Toxoplasmosis

Toxoplasma gondii

Toxoplasma gondii

- Phylum apicomplexa
- Discovered in 1908 in small rodent
- Worldwide in distribution
- Obligate intracellular parasite
- Morphological forms

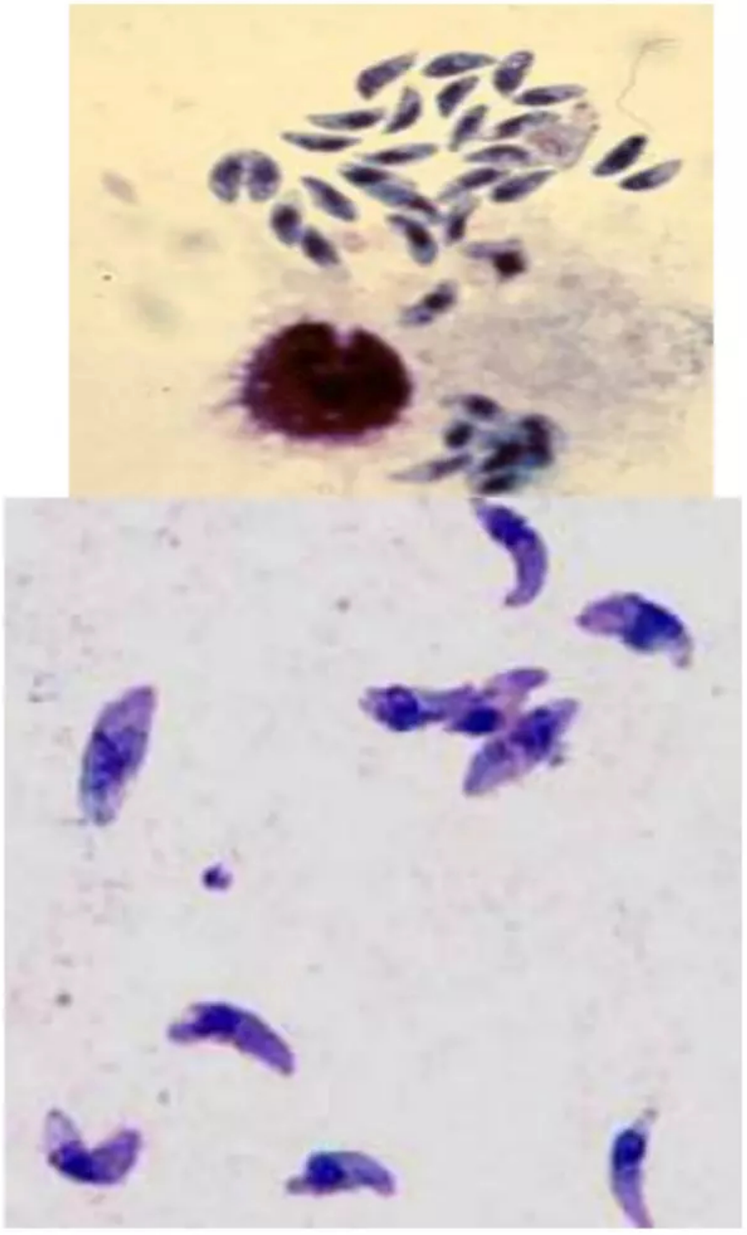
Tachyzoites

Tissue cyst

Oocyst

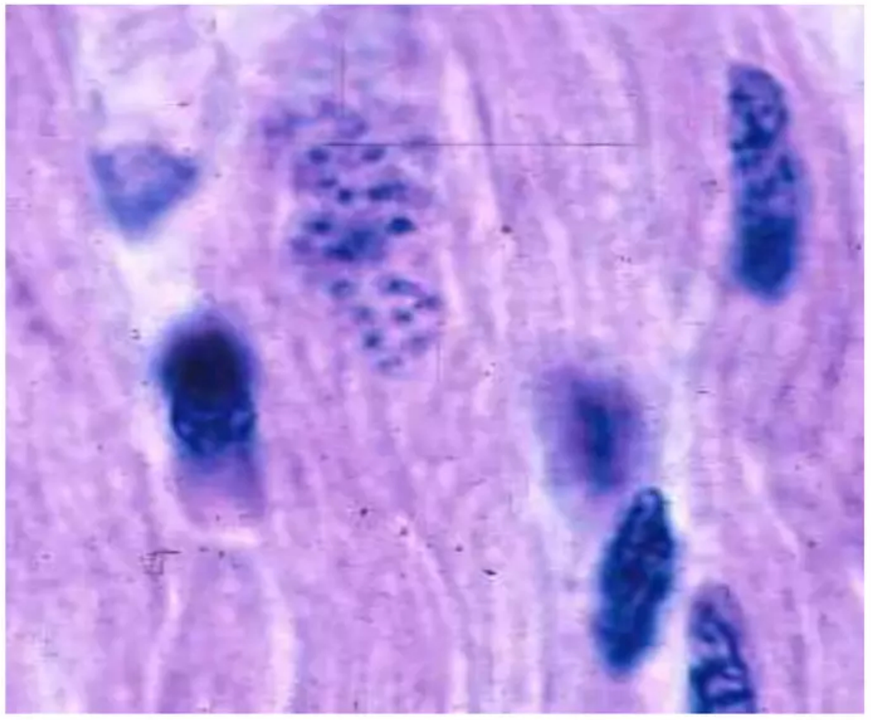
