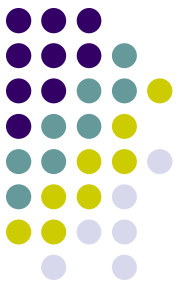
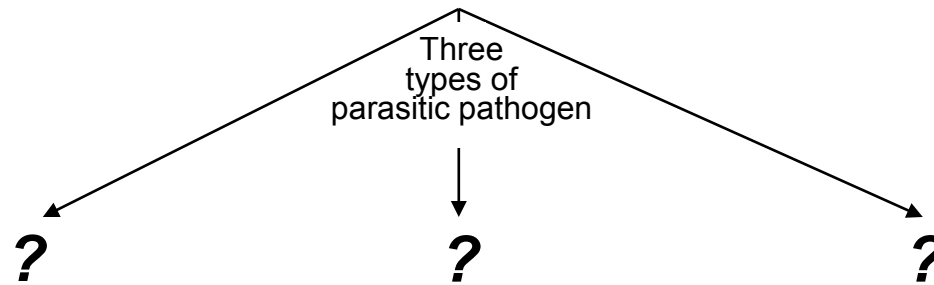


Common Parasitic Pathogens

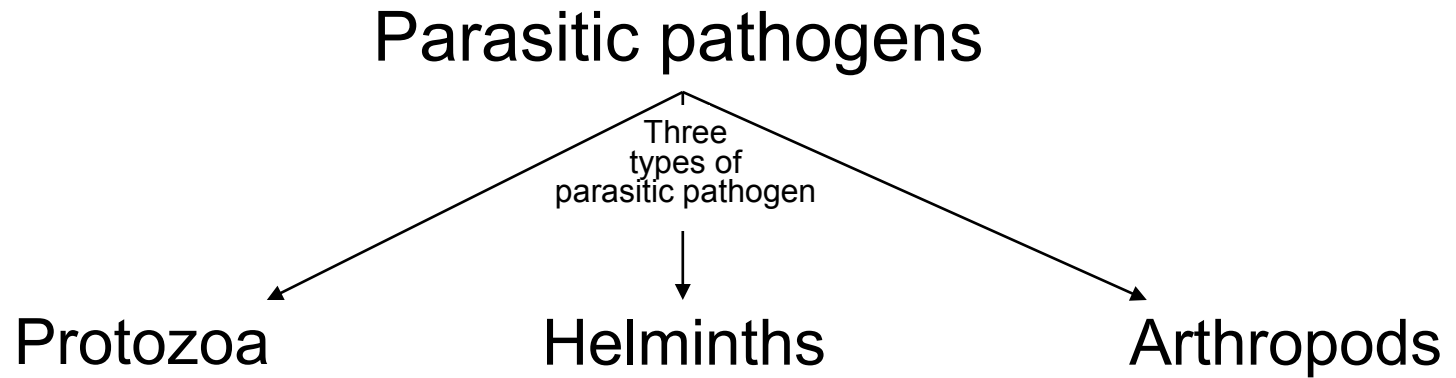
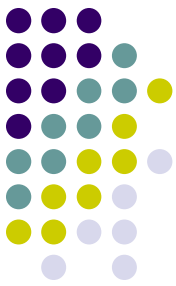


Parasitic pathogens

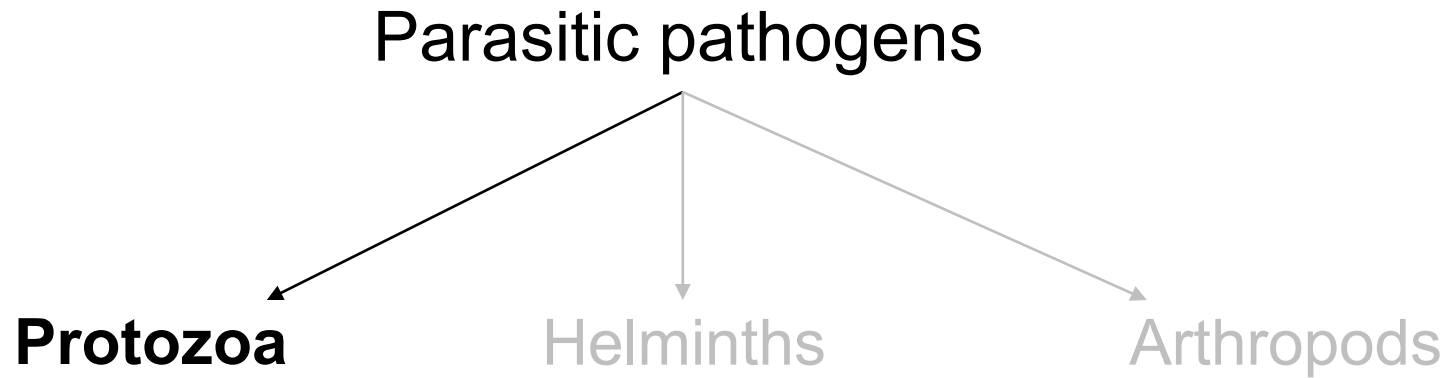
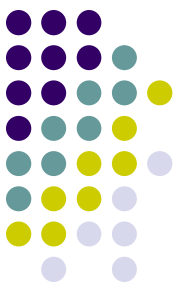


Common Parasitic Pathogens

2

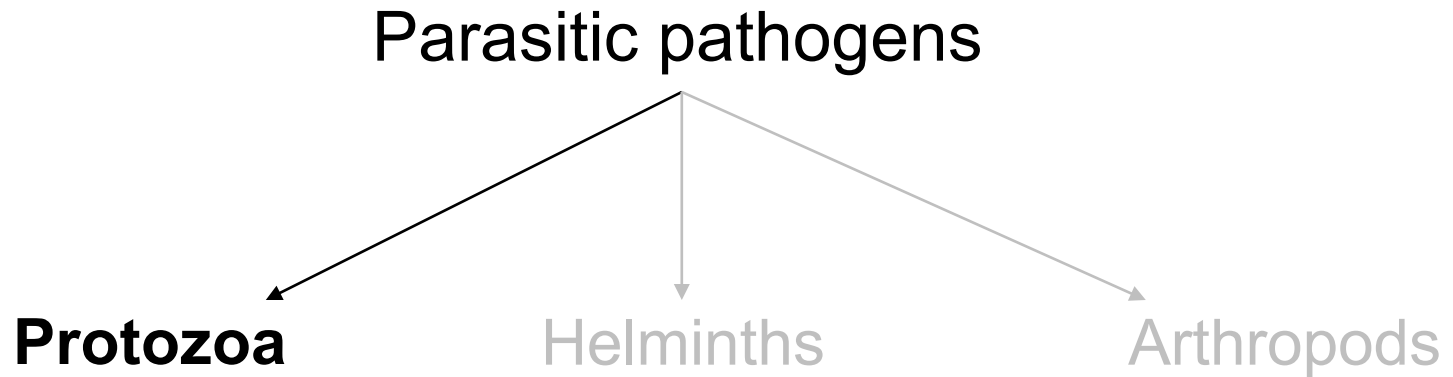
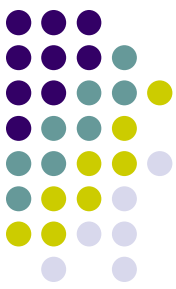


Common Parasitic Pathogens



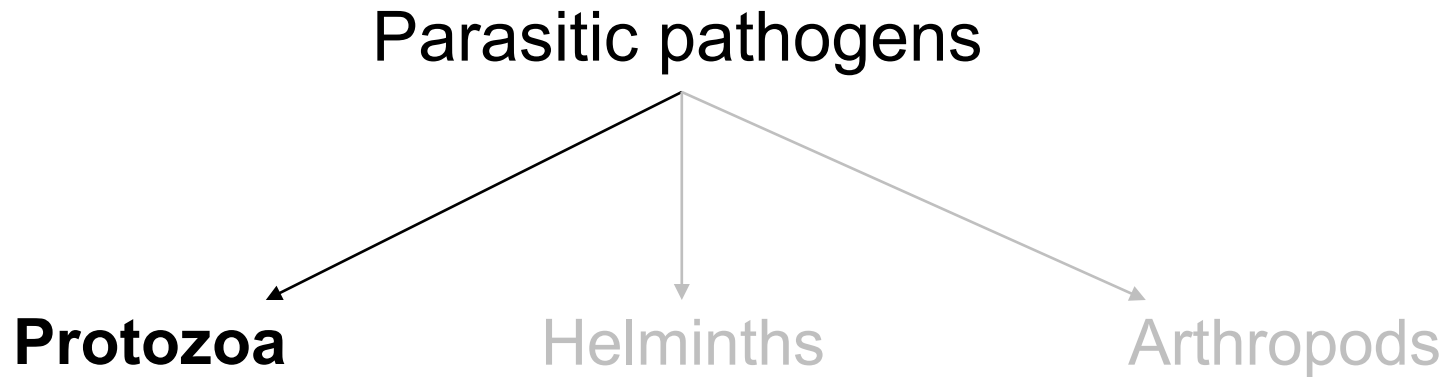
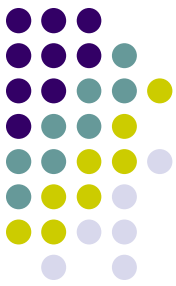
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Common Parasitic Pathogens



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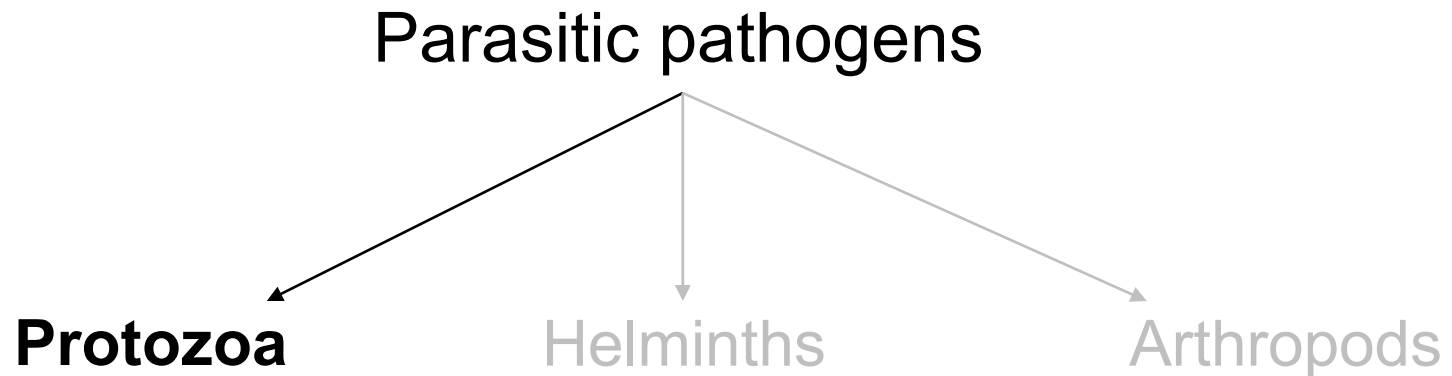
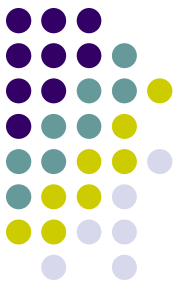
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Broadly speaking, what are protozoa?

They are unicellular eukaryotes capable of some form of motility. Protozoa feed on organic material, and many are parasites. The term *protozoa* is considered outdated by modern biologists, but it persists in the ophthalmic literature.

Common Parasitic Pathogens

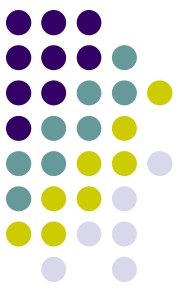


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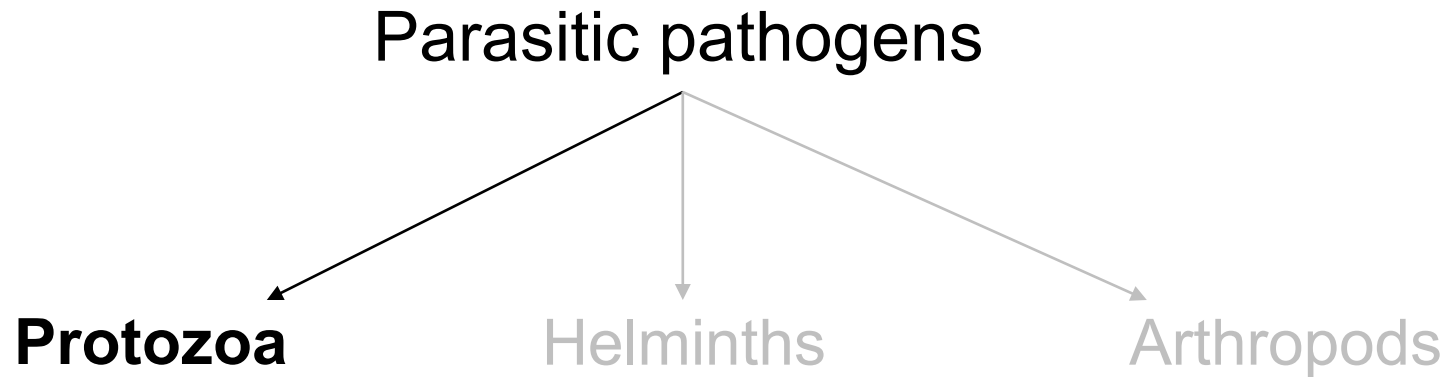
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Common Parasitic Pathogens



7



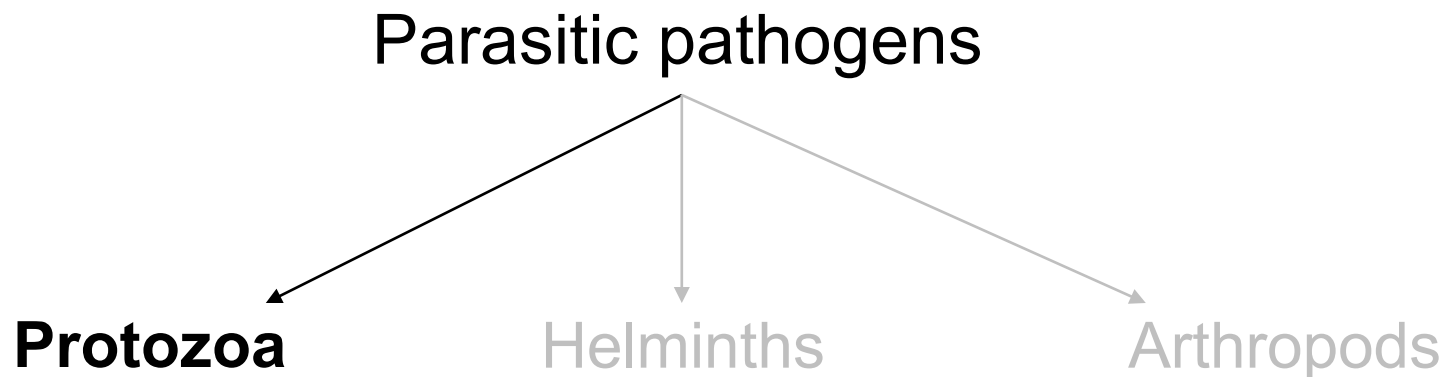
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Prokaryote

Common Parasitic Pathogens



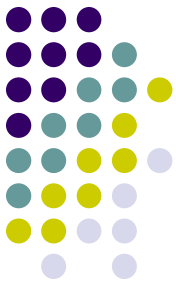
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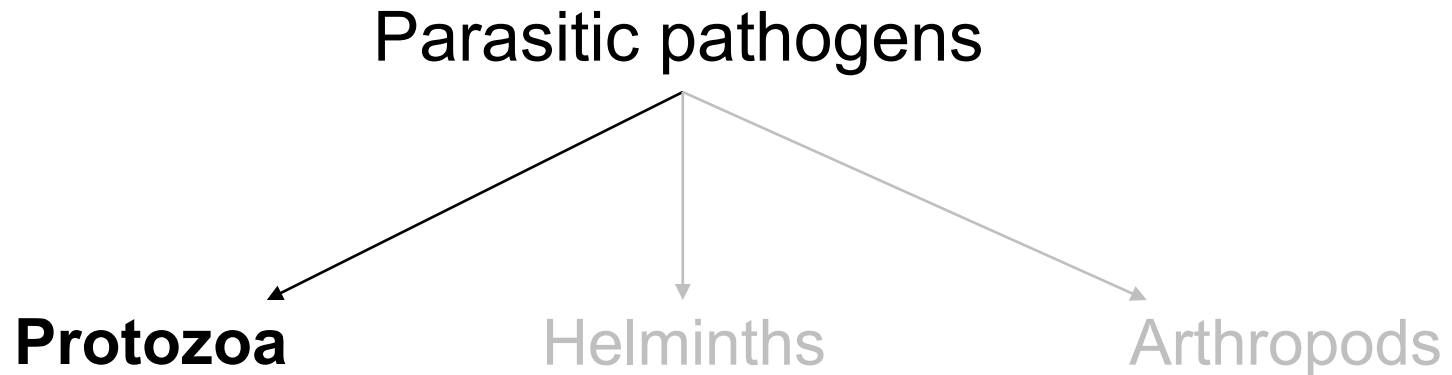
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Common Parasitic Pathogens



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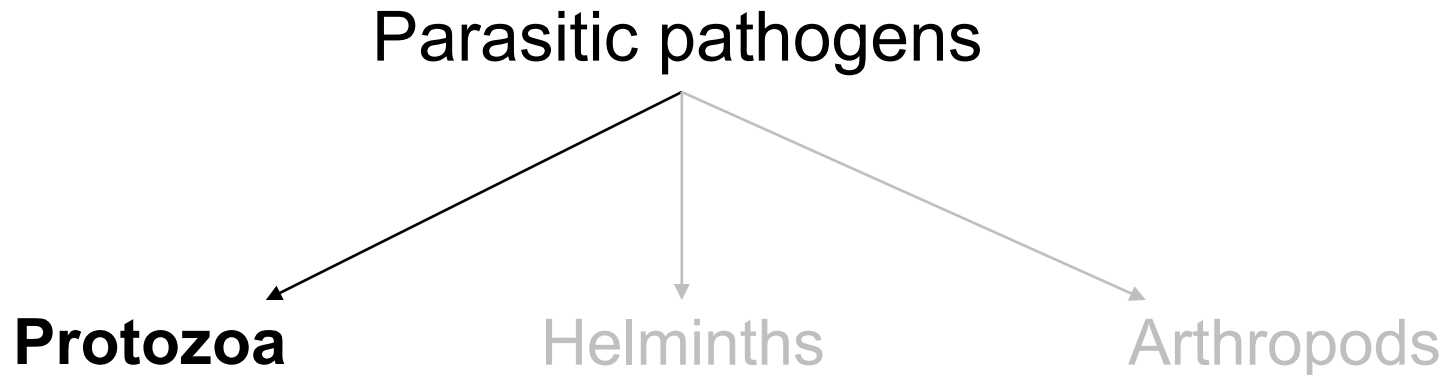
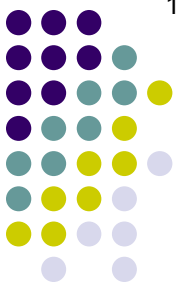
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Eukaryotic cells have a three words, whereas prokaryotic cells do not

Common Parasitic Pathogens



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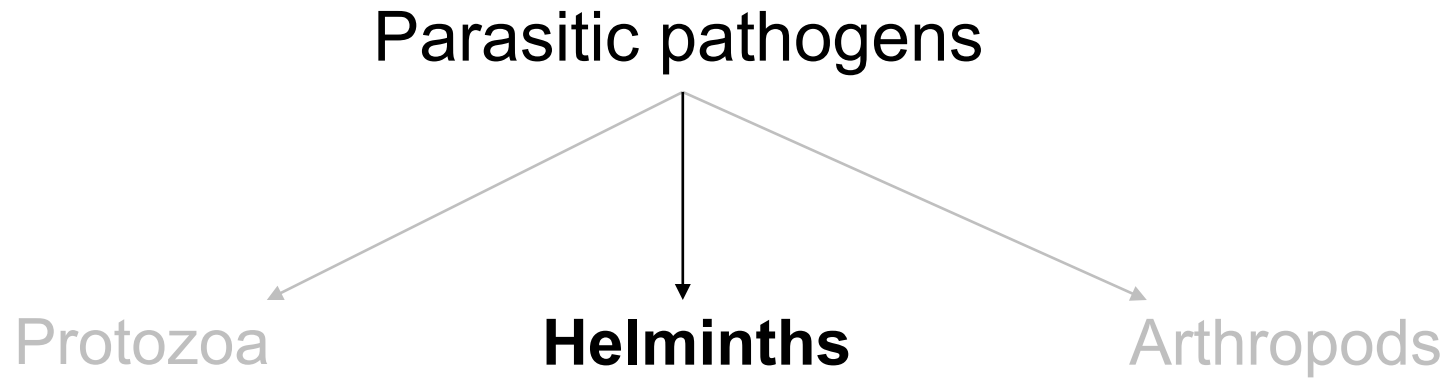
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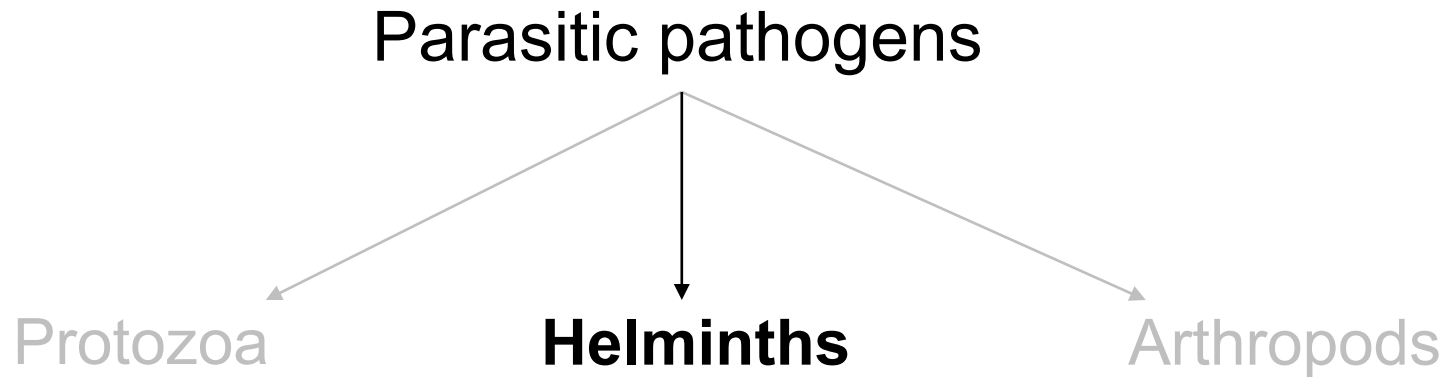
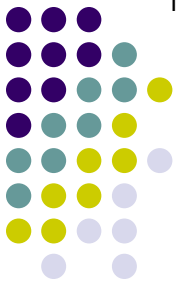
Common Parasitic Pathogens

11



Likewise, what are helminths?

Common Parasitic Pathogens

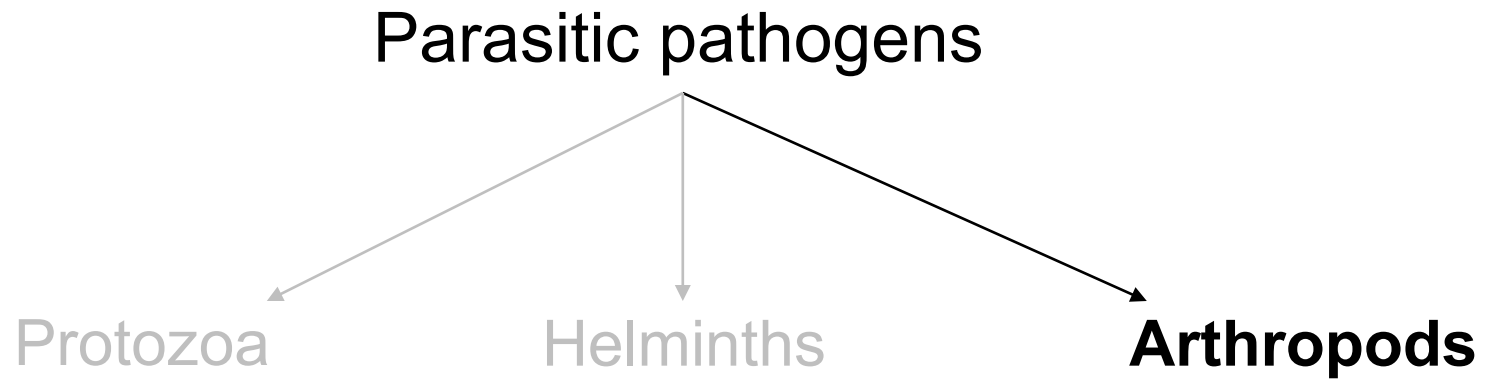
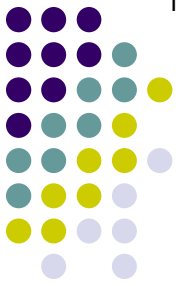


Likewise, what are helminths?

Helminths are parasitic worms (or worm-like organisms).

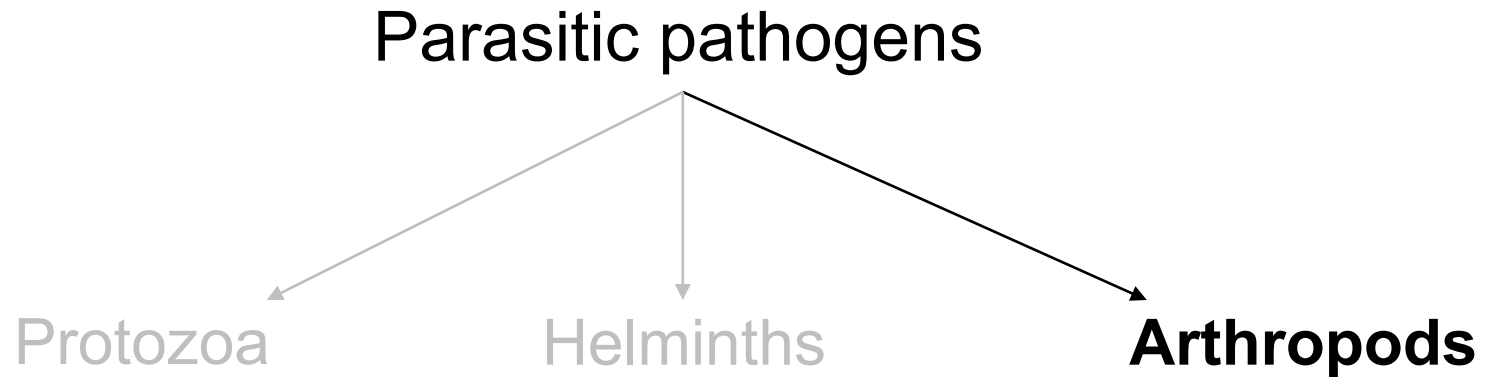
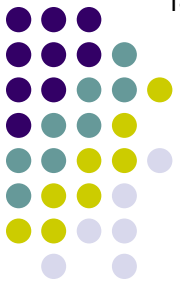
By definition, they live inside the body of their host.

Common Parasitic Pathogens



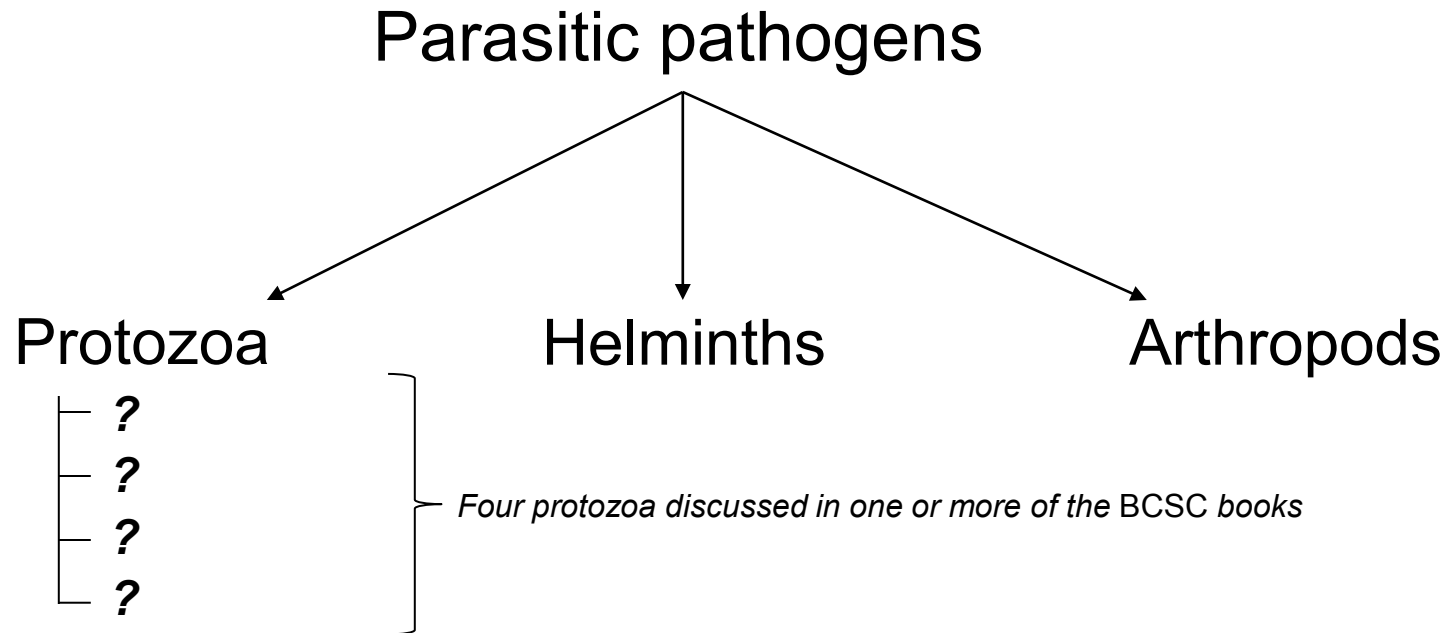
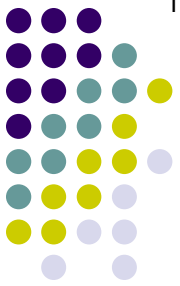
Finally—what are arthropods?

Common Parasitic Pathogens

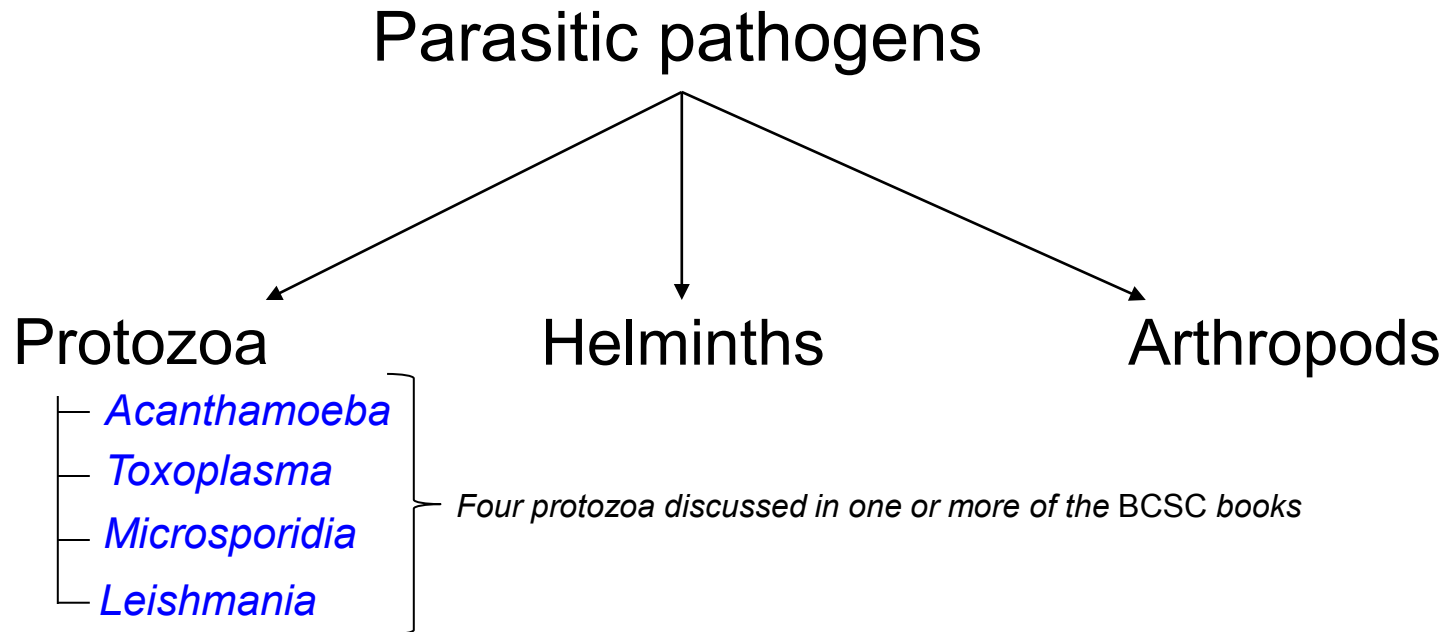
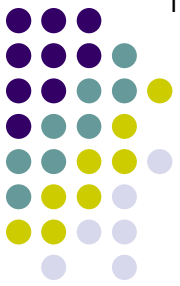


Finally—what are arthropods?
Arthropods are bugs—literally. They have a body,
and may have an exoskeleton and/or appendages.

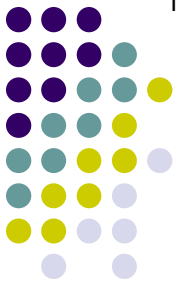
Common Parasitic Pathogens



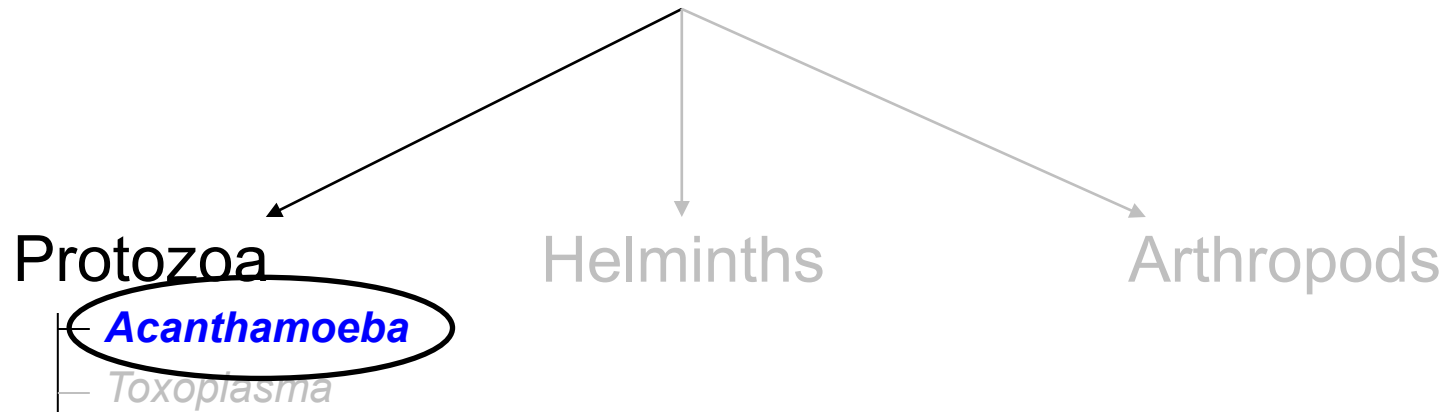
Common Parasitic Pathogens



Common Parasitic Pathogens

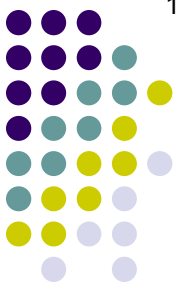


Parasitic pathogens

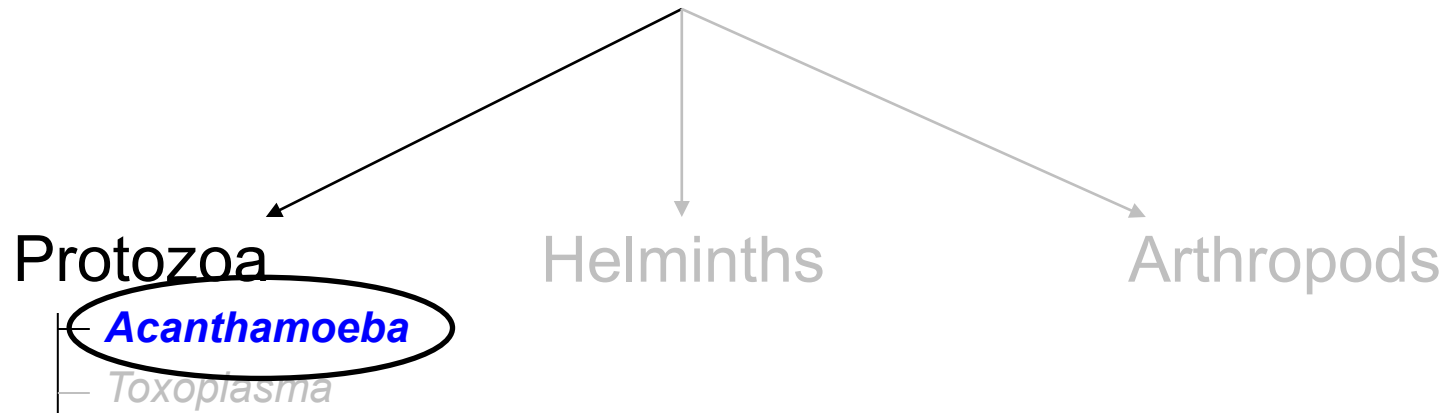


Acanthamoeba is notorious for causing what sort of ocular infection?

Common Parasitic Pathogens



Parasitic pathogens

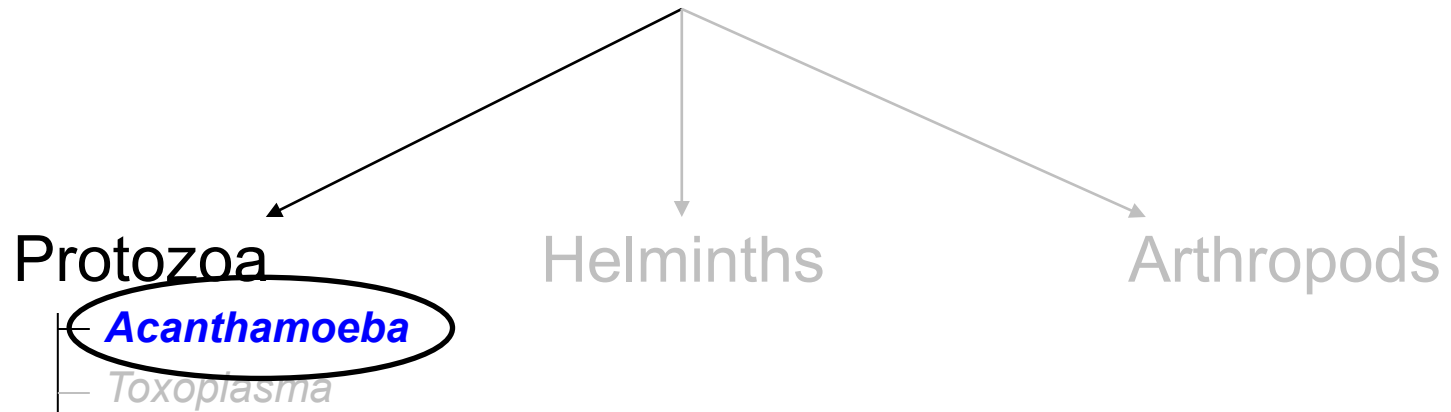


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A devastating, sight-threatening keratitis

Common Parasitic Pathogens



Parasitic pathogens



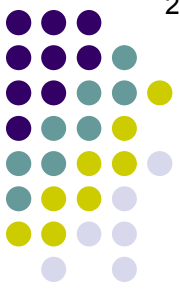
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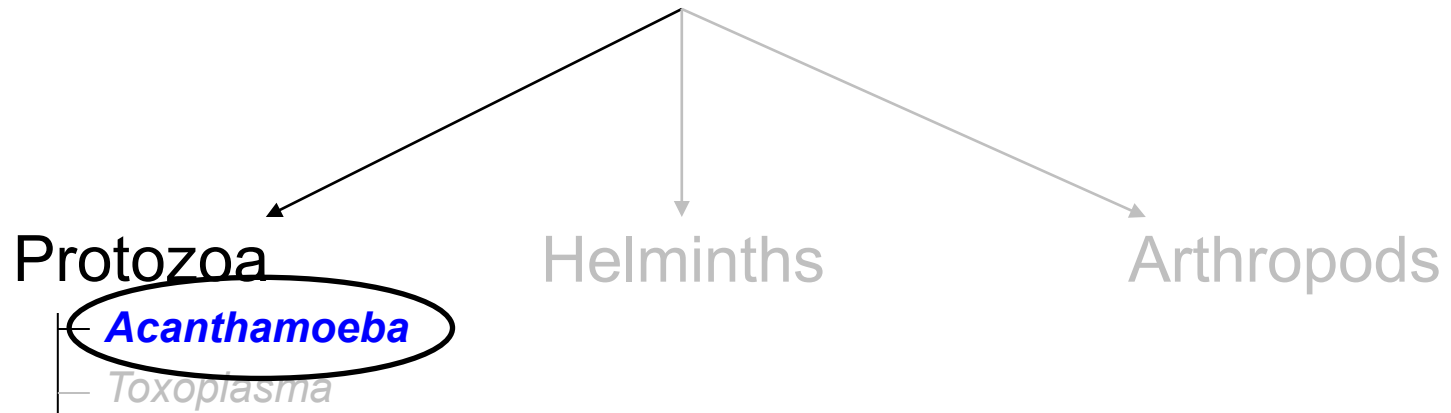
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Common Parasitic Pathogens



Parasitic pathogens



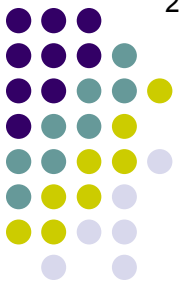
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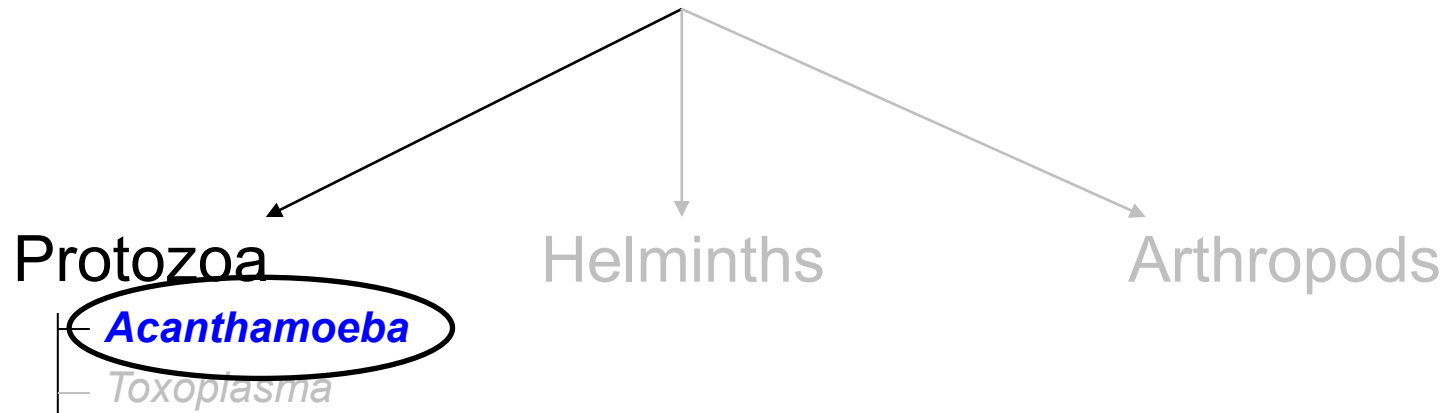
--The motile

--?

