

Lesson $\rightarrow$ 1

Introduction to Medical Parasitology

- 1) **Parasitology** $\div$ It is the branch of Medical microbiology which deal with parasites (morphology, life cycle).
- 2) **Parasite** $\div$ Parasite is a living organism which is depend on another host for nourishment and shelter.
- 3) **Types of Parasite** $\div$
 - i) **Ecto Parasite** $\div$ A parasite which live on the external surface of the host. eg. ticks, mites.
 - ii) **Endo Parasite** $\div$ A parasite which live within the body of organism or Host. Eg. E. Histolytica.
 - iii) **Accidental parasite** $\div$ when parasite are infection to unnatural or unusual Host eg. Toxocara canis.
 - iv) **Aberant Parasite** $\div$ It is define as the parasite infect an Host but can't live develop further. eg. Toxocara.
 - v) **Facultative Parasite** $\div$ It is define as which may be free living but can obtain the Nutrition from the Host. eg. Naegleria fowleri.
 - vi) **Obligate Parasite** $\div$ It is define as the parasite which

can't exist without their Host
eg: Malaria parasite.

(vii) Temporary Parasites.

(viii) Permanent Parasites.

Host

1) Host :- It is defined as an organism which harbors the parasite and provide the nourishment and shelter to the parasite.

2) Type of Host :-

(i) Definitive Host :- It is define as the adult stage or sexual stage of parasite are found in organism or Host.

(ii) Intermediate Host :- It is define as the larval or asexual stage of a parasite are found in organism or Host.

(iii) Paratenic Host :- It is define as the larval stage of parasite are survive but does not develop further in Host.

(iv) Reservoir Host :- It is harbors the parasite and acts as a source of infection to another Host.

• ————— Classification of parasite ————— •

1) Classification of Parasite (Protozoa)

Group	Example.
i) Protozoa (unicellular)	
(A) Amoebae.	Entamoeba Histolytica
(B) Flagellates	Giardia, Lamblia, Leishmania
(C) Sporozoa	Plasmodium vivax, Toxoplasma
(D) Ciliate	Balantidium.

2) Classification of Animalia (Helminth)

Group	Example.
Helminth (Multicellular)	
(A) Trematodes	Schistosoma, Hepatica, C. Sinensis
(B) cestodes	Ten Taenia Saginata, Taenia ^{Solium}
(C) Nematodes.	Ascaris Lumbricoides.
	Ancylostoma duodenal.

• ————— Sources of infection ————— •

- 1) Contaminated Soil and water.
- 2) Fish
- 3) Raw or uncooked material.
- 4) Blood - Sucking insects.
- 5) Crab.
- 6) Human or Animal.

• ————— Pathogenesis ————— •

- 1) Intestinal infection (By Round worm)
- 2) Inflammation reaction (By E. Histolytica)
- 3) Neoplasia (By S. Haematobium)

Lesson → 2

General Characteristics Morphology Classification

1) **Protozoology** — It is the branch of Parasitology which deal with Protozoa (morphology life cycle).

2) **Characteristics of Protozoa** —

- Protozoa are unicellular.
- Protozoa are eukaryotic cell.
- They are measure from 1 μ m to 150 μ m.
- Single protozoal cell perform all function such as:
 - (A) Respiration
 - (B) Digestion
 - (C) Excretion
 - (d) Reproduction
 - (e) Locomotion

— Protozoal cell consist by —

- | | |
|---------------------|---------------------------|
| (A) Plasma membrane | (d) Golgi body |
| (B) Cytoplasm | (e) Ribosome |
| (c) mitochondria | (f) Endoplasmic Reticulum |

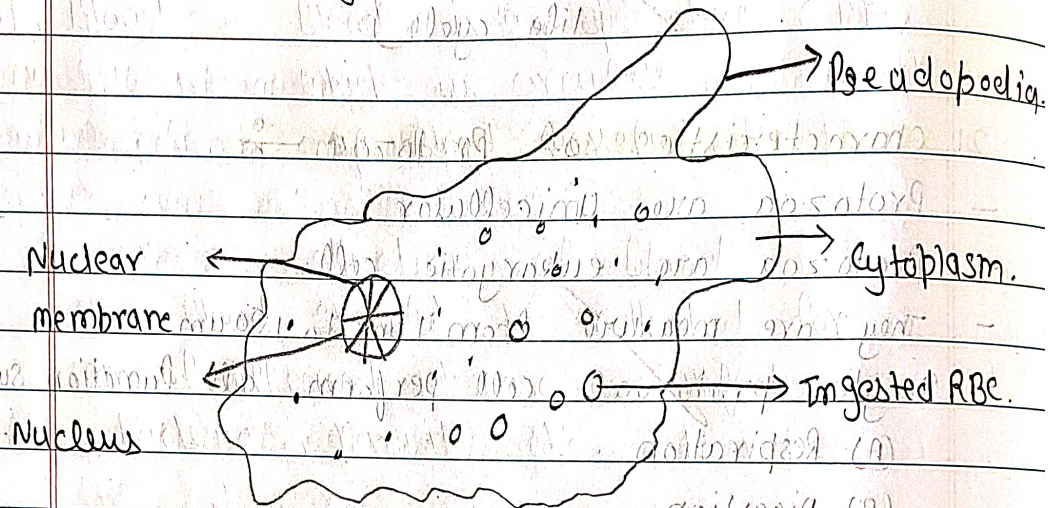
3) **Classification of Protozoa** —

- 1) Amoebida — Entamoeba, Balantidia.
- 2) Sporozoa — Plasmodium vivax, P. Falciparum.
- 3) Ciliata — Balantidium coli.
- 4) Flagellata or Mastigophora — Giardia, Trichomonas vaginalis.

— **Structure of Protozoa** —

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Most parasitic protozoa in Human are less than 50 μm in size. The smallest are 1 to 10 μm long but *Balantidium coli* may measure 150 μm . The plasma membrane enclosing the cytoplasm and cover with cilia and flagella.



5) Helminthology $\frac{\circ}{\circ}$ It is the branch of parasitology which deals with the Helminth. (morphology and pathogenesis).

Characteristic of Helminth $\frac{\circ}{\circ}$

- Helminth are multicellular.
- Helminth are prokaryotic.
- Helminth are elongated flat and round in shape.
- Mostly helminth are produced the egg.
- They are completed their life cycle in one or more than one host.

