Locomotion

- Animals exhibit certain unique - **life processes.**
- The important life processes are - **locomotion** and **reproduction.**
- All living organisms produce young ones of their - **own kind.**
- Some protozoans reproduce - **asexually.**
- Majority of protozoans reproduce - **sexually**.
- Most of the sexually reproducing organisms produce - **gametes.**
- All most all adult organisms are diploid with - **two sets of chromosomes (2n).**
- Chromosomal number (2n) gets reduced to haploid set (n) in the - **meiotic division that occurs during gametogenesis.**
- Union of pronuclei of gametes restores the - **diploid chromosomal number.**
- The slowest locomotion is - **amoeboid locomotion.**
- The fastest locomotion is - **ciliary locomotion.**

LOCOMOTION IN PROTOZOANS

- Animals move from place to place for the sake of - **Food, shelter and reproduction.**
- Locomotion influenced by **-external and internal stimuli**.
- Movement of organisms from one place to other is called - **Locomotion.**
- Locomotory organelles found in protozoa are - **Pseudopodia, Flagella, Cilia and Myonemes.**
- Locomotory organelle in amoeboid locomotion - **Pseudopodia.**
- Amoeboid locomotion is seen in - **Amoeba**
- Locomotory organelles in swimming locomotion are - **Cilia, Flagella.**
- Examples for swimming locomotion - **Paramecium, Euglena.**
- Locomotory orgenelles of gliding type of locomotion are - **Myonemes**
- Example of Gliding locomotion - **Euglena, Sporozoans**
- Cellular extensions are - **Pseudopodia**
- Chief organelles for locomotion in Protozoa are - **Pseudopodia, Flagella, Cilia.**
- Organelles for Ingestion of food - **Pseudopodia and cilia**
- Microtubular structures that help in locomotion are - **Myonemes.**
- Protozoans in water are subject to forces of water resistance : **Pressure drag and viscous drag.**
- Pressure drug is - **due to the difference of pressure between two ends.**
- Viscous drag is **- due to the water molecules attached to the surface.**
- Viscous drag is more important for - **Protozoans.**
- Protozoans are not streamlined to minimize - **the pressure drag.**

PSEUDOPODIA

- The temporary outgrowths of the cell formed on the surface of the body are - **Pseudopodia.**
- Organisms with many pseudopodia are called - **Polypodial organisms Eg : Amoeba**
- Organisms with a single pseudopodium are called - **Monopodial organisms - Eg : Entamoeba**
- Pseudopodia are the characteristic of the classes- **Rhizopodia and Actinopodia.**
- Pseudopodia occur in few mastigophorans - **Mastigamoeba.**
- Based on their form and structure pseudopodia are - **4 types, Lobopodia, Filopodia, Reticulopodia and Axopodia or Actinopodia**
- Lobopodia are - Blunt and finger like tubular pseudopodia containng ectoplasm and endoplasm with round tip Eg : **Amoeba, Entamoeba.**
- Filopoda are - Slender filamentous, pseudopodia with pointed tips. Eg : **Euglypha, Lecithium.**

- Reticulopodia are - Filamentous branched, net like pseudopodia chiefly meant for food collection **Eg : Elphidium, Globigerina.**
- Recticulopodia are also called - **Myxopodia.**
- Primary function of Recticulopodia is - **Ingestion of food.**
- Retculopodia are common in - **Foraminifers**
- Needle like pseudopodia, which develop radially on the body surface with a central axial filament are - **Axopodia or Actinopodia**
- Pseudopodia with adhesive cytoplasm - **Axopodia or Actinopodia**
- Main function of Axopodia is - **Food collection.**
- Axopodia occur in - **Helozoans (Actinosphaerium, Actinophrys) and Radiolarians (Collozoum)**

FLAGELLA

- Flagella are the locomotor organelles of - **the mastigophore protozoans**
- Flagellum consists of - **a long stiff axial filament or axoneme**
- Axoneme is surrounded by **- Protoplasmic sheath**
- Axoneme arises from - **The basal granule (or) blepharoplast (or) basal body (or) kinetosomes**
- Blepharoplasts are derived from - **the centrioles**
- The number of flagella in Ceratium - **Two**
- The number of flagella in Trichomonas - **Four**
- The number of flagella in Giardia - **Eight**
- The number of flagella in Trichonympha - **Many**

