Lecture No. 21 PARASITOLOGY DR.Raad H.H. **Protozology**

**Introduction** :

**Protozoa**:

They are **unicellular** **eukaryotic** organisms of a single cell and protoplasmic mass perform all necessary functions of metabolism and reproduction and they are either parasitic or free living ;all protozoa are microscopic.

Eukaryote: a cell with a well-defined chromosome in a membrane bound nucleus (true nucleous with membrane); (versus prokaryotic bacteria with nucleic acid material not bound in a nuclear membrane).

**Body** **structure** :

1. Plasmalemma : cell membrane.
2. Cytoplasm
3. Ectoplasm
4. Endoplasm

3- Nucleus : contain Nucleolus.

 Nucleus are Two types :

1. Compact Nucleus : with large mass of chromatin granules e.g. Ciliata.
2. Vesicular Nucleus : with reticular radial shape chromatin e.g. Trypanosomes.

Note

All protozoa with one Nucleus except Ciliata with two Nucleus ,Micro Nucleus responsible for reproduction and Macro Nucleus for other cell functions.

**Physiological functions**

1. Locomotion (movement) a-flagellum e.g. Trypanosomes. B-ciliates e.g. *Balantidium coli* c-Pseudopodia e.g. Amoeba d- Gliding or contracting movement e.g. Coccidia
2. Nutrition : **parasitic forms with holozoi nutrition** ; a-cytosome: permanent opening for nutrition e.g. *Balantidium coli* b- micropore :opening inside the cell membrane e.g. Plasmodium c- temporary pseudopodia e.g. Amoeba d- selective permeability
3. Excretion a- cell membrane e.g. Trypanosomes b- temporary opening e.g. Amoeba c- permanent opening (Cytopyge ) e.g. *Balantidium coli*
4. Secretion a- enzymes assist in penetration of host cell wall e.g. Entamoeba histolytica b- secret solid materials to produce cyst wall for permanent protection e.g. Giardia
5. Respiration parasites takes O2 through metabolic process . No respiratory system exist .
6. Multiplication And Reproduction

A – Direct multiplication (Asexual reproduction)

1. Binary fission : longitudinal division of the nucleus as in Trypanosomes and an transverse division in Balantidium .
2. Multiple fission :division of nucleus to many No. of particles (small chromatin particles ) , this called Merogony ; Schizogony ( merozoite ; shizont) e.g. Isospora .
3. Budding : this method produce the (Trophozoite) which a small parasite unequal fragments derived from the mother like buds then separated to complete their life cycle .
4. External budding e.g. Babesia
5. Internal = e.g. Sarcocystis
6. Endodygony (2 daughter cells arising from internal budding of parent )
7. Endopolydygony (more than 2 daughter cells resulting from internal budding of parent)) e.g. Toxoplasma gondii .

B – Indirect multiplication (Sexual reproduction)

1. **syngamy**

 This method produce Gametocytes ; Micro Gametocytes (male), Macro Gametocytes (female) ; then a fertilization (fussion) occur between those to produce the Zygote which divided to Sporozoites by a Sporulation method as in Plasmodium .

1. Conjugation :

Method in which a temporary fusion of old parasite with a young one by a temporary inter canal ;the micronuclei of both are dissolved then the micronuclei divided and transfer to each of them then a transverse binary fission occur to produce 4 new parasites e.g. *Balantidium coli* (**ciliates)** .

SPECIALIZED TERMS FOR PROTOZOA:

TROPHOZOITE: Metabolically active form of protozoan parasites,
within the appropriate organ of the host.

 CYST: Metabolically inactive form of protozoan parasites,
adapted for transmission.

**Protozoa classification**

1. According to Cox 1994 ;Depending on locomotion method:

Kingdom Protista

protozoa (45000 unicellular spp.)

1. Group 1) phylum Apicomplexa ( **Sporozoa** )

 2) phylum Microsporidia no locomotion

 Organelles e.g

 Plasmodium

1. Group 1) phylum Kinetoplasta ( **Flagellates** )

 2) phylum Parabasalia

 3) = Metamonada movement by

 Flagellum

 e.g. Trypanosoma

1. Group phylum Rhizopoda ( **Sarcodina**) moving

 By Pseudopodia

 e.g. Amoeba

1. Group phylum Ciliophora Ciliata Move by **ciliates** e.g. Balantidium
2. Another classification according to Markell &Voges 1999 ; Depending on movement organelles :
3. Phylum Sarcomastigophora 1) sub phylum Sarcodina e.g. Amoeba 2) sub phylum Mastigophora e.g. Trypanosoma
4. Phylum Apicomplexa
5. Phylum Microspora
6. Phylum Ciliophora

**\*\*\*There are over 50,000 species of protozoa, from which fifth are parasitic , some 10000 species.**