Classification of Helminth $\frac{\circ}{\circ}$

1) **Phylum Platyhelminth** $\div$ They are flat, leaf like or tape like. They do not possess body cavity and their alimentary canal is absent or incomplete.

(a) Cestode (Tape worm).

(b) Trematode (leaf like or flukes)

2) **Phylum Nematoda** $\div$ Nematoda are cylindrical or unsegmented. They have a body cavity, complete alimentary canal, no circulatory system, and body wall.

$\div$ **Character of cestode, trematode and Nematodes** $\div$

Character	Cestode	Trematode	Nematodes.
Shape	Tape like	Leaf like	Elongated and cylindrical
Body	Segmented	Unsegmented	Unsegmented.
Body Cavity	Absent	Absent	Present.
Alimentary Canal	Absent	Incomplete	Present.

Lesson → 3.

Collection, Transportation, Processing and preservation of sample for Routine Investigation.

1) **Blood** — Blood is a specialize connective tissue which is circulate in closed system of blood vessels.

— Collection of Blood —

The Blood should be collected for determination of different disease or infection caused by Bacteria, parasite etc.

— Method Name —

1) **Venous Method** — This method is used when more amount of Blood are required for processing or determination of different disease so that Blood should be collected from vein.

⇒ **Requirement** —

- 1) Syringe
- 2) Test tube or vial
- 3) Cotton swab
- 4) 70% Alcohol
- 5) Tourniquet

⇒ **Procedure** —

1) All the requirement are place in a tray or on table.

- 2) Site the patient in comfortable position on chair.
- 3) Select the vein or puncture site for Blood Collection.
- 4) Apply the tourniquet on arm (above 2 to 3 cm from elbow joint).
- 5) Sterilize the puncture site with 70% Alcohol.
- 6) Insert the needle on puncture site at 30 to 45 angle.
- 7) Push back the piston slowly for collection and fill the syringe.
- 8) Release the tourniquet and place a cotton swab on puncture site.
- 9) Take out the needle and hold the cotton swab tightly with hand for 10-15 min.
- 10) After collection, Blood should be transfer to appropriate vial or Test tube and labelled it.

2) **Capillary method** $\rightarrow$ This method is used when little amount of Blood are require for processing so that Blood should collected from finger or capillary vein. Such as in case Malaria, Parasite.

$\Rightarrow$ **Requirement** $\rightarrow$

- 1) Needle or lancet
- 2) 70% Alcohol.
- 3) Cotton Swab
- 4) Glass slide.

$\Rightarrow$ **Procedure** $\rightarrow$

- 1) Site the patient in comfortable position.

- 2) Select the finger for blood collection.
- 3) Clean the puncture site with 70% Alcohol.
- 4) Tightly press the finger tip portion.
- 5) Prick the finger tip with needle or lancet.
- 6) Discard the first drop.
- 7) Place the second drop on microscopic Glass slide.
- 8) Apply the cotton swab on puncture site for 5-10 min.
- 9) Prepare a smear on glass slide for processing.

Transportation of Blood Specimen

After collection, Blood should be immediately placed at $2-8^{\circ}\text{C}$ and should be transported at $2-8^{\circ}\text{C}$ in cold box - using ice in a Thermos flask or box.

⇒ **Preservation** - The Blood specimen should be preserved at $2-4^{\circ}\text{C}$ with appropriate anticoagulant.

- 1) EDTA - Ethylenediamine Tetraacetic Acid.
- 2) Heparin.
- 3) Sodium fluoride.
- 4) Oxalate.
- 5) Citrate.

⇒ **Processing Blood Specimen** - The Blood specimen should be labelled and transferred to the appropriate department or laboratories.

- | | |
|------------------|--------------------|
| (A) Haematology | (D) Blood Banking |
| (B) Biochemistry | (E) Histopathology |
| (C) Microbiology | |

Collection of Stool

Stool

- ⇒ **Procedure** -
- 1) Give the instruction to the patient about specimen collection.
 - 2) Give a clean and dry container to the patient.
 - 3) The first morning specimen should be referred for collection.
 - 4) The specimen should be collection by appropriate technique.
 - 5) Tightly closed the container.
 - 6) The specimen should be transport within one hour.
 - 7) The specimen should be examine with 2 hr.

Examination of Stool specimen

- 1) **Physical Examination** -
- (A) Colour
 - (B) Volume
 - (C) PH
 - (d) Consistency
 - (e) odour

2) **Chemical Examination** - Benzidine Method.

- 3) **Microscopic Examination** -
- (A) Pus cell
 - (B) Red Blood cell
 - (C) Leucocyte
 - (d) Fat Globules
 - (e) Cyst
 - (f) Larva
 - (g) Egg
 - (H) Bacteria.

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3) **Microscopic Examination**

- | | |
|--------------------|--------------|
| (B) Red Blood cell | (g) Egg |
| (C) Leucocyte | (H) Bacteria |
| (d) Fat Globules | |
| (e) Cyst | |
| (f) Larva | |

Method

1) Saline Method

⇒ Requirement (A) microscopic glass slide

(B) Cover slip

(C) microscope

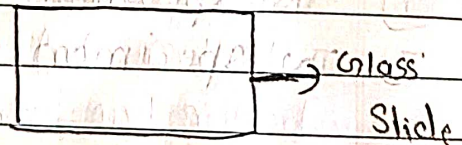
(D) Applicator stick

(E) stop watch

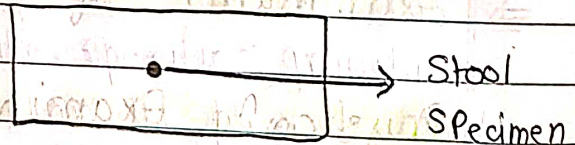
⇒ Reagent Normal saline

⇒ Procedure

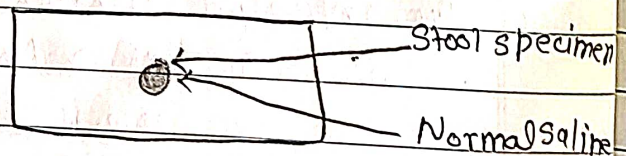
1) Take a clean and dry microscopic glass slide.



