TOPIC: INTRODUCTION TO PROTOZOA:STRUCTURE, LIFE AND LOCOMOTION IN PARAMOECIUM

LECTURE NO:03

B.SC PART 1

ZOOLOGY(HONS.)-PAPER I-GROUP A

CHAPTER 2

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Class1. Telosporea

Spores without polar capsules or filaments.

Sporozoites elongated, microgamete flagellated.

Trophozoties with one nucleus only.

Subclass -1. Gregarinia

Trophozoites large and found in the gut and body cavities (i.e. extracellular) of invertebrates.

Zygote non motile.

Male and female gametes merogamous.

Sporozoites found in sporocyst.

Parasites of
invertebrates. Eg.
Monocystis,
Gregarine.

Subclass- 2. Coccidia

Trophozoites small and intracellular.

Gametophytes dimorphic.

Sporozoites in sporocysts.

Blood or gut parasites of vertebrates. Eg- *Eimeria, Isospora.*

Class 2. Toxoplasmea

Spores not formed.

Only asexual reproduction. E. g- *Toxoplasma.*

Class 3. Haplosporea

Spores with spore cases.

Parasitic of fish and invertebrates.

Pseudopodia may be present but no flagella.

Reproduction by schizogony only (asexual) E.g. *Ichthyosporidium, Haplosporidium*

Subphylum- III. Cnidospora

Trophozoite has many nuclei.

Spore formation occurs throughout life.

Spores contain polar capsules with polar filaments.

Class 1. Myxosporidea

Spores develop from several nuclei.

Spore within two or three valves.

Order -1. *Myxosporida.*

Spores large and with a bivalve membrane.

Polar capsule 1, 2 or 4; each with a filament.

Tropozoites amoeboid.

Eg. *Myxidium.*

Order- 2. Actinomyxida

Spores large and with a trivalved membrane.

Polar capsule 3, each with a filament. Eg. *Triactinomyxon, Sphaeractinomyxon.*

Class-2. Microsporidea

Spores small and with a univalved membrane.

With or without polar capsule E.g. *Nosema*.

Subphylum – IV. Ciliophora

Body organization complex.

Presence of cilia as feeding and locomotory organelles at some stage in the life cycle.

Two types of nuclei- micronucleus and macronucleus are present.

Asexual reproduction by binary fission or budding.

Sexual reproduction by conjugation.

Class1. Ciliate (Infusoria)

Protozoa with a definite from and size.

Body bounded externally by a firm pellicle.

Locomotor organelles cilia.

Definite mouth and gullet present. Anal Aperture. Permanent.

One or more contractile vacuoles present.

Have two kinds of nuclei large macronucleus and smaller micronucleus.

Subclass (1). Holotricha.

1. Body cilia uniform.

Buccal cilia absent.

Order- 1. Gymnostomatida

Body large.

Buccal cilia absent.

Cytostome opens to outside. E.g. *Coleps, Didinium, Nassula*

Order-2. Trichotomatida

Cytostome at the bottom of vestibule.

Spiral ows of cilia in vestibule; no cilia in bucal region. Example; *Colpoda, Balantidium.*

Order- 3. Chonotrichida

Body vase shaped.

Body cilia absent.

Funnel at the free end of body with vestibular cilia.

Ectocommensal on crustaceans. Example- *Lobochona, Spirochona*.

Order- 4. Apostomatida

Body with spirally arranged cilia.

Cytostome mid ventral.

Parasites or commensalism with complex life cycle, completed on two hosts. E.g. - *Hyalophysa, Polyspira*.

Order-5. Astomatida

Cytostome absent.

Body ciliation uniform.

Parasites or commensals in gut and coelom of earthworm. E.g. - *Anoplophrya, Hoplitophyrya.*

Order-6. Hymenostomatida;

Body small and with uniform cilia on body.

Buccal cavity with undulating membrane and adoral zone of membrane cells. E.g. - *Colpidium, Paramecium.*

Subclass (2) Peritrichia

1. Adult without body cilia.

Sessile organism. Order- 1. Peritrichida

1. Characters of subclass peritricha,

E.g. - *Vorticella, Carchesium.*

Subclass (3) Suctoria

Body sessile and stalked.

Young with cilia, adult; with tentacles.

Order 1 Suctorida

Characters as of subclass suctorida. E.g. - *Ephelota, Podophrya.*

Body cilia reduced.

Buccal cilia well marked.

Order-1. Heterotrichida

Body encased in lorica.

Body cilia usually absent.

Body naked with uniform body cilia. Eg. - *Bursaria, Stentor, Blepharisma*.

Order-2. Hypotrichida

Body dorso-ventrally flattend.

Body cilia at vental side, forming cirri. Eg. - *Euplotes, Kerona*.

Order -3. Oligotrichida

Body cilia reduced or absent.

Buccal membranelles at front end only. E.g. -*Strombidium, Halteria.*

Study of Paramecium with particular reference

Systematic position

PHYLUM	**PROTOZOA**
SUB PHYLUM	**CILLOPHORA**
CLASS	**CILIATA**
SUBCLASS	**HOIOTRICHIA**
ORDER	**HYMENOSTOMATIDA**
SUBORDER	**PENICULINA**
GENUS	***PARAMECIUM***
Species	***caudatum***

Paramecium (Gr., Paramekos- oblong + Caudata-tail) is an elongated and slipper shaped animal.

Paramecium is a typical ciliate microscopic organism.

Its ten species are recognized all over the world.

Ciliates are characterized by the presence of cilia as locomotors organelles (Fig.7).

Locomotion in Paramecium

Paramecium shows following two methods of locomotion.

-Ciliary movement:

Cilia are main locomotory organ in paramecium this are fine hair like protoplasmic processes all over the body.

