

Non Chordata Part I

I Semester B.Sc. Zoology Core Course 1

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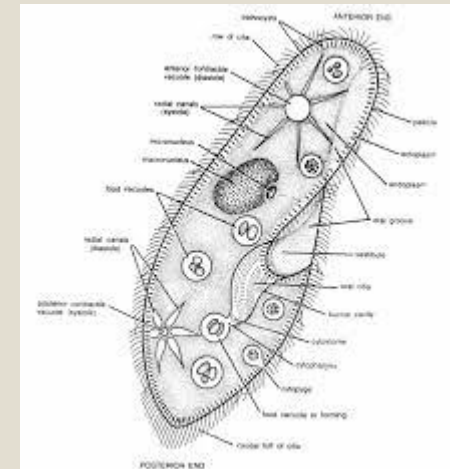
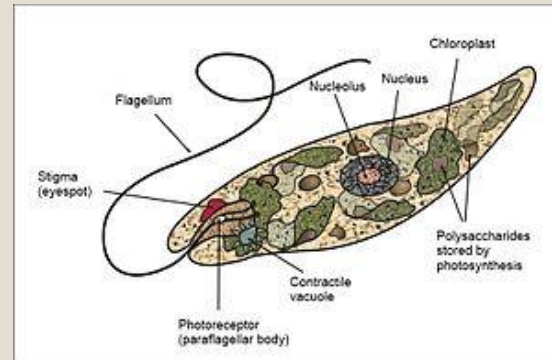
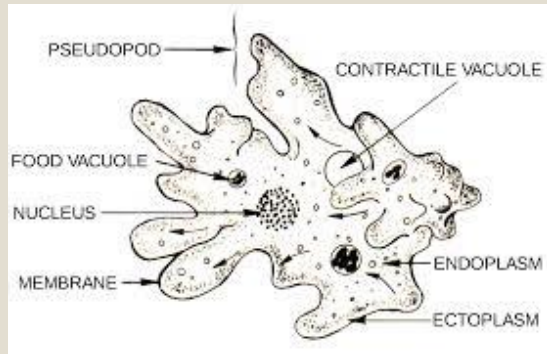
KINGDOM PROTISTA

PROTISTA - INTRODUCTION

- ERNEST HAECKEL proposed new Kingdom PROTISTA (First of all/ to establish)
- Protista is a group of highly diverse group of mostly aquatic, unicellular, colonial or coenobial eukaryotes.
- Bridges gap between plants & animals / prokaryotic monerans and multicellular eukaryotes

Salient Features

- Acellular or colonial body without tissues or organs
- Locomotor structures include **PSEUDOPODIA**, **FLAGELLA** and **CILIA**
- Nutrition autotrophic or heterotrophic
- Cyst formation – encystment & excystment
- Reproduction is asexual & sexual