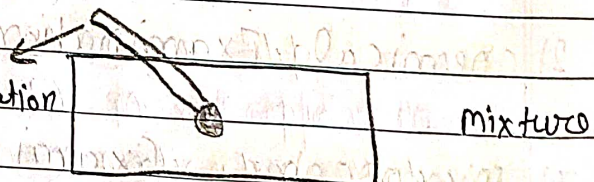
2) Place little amount of stool specimen on slide.



3) Put one drop of Normal saline on specimen.



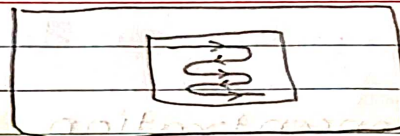
4) Mix well with Applicator Stick.



5) Place a cover slip on suspension or mixture and wait for 3-5 mins.



- 6) Examine under low power objective (10x) and High Power objective (45x).



2) Iodine Method :-

- ⇒ Requirement :- (A) Microscopic Glass slide.
(B) Cover slip
(C) Microscope.
(D) Stop watch.

⇒ Reagent :- Lugol's Iodine Solutions.

⇒ Procedure :- 1) Take a clean and dry microscope glass slide.

- 2) Place little amount of stool specimen on slide.
- 3) Put one drop of Lugol's - Iodine solution on specimen.
- 4) Mix well with applicator stick.
- 5) Place a cover slip on suspension or mixture.
- 6) Wait for 5-10 min.
- 7) Observe under the microscope.

⇒ Observation :-

Normal :- No protozoa or Helminth.

Intestinal infection :- Protozoa or helminth are seen.

Lesson $\rightarrow$ 4.

Concentration Techniques.

1) **Concentration Technique** $\rightarrow$ Is used for detection of different parasite which can't detect by direct microscopy or presence of parasite is small in Number.

$\Rightarrow$ **Floitation Technique** $\rightarrow$ The flotation techniques are used for identification of different egg or cyst.

i) **Saturated Sodium chloride flotation technique** $\rightarrow$ The Saturated Sodium chloride technique is a useful method of concentrating the Hook worm and round worm.

$\Rightarrow$ **Principle** $\rightarrow$ When the specific gravity of solution is more than the parasite egg or cyst they will float on the top of solution. They are collected by process and examine under the microscope.

$\Rightarrow$ **Requirement** $\rightarrow$

- 1) Glass bottle or test tube
- 2) Cover Slip.
- 3) Microscopic glass slide.
- 4) Applicator stick.
- 5) Microscope.

$\Rightarrow$ **Reagent** $\rightarrow$ Saturated Sodium chloride.

⇒ Procedure

- 1) Take a clean and dry glass bottle or test tube. (about 10 ml.)



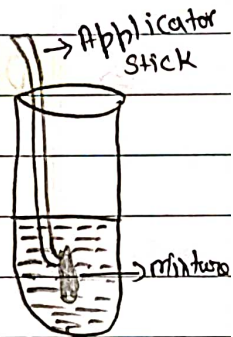
→ Glass test tube.

- 2) Fill the half portion of test tube with Saturated Saline Solution.



→ Saturated NaCl.

- 3) Mix 0.5g faeces or stool specimen with applicator stick in these solutions.

→ Stool Specimen
→ Saturated NaCl.→ Applicator stick
→ mixture

- 4) Fill the test tube completely up to brim with saturated sodium chloride



→ mixture (NaCl + faeces)

- 5) Carefully place a glass cover slip on the top of tube.

- 6) Wait for 20 to 30 min for float the egg or cyst.

- 7) Carefully lift the cover slip and place on the glass slide.

→ Floated Material



Cover slip.

→ Glass Slide.

8) Examine under microscope and calculated the parasite.

(B) Zinc sulphate floatation Technique $\rightarrow$

Zinc sulphate technique is recommended for concentrating the cyst of *On. Lambli* and *E. Histolytica* and egg of *T. Trichiura* and *Clonorchis* species.

$\Rightarrow$ **Principle** $\rightarrow$ A zinc Sulphate solution is used which has a specific gravity is 1.180 — 1.200. Stool specimen are mix in the solution and centrifuge the suspension or mixture for the egg or cyst will be float on the top. They are collected and examine under microscope.

$\Rightarrow$ **Requirement** $\rightarrow$

- 1) Test tube
- 2) Glass Slide
- 3) microscope
- 4) centrifuge
- 5) Inoculating loop

$\Rightarrow$ **Reagent** $\rightarrow$

- 1) 33% Zinc Sulphate Solution.

(A) Zinc Sulphate Crystal — 33g
(B) Distilled water — 100 ml.

$\Rightarrow$ **procedure** $\rightarrow$

- 1) Take a clean and dry glass slide.

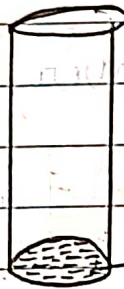
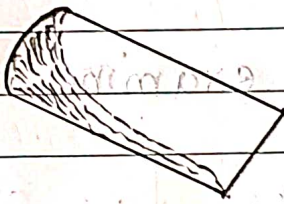
- 2) Mix 0.5 g of stool and distilled water in test tube.



mixture
(D/w + Stool).

- 3) Centrifuge at 3000 RPM for 1-2 min.

- 4) Discard the Supernatant fluid.



Sediment.

- 5) Fill the tube with 33% zinc sulphate solution upto top and mix well.



Mixture
(zinc sulphate + Sediment).

- 6) Centrifuge at 3000 RPM for 1-2 min and observe the tube.

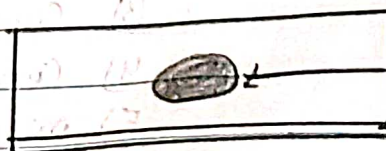


Surface film.

zinc sulphate solution.

Sediment.