ULTA / STRUCTURE OR FLAGELLUM

- The central axial filament (or) axoneme of flagellum shows - **9 + 2 arrangement.**
- The two central logitudinal tubules are enclosed by - **inner sheath.**
- The central singlet microtubules are surrounded by - **Nine peripheral "doublets".**
- Nine peripheral doublets form a - **Cylinder.**
- The doubets of the outer ring are connected to the centre by - **radial spokes.**
- Each doublet of the outer ring has - **a pair of dynein arms.**
- Peripheral doublets are surrounded by - **Membranous outer sheath also called Protoplasmic sheath.**
- Basal granule is formed by the bases of - **Peripheral tubules.**
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- Below the level of pellicle the basal granule is formed as - **9 triplets**
- Minute hair like structures present along the length of some flagella are called - **Mastigonemes or Flimmers.**
- Flimmers are - **solid and 5 nm thick.**
- Mastigonemes are - **tubular and 20 nm thick.**
- If mastigogemes are not present on a flagellum and is with a terminal filament, it is - **Acronematic type Eg : Chlamydomonas, Polytoma**
- If, mastigonemes are in one row along the length of the axoneme, it is - **Stichonematic type Eg : Euglena, Astasia.**
- If mastigonomes are in two or more rows along the length of the axoneme, it is - **Pantonematic type Eg : Peranema, Monas.**
- If, mastigonemes are in two or more rows along the length of flagellum and ends as named axial filament - **Pantacronematic type Eg : Urceolus.**
- If the flagellum is simple without flimmers and terminal named filament is - **Anematic type (simple) Eg : Chilomonas, Cryptomonas**

CILIA

- Short but highly vibratile organelles in large numbers on the body of protozoans are - **Cilia.**

- Cilia are found in - **Ciliophoran protozoans.**
- Cilia are locomotary organnelles, throughout their life in the class - **C**
- Primitive form like holotriche is - **Paramecium**
- The advanced form like peritriche is - **Vorticella**
- Cilia are present only in young condition but in the adults they are modified into sucking tentacles in - **Suctoria Eg : Acinata**
- The central axoneme or axial filament of a cilium or flagellum is formed by - **Microtubules**
- The arrangement of microtubules in the axoneme of a cilium or flagellum is - **9 + 2**
- The arrangement of microtubules in the Basal granule is **- 9 (Triplets) + 0**
- The structures connecting kinetosomes are called - **Kinetodesmata**
- Kinetodesmata are also called - **Neurofibrils**
- The longitudinal row of Basal granules and their kinetodesmata together called - **Kinety**
- A network of kinety present in the ectoplasm of Paramecium is - **Infraciliary system.**
- A neuromotorium centre near cytopharyx is - **Motorium**
- Motorium and infraciliary system together called - **Neuromotor system.**
- The neuromotor system coordinates & controls - **Ciliary movement.**
- If neuromotorium is destroyed, the cilia loose coordination and stop - **beating of cilia.**
- Fastest locomotion in protozoa - **Ciliary movement.**
- Organelles that help both in locomotion and ingestion of food are - **pseudopodia and cilia.**

DIFFERENCES BETWEEN FLAGELLA AND CILIA

- Flagellum length is - **150 μ**
- Cilium lengths is - **5 to 10 μ**
- Flagella produce - **Undular movements**
- Cilia produce - **Pendular movements**
- Flagella help in - **Only locomotion**
- Cilia help in - **Both feeding and locomotion**
- Flagella - **Do not fuse**
- Cilia fuse to form - **Membranelles, undulating membranes and cirri (compound ciliary organelles**
- Flagella are seen only - **at one end**
- Ciliar are present - **throughout the body surface or part of the cell.**
- Number of flagella : Generally **- 1 or 2 or 4 or 8 or many.**
- More number of flagella are present in **- Trichonympha**
- Cilia are generally - **more in number**

AMOEBOID LOCOMOTION

- Locomotion caused by pseudopodia is called - **amoeboid or pseudopodial locomotion.**
- Amoeboid locomotion is common in - **Rhizopoda, (Amoeba, Entamoeba).**
- Amoeboid locomotion also exhibited by - **amoeboid cells, macrophages, monocytes and neutrophils.**
- "Sol-Gel Theory" or "Change of Viscosity Theory" advocated by - **Miss L.H. Hyman**
- Sol-Gel Theory was confirmed by - **Pantin and Mast.**
- "Molecular Theory" or "Folding and Unfolding of protein molecules theory" or Back contraction was put forward by - **Goldacre and Lorsch.**

- Fountain zone theory or Front contraction theory was put forward by - **Allen.**
- Most acceptable theory with regard to formation of Pseudopodia is - **Sol - Gel theory or Change of Viscosity theory**