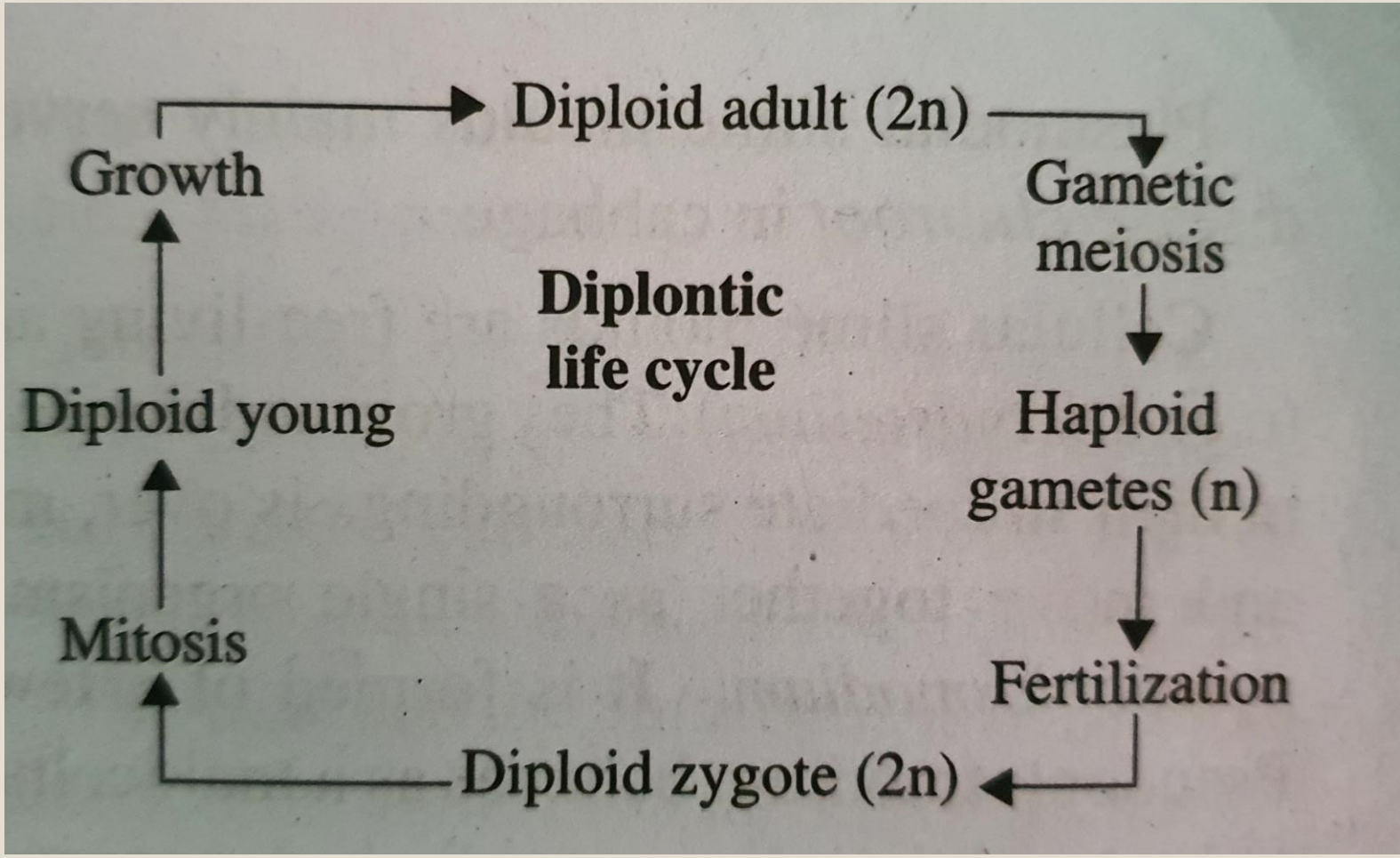


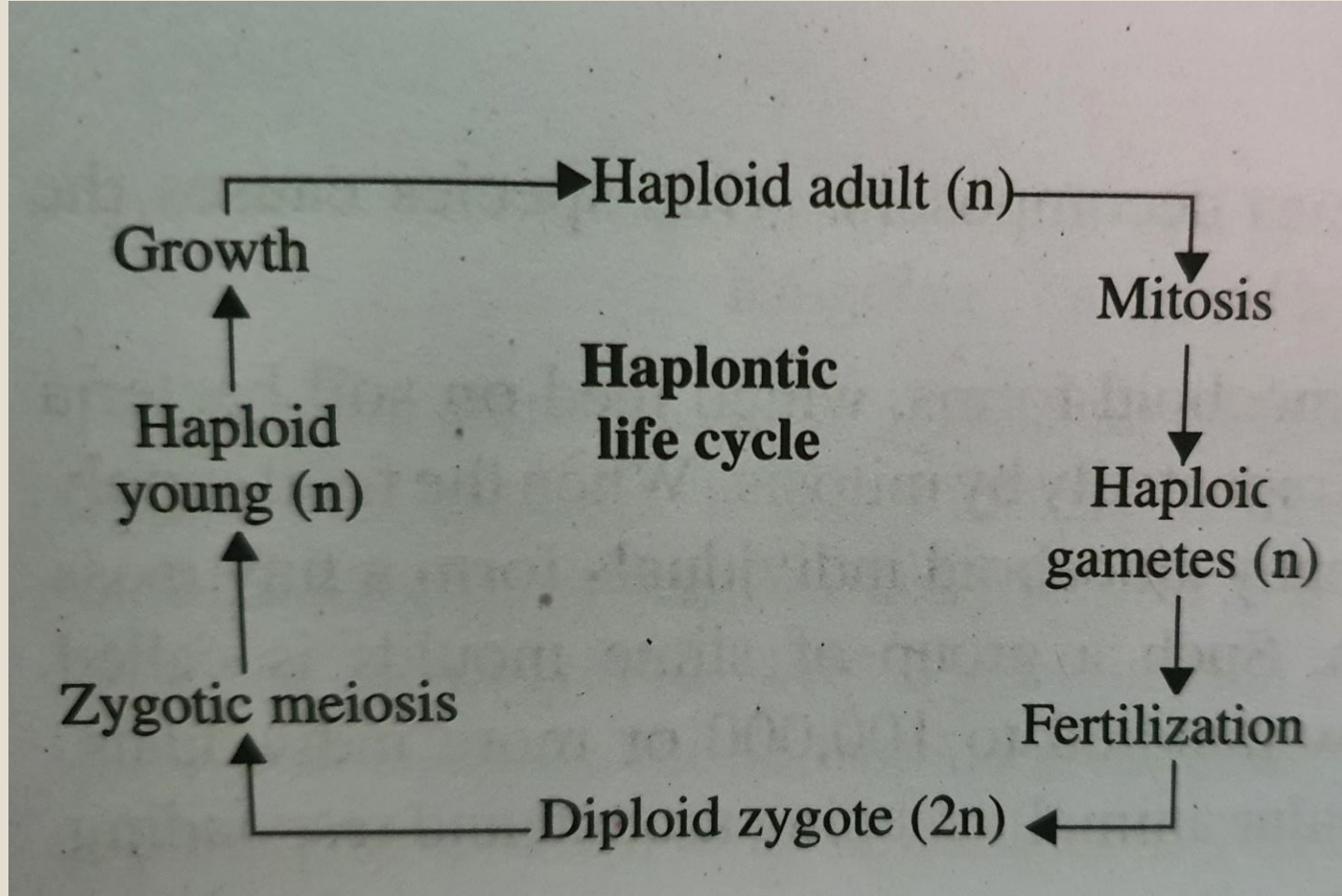
Salient Features

- Asexual – fission, plasmotomy & Budding
- Fission – binary fission (Paramecium) & multiple fission (Plasmodium)
- Plasmotomy – Oplina (multinucleate)
- Budding – buds – from a prominence of the body
- Sexual reproduction – syngamy – zygote
- Sexual reproduction – offspring
- Asexual reproduction – clones

SEXUAL REPRODUCTION

- In sexual reproduction - haploid forms divide mitotically and form haploid gametes. These fuse in pairs and form diploid zygotes.
- Zygotes undergo meiosis and produce haploid individuals. This is called **zygotic meiosis**.
- In diploid forms undergo meiosis and form haploid gametes. This is called **gametic meiosis**.
- These gametes fuse in pairs and form diploid zygotes. The zygotes undergo mitosis and form diploid individuals.
- In haploid forms, mitosis gives rise to gametes, and meiosis gives rise to adults.
- In diploid forms, mitosis produces adults and meiosis produces gametes.
