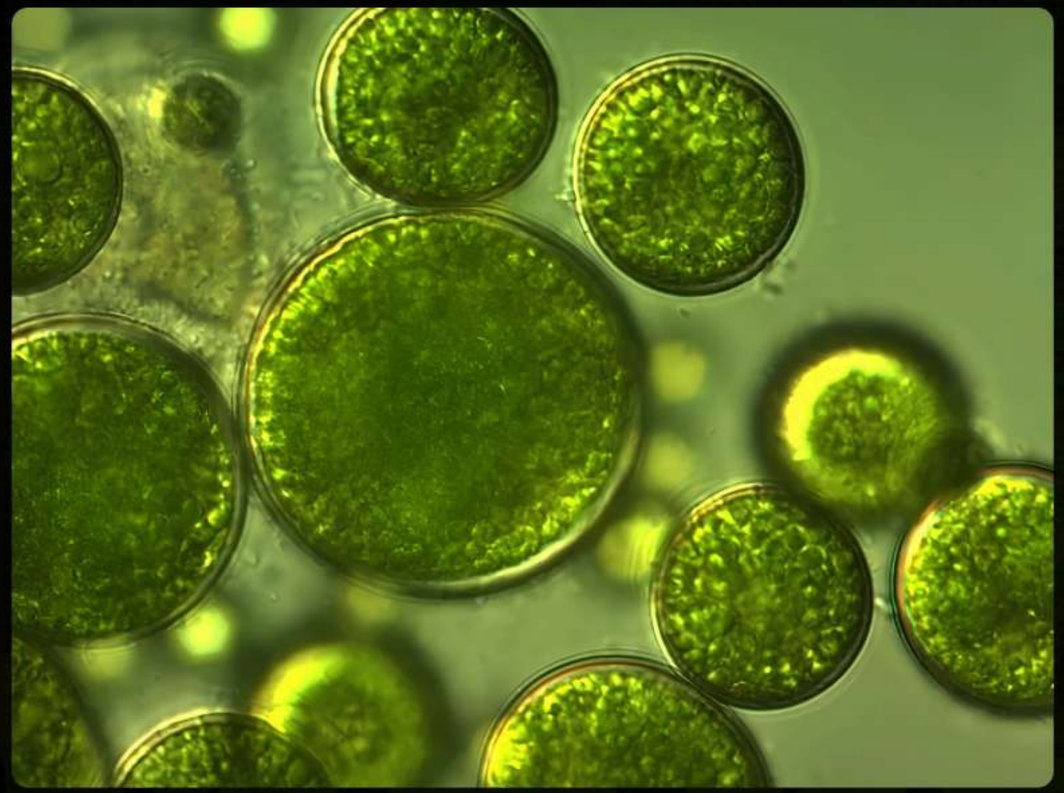
1. Embryo
   - Present (Embryophytes) — B|P|G|A
   - Absent (Non-Embryophytes) — Algae

2. Vascular System
   - Present — Tracheophytes — G|A
   - Absent — Atracheophytes — A|B|P

3. Seed Formation
   - Present — Spermatophytes — G|A
   - Absent — Aspermatophytes — A|B|P

4. Sex Organs
   - Hidden (Cryptogams) — A|B|P
   - Visible (Phanerogams) — G|A

ALGAE



INTRODUCTION

- Non- Embryophytes (No embryo Formation)
- Non Vascular (Atracheophytes)
- Thalloid (Body is not well differentiated into root, stem & leaves)
- Study of Algae is PHYCOLOGY
- Mainly - Aquatic and also occur in association with fungi (lichens) and animal (sloth bear)

GENERAL CHARACTERISTIC

- Occurence : Aquatic (Marine/ Freshwater)
- Body Organization : Cellular
  - Unicellular (Chlamydomonas)
  - Large & Massive (Kelps)
  - Colonial (Volvox)
  - Filamentous (Ulothrix & Spirogyra)

Marathon

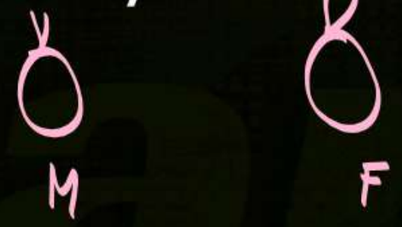
MODE OF REPRODUCTION

- Vegetative Reproduction- Fragmentation
- Asexual Reproduction - Zoospores
  - Motile
  - Biflagellated
  - Pyriform (Pear- Shaped)
  - Endogenous in Origin (Inside the covering)

SEXUAL REPRODUCTION

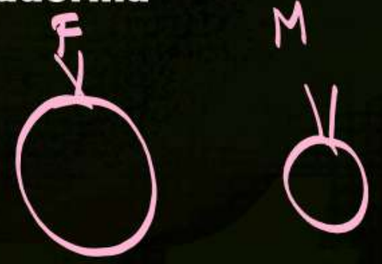
Isogamy

Eg: Ulothrix (flagellated and similar in size)
spirogyra (Non- flagellated by similar in size)



Anisogamy

Eg: Some species of Eudornia



Oogamy

Eg: Volvox, Fucus

Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
Also known as	Green Algae	Brown Algae	Red Algae
Habitat	Freshwater Salt water Brackish water (Found in shallowest depths)	Marine	Marine
Habit	Unicellular, Colonial, Filamentous	Simple, Branched, Filamentous	Multicellular, complex Body structure

Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
		Kelps (Profusely Branched, Larger forms have air bladders for Buoyancy)	
		Plant body divided into:	
		Holdfast: Attaches to Substratum	
		Stipe: Stalk like	
		Frond: Leaf - like photosynthetic organ	

BACKLOG MARATHON SERIES

Next Toppers

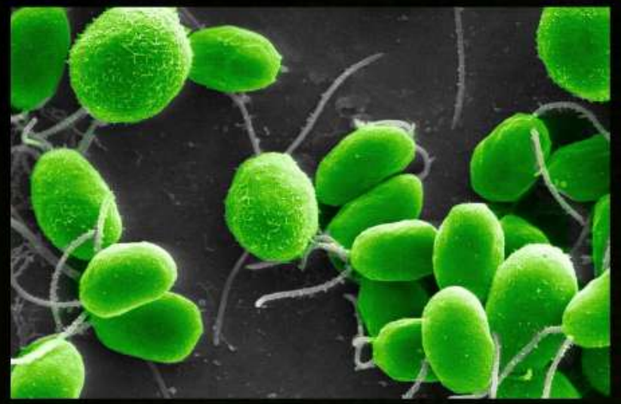
Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
Cell wall	Inner Layer - cellulose Outer Layer - Pectose	Cellulose (covered with gelatinous ALGIN) Hydrocolloids: compound that have good water holding capacity	Cellulose & Pectin Hydrocolloids- (Agar and carragen)
Pigments	chlorophyll a, b carotene Xanthophyll	chlorophyll a, c carotenoids Xanthophylls	chlorophyll a, d r- phycoerythrin r- phycocyanin

Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
Colouration	Green	Olive green to shades of brown (Due to xanthophyll - fucoxanthin)	Red colour
Reserve food material	Storage body - Pyrenoids (Starch & Proteins. Protein granule surrounded by starch) in chloroplast	Complex carbohydrates Laminarin or mannitol	Floridean Starch (Structurally similar to Amylopectin & Glycogen)
Vegetative Reproduction	Fragmentation	Fragmentation	Fragmentation

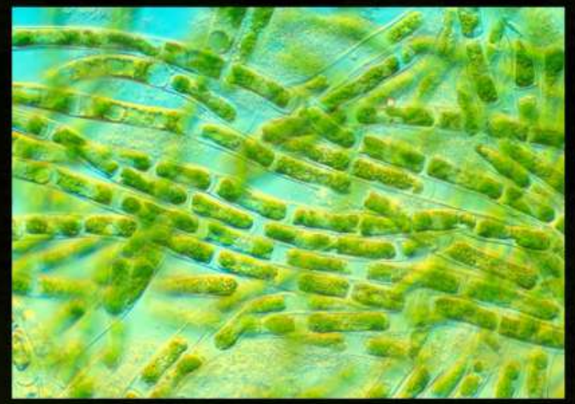
Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
Asexual Reproduction	Zoospores, Motile Equal, Apically placed flagella	Zoospores, Motile , Biflagellate, Unequal, laterally placed flagella	Non-motile spores
Sexual Reproduction	Isogamy, Anisogamy, Oogamy	Isogamy, Anisogamy, Oogamy	Oogamy (Gametes non-motile)

Marathon

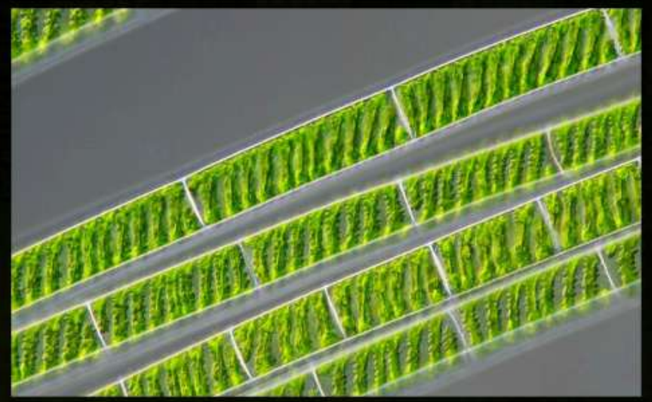
Characters	Chlorophyceae	Phaeophyceae	Rhodophyceae
Examples	Chlamydomonas	Fucus	Polysiphonia
	Ulothrix	Laminaria	Porphyra (Edible)
	Spirogyra	Ectocarpus	Gracilaria (Extraction of agar)
	Chara	Dictyota	Gelidium
	Volvox (Rolling algae)	Sargassum (Gulf weed)	-



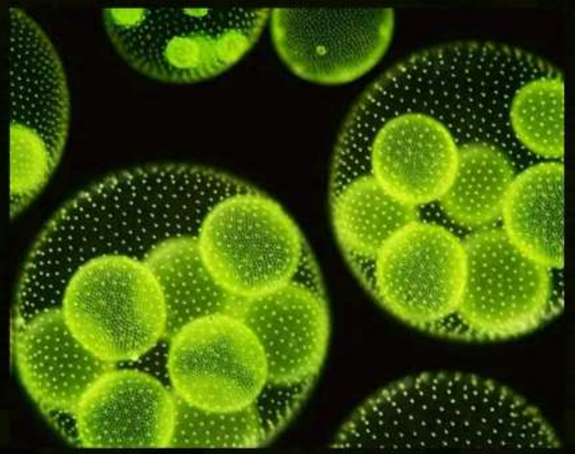
Chlamydomonas



Ulothrix



Spirogyra



Volvox (Rolling algae)

Chara

Fucus

Lamiinaria

Dictyota

Sargassum(Gulf weed)

Ectocarpus

Polysiphonia

Porphyra

Gracillaria

Geliidium

BRYOPHYTES

INTRODUCTION

- Simplest & primitive land plants.
- Habitat : Damp and Shady Ex: Mosses and Liverworts
- Amphibians of Plant Kingdom
- First Embryophytes
- Atracheophytes
- Aspermatophytes
- Cryptogams

Marathon

BRYOPHYTES

- Liverworts
  - Riccia
  - Marchantia
- Mosses
  - Funaria
  - Sphagnum
  - Polytrichum

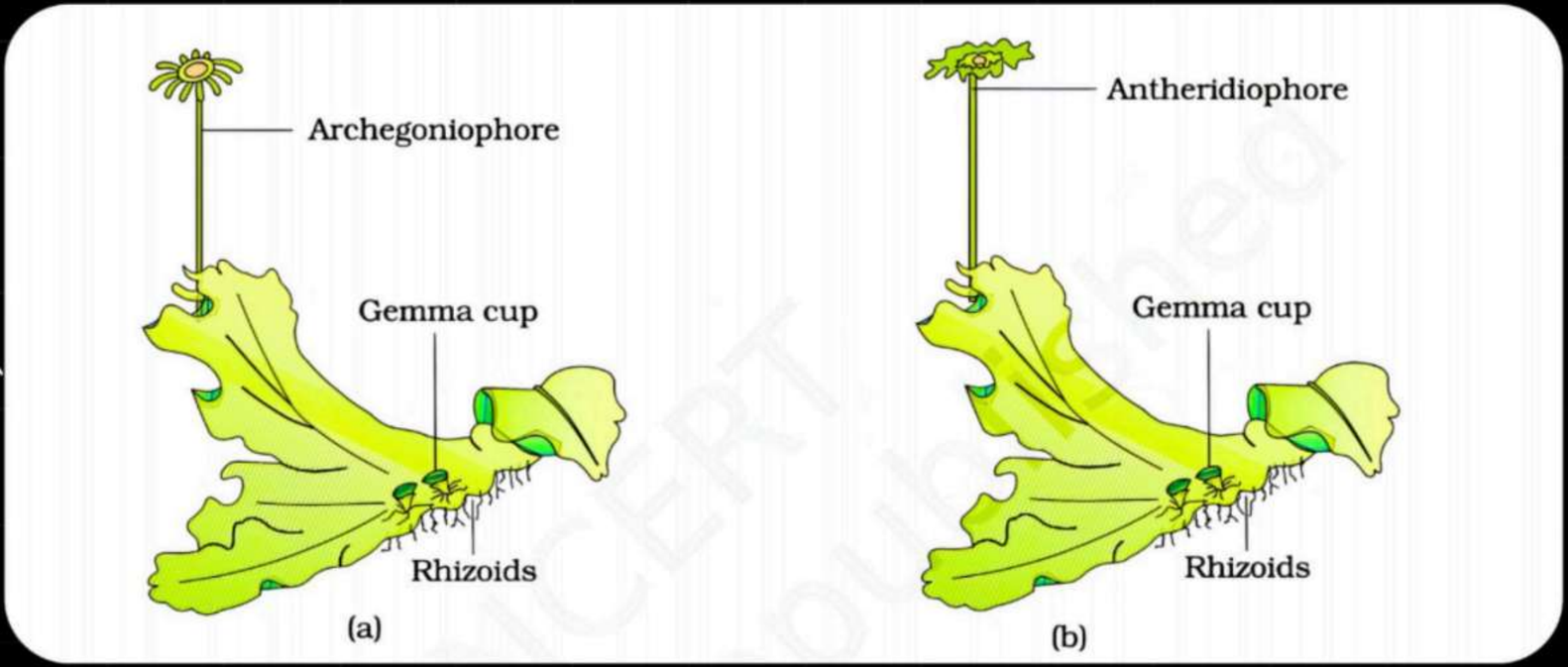
Marathon

LIVERWORTS: MARCHANTIA

→ It has the different plant bodies.

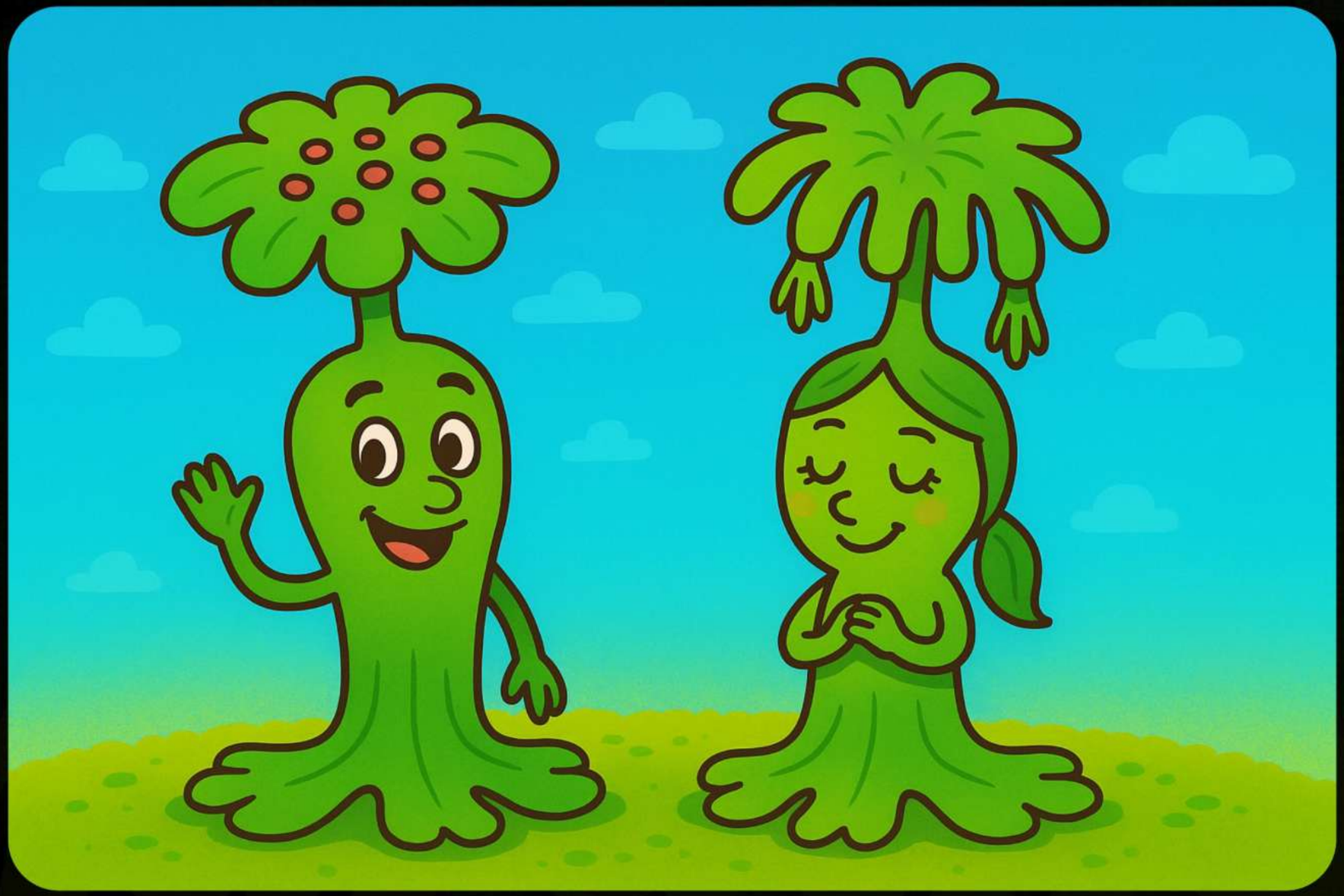
Dioecious
- → male structure is present on one plant Body
- → Female structure is present on different plant Body.

→ Rhizoids : Root like structure
Unicellular & Unbranched
(help in attachment to Substratum (Rock, soil))

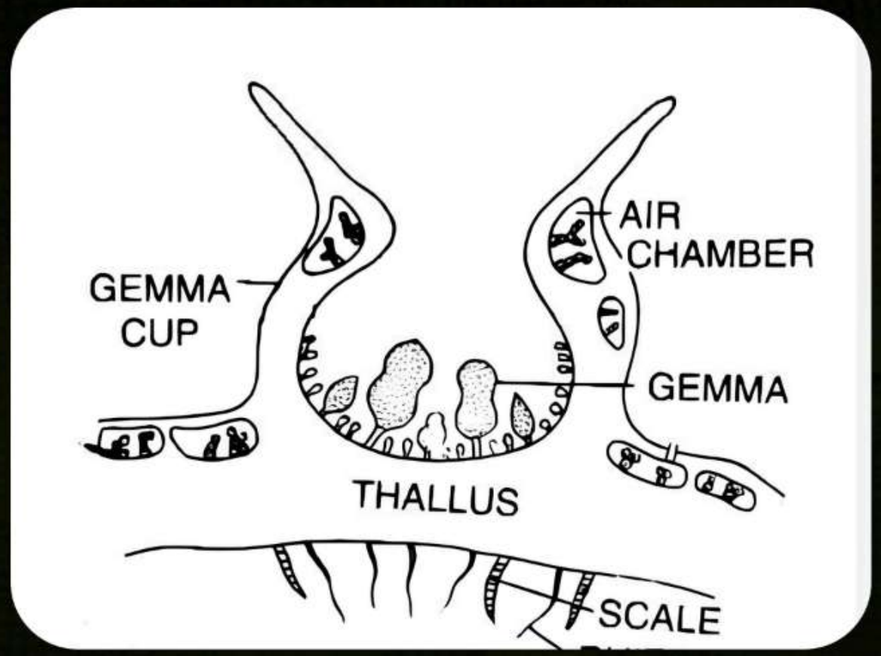


Thalloid: Body is not well differentiated into root, stem & leaves.

Female Sex Organ →	Archegonia
Male Sex organ →	Antheridia



LIVERWORTS: ASEXUAL REPRODUCTION

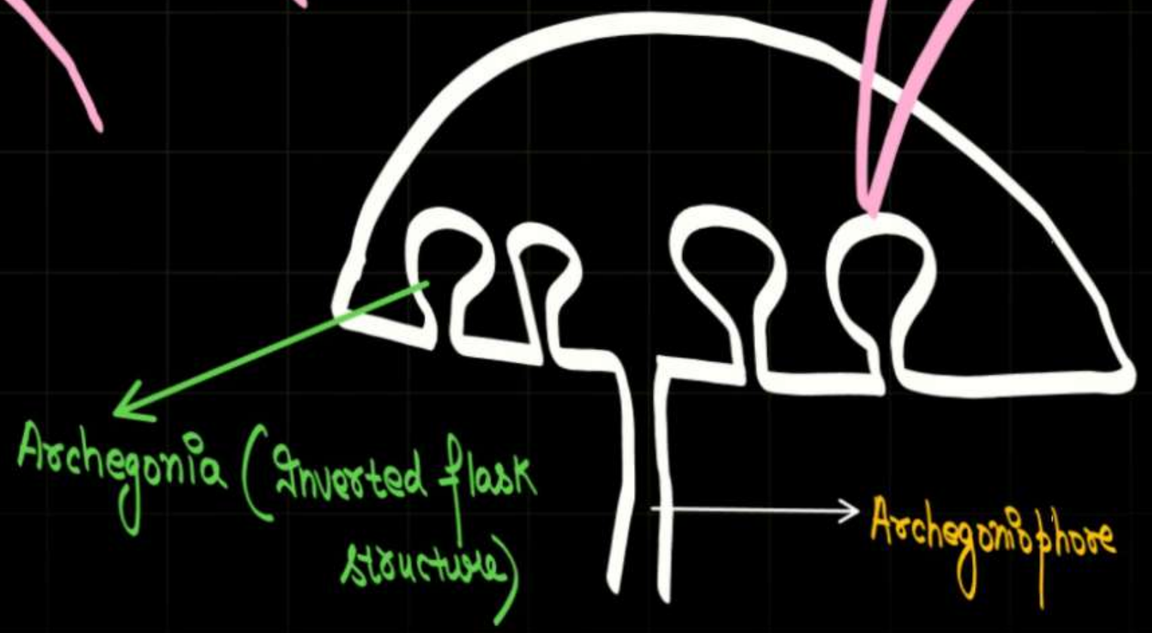


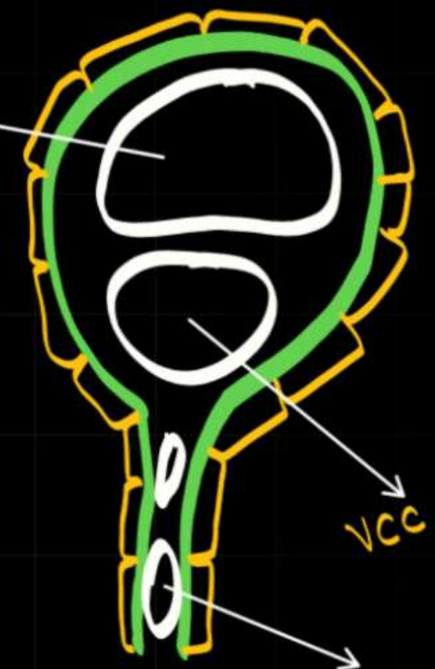
Gemma Spores ⟶ Asexual Spores (Asexual Reproduction)
(They are green in colour, multicellular)

प्रारंभ BATCH

Next Toppers

BRYOPHYTES: ARCHEGONIUM

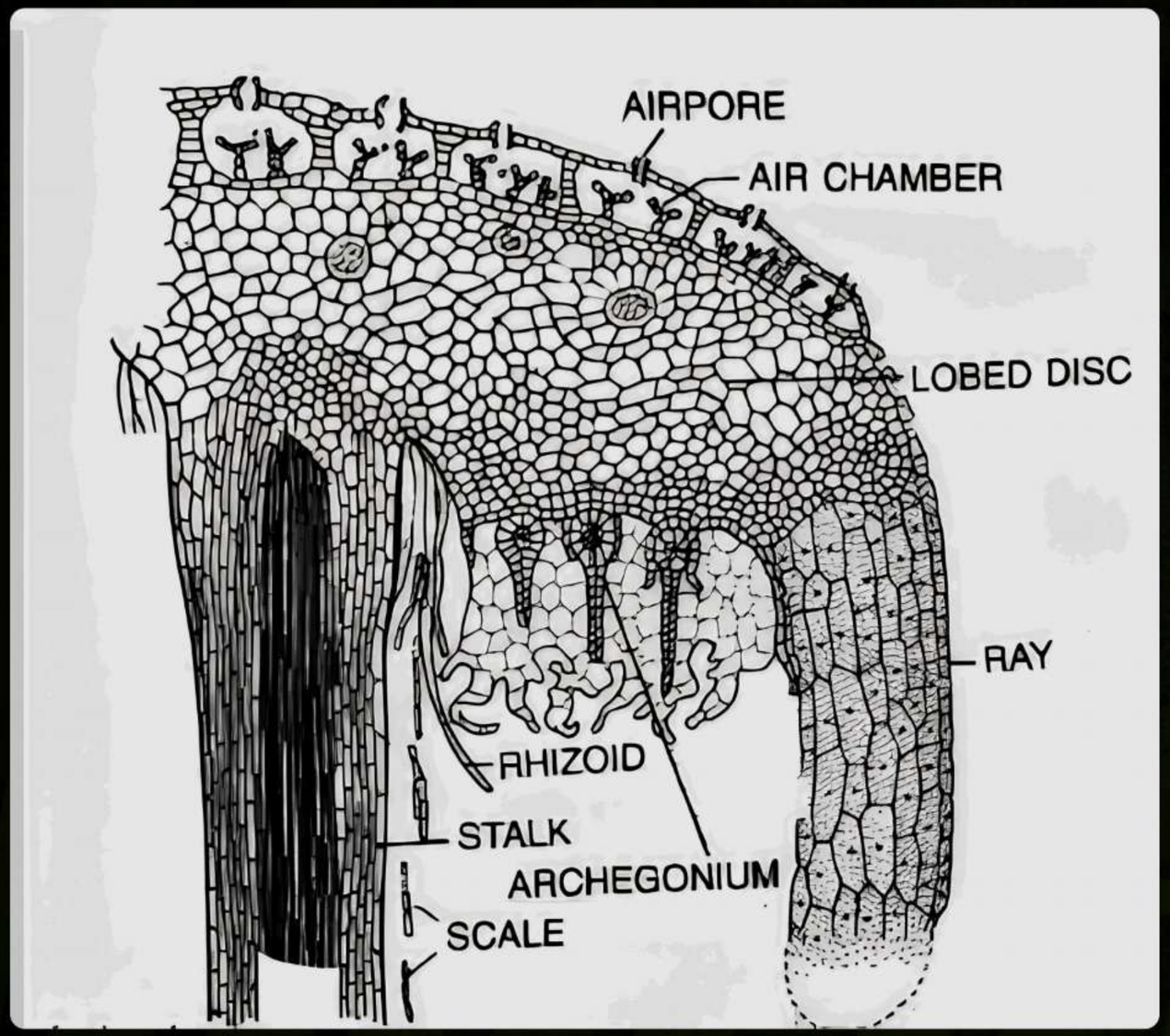




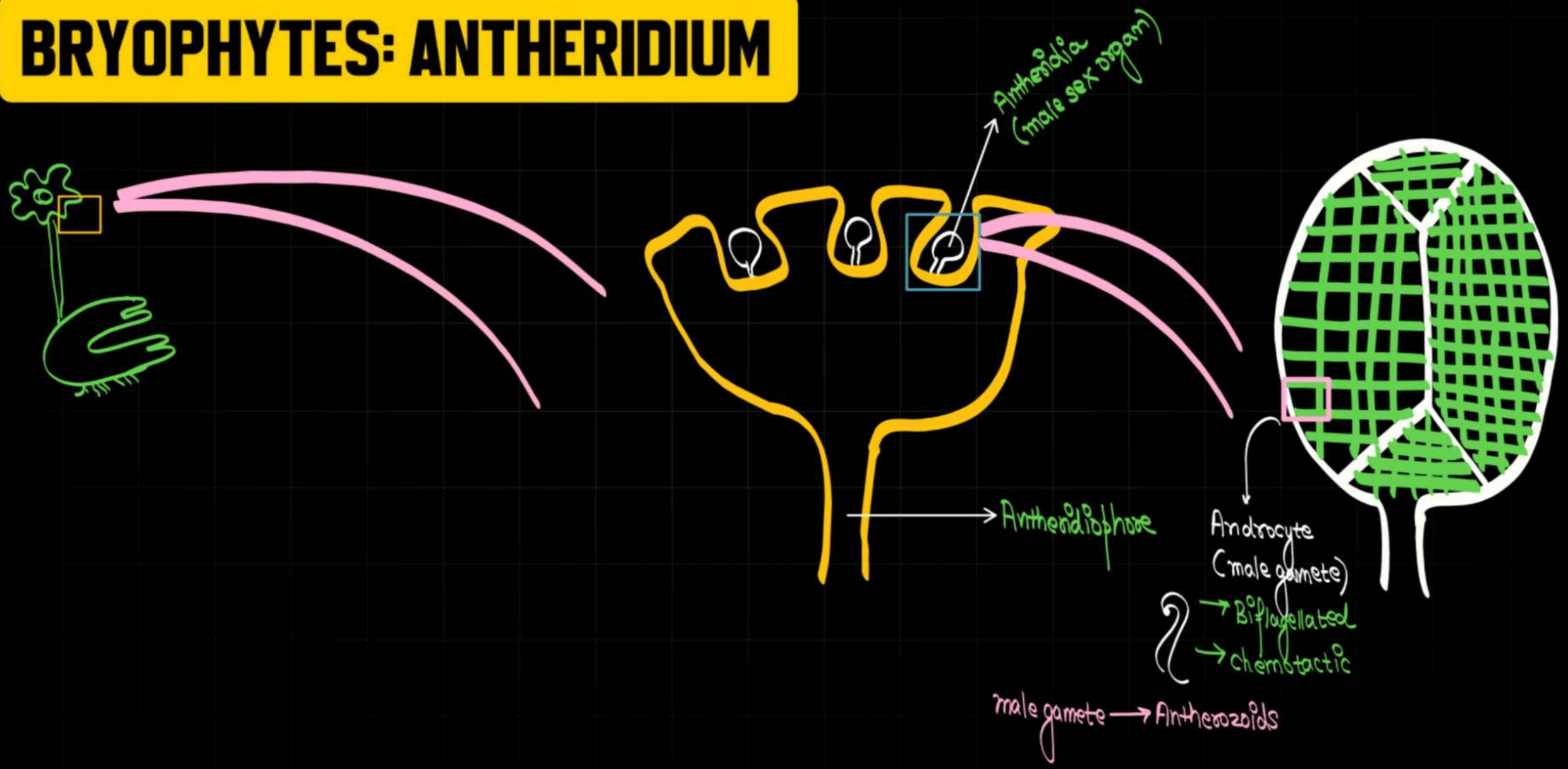
Archegonia (Female sex organ)

