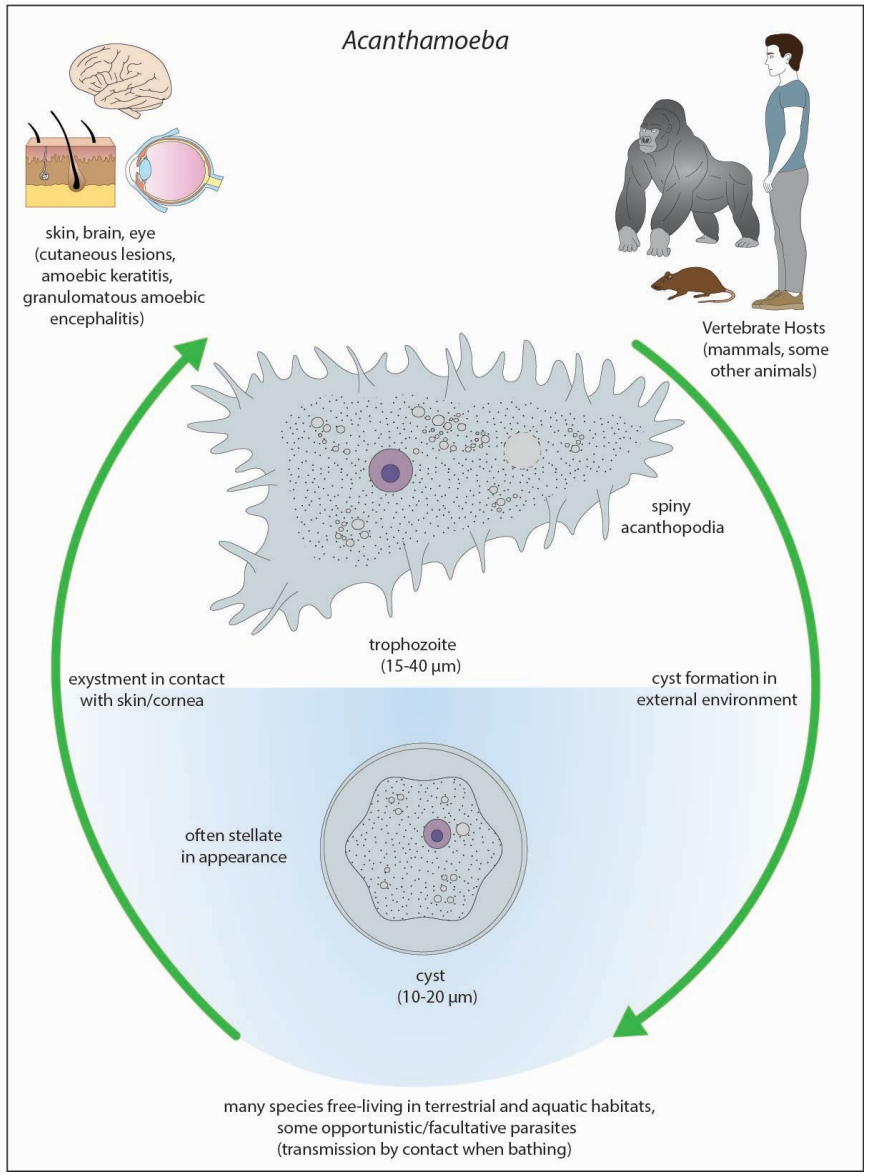
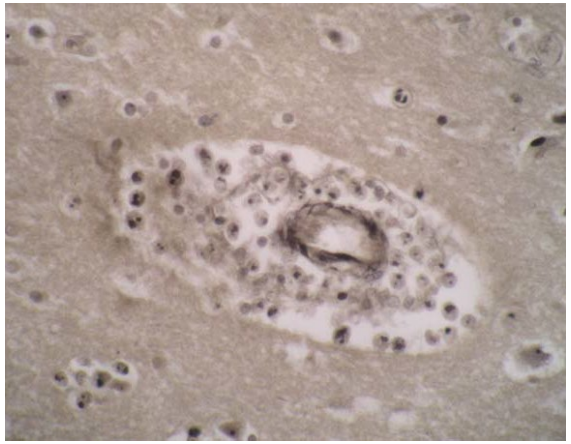
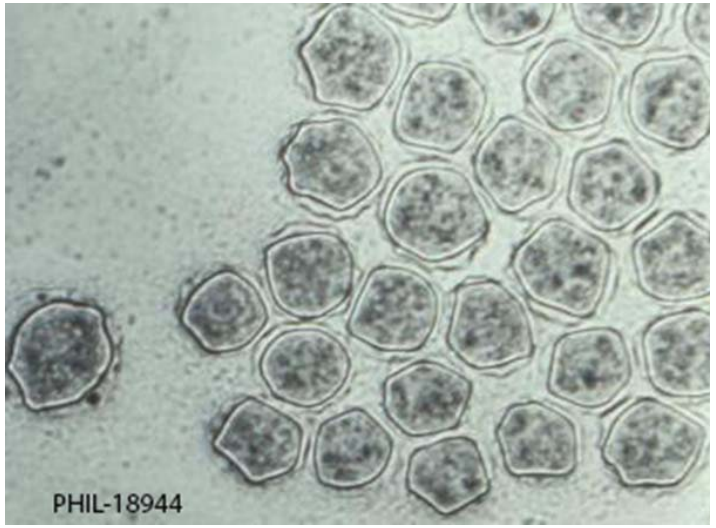
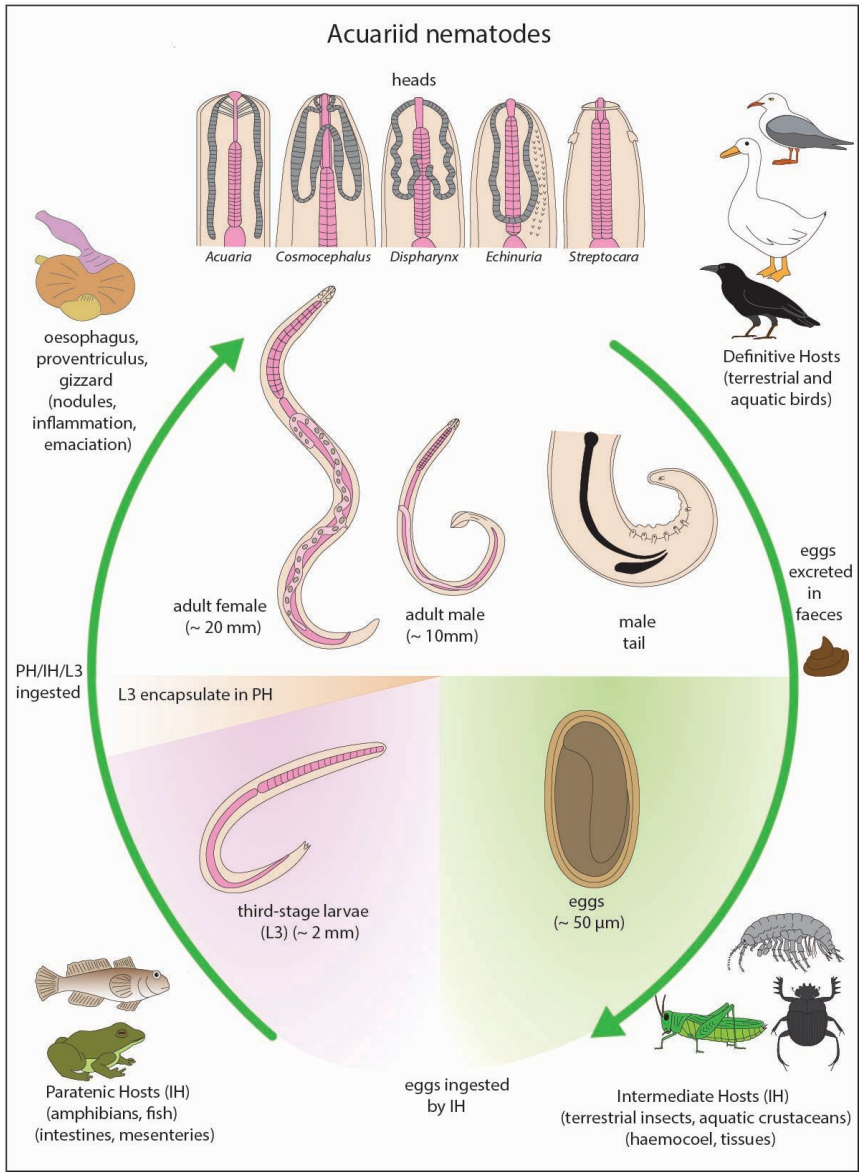
The Australian Society for Parasitology Inc.

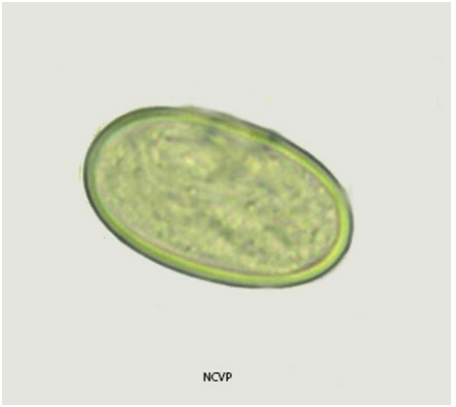

Acanthamoeba
skin, brain, eye
(cutaneous lesions,
amoebic keratitis,
granulomatous amoebic
encephalitis)
Vertebrate Hosts
(mammals, some
other animals)
spiny
acanthopodia
trophozoite
(15-40 µm)
exystment in contact
with skin/cornea
cyst formation in
external environment
often stellate
in appearance
cyst
(10-20 µm)
many species free-living in terrestrial and aquatic habitats,
some opportunistic/facultative parasites
(transmission by contact when bathing)

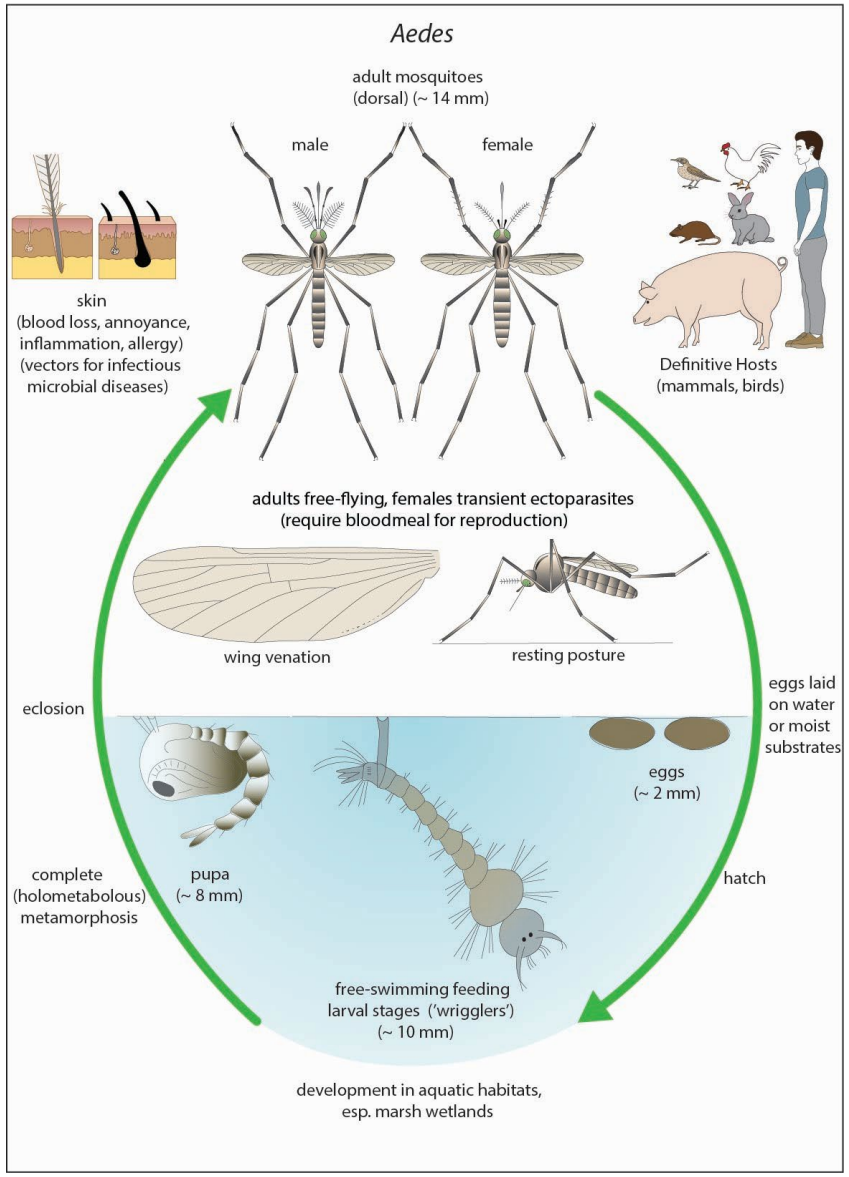

wiki




PHIL-18944

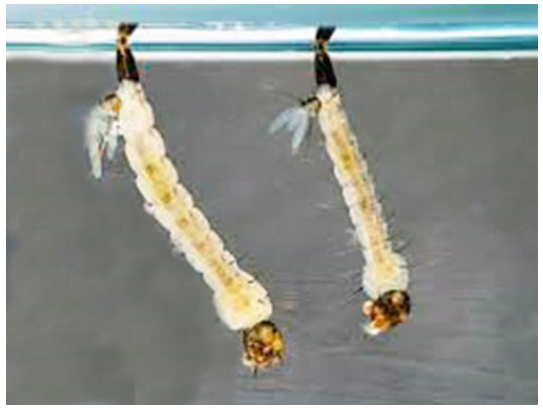

Acuariid nematodes
heads
Acuaria
Cosmocephalus
Dispharynx
Echinuria
Streptocara
oesophagus, proventriculus, gizzard (nodules, inflammation, emaciation)
Definitive Hosts (terrestrial and aquatic birds)
adult female (~ 20 mm)
adult male (~ 10mm)
male tail
eggs excreted in faeces
PH/IH/L3 ingested
L3 encapsulate in PH
third-stage larvae (L3) (~ 2 mm)
eggs (~ 50 µm)
Paratenic Hosts (IH) (amphibians, fish) (intestines, mesenteries)
eggs ingested by IH
Intermediate Hosts (IH) (terrestrial insects, aquatic crustaceans) (haemocoel, tissues)

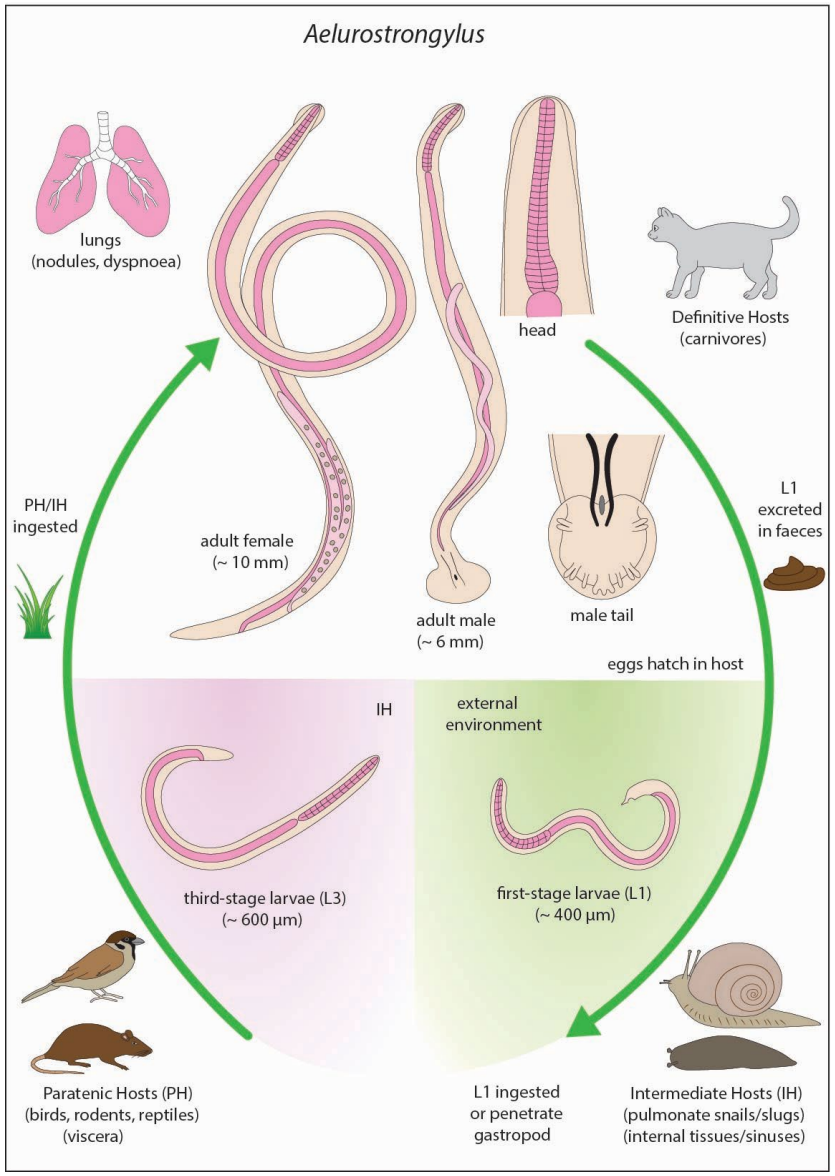

NCVP

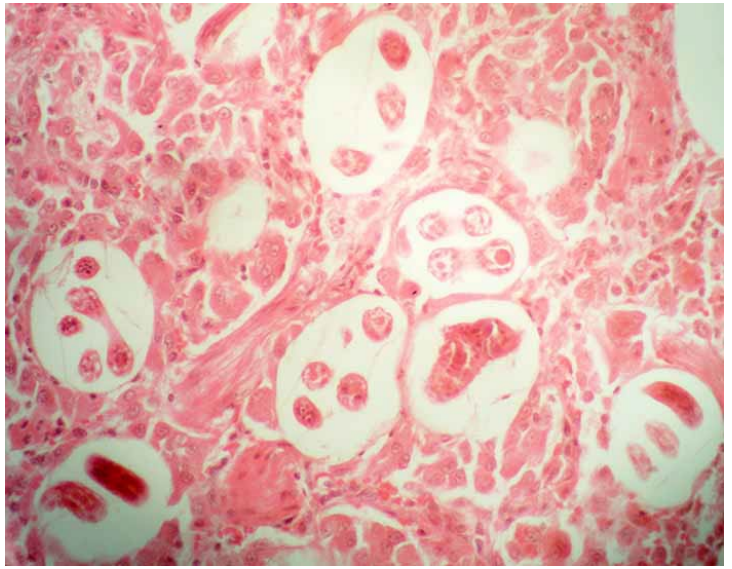

Aedes
adult mosquitoes
(dorsal) (~ 14 mm)
male
female
skin
(blood loss, annoyance,
inflammation, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
adults free-flying, females transient ectoparasites
(require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs laid
on water
or moist
substrates
eggs
(~ 2 mm)
complete
(holometabolous)
metamorphosis
pupa
(~ 8 mm)
hatch
free-swimming feeding
larval stages ('wrigglers')
(~ 10 mm)
development in aquatic habitats,
esp. marsh wetlands

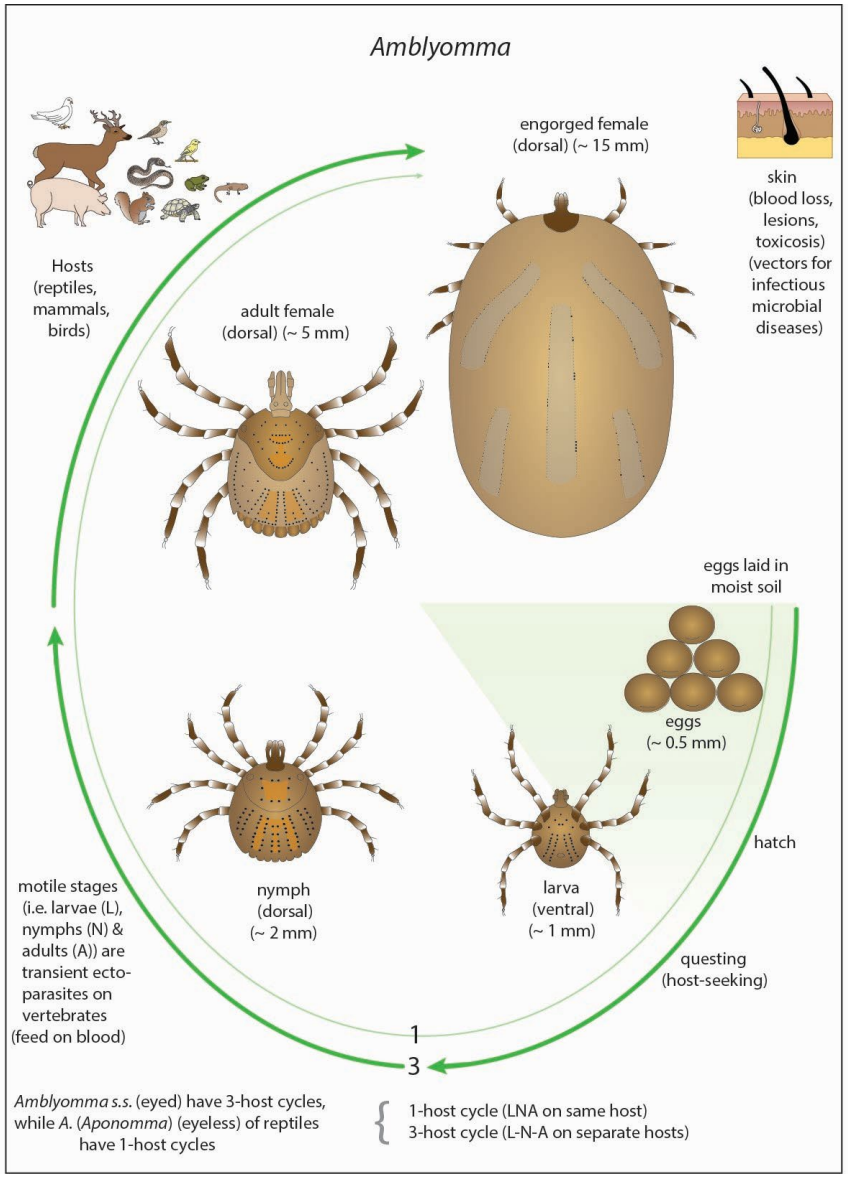

PHIL-9253


PHIL-20799

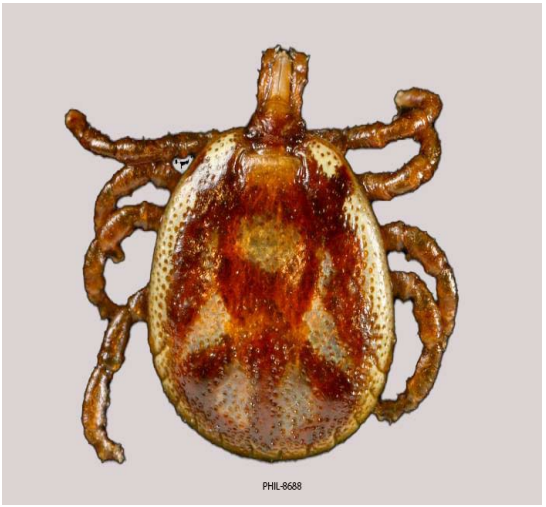


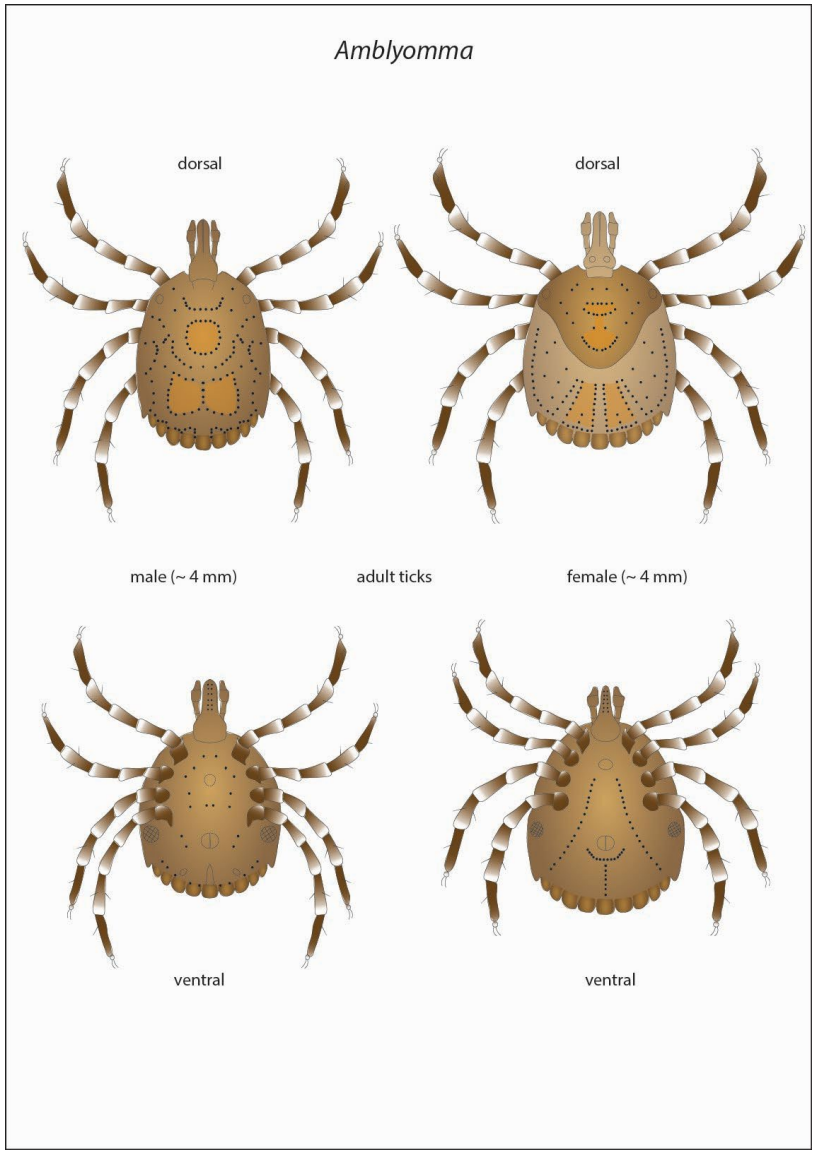

Aelurostrongylus
lungs
(nodules, dyspnoea)
head
Definitive Hosts
(carnivores)
PH/IH
ingested
adult female
(~ 10 mm)
adult male
(~ 6 mm)
male tail
L1
excreted
in faeces
eggs hatch in host
IH
external
environment
third-stage larvae (L3)
(~ 600 µm)
first-stage larvae (L1)
(~ 400 µm)
Paratenic Hosts (PH)
(birds, rodents, reptiles)
(viscera)
L1 ingested
or penetrate
gastropod
Intermediate Hosts (IH)
(pulmonate snails/slugs)
(internal tissues/sinuses)



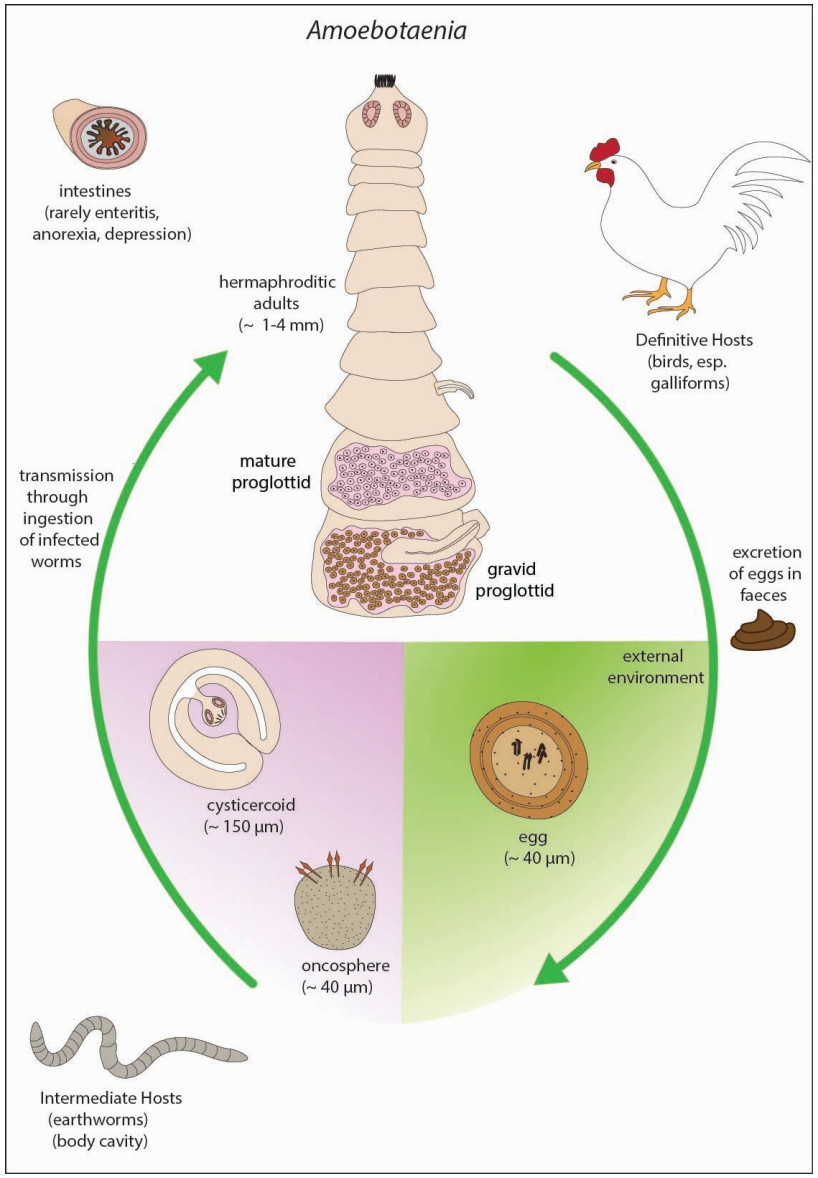

Amblyomma
engorged female
(dorsal) (~ 15 mm)
skin
(blood loss,
lesions,
toxicosis)
(vectors for
infectious
microbial
diseases)
Hosts
(reptiles,
mammals,
birds)
adult female
(dorsal) (~ 5 mm)
eggs laid in
moist soil
eggs
(~ 0.5 mm)
hatch
nymph
(dorsal)
(~ 2 mm)
larva
(ventral)
(~ 1 mm)
motile stages
(i.e. larvae (L),
nymphs (N) &
adults (A)) are
transient ecto-
parasites on
vertebrates
(feed on blood)
questing
(host-seeking)
1
3
Amblyomma s.s. (eyed) have 3-host cycles,
while A. (Aponomma) (eyeless) of reptiles
have 1-host cycles
1-host cycle (LNA on same host)
3-host cycle (L-N-A on separate hosts)

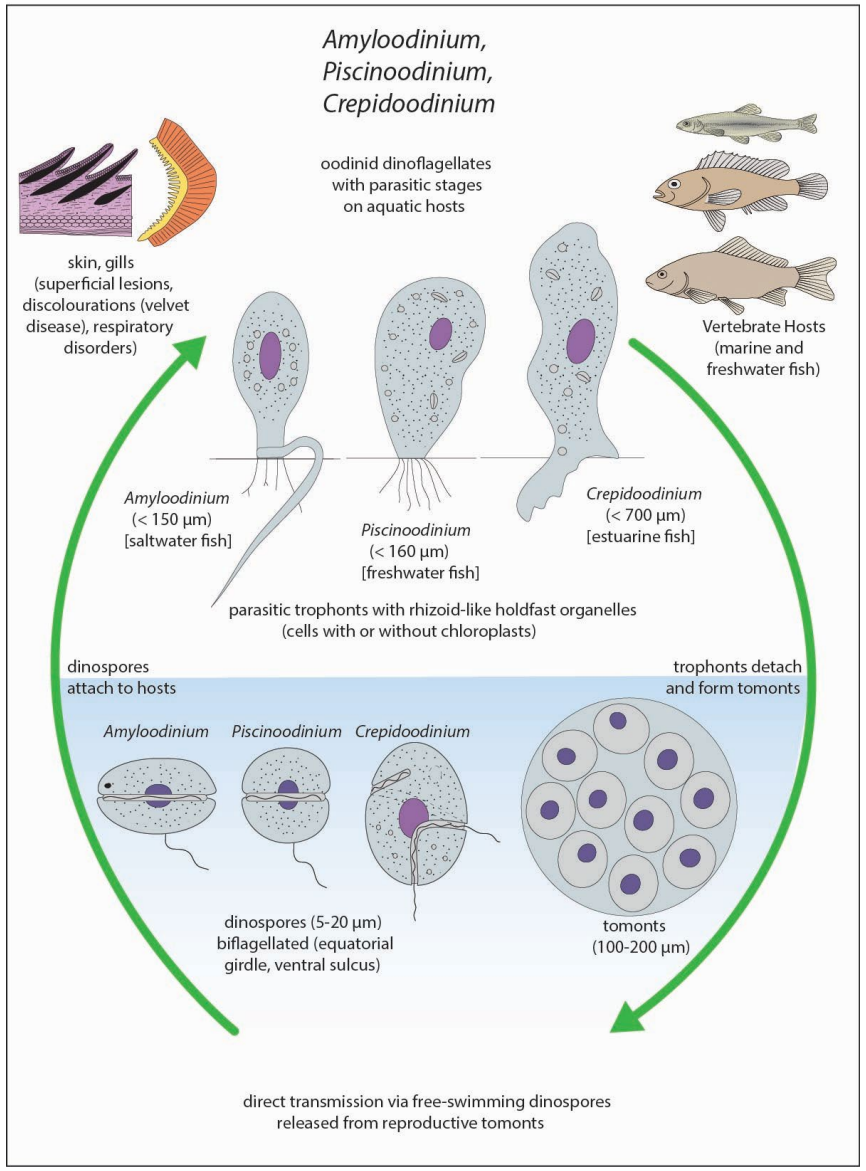

PHIL-10873

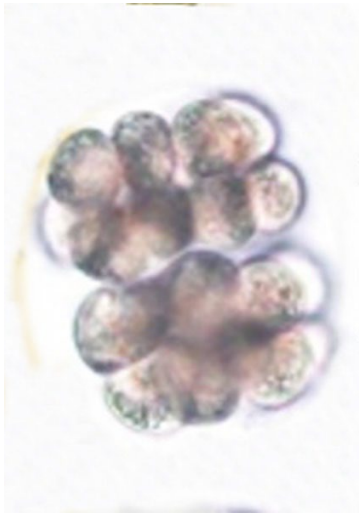

PHIL-8688

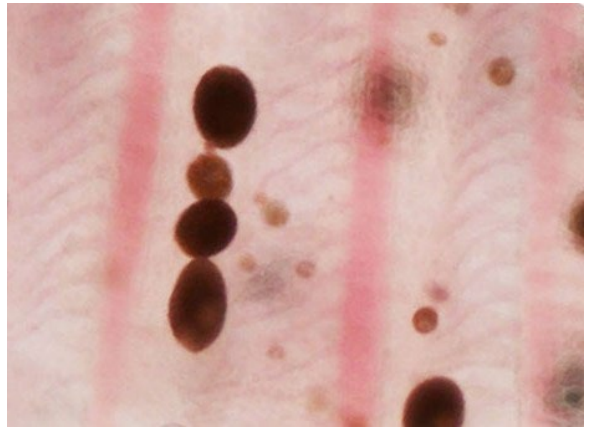

Amblyomma
dorsal
dorsal
male (~ 4 mm)
adult ticks
female (~ 4 mm)
ventral
ventral

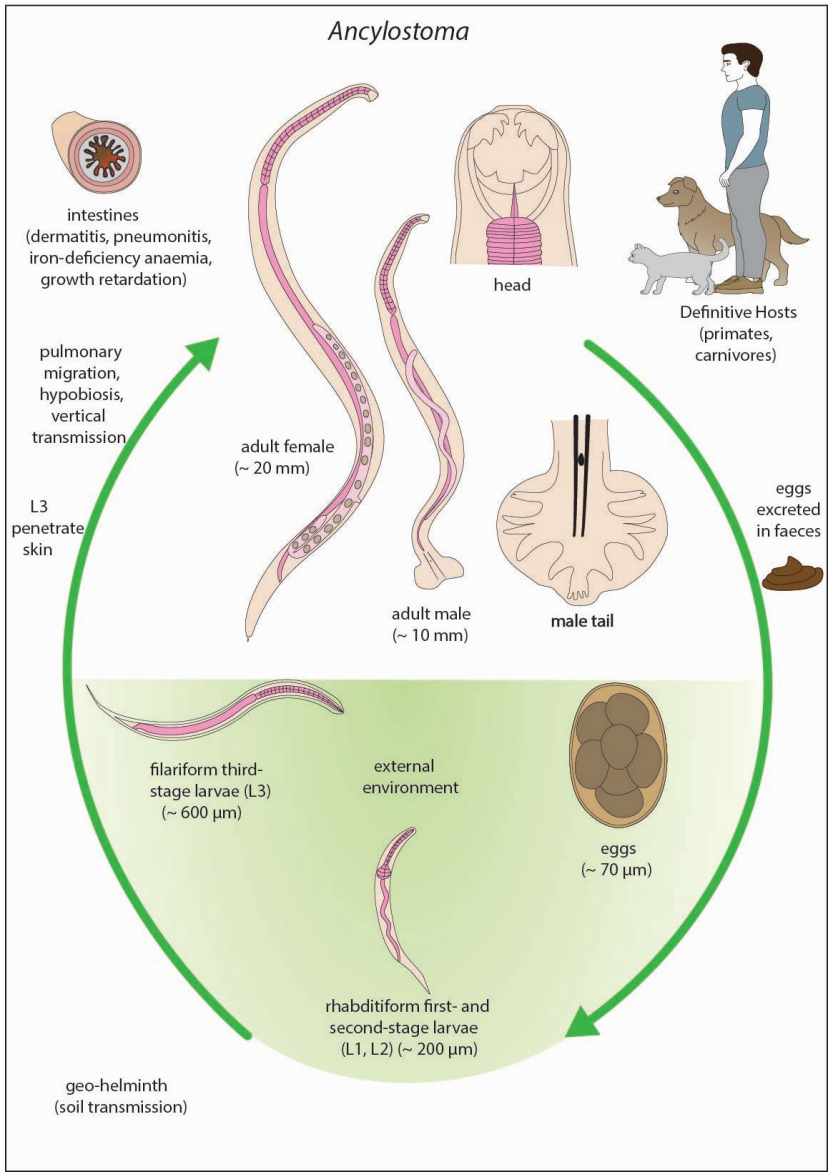

PHIL-5981

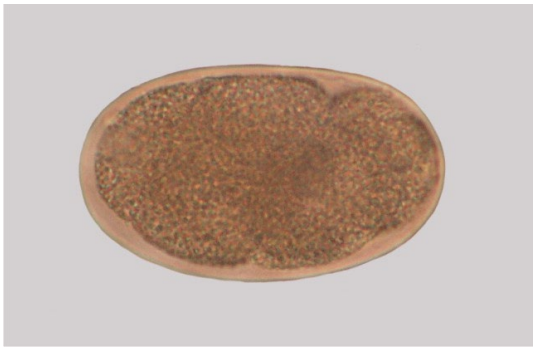

Amoebotaenia
intestines
(rarely enteritis,
anorexia, depression)
hermaphroditic
adults
(~ 1-4 mm)
Definitive Hosts
(birds, esp.
galliforms)
transmission
through
ingestion
of infected
worms
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 150 µm)
egg
(~ 40 µm)
oncosphere
(~ 40 µm)
Intermediate Hosts
(earthworms)
(body cavity)


Amyloodinium,
Piscinoodinium,
Crepidoodinium
oodinid dinoflagellates
with parasitic stages
on aquatic hosts
skin, gills
(superficial lesions,
discolourations (velvet
disease), respiratory
disorders)
Vertebrate Hosts
(marine and
freshwater fish)
Amyloodinium
(< 150 µm)
[saltwater fish]
Piscinoodinium
(< 160 µm)
[freshwater fish]
Crepidoodinium
(< 700 µm)
[estuarine fish]
parasitic trophonts with rhizoid-like holdfast organelles
(cells with or without chloroplasts)
dinospores
attach to hosts
trophonts detach
and form tomonts
Amyloodinium
Piscinoodinium
Crepidoodinium
dinospores (5-20 µm)
biflagellated (equatorial
girdle, ventral sulcus)
tomonts
(100-200 µm)
direct transmission via free-swimming dinospores
released from reproductive tomonts

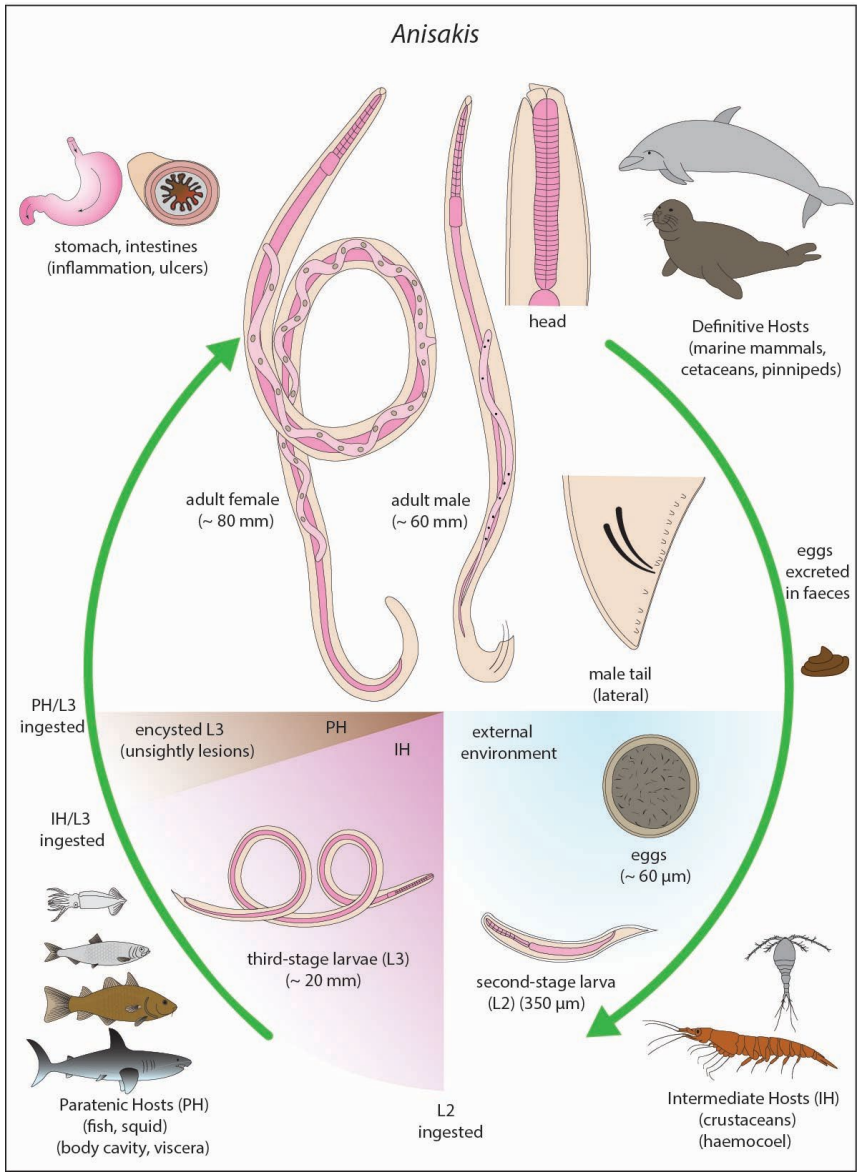


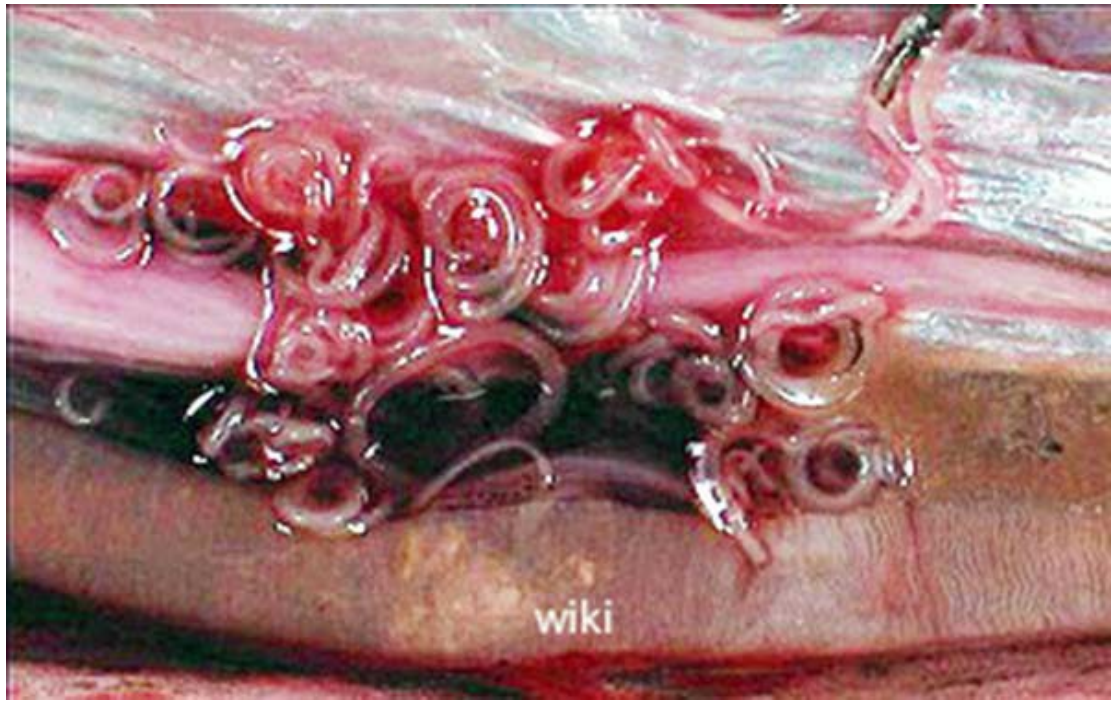


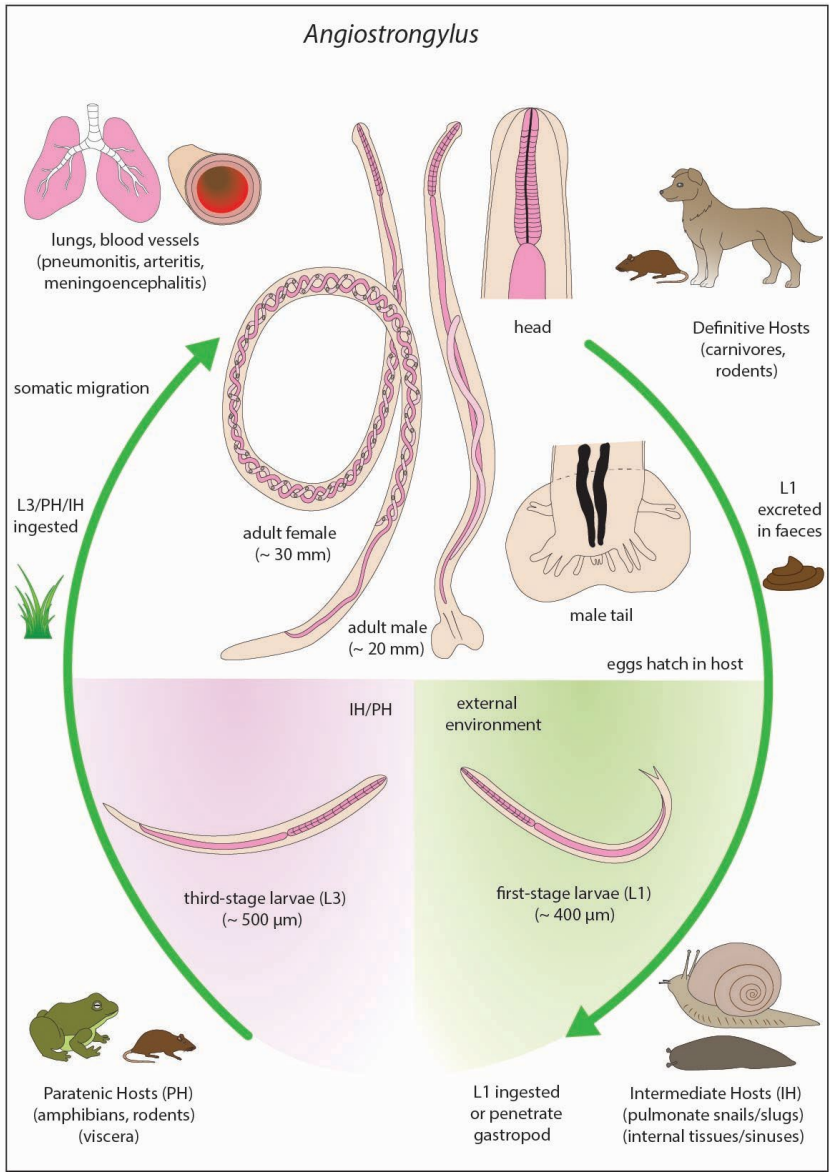

Ancylostoma
intestines
(dermatitis, pneumonitis,
iron-deficiency anaemia,
growth retardation)
head
Definitive Hosts
(primates,
carnivores)
pulmonary
migration,
hypobiosis,
vertical
transmission
adult female
(~ 20 mm)
L3
penetrate
skin
adult male
(~ 10 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 600 µm)
external
environment
eggs
(~ 70 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 200 µm)
geo-helminth
(soil transmission)

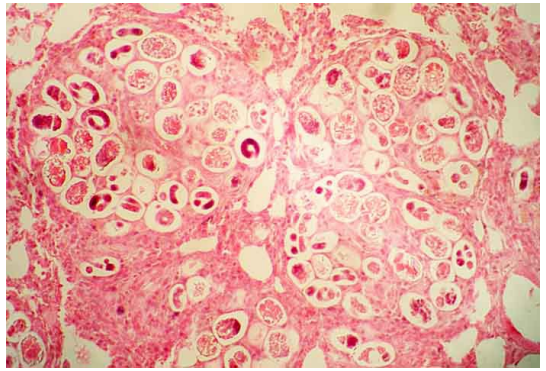


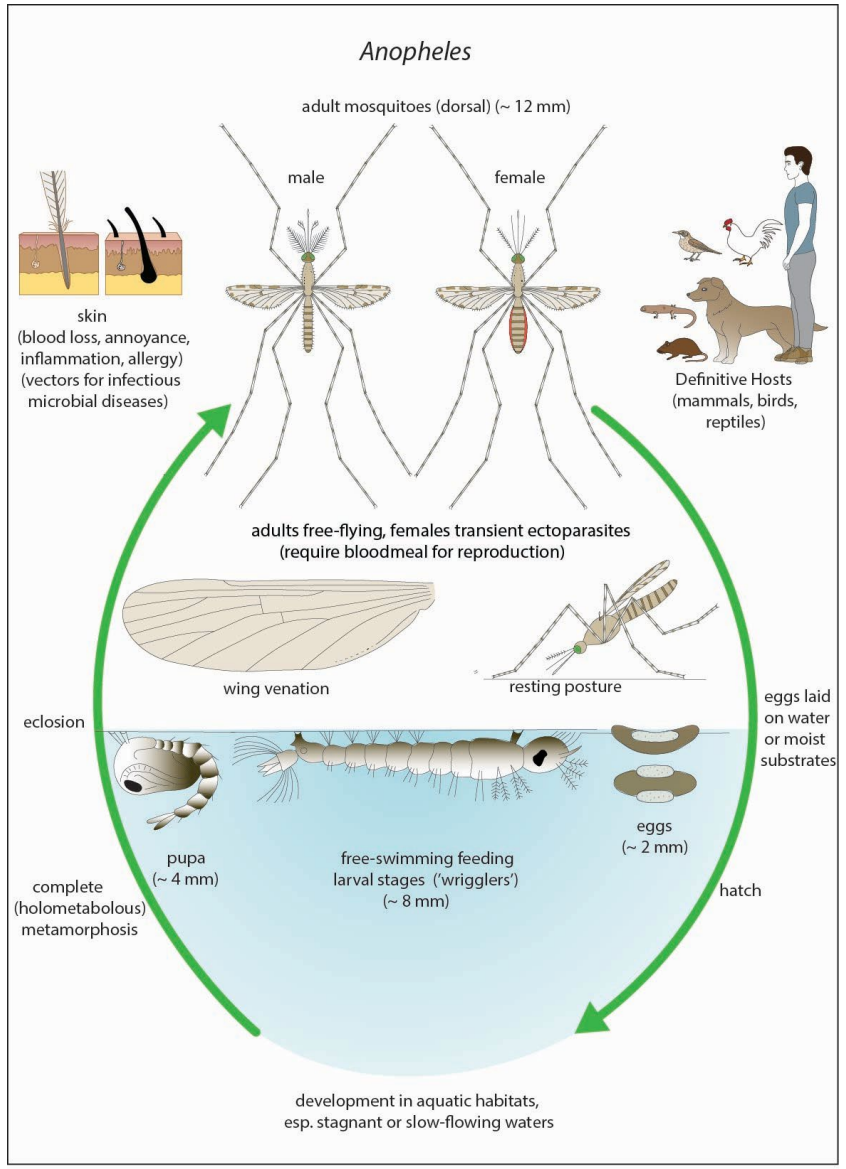

PHIL-5205


Anisakis
stomach, intestines
(inflammation, ulcers)
head
Definitive Hosts
(marine mammals,
cetaceans, pinnipeds)
adult female
(~ 80 mm)
adult male
(~ 60 mm)
male tail
(lateral)
eggs
excreted
in faeces
PH/L3
ingested
encysted L3
(unsightly lesions)
PH
IH
external
environment
IH/L3
ingested
eggs
(~ 60 µm)
third-stage larvae (L3)
(~ 20 mm)
second-stage larva
(L2) (350 µm)
Paratenic Hosts (PH)
(fish, squid)
(body cavity, viscera)
L2
ingested
Intermediate Hosts (IH)
(crustaceans)
(haemocoel)


wiki

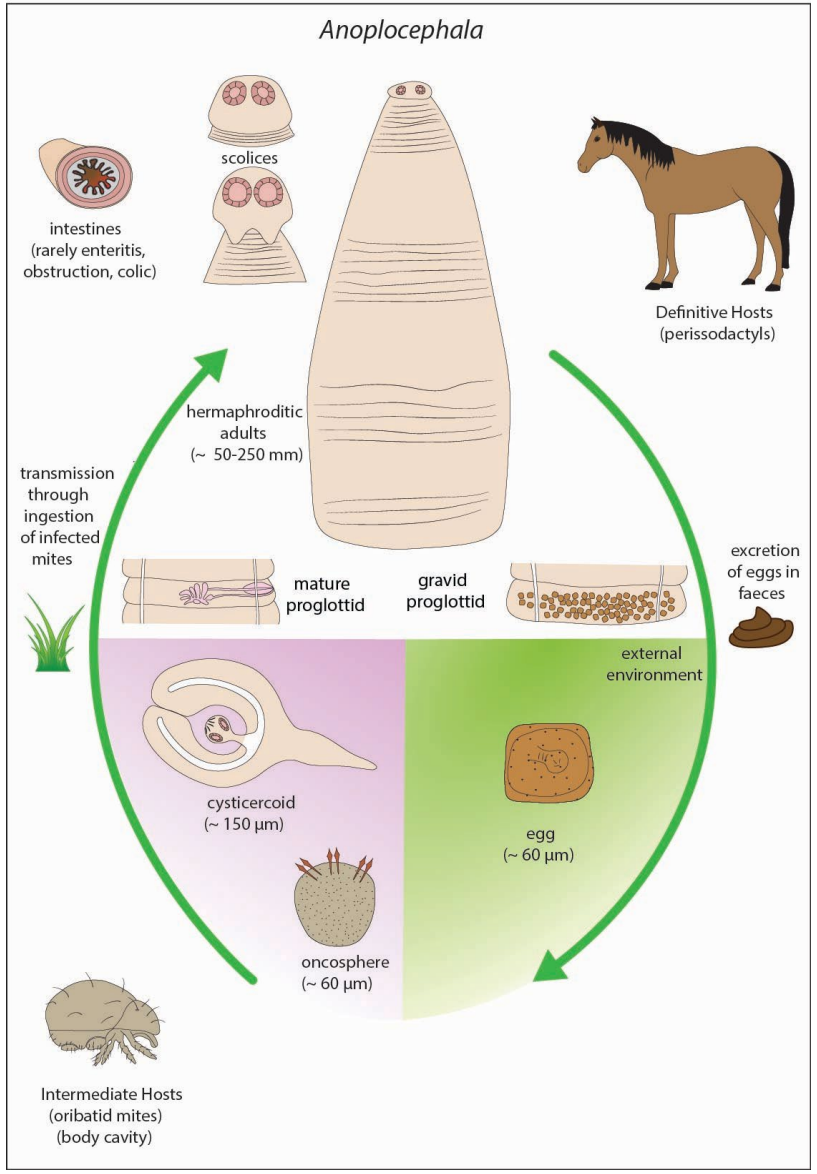

Angiostrongylus
lungs, blood vessels
(pneumonitis, arteritis,
meningoencephalitis)
head
Definitive Hosts
(carnivores,
rodents)
somatic migration
L3/PH/IH
ingested
adult female
(~ 30 mm)
adult male
(~ 20 mm)
male tail
L1
excreted
in faeces
eggs hatch in host
IH/PH
external
environment
third-stage larvae (L3)
(~ 500 µm)
first-stage larvae (L1)
(~ 400 µm)
Paratenic Hosts (PH)
(amphibians, rodents)
(viscera)
L1 ingested
or penetrate
gastropod
Intermediate Hosts (IH)
(pulmonate snails/slugs)
(internal tissues/sinuses)

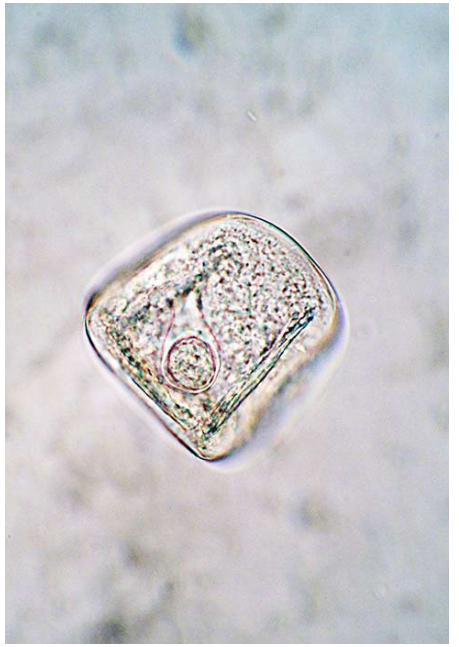


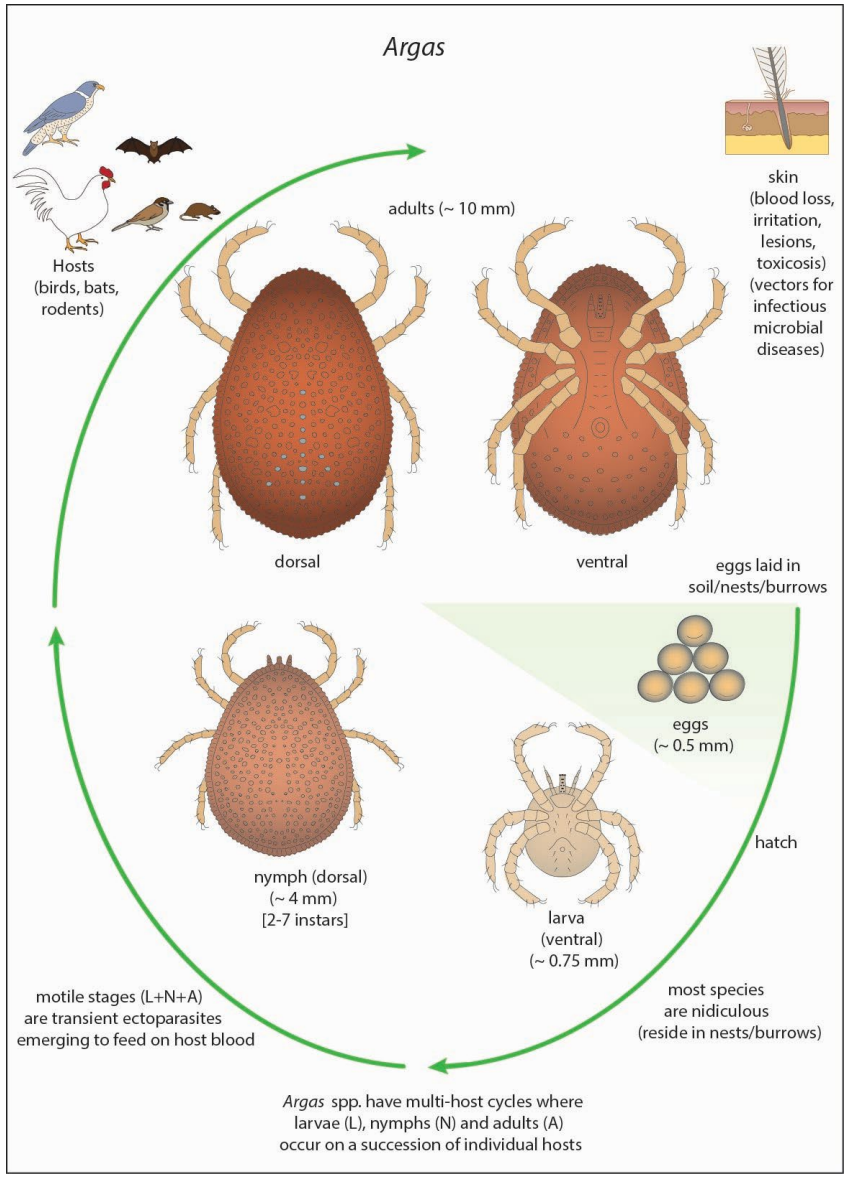

Anopheles
adult mosquitoes (dorsal) (~ 12 mm)
male
female
skin
(blood loss, annoyance, inflammation, allergy)
(vectors for infectious microbial diseases)
Definitive Hosts
(mammals, birds, reptiles)
adults free-flying, females transient ectoparasites
(require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs laid on water or moist substrates
pupa
(~ 4 mm)
free-swimming feeding larval stages ('wrigglers')
(~ 8 mm)
eggs
(~ 2 mm)
complete (holometabolous) metamorphosis
hatch
development in aquatic habitats,
esp. stagnant or slow-flowing waters


PHIL-7192

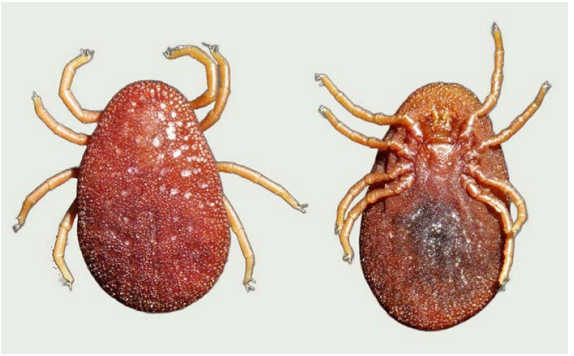

PHIL-27679


Anoplocephala
scolices
intestines
(rarely enteritis,
obstruction, colic)
Definitive Hosts
(perissodactyls)
hermaphroditic
adults
(~ 50-250 mm)
transmission
through
ingestion
of infected
mites
excretion
of eggs in
faeces
mature
proglottid
gravid
proglottid
external
environment
cysticercoid
(~ 150 µm)
egg
(~ 60 µm)
oncosphere
(~ 60 µm)
Intermediate Hosts
(oribatid mites)
(body cavity)

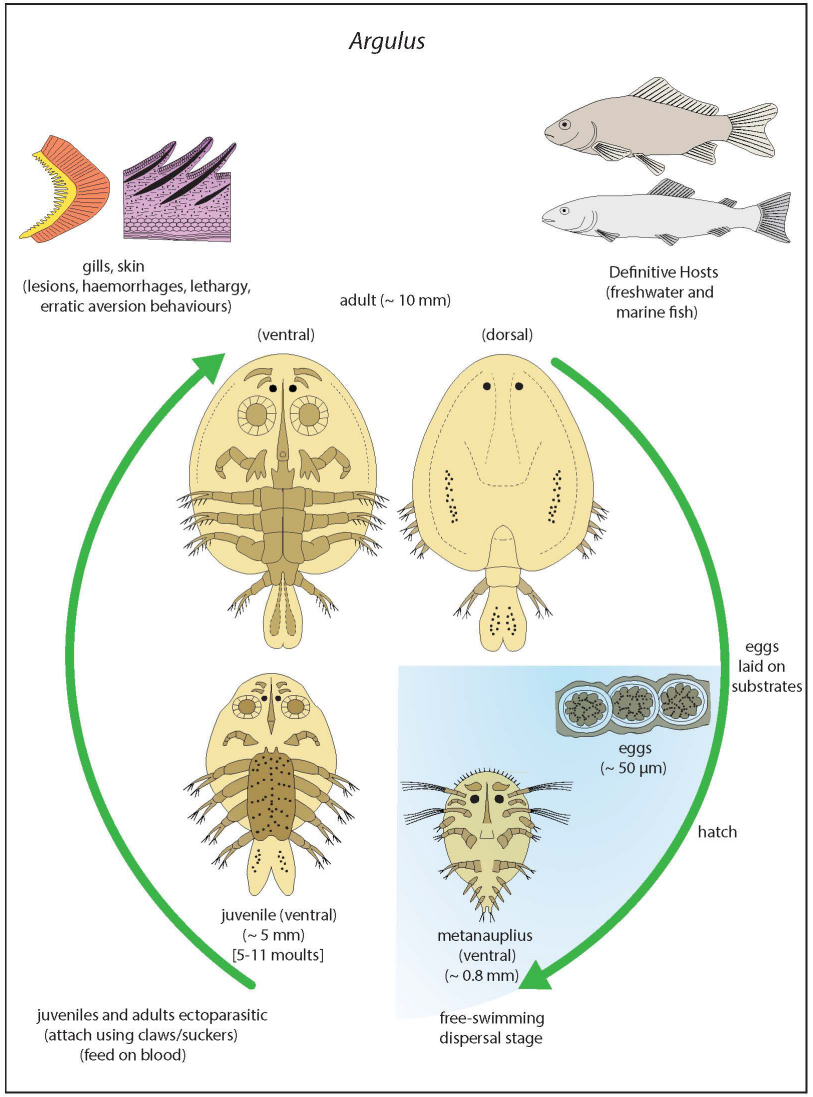



Argas
Hosts
(birds, bats,
rodents)
adults (~ 10 mm)
skin
(blood loss,
irritation,
lesions,
toxicosis)
(vectors for
infectious
microbial
diseases)
dorsal
ventral
eggs laid in
soil/nests/burrows
eggs
(~ 0.5 mm)
hatch
nymph (dorsal)
(~ 4 mm)
[2-7 instars]
larva
(ventral)
(~ 0.75 mm)
motile stages (L+N+A)
are transient ectoparasites
emerging to feed on host blood
most species
are nidiculous
(reside in nests/burrows)
Argas spp. have multi-host cycles where
larvae (L), nymphs (N) and adults (A)
occur on a succession of individual hosts

