



NEET-AIIMS

BIOLOGY

ZOOLOGY-III



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"Human Health and Disease"

- Ancient greek people and Hippocrates (father of medicine) → Proof Persons those have Black Bile are generally hot personality → Good Humour Hypothesis
- William Harvey (discovered blood circulation) disproved Black Bile hypothesis by using thermometer.
i.e., disproved good humour hypothesis.
- Disease → Any condition which interferes normal function of body.
- Typhoid → Caused by *Salmonella typhi* bacteria
- Historic case → Mary Mallon [Nick Name - Typhoid Mary] was a cook & carrier of typhoid. Spread typhoid infection in many homes through cooked food.
- Test → Widal Test
- Symptoms → High fever (Typhoid Bacteria adapt in adverse effect of HCl & high fever.)
 - Abdominal pain → Cramps
 - Hair loss.

Bacterial Diseases :-

- 1) Pneumonia → Caused by
 - (i) *Diplococcus Pneumoniae* (ii) *Haemophilus influenzae*.
 - Lung disease.
 - Symptoms - fever, chill, watery lungs; coughing, sneezing - In acute case, nails & lips turn grey to bluish.
- 2) Tuberculosis → Caused by *Mycobacterium tuberculi*.
→ Mantoux test.

→ leprosy

3) leprosy → Hansen's disease (Kuth rog)
 → Mycobacterium leprae.

→ free culture of bacteria is not ~~bacterium~~ possible,
 so not comes under Koch postulates.

* Note → Culture of leprosy bacteria done in
 Armadillo's body.

4) Whooping Cough → Bordetella pertussis.
 (Kali Khazi).

5) food poisoning → Clostridium botulinum.
 (Botulism)

6) Plague → Yersinia pestis, Pasteurella pestis
 Vector → Rat flea (Xenophyella)

7) Syphilis → Treponema palladium
 Test → Wassermann (VDRL - Venereal Disease Research
 Laboratory Test)
 → Painless ulcer - Chancres

Protozoan Disease :-

i) Malaria Parasite → Plasmodium (Digenetic).
 [i] Primary host → Human (asexual cycle of Plasmodium)
 [ii] Secondary host → female anopheles (sexual cycle of
 Plasmodium).

→ Main species - ① P. vivax (Benigne tertian malaria)
 ② P. ovale (Mild tertian malaria)
 ③ P. malariae (Quatern malaria).

- ④ *P. falciparum* → Cerebral malaria, Brain malaria, Black water fever ~~Black~~
 → Estiva - Autumnal malaria.
 → Pre-erythrocytic cycle absent.

(i) Maudsloti - *P. falciparum*

(ii) Zeimann dot - *P. malariae*.

(iii) Schiffner dot - *P. vivax*.

(iv) James dot - *P. ovale*.