Common Parasitic Pathogens



Parasitic pathogens



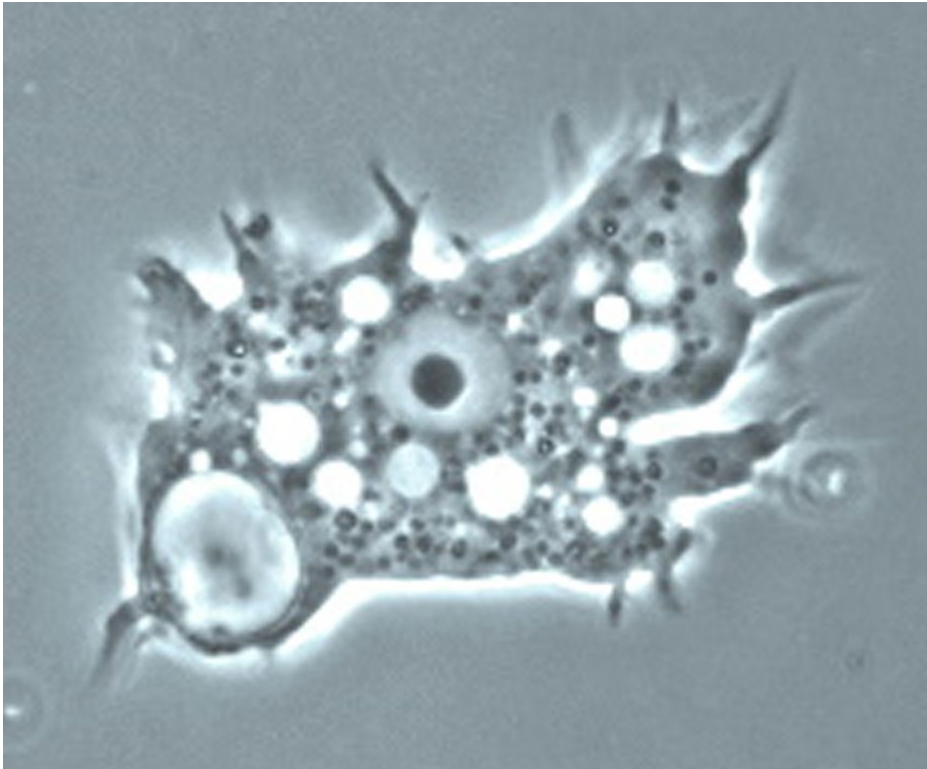
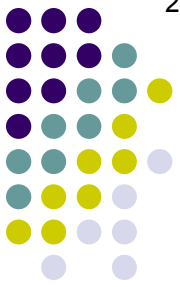
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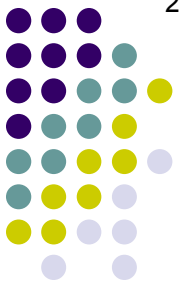
Common Parasitic Pathogens



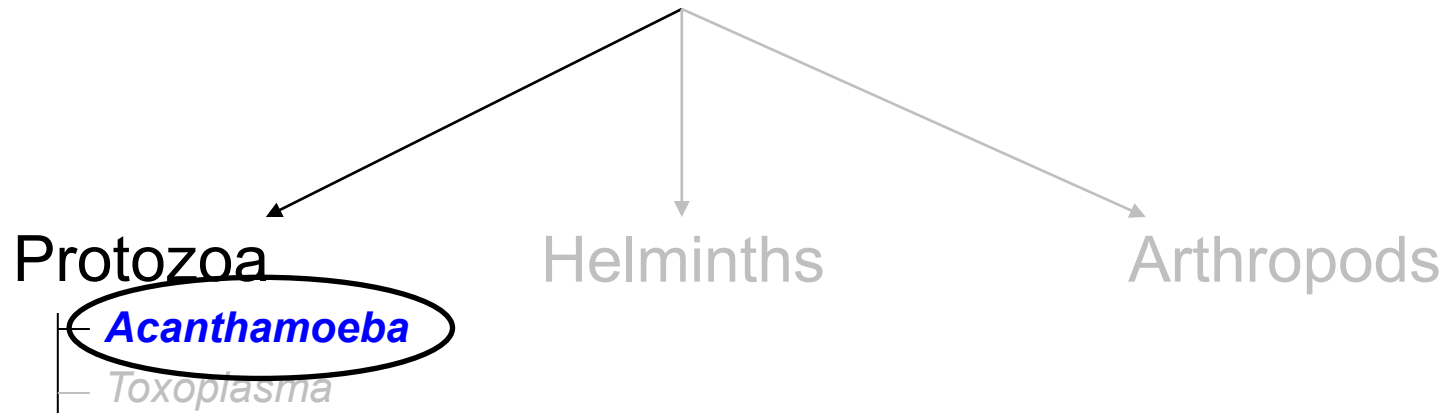
Trophozoite form

Acanthamoeba

Common Parasitic Pathogens



Parasitic pathogens

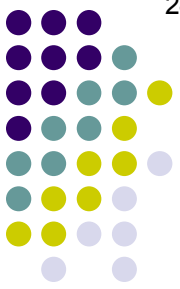


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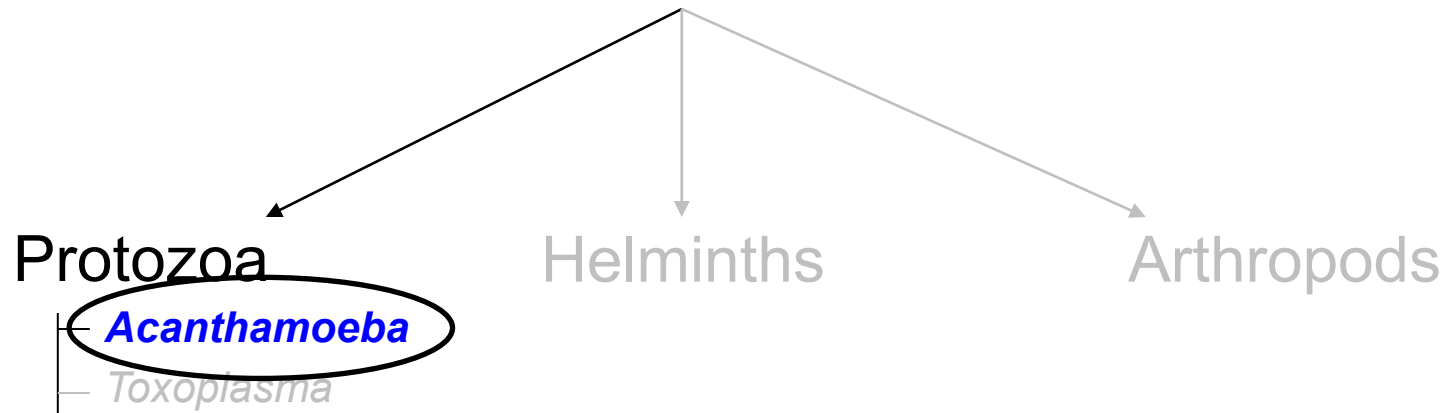
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Common Parasitic Pathogens



Parasitic pathogens

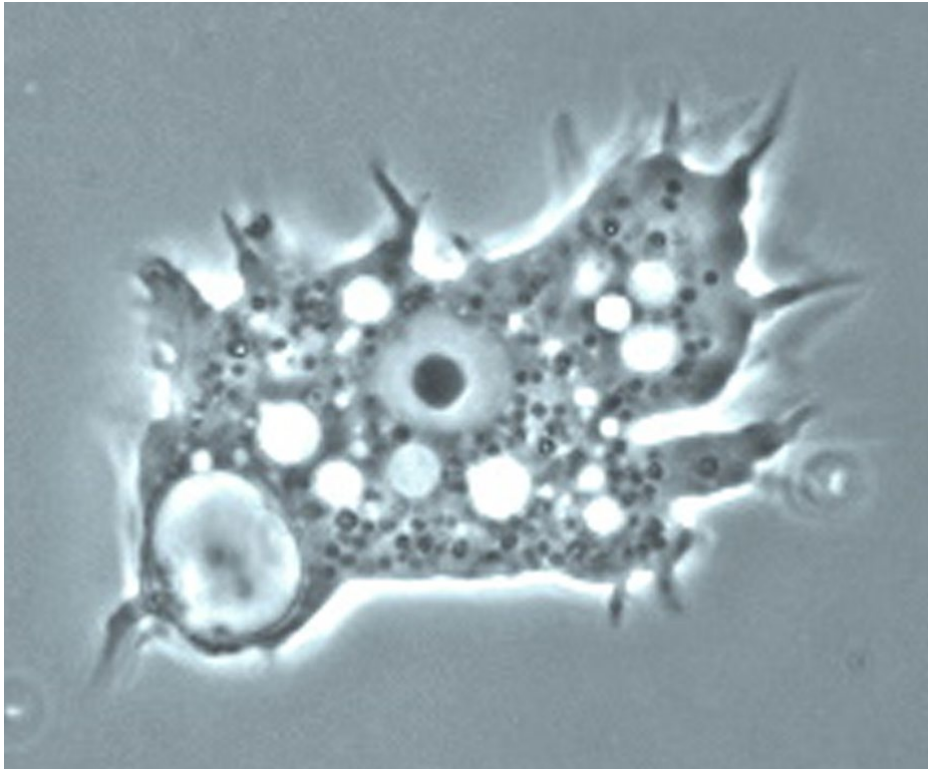
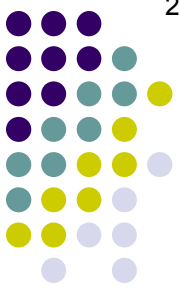


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Common Parasitic Pathogens



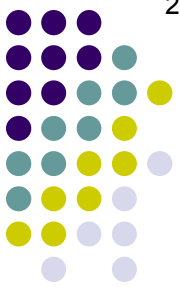
Trophozoite form



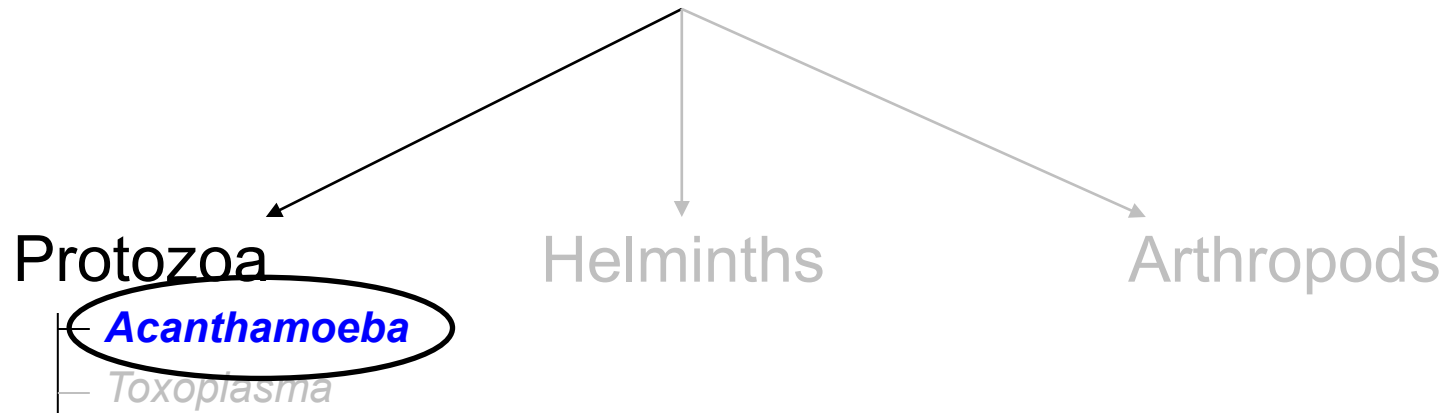
Cyst form

Acanthamoeba

Common Parasitic Pathogens



Parasitic pathogens



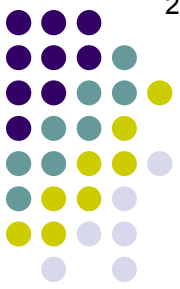
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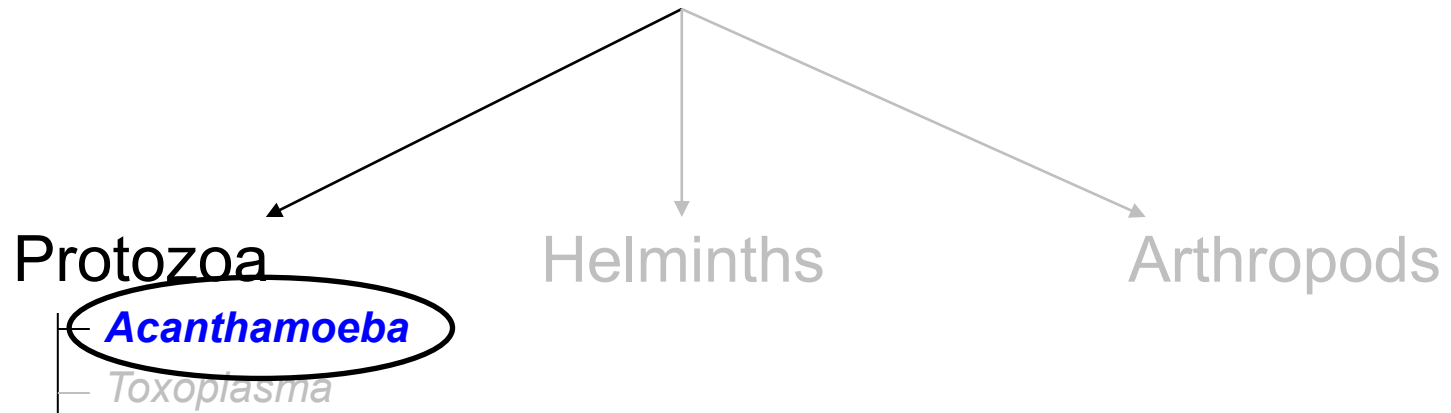
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Next Q

Common Parasitic Pathogens



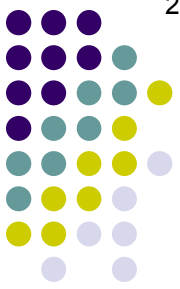
Parasitic pathogens



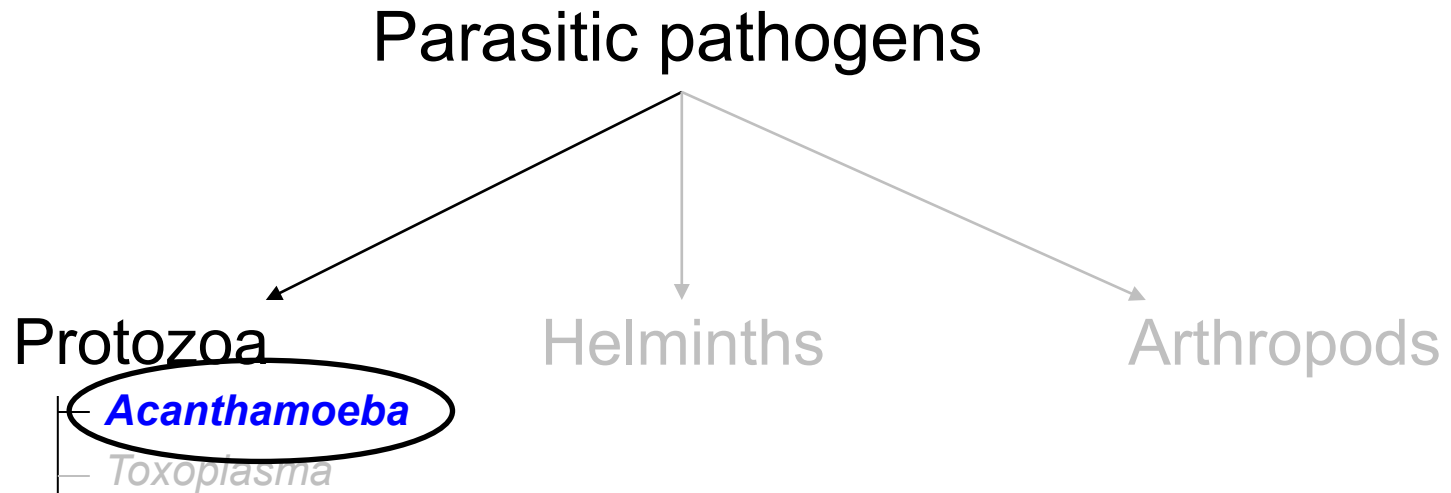
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Common Parasitic Pathogens



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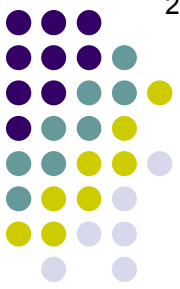
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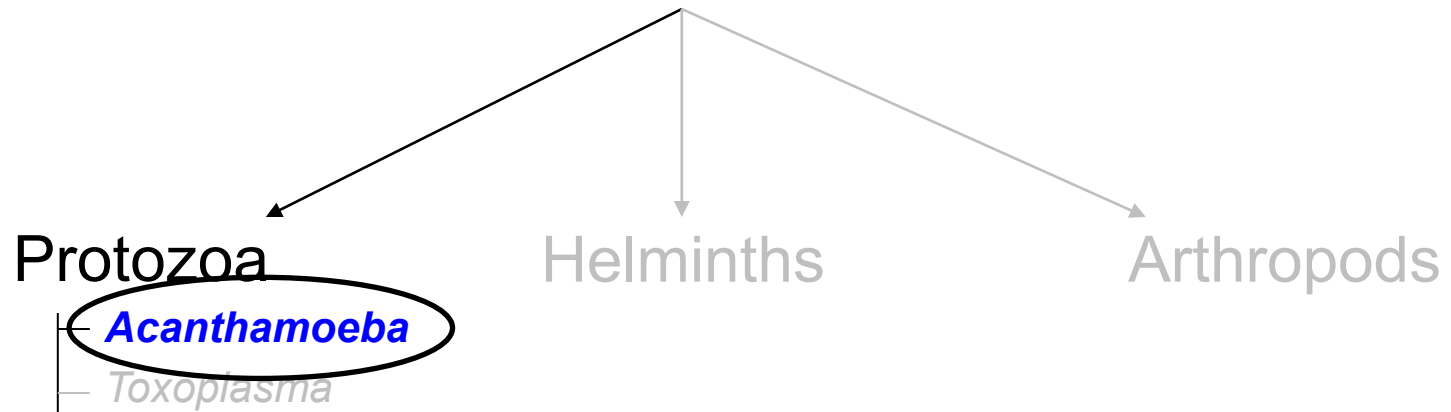
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Common Parasitic Pathogens



Parasitic pathogens



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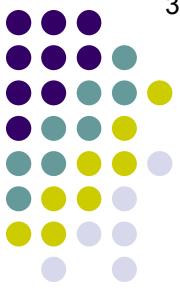
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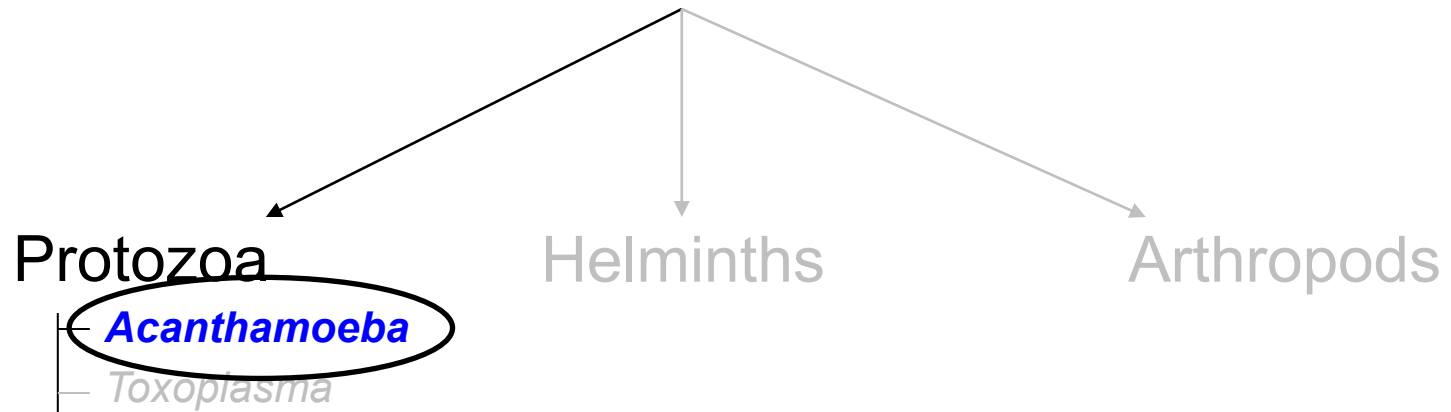
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Non-nutrient agar with E. coli overlay

Common Parasitic Pathogens



Parasitic pathogens



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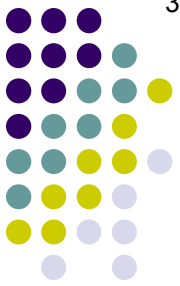
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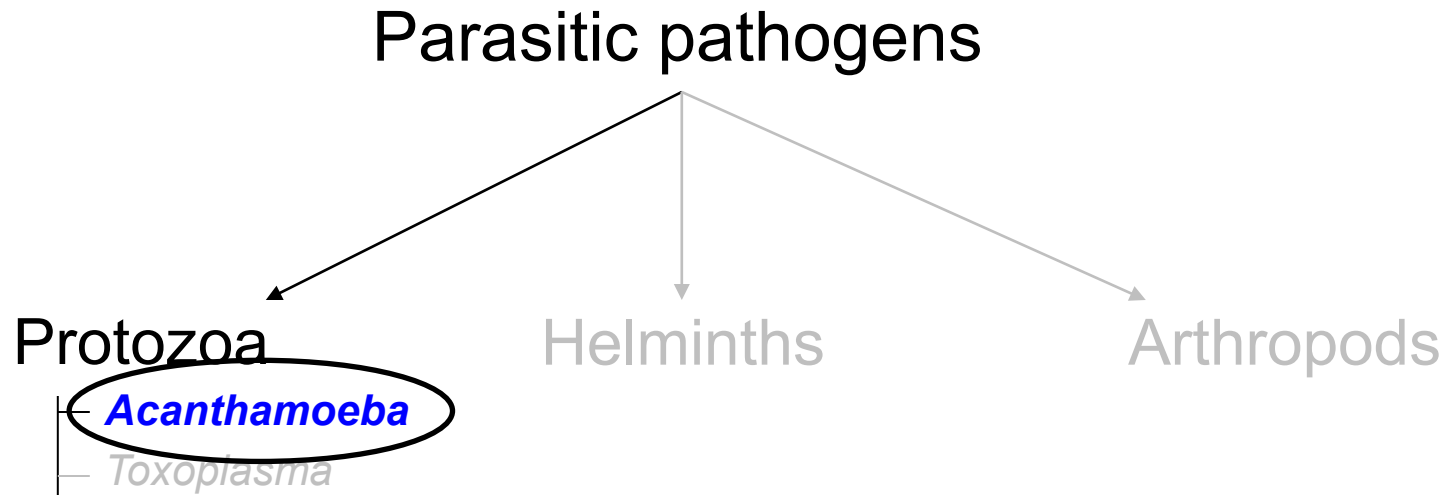
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Common Parasitic Pathogens



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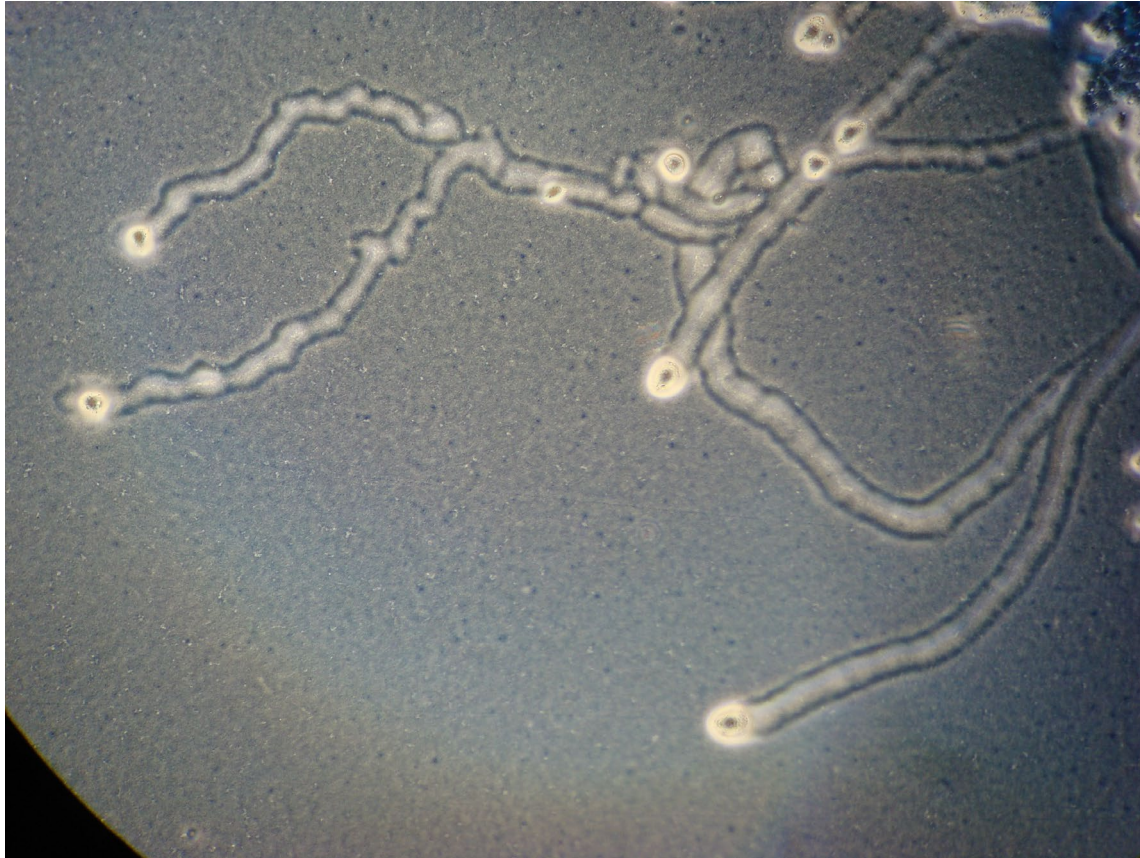
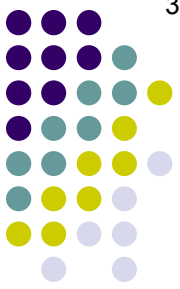
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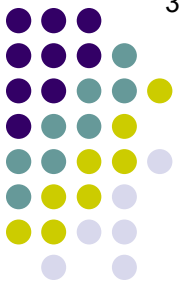
What constitutes a positive 'culture'?

When placed on such a culture plate, the trophozoite form of the amoeba will graze, in the process leaving observable trails in the agar

Common Parasitic Pathogens

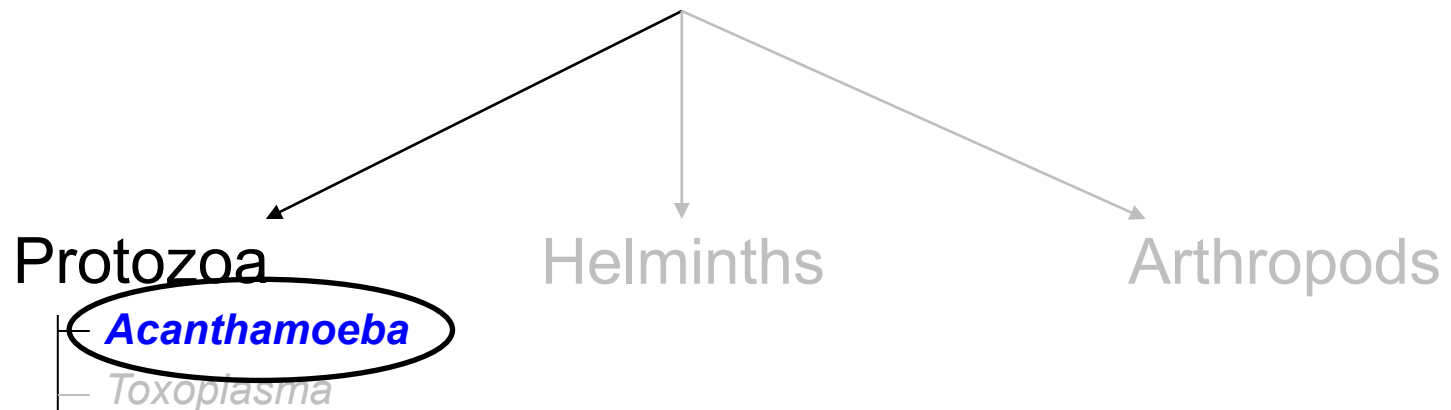


Acanthamoeba: Feeding tracks on non-nutrient agar *E coli* plate



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early *Acanthamoeba keratitis*?

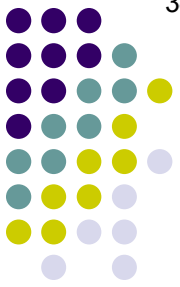
ocular infection?

When culturing for *Acanthamoeba*?

E. coli overlay

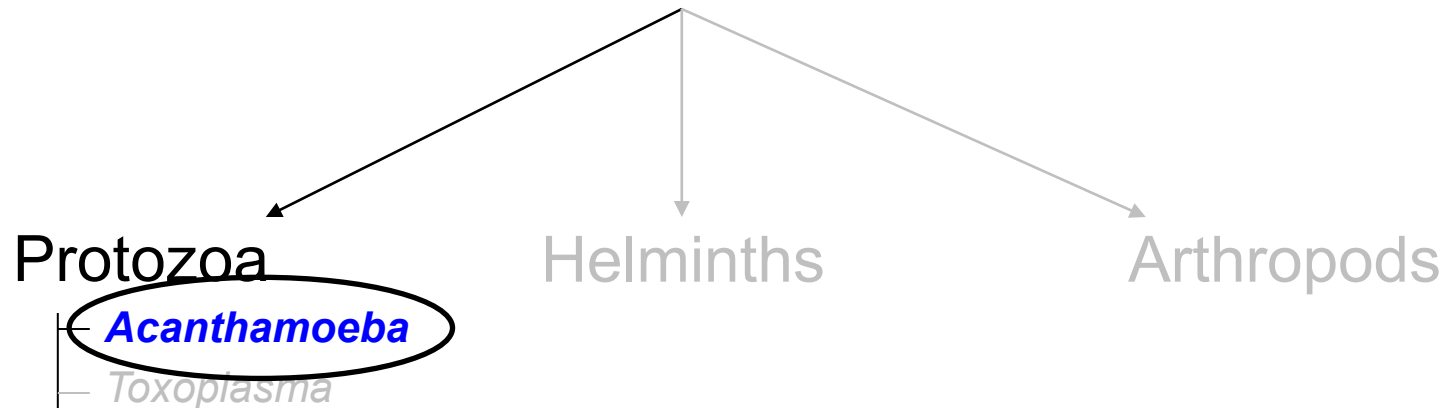
‘culture’?

On a culture plate, the motile trophozoite respond by grazing its way around the plate, in the process leaving **observable trails** in the agar



Common Parasitic Pathogens

Parasitic pathogens



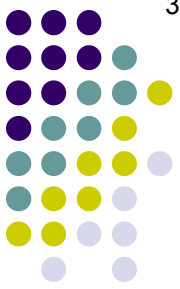
What is the most common misdiagnosis of early
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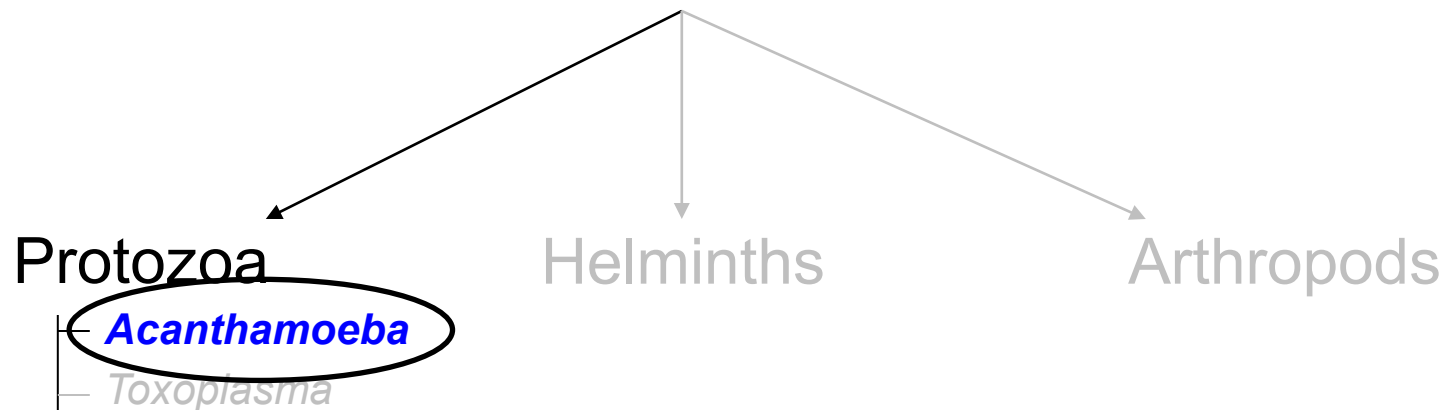
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Common Parasitic Pathogens

Parasitic pathogens



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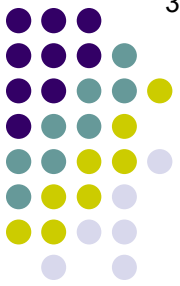
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Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

Toxoplasma

Helminths

Arthropods

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HSV keratitis

Why HSV?

Because early *Acanthamoeba keratitis* is often [redacted] in appearance at the slit lamp

ocular infection?

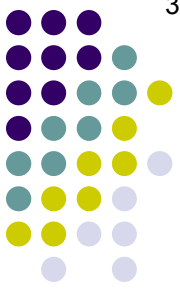
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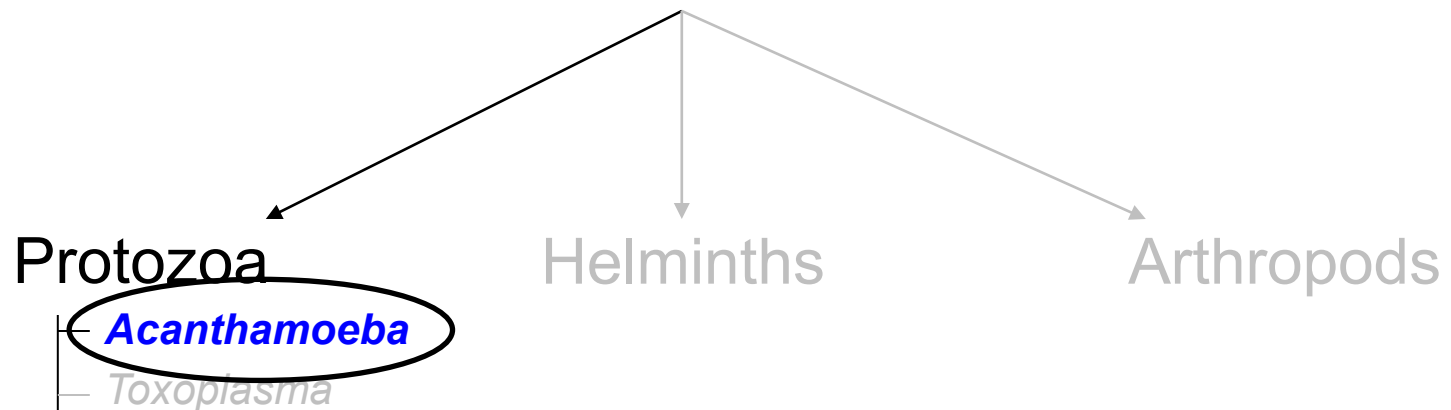
‘culture’?

On a culture plate, the motile trophozoite respond by grazing its way around the plate, in the process leaving **observable trails** in the agar

Common Parasitic Pathogens



Parasitic pathogens



What is the most common misdiagnosis of early *Acanthamoeba keratitis*?
HSV keratitis

Why HSV?

Because early *Acanthamoeba keratitis* is often dendritic in appearance at the slit lamp

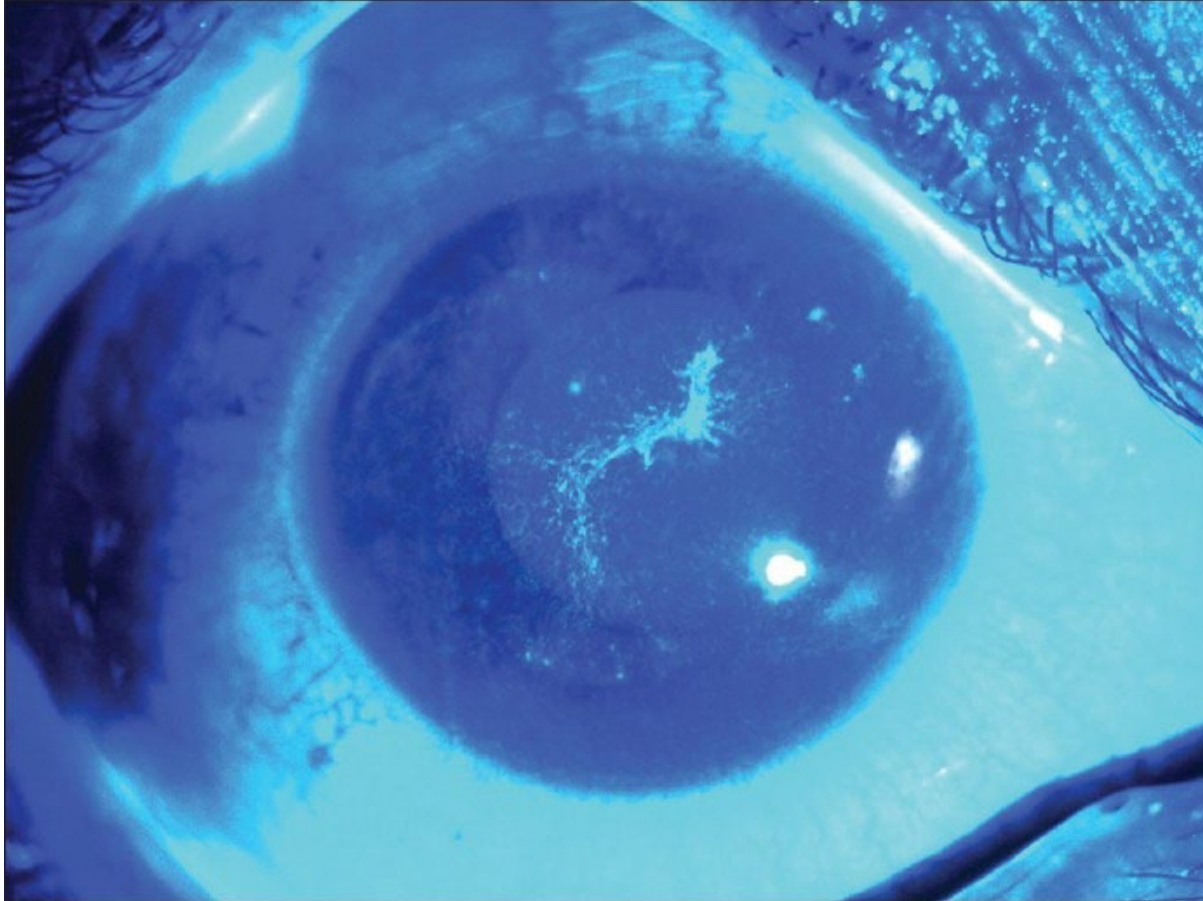
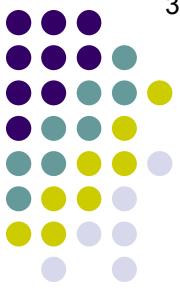
ocular infection?

When culturing for *Acanthamoeba*?
E. coli overlay

Why 'culture'?

On a culture plate, the motile trophozoite respond by grazing its way around the plate, in the process leaving **observable trails** in the agar

Common Parasitic Pathogens



Acanthamoeba: (Pseudo)dendrites



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

Toxoplasma

Helminths

Arthropods

What is the most common misdiagnosis of early

Acanthamoeba keratitis?

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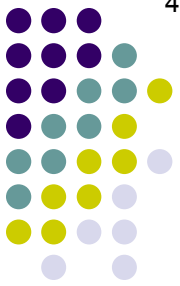
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the agar

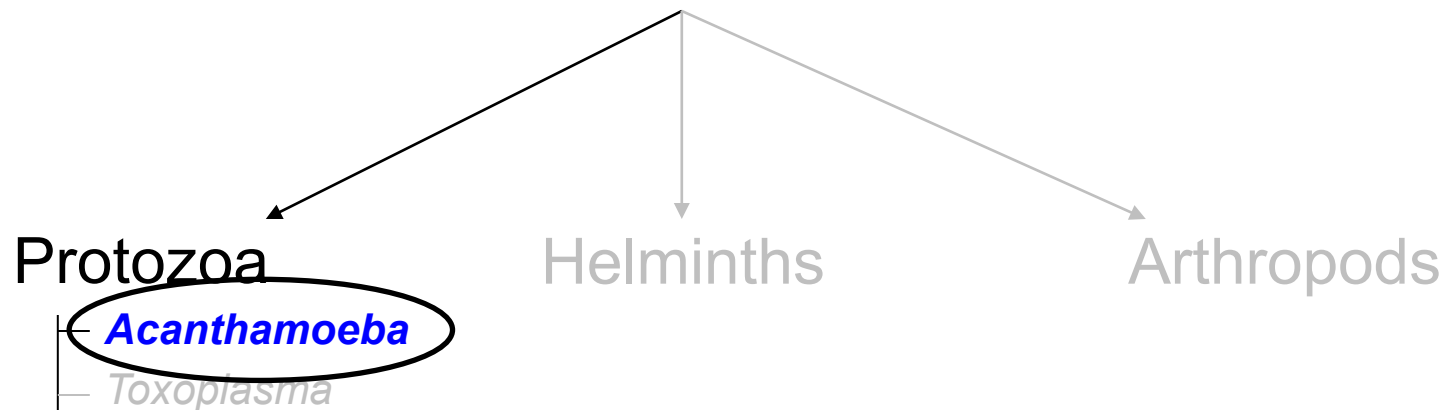
Dendritic in appearance??!! I thought Acanthamoeba was known for having

a **two words** What's the dealio?

Common Parasitic Pathogens



Parasitic pathogens



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E. coli overlay

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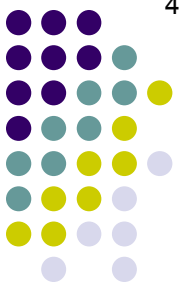
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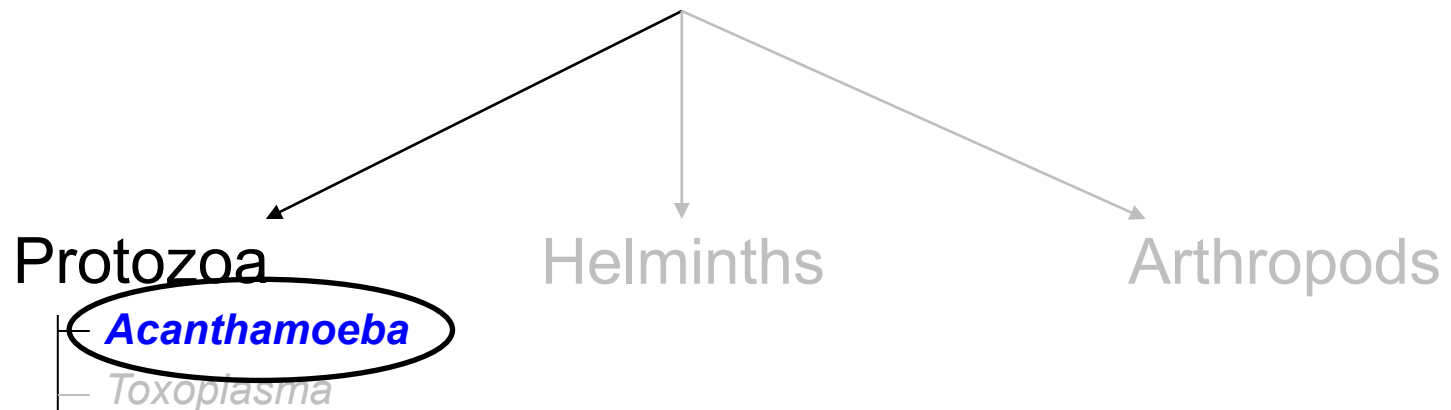
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Dendritic in appearance??!! I thought Acanthamoeba was known for having a ‘ring infiltrate.’ What’s the dealio?

Common Parasitic Pathogens



Parasitic pathogens



What is the most common misdiagnosis of early *Acanthamoeba keratitis*?
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ocular infection?

When culturing for *Acanthamoeba*?
E. coli overlay

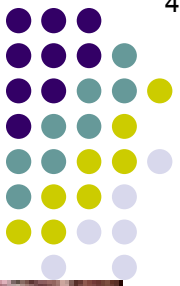
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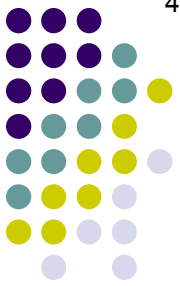
Dendritic in appearance??!! I thought Acanthamoeba was known for having a ‘ring infiltrate.’ What’s the dealio?

A ring-shaped infiltrate is indeed classic for *Acanthamoeba*; however, it is a relatively **late** finding in the dz

Common Parasitic Pathogens

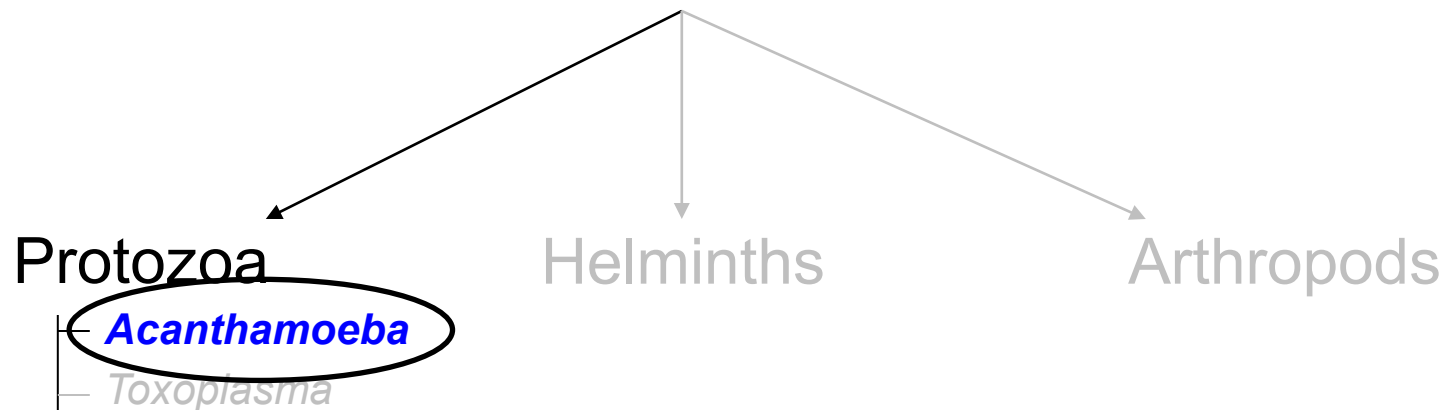


Acanthamoeba: Ring-shaped infiltrate



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early Acanthamoeba keratitis?