- The life cycle with gametic meiosis prominent diploid adult stage is called **diplontic life cycle**
- The life cycle with zygotic meiosis and prominent haploid adult stage is called **haplontic life cycle**.







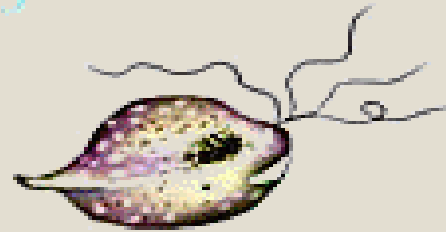
Trypanosoms



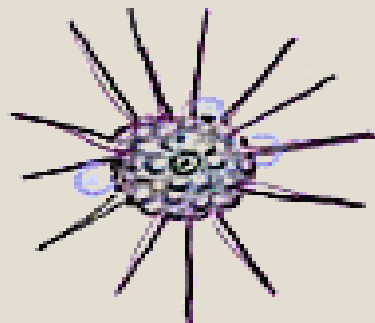
Eualena



Lextilaria



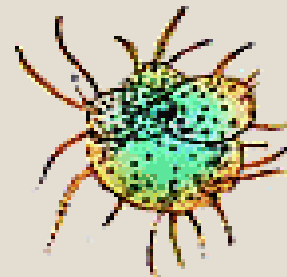
Trichomonas



Achinophrys



Dittulgia



Textularia



vorticella



Paramecium



Coleps



Stentor

CLASSIFICATION

- Fungal Protists
- Protophyta
- Protozoa

FUNGAL PROTISTS

- Saprophytic or parasitic protists – fungi & animals
- 1) Slime moulds (Myxomycophyta)
- Egs., Physarum, Tubifera, Dictyostelium
- 2) Parasitic microsporidians (Microsporidia)
- Egs., Nosema, Microsporidium, Brachiola

PROTOPHYTA

- Plant like protists
- Algal protist or chlorophyll bearing photosynthetic protists
- Egs. Peridinium, Noctiluca, Ceratium, Diatoma, Euglena, Porphyra

PROTOZOA

- Chlorophyll – lacking, non – photosynthetic protists
- Major producers of biosphere
- Egs. Amoeba, Entamoeba, Trypanosoma, Paramecium, Plasmodium