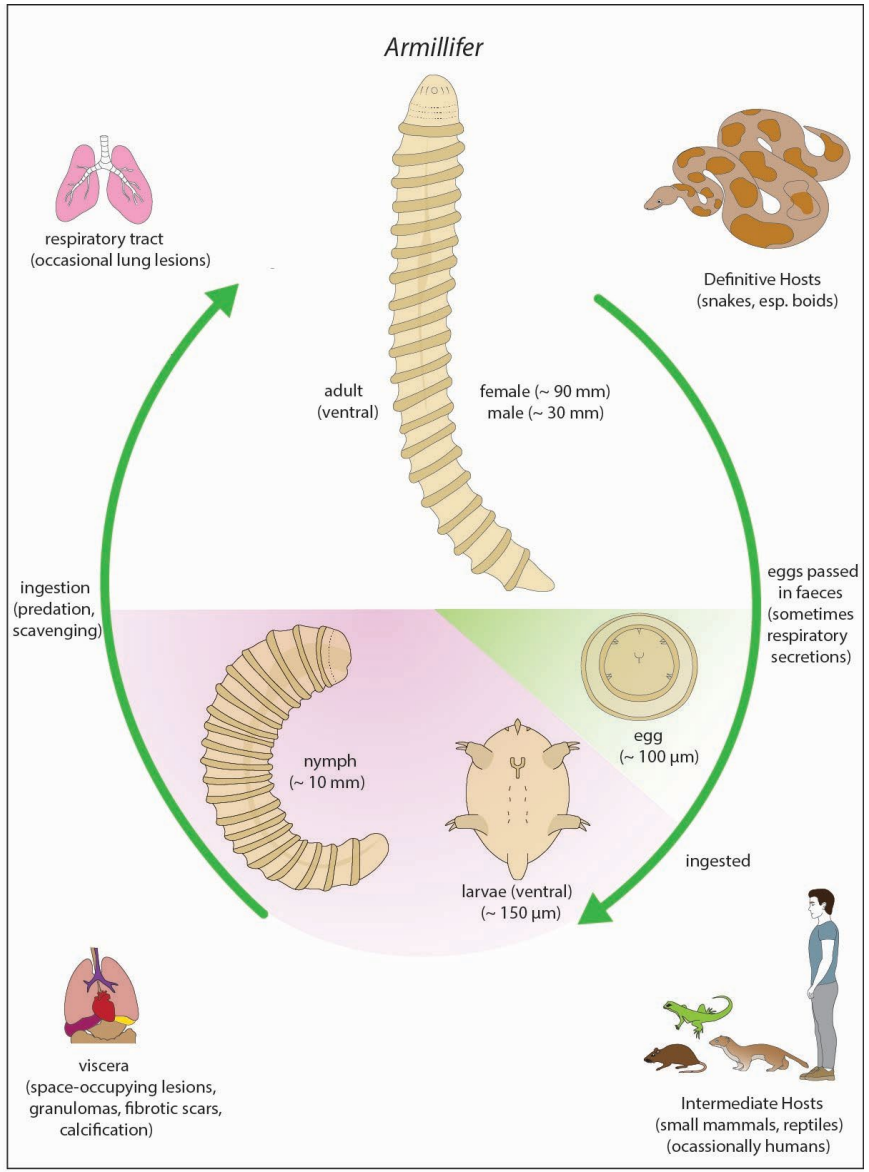

PHIL-5967

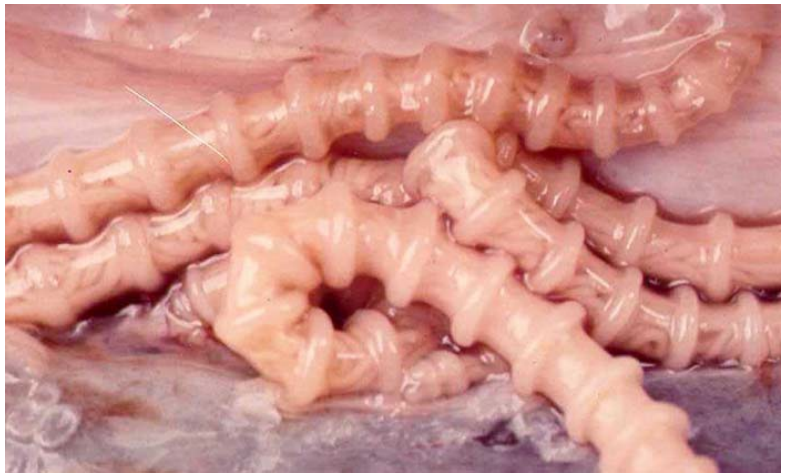


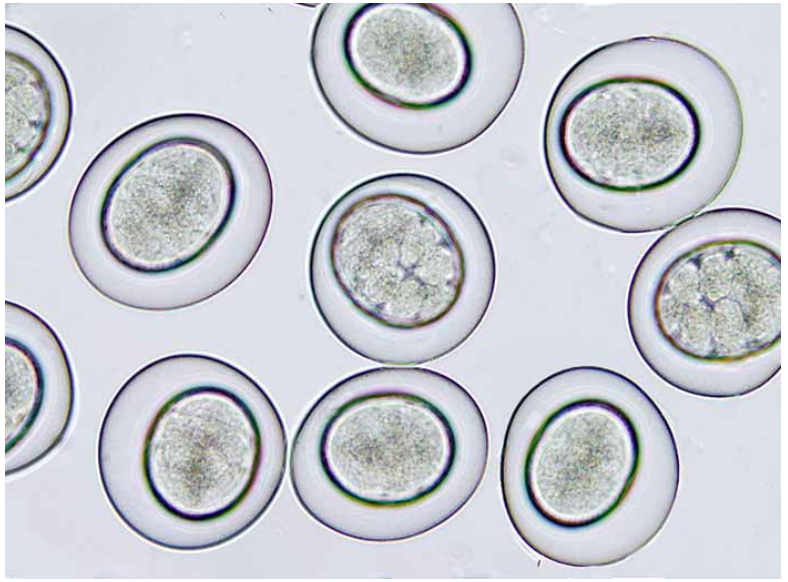

PHIL-28222

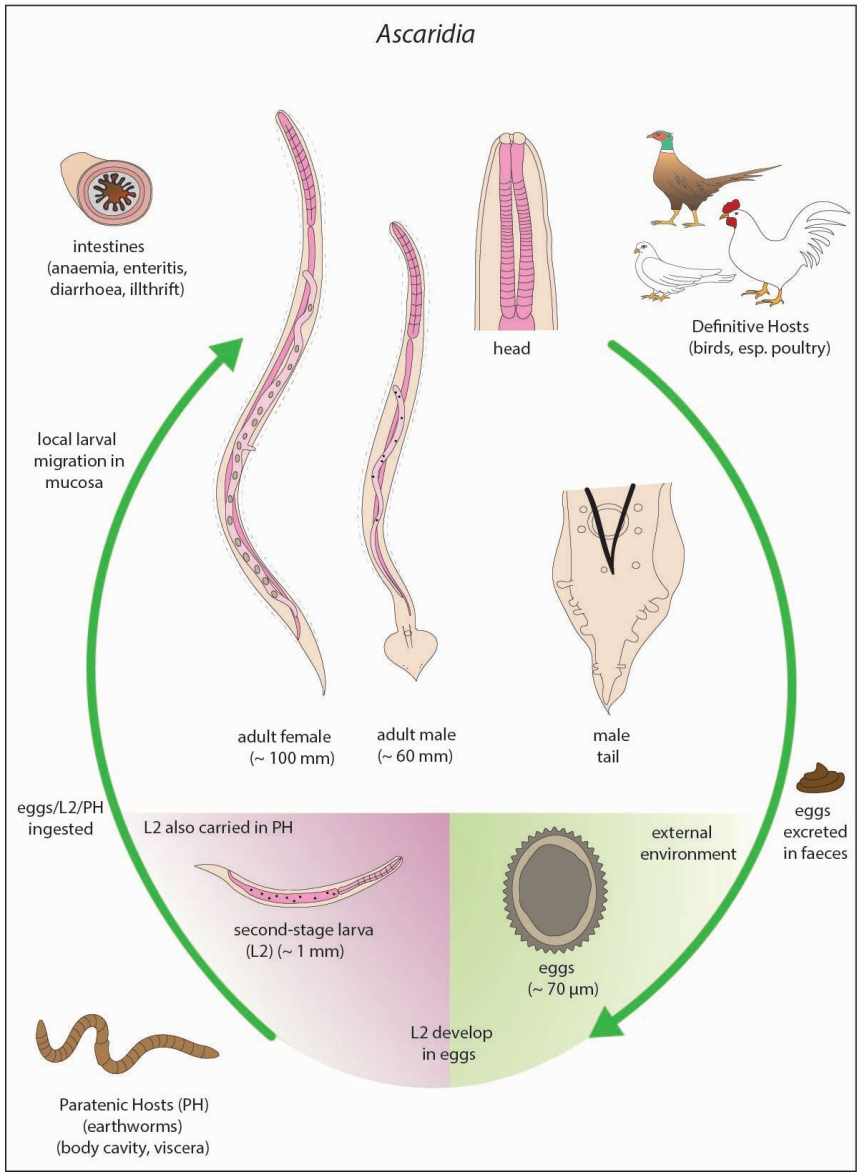

Argulus
gills, skin
(lesions, haemorrhages, lethargy,
erratic aversion behaviours)
Definitive Hosts
(freshwater and
marine fish)
adult (~ 10 mm)
(ventral)
(dorsal)
eggs
laid on
substrates
eggs
(~ 50 µm)
hatch
juvenile (ventral)
(~ 5 mm)
[5-11 moults]
metanauplius
(ventral)
(~ 0.8 mm)
juveniles and adults ectoparasitic
(attach using claws/suckers)
(feed on blood)
free-swimming
dispersal stage

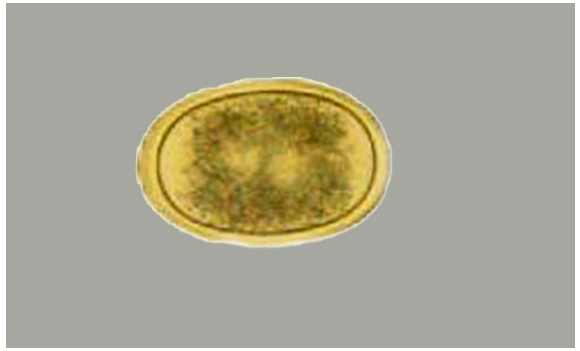

wiki

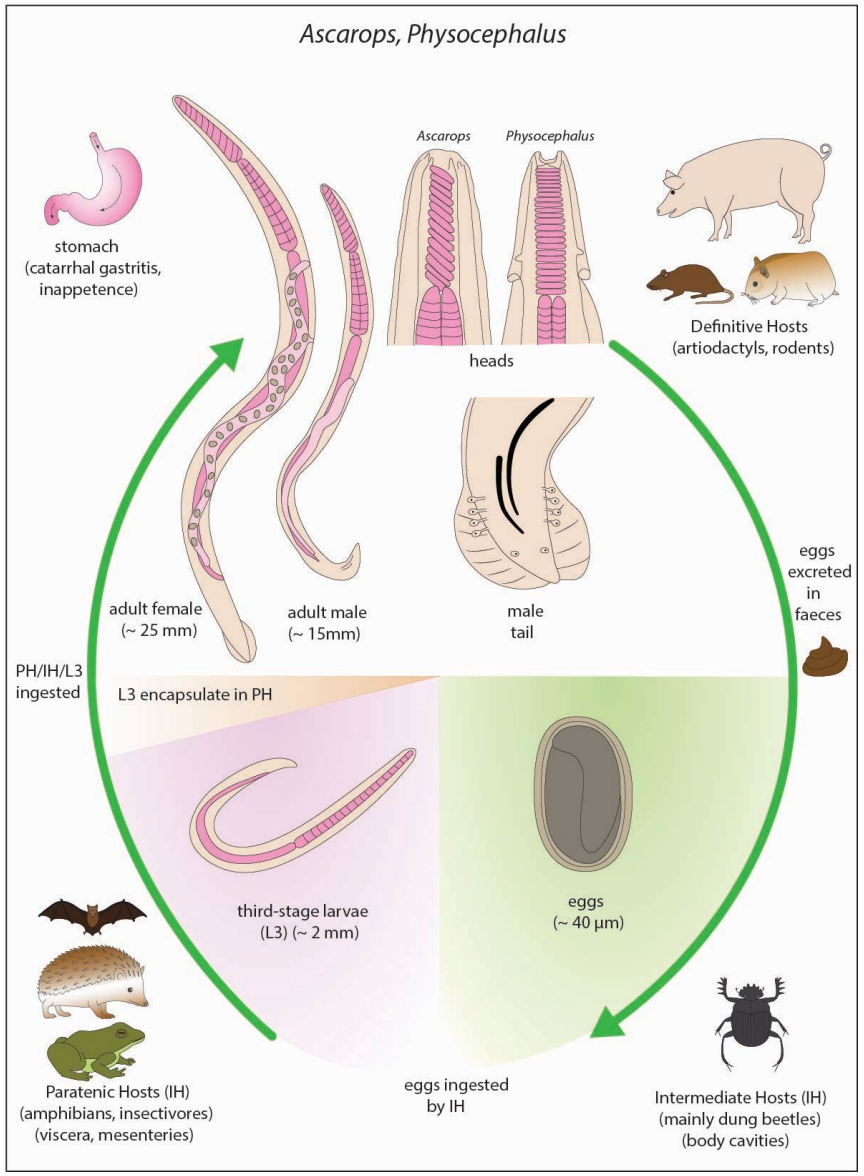

Armillifer
respiratory tract
(occasional lung lesions)
Definitive Hosts
(snakes, esp. boids)
adult
(ventral)
female (~ 90 mm)
male (~ 30 mm)
ingestion
(predation,
scavenging)
eggs passed
in faeces
(sometimes
respiratory
secretions)
nymph
(~ 10 mm)
egg
(~ 100 µm)
ingested
larvae (ventral)
(~ 150 µm)
viscera
(space-occupying lesions,
granulomas, fibrotic scars,
calcification)
Intermediate Hosts
(small mammals, reptiles)
(ocassionally humans)

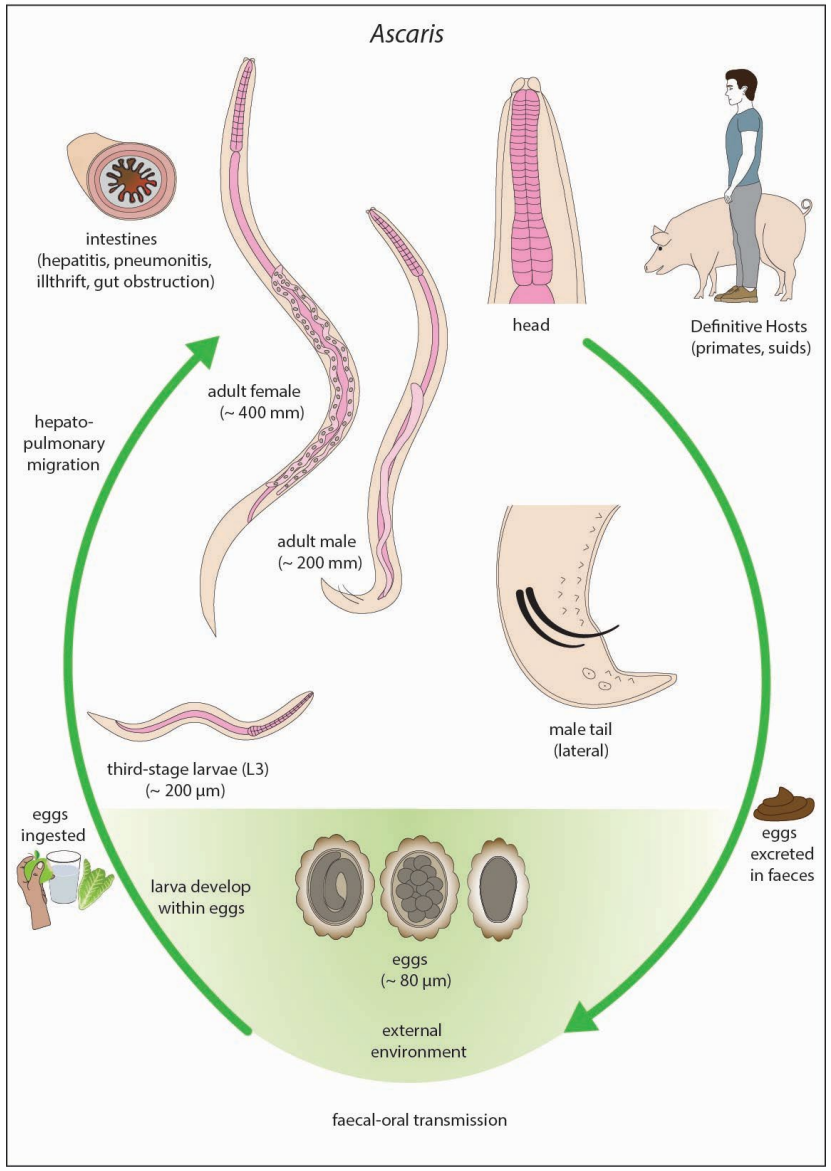


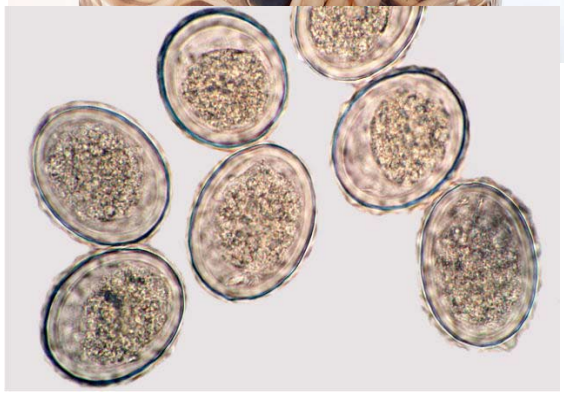


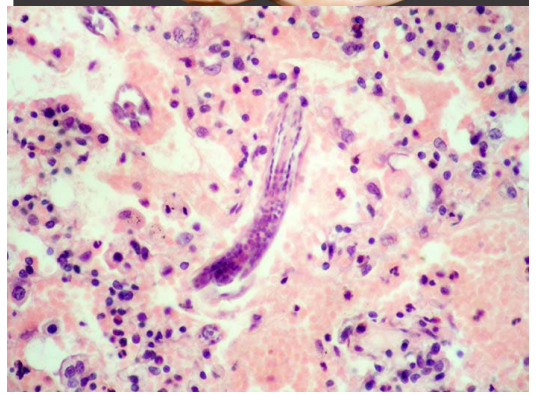

Ascaridia
intestines
(anaemia, enteritis,
diarrhoea, illthrift)
head
Definitive Hosts
(birds, esp. poultry)
local larval
migration in
mucosa
adult female
(~ 100 mm)
adult male
(~ 60 mm)
male
tail
eggs/L2/PH
ingested
L2 also carried in PH
external
environment
eggs
excreted
in faeces
second-stage larva
(L2) (~ 1 mm)
eggs
(~ 70 µm)
L2 develop
in eggs
Paratenic Hosts (PH)
(earthworms)
(body cavity, viscera)

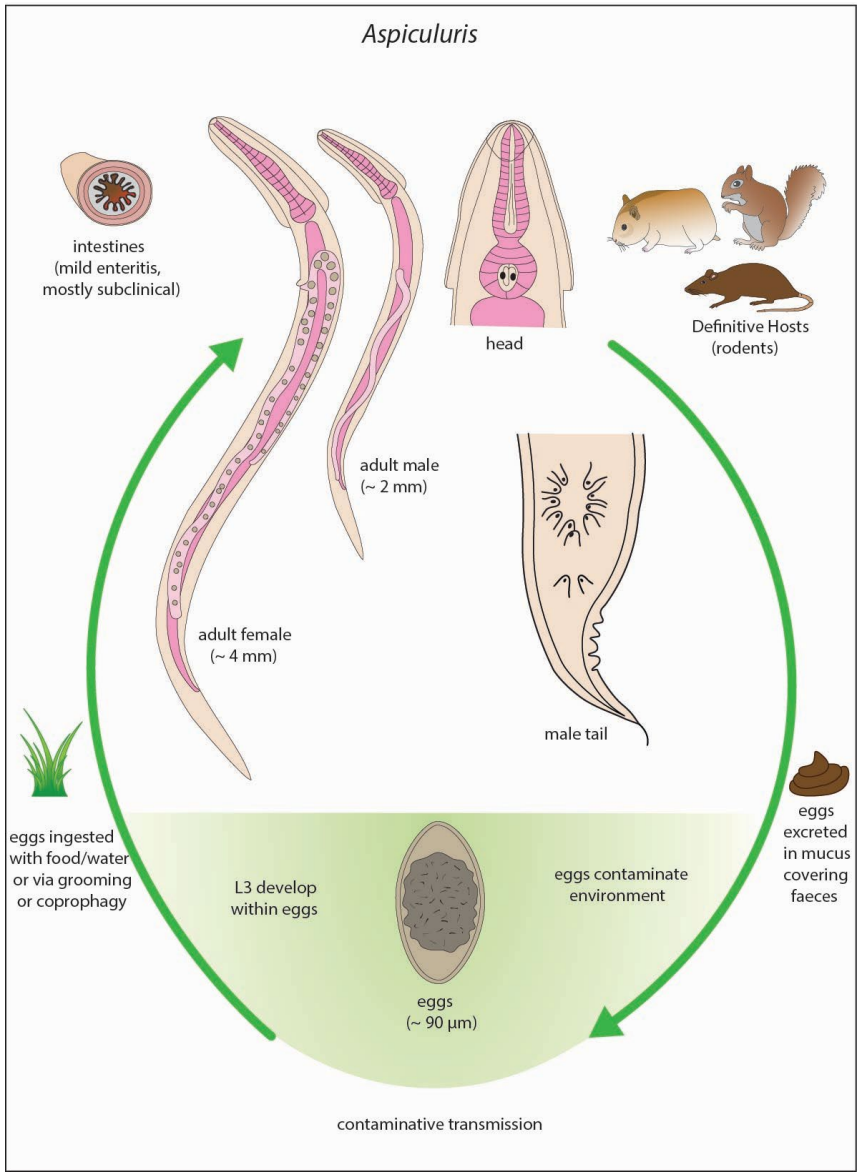


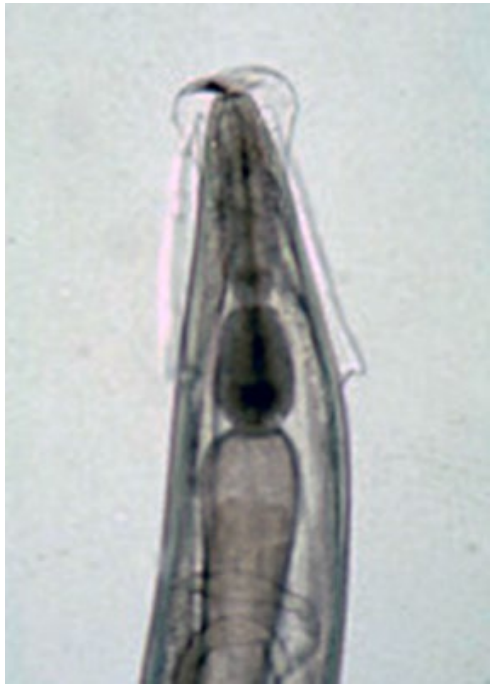

Ascarops, Physocephalus
Ascarops
Physocephalus
stomach
(catarrhal gastritis,
inappetence)
heads
Definitive Hosts
(artiodactyls, rodents)
adult female
(~ 25 mm)
adult male
(~ 15mm)
male
tail
eggs
excreted
in
faeces
PH/IH/L3
ingested
L3 encapsulate in PH
third-stage larvae
(L3) (~ 2 mm)
eggs
(~ 40 µm)
Paratenic Hosts (IH)
(amphibians, insectivores)
(viscera, mesenteries)
eggs ingested
by IH
Intermediate Hosts (IH)
(mainly dung beetles)
(body cavities)

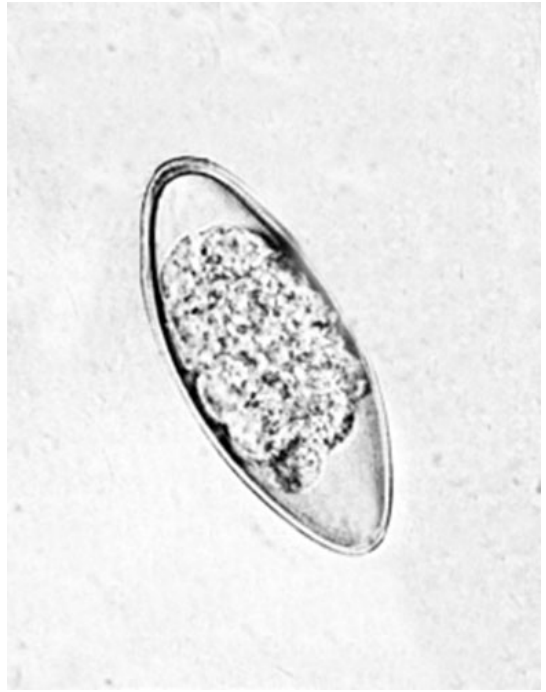

Ascaris
intestines
(hepatitis, pneumonitis,
illthrift, gut obstruction)
head
Definitive Hosts
(primates, suids)
adult female
(~ 400 mm)
hepato-
pulmonary
migration
adult male
(~ 200 mm)
male tail
(lateral)
third-stage larvae (L3)
(~ 200 µm)
eggs
ingested
eggs
excreted
in faeces
larva develop
within eggs
eggs
(~ 80 µm)
external
environment
faecal-oral transmission

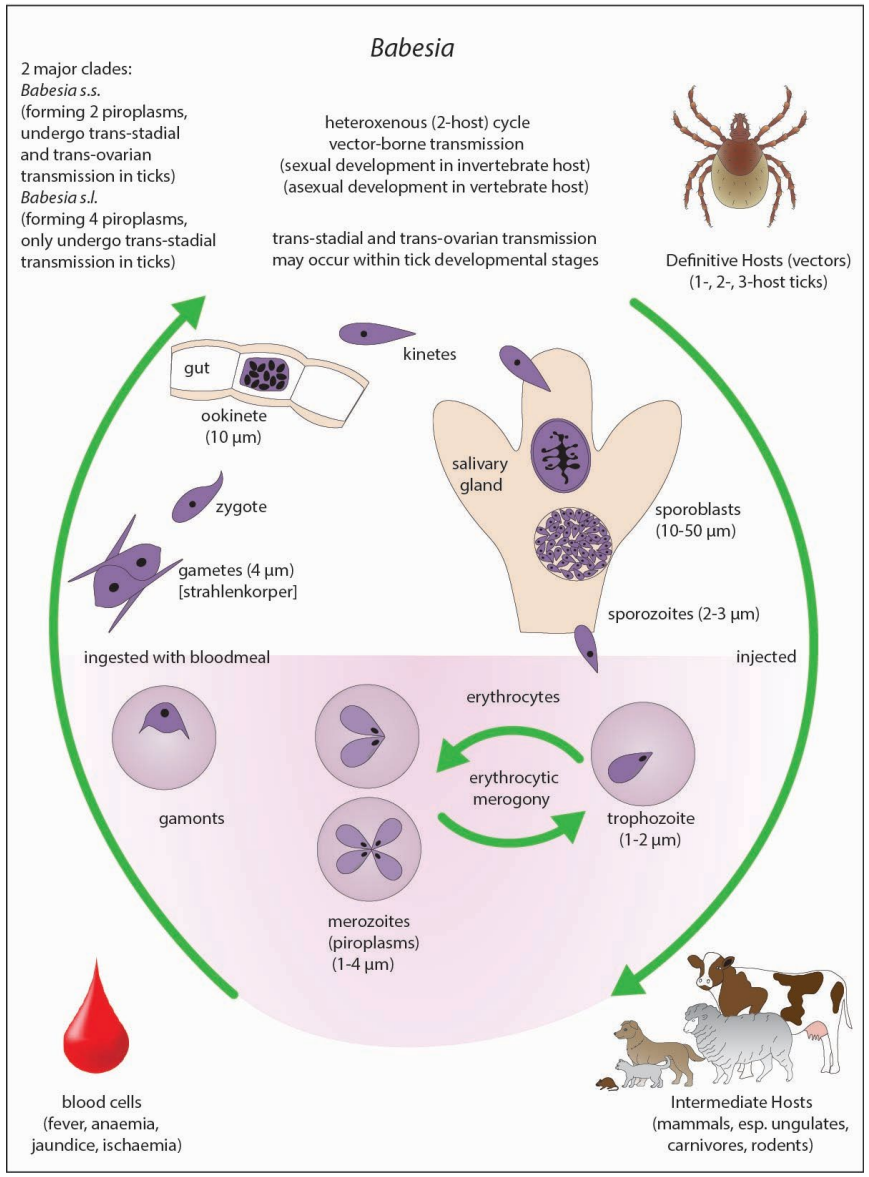


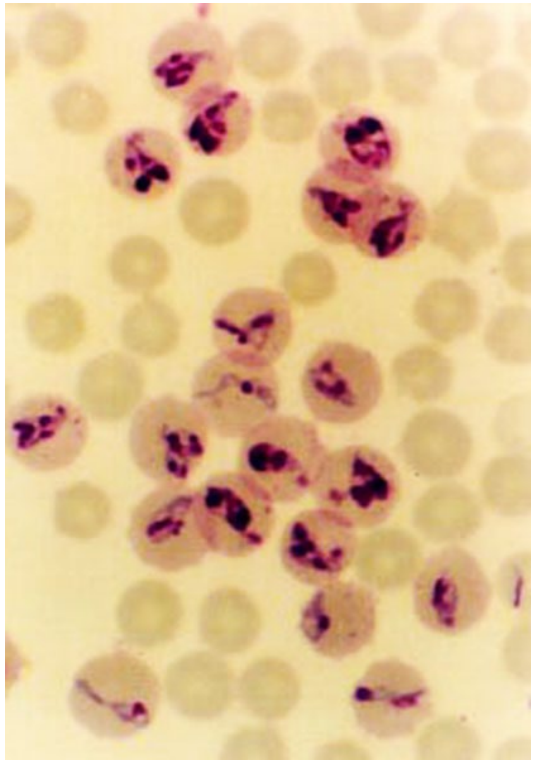


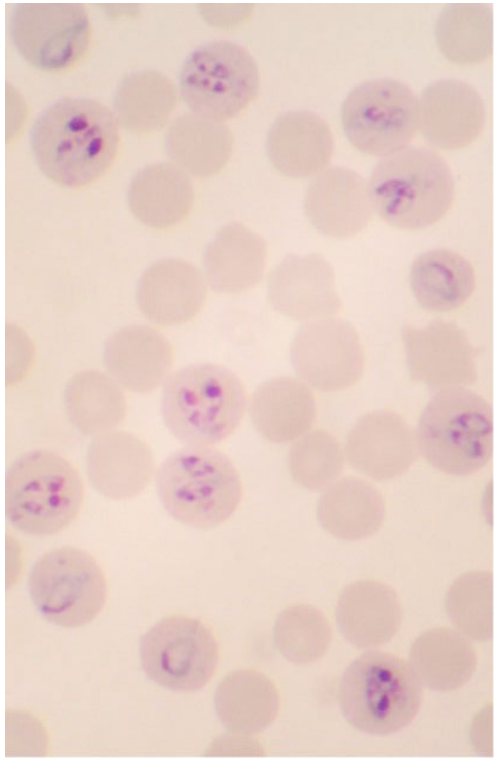

Aspiculuris
intestines
(mild enteritis,
mostly subclinical)
head
Definitive Hosts
(rodents)
adult male
(~ 2 mm)
adult female
(~ 4 mm)
male tail
eggs ingested
with food/water
or via grooming
or coprophagy
L3 develop
within eggs
eggs
(~ 90 µm)
eggs contaminate
environment
eggs
excreted
in mucus
covering
faeces
contaminative transmission

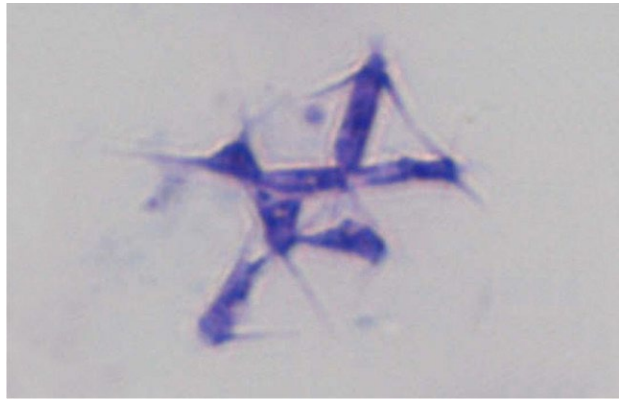


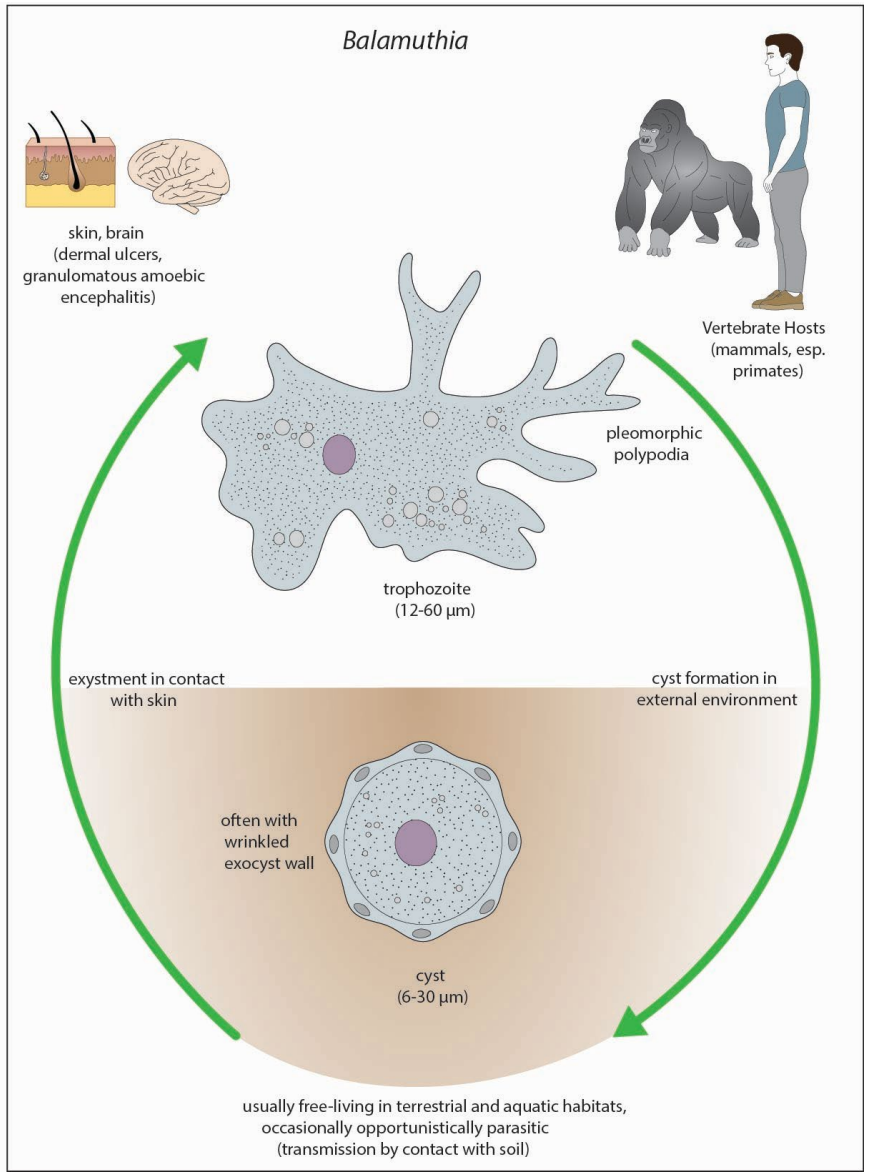


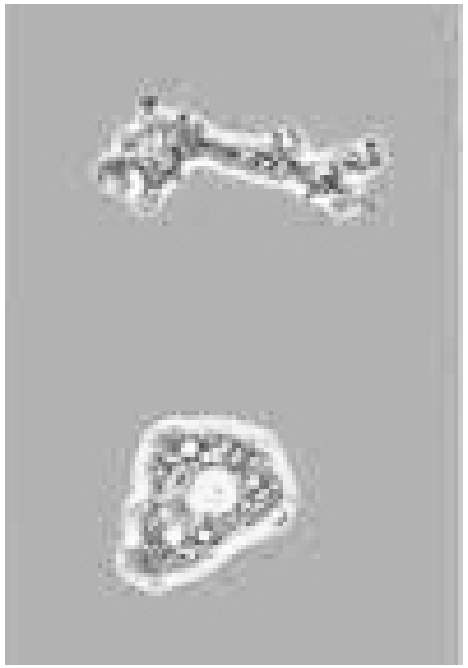

Babesia
2 major clades:
Babesia s.s.
(forming 2 piroplasms, undergo trans-stadial and trans-ovarian transmission in ticks)
Babesia s.l.
(forming 4 piroplasms, only undergo trans-stadial transmission in ticks)
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
trans-stadial and trans-ovarian transmission may occur within tick developmental stages
Definitive Hosts (vectors)
(1-, 2-, 3-host ticks)
gut
kinetes
ookinete
(10 µm)
salivary gland
zygote
sporoblasts
(10-50 µm)
gametes (4 µm)
[strahlenkorper]
sporozoites (2-3 µm)
ingested with bloodmeal
injected
erythrocytes
erythrocytic merogony
gamonts
trophozoite
(1-2 µm)
merozoites
(piroplasms)
(1-4 µm)
blood cells
(fever, anaemia, jaundice, ischaemia)
Intermediate Hosts
(mammals, esp. ungulates, carnivores, rodents)

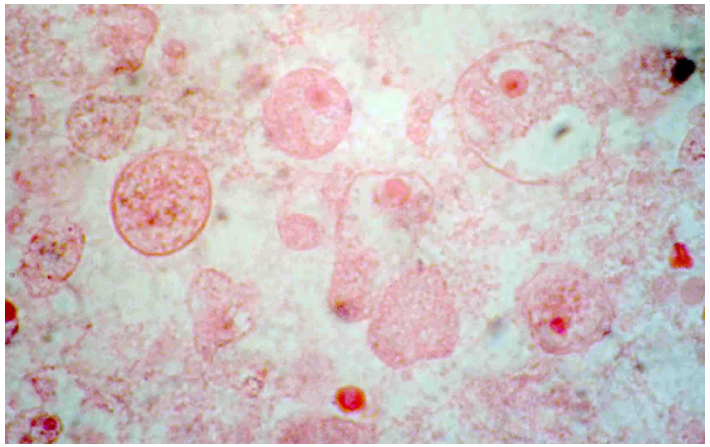


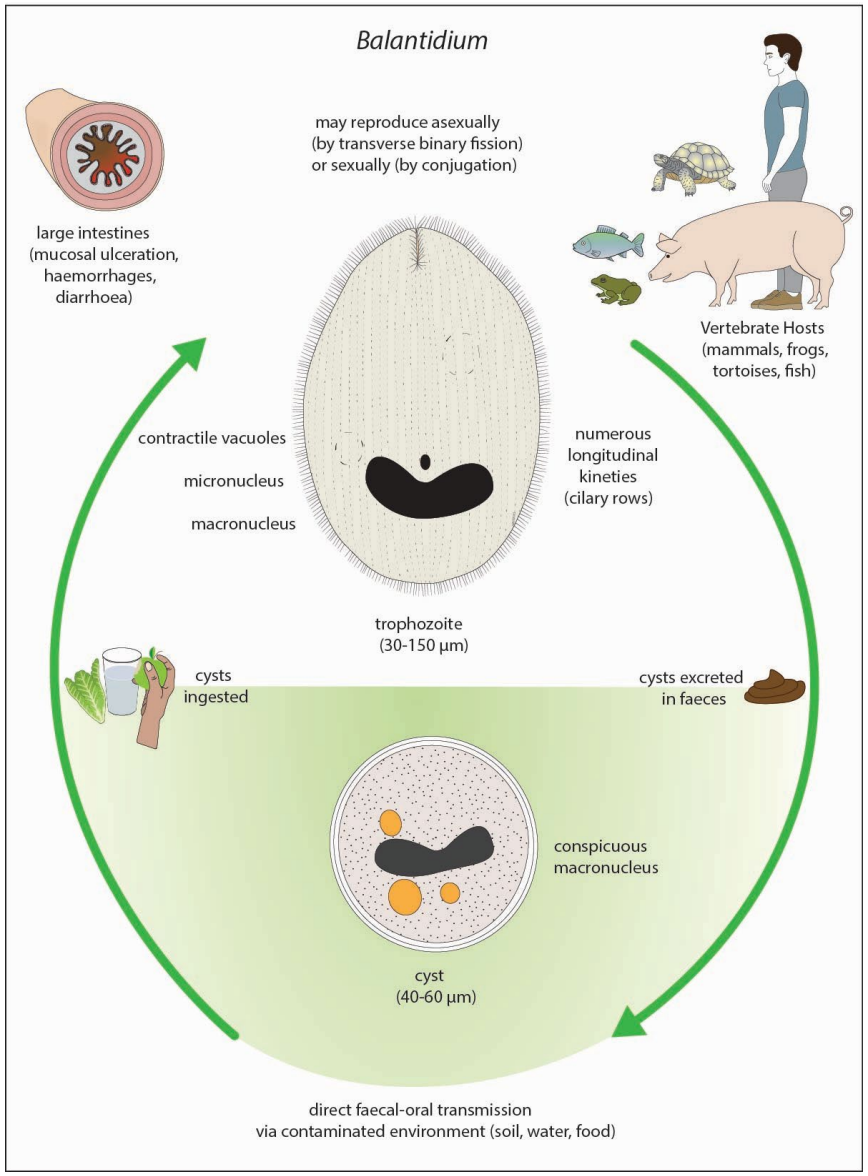


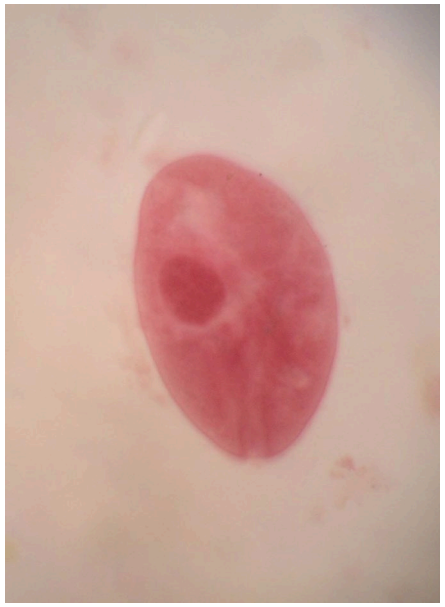


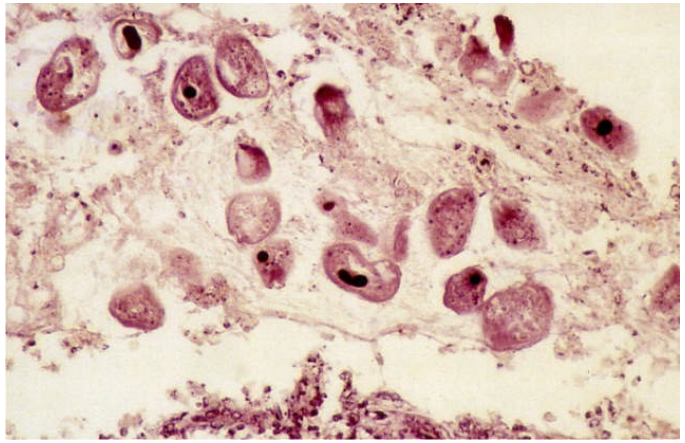

Balamuthia
skin, brain
(dermal ulcers,
granulomatous amoebic
encephalitis)
Vertebrate Hosts
(mammals, esp.
primates)
pleomorphic
polypodia
trophozoite
(12-60 µm)
exystment in contact
with skin
cyst formation in
external environment
often with
wrinkled
exocyst wall
cyst
(6-30 µm)
usually free-living in terrestrial and aquatic habitats,
occasionally opportunistically parasitic
(transmission by contact with soil)

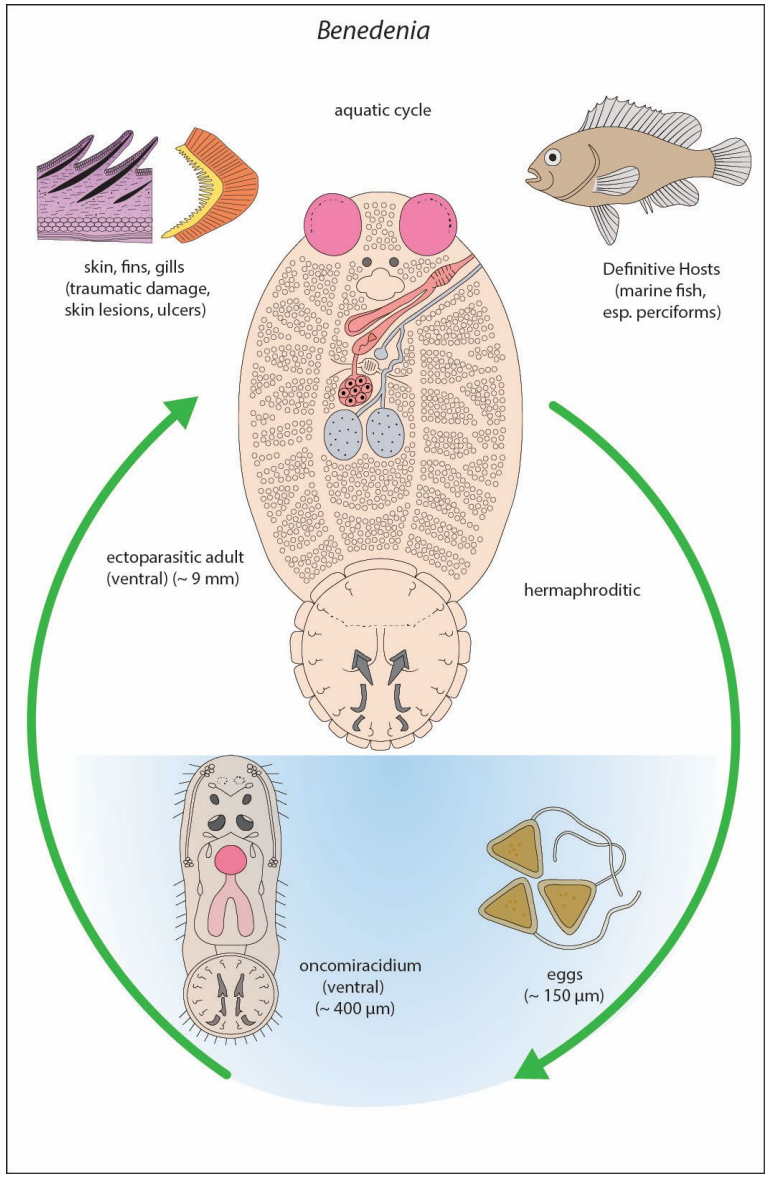


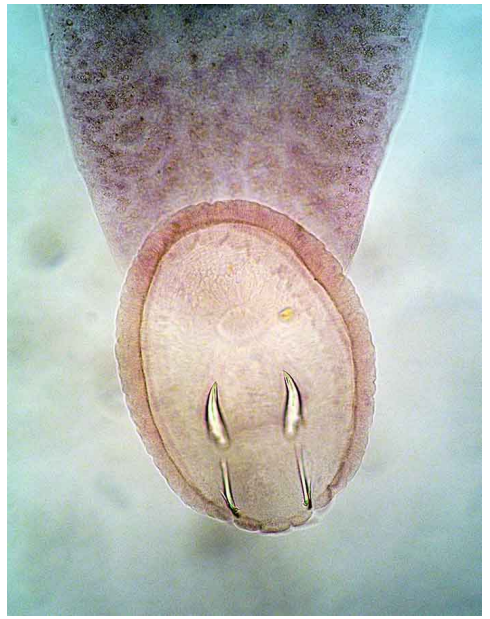


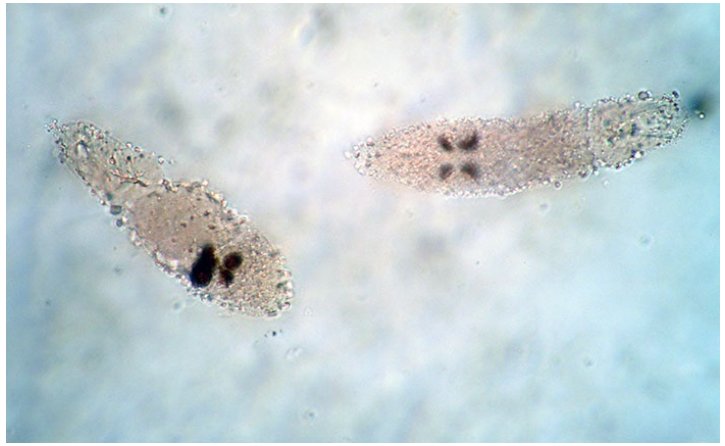

Balantidium
large intestines
(mucosal ulceration,
haemorrhages,
diarrhoea)
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
Vertebrate Hosts
(mammals, frogs,
tortoises, fish)
contractile vacuoles
micronucleus
macronucleus
numerous
longitudinal
kineties
(ciliary rows)
trophozoite
(30-150 µm)
cysts
ingested
cysts excreted
in faeces
conspicuous
macronucleus
cyst
(40-60 µm)
direct faecal-oral transmission
via contaminated environment (soil, water, food)

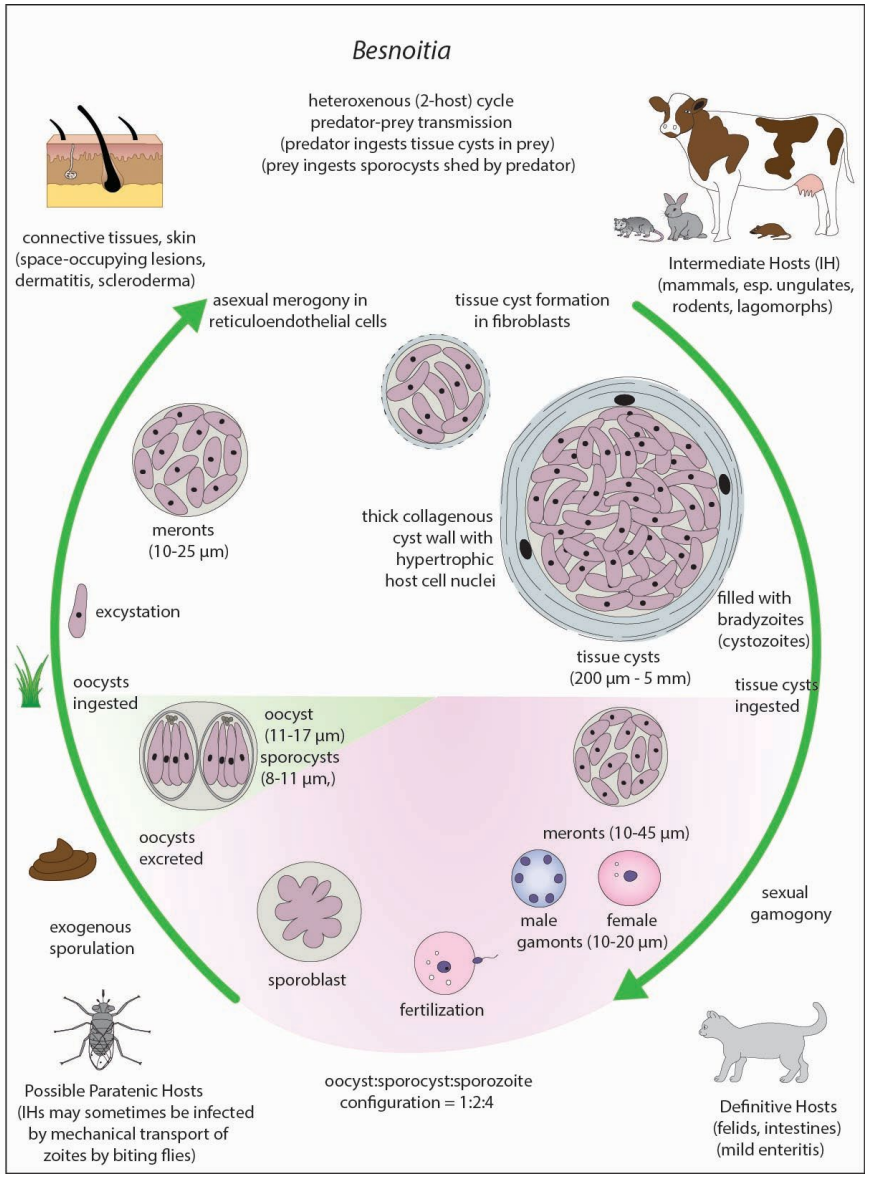


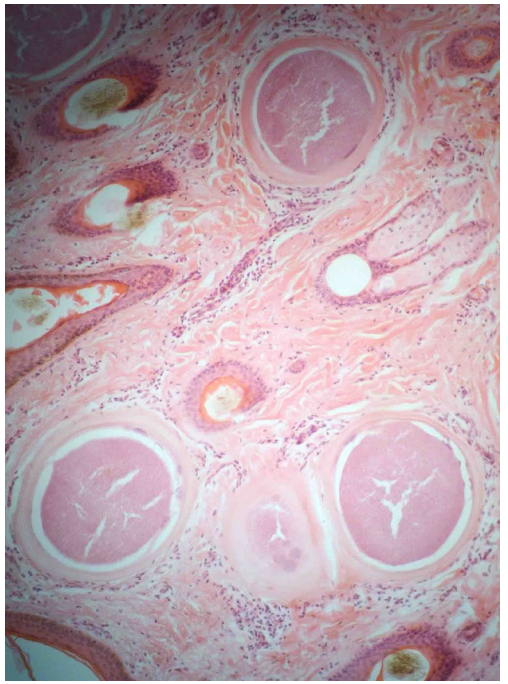


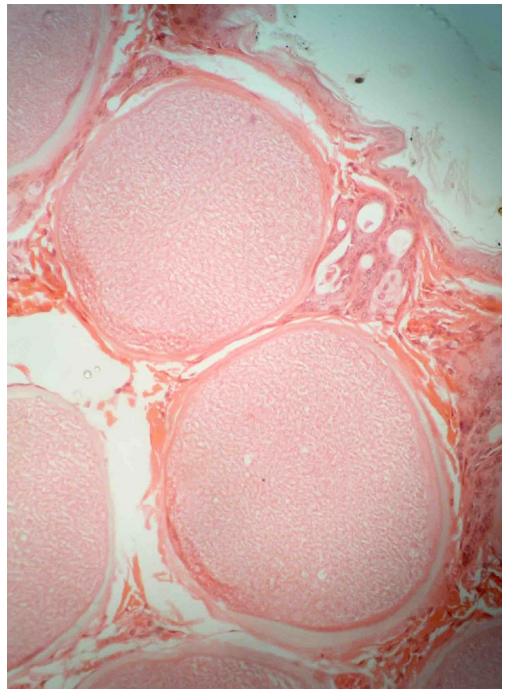

Benedenia
aquatic cycle
skin, fins, gills
(traumatic damage,
skin lesions, ulcers)
Definitive Hosts
(marine fish,
esp. perciforms)
ectoparasitic adult
(ventral) (~ 9 mm)
hermaphroditic
oncomiracidium
(ventral)
(~ 400 µm)
eggs
(~ 150 µm)

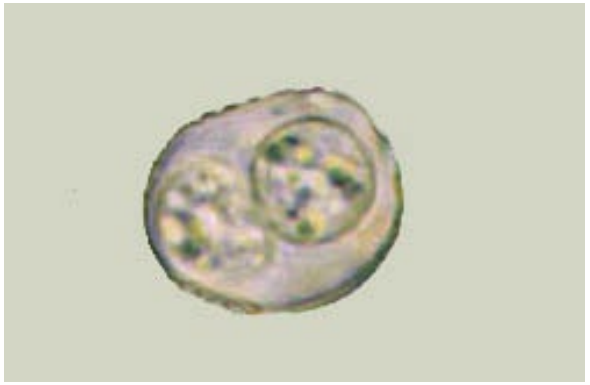


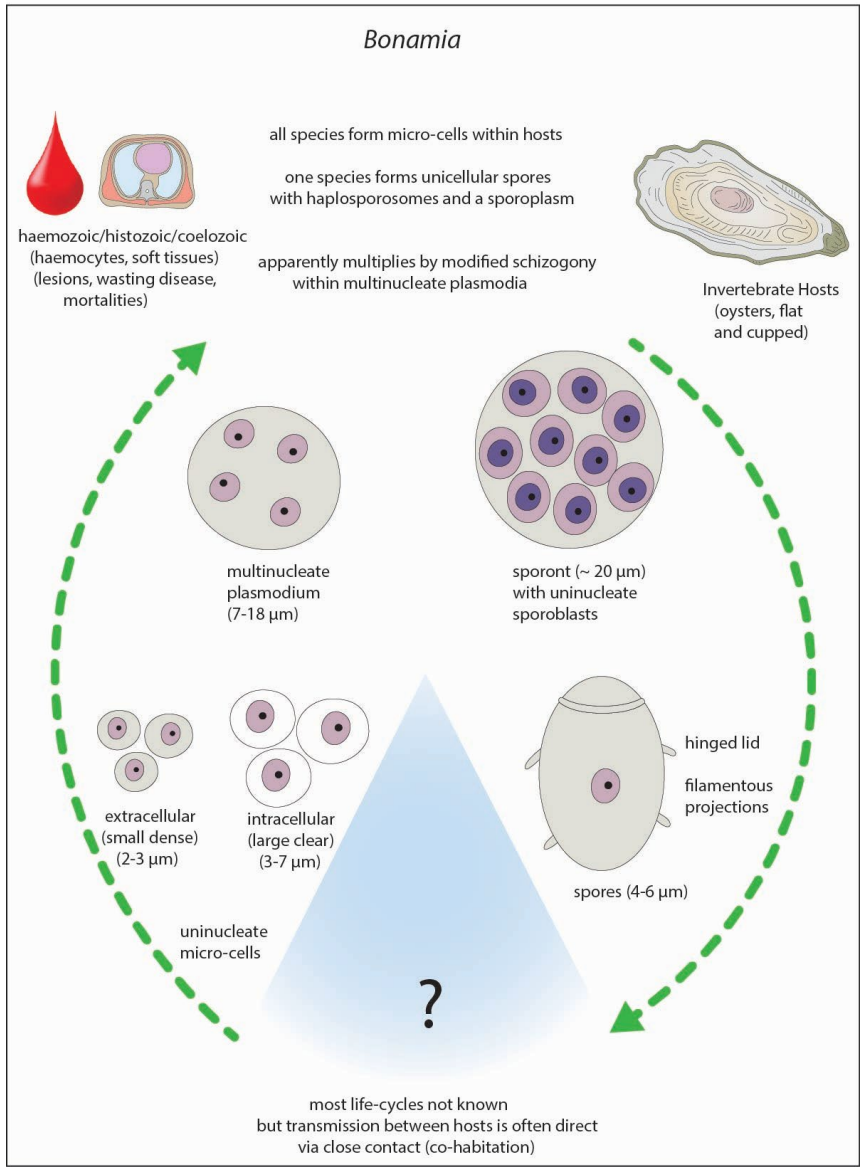


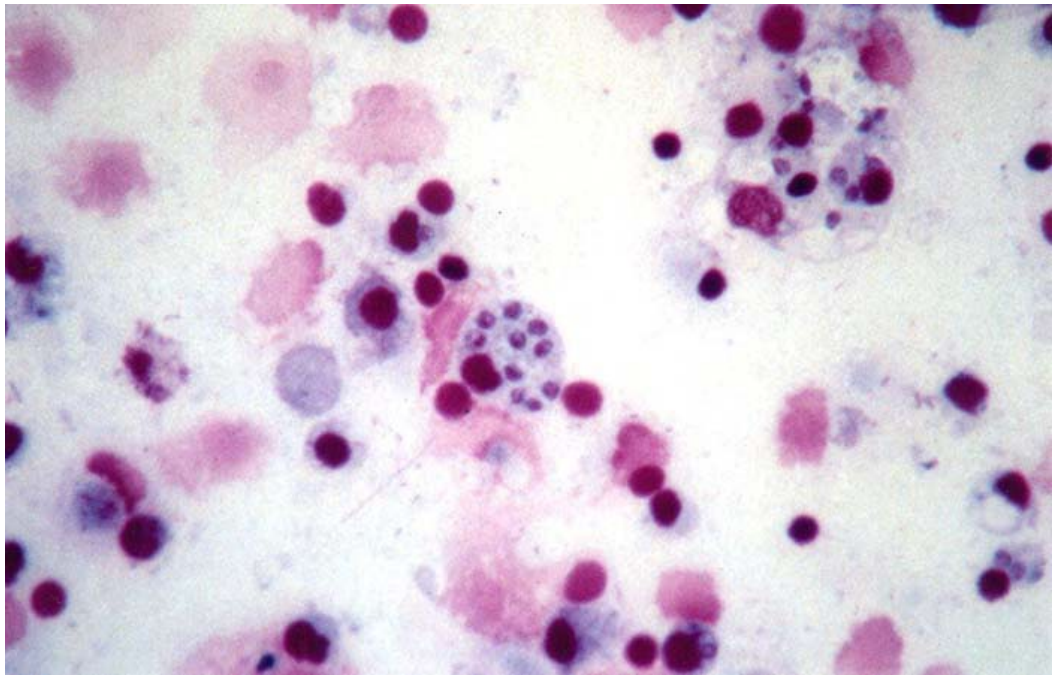

Besnoitia
heteroxenous (2-host) cycle
predator-prey transmission
(predator ingests tissue cysts in prey)
(prey ingests sporocysts shed by predator)
connective tissues, skin
(space-occupying lesions,
dermatitis, scleroderma)
Intermediate Hosts (IH)
(mammals, esp. ungulates,
rodents, lagomorphs)
asexual merogony in
reticuloendothelial cells
tissue cyst formation
in fibroblasts
meronts
(10-25 µm)
thick collagenous
cyst wall with
hypertrophic
host cell nuclei
filled with
bradyzoites
(cystozoites)
excystation
tissue cysts
(200 µm - 5 mm)
oocysts
ingested
tissue cysts
ingested
oocyst
(11-17 µm)
sporocysts
(8-11 µm,)
meronts (10-45 µm)
oocysts
excreted
male
female
gamonts (10-20 µm)
sexual
gamogony
exogenous
sporulation
sporoblast
fertilization
Possible Paratenic Hosts
(IHs may sometimes be infected
by mechanical transport of
zoites by biting flies)
oocyst:sporocyst:sporozoite
configuration = 1:2:4
Definitive Hosts
(felids, intestines)
(mild enteritis)

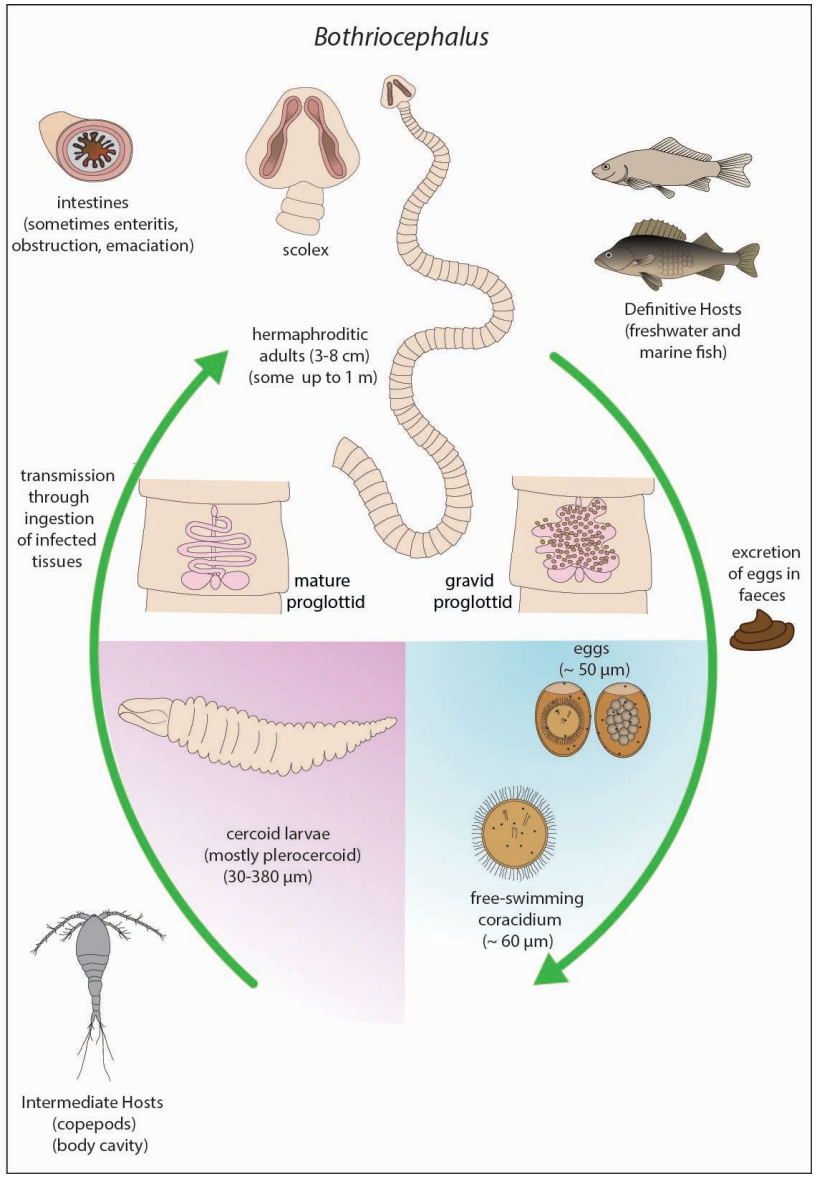


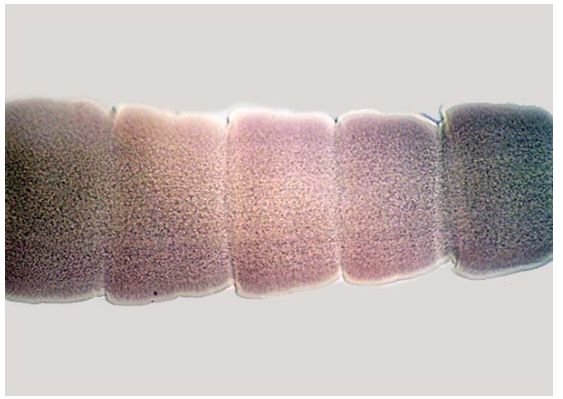


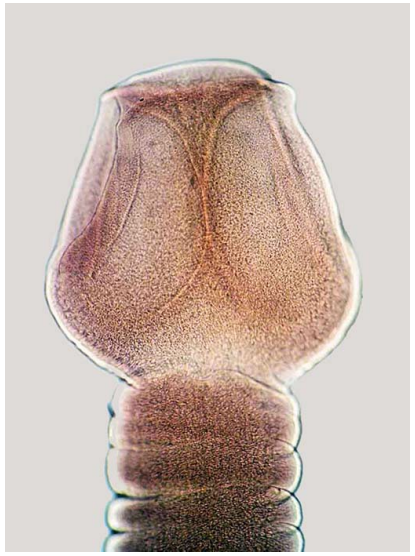


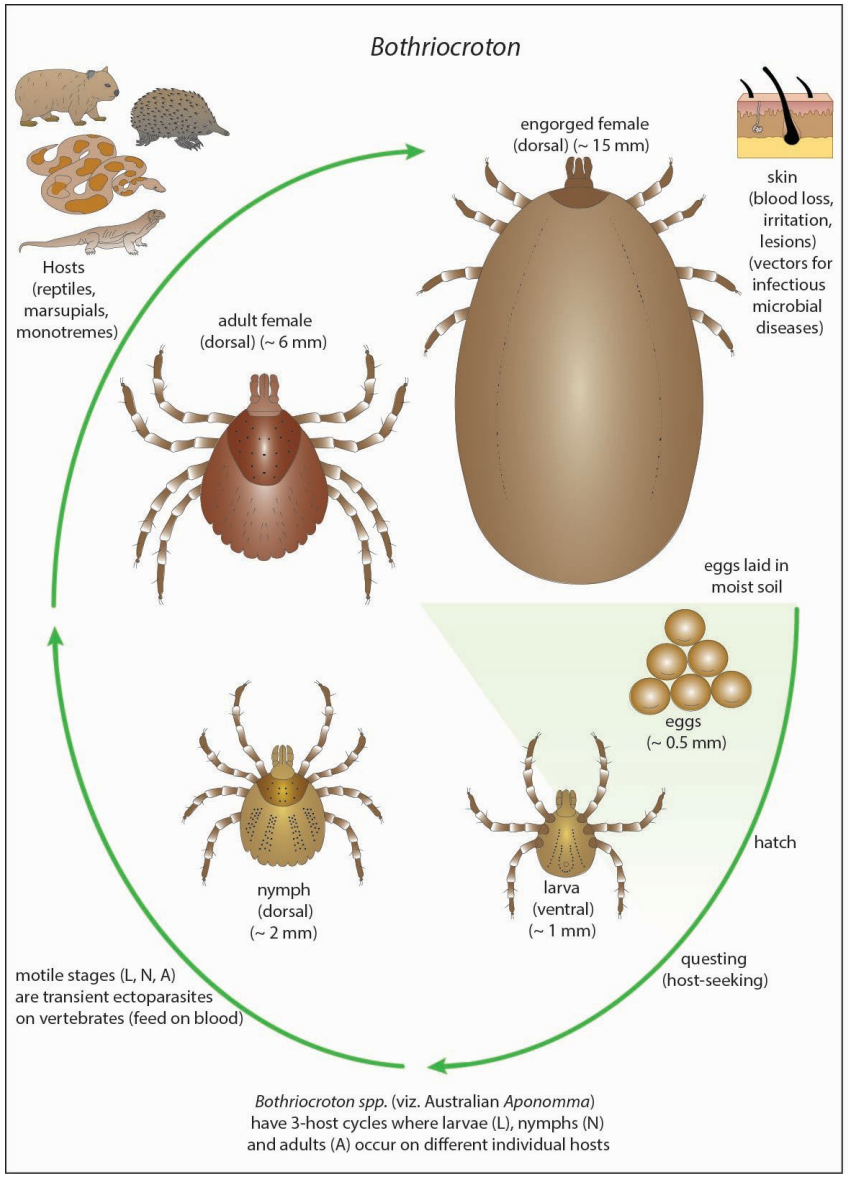

Bonamia
all species form micro-cells within hosts
one species forms unicellular spores
with haplosporosomes and a sporoplasm
apparently multiplies by modified schizogony
within multinucleate plasmodia
haemozoic/histozoic/coelozoic
(haemocytes, soft tissues)
(lesions, wasting disease,
mortalities)
Invertebrate Hosts
(oysters, flat
and cupped)
multinucleate
plasmodium
(7-18 µm)
sporont (~ 20 µm)
with uninucleate
sporoblasts
extracellular
(small dense)
(2-3 µm)
intracellular
(large clear)
(3-7 µm)
hinged lid
filamentous
projections
spores (4-6 µm)
uninucleate
micro-cells
?
most life-cycles not known
but transmission between hosts is often direct
via close contact (co-habitation)

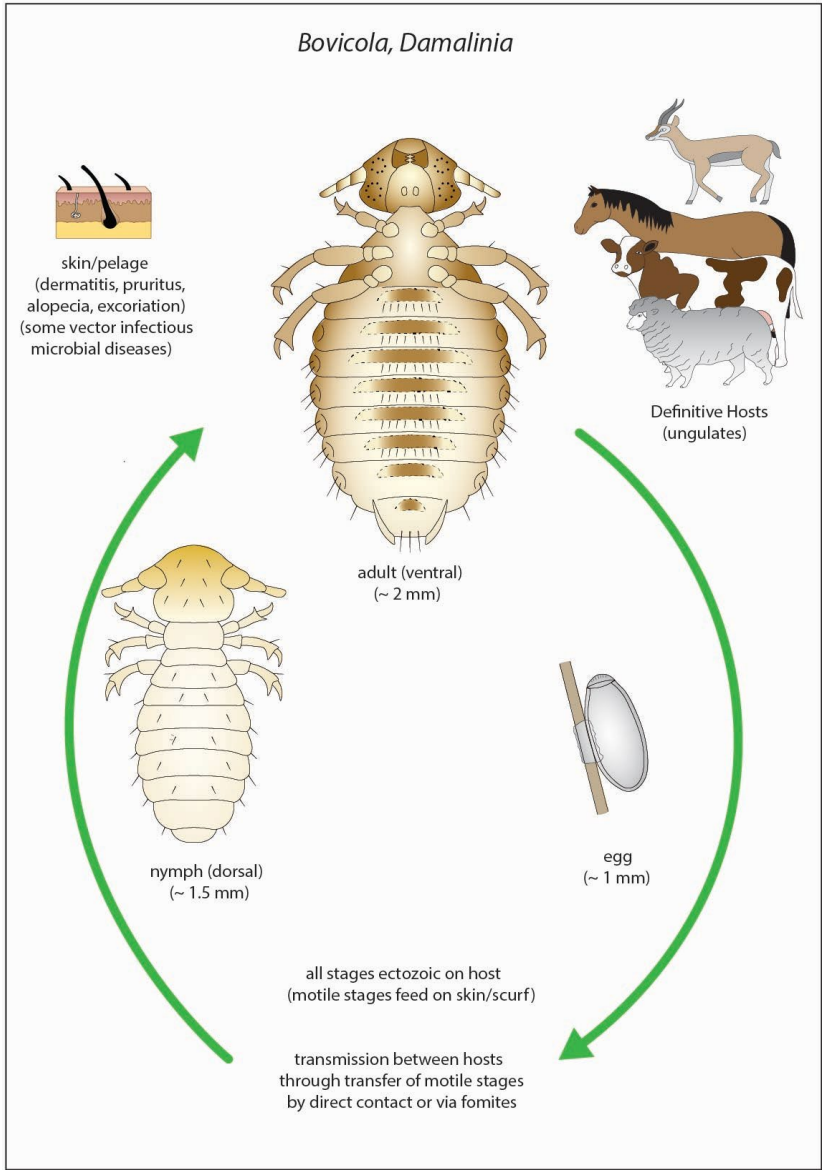


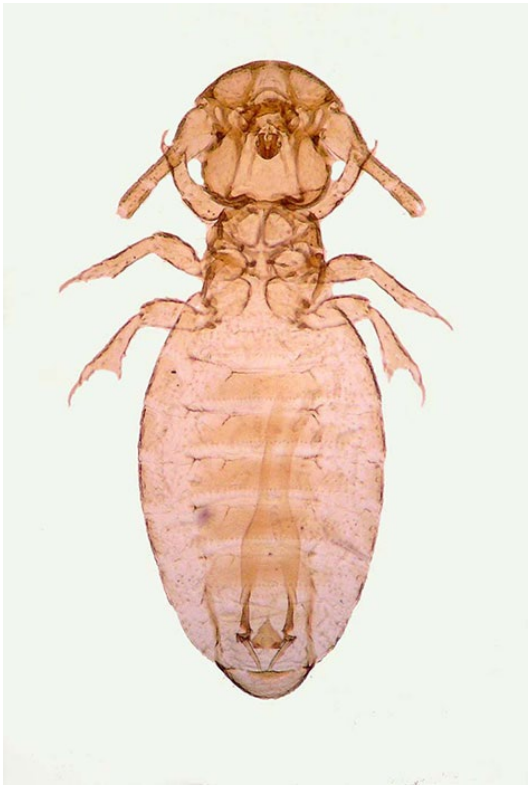

Bothriocephalus
intestines
(sometimes enteritis,
obstruction, emaciation)
scolex
Definitive Hosts
(freshwater and
marine fish)
hermaphroditic
adults (3-8 cm)
(some up to 1 m)
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
eggs
(~ 50 µm)
cercoid larvae
(mostly plerocercoid)
(30-380 µm)
free-swimming
coracidium
(~ 60 µm)
Intermediate Hosts
(copepods)
(body cavity)