VCC → Ventral canal cell

NCC → Neck canal cell


AIRPORE
AIR CHAMBER
LOBED DISC
RAY
RHIZOID
STALK
ARCHEGONIUM
SCALE

BRYOPHYTES: ANTHERIDIUM



LIFECYCLE IN PLANT KINGDOM

Gametophyte → carries gametes
(haploid) (n)

Sporophyte → produce spores
(Diploid) (2n)

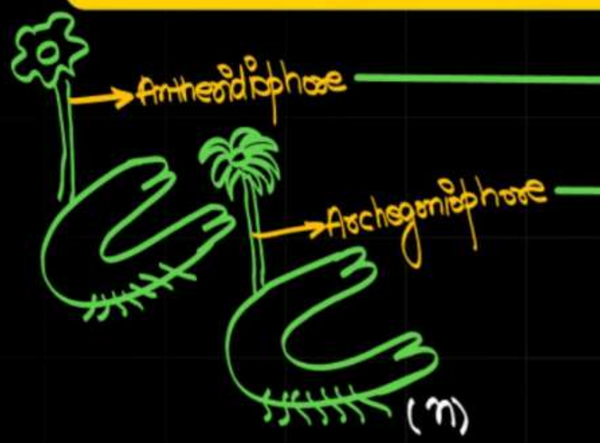
Haplo-Diplontic
50 - 50
(gametophyte – sporophyte)

Haplontic
(Gametophyte Dominant)

Diplontic
(Sporophyte Dominant)

BACKLOG MARATHON SERIES
Next Toppers

LIFECYCLE: MARCHANTIA



→ Antheridiophore → Antheridia (male sex organ)

→ Archegoniophore → Archegonia (female sex organ)

→ Antherozoids (male gamete) (n)

→ egg (female gamete) (n)

Syngamy → Zygote (2n)

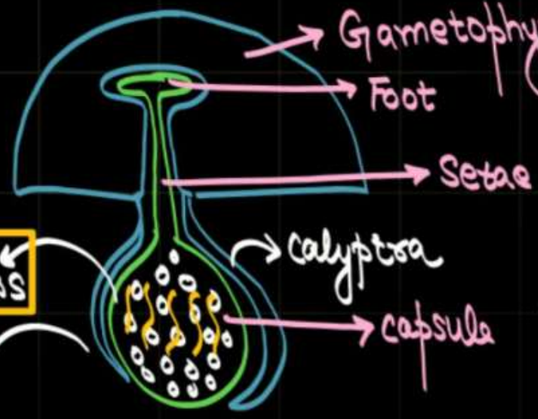
Zygote (2n) → mitosis → Embryo (2n) → young sporophyte (2n)

→ Dioecious

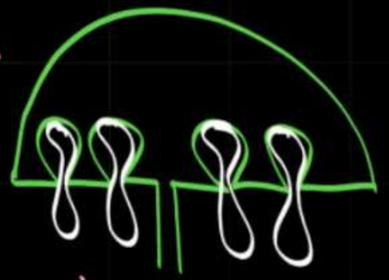
→ Rhizoids → Unicellular, Unbranched

→ Haploid → Gametophyte

→ Thalloid



(helps in Dispersal of spores during unfavourable condition) Elaters



mature sporophyte (2n) → SMC (spore mother cell) → meiosis → Spores (n) → Germinate

→ Sporophyte : Dependant on Gametophyte

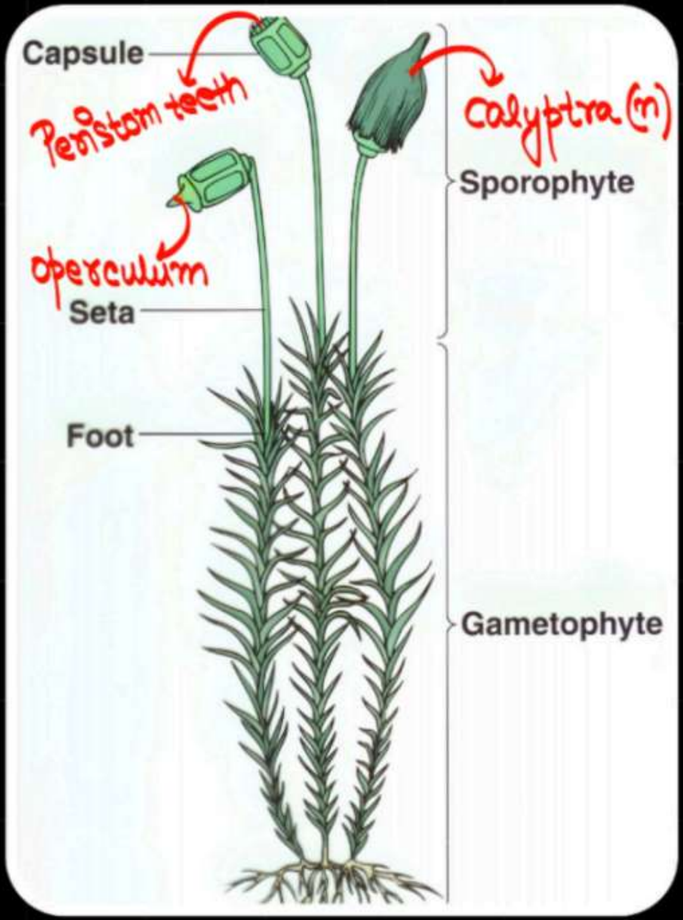
→ All are Homosporous (same kind of spores)

→ Haplo-Diplontic lifecycle

Marathon

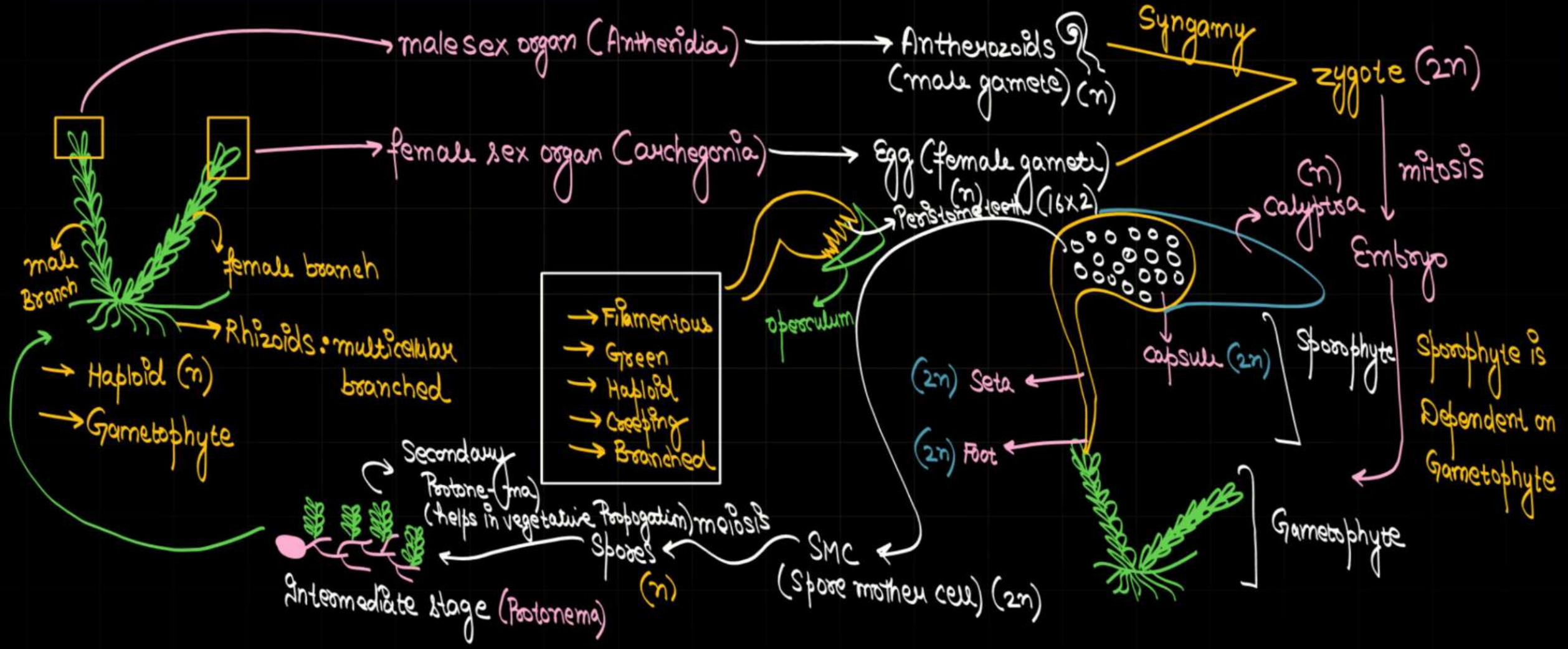
FUNARIA

Erect, They don't have true root, stem & leaves



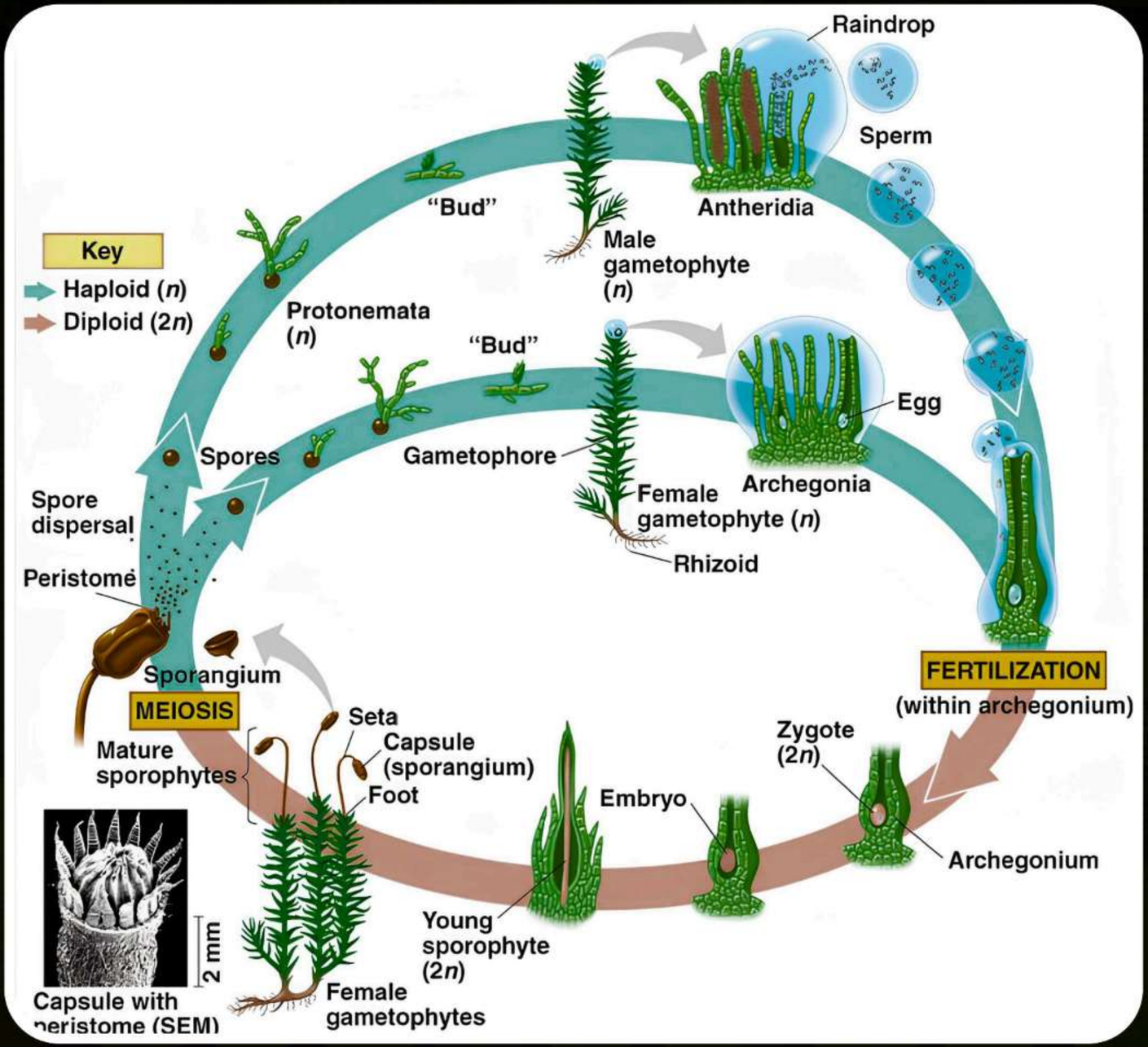
BACKLOG MARATHON SERIES
Next Toppers

LIFECYCLE : FUNARIA



BACKLOG MARATHON SERIES

Next Toppers



examples: Funaria, Sphagnum (peat moss)

Polytrichum

PTERIDOPHYTE

- Tracheophytes (Vascular System Present)
- Aspermatophytes (no seed formation)
- Cryptogams (sex organs → hidden)
- Vascular amphibians or Reptiles of Plant Kingdom

- They have true root, stem & leaves

macrophyll : ferns
microphyll : Selaginella

प्रारंभ BATCH
Next Toppers

LIFECYCLE : PTERIDOPHYTES

Sorus (group of sporangium) → Sorus (singular)

Sori (Plural)

Sorus → SMC (Spore mother cell) (2n) —meiosis→ Spores (n)

Spores (n) → microspores, megaspores

microspores → germinate

Sporophyll

→ Haploid
→ Heart Shaped
→ Multicellular
→ Independent
→ Inconspicous

♂ ♀ → Rhizoids

Gametophyte (n)

male sex organ → Antheridium → (n) Antherozoids

female sex organ → Archegonium → Egg (n)

Syngamy: Egg (n) + (n) Antherozoids → Zygote (2n)

Zygote (2n) → Embryo

→ True root, stem & leaves are present
→ Main Plant Body: Sporophyte
→ Diploid (2n)

Homosporous (most of the pteridophytes) → Same type of spores → Monoecious

Heterosporous (eg. Selaginella & Salvinia) → Different type of spores
- microspores (represent male spore) → male gametophyte
- megaspores (represent female spore) → female gametophyte

Dioecious

Precursor of seed habit → shows → Heterosporous species

Selaginella

Salvinia

Equistem

Adiantum

Marsilea

Dryopteris

PTERIDOPHYTES

- Pteridophytes are further classifies into four classes:
  - Psilopsida (Psilotum)
  - Lycopsida (Selaginella , Lycopodium)
  - Sphenopsida (Equistem)
  - Pteropsida (Dryopteris, Pteris, Ferns and Adiantum)

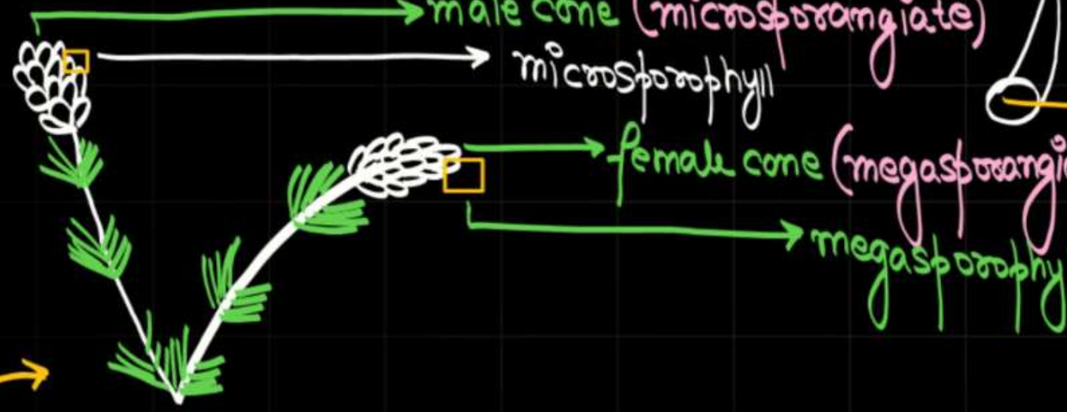
GYMNOSPERMS

GYMNOSPERMS

1. Archegoniates : contains archegonia
2. Spermatophytes : Bear seeds (phanerogams)
3. Heterosporous
4. Diplontic Lifecycle
5. Show xerophytic adaptation
   a. Thick cuticle (a protective, waxy, and non-cellular layer covering the epidermis of aerial plant organs like leaves and young shoots)
   b. Well- developed root
   c. Possess vascular system
   d. Sunken stomata

Marathon

GYMNOSPERMS: LIFECYCLE



male cone (microsporangiate)
microsporophyll
female cone (megasporangiate)
megasporophyll

microsporangium → MMC (Microspore mother cell) —meiosis→ microspores (n) → Pollen grain (male gametophyte) → Released by wind

megasporangium → MMC (Megaspore mother cell) → female gamete (n)

wind pollination → Anemophily

male gametes (n)

Syngamy

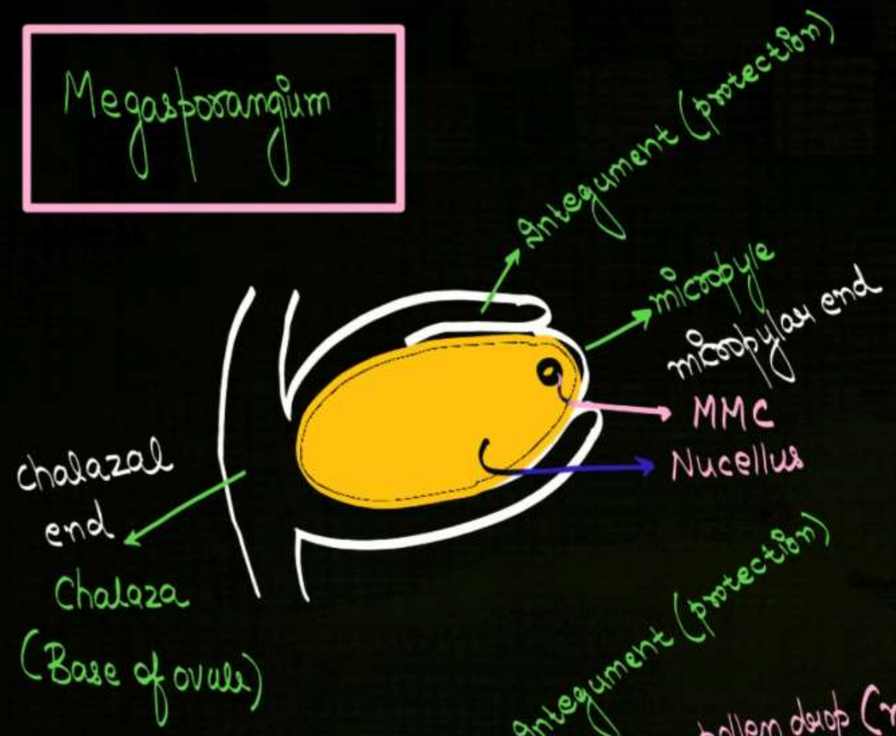
(2n) Zygote → Embryo → Seed → germinate → Sporophyte → 2n

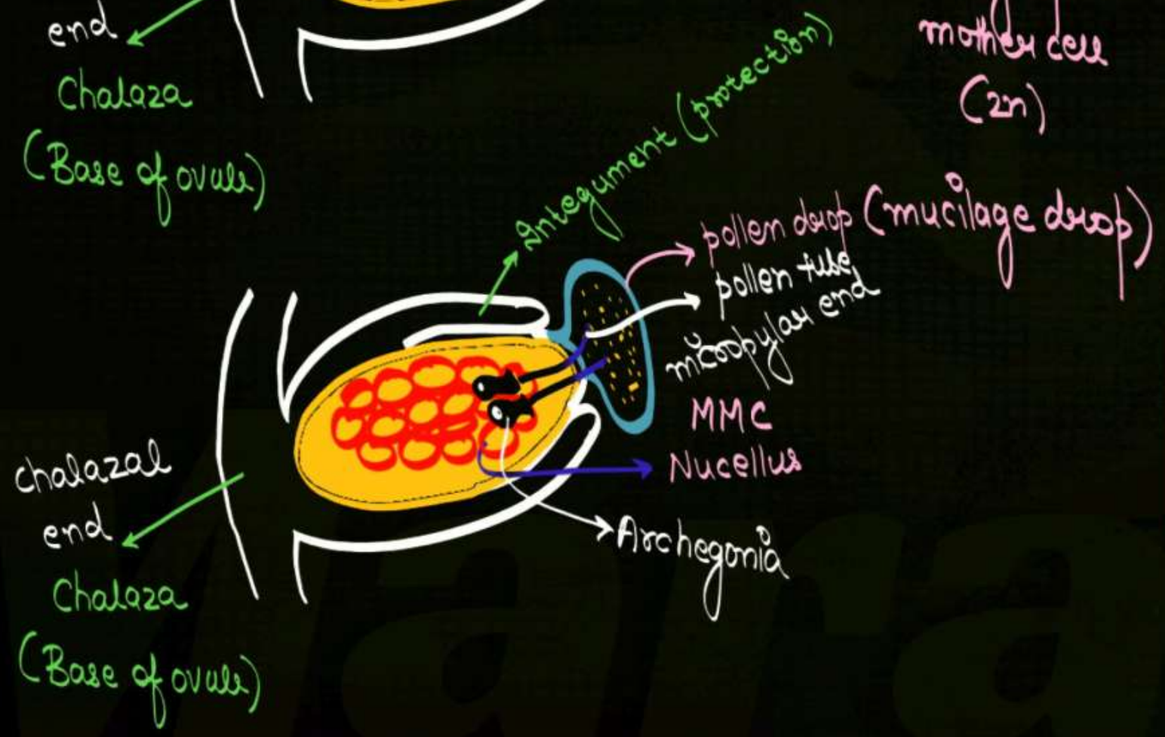
- Thick cuticle
- Sunken stomata
- well developed Vascular system.

BACKLOG MARATHON SERIES

Next Toppers

Megasporangium





MMC → (meiosis) → M, (n) c

Megaspore mother cell (2n)

megaspore towards chalazal end degenerates

→ only one functional megaspore → (mitosis) → mass of cell (Endosperm) (n)

Pre-fertilization event

Siphnogamy : formation of pollen tube

Endosperm → female gametophyte

Cycas

Ephedra

Pinus

Gingkobiloba

Sequoia

Gnetum

Characters	Cycas	Pinus
Plant Body	Dioecious, Short	Monoecious, Tall
Root	(No root hair & root cap) Coralloid roots N_2 fixation (Symbiotic association with Anabena)	(↑ absorption of H_2O & minerals) Tap roots with mycorrhiza Symbiotic association with fungi
Stem	Unbranched	Branched

Characters	Cycas	Pinus
Leaves	Pinnately compound	Scale leaves & needle leaves
Vegetative Propagation	Buds and Bulbs	Absent
Cones	Male cone - large Female cone - loosely	Male cone - small Female cone - compact

Characters	Cycas	Pinus
Microsporophyll	Numerous sporangia on abaxial surface	2 sporangia on abaxial surface
Antherozoid	Large and Motile	Non-motile
Female Gametophyte	Endosperm (2-3 archegonia)	Endosperm (2-8 archegonia)

Characters	Cycas	Pinus
Pollination	Wind (Anemophilous)	Wind (Anemophilous)

BACKLOG MARATHON SERIES

Next Toppers

Animal Kingdom

Chapter-4

Animals

General Features

→ Multicellular (many cells)

→ Heterotrophs (Holozoic nutrition)

→ Eukaryotic (membrane bound organells & well-defined nucleus)

PHYLUM

- Porifera
- Coelenterata/ Cnidaria
- Ctenophora
- Platyhelminthes
- Nemathelminthes /Aschelminthes
- Annelida
- Arthropoda
- Mollusca
- Echinodermata
- Hemichordata
- Chordata

BASIS OF CLASSIFICATION

01 Level of organisation

02 Symmetry

03 Germinal (Embryonic) layer

04 Coelom (Body cavity)

05 Metamerism

06 Notochord!

07 Embryonic development

08 Body plan

- Cellular level → In sponges, cells are arranged as loose cell aggregates and division of labour occurs among cells (Tissues absent) ex : Porifera
- Tissue level → In coelenterates and ctenophores, cells performing the same function are arranged into tissues
- Organ level → In platyhelminthes tissues are grouped together to form organs.
- Organ system level → In higher animals, organs further organise to form organ systems. e.g. Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata, Chordata

Marathon

SYMMETRY

- It is the arrangement of similar body parts on 2 sides of main axis of the body. Animals on the basis of symmetry are of three types

Marathon

TYPES OF SYMMETRY

- Asymmetry
- Radial Symmetry
- Bilateral Symmetry

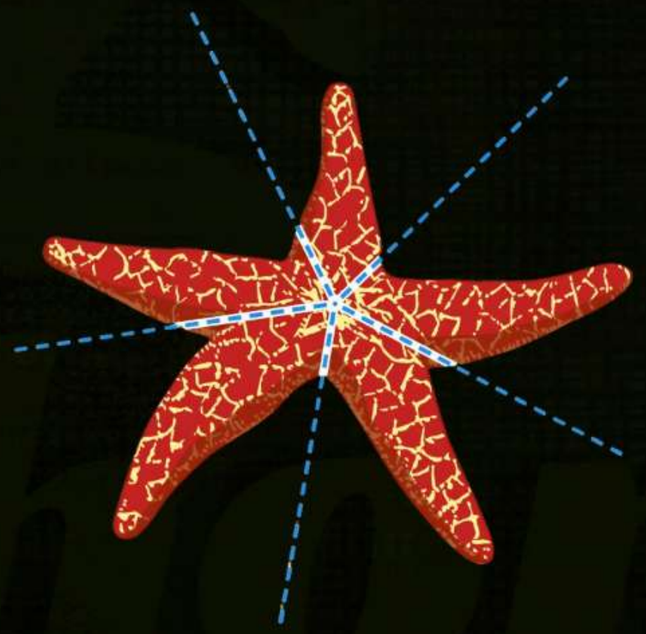
ASYMMETRY

- Body cannot be divided into 2 similar parts.
- e.g. Most poriferans

Marathon

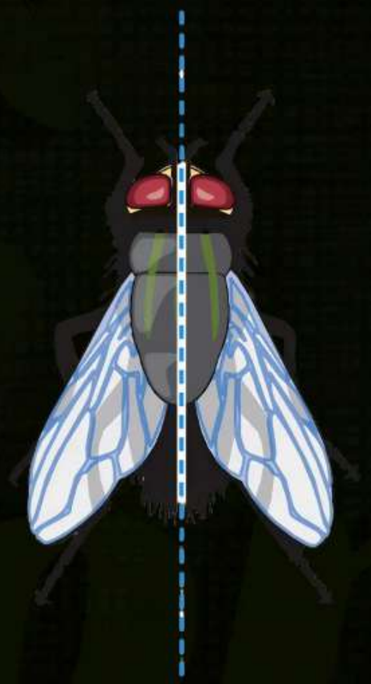
RADIAL SYMMETRY

- When any plane passing through the central axis of the body divides the organism into two identical halves
- e.g. some Poriferans, Cnidarians, Ctenophores and adult Echinoderms.



BILATERAL SYMMETRY

- Body can be divided into identical right & left halves in only one plane.
- e.g. Platyhelminthes to Chordata (Larvae of Echinoderms).