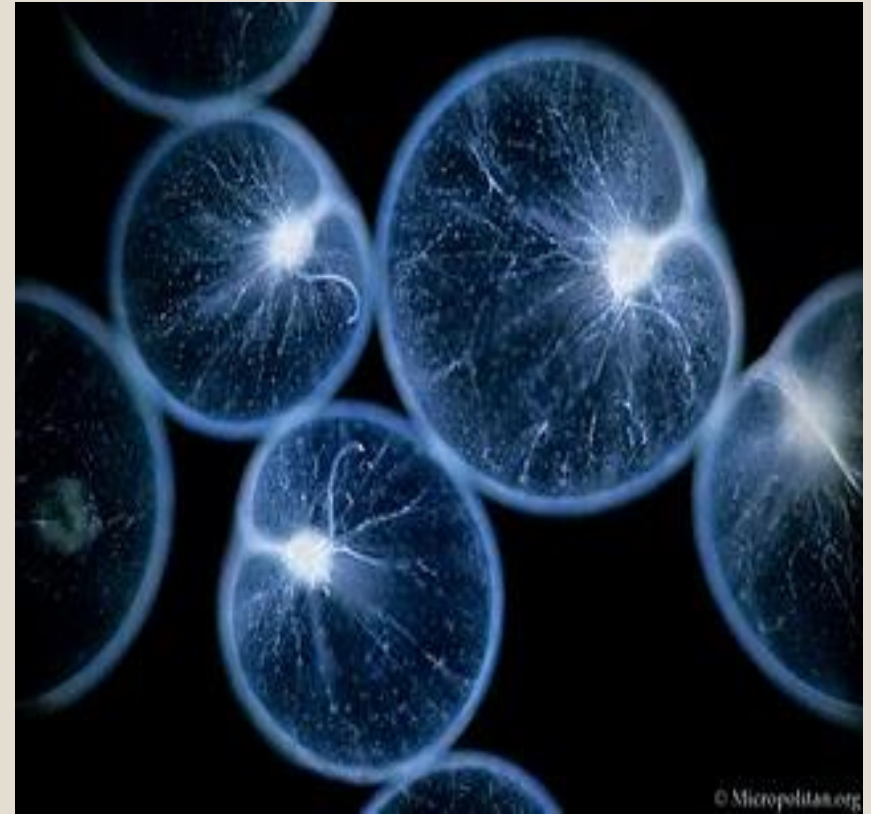
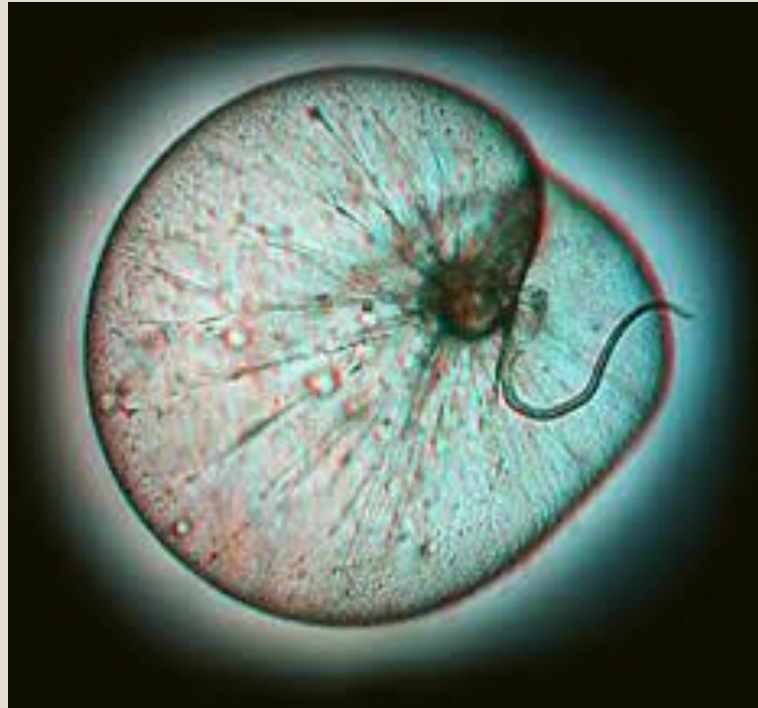
Phylum - Dinoflagellata

- Dinoflagellata is a large group of *biflagellate, photosynthetic or heterotrophic protists*, whose body is enclosed within a shell, called *lorica* or *theca*.
- Nearly 2000 species of living dinoflagellates have been identified so far.
- The common examples are *Noctiluca*, *Ceratium*, *Gymnodinium*, *Glenodinium*, *Peridinium*, *Gonyaulax*, etc.
- Most dinoflagellates are marine forms, and some are fresh-water forms.
- Together with diatoms, they constitute the most important primary producers of the marine eco system.
- Some forms, such as *zooxanthellae*, are *endosymbionts* of marine animals and they play an important role in the biology of coral reefs (*zooxanthellae* are yellow or brown unicellular symbiotic dinoflagellates and other algae; green unicellular symbiotic algae are called *zoochlorellae*).