HSV keratitis

Why HSV?

Because early Acanthamoeba

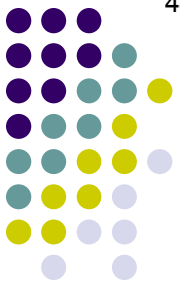
dendritic in appearance

In what key way do the dendrites of Acanthamoeba keratitis differ from those of HSV keratitis?

Dendritic in appearance??!! I

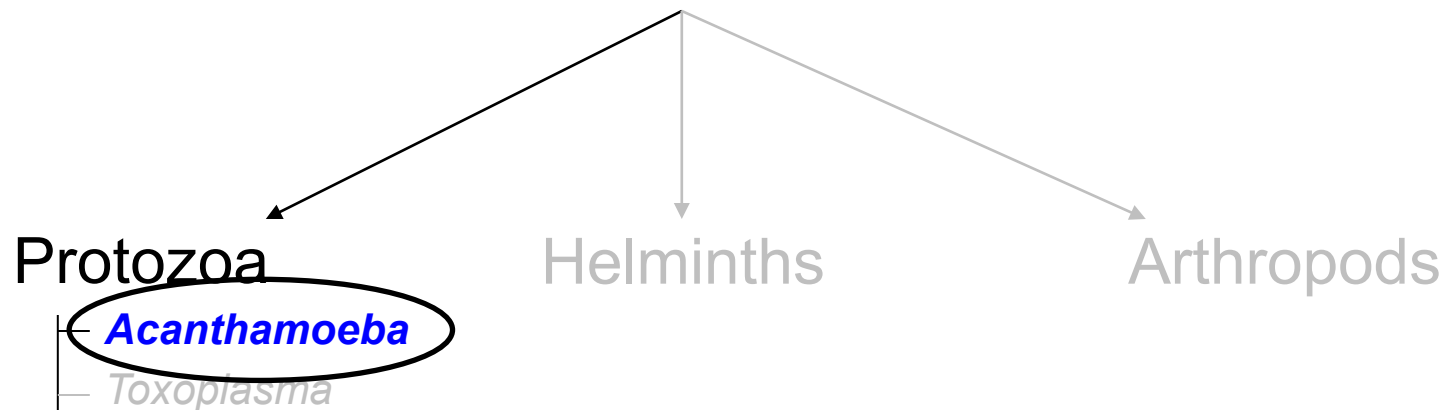
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A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the dz.



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

Acanthamoeba keratitis?

HSV keratitis

Why HSV?

Because early *Acanthamoeba*

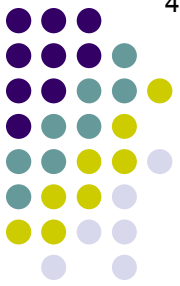
dendritic in appearance

Dendritic in appearance??!! I see a 'ring infiltrate.' What's the cause?

A ring-shaped infiltrate is indeed classic for *Acanthamoeba*; however, it is a relatively late finding in the eye.

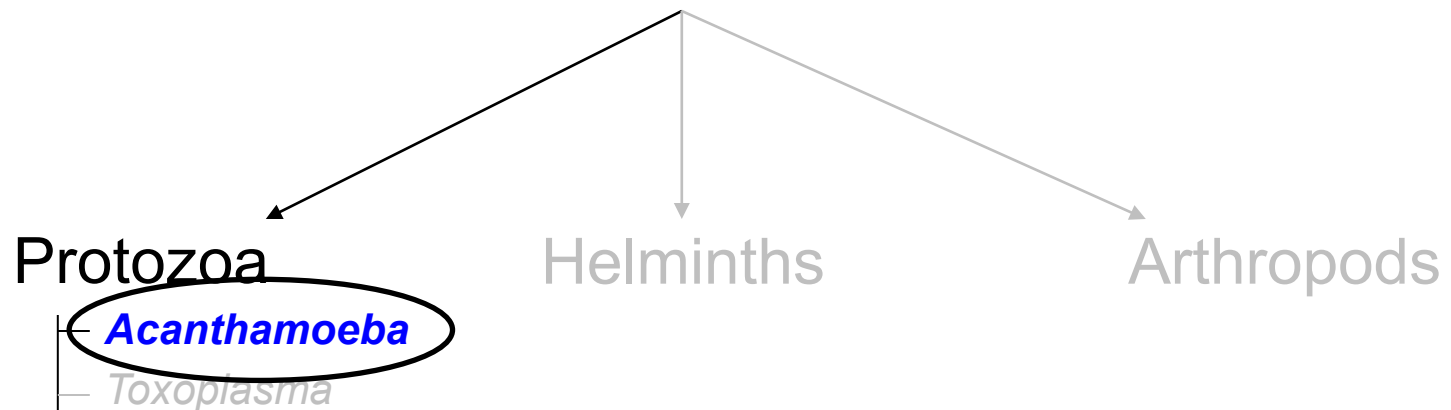
*In what key way do the dendrites of *Acanthamoeba keratitis* differ from those of HSV keratitis?*

HSV dendrites usually have **two words**, whereas *Acanthamoeba* dendrites don't.



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

Acanthamoeba keratitis?

HSV keratitis

Why HSV?

Because early *Acanthamoeba*

dendritic in appearance

Dendritic in appearance??!!

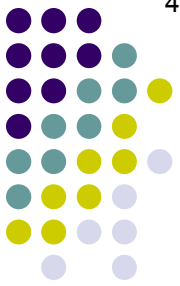
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A ring-shaped infiltrate is indeed classic for *Acanthamoeba*; however, it is a relatively late finding in the disease.

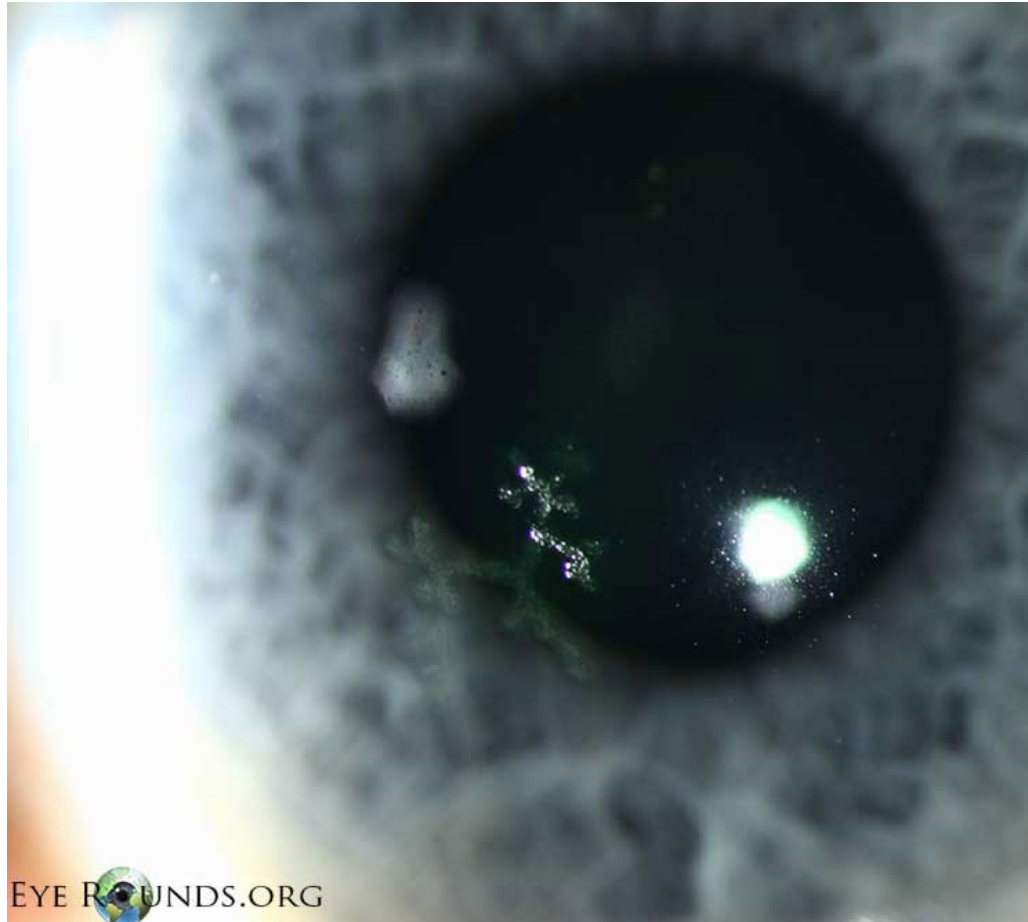
In what key way do the dendrites of *Acanthamoeba keratitis* differ from those of HSV keratitis?

HSV dendrites usually have terminal bulbs, whereas *Acanthamoeba* dendrites don't.

When culturing for *Acanthamoeba*?
E. coli overlay

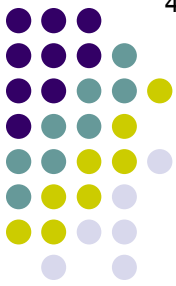


Common Parasitic Pathogens

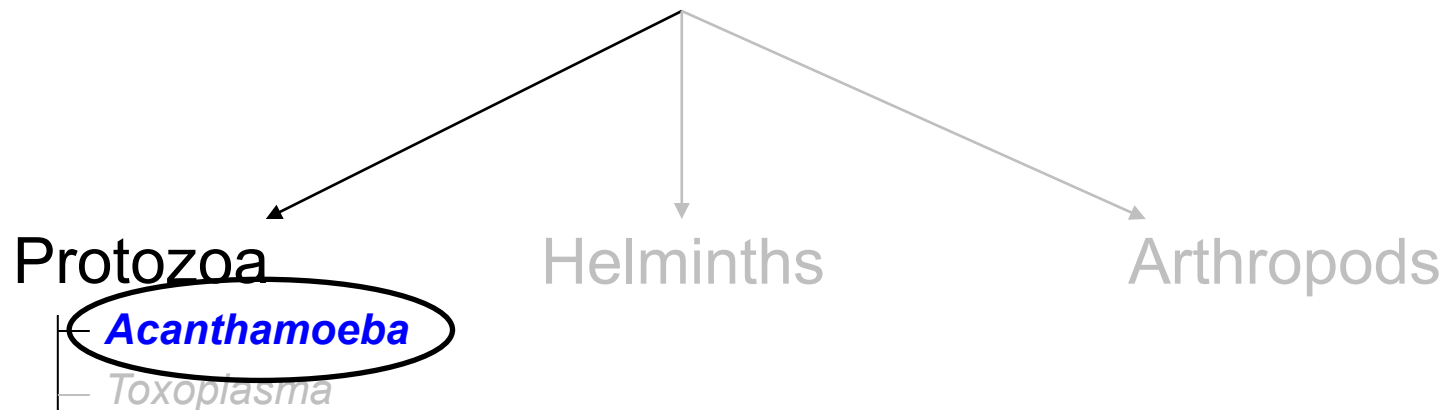


HSV dendrites: Terminal bulbs (look carefully)

Common Parasitic Pathogens



Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

Acanthamoeba keratitis?

HSV keratitis

Why HSV?

Because early *Acanthamoeba*

dendritic in appearance

Dendritic in appearance??!!

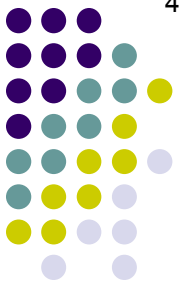
a 'ring infiltrate.' What's the

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In what key way do the dendrites of Acanthamoeba keratitis differ from those of HSV keratitis?

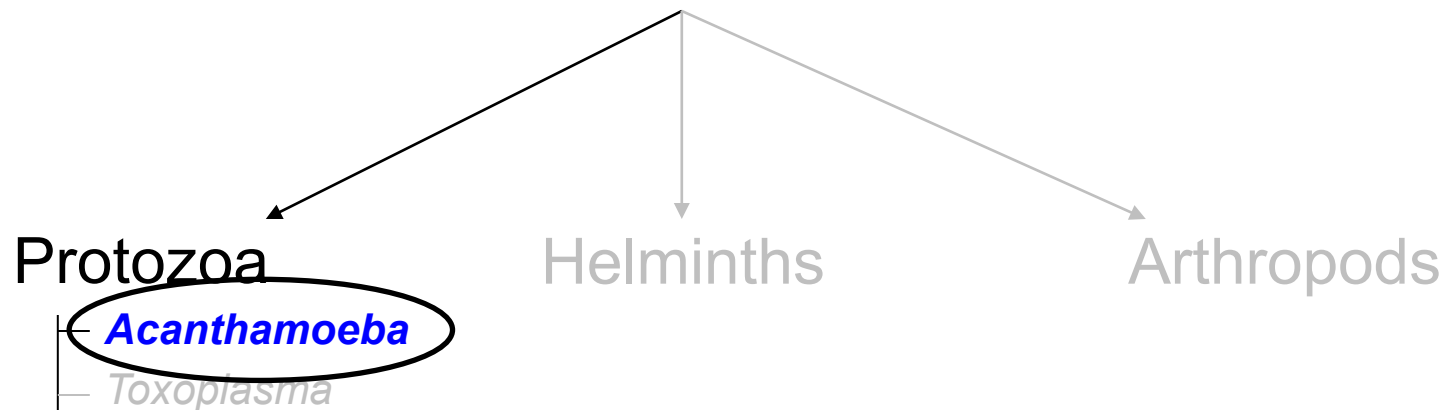
HSV dendrites usually have terminal bulbs, whereas *Acanthamoeba* dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

When culturing for *Acanthamoeba*?
E. coli overlay



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

Acanthamoeba keratitis

HSV keratitis

In what key way might the presenting complaint of an Acanthamoeba keratitis patient differ from that of an HSV keratitis patient?

Why HSV?

Because early Acanthamoeba

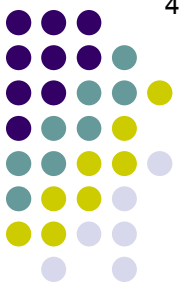
dendritic in appearance at first

How does Acanthamoeba keratitis differ from those of HSV keratitis?

HSV dendrites usually have terminal bulbs, whereas Acanthamoeba dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

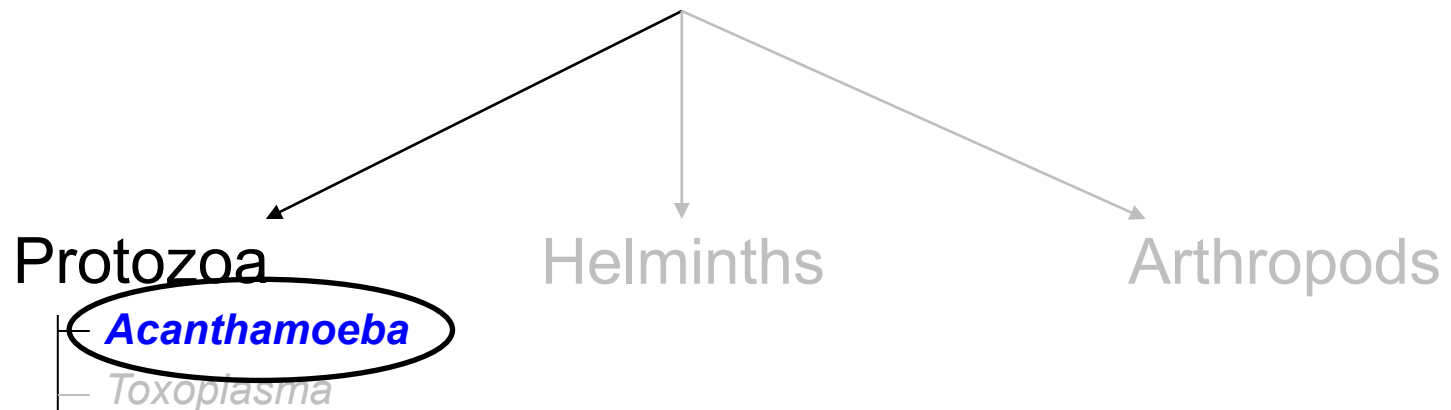
Dendritic in appearance??!! I see a 'ring infiltrate.' What's the cause?

A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the dz.



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early acanthamoeba keratitis?

HSV keratitis

In what key way might the presenting complaint of an Acanthamoeba keratitis patient differ from that of an HSV keratitis patient?

The patient with Acanthamoeba keratitis will complain of pain that seems out of proportion to the clinical picture, while the HSV keratitis patient will have **less** pain than would be expected given the appearance of the cornea.

Why HSV?

Because early Acanthamoeba keratitis is

dendritic in appearance at first.

How does Acanthamoeba keratitis differ from those of HSV keratitis?

HSV dendrites usually have terminal bulbs, whereas Acanthamoeba dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

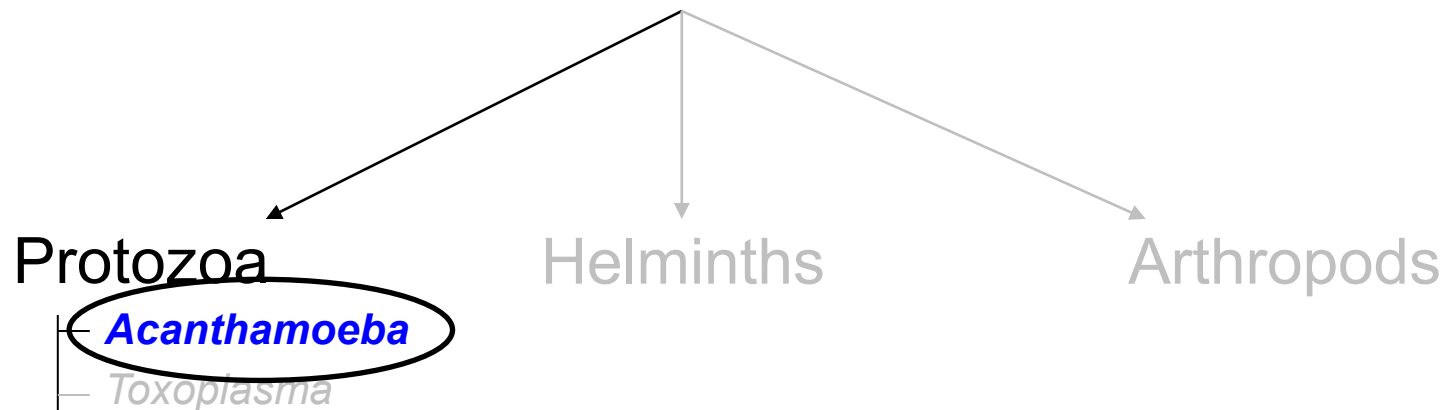
Dendritic in appearance??!! I see a 'ring infiltrate.' What's the differential diagnosis?

A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the dz.



Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

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Why HSV?

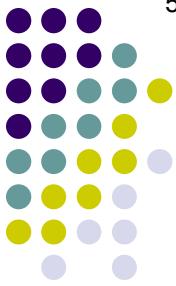
Because early *Acanthamoeba* is less painful and dendritic in appearance

Why is *Acanthamoeba* keratitis so painful?

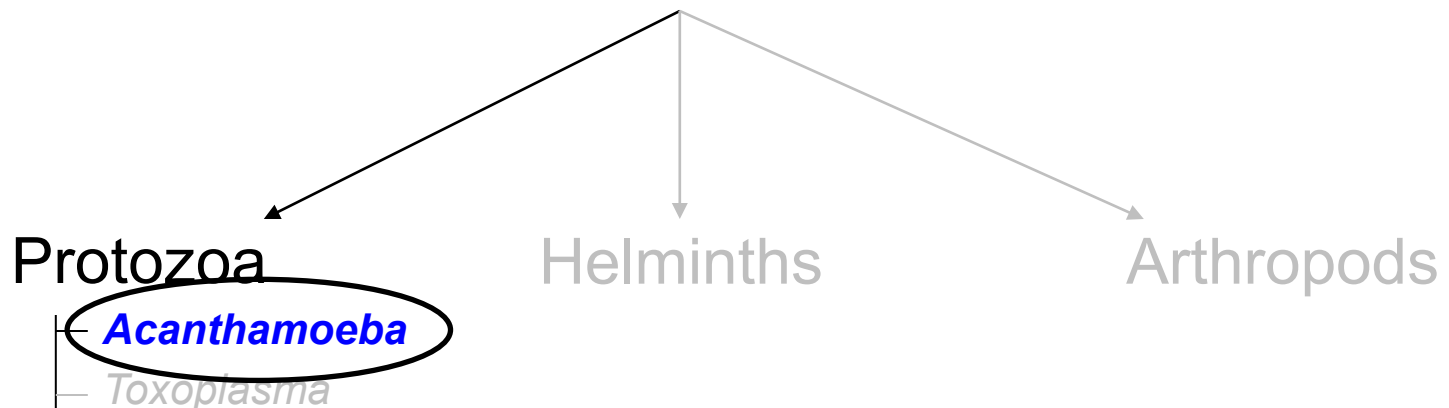
Dendritic in appearance??!! *Acanthamoeba* dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

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Common Parasitic Pathogens



Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

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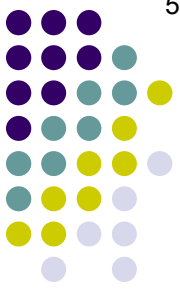
Why is *Acanthamoeba* keratitis so painful?

Because the bug has a propensity for

two words

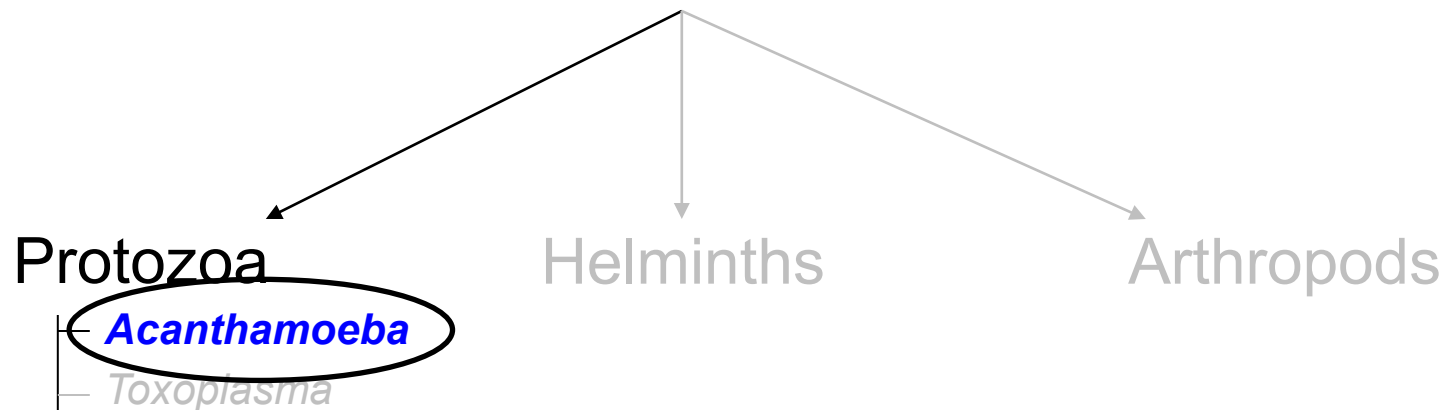
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Common Parasitic Pathogens

Parasitic pathogens



What is the most common misdiagnosis of early ocular infection?

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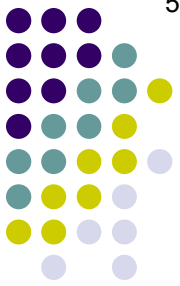
Why HSV?

Because early *Acanthamoeba* keratitis is less painful than HSV keratitis.

Why is *Acanthamoeba* keratitis so painful?
Because the bug has a propensity for perineural invasion

Dendritic in appearance??!! *Acanthamoeba* dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

A ring-shaped infiltrate is indeed classic for *Acanthamoeba*; however, it is a relatively late finding in the dz.



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

— Toxoplasma

Does perineural invasion manifest in manner visible at the slit lamp?

What is the most common misdiagnosis for Acanthamoeba keratitis?

Acanthamoeba keratitis

HSV keratitis

In what key ways do the clinical pictures of Acanthamoeba keratitis and HSV keratitis differ?

The patient with Acanthamoeba keratitis will have a more severe and painful presentation.

The patient with HSV keratitis will have a more localized and less painful presentation.

Why HSV?

Because early Acanthamoeba keratitis is dendritic in appearance.

Acanthamoeba dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the disease.

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Why is Acanthamoeba keratitis so painful?

Because the bug has a propensity for perineural invasion.

perineural invasion

Dendritic in appearance??!!

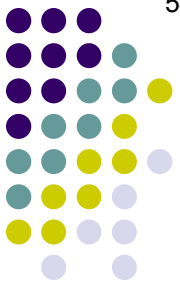
a 'ring infiltrate.' What's the classic finding for Acanthamoeba?

A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the disease.

Acanthamoeba dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

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Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

— Toxoplasma

Does perineural invasion manifest in manner visible at the slit lamp?
It can—it presents as whitish radial lines (these are the inflamed nerves)

What is the most common misdiagnosis for Acanthamoeba keratitis?

Acanthamoeba keratitis

HSV keratitis

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The patient with Acanthamoeba keratitis will have a more severe clinical picture, while the HSV keratitis patient will have a less severe clinical picture.

Why HSV?

Because early Acanthamoeba keratitis is dendritic in appearance.

dendritic in appearance

Why is Acanthamoeba keratitis so painful?

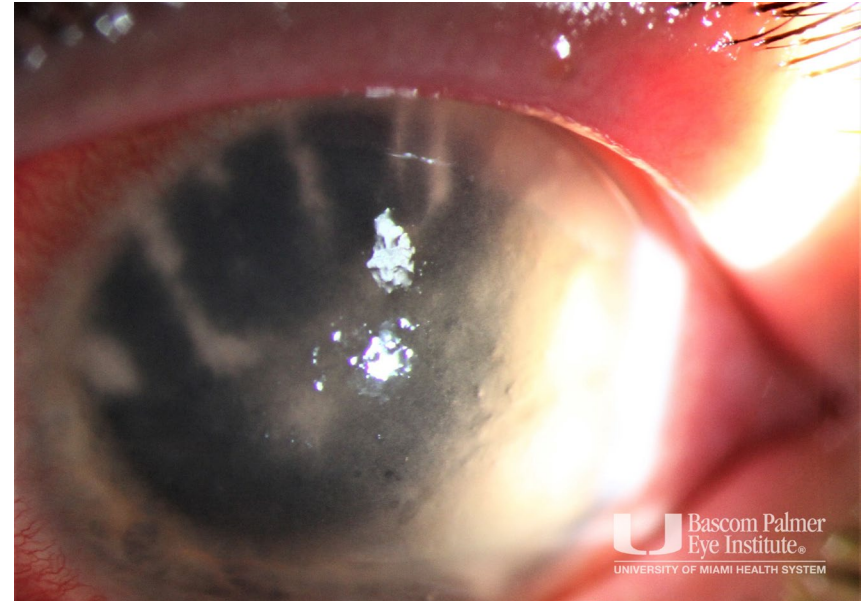
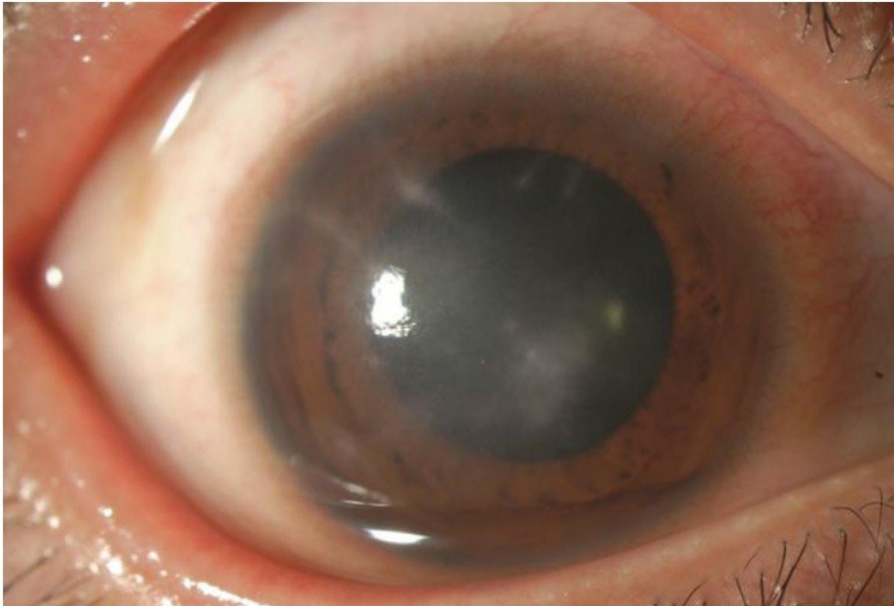
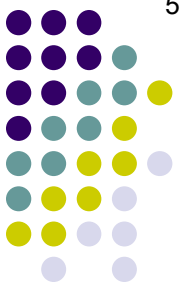
Because the bug has a propensity for perineural invasion.

perineural invasion

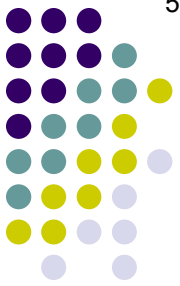
Dendritic in appearance??!! I think Acanthamoeba dendrites don't. Evaluate all dendrites carefully for the presence of terminal bulbs!

A ring-shaped infiltrate is indeed classic for Acanthamoeba; however, it is a relatively late finding in the dz.

Common Parasitic Pathogens



Acanthamoeba: Perineural invasion



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

— *Toxoplasma*

Does perineural invasion manifest in manner visible at the slit lamp?

It can—it presents as whitish radial lines (these are the inflamed nerves)

When present, what is this sign called?

What is the most common misdiagnosis?

Acanthamoeba keratitis

In what key way do the two

patient differ?

The patient with

of proportion to the clinical picture, while the HSV keratitis patient will have

less pain

Why HSV?

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dendritic in appearance

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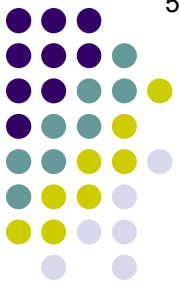
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carefully for the presence of terminal bulbs!

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Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

— Toxoplasma

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When present, what is this sign called?
Radial perineuritis (or keratoneuritis)

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Common Parasitic Pathogens

Parasitic pathogens

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How specific for Acanthamoeba is this sign?

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Because early Acanthamoeba

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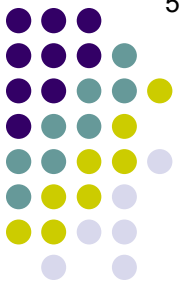
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Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Acanthamoeba

— *Toxoplasma*

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When present, what is this sign called?

Radial perineuritis (or keratoneuritis)

How specific for Acanthamoeba is this sign?

The Cornea book says it's "nearly pathognomonic for amebic keratitis"

What is the most common misdiagnosis?

Acanthamoeba keratitis

In what key way do the clinical pictures of the two

The patient with Acanthamoeba keratitis

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Why is Acanthamoeba keratitis so painful?

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dendritic in appearance

Dendritic in appearance??!! I

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HSV keratitis

Why HSV?

Because early Acanthamoeba

dendritic in appearance

Why is Acanthamoeba keratitis so painful?

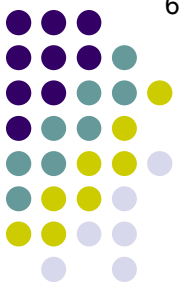
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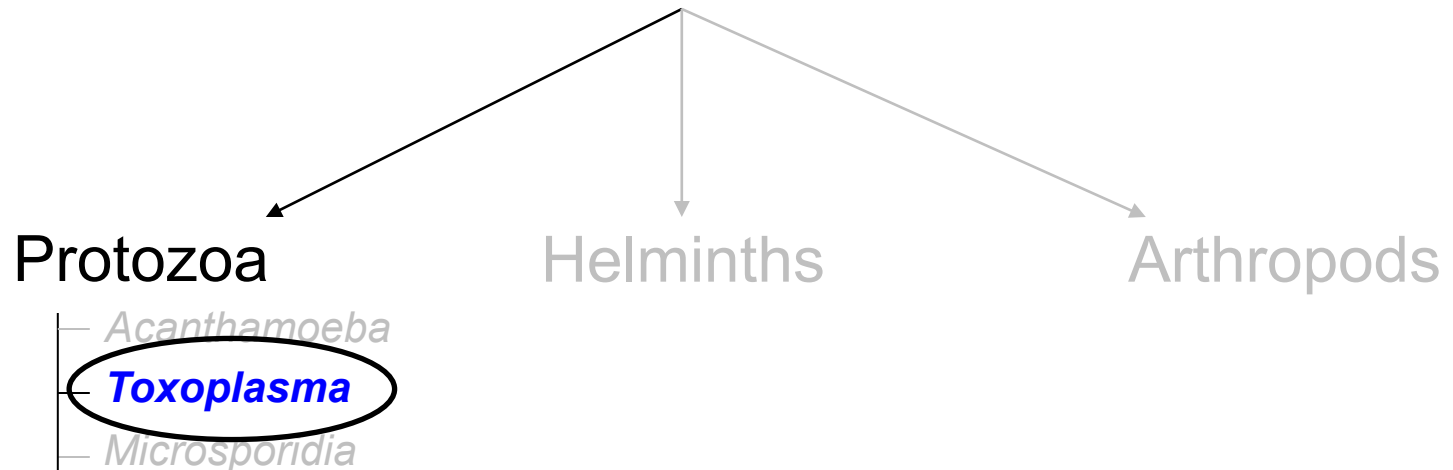
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Common Parasitic Pathogens

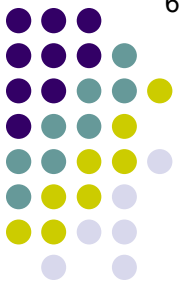


Parasitic pathogens

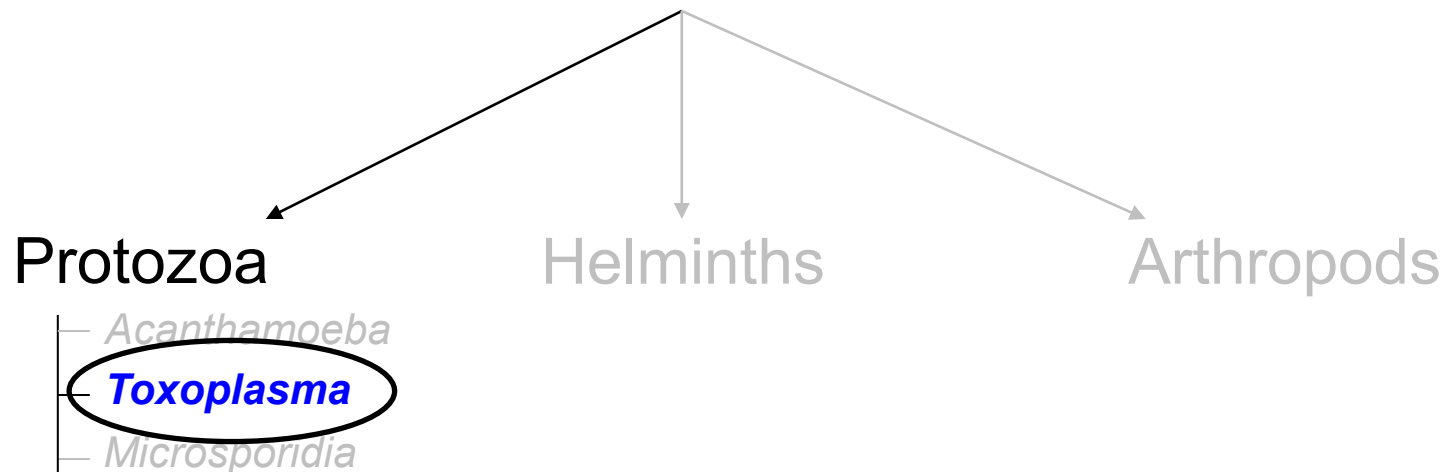


What is the full name of the causative organism in ocular toxoplasmosis?

Common Parasitic Pathogens

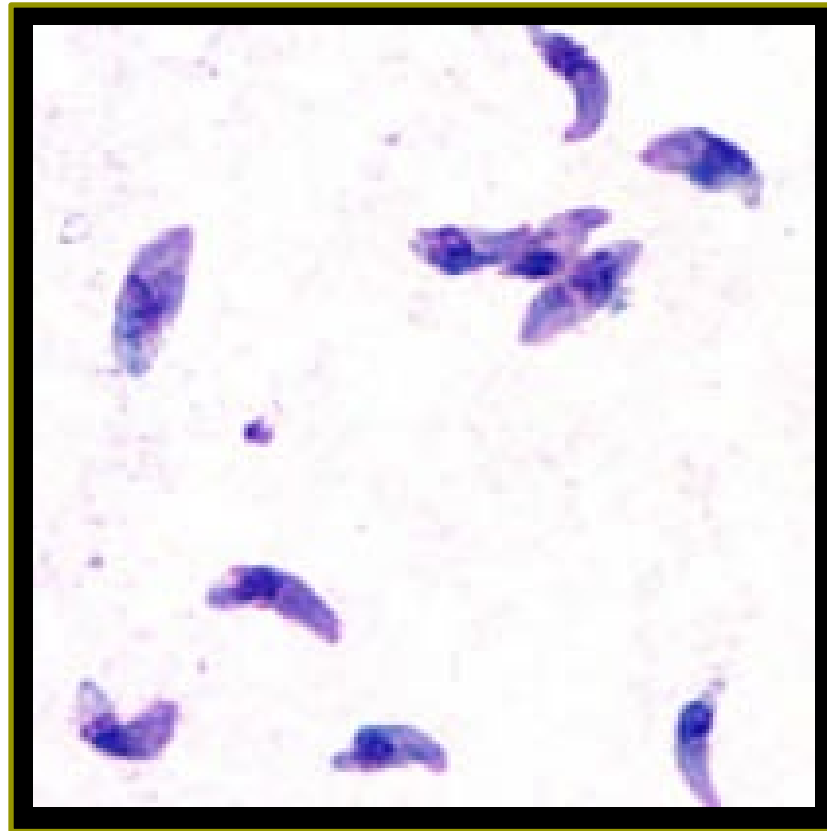
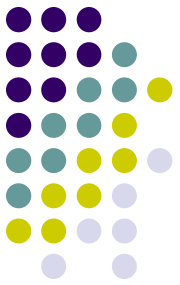


Parasitic pathogens



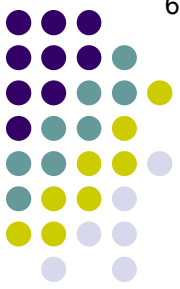
What is the full name of the causative organism in ocular toxoplasmosis?
Toxoplasma gondii

Common Parasitic Pathogens

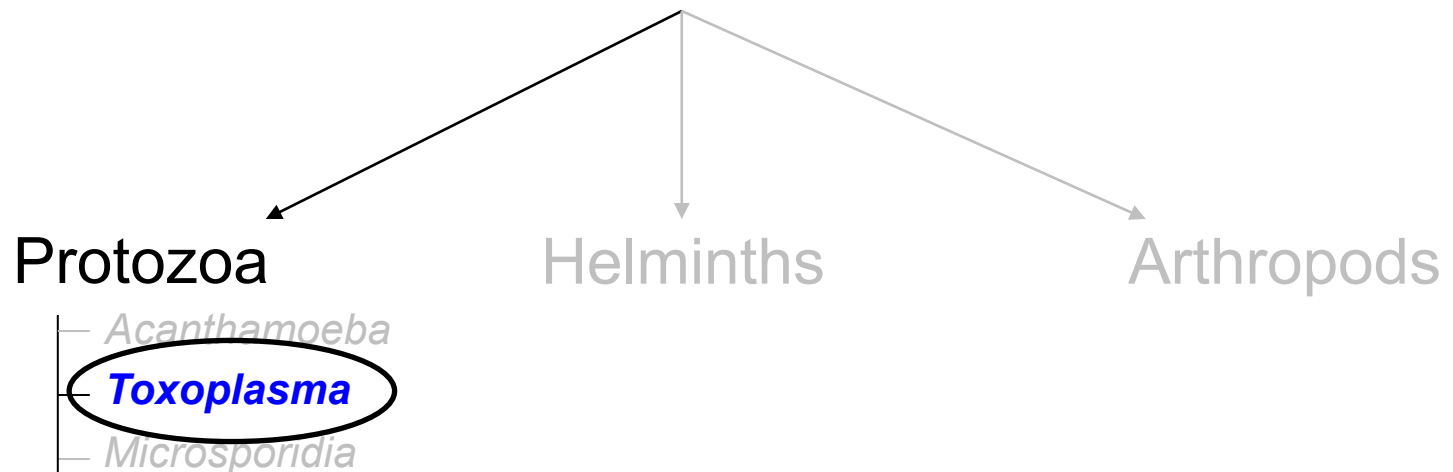


Toxoplasma gondii

Common Parasitic Pathogens



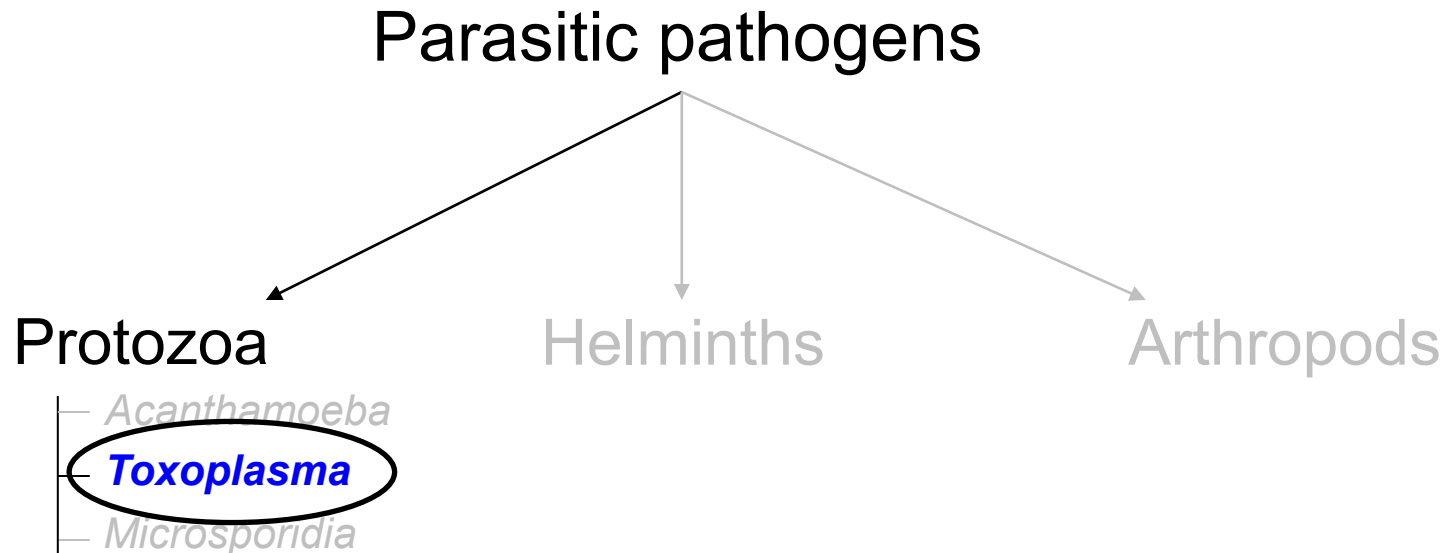
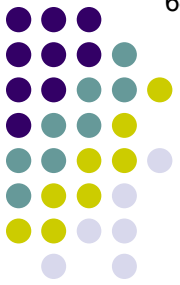
Parasitic pathogens



What is the full name of the causative organism in ocular toxoplasmosis?
Toxoplasma gondii

Where in the world can T gondii be found?