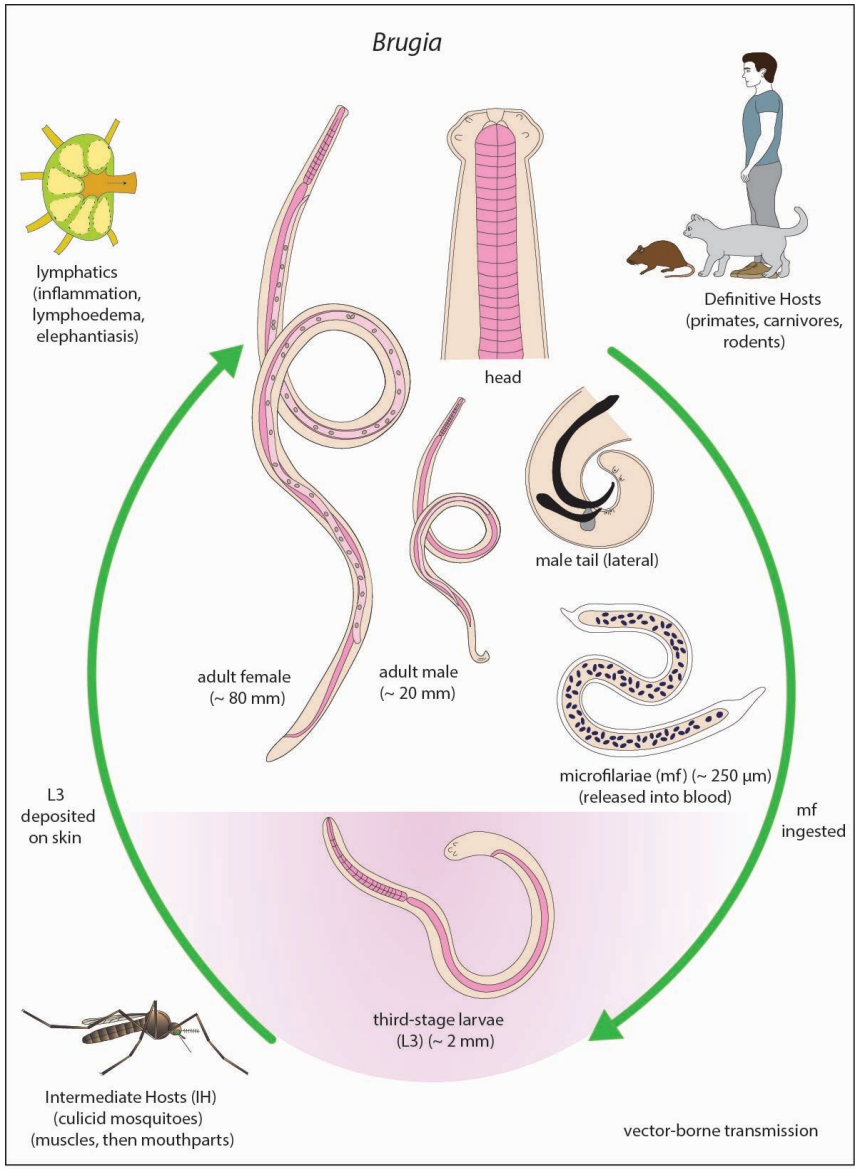


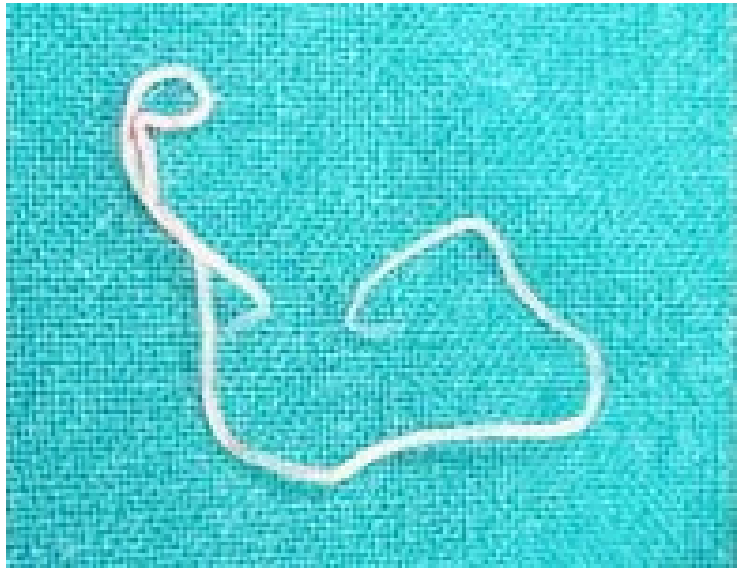



Bothriocroton
Hosts
(reptiles,
marsupials,
monotremes)
engorged female
(dorsal) (~ 15 mm)
skin
(blood loss,
irritation,
lesions)
(vectors for
infectious
microbial
diseases)
adult female
(dorsal) (~ 6 mm)
eggs laid in
moist soil
eggs
(~ 0.5 mm)
hatch
nymph
(dorsal)
(~ 2 mm)
larva
(ventral)
(~ 1 mm)
questing
(host-seeking)
motile stages (L, N, A)
are transient ectoparasites
on vertebrates (feed on blood)
Bothriocroton spp. (viz. Australian Aponomma)
have 3-host cycles where larvae (L), nymphs (N)
and adults (A) occur on different individual hosts


Bovicola, Damalinia
skin/pelage
(dermatitis, pruritus,
alopecia, excoriation)
(some vector infectious
microbial diseases)
Definitive Hosts
(ungulates)
adult (ventral)
(~ 2 mm)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/scurf)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites




Brugia
lymphatics
(inflammation,
lymphoedema,
elephantiasis)
head
Definitive Hosts
(primates, carnivores,
rodents)
male tail (lateral)
adult female
(~ 80 mm)
adult male
(~ 20 mm)
microfilariae (mf) (~ 250 µm)
(released into blood)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 2 mm)
Intermediate Hosts (IH)
(culicid mosquitoes)
(muscles, then mouthparts)
vector-borne transmission

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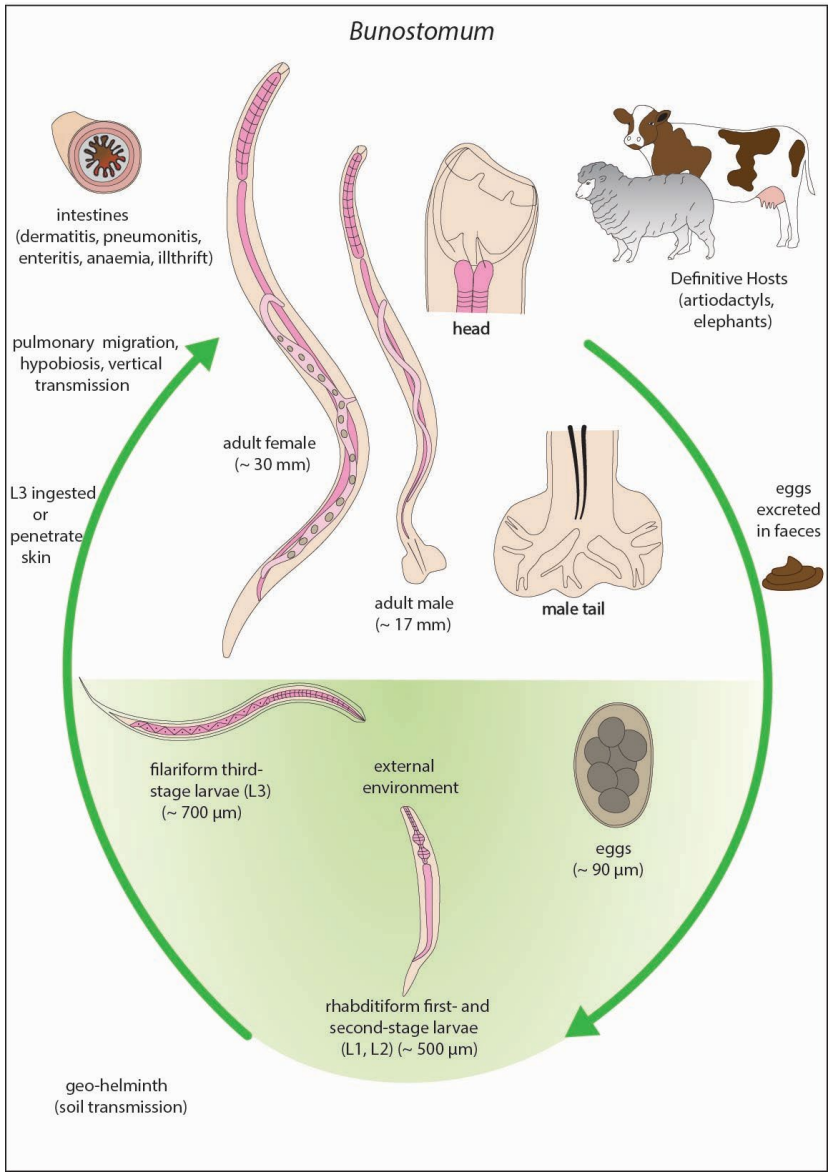
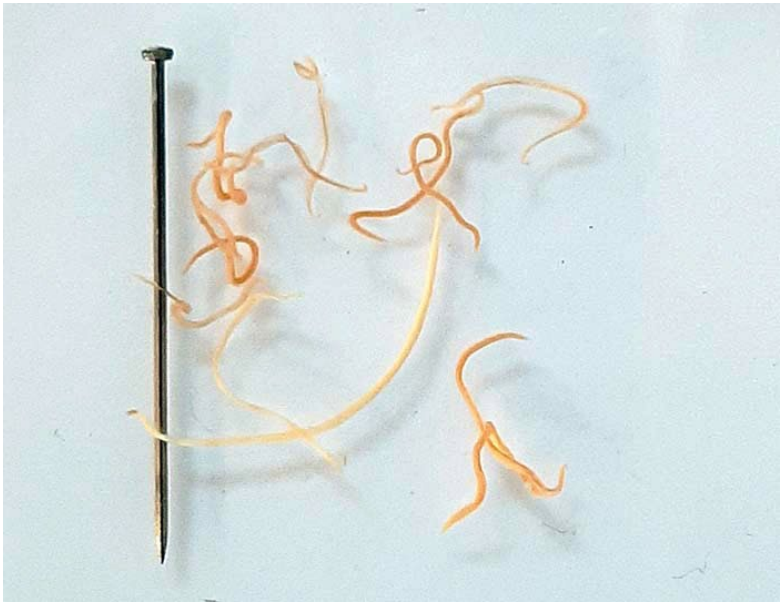
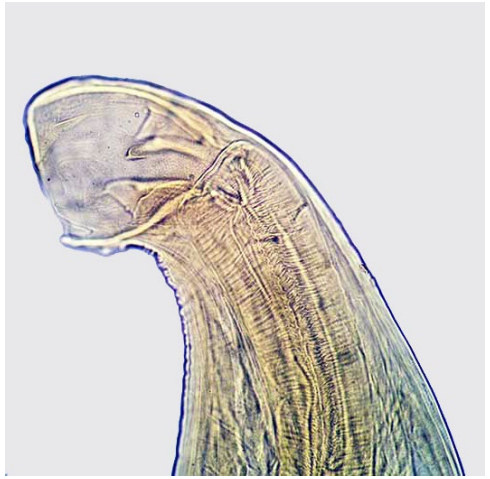
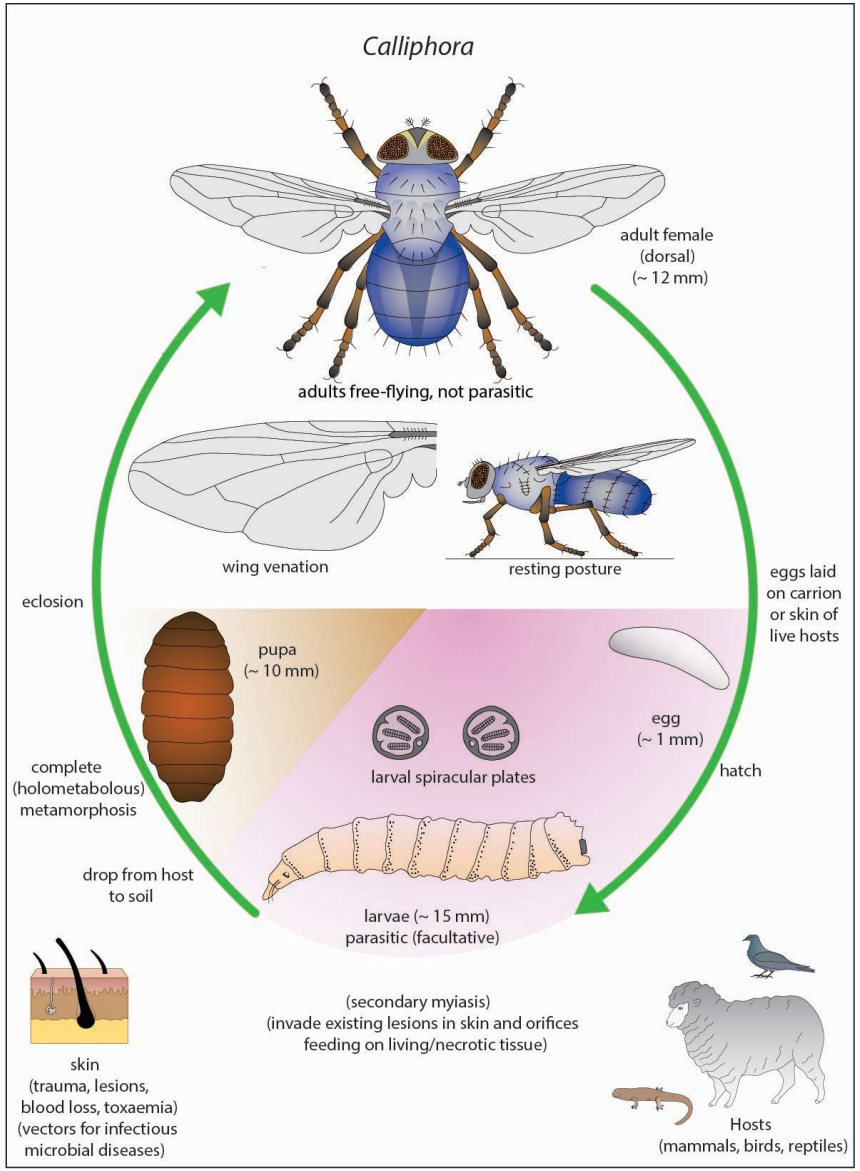
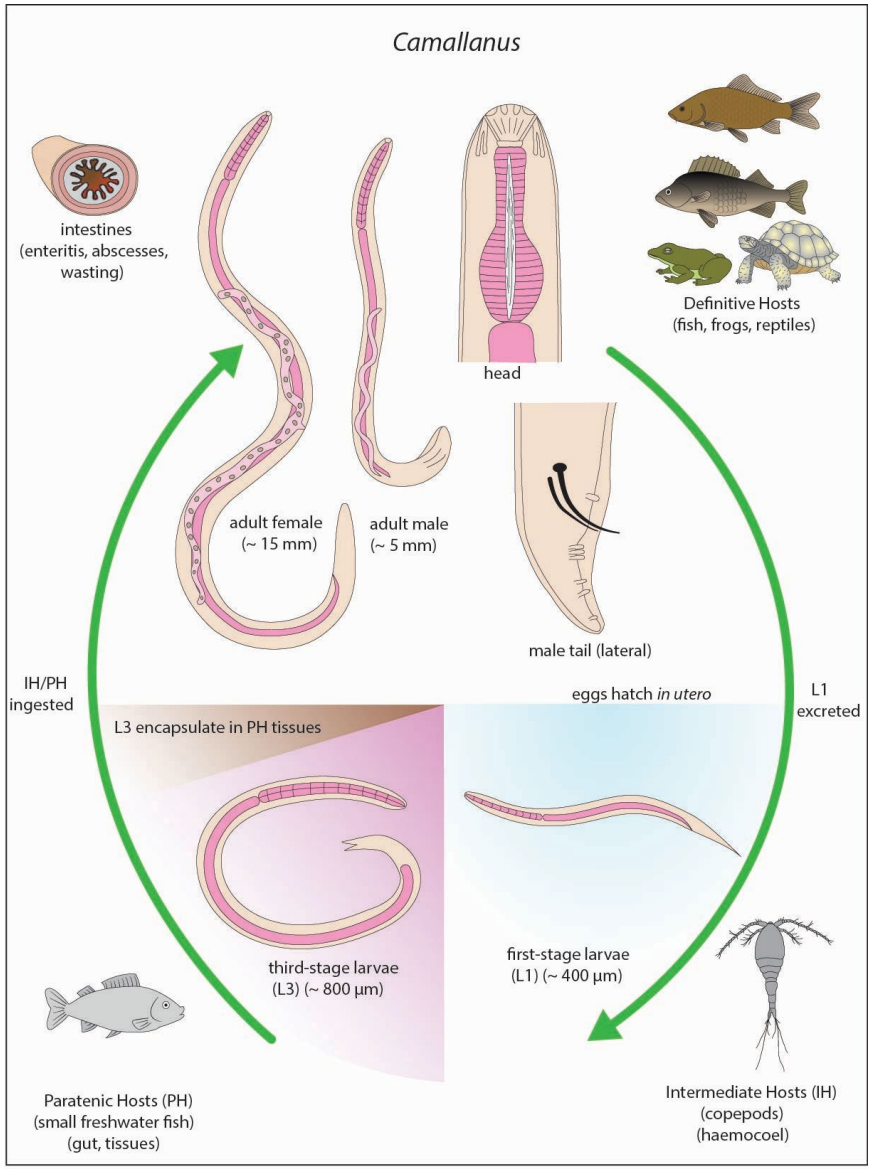
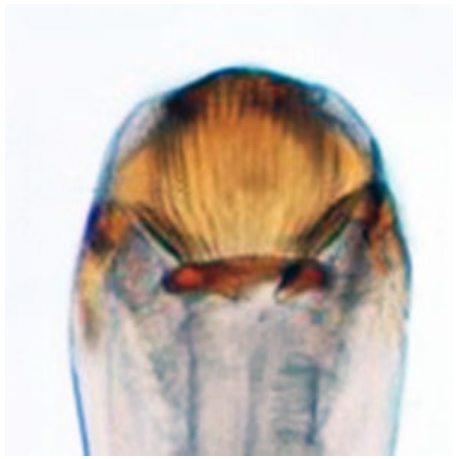

Bunostomum
intestines
(dermatitis, pneumonitis,
enteritis, anaemia, illthrift)
head
Definitive Hosts
(artiodactyls,
elephants)
pulmonary migration,
hypobiosis, vertical
transmission
adult female
(~ 30 mm)
L3 ingested
or
penetrate
skin
adult male
(~ 17 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 700 µm)
external
environment
eggs
(~ 90 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 500 µm)
geo-helminth
(soil transmission)



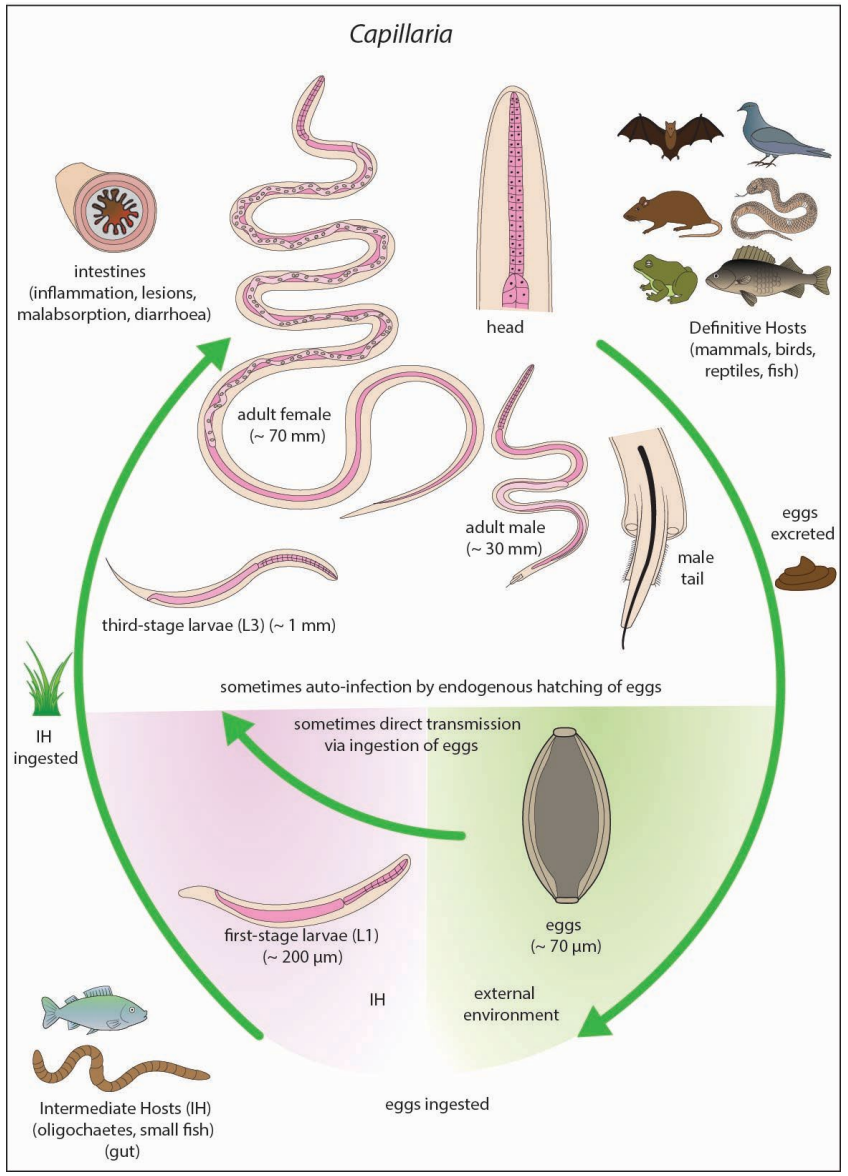



Calliphora
adult female
(dorsal)
(~ 12 mm)
adults free-flying, not parasitic
wing venation
resting posture
eggs laid
on carrion
or skin of
live hosts
eclosion
pupa
(~ 10 mm)
egg
(~ 1 mm)
larval spiracular plates
hatch
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (~ 15 mm)
parasitic (facultative)
(secondary myiasis)
(invade existing lesions in skin and orifices
feeding on living/necrotic tissue)
skin
(trauma, lesions,
blood loss, toxaemia)
(vectors for infectious
microbial diseases)
Hosts
(mammals, birds, reptiles)


Camallanus
intestines
(enteritis, abscesses,
wasting)
adult female
(~ 15 mm)
adult male
(~ 5 mm)
head
Definitive Hosts
(fish, frogs, reptiles)
male tail (lateral)
IH/PH
ingested
L3 encapsulate in PH tissues
eggs hatch in utero
L1
excreted
third-stage larvae
(L3) (~ 800 µm)
first-stage larvae
(L1) (~ 400 µm)
Paratenic Hosts (PH)
(small freshwater fish)
(gut, tissues)
Intermediate Hosts (IH)
(copepods)
(haemocoel)

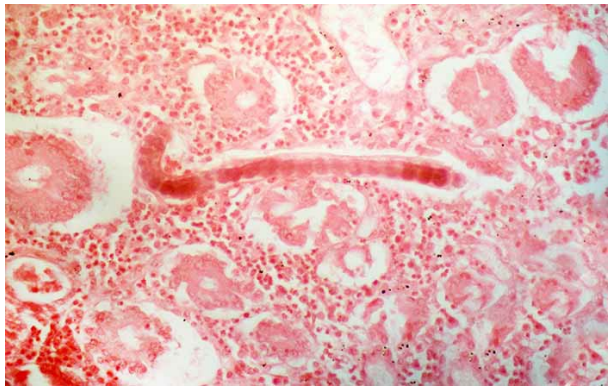


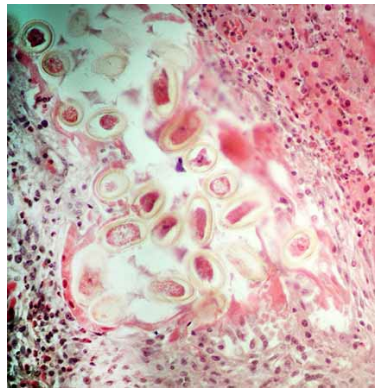

The Aquarium Life

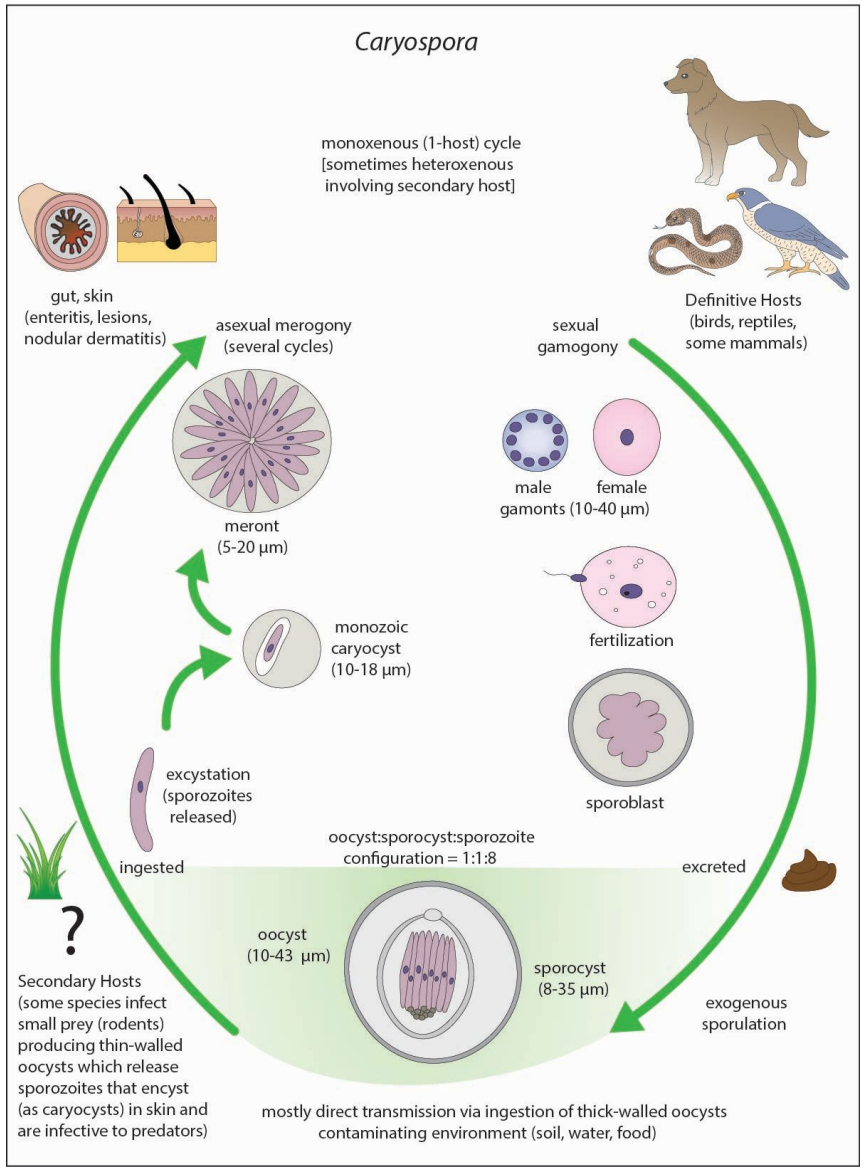

Capillaria
intestines
(inflammation, lesions,
malabsorption, diarrhoea)
head
Definitive Hosts
(mammals, birds,
reptiles, fish)
adult female
(~ 70 mm)
adult male
(~ 30 mm)
male
tail
eggs
excreted
third-stage larvae (L3) (~ 1 mm)
sometimes auto-infection by endogenous hatching of eggs
IH
ingested
sometimes direct transmission
via ingestion of eggs
first-stage larvae (L1)
(~ 200 µm)
eggs
(~ 70 µm)
IH
external
environment
Intermediate Hosts (IH)
(oligochaetes, small fish)
(gut)
eggs ingested

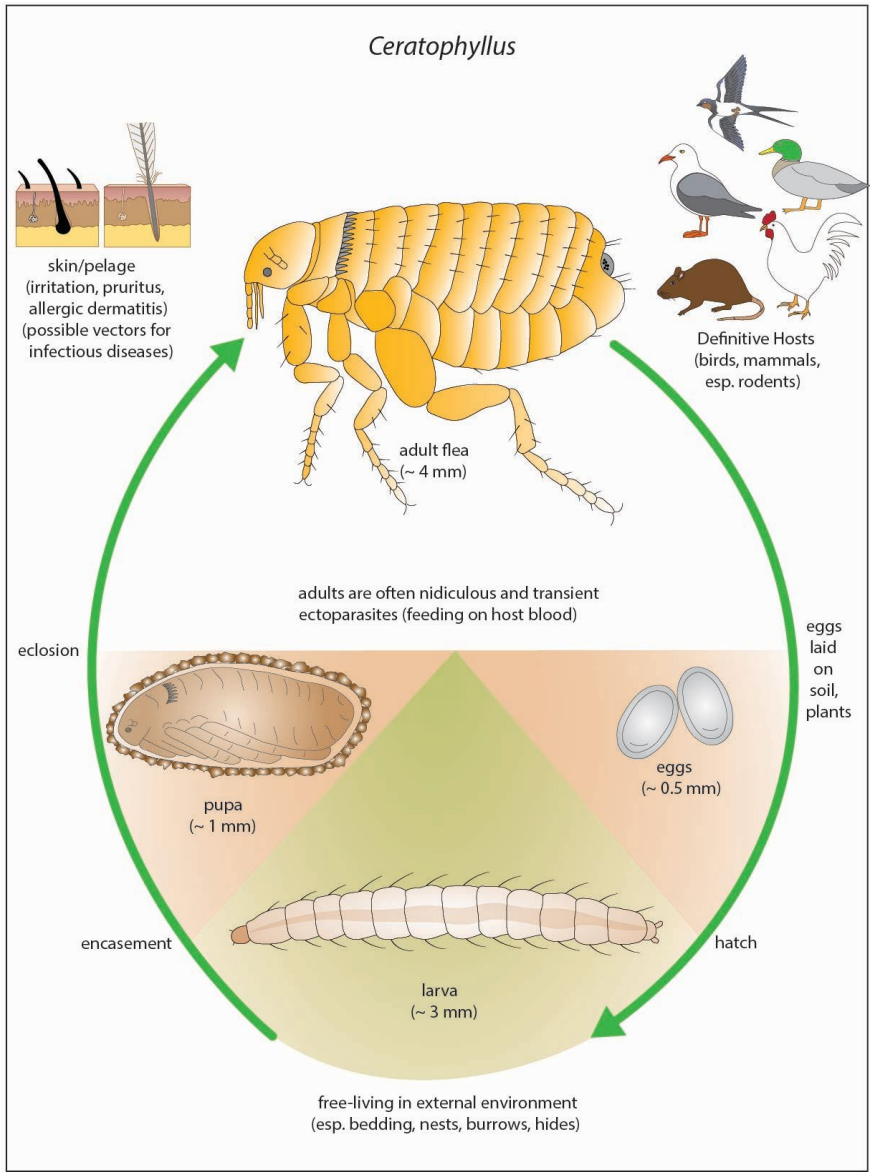

wiki

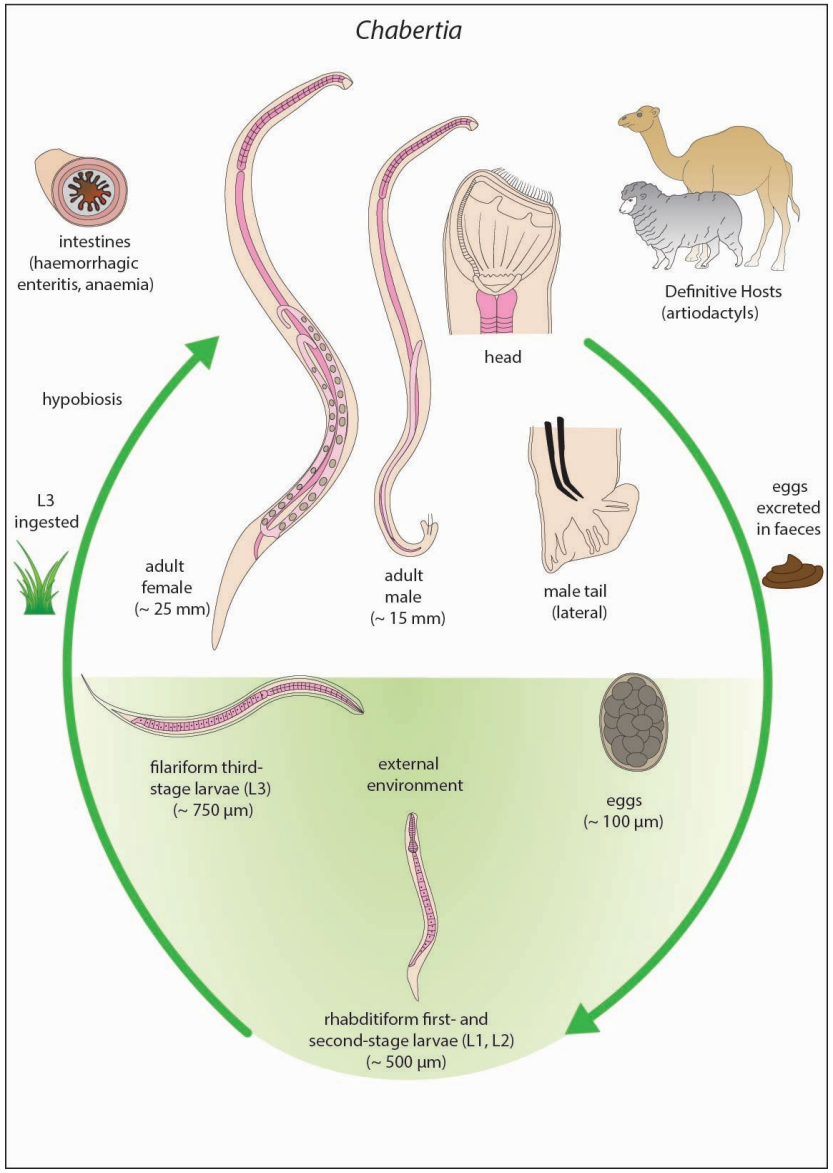

PHIL-1376

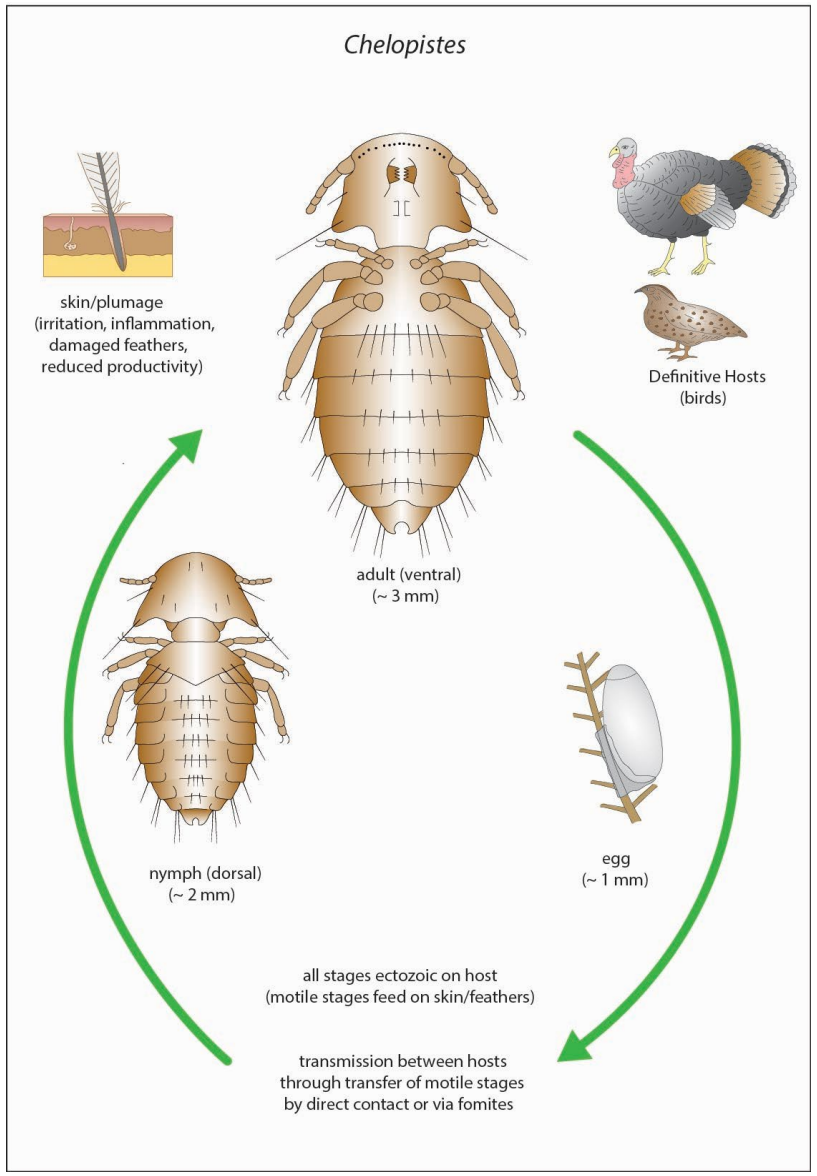


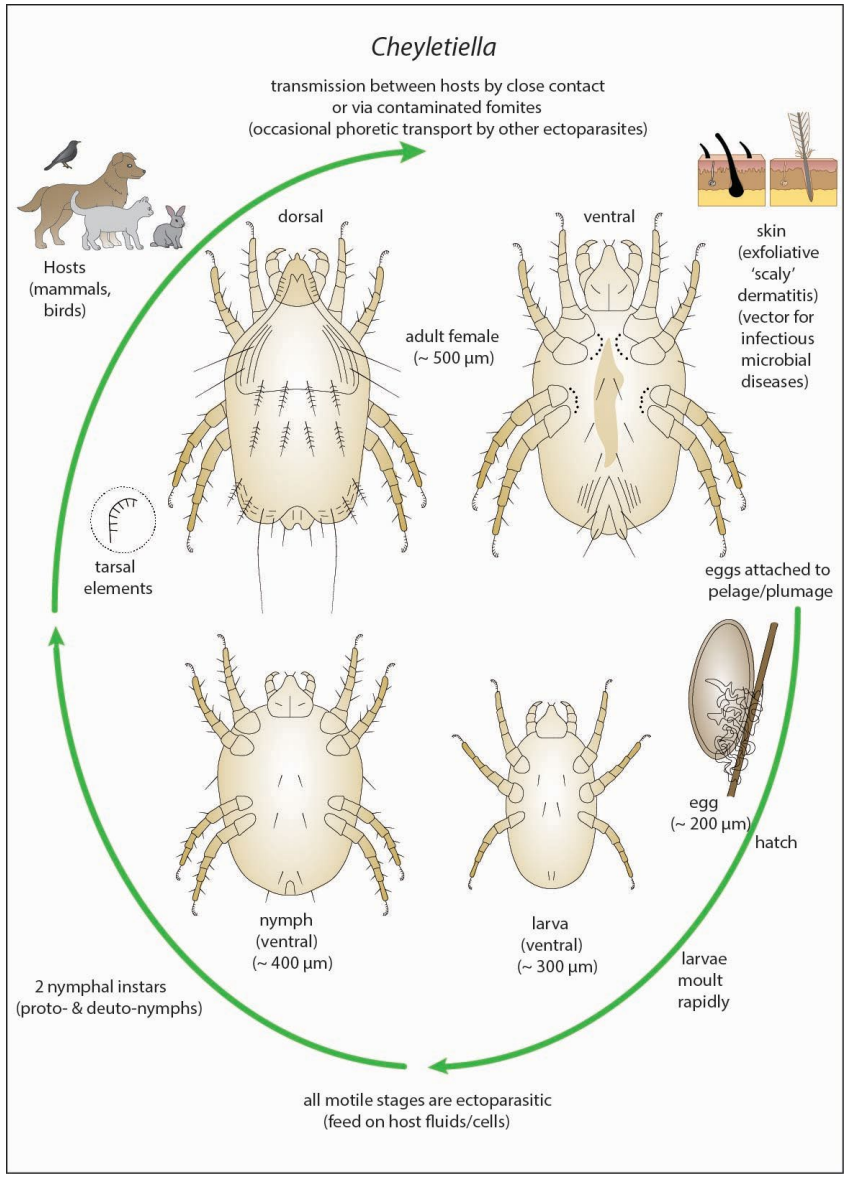


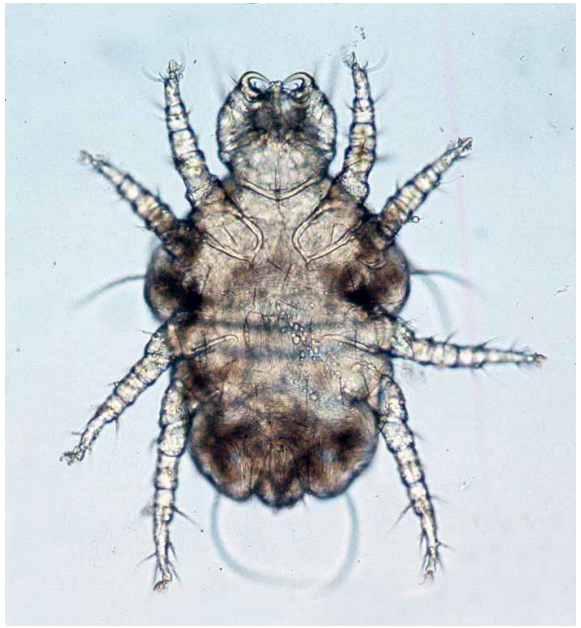

Caryospora
monoxenous (1-host) cycle
[sometimes heteroxenous
involving secondary host]
gut, skin
(enteritis, lesions,
nodular dermatitis)
asexual merogony
(several cycles)
meront
(5-20 µm)
monozoic
caryocyst
(10-18 µm)
excystation
(sporozoites
released)
ingested
?
Secondary Hosts
(some species infect
small prey (rodents)
producing thin-walled
oocysts which release
sporozoites that encyst
(as caryocysts) in skin and
are infective to predators)
sexual
gamogony
Definitive Hosts
(birds, reptiles,
some mammals)
male
gamonts (10-40 µm)
female
fertilization
sporoblast
oocyst:sporocyst:sporozoite
configuration = 1:1:8
excreted
oocyst
(10-43 µm)
sporocyst
(8-35 µm)
exogenous
sporulation
mostly direct transmission via ingestion of thick-walled oocysts
contaminating environment (soil, water, food)

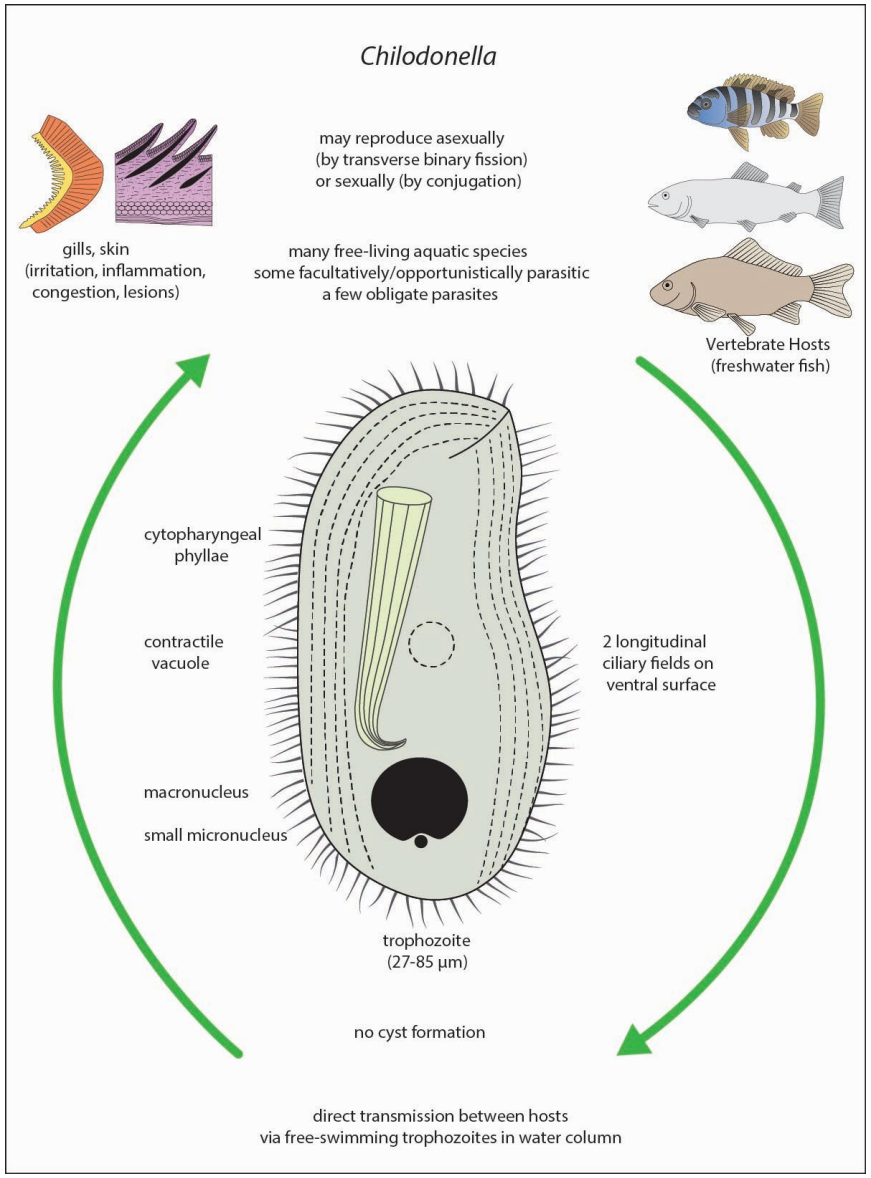

Ceratophyllus
skin/pelage
(irritation, pruritus,
allergic dermatitis)
(possible vectors for
infectious diseases)
Definitive Hosts
(birds, mammals,
esp. rodents)
adult flea
(~ 4 mm)
adults are often nidiculous and transient
ectoparasites (feeding on host blood)
eclosion
eggs
laid
on
soil,
plants
pupa
(~ 1 mm)
eggs
(~ 0.5 mm)
encasement
hatch
larva
(~ 3 mm)
free-living in external environment
(esp. bedding, nests, burrows, hides)

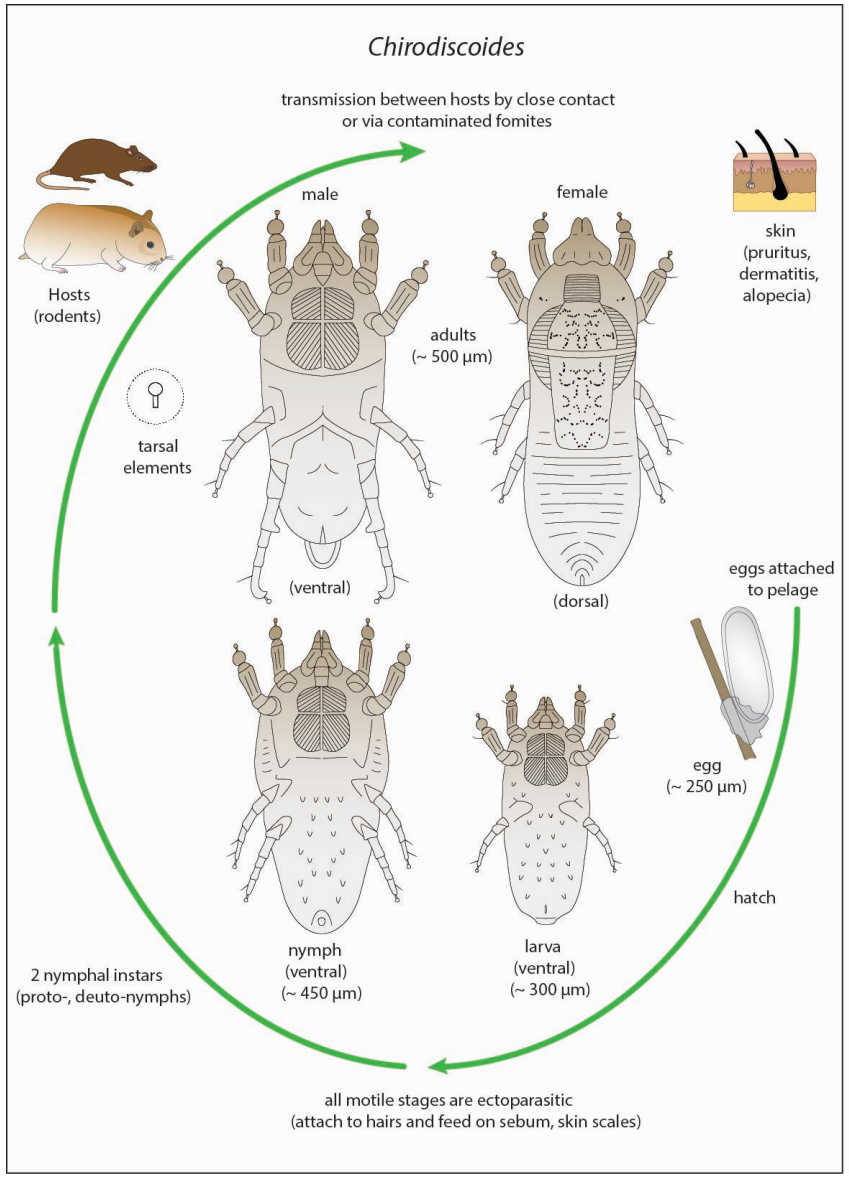

Chabertia
intestines
(haemorrhagic
enteritis, anaemia)
Definitive Hosts
(artiodactyls)
head
hypobiosis
L3
ingested
adult
female
(~ 25 mm)
adult
male
(~ 15 mm)
male tail
(lateral)
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 750 µm)
external
environment
eggs
(~ 100 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 500 µm)

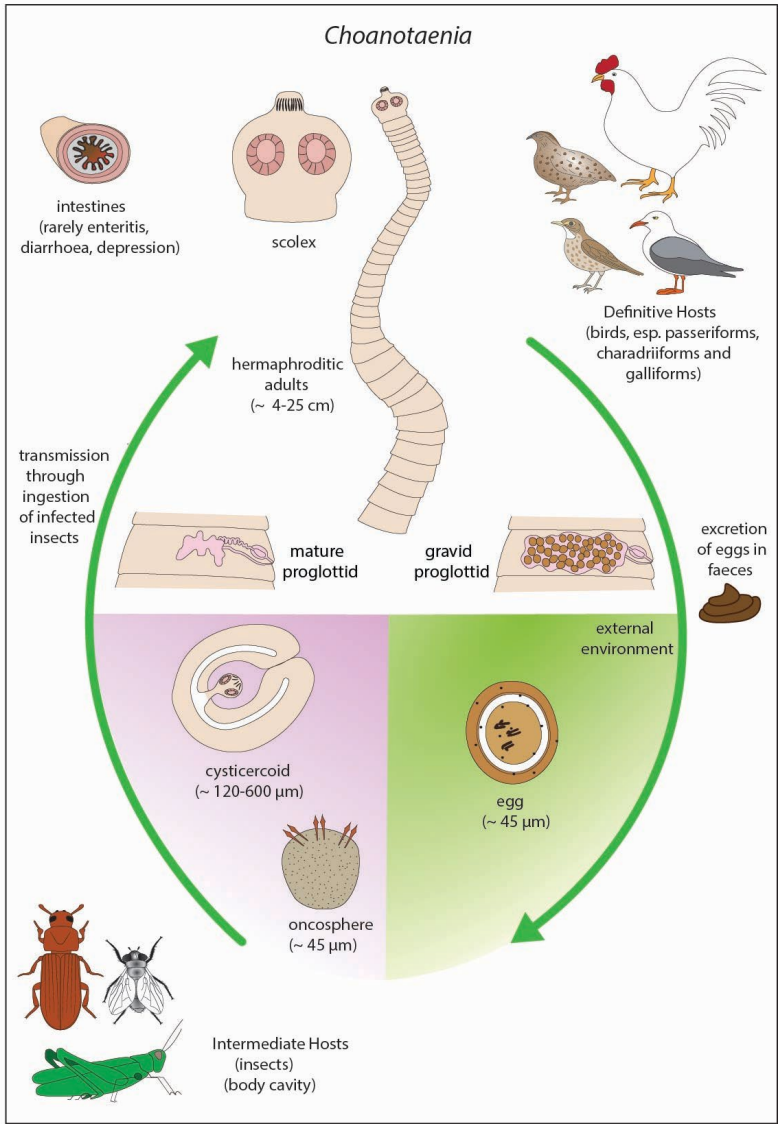

Chelopistes
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 3 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

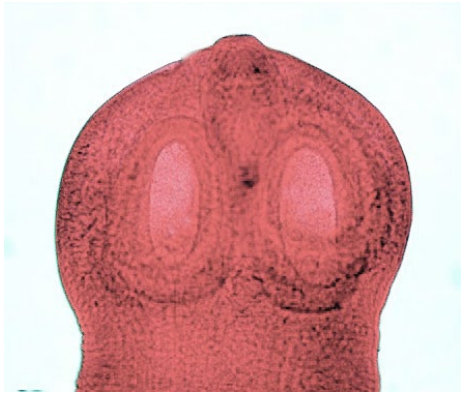

Cheyletiella
transmission between hosts by close contact
or via contaminated fomites
(occasional phoretic transport by other ectoparasites)
Hosts
(mammals,
birds)
dorsal
ventral
skin
(exfoliative
'scaly'
dermatitis)
(vector for
infectious
microbial
diseases)
adult female
(~ 500 µm)
tarsal
elements
eggs attached to
pelage/plumage
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 400 µm)
larva
(ventral)
(~ 300 µm)
larvae
moult
rapidly
2 nymphal instars
(proto- & deuto-nymphs)
all motile stages are ectoparasitic
(feed on host fluids/cells)

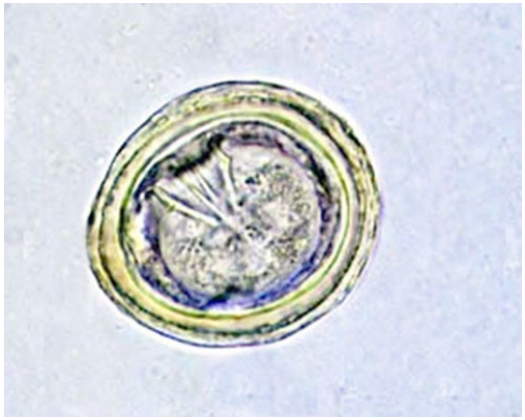


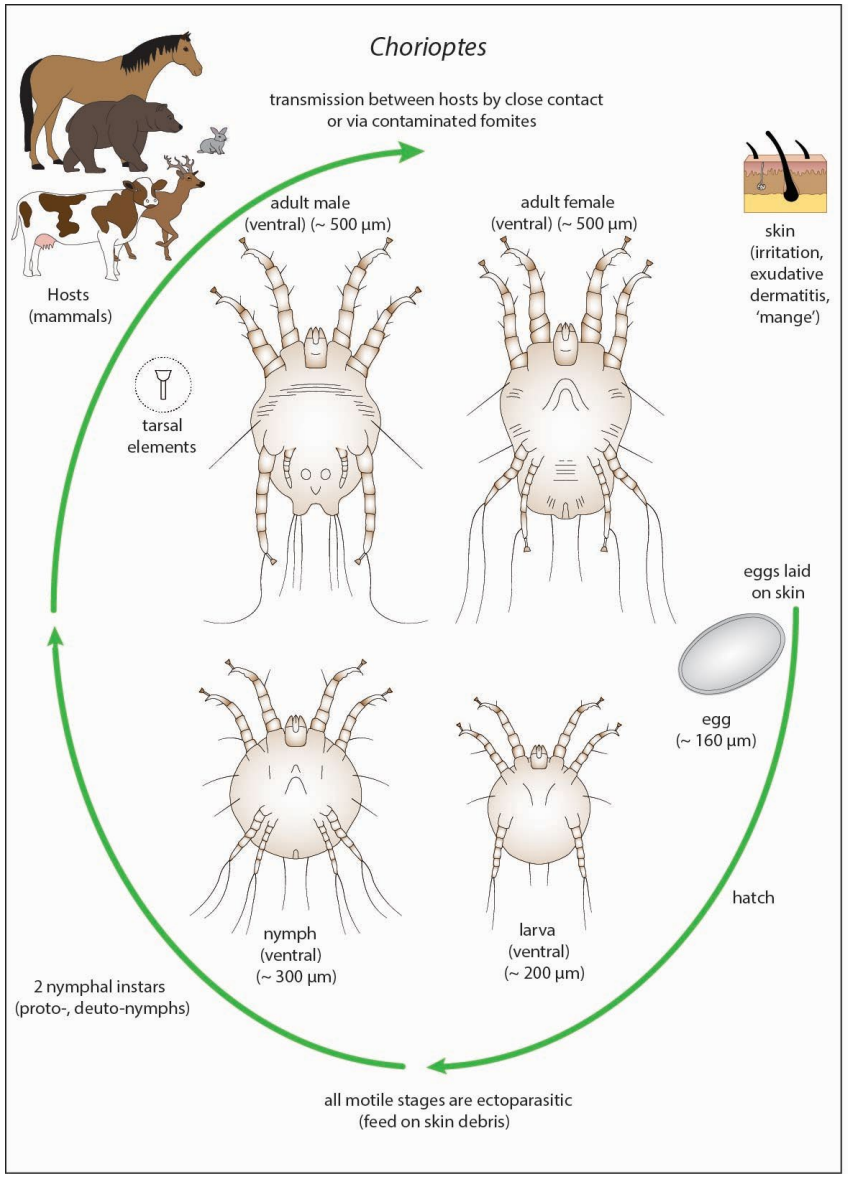

Chilodonella
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
gills, skin
(irritation, inflammation,
congestion, lesions)
many free-living aquatic species
some facultatively/opportunistically parasitic
a few obligate parasites
Vertebrate Hosts
(freshwater fish)
cytopharyngeal
phyllae
contractile
vacuole
macronucleus
small micronucleus
2 longitudinal
ciliary fields on
ventral surface
trophozoite
(27-85 µm)
no cyst formation
direct transmission between hosts
via free-swimming trophozoites in water column

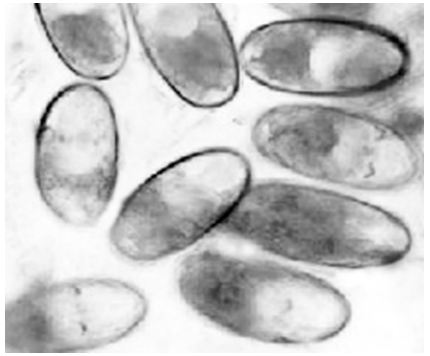

Chirodiscoides
transmission between hosts by close contact
or via contaminated fomites
Hosts
(rodents)
male
female
skin
(pruritus,
dermatitis,
alopecia)
adults
(~ 500 µm)
tarsal
elements
(ventral)
(dorsal)
eggs attached
to pelage
egg
(~ 250 µm)
hatch
nymph
(ventral)
(~ 450 µm)
larva
(ventral)
(~ 300 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(attach to hairs and feed on sebum, skin scales)

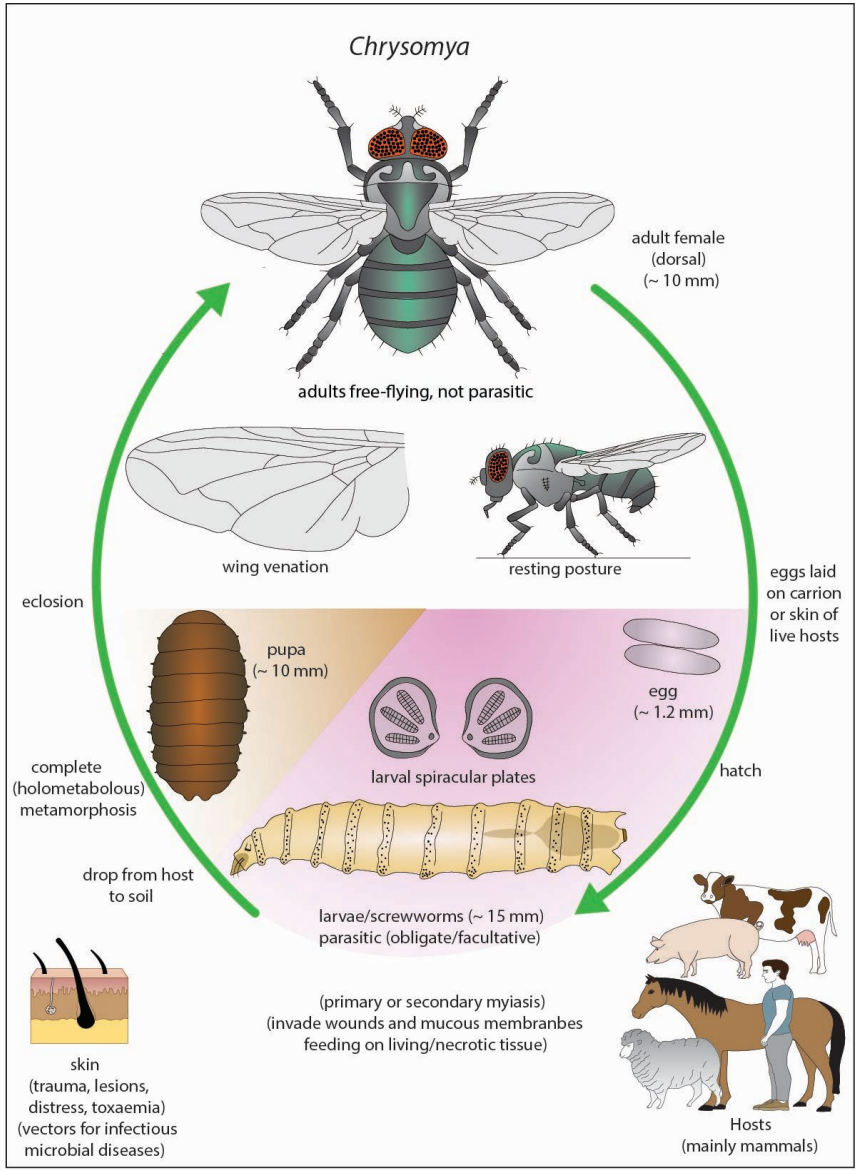

Choanotaenia
intestines
(rarely enteritis,
diarrhoea, depression)
scolex
hermaphroditic
adults
(~ 4-25 cm)
Definitive Hosts
(birds, esp. passeriforms,
charadriiforms and
galliforms)
transmission
through
ingestion
of infected
insects
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 120-600 µm)
egg
(~ 45 µm)
oncosphere
(~ 45 µm)
Intermediate Hosts
(insects)
(body cavity)

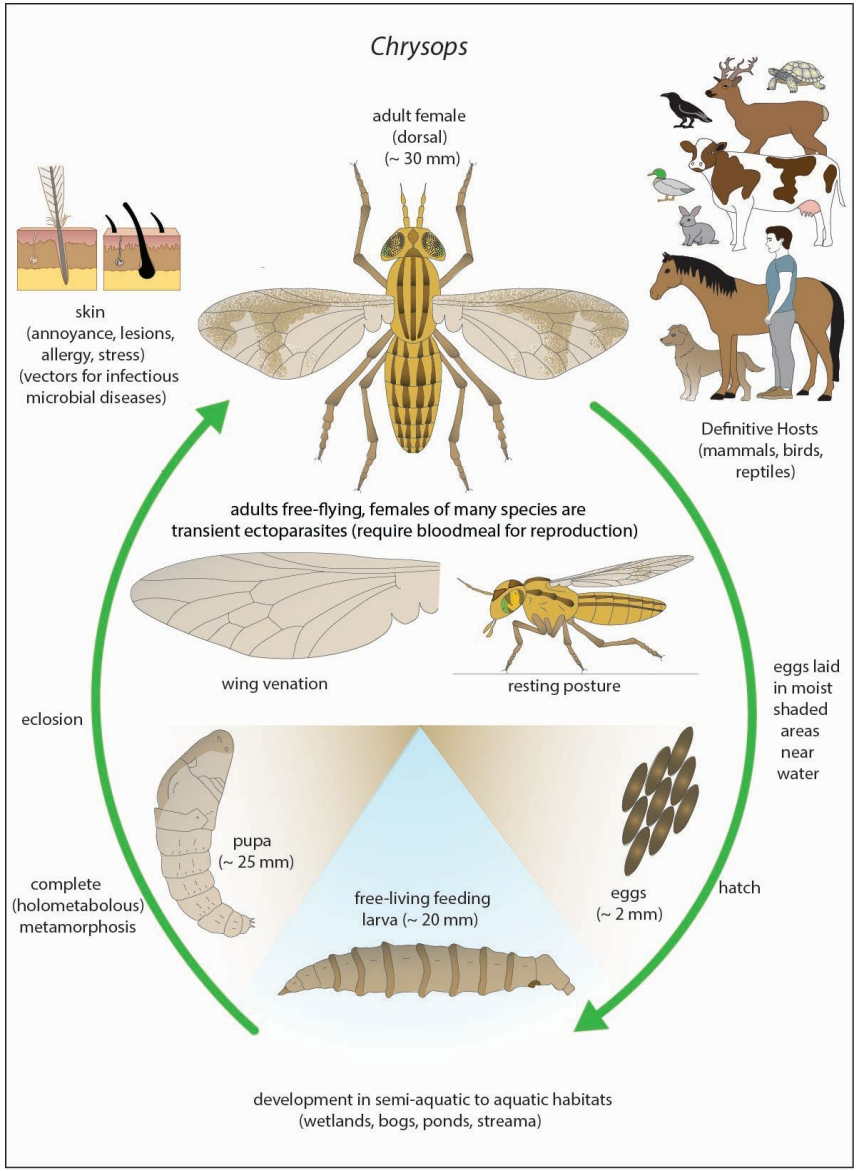





Chorioptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
adult male
(ventral) (~ 500 µm)
adult female
(ventral) (~ 500 µm)
skin
(irritation,
exudative
dermatitis,
'mange')
tarsal
elements
eggs laid
on skin
egg
(~ 160 µm)
hatch
nymph
(ventral)
(~ 300 µm)
larva
(ventral)
(~ 200 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on skin debris)




Chrysomya
adult female
(dorsal)
(~ 10 mm)
adults free-flying, not parasitic
wing venation
resting posture
eggs laid
on carrion
or skin of
live hosts
eclosion
pupa
(~ 10 mm)
egg
(~ 1.2 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
hatch
drop from host
to soil
larvae/screwworms (~ 15 mm)
parasitic (obligate/facultative)
(primary or secondary myiasis)
(invade wounds and mucous membranbes
feeding on living/necrotic tissue)
skin
(trauma, lesions,
distress, toxaemia)
(vectors for infectious
microbial diseases)
Hosts
(mainly mammals)