Phylum - Dinoflagellata

- Dense populations of some marine dinoflagellates (such as *Noctiluca*, *Gymnodinium*, *Gonyaulax*, etc.) often cause the phenomenon of *red tide*, which makes the sea surface red.
- Red tide can be disastrous to other marine life, because these dense populations compete with other organisms for oxygen and produce toxic substances.
- Severe outbreaks of red tide sometimes cause air pollution, resulting in respiratory complaints in the people living nearby. The cause of red tide is not definitely understood.
- Many species of dinoflagellates exhibit *bioluminescence*; they emit light which makes the sea surface glowing in darkness.
- Light is produced by the oxidation of the protein *luciferin* by the enzyme *luciferase*

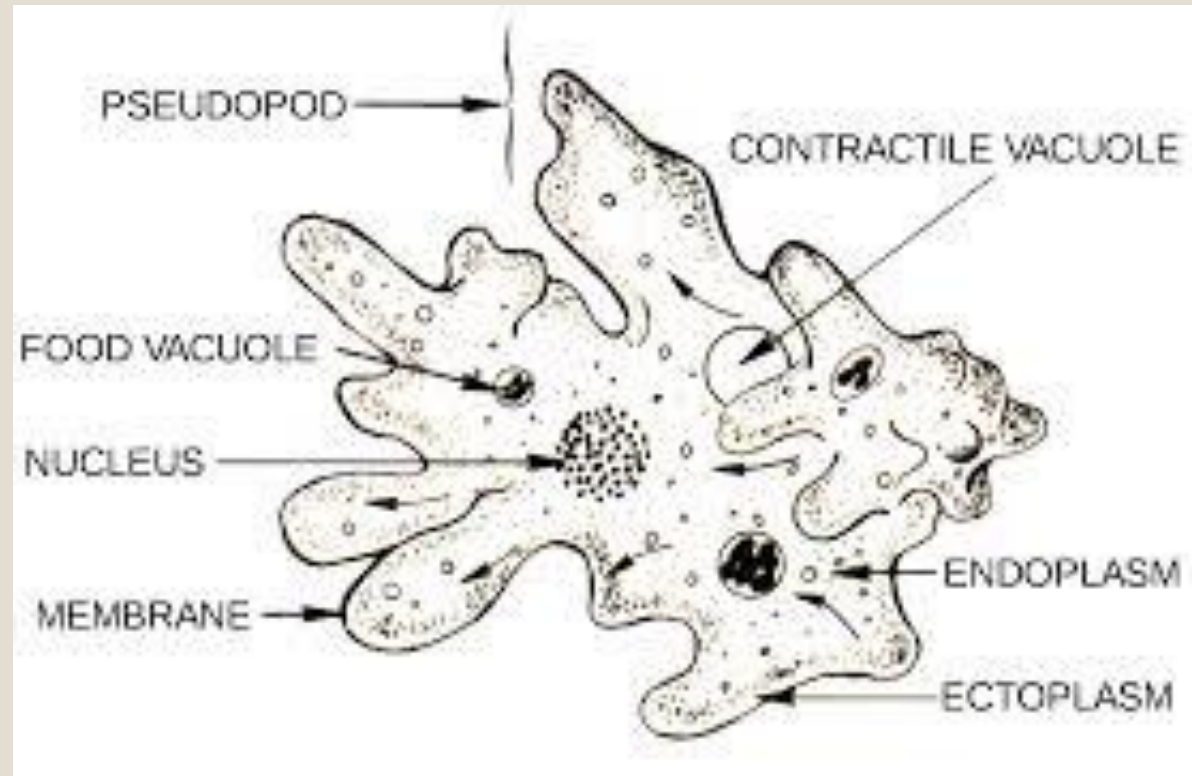
NOCTILUCA



Phylum - Rhizopoda

- Rhizopoda is a group of pseudopodia bearing amoeboid protists.
- Body is symmetrical or asymmetrical –without definite anterior and posterior ends or dorsal and ventral surfaces
- Cytoplasm marked to ectoplasm and endoplasm
- Locomotion – pseudopodia
- Contractile vacuoles present in freshwater forms for osmoregulation
- Nutrition – holozoic. Some are saprobes
- Asexual reproduction by binary fission
- Encystment occurs during unfavourable seasons
- Examples :- Amoeba, Entamoeba, Arcella, etc