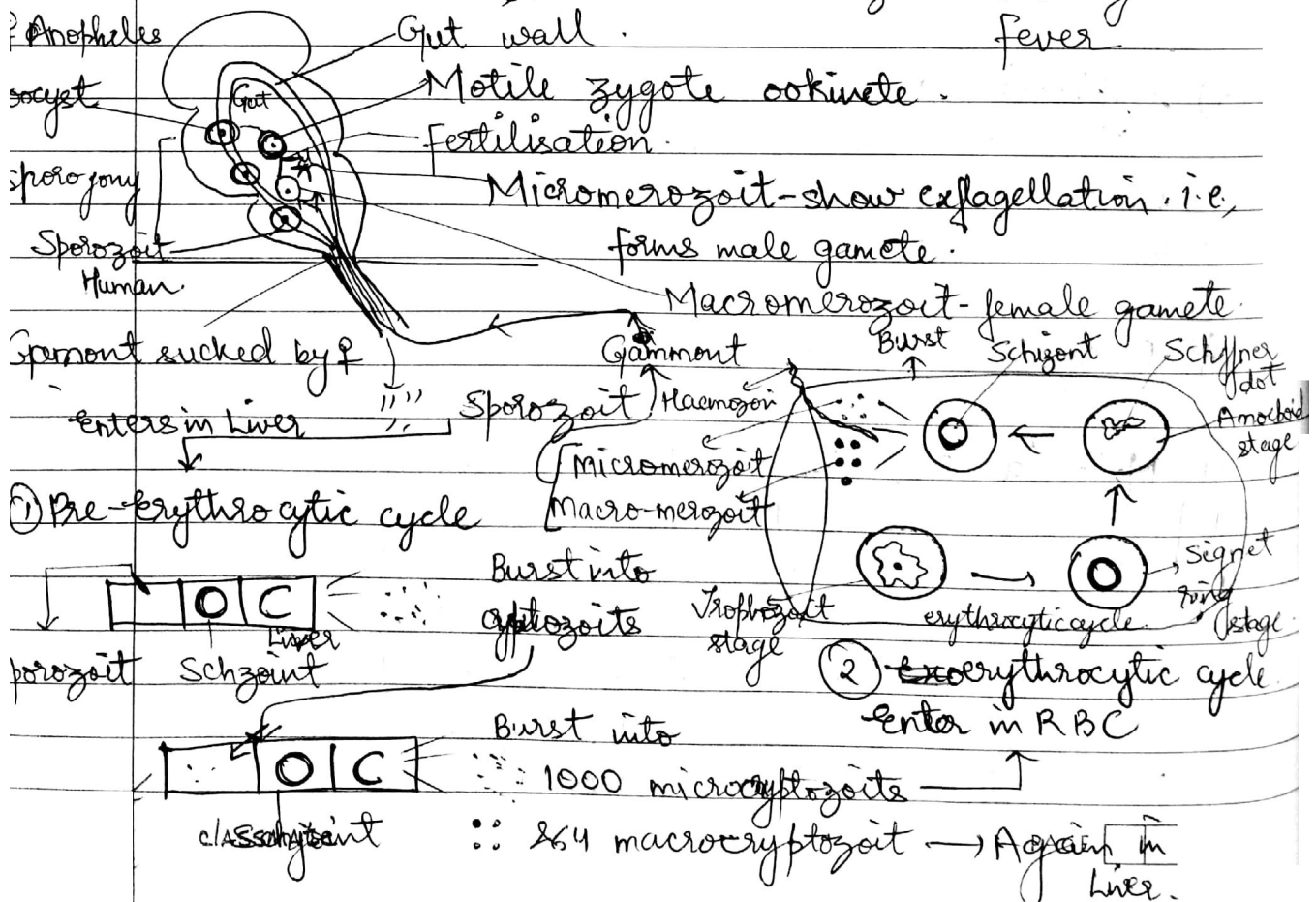
→ Monkey is reservoir host for malarial parasite.

→ Charles Laveran discovered Plasmodium (malarial parasite).

→ Sir Ronald Ross - discovered oocyst of malarial parasite in gut wall of female anophelis.

→ Engineer, also AFMC doctor. → At midnight in Sikkenderabad AP.

* Haemozoin → Shivering + fever.



* Note → *Giardia lamblia* (Grand old man of intestine)

→ Causes Giardiasis [watery faecal matter with very or Bgg-Packer's bad smell].
 disease
 or Tricelleria disease

→ *Giardia* is parasite of small intestine (Duodenum)
 → Infection by contaminated water which is contaminated by so-faecal way.

Additional Points :-

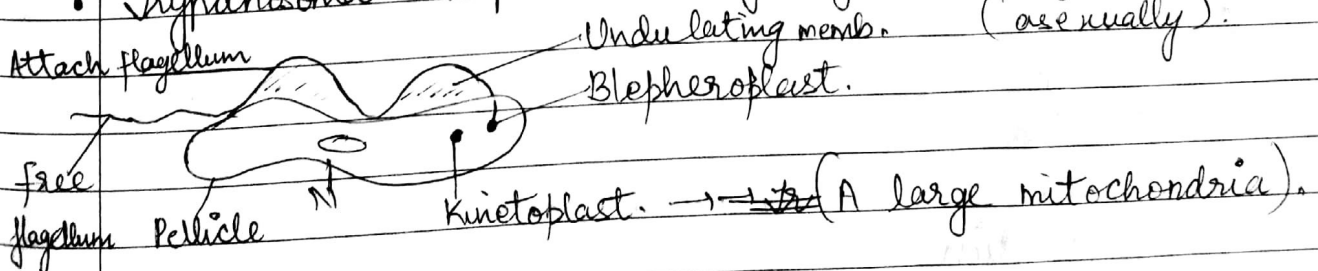
⇒ Symptoms of amoebic dysentery -

→ Faecal matter is slimy with mucous & blood, ie., bloody stool with mucous.
 → Presence of chalice (white crystal) in faecal matter

→ Chalice are charcoal laden crystals.