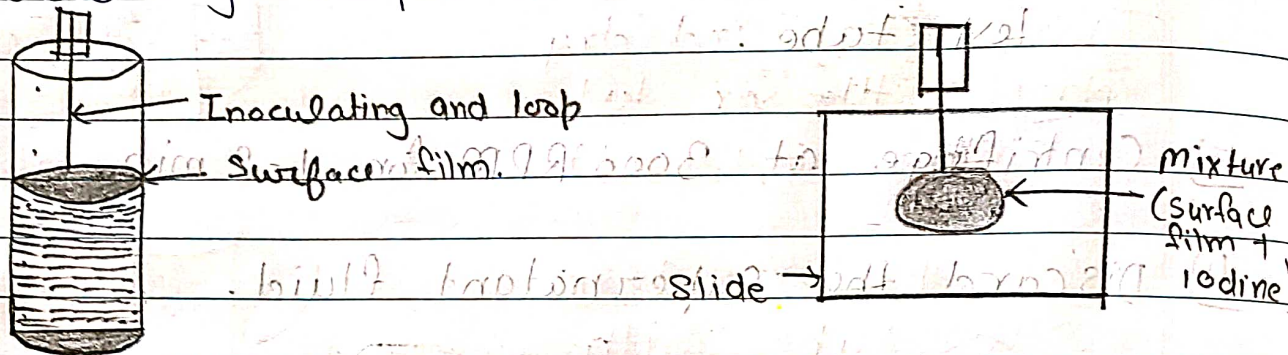
- 7) Take a glass slide and place one drop of iodine solution on it.



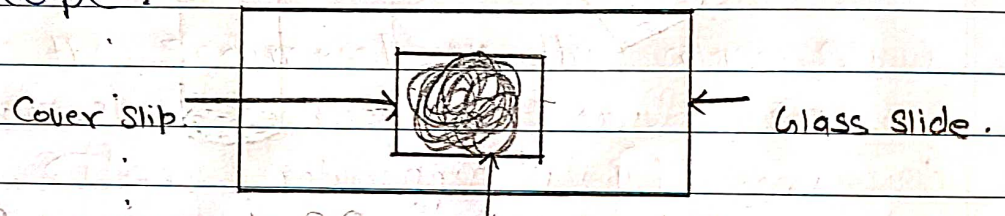
Iodine.

Glass slide.

- 8) Pick up the one or two drop of surface film with inoculating loop and mix with iodine.



- 9) Cover with cover slip and examine under the microscope.



- 2) **Sedimentation technique** — Sedimentation technique is most recommends for identification of parasite. This technique are based on the centrifugation or sedimentation.

- ⇒ **Principle** — When the specific gravity solution is less than the parasite egg or cyst they will be sediment at the bottom in the test tube. The supernatant are separated or discard and examine the sediment by microscope.

- ⇒ **Requirement** —
- 1) Test tube
 - 2) Glass slide
 - 3) Cover slip
 - 4) Centrifuge
 - 5) Microscope
 - 6) Stop watch.

⇒ **Reagent** 1) 10% Formalin.

(A) Formaldehyde — 10ml

(B) Distilled water — 90 ml.

2) Diethyl ether or ethyl acetate.

⇒ **Procedure** 1) Take a clean and dry test tube (at 15ml)

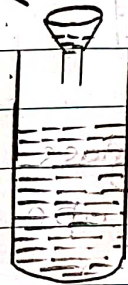
2) Mix 0.5g stool specimen and 10ml Formalin solution.



mixture

(Stool + Formalin)

3) Wait for 30 min and filter with filter paper in another tube.



4) Add 3-4 ml of Diethyl ether or ether acetate.

5) Centrifuge at 3000 RPM for 5-10 min. and observe the tube.



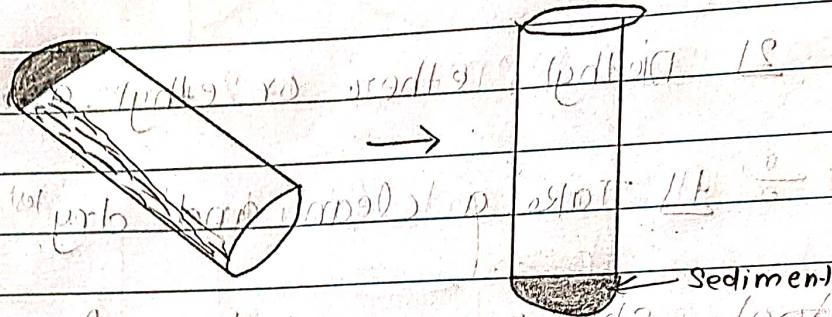
Ether and dissolve fat

faecal debris

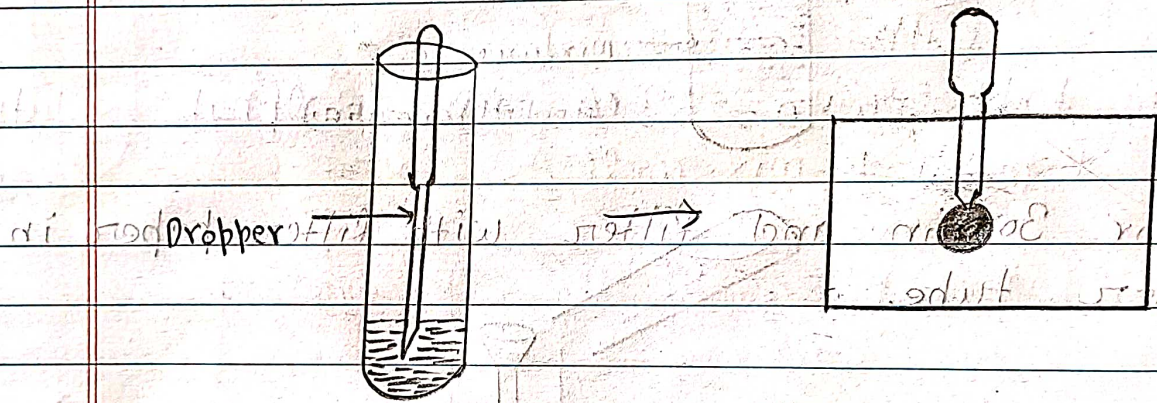
formalin

Sediment (containing parasite)