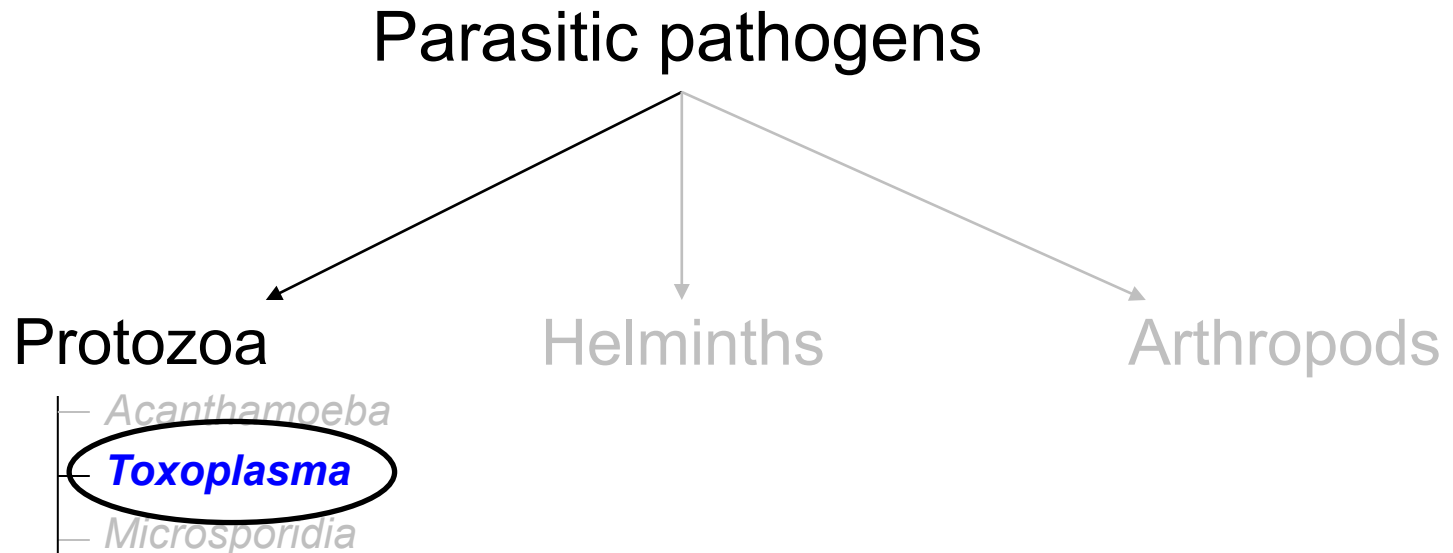
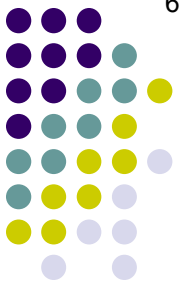
Common Parasitic Pathogens



What is the full name of the causative organism in ocular toxoplasmosis?
Toxoplasma gondii

Where in the world can *T. gondii* be found?
Everywhere—it has a worldwide distribution

Common Parasitic Pathogens



What is the full name of the causative organism in ocular toxoplasmosis?

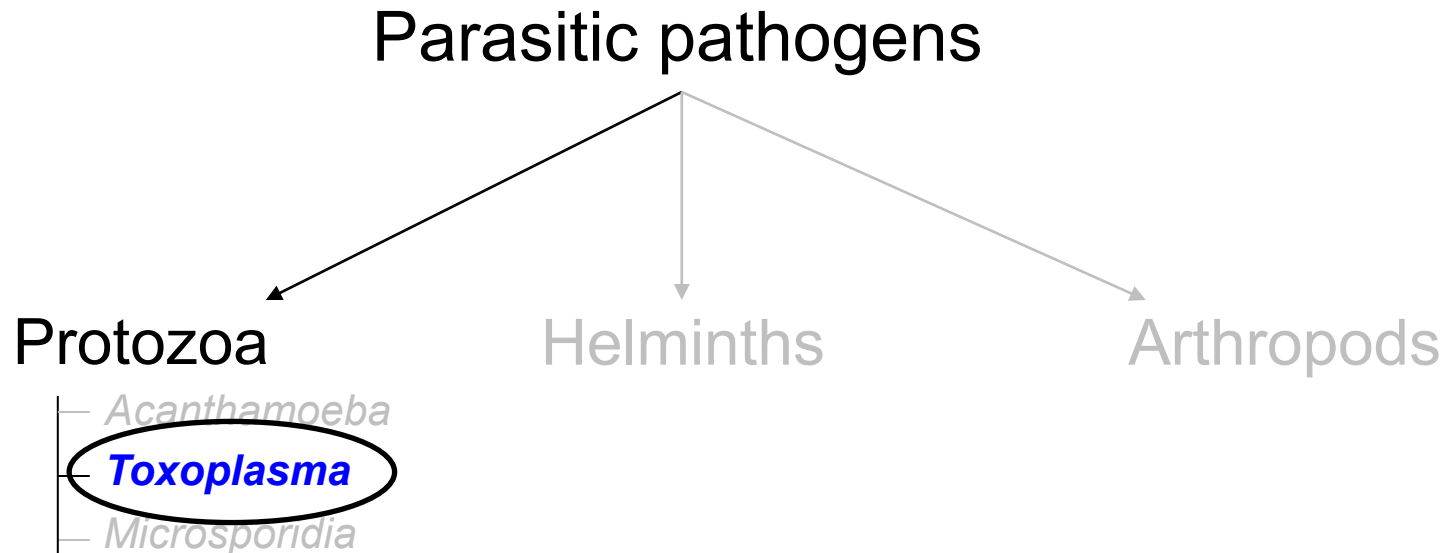
Toxoplasma gondii

Where in the world can T gondii be found? Is it a common human pathogen?

Everywhere—it has a worldwide distribution



Common Parasitic Pathogens



What is the full name of the causative organism in ocular toxoplasmosis?

Toxoplasma gondii

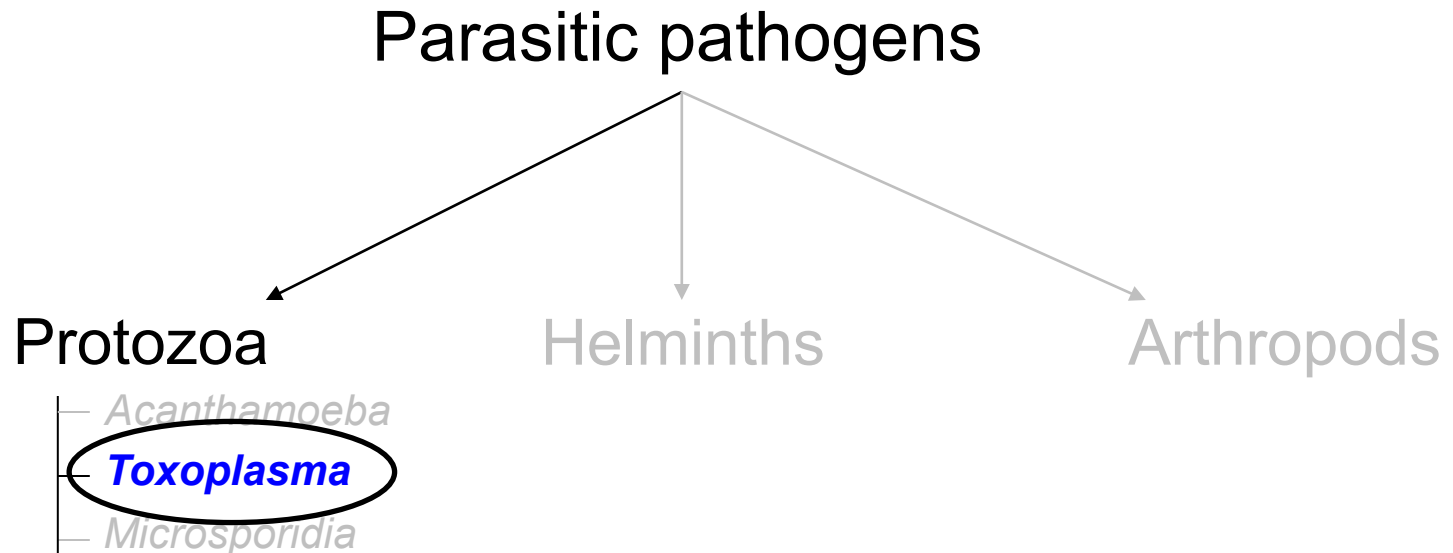
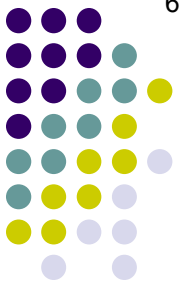
Where in the world can T gondii be found? Is it a common human pathogen?

Everywhere—it has a worldwide distribution. Yes—it's likely that

big number

people are infected worldwide

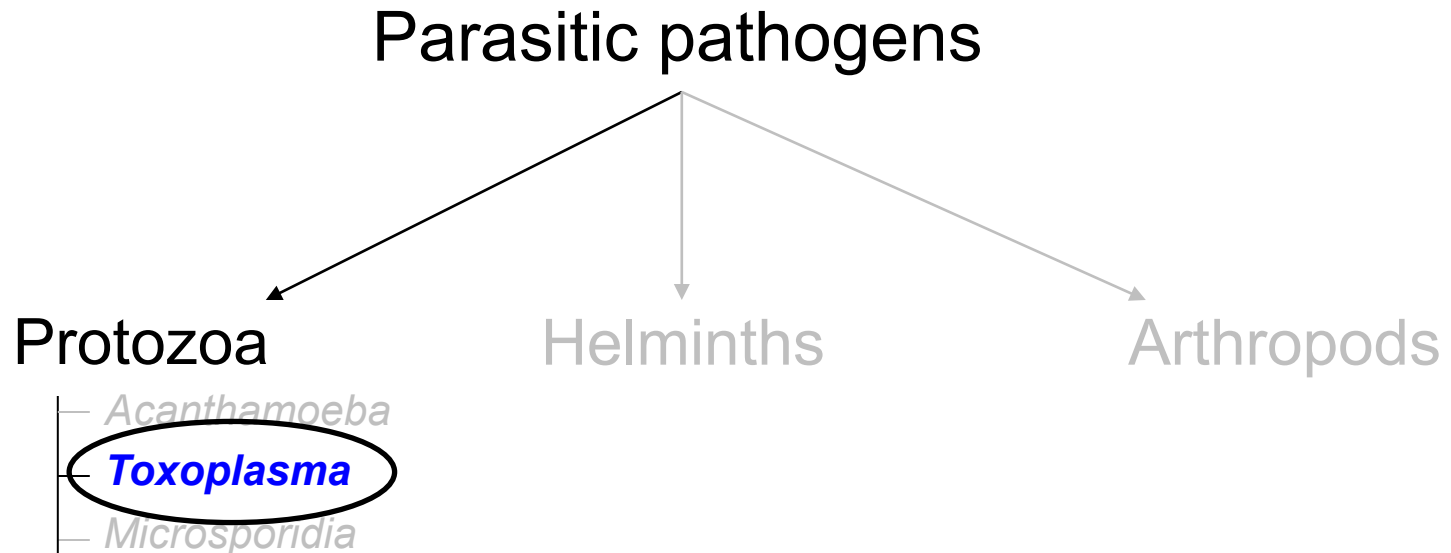
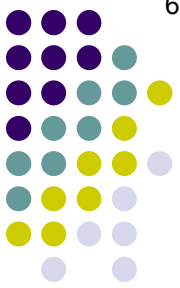
Common Parasitic Pathogens



What is the full name of the causative organism in ocular toxoplasmosis?
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Common Parasitic Pathogens

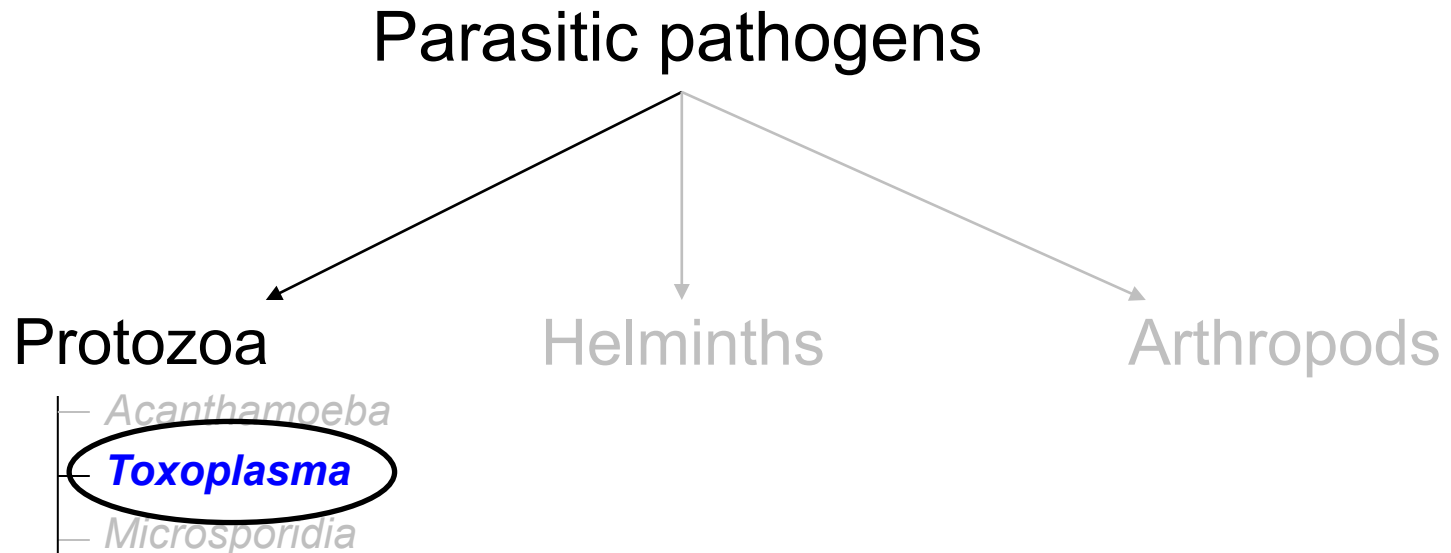
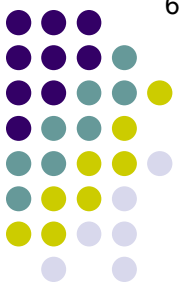


What is the full name of the causative organism in ocular toxoplasmosis?
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Where in the world can T gondii be found? Is it a common human pathogen?
Everywhere—it has a worldwide distribution. Yes—it's likely that a billion people are infected worldwide.

What animal is its definitive host?

Common Parasitic Pathogens

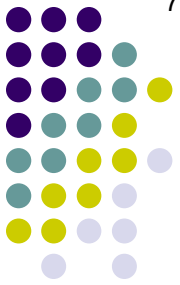


What is the full name of the causative organism in ocular toxoplasmosis?
Toxoplasma gondii

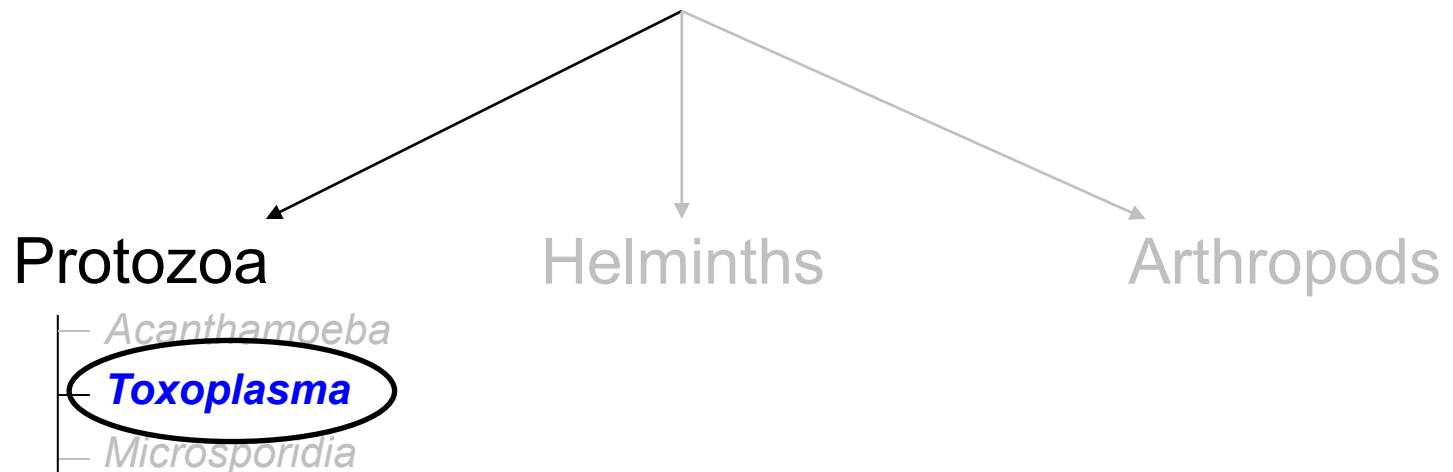
Where in the world can T gondii be found? Is it a common human pathogen?
 Everywhere—it has a worldwide distribution. Yes—it's likely that a billion people are infected worldwide.

What animal is its definitive host?
 The cat

Common Parasitic Pathogens



Parasitic pathogens



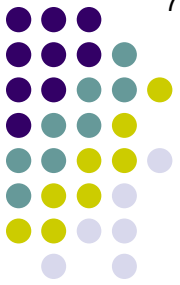
What is the full name of the causative organism in ocular toxoplasmosis?

Which ocular structures are most commonly involved in Toxoplasma infection?

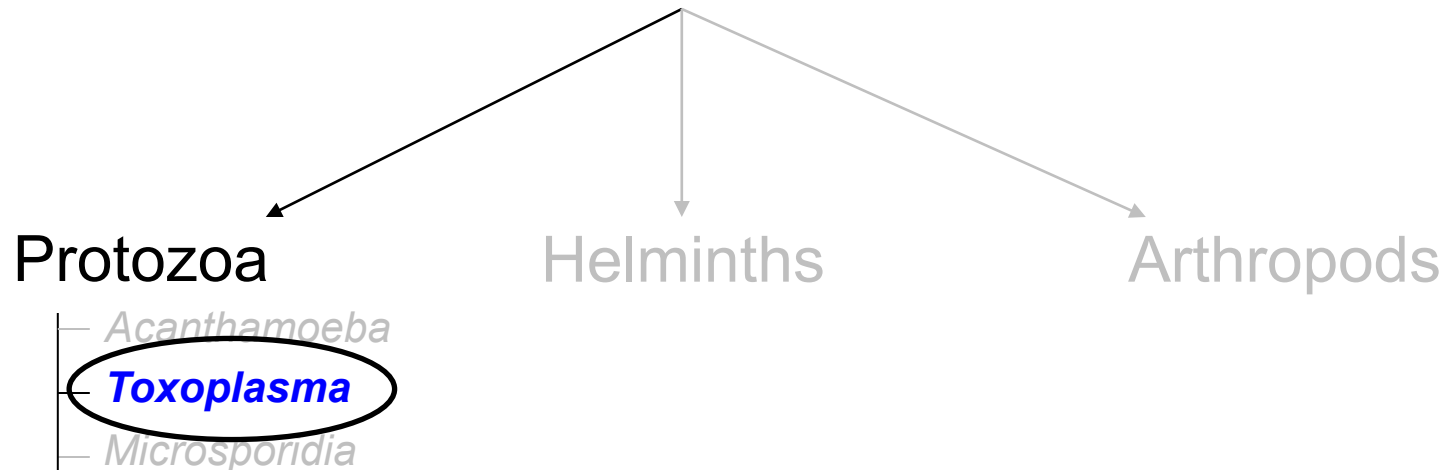
What animal is its definitive host?

The cat

Common Parasitic Pathogens



Parasitic pathogens



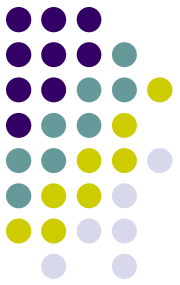
What is the full name of the causative organism in ocular toxoplasmosis?

Which ocular structures are most commonly involved in Toxoplasma infection?
The retina and choroid

What animal is its definitive host?

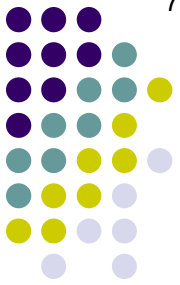
The cat

Common Parasitic Pathogens

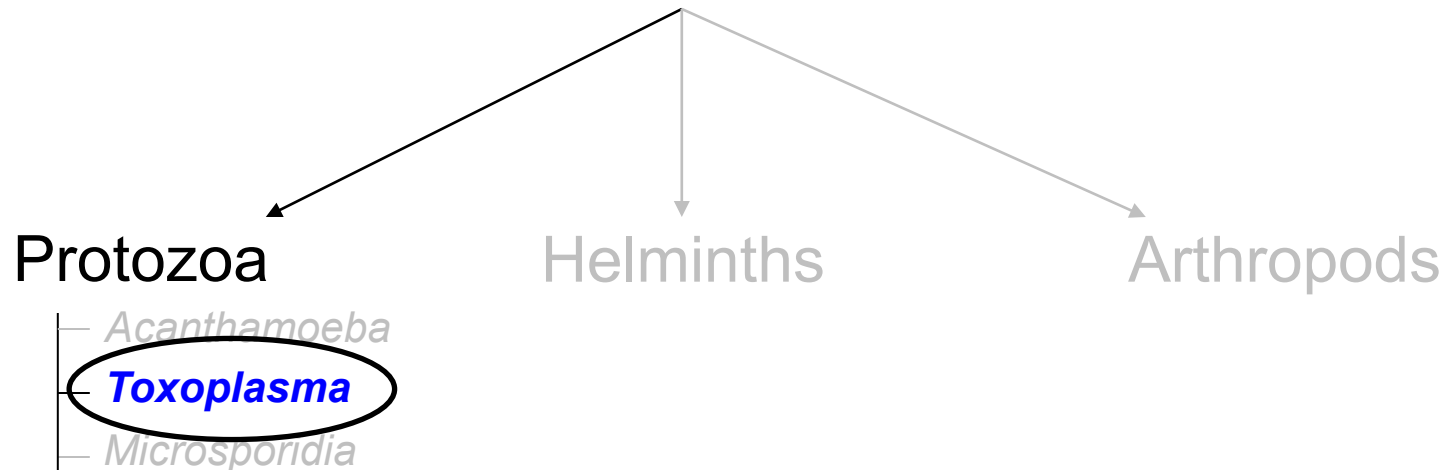


Classic presentation of *Toxoplasma* retinochoroiditis:
An active retinal lesion next to an old inactive scar

Common Parasitic Pathogens



Parasitic pathogens



What is the full name of the causative organism in ocular toxoplasmosis?

Which ocular structures are most commonly involved in Toxoplasma infection?

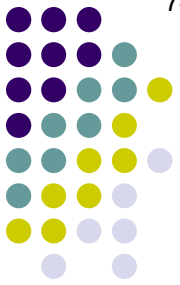
The retina and choroid

Is toxoplasmosis a common form of infectious posterior uveitis?

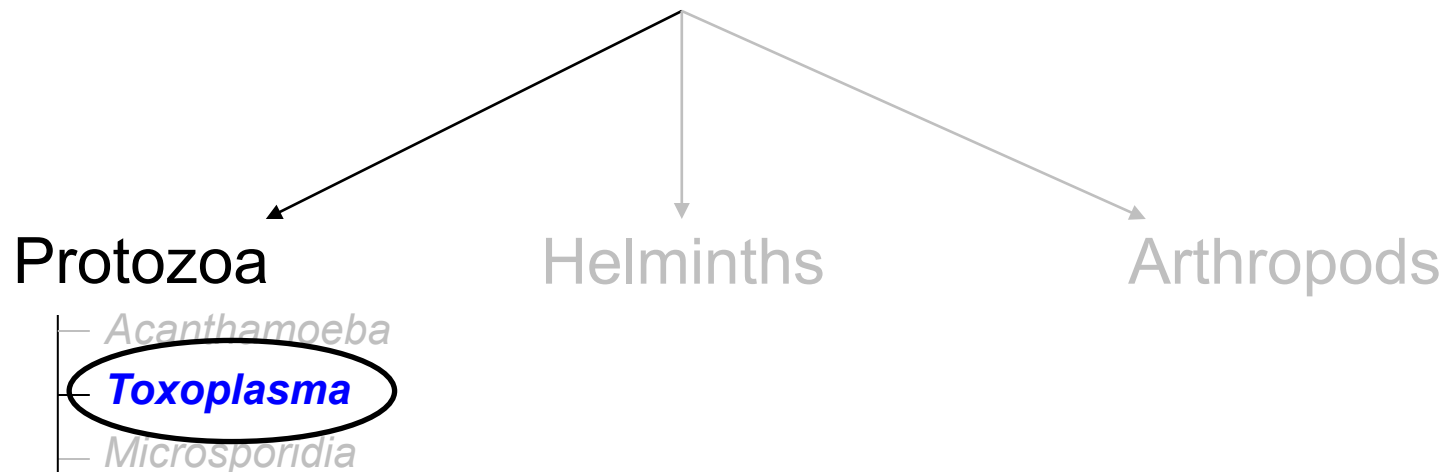
What animal is its definitive host?

The cat

Common Parasitic Pathogens



Parasitic pathogens



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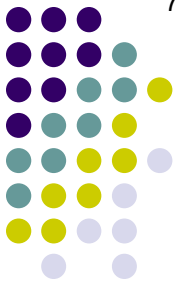
The retina and choroid

Is toxoplasmosis a common form of infectious posterior uveitis?

It is indeed—in fact, it is the **most** common

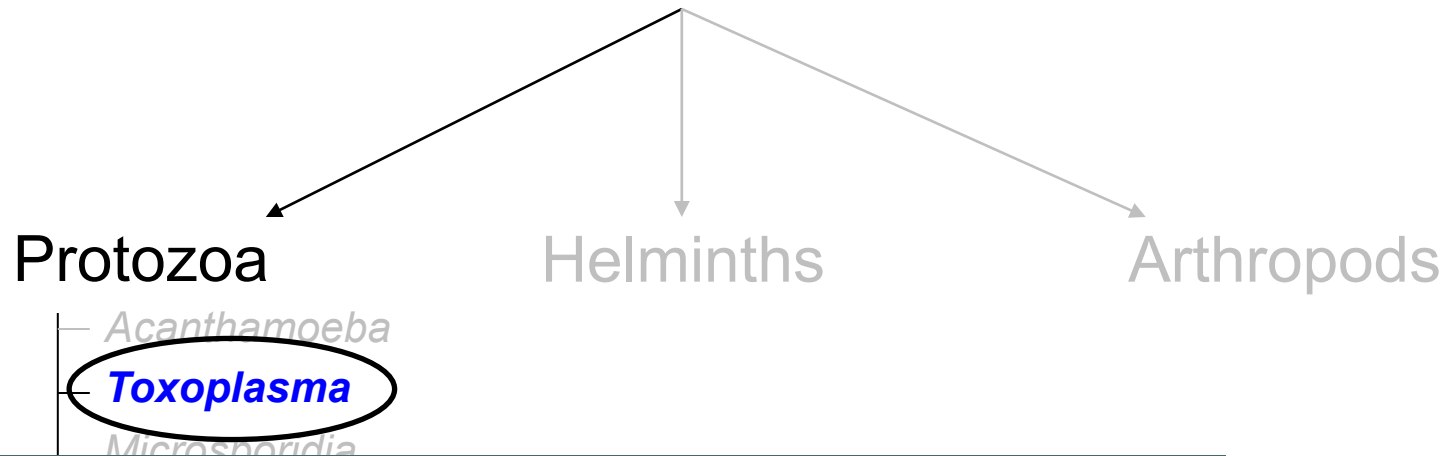
What animal is its definitive host?

The cat



Common Parasitic Pathogens

Parasitic pathogens



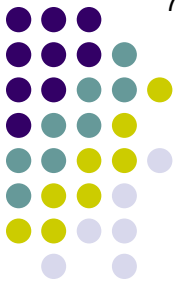
What are the three common means of catching the toxo bug?

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Which ocular s
The retina and

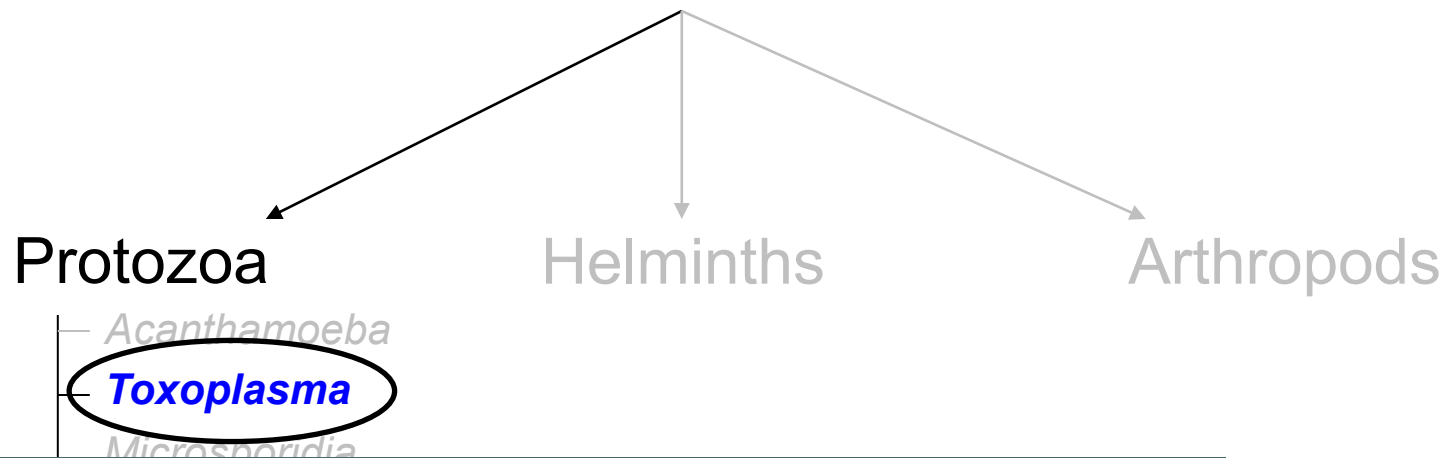
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What animal is its definitive host?
The cat



Common Parasitic Pathogens

Parasitic pathogens



What are the three common means of catching the toxo bug?

- Transplacentally
- Ingestion of undercooked meat (#1 type:) that harbors toxo cysts
- Ingestion of cysts directly from cat feces (well, not *directly* directly)

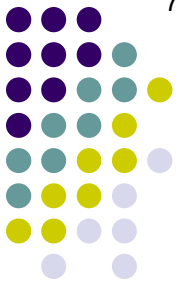
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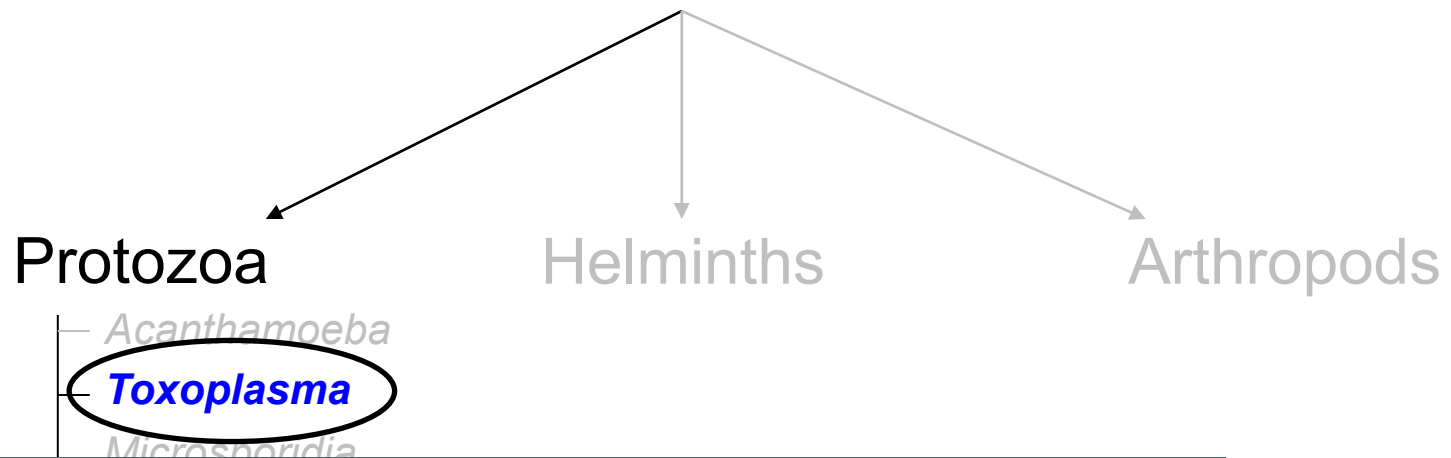
What animal is its definitive host?

The cat



Common Parasitic Pathogens

Parasitic pathogens



What are the three common means of catching the toxo bug?

- Transplacentally
- Ingestion of undercooked meat (#1 type: pork) that harbors toxo cysts
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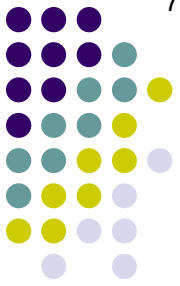
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Common Parasitic Pathogens

Parasitic pathogens

Toxoplasmosis has its own slide-set (U7); see it for more detail re this very important bug!

— *Acanthamoeba*
 — ***Toxoplasma***
 — *Microsporidia*

What are the three common means of catching the toxo bug?

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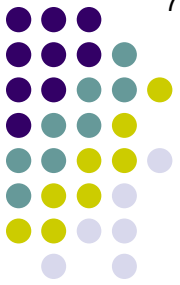
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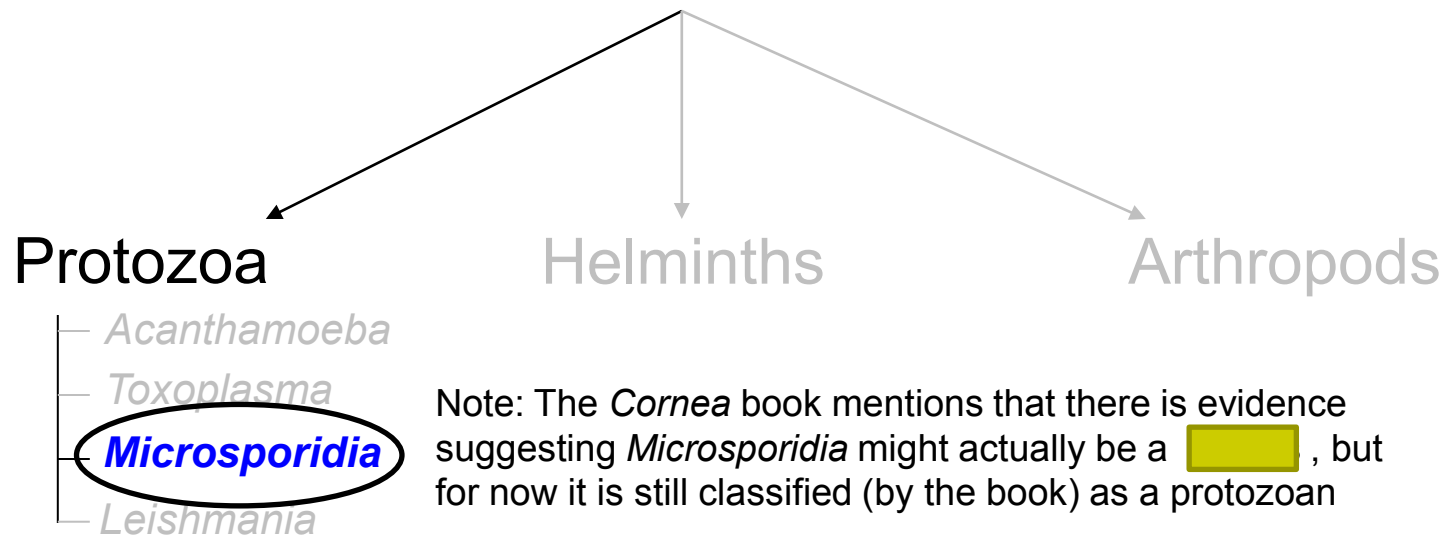
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The cat

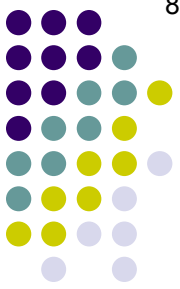
Common Parasitic Pathogens



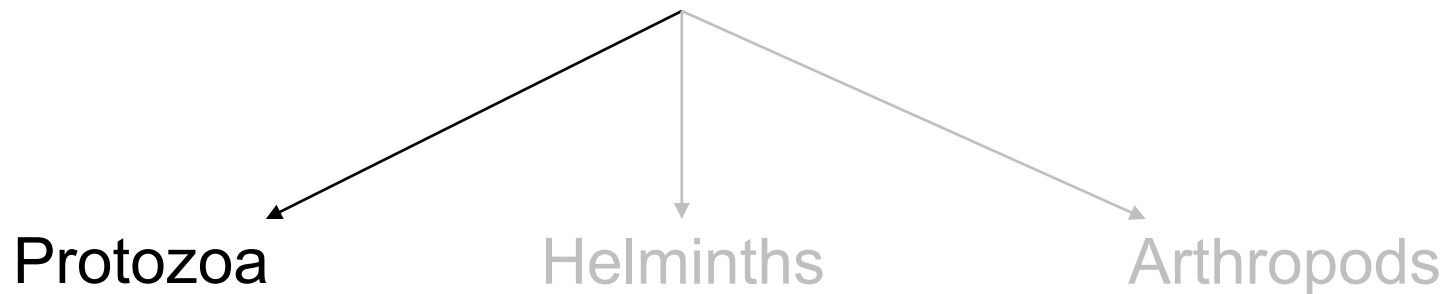
Parasitic pathogens



Common Parasitic Pathogens



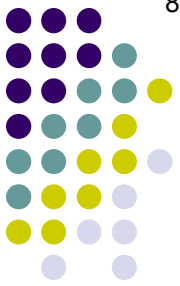
Parasitic pathogens



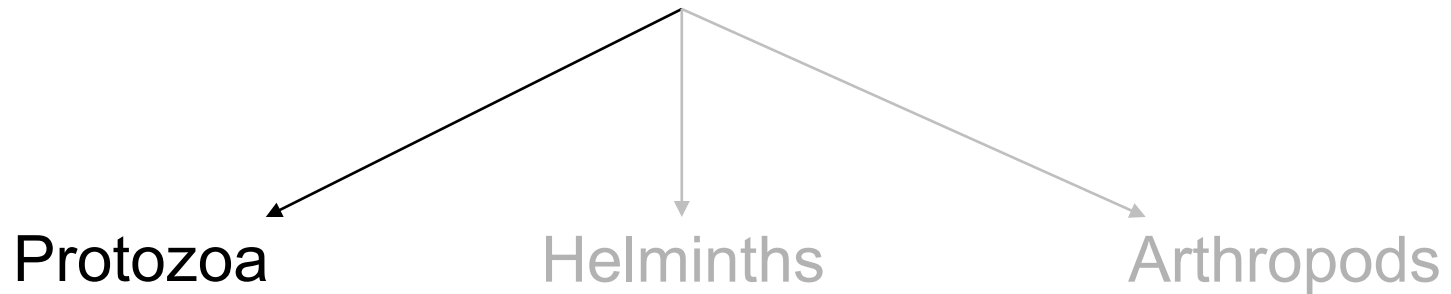
— *Acanthamoeba*
— *Toxoplasma*
— ***Microsporidia***
— *Leishmania*

Note: The *Cornea* book mentions that there is evidence suggesting *Microsporidia* might actually be a fungus , but for now it is still classified (by the book) as a protozoan

Common Parasitic Pathogens

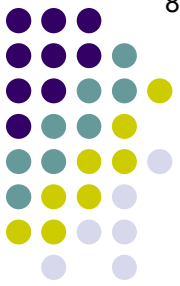


Parasitic pathogens



Acanthamoeba
Toxoplasma
Microsporidia
Leishmania

What sort of ocular infection is caused by Microsporidia?



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

Helminths

Arthropods

— *Acanthamoeba*

— *Toxoplasma*

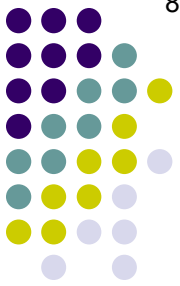
— ***Microsporidia***

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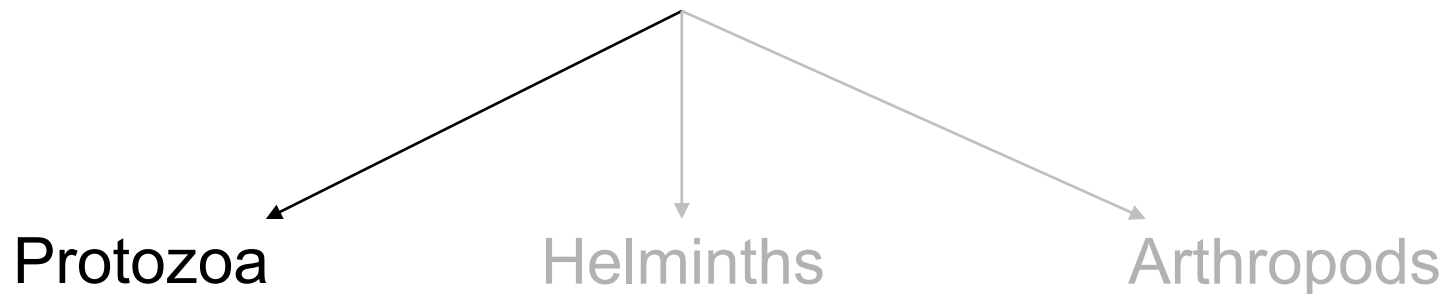
What sort of ocular infection is caused by Microsporidia?

Keratoconjunctivitis

Common Parasitic Pathogens



Parasitic pathogens



— *Acanthamoeba*

— *Toxoplasma*

— ***Microsporidia***

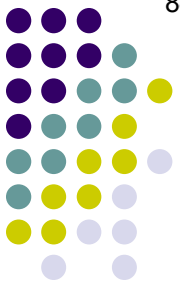
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What sort of ocular infection is caused by Microsporidia?

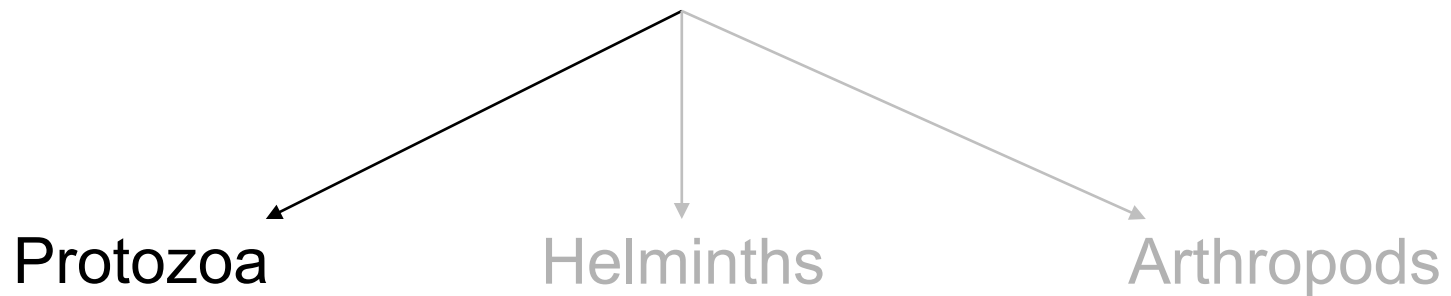
Keratoconjunctivitis

Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?

Common Parasitic Pathogens

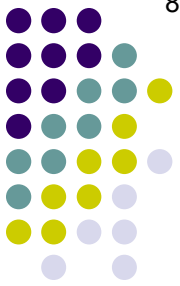


Parasitic pathogens

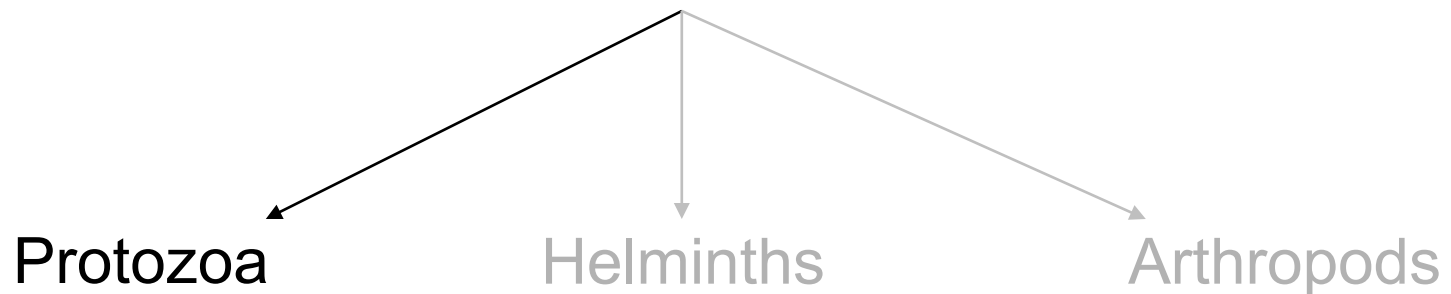


- *Acanthamoeba*
 - *Toxoplasma*
 - ***Microsporidia***
 - *Leishmania*
- What sort of ocular infection is caused by Microsporidia?
Keratoconjunctivitis
- Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?
AIDS patients

Common Parasitic Pathogens



Parasitic pathogens



— *Acanthamoeba*

— *Toxoplasma*

— ***Microsporidia***

— *Leishmania*

What sort of ocular infection is caused by Microsporidia?

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Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?

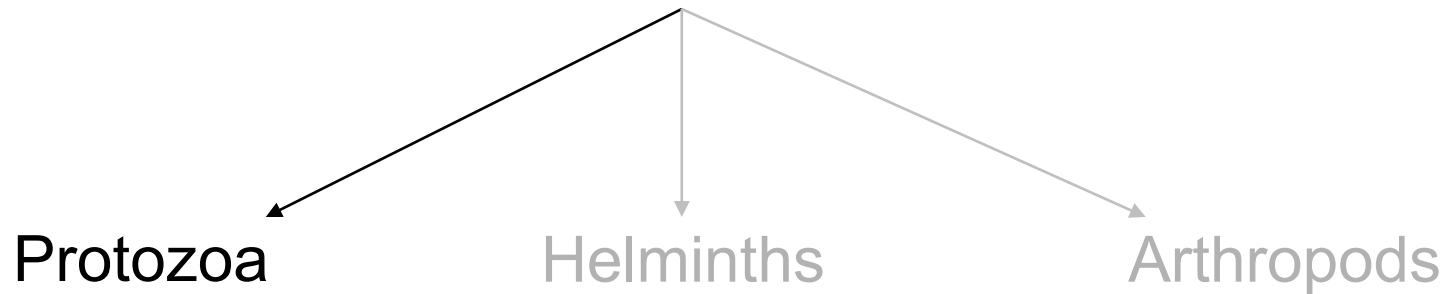
AIDS patients

What is the classic presentation of Microsporidia conjunctivitis?