→ Sec. infection of *E. histolytica* is lethal. due to regular feeding of mucosa & submucosa, of intestinal wall ^{becomes} ~~because~~ perforated and parasite comes in blood stream & circulate in lungs, brain etc

• *Trypanosoma* reproduce only by - binary fission (asexually).



→ *Trypanosoma* is polymorphic protozoan - have Leptomonad, Leishmania & tritrichial form.

→ Undulating membrane maintain speed in viscous fluid.

• Euglena is connecting link b/w plant and animals.

→ Euglena have 2 flagella (one short & one long)

→ Binary fission - longitudinal

→ Reserve food material in paramylum granule.

→ Centriole absent in euglena.

→ Basal granule or blepharoplast considered as centriole because divides $\neq$ before nuclear division.

• Contractile vacuole absent in.

→ Parasitic amoeba (*E. histolytica*)

→ Marine amoeba (*A. radiosa*, *A. radiata*, *A. Pelomyxa*)
Multiple nuclei. ←

→ Amoeba proteus - freshwater amoeba.

→ Most popular amoeba theory for locomotion is Sol $\rightleftharpoons$ Gel (Nast & Partin)

Helminthic Diseases :- (Nemathelminthoses/ Aschelminthoses)

1) Ascariasis :-

⇒ • By *A. lumbricoides* ($2n=2$) → Shows cutely.

• Symptoms -

→ Abdominal pain ~~++~~

→ Internal bleeding / haemorrhage.

→ Constipation.

→ Blockage of intestinal passage.

• Oil of chenopodium treats ascariasis.
(bathua)

bathus → Chilopoda)

OPGLTBAS



Toppernotes

- Infective stage → 2nd stage ^{Unleash the topper in you} RFL - bdatiform larva.
[embryonated egg with 2nd step RFL]

- Male and female ascaris in human intestine



2.5 lakh fertilised eggs come out along with faecal matter.



Eggs viable upto 7 years in soil if temp^o is 85°F. (1st moulting in soil)



Food & water contaminated by embryonated eggs



Enter in human intestine with 2nd step RFL.



2nd step larva from intestine to liver by hepatic portal vein.



from intestine it reach into heart & then to lungs (II, III moulting)



from lungs to intestine [IV - final moulting]



Ascaris (cycle repeats).

- ♂ & ♀ ascaris = telogonic → Only particular part of gonads [Testis or Ovary] forms gamete.
- Sperm → Amoeboid
- Eggs → Mammillated (LCP) → 3 layers.
 - Lipid (enterified glycoside) - Outer layer
 - Chitin - Middle
 - Protein - Outer

2) filariasis :-

⇒ Caused by *Wucheria bancrofti* & *W. malayi*.

- Viviparous or ovoviviparous.
- Parasite of lymph & blood.
- Infective stage → Microfilariae.
- Vector → female culex, female Aedes.
- Symptoms -

→ Blockage of lymph passage (oedema)

→ Lower limbs swell up.

→ Genital organs also affected.

• Best diagnosis time → mid-night

• Most patients → Bihar and West-Bengal.

• Very slowly spreading disease.

* Note → *Aedes aegypti* (Tiger mosquito). (Aedes)

→ wings spotted.

→ Abdomen have white and black bands

→ Vector for Dengue, Chikengunia and yellow fever (not in India) [viral disease].

fungal diseases :-

1) Ringworm :-

⇒ Caused by *Microsporum*, *Trichophyton*, *Epidormophyton* } soil fungi.

• Spread by using comb, soap, towel of patients.

• Symptom → dry scaly lesions.