GERMINAL LAYERS

Diploblastic

If two germ layers are present

- Eg: Cnidaria to ctenophora

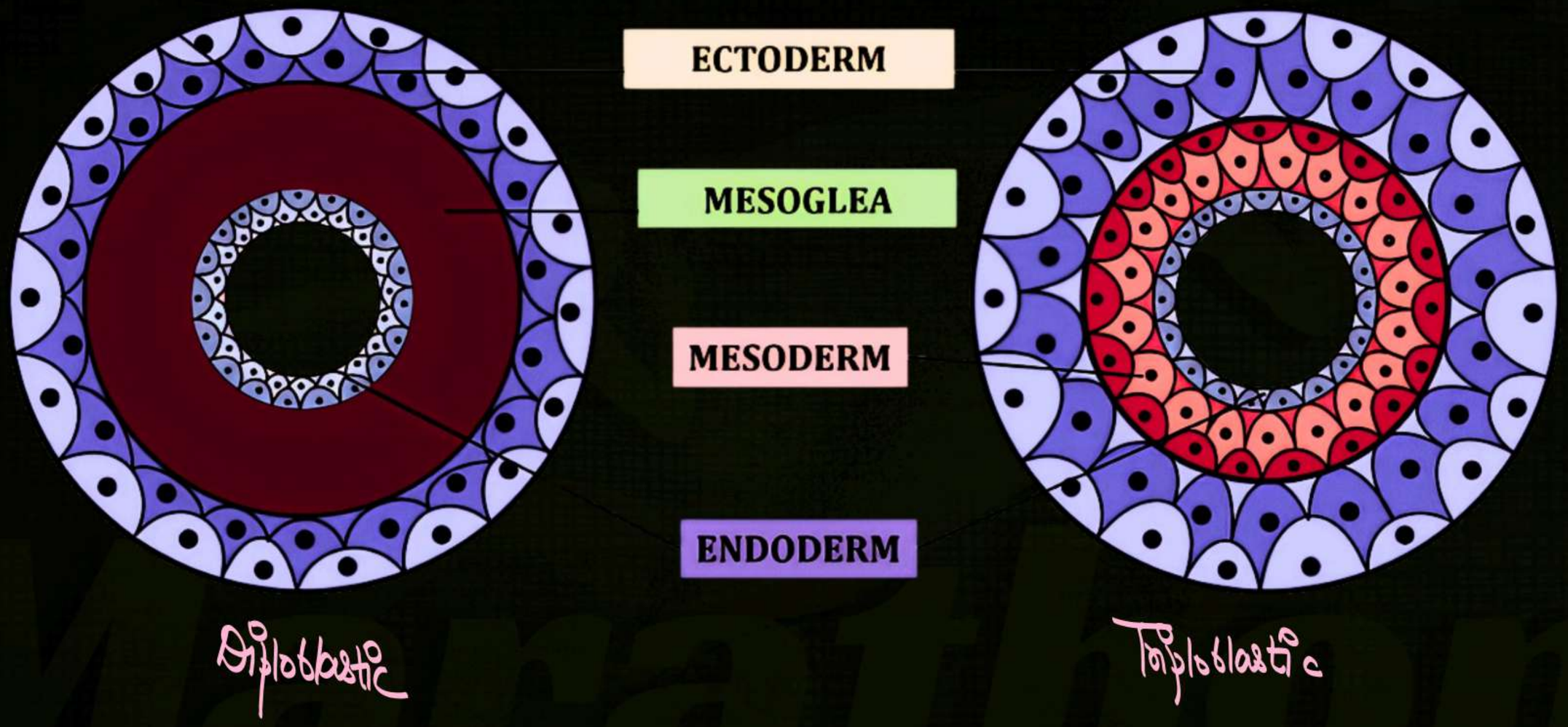
Triploblastic

Three germ layers are present
- Ectoderm
- Endoderm
- mesoderm

- Eg: Platyhelminthes to Chordata

BACKLOG MARATHON SERIES

Next Toppers

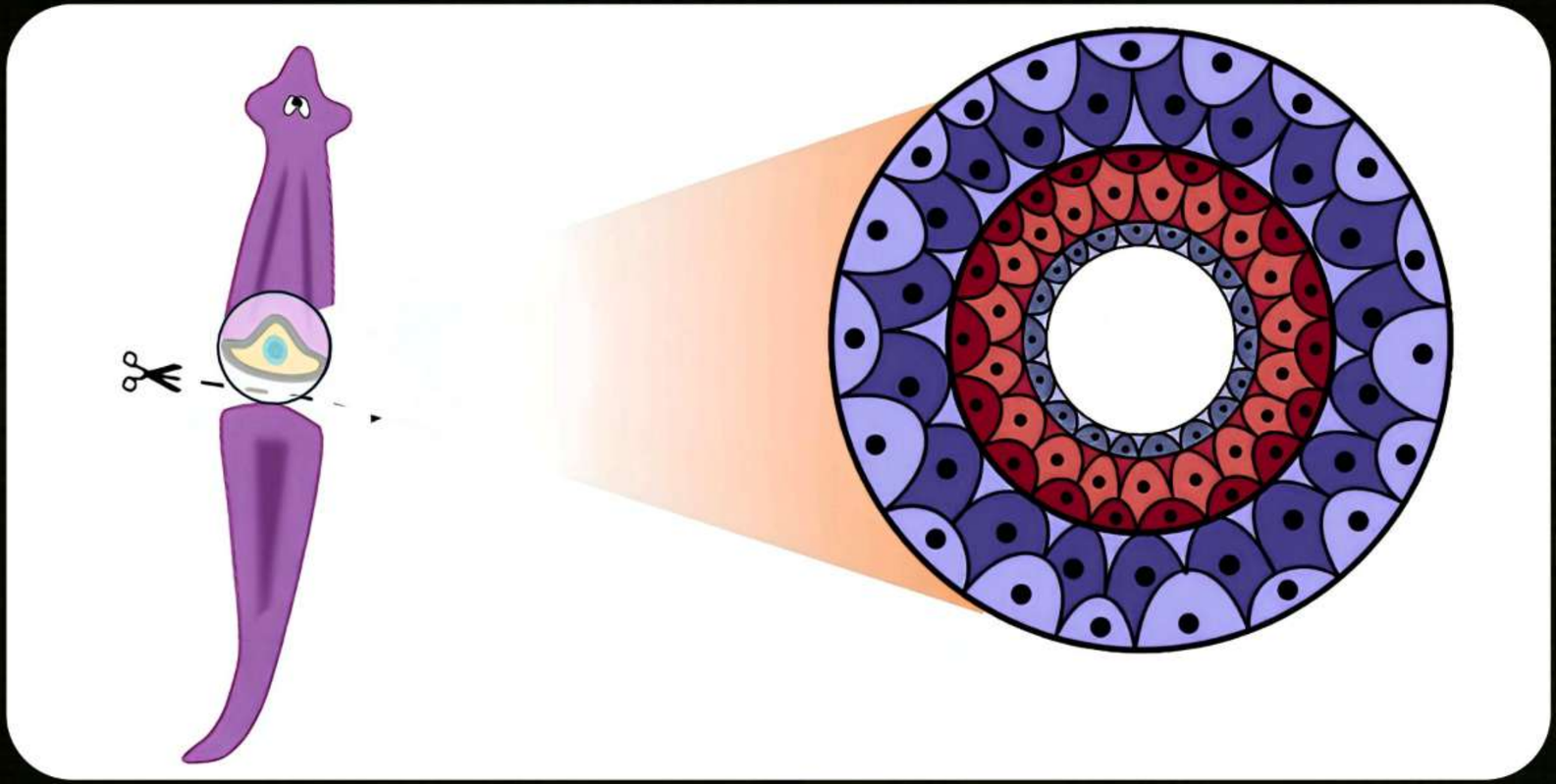


BODY CAVITY OR COELOM

- Presence or absence of a cavity between the body wall and gut wall is very important in classification.

Marathon

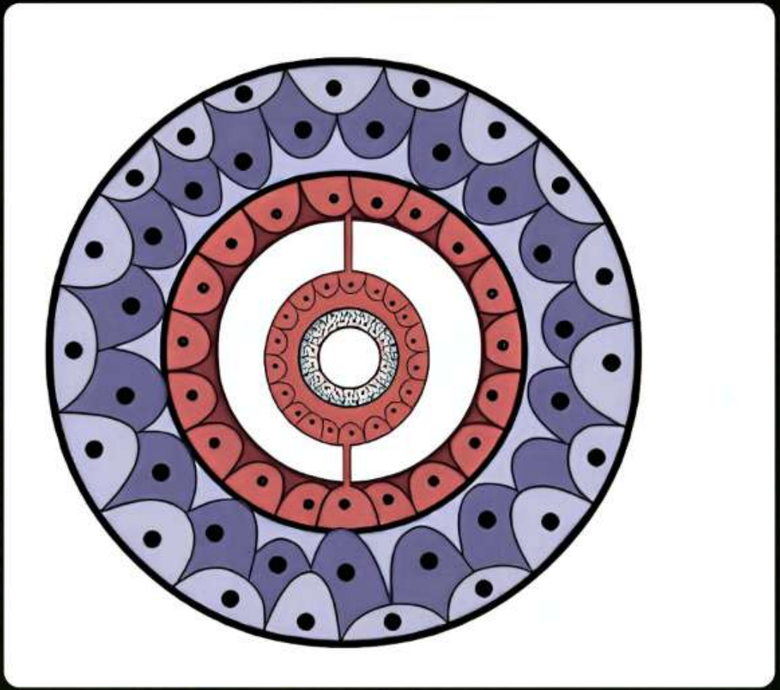
(a) Acoelomate :- Body cavity is absent. e.g, Porifera to Platyhelminthes.



(b) Pseudo-coelomate (False coelomate) Body cavity is not lined by mesoderm.

(c) Coelomate (True coelom) :- Coelom is lined by mesoderm, and filled with coelomic fluid e.g. Annelida to Chordata.

Body cavity is formed by splitting of mesoderm.

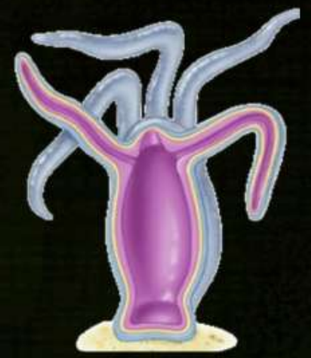


BODY PLAN

Cell-aggregated type

e.g. Porifera

Blind sac



Only single opening to the outside of the body that serves as both mouth and anus.
e.g, Coelenterates to Platyhelminthes

Tube with in tube

Found in those animals having complete digestive tract i.e. with separate openings mouth and anus.
e.g, Aschelminthes to chordates.

SEGMENTATION

Metameric segmentation

It is phenomenon in which the body is externally and Internally divided into segments with a serial repetition of at least some organs.
e.g, Annelida (Earthworm), Arthropoda and Chordata

NOTOCHORD

It is mesodermally derived supporting rod like structure formed on the dorsal side during embryonic development in some animals.

Non-chordates

- Animals withour notochord
- e.g - Porifera to Hemichordata

Chordates

- Animals with notochord
- e.g Chordata

Marathon

DIGESTIVE SYSTEM

Complete Digestive System

Two openings are present
One act as → mouth
Another act as → Anus

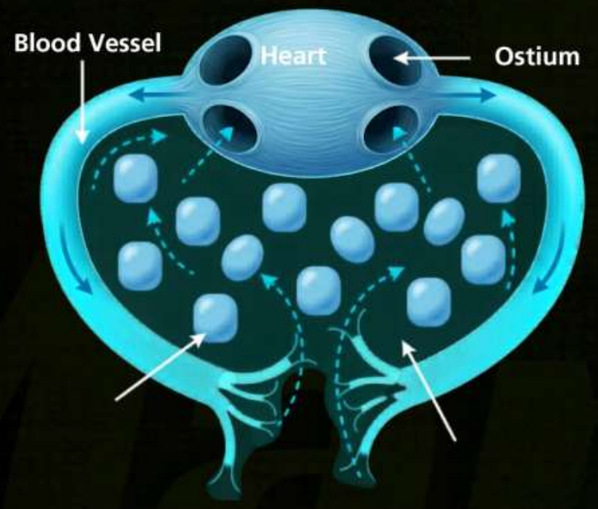
Incomplete Digestive System

Single opening is present act as both mouth & Anus

CIRCULATORY SYSTEM

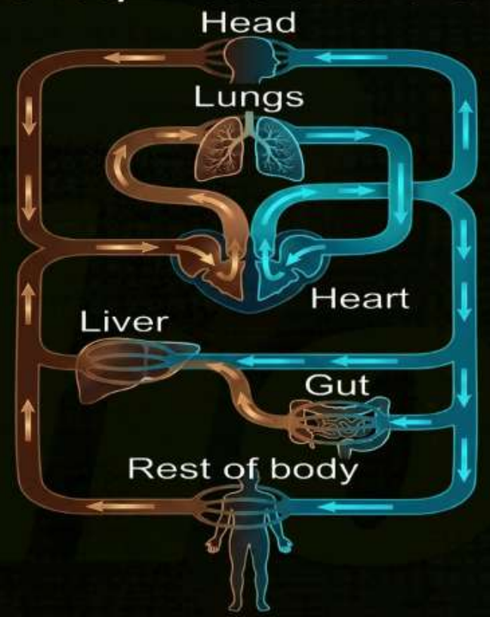
OPEN

In which the blood is pumped out of the heart and the cell & tissue are bathed in it.
e.g, Arthropods, Molluscs, Echinodermates, Hemichordata & lower chordates like tunicates.



CLOSED

In which the blood is circulated through a series of vessels of varying diameter i.e. Arteries, veins and blood capillaries.
e.g, Annelids, most of the Chordates



Kingdom	Levels of Organisation	Symmetry	Body Cavity or Coelom	Phylum
Animalia (multicellular)	Cellular level.	mostly asymmetrical	acoelomata	Porifera
	Tissue/Organ/ Organ system	Radial	acoelomata	Coelenterata (Cnidaria)
				Ctenophora
		Bilateral	Without body cavity (acoelomates)	Platyhelminthes
			With false coelom (pseudocoelomates)	Aschelminthes
			With true coelom (coelomates)	• Annelida • Arthropoda • Mollusca • Echinodermata • Hemichordata • Chordata

Echinodermata exhibits radial or bilateral symmetry depending on the stage.

BACKLOG MARATHON SERIES

Next Toppers

PHYLUM: PORIFERA

members of phylum porifera are called Sponges or pore Bearers

Habit & Habitat : Sessile, Aquatic (mostly marine & few of them live in freshwater)

LOO : Cellular Level of Organization
(Level of Organization)

Coelom (Body cavity) Acoelomate

Germ layer: No Germ Layer

Body Plan : Cell Aggregated

Symmetry : Asymmetry

(Radial symmetry in Sycon and Leucosolenia)

Segmentation : Absent

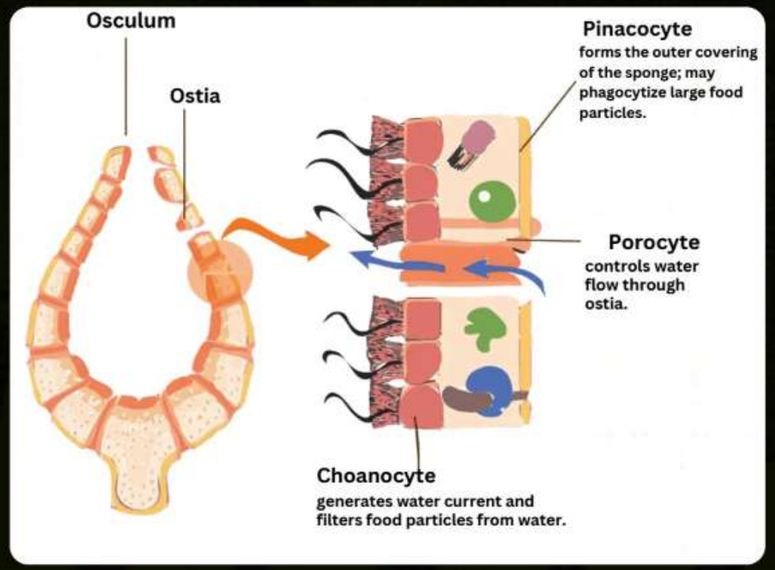
Notochord: Absent

BODY WALL CONSISTS OF :-

(i) Outer Pinacoderm – Consists of pinacocytes and porocytes.

(ii) Inner choanoderm - Consists of flagellated collar cells or choanocytes. (Unique characteristic of Porifera).

(iii) Body wall encloses a large central cavity the spongocoel or paragastric cavity



WATER CANAL SYSTEM

Water enters through ostia in the body wall into spongocoel and goes out through osculum.

This pathway of water transport is helpful in food gathering (Nutrition), respiratory exchange and removal of wastes (excretion).

Ceaseless beating of flagella helps in maintaining flow of water current.

Skeleton : Spicules & spongin fibre

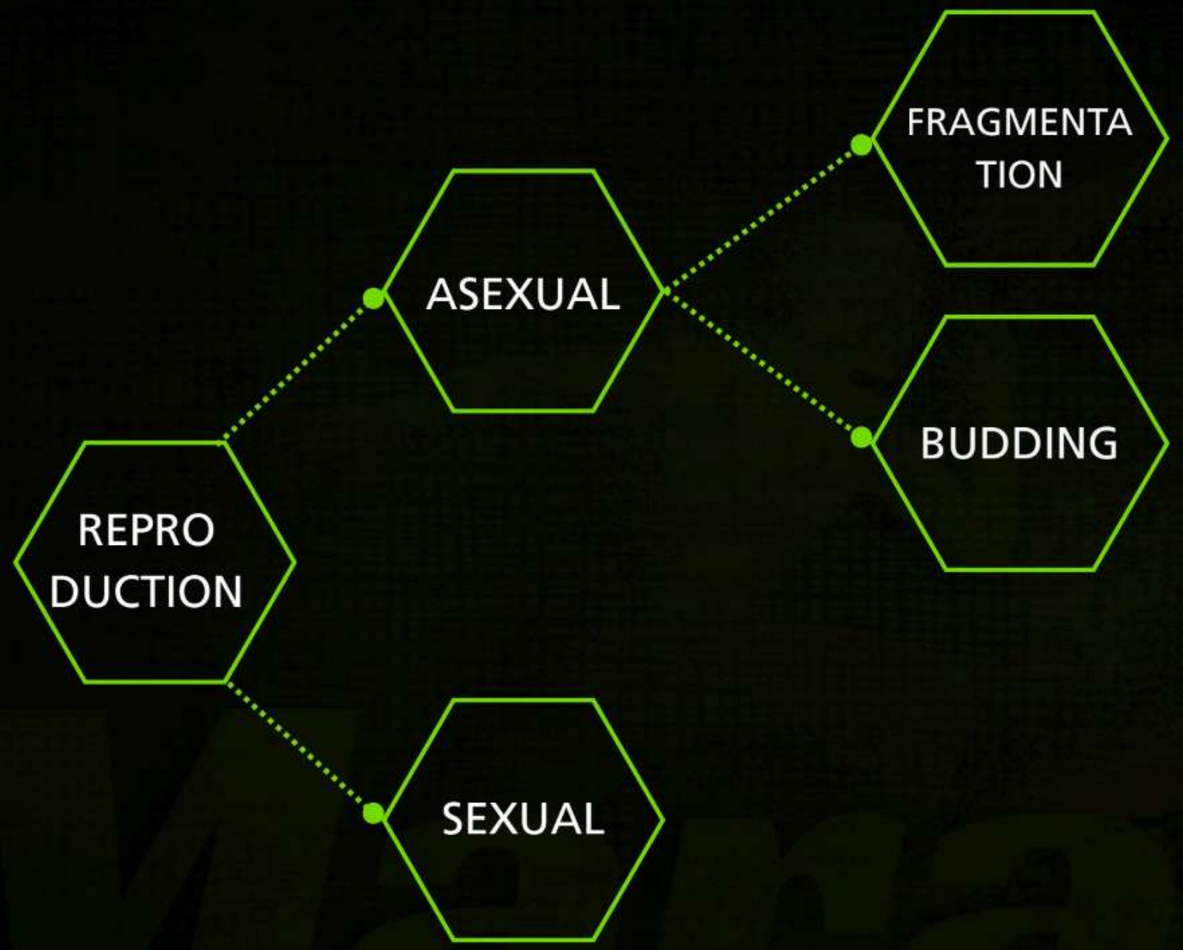
Fertilisation : Internal

Development : Indirect (Larval stages are present)

Reproduction : Sexes are not Seperate (Hermaphrodite)

Digestion : Intracellular

REPRODUCTION

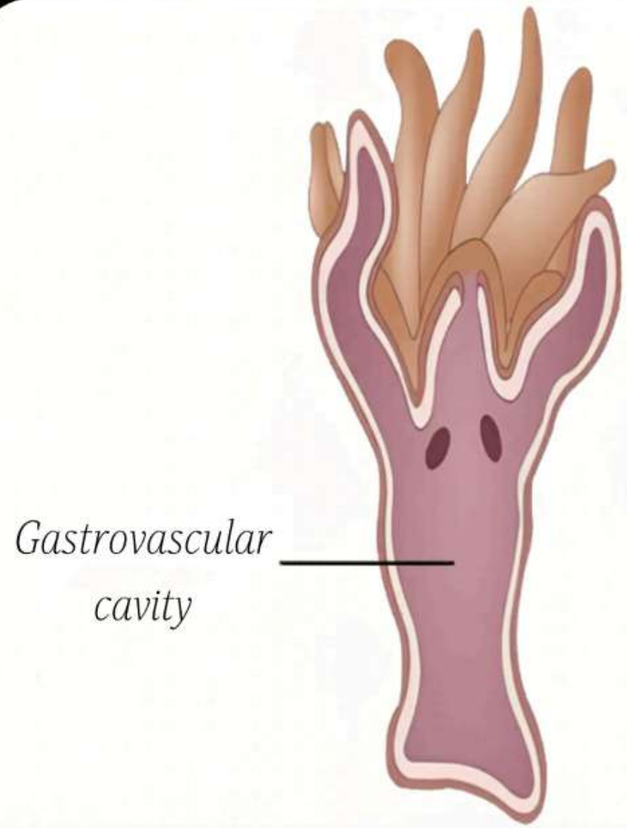


Spongilla (Fresh water sponge)

Sycon (Scypha)

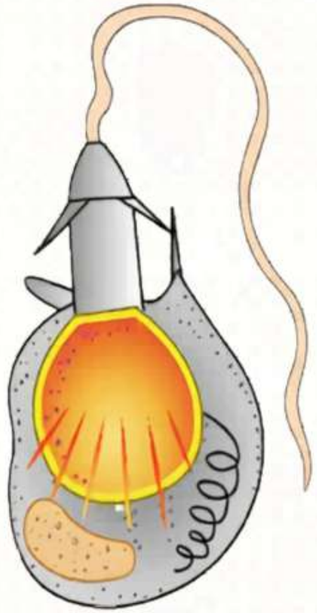
Euspongia (Bath sponge)

PHYLUM: COELENTRATA/CNIDARIA



WHY NAMED SO?
Cnidarians due to the presence of stinging cells called Cnidoblasts or Cnidocytes.

WHY NAMED SO?
Coelenterates due to the presence of gastrovascular cavity



PHYLUM: COELENTRATA/CNIDARIA

Habit & Habitat : Solitary or colonial Sessile or free-swimming Aquatic → mostly marine

LOO : Tissue level of organization.

Coelom : Acoelomate (coelom Absent)

Germ layer: Diploblastic (2 germ layers are present)

Body Plan : Blind sac

Symmetry : Radial Symmetry.

Segmentation : Absent

Notochord: Absent

Body of some coelenterates may be covered by exoskeleton of calcium carbonate.
eg. Corals

Mushroom coral

Brain coral (Meandrina)

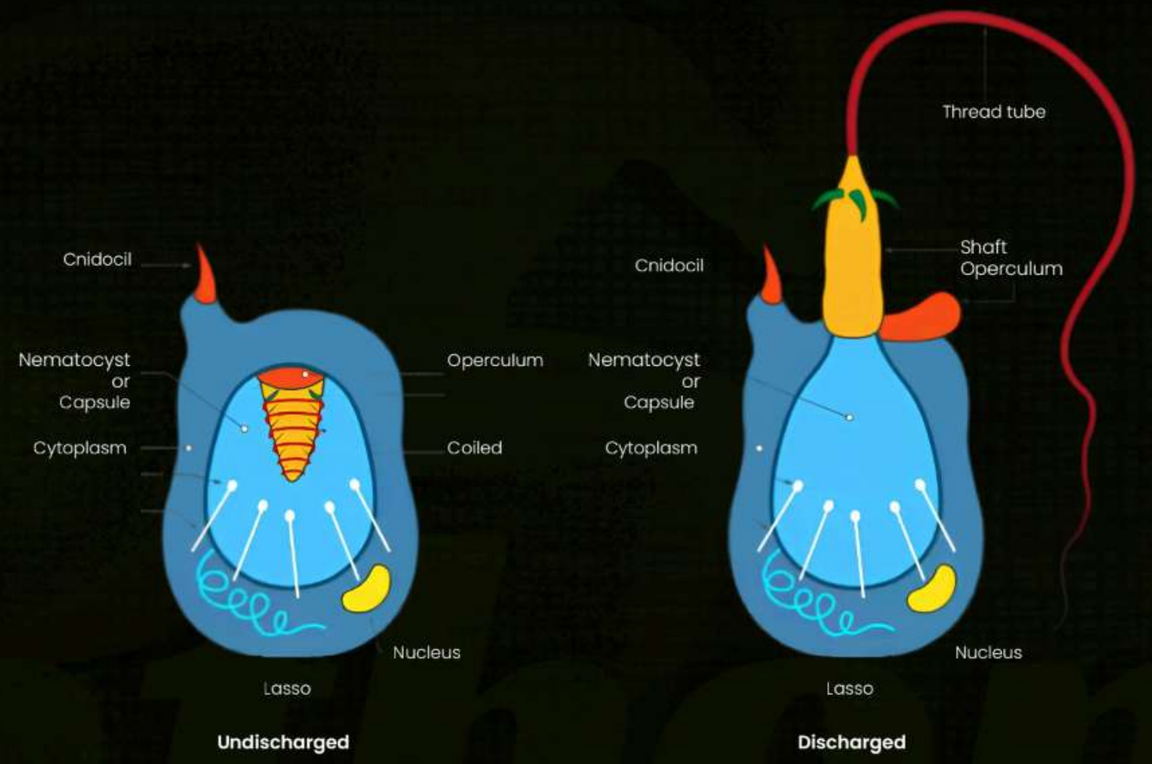
Organ pipe coral (Tubipora)

Marathon

Cnidoblast or Cnidocyte (contains stinging capsule as Nematocyst) present on the tentacles and body, which are used for anchorage (Attachment), defence and for the capture of Prey (Offence)

Cnidoblast or Cnidocyte ⟶ cells.

Stinging capsul ⟶ Nematocyst



- A large central cavity called Coelenteron.
- Incomplete digestive tract (Blind sac).