Common Parasitic Pathogens



Parasitic pathogens



— *Acanthamoeba*

— *Toxoplasma*

— ***Microsporidia***

— *Leishmania*

What sort of ocular infection is caused by Microsporidia?

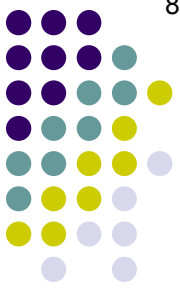
Keratoconjunctivitis

Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?

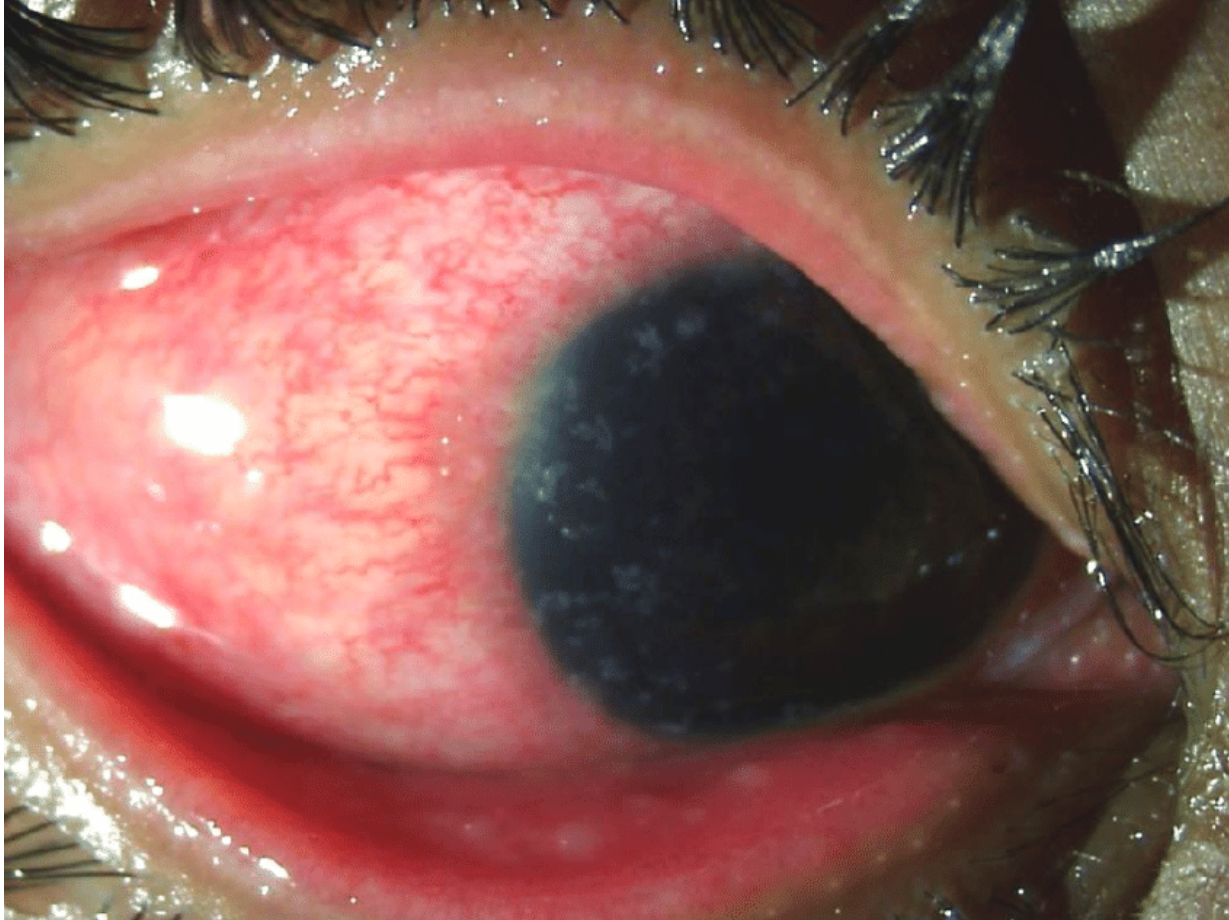
AIDS patients

What is the classic presentation of Microsporidia conjunctivitis?

Bilateral irritation, photophobia, decreased vision, and conjunctival injection

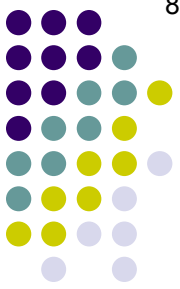


Acute/Hyperacute Conjunctivitis

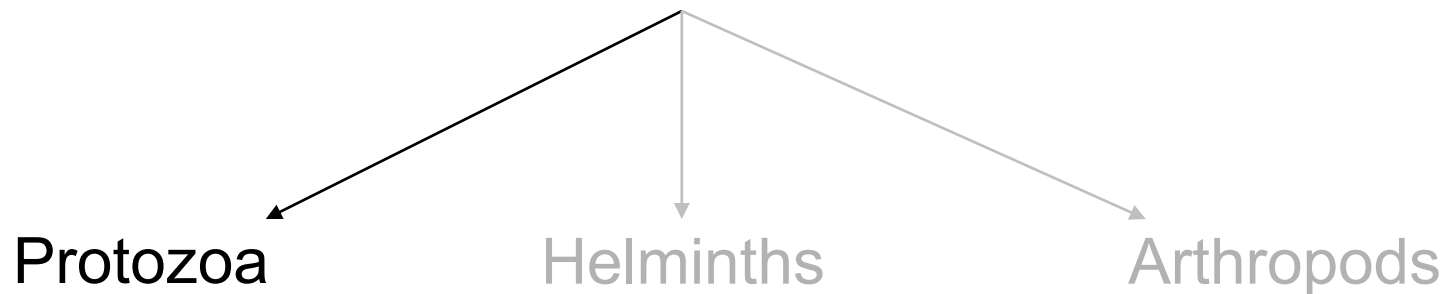


Microsporidia keratoconjunctivitis

Common Parasitic Pathogens



Parasitic pathogens



- Acanthamoeba
- Toxoplasma
- **Microsporidia**
- Leishmania

What sort of ocular infection is caused by Microsporidia?

Keratoconjunctivitis

Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?

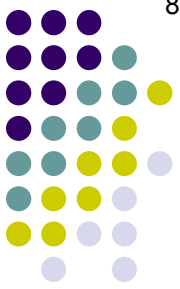
AIDS patients

What is the classic presentation of Microsporidia conjunctivitis?

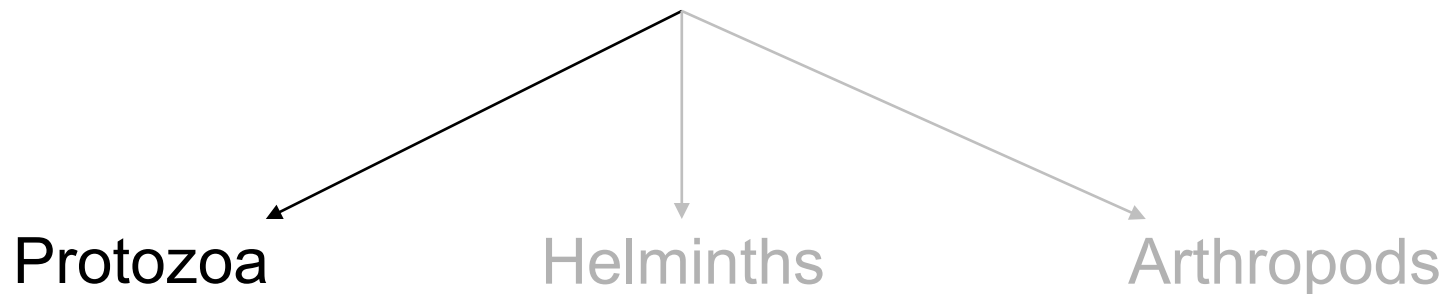
Bilateral irritation, photophobia, decreased vision, and conjunctival injection

What is the treatment for Microsporidia keratitis?

Common Parasitic Pathogens



Parasitic pathogens



Acanthamoeba

Toxoplasma

Microsporidia

Leishmania

What sort of ocular infection is caused by Microsporidia?

Keratoconjunctivitis

Who (ie, what pt population) gets Microsporidia keratoconjunctivitis?

AIDS patients

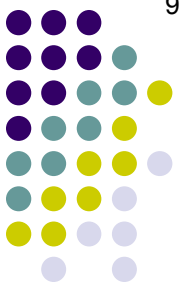
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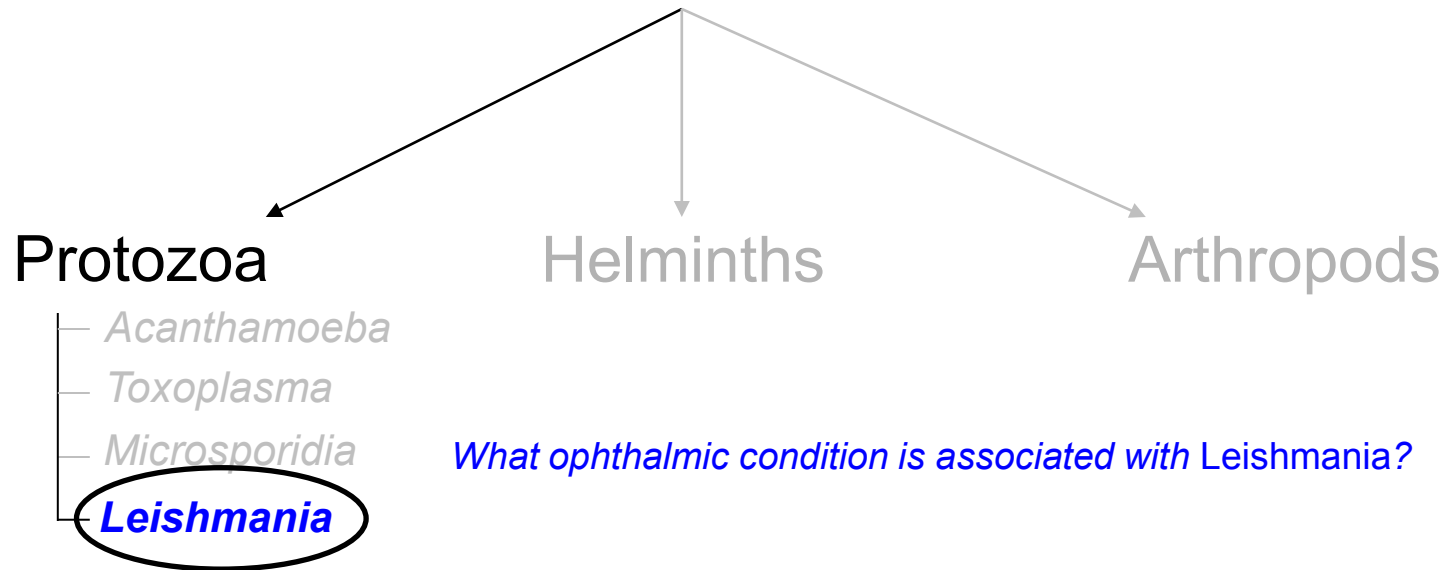
What is the treatment for Microsporidia keratitis?

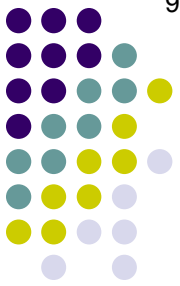
Topical fumagillin

Common Parasitic Pathogens

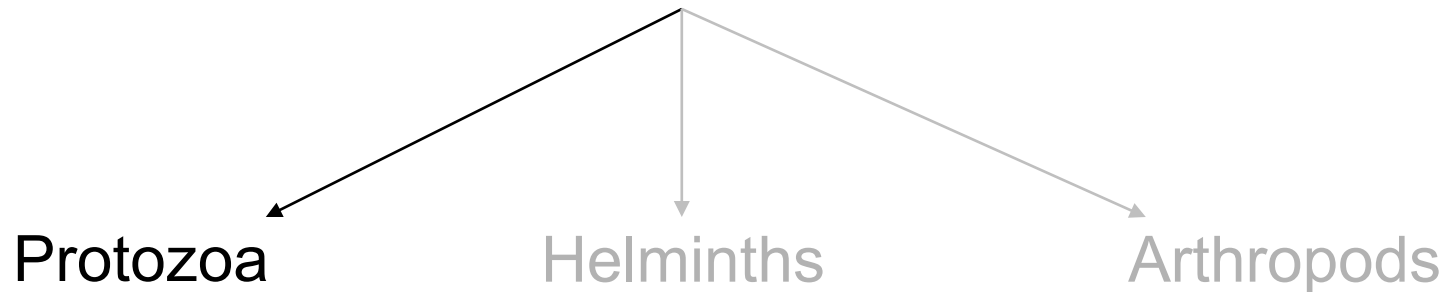


Parasitic pathogens





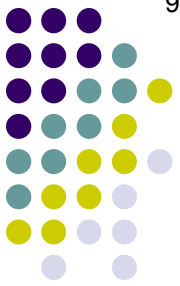
Parasitic pathogens



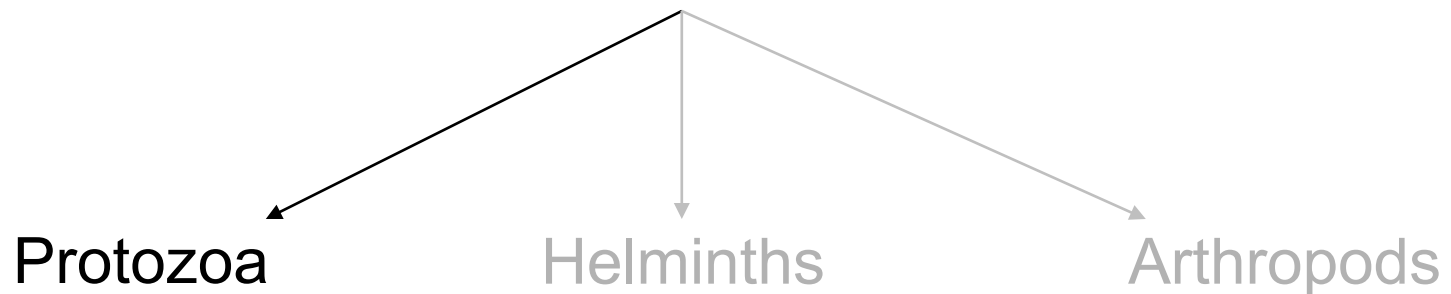
- *Acanthamoeba*
- *Toxoplasma*
- *Microsporidia*
- ***Leishmania***

What ophthalmic condition is associated with Leishmania?
An eyelid ulcer as a manifestation of **cutaneous leishmaniasis**
(the general term for the condition caused by this protozoan)

Common Parasitic Pathogens



Parasitic pathogens

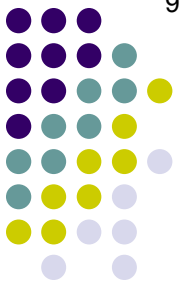


- *Acanthamoeba*
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- ***Leishmania***

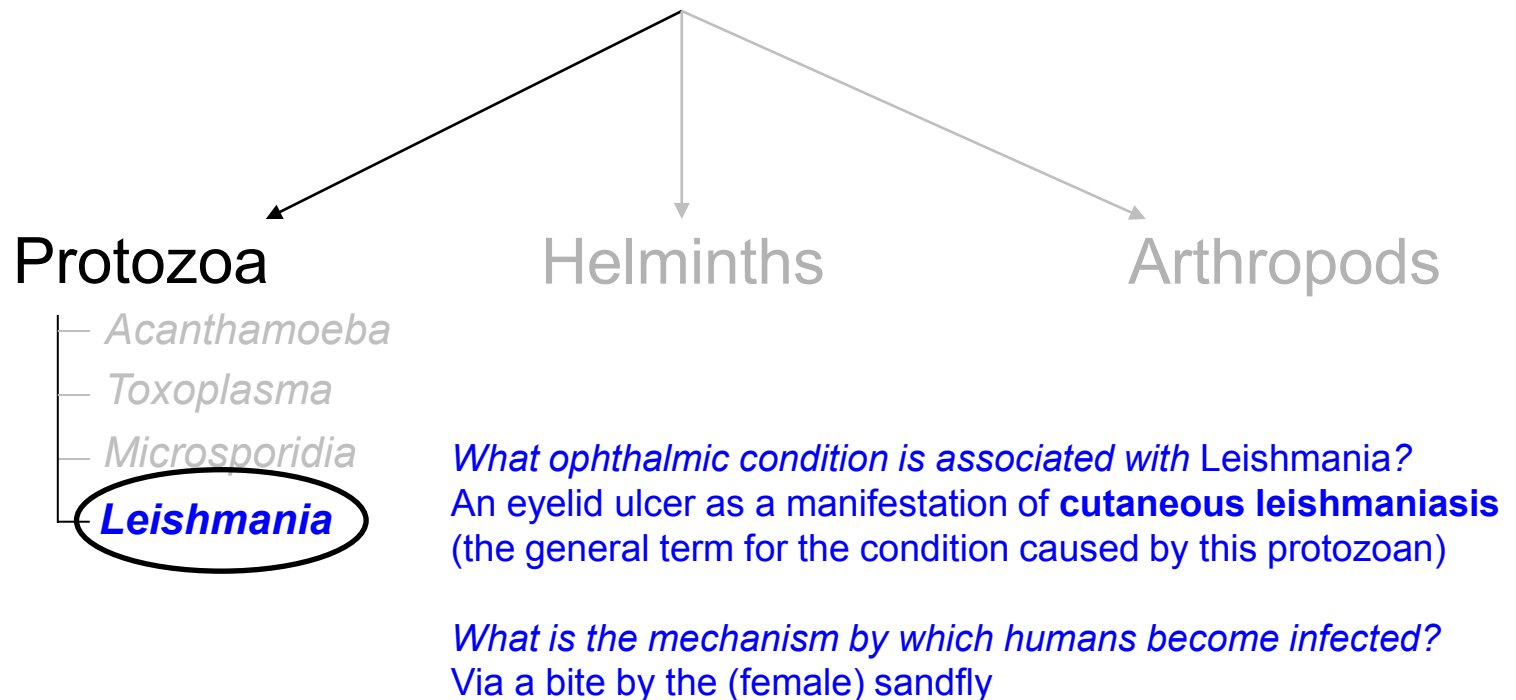
What ophthalmic condition is associated with Leishmania?
An eyelid ulcer as a manifestation of **cutaneous leishmaniasis**
(the general term for the condition caused by this protozoan)

What is the mechanism by which humans become infected?

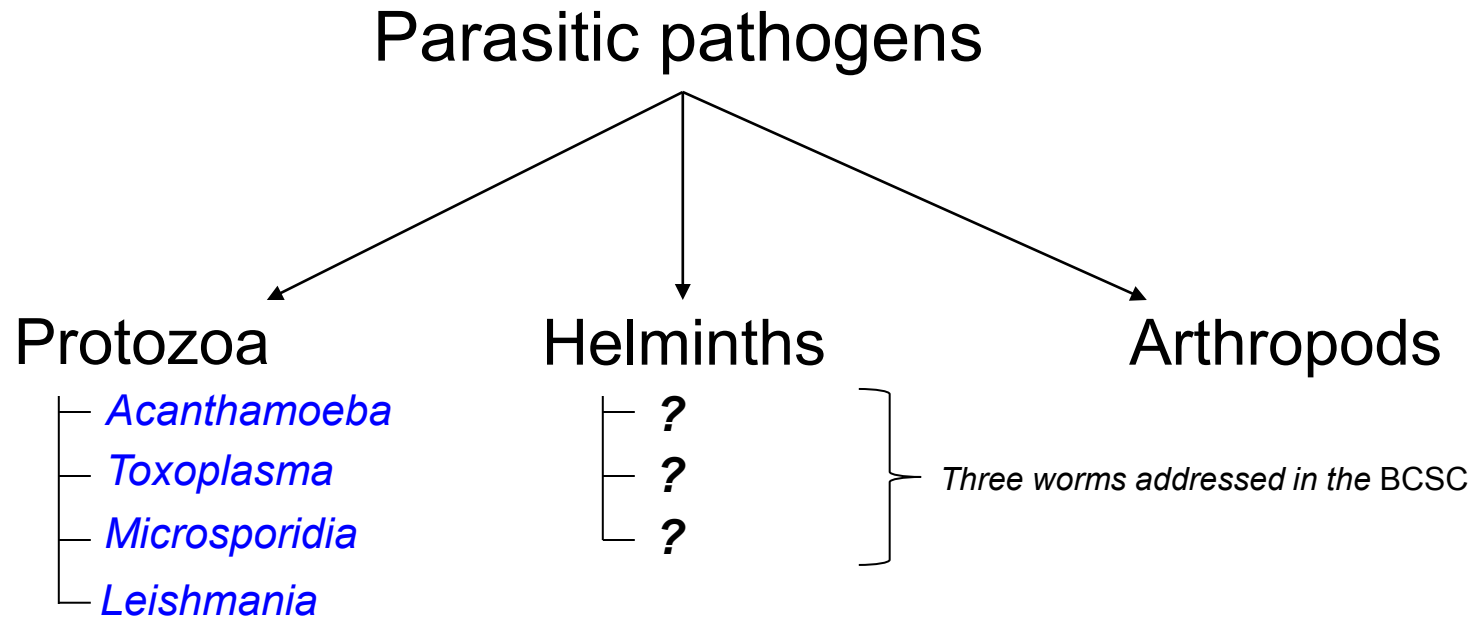
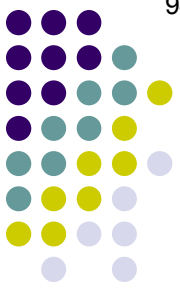
Common Parasitic Pathogens



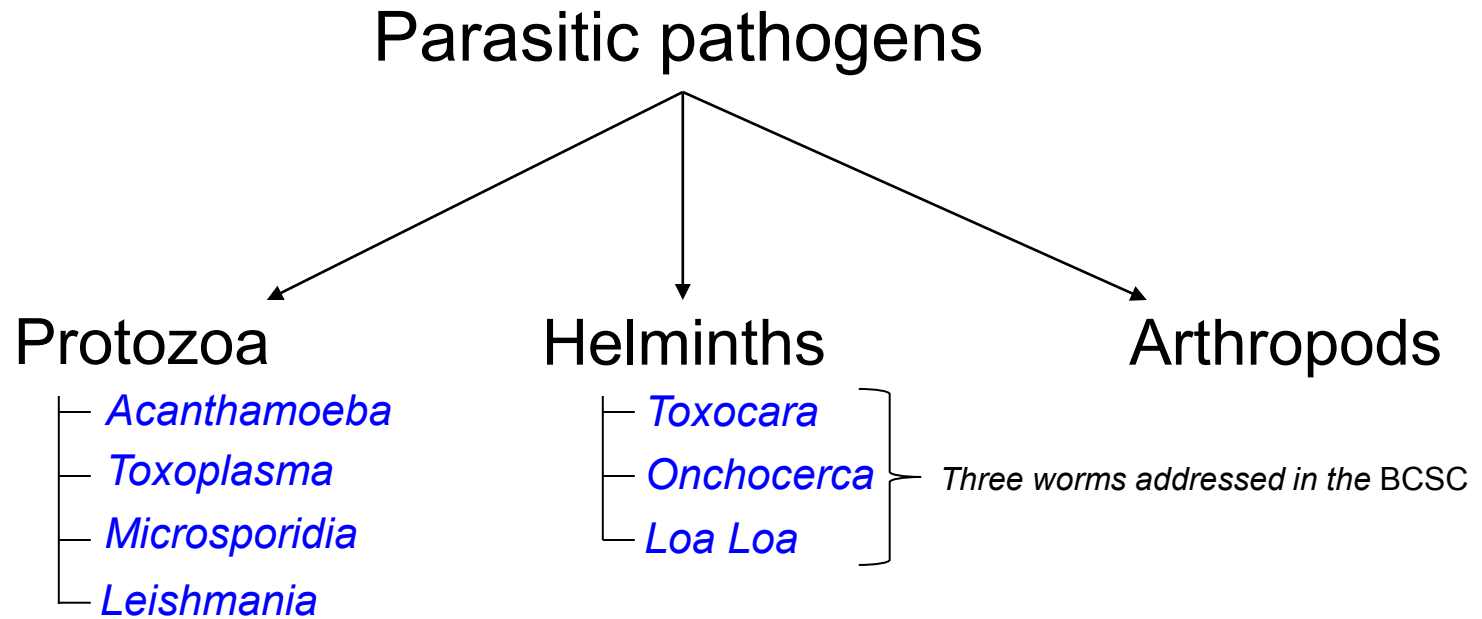
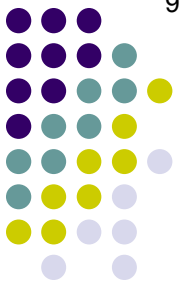
Parasitic pathogens

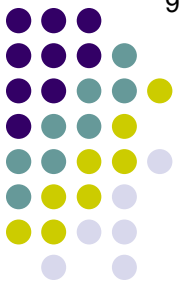


Common Parasitic Pathogens

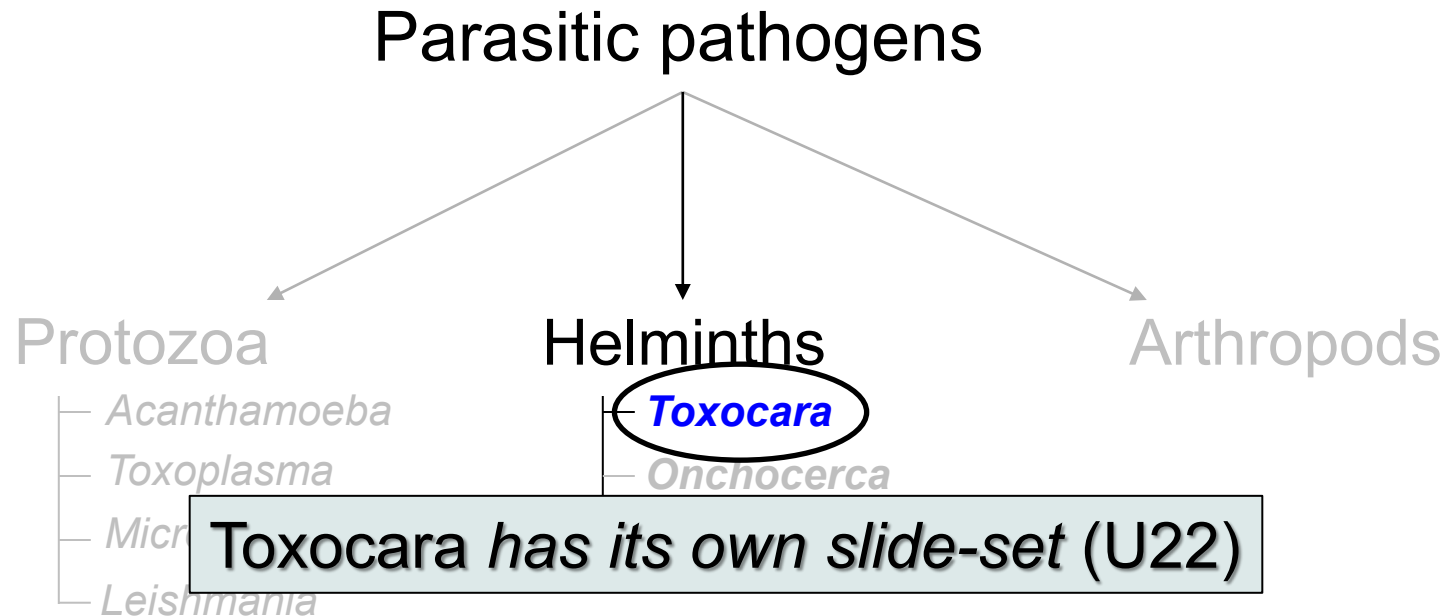


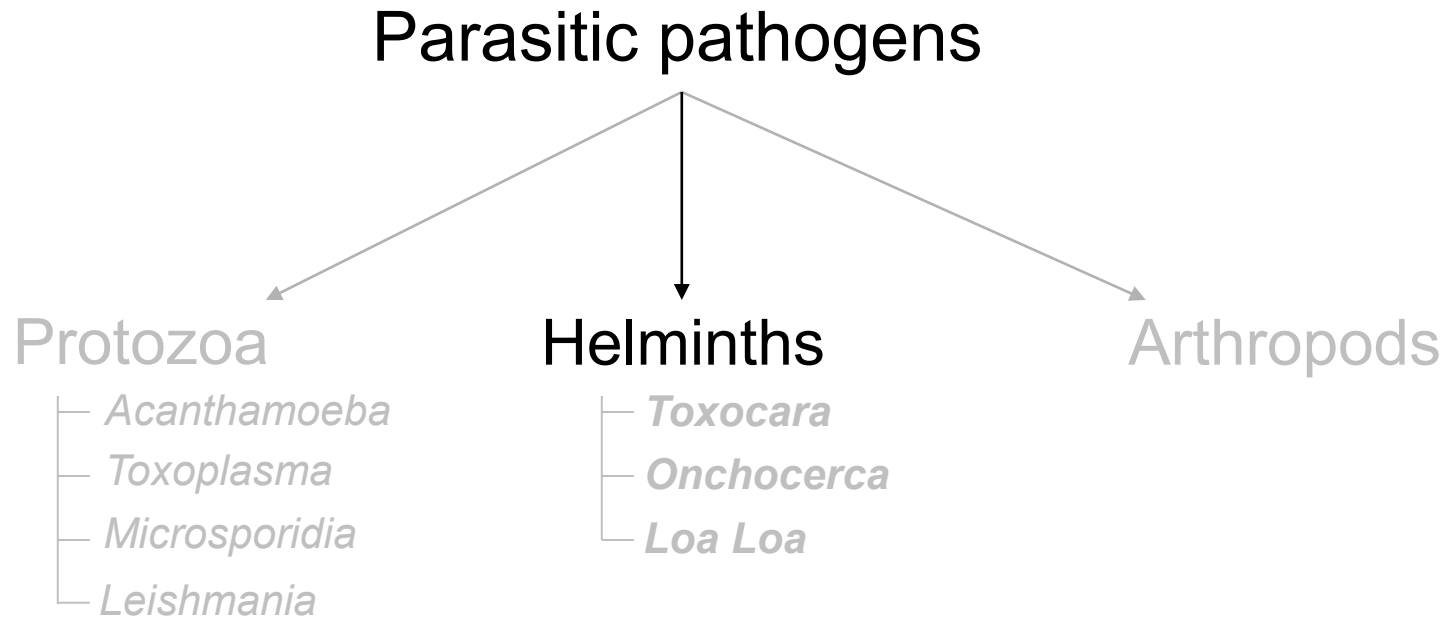
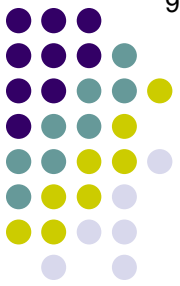
Common Parasitic Pathogens





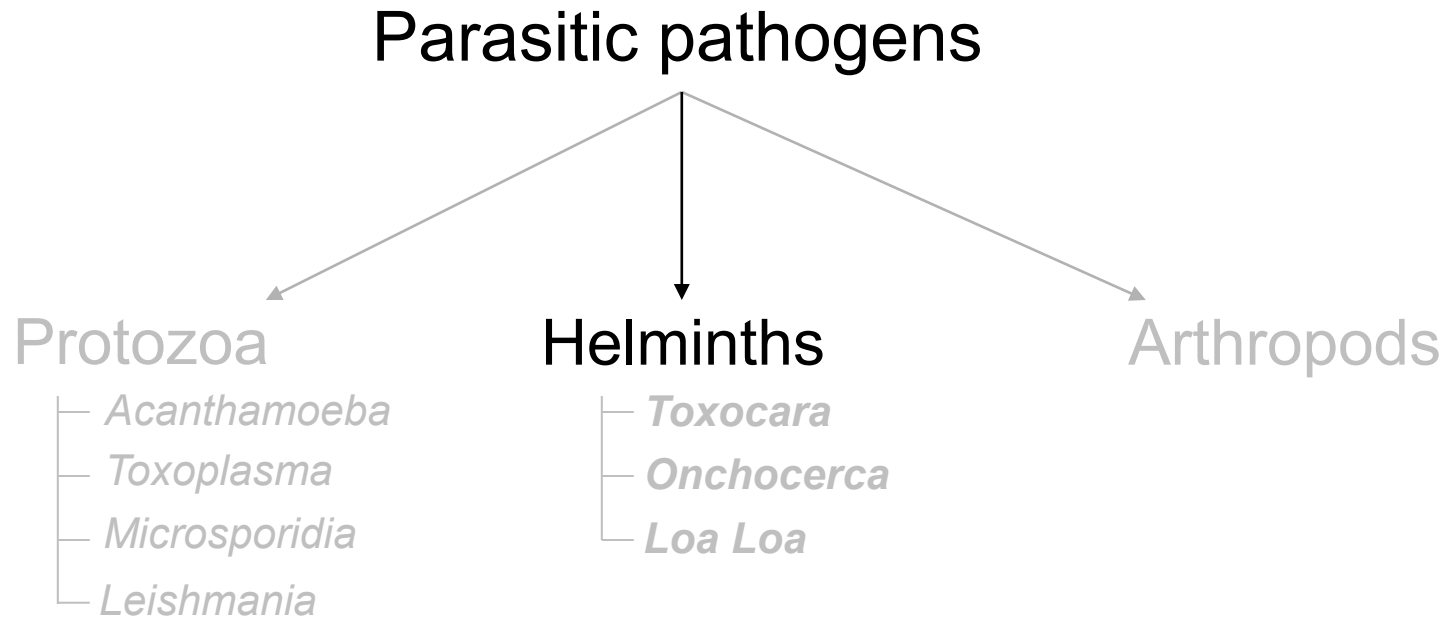
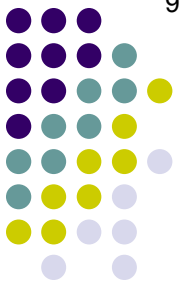
Common Parasitic Pathogens





The three helminths implicated in DUSN are covered in slide-set R15

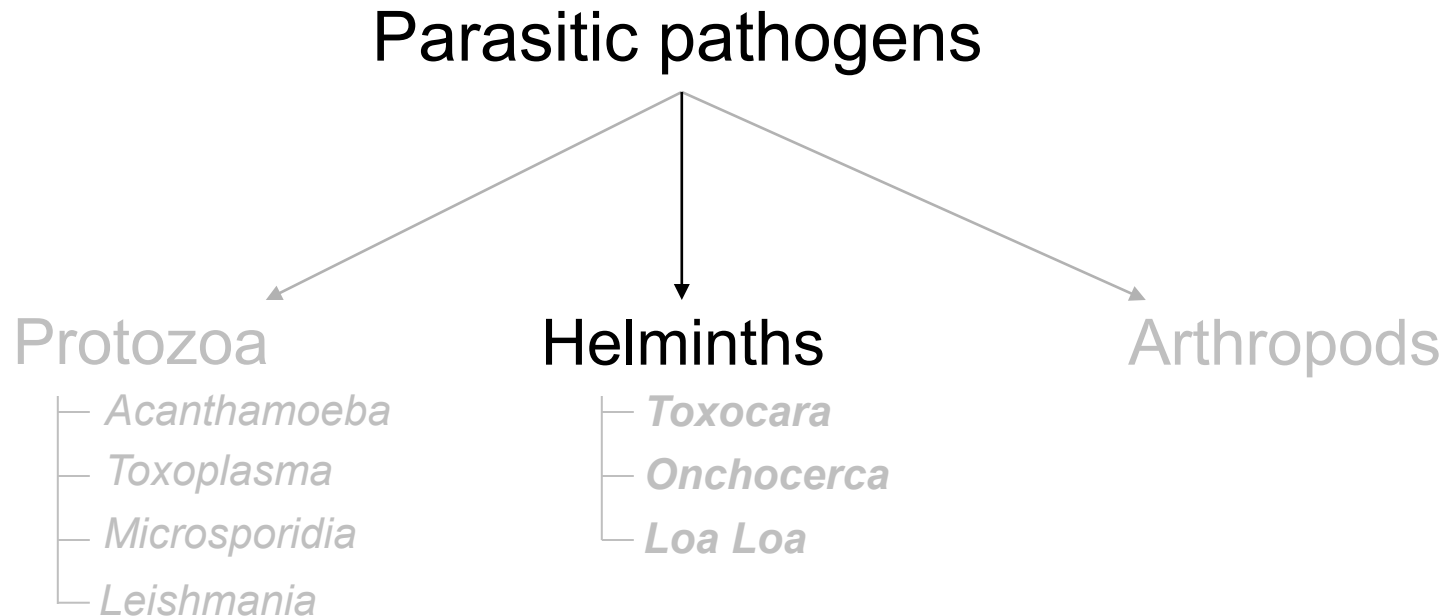
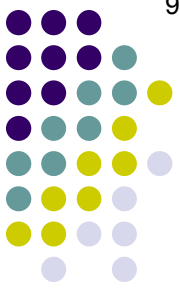
Common Parasitic Pathogens



What does DUSN stand for in this context?

*The three helminths implicated in **DUSN** are covered in slide-set R15*

Common Parasitic Pathogens

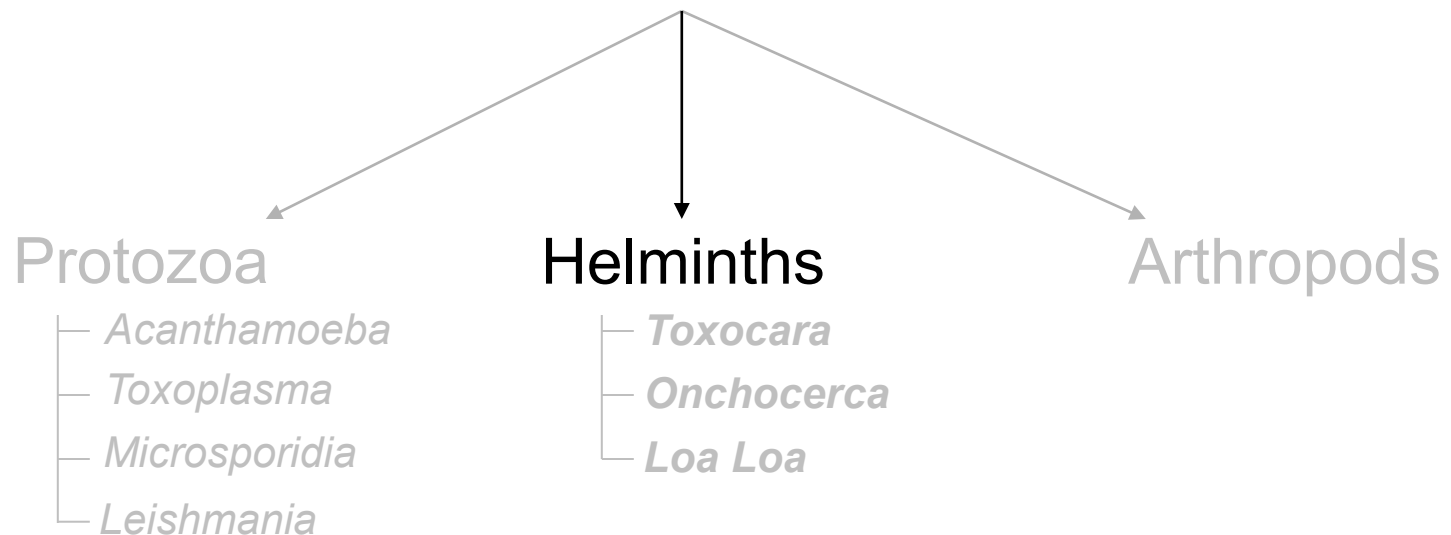


What does DUSN stand for in this context?
Diffuse unilateral subacute neuroretinitis

The three helminths implicated in **DUSN** are covered in slide-set R15



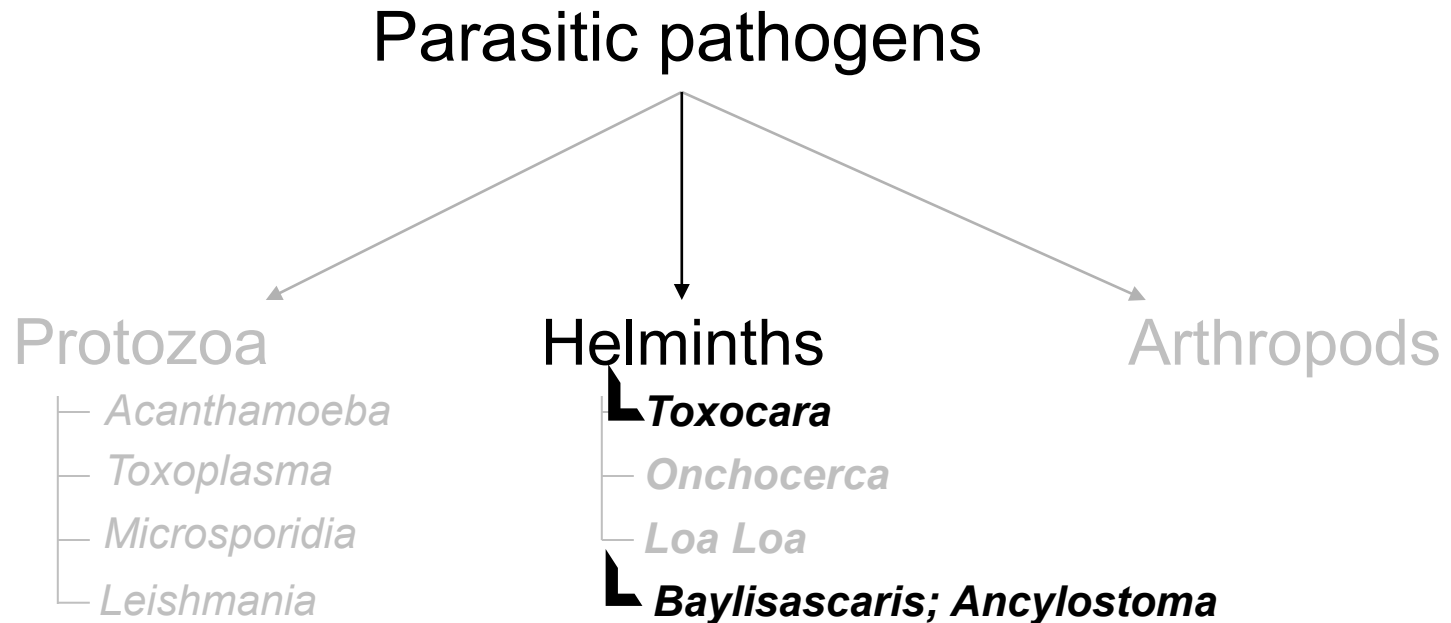
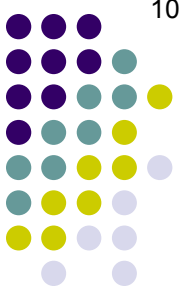
Parasitic pathogens



Next Q

The three helminths implicated in DUSN are...?
are covered in slide-set R15

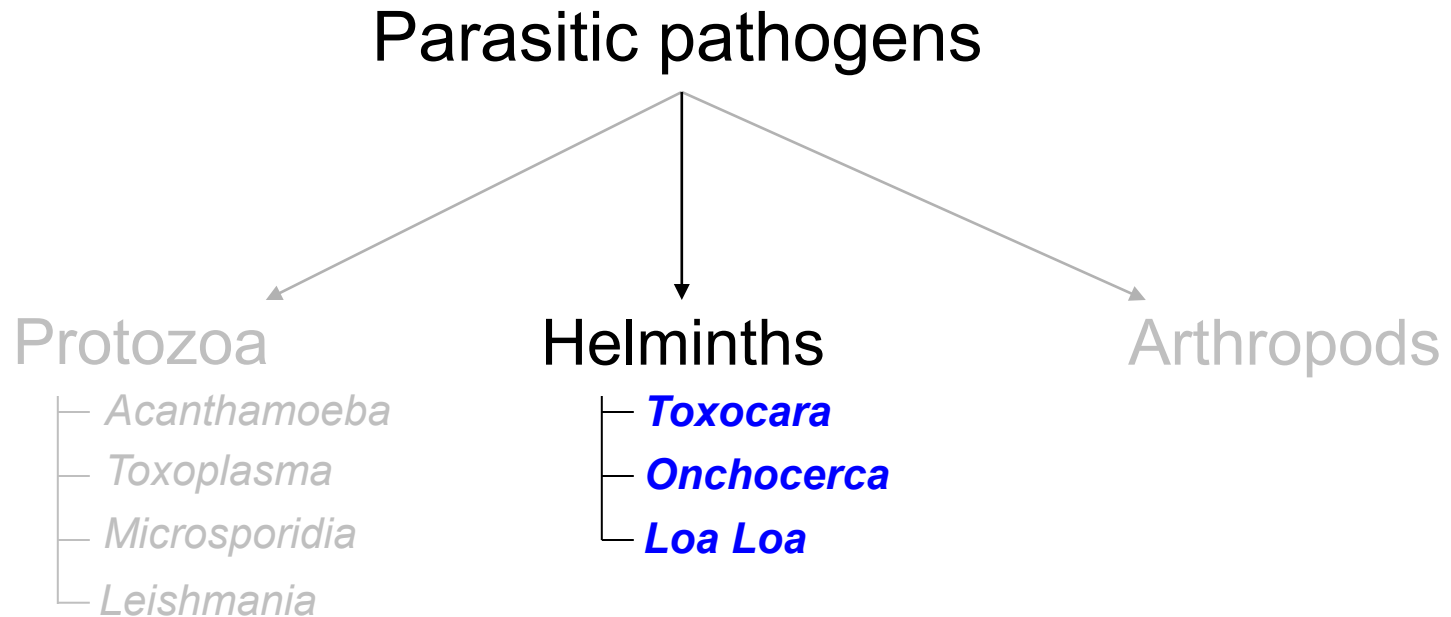
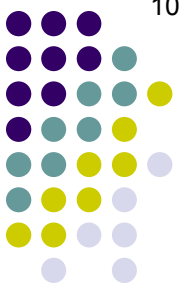
Common Parasitic Pathogens



Next Q

The three helminths implicated in DUSN are...?
are covered in slide-set R15

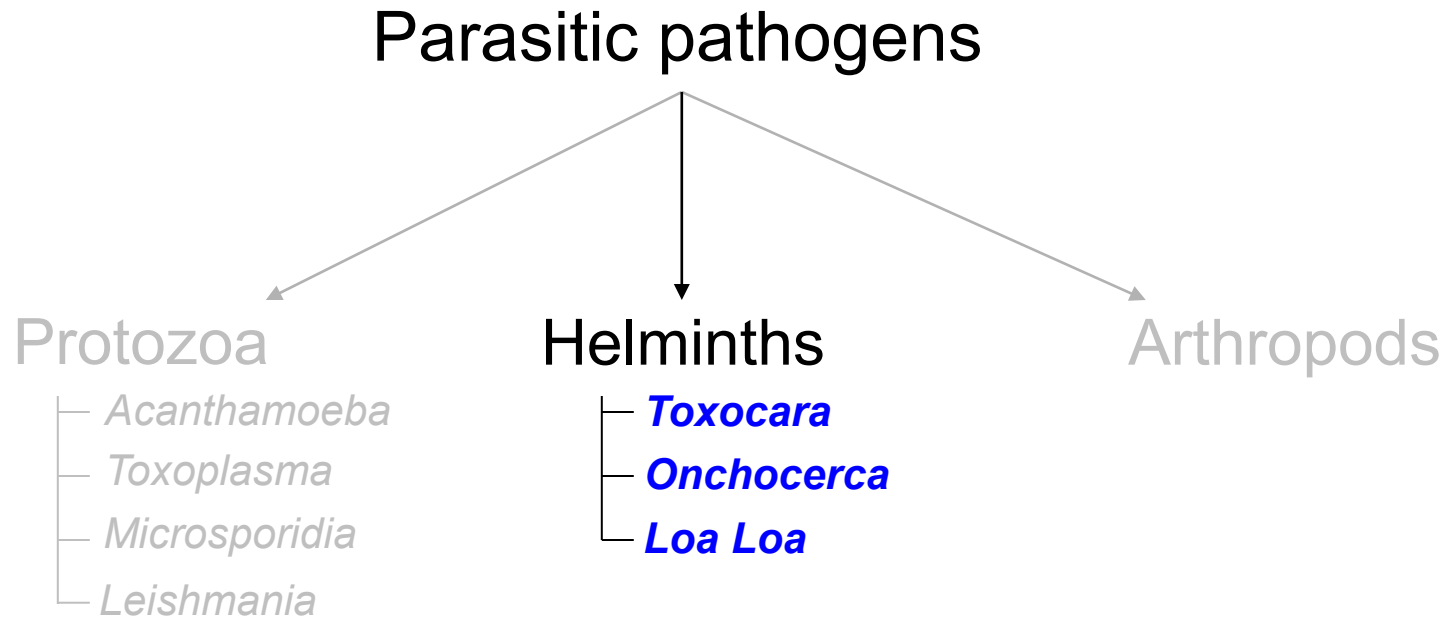
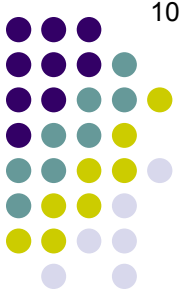
Common Parasitic Pathogens



Re helminthic ocular conditions...