AMOEBA

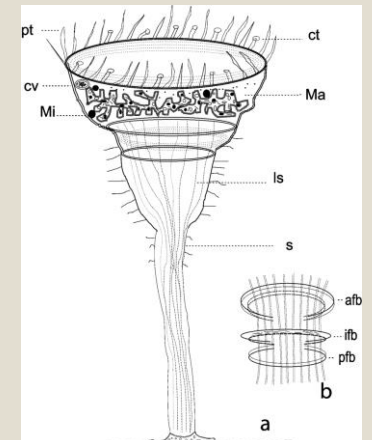
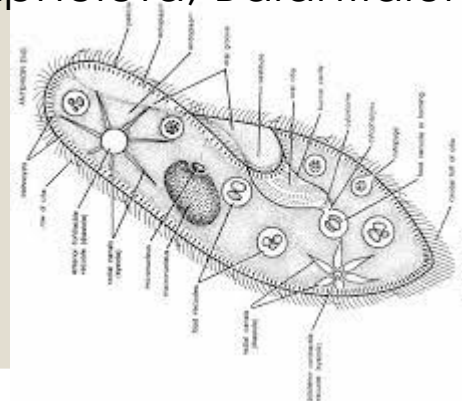
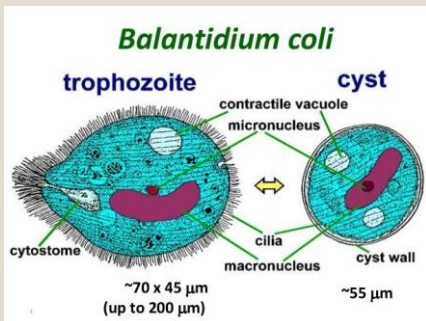
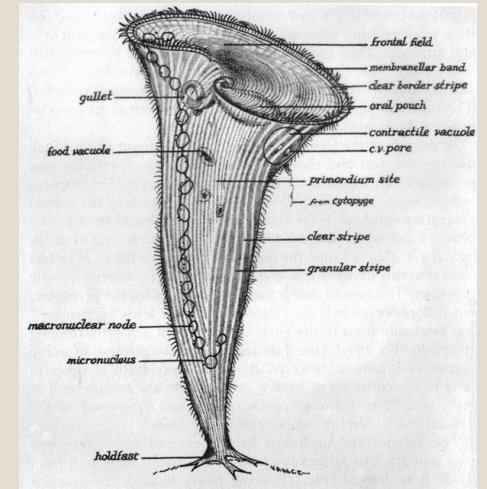


Phylum - Ciliophora

- Large group of highly diverse, cilia-bearing, binucleate or multinucleate protists commonly called ciliates
- Symmetrical or nearly symmetrical body with permanent shape and definite anterior and posterior ends
- Body covered by pellicle – outer cell membrane and an inner alveolar layer of flattened membraneous sacs
- Presence of cilia through out life – locomotor, food collection and ingestory organelles
- Presence of a complex, fibrillary, infra-ciliary apparatus below the pellicle. It consist of kinetosomes and kinetodesmata
- Cytoplasm – outer cortex (ectoplasm) and inner medulla (endoplasm)
- Presence of saccular extrusomes called trichocysts – cortex – adhesion, anchorage and defence

Phylum - Ciliophora

- Presence of ingestory or food collecting apparatus in free living forms
- Heterokaryotic and dimorphic nuclear apparatus – small micronucleus and large macronuclei. Micronucleus – reproduction & macronucleus – metabolism
- Nutrition – holozoic – free living forms & parasitic – saprotrophic
- Asexual reproduction – binary fission, conjugation, endomixis, etc
- 8000 sps of ciliates – free living and parasitic – freshwater, salt water, moist soil, Antarctic ice, hot springs, etc.
- Examples:- Paramecium, Vorticella, Ephelota, Balantidium, Stentor, etc