Chrysops
adult female
(dorsal)
(~ 30 mm)
skin
(annoyance, lesions,
allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds,
reptiles)
adults free-flying, females of many species are
transient ectoparasites (require bloodmeal for reproduction)
wing venation
resting posture
eggs laid
in moist
shaded
areas
near
water
eclosion
pupa
(~ 25 mm)
complete
(holometabolous)
metamorphosis
free-living feeding
larva (~ 20 mm)
eggs
(~ 2 mm)
hatch
development in semi-aquatic to aquatic habitats
(wetlands, bogs, ponds, streama)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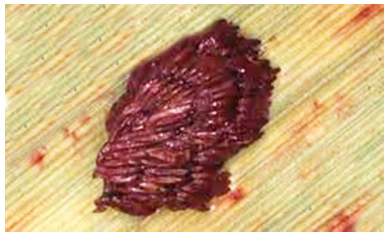
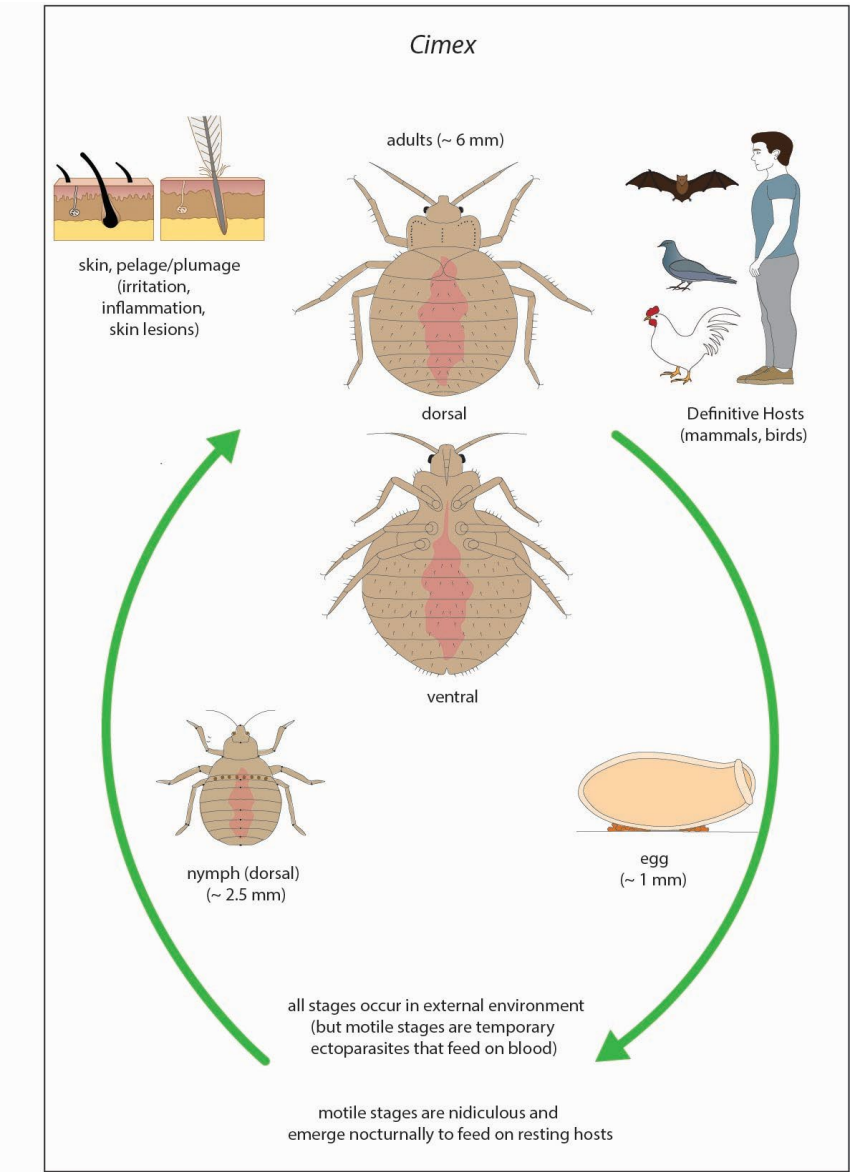
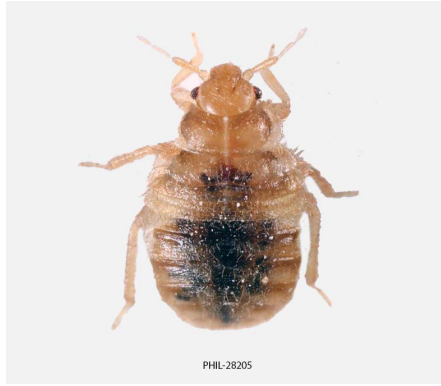
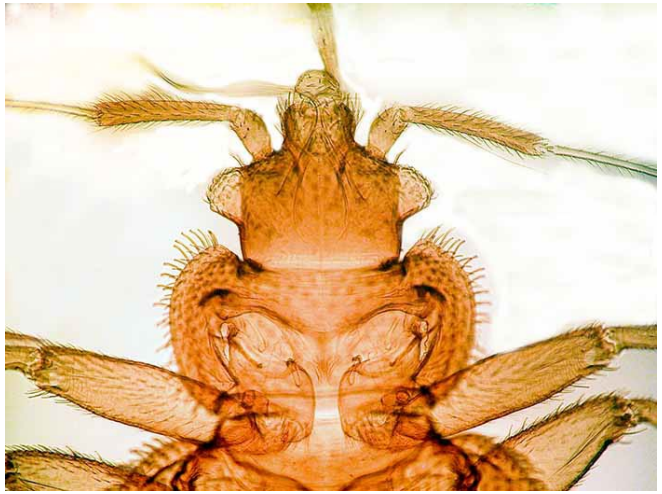
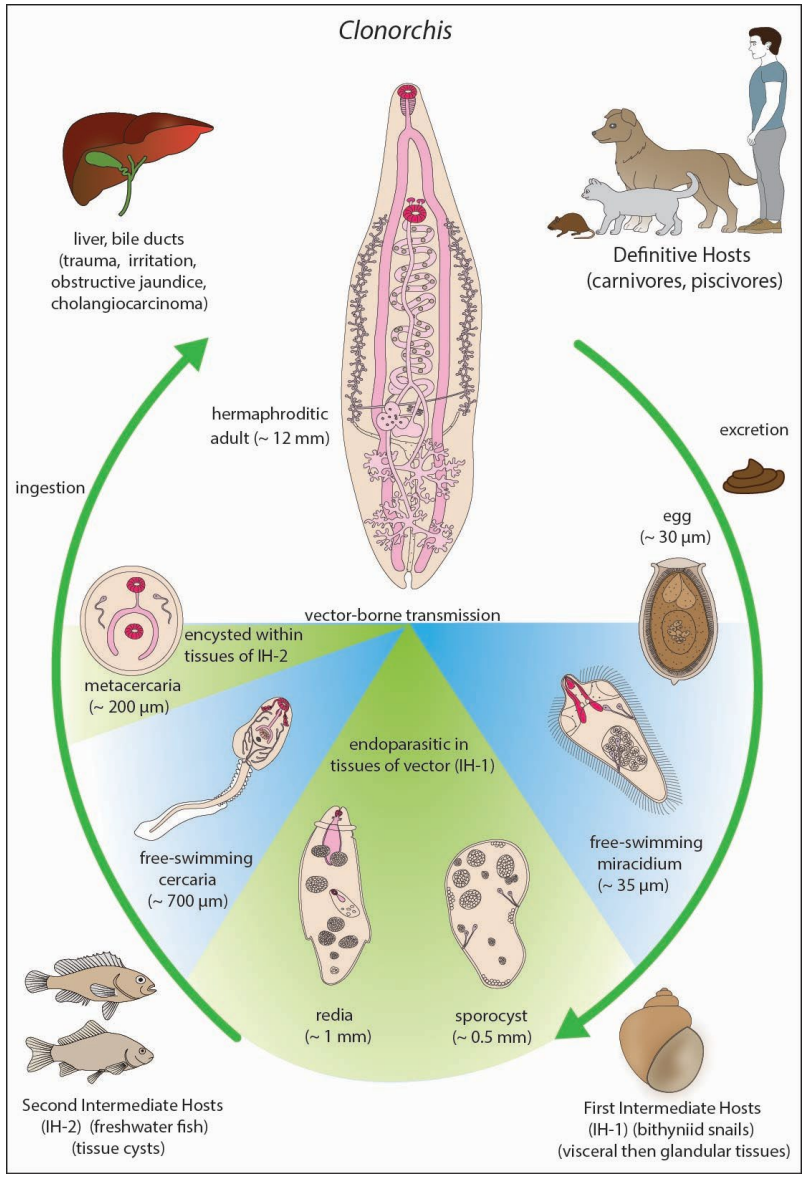


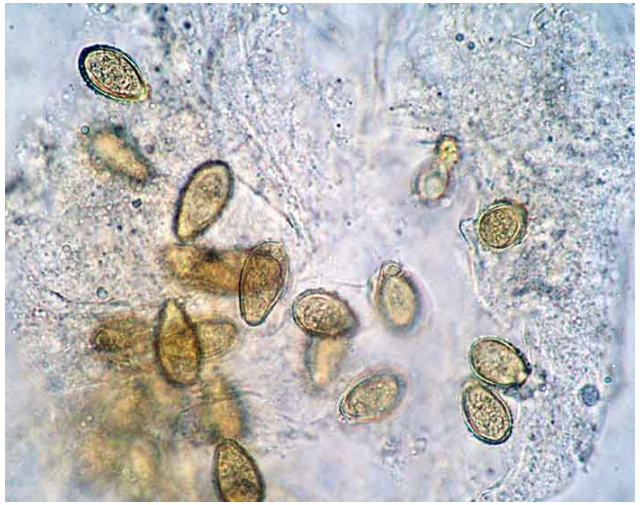

Cimex
adults (~ 6 mm)
skin, pelage/plumage
(irritation,
inflammation,
skin lesions)
dorsal
Definitive Hosts
(mammals, birds)
ventral
nymph (dorsal)
(~ 2.5 mm)
egg
(~ 1 mm)
all stages occur in external environment
(but motile stages are temporary
ectoparasites that feed on blood)
motile stages are nidiculous and
emerge nocturnally to feed on resting hosts

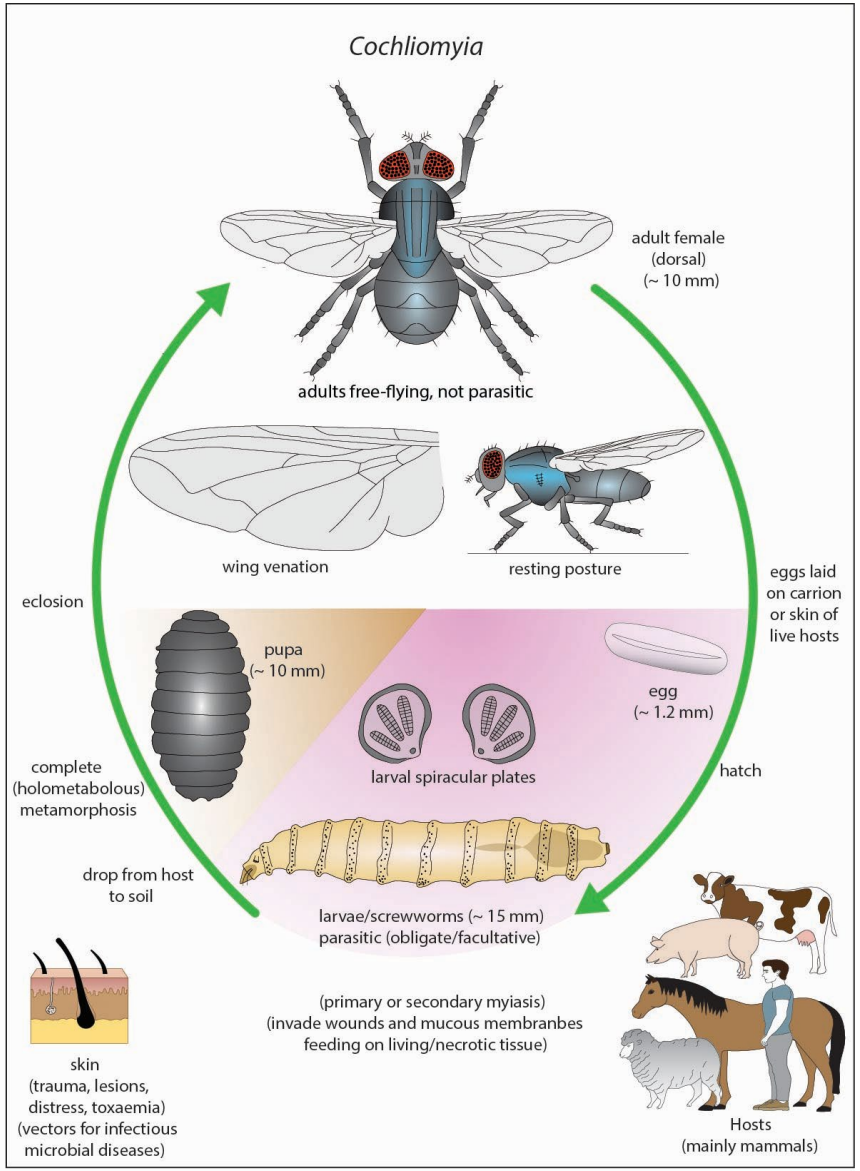

PHIL-6283


PHIL-28205




Clonorchis
liver, bile ducts
(trauma, irritation,
obstructive jaundice,
cholangiocarcinoma)
Definitive Hosts
(carnivores, piscivores)
hermaphroditic
adult (~ 12 mm)
excretion
ingestion
egg
(~ 30 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 200 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 700 µm)
free-swimming
miracidium
(~ 35 µm)
redia
(~ 1 mm)
sporocyst
(~ 0.5 mm)
Second Intermediate Hosts
(IH-2) (freshwater fish)
(tissue cysts)
First Intermediate Hosts
(IH-1) (bithyniid snails)
(visceral then glandular tissues)




Cochliomyia
adult female
(dorsal)
(~ 10 mm)
adults free-flying, not parasitic
wing venation
resting posture
eclosion
eggs laid
on carrion
or skin of
live hosts
pupa
(~ 10 mm)
egg
(~ 1.2 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
hatch
drop from host
to soil
larvae/screwworms (~ 15 mm)
parasitic (obligate/facultative)
(primary or secondary myiasis)
(invade wounds and mucous membranbes
feeding on living/necrotic tissue)
skin
(trauma, lesions,
distress, toxaemia)
(vectors for infectious
microbial diseases)
Hosts
(mainly mammals)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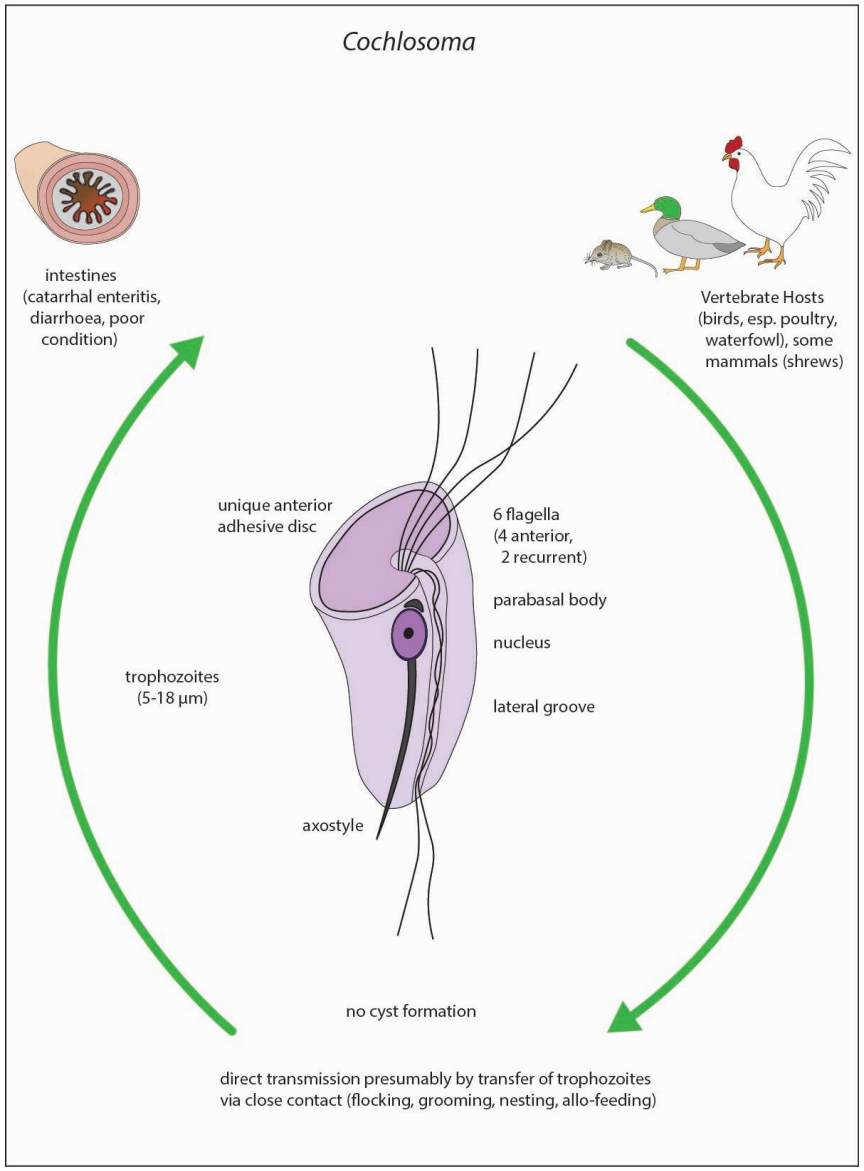
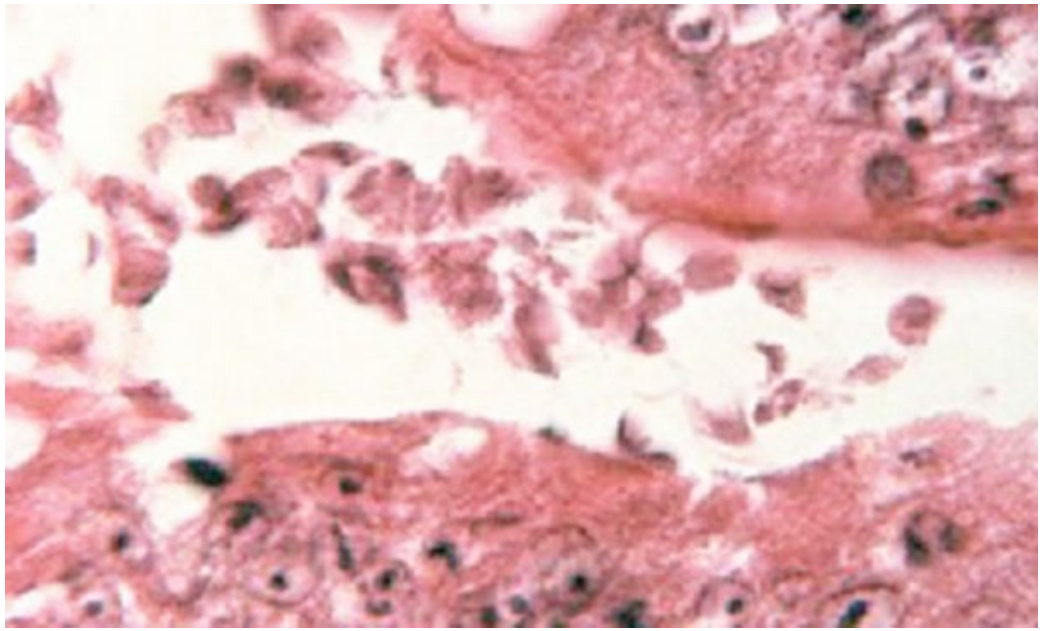
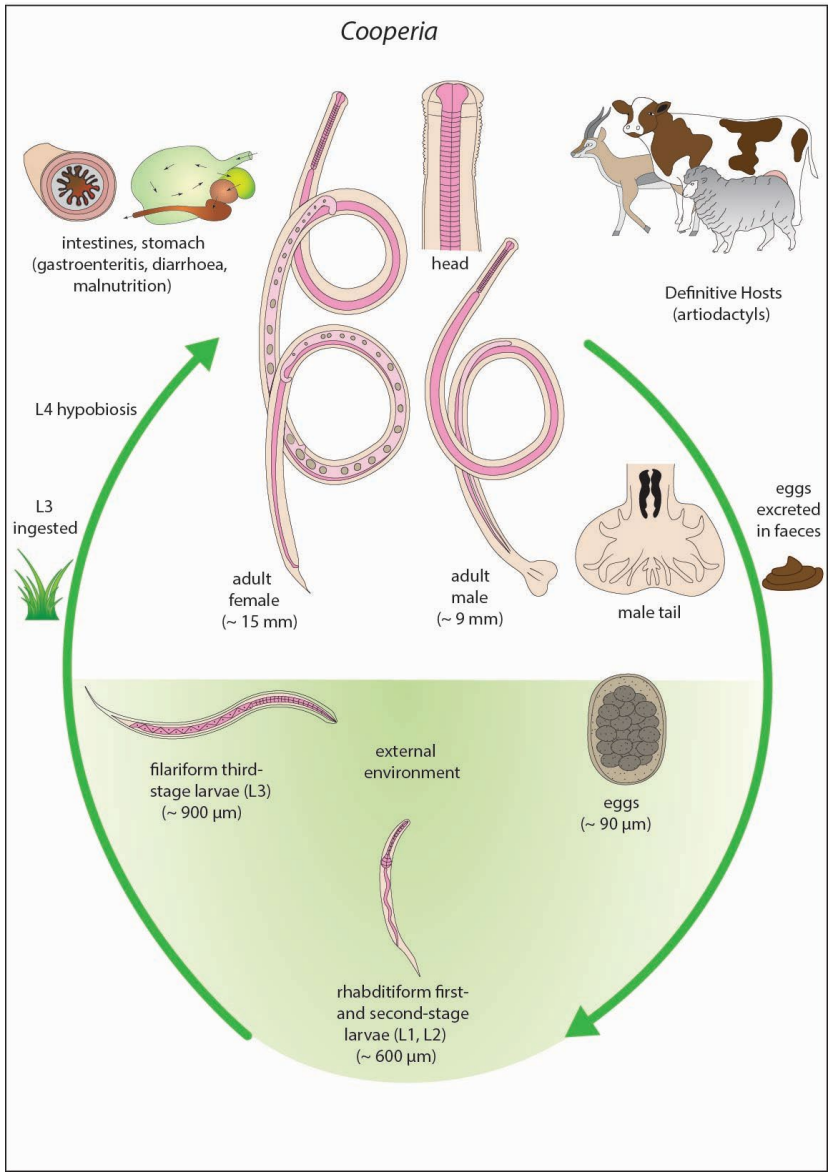
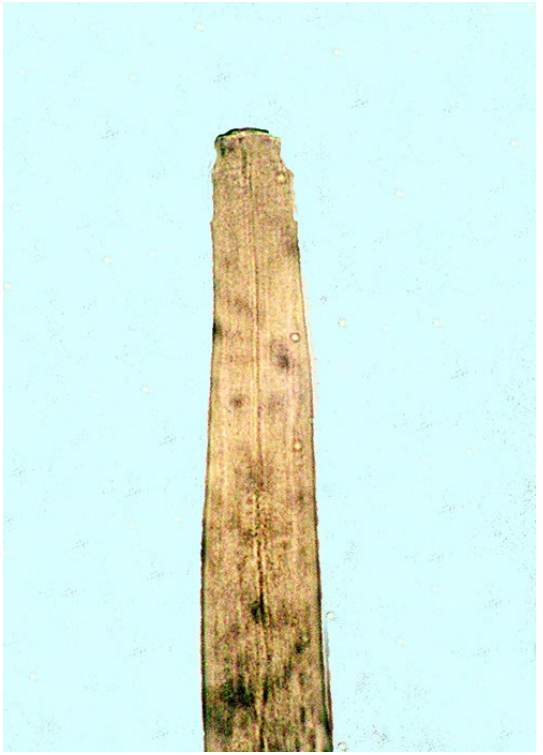
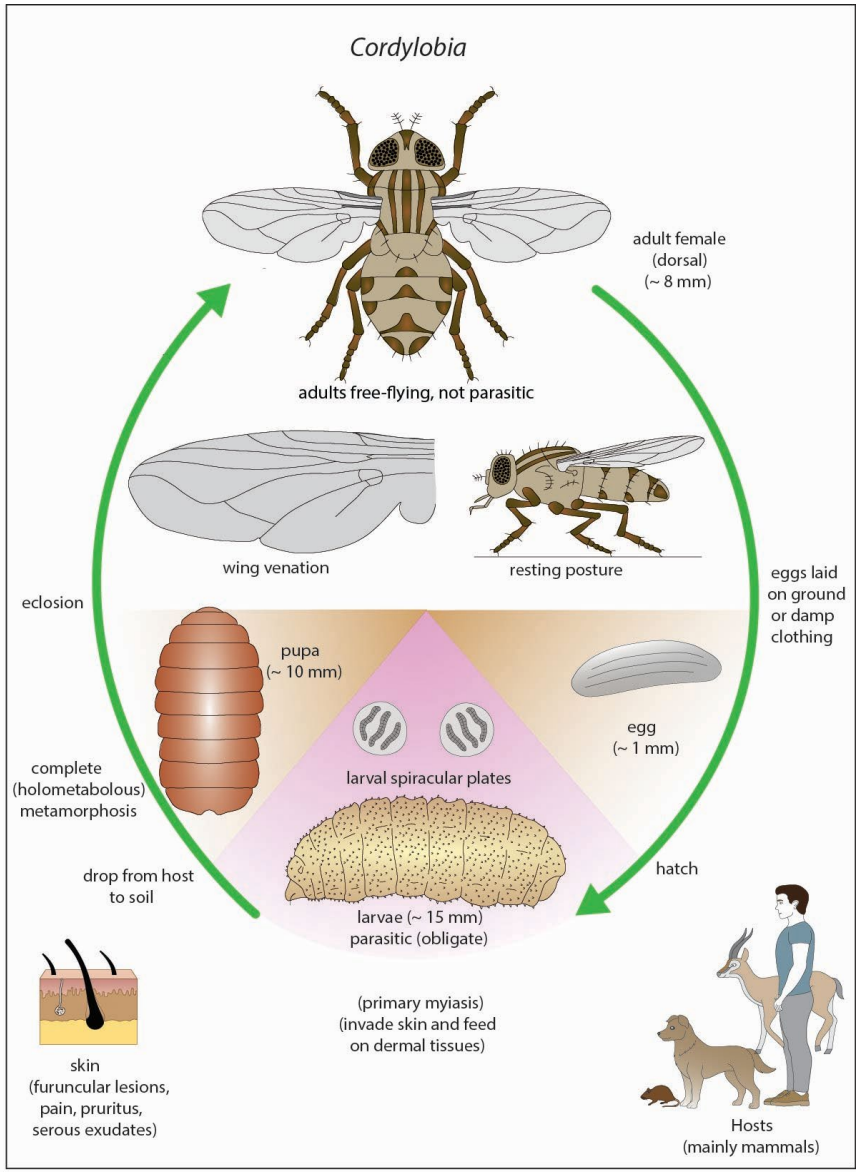
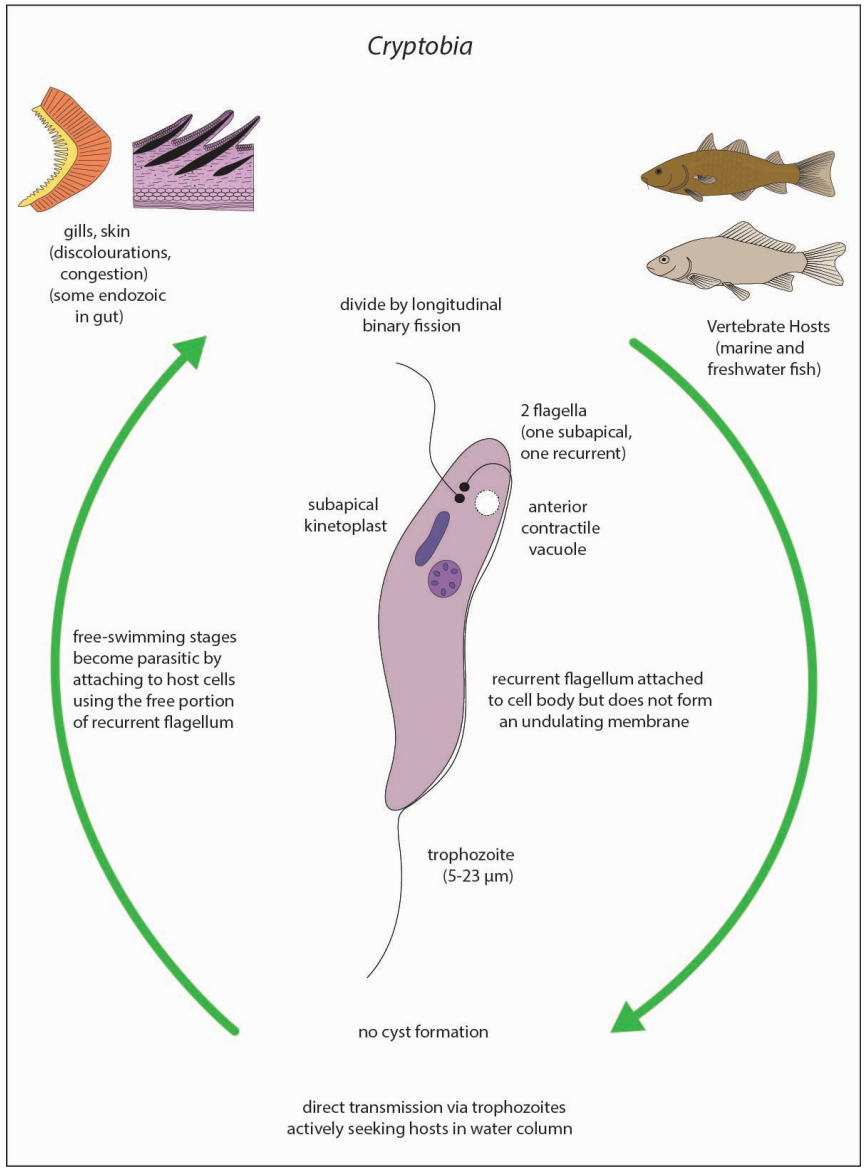

Cochlosoma
intestines
(catarrhal enteritis,
diarrhoea, poor
condition)
Vertebrate Hosts
(birds, esp. poultry,
waterfowl), some
mammals (shrews)
unique anterior
adhesive disc
6 flagella
(4 anterior,
2 recurrent)
parabasal body
nucleus
lateral groove
trophozoites
(5-18 µm)
axostyle
no cyst formation
direct transmission presumably by transfer of trophozoites
via close contact (flocking, grooming, nesting, allo-feeding)

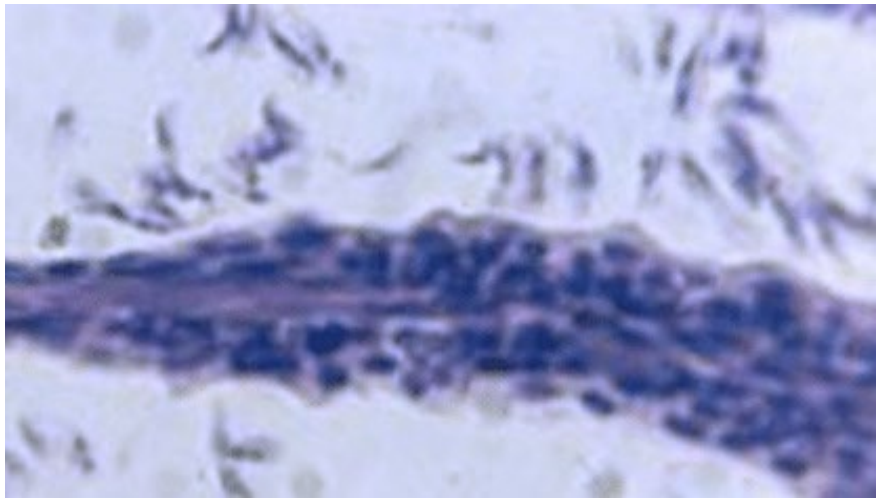


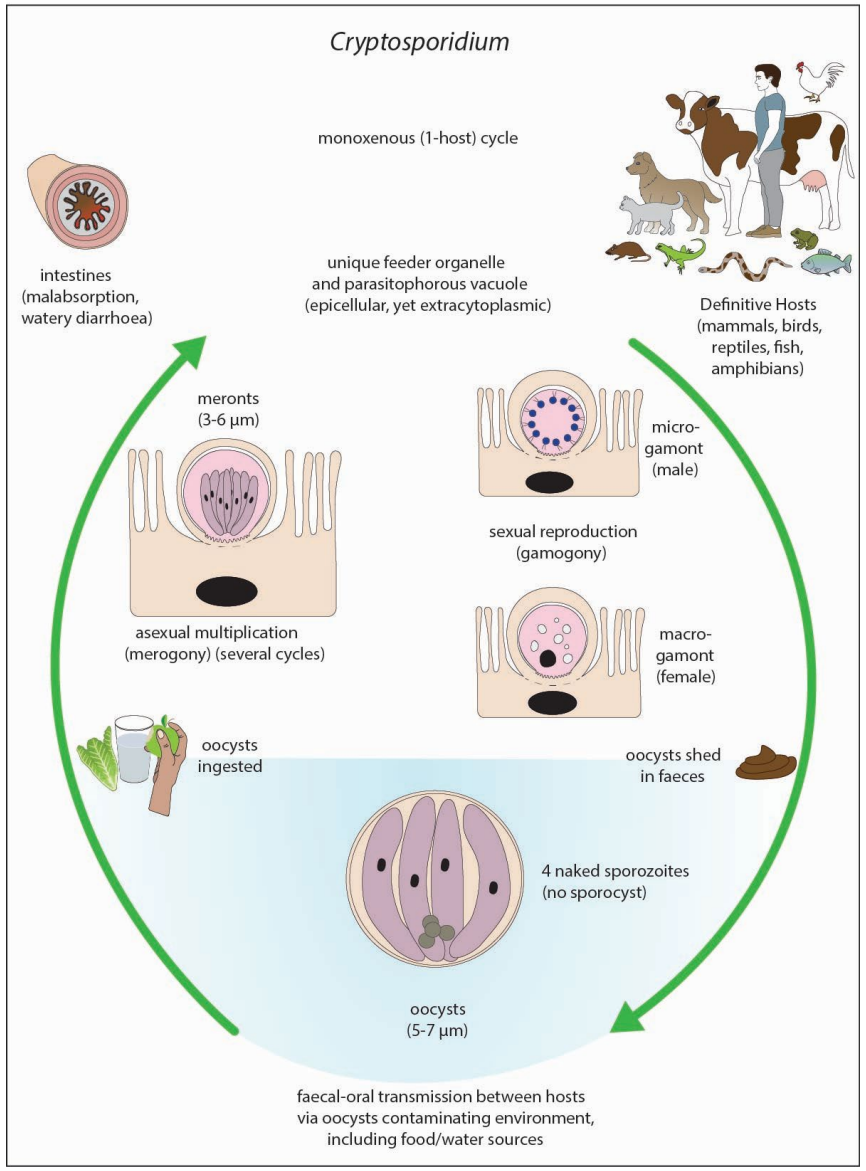

Cooperia
intestines, stomach
(gastroenteritis, diarrhoea,
malnutrition)
head
Definitive Hosts
(artiodactyls)
L4 hypobiosis
L3
ingested
adult
female
(~ 15 mm)
adult
male
(~ 9 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 900 µm)
external
environment
eggs
(~ 90 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 600 µm)

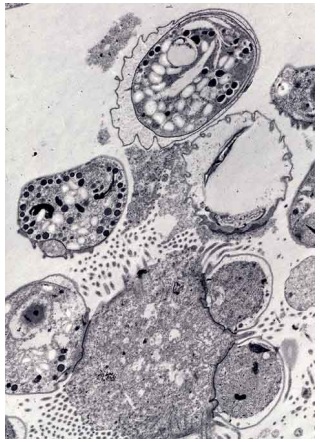
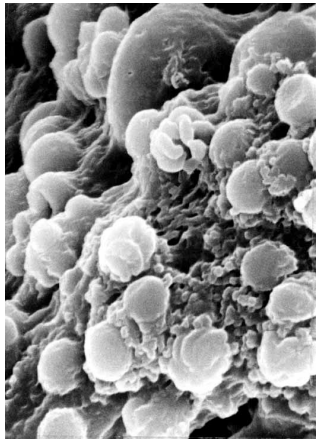
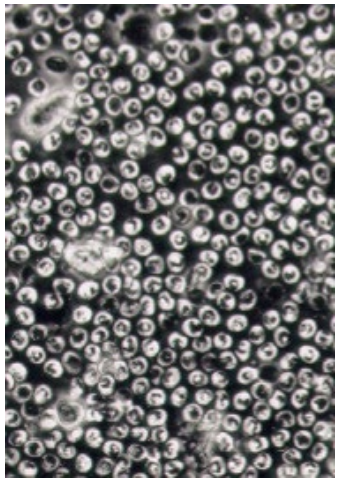
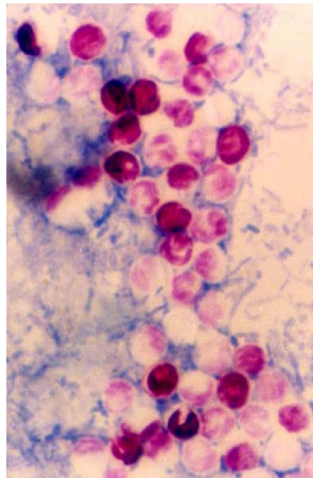
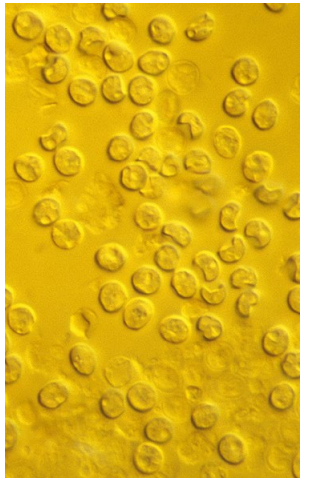


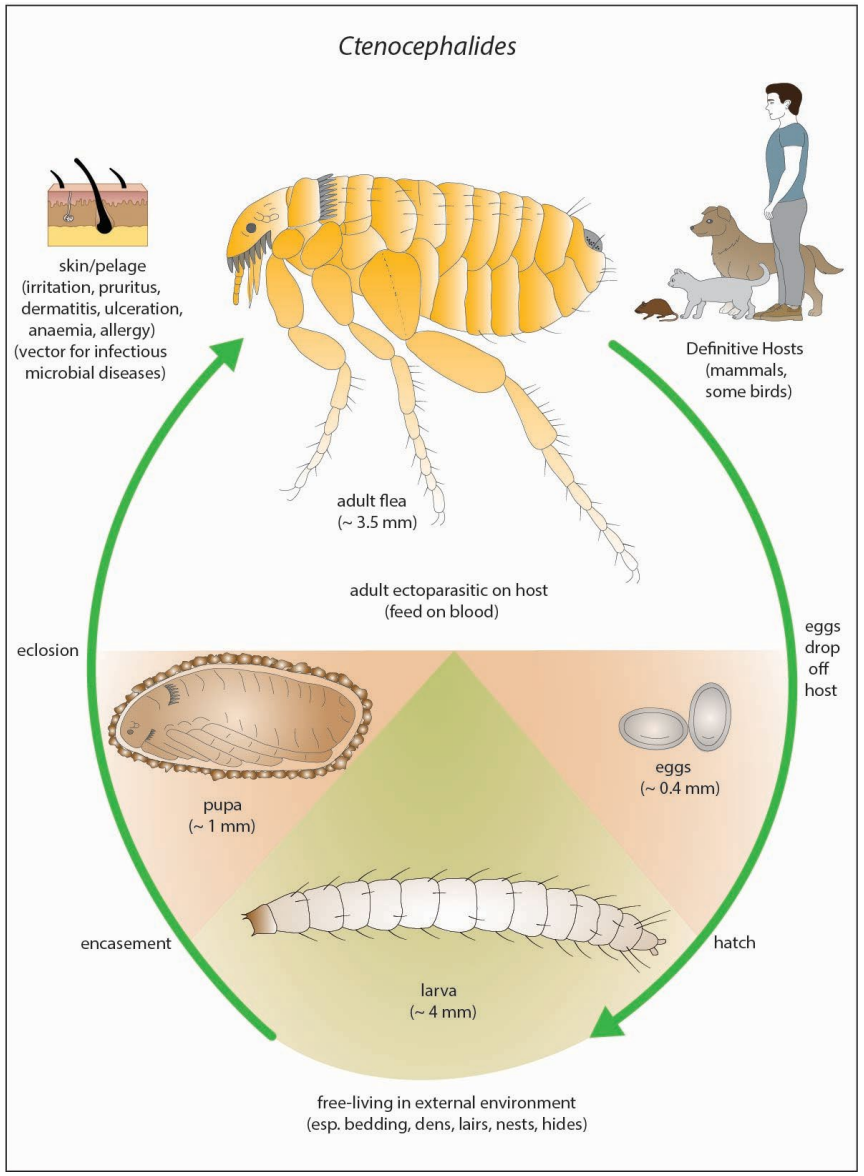

Cordylobia
adult female
(dorsal)
(~ 8 mm)
adults free-flying, not parasitic
wing venation
resting posture
eggs laid
on ground
or damp
clothing
eclosion
pupa
(~ 10 mm)
egg
(~ 1 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
drop from host
to soil
hatch
larvae (~ 15 mm)
parasitic (obligate)
(primary myiasis)
(invade skin and feed
on dermal tissues)
skin
(furuncular lesions,
pain, pruritus,
serous exudates)
Hosts
(mainly mammals)

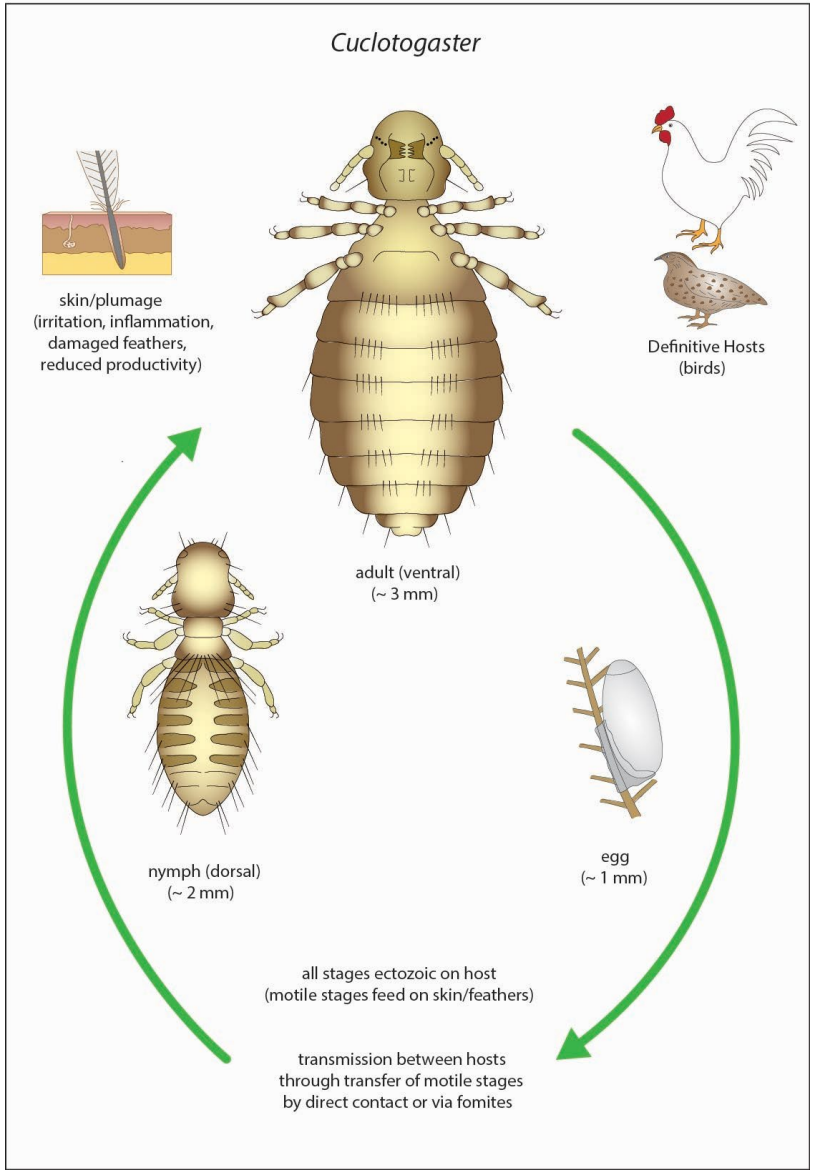

Cryptobia
gills, skin
(discolourations,
congestion)
(some endozoic
in gut)
divide by longitudinal
binary fission
Vertebrate Hosts
(marine and
freshwater fish)
2 flagella
(one subapical,
one recurrent)
subapical
kinetoplast
anterior
contractile
vacuole
free-swimming stages
become parasitic by
attaching to host cells
using the free portion
of recurrent flagellum
recurrent flagellum attached
to cell body but does not form
an undulating membrane
trophozoite
(5-23 µm)
no cyst formation
direct transmission via trophozoites
actively seeking hosts in water column

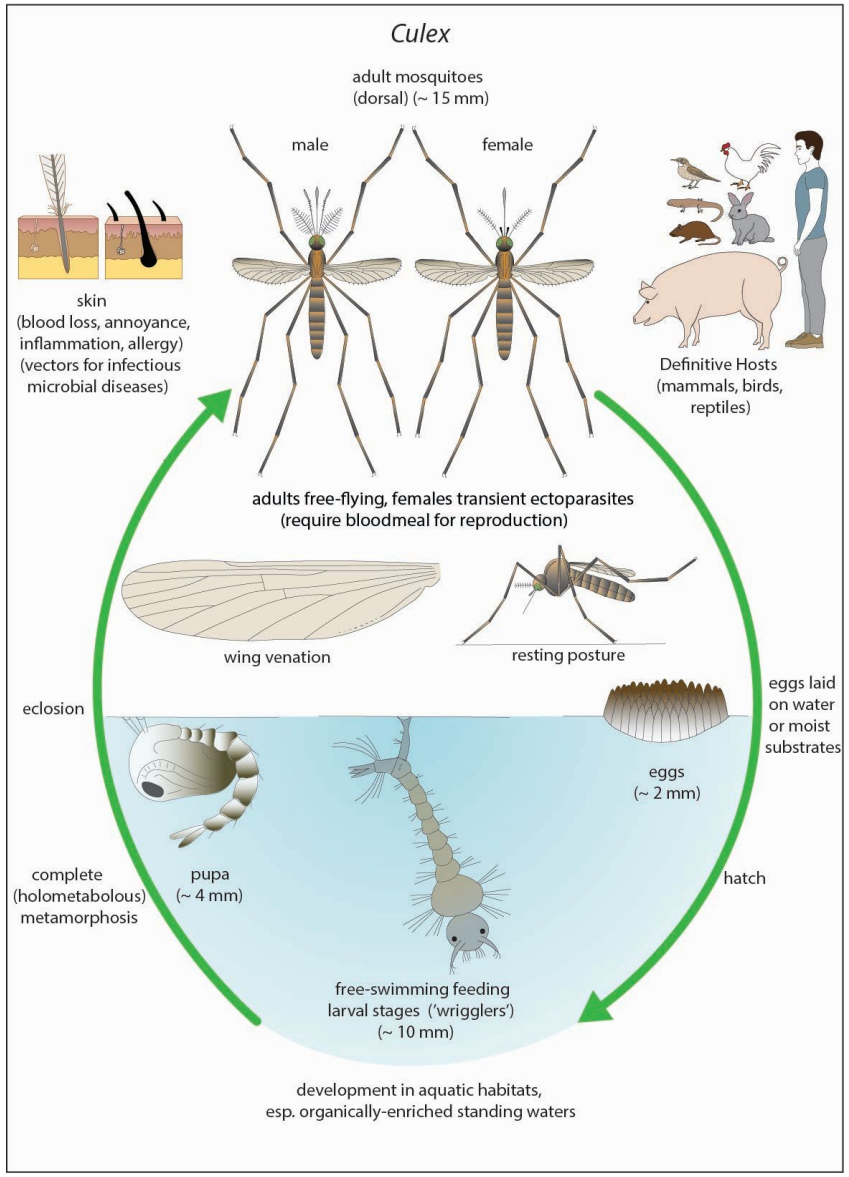



Cryptosporidium
monoxenous (1-host) cycle
intestines
(malabsorption,
watery diarrhoea)
unique feeder organelle
and parasitophorous vacuole
(epicellular, yet extracytoplasmic)
Definitive Hosts
(mammals, birds,
reptiles, fish,
amphibians)
meronts
(3-6 µm)
micro-
gamont
(male)
sexual reproduction
(gamogony)
asexual multiplication
(merogony) (several cycles)
macro-
gamont
(female)
oocysts
ingested
oocysts shed
in faeces
4 naked sporozoites
(no sporocyst)
oocysts
(5-7 µm)
faecal-oral transmission between hosts
via oocysts contaminating environment,
including food/water sources


Ctenocephalides
skin/pelage
(irritation, pruritus,
dermatitis, ulceration,
anaemia, allergy)
(vector for infectious
microbial diseases)
Definitive Hosts
(mammals,
some birds)
adult flea
(~ 3.5 mm)
adult ectoparasitic on host
(feed on blood)
eclosion
eggs
drop
off
host
pupa
(~ 1 mm)
eggs
(~ 0.4 mm)
encasement
hatch
larva
(~ 4 mm)
free-living in external environment
(esp. bedding, dens, lairs, nests, hides)


Cuclotogaster
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 3 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

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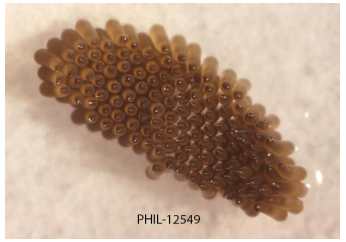
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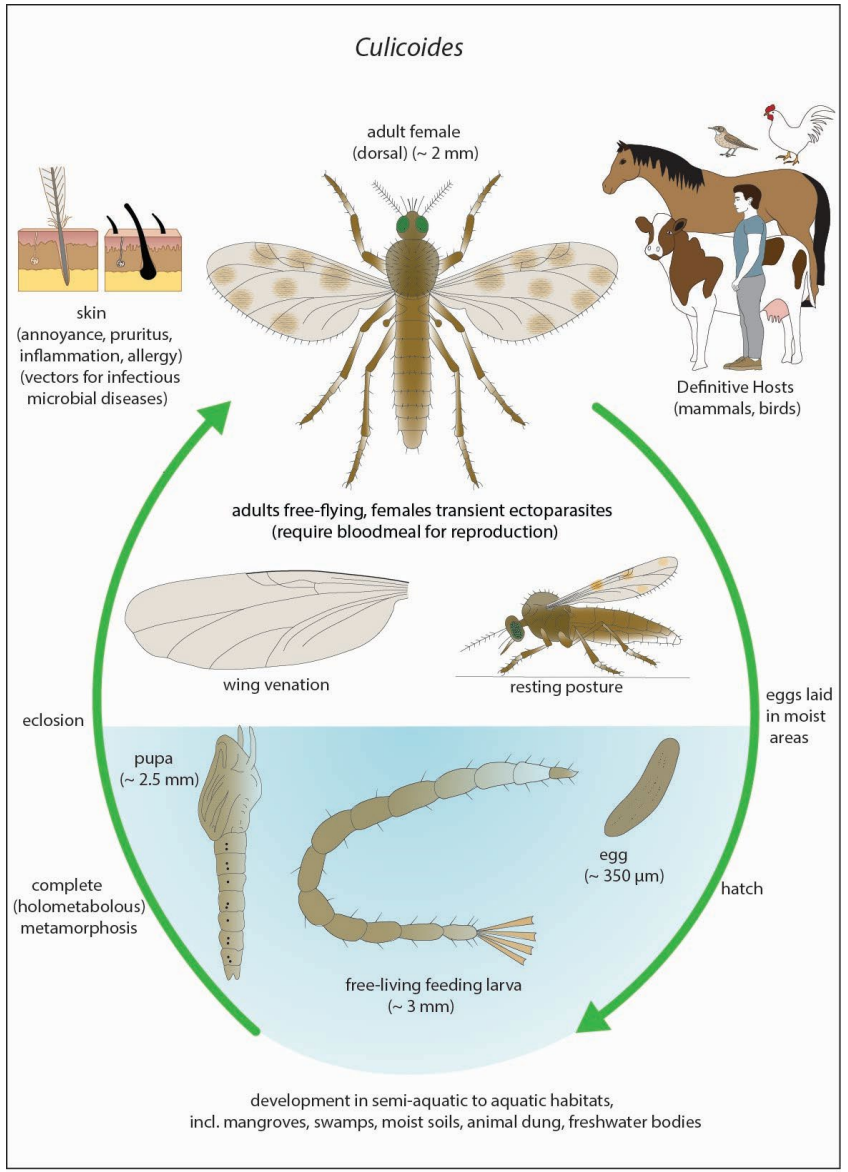
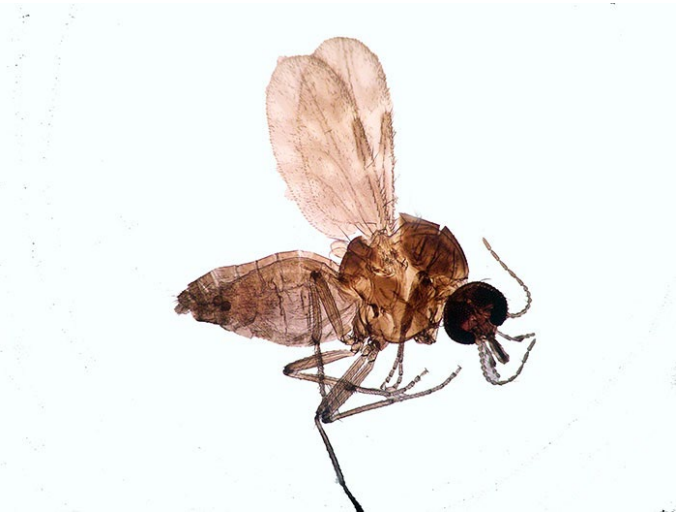
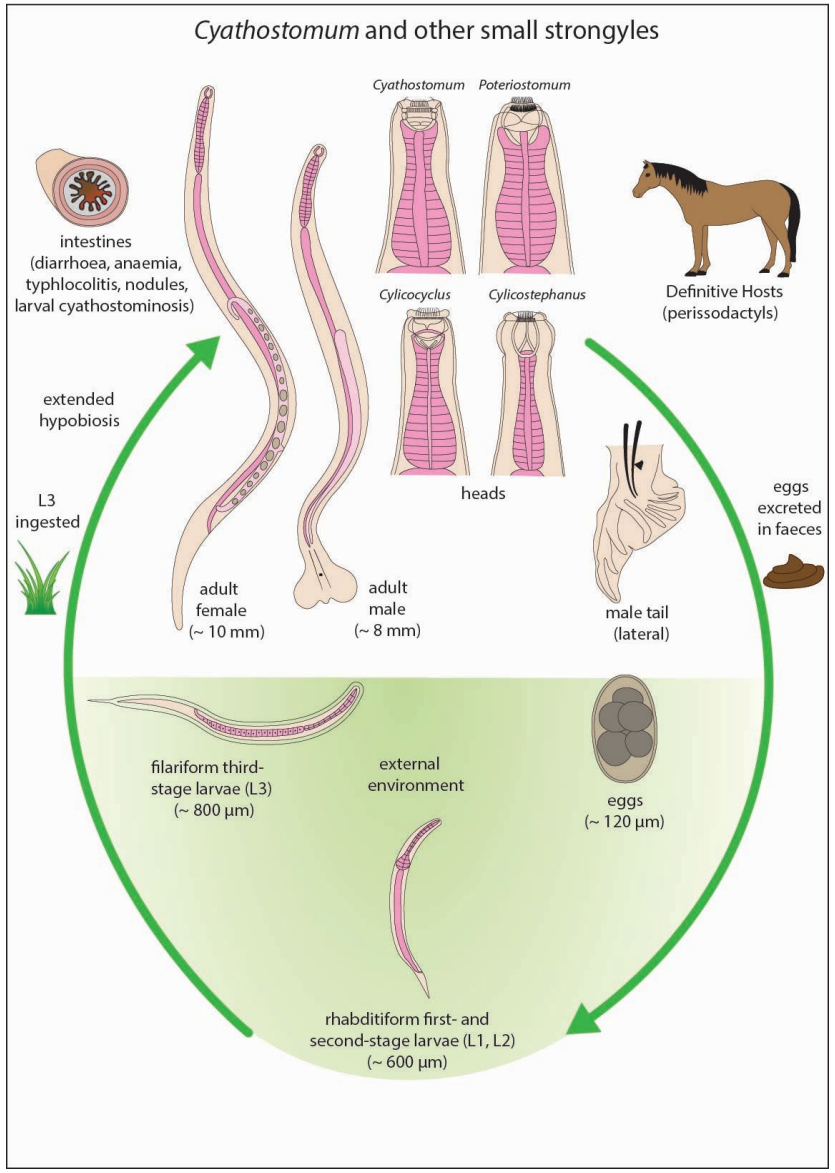
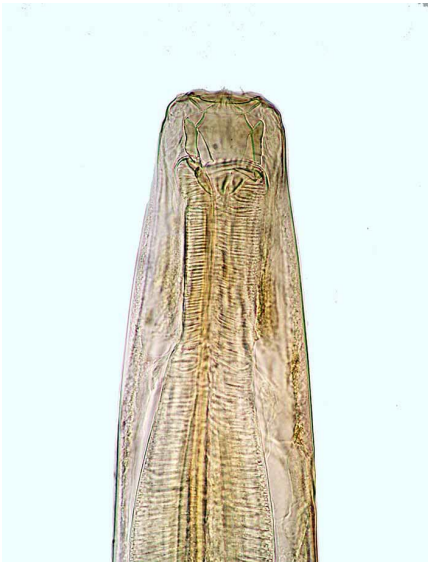
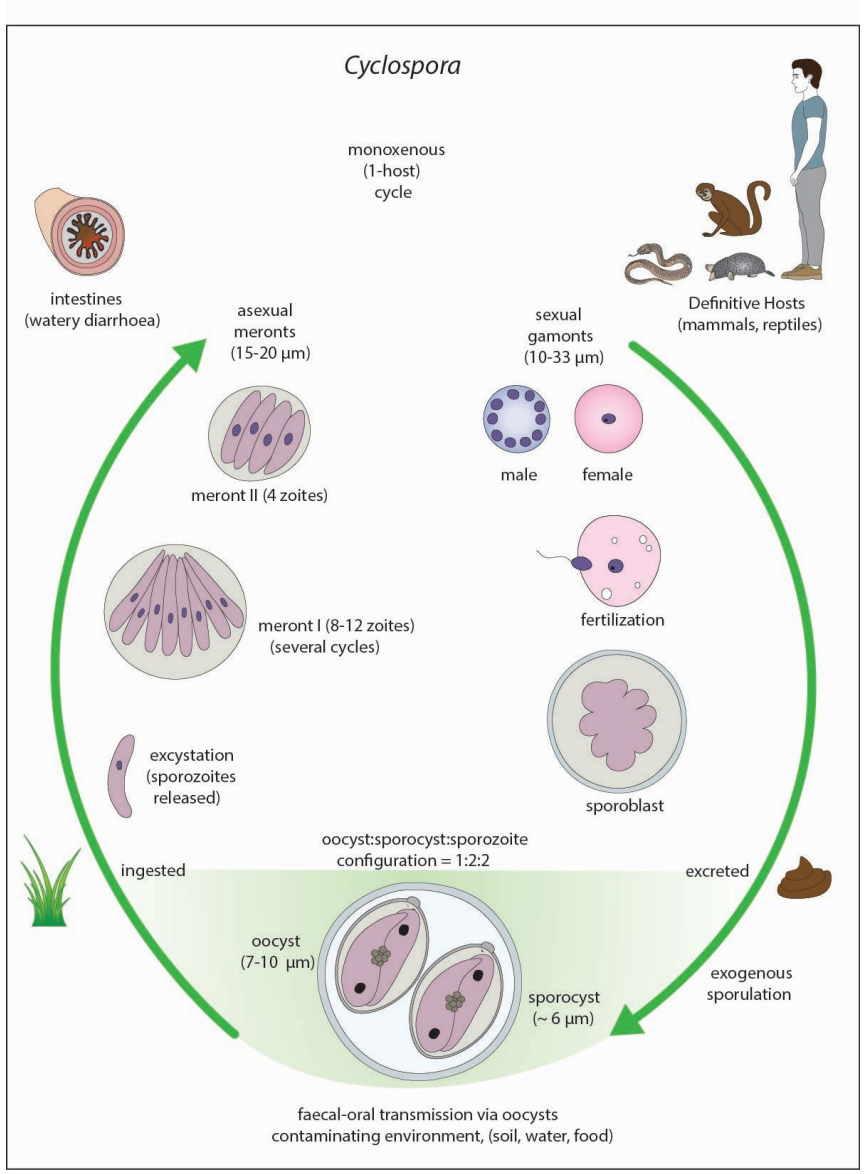
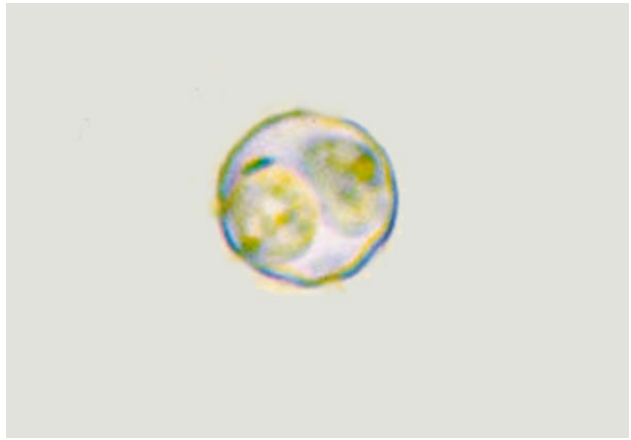

Culicoides
adult female
(dorsal) (~ 2 mm)
skin
(annoyance, pruritus,
inflammation, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
adults free-flying, females transient ectoparasites
(require bloodmeal for reproduction)
wing venation
resting posture
eggs laid
in moist
areas
eclosion
pupa
(~ 2.5 mm)
egg
(~ 350 µm)
hatch
complete
(holometabolous)
metamorphosis
free-living feeding larva
(~ 3 mm)
development in semi-aquatic to aquatic habitats,
incl. mangroves, swamps, moist soils, animal dung, freshwater bodies

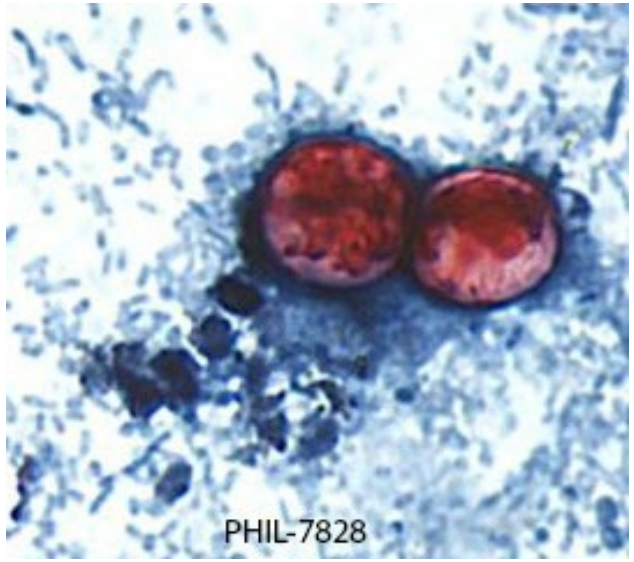


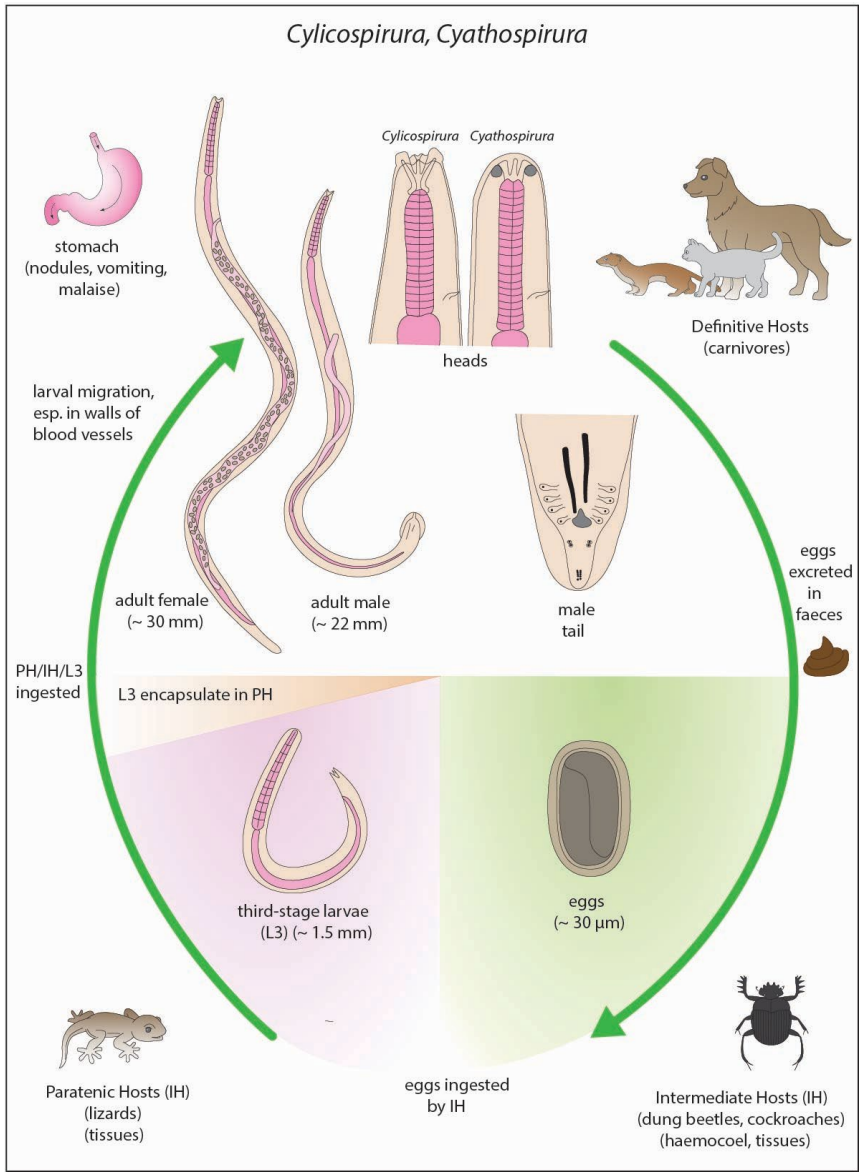

Cyathostomum and other small strongyles
Cyathostomum
Poteriostomum
Cylicocyclus
Cylicostephanus
intestines
(diarrhoea, anaemia,
typhlocolitis, nodules,
larval cyathostominosis)
Definitive Hosts
(perissodactyls)
extended
hypobiosis
L3
ingested
heads
eggs
excreted
in faeces
adult
female
(~ 10 mm)
adult
male
(~ 8 mm)
male tail
(lateral)
filariform third-
stage larvae (L3)
(~ 800 µm)
external
environment
eggs
(~ 120 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 600 µm)

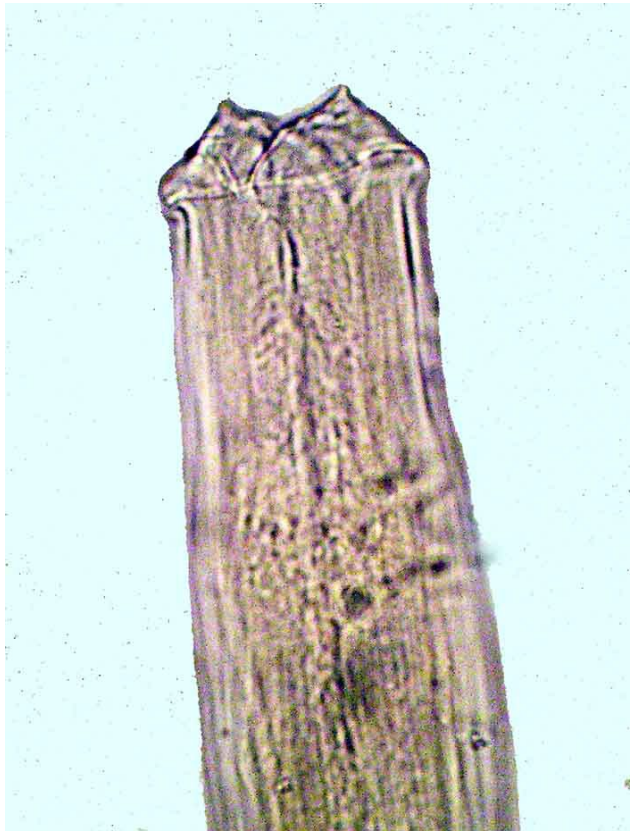


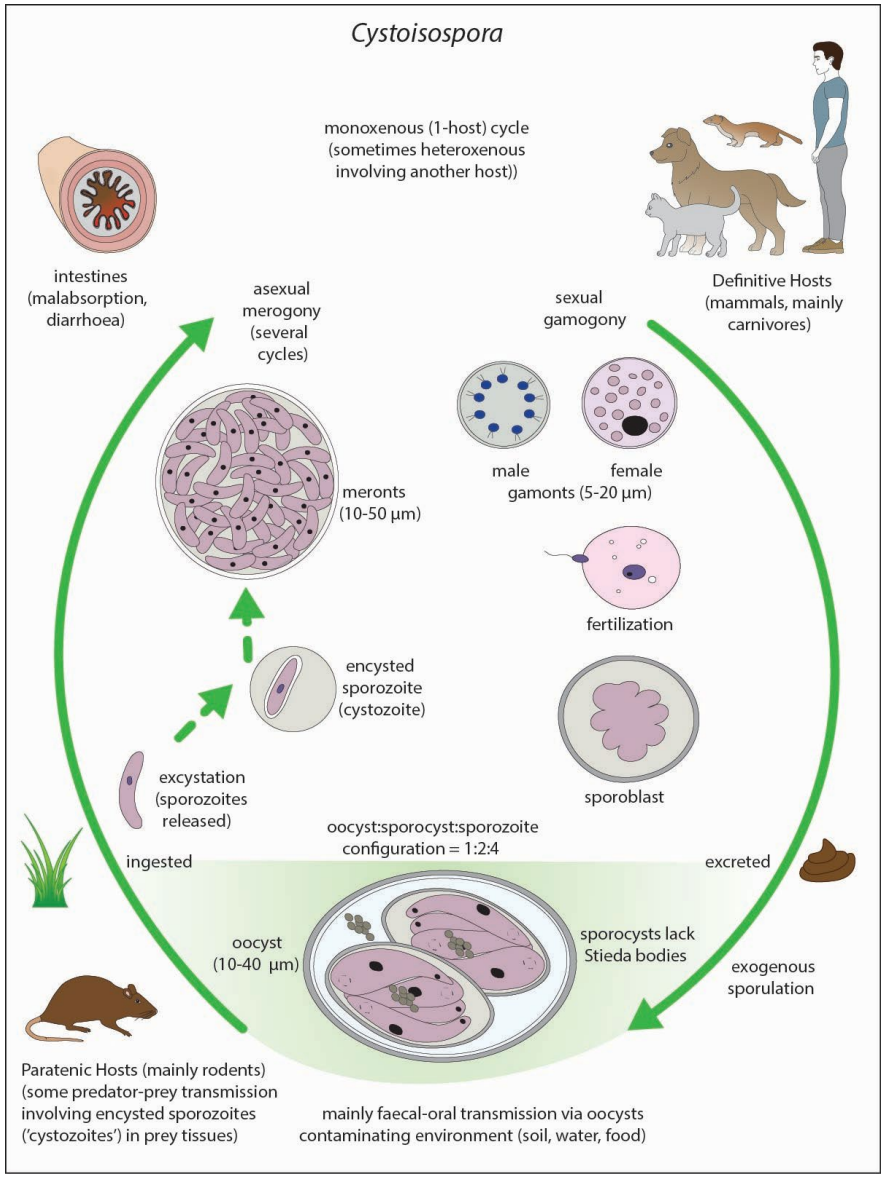

Cyclospora
monoxenous
(1-host)
cycle
intestines
(watery diarrhoea)
asexual
meronts
(15-20 µm)
meront II (4 zoites)
meront I (8-12 zoites)
(several cycles)
excystation
(sporozoites
released)
ingested
oocyst
(7-10 µm)
oocyst:sporocyst:sporozoite
configuration = 1:2:2
sporocyst
(~ 6 µm)
faecal-oral transmission via oocysts
contaminating environment, (soil, water, food)
sexual
gamonts
(10-33 µm)
male
female
fertilization
sporoblast
excreted
exogenous
sporulation
Definitive Hosts
(mammals, reptiles)