Which causes a condition known as *river blindness*?

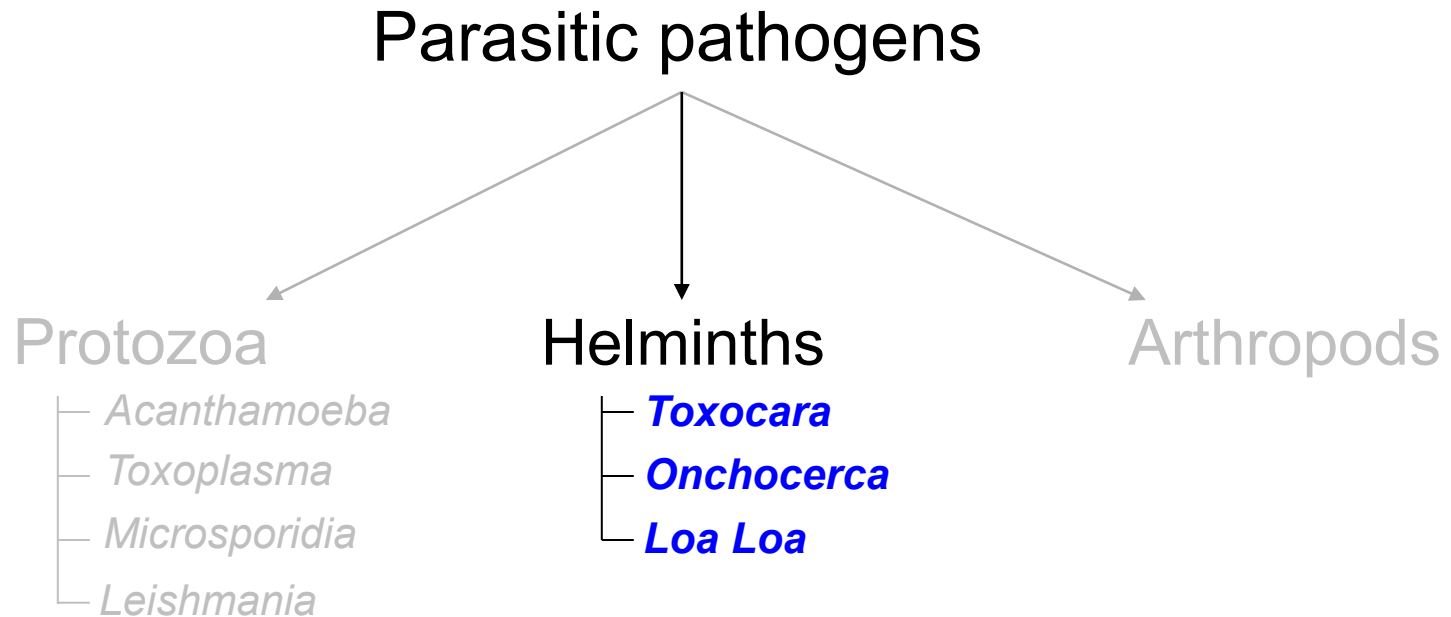
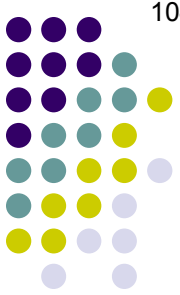
Common Parasitic Pathogens



Re helminthic ocular conditions...

Which causes a condition known as *river blindness*? *Onchocerca*

Common Parasitic Pathogens

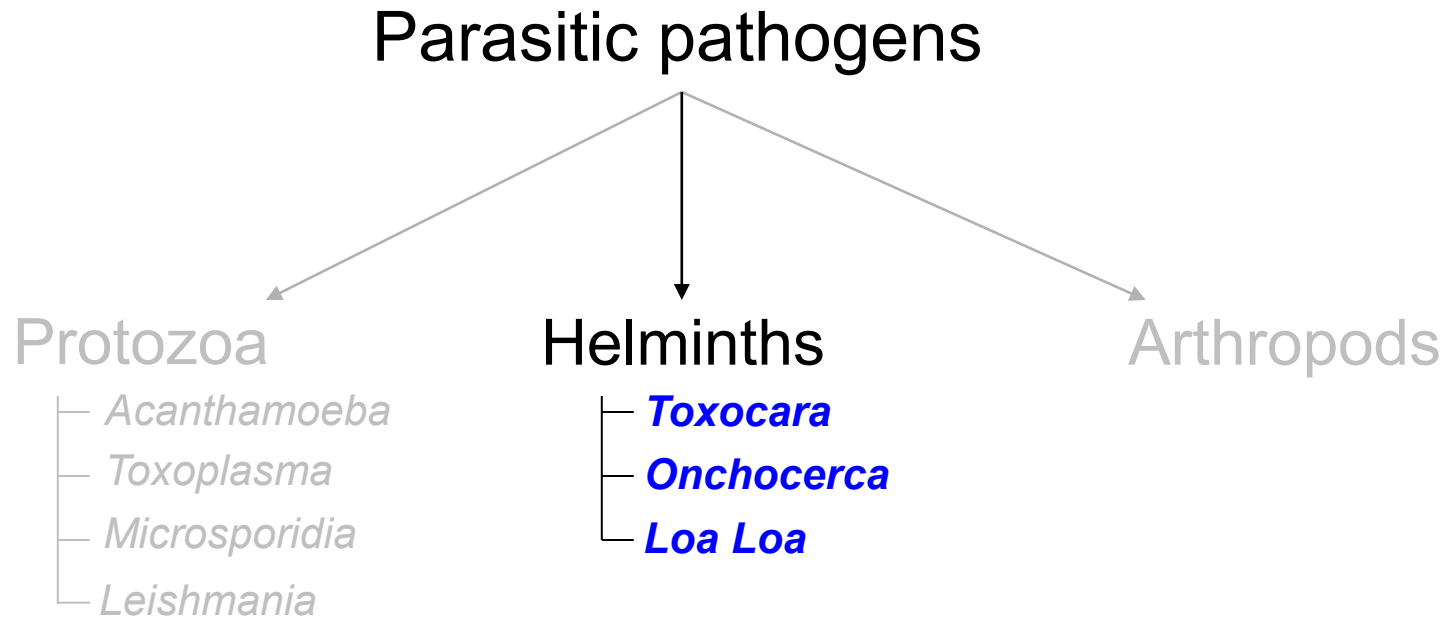
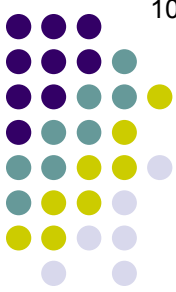


Re helminthic ocular conditions...

Which causes a condition known as *river blindness*? *Onchocerca*

Which is transmitted via the bite of the blackfly?

Common Parasitic Pathogens



Re helminthic ocular conditions...

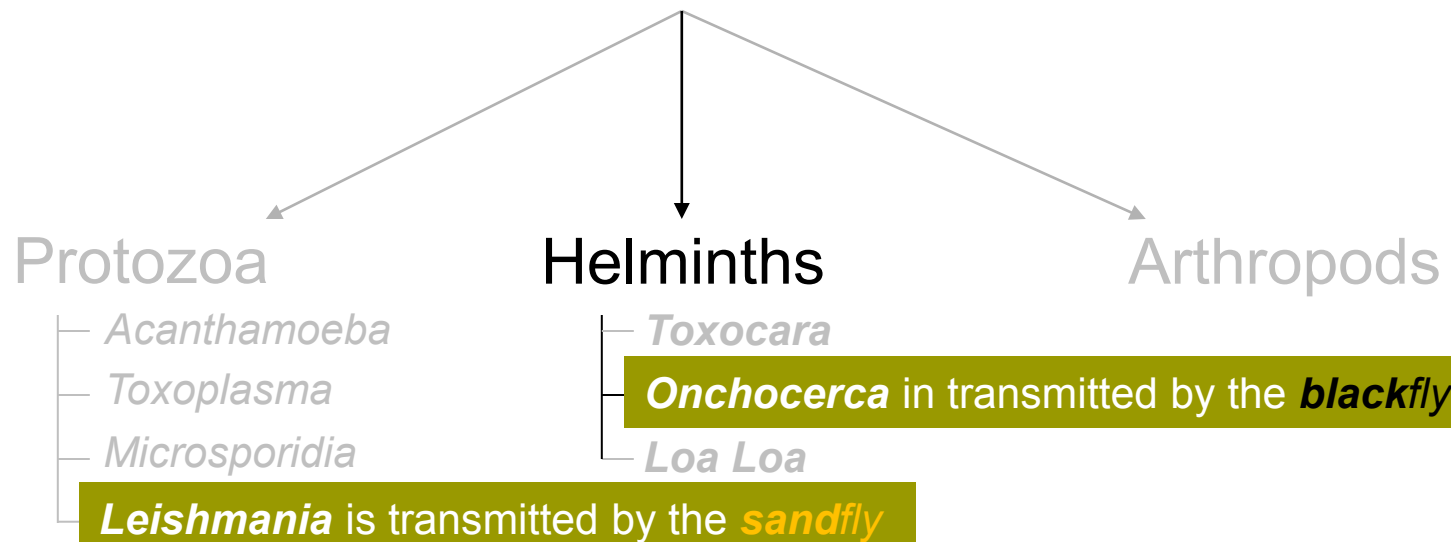
Which causes a condition known as *river blindness*? *Onchocerca*

Which is transmitted via the bite of the blackfly? *Onchocerca*

Common Parasitic Pathogens



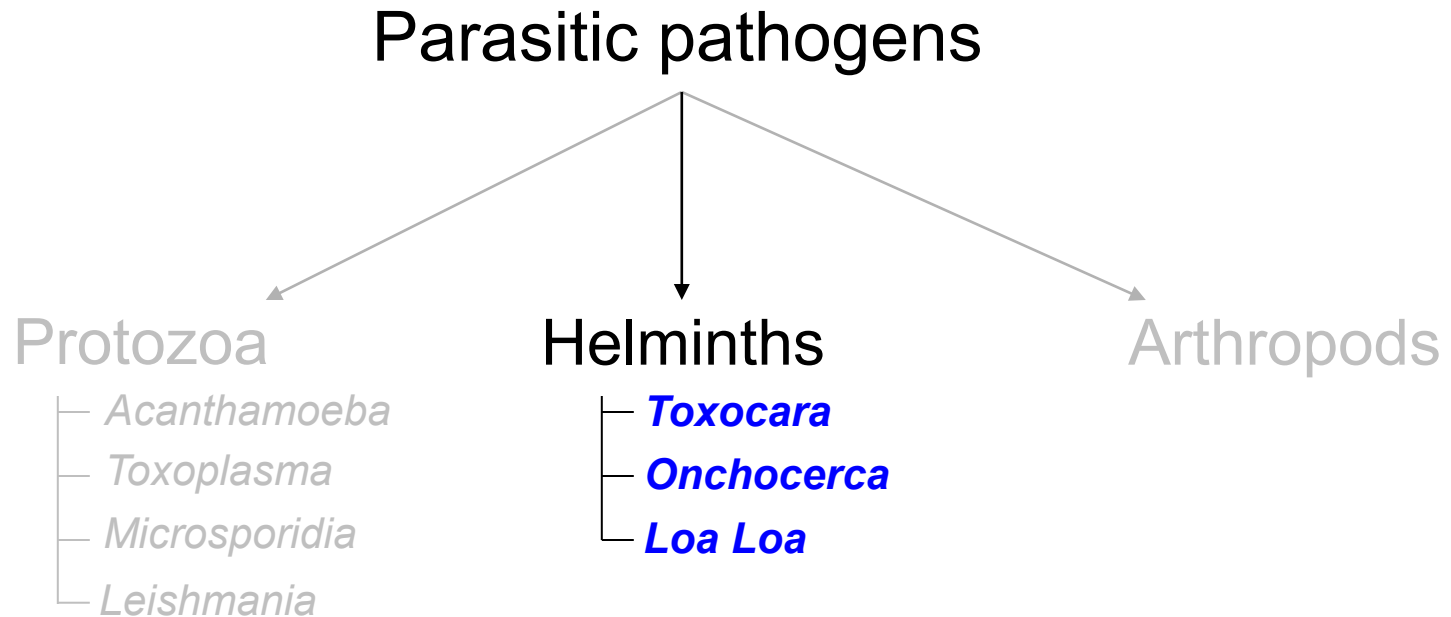
Parasitic pathogens



Re helminthic ocular conditions...

Take note, and don't get them confused!

Common Parasitic Pathogens



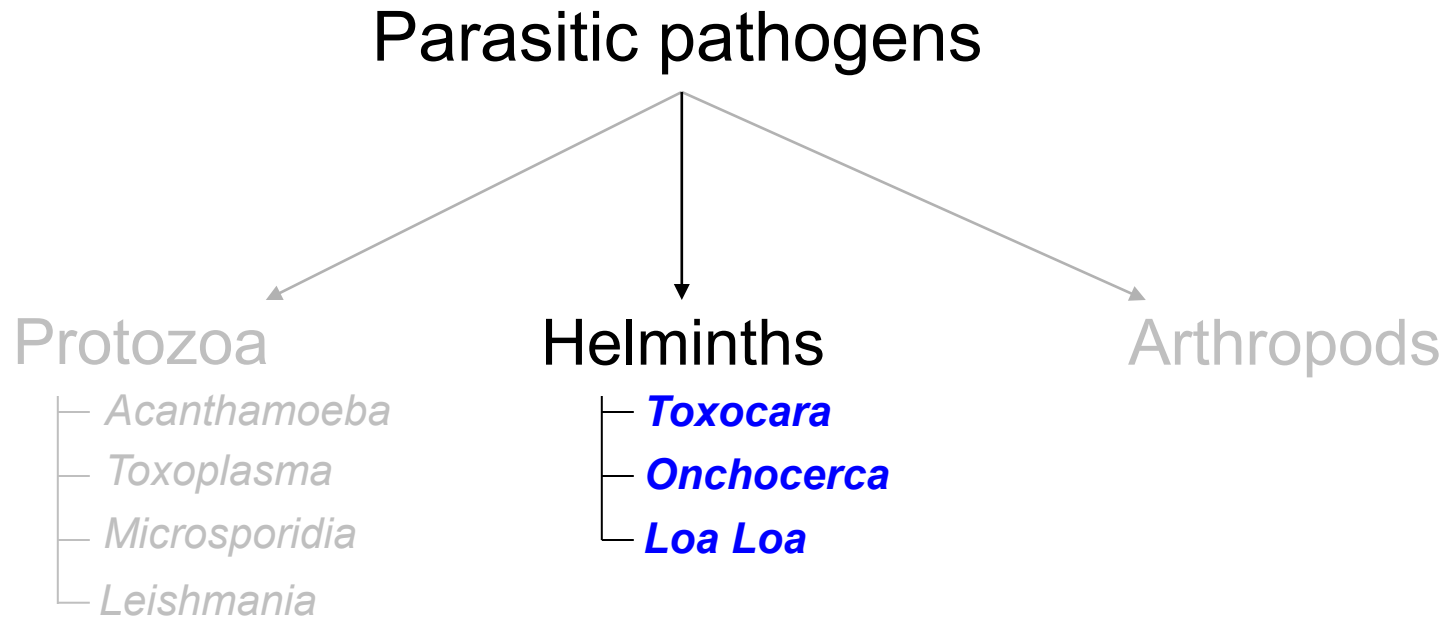
Re helminthic ocular conditions...

Which causes a condition known as *river blindness*? *Onchocerca*

Which is transmitted via the bite of the blackfly? *Onchocerca*

Which can be observed moving beneath the conjunctiva?

Common Parasitic Pathogens



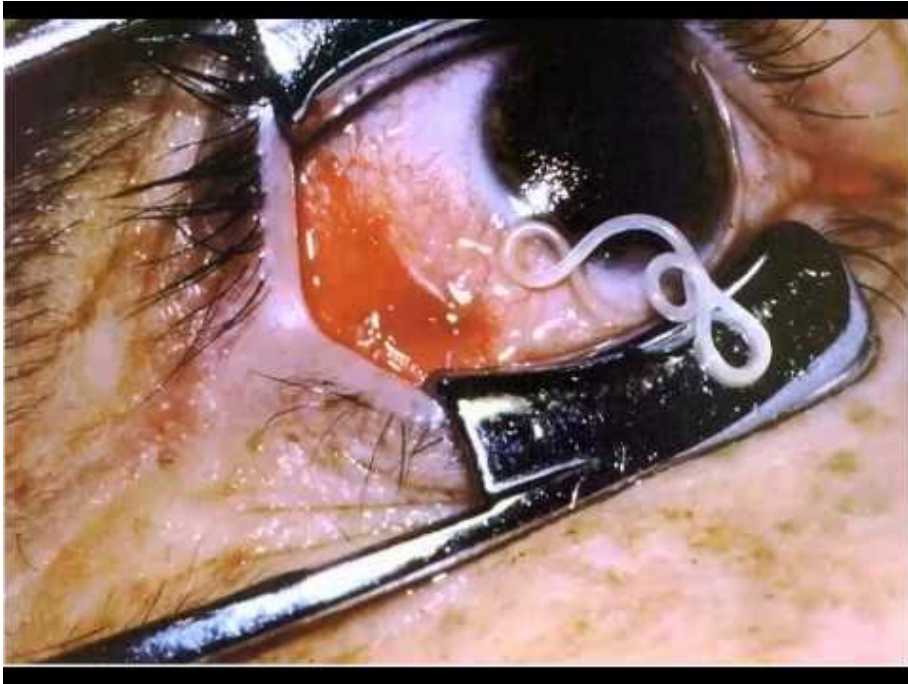
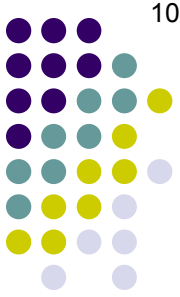
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Which causes a condition known as *river blindness*? *Onchocerca*

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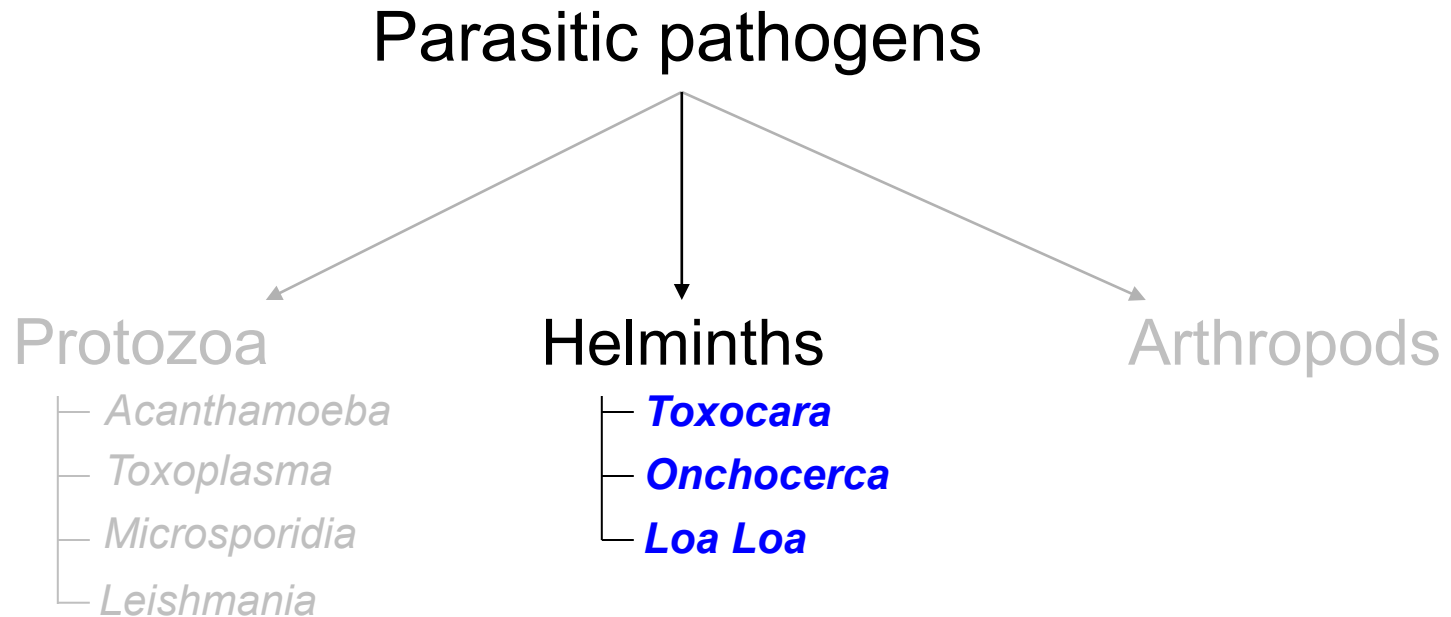
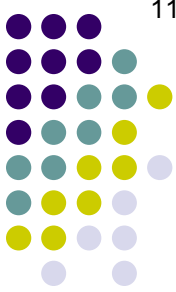
Which can be observed moving beneath the conjunctiva? *Loa Loa*

Common Parasitic Pathogens



Loa Loa. Yikes

Common Parasitic Pathogens



Re helminthic ocular conditions...

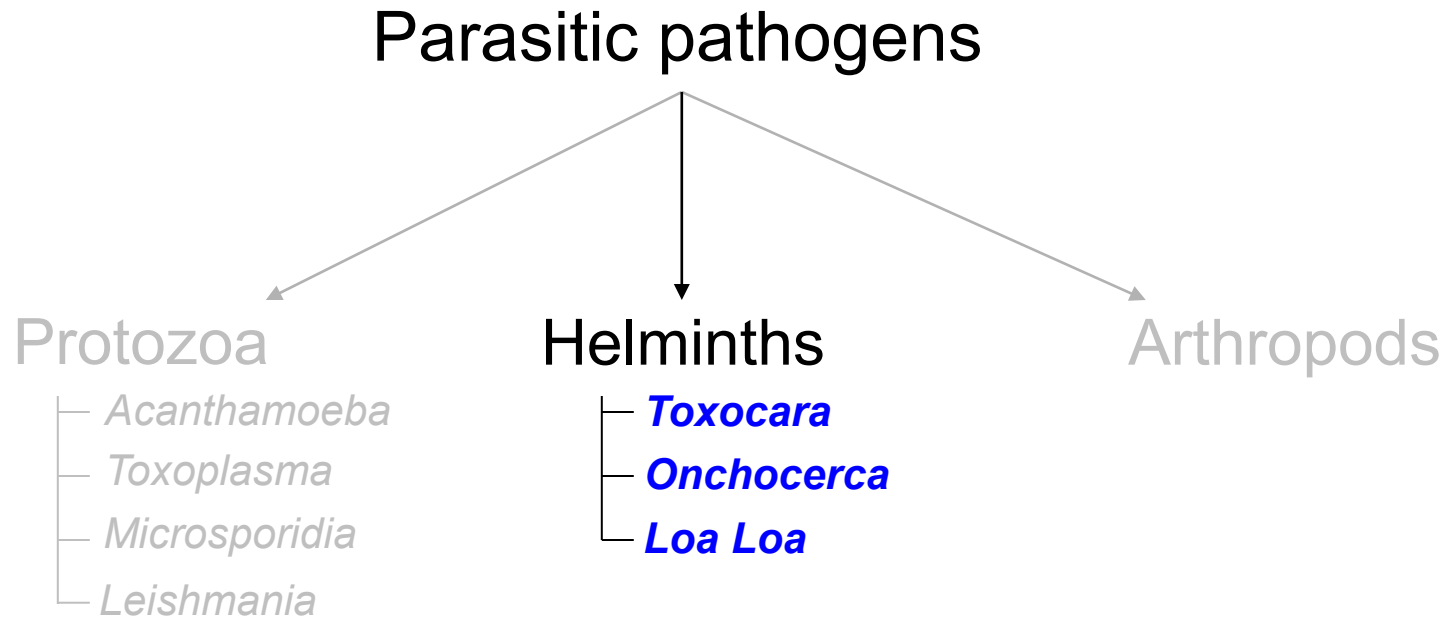
Which causes a condition known as *river blindness*? *Onchocerca*

Which is transmitted via the bite of the blackfly? *Onchocerca*

Which can be observed moving beneath the conjunctiva? *Loa Loa*

Which can be observed swimming in the AC?

Common Parasitic Pathogens



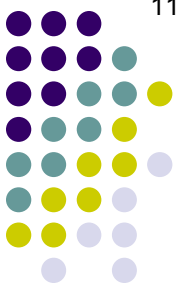
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Which is transmitted via the bite of the blackfly? *Onchocerca*

Which can be observed moving beneath the conjunctiva? *Loa Loa*

Which can be observed swimming in the AC? *Onchocerca*



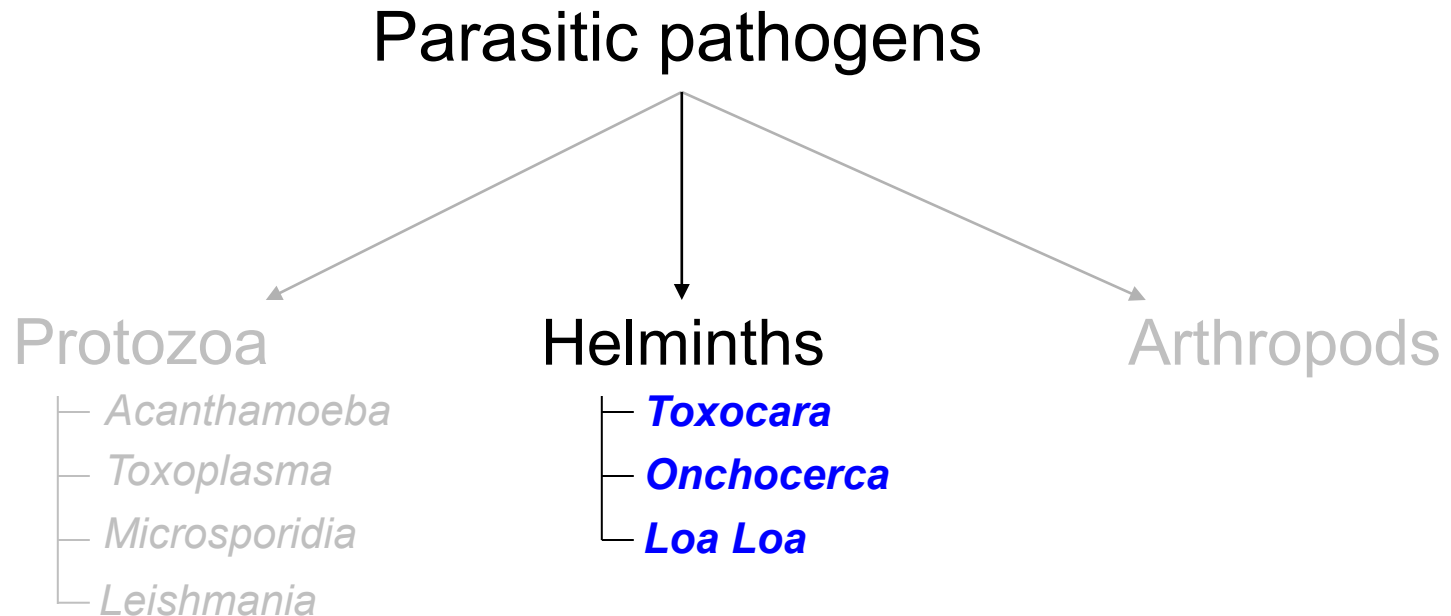
Common Parasitic Pathogens



Onchocerca swimming in the AC (the video is more impressive)

https://www.youtube.com/watch?v=_xljzQAstaM

Common Parasitic Pathogens



Re helminthic ocular conditions...

Which causes a condition known as *river blindness*? *Onchocerca*

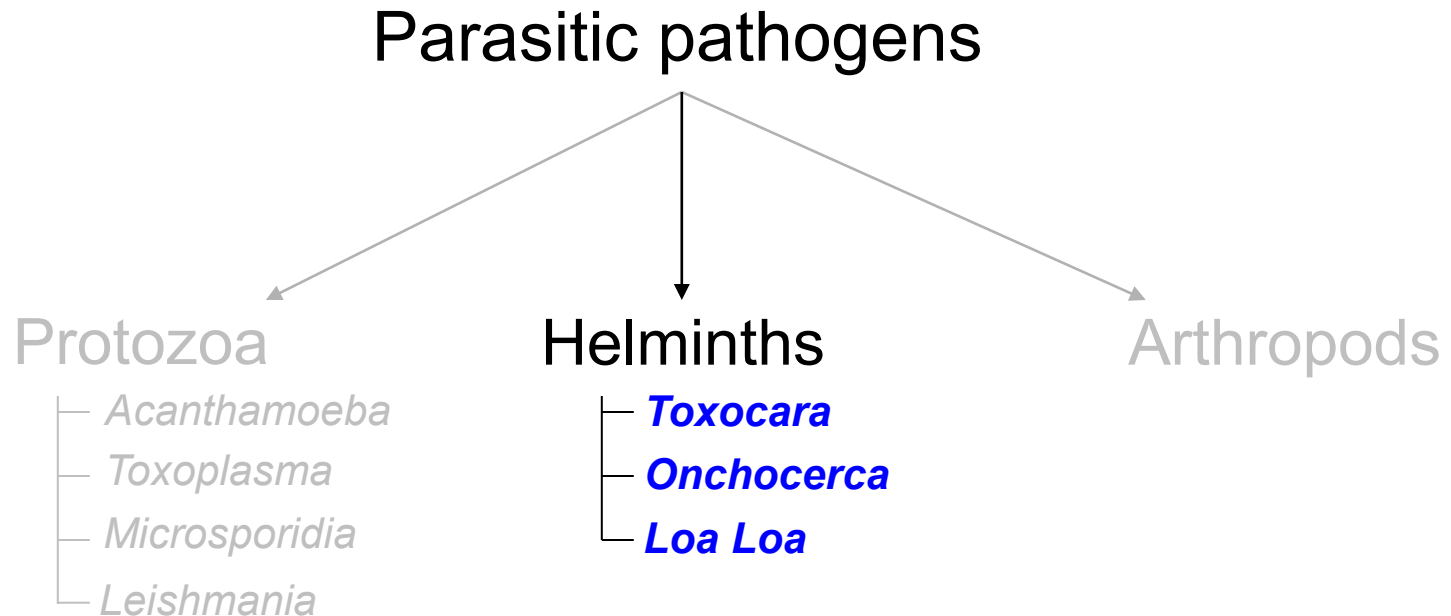
Which is transmitted via the bite of the blackfly? *Onchocerca*

Which can be observed moving beneath the conjunctiva? *Loa Loa*

Which can be observed swimming in the AC? *Onchocerca*

Which is a resident parasite in dogs?

Common Parasitic Pathogens



Re helminthic ocular conditions...

Which causes a condition known as *river blindness*? *Onchocerca*

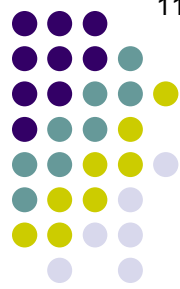
Which is transmitted via the bite of the blackfly? *Onchocerca*

Which can be observed moving beneath the conjunctiva? *Loa Loa*

Which can be observed swimming in the AC? *Onchocerca*

Which is a resident parasite in dogs? *Toxocara*

Common Parasitic Pathogens



Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

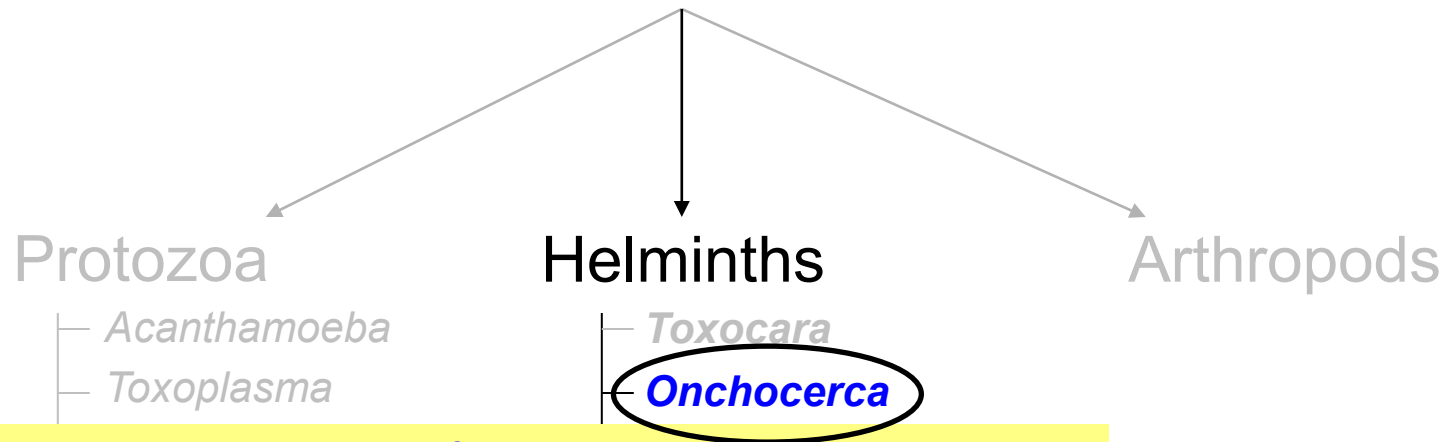
Is onchocerciasis a serious condition?

ndness? *Onchocerca*
 fly? *Onchocerca*
 conjunctiva? *Loa Loa*
 ? *Onchocerca*
 ra

Common Parasitic Pathogens



Parasitic pathogens



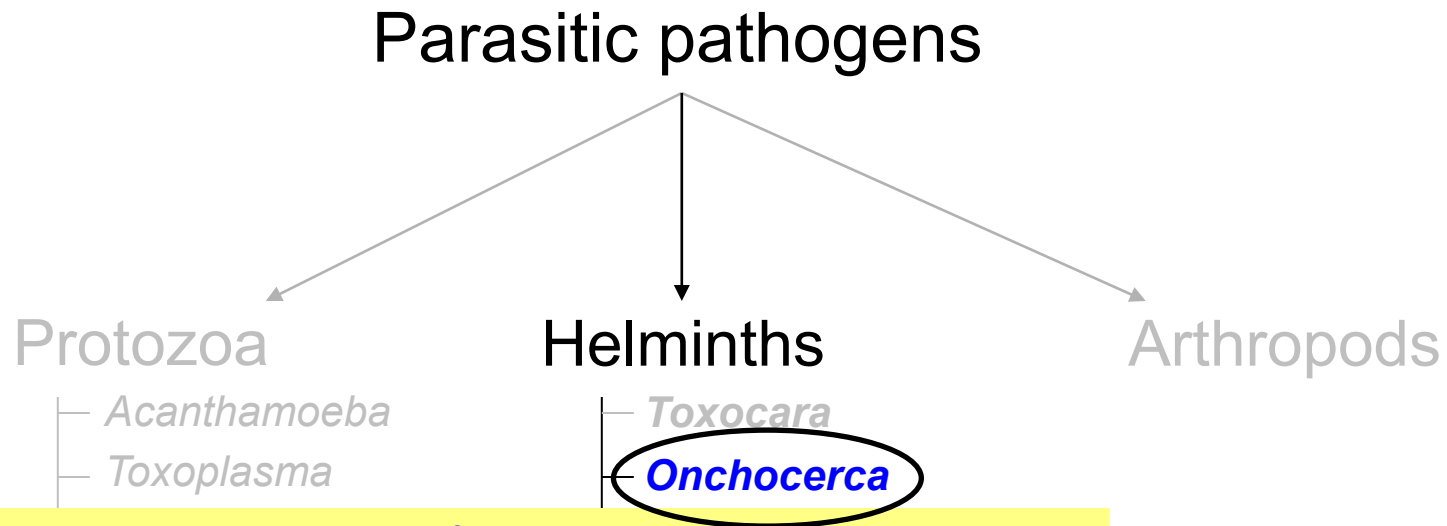
Is onchocerciasis a serious condition?

Indeed it is (it ain't called river **blindness** for nothing!)

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Common Parasitic Pathogens



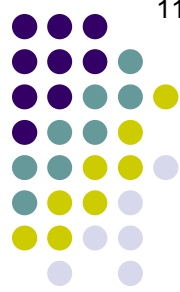
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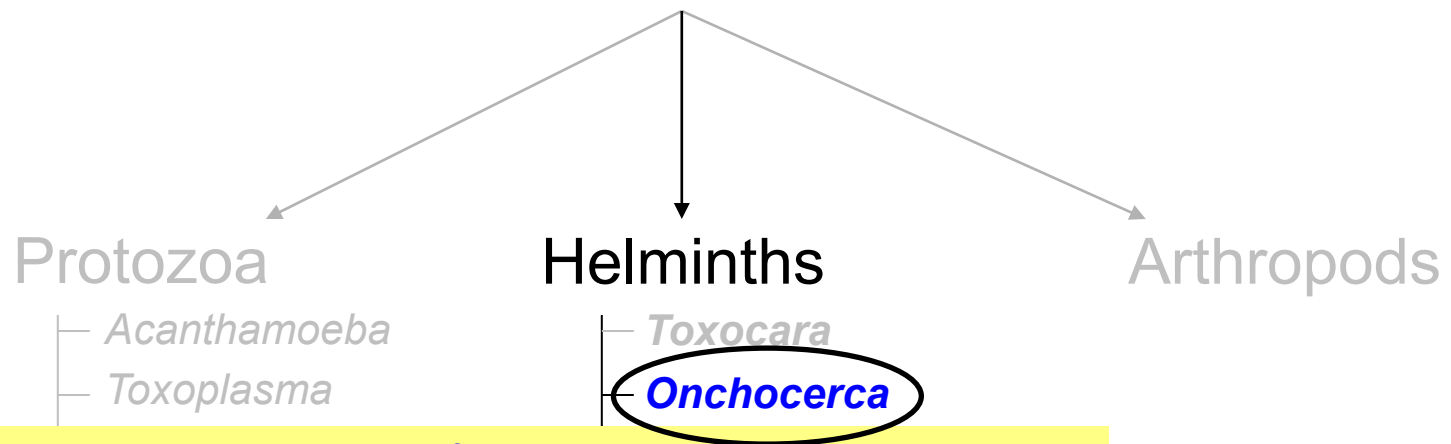
Is it common?

ndness? Onchocerca
 fly? Onchocerca
 conjunctiva? Loa Loa
 ? Onchocerca
 ra

Common Parasitic Pathogens



Parasitic pathogens



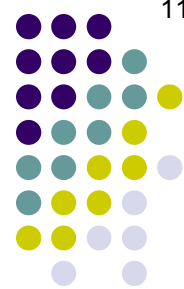
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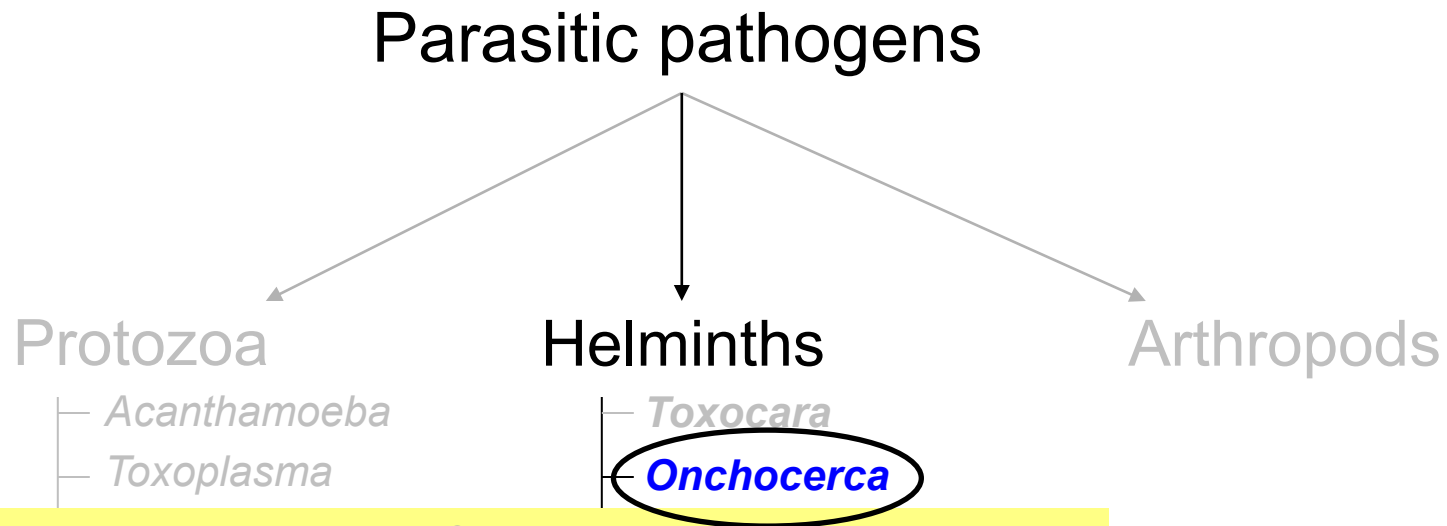
Is it common?

Yep—it's the second most common cause of infectious visual morbidity

ndness? *Onchocerca*
 fly? *Onchocerca*
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 ra



Common Parasitic Pathogens



Is onchocerciasis a serious condition?