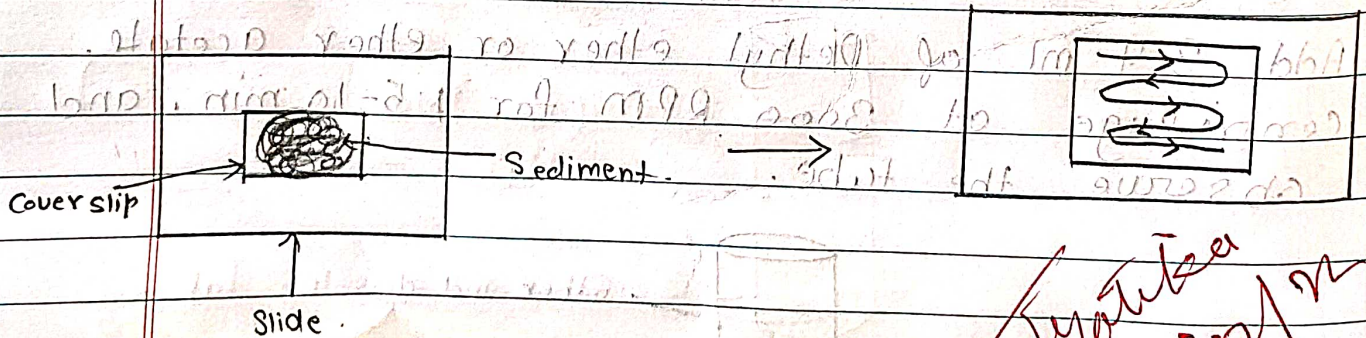
- 6) Discard the upper layer such as ether, debris and formalin.



- 7) Transfer the sediment on the glass slide.



- 8) Cover with glass cover slip and examine under the microscope.



Signature
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L-5

Entamoeba Histolytica and Giardiasis.

1) Define Trophozoite?

Ans Trophozoite is the activated, growing or vegetative stage in the life cycle of the specific parasite.

3) Define Ameobae?

Ans Ameobae are simple protozoa and don't have any specific shape.

4) Define Giardiasis?

Ans This infection is caused by Giardia.

5) Define Diarrhoea?

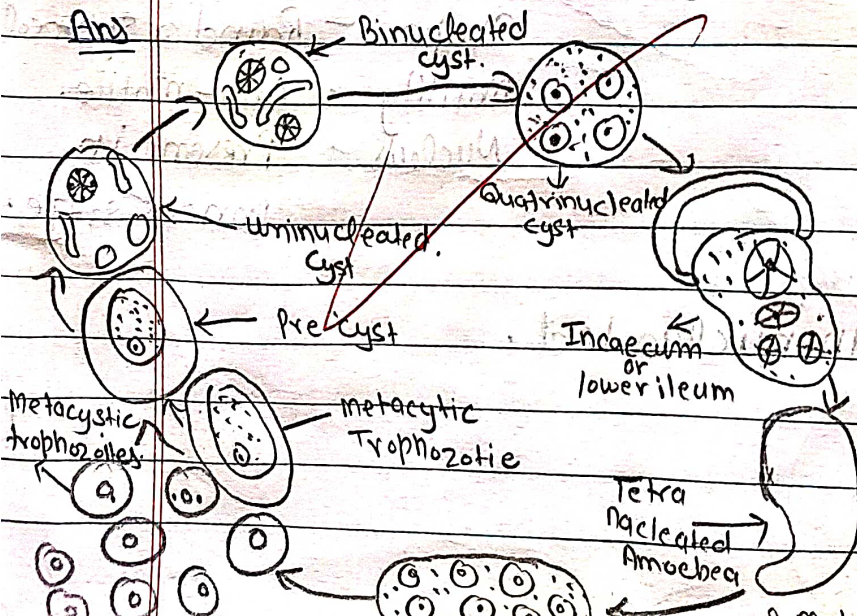
Ans abnormally frequent discharge of a loose, watery stool.

6) Define Amebiasis?

Ans The infection or disease is caused by the amebae species.

7) Describe the life cycle and lab. diagnosis of E. Histolytica.

Ans



E. Histolytica causes many diseases such as.

- 1) Diarrhoea.
- 2) Ulcer
- 3) Amoebic dysentery or intestinal amoebiasis.
- 4) Hepatic amoebiasis
- 5) Liver infection
- 6) UTI infection

Q1) Explain the morphology of *E. Histolytica* with appropriate diagram?

Ans: Morphology of *E. Histolytica* are available in three form or stage such as.

i) Trophozoite

Presence or form — Only in tissue

Size — 18 to 40 μm

Shape — Spherical (No specific)

Nucleus — Spherical or Round Shape

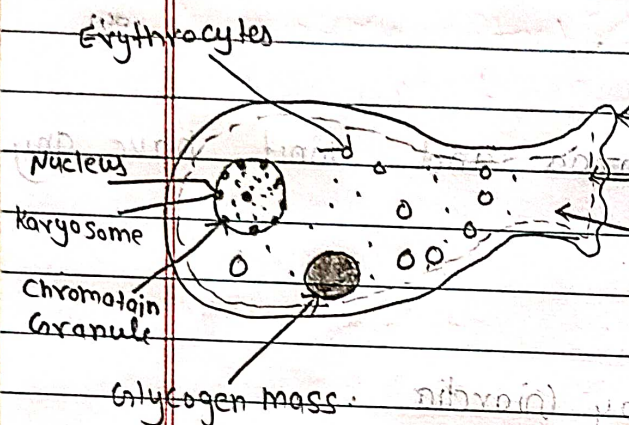
Karyosome — Present

Motility — Motile with Pseudopodia

Cytoplasm —

i) Ectoplasm.

ii) Endoplasm.



ii) Pre-cyst

Size — 18 to 25 μm

Shape — Spherical or oval

Nucleus — Present

Karyosome — Present in Nucleus

Motility — Non-motile

Cytoplasm — Present

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iii) Cyst

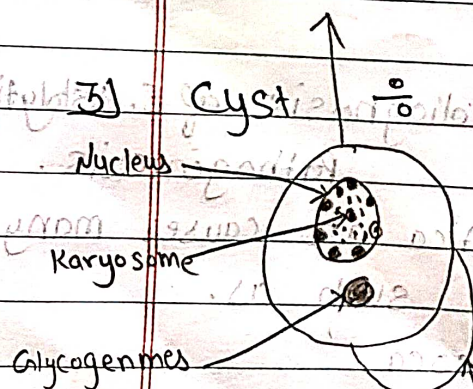
Size — 10 to 15 μm

Shape — Round or Spherical

Motility — Non-motile

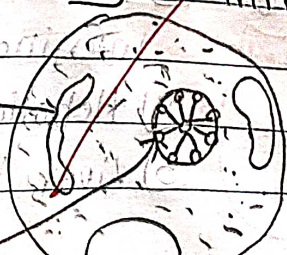
Nucleus — Present in

various stage



⇒ Stage — i) Uninucleated.