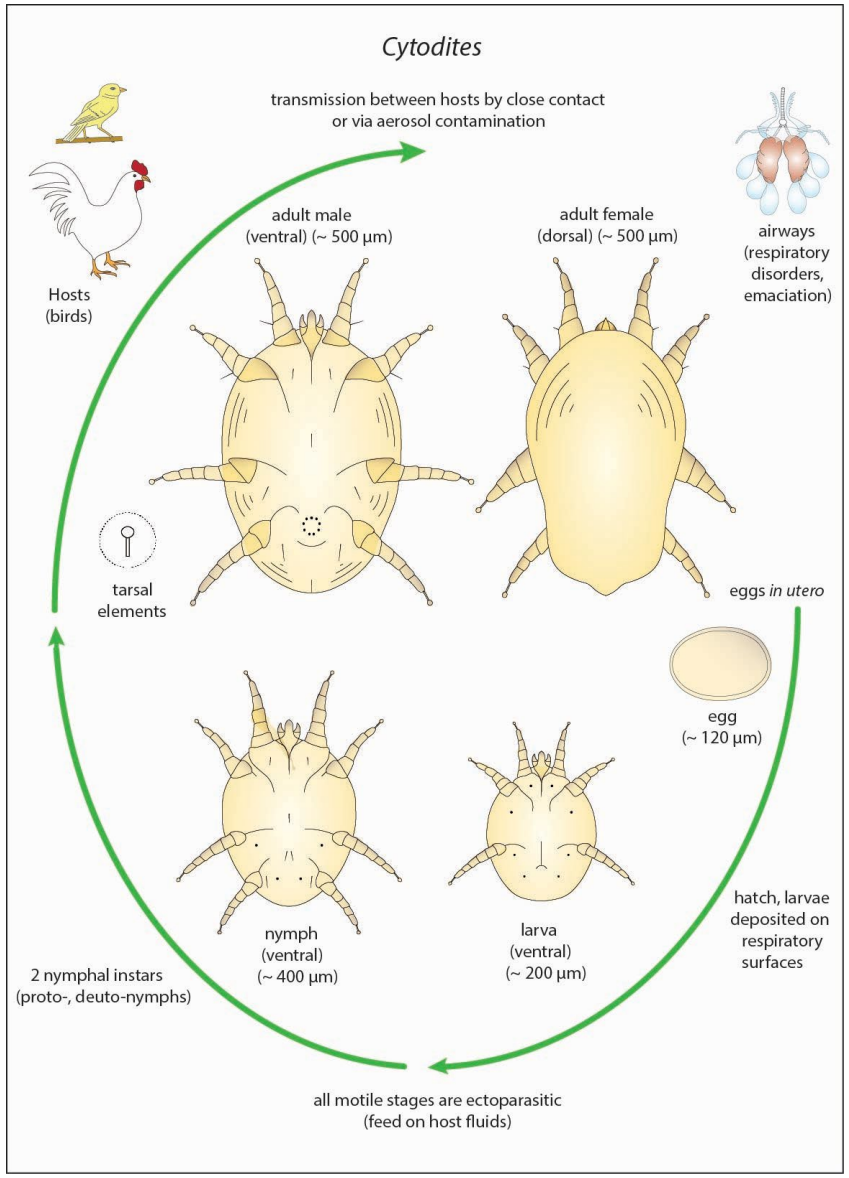


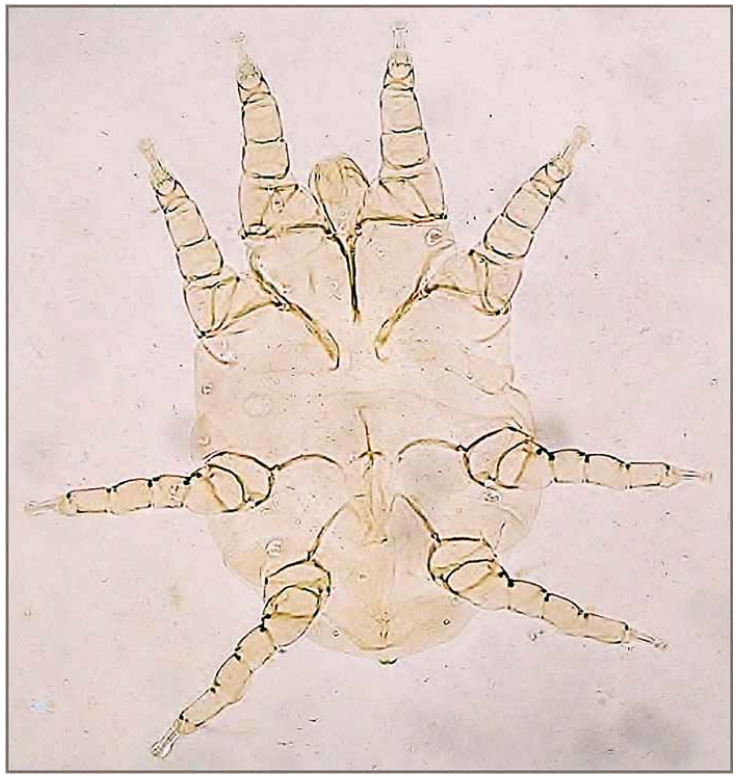

PHIL-7828

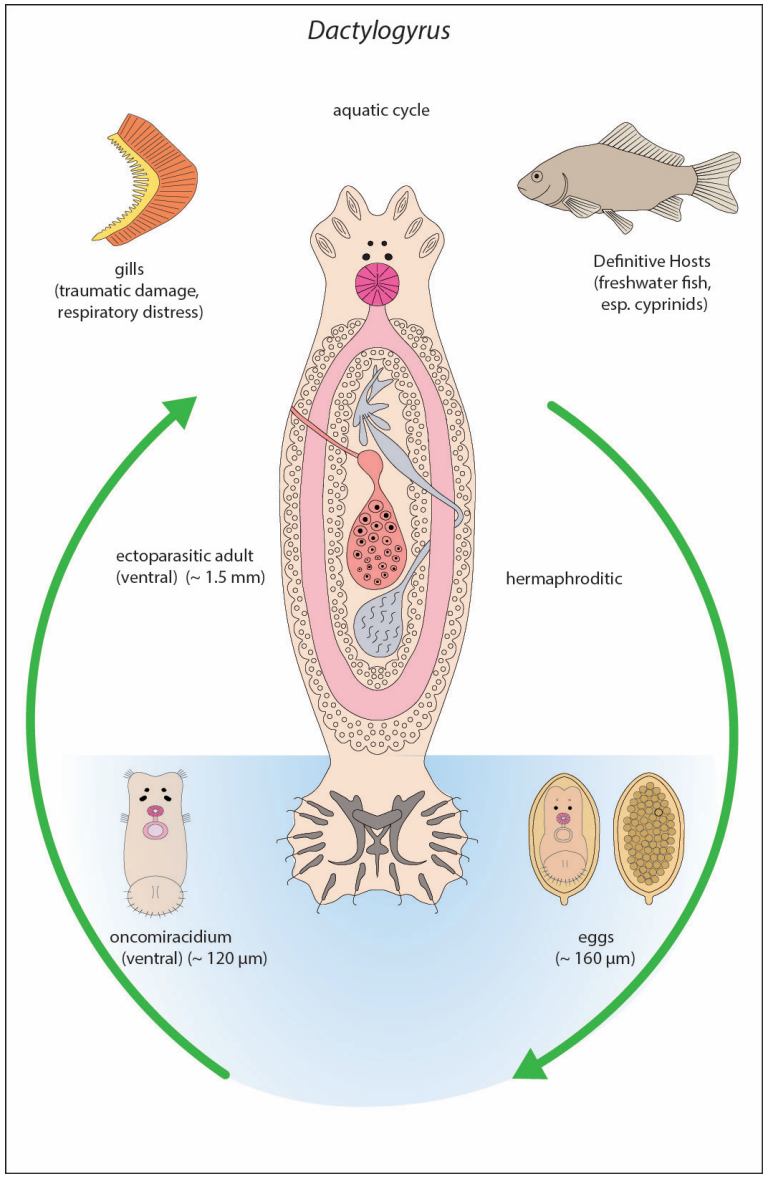

Cylicospirura, Cyathospirura
stomach
(nodules, vomiting,
malaise)
Cylicospirura
Cyathospirura
heads
Definitive Hosts
(carnivores)
larval migration,
esp. in walls of
blood vessels
adult female
(~ 30 mm)
adult male
(~ 22 mm)
male
tail
eggs
excreted
in
faeces
PH/IH/L3
ingested
L3 encapsulate in PH
third-stage larvae
(L3) (~ 1.5 mm)
eggs
(~ 30 µm)
Paratenic Hosts (IH)
(lizards)
(tissues)
eggs ingested
by IH
Intermediate Hosts (IH)
(dung beetles, cockroaches)
(haemocoel, tissues)

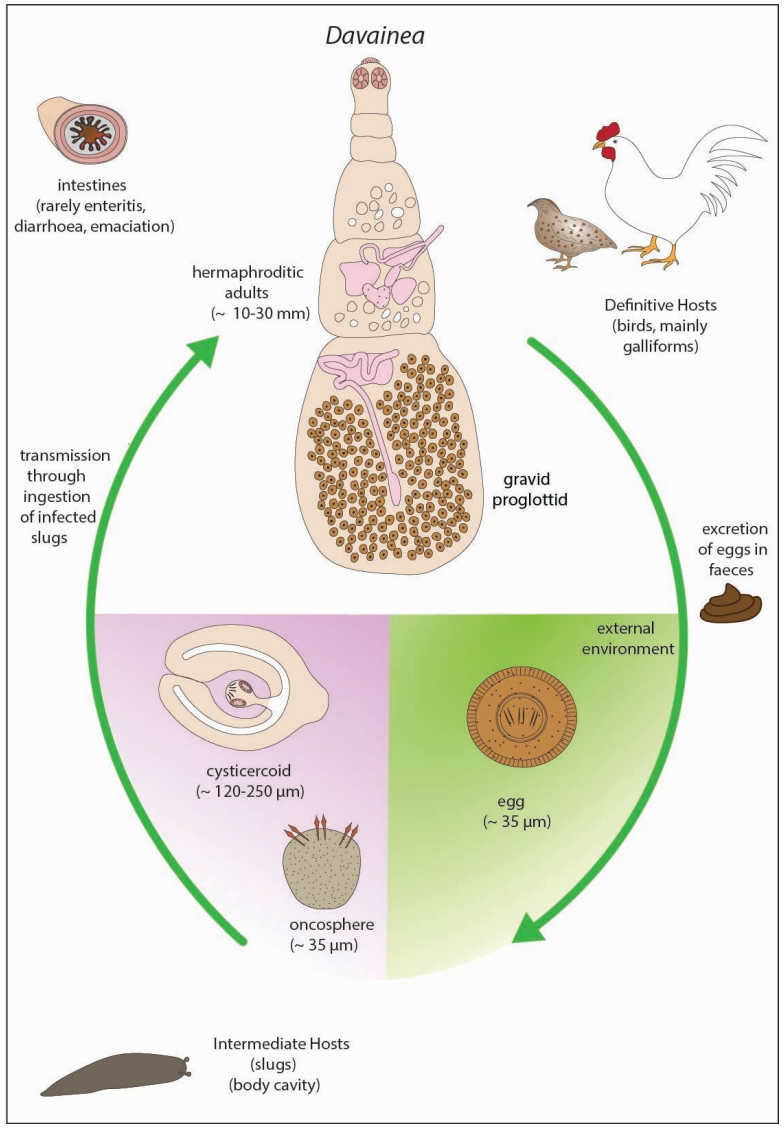


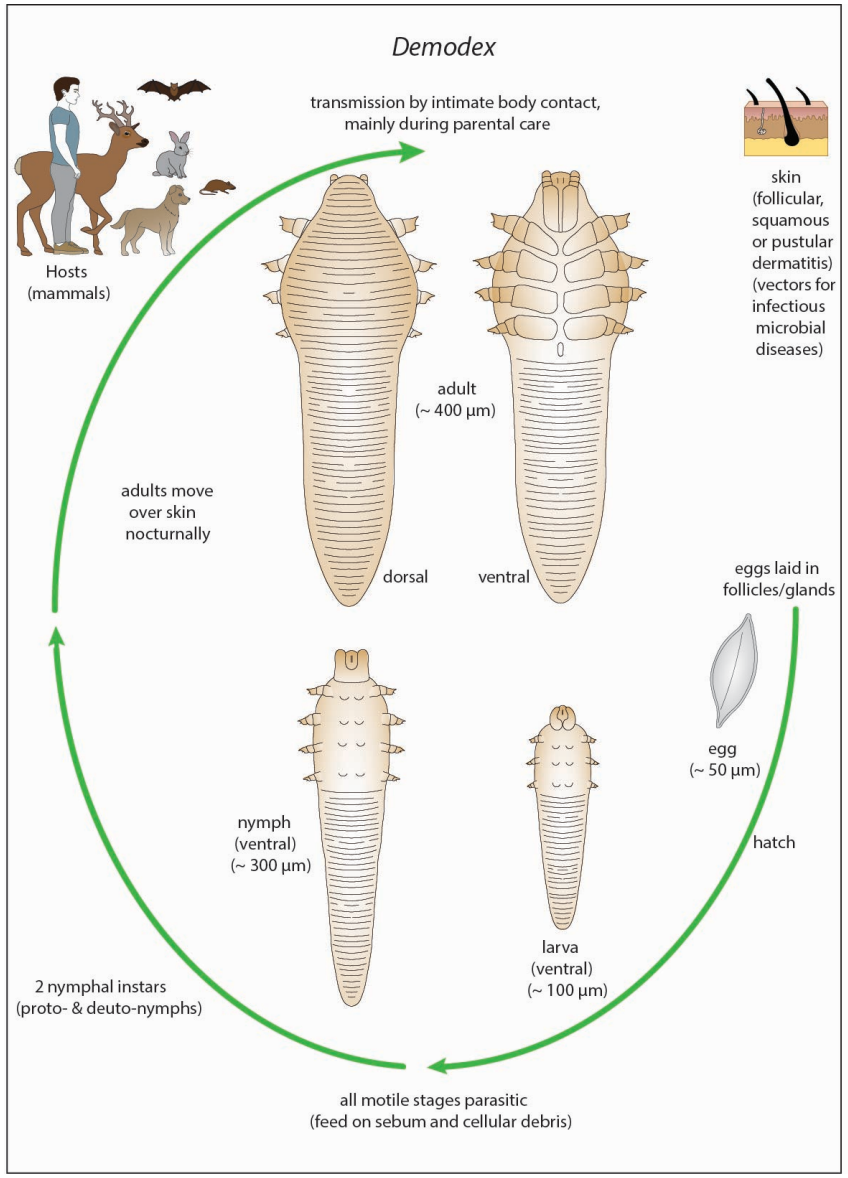

Cystoisospora
monoxenous (1-host) cycle
(sometimes heteroxenous
involving another host))
intestines
(malabsorption,
diarrhoea)
Definitive Hosts
(mammals, mainly
carnivores)
asexual
merogony
(several
cycles)
sexual
gamogony
meronts
(10-50 µm)
male
female
gamonts (5-20 µm)
fertilization
encysted
sporozoite
(cystozoite)
excystation
(sporozoites
released)
sporoblast
oocyst:sporocyst:sporozoite
configuration = 1:2:4
ingested
excreted
oocyst
(10-40 µm)
sporocysts lack
Stieda bodies
exogenous
sporulation
Paratenic Hosts (mainly rodents)
(some predator-prey transmission
involving encysted sporozoites
('cystozoites') in prey tissues)
mainly faecal-oral transmission via oocysts
contaminating environment (soil, water, food)

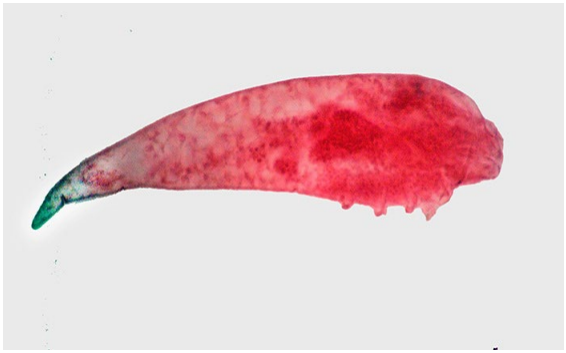

Cytodites
transmission between hosts by close contact
or via aerosol contamination
Hosts
(birds)
airways
(respiratory
disorders,
emaciation)
adult male
(ventral) (~ 500 µm)
adult female
(dorsal) (~ 500 µm)
tarsal
elements
eggs in utero
egg
(~ 120 µm)
nymph
(ventral)
(~ 400 µm)
larva
(ventral)
(~ 200 µm)
hatch, larvae
deposited on
respiratory
surfaces
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on host fluids)

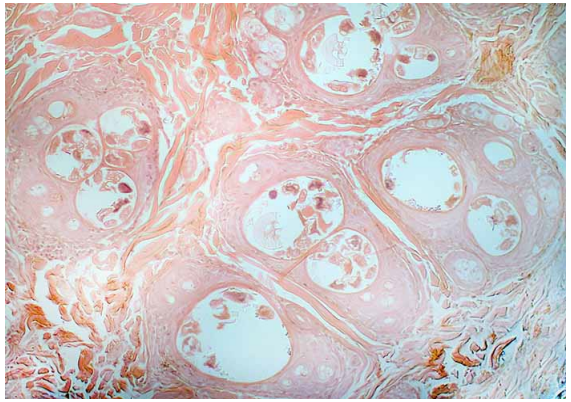


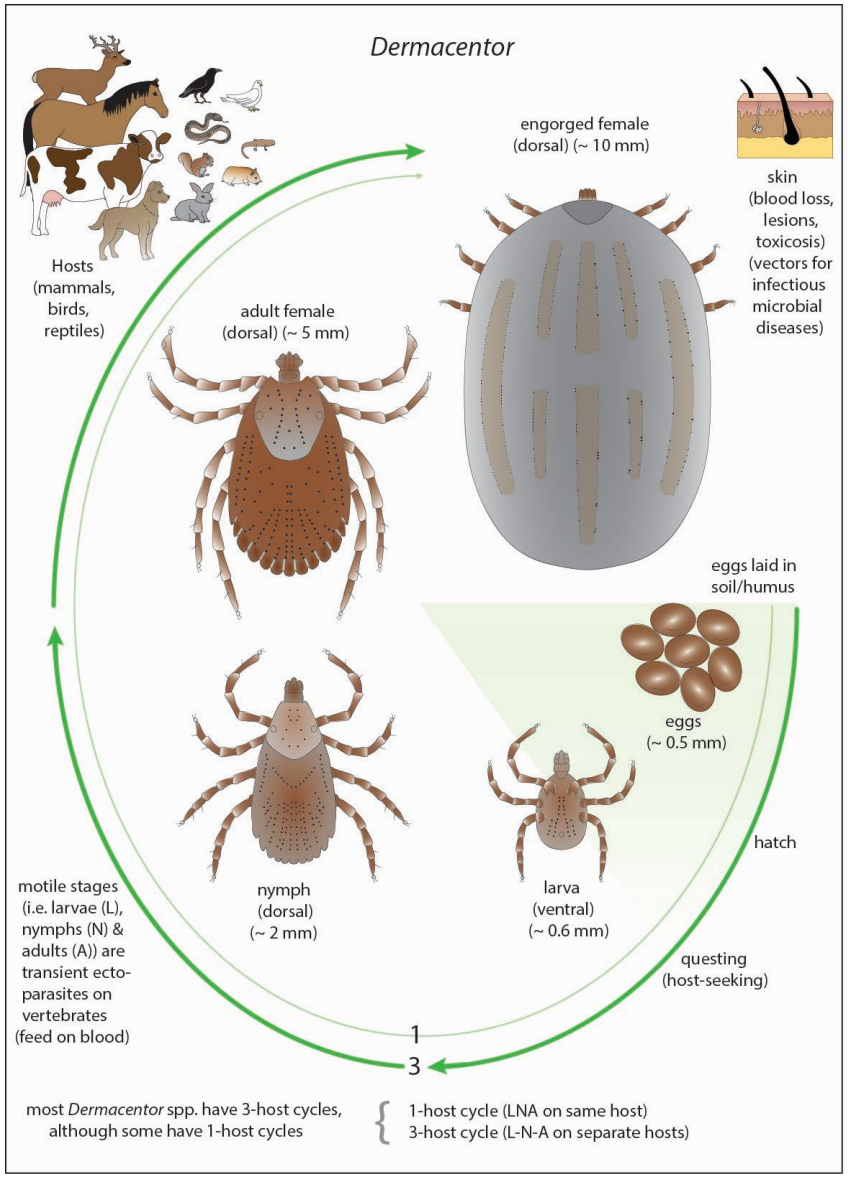

Dactylogyrus
aquatic cycle
gills
(traumatic damage,
respiratory distress)
Definitive Hosts
(freshwater fish,
esp. cyprinids)
ectoparasitic adult
(ventral) (~ 1.5 mm)
hermaphroditic
oncomiracidium
(ventral) (~ 120 µm)
eggs
(~ 160 µm)

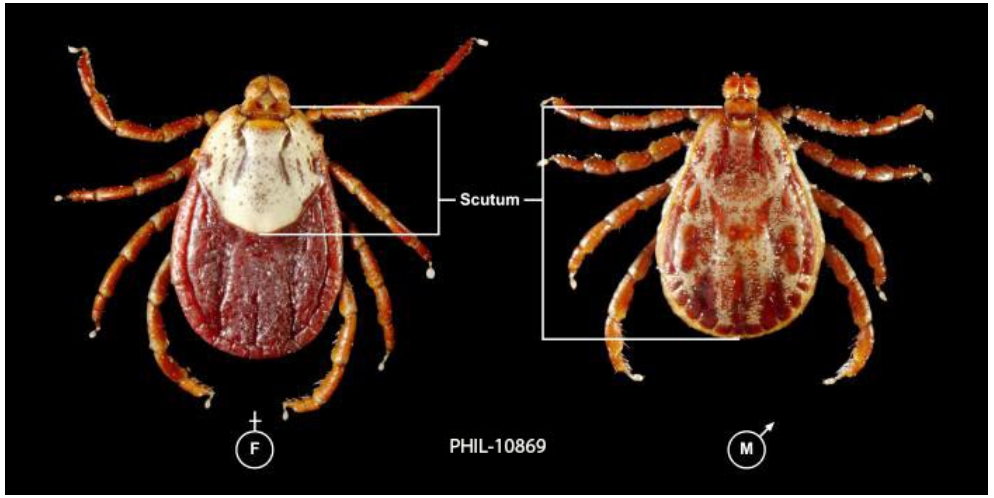

Davainea
intestines
(rarely enteritis,
diarrhoea, emaciation)
hermaphroditic
adults
(~ 10-30 mm)
Definitive Hosts
(birds, mainly
galliforms)
transmission
through
ingestion
of infected
slugs
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 120-250 µm)
egg
(~ 35 µm)
oncosphere
(~ 35 µm)
Intermediate Hosts
(slugs)
(body cavity)


Demodex
transmission by intimate body contact, mainly during parental care
Hosts (mammals)
skin (follicular, squamous or pustular dermatitis) (vectors for infectious microbial diseases)
adult (~ 400 µm)
adults move over skin nocturnally
dorsal
ventral
eggs laid in follicles/glands
egg (~ 50 µm)
hatch
nymph (ventral) (~ 300 µm)
larva (ventral) (~ 100 µm)
2 nymphal instars (proto- & deuto-nymphs)
all motile stages parasitic (feed on sebum and cellular debris)

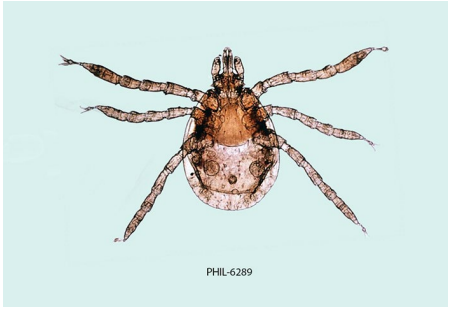





Dermacentor
Hosts (mammals, birds, reptiles)
engorged female (dorsal) (~ 10 mm)
skin (blood loss, lesions, toxicosis) (vectors for infectious microbial diseases)
adult female (dorsal) (~ 5 mm)
eggs laid in soil/humus
eggs (~ 0.5 mm)
hatch
nymph (dorsal) (~ 2 mm)
larva (ventral) (~ 0.6 mm)
motile stages (i.e. larvae (L), nymphs (N) & adults (A)) are transient ecto-parasites on vertebrates (feed on blood)
questing (host-seeking)
1
3
most Dermacentor spp. have 3-host cycles, although some have 1-host cycles
1-host cycle (LNA on same host)
3-host cycle (L-N-A on separate hosts)


Scutum
F
PHIL-10869
M


PHIL-7321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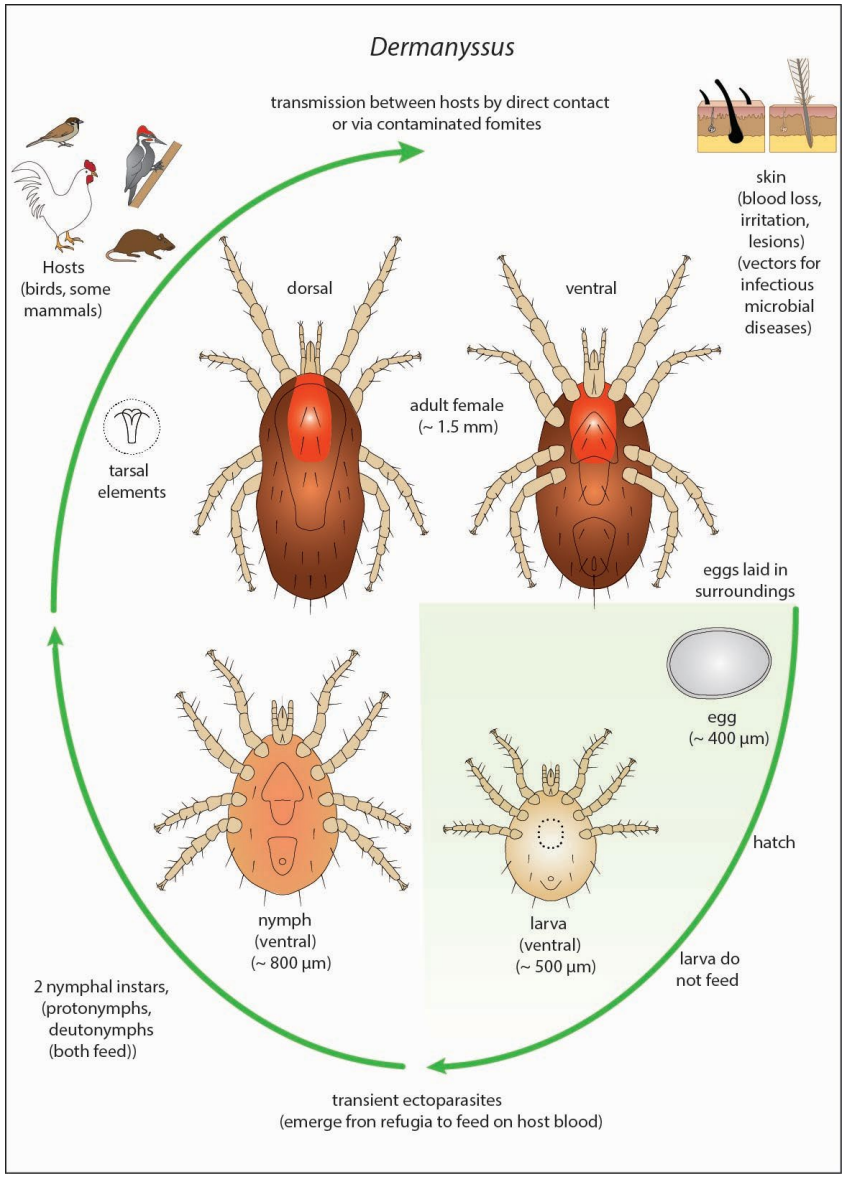
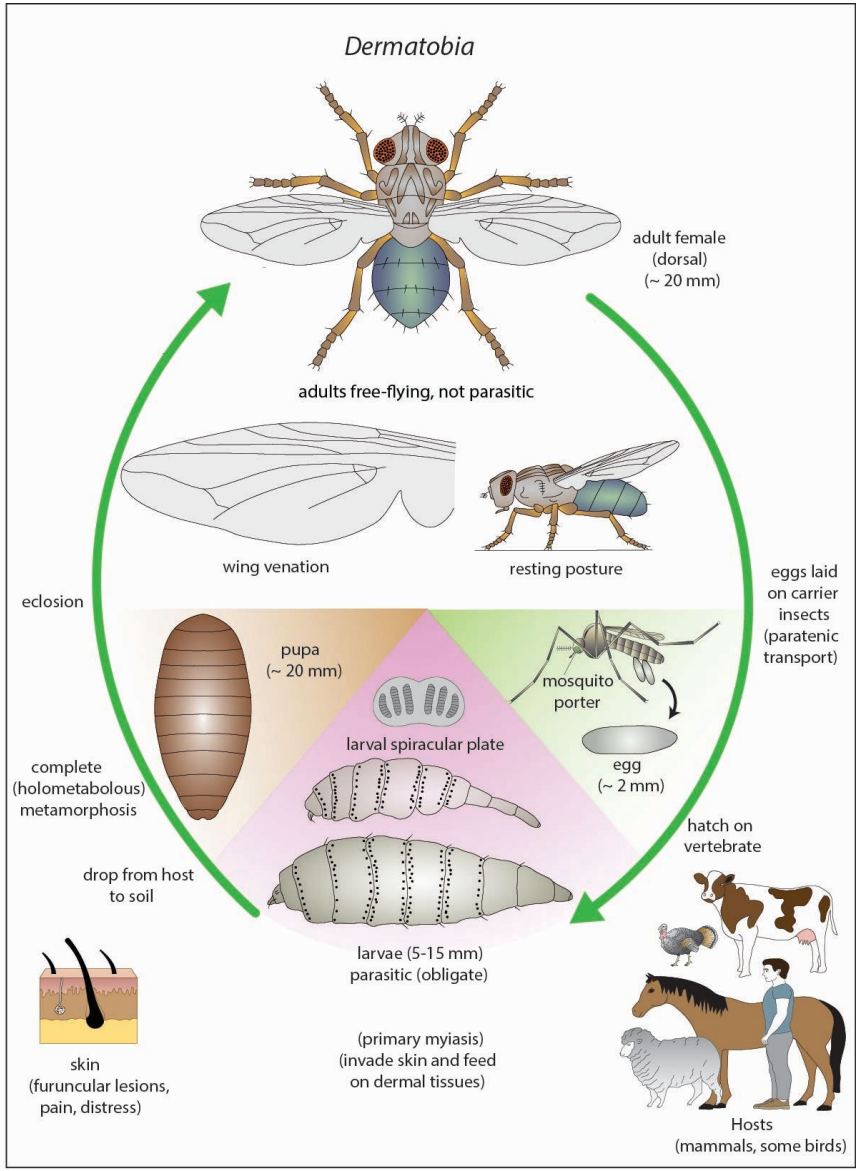
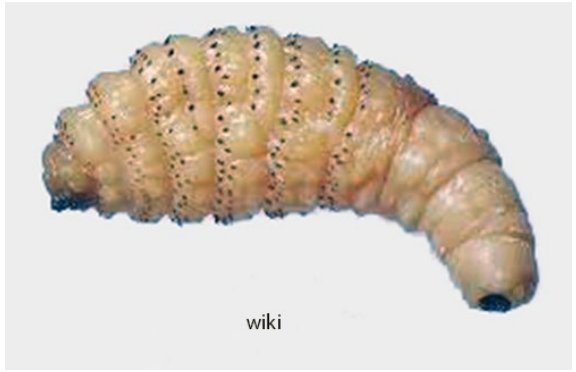
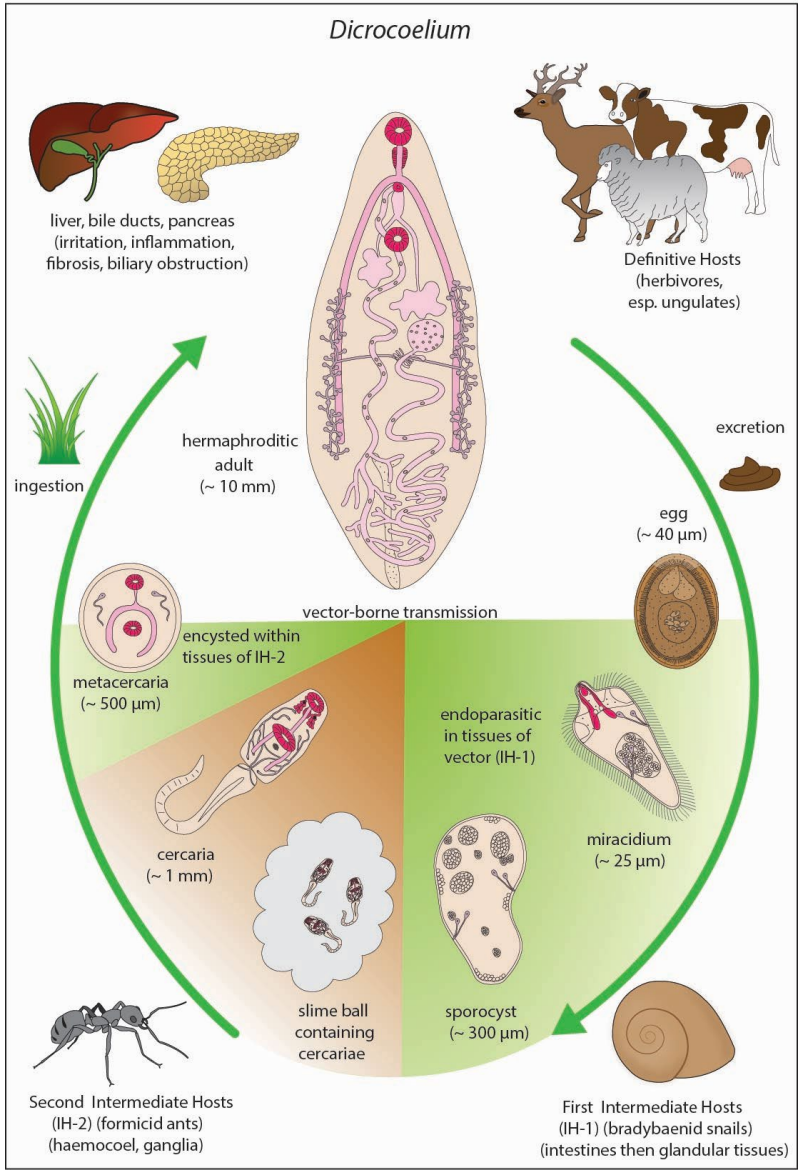

Dermanyssus
transmission between hosts by direct contact
or via contaminated fomites
skin
(blood loss,
irritation,
lesions)
(vectors for
infectious
microbial
diseases)
Hosts
(birds, some
mammals)
dorsal
ventral
adult female
(~ 1.5 mm)
tarsal
elements
eggs laid in
surroundings
egg
(~ 400 µm)
hatch
nymph
(ventral)
(~ 800 µm)
larva
(ventral)
(~ 500 µm)
larva do
not feed
2 nymphal instars,
(protonymphs,
deutonymphs
(both feed))
transient ectoparasites
(emerge fron refugia to feed on host blood)

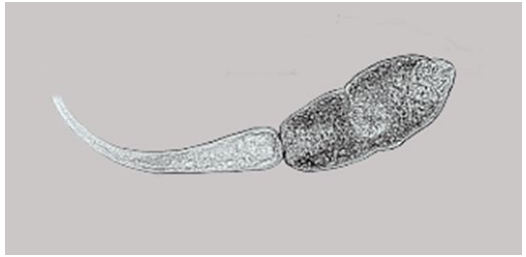

Dermatobia
adult female
(dorsal)
(~ 20 mm)
adults free-flying, not parasitic
wing venation
resting posture
eggs laid
on carrier
insects
(paratenic
transport)
eclosion
pupa
(~ 20 mm)
mosquito
porter
larval spiracular plate
egg
(~ 2 mm)
complete
(holometabolous)
metamorphosis
hatch on
vertebrate
drop from host
to soil
larvae (5-15 mm)
parasitic (obligate)
(primary myiasis)
(invade skin and feed
on dermal tissues)
skin
(furuncular lesions,
pain, distress)
Hosts
(mammals, some birds)

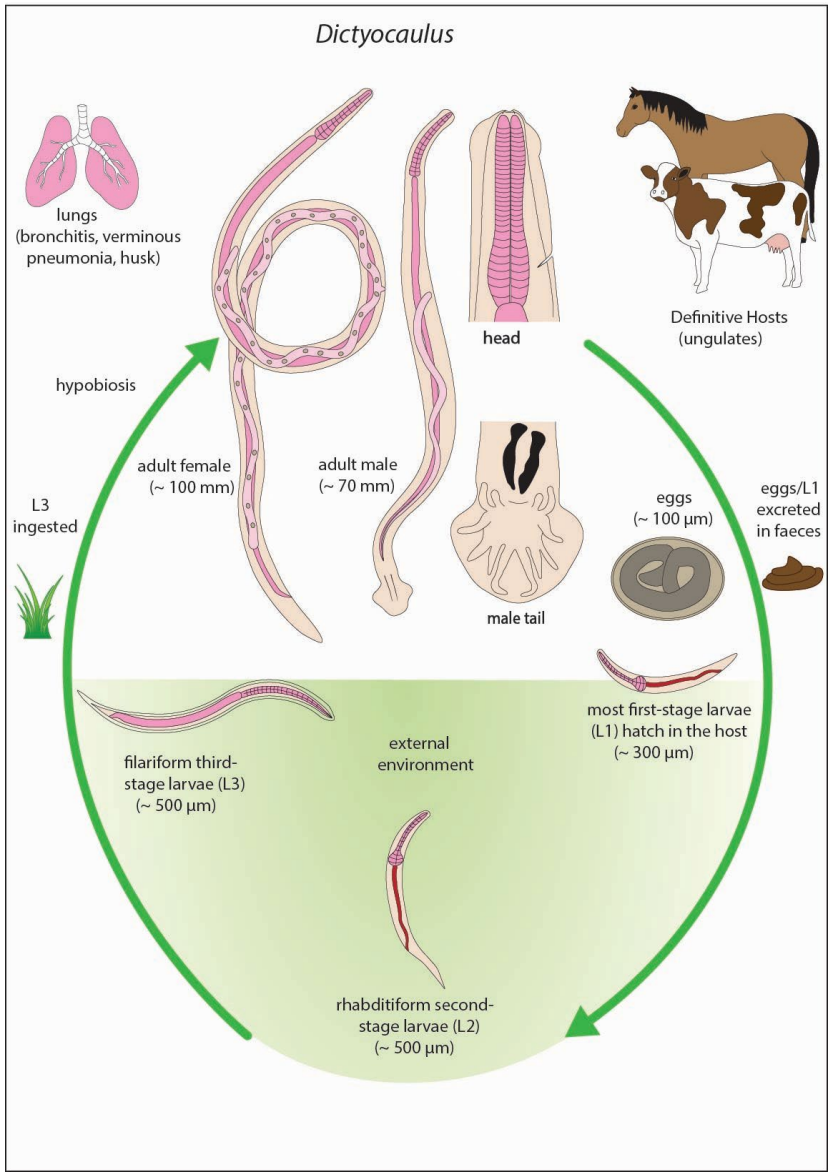

wiki

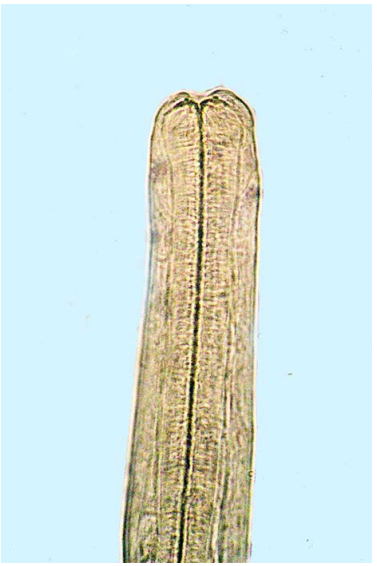

wiki

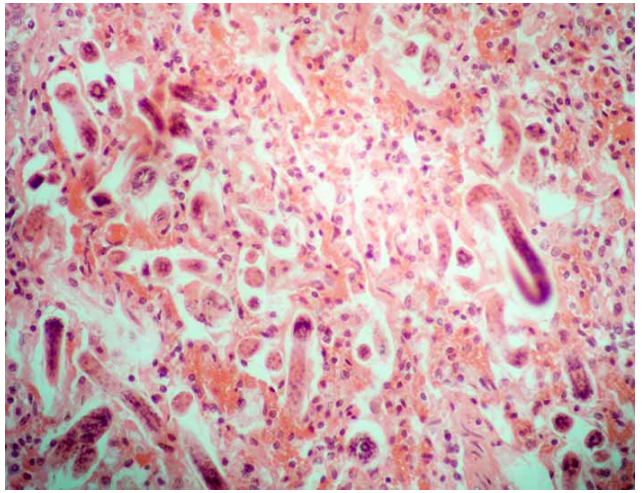

Dicrocoelium
liver, bile ducts, pancreas
(irritation, inflammation,
fibrosis, biliary obstruction)
Definitive Hosts
(herbivores,
esp. ungulates)
ingestion
hermaphroditic
adult
(~ 10 mm)
excretion
egg
(~ 40 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 500 µm)
endoparasitic
in tissues of
vector (IH-1)
cercaria
(~ 1 mm)
miracidium
(~ 25 µm)
slime ball
containing
cercariae
sporocyst
(~ 300 µm)
Second Intermediate Hosts
(IH-2) (formicid ants)
(haemocoel, ganglia)
First Intermediate Hosts
(IH-1) (bradybaenid snails)
(intestines then glandular tissues)

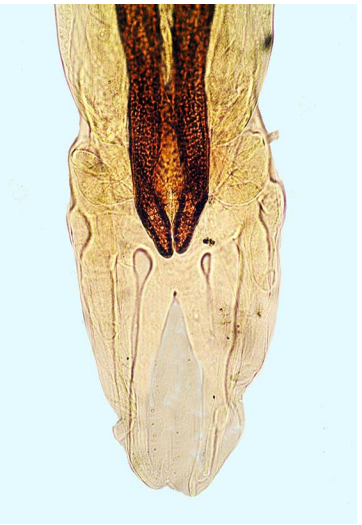

wiki

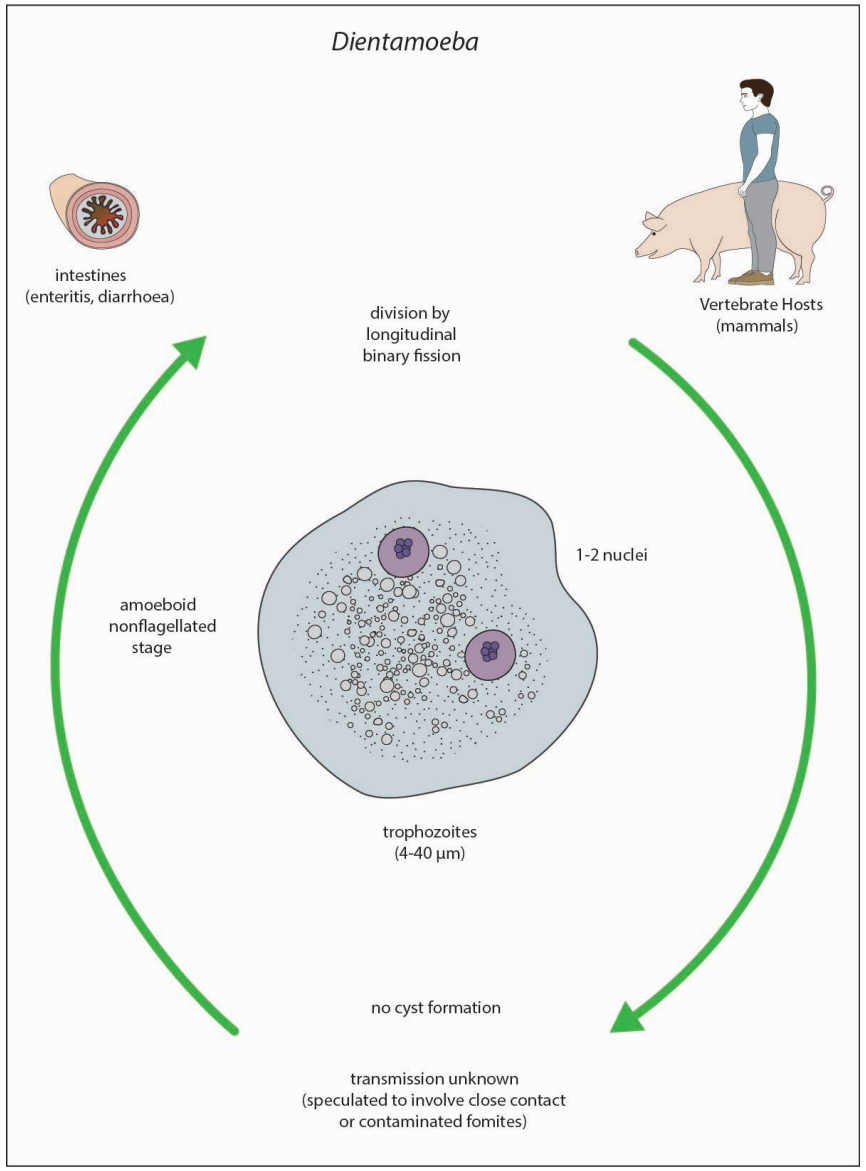


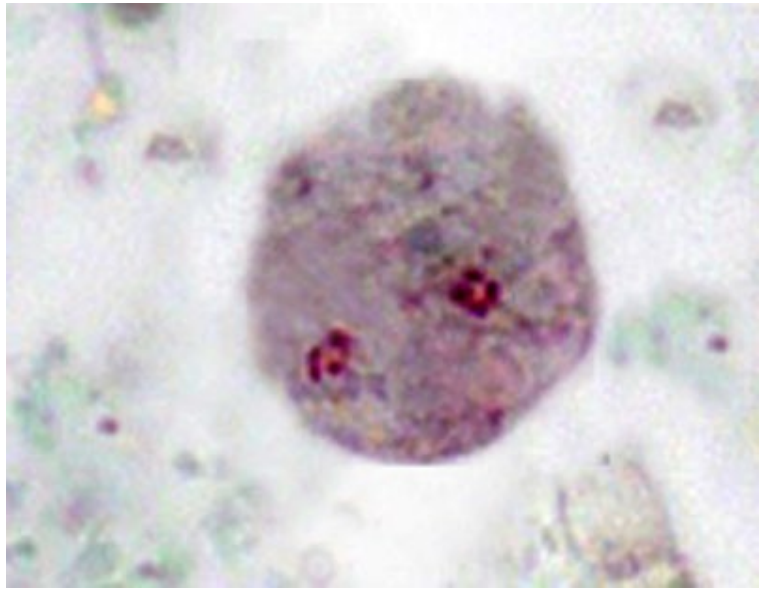

Dictyocaulus
lungs
(bronchitis, verminous
pneumonia, husk)
head
Definitive Hosts
(ungulates)
hypobiosis
adult female
(~ 100 mm)
adult male
(~ 70 mm)
male tail
eggs
(~ 100 µm)
eggs/L1
excreted
in faeces
L3
ingested
most first-stage larvae
(L1) hatch in the host
(~ 300 µm)
external
environment
filariform third-
stage larvae (L3)
(~ 500 µm)
rhabditiform second-
stage larvae (L2)
(~ 500 µm)

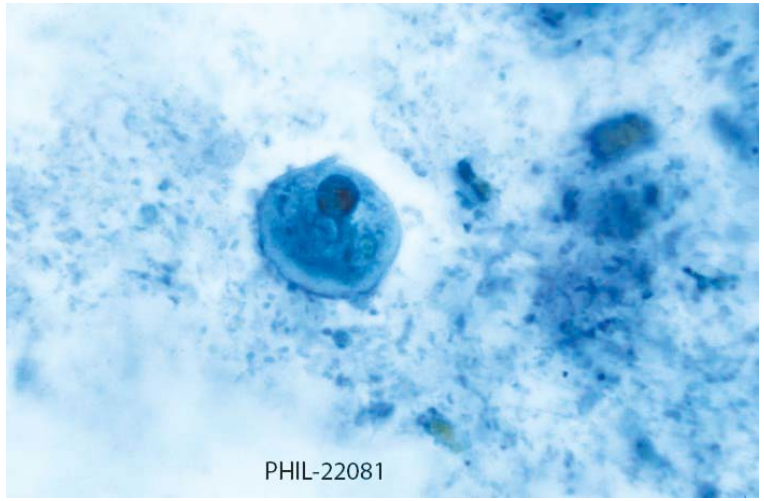


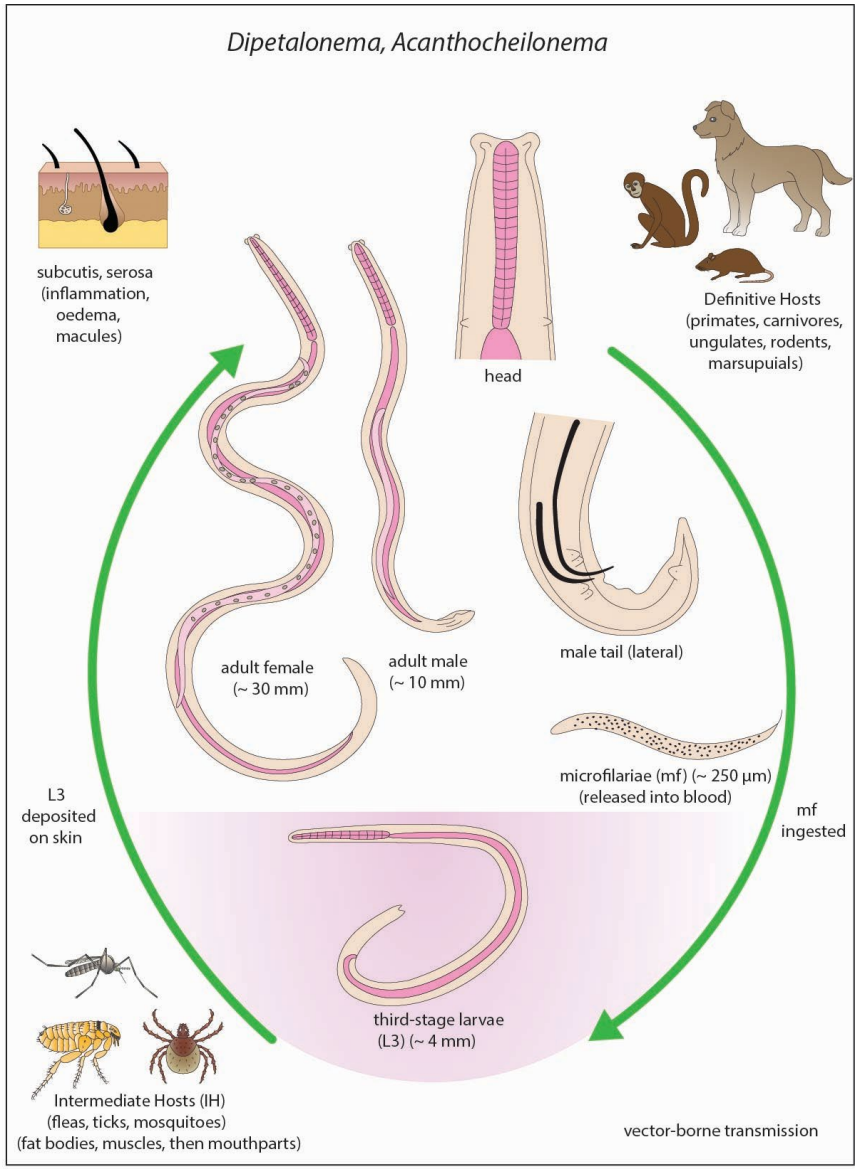


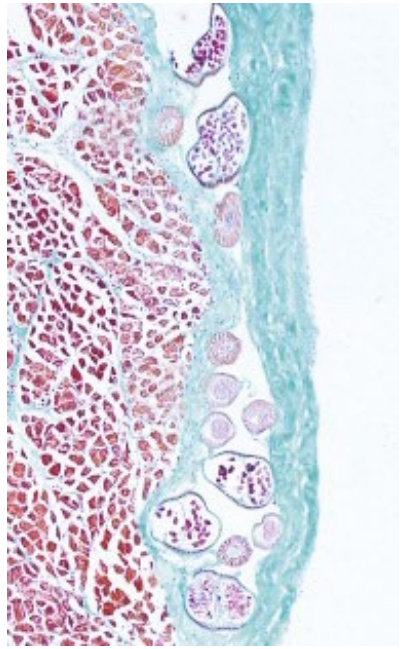



Dientamoeba
intestines
(enteritis, diarrhoea)
Vertebrate Hosts
(mammals)
division by
longitudinal
binary fission
1-2 nuclei
amoeboid
nonflagellated
stage
trophozoites
(4-40 µm)
no cyst formation
transmission unknown
(speculated to involve close contact
or contaminated fomites)

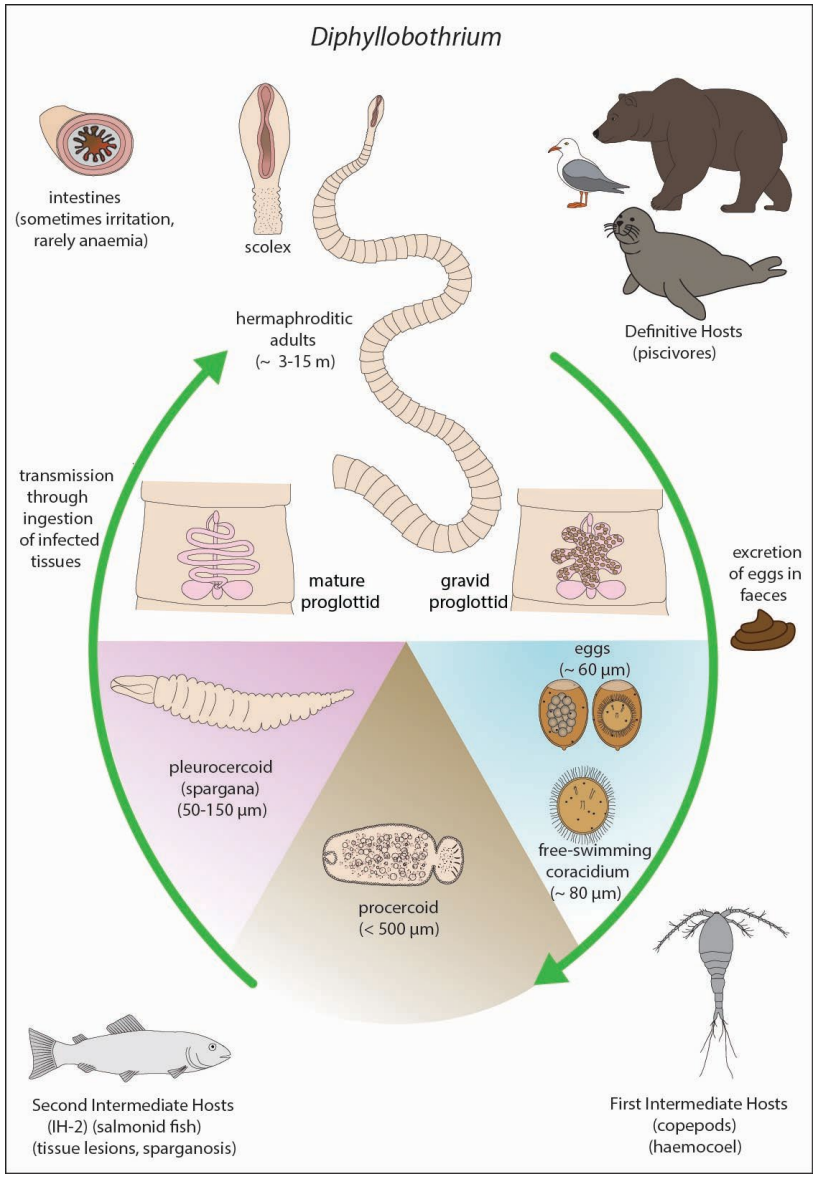


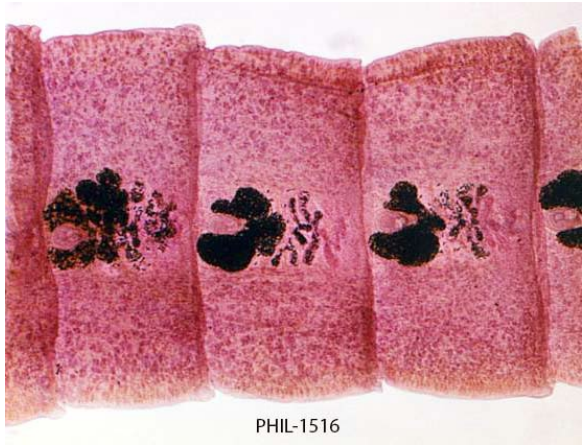

PHIL-22081

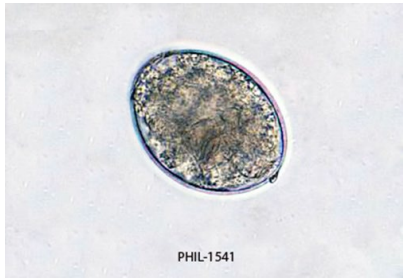

Dipetalonema, Acanthocheilonema
subcutis, serosa (inflammation, oedema, macules)
head
Definitive Hosts (primates, carnivores, ungulates, rodents, marsupuials)
adult female (~ 30 mm)
adult male (~ 10 mm)
male tail (lateral)
microfilariae (mf) (~ 250 µm) (released into blood)
L3 deposited on skin
mf ingested
third-stage larvae (L3) (~ 4 mm)
Intermediate Hosts (IH) (fleas, ticks, mosquitoes) (fat bodies, muscles, then mouthparts)
vector-borne transmission

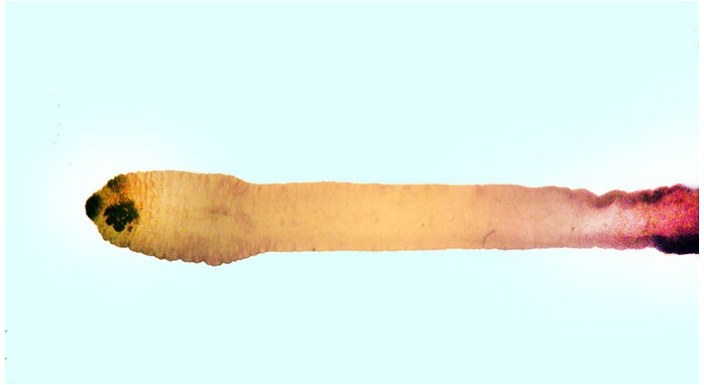


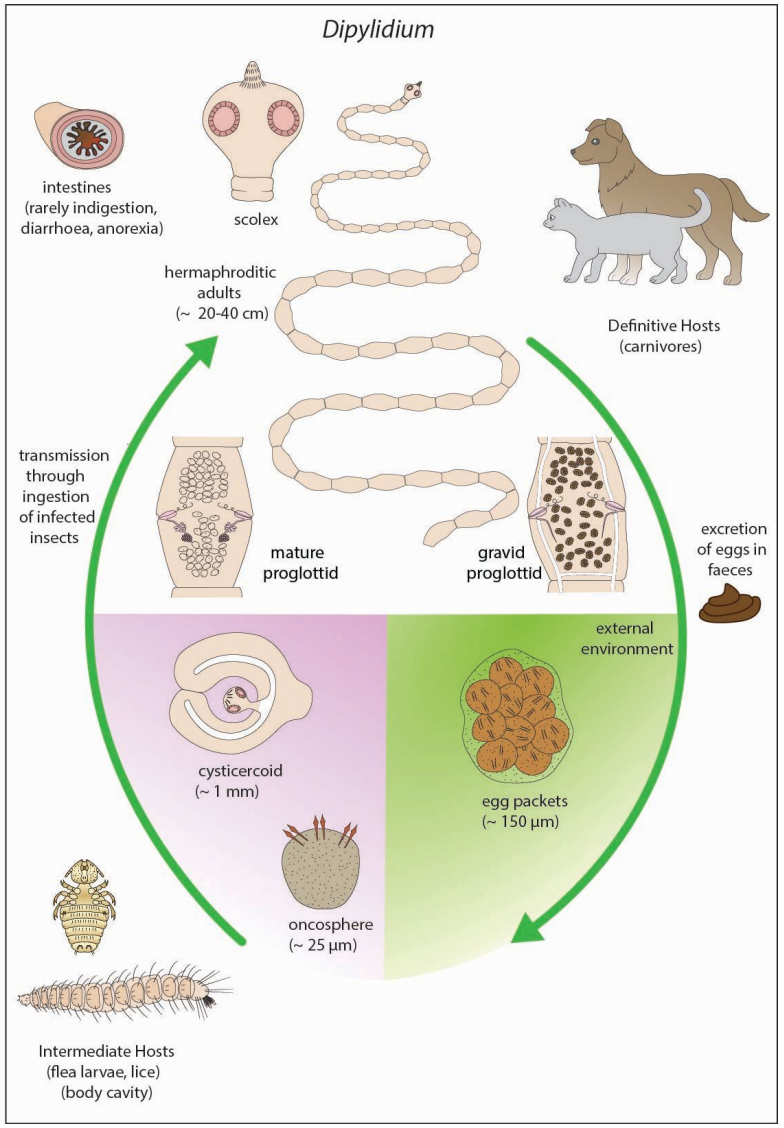

PHIL-1144

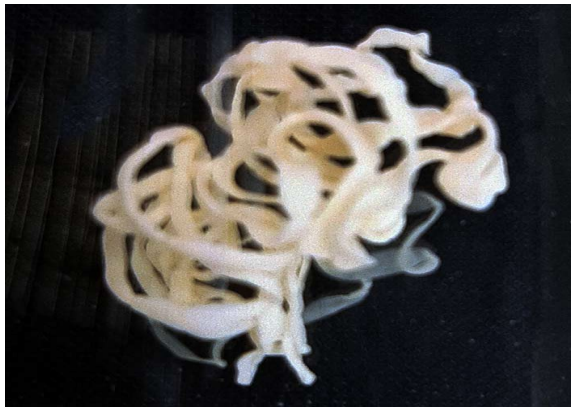

Diphyllobothrium
intestines
(sometimes irritation,
rarely anaemia)
scolex
hermaphroditic
adults
(~ 3-15 m)
Definitive Hosts
(piscivores)
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
eggs
(~ 60 µm)
pleurocercoid
(spargana)
(50-150 µm)
free-swimming
coracidium
(~ 80 µm)
procercoid
(< 500 µm)
Second Intermediate Hosts
(IH-2) (salmonid fish)
(tissue lesions, sparganosis)
First Intermediate Hosts
(copepods)
(haemocoel)

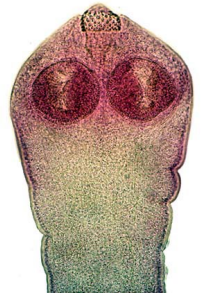

PHIL-1516

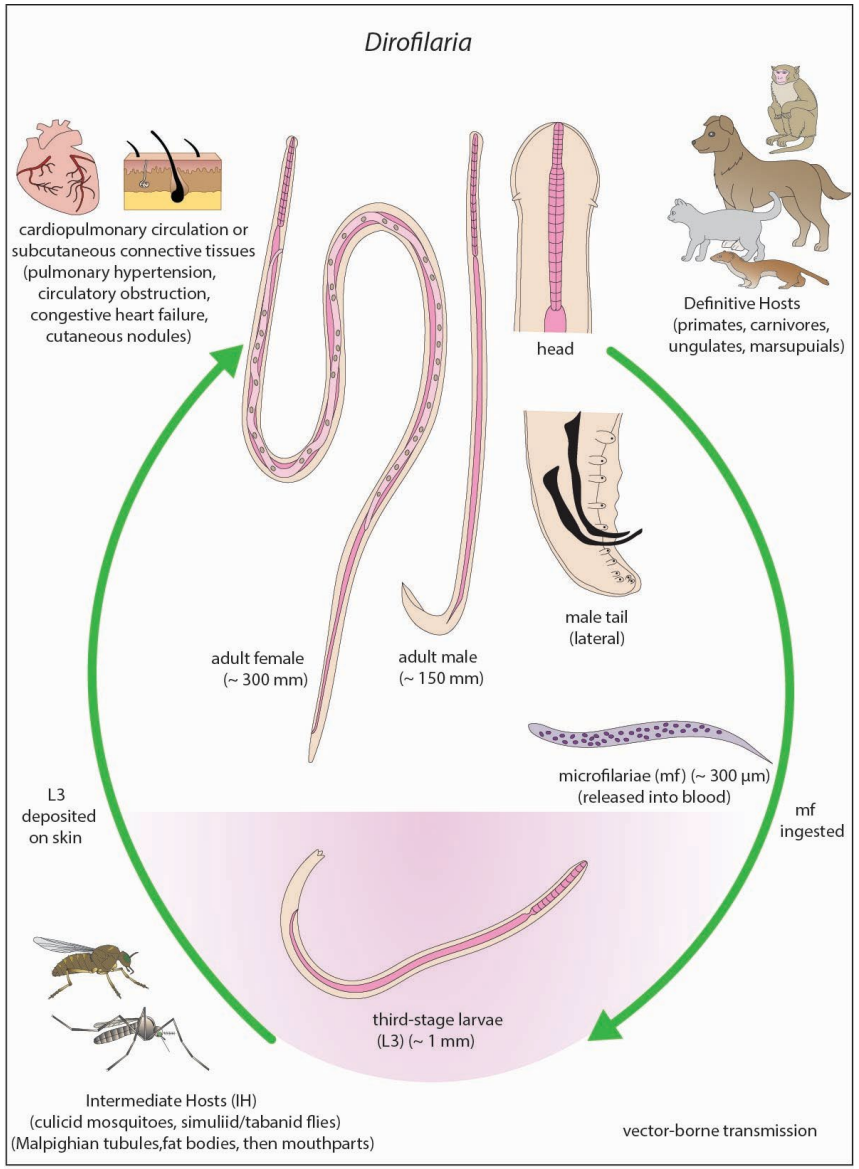

PHIL-1541

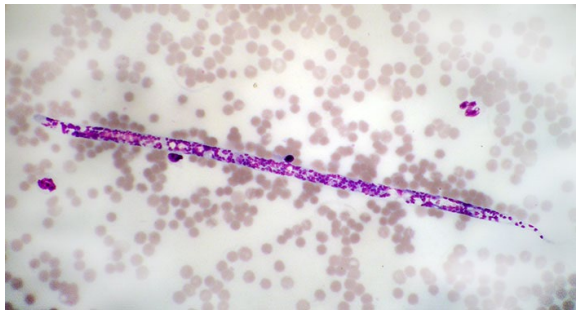


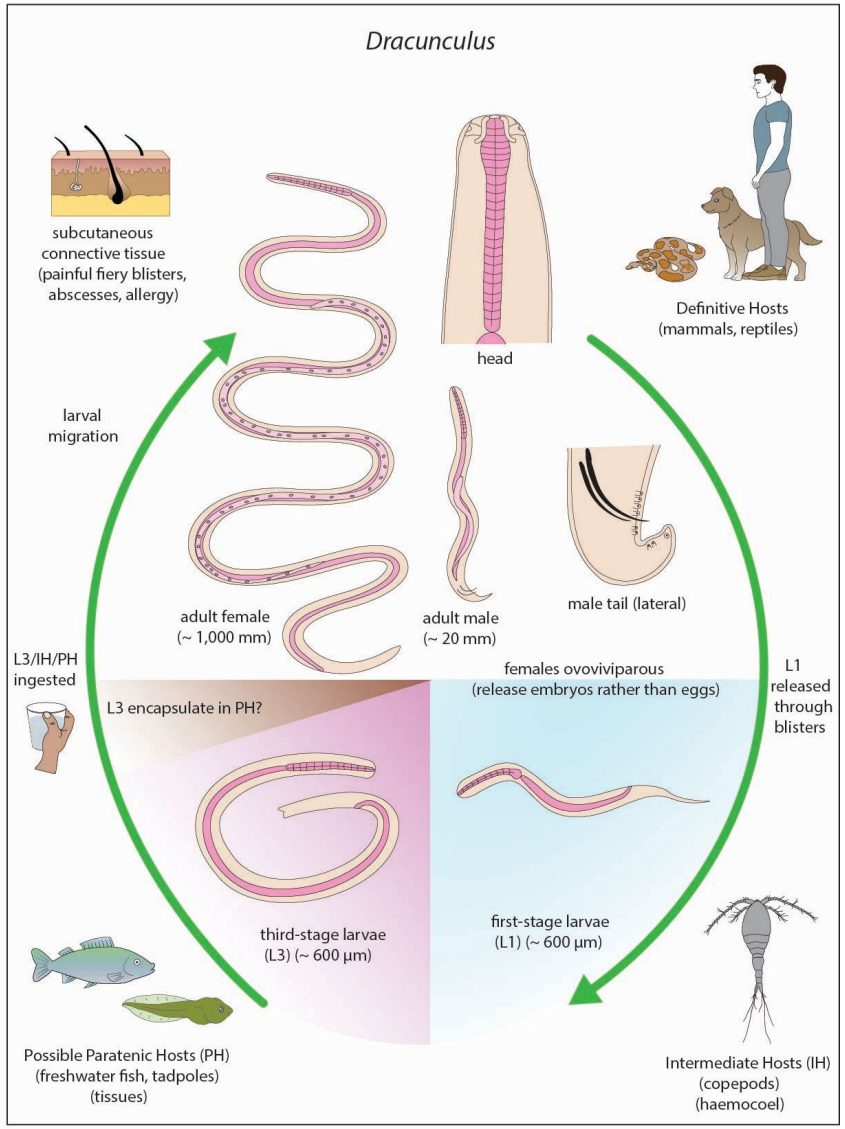

Dipylidium
intestines
(rarely indigestion,
diarrhoea, anorexia)
scolex
hermaphroditic
adults
(~ 20-40 cm)
Definitive Hosts
(carnivores)
transmission
through
ingestion
of infected
insects
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 1 mm)
egg packets
(~ 150 µm)
oncosphere
(~ 25 µm)
Intermediate Hosts
(flea larvae, lice)
(body cavity)



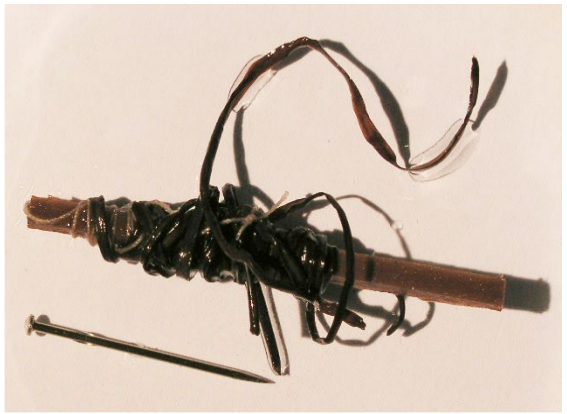



Dirofilaria
cardiopulmonary circulation or
subcutaneous connective tissues
(pulmonary hypertension,
circulatory obstruction,
congestive heart failure,
cutaneous nodules)
head
Definitive Hosts
(primates, carnivores,
ungulates, marsupuials)
male tail
(lateral)
adult female
(~ 300 mm)
adult male
(~ 150 mm)
microfilariae (mf) (~ 300 µm)
(released into blood)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 1 mm)
Intermediate Hosts (IH)
(culicid mosquitoes, simuliid/tabanid flies)
(Malpighian tubules,fat bodies, then mouthparts)
vector-borne transmission



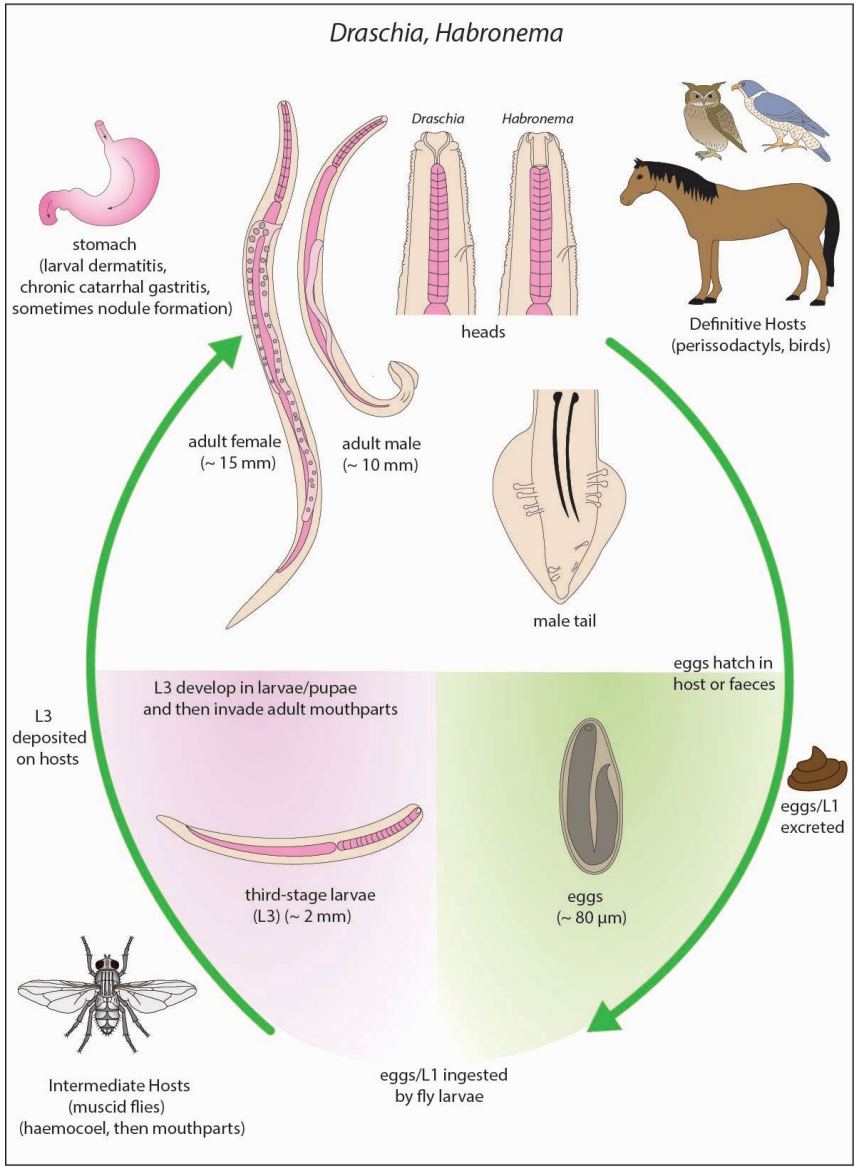

Dracunculus
subcutaneous connective tissue (painful fiery blisters, abscesses, allergy)
head
Definitive Hosts (mammals, reptiles)
larval migration
adult female (~ 1,000 mm)
adult male (~ 20 mm)
male tail (lateral)
L3/IH/PH ingested
L3 encapsulate in PH?
females ovoviviparous (release embryos rather than eggs)
L1 released through blisters
third-stage larvae (L3) (~ 600 µm)
first-stage larvae (L1) (~ 600 µm)
Possible Paratenic Hosts (PH) (freshwater fish, tadpoles) (tissues)
Intermediate Hosts (IH) (copepods) (haemocoel)