Marathon

Coelenterates have two basic body forms (Dimorphic)

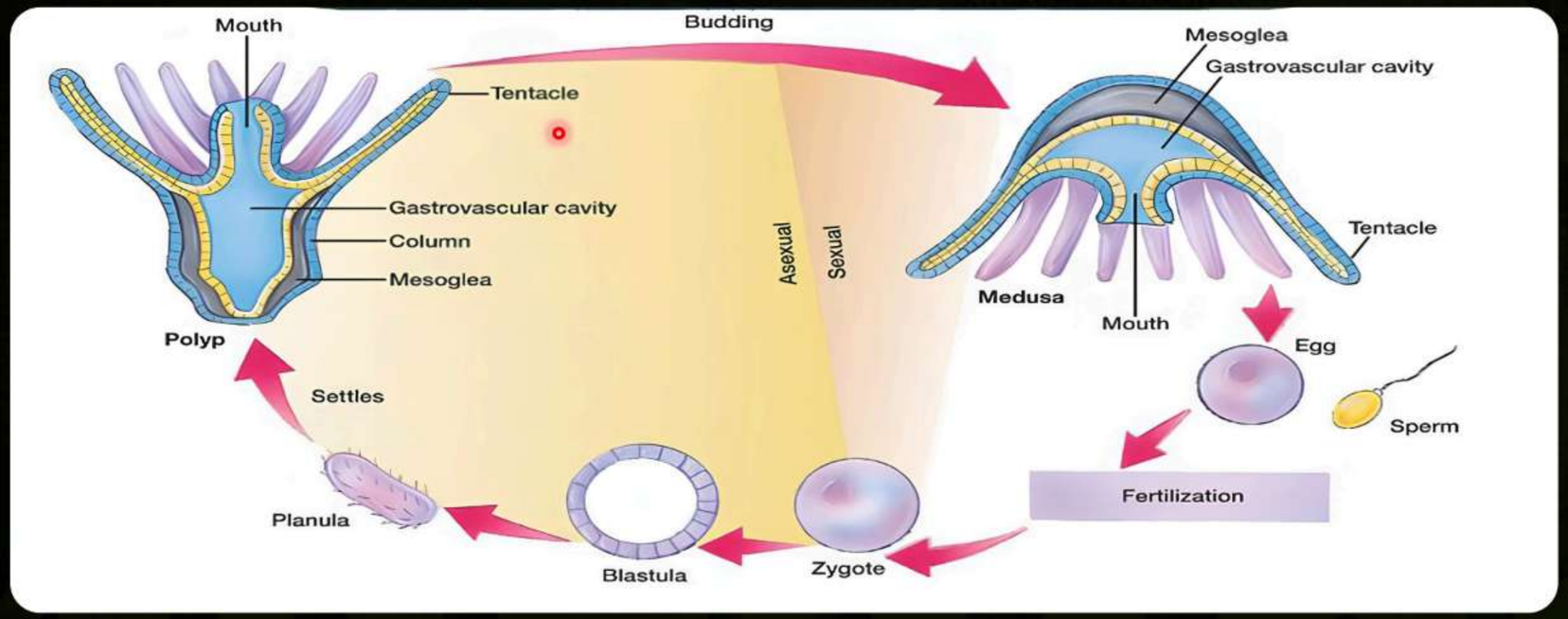
Polyp

- Cylindrical and sessile form
- solitary or colonial
- Mouth and tentacles directed upwards
- Asexual form

Medusa

- Umbrella shaped
- Free swimming Always solitary
- Mouth and tentacles directed downwards
- Sexual form

Alternation of generation (Metagenesis) is the phenomenon shown by some cnidarians in which polyps produce medusae asexually and medusae form the polyps sexually. e.g, Obelia, Physalia

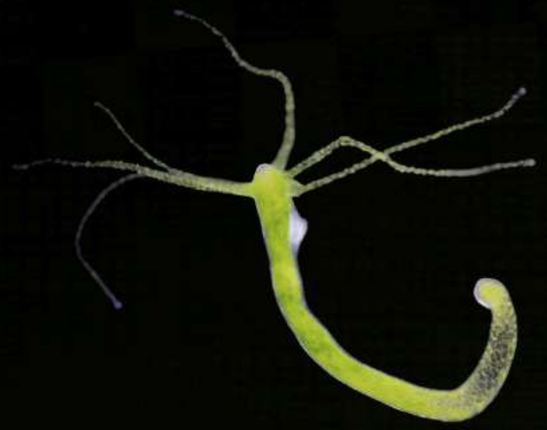


Note:- Metagenesis is absent in Hydra , Adamsia and Aurelia

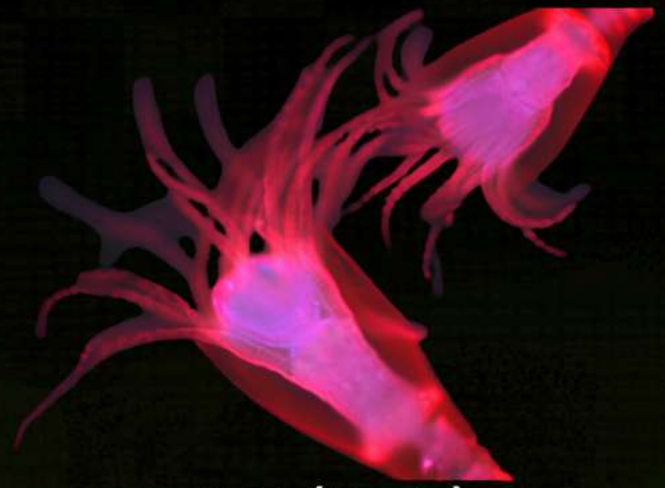
REPRODUCTION

1. Asexual by budding
2. Sexual by production of gametes
3. Development is indirect with larval stages

Marathon



Hydra (Fresh water polyp)



Obelia (Sea Fur)

Pennatula (Sea Pen)

Physalia (Portuguese man of war)

Gorgonia (Sea fan)

Adamsia (Sea anemone)

Aurelia (Jelly fish)

Marathon

PHYLUM: CTENOPHORA

Habit & Habitat : floats on the surface of water. Exclusively marine

LOO : Tissue level of organization.

Coelom : Acoelomate (Body cavity is Absent)

Germ layer: Diploblastic (Two Germ layers are present)

Body Plan : Blind Sac

Symmetry : Radial Symmetry.

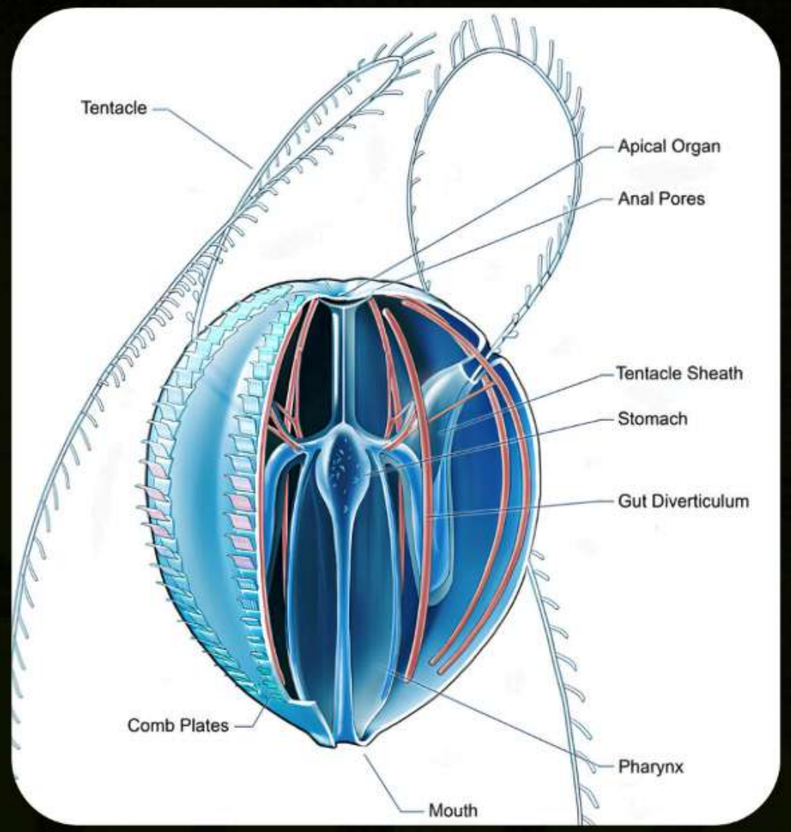
Segmentation : Absent

Notochord: Absent.

- Ctenophores are known for their beauty and delicate nature.
- In sunlight their comb plates give the effect of a rainbow. They are commonly known as "Sea-gooseberries" or “Comb-jellies" or "Sea-walnuts".
- Bioluminescence (The property of a living organism to emit light) is well marked.

Marathon

Locomotion takes place by the presence of 8 ciliary comb plates on the body surface.



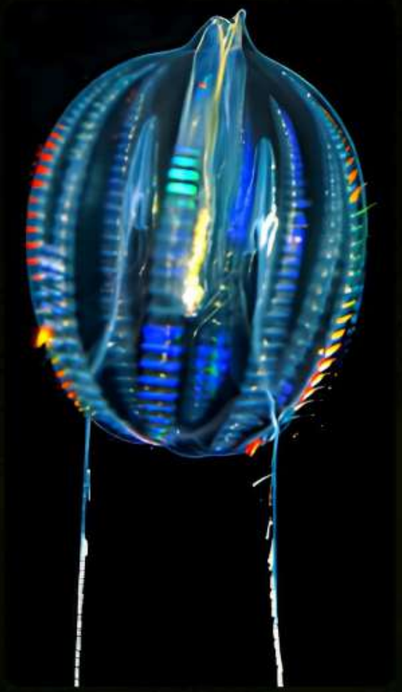
They are carnivorous. A pair of long solid tentacles are present. Special type of cells are present on tentacles, called Lasso cells (Colloblasts) which help in catching the prey.

Fertilisation : External

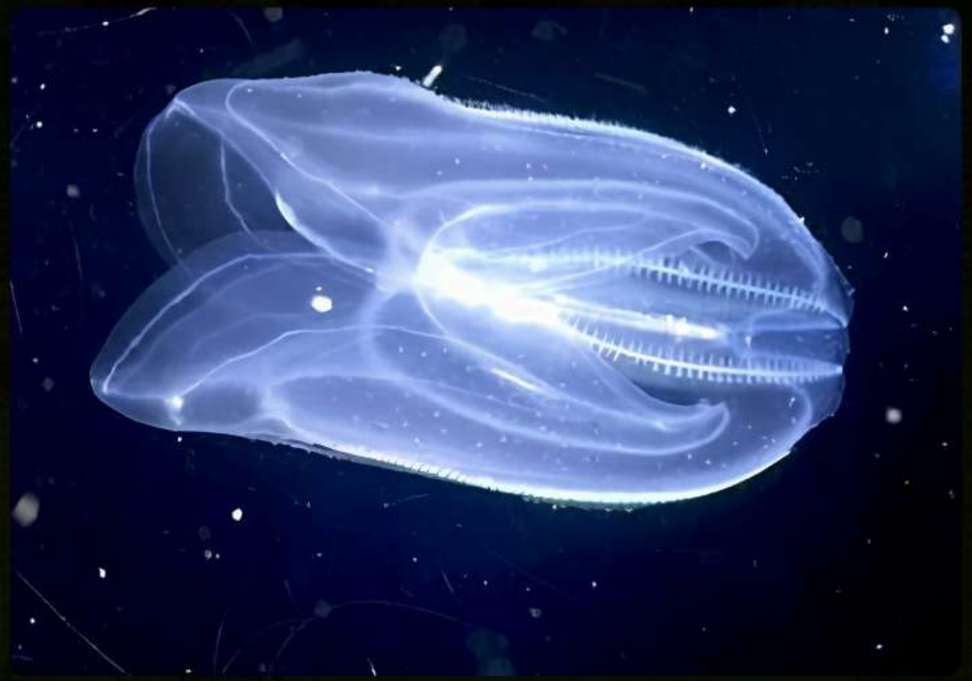
Development : Indirect (larval stages are present)

Reproduction : Sexual Reproduction, Sexes are not seperate (Hermaphrodite)

Digestion : Intracellular & Extracellular



Pleurobrachia (Sea- Gooseberry)



Ctenoplana

PHYLUM: PLATYHELMINTHES

Dorso-ventrally flat

Habit & Habitat : Terrestial, Aquatic, free-living, parasitic

LOO : Organ level of Organization

Coelom Acoelomate

Germ layer: Triploblastic

Body Plan : Blindsac

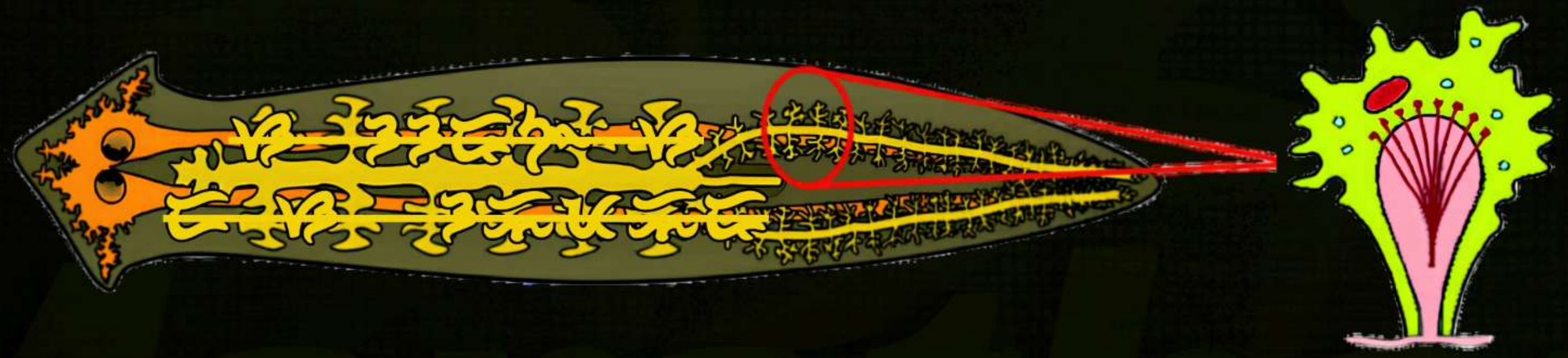
Symmetry : Bilateral Symmetry

Segmentation : Absent

Notochord: Absent

- These are mostly endoparasites found in animals including human being but some are free living (aquatic).
- Locomotory organs are absent in these animals but adhesive organs like suckers, hooks etc are present in parasitic form.

- They absorb nutrients from the host directly through their body surface.
- Excretion occurs through specialised cells called flame cells or Solenocytes (Protonephridia).They also help in osmoregulation.
- Excretory matter is ammonia.



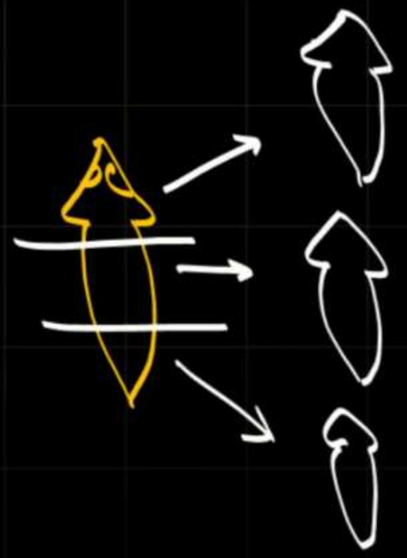
Fertilisation : Internal

Development : Indirect

Reproduction : mostly bisexual

Digestion : Extracellular (outside cell)

eg: Planaria ⟶ High regeneration capacity



Taenia (Tapeworm)

Fasciola (Liver Fluke)

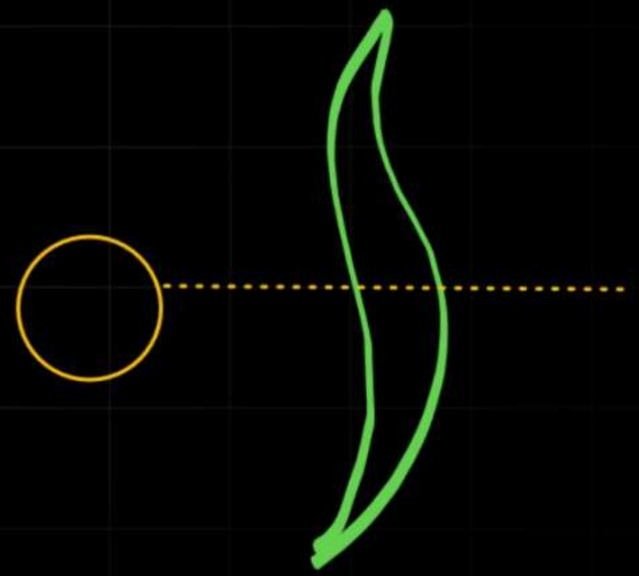
Marathon

PHYLUM: ASCHELMINTHES

They are also called Roundworms

Habit & Habitat : Nematodes are found everywhere, they may be free living (aquatic and terrestrial) or parasite in plants and animals.

LOO : Organ System Level of Organization.



Coelom : Pseudocoelomates

Germ layer: Triploblastic (Three germ layers are present)

Body Plan : Tube within Tube.

Symmetry : Bilateral Symmetry.

Segmentation : Absent

Notochord: Absent

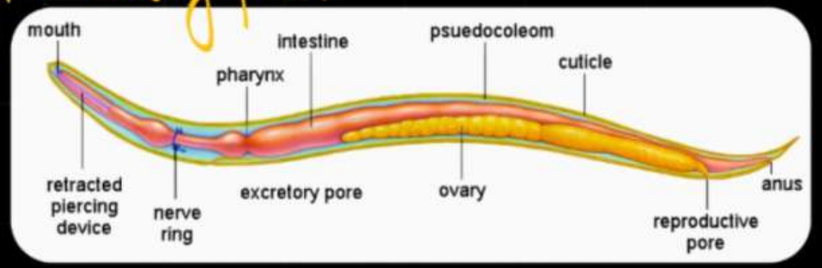
Fertilisation : Internal

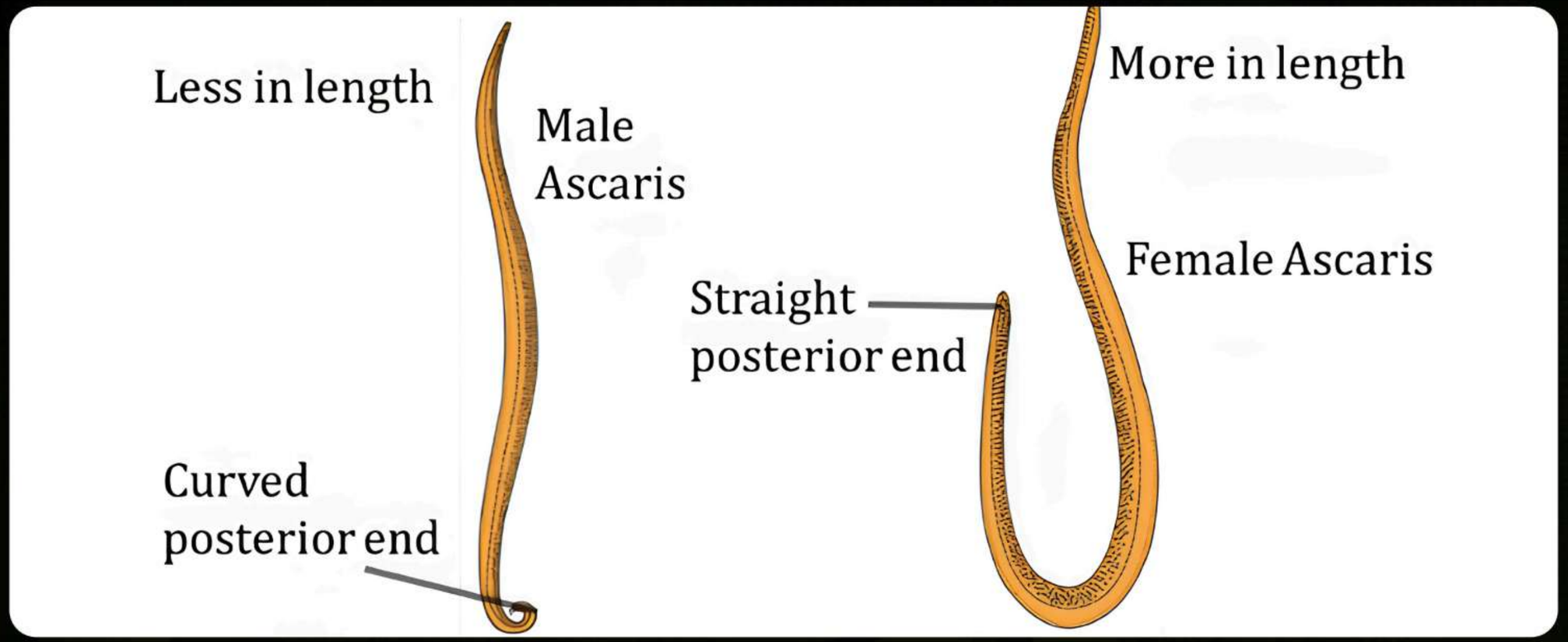
Development : Direct or Indirect

Reproduction : Sexual Reproduction, Sexes are seperate.

Digestion : Digestive tract is complete and differentiated into mouth, pharynx, intestine and anus. Pharynx is muscular and well developed.

Excretion : Excretory Tube remove all waste of Body cavity through Excretory pore.




Less in length
Male Ascaris
Curved posterior end
More in length
Female Ascaris
Straight posterior end

EXAMPLES

Ascaris - Round worm (in small intestine)

Wuchereria - Filarial worm

Ancylostoma - Hookworm (in small intestine)

PHYLUM: ANNELIDA

Their body surface is distinctly marked out into segments or metameres (Latin, annulus: little ring) and hence, the phylum name Annelida.

Habit & Habitat : free living found in moist soil (Terrestrial), fresh water or marine but few are parasite.

LOO : Organ System level of Organization.

Coelom Coelomate

Germ layer: Triploblastic

Body Plan : Tube within Tube

Symmetry : Bilateral Symmetry.

Segmentation : Metameric Segmentation.

Notochord: Absent.

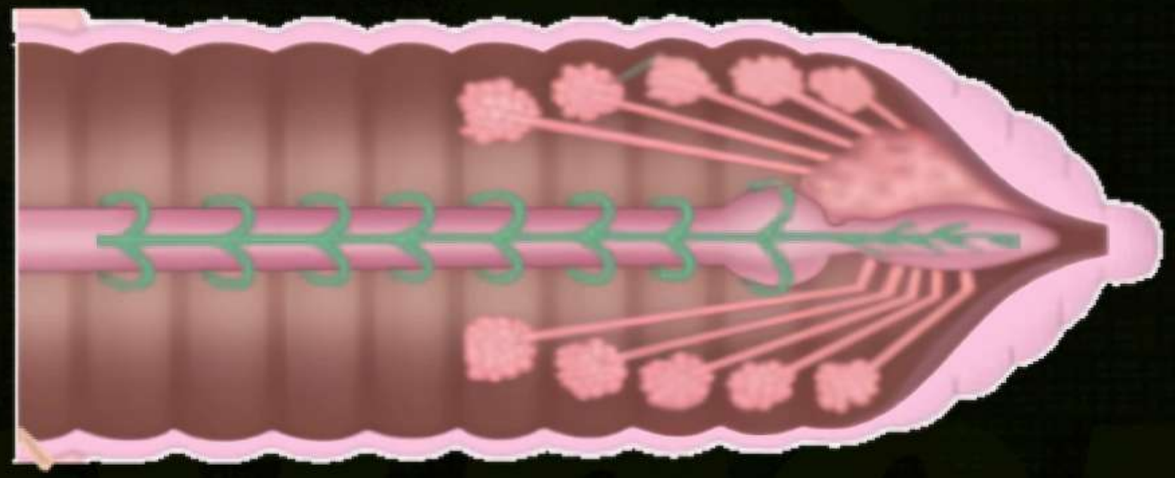
- They posses longitudnal and circular muscles which help in locomotion .
- Aquatic annelids like neries possess lateral appendages , parapodia which helps in swimming.

Marathon

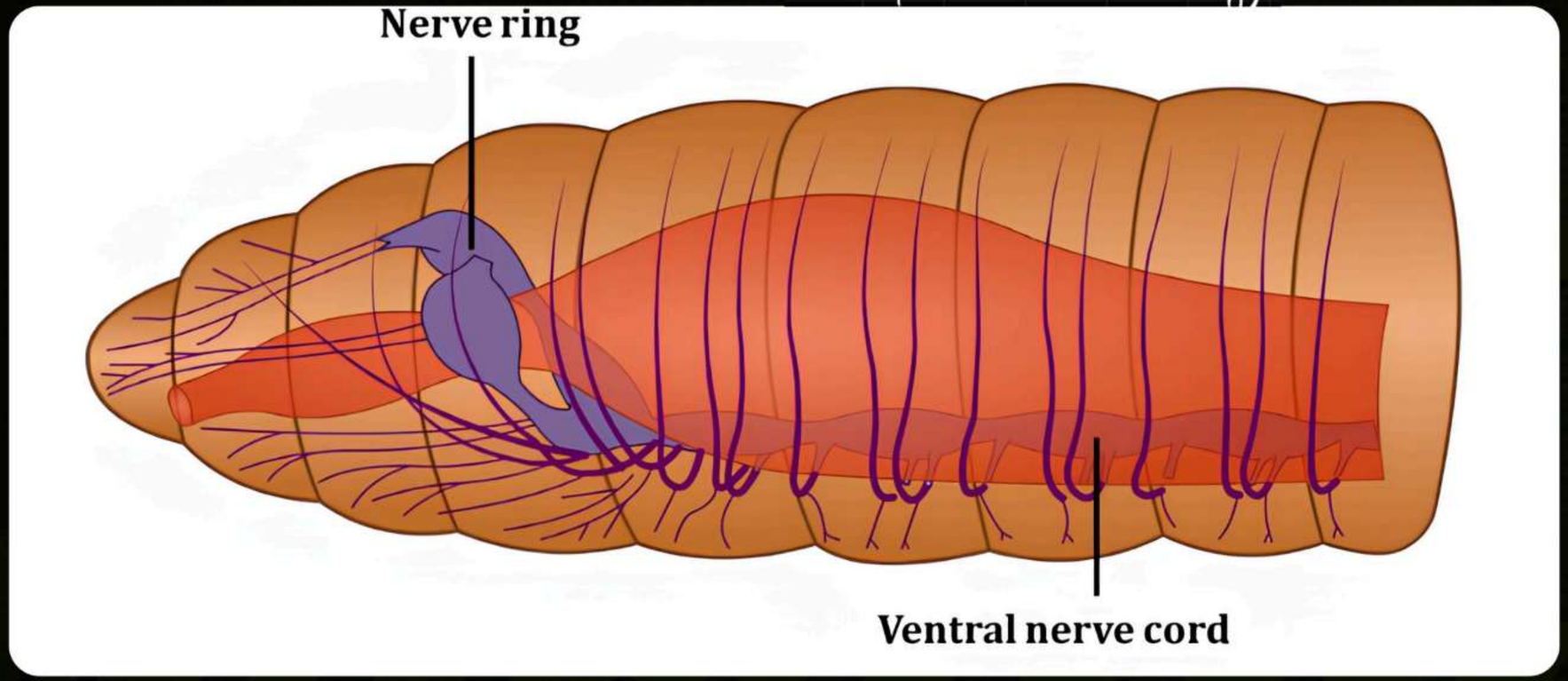
- Excretory organs are Nephridia (sing. nephridium). They also help in osmoregulation.

Excretory matter

1. Ammonia in aquatic form
2. Urea in land form



- Nervous system consists of a nerve ring (Brain) and a solid, double, and ventral nerve cord with ganglia. (Group of neuronal cell body)



Fertilisation : Internal & External.

Development : Direct (Earthworm and Leech) or indirect (Nereis)

Reproduction : sexual - Nereis is dioecious, but earthworms and leeches are monoecious.

Digestion : Digestive tract is complete, straight and extends through entire body.

Circulation : closed Type.

EXAMPLES

Pheretima (Earthworm)

Hirudinaria (Blood sucking Leech)

Nereis (Sandworm)

Marathon

PHYLUM: ARTHROPODA

Jointed Appendages.

Habit & Habitat : They may be aquatic (marine and fresh water) or terrestrial, free living and sometimes parasitic (mosquito), solitary, colonial (bee), gregarious (Locust).

LOO : Organ System level of organization.

Coelom : Coelomate (True coelom is present)

Germ layer: Triploblastic (Three Germ layers are present)

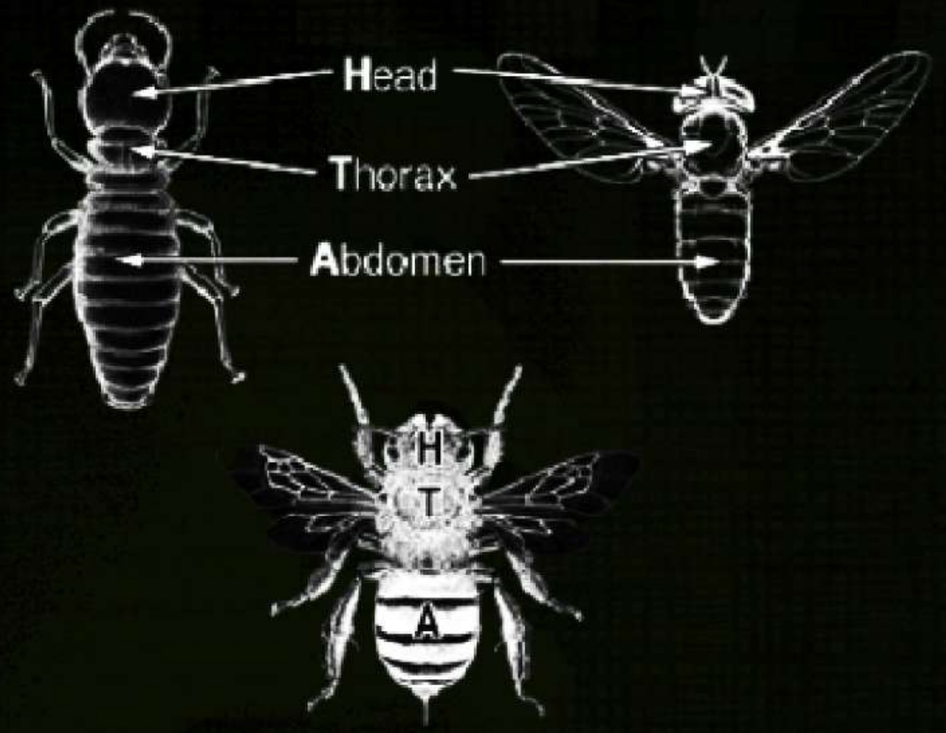
Body Plan : Tube within Tube.

Symmetry : Bilateral Symmetry.

