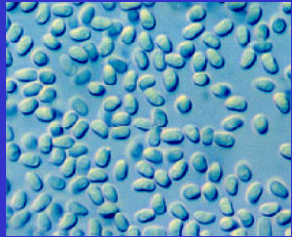


BioMedical Parasitology

Protozoology
Microspora



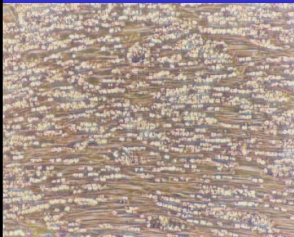
Prof Peter O'Donoghue

1

Micro-spores

microscopic unicellular spores
phase-bright refractile appearance

low power



high power




4

PROTOZOA


65,000 species
(31,250 extant + 33,750 extinct)

flagellates




6,900 species
5,100 free-living
1,800 parasitic

amoebae




11,550 species
11,300 free-living
250 parasitic

sporozoa



5,600 species
all parasitic

ciliates



7,200 species
4,700 free-living
2,500 parasitic

2


Microspora

- obligate intracellular parasites
- 1200 species in 140 genera
- true eukaryotes (nuclear membrane, cytoskeleton)
- other characters reminiscent of prokaryotes (lack mitochondria and dictyosomes, small genome, gene organization)
- common in fish and arthropods (esp. crustaceans)
- becoming more frequently recognized in humans
- many aligned with similar species in animals (suggesting zoonotic origin)
- but some only found in humans


5

SPOROZOA


Apicomplexa
(apical complex)
(oocysts)



Microspora
(unicellular)
(spores)



Myxozoa
(multicellular)
(spores)



All parasitic

3

Microsporidiosis

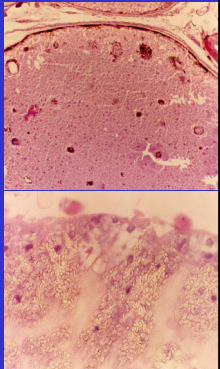
Common in fish and arthropods

species in fish associated with:

- respiratory distress (*Loma*)
- anaemia (*Nucleospora*)
- myeloencephalitis (*Microsporidium*)
- lesions/xenomas (*Glugea*)

species in arthropods associated with:

- bee dysentery (*Nosema*)
- silkworm disease (*Loma?*)
- crayfish cotton-tail (*Thelohania*)

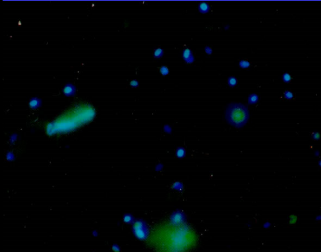
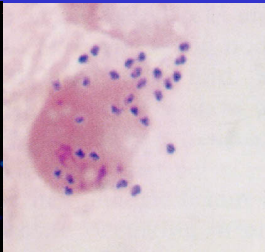


6

Free microspores

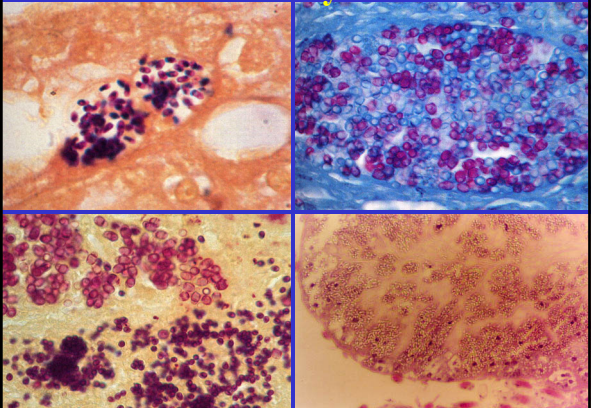
small microscopic bodies (2-4 μm long)
refractile appearance (chitinous wall)

fluorescence microscopy histological examination

7

Tissue cysts

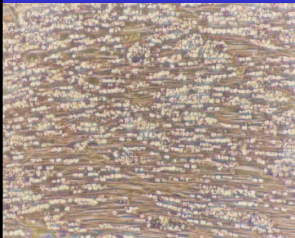
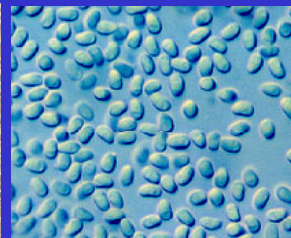