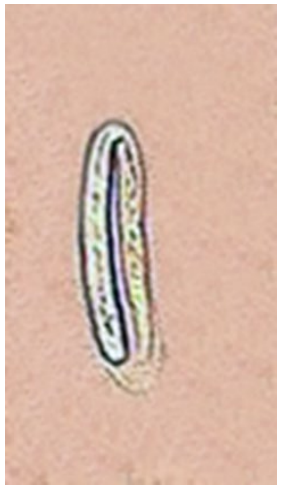

PHIL-8211

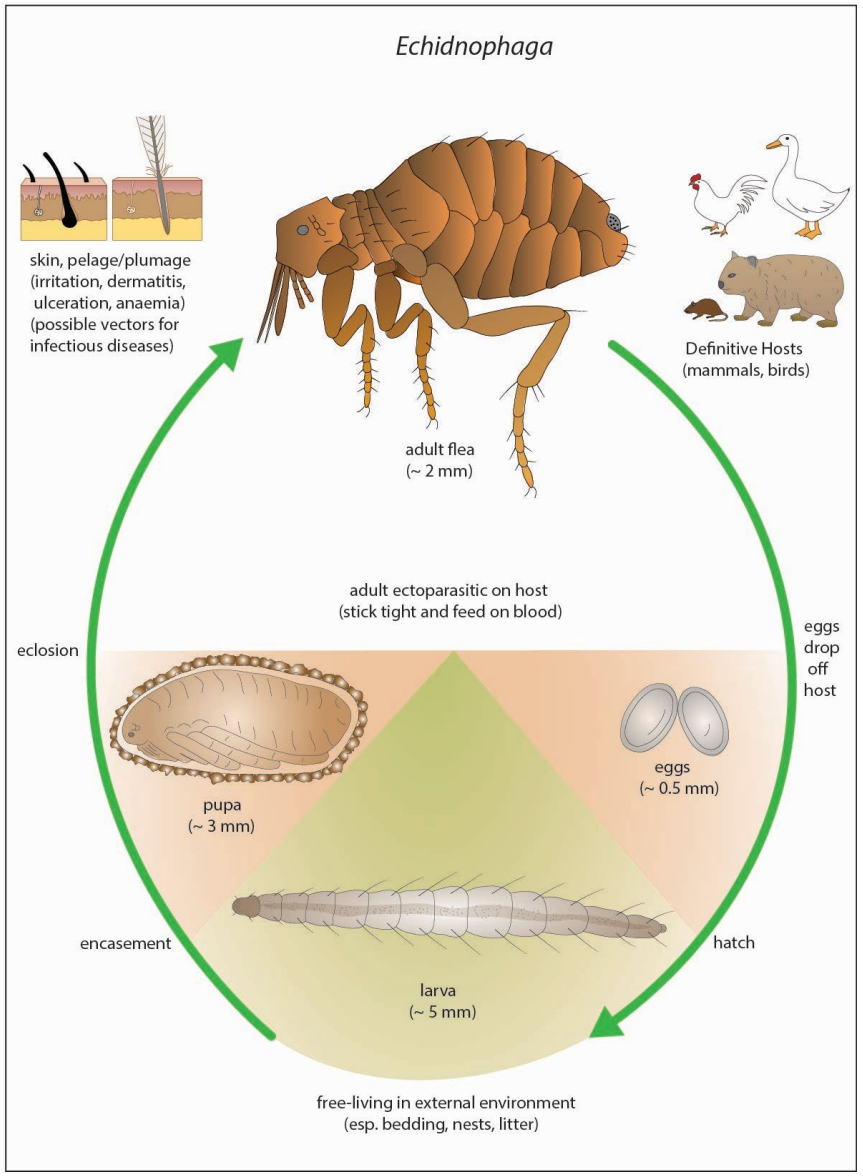


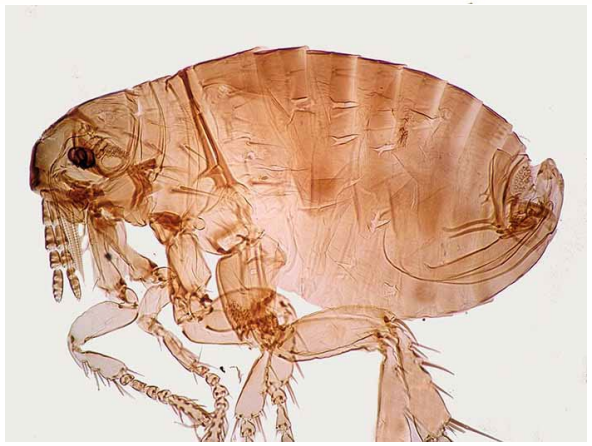

PHIL-663

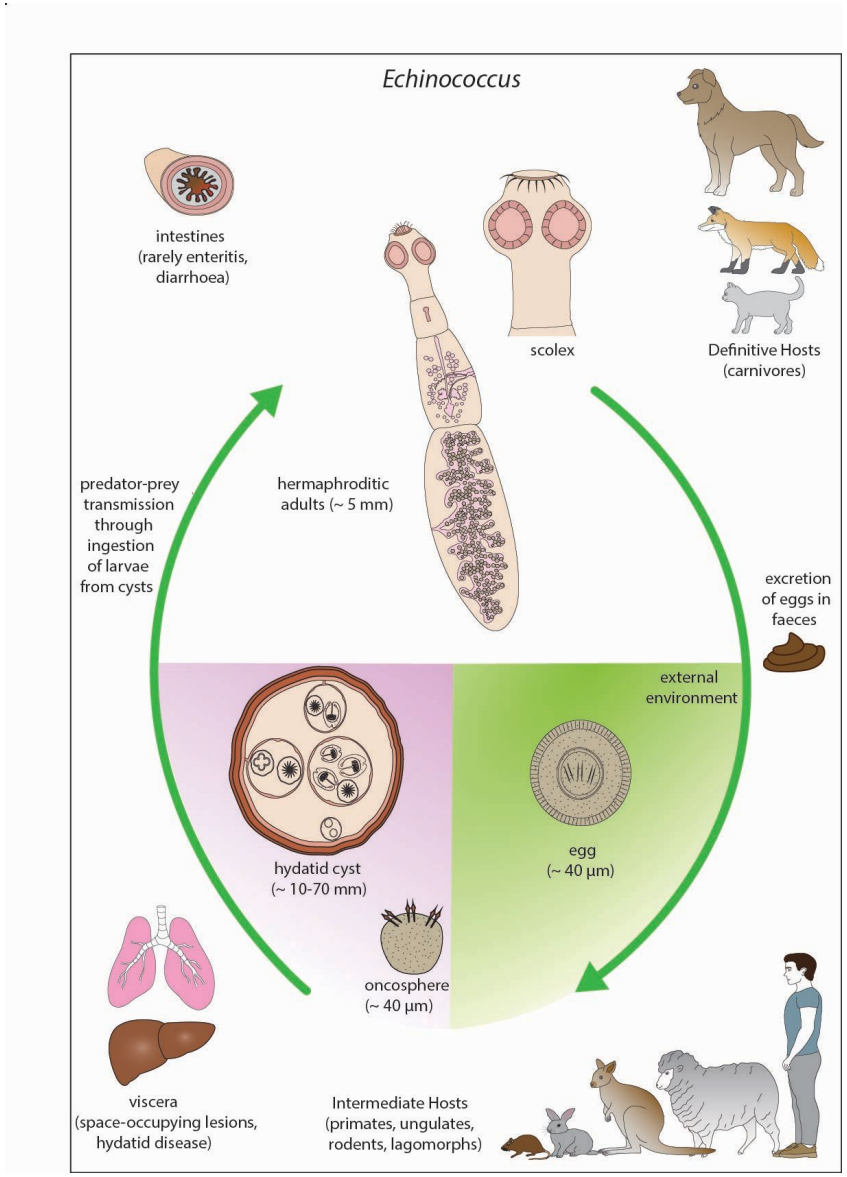

Copepod

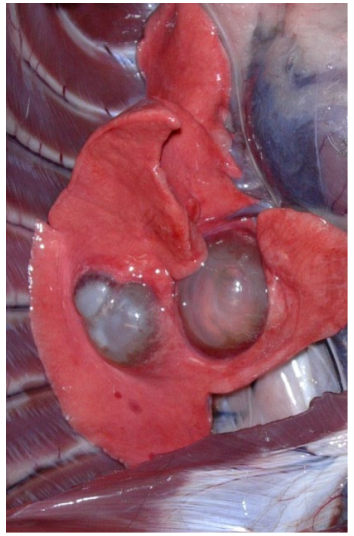

Draschia, Habronema
stomach
(larval dermatitis,
chronic catarrhal gastritis,
sometimes nodule formation)
Draschia
Habronema
heads
Definitive Hosts
(perissodactyls, birds)
adult female
(~ 15 mm)
adult male
(~ 10 mm)
male tail
eggs hatch in
host or faeces
L3 develop in larvae/pupae
and then invade adult mouthparts
L3
deposited
on hosts
eggs/L1
excreted
third-stage larvae
(L3) (~ 2 mm)
eggs
(~ 80 µm)
Intermediate Hosts
(muscid flies)
(haemocoel, then mouthparts)
eggs/L1 ingested
by fly larvae

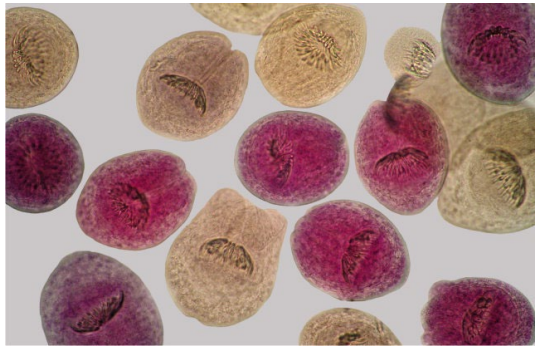


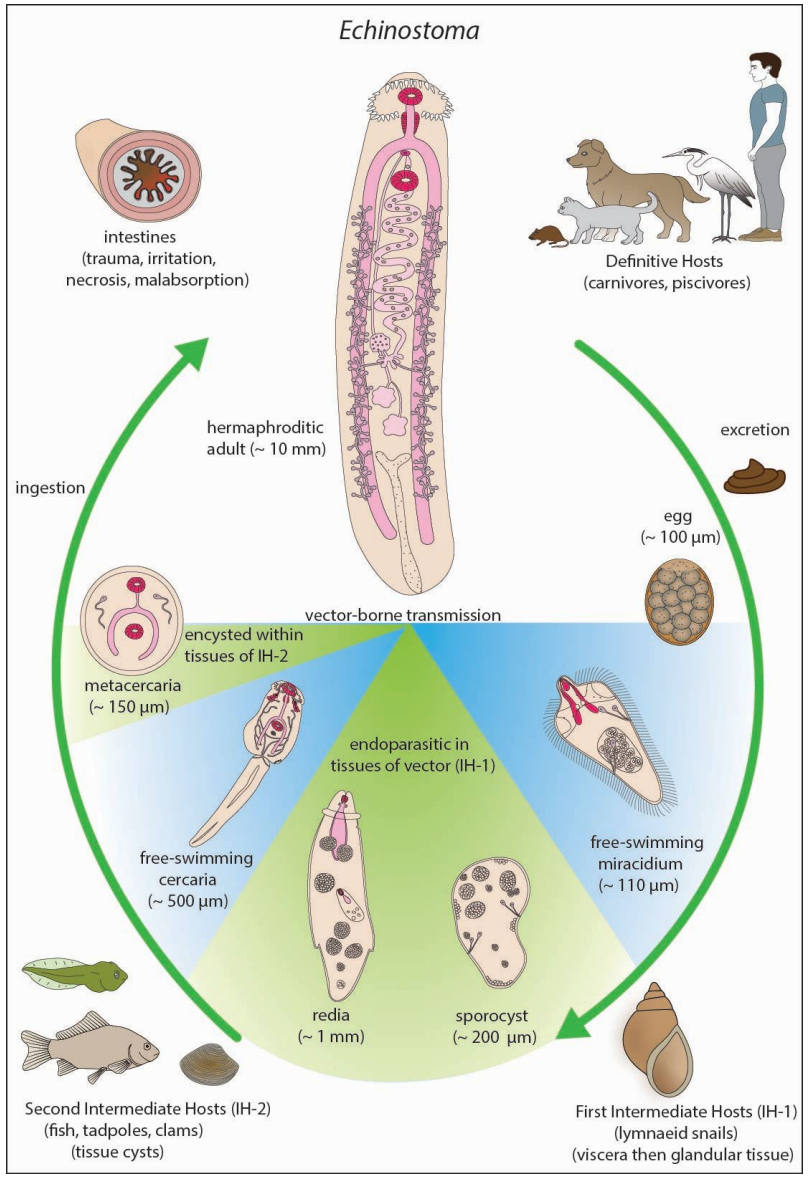

Echidnophaga
skin, pelage/plumage
(irritation, dermatitis,
ulceration, anaemia)
(possible vectors for
infectious diseases)
adult flea
(~ 2 mm)
Definitive Hosts
(mammals, birds)
adult ectoparasitic on host
(stick tight and feed on blood)
eclosion
eggs
drop
off
host
pupa
(~ 3 mm)
eggs
(~ 0.5 mm)
encasement
hatch
larva
(~ 5 mm)
free-living in external environment
(esp. bedding, nests, litter)

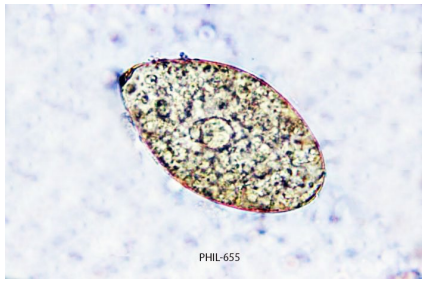


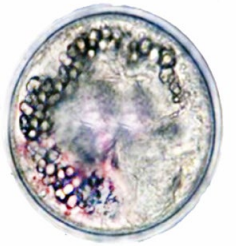

Echinococcus
intestines
(rarely enteritis,
diarrhoea)
scolex
Definitive Hosts
(carnivores)
predator-prey
transmission
through
ingestion
of larvae
from cysts
hermaphroditic
adults (~ 5 mm)
excretion
of eggs in
faeces
external
environment
hydatid cyst
(~ 10-70 mm)
egg
(~ 40 µm)
oncosphere
(~ 40 µm)
viscera
(space-occupying lesions,
hydatid disease)
Intermediate Hosts
(primates, ungulates,
rodents, lagomorphs)

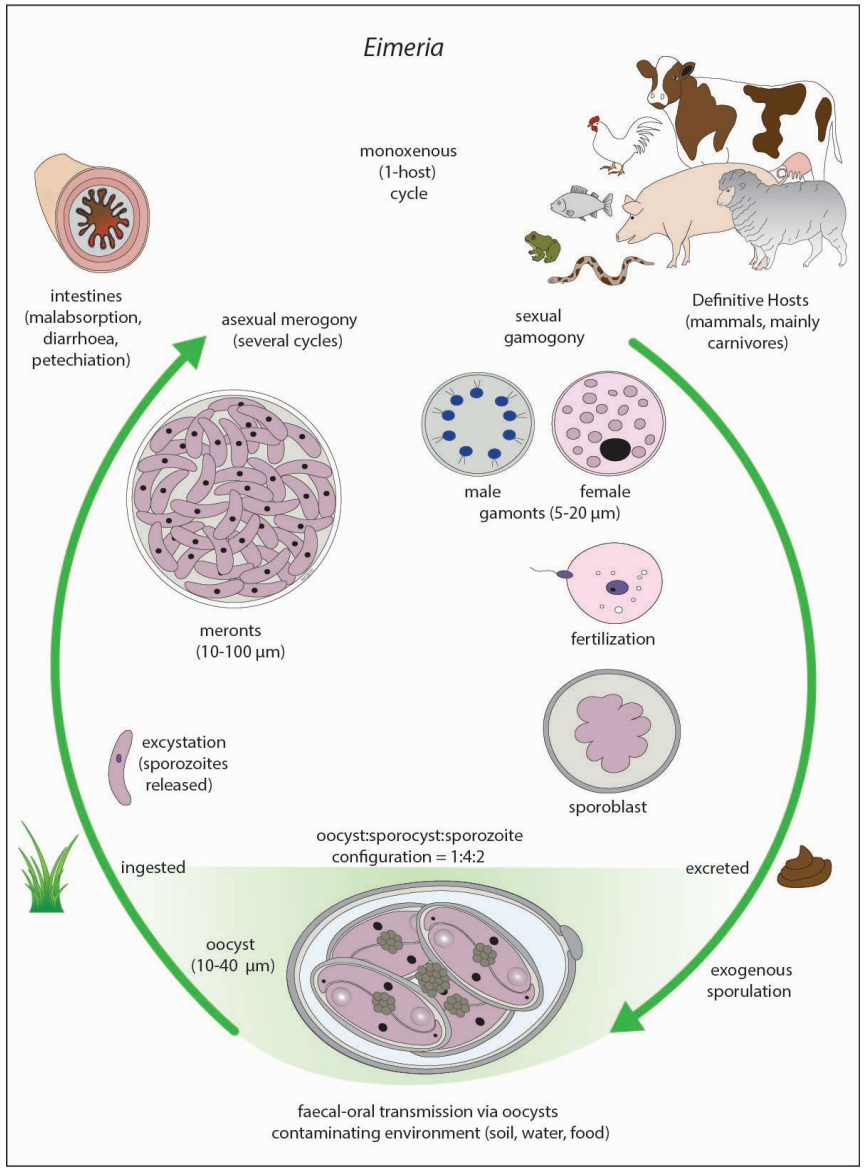


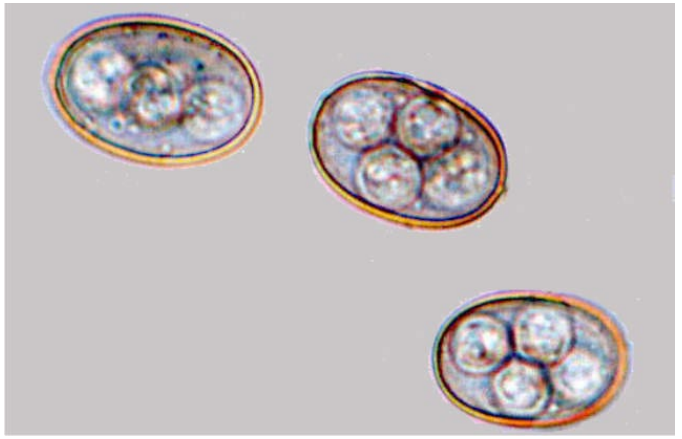


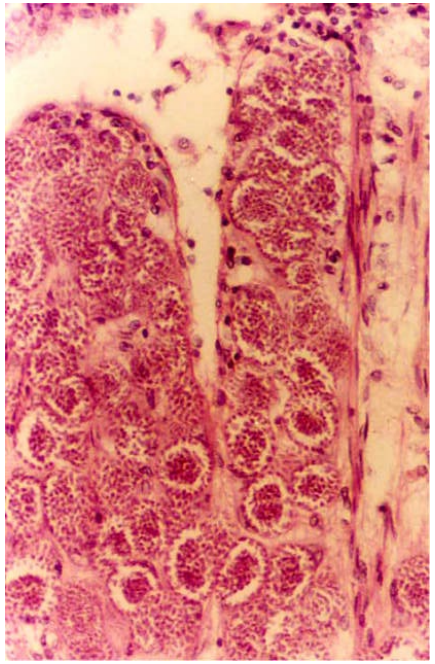

Echinostoma
intestines
(trauma, irritation,
necrosis, malabsorption)
hermaphroditic
adult (~ 10 mm)
Definitive Hosts
(carnivores, piscivores)
excretion
ingestion
egg
(~ 100 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 150 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 500 µm)
free-swimming
miracidium
(~ 110 µm)
redia
(~ 1 mm)
sporocyst
(~ 200 µm)
Second Intermediate Hosts (IH-2)
(fish, tadpoles, clams)
(tissue cysts)
First Intermediate Hosts (IH-1)
(lymnaeid snails)
(viscera then glandular tissue)

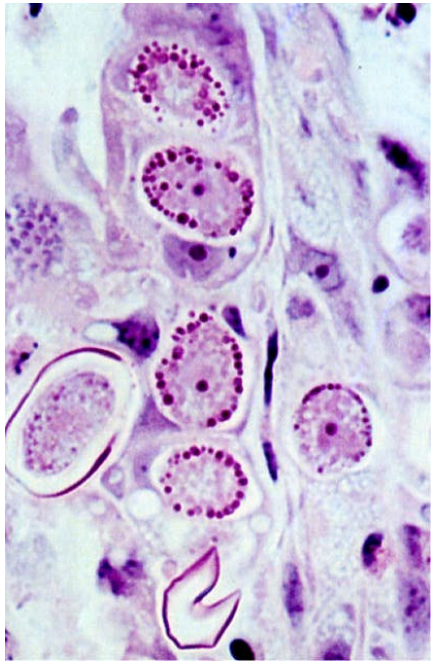

PHIL-655

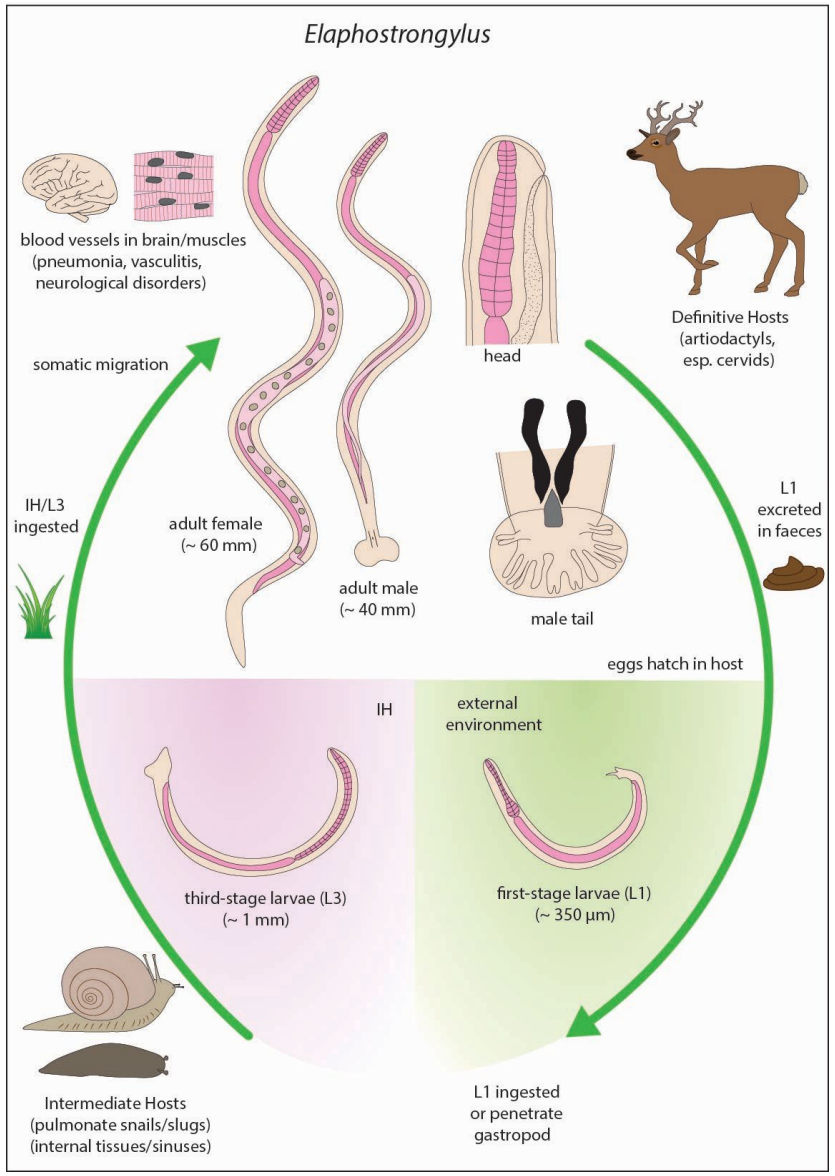


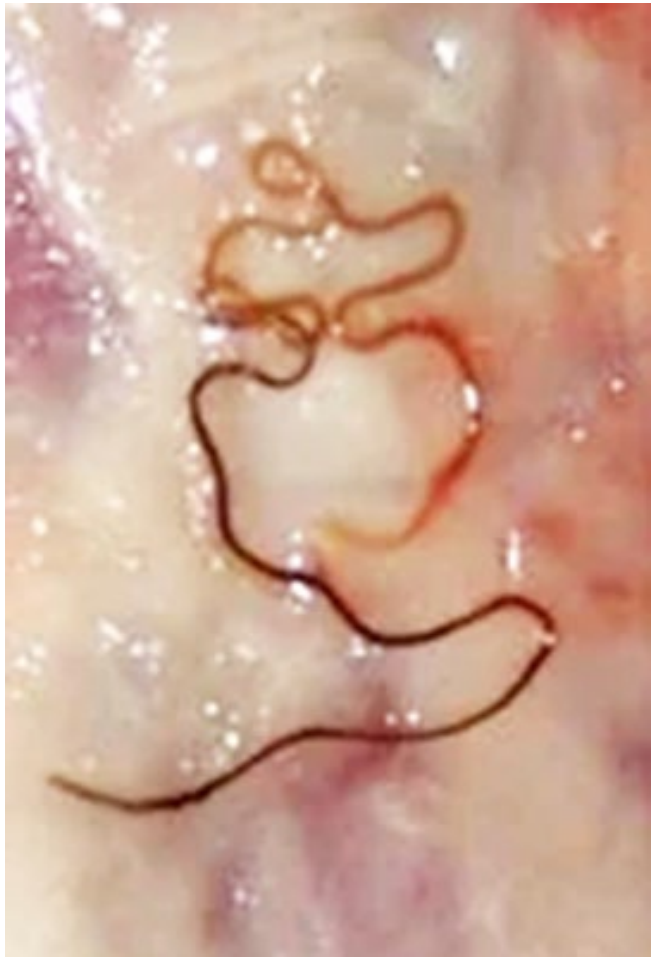

Eimeria
monoxenous
(1-host)
cycle
intestines
(malabsorption,
diarrhoea,
petechiation)
asexual merogony
(several cycles)
sexual
gamogony
Definitive Hosts
(mammals, mainly
carnivores)
male
female
gamonts (5-20 µm)
meronts
(10-100 µm)
fertilization
excystation
(sporozoites
released)
sporoblast
oocyst:sporocyst:sporozoite
configuration = 1:4:2
ingested
excreted
oocyst
(10-40 µm)
exogenous
sporulation
faecal-oral transmission via oocysts
contaminating environment (soil, water, food)

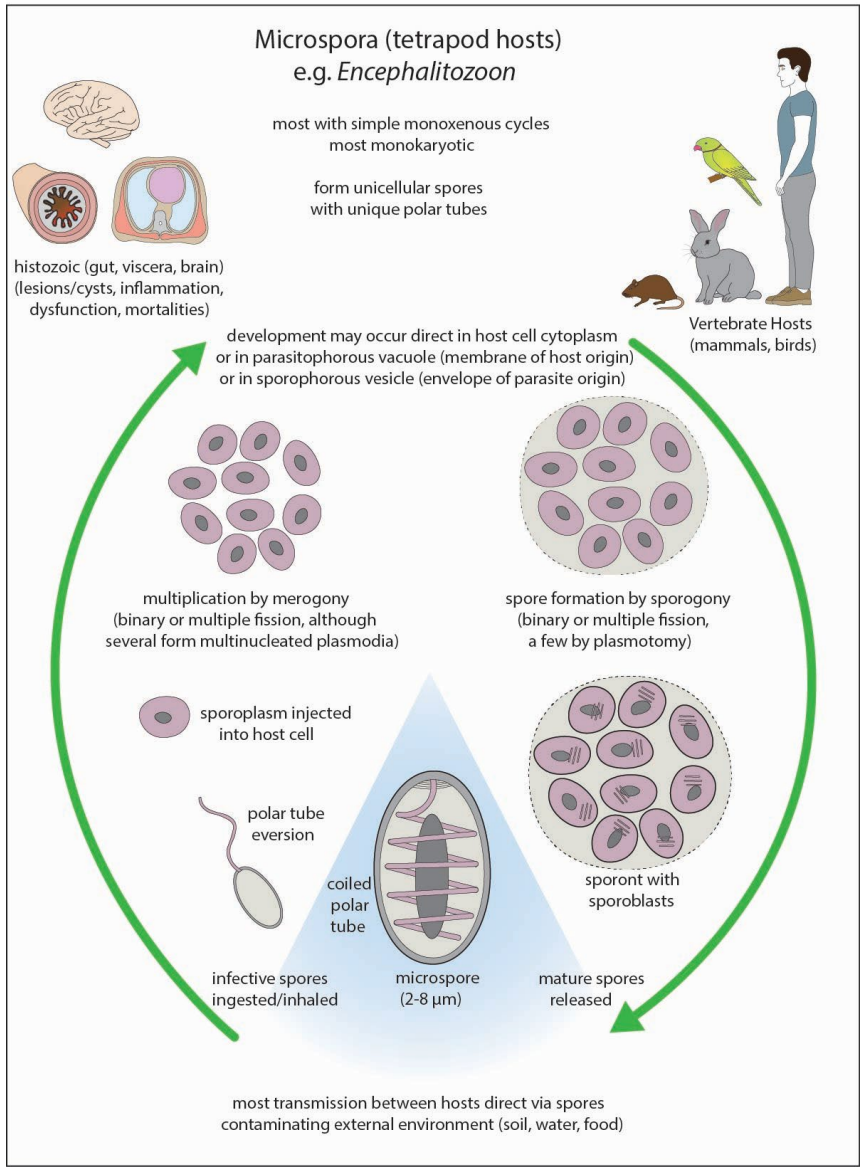


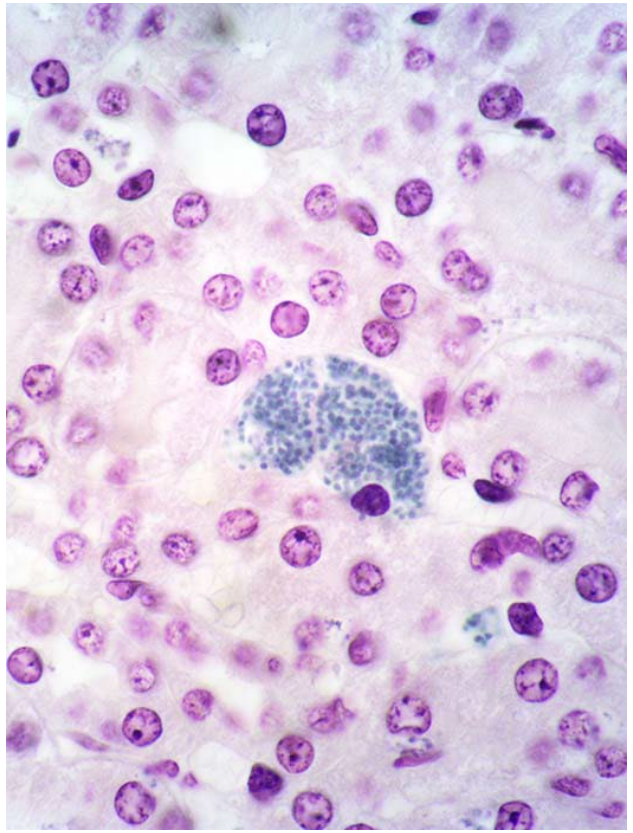


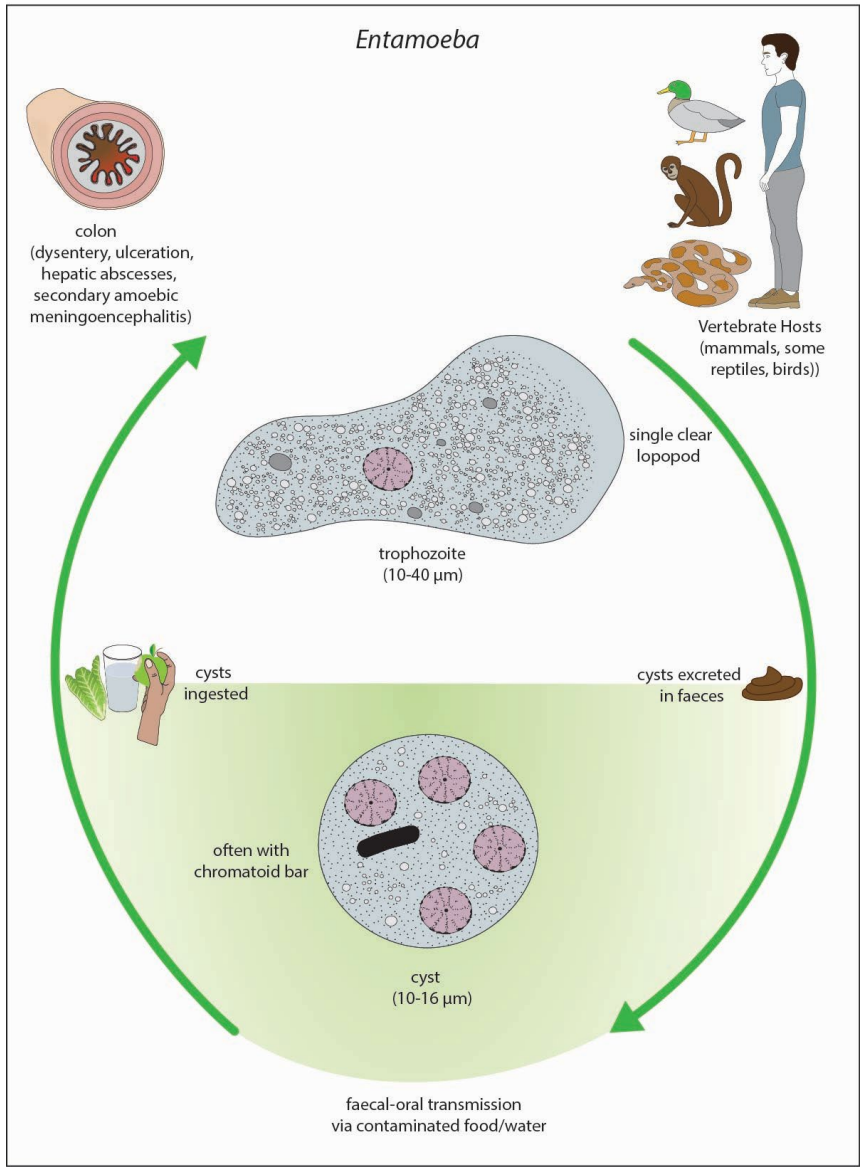



Elaphostrongylus
blood vessels in brain/muscles
(pneumonia, vasculitis,
neurological disorders)
somatic migration
IH/L3
ingested
adult female
(~ 60 mm)
adult male
(~ 40 mm)
head
male tail
Definitive Hosts
(artiodactyls,
esp. cervids)
L1
excreted
in faeces
eggs hatch in host
IH
external
environment
third-stage larvae (L3)
(~ 1 mm)
first-stage larvae (L1)
(~ 350 µm)
Intermediate Hosts
(pulmonate snails/slugs)
(internal tissues/sinuses)
L1 ingested
or penetrate
gastropod

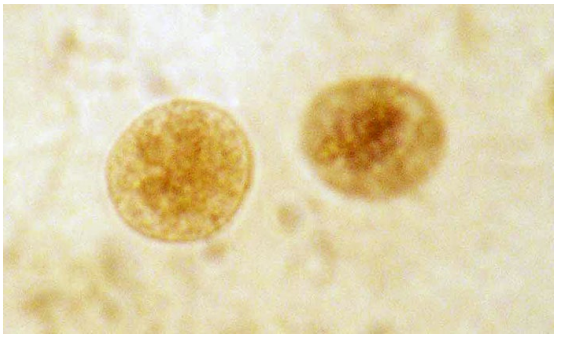


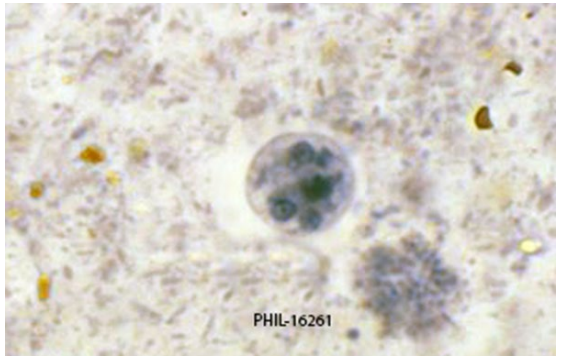

Microspora (tetrapod hosts)
e.g. *Encephalitozoon*
most with simple monoxenous cycles
most monokaryotic
form unicellular spores
with unique polar tubes
histozoic (gut, viscera, brain)
(lesions/cysts, inflammation,
dysfunction, mortalities)
Vertebrate Hosts
(mammals, birds)
development may occur direct in host cell cytoplasm
or in parasitophorous vacuole (membrane of host origin)
or in sporophorous vesicle (envelope of parasite origin)
multiplication by merogony
(binary or multiple fission, although
several form multinucleated plasmodia)
spore formation by sporogony
(binary or multiple fission,
a few by plasmotomy)
sporoplasm injected
into host cell
polar tube
eversion
coiled
polar
tube
sporont with
sporoblasts
infective spores
ingested/inhaled
microspore
(2-8 µm)
mature spores
released
most transmission between hosts direct via spores
contaminating external environment (soil, water, food)

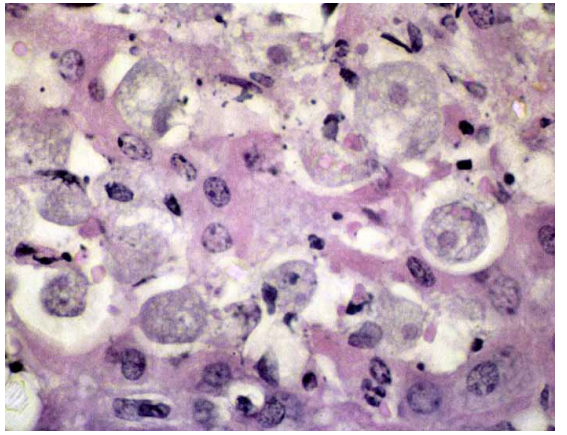


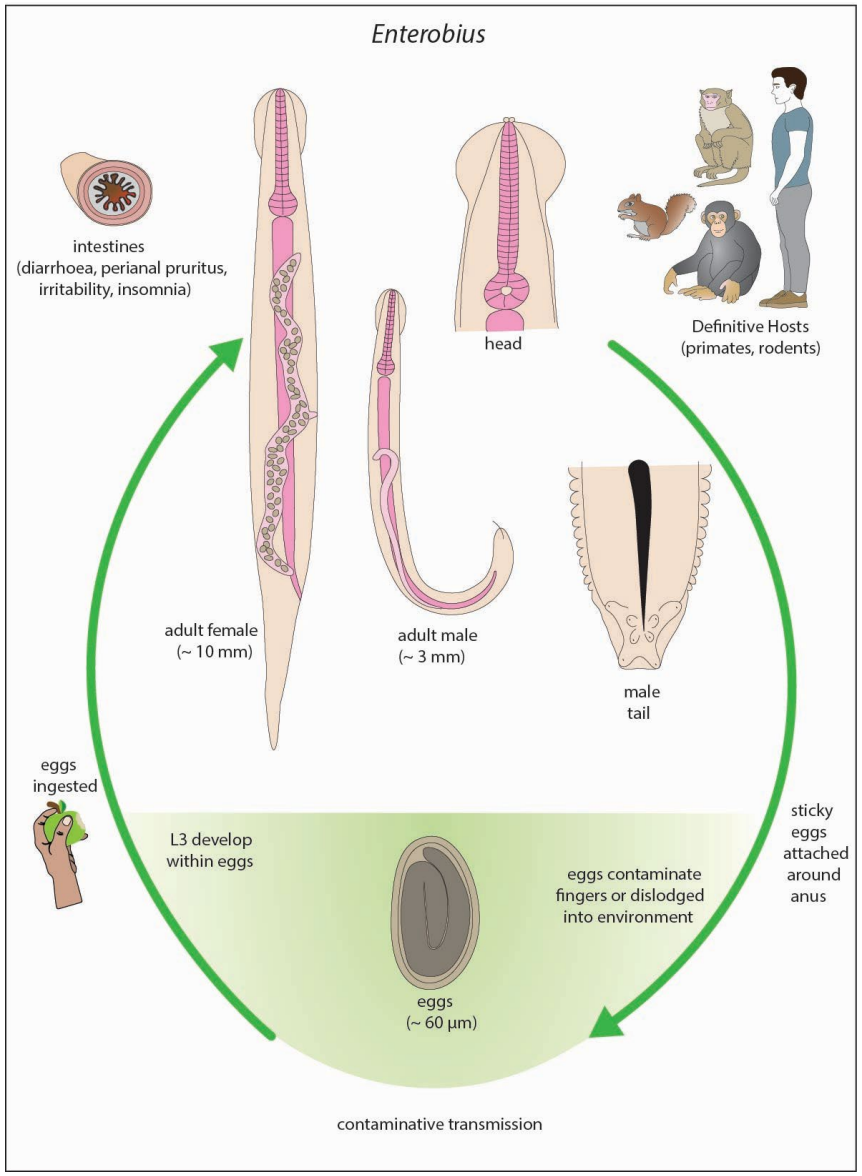

Entamoeba
colon
(dysentery, ulceration,
hepatic abscesses,
secondary amoebic
meningoencephalitis)
Vertebrate Hosts
(mammals, some
reptiles, birds))
single clear
lopopod
trophozoite
(10-40 µm)
cysts
ingested
cysts excreted
in faeces
often with
chromatoid bar
cyst
(10-16 µm)
faecal-oral transmission
via contaminated food/water

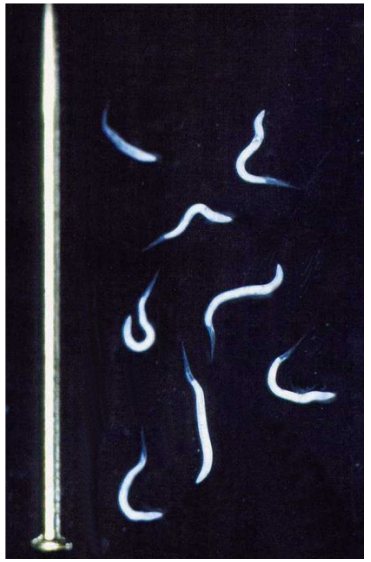

PHIL-22178

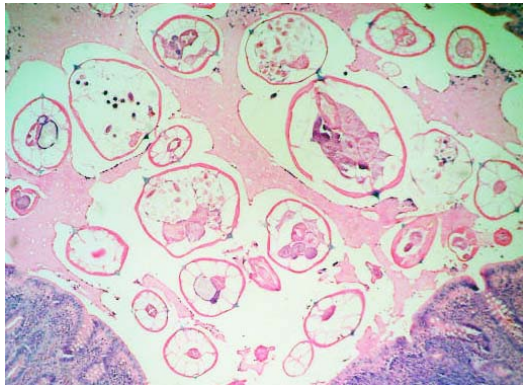



PHIL-16261

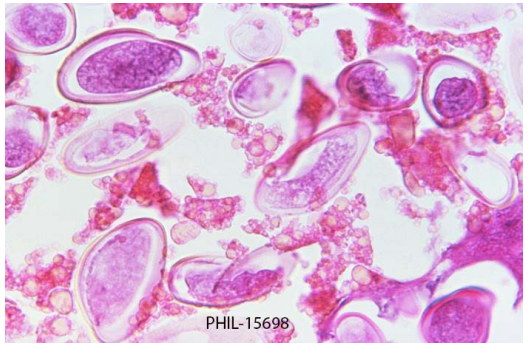


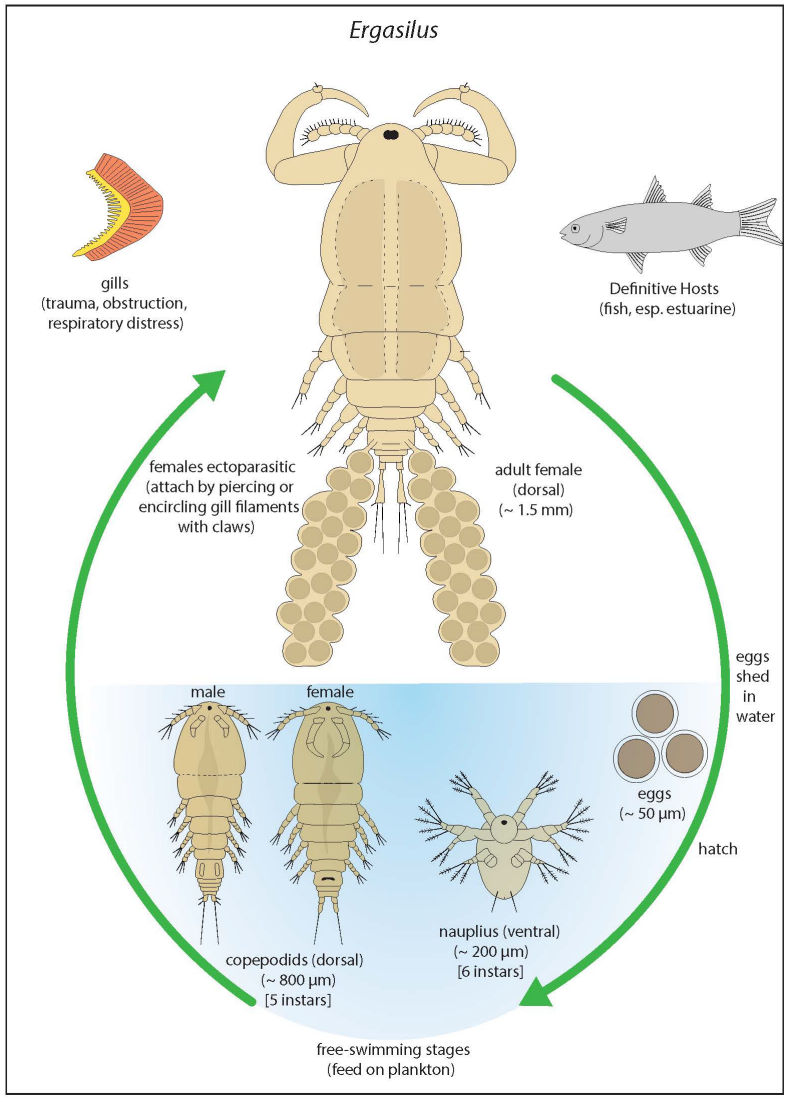

Enterobius
intestines
(diarrhoea, perianal pruritus,
irritability, insomnia)
head
Definitive Hosts
(primates, rodents)
adult female
(~ 10 mm)
adult male
(~ 3 mm)
male
tail
eggs
ingested
L3 develop
within eggs
eggs
(~ 60 µm)
eggs contaminate
fingers or dislodged
into environment
sticky
eggs
attached
around
anus
contaminative transmission

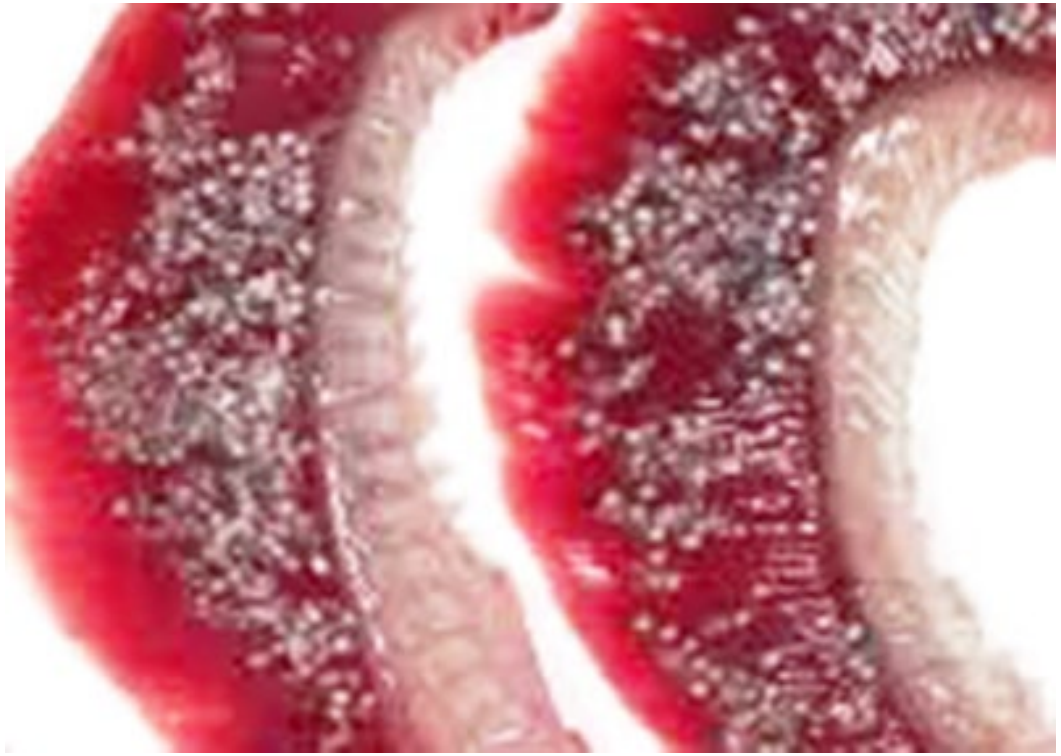


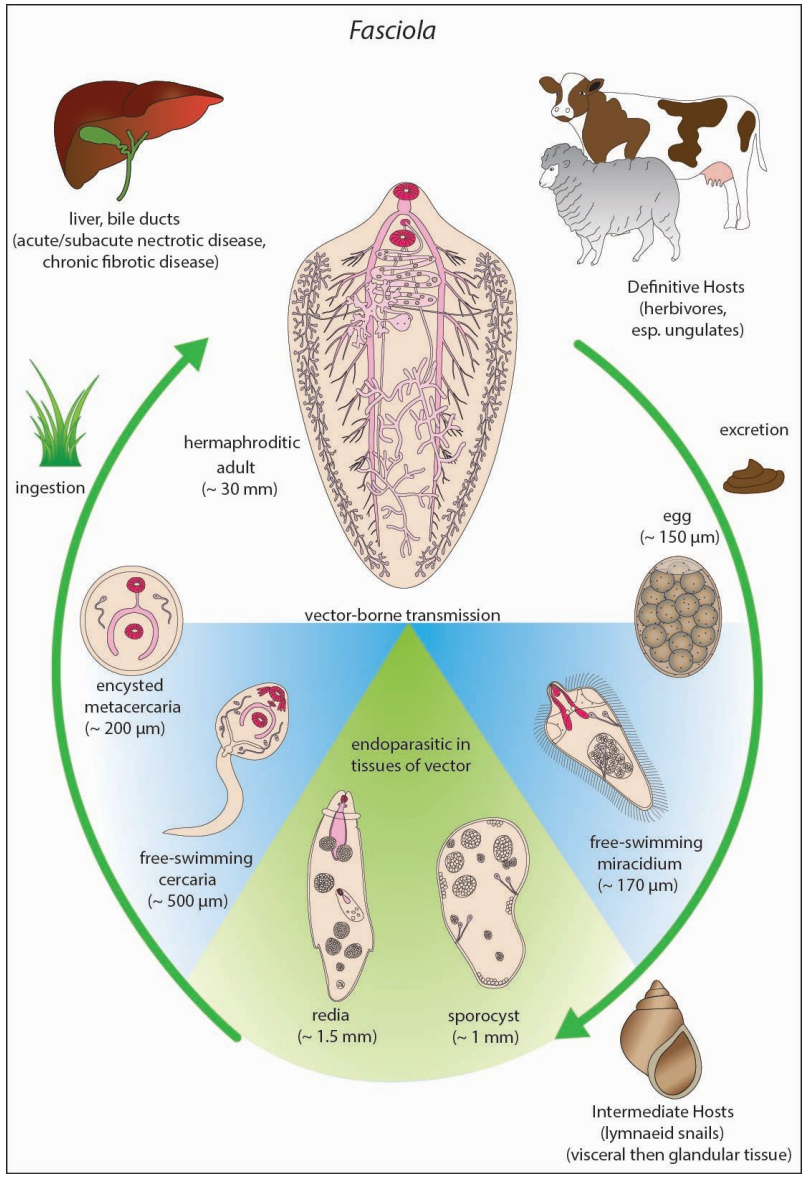


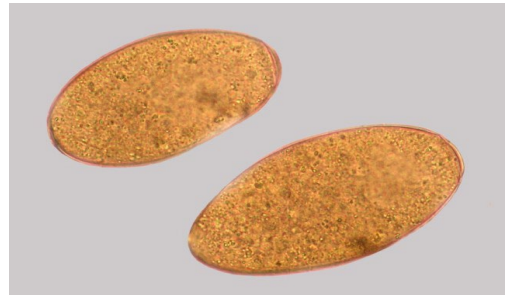

pin
worm

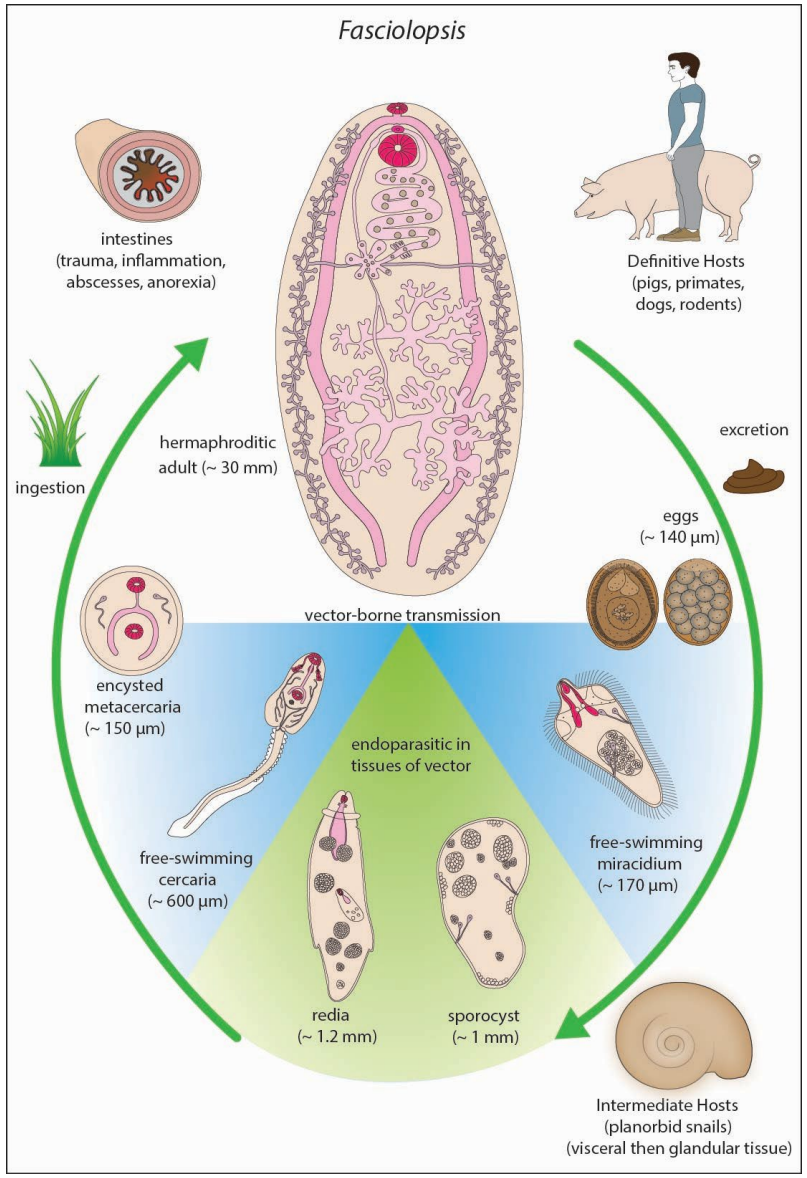

PHIL-15698


Ergasilus
gills
(trauma, obstruction,
respiratory distress)
Definitive Hosts
(fish, esp. estuarine)
females ectoparasitic
(attach by piercing or
encircling gill filaments
with claws)
adult female
(dorsal)
(~ 1.5 mm)
eggs
shed
in
water
male
female
eggs
(~ 50 µm)
hatch
nauplius (ventral)
(~ 200 µm)
[6 instars]
copepodids (dorsal)
(~ 800 µm)
[5 instars]
free-swimming stages
(feed on plankton)

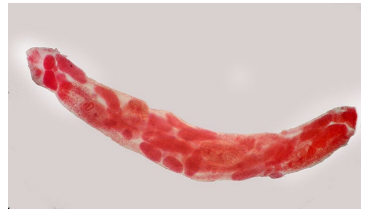


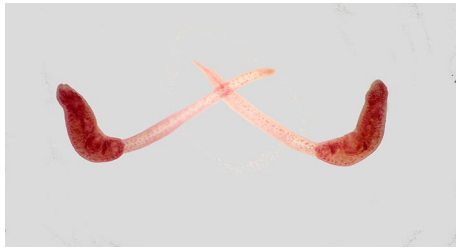

Fasciola
liver, bile ducts
(acute/subacute nectrotic disease,
chronic fibrotic disease)
Definitive Hosts
(herbivores,
esp. ungulates)
hermaphroditic
adult
(~ 30 mm)
ingestion
excretion
egg
(~ 150 µm)
vector-borne transmission
encysted
metacercaria
(~ 200 µm)
endoparasitic in
tissues of vector
free-swimming
cercaria
(~ 500 µm)
free-swimming
miracidium
(~ 170 µm)
redia
(~ 1.5 mm)
sporocyst
(~ 1 mm)
Intermediate Hosts
(lymnaeid snails)
(visceral then glandular tissue)

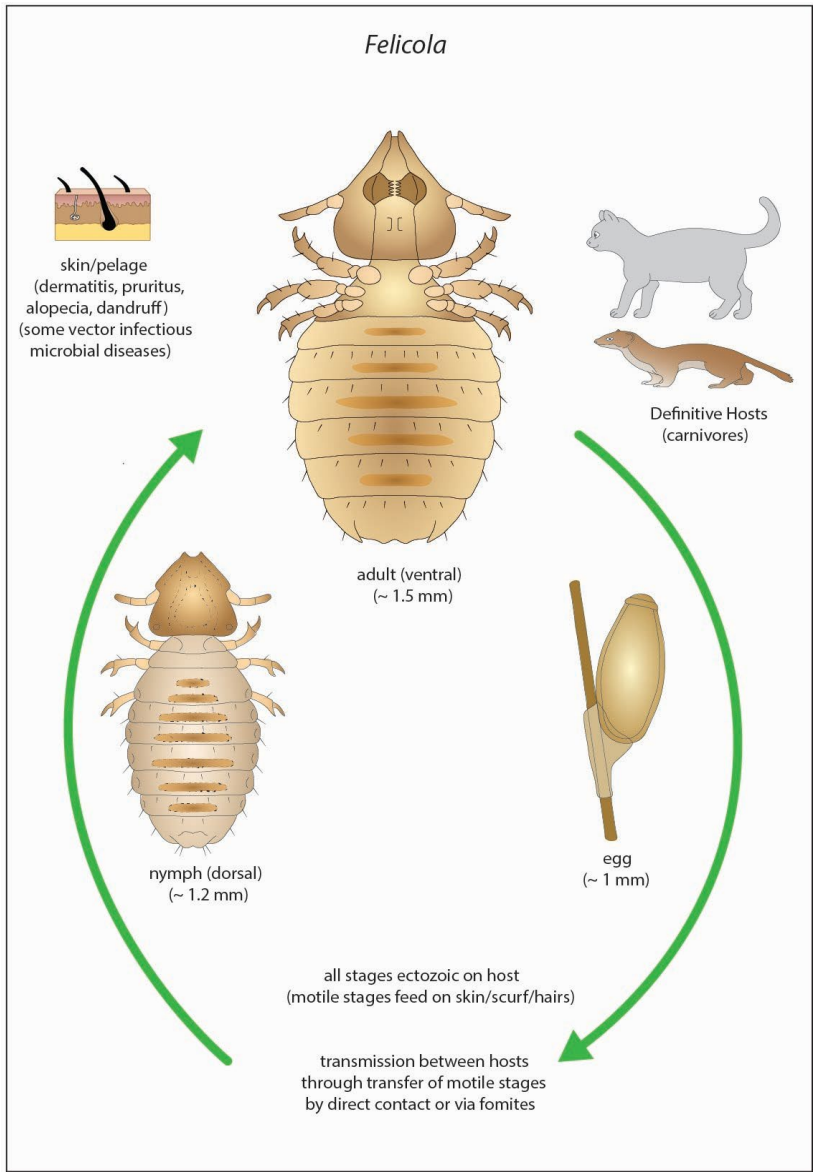


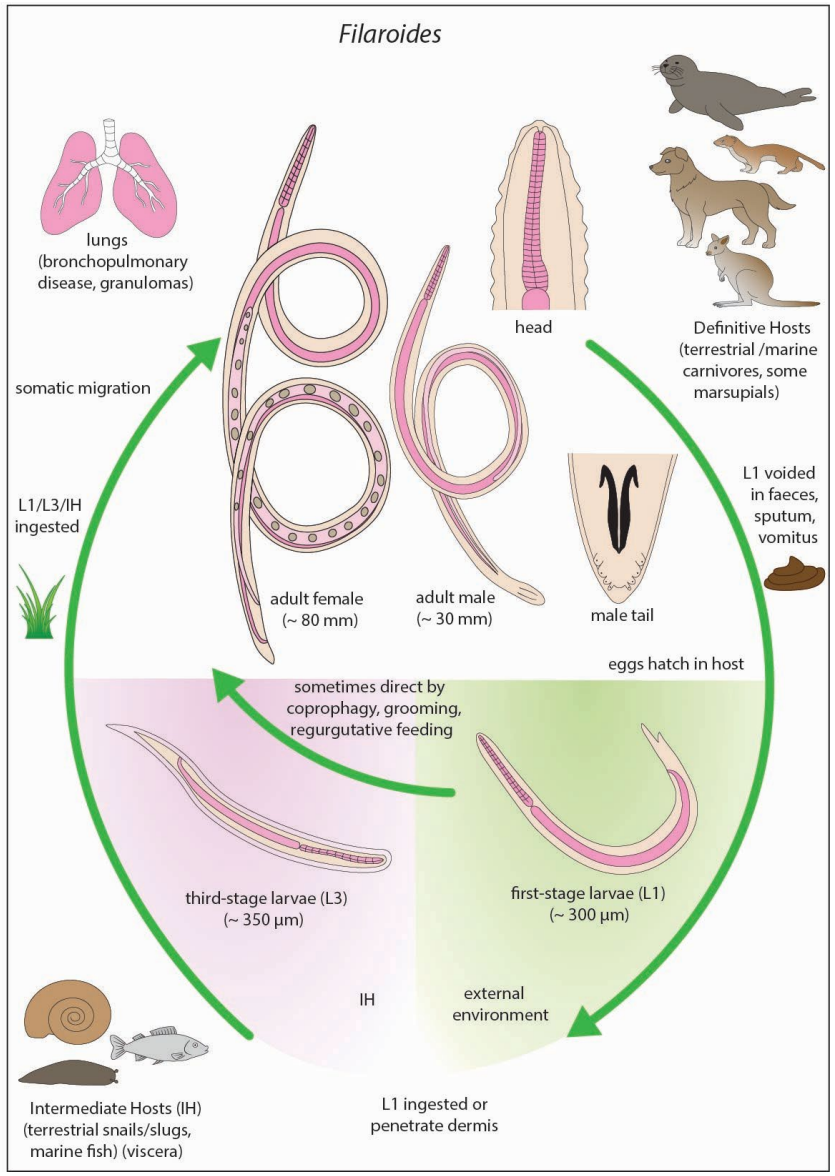

Fasciolopsis
intestines
(trauma, inflammation,
abscesses, anorexia)
Definitive Hosts
(pigs, primates,
dogs, rodents)
ingestion
hermaphroditic
adult (~ 30 mm)
excretion
eggs
(~ 140 µm)
vector-borne transmission
encysted
metacercaria
(~ 150 µm)
endoparasitic in
tissues of vector
free-swimming
cercaria
(~ 600 µm)
free-swimming
miracidium
(~ 170 µm)
redia
(~ 1.2 mm)
sporocyst
(~ 1 mm)
Intermediate Hosts
(planorbid snails)
(visceral then glandular tissue)

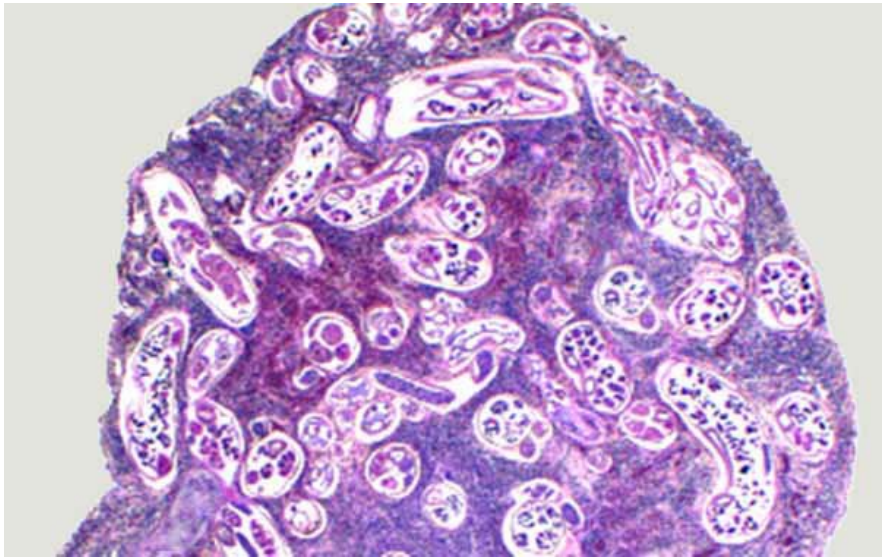

PHIL-15219

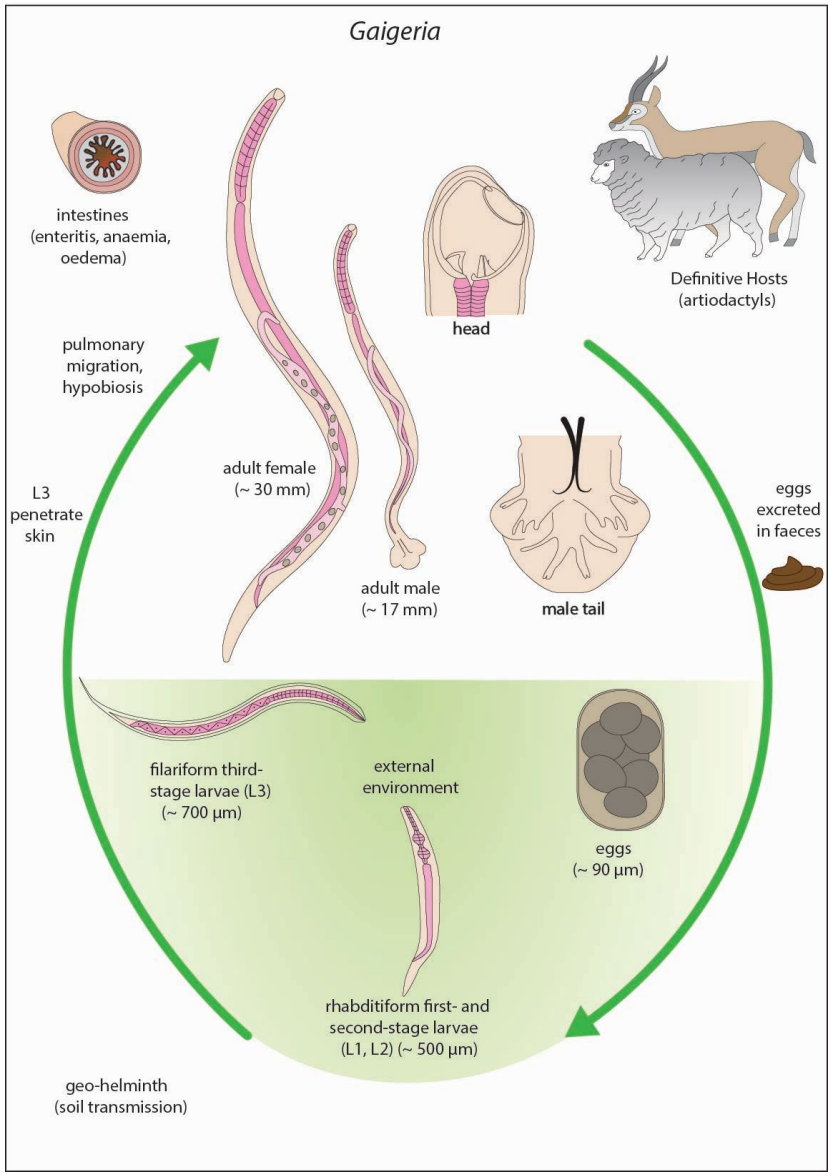


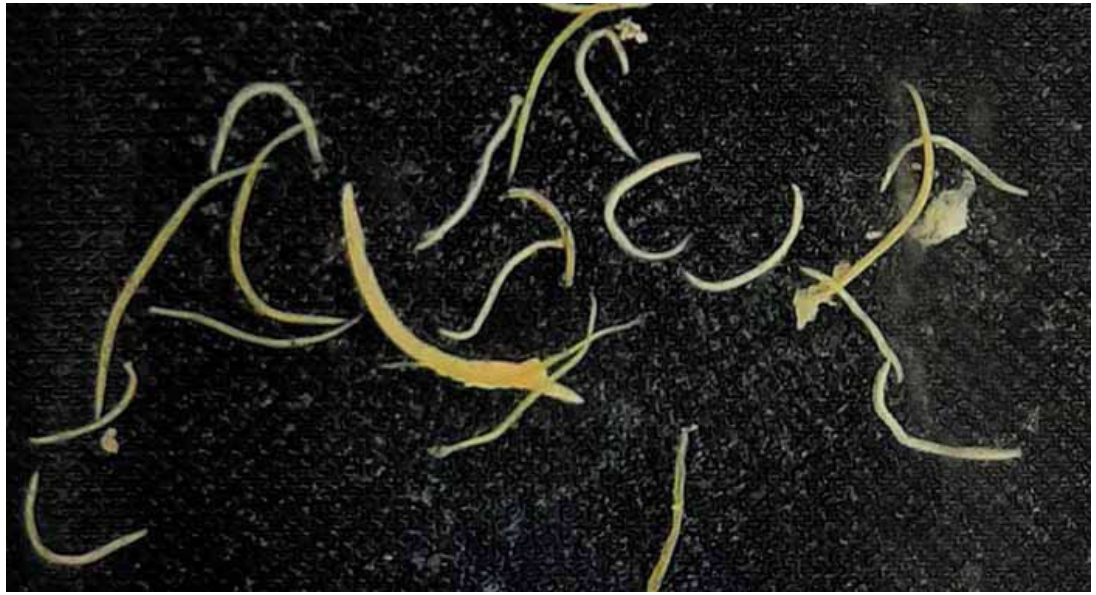


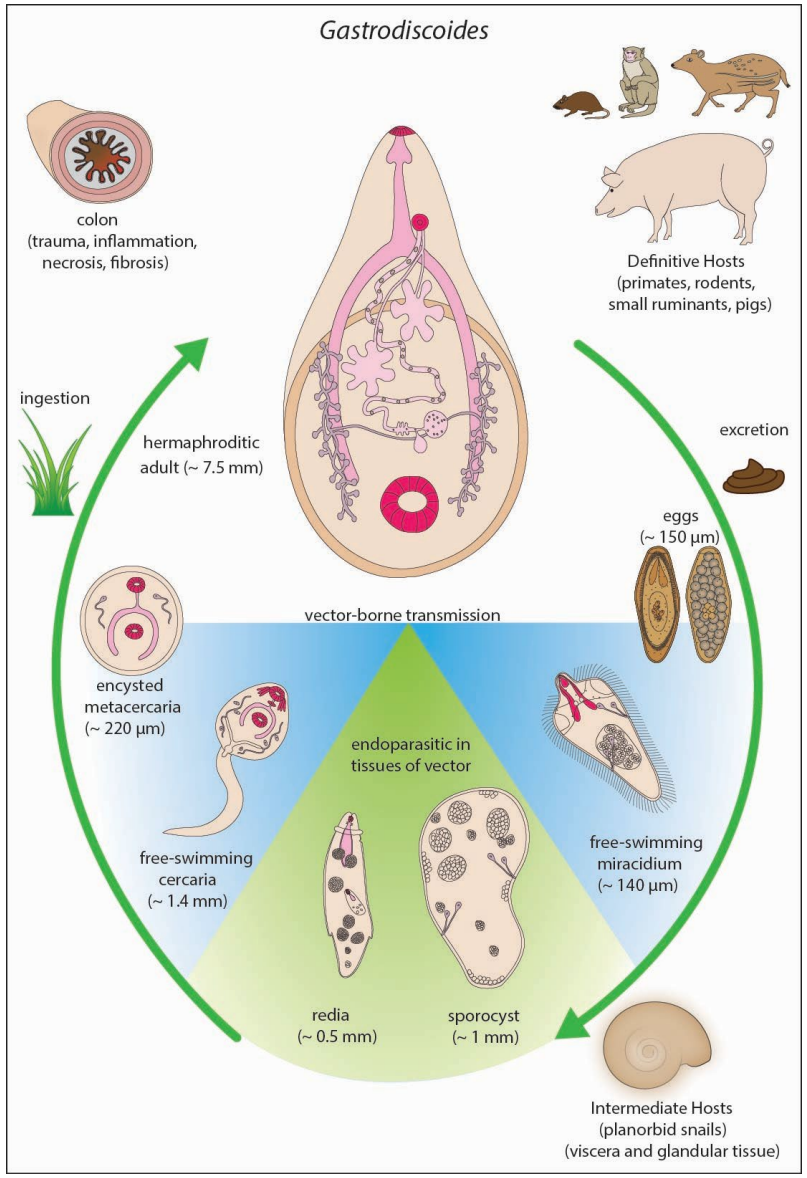

Felicola
skin/pelage
(dermatitis, pruritus,
alopecia, dandruff)
(some vector infectious
microbial diseases)
adult (ventral)
(~ 1.5 mm)
Definitive Hosts
(carnivores)
nymph (dorsal)
(~ 1.2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/scurf/hairs)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