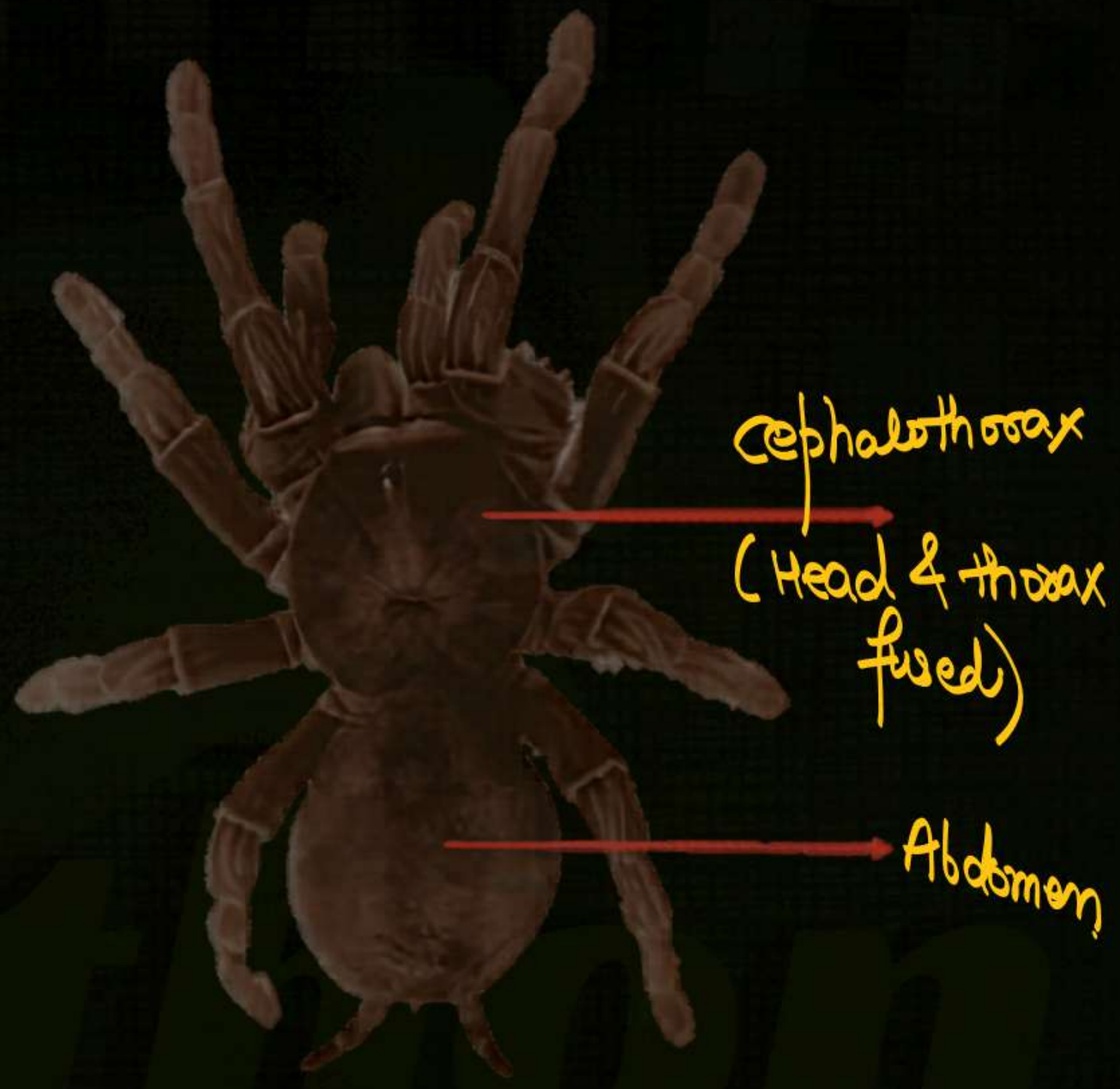
Segmentation : Metameric Segmentation

Notochord: Absent.

- Arthropoda is the largest phylum of animalia which includes insects.
- Over two-thirds of named species on earth are arthropods.
- Body is divided into three region Head, thorax & abdomen,



- In some animals (for example Scorpion, Crab) there are two body parts --- Cephalothorax and abdomen. (Head and thorax fused to form cephalothorax)



UNIQUE FEATURES

(i) They have jointed appendages for different functions. (arthro - jointed, poda - foot/appendages).

(ii) The body of Arthropods is covered by Chitinous exoskeleton.

Marathon

Circulatory system is Open type

- Digestive tract is complete,
- Respiration by gills (e.g. Prawn), Book-gills (e.g. King crab). Tracheal system (e.g. Insects), Book-lungs (e.g. Scorpion)

Excretory organs are –

- Antennary or green glands (e.g, Prawn),
- Coxal gland (e.g, Scorpion),
- Malpighian tubules (e.g, Insects) .

Marathon

- Sensory organs like simple eyes, or compound eyes or both, antennae, statocyst
- Sexes are separate.
- Fertilization is usually internal.
- They are mostly oviparous (Few are viviparous e.g. scorpion).
- Development may be direct or indirect.

- Economically important insects :-

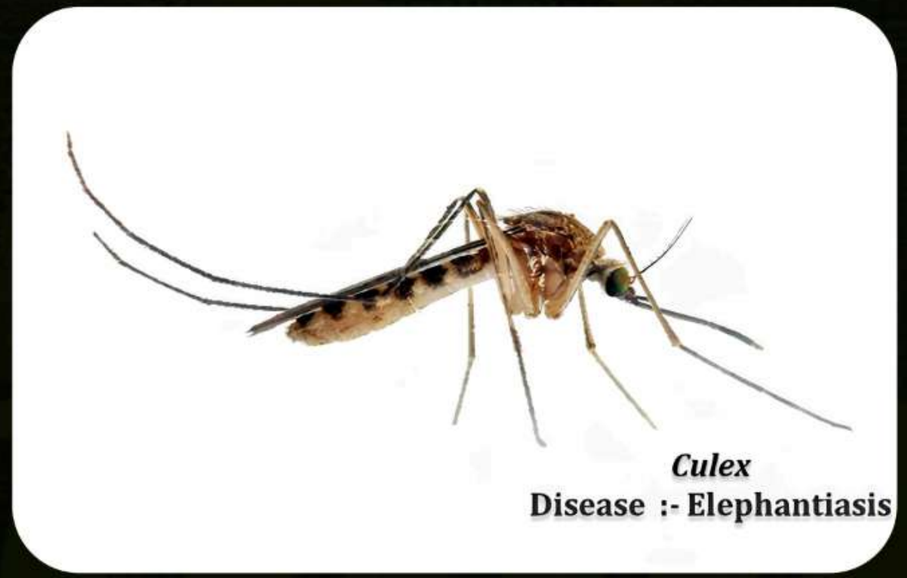
Bombyx (Silkworm)

Apis (Honey bee)

Laccifer (Lac Insect)

- Vectors – Mosquitoes

Anopheles



- Gregarious pest – Locusta (Locust) :-

- Living fossil – Limulus (King crab) :-

PHYLUM: MOLLUSCA

Soft bodied Animals. 2nd largest phylum.

Habit & Habitat : Are terrestial or aquatic (marine or freshwater).

LOO : Organ System level of Organization.

Coelom Coelomates.

Germ layer: Triploblastic

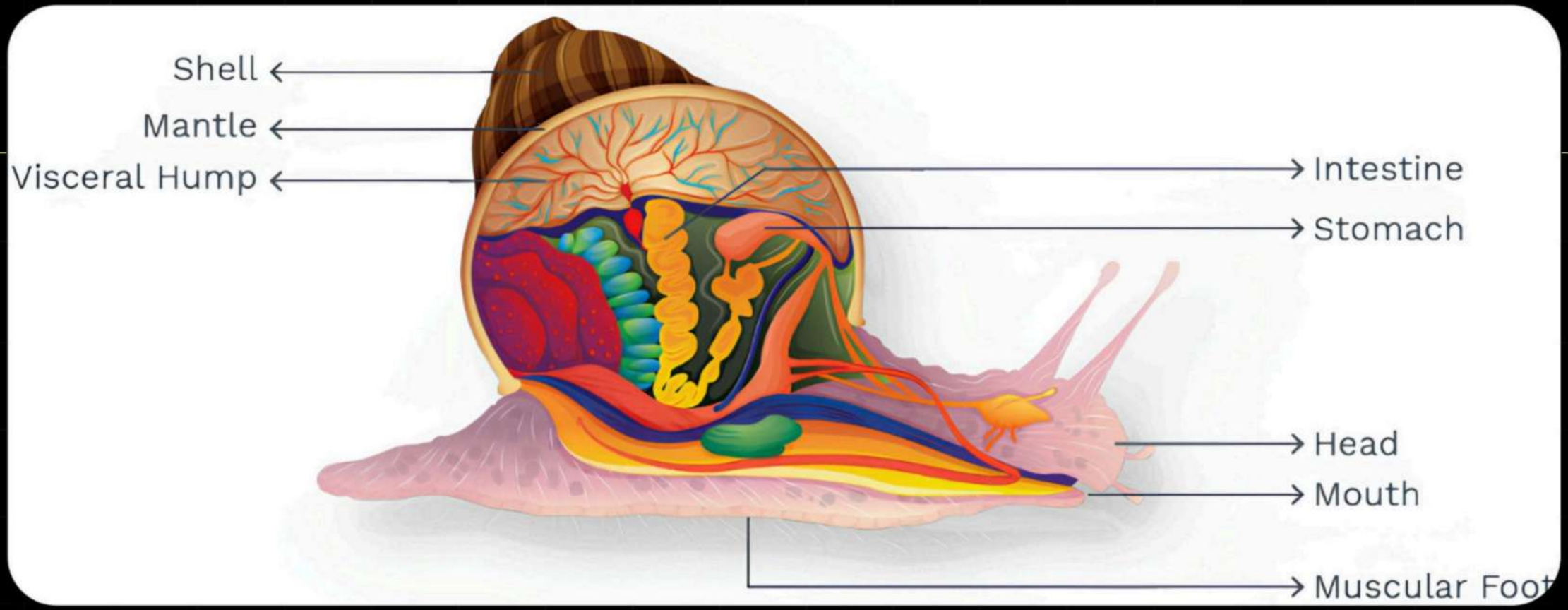
Body Plan : Tube within Tube

Symmetry : Bilateral Symmetry except class - Gastropoda

Segmentation : Absent except Neopilina.

Notochord: Absent.

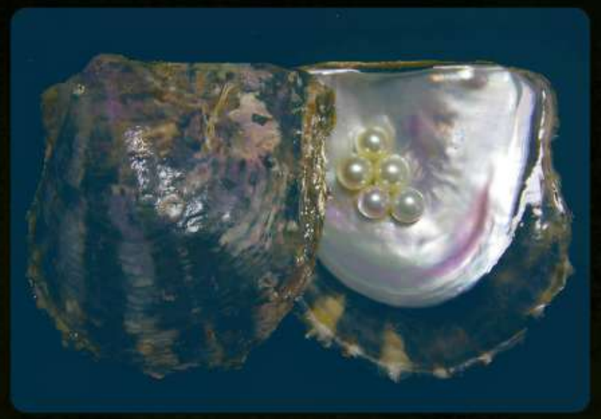
- The body is divided into head, mantle, muscular foot and visceral hump.



- Anterior head region has sensory tentacles
- The mouth consist file- like rasping organ called radula

EXAMPLES

Pila (Apple snail)



Pinctada (Pearl oyster)

Sepia (Cuttlefish)

Octopus (Devil fish)

Aplysia (Seahare)

Loligo (Squid)

Marathon

Dentalium (Tusk shell)

Chaetopleura (Chiton)

Marathon

PHYLUM: ECHINODERMATA

Habit & Habitat : Spiny Skin. All are marine

LOO : Organ System level of Organization

Coelom Coelomates.

Germ layer: Triploblastic

Body Plan : Tube within Tube.

Symmetry : Bilateral & Radial (Adult) ★
(Larvae)

Segmentation : Absent

Notochord: Absent

- Digestive system is complete with mouth on the lower (ventral) side and anus on the upper (dorsal) side
- The most distinctive feature of echinoderms is the presence of water vascular system which helps in locomotion, capture and transport of food and respiration.
- An excretory system is absent
- Sexes are separate. Reproduction is sexual.

Marathon

- Fertilisation is usually external. Development is indirect with free-swimming larva.

Asterias (Star fish)

Echinus (Sea urchin)

Antedon (Sea lily)

Cucumaria (Sea cucumber)

Ophiura (Brittle star)

PHYLUM: HEMICHORDATA

Stomochord.

Habit & Habitat : All are marine

LOO : Organ System level of organization

Coelom Coelomates

Germ layer: Triploblastic

Body Plan : Tube within tube

Symmetry : Bilateral Symmetry

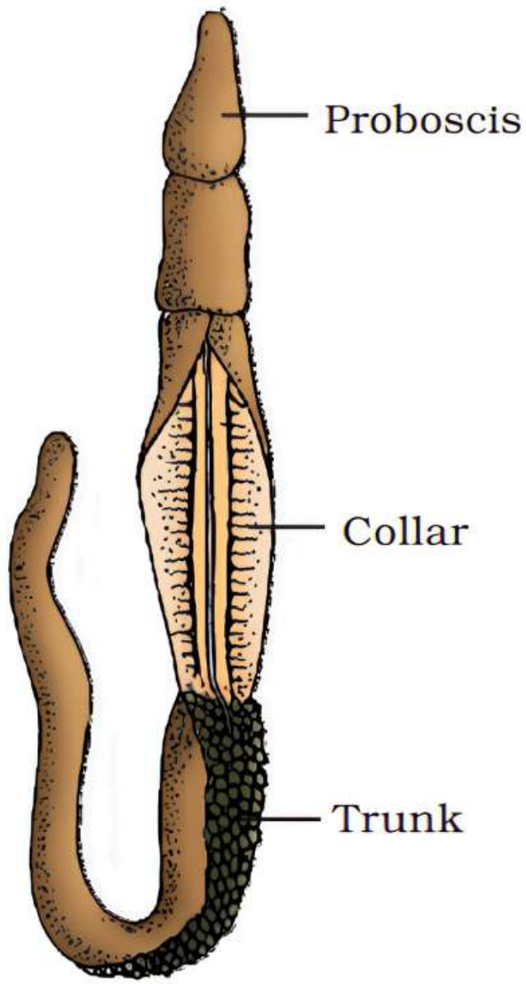
Segmentation : Absent

Notochord: Absent

- This phylum consists of a small group of worm-like marine animals.
- The body is cylindrical and is composed of an anterior proboscis, a collar and a long trunk .
- Circulatory system is of open type.
- Respiration takes place through gills.
- Excretory organ is proboscis gland.
- Sexes are separate.
- Fertilisation is external.
- Development is indirect.

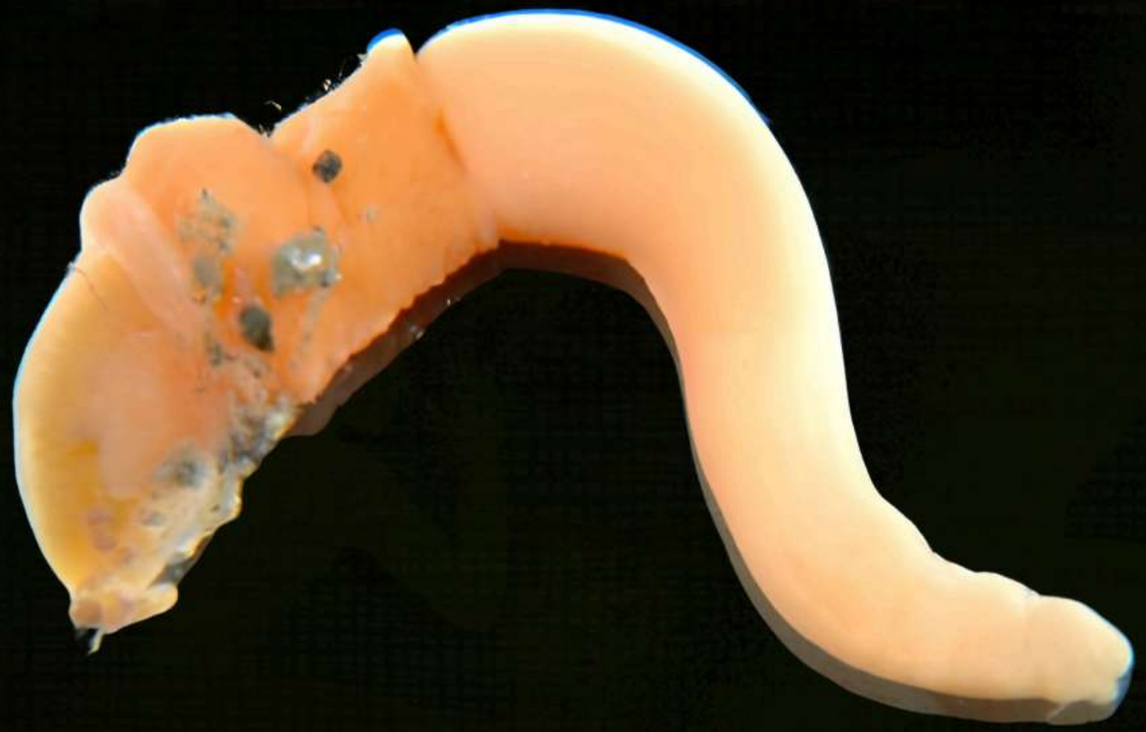
Marathon

Balanoglossus



BACKLOG MARATHON SERIES

Next Toppers



Saccoglossus

Phylum → CHORDATA

LOO : Organ System Level of Organization

Coelom Coelomates

Germ layer: Triploblastic

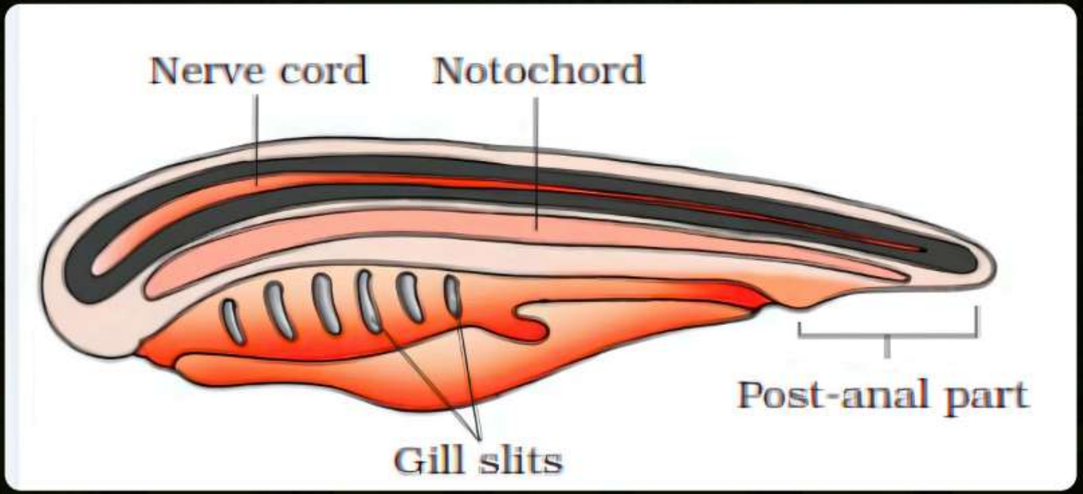
Body Plan : Tube within tube

Symmetry : Bilateral Symmetry.

Segmentation : Present

Notochord: Present

- Presence of a notochord: A rod-like structure is present in the organisms, which in the later stages undergoes some changes to form the vertebral column.
- Presence of dorsal hollow nerve cord: The nerve cord lies to the dorsal of the notochord and is always hollow.
- Presence of pharyngeal gill slits: At some stage of the life cycle the chordates have a pair of gill slits on the lateral side. In Pisces,they are present throughout the life.



S.No	Chordates	Non-Chordates
1	Notochord Present.	Notochord absent.
2	Central nervous System is dorsal hollow and single.	Central nervous system is ventral, solid and double.
3	Pharynx perforated by gill slits	Gill slits are absent.
4	Heart is ventral.	Heart is dorsal (is present)
5	A post-anal part (tail) is present.	Post-anal tail is absent.

PHYLUM CHORDATA

- Urochordata or Tunicata
- Cephalochordata
- Vertebrata

Protochordates.

Marathon

SUB-PHYLUM UROCHORDATA

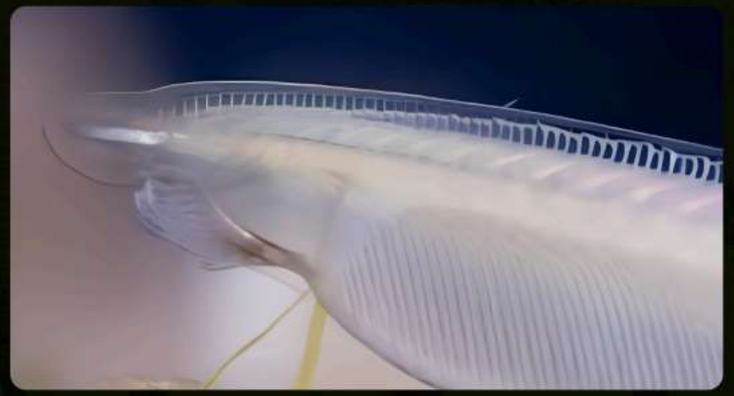
The notochord is only present in the tail of the larva and disappears in the adult and in cephalochordata it extends from head to tail region and is persistent throughout thier life.

Marathon

Ascidia

Salpa

Doliolum



Cephalochordata Branchiostoma (Amphioxus or Lancelet)

SUBPHYLUM VERTEBRATA

- The members of subphylum Vertebrata possess notochord during the embryonic period. The notochord is replaced by a cartilaginous or bony vertebral column in the adult. Thus all vertebrates are chordates but all chordates are not vertebrates.

Marathon

- vertebrates have a ventral muscular heart with two, three or four chambers,
- Brain is enclosed in a hard bony structure called cranium.
- kidneys for excretion and osmoregulation and paired appendages which may be fins or limbs.
- Exoskeleton and endoskeleton both are present.
- Respiration is either by gills, skin or by the lungs.
- Sense organs are well developed like the eyes, ear, nose, and tongue.
- Nervous system consists of brain and the spinal cord.

Vertebrata

Division

- Agnatha (lacks jaw)
  - Class
    1. Cyclostomata
- Gnathostomata (bears jaw)
  - Super Class
    - Pisces (bear fins)
      - Class
        1. Chondrichthyes
        2. Osteichthyes
    - Tetrapoda (bear limbs)
      - Class
        1. Amphibia
        2. Reptilia
        3. Aves
        4. Mammals

Marathon

CLASS – CYCLOSTOMATA

- All living members of the class Cyclostomata are ectoparasites on some fishes.
- They have an elongated body bearing 6-15 pairs of gill slits for respiration
- Cyclostomes have a sucking and circular mouth without jaws
- Their body is devoid of scales and paired fins.
- Cranium and vertebral column are cartilaginous

Marathon

- Circulation is of closed type.
- Cyclostomes are marine but migrate for spawning to fresh water. After spawning, within a few days, they die. Their larvae, after metamorphosis, return to the ocean.

Marathon

Petromyzon (Lamprey)

Myxine (Hagfish)

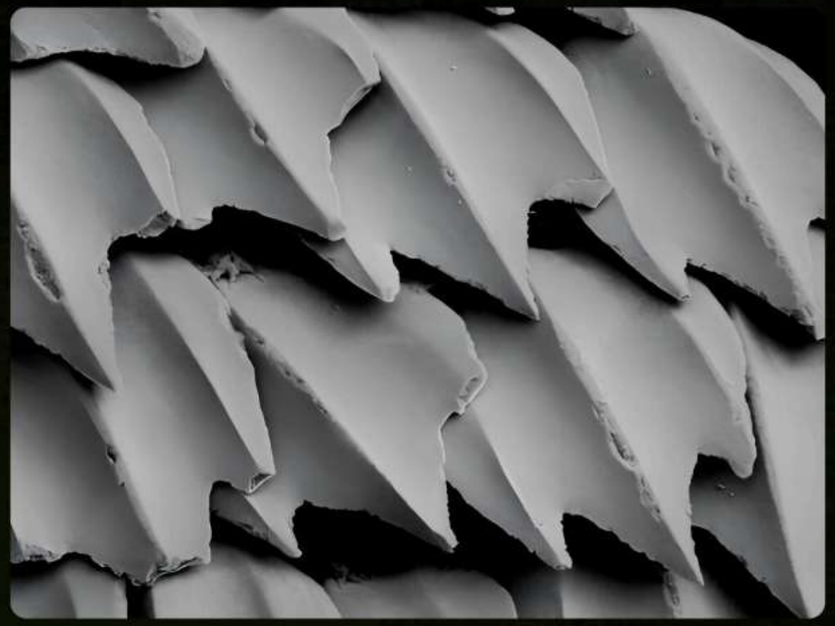
Marathon

CLASS – CHONDRICHTHYES

- They are marine animals with streamlined body and have cartilaginous endoskeleton
- Mouth is located ventrally.

Marathon

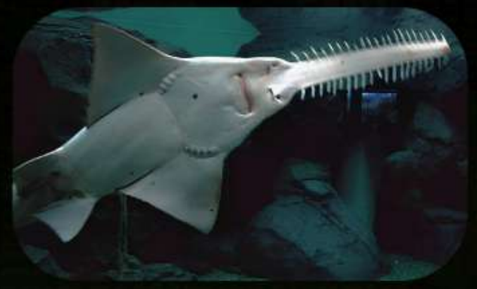
- Notochord is persistent throughout life.
- Gill slits are separate and without operculum (gill cover).
- The skin is tough, containing minute placoid scales.
- Their jaws are very powerful.
- These animals are predaceous.
- Due to the absence of air bladder, they have to swim constantly to avoid sinking.



- Heart is two-chambered (one auricle and one ventricle).
- Some of them have electric organs (e.g., Torpedo) and some possess poison sting (e.g., Trygon).
- They are cold-blooded (poikilothermous) animals, i.e., they lack the capacity to regulate their body temperature.
- Sexes are separate.
- In males pelvic fins bear claspers.
- They have internal fertilisation and many of them are viviparous.

Marathon

Scoliodon (Dog fish)



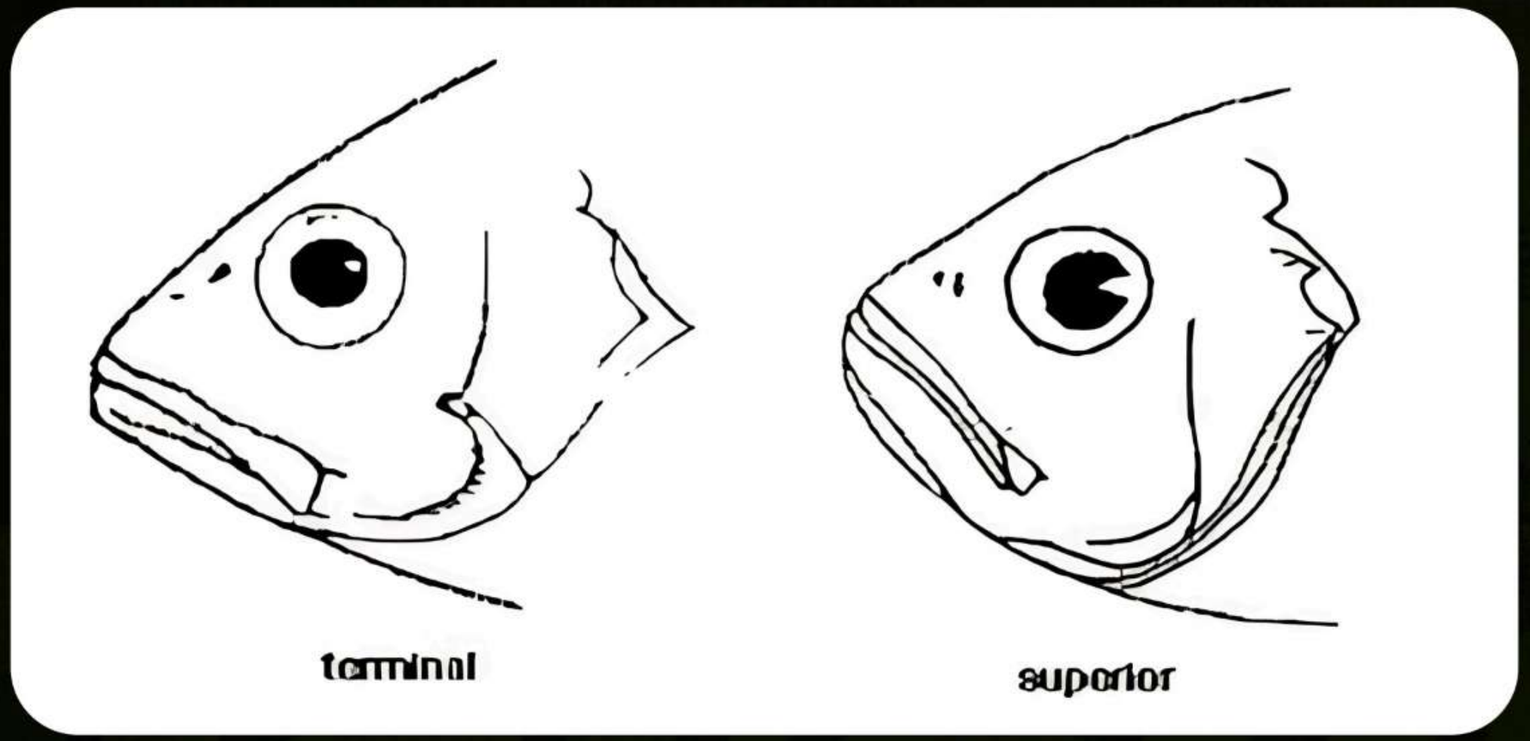
Pristis (Saw fish)

Carcharodon (Great white shark)

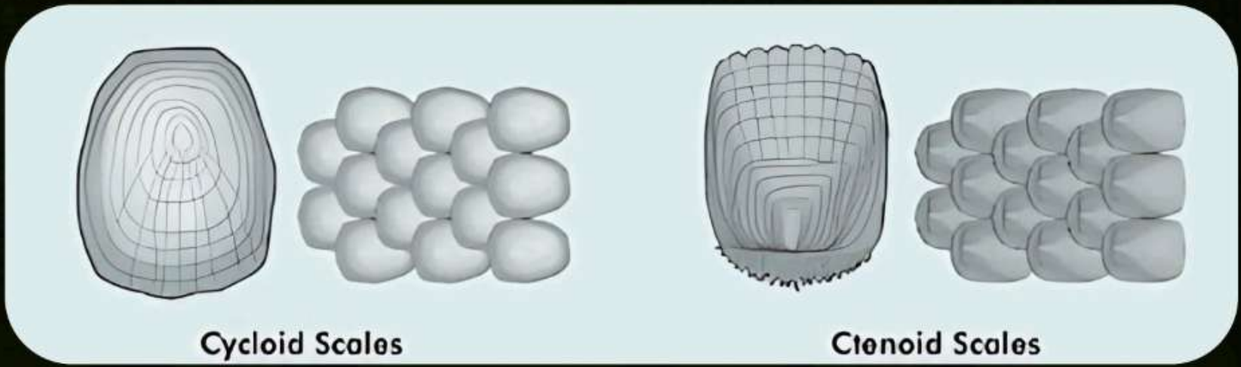
Trygon (Sting ray)

CLASS – OSTEICHTHYES

- It includes both marine and fresh water fishes with bony endoskeleton. Their body is streamlined. Mouth is mostly terminal



- They have four pairs of gills which are covered by an operculum on each side.
- Skin is covered with cycloid/ctenoid scales.
- Air bladder is present which regulates buoyancy.
- Heart is twochambered (one auricle and one ventricle).
- They are cold-blooded animals.
- Sexes are separate.
- Fertilisation is usually external. They are mostly oviparous and development is direct.