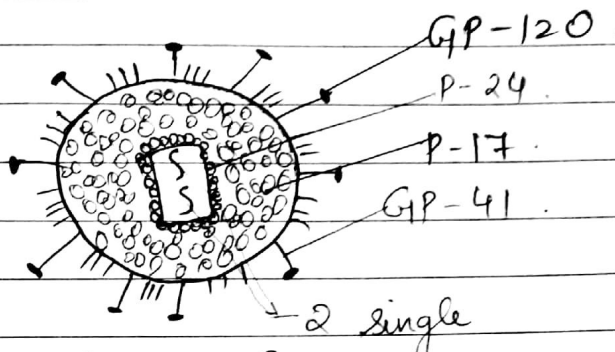
• *Tinea pedis* causes athlete feet.

T. barbis infect beard area and face.

T. cruris infect groin, arm pit.

• fungal growth needs heat and moisture.

AIDS



2 single stranded RNA (with reverse transcriptase enzyme).

HIV [Human Immunodeficiency virus]

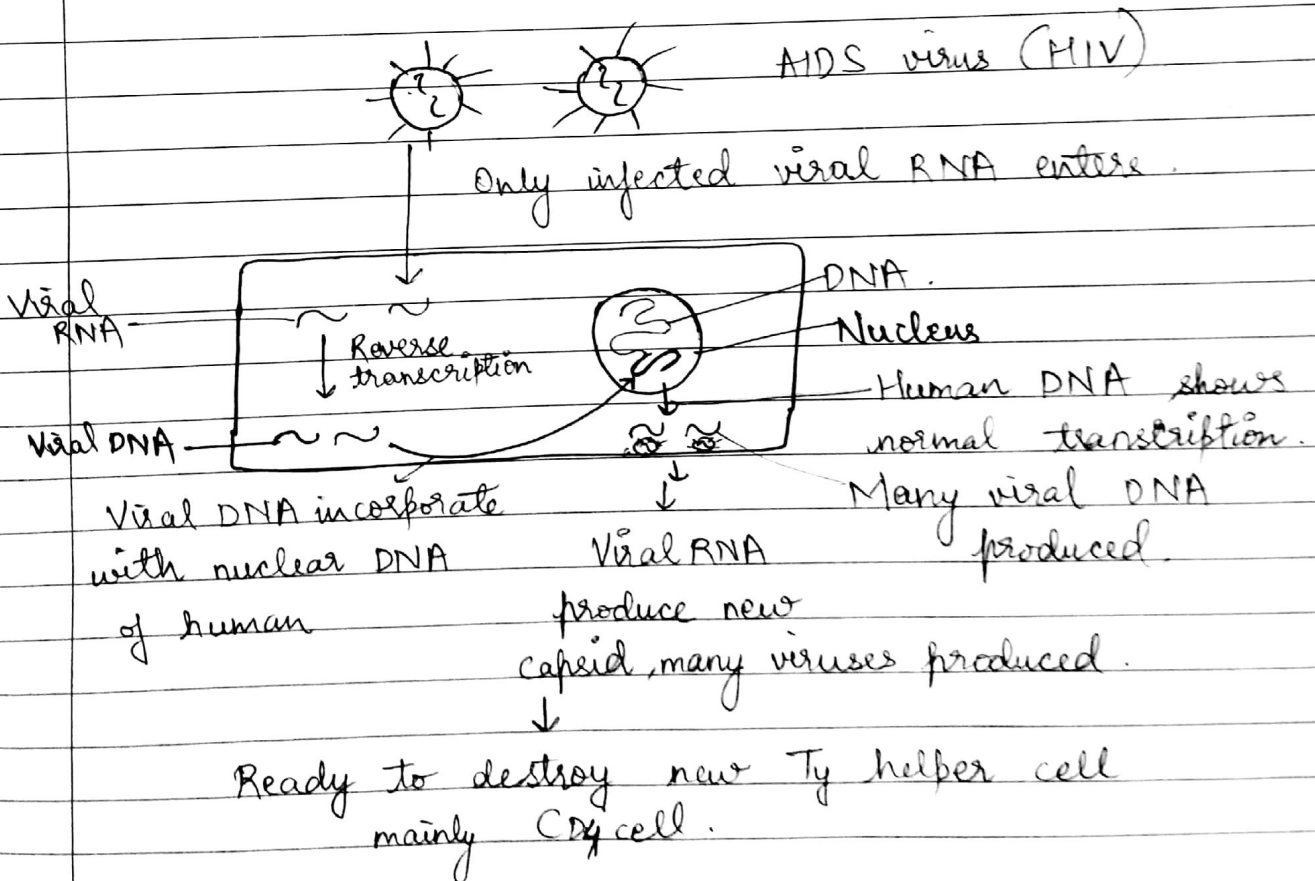
• NACO → National AIDS Control Organisation.