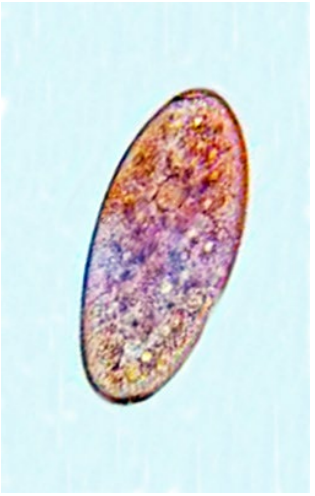

Filaroides
lungs
(bronchopulmonary
disease, granulomas)
head
Definitive Hosts
(terrestrial /marine
carnivores, some
marsupials)
somatic migration
L1/L3/IH
ingested
L1 voided
in faeces,
sputum,
vomitus
adult female
(~ 80 mm)
adult male
(~ 30 mm)
male tail
eggs hatch in host
sometimes direct by
coprophagy, grooming,
regurgutative feeding
third-stage larvae (L3)
(~ 350 µm)
first-stage larvae (L1)
(~ 300 µm)
IH
external
environment
Intermediate Hosts (IH)
(terrestrial snails/slugs,
marine fish) (viscera)
L1 ingested or
penetrate dermis

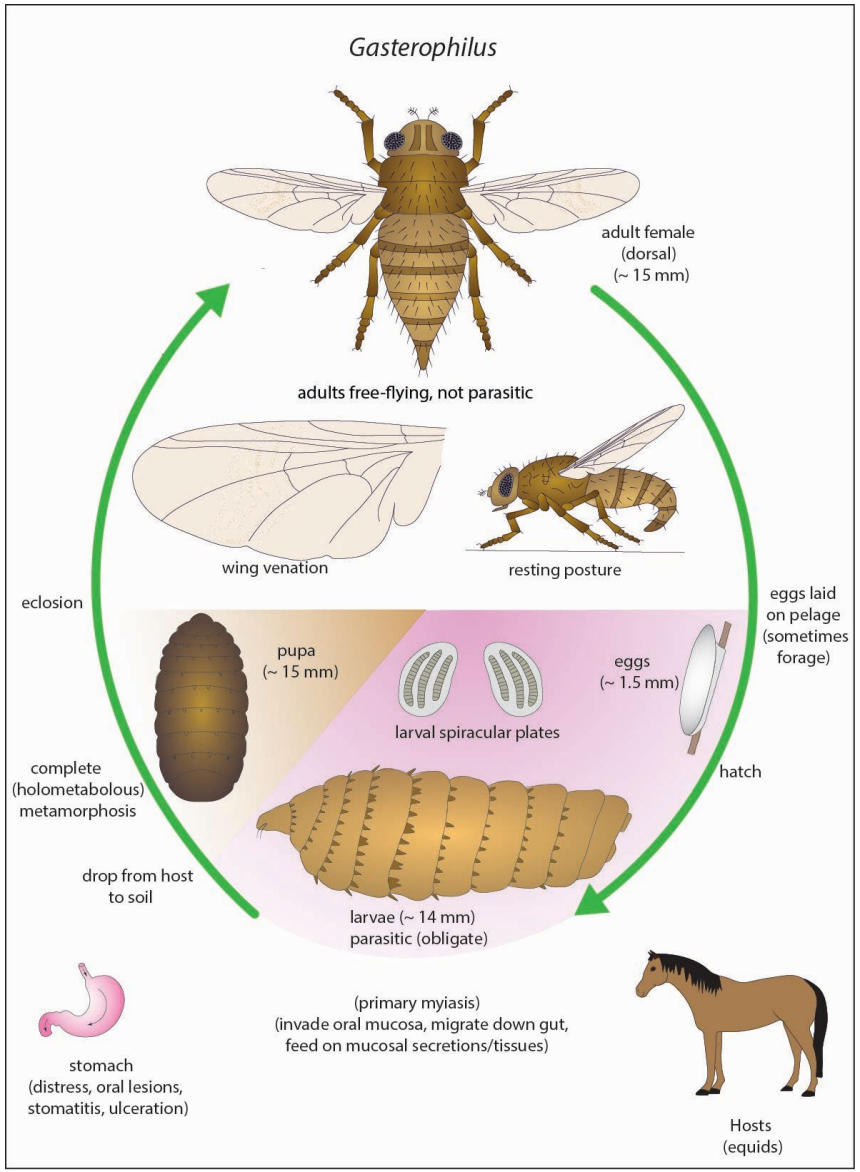


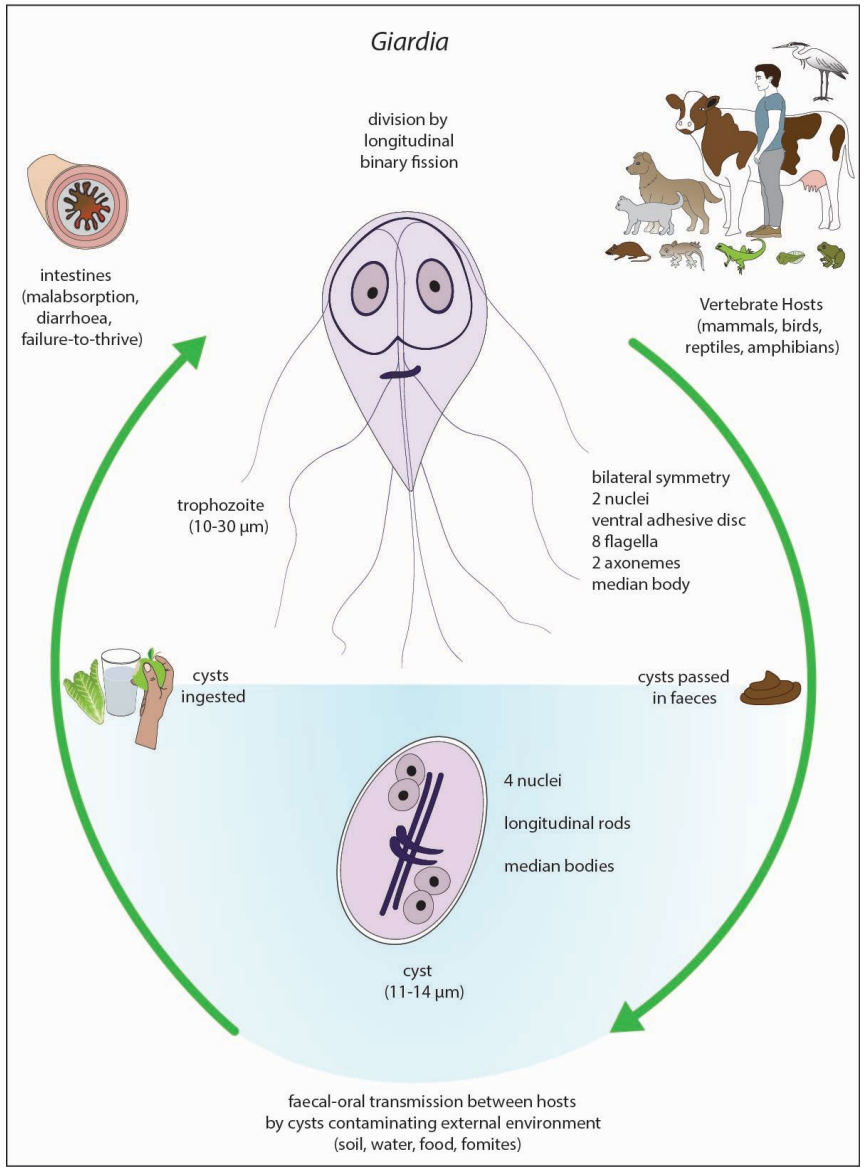

Gaigeria
intestines
(enteritis, anaemia,
oedema)
head
Definitive Hosts
(artiodactyls)
pulmonary
migration,
hypobiosis
adult female
(~ 30 mm)
adult male
(~ 17 mm)
male tail
L3
penetrate
skin
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 700 µm)
external
environment
eggs
(~ 90 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 500 µm)
geo-helminth
(soil transmission)

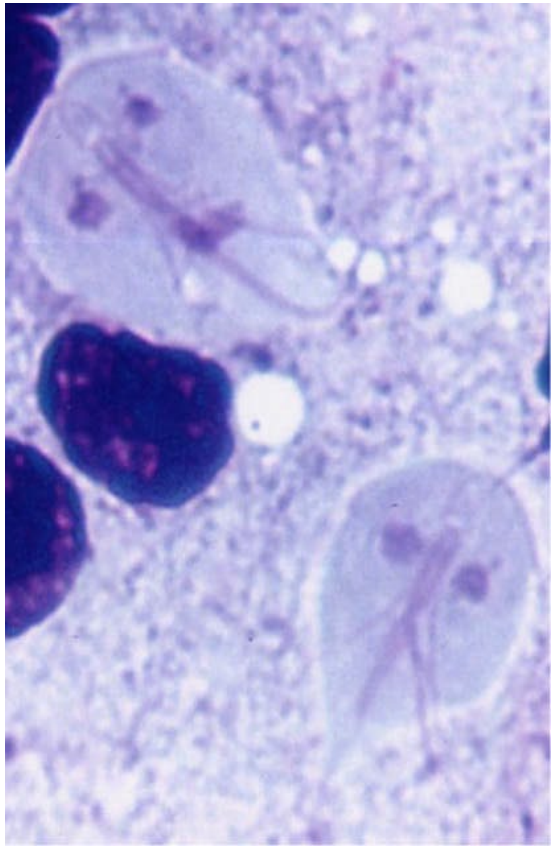


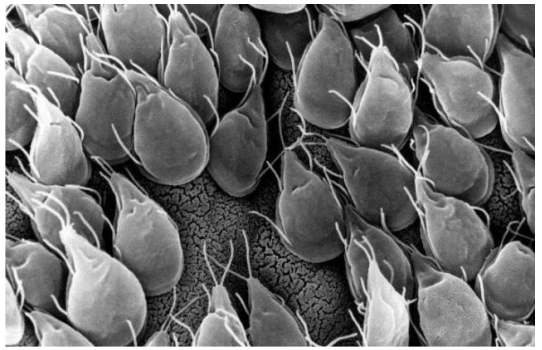

Gastrodiscoides
colon
(trauma, inflammation,
necrosis, fibrosis)
Definitive Hosts
(primates, rodents,
small ruminants, pigs)
ingestion
hermaphroditic
adult (~ 7.5 mm)
excretion
eggs
(~ 150 µm)
vector-borne transmission
encysted
metacercaria
(~ 220 µm)
endoparasitic in
tissues of vector
free-swimming
cercaria
(~ 1.4 mm)
free-swimming
miracidium
(~ 140 µm)
redia
(~ 0.5 mm)
sporocyst
(~ 1 mm)
Intermediate Hosts
(planorbid snails)
(viscera and glandular tissue)

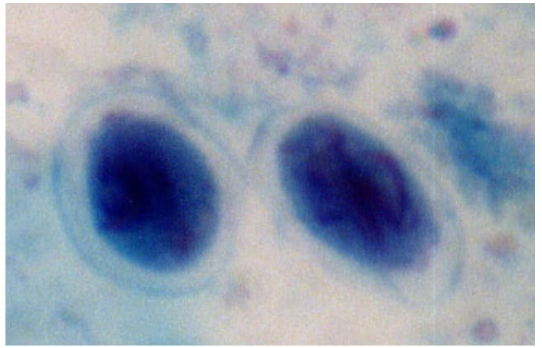


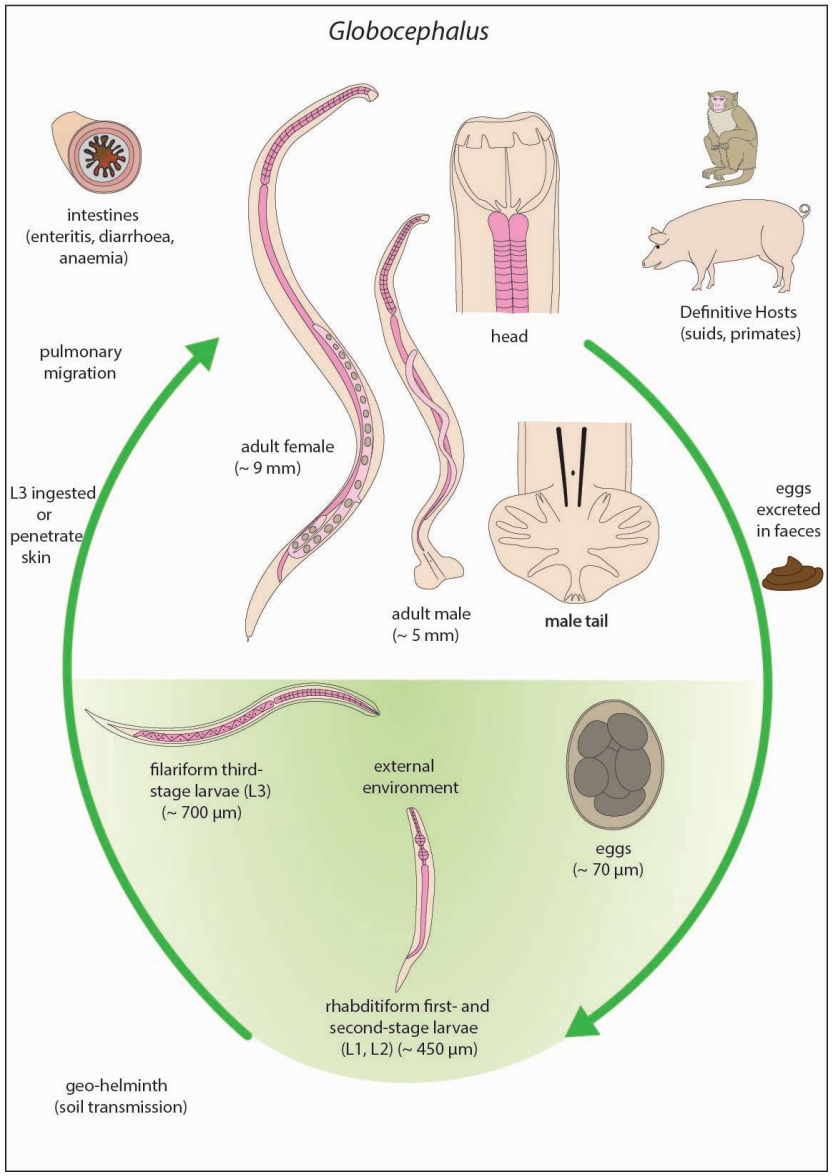

Gasterophilus
adult female
(dorsal)
(~ 15 mm)
adults free-flying, not parasitic
wing venation
resting posture
eclosion
eggs laid
on pelage
(sometimes
forage)
pupa
(~ 15 mm)
eggs
(~ 1.5 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
hatch
drop from host
to soil
larvae (~ 14 mm)
parasitic (obligate)
(primary myiasis)
(invade oral mucosa, migrate down gut,
feed on mucosal secretions/tissues)
stomach
(distress, oral lesions,
stomatitis, ulceration)
Hosts
(equids)

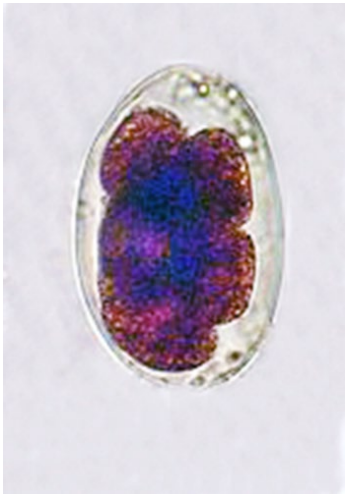

Giardia
division by
longitudinal
binary fission
intestines
(malabsorption,
diarrhoea,
failure-to-thrive)
Vertebrate Hosts
(mammals, birds,
reptiles, amphibians)
trophozoite
(10-30 µm)
bilateral symmetry
2 nuclei
ventral adhesive disc
8 flagella
2 axonemes
median body
cysts
ingested
cysts passed
in faeces
4 nuclei
longitudinal rods
median bodies
cyst
(11-14 µm)
faecal-oral transmission between hosts
by cysts contaminating external environment
(soil, water, food, fomites)

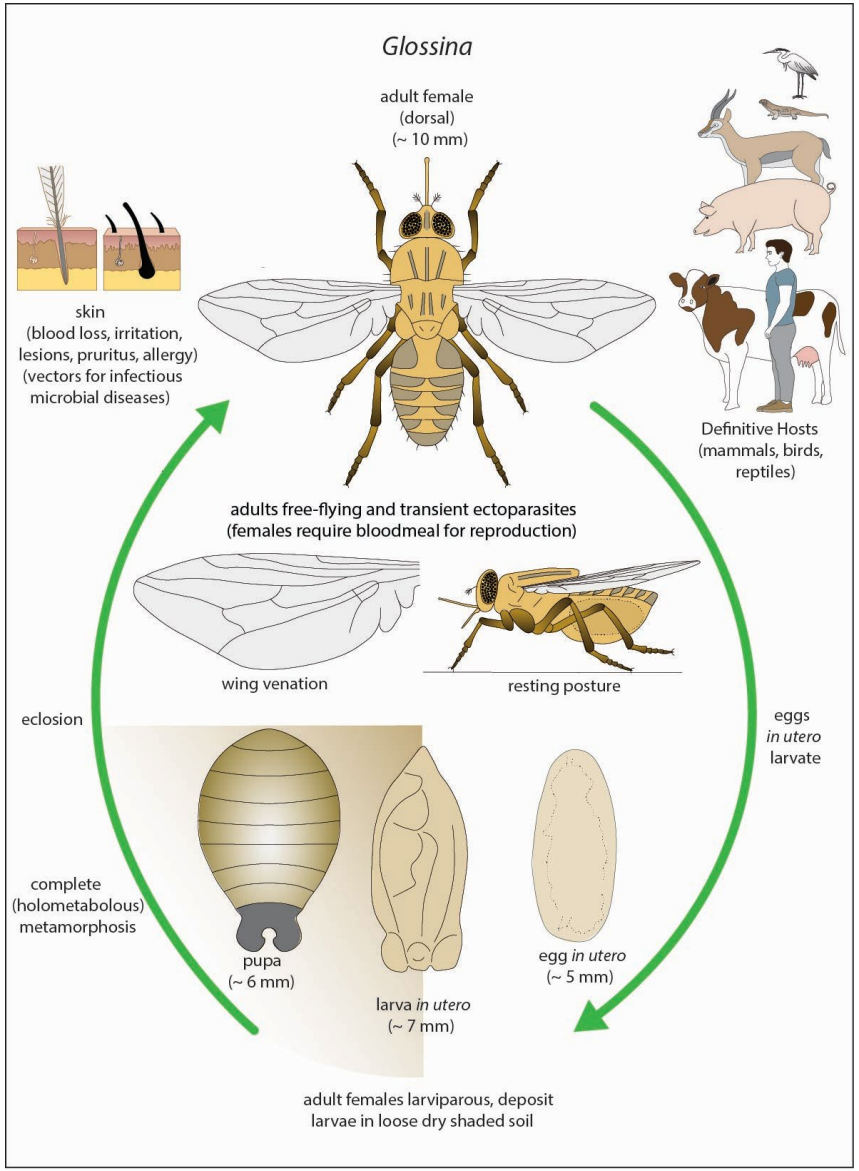






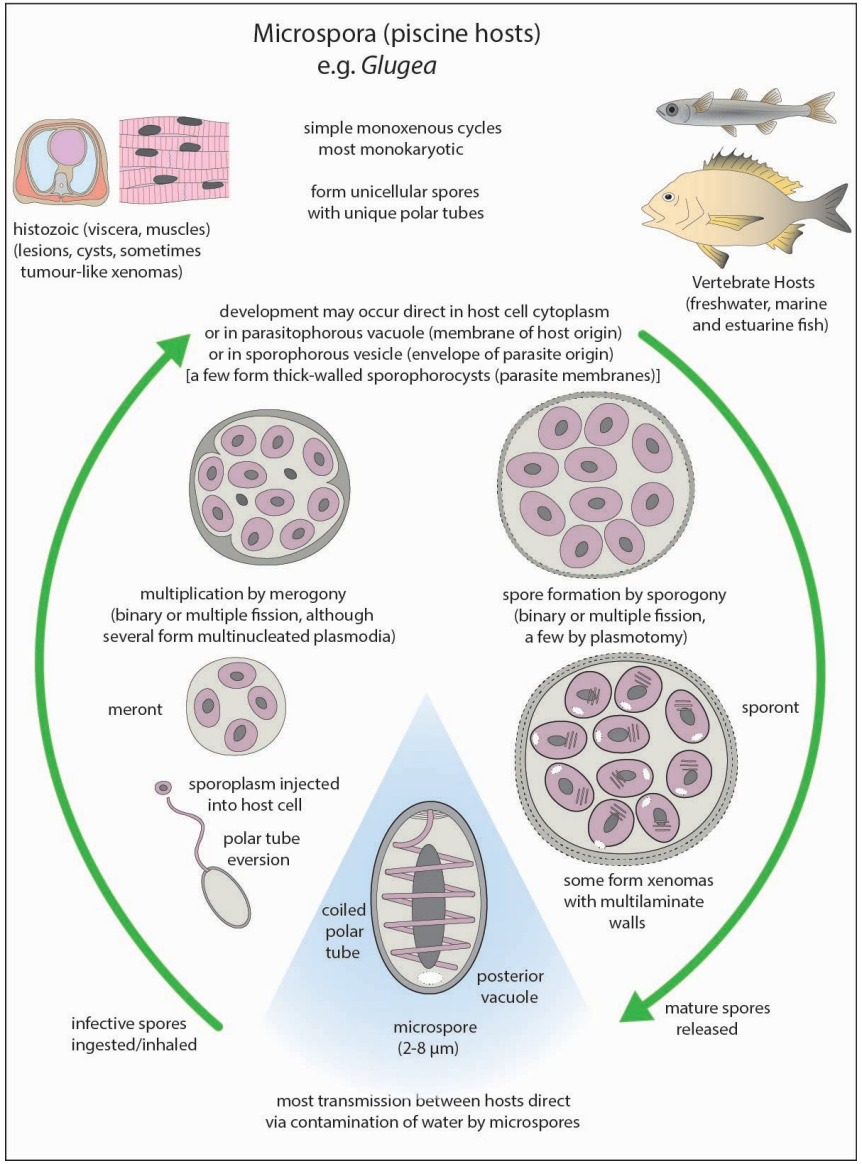

Globocephalus
intestines
(enteritis, diarrhoea,
anaemia)
head
Definitive Hosts
(suids, primates)
pulmonary
migration
adult female
(~ 9 mm)
L3 ingested
or
penetrate
skin
eggs
excreted
in faeces
adult male
(~ 5 mm)
male tail
filariform third-
stage larvae (L3)
(~ 700 µm)
external
environment
eggs
(~ 70 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 450 µm)
geo-helminth
(soil transmission)

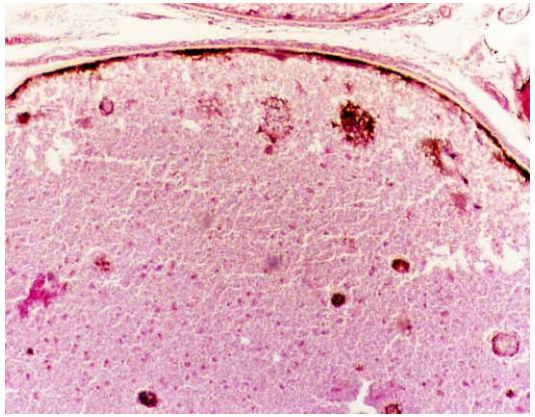


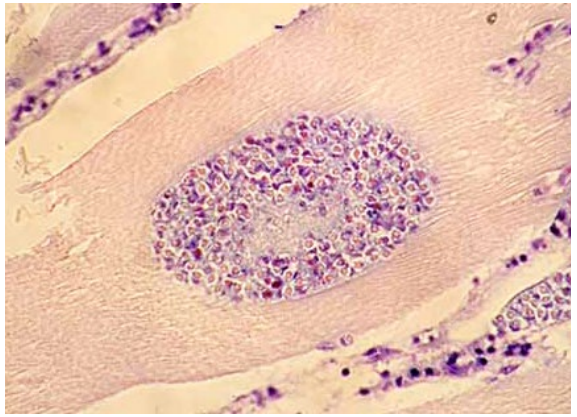

Glossina
adult female
(dorsal)
(~ 10 mm)
skin
(blood loss, irritation,
lesions, pruritus, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds,
reptiles)
adults free-flying and transient ectoparasites
(females require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs
in utero
larvate
complete
(holometabolous)
metamorphosis
pupa
(~ 6 mm)
larva in utero
(~ 7 mm)
egg in utero
(~ 5 mm)
adult females larviparous, deposit
larvae in loose dry shaded soil

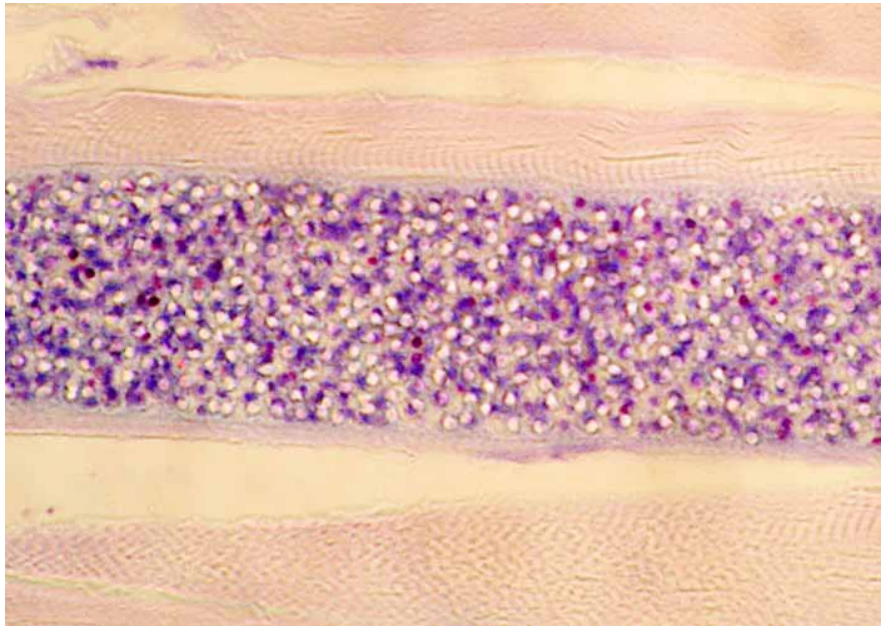

Tsetse flies

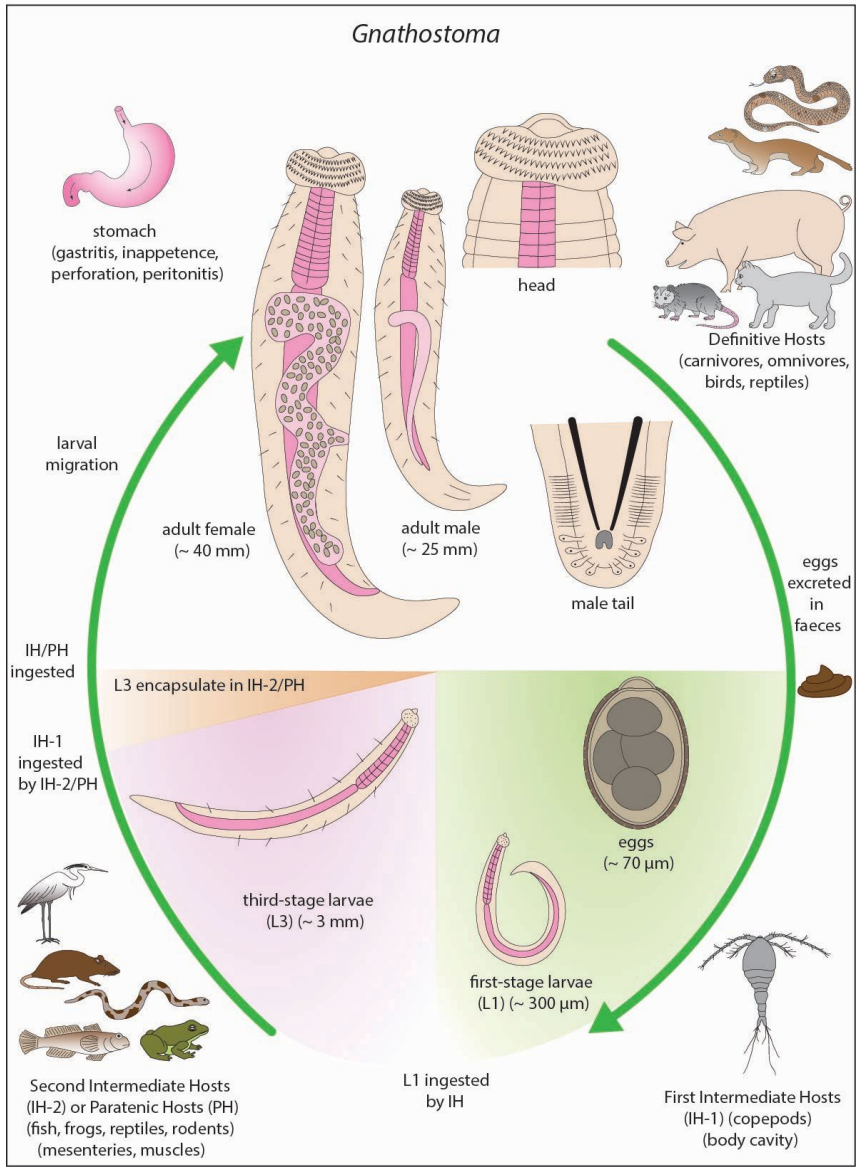

Britannica

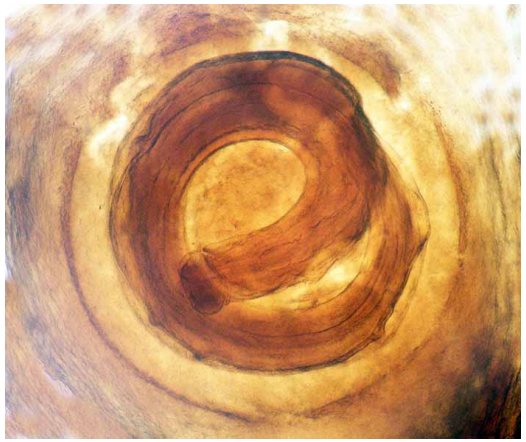

Microspora (piscine hosts)
e.g. Glugea
simple monoxenous cycles
most monokaryotic
form unicellular spores
with unique polar tubes
histozoic (viscera, muscles)
(lesions, cysts, sometimes
tumour-like xenomas)
Vertebrate Hosts
(freshwater, marine
and estuarine fish)
development may occur direct in host cell cytoplasm
or in parasitophorous vacuole (membrane of host origin)
or in sporophorous vesicle (envelope of parasite origin)
[a few form thick-walled sporophorocysts (parasite membranes)]
multiplication by merogony
(binary or multiple fission, although
several form multinucleated plasmodia)
spore formation by sporogony
(binary or multiple fission,
a few by plasmotomy)
meront
sporont
sporoplasm injected
into host cell
polar tube
eversion
some form xenomas
with multilaminate
walls
coiled
polar
tube
posterior
vacuole
infective spores
ingested/inhaled
microspore
(2-8 µm)
mature spores
released
most transmission between hosts direct
via contamination of water by microspores

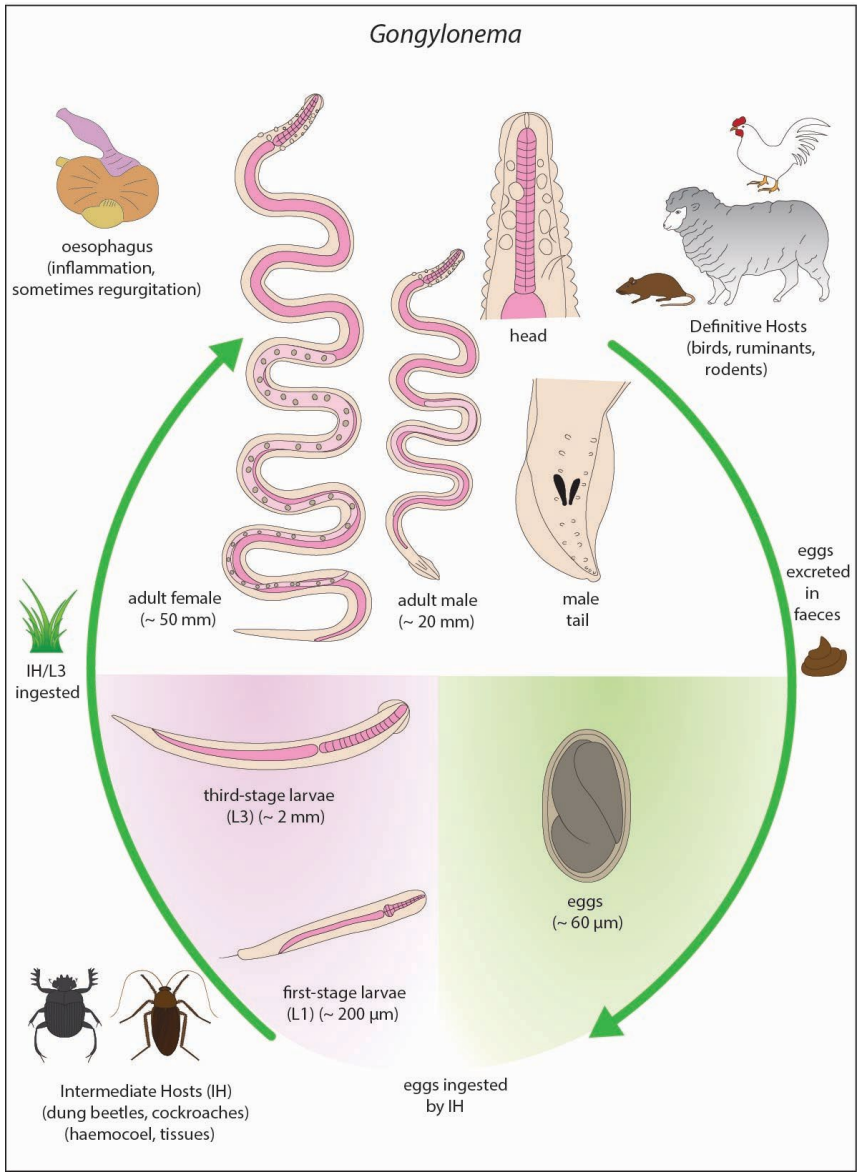


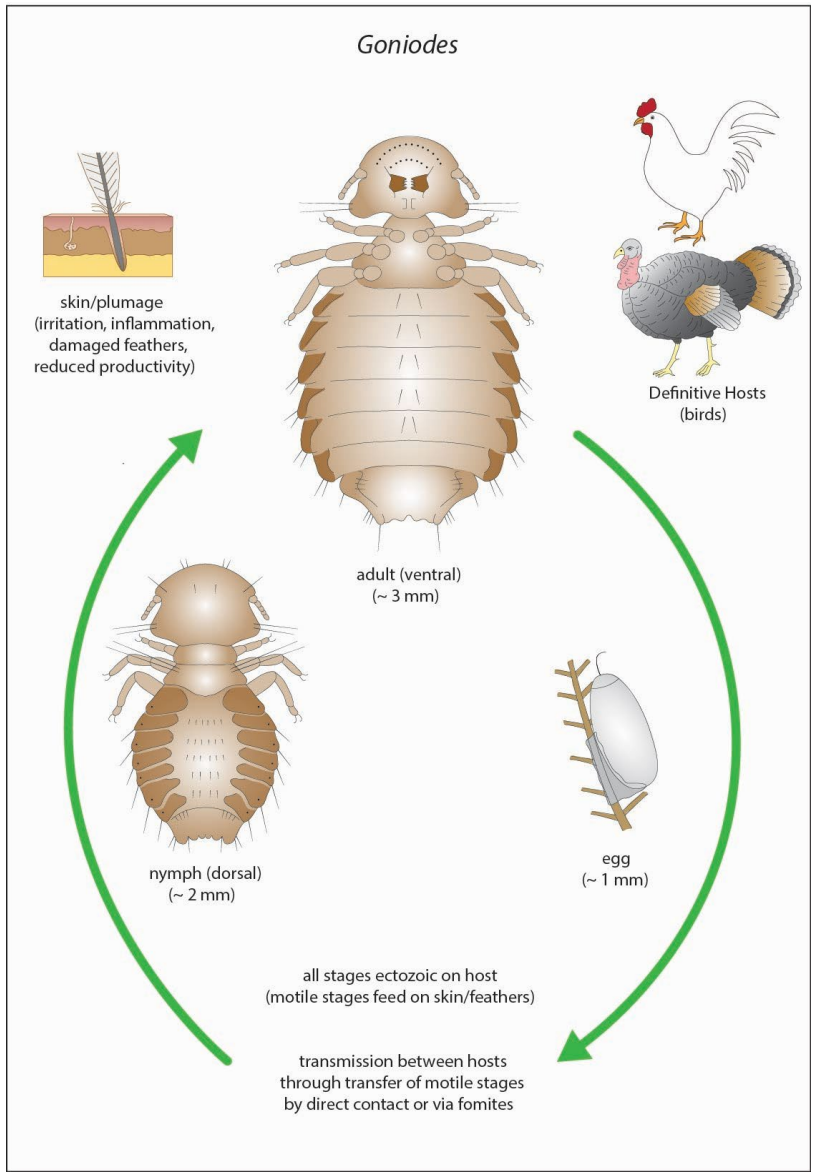


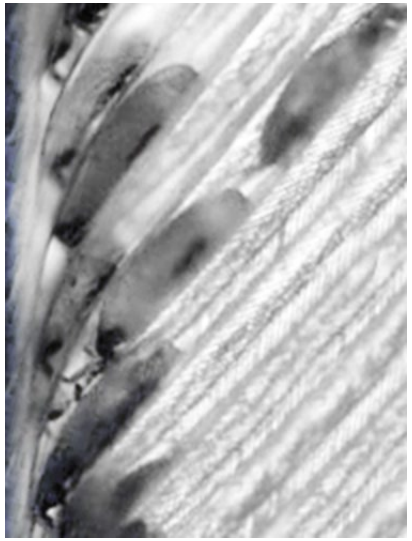


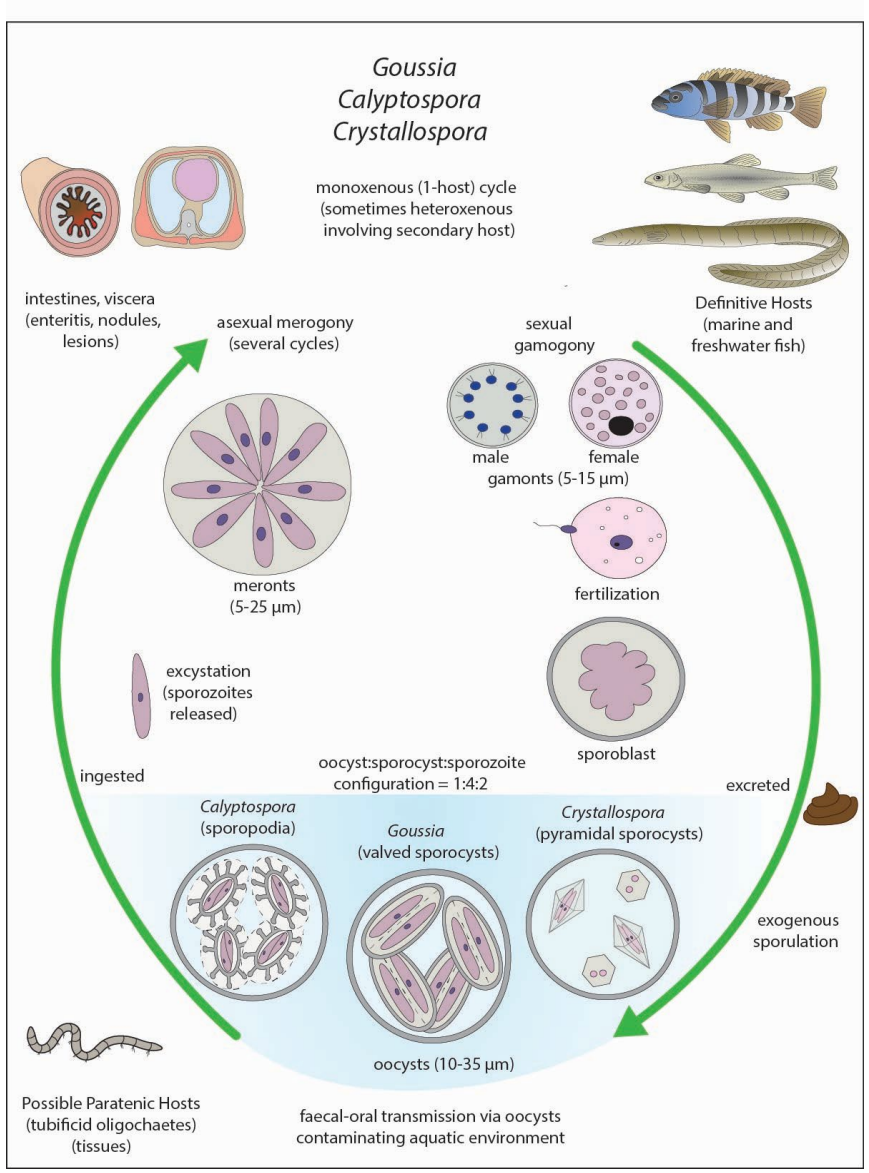

Gnathostoma
stomach
(gastritis, inappetence,
perforation, peritonitis)
head
Definitive Hosts
(carnivores, omnivores,
birds, reptiles)
larval
migration
adult female
(~ 40 mm)
adult male
(~ 25 mm)
male tail
eggs
excreted
in
faeces
IH/PH
ingested
L3 encapsulate in IH-2/PH
IH-1
ingested
by IH-2/PH
eggs
(~ 70 µm)
third-stage larvae
(L3) (~ 3 mm)
first-stage larvae
(L1) (~ 300 µm)
Second Intermediate Hosts
(IH-2) or Paratenic Hosts (PH)
(fish, frogs, reptiles, rodents)
(mesenteries, muscles)
L1 ingested
by IH
First Intermediate Hosts
(IH-1) (copepods)
(body cavity)

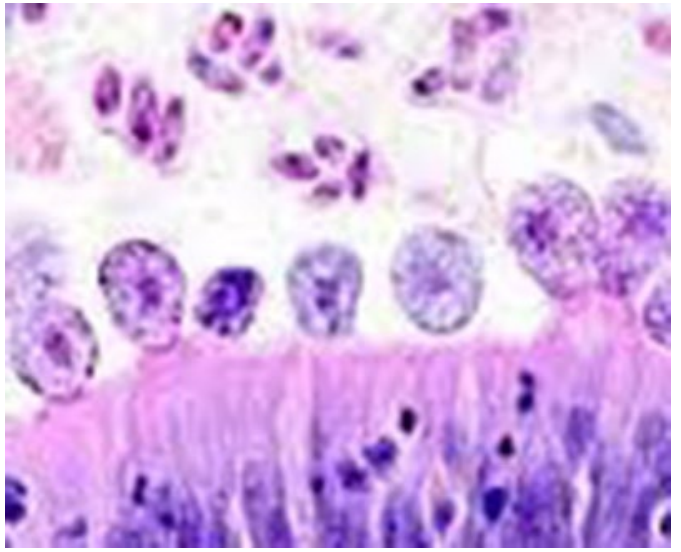


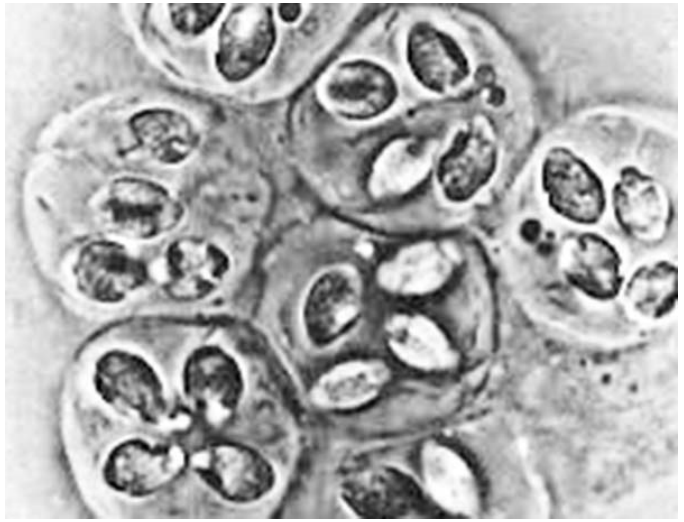

Gongylonema
oesophagus
(inflammation,
sometimes regurgitation)
head
Definitive Hosts
(birds, ruminants,
rodents)
adult female
(~ 50 mm)
adult male
(~ 20 mm)
male
tail
eggs
excreted
in
faeces
IH/L3
ingested
third-stage larvae
(L3) (~ 2 mm)
eggs
(~ 60 µm)
first-stage larvae
(L1) (~ 200 µm)
Intermediate Hosts (IH)
(dung beetles, cockroaches)
(haemocoel, tissues)
eggs ingested
by IH

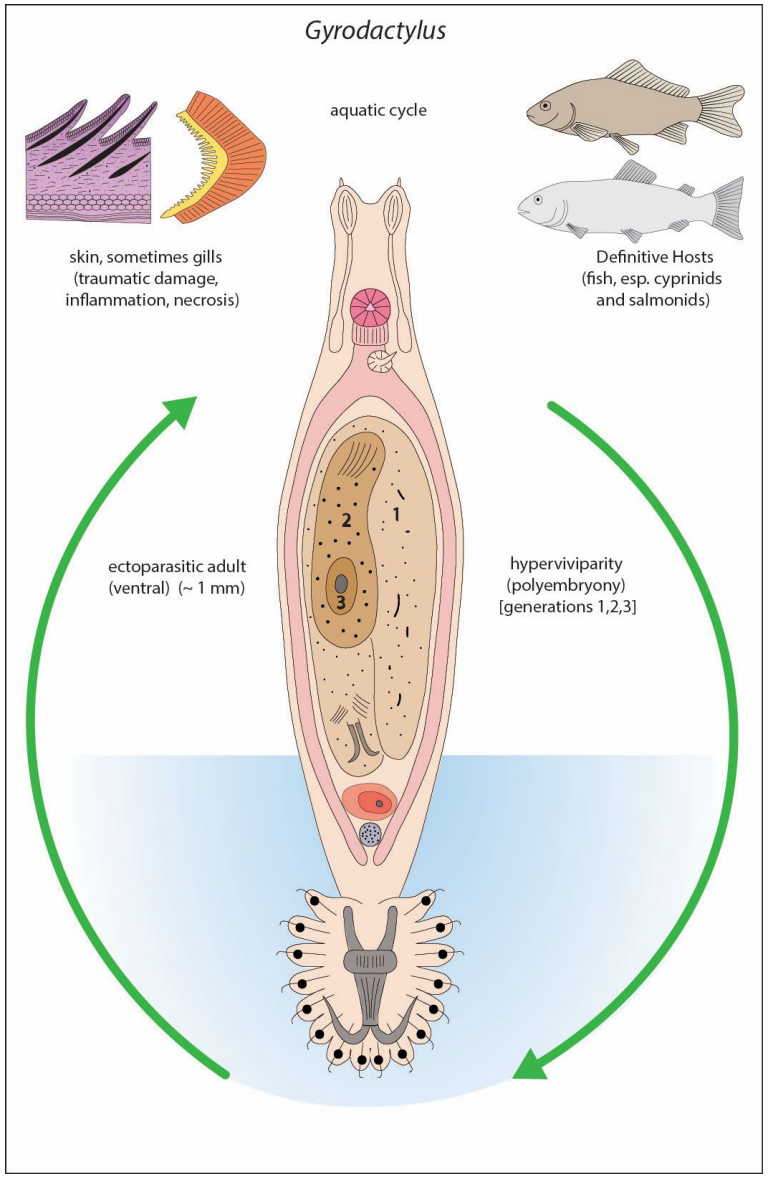

Goniodes
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 3 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

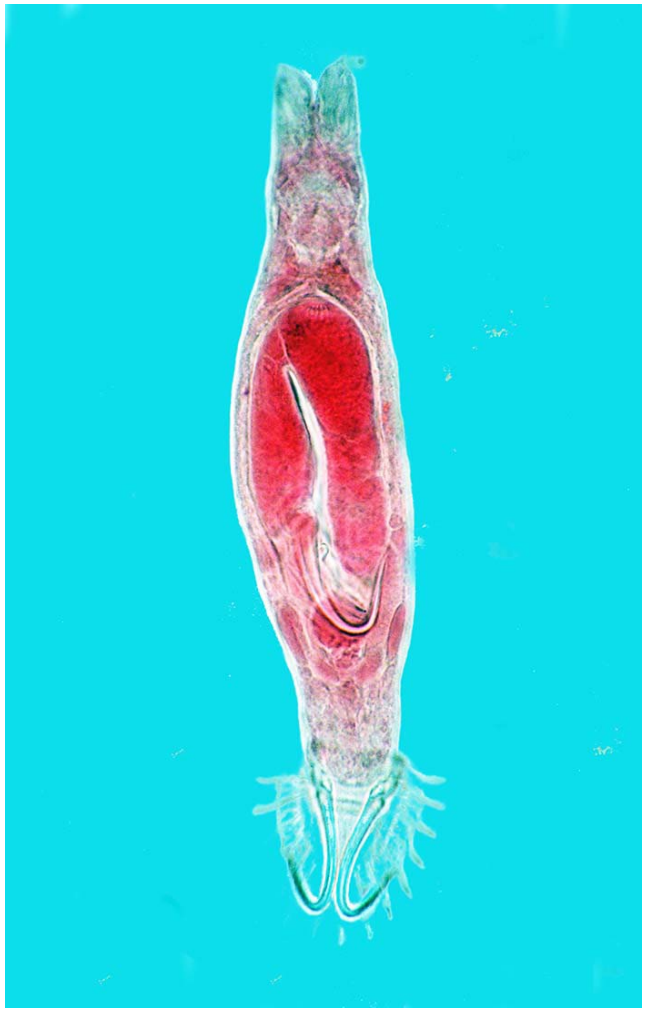


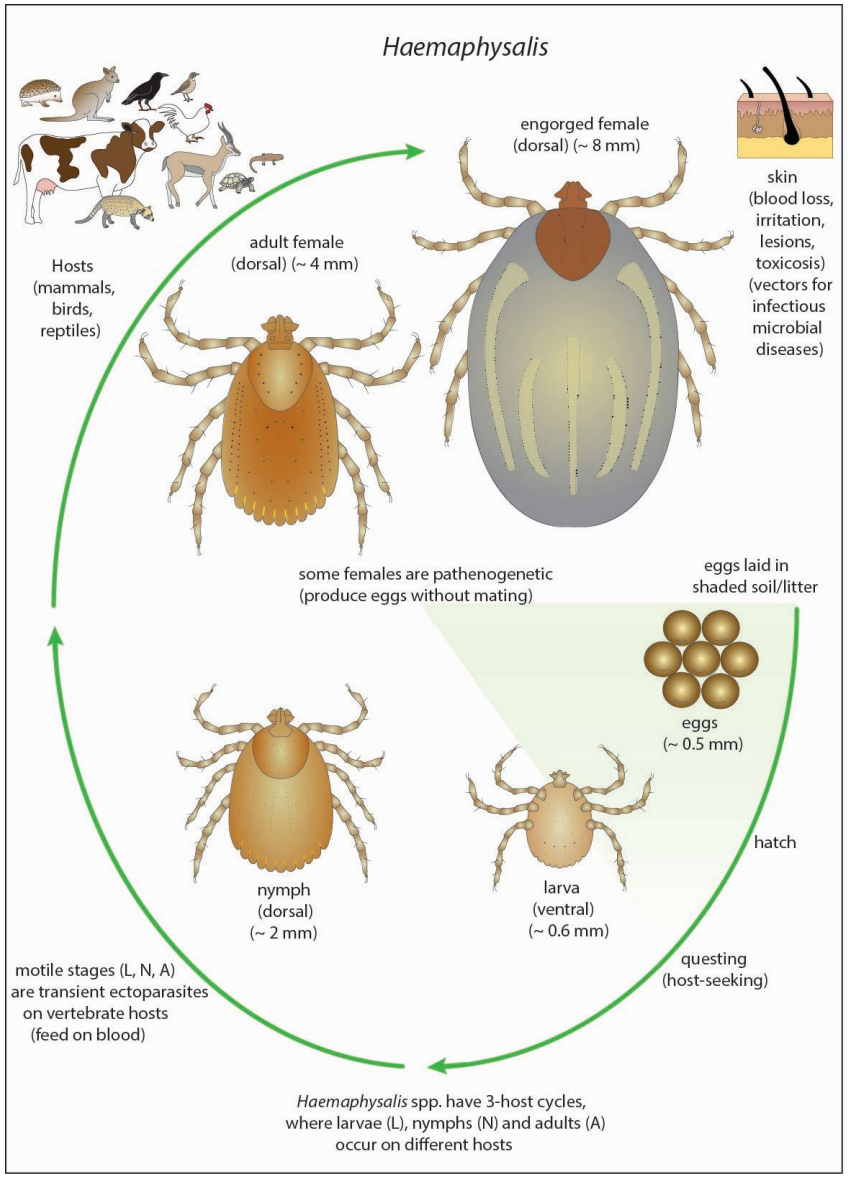

Goussia
Calyptospora
Crystallospora
monoxenous (1-host) cycle
(sometimes heteroxenous
involving secondary host)
intestines, viscera
(enteritis, nodules,
lesions)
asexual merogony
(several cycles)
sexual
gamogony
Definitive Hosts
(marine and
freshwater fish)
male
female
gamonts (5-15 µm)
meronts
(5-25 µm)
fertilization
excystation
(sporozoites
released)
sporoblast
ingested
oocyst:sporocyst:sporozoite
configuration = 1:4:2
excreted
Calyptospora
(sporopodia)
Goussia
(valved sporocysts)
Crystallospora
(pyramidal sporocysts)
exogenous
sporulation
oocysts (10-35 µm)
Possible Paratenic Hosts
(tubificid oligochaetes)
(tissues)
faecal-oral transmission via oocysts
contaminating aquatic environment



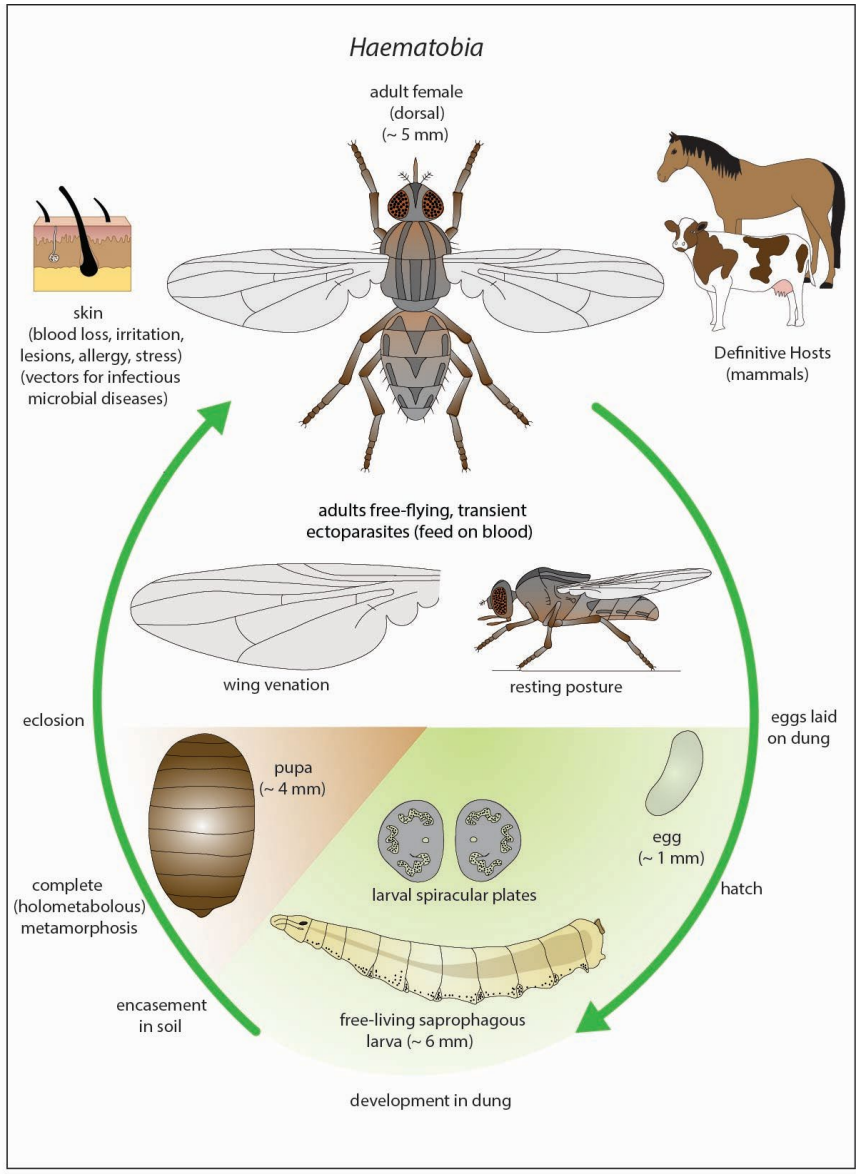



Gyrodactylus
aquatic cycle
skin, sometimes gills
(traumatic damage,
inflammation, necrosis)
Definitive Hosts
(fish, esp. cyprinids
and salmonids)
ectoparasitic adult
(ventral) (~ 1 mm)
hyperviviparity
(polyembryony)
[generations 1,2,3]
1
2
3

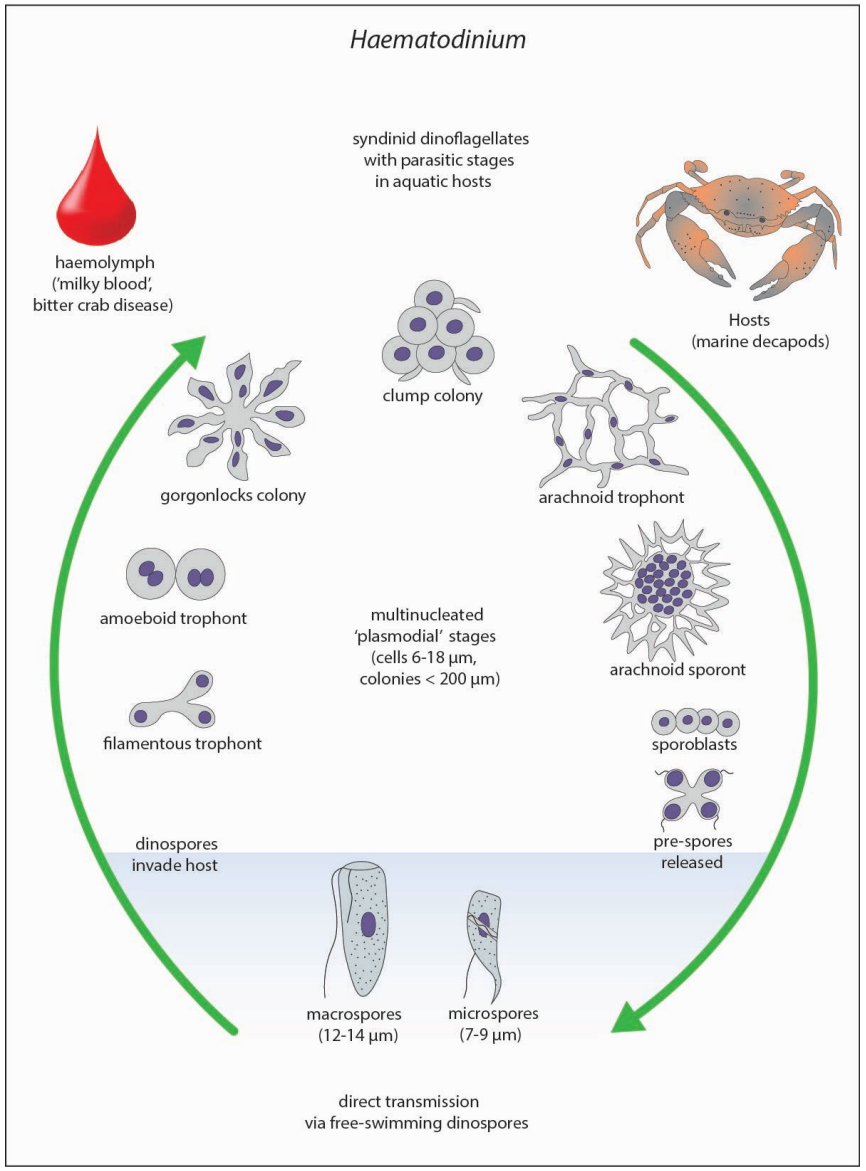


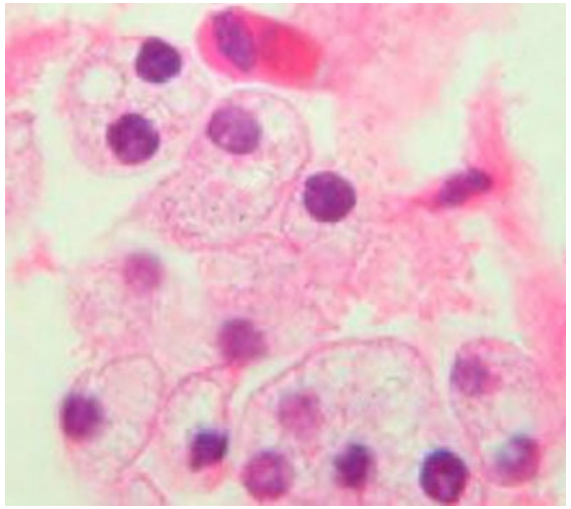

Haemaphysalis
engorged female
(dorsal) (~ 8 mm)
skin
(blood loss,
irritation,
lesions,
toxicosis)
(vectors for
infectious
microbial
diseases)
adult female
(dorsal) (~ 4 mm)
Hosts
(mammals,
birds,
reptiles)
some females are pathenogenetic
(produce eggs without mating)
eggs laid in
shaded soil/litter
eggs
(~ 0.5 mm)
hatch
nymph
(dorsal)
(~ 2 mm)
larva
(ventral)
(~ 0.6 mm)
questing
(host-seeking)
motile stages (L, N, A)
are transient ectoparasites
on vertebrate hosts
(feed on blood)
Haemaphysalis spp. have 3-host cycles,
where larvae (L), nymphs (N) and adults (A)
occur on different hosts

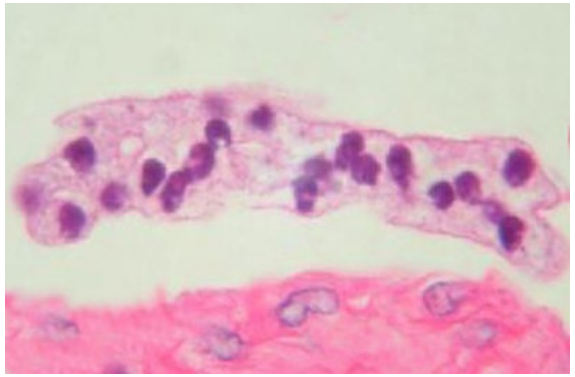

PHIL-22873

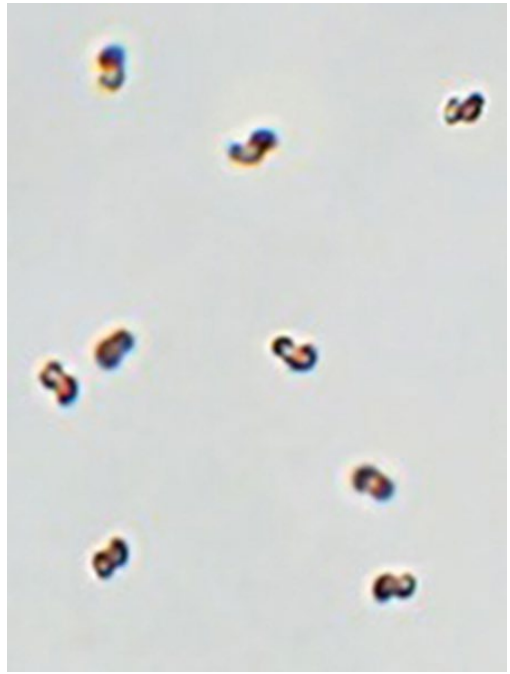

Haematobia
adult female
(dorsal)
(~ 5 mm)
skin
(blood loss, irritation,
lesions, allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals)
adults free-flying, transient
ectoparasites (feed on blood)
wing venation
resting posture
eclosion
eggs laid
on dung
pupa
(~ 4 mm)
egg
(~ 1 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
hatch
encasement
in soil
free-living saprophagous
larva (~ 6 mm)
development in dung