Marine – Exocoetus (Flying fish)

Hippocampus (Sea horse)

Aquarium – Betta (Fighting fish)

Pterophyllum (Angel fish)

Clarias (Magur)

Freshwater – Labeo (Rohu)

Catla (Katla)

CLASS – AMPHIBIA

- As the name indicates (Gr., Amphi : dual, bios, life), amphibians can live in aquatic as well as terrestrial habitats

Marathon

- Most of them have two pairs of limbs.
- Body is divisible into head and trunk.
- Tail may be present in some.
- The amphibian skin is moist (without scales).
- The eyes have eyelids.
- A tympanum represents the ear.
- Alimentary canal, urinary and reproductive tracts open into a common chamber called cloaca which opens to the exterior.

Marathon

- Respiration is by gills, lungs and through skin.
- The heart is three chambered (two auricles and one ventricle).
- These are cold-blooded animals.
- Sexes are separate.
- Fertilisation is external.
- They are oviparous and development is indirect.

Marathon

Bufo (Toad)

Rana (Frog)

Marathon

Salamandra (Salamander)

Hyla (Tree frog)

Ichthyophis (Limbless amphibia)

CLASS – REPTILIA

- The class name refers to their creeping or crawling mode of locomotion.
- They are mostly terrestrial animals and their body is covered by dry and cornified skin, epidermal scales or scutes.
- They do not have external ear openings.
- Tympanum represents ear.

- Limbs, when present, are two pairs.
- Heart is usually three-chambered, but four-chambered in crocodiles.
- Reptiles are poikilotherms. Snakes and lizards shed their scales as skin cast.
- Sexes are separate.
- Fertilisation is internal.
- They are oviparous and development is direct.

ecdysis:

Chelone (Turtle)

Testudo (Tortoise)

Chameleon (Tree lizard)

Calotes (Garden lizard)

Crocodilus (Crocodile)

Alligator (Alligator)

Hemidactylus (Wall lizard)

Poisonous snakes – Naja (Cobra)

Bngarus (Krait)

Vipera (Viper)

CLASS – AVES

- The characteristic features of Aves (birds) are the presence of feathers and most of them can fly except flightless birds (e.g., Ostrich).
- They possess beak.
- The forelimbs are modified into wings.
- The hind limbs generally have scales and are modified for walking, swimming or clasping the tree branches.
- Skin is dry without glands except the oil gland at the base of the tail.

Marathon

- Endoskeleton is fully ossified (bony) and the long bones are hollow with air cavities (pneumatic).
- The digestive tract of birds has additional chambers, the crop and gizzard.
- Heart is completely fourchambered.
- They are warm-blooded (homoiothermous) animals, i.e., they are able to maintain a constant body temperature.

Marathon

- Respiration is by lungs. Air sacs connected to lungs supplement respiration.
- Sexes are separate. Fertilisation is internal. They are oviparous and development is direct.

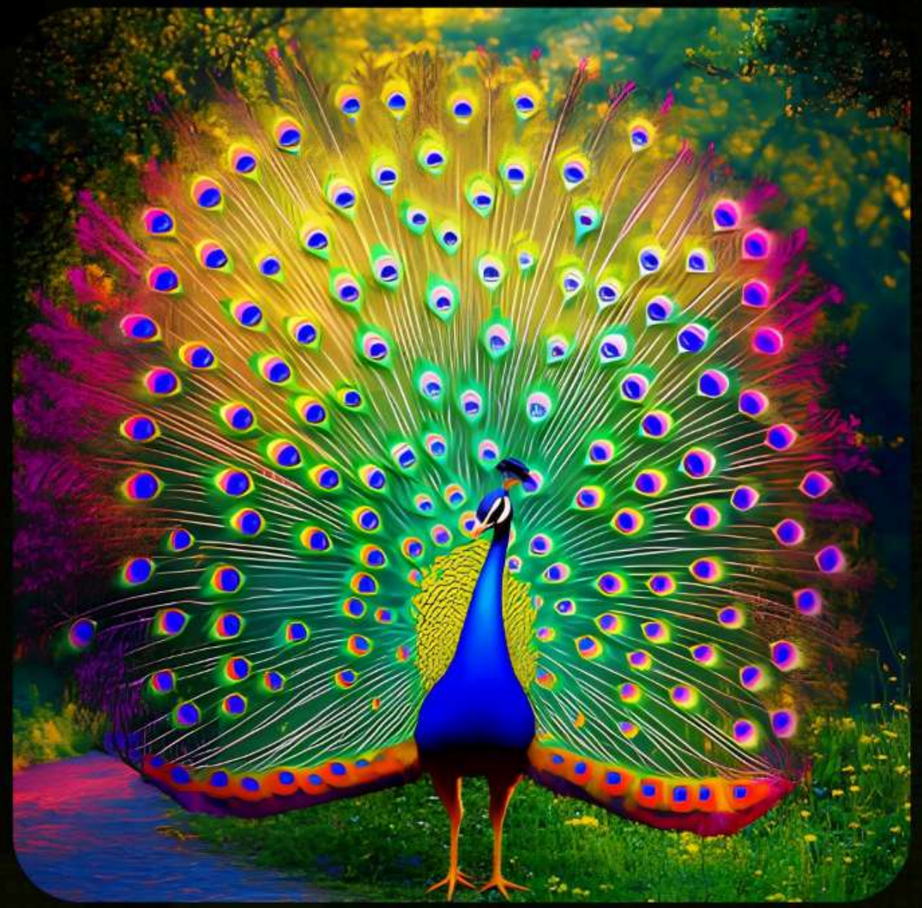
Marathon

Corvus (Crow)

Columba (Pigeon)

Psittacula (Parrot)

Struthio (Ostrich)



Pavo (Peacock)

Aptenodytes (Penguin)

Neophron (Vulture

CLASS – MAMMALIA

- They are found in a variety of habitats – polar ice caps, deserts, mountains, forests, grasslands and dark caves. Some of them have adapted to fly or live in water.
- The most unique mammalian characteristic is the presence of milk producing glands (mammary glands) by which the young ones are nourished.
- They have two pairs of limbs, adapted for walking, running, climbing, burrowing, swimming or flying .
- The skin of mammals is unique in possessing hair

- External ears or pinnae are present. Different types of teeth are present in the jaw.
- Heart is fourchambered.
- They are homoiothermous.
- Respiration is by lungs.
- Sexes are separate and fertilisation is internal.
- They are viviparous with few exceptions and development is direct.

Oviparous-Ornithorhynchus (Platypus)

Viviparous - Macropus (Kangaroo)

Pteropus (Flying fox)

Camelus (Camel)

Macaca (Monkey)

Rattus (Rat)

Canis (Dog)

Felis (Cat)

Elephas (Elephant)

Equus (Horse)

Balaenoptera (Blue whale

Panthera tigris (Tiger).

Marathon

Delphinus (Common dolphin)

Panthera leo (Lion)

BACKLOG MARATHON SERIES

Next Toppers

Morphology of Flowering plants

Chapter-5

THE ROOT

General points about roots

(1) Cylindrical, non-green, Underground

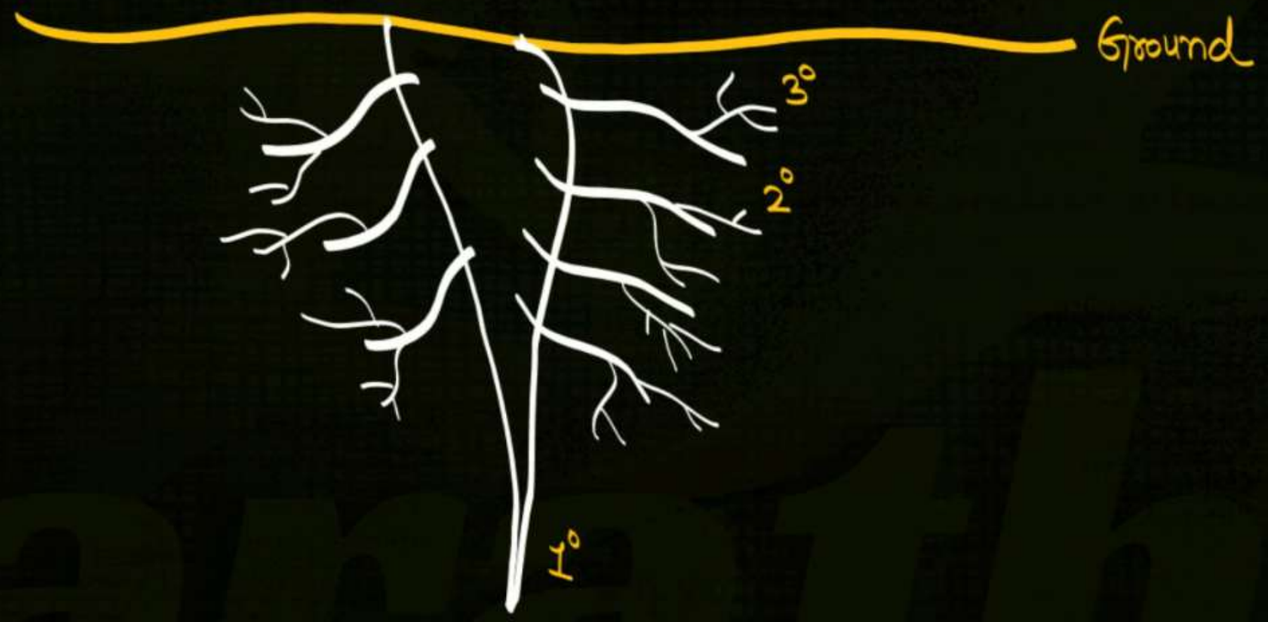
(2) Roots lack Nodes & Internodes

(3) Lateral Branching

(4) Positively Geotrophic (Grows towards Ground)

(5) Positively Hydrotrophic (Towards H_2O)

(6) Negatively phototrophic



Marathon

TYPES OF ROOT SYSTEM

Root develop from Radicle of an embryo.

- Tap Root System
- Fibrous Root System
- Adventious Root System

Marathon

TAP ROOT SYSTEM

Root forms directly from radicle called primary Root.

ex :- Mustard Plant.

MUSTARD PLANT

FIBROUS ROOT SYSTEM

→ Primary Root is short-lived

ex:- Monocot (wheat)

ADVENTITIOUS ROOT SYSTEM

Root develop from other part of plant (stem or leaves) except Radicle

ex: Banyan Tree & Grass.

Marathon

FUNCTIONS OF ROOT

→ Absorption of water & minerals

→ Anchorage

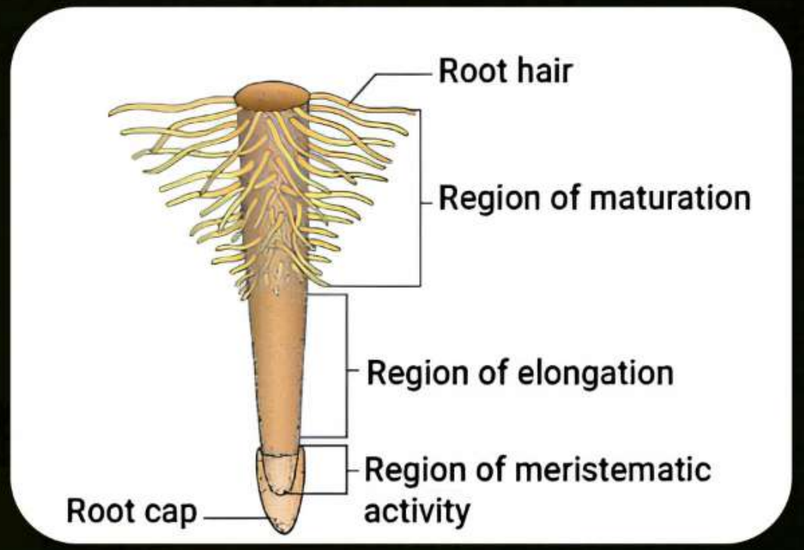
→ Storage of Reserve Food material

→ Synthesis of Plant Growth Regulators (Auxin)

Marathon

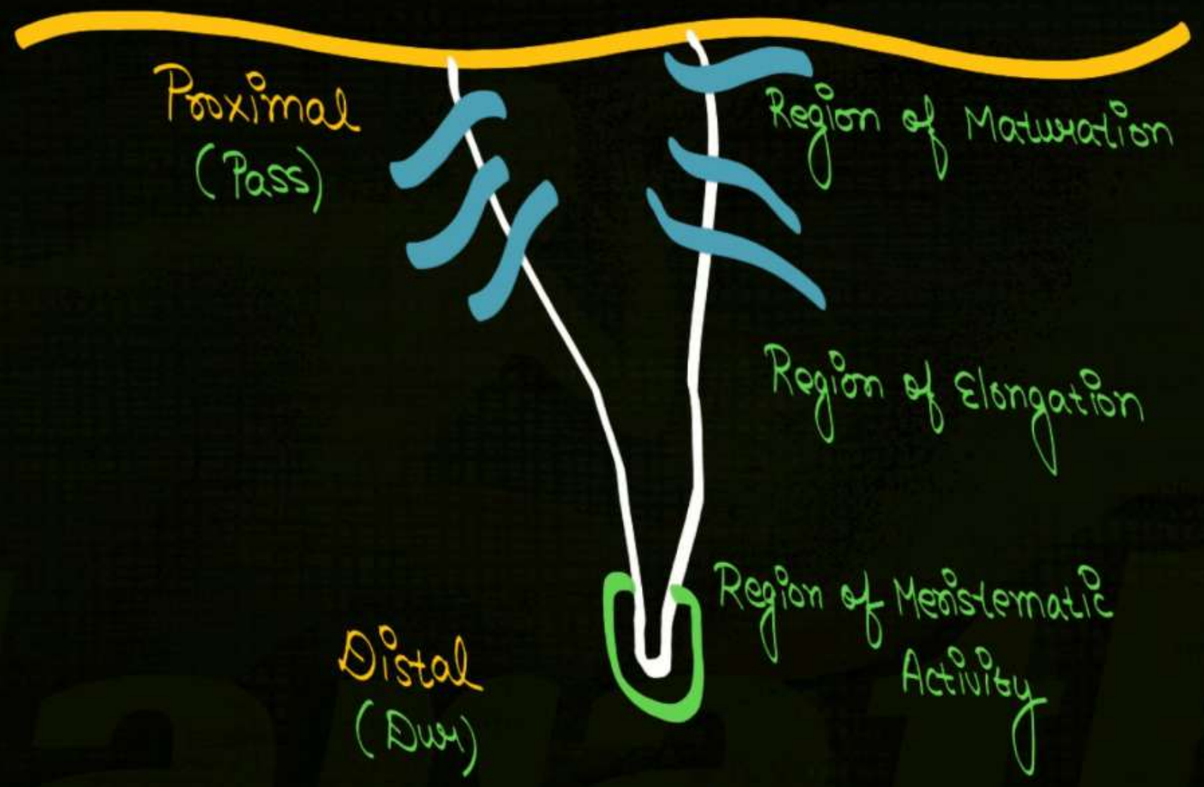
REGIONS OF ROOT

- Region of Meristematic Activity
- Region of Elongation
- Region of Maturation



BACKLOG MARATHON SERIES

Next Toppers



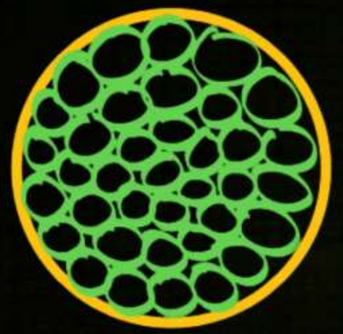
Root Cap. (Living)

Thimble Shaped

Function : It provide protection to region of meristematic Activity

Marathon

REGION OF MERISTEMATIC



- → Dividing cells
- → Small Size
- → Compactly Arranged
- → No Intercellular space is present
- → Thin cell wall
- → Prominent nucleus
- → Vacuole Absent
- → Less Cytop

REGION OF ELONGATION

The cells proximal to this region undergo rapid elongation and enlargement and are responsible for the growth of the root in length.

→ Maximum Active Absorption of water takes place in this Region

REGION OF MATURATION

The cells of the elongation zone gradually differentiate and mature. Epidermal cells form very fine and delicate, thread-like structures called root hairs.

maximum passive
Absorption takes place

Marathon

THE STEM

General points:-

→ Stem bears branches, fruits, leaves & flowers.

→ Initial stage : Green

later stage : Dark brown & woody.

→ Nodes & Internodes are present.

→ Stem develop from plumule.

Bud: Compressed shoot (Two types of Bud)

- Lateral Bud or Axillary Bud (Between stem & leaf)

- Apical Bud or Terminal Bud (Apex)

→ Positively Phototrophic

→ Negatively Hydrotrophic

→ Negatively Geotrophic

Marathon

FUNCTION OF STEM

- The main function of the stem is spreading out branches bearing leaves, flowers and fruits.
- It conducts water, minerals.
- Some stems perform the function of storage of food, support, protection and of vegetative propagation.

Marathon

THE LEAF

flattened, photosynthetic, lateral

Axillary Bud $\xrightarrow[\text{later}]{}$ develops into branches

Leaves develop from shoot Apical Meristem

Acropetal order

Older leaves are present at the Base & younger leaves are located at the top

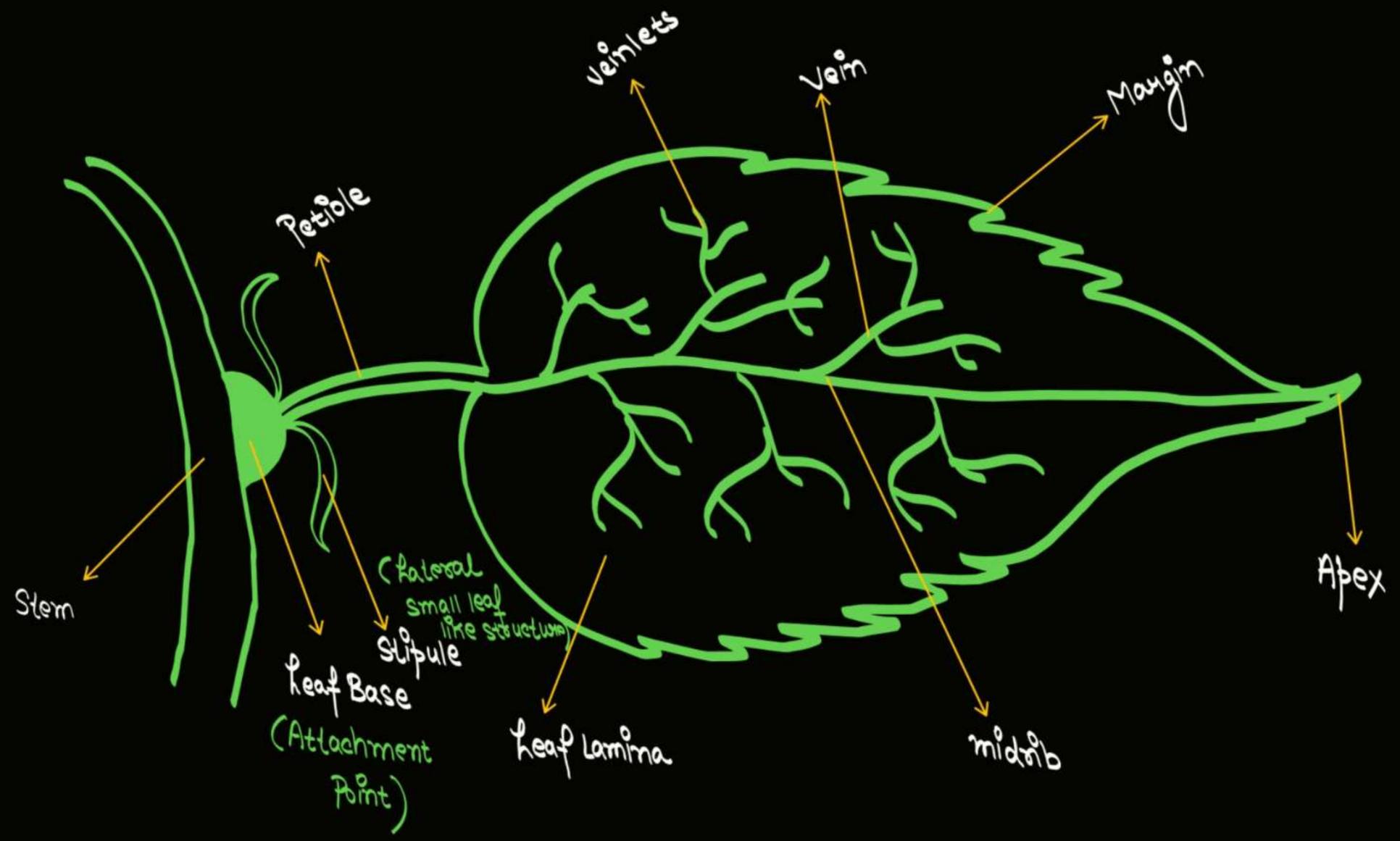
} Acropetal order.

PARTS OF LEAF

- Leaf Base
- Petiole
- Leaf lamina or Leaf Blade

BACKLOG MARATHON SERIES

Next Toppers



Function of Petiole

- → long, cylindrical, stalk, flexible
- → Join leaf base & leaf lamina.
- → It provide proper sunlight to leaf lamina.
- → Allow leaf blade or lamina to flutter in wind.

- In monocotyledons, the leaf base expands into a sheath covering the stem partially or wholly.
- In some leguminous plants the leafbase may become swollen, which is called the pulvinus

Marathon

Pulvinus

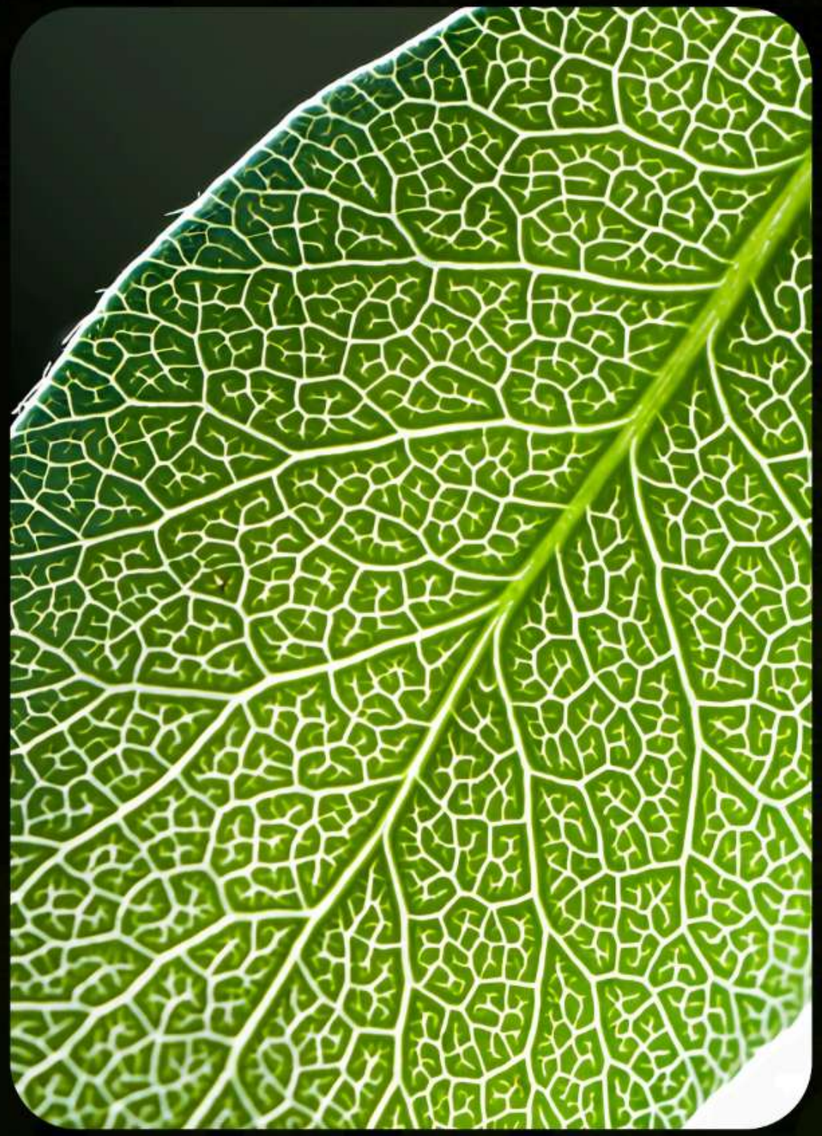
- Middle prominent vein, which is known as the midrib.
- Veins provide rigidity to the leaf blade and act as channels of transport for water, minerals and food materials.

Marathon

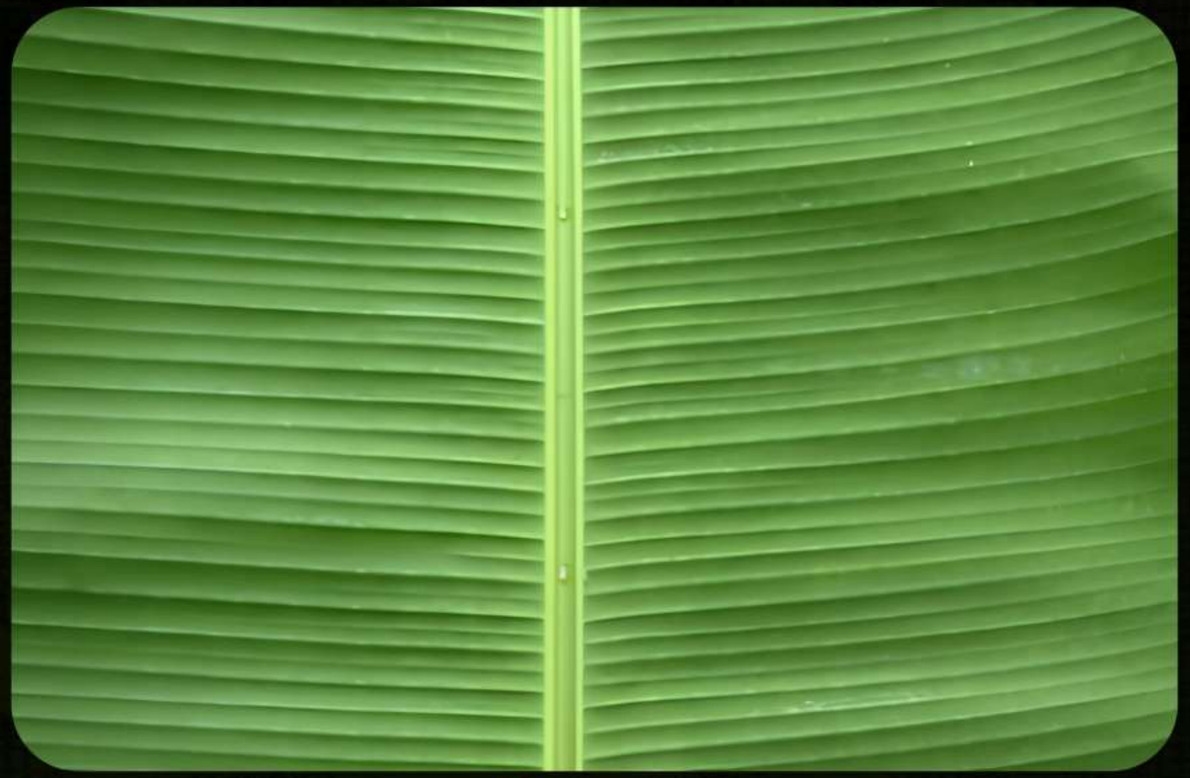
VENATION

Arrangement of veins & veinlets on leaf blade called Venation

VENATION
- Reticulate Venation (network)
- Parallel Venation



Reticulate Venation



Parallel Venation

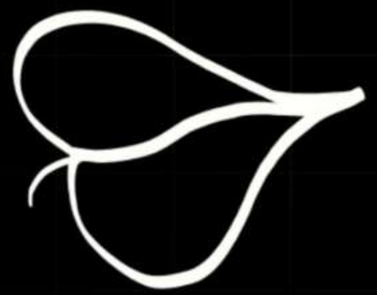
BACKLOG MARATHON SERIES

Next Toppers

TYPES OF LEAVES

two types of leaves

- Simple



- Compound
  - Pinnately compound
    ex: Neem
  - Palmately compound.
    ex: silk cotton.