These are inclined backward and their beating drives the body forward but they may be directed forward and then their strokes push the body backward.

The cilia of longitudinal row beat one after the other in a metachronial succession or in a metachronous rhythm.

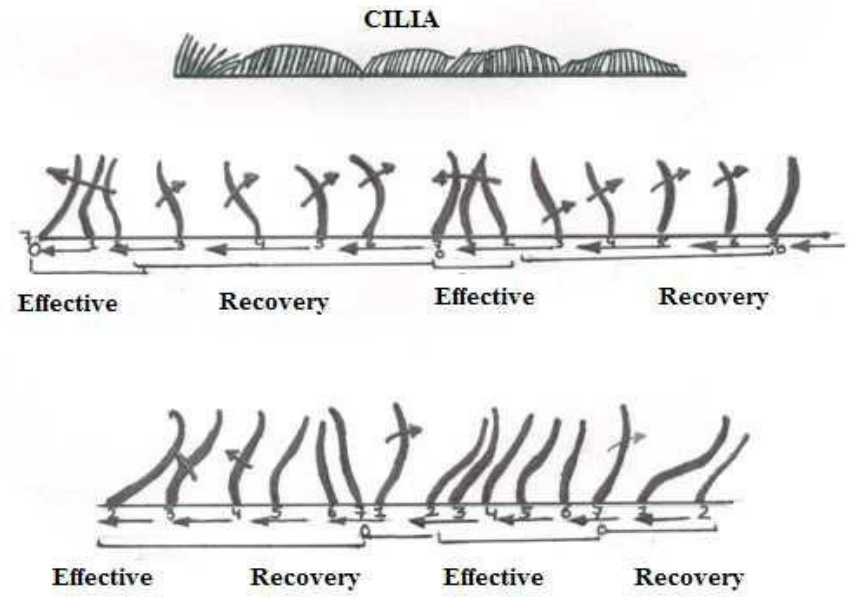

Fig.8 **Two stage in ciliary movement (A)Effective(B)Recovery**

The cilia of transverse row vibrate simultaneously.

The movement of cilia is controlled by the neuromotor system.

Each oscillation of cilia consists of two stocks, one is effective stock and another is recovery stock.

The cilia beat somewhat towards the right sight. as a result the body of paramecium rotates spirally slightly toward s the left.

The cilia of oral groove strike more vigorously and obliquely (Fig.8 and 9).

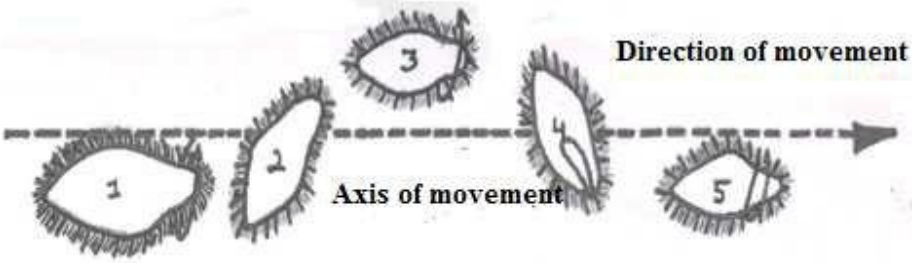

Fig.9 Path followed by Paramecium during swimming

2-Body contortions:

Paramecium can pass through a passage narrow than its body by the contraction and twisting of body, after which body assumes its normal size.

1.4.2- Osmoregulation in paramecium:

The amount of water in the body is controlled by the two contractile vacuoles present one on either end of the body.

Excess of water from cytoplasm is collected in the microtubules of endoplasmic reticulum.

From here water is passed on to the nephridia tubes and then to feeder canal.

In feeder canal it accumulates in the ampullae.

On getting filled the ampullae discharged it in the contractile vacuole.

The vacuoles enlarge by gradually receiving water.

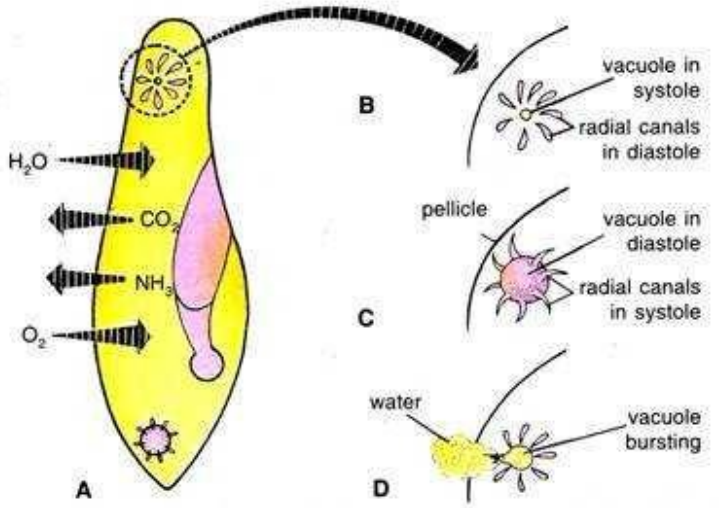

Fig.10 Paramecium:Diagramatic representation of Respiration,Excretion and Osmoregulation

When grown to its maximum size, vacuole contracts and empties its water to the exterior through the canal that connects it with a pore in the pellicle.

When the vacuole is in a state of diastole that is fully distended the feeding canals disappear as small streaks soon after the systole.

The contractile vacuoles expand and contract at regular interval assisted by the myofibrils.

The posterior contractile vacuole pulsates much faster than the anterior contractile vacuole probably because of large amount of water reaching the posterior region of the cytopharynx (Fig.10).