VORTICELLA



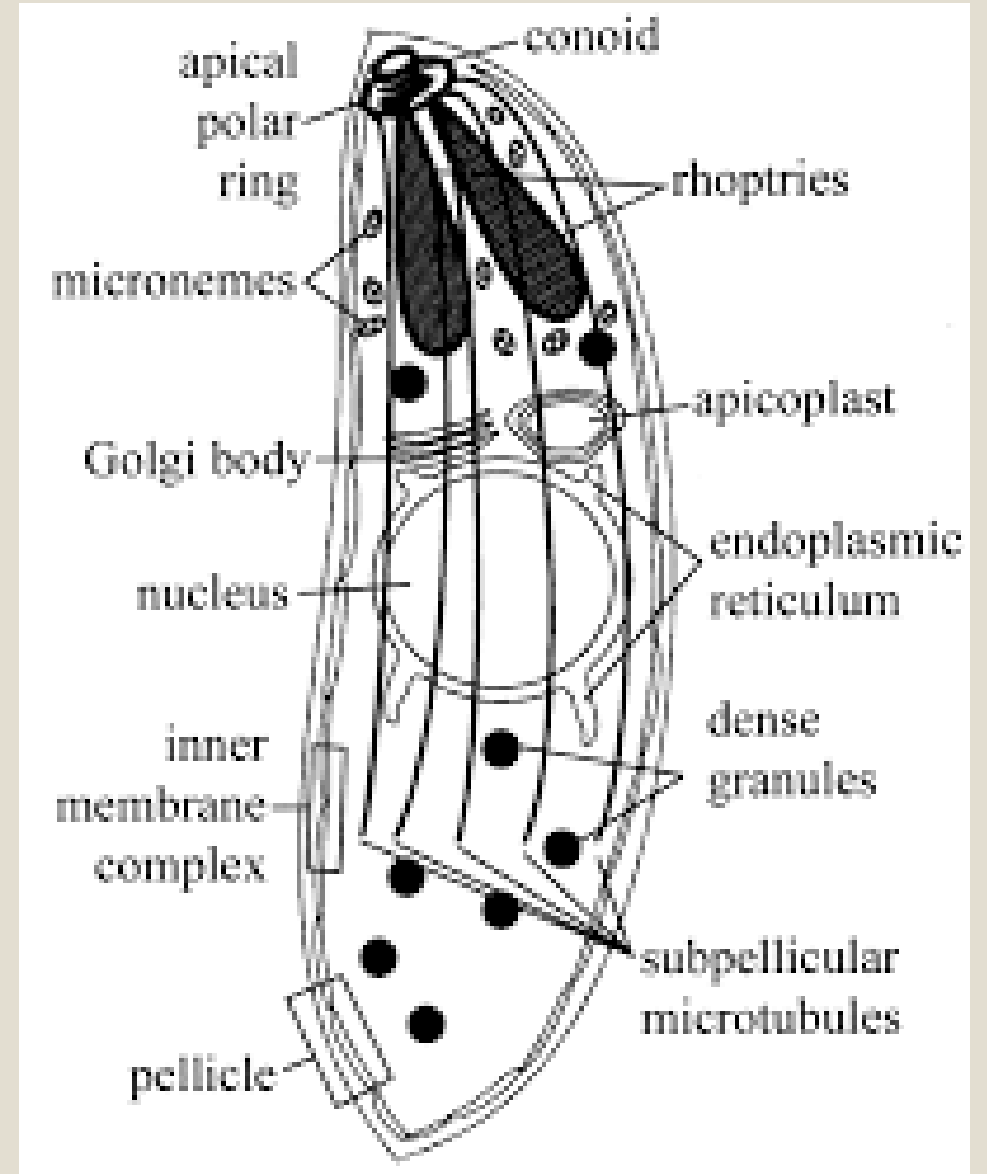
Phylum - Apicomplexa

- A heterogenous group of spore forming obligatory endoparasitic protists characterized by apical complex
- Body covered by semi rigid pellicle. It consists of outer plasma membrane and two alveolar membranes
- Absence of locomotor structure in adults - gametes have flagella and immature forms – pseudopodia
- Apical organelle – apical complex - in infective motile stage for adhesion or penetration. Cone like complex structure with one or two polar rings of microtubules, several flask like glandular structures – rhoptries and numerous tubular micronemes. Secretes enzymes which dissolves the host cells for adhesion or penetration
- Cytoplasm may nor may not marked into ectoplasm and endoplasm

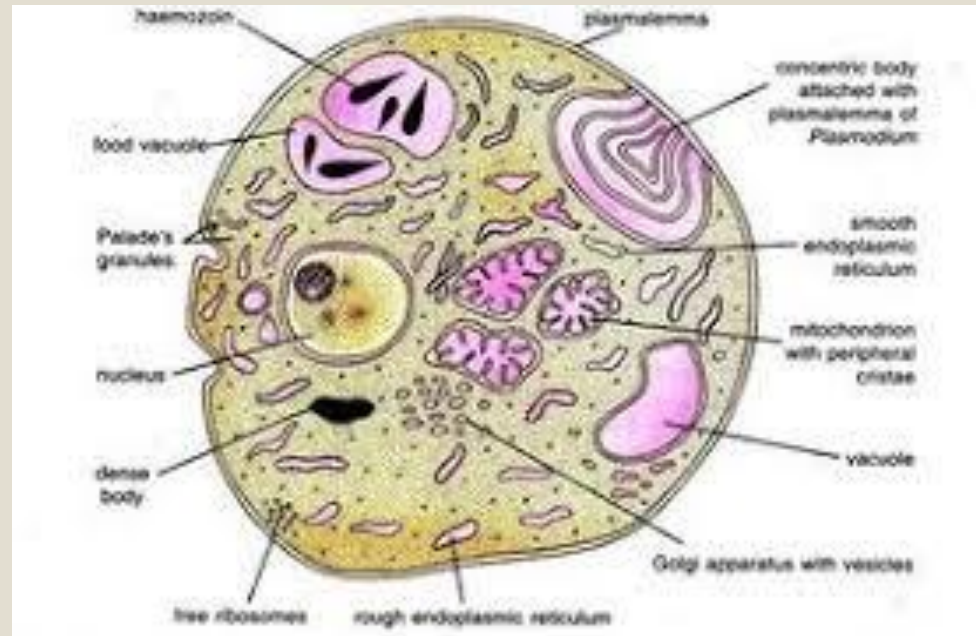
Phylum - Apicomplexa

- Young forms are multinucleate. Multinucleate by the time of multiple fission
- Nutrition is parasitic
- Formation of encysted spores by the multiple fission of adults, except in blood-inhabiting forms
- Life cycle is complex, involving more than one hosts, asexual and sexual reproduction and an alternation between diploid and haploid generations
- 500 sps of sporozoans identified
- Egs. Plasmodium, Gregarina, Monocystis, Eimeria, Myxidium, etc