- When its lamina is entire or when incised, the incisions do not touch the midrib.
- When the incisions of the lamina reach up to the midrib breaking it into a number of leaflets, the leaf is called compound

Marathon

Simple leaf

Marathon

Pinnately compound

Palmately compound

- Number of leaflets are present on a common axis, the rachis, which represents the midrib of the leaf as in neem
- In palmately compound leaves, the leaflets are attached at a common point, i.e., at the tip of petiole, as in silk cotton.

Marathon

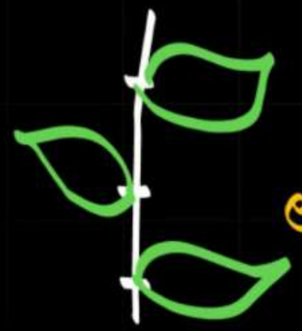
PHYLLOTAXY

Arrangement of leaves on stem or branch is called phyllotaxy.

Marathon

TYPES OF PHYLLOTAXY

Alternate

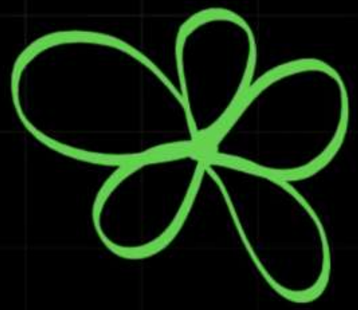


ex: chinarose, mustard, Sunflower plant.

opposite

ex: Calotropis & Guava

whorled



ex:- Alstonia

Alternate

Opposite

whorled

THE INFLORESCENCE

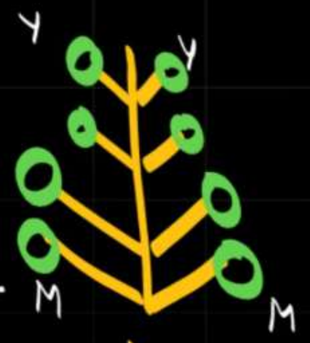
Arrangement of flowers on floral axis.

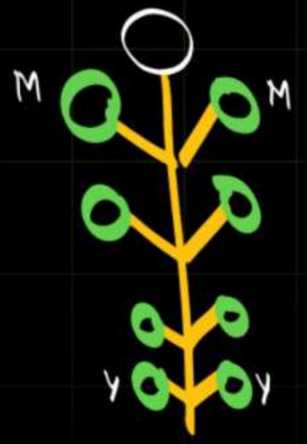
- Depending on whether the apex gets developed into a flower or continues to grow

Racemose

→ youngest flower at the top
mature flower at the Base

→ Unlimited growth (Acropetal order)

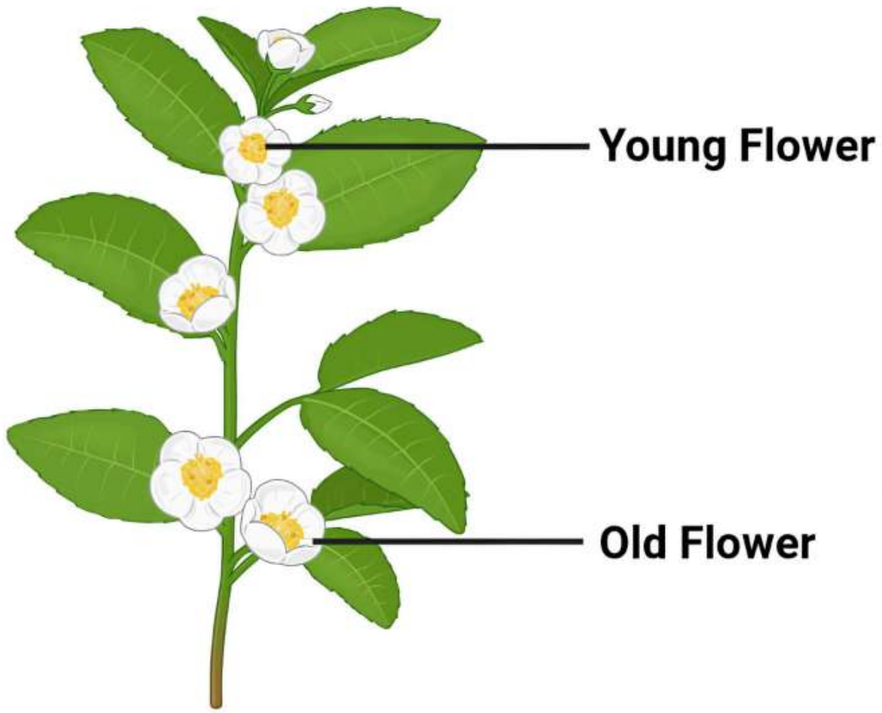




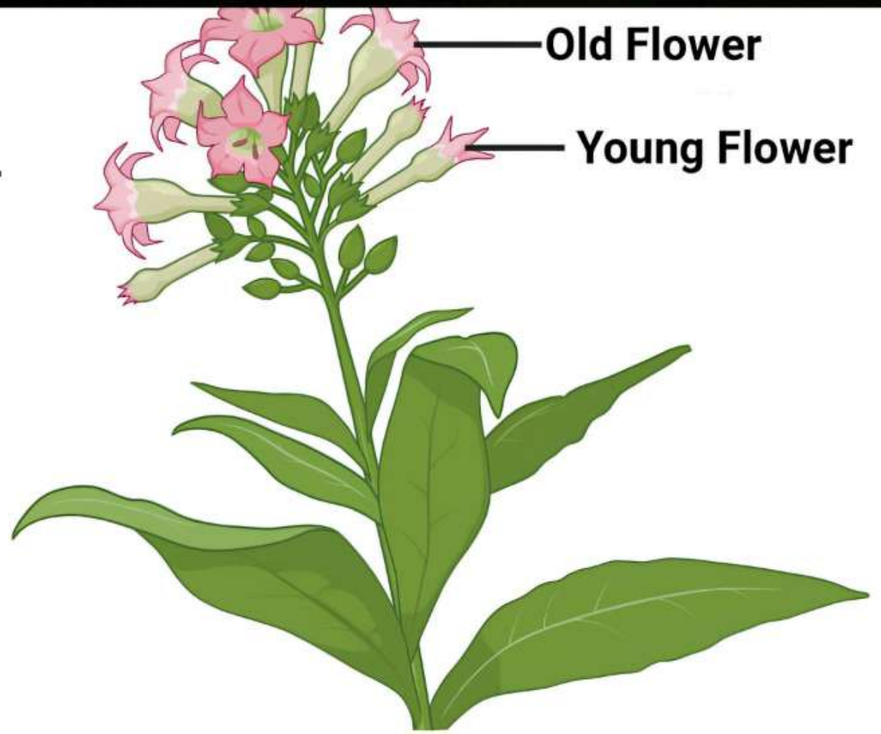
Cymose

→ youngest flower at the Base &
mature flower at the top.

→ Growth is limited (Apex terminate into flower)
(Basipetal order)



Racemose Inflorescence



Cymose Inflorescence

THE FLOWER

How flower is formed ⟶ Shoot Apical Meristem (SAM)

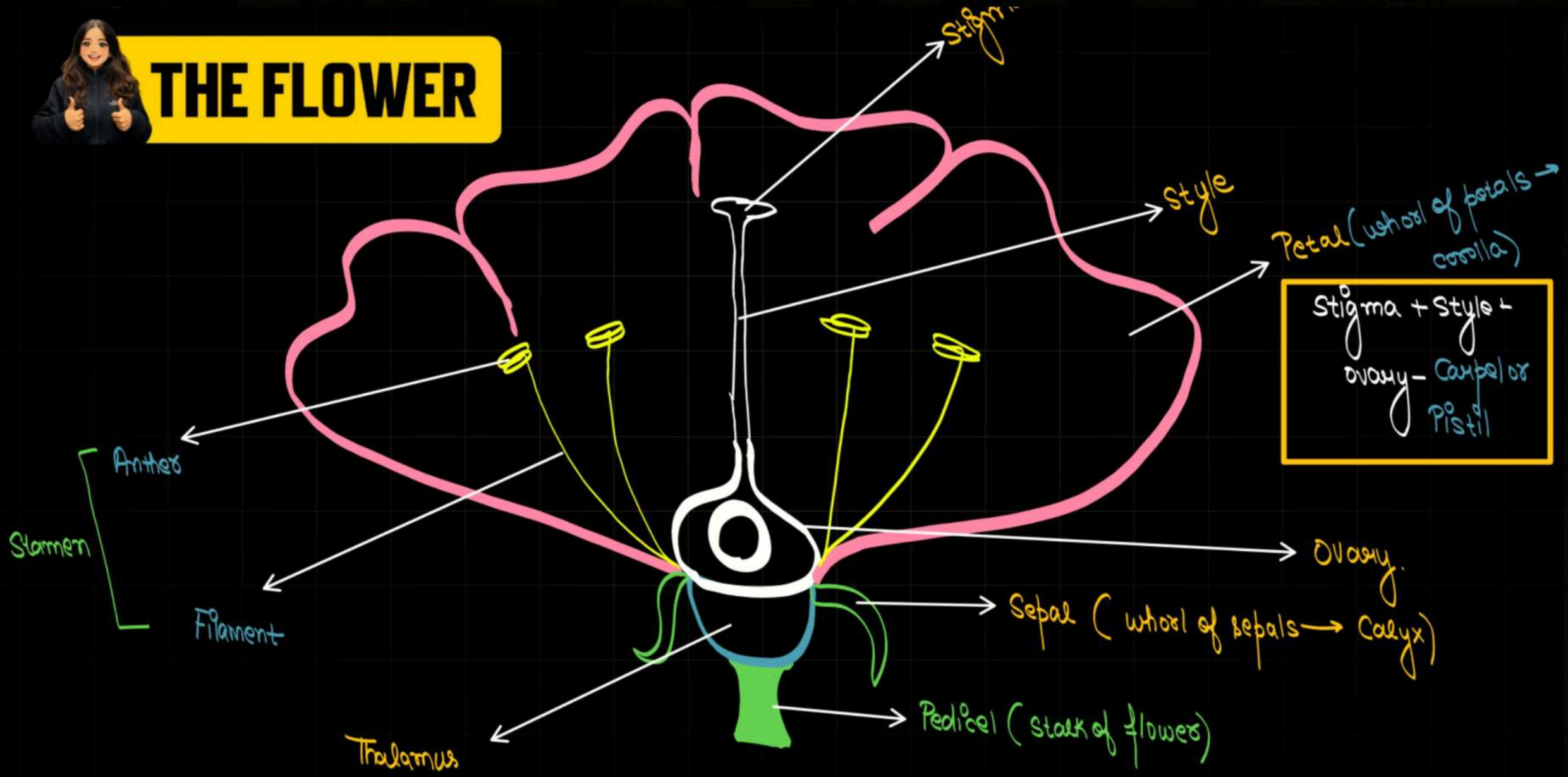
↓

Cells of shoot Apical meristem

↓

Floral meristem

THE FLOWER


Stigma
Style
Petal (whorl of petals → corolla)
Stigma + Style + ovary – Carpel or Pistil
Anther
Stamen
Filament
Ovary
Sepal (whorl of sepals → Calyx)
Pedicel (stalk of flower)
Thalamus

BACKLOG MARATHON SERIES

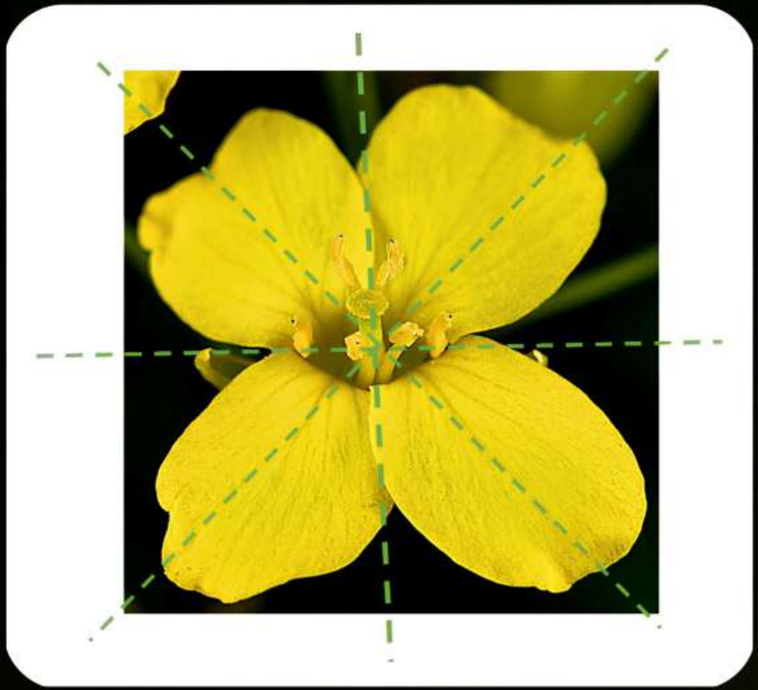
Next Toppers

FLOWER ON THE BASIS OF SYMMETRY

Actinomorphic
(Radial Symmetry)
eg: Mustard, Datura
chilli

Zygomorphic
(Bilateral Symmetry)
eg: pea, Gulmohar, Cassia, Bean

Asymmetric
eg: Canna



MUSTARD

DATURA

CHILLI

BEAN

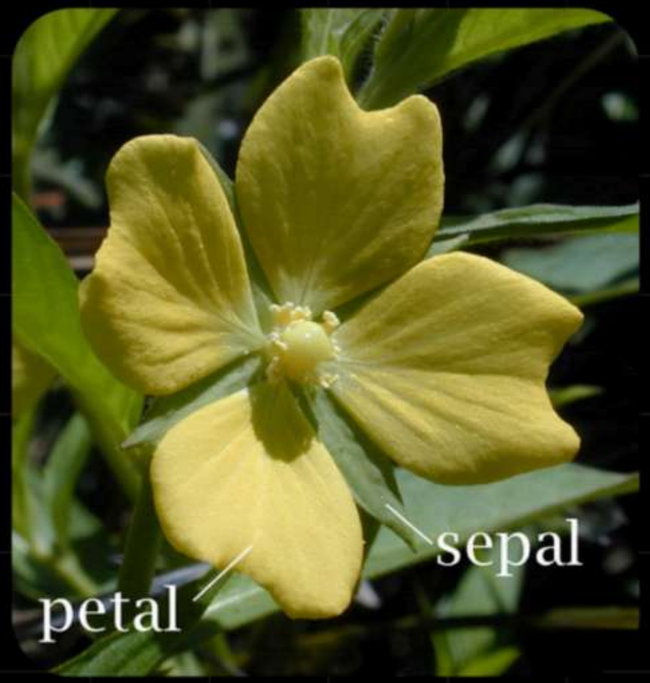
PEA

GULMOHUR

floral Appendages: Petals, sepals, stamen, pistil

trimerous

If floral appendages are present in multiple of 3.



tetramerous

If floral appendages are present in multiple of 4

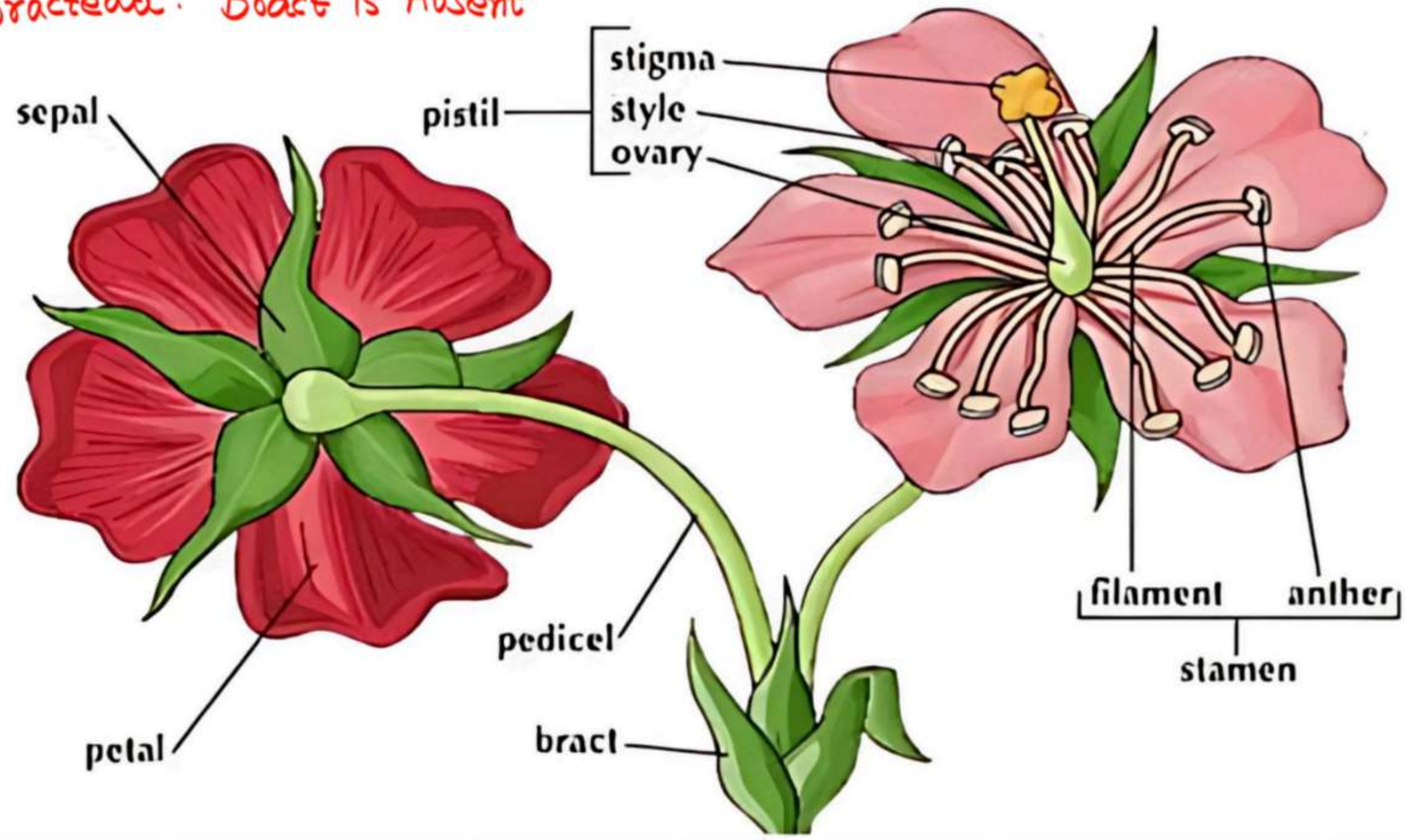
pentamerous

If floral appendages are present in multiple of 5

BACKLOG MARATHON SERIES

Next Toppers

Ebracteate: Bract is Absent



Bracteate flower: Bract is present (small leaf like structure present at the base of pedicel)

BACKLOG MARATHON SERIES

Next Toppers

FLOWER ON THE BASIS OF POSITION OF OVARY

Hypogynous

below Gynoecium

Ovary : Superior ovary

Ex: Mustard, chinarose & Brinjal

Perigynous

Ovary: Half Inferior

Ex: Plum, Peach & Rose

Epigynous

Above

Ovary : Inferior ovary

ex: Cucumber, Guava & Ray florets of Sunflower

BACKLOG MARATHON SERIES

Next Toppers

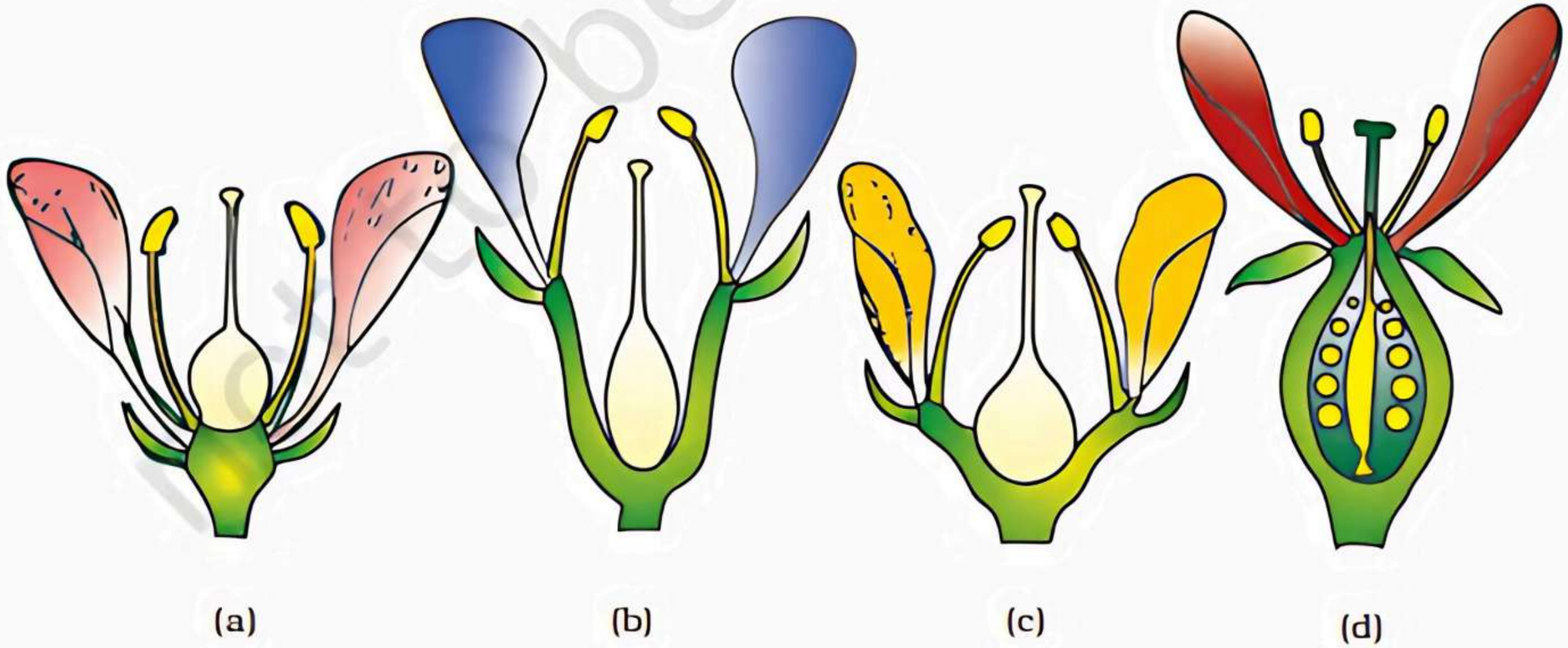


Figure 5.9 Position of floral parts on thalamus : (a) Hypogynous (b) and (c) Perigynous (d) Epigynous

PARTS OF A FLOWER

1. Calyx : whorl of sepals
   - (2) Outermost whorl
   - (3) Green in colour, protect flower in Bud stage

Calyx
- → Fused or United → Gamosepalous
- → Free → Polysepalous

② **Corolla** whorl of Petals

→ Bright coloured petals

Corolla
- → Fused or United → Gamopetalous
- → Free → Polypetalous.

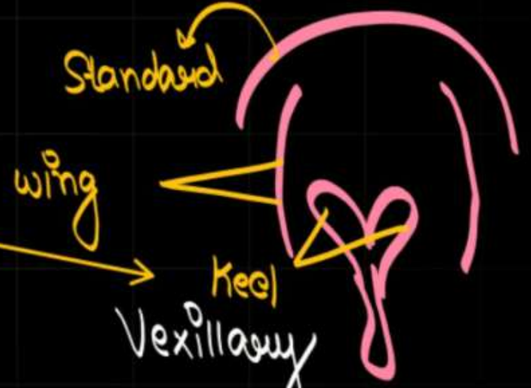
BACKLOG MARATHON SERIES

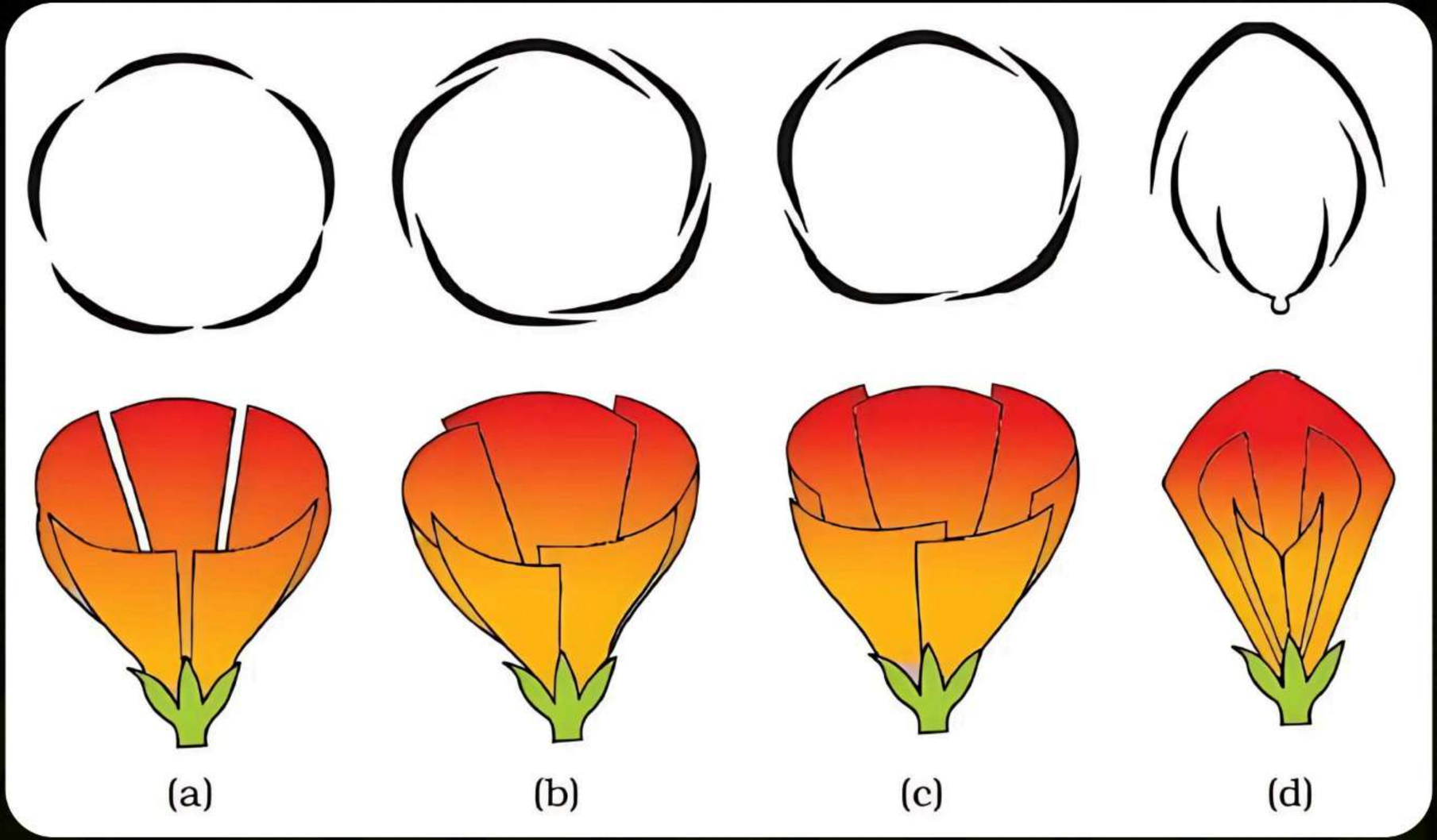
Next Toppers

AESTIVATION

Arrangement of Calyx & corolla on floral bud with respect to other members of their whorl

- **Valvate**
  (when petals touch eachother at margin)
  ex: Calotropis
- **Twisted**
  (Petals overlap each other in particular manner)
  eg: chinarose, ladyfinger, cotton.
- **Imbricate**
  Petals don't overlap each other in particular direction
  eg: Cassia & Gulmohur
- **Vexillary**
  5 petals
  1 Standard Petal, 2 wings, 2 Keel
  Ex: pea & Bean flower.



