

Lecture No.14-16

Coccidia and Coccidiosis (*Eimeria*):

Phylum:Apicomplexa

Class: Sporozoea

- Member of the sporozoea are parasitic
 - Produce spore
 - Do not have organ of locomotion like cilia or flegella, except gamete stage.
 - This group of parasite is distinct because of presence of **apical complex**
 - Microgamete** of this group are flagellated.
- Reproduction is both asexual(**Schizogony**) and sexual(**Gametogony**), after formation of zygote, there is fornation of spore(**Sporogony**)
- Single nucleated

What is Apical Complex

- Apical complex is an electron microscopic structure consist of
 - -Polar ring
 - -conoid
 - -micronemes
 - -rhoptries
 - -micropores
 - -subpellicular tubules

Subclass

-
-



Coccidia

Piroplasmia



- Order

Eucoccidiida

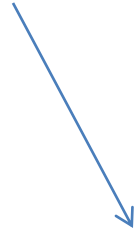
Piroplasmida

- Sub order

Eimeriina

Haemosporina

Adeleina



- **Eimeriina---3 families**
- -Eimeriidae
- -Cryptosporidiidae
- -Sarcocystidae

FAMILY=Eimeriidae

Commonly called coccidia

Intracellular parasite, found mostly in epithelial cell of intestine

- -Single host parasite in which they undergo asexual(schizogony or merogony) and sexual (gametogony) reproduction.
- Union of male gamete (microgamete) and a female gamete(macrogamete) produces **zygote** inside the epithelial cell of intestine and leave host after developing a protective layer called cyst wall in the form **of oocyst**.

Oocyst , outside host undergo a process of sporogony.

- A variable number of spore(Sporocyst) contain one or more sporozoite.
- Tissue cyst absent
- Different genera under this family are(see fig. from Bhatia)
- 1. *Tyzzeria*: No sporocyst, eight sporozoites in the cyst.
- 2. *Isospora*: 2 sporocysts each containing 4 sporozoites(eg. *Isospora*, *Sarcocystis*, *Toxoplasma*, *Hammondia*, *Besnoitia*)
- 3. *Eimeria*: 4 sporocysts each containing 2 sporozoites
- 4. *Wenyonella*: 4 sporocysts each containing 4 sporozoites
- 5. *Cryptosporidium* :4 naked sporozoites without sporocyst

Morphology of oocyst

- Oocyst contain zygote---pass out with faeces.Under appropriate condition become sporulated.
- Common shape of oocysts are-oval, spherical,ellipsoidal, sub –spherical.
- Cyst wall bilayered, clean, transparentouter layer of some may be spiny, inner layer thin.small thinning at narrow pole is called **micropyle**.It is covered by a **cap called micropylar cap or polar cap**
- Cytoplasm of un nucleated zygote is coarsely granular, later it contract in to ball leaving some surrounding.
- Some dark granules may seen near the micropyle called
- **polar granules**

Sporogony

- Occurs with sporulation of oocyst with division of sporont into 2 sporocyst(*Isospora*)
- Or 4 sporocyst(*Eimeria, Wenyonella*).
- A part of protoplasm left after spore formation called- **oocystic residuum**.
- **Stieda body** is present at the most pointed end of sporocyst
- Each sporocyst further divided into 2 or 4 banana – **shaped sporozoites** .
- The leftout protoplasmic mass is called sporocystic residuum. (see fig from book Bhatia)

Life cycle

- Start with injection of sporulated oocyst by host

- excystation

in presence of CO₂, trypsin, bile help

Sporozoite will come out

conoid helps in penetration to host cell

Epithelial cell of
intestine(trophozoite)



- Nuclear division by schizogony or formation of 1st gen. schizogony. Cytoplasm surrounded by nuclear material produce 1st gen. merozoite



- They release, enter in to new epithelial cell, continue the cycle.

In some 2nd genmerozoite may produce 3rd or more gen. of asexual reproduction or may differentiate into sexual stage.

- No. of microgamete(male)>no. of macrogamete(female)
- Rupture of microgamont liberate microgamete--- fertilize the macrogamete.
- **Sporogony:**
- Sporulation occur outside the host. Initially zygote fills the oocyst cavity within few hour. Protoplasm contract from wall form sporont. Sporont divided into 4. remaining cytoplasm become oocystic residuum body.

- Then in between sporocyst, the protoplasm further divided to form 2 sporozoites . Left over protoplas is called sporocystic residuum body.
- For sporulation ---adequate o₂, moisture, temp needed .
- Coccidia infection self limiting
- Asexual reproduction does not occur contineously
- In absence of reinfection, one cycle take place
- Repeated infection, immunity develop in some spp.