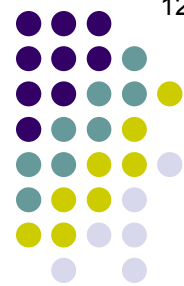
Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

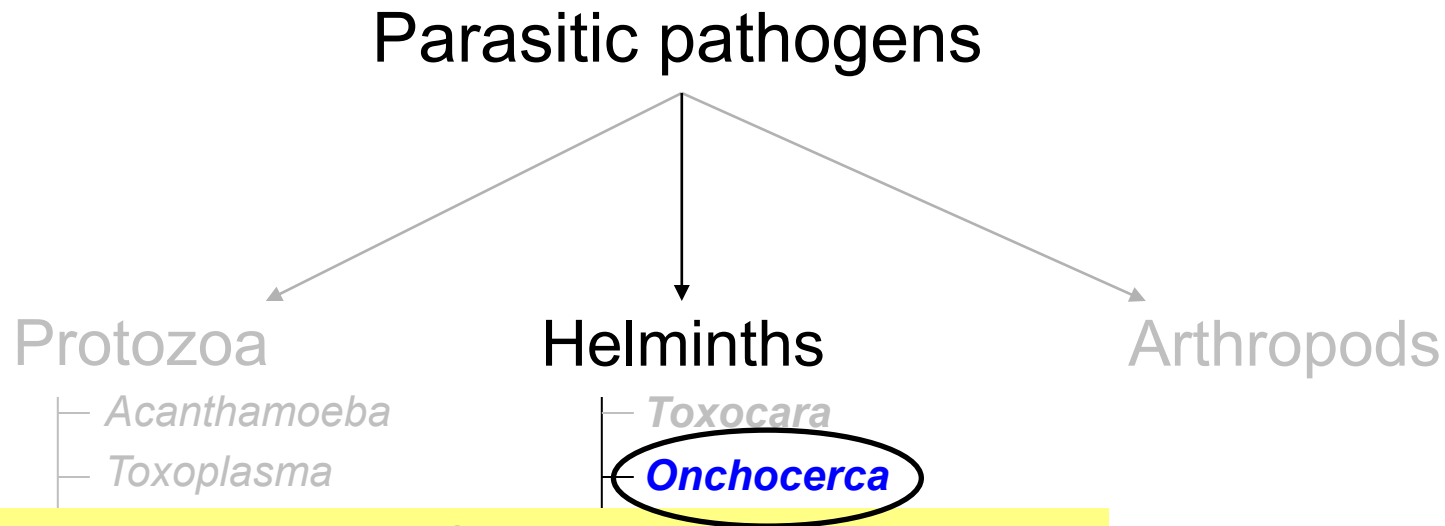
Yep—it's the second most common cause of infectious visual morbidity

What's the most common cause of infectious visual morbidity?
(You know this one!)

ndness? Onchocerca
ily? Onchocerca
conjunctiva? Loa Loa
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ra



Common Parasitic Pathogens



Is onchocerciasis a serious condition?

Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

Yep—it's the second most common cause of infectious visual morbidity

What's the most common cause of infectious visual morbidity?

(You know this one!)

Trachoma (told ya!)

ndness? *Onchocerca*
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 ra

Common Parasitic Pathogens



Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

Is onchocerciasis a serious condition?

Indeed it is (it ain't called **river blindness** for nothing!)

*OK fair, I get the 'blindness' part of the name now.
But why is it called **river blindness**?*

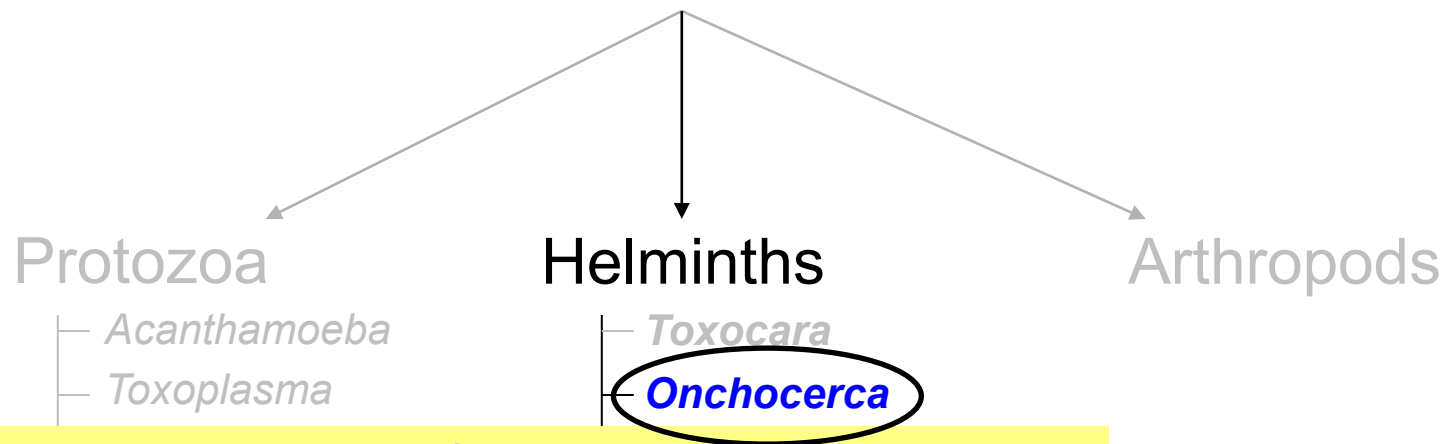
is **visual morbidity**

ndness? *Onchocerca*
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ra

Common Parasitic Pathogens



Parasitic pathogens



Is onchocerciasis a serious condition?

Indeed it is (it ain't called **river blindness** for nothing!)

OK fair, I get the 'blindness' part of the name now.

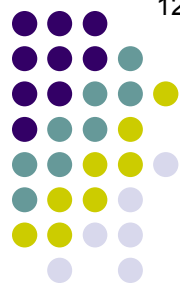
*But why is it called **river blindness**?*

The blackfly lives only near fast-flowing rivers, so cases tend to cluster around them

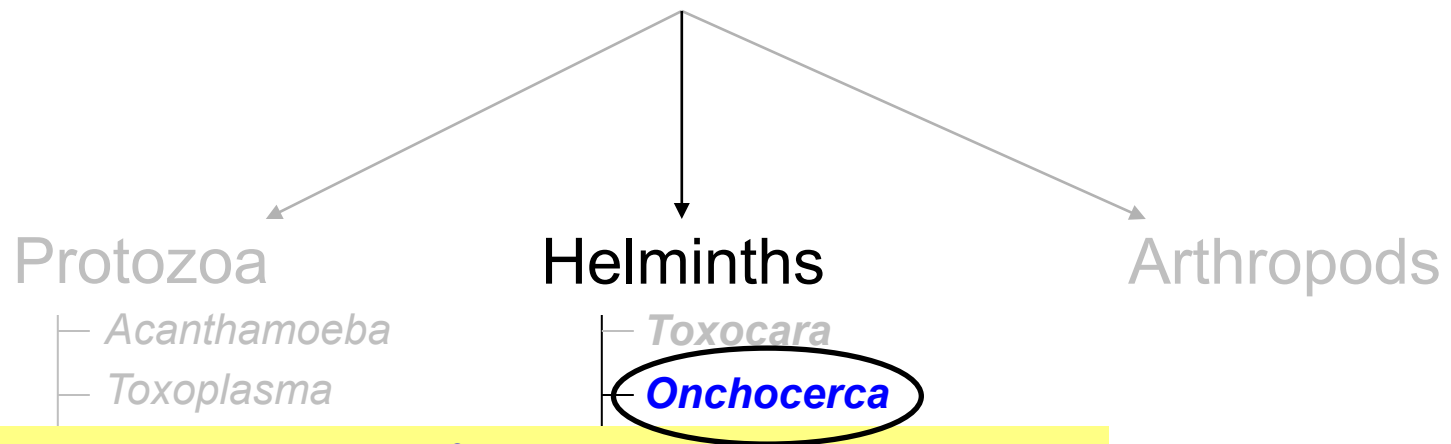
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Common Parasitic Pathogens



Parasitic pathogens



Is onchocerciasis a serious condition?

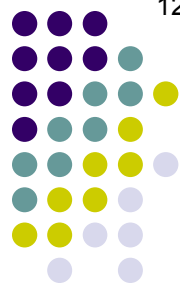
Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

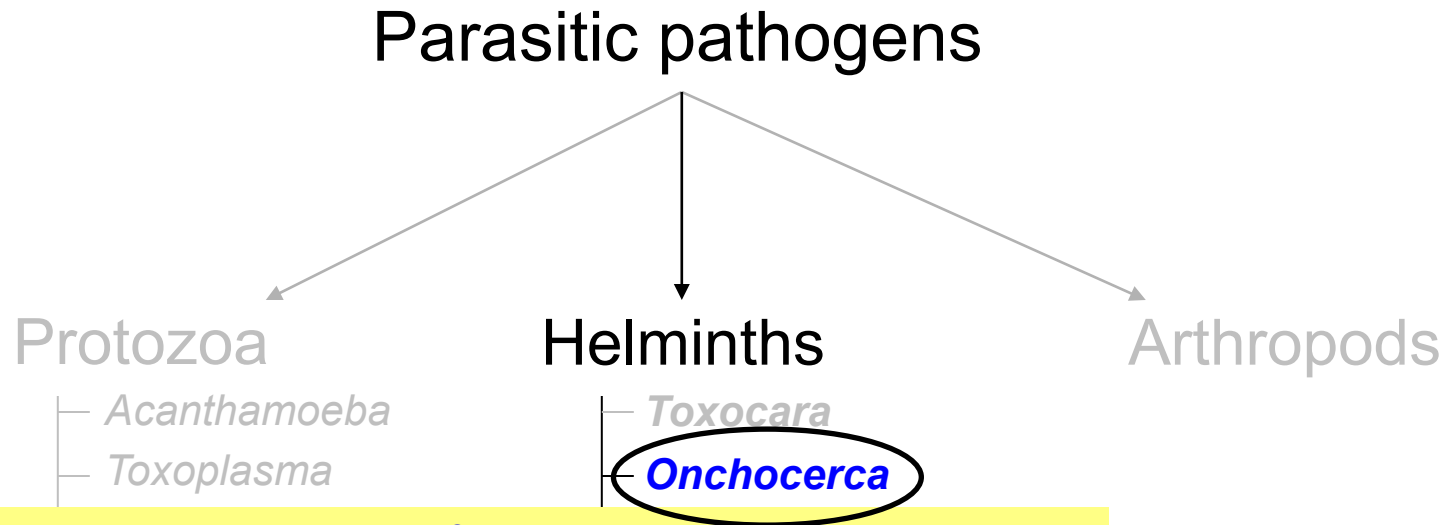
Yep—it's the second most common cause of infectious visual morbidity

Where in the world does it occur?

ndness? *Onchocerca*
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Common Parasitic Pathogens



Is onchocerciasis a serious condition?

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Is it common?

Yep—it's the second most common cause of infectious visual morbidity

Where in the world does it occur?

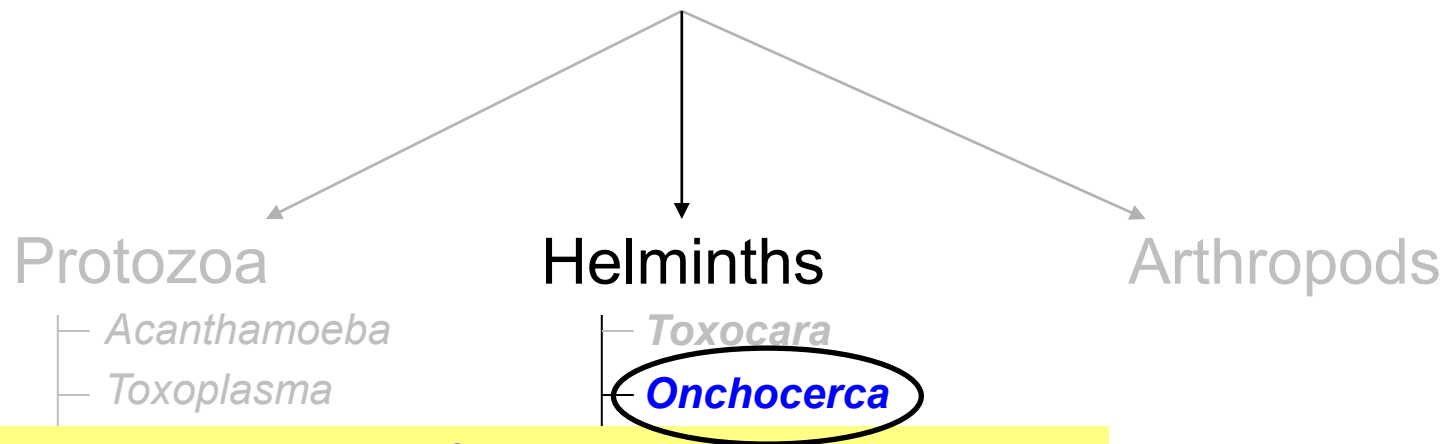
While it can be found in both Latin America and the Middle East, the locale where it is really a problem is

ndness? Onchocerca
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Common Parasitic Pathogens



Parasitic pathogens



Is onchocerciasis a serious condition?

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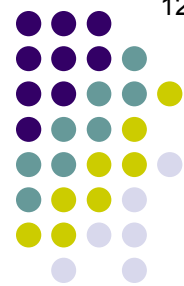
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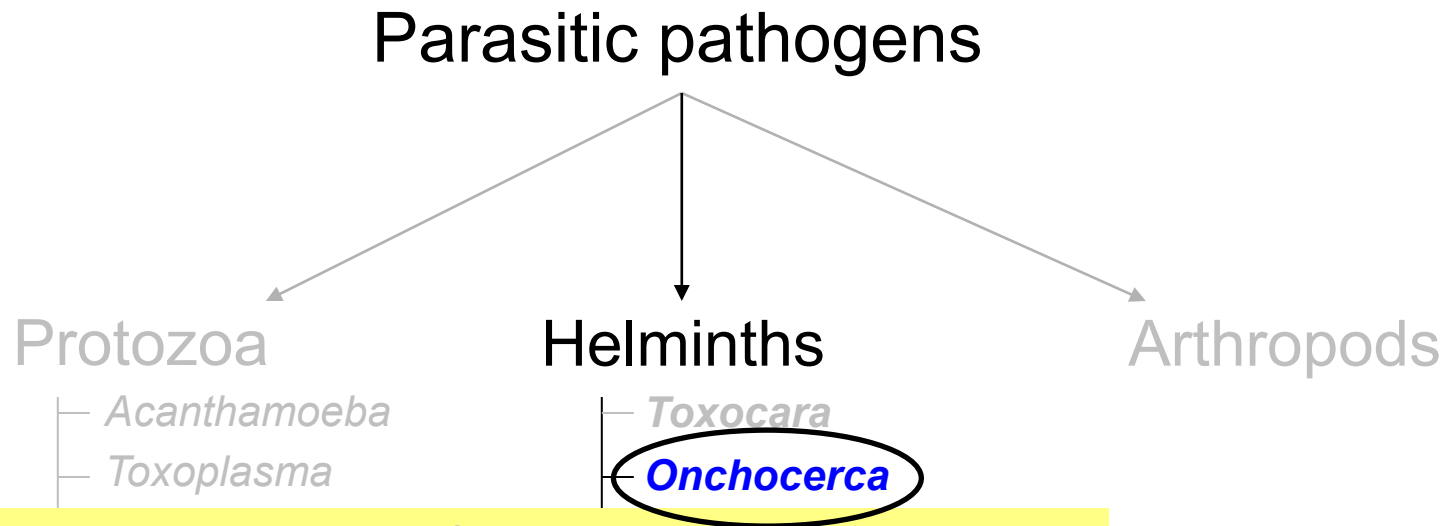
Where in the world does it occur?

While it can be found in both Latin America and the Middle East, the locale where it is really a problem is sub-Saharan Africa

ndness? *Onchocerca*
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 ? *Onchocerca*
 ra



Common Parasitic Pathogens



Is onchocerciasis a serious condition?

Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

Yep—it's the second most common cause of infectious visual morbidity

Where in the world? *What proportion of cases are in Africa?*

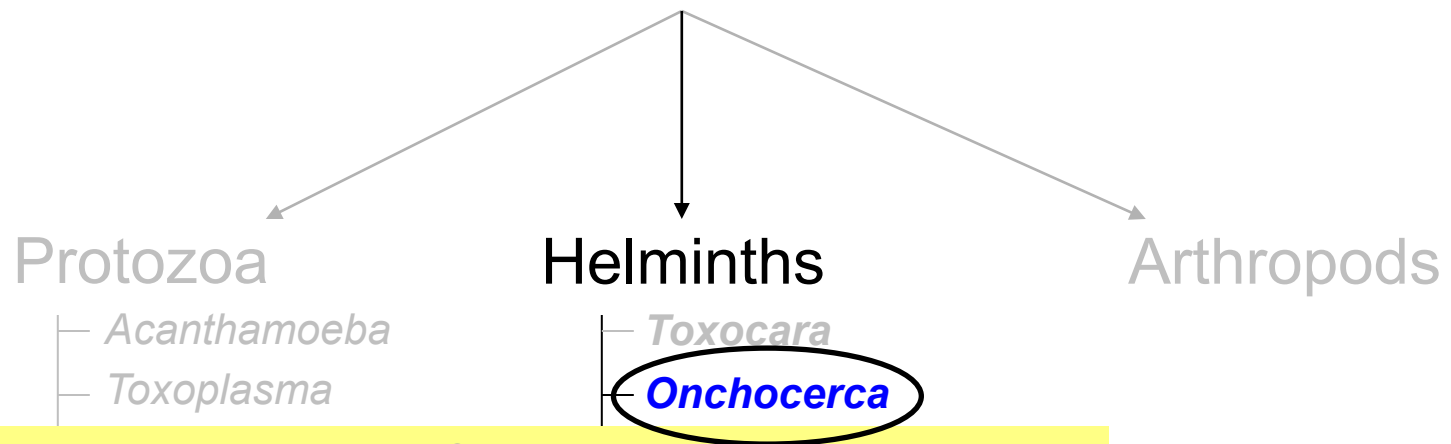
While it can be found everywhere, the locale where it is really a problem is **sub-Saharan Africa**

ndness? *Onchocerca*
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 ? *Onchocerca*
 ra

Common Parasitic Pathogens



Parasitic pathogens



Is onchocerciasis a serious condition?

Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

Yep—it's the second most common cause of infectious visual morbidity

Where in the world?

What proportion of cases are in Africa?

99%

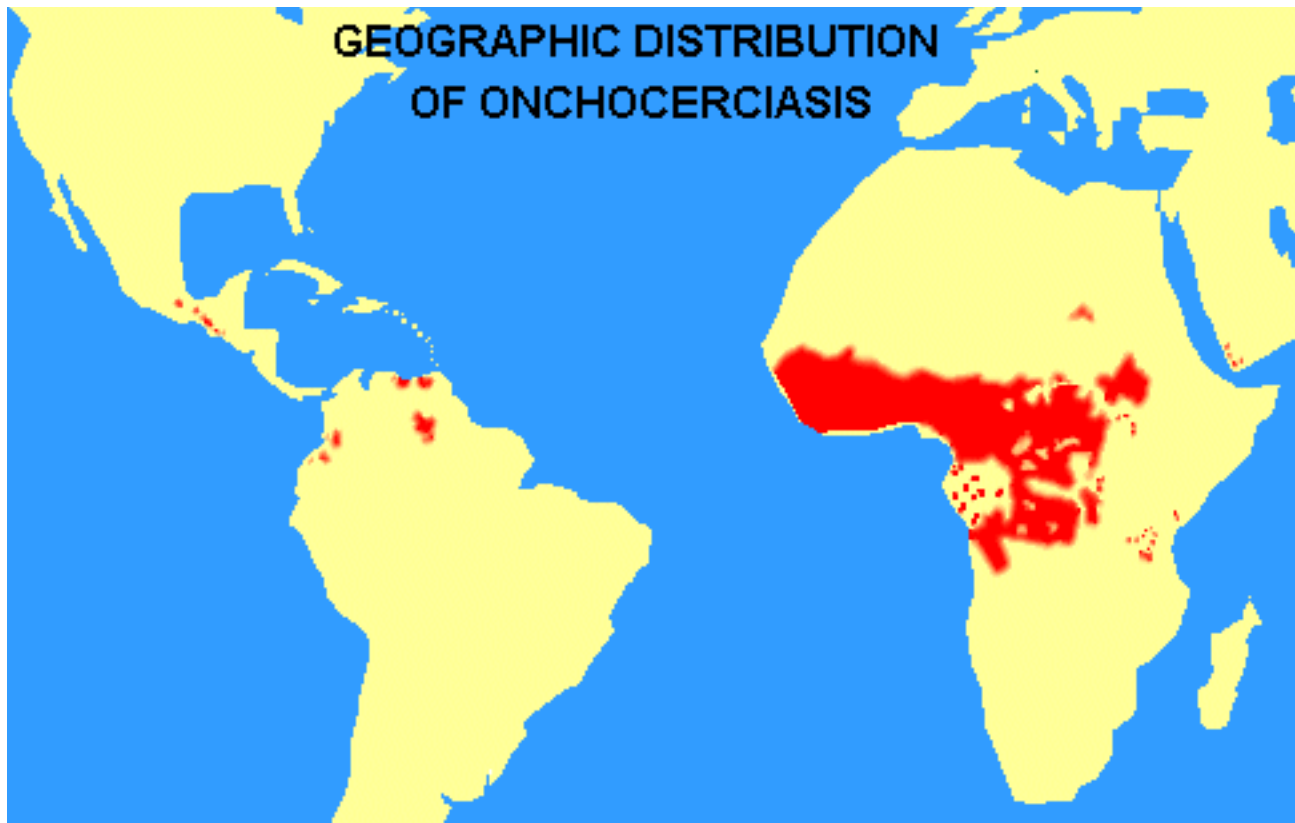
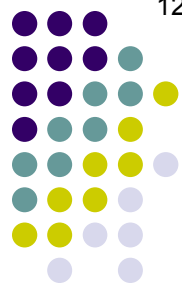
While it can be found

where it is really a problem is

sub-Saharan Africa

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Common Parasitic Pathogens

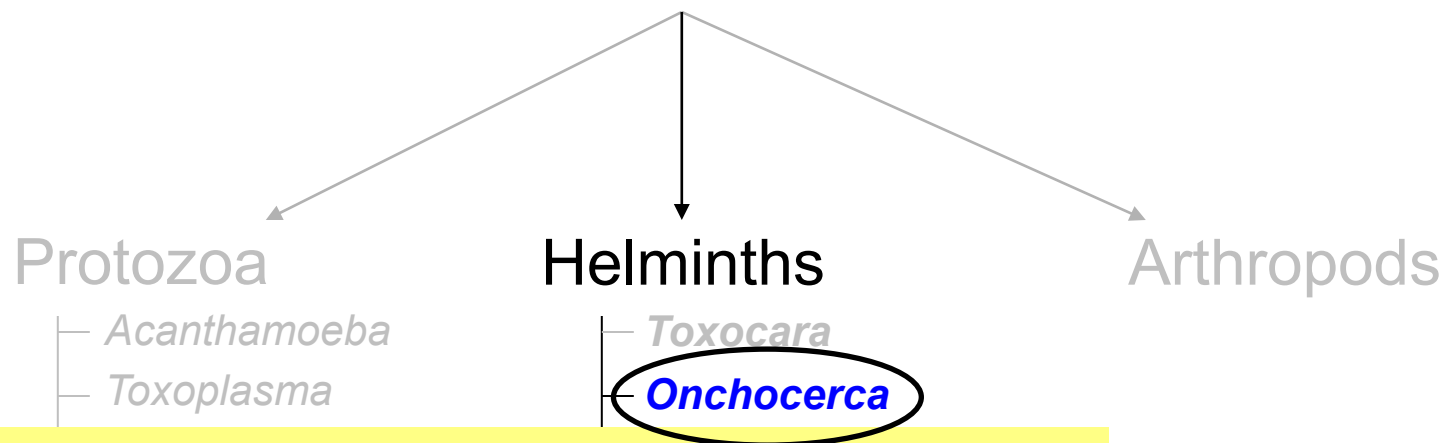


Onchocerciasis distribution

Common Parasitic Pathogens



Parasitic pathogens



Is onchocerciasis a serious condition?

Indeed it is (it ain't called river **blindness** for nothing!)

Is it common?

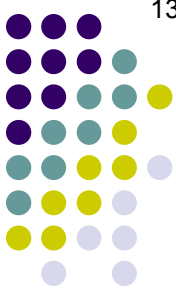
Yep—it's the second most common cause of infectious visual morbidity

Where in the world does it occur?

While it can be found in both Latin America and the Middle East, the locale where it is really a problem is sub-Saharan Africa. In fact, it's sometimes called **African** river blindness.

ndness? Onchocerca
ly? Onchocerca
conjunctiva? Loa Loa
? Onchocerca
ra

Common Parasitic Pathogens



Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

How do humans acquire the worm?

bidity
 ndness? *Onchocerca*
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 etimes ra



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

How do humans acquire the worm?

They are bitten by a blackfly (you knew that already) carrying the
 form of the worm, which is transmitted by the bite

blindness? *Onchocerca*
 fly? *Onchocerca*
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Common Parasitic Pathogens

Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

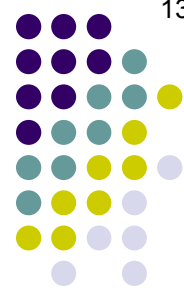
- *Toxocara*
- ***Onchocerca***

Arthropods

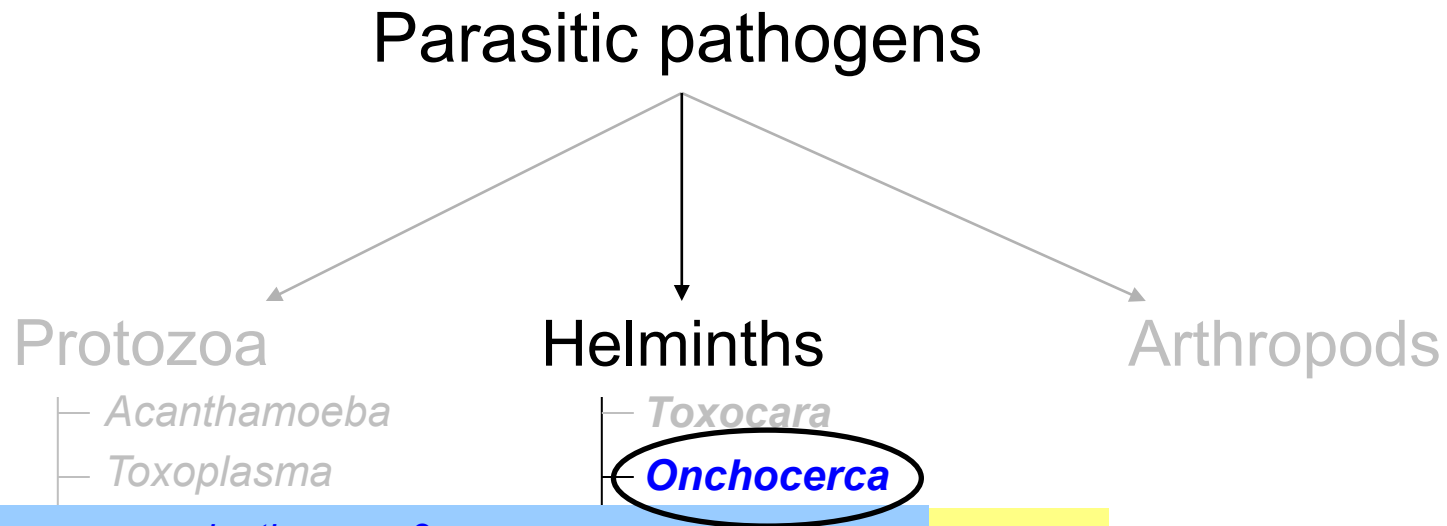
How do humans acquire the worm?

They are bitten by a blackfly (you knew that already) carrying the microfilariae form of the worm, which is transmitted by the bite

blindness? *Onchocerca*
 fly? *Onchocerca*
 conjunctiva? *Loa Loa*
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 etimes *Onchocerca*



Common Parasitic Pathogens

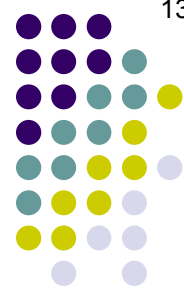


How do humans acquire the worm?

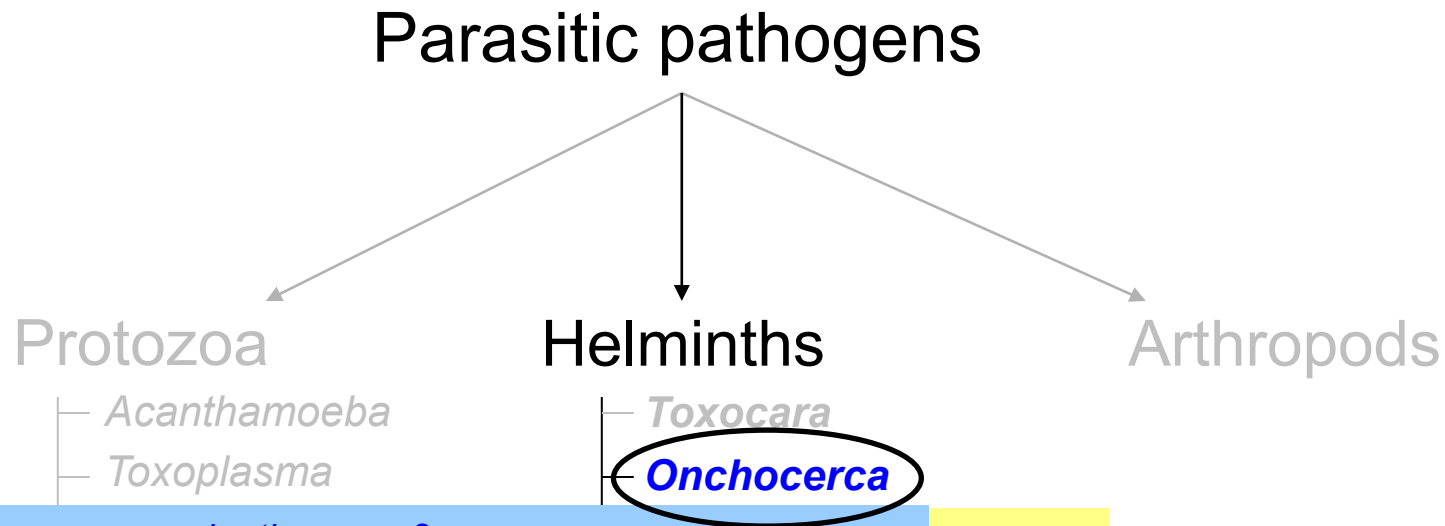
They are bitten by a blackfly (you knew that already) carrying the microfilariae form of the worm, which is transmitted by the bite

What do the microfilariae do upon entering a host?

blindness? *Onchocerca*
 fly? *Onchocerca*
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 the locale? *Onchocerca*
 etimes *ra*



Common Parasitic Pathogens



How do humans acquire the worm?

They are bitten by a blackfly (you knew that already) carrying the microfilariae form of the worm, which is transmitted by the bite

What do the microfilariae do upon entering a host?

They form the subcutaneous nodules that are classic for the condition. Over the course of the next year they grow into the adult form of the worm.

blindness?

Onchocerca

Onchocerca

Loa Loa

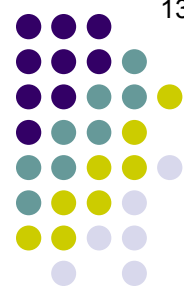
Onchocerca

Onchocerca

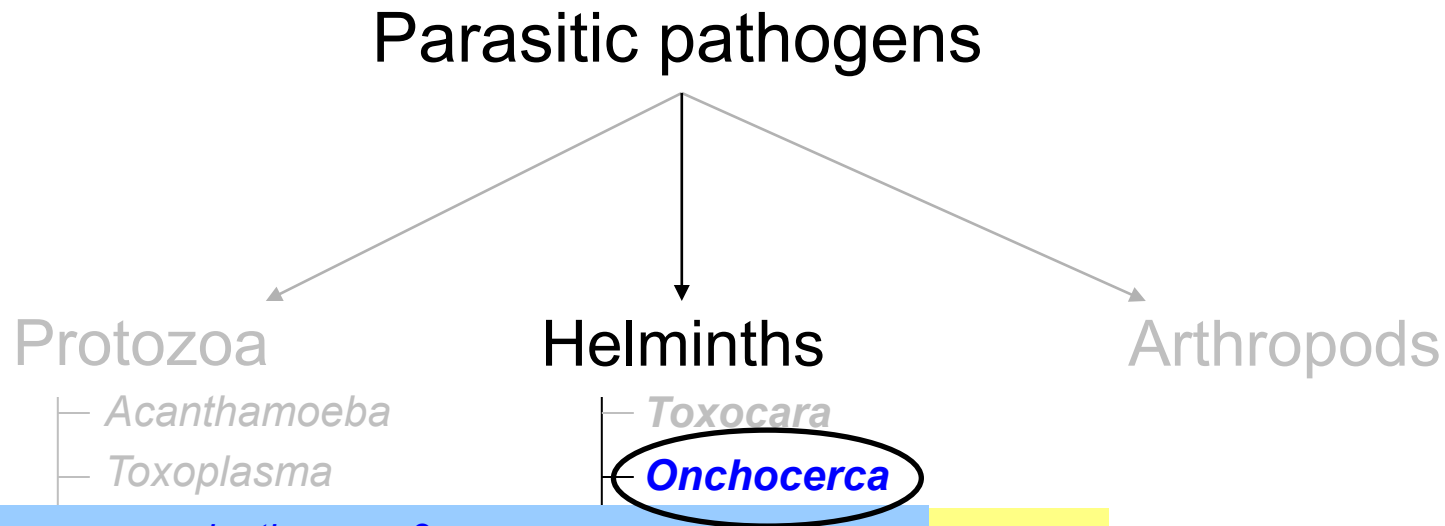
Common Parasitic Pathogens



Onchocerciasis: Skin nodules



Common Parasitic Pathogens



How do humans acquire the worm?

They are bitten by a blackfly (you knew that already) carrying the microfilariae form of the worm, which is transmitted by the bite

What do the microfilariae do upon entering a host?

They form the subcutaneous nodules that are classic for the condition. Over the course of the next year they grow into the adult form of the worm. The adults then start cranking out microfilariae by the millions, which disseminate throughout the body, including the eye.

blindness?

Onchocerca

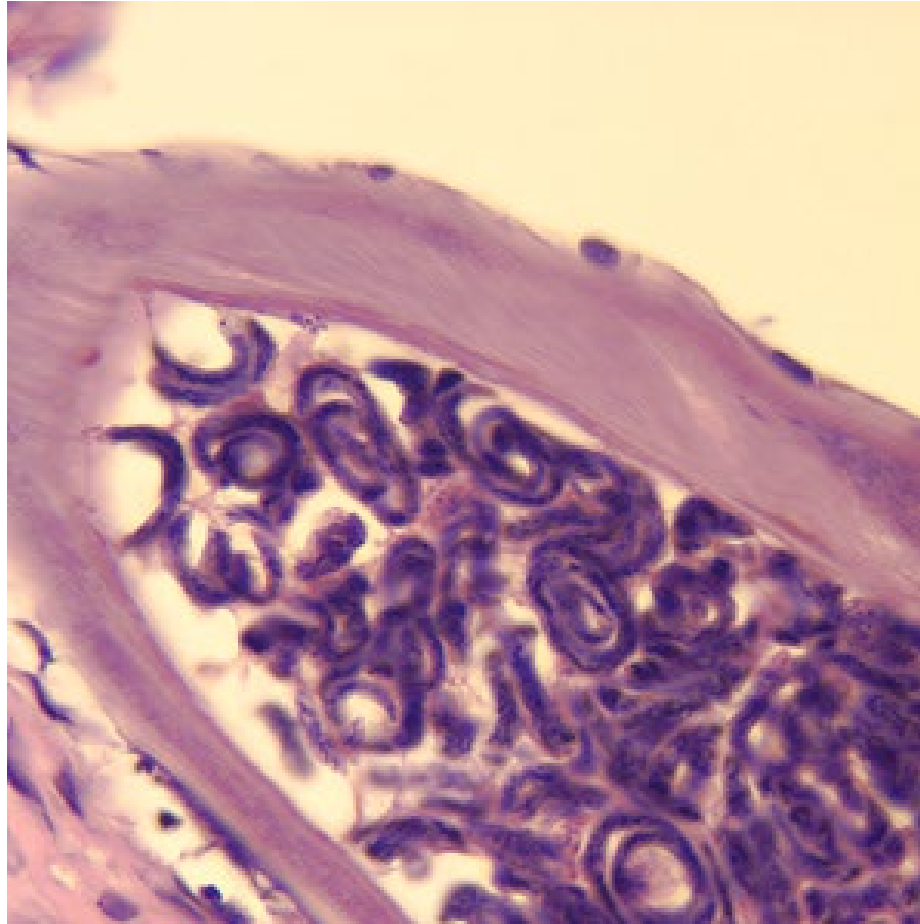
Onchocerca

Loa Loa

Onchocerca

Onchocerca

Common Parasitic Pathogens



Uterus of an adult female worm chock-full of microfilariae



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

How do humans acquire the worm?

They are bitten by a blackfly (you know it as a sandfly).

microfilariae form of the worm, which

How big is the microfilariae form of the worm?

What do the microfilariae do upon entering a host?

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blindness?

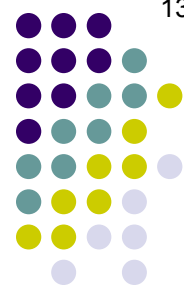
Onchocerca

ly? Onchocerca

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ra



Common Parasitic Pathogens

Parasitic pathogens

Protozoa

- *Acanthamoeba*
- *Toxoplasma*

Helminths

- *Toxocara*
- ***Onchocerca***

Arthropods

How do humans acquire the worm?

They are bitten by a blackfly (you know it as a sandfly).

microfilariae form of the worm, which

How big is the microfilariae form of the worm?

About a third of a millimeter

What do the microfilariae do upon entering a host?

They form the subcutaneous nodules that are classic for the condition. Over the course of the next year they grow into the adult form of the worm. The adults then start cranking out microfilariae by the millions, which disseminate throughout the body, including the eye

blindness?

Onchocerca

blindness? Onchocerca

conjunctiva? Loa Loa

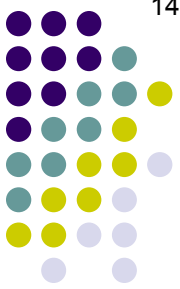
? Onchocerca

the locale

sometimes

Onchocerca

Common Parasitic Pathogens



Onchocerca: Microfilariae



Common Parasitic Pathogens

Parasitic pathogens

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What do the microfilariae do upon entering a host?

They form the subcutaneous nodules that are classic for the condition. Over the course of the infection, the worms mature into the

adult form of the worm.

How big is the adult form of the worm?

The adult worms are found in the blood and lymphatic system, where they can be found by the millions, which disseminate throughout the body, including the eye.

blindness?

Onchocerca

Onchocerca

conjunctiva? *Loa Loa*

? *Onchocerca*

Onchocerca



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How big is the adult form of the worm?
 Up to a meter

blindness?

Onchocerca

Onchocerca

conjunctiva? *Loa Loa*

? *Onchocerca*

Onchocerca



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How big is the adult form of the worm?
Up to a meter

No, seriously—how big is it?

blindness? *Onchocerca*
 blindness? *Onchocerca*
 blindness? *Loa Loa*
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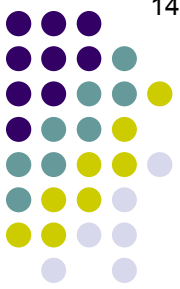
How big is the adult form of the worm?

Up to a meter

No, seriously—how big is it?

I'm not even kidding—the adult female can be a meter long

Common Parasitic Pathogens



Onchocerca: Three adult males, and a female



Common Parasitic Pathogens

Parasitic pathogens

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Arthropods

How do humans acquire the worm?

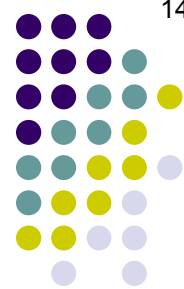
They are bitten by a blackfly (you knew that already) carrying the microfilariae form of the worm.

What do the microfilariae do?

They form the subcutaneous condition. Over the course of the adult form of the worm. The microfilariae by the millions, body, **including the eye.**

Which ophthalmic structures can be affected by the worm?

Onchocerca
Loa Loa



Common Parasitic Pathogens

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Any of them, from the lids to the retina

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Loa Loa



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In what specific ways can onchocerciasis cause blindness?

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Onchocerca
Loa Loa



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In what specific ways can onchocerciasis cause blindness?

- Sclerosing keratitis
- Glaucoma
- Uveitis
- Cataracts
- Chorioretinitis with late optic atrophy

Onchocerca
Loa Loa



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Which ophthalmic structures can be affected by the worm?

Any of them, from the lids to the retina

In what specific ways can it affect the eye?

--**Sclerosing keratitis**

--Glaucoma

--Uveitis

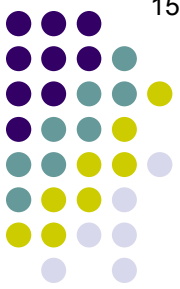
--Cataracts

--Chorioretinitis with late optic atrophy

All this being said, onchocerciasis appears in only two BCSC books: *Cornea* and *Uveitis*, and gets more love in the *Cornea* book.