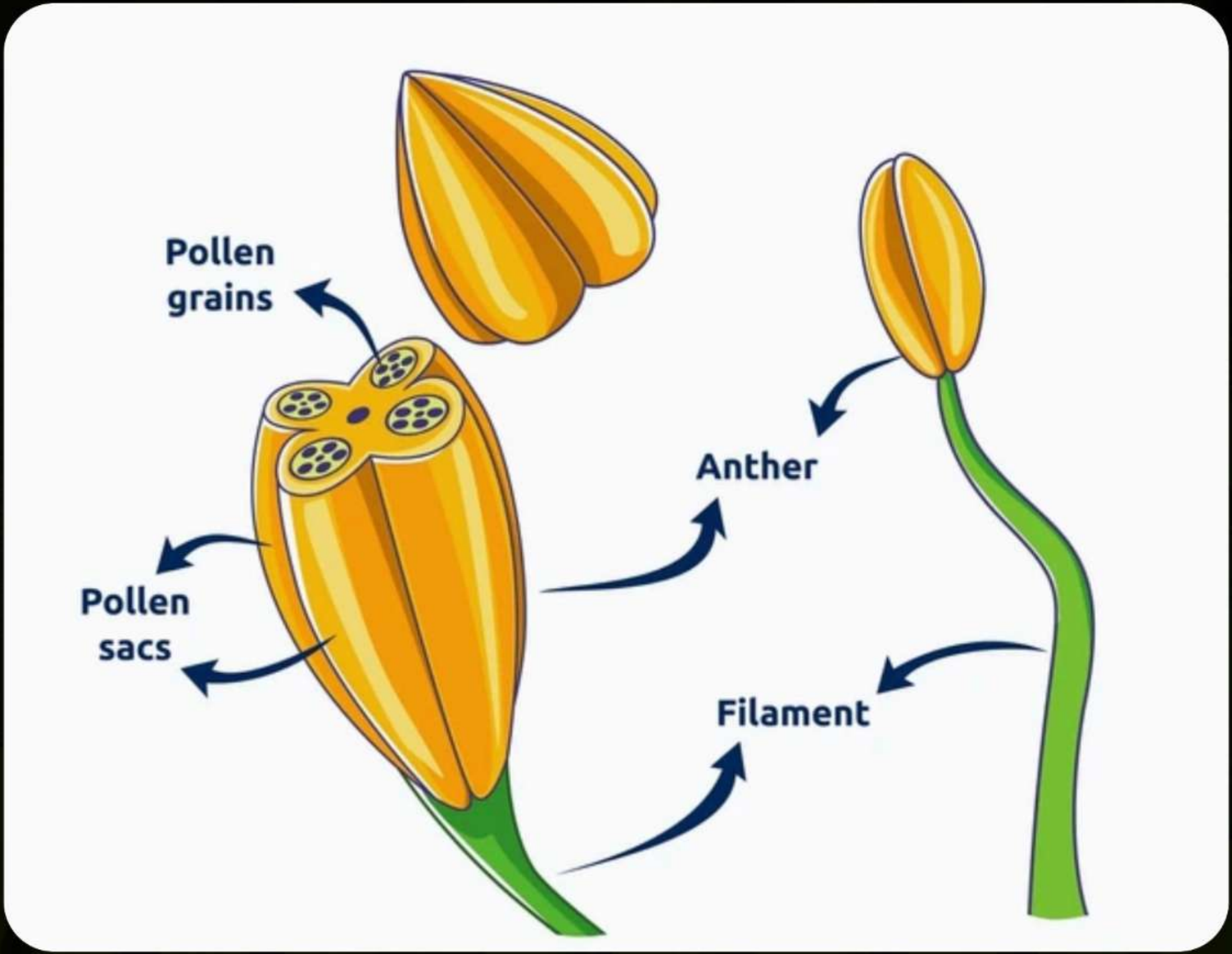

(a)
(b)
(c)
(d)

ANDROECIUM

→ Whorl of stamen

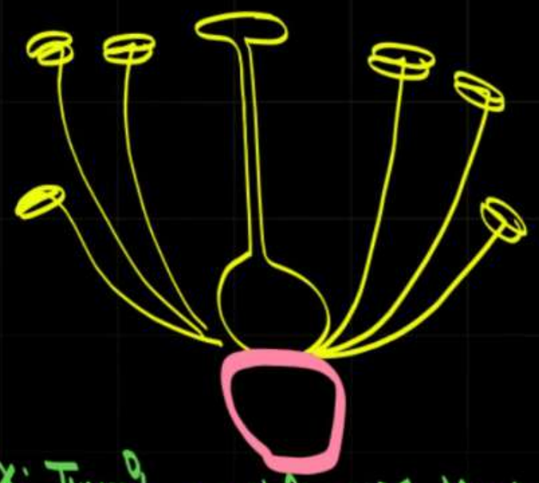
→ Male reproductive structure

→ Third whorl


Pollen grains
Pollen sacs
Anther
Filament

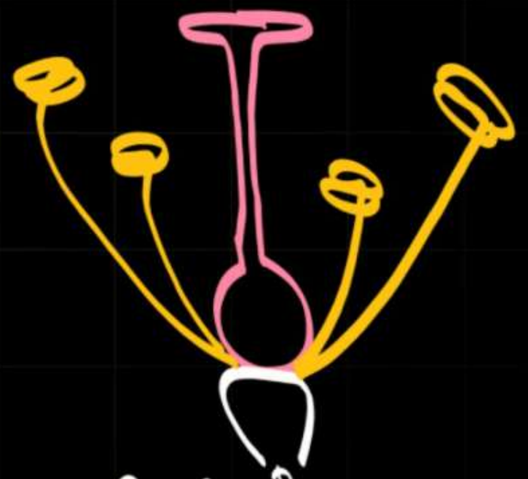
LENGTH OF STAMEN

Tetradynamous



ex: Turnip, cauliflower, Mustard

Didynamous



ex: Cassia

Tetradynamous

Didynamous

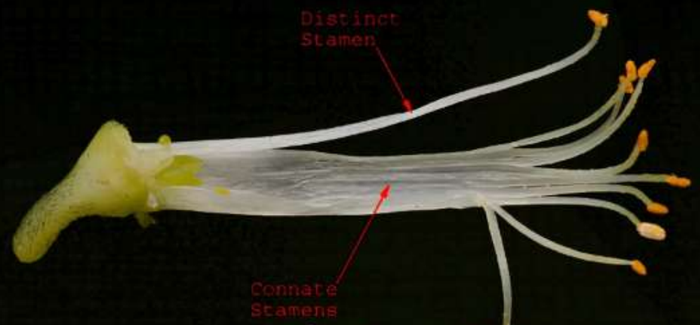
Stamens are fused with themselves or with other whorl such as petals

Cohesion — Adhesion

(1) Adelphous: Anther free but filaments are fused

- Monoadelphous
  - Only one bundle
  - eg: chinarose
- Diadelphous
  - forming two bundles.
  - eg: pea
- Polyadelphous
  - forming many Bundles.
  - eg: citrus.

Monoadelphous



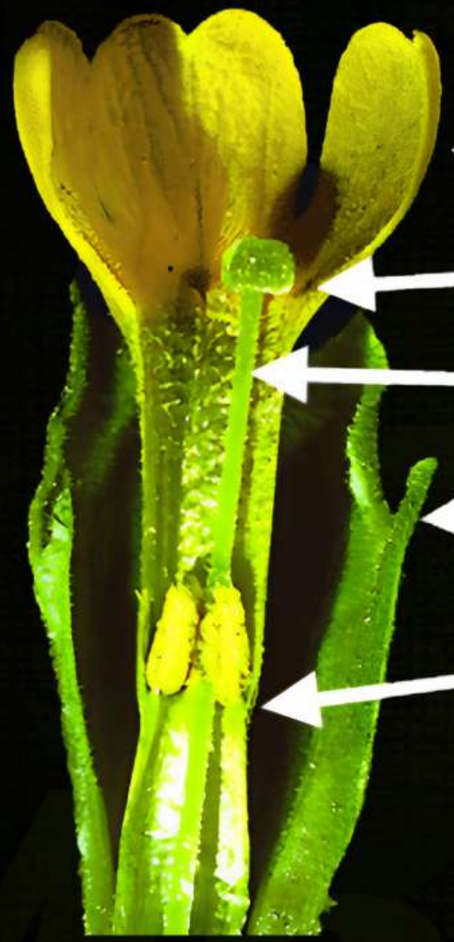
Diadelphous.

Polyadelphous.

(2) Polyandrous : Both Anther & filaments are free

Adhesion :
- → Epipetalous → Stamen is fused with corolla eg : Brinjal
- → Epiphyllous → Stamen is fused with Perianth (calyx & corolla are fused)

ex : lily.


connate petals
stigma
style
connate sepals
epipetalous
stamens

GYNOECIUM

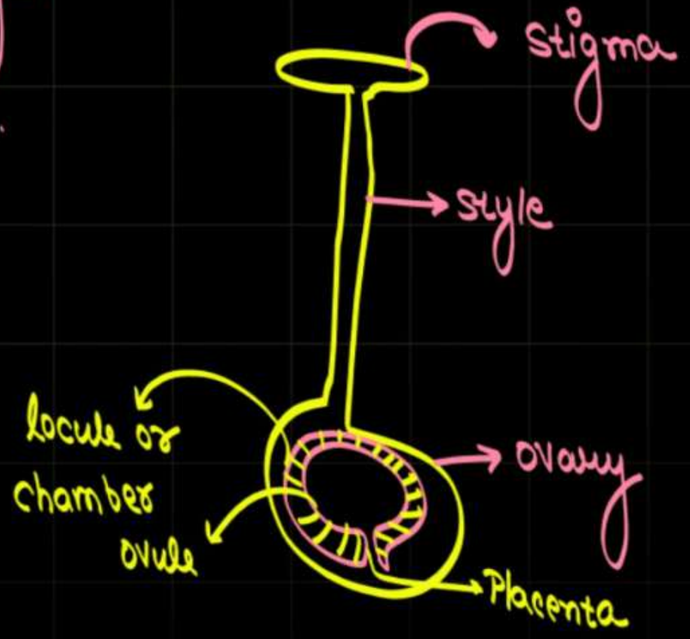
→ 4 whorl

→ Female Reproductive organ

→ whorl of pistil or carpel.

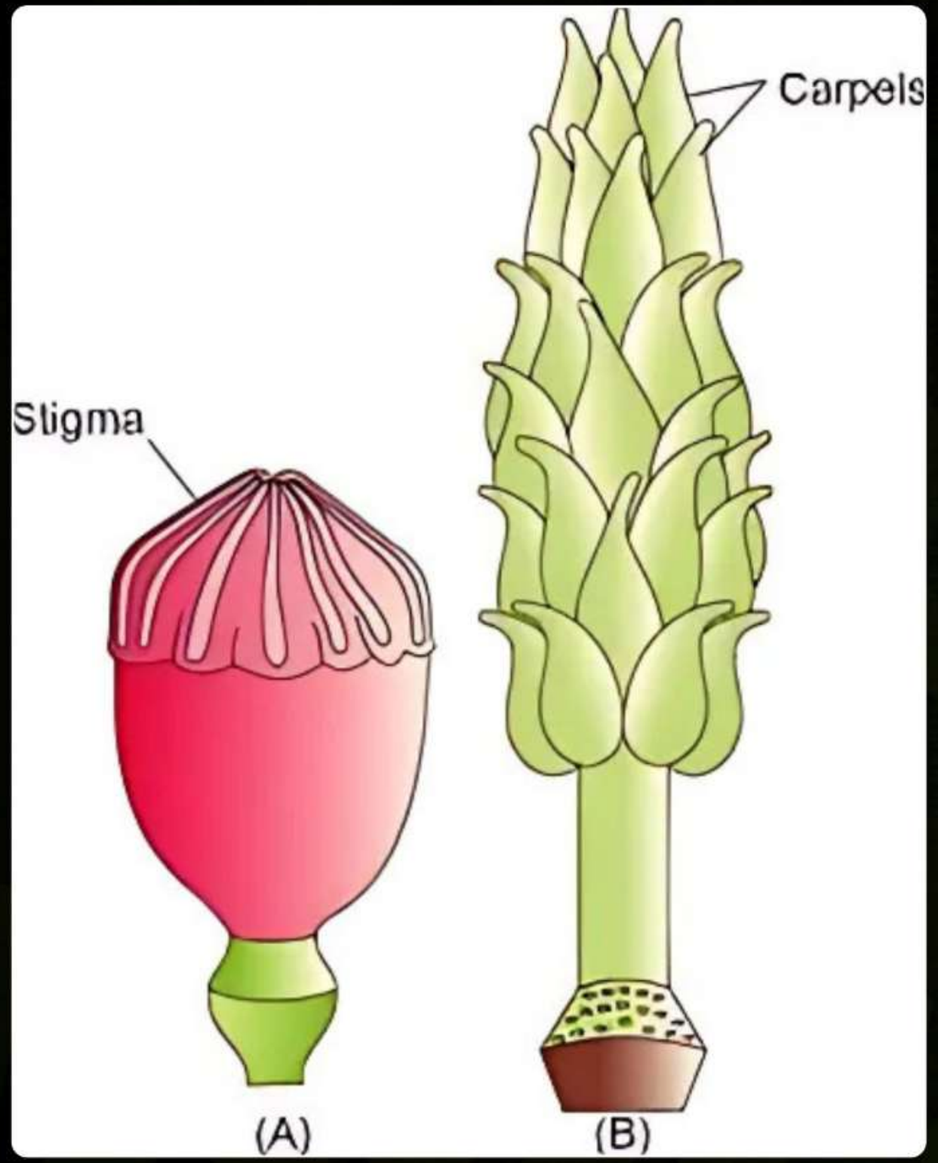
If one carpel → monocarpellary

multiple → multicarpellary



BACKLOG MARATHON SERIES

Next Toppers



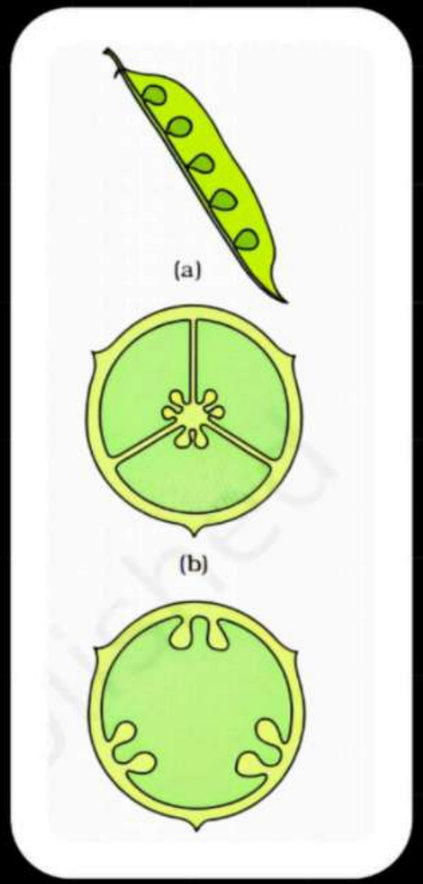
Multicarpellary

- Carpels are free
  - Apocarpous
  - ex: Michelia
- Carpels are fused
  - Syncarpous
  - eg: Papaver

BACKLOG MARATHON SERIES

Next Toppers

PLACENTATION



Arrangement of ovule on placenta (nutritive tissue)

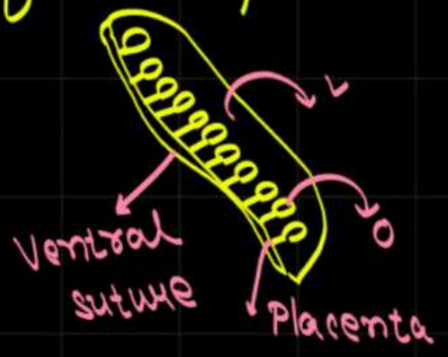
(1) Marginal

(2) Axile

(3) Parietal

(4) Free central

(5) Basal Placentation



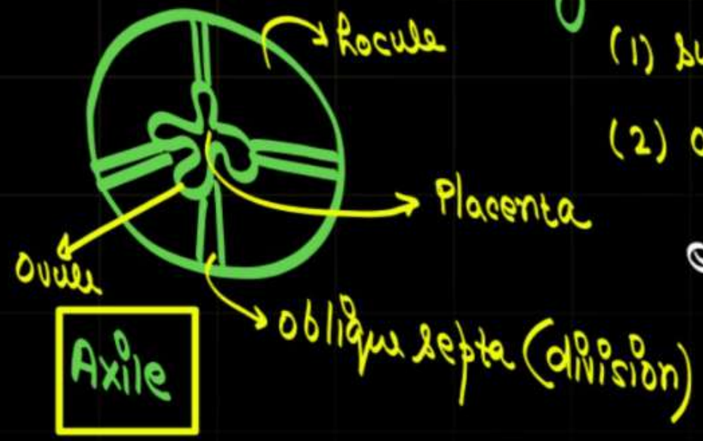
ex: Pea (Pisum sativum)

Marginal

(1) swollen placenta

(2) oblique septa.

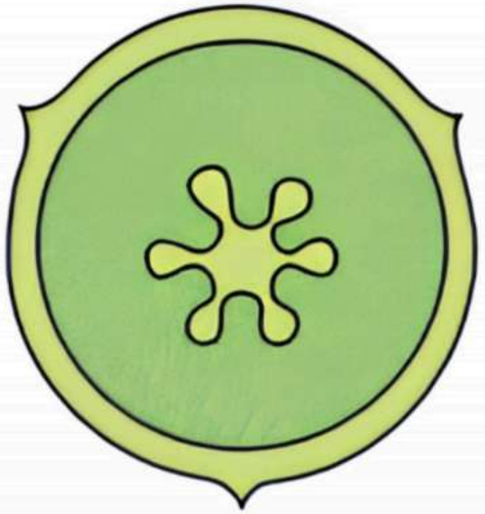
eg: chinarose, Tomato & Lemon



Axile

BACKLOG MARATHON SERIES

Next Toppers

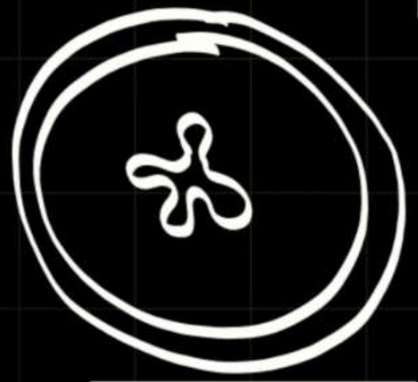


(d)

(e)

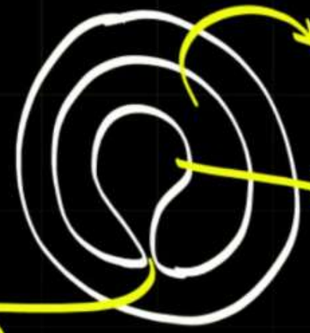
eg: mustard & argemone

Parietal placentation



eg: Dianthus & Primrose

Free central



eg: Sunflower & Marigold

- In marginal placentation the placenta forms a ridge along the ventral suture of the ovary and the ovules are borne on this ridge forming two rows.
- When the placenta is axial and the ovules are attached to it in a multilocular ovary, the placentaion is said to be axile.
- In parietal placentation, the ovules develop on the inner wall of the ovary or on peripheral part.

Marathon

- When the ovules are borne on central axis and septa are absent, the placentation is called free central.
- In basal placentation, the placenta develops at the base of ovary and a single ovule is attached to it.

Marathon

Marginal Placentation

Free central

Axile placentation

Parietal Placentation

THE FRUIT

Ripened ovary ⟶ Fruit

When fruit is formed without fertilization called parthenocarpic fruit.

Ovary wall ⟶ Fruit wall (Pericarp) 3 layers

- Outer → Epicarp
- Middle → Mesocarp
- Inner → Endocarp

Drupe : fleshy fruit with stony endocarp

eg: Mango & Coconut

BACKLOG MARATHON SERIES

Next Toppers

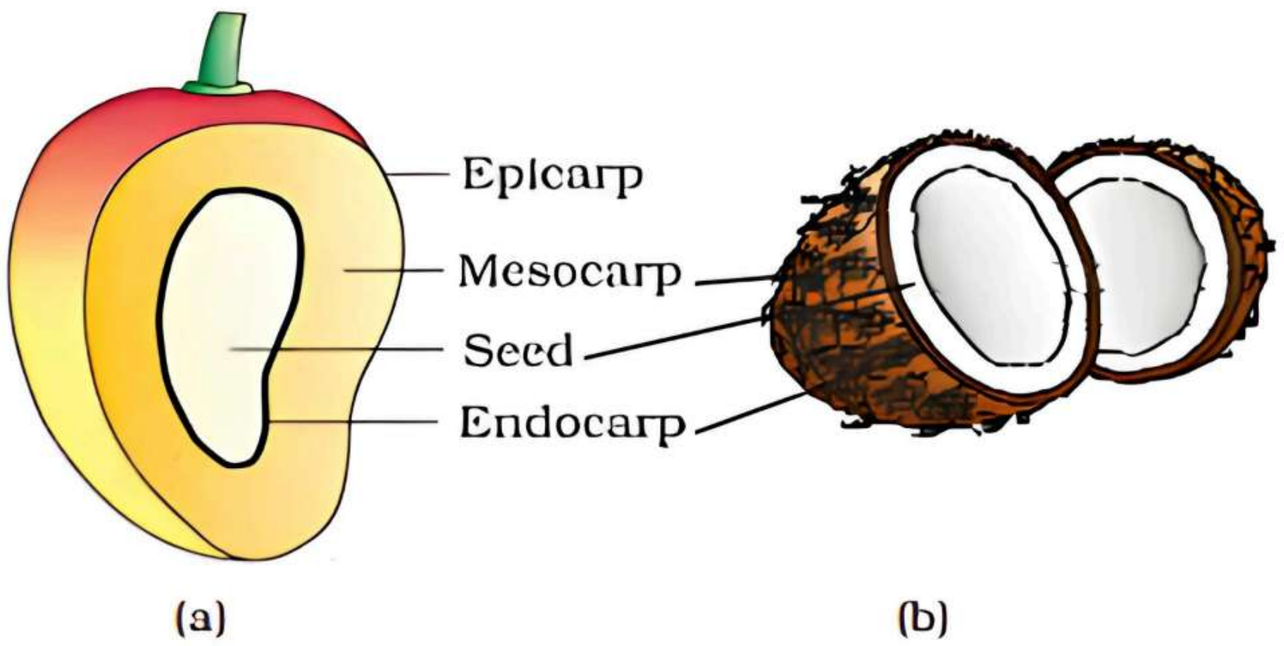


Figure 5.13 Parts of a fruit : (a) Mango (b) Coconut

THE SEED

Ovule → Seed

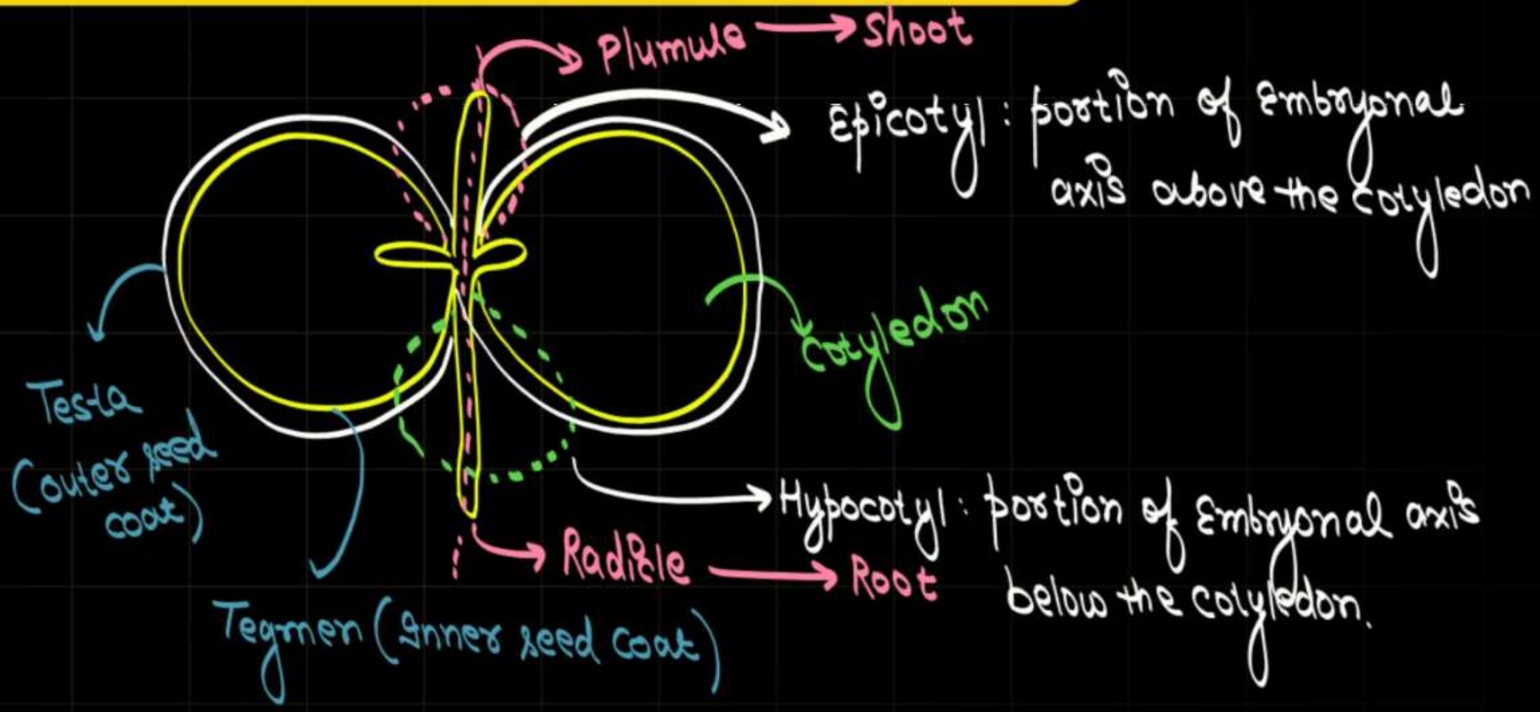
- Seed coat
  - outer coat (Testa)
  - Inner coat (Tegmen)

Seed
- Dicot Seed
- Monocot seed

BACKLOG MARATHON SERIES

Next Toppers

STRUCTURE OF A DICOTYLEDONOUS SEED



Endosperm : Reserve food material for Developing Embryo.

Endosperm

Non-Endospermous

Endosperm is completely consumed by Developing Embryo

ex: pea, Groundnut

Endospermous

Endosperm is left

eg: Castor

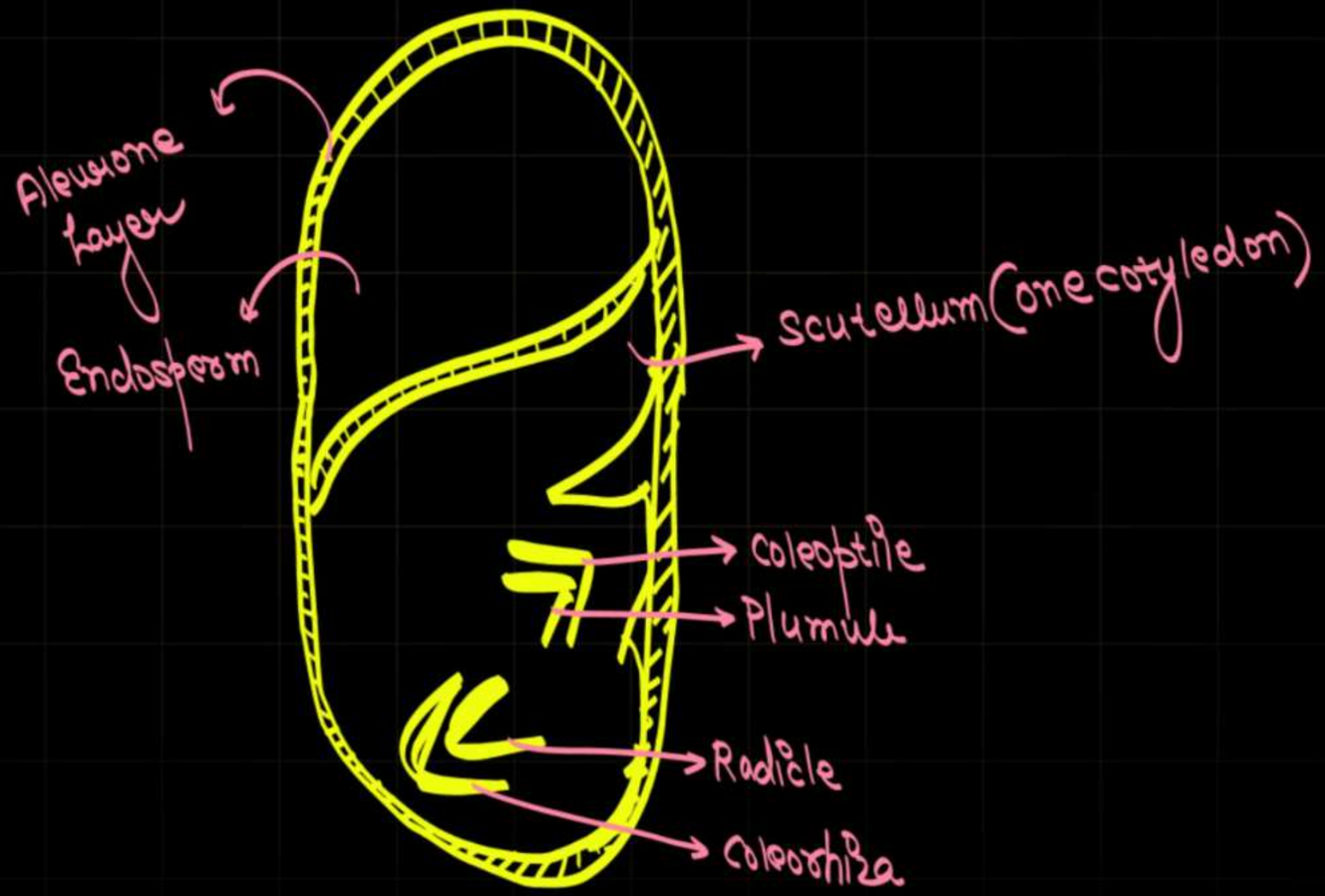
mostly monocot seeds are endospermous

Exception — Orchid (non-Endospermous)

BACKLOG MARATHON SERIES

Next Toppers

STRUCTURE OF MONOCOTYLEDONOUS SEED



Next Toppers

THANK YOU