• AIDS day → 1st Dec.

• firstly reported → 1981 (USA)

• In India → 1986

• "Die with ignorance" - AIDS.



- Normal no. of CD₄ cell = $900 \times 10^6 / L$.
- Reduced by AIDS = $200 \times 10^6 / L$.

- Drugs → Zidovudine or AZT (Azidothymidine)
 - DDI → Didanosine
 - DDC → Dideoxy cytidine.
 - AZT → Retrovir is first drug, but effective now.
 - Dr. prefers AZT + Nstavopine.
 - All these drugs are nucleosides & given by sub-cutaneous injection.
 - These are molecular analogs, stop the conversion of viral RNA into viral DNA, i.e., stop or slow down the reverse transcription.
- Macrophages and T-Helper cells are factory of HIV virus.
- During infection $\frac{1}{2}$ site of T-helper cell - T_H helper cells itself bind with GP-120 site of AIDS virus.
- Full blown AIDS - also shows ARC (AIDS related Complex), i.e., due to weak immune system following infection occur -
 - (i) Mycobacterium avium (TR)
 - (ii) Candida albicans (Candiditis)
 - (iii) Pneumocystis carinii (Pneumonia)
 - (iv) Toxoplasma gondii (Encephalitis)
 - (v) Kaposi's sarcoma - cancer of skin & lymph nodes
- HIV not spread by
 - Touching, dry kissing, eating with patient.
 - Mosquito bite.
- HIV spread by -

- Oral sex, wet kissing, unsafe sexual contact with patient.
- Unsafe blood transfusion
- By placenta of infected mother to foetus.
- Unsafe instruments of barber.

* Cancer :- Symptoms :-

- ⇒ • Weight loss (rapidly)
- Still diarrhoea
- Opportunistic infection
- Night sweating
- Rashes on skin
- Hair loss.

* Incubation period → 2 months to 5-10 years (Time lag)

* Cancer :-

- ⇒ • Kark rog.
- Oncology → Study of cancer
- ✓ • Carcinoma → Cancer of epithelial ectoderm.
Eg. Breast cancer (females), lung cancer (males)
- Oncogenes → Cancer causing genes.
- ✓ • Sarcoma → Cancer of primitive mesoderm.
Eg. Bone cancer, lymphnode cancer.
- Glioma → Cancer of glial cells.
- * In brain cancer, neurons don't divide, only neuroglial cells (microglial cells) divide.
- Adenoma → Gland cancer.

- Melanoma → Cancer of pigmented cells
eg. skin.
- Lymphoma → Cancer of lymphode.

• Carcinogens Part of cancer.

- ① Soot → skin + lungs
- ② Cadmium oxide → Prostate
- ③ DES (Diethyl Stilbestrol) → Vagina
- ④ Mustard gas → lung cancer
- ⑤ Coal tar (3,4-benzopyrene) → skin + lung
- ⑥ N-Nitrosomethylene → lung cancer
- ⑦ Vinyl chloride → liver
- ⑧ Ni, Cr, Asbestos → lungs
- ⑨ Aflatoxin → Liver

- Genital warts and genital herpes are STDs which convert to cancer.

- Onco-virus → Cancer causing virus (mostly retroviruses)
- Kaposi sarcoma.
- HPV (Human Papilloma Virus)
- Burkitt lymphoma virus.

- Normal body cells have proto-oncogenes (C-one) don't cause cancer. But cause cancer when they convert into oncogenes.

- Cancer cells have more telomerase enzyme activity.

- Uncontrolled mitotic division is called cancer.

- eg. Leukemia (Blood cancer) in which no. of WBC abnormally ↑.