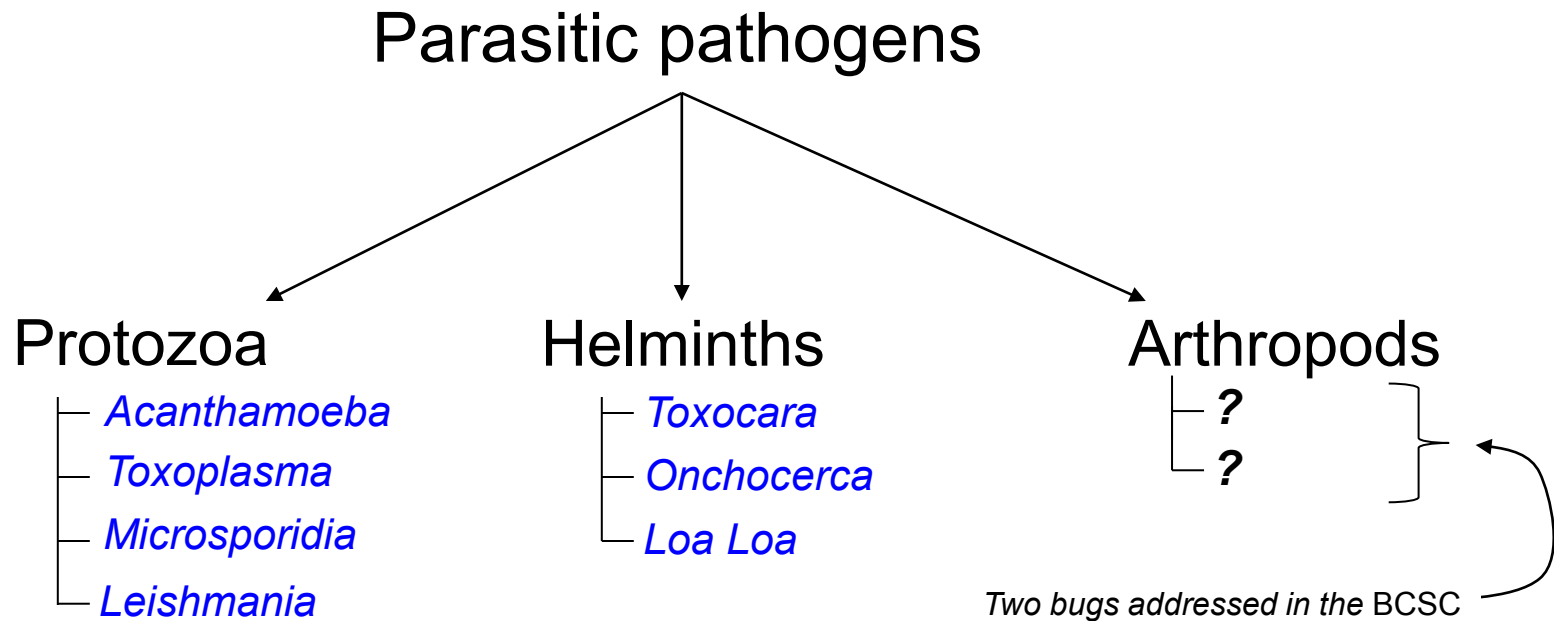
Thus, if you remember nothing else about it, **remember that it can cause a severe sclerosing keratitis!**

Common Parasitic Pathogens

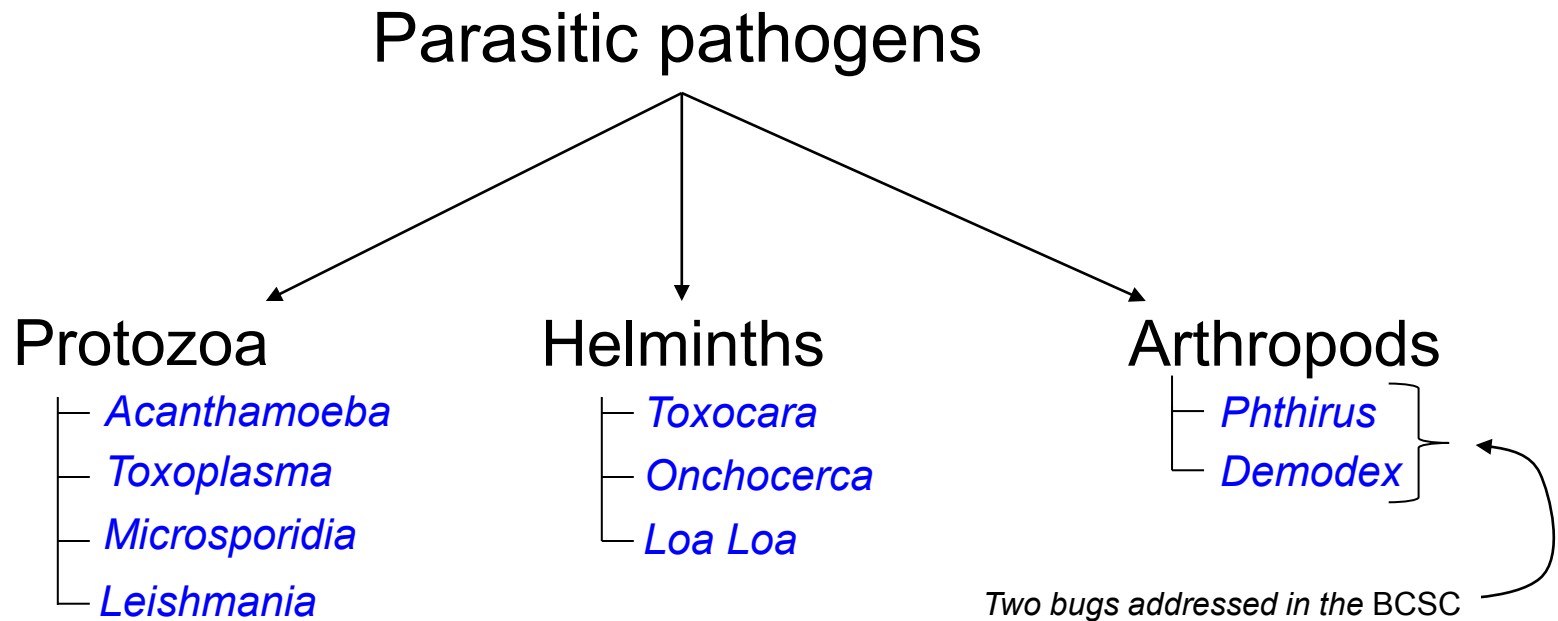
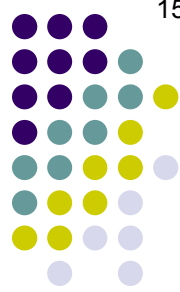


Onchocerciasis: Sclerosing keratitis

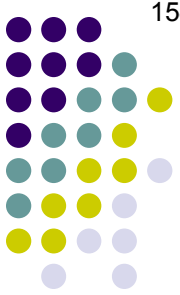
Common Parasitic Pathogens



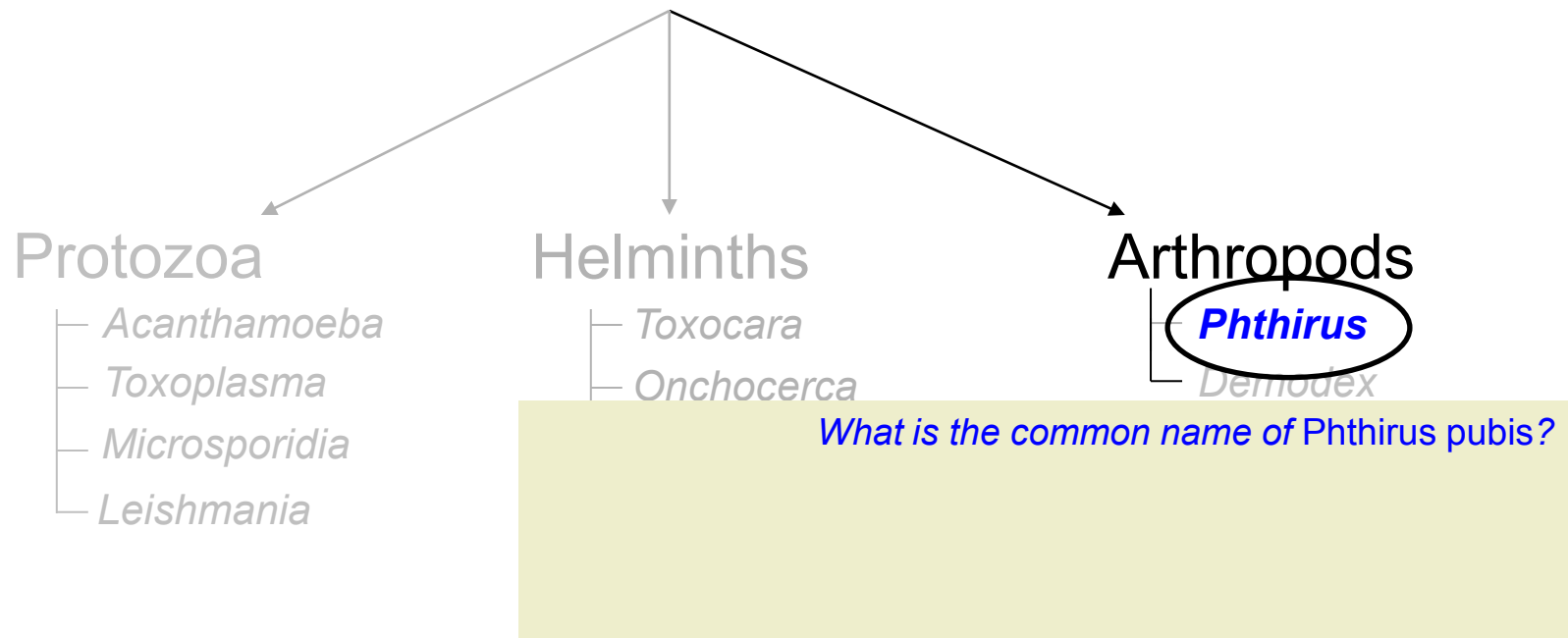
Common Parasitic Pathogens



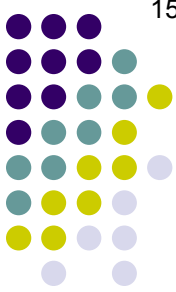
Common Parasitic Pathogens



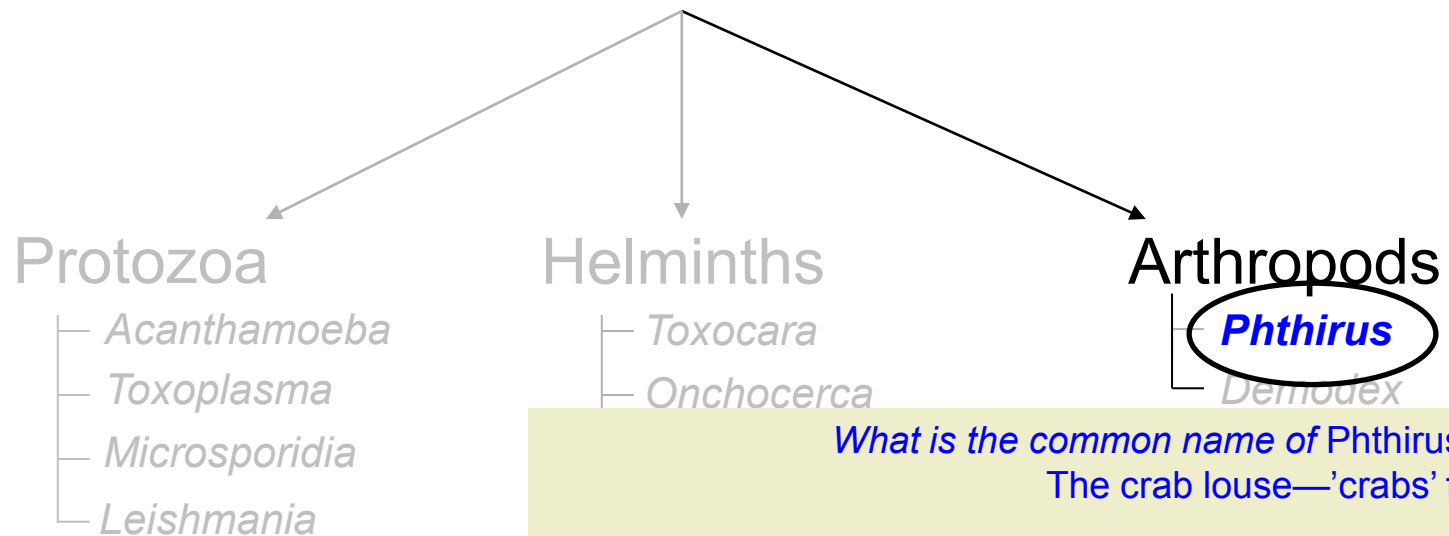
Parasitic pathogens



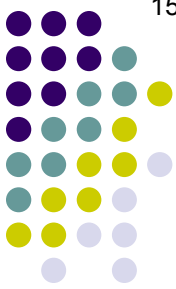
Common Parasitic Pathogens



Parasitic pathogens



Common Parasitic Pathogens

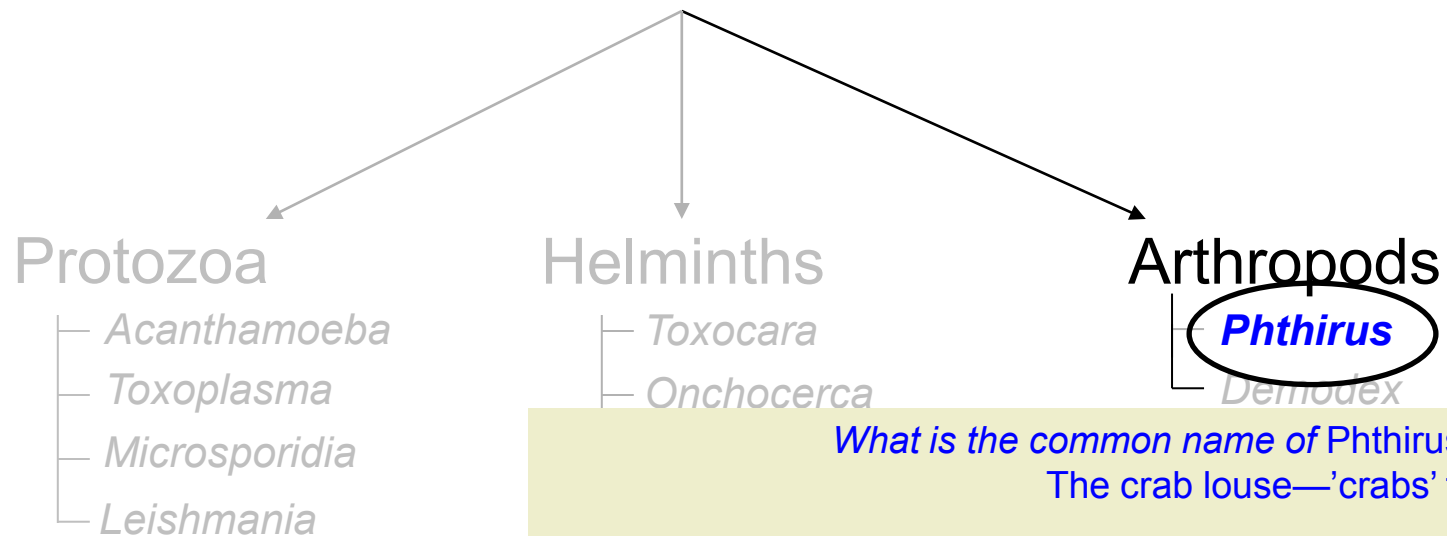


Hi there!

Common Parasitic Pathogens



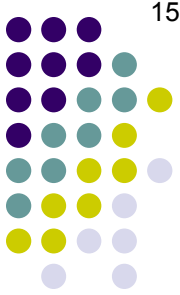
Parasitic pathogens



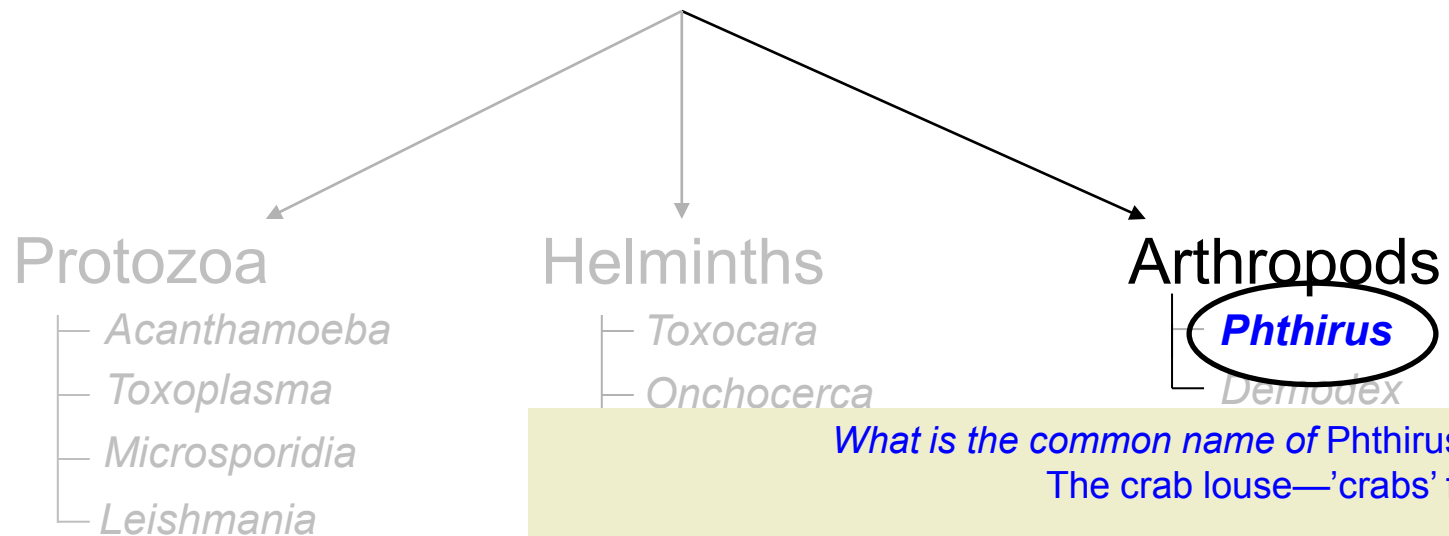
*What is the common name of Phthirus pubis?
The crab louse—'crabs' for short*

What ophthalmic condition does it cause?

Common Parasitic Pathogens



Parasitic pathogens



*What is the common name of Phthirus pubis?
The crab louse—'crabs' for short*

*What ophthalmic condition does it cause?
If it takes hold in the lashes, blepharoconjunctivitis will result*

Common Parasitic Pathogens

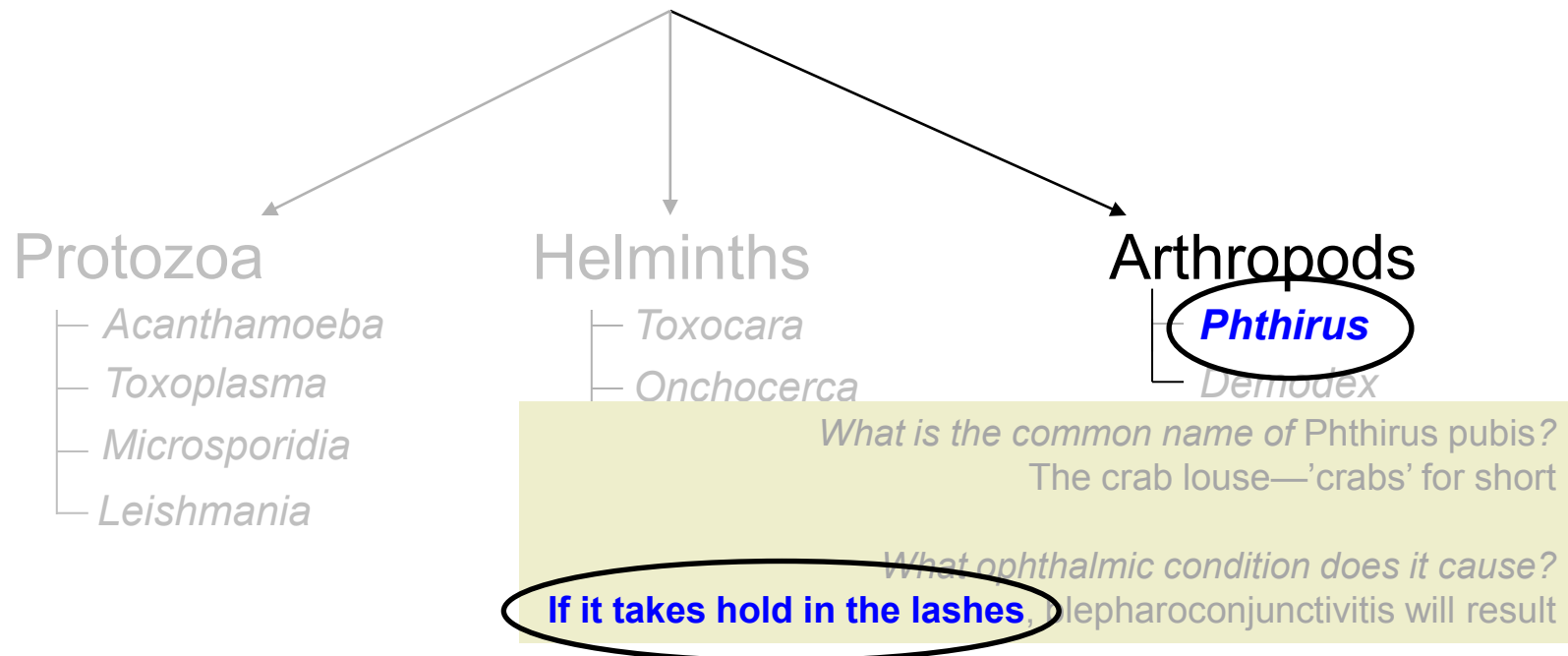


Phthirus pubis on the eyelid

Common Parasitic Pathogens



Parasitic pathogens

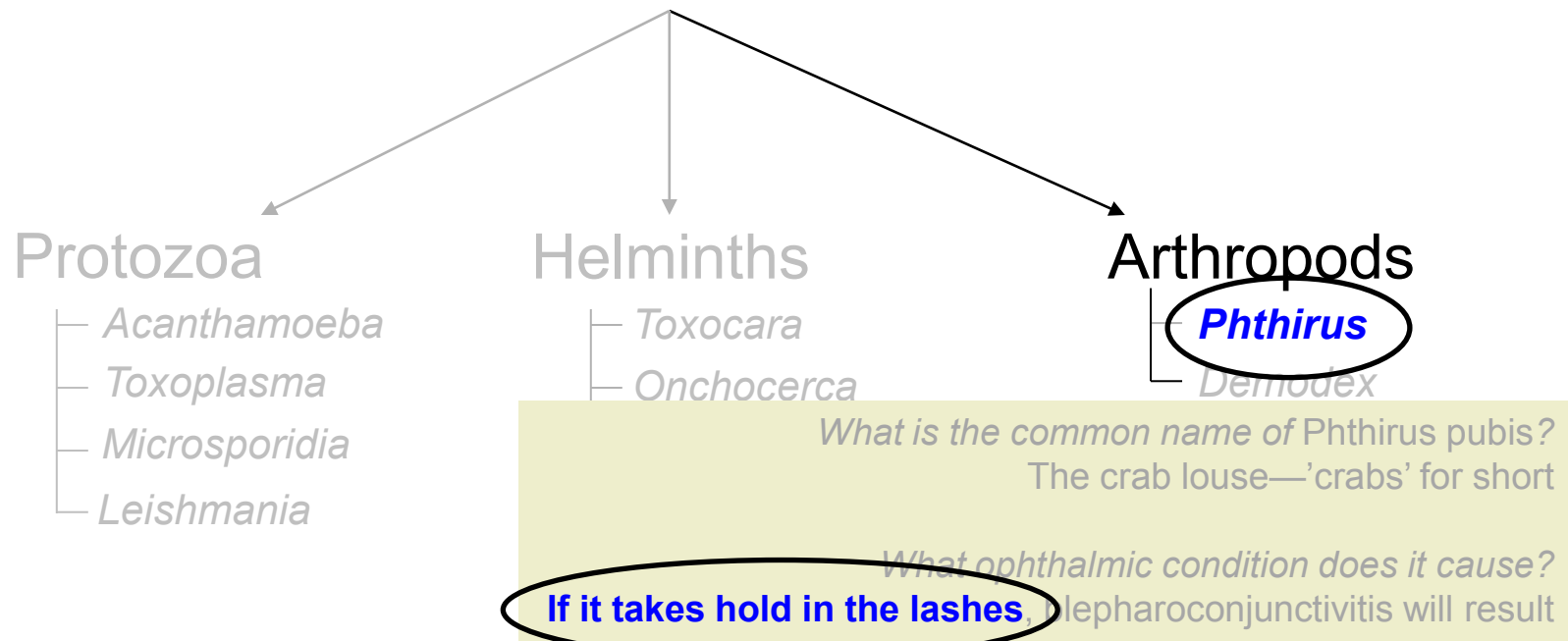


How is Phthirus infestation of the lashes and eyebrows acquired?

Common Parasitic Pathogens



Parasitic pathogens

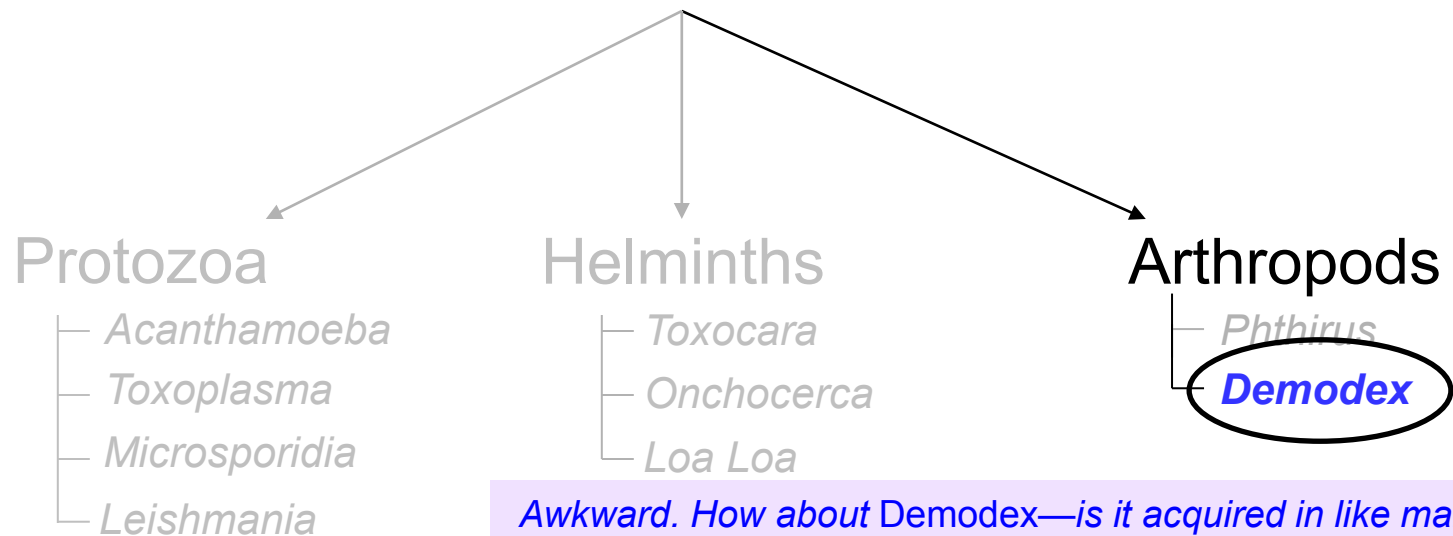


How is Phthirus infestation of the lashes and eyebrows acquired?
It's a venereal disease. Use your imagination.

Common Parasitic Pathogens



Parasitic pathogens

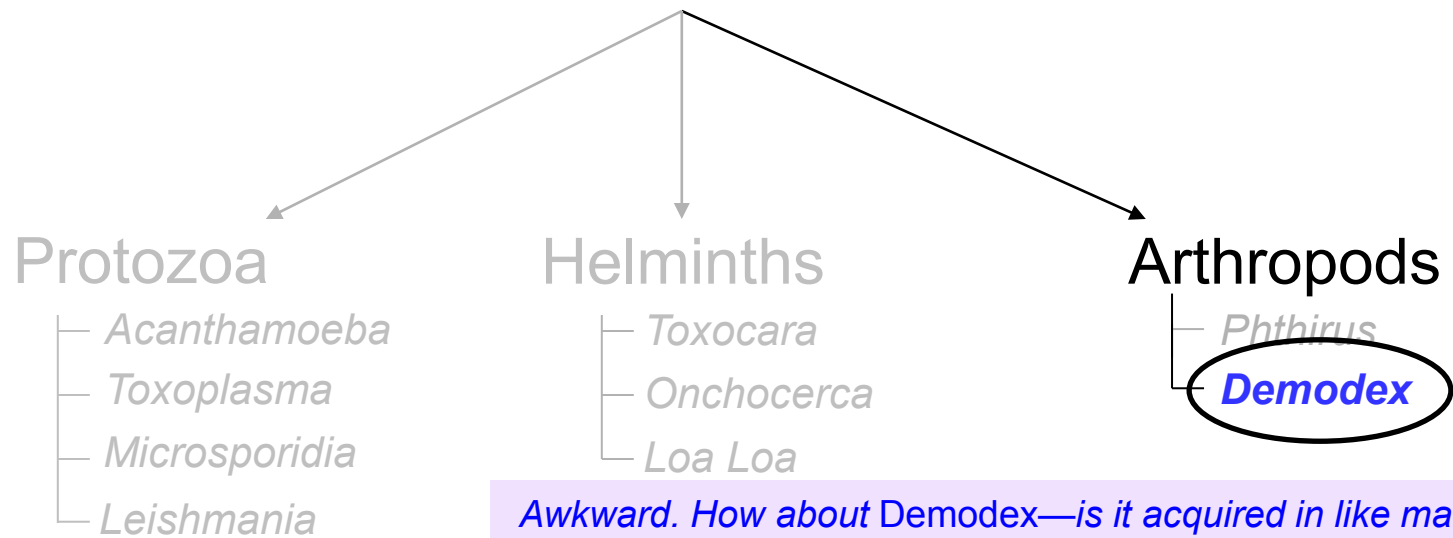


Awkward. How about Demodex—is it acquired in like manner?

Common Parasitic Pathogens

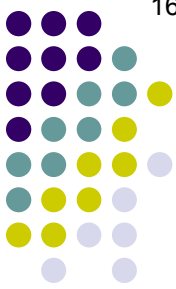


Parasitic pathogens



Awkward. How about Demodex—is it acquired in like manner?
No, it's part of the normal fauna of the lashes and adnexa

Common Parasitic Pathogens

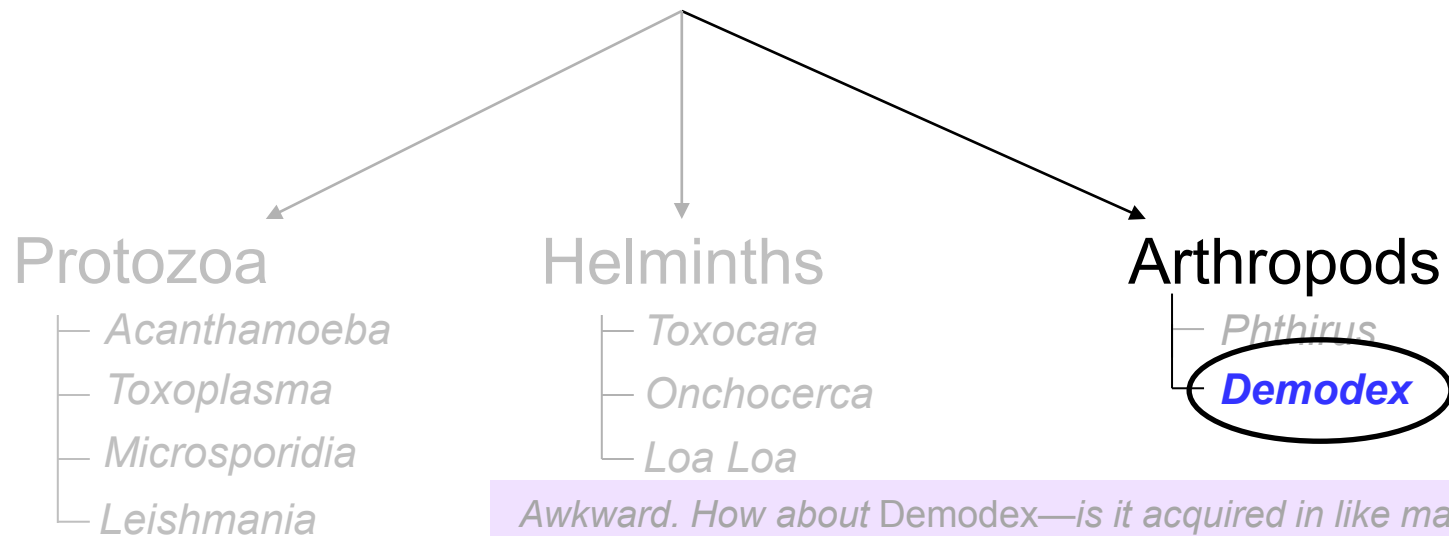


Demodex

Common Parasitic Pathogens



Parasitic pathogens



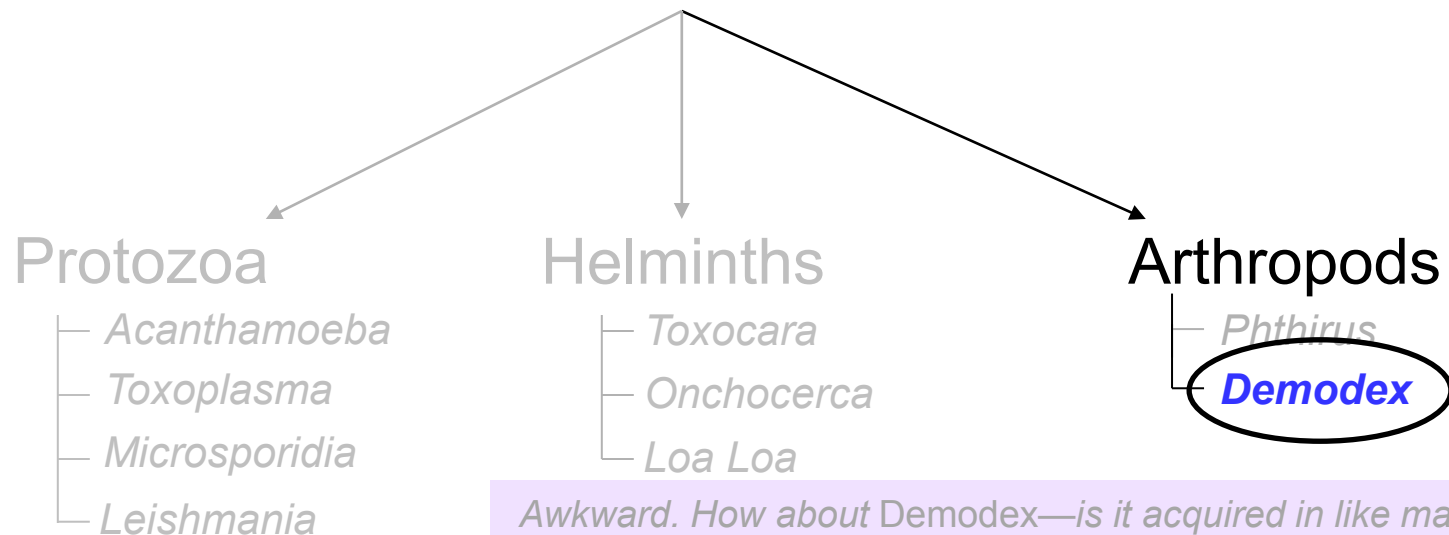
Awkward. How about Demodex—is it acquired in like manner?
No, it's **part of the normal fauna** of the lashes and adnexa

How common is Demodex infestation?

Common Parasitic Pathogens



Parasitic pathogens



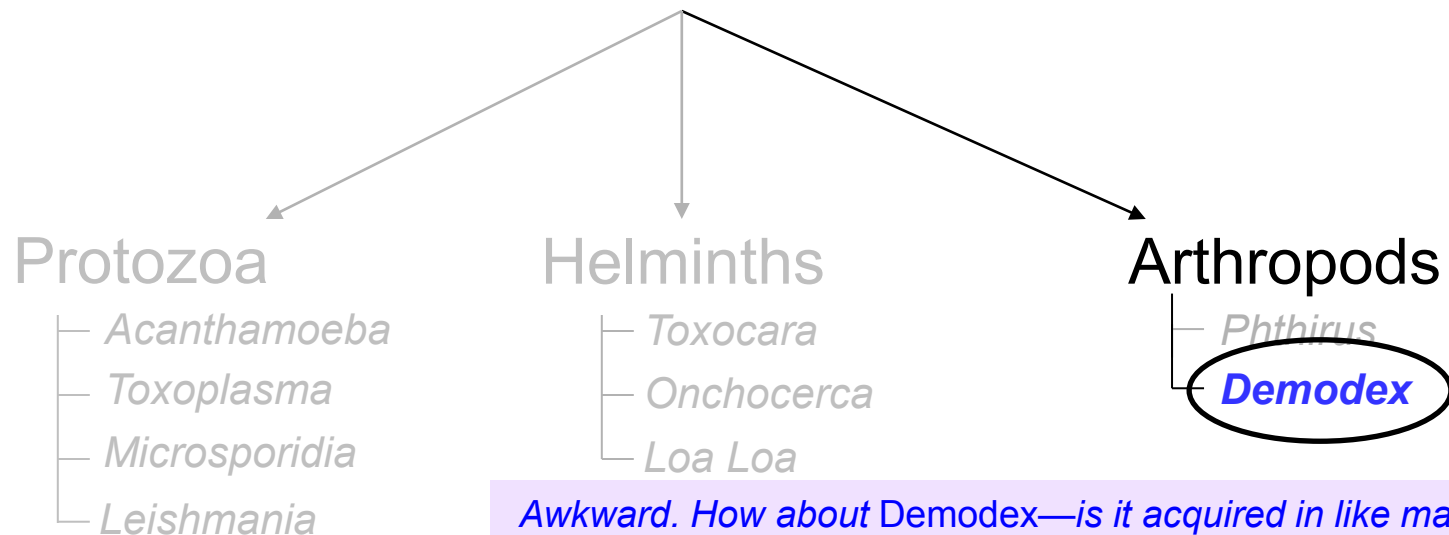
Awkward. How about *Demodex*—is it acquired in like manner?
No, it's **part of the normal fauna** of the lashes and adnexa

*How common is **Demodex** infestation?*
Very (it approaches 100% in the elderly)

Common Parasitic Pathogens



Parasitic pathogens



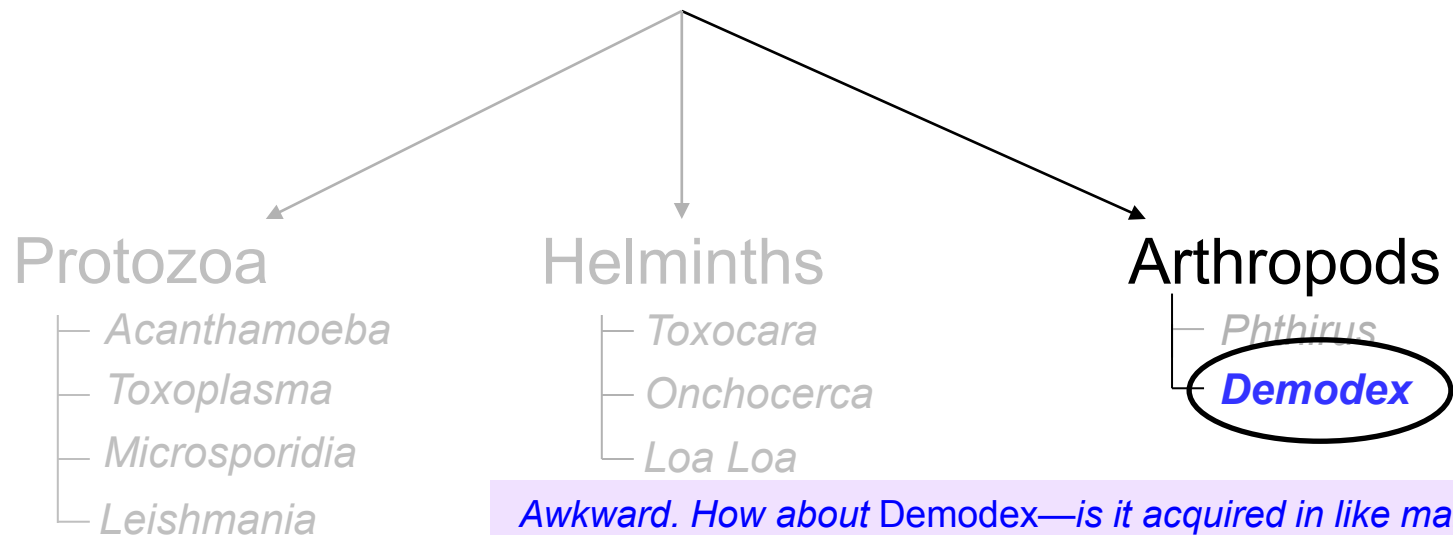
*Awkward. How about Demodex—is it acquired in like manner?
No, it's part of the normal fauna of the lashes and adnexa*

How does Demodex infestation manifest clinically?

Common Parasitic Pathogens



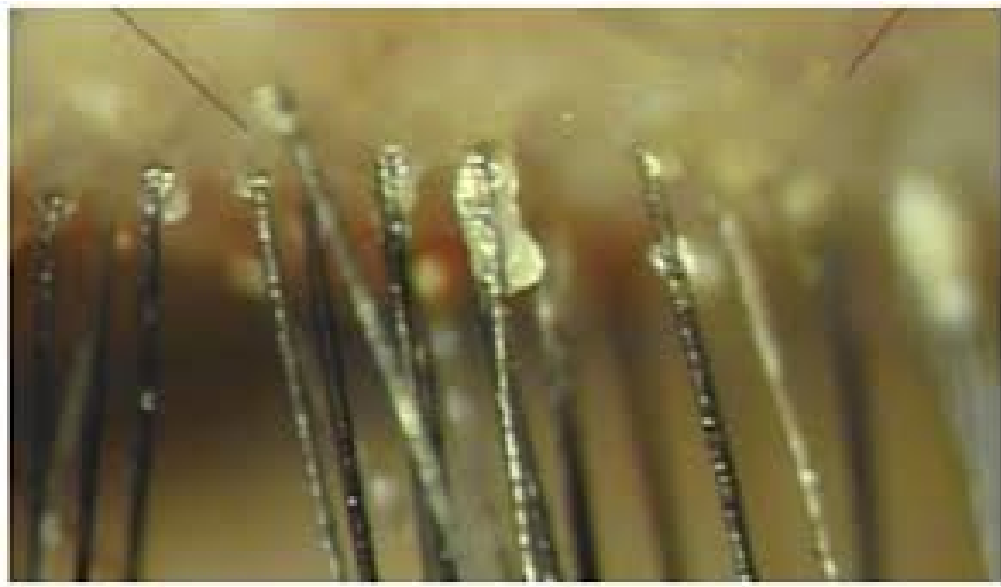
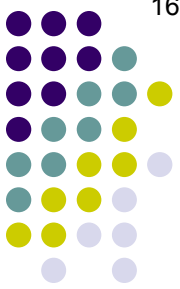
Parasitic pathogens



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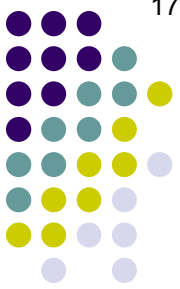
How does Demodex infestation manifest clinically?
 As waxy sleeves on the proximal lashes

Common Parasitic Pathogens



Demodex: Eyelash sleeves

Common Parasitic Pathogens



These are *Demodex* mites next to an eyelash within the follicle opening. Note their size.

Common Parasitic Pathogens



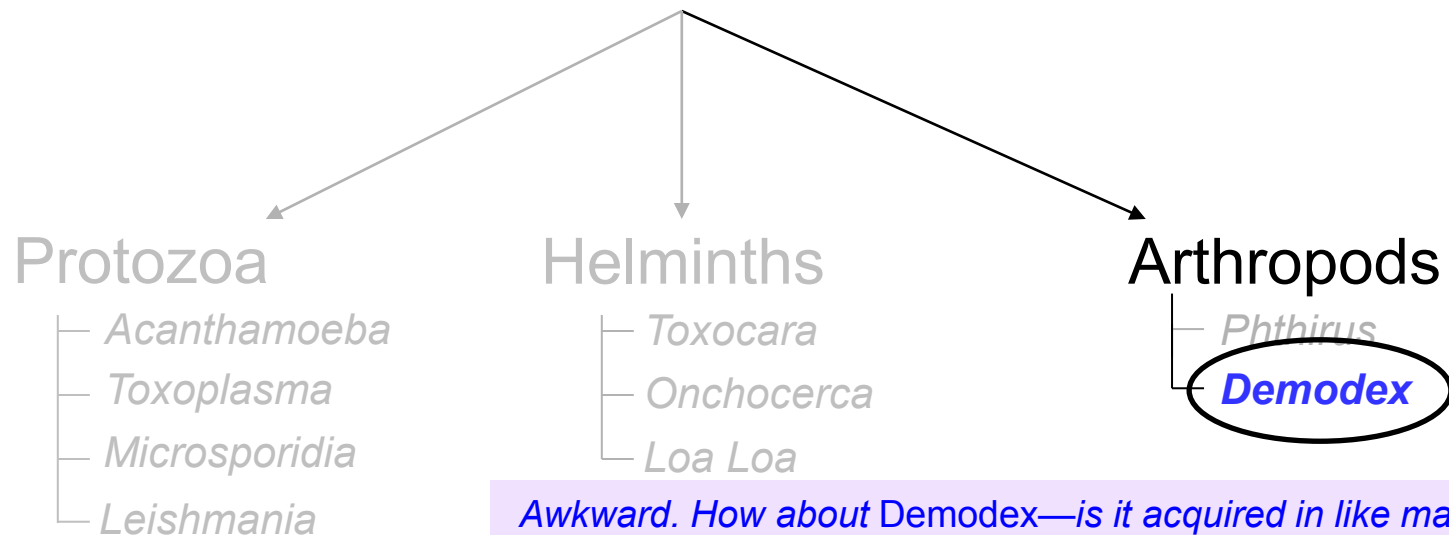
These are *Demodex* mites next to an eyelash within the follicle opening. Note their size.

Take-home point: *Demodex* are NOT visible at the slit lamp. The only slit-lamp sign of *Demodex* is sleeving of the lash base.

Common Parasitic Pathogens



Parasitic pathogens



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 No, it's part of the normal fauna of the lashes and adnexa

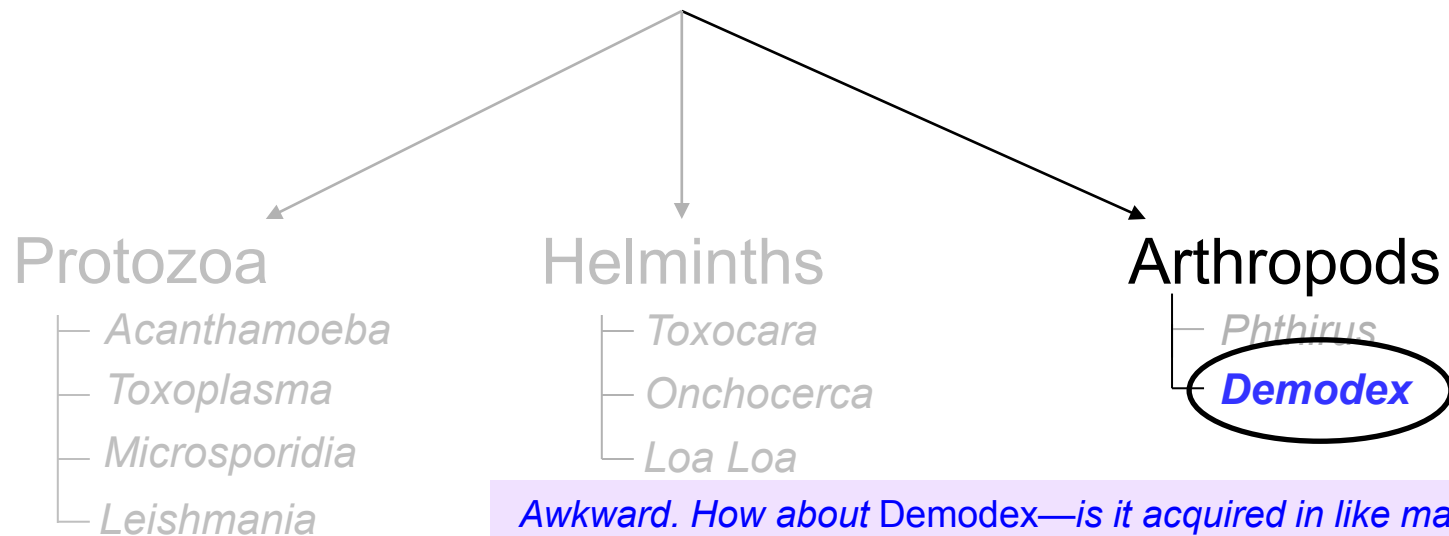
How does Demodex infestation manifest clinically?
 As waxy sleeves on the proximal lashes

What ophthalmic condition does it cause?

Common Parasitic Pathogens



Parasitic pathogens



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No, it's part of the normal fauna of the lashes and adnexa

How does Demodex infestation manifest clinically?
As waxy sleeves on the proximal lashes

What ophthalmic condition does it cause?
Blepharoconjunctivitis