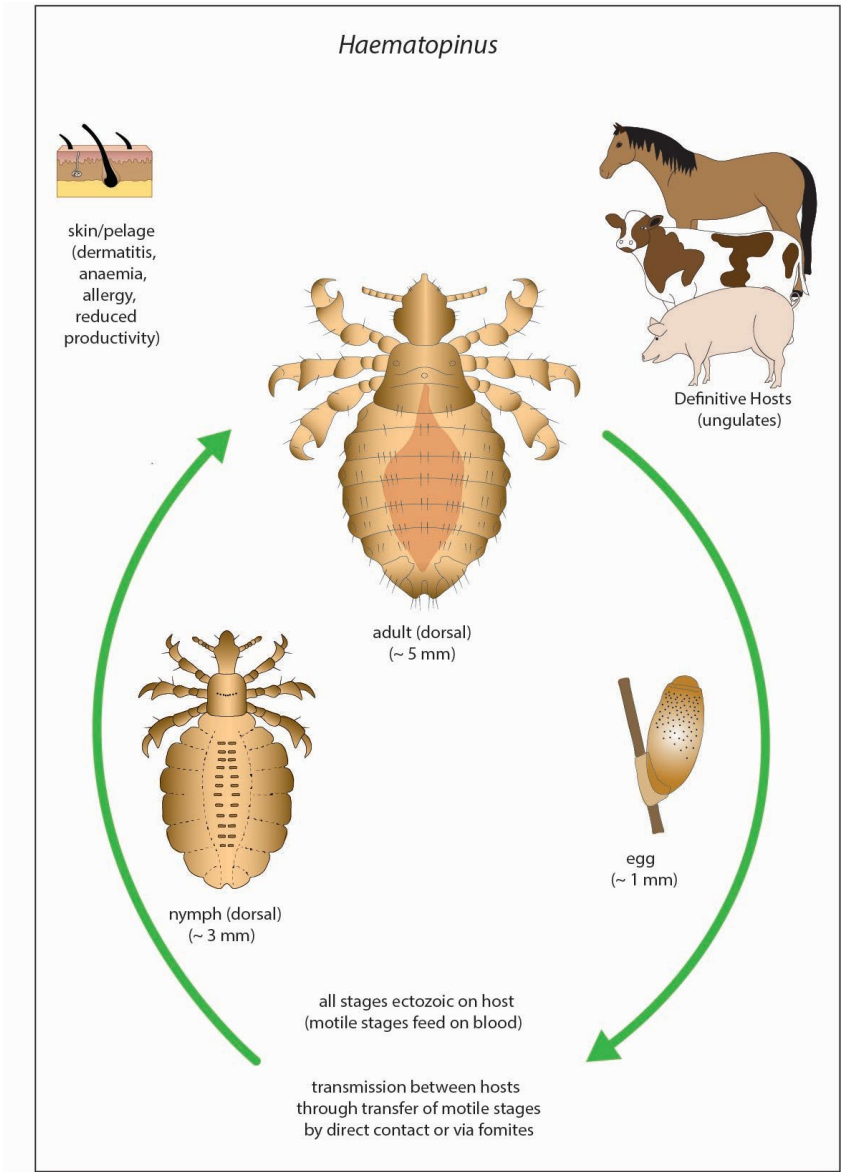

wiki

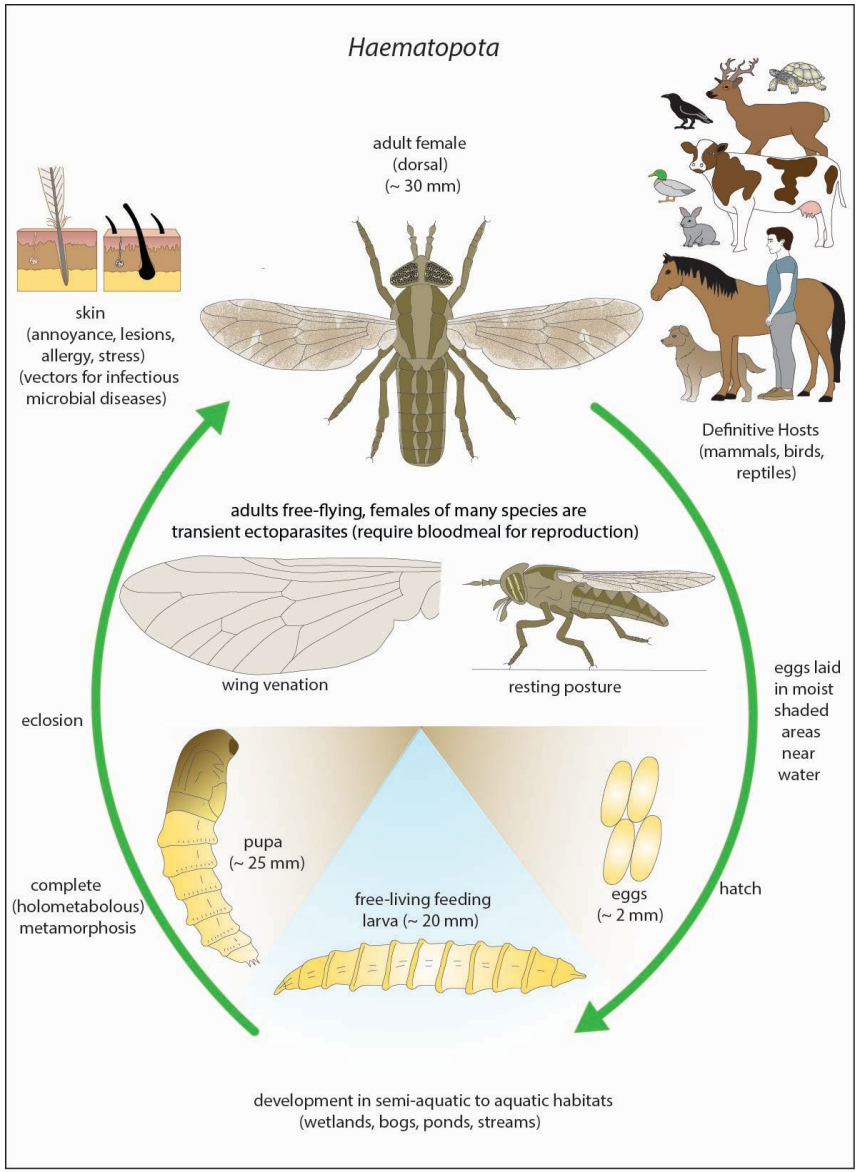

Haematodinium
syndinid dinoflagellates with parasitic stages in aquatic hosts
haemolymph ('milky blood', bitter crab disease)
Hosts (marine decapods)
clump colony
gorgonlocks colony
arachnoid trophont
amoeboid trophont
multinucleated 'plasmodial' stages (cells 6-18 µm, colonies < 200 µm)
arachnoid sporont
filamentous trophont
sporoblasts
pre-spores released
dinospores invade host
macrospores (12-14 µm)
microspores (7-9 µm)
direct transmission via free-swimming dinospores



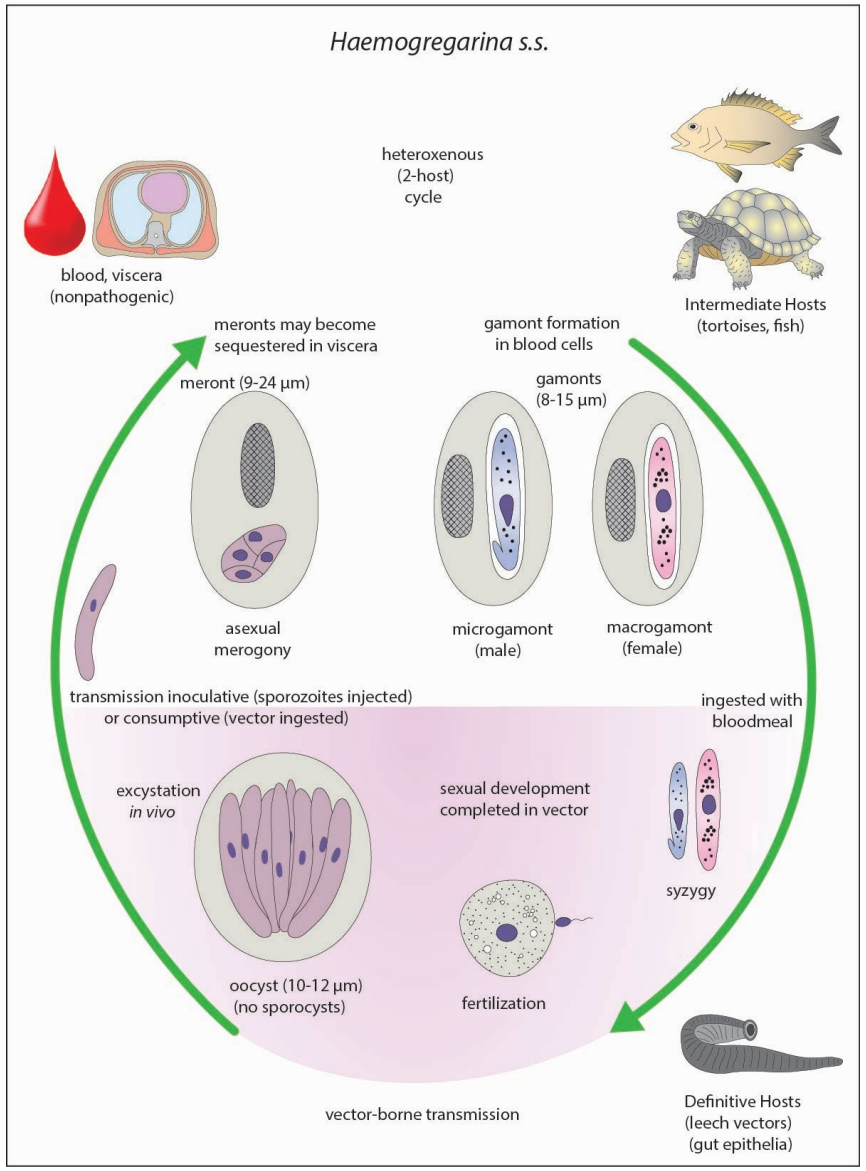


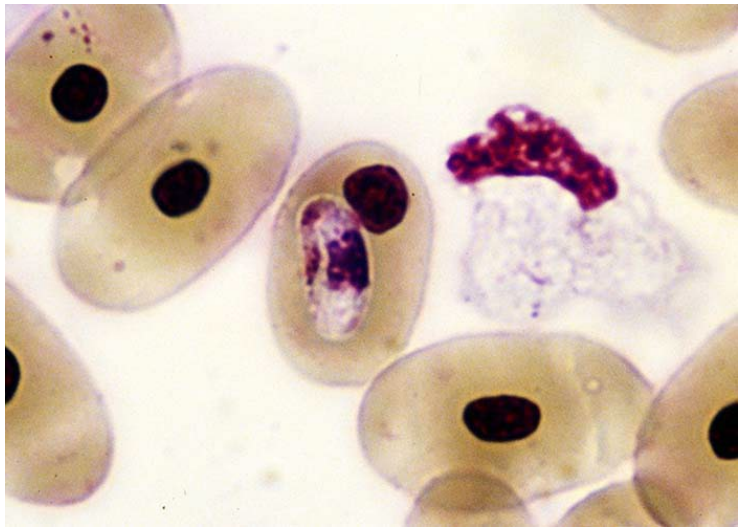


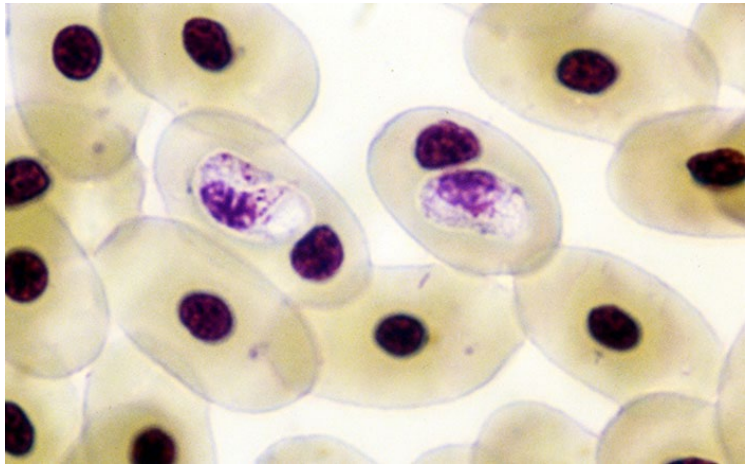

Haematopinus
skin/pelage
(dermatitis,
anaemia,
allergy,
reduced
productivity)
Definitive Hosts
(ungulates)
adult (dorsal)
(~ 5 mm)
egg
(~ 1 mm)
nymph (dorsal)
(~ 3 mm)
all stages ectozoic on host
(motile stages feed on blood)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

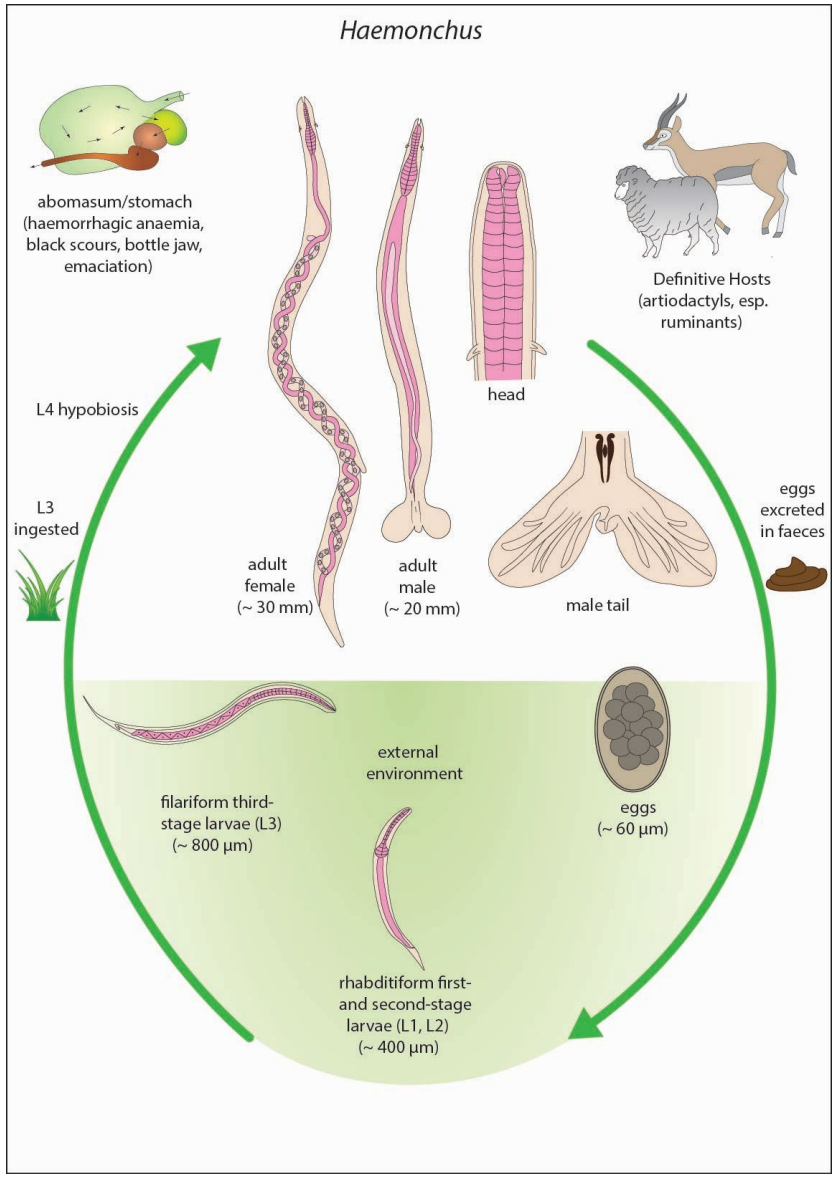

Haematopota
adult female
(dorsal)
(~ 30 mm)
skin
(annoyance, lesions,
allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds,
reptiles)
adults free-flying, females of many species are
transient ectoparasites (require bloodmeal for reproduction)
wing venation
resting posture
eggs laid
in moist
shaded
areas
near
water
eclosion
pupa
(~ 25 mm)
free-living feeding
larva (~ 20 mm)
eggs
(~ 2 mm)
hatch
complete
(holometabolous)
metamorphosis
development in semi-aquatic to aquatic habitats
(wetlands, bogs, ponds, streams)

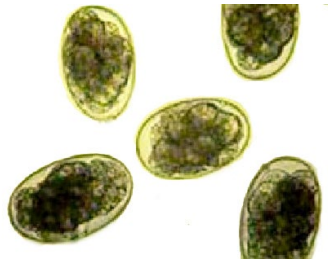

wiki

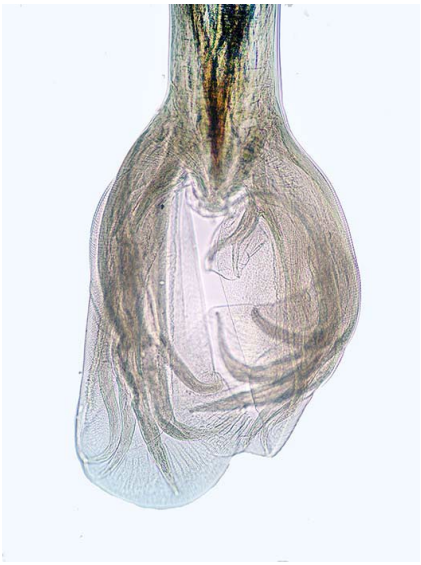

Haemogregarina s.s.
heteroxenous
(2-host)
cycle
blood, viscera
(nonpathogenic)
Intermediate Hosts
(tortoises, fish)
meronts may become
sequestered in viscera
gamont formation
in blood cells
meront (9-24 µm)
gamonts
(8-15 µm)
asexual
merogony
microgamont
(male)
macrogamont
(female)
transmission inoculative (sporozoites injected)
or consumptive (vector ingested)
ingested with
bloodmeal
excystation
in vivo
sexual development
completed in vector
syzygy
oocyst (10-12 µm)
(no sporocysts)
fertilization
vector-borne transmission
Definitive Hosts
(leech vectors)
(gut epithelia)

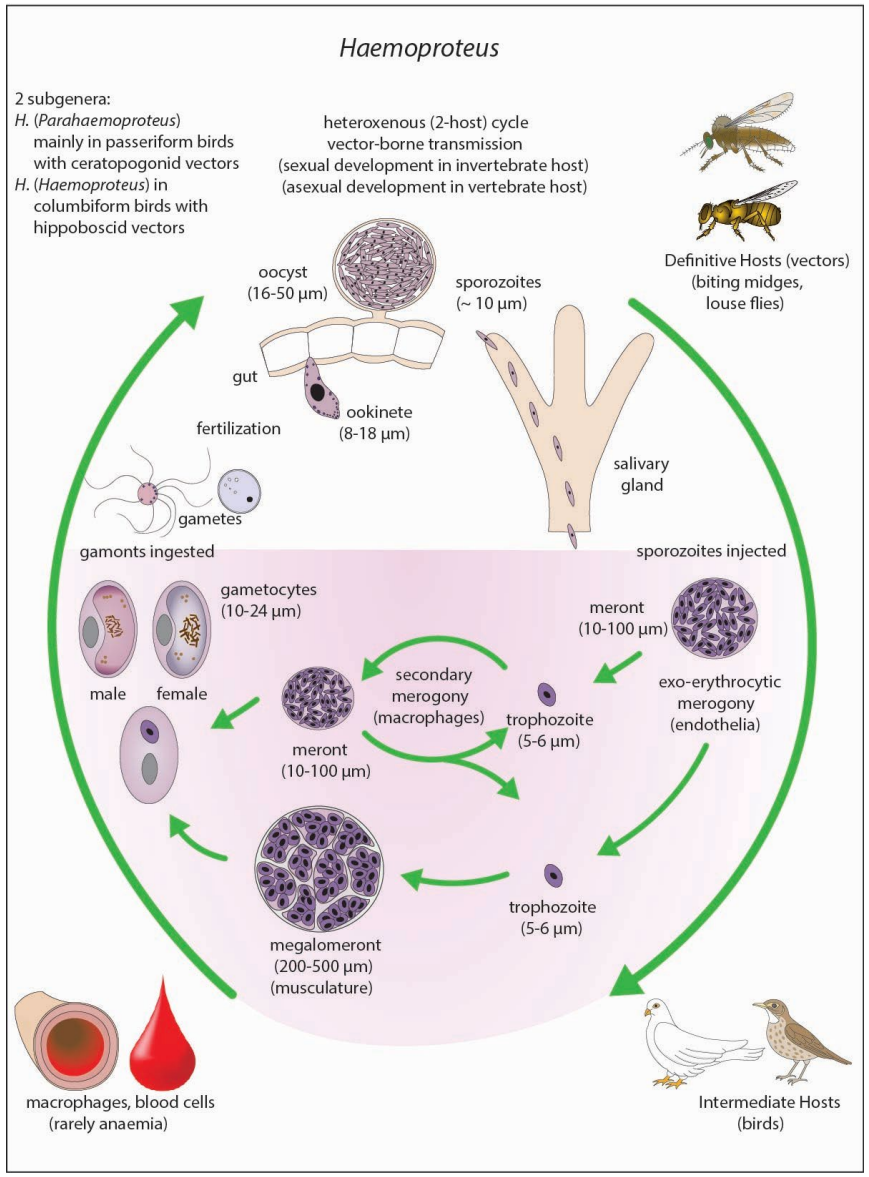


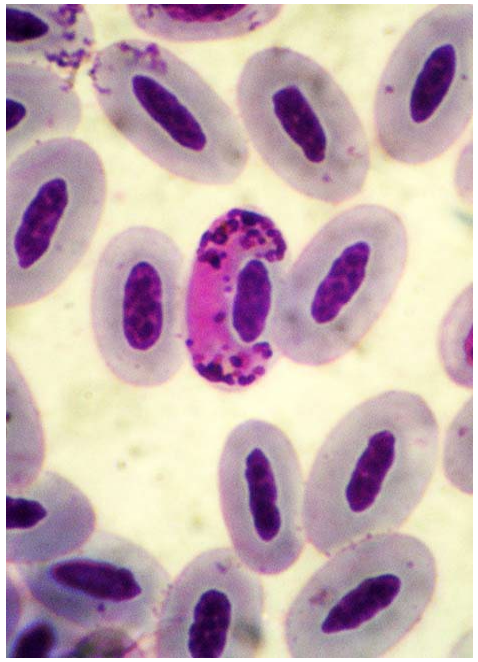


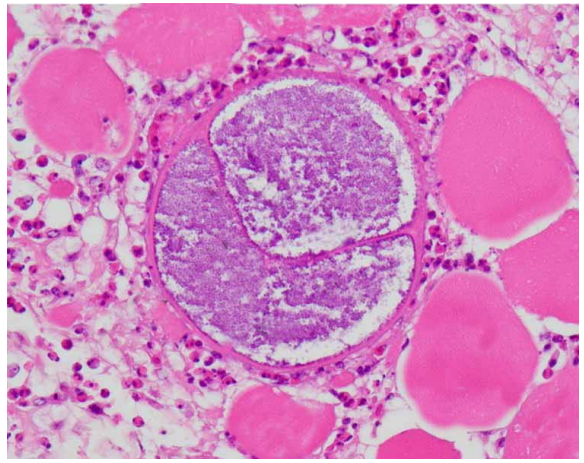

Haemonchus
abomasum/stomach
(haemorrhagic anaemia,
black scours, bottle jaw,
emaciation)
Definitive Hosts
(artiodactyls, esp.
ruminants)
head
L4 hypobiosis
L3
ingested
adult
female
(~ 30 mm)
adult
male
(~ 20 mm)
male tail
eggs
excreted
in faeces
external
environment
filariform third-
stage larvae (L3)
(~ 800 µm)
eggs
(~ 60 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 400 µm)

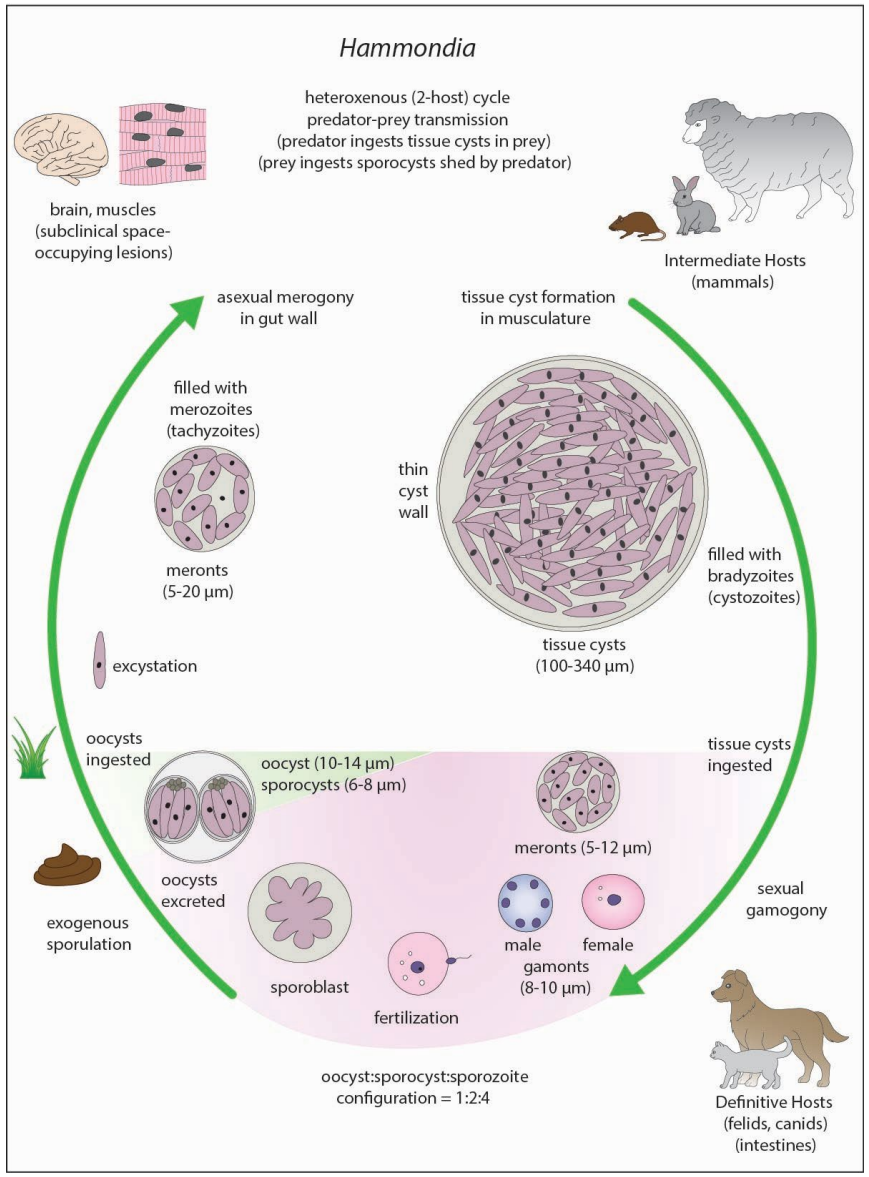


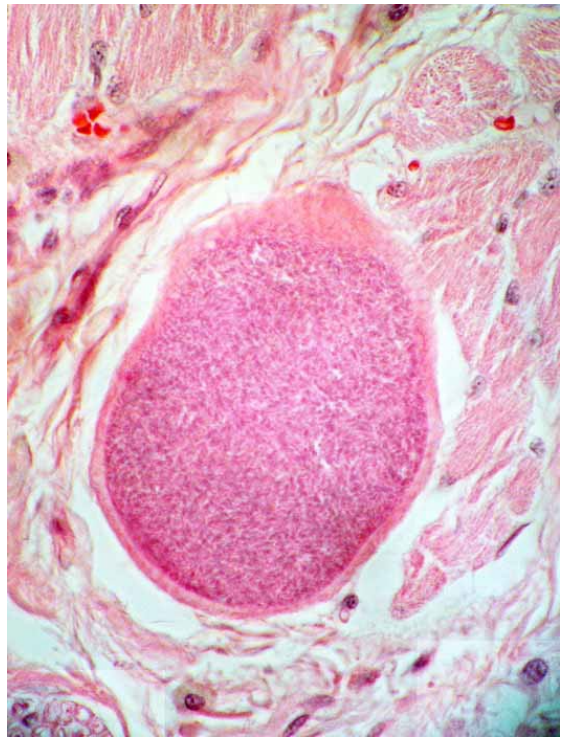


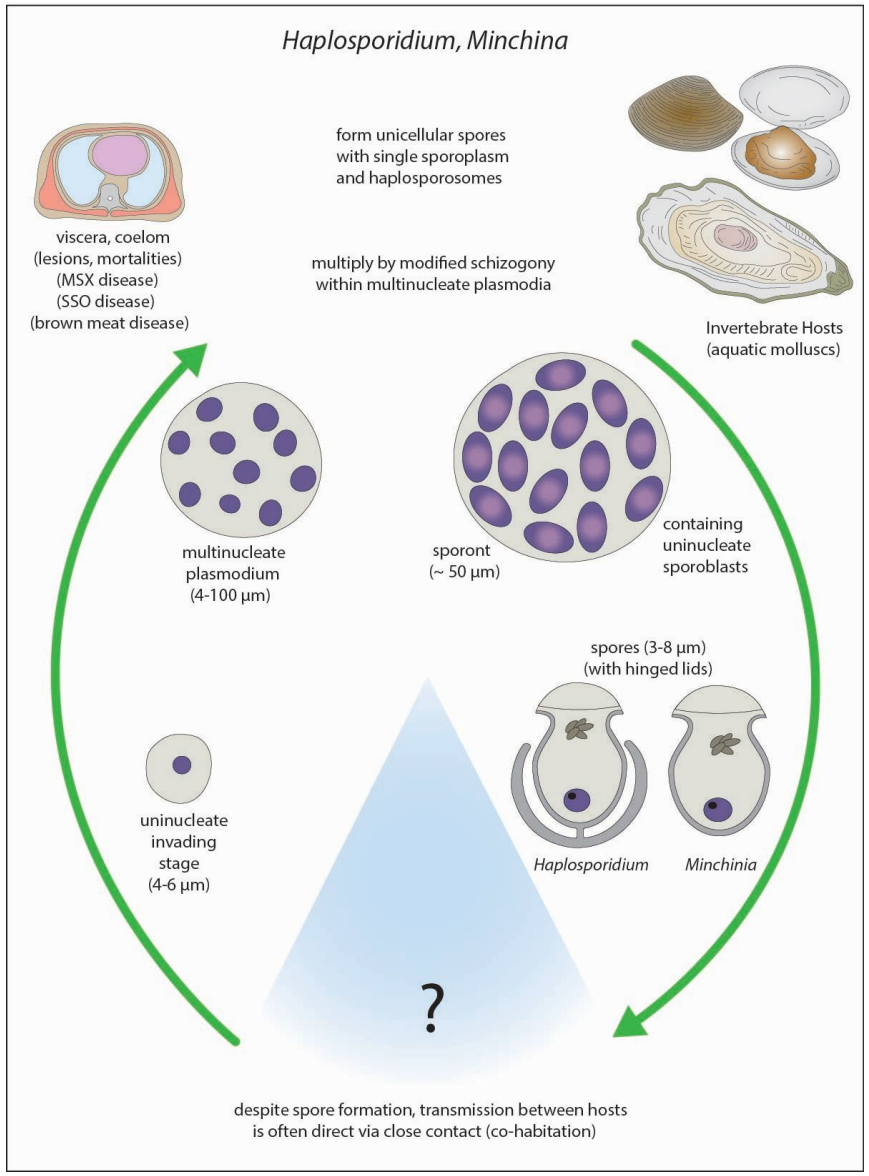

Haemoproteus
2 subgenera:
H. (Parahaemoproteus) mainly in passeriform birds with ceratopogonid vectors
H. (Haemoproteus) in columbiform birds with hippoboscid vectors
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
Definitive Hosts (vectors) (biting midges, louse flies)
oocyst (16-50 µm)
sporozoites (~ 10 µm)
gut
ookinete (8-18 µm)
fertilization
salivary gland
gametes
gamonts ingested
sporozoites injected
gametocytes (10-24 µm)
male
female
meront (10-100 µm)
exo-erythrocytic merogony (endothelia)
secondary merogony (macrophages)
trophozoite (5-6 µm)
meront (10-100 µm)
trophozoite (5-6 µm)
megalomeront (200-500 µm) (musculature)
macrophages, blood cells (rarely anaemia)
Intermediate Hosts (birds)

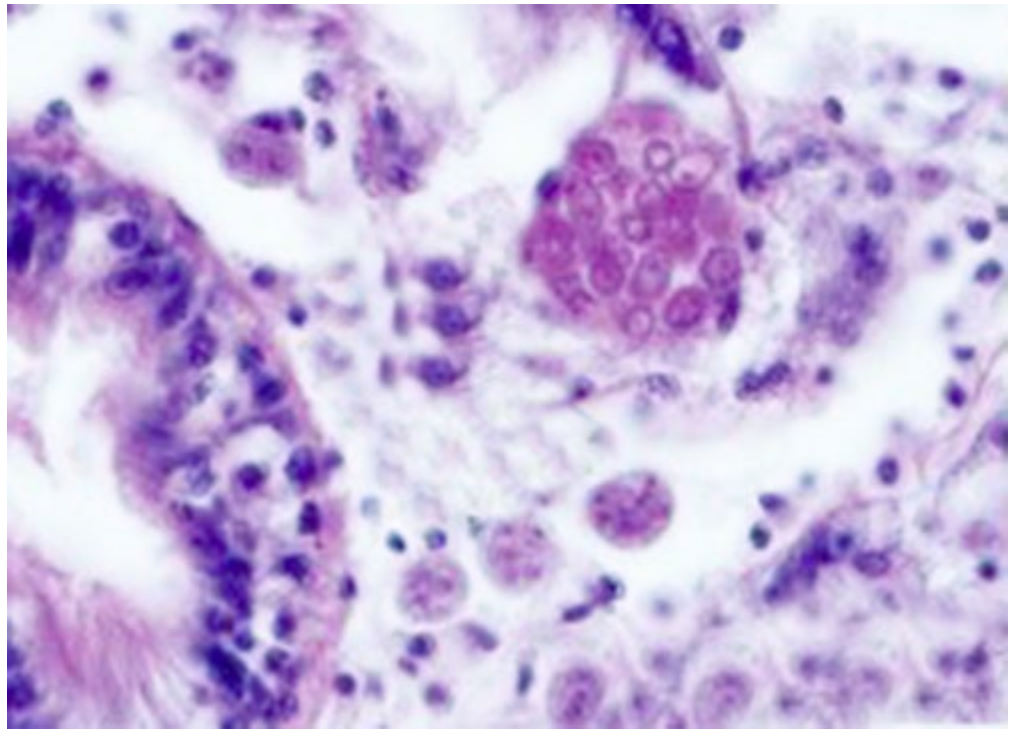


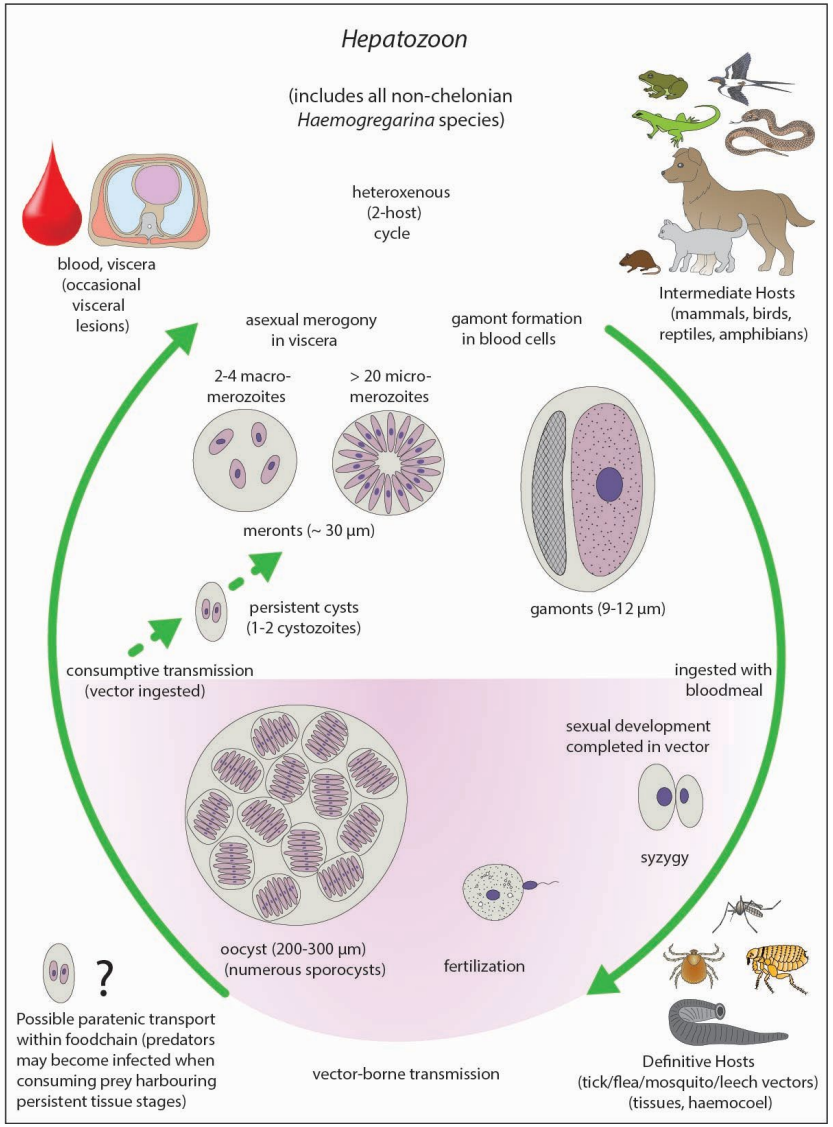


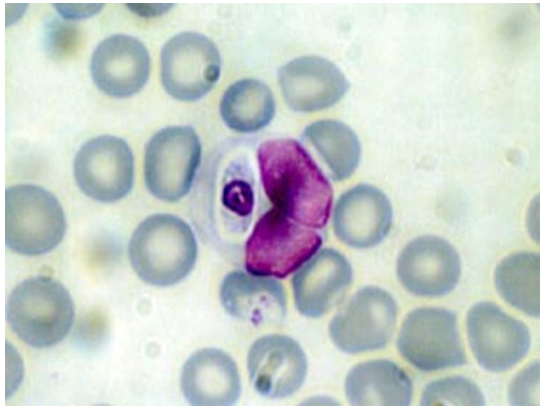

Hammondia
heteroxenous (2-host) cycle
predator-prey transmission
(predator ingests tissue cysts in prey)
(prey ingests sporocysts shed by predator)
brain, muscles
(subclinical space-occupying lesions)
Intermediate Hosts
(mammals)
asexual merogony
in gut wall
tissue cyst formation
in musculature
filled with
merozoites
(tachyzoites)
meronts
(5-20 µm)
thin
cyst
wall
filled with
bradyzoites
(cystozoites)
tissue cysts
(100-340 µm)
excystation
oocysts
ingested
oocyst (10-14 µm)
sporocysts (6-8 µm)
tissue cysts
ingested
meronts (5-12 µm)
oocysts
excreted
exogenous
sporulation
sporoblast
male
female
gamonts
(8-10 µm)
sexual
gamogony
fertilization
oocyst:sporocyst:sporozoite
configuration = 1:2:4
Definitive Hosts
(felids, canids)
(intestines)

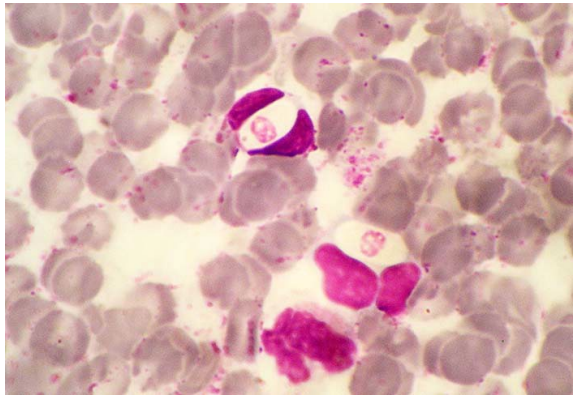


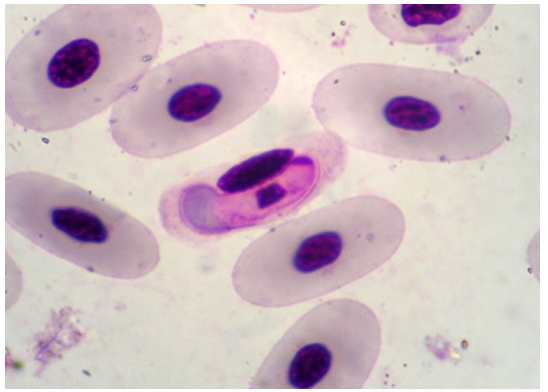

Haplosporidium, Minchina
form unicellular spores
with single sporoplasm
and haplosporosomes
viscera, coelom
(lesions, mortalities)
(MSX disease)
(SSO disease)
(brown meat disease)
multiply by modified schizogony
within multinucleate plasmodia
Invertebrate Hosts
(aquatic molluscs)
multinucleate
plasmodium
(4-100 µm)
sporont
(~ 50 µm)
containing
uninucleate
sporoblasts
spores (3-8 µm)
(with hinged lids)
uninucleate
invading
stage
(4-6 µm)
Haplosporidium
Minchinia
?
despite spore formation, transmission between hosts
is often direct via close contact (co-habitation)

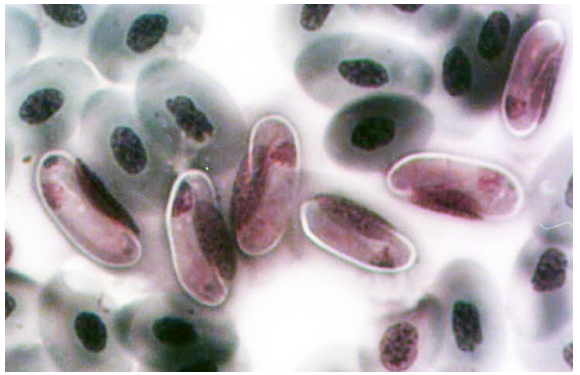


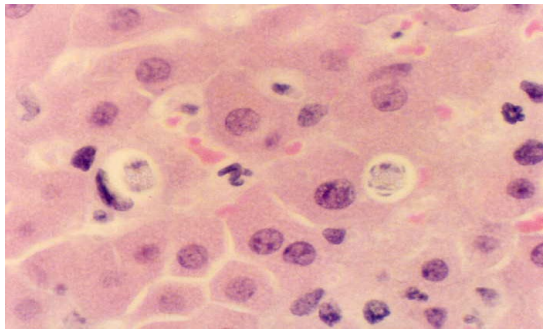

Hepatozoon
(includes all non-chelonian
Haemogregarina species)
heteroxenous
(2-host)
cycle
blood, viscera
(occasional
visceral
lesions)
Intermediate Hosts
(mammals, birds,
reptiles, amphibians)
asexual merogony
in viscera
gamont formation
in blood cells
2-4 macro-
merozoites
> 20 micro-
merozoites
meronts (~ 30 µm)
gamonts (9-12 µm)
persistent cysts
(1-2 cystozoites)
consumptive transmission
(vector ingested)
ingested with
bloodmeal
sexual development
completed in vector
syzygy
oocyst (200-300 µm)
(numerous sporocysts)
fertilization
?
Possible paratenic transport
within foodchain (predators
may become infected when
consuming prey harbouring
persistent tissue stages)
vector-borne transmission
Definitive Hosts
(tick/flea/mosquito/leech vectors)
(tissues, haemocoel)

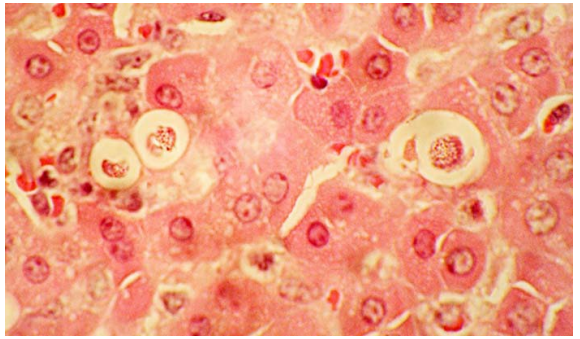


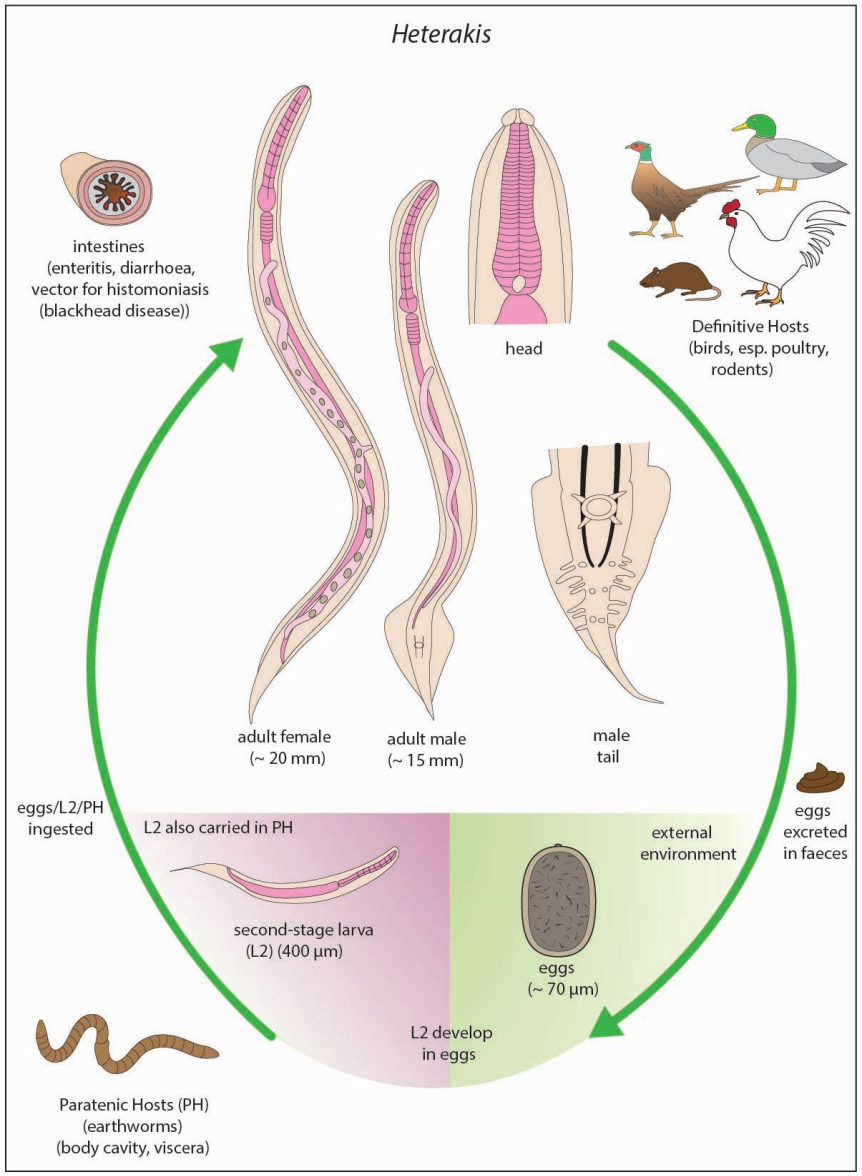


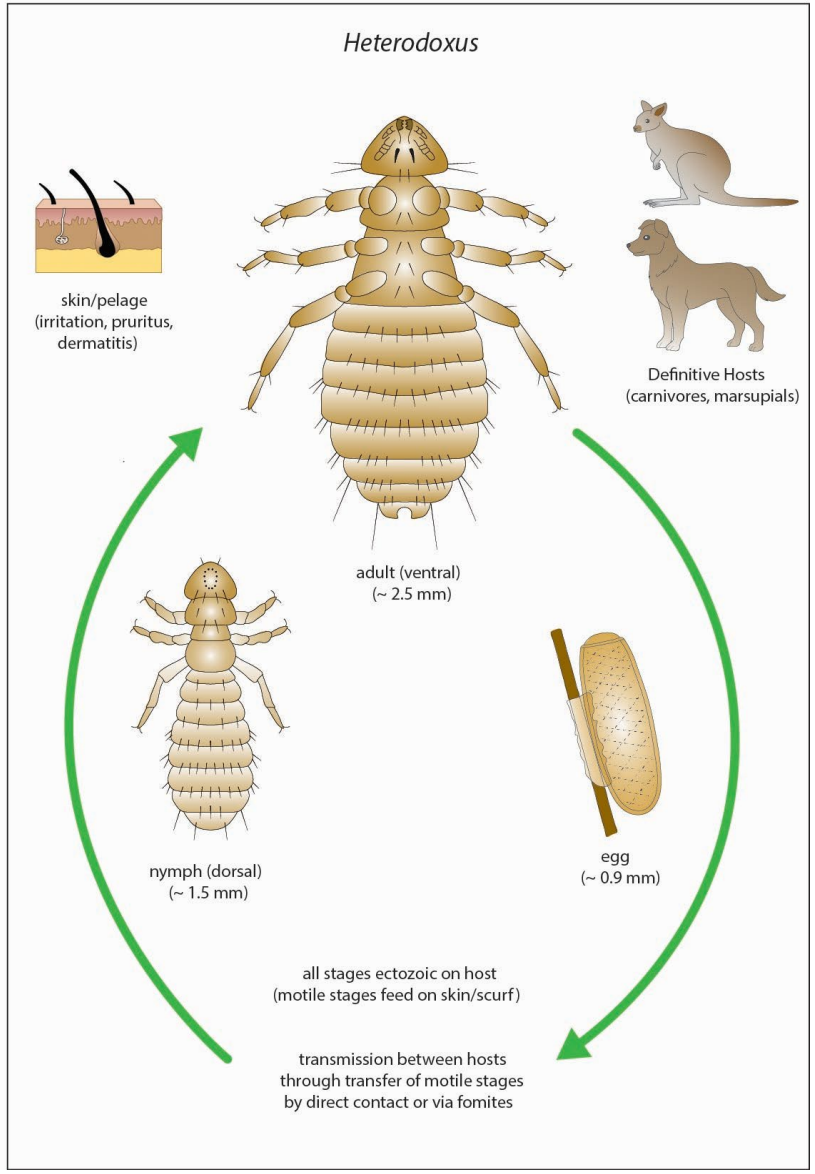


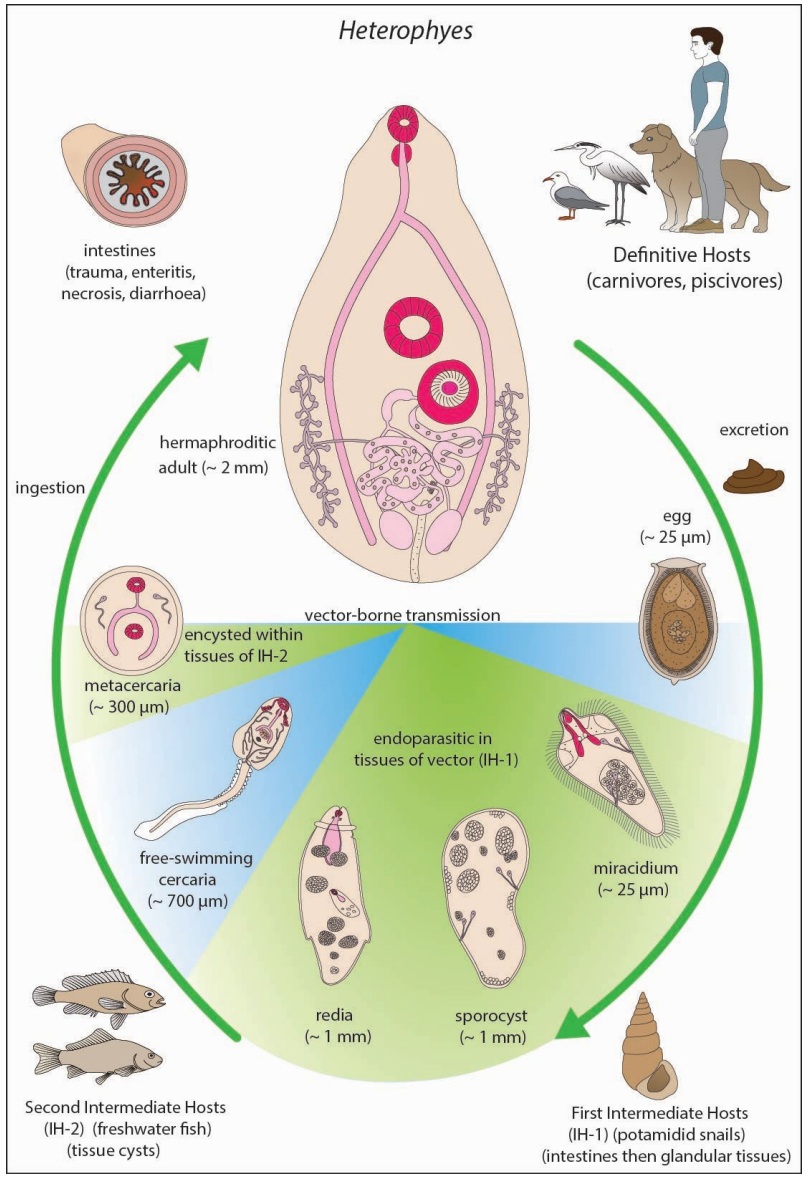


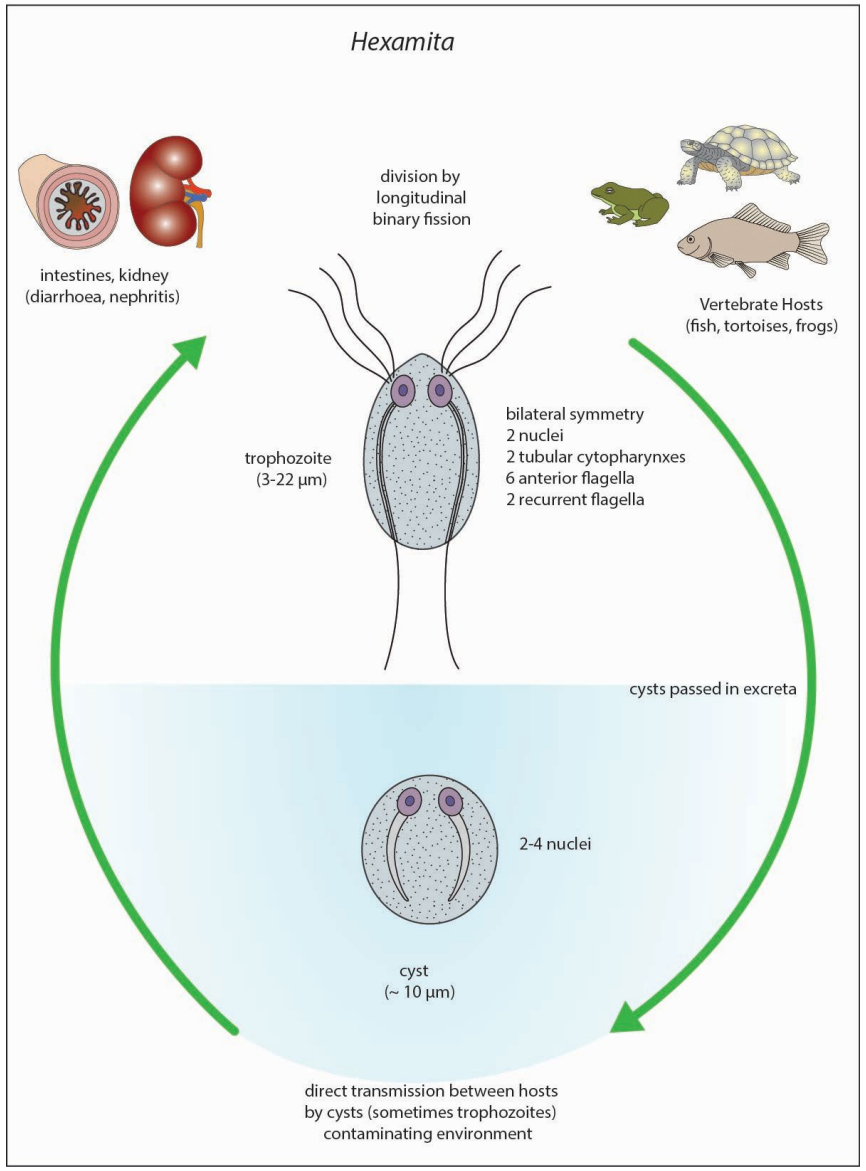


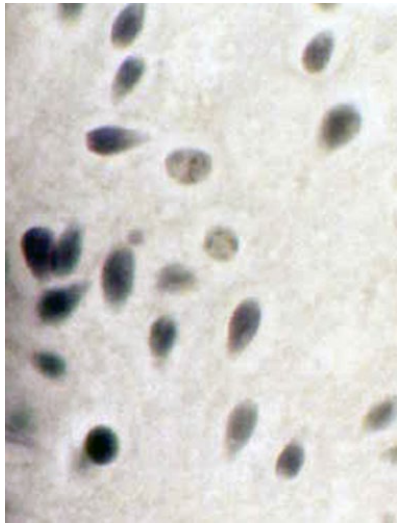


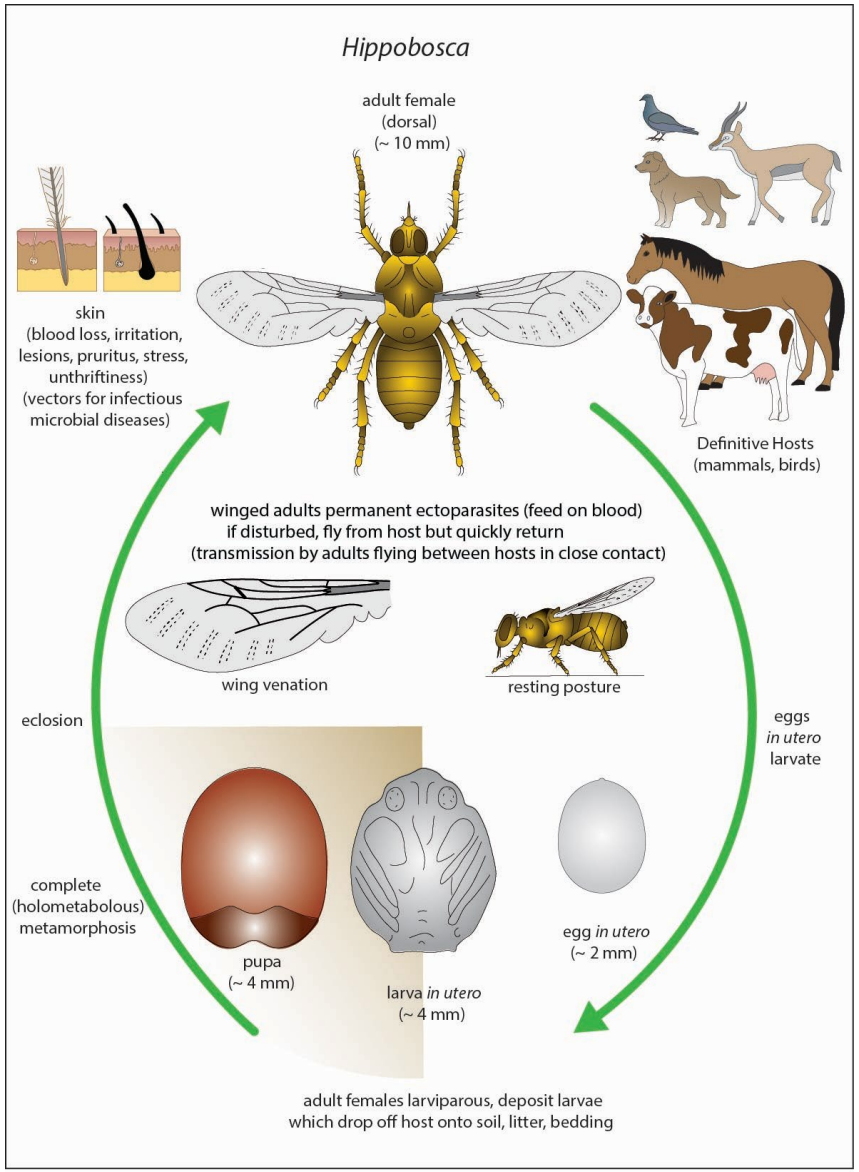

Heterakis
intestines
(enteritis, diarrhoea,
vector for histomoniasis
(blackhead disease))
head
Definitive Hosts
(birds, esp. poultry,
rodents)
adult female
(~ 20 mm)
adult male
(~ 15 mm)
male
tail
eggs/L2/PH
ingested
L2 also carried in PH
external
environment
eggs
excreted
in faeces
second-stage larva
(L2) (400 µm)
eggs
(~ 70 µm)
L2 develop
in eggs
Paratenic Hosts (PH)
(earthworms)
(body cavity, viscera)

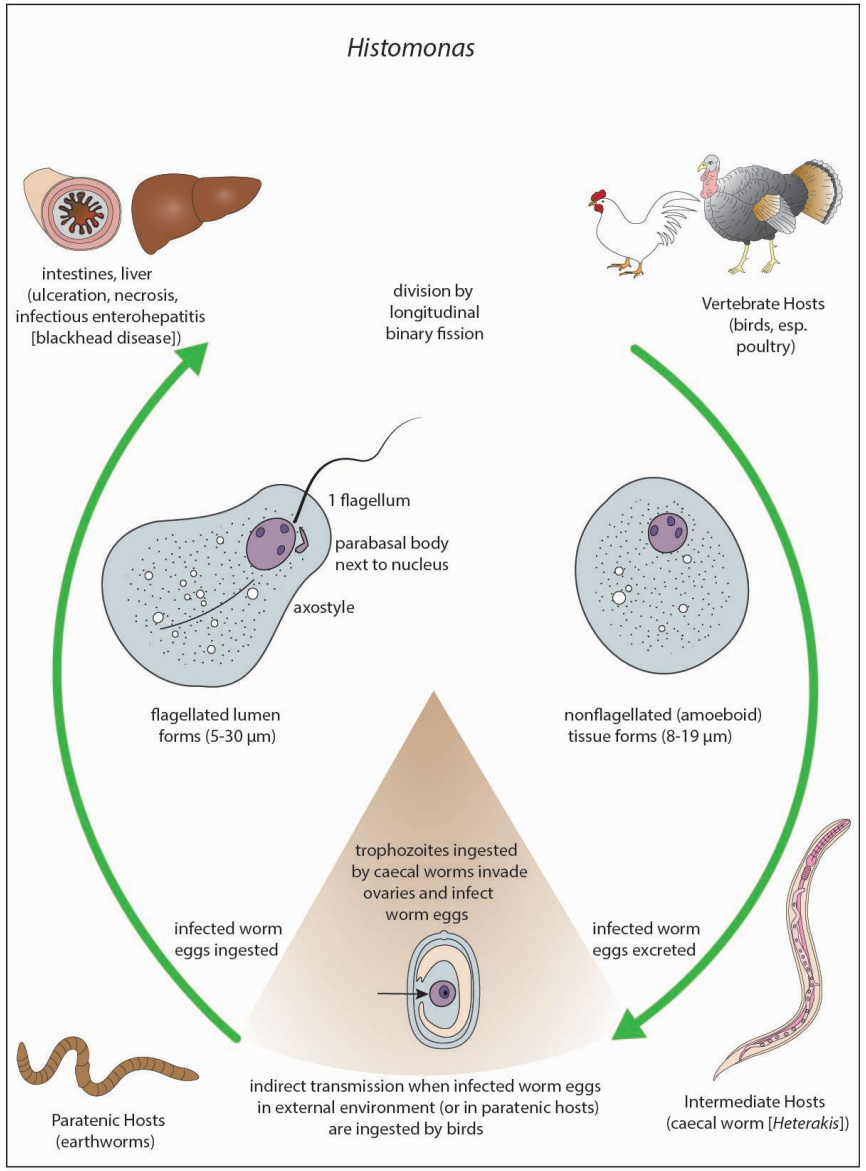

Heterodoxus
skin/pelage
(irritation, pruritus,
dermatitis)
adult (ventral)
(~ 2.5 mm)
Definitive Hosts
(carnivores, marsupials)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 0.9 mm)
all stages ectozoic on host
(motile stages feed on skin/scurf)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

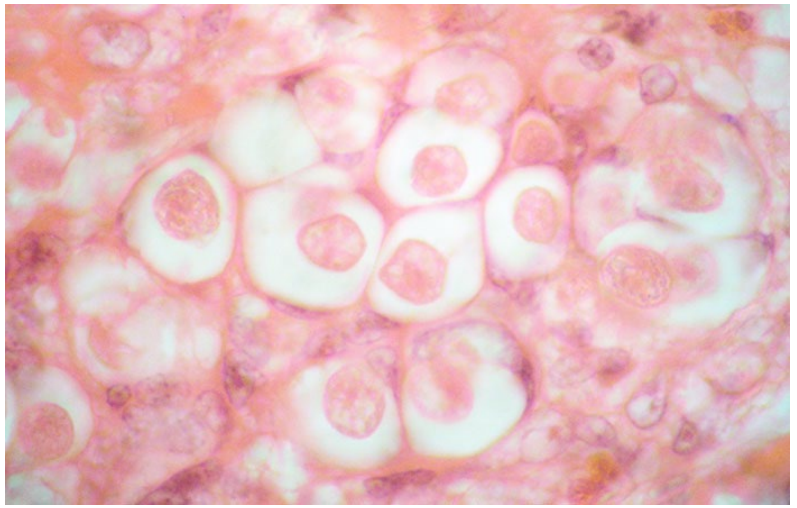

Heterophyes
intestines
(trauma, enteritis,
necrosis, diarrhoea)
Definitive Hosts
(carnivores, piscivores)
hermaphroditic
adult (~ 2 mm)
excretion
ingestion
egg
(~ 25 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 300 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 700 µm)
miracidium
(~ 25 µm)
redia
(~ 1 mm)
sporocyst
(~ 1 mm)
Second Intermediate Hosts
(IH-2) (freshwater fish)
(tissue cysts)
First Intermediate Hosts
(IH-1) (potamidid snails)
(intestines then glandular tissues)

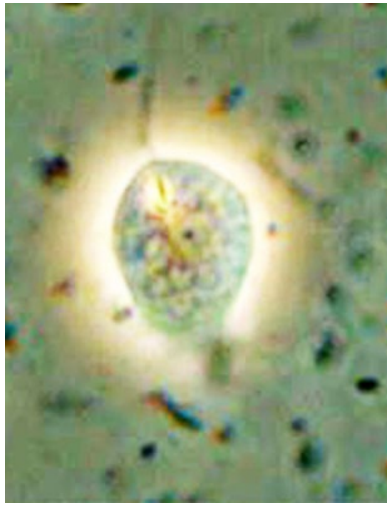

Hexamita
division by
longitudinal
binary fission
intestines, kidney
(diarrhoea, nephritis)
Vertebrate Hosts
(fish, tortoises, frogs)
trophozoite
(3-22 µm)
bilateral symmetry
2 nuclei
2 tubular cytopharynxes
6 anterior flagella
2 recurrent flagella
cysts passed in excreta
2-4 nuclei
cyst
(~ 10 µm)
direct transmission between hosts
by cysts (sometimes trophozoites)
contaminating environment

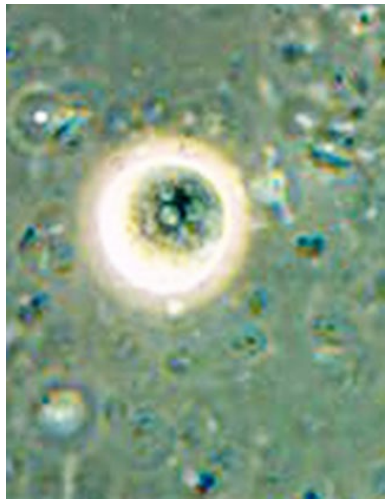


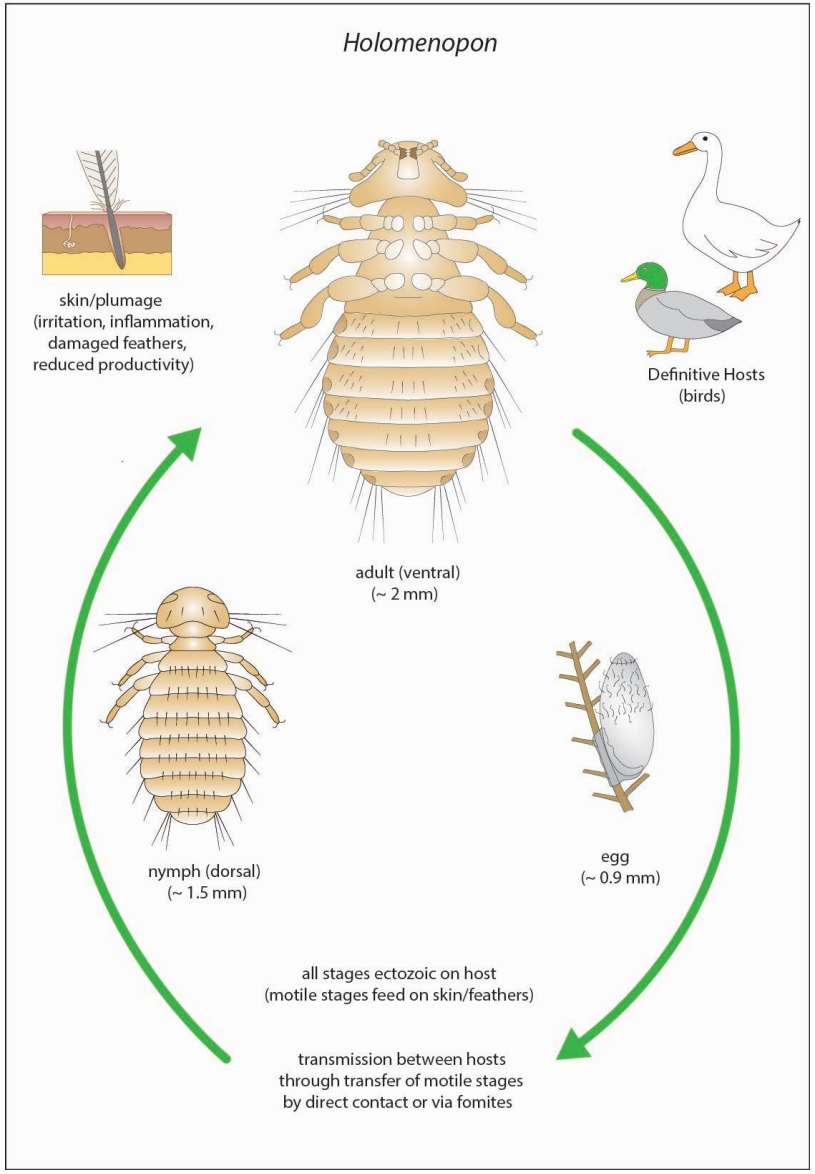

Hippobosca
adult female
(dorsal)
(~ 10 mm)
skin
(blood loss, irritation,
lesions, pruritus, stress,
unthriftiness)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
winged adults permanent ectoparasites (feed on blood)
if disturbed, fly from host but quickly return
(transmission by adults flying between hosts in close contact)
wing venation
resting posture
eclosion
eggs
in utero
larvate
complete
(holometabolous)
metamorphosis
pupa
(~ 4 mm)
larva in utero
(~ 4 mm)
egg in utero
(~ 2 mm)
adult females larviparous, deposit larvae
which drop off host onto soil, litter, bedding

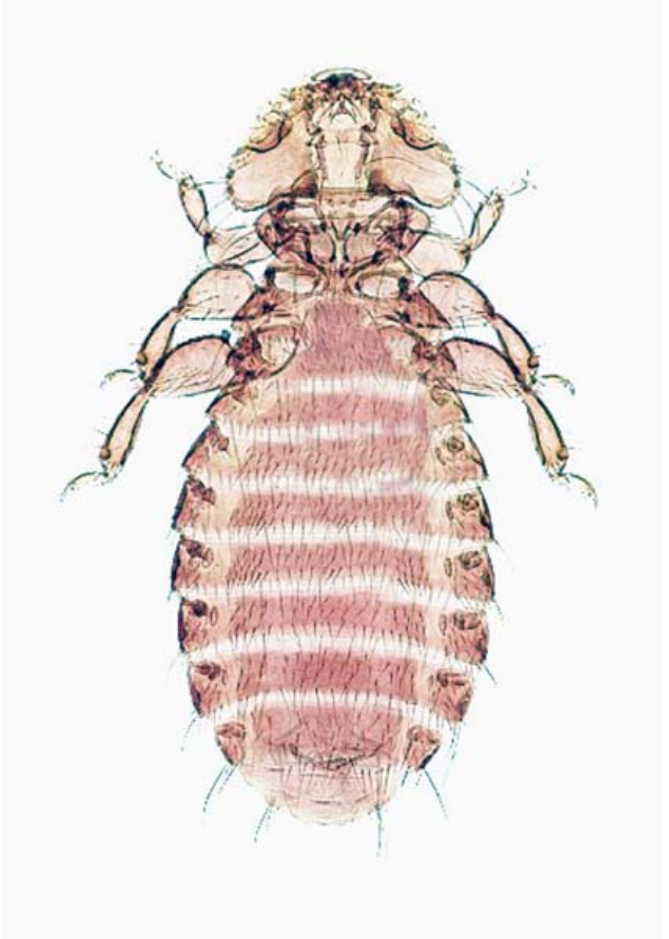

Histomonas
intestines, liver
(ulceration, necrosis,
infectious enterohepatitis
[blackhead disease])
division by
longitudinal
binary fission
Vertebrate Hosts
(birds, esp.
poultry)
1 flagellum
parabasal body
next to nucleus
axostyle
flagellated lumen
forms (5-30 µm)
nonflagellated (amoeboid)
tissue forms (8-19 µm)
trophozoites ingested
by caecal worms invade
ovaries and infect
worm eggs
infected worm
eggs ingested
infected worm
eggs excreted
Paratenic Hosts
(