- Normal cells have property of contact inhibition, i.e., stop their dividing when touch boundary of other body organs. So, not cause cancer.
- Cancer cells (neoplastic cells) lose power of contact inhibition and rapidly divide to cause cancer.

Tumour (Uncontrolled division of neoplastic cells).

Benign Tumour

- Not dangerous
- Restricted to a part (localised)
- Doesn't show metastasis.

* Oncoviruses are mainly those retrovirus causing cancer.

- E.g. Burkitt lymphoma virus

Kaposi sarcoma virus

HPV → Human Papilloma Virus

HSV → Herpes simplex Virus

HIV → also oncogenic.

Malignant Tumour

- Shows metastasis, i.e., some cells from tumour slough off and come in blood circulation and when attached to other organs like bones, lungs and then causes tumours of other parts.
- Most dangerous non-infectious disease is cancer [Malignant tumour].

* Diagnosis →

- 1) Biopsy [Histopathological test] → A piece of tissue is taken from suspected area, after suitable stain observed under light microscope.
- Initial diagnosis method.

2) CT scan [Computed Tomography] → Detect the 3-D structure of internal organ cancer.

3) MRI [Magnetic Resonance Imaging] → In this method, non-ionising radiation and EM waves are used which give proper idea of cancer of internal organ.

- Best and common method to detect cancer of int. organs
- Best diagnosis method for patient.

* Note → UV-B Rays [Non-ionising] → Cause DNA damage.

4) Molecular Diagnosis → Detect cancer, AIDS, Syphilis and other diseases just after infection, i.e., early diagnosis done by molecular diagnosis.

(a) PCR (b) ELISA (c) DNA probe.

[a] PCR :- [Polymeric Chain Reaction]

- Nick name - Public Choice Reaction.
- By PCR, we can produce multiple copies of same kind of DNA. So, we study the disease causing gene.

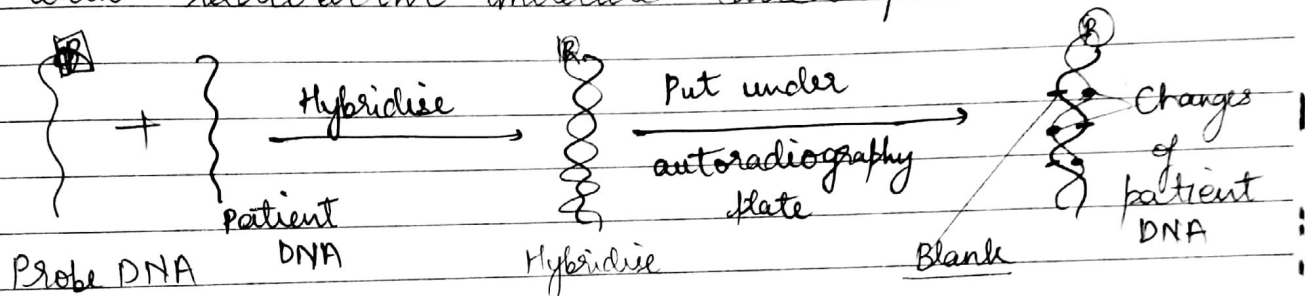
[b] ELISA :- [Enzyme Linked Immuno Sorbent Assay]

- Based on antigen-antibody concept, i.e., detect pathogenic antigens [pathogenic micro-organisms] as well as antibody formation against particular antigen.

- Key reagent of ELISA → Alkaline phosphate.
- Main enzyme used → Horse Red Peroxidase.

* Note → In case of AIDS, ELISA confirmed by western blot technique, i.e., confirmatory test of AIDS is western blot.

[c] Probe :- Single stranded DNA or RNA if tagged with radioactive molecule called probe.



- Result - Changes in patient DNA shows blank by probe in autoradiography, i.e., probe don't read changed sequence.
- So, by idea of particular gene sequence, disease is identified.

* Common Cold :-

⇒ Most common infectious disease.

- Caused by Rhinovirus.

* Note → Most Common fungal infectious disease - Ringworm.

- Symptoms :-
 - Lungs not affected
 - Only upper respiratory passage affected.
 - Congestion in nasal passage.
 - Running nose.