10

Micro-spores

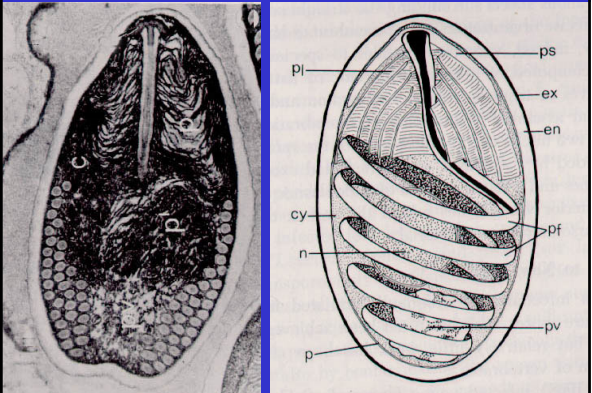
microscopic unicellular spores
phase-bright refractile appearance

low power high power

8

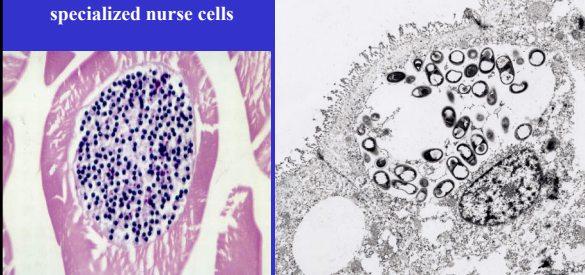
Spore ultrastructure



11

Intracellular development


- merogony and sporogony within host cells
- numerous spores formed
- tissue cysts (xenomas) in specialized nurse cells



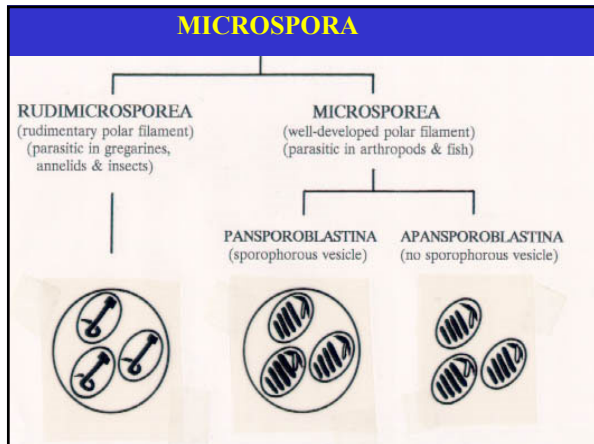
9

polar tube extrusion

sporoplasm injection



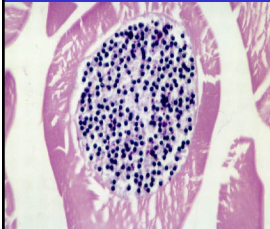
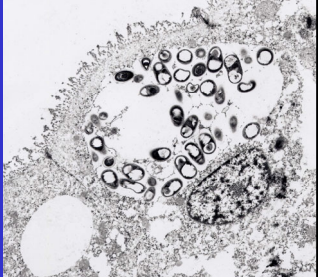
12