FORMATION OF PSEUDOPODIUM

- The protoplasm which is thick, less in quantity, nongranular transparent and contractile is - **Plasmagel.**
- The protoplasm which is more in quantity less viscous, fluid like more granular and opaque is - **plasmasol.**
- The change of Sol into Gel, and Gel into Sol is a - **Physico - Chemical change.**
- The first stage in the formation of pseudopodia is - **Hyaline cap formation.**
- Hyaline cap contain - **thickened ectoplasm at the advancing end**
- The point of weakness in the elasticity of plasmagel develops below the **- Hyaline cap.**
- Conversion of plasma gel into plasma sol by taking water is called - **Solation.**
- Conversion of plasma sol into plasma get by losing water is called - **Gelation.**
- During amoeboid locomotion amoeba has - **Two ends.**
- Ectoplasm is - **Plasma gel**
- Endoplasm is - **Plasma sol**
- The smooth round end is - **advancing end**
- The outer region of plasma sol produces - **Plasmagel tube.**
- During pseudopodial formation conversion of sol into gel takes place near (gelation zone) - **the advancing end**
- The trailing or retractile or wrinkled ends is - **Uroid end.**
- The protein molecules present in the cytoplasm that are involved in the amoeboid locomotion are - **actin and myosin.**
- During pseudopodial formation, conversion of Gel into Sol takes place nerar the (Solation zone) - **"Uroid".**
- Conversion of sol into gel takes place near the - **advancing end**
- Gelation occurs at the - **advancing end**
- Solation occurs at the - **Uroid end**
- Gelation and solation occur - **Simultaneously at the same rate**
- Contraction of plasmagel tube at the trailing end exerts - **Hydraulic pressure on plasma sol**
- This results in the continuous flow of plasma sol forwares in the plasmagel tube and forms the pseudopodium.
- On the basis of action of protein molecules sol gel theory was explained by - **Goldacre and Lorsch.**
- When the protein molecules of Amoeba are in Folded or Contracted condition the endoplam is said to be in - **'Sol State".**
- When the protein molecules are in relaxed or unfolded condition, the endoplasm is said to be in - **Gel State".**
- Folded protein molecules unfold at the gelation point of the advancing end by - **losing water.**
- Relaxed proteins at the solation point below the uroid surface fold due to - **The absorption of water molecules and their interaction with myosin molecules.**
- The energy required for amoeboid locomotion is available from **- ATP by the action of ATPase**

SWIMMING LOCOMOTION

- The type of locomotion performed by flagellum and cilia is - **Swimming.**
- Flagella and cilia are called Undulipodia by - **L.H. Hyman**

BENDING MOVEMENT OF FLAGELLUM AND CILIA

- Bending movement is brought about by - **the sliding of microtubules past each other.**

- Dynein arms of each doublet attach to an adjacent doublet and pull the neighbouring doublet and slide past each other in - **opposite directions.**
- This process is repeated during the bending movement.
- As the doublets are physically held in place by the radial spokes, they can not slide past much, and cause - **bending movement.**
- Dynein arms show complex cycles of movements using energy provided by - **ATP**
- The bending movements of flagellum and cilium play and important role - **in their locomotion.**

UNDULATION MOVEMENTS

- Flegellum shows - **Undulations and side wise lashing movements.**
- Undulation from the base to the tip causes pushing force due to which the organism is - **pushed backward.**
- Pushing force like a - **Propeller of a boat.**
- Undulation from the tip to the base causes pulling force due to this the organism is - **pulled forward.**
- Pulling force like a - **Propeller of an Aeroplane**
- When the undulations are spiral organism shows - **rotatory movements.**
- If the flagella bends, to one side and undulations from base to the tip, the organism moves - **Lateerally in the opposite direction.**
- Sidewise lash movement consists of 2 strokes -

  1) Effective strokes 2) Recovery stroke

CILIARY LOCOMOTION

- Ciliary movement is similar to - **Paddle movement**
- Beating of cilia in longitudinal row one after another is called - **Metachronous movement.**
- The Cilia of transverse row best simultaneously in one direction is called - **Synchronous movement.**
- Synchronous movement seen in the - **Transverse row of Cilia.**
- The stroke in which cilia bends backwards and beats the water is called - **Effective stroke**
- The effective stroke - **body moves forwards and water moves backwards.**
- The cilia by its backward movement regains to its original position is called - **Recovery stroke.**

GLIDING LOCOMOTION

- Small zig-zag movement in the protozoans caused by the contractions and relaxations of myonemes present below the pellicle is called - **gliding locomotion.**
- Gliding locomotion in the flagellates is called - **Euglenoid movement**
- Gliding locomotion in the sporozoans is called - **Gregarine movement.**

METABOLY

- In many protozoans the strips can slide past one another, causing wriggling motion called - **metaboly.**
- Pellicle in protozoans is composed of - **proteinaceous strips.**
- Proteinaceous strips supported by - **dorsal and ventral microtubules.**