Chromatin
bar body



proprioate (ii) Binucleated (ii) Quaternucleated (infective Stage).

three

n tissue.

No specific
round shape

Pseudop

oval

iculus

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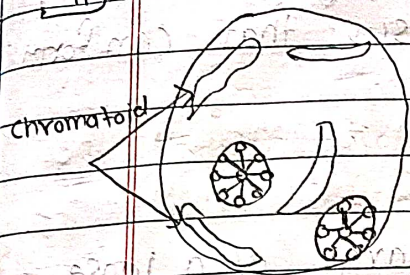
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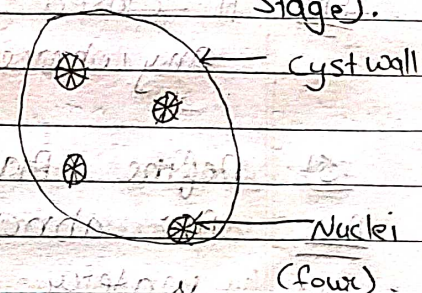
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stage.

(ii) Binucleated



(ii) Quaternucleated (infective Stage).



9) Tabulate the difference between Amebic dysentery and bacillary dysentery?

Amebic dysentery	Bacillary dysentery
1) Copious amount of stool.	1) Small amount of stool.
2) Stool has a dark color.	2) Stool has a fresh blood.
3) Stool has an offensive odor.	3) Stool has an odorless.
4) Treated with anti-protozoal drugs.	4) Treated with antibiotics.
5)	

10) Write a short note on Giardia Lamblia?

Ans. Giardia Lamblia :- This intestinal flagellate was discovered by Leeuwenhoek in 1681 in his own stool. Giardia Lamblia is present in duodenum and upper part of jejunum of man. It is only protozoa found in human small intestine.

Morphology :- 1) Trophozoite.

2) Cyst.

2) Define Cyst?

Ans A closed, sac-like pocket of tissue that can form anywhere in the body.

3) Define Diarrhoea?

Ans An abnormally frequent discharge of a loose, watery stool.

Hyperlike

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2) Define Cyst ?

Ans A closed, sac-like pocket of tissue that
occurs anywhere in the body.

3) Define Diarrhoea ?

Ans An abnormally frequent discharge
of watery stool.

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Micro

L-9

Introduction of Virology.

1) **Virology** $\frac{0}{0}$ It is branch of medical microbiology which deals with virus, (morphology).

2) **virus** $\frac{0}{0}$ It is define as the smallest ~~ver~~ intracellular infective agent which is containing only one type of nucleic acid (DNA or RNA) as their genetic material.

Characteristic of virus $\frac{0}{0}$

1) viruses are small in size (20nm).

2) They have only one type of Nucleic Acid (DNA or RNA)

3) They have no metabolic activity or function outside of living cell.

4) They are resistant to antibiotics.

5) They are multiply by complex form, not by binary fission.

6) They don't have any cell wall and cellular enzyme.

$\Rightarrow$ **Morphology** $\frac{6}{0}$

1) Size — 20nm to 300nm

[Smallest — 20nm (Parvo virus)
Largest — 300nm (Small Pox).]

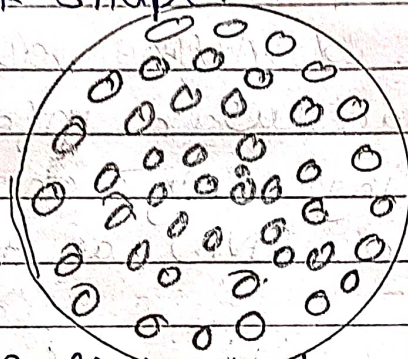
2) Measurement (or examination) $\frac{1}{1}$

(A) Colodion filter technique.

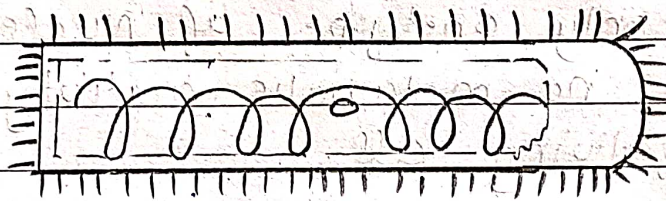
- (B) ultra centrifugation technique
- (C) Electron Microscopy (modern technique).
- (d) Viral Haemagglutinin technique.

⇒ Shape

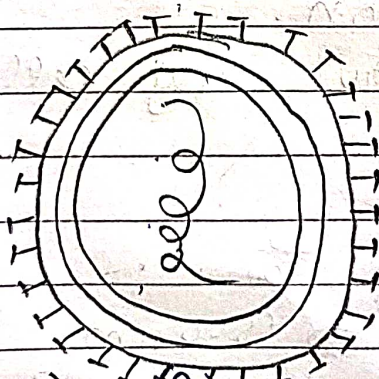
(A) Pox virus — Brick shape.



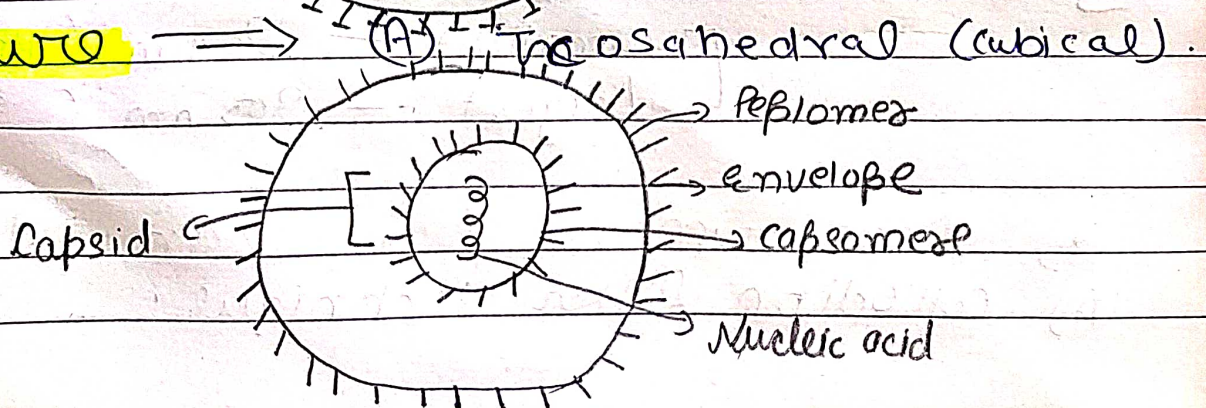
(B) Rhobdo virus — Bullet shape.