Toxoplasma gondii Morphology

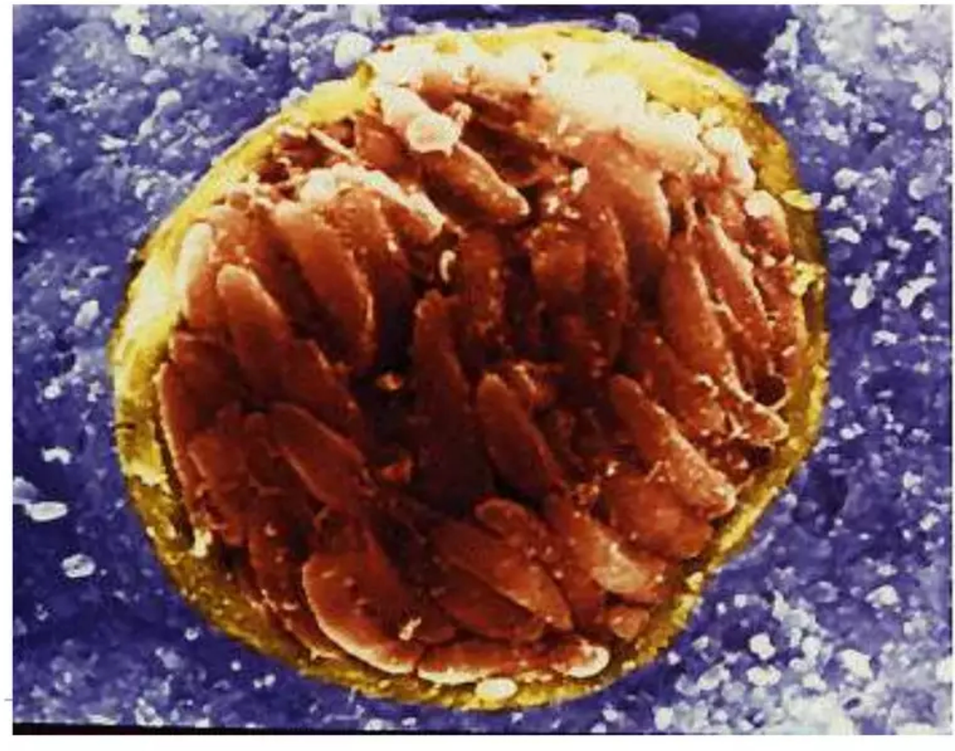
- **Tachyzoite:** crescent shaped
- Active multiplying form seen during acute infection
- Enters host cell & assume an oval shape
- Multiplies asexually within host cell- internal budding
- Trophozoites released which infects other cells



Toxoplasma gondii Morphology

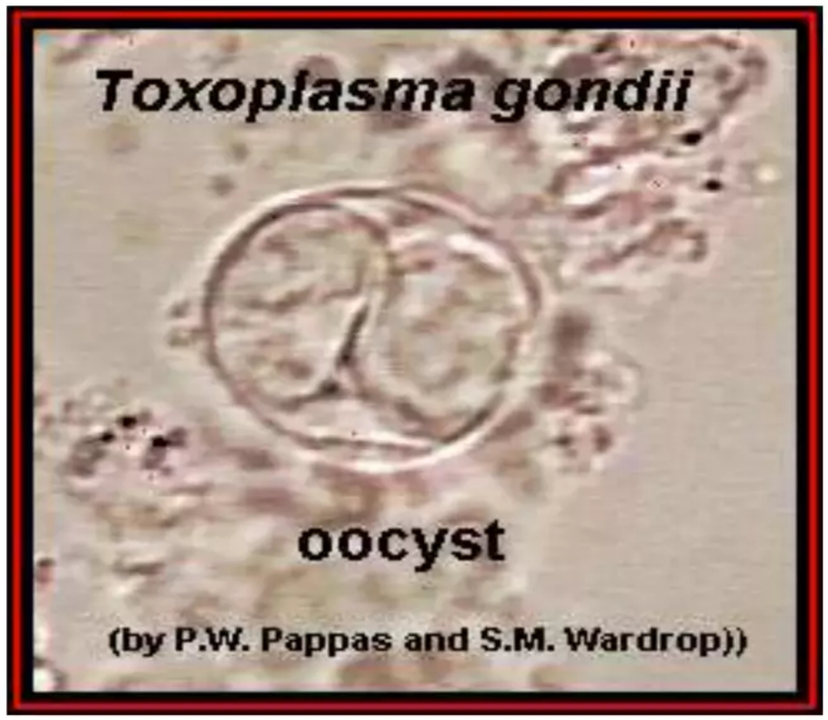
- **Tissue cyst:** occurs in chronic infection
- Formed when parasites multiply & produce a wall within host cell
- Bradyzoites are slowly multiplying forms of trophozoite contained in a tissue cyst
- Young cysts are small while older contains hundreds of bradyzoites





Toxoplasma gondii Morphology

- **Oocyst**
- Present in cat & other felines not in humans
- Oval or spherical shape & contains a sporoblast
- Formed by sexual reproduction (Gametogony)



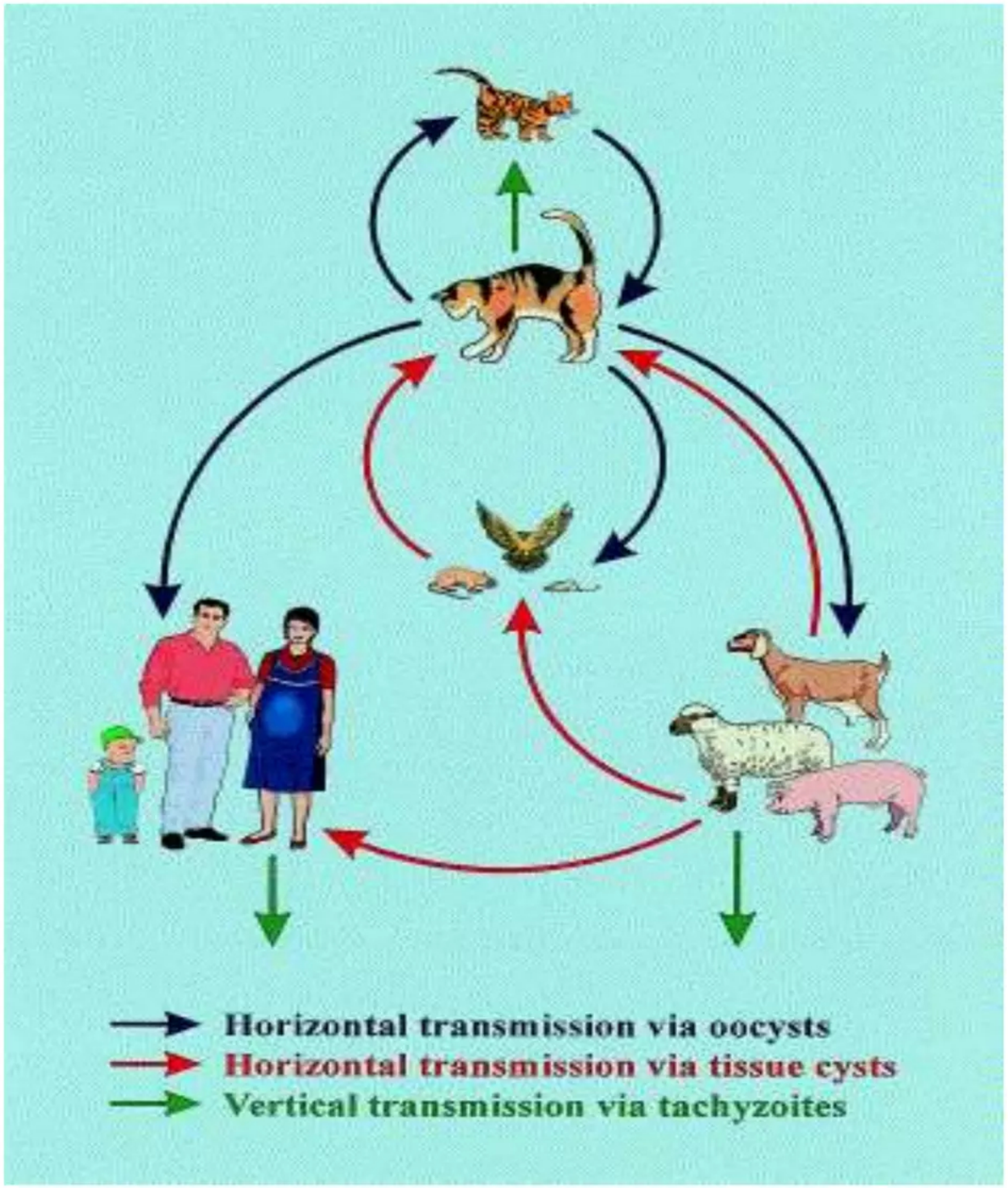
Life Cycle

- **Definitive hosts**

Mainly domestic and wild cats.

- **Intermediate host**

Human, cattle, birds, rodents, pigs, and sheep.



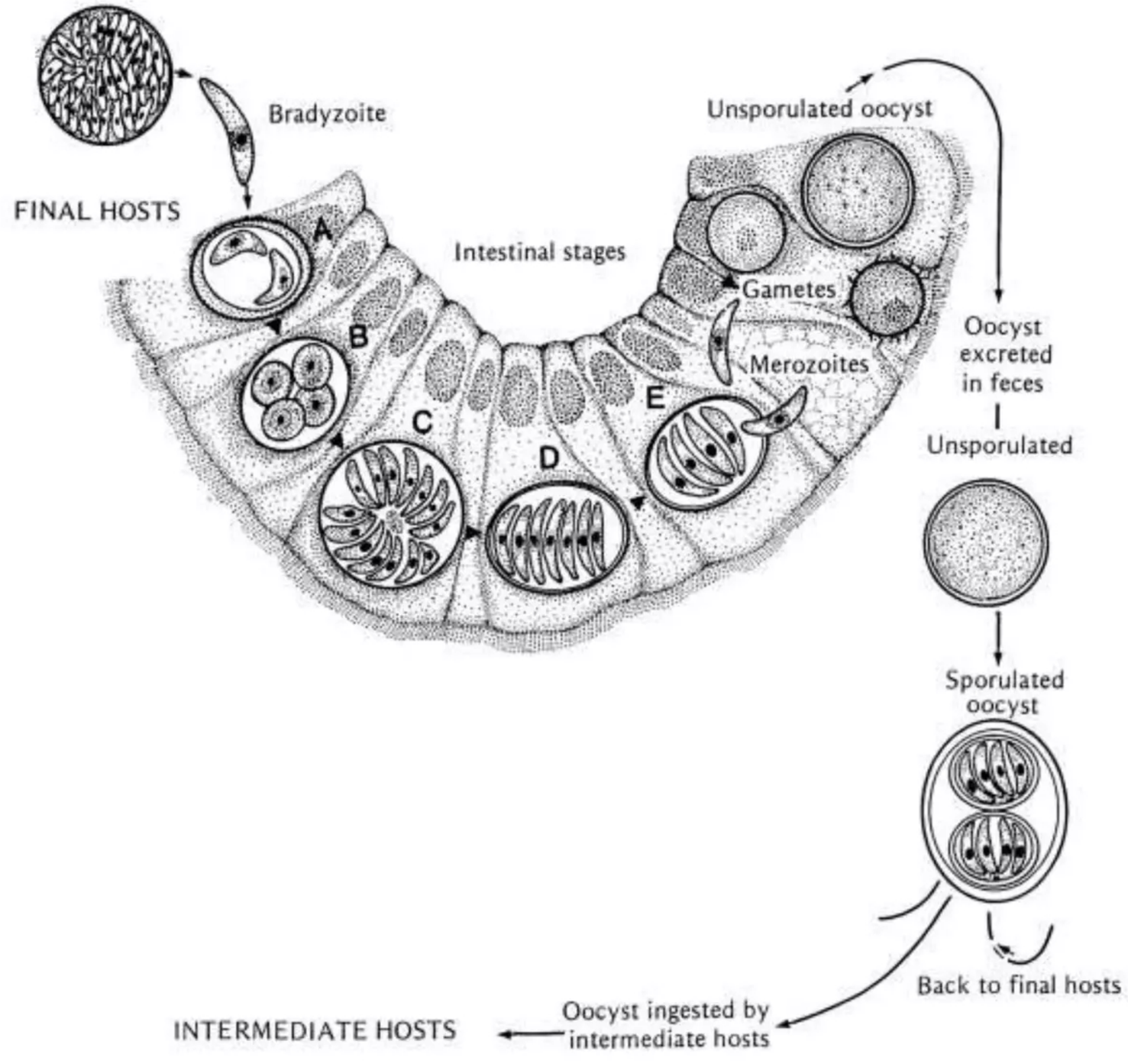
Life Cycle

- **Enteric cycle:** Occurs in cats & felines
- Both asexual multiplication & sexual reproduction within mucosal epithelial cells of small intestine
- Ingestion of any of 3 infectious stages, invades mucosal cells of cat's small intestine & undergoes asexual generation before sexual cycle begins

Life Cycle

- Fertilization of male & female gametes- oocyst develop exit from host cell into gut lumen & pass out in feces
- Develops in soil for few days & become infectious
- Sporoblast divides into 2- sporocyst
- Four sporozoites develops into each sporocyst
- Mature oocyst having 8 sporozoites is infective form of parasite.

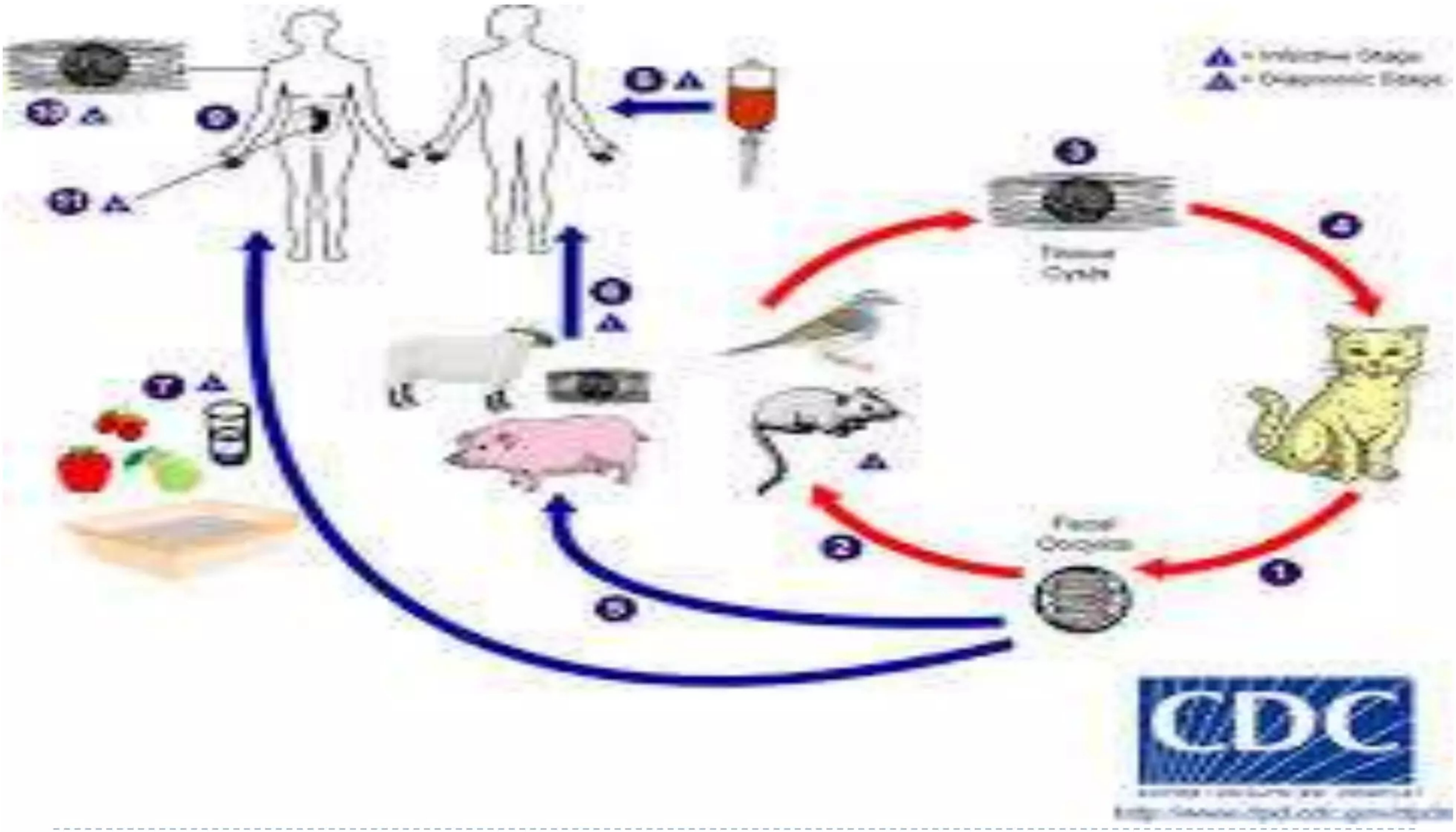
Life cycle


Bradyzoite
FINAL HOSTS
A
B
C
D
E
Intestinal stages
Unsporulated oocyst
Gametes
Merozoites
Oocyst excreted in feces
Unsporulated
Sporulated oocyst
Back to final hosts
Oocyst ingested by intermediate hosts
INTERMEDIATE HOSTS

Life cycle

- **Exoenteric cycle:** Intermediate hosts acquires infection by ingestion of sporulated cyst & by ingestion of undercooked meat containing tissue cyst
- In duodenum oocyst release **sporozoites** & tissue cyst releases **bradyzoites**
- Pass through gut wall, circulate in body, invades various cells especially macrophages-form **tachyzoites**
- Multiply ,break out & spread infection

Life cycle



Life cycle

- In the macrophage tachyzoites develop and travel to various parts of the body via blood stream (Heart, spleen, liver and brain).
- once immune response is trigered, tachyzoites encyst into zoitocysts and pseudocysts which contain bradyzoites(inactive).