APICAL COMPLEX



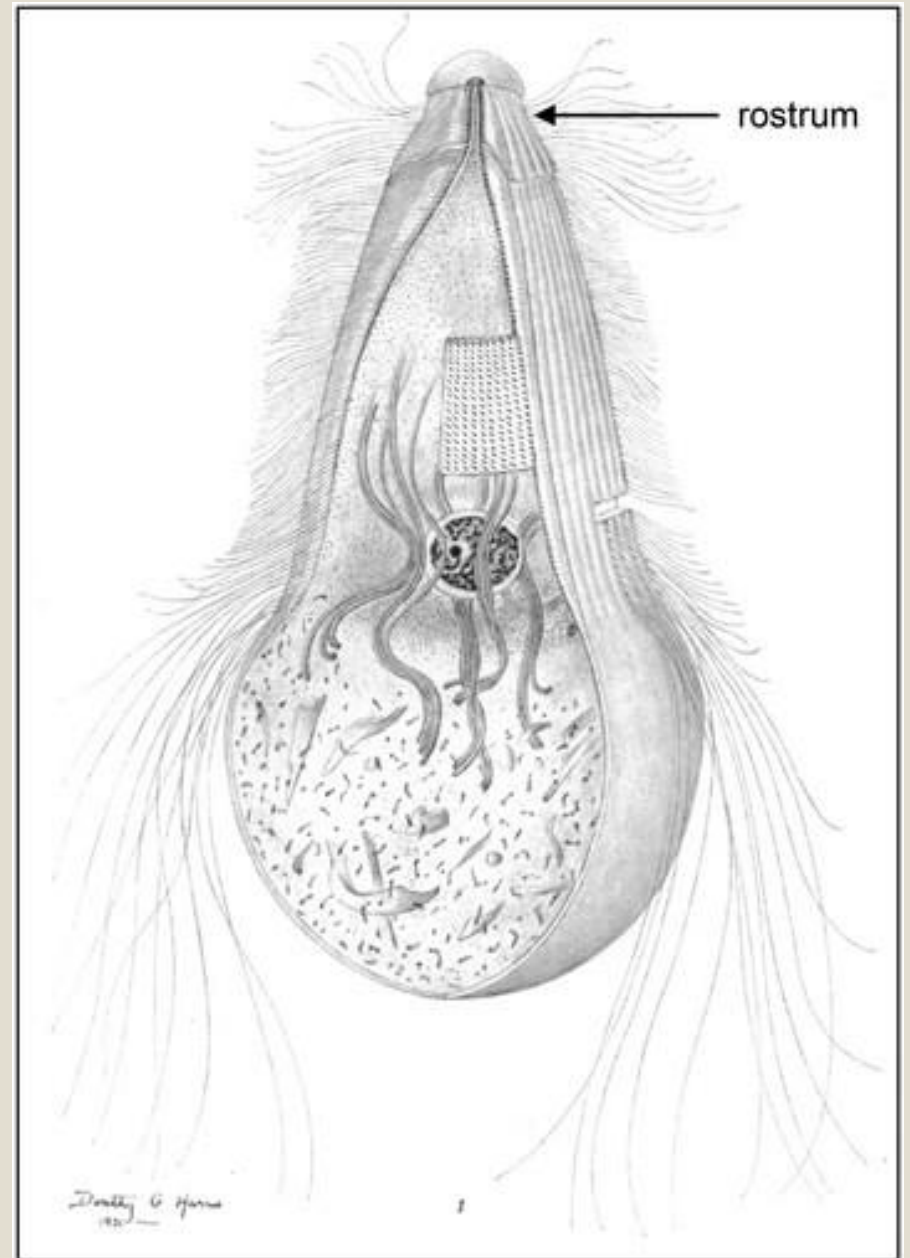
PLASMODIUM



Phylum - PARABASILIA

- Parabasilia is a group of anaerobic, flagellate protists with a parabasal apparatus.
- Presence of flagella, arranged in one or more clusters near the anterior end of the body. The kinetosomes of flagella are linked to parabasal bodies
- Presence of an axial, rod-like, microtubular supporting structure called axostyle running through the longitudinal axis of the body
- Mitochondria is secondarily lost, but there are small hydrogenosomes.
- Absence of ingestatory apparatus
- Presence of one or more nuclei
- Nearly 2000 sps of living parabasilids
- Endosymbionts in the gut of termites, cockroach, etc, some are pathogenic parasites in man and other vertebrates and some are free-living
- Examples – Trichomonas, Trichonympha

TRICHONYMPHA



THANK YOU!