(C) Influenza virus — roughly shape.

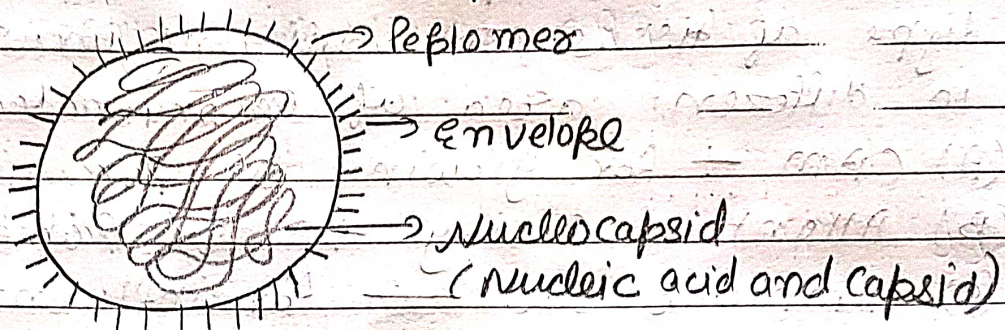


⇒ Structure



(B) Helical

(C) Complex



⇒ Classification

1) DNA ÷ Deoxyribo Nucleic Acid

2) RNA ÷ Ribonucleic Acid

1) DNA Virus

(2) RNA Virus

(A) Rotavirus

(A) Retro virus

(B) Hepes virus

(B) Reo virus

(C) Parvo virus

(C) Rhabdo virus

(d) Adeno virus

(d) Arbo virus

(e) Picornavirus

⇒ Cultivation of virus

virus can't grow on any inanimate culture media, they are grow only in living cell.

1) Animal inoculation

(A) pathogenesis of viral disease

(B) for viral oncogenesis

(C) Primary isolation of virus

It provide an aseptic environment with various type of tissue. The different viruses can be grown in different area of embryonated egg.

- (A) CAM $\div$ for growing of Pox viruses.
- (B) Allantoic cavity $\div$ for Rabies virus.
- (C) Amniotic sac $\div$ for influenza virus.
- (d) Yolk sac $\div$ for Rickets.

$\Rightarrow$ Tissue culture $\frac{8}{0}$

- (A) organ culture
- (B) Explant culture
- (C) cell culture

Micro

L-10

Medically Important Viruses.

Human immunodeficiency virus (HIV).

AIDS was first recognized in USA in July 1981. The causative agent of AIDS was reported in May 1983 by Luc Montagnier from Pasteur Institute, Paris.

HIV - 1 (A) HIV - 1

(B) HIV - 2

In India, first case HIV-1 was found in 1986 and HIV-2 in 1991.

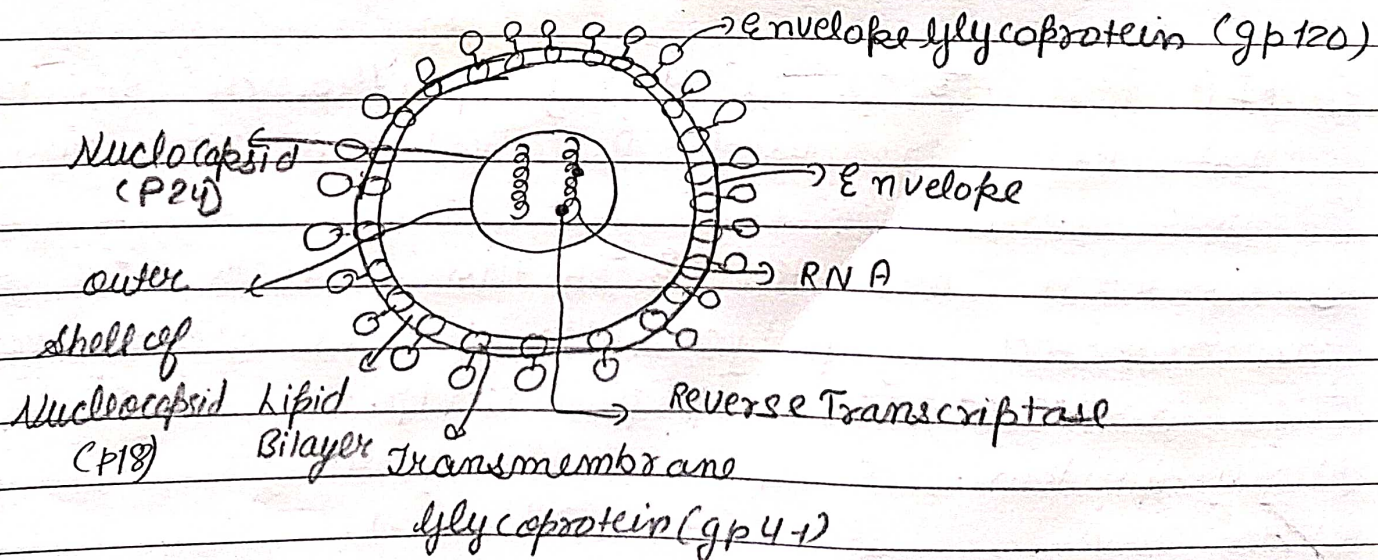
Morphology - Size 90 to 120 nm in diameter.

Shape - Spherical.

Envelope - Present.

RNA - Present

Nucleocapsid - Present



⇒ Mode of Transmission :- (A) Sexual contact
(B) Parenteral transmission
(C) Perinatal transmission

⇒ Laboratory diagnosis :- HIV infection.

1) Specific test for HIV infection :-

- (A) Antigen detection (C) virus isolation.
(B) Antibody detection (d) Detection of viral nucleic Acid.

2) Non-Specific test :-

- (A) TLC (C) IgG and IgA level.
(B) Platelet count. (d) SRIN test for CMT.

⇒ Laboratory test for HIV detection :-

1) ELISA Test :- It is most useful test for identification of HIV-1 and HIV-2. HIV virus can also detect in window period by ELISA test.

2) RIA Test :- It is Highly specific or sensitive test. RIA are used for detection HIV antigen and antibody.

3) Western blot test :- In this test the HIV protein are detected by polyacrylamide gel electrophoresis on nitrocellulose paper strip.

- (A) glycoprotein. (C) P18 (e) gp 41
(B) Ig 160 (d) P24 (F) p51.

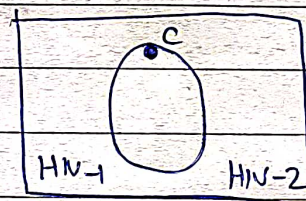
4) **Rapid test** :- In this test, the card is used for detection of Antigen and Antibody of HIV.

⇒ **Procedure of Rapid test** :-

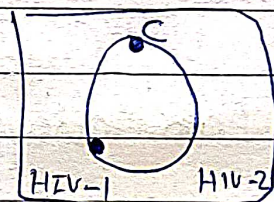
- 1) Take a sterilize rapid test card.
- 2) Add one drop of buffer solution in test card.
- 3) Add one drop of serum or specimen in test card.
- 4) wait for 2min and add one drop of buffer solution.
- 5) Add one drop of enzyme conjugate in the test card.
- 6) wait for 10 to 20 min and observe the reaction in test card.

⇒ **observation** :-

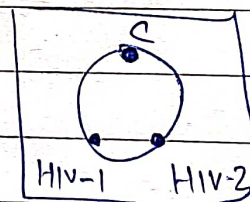
- 1) If one dot are seen on control, that means the test is Negative.



- 2) If two dots are seen on control and HIV-1, that mean that test is HIV-1 positive or reactive



- 3) If three dots are seen on controls. HIV-1 and HIV-2 that mean test is HIV-1 and HIV-2 are positive or reactive



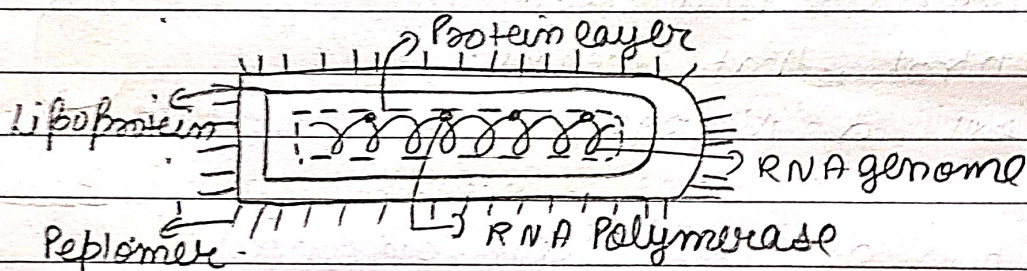
- 4) If no dots are seen on test card, that mean card is invalid.



RABBITES VIRUS.

Rabies virus are belong to Rhabdo virus family. They are mostly found in Dog, cat, Bat, fox. This virus spread to people from the saliva of infected animal. Rabies virus infect the central nervous system of man.

morphology	Size	—	120 to 180 nm
	Shape	—	Bullet shape
	Genome	—	RNA
	Envelope	—	Replomer containing Nucleocapsid.
		—	Helical Symmetry.
	Incubation	—	1 to 3 month.



- ⇒ **Lab diagnosis**
- 1) Saliva
 - 2) CSF
 - 3) facial skin biopsy
 - 4) Brain tissue.
 - 5) Cerebellum.

⇒ **Immuno fluorescence test** — Viral Antigen can be detect in saliva or facial skin biopsy by direct immunofluorescence test.

⇒ **Polymerase chain Reaction** — It is very sensitive test which is used for detection of rabies virus RNA.

Antibody detection $\frac{6}{10}$ High titre antibody in the CSF can be used for diagnosis of antibody of Rabbits virus.

Demonstration of Negri Bodies $\frac{6}{10}$ Rabbits virus are also detected by Histological staining method in Brain tissue.

$\Rightarrow$ **Symptom of virus** $\frac{6}{10}$ (A) Fever (B) Headache (C) Fatigue (d) Muscle pain (e) Vomiting. (e) Paralysis (g) mental confusion.

Prevention $\frac{6}{10}$ 1) All dogs and cat more than four month of age must be vaccination against rabbies.

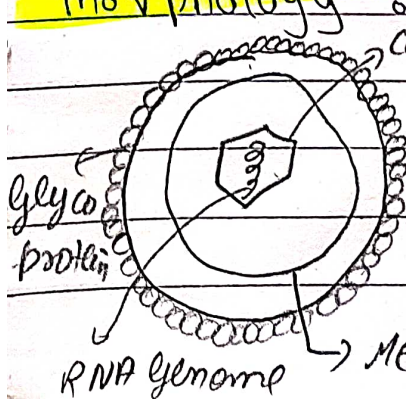
2) Avoiding contact with unknown animals.

3) Keep bats out of your home.

POLIO VIRUS $\frac{6}{10}$
Virus ——— Mouth ——— Multiply in pharynx and intestine.

↓
Destroy the motor or Horn cell of Spinal cord ← Spinal cord ← Blood stream, and Brain.

Morphology $\frac{6}{10}$



Size

— 25-30 nm

Shape

— Spherical

Genome

— RNA

Symmetry

— Icosahedral

Capsid

— Present

Incubation

— 5 day - 30 day

Lab — Diagnosis —

Specimen —

1) Throat swab	3) Blood.
2) Rectal swab	4) CSF
3) Stool.	
4) Brain tissue	

Direct microscopy — Virus can be demonstrated in stool by direct electron microscopy.

Isolation of virus —

- i) Monkey kidney cell.
- ii) HELA.
- iii) HEp-2.

Symptoms —

i) Vomiting	iii) Fever	v) Sore throat.
ii) Headache	iv) Neck Pain	vi) Paralysis.

Prevention —

- 1) Giving the polio vaccination to children.
- 2) Always taking clean water and food.