Pathogenesis

1) Acquired toxoplasmosis
   - Mild lymphatic inflammation
2) Congenital toxoplasmosis

Pathogenesis

- Congenital toxoplasmosis
- Foetus infected by focal lesions in placenta
- Generalized infection then clears from visceral & may localize in CNS
- During first trimester-major CNS anomalies
- Second & 3rd trimester- less severe neurological damage

Pathogenesis

Congenital toxoplasmosis

1. Intracerebral calcification
2. Chorioretinitis (Ocular toxoplasmosis)
3. Hydrocephaly
4. Microcephaly
5. Convulsions
6. Mental retardation
7. Cardiomegaly

Pathogenesis

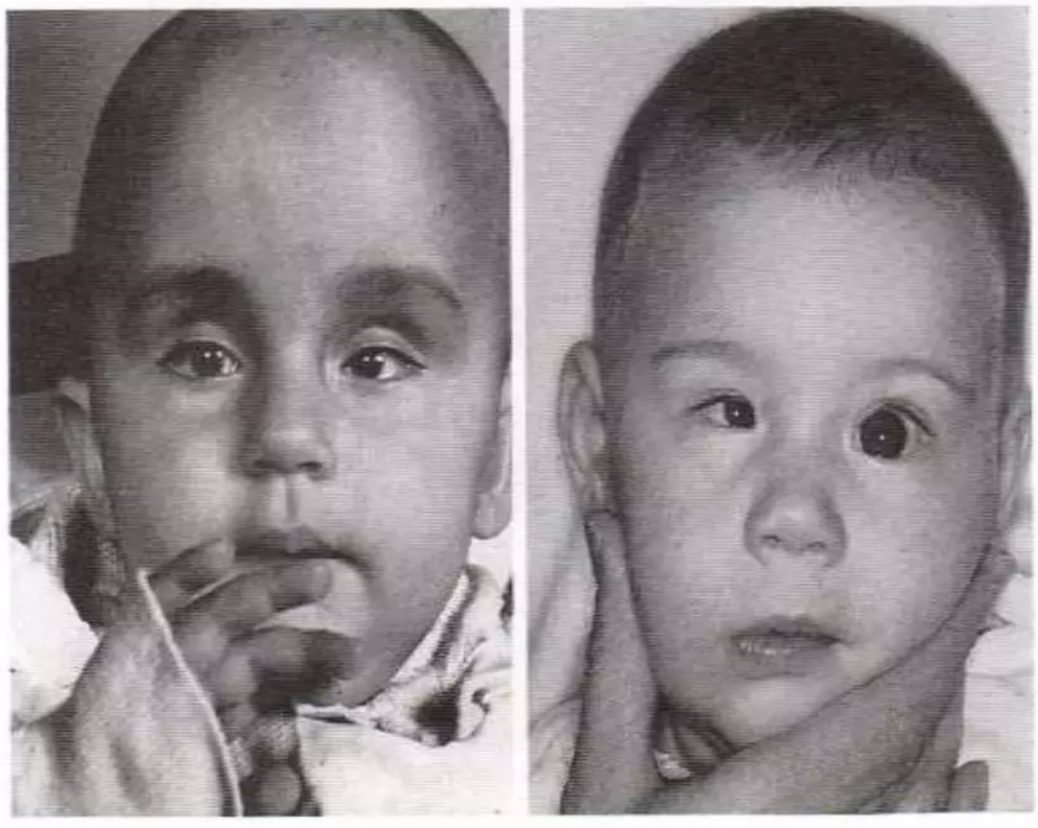


Fig. 16.9 Congenital toxoplasmosis in children. Hydrocephalus with bulging forehead (left) and microophthalmia of the left eye (right). (Courtesy of Dr J. Couvreur).

Pathogenesis

- Acquired toxoplasmosis
- Les severe than congenital toxoplasmosis
- Commonest manifestation is lymphadenopathy
- Most frequently deep cervical lymph nodes
- Fever ,malaise, headache, muscle pain, fatigue & sore throat
- Rarely pneumonitis, myocarditis, meningoencephalitis
- In Immunocompromised patients Encephalitis is most frequent manifestation
- Acute infection can produce psychotic symptoms- like schizophrenia

Pathogenesis

- Immunocompromised patients: CNS primarily involved
- Diffuse encephalopathy
- Meningoencephalitis
- Altered mental state, motor impairment, seizures, abnormal reflexes

Immunity

- Both humoral & cellular immune response

- T lymphocytes mediate most immunity to *T.gondii* via macrophage activation.