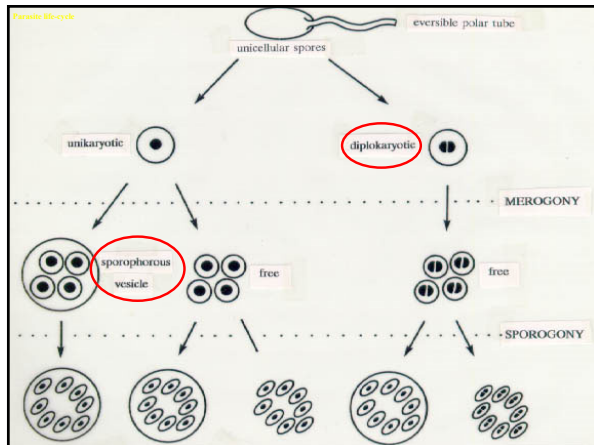
13

Parasite pathogenicity: Intracellular development

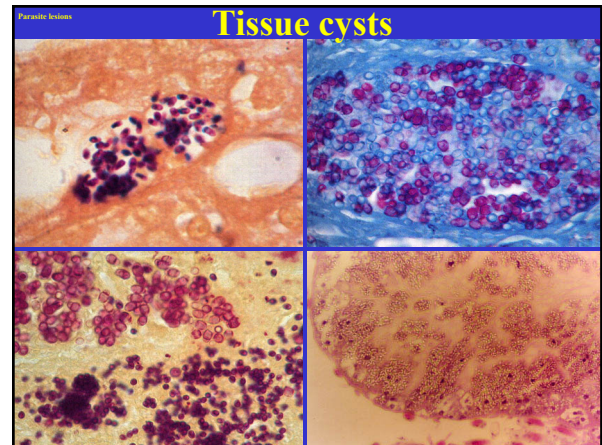
- merogony and sporogony within host cells
- numerous spores formed
- tissue cysts (xenomas) in specialized nurse cells

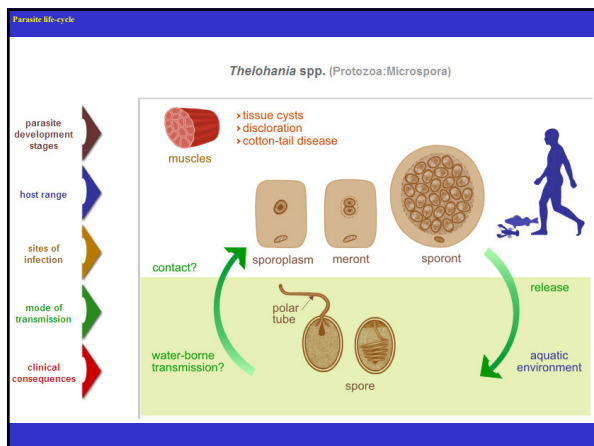
16



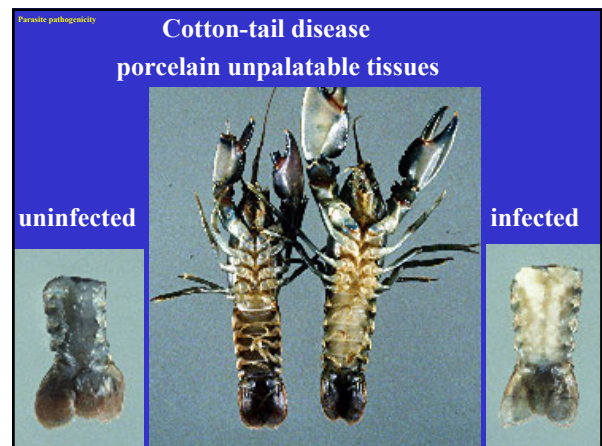
14



17



15



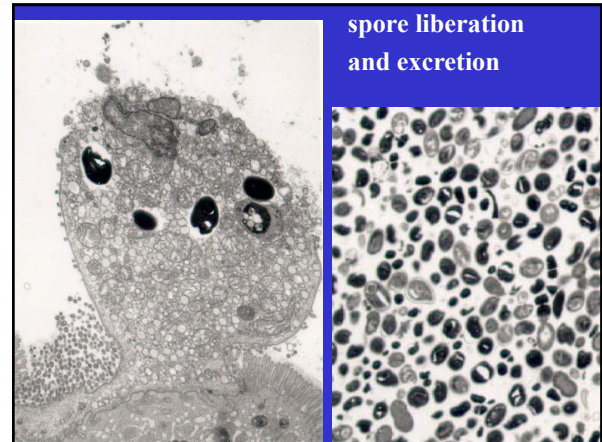
18

Parasite biodiversity

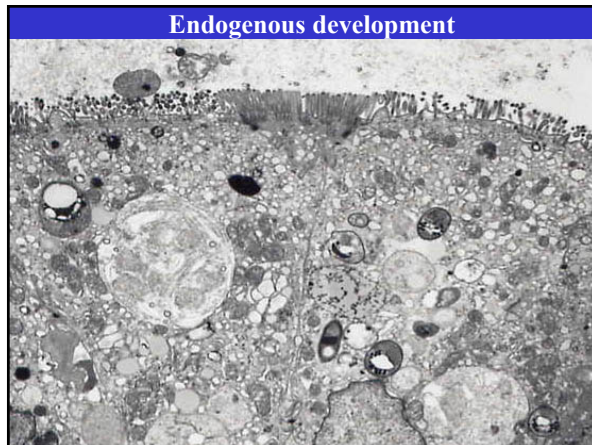
Human microsporidiosis

Microsporean species	Mammalian hosts	Site of infection
<i>Enterocytozoon bieneusi</i>	humans, pigs	intestine, liver
<i>Encephalitozoon (Septata) intestinalis</i>	humans	disseminated
<i>Encephalitozoon hellem</i>	humans	disseminated
<i>Encephalitozoon cuniculi</i>	rabbits, rodents, canids	disseminated
<i>Nosema connori</i>	humans	disseminated
<i>Nosema ocularum/algerae</i>	humans	cornea
<i>Vittaforma (Nosema) cornea</i>	humans	cornea
<i>Trachipleistophora hominis</i>	humans	muscle
<i>Pleistophora sp.</i>	humans	muscle
<i>Thelohania sp.</i>	humans	brain, muscle, liver
<i>Microsporidium spp.</i>	humans	brain, muscle

19



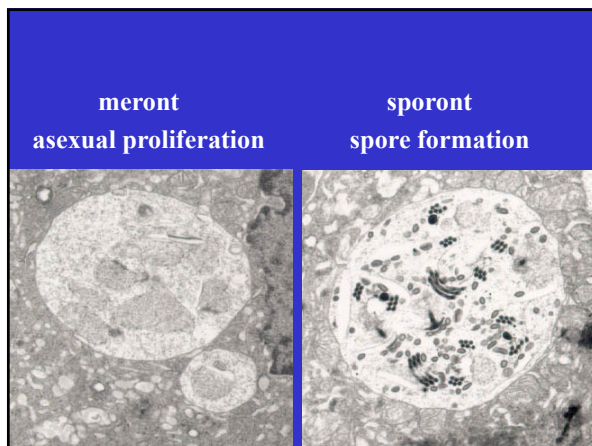
22



20

- ## Pathogenicity
- endogenous development intracellular
 - cell lysis – subacute presentation
 - tissue cyst formation – chronic presentation
- susceptible hosts
- young children
 - immunocompromised hosts (AIDS)
- symptoms/signs
- neurologic – convulsions, vomiting, headaches, fever, coma
 - ocular – keratoconjunctivitis, chronic sinusitis
 - muscular – atrophy, muscle fibre degeneration
 - enteric – diarrhoea, fever, malaise, weight loss
 - pulmonary – respiratory signs

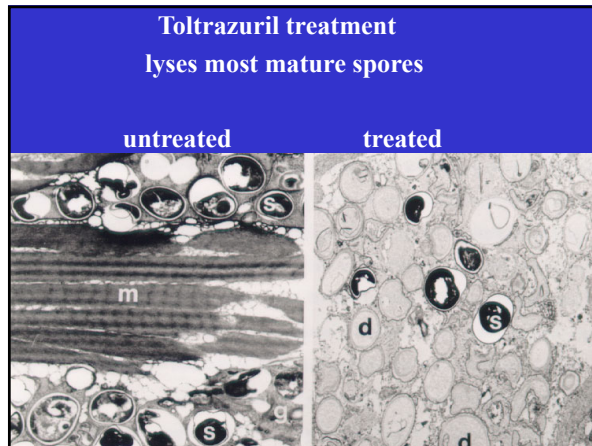
23



21

- Parasite management
- ## Treatment
- complicated by
- intracellular location
 - resistant nature of spores
 - unique biochemistry
-
- chemotherapy partially effective
- | | |
|---------------------------------|--------------------------------|
| • albendazole | ocular/intestinal/disseminated |
| • metronidazole | intestinal |
| • trimethoprim-sulfamethoxazole | disseminated |
| • toltrazuril | disseminated |

24



25

SUMMARY

Spore-forming parasites other than Apicomplexa

MICROSPORA

- unicellular spores with polar tubules used to inject sporoplasm
- common histozoic parasites of fish and arthropods
- clinical infections now being detected in humans, especially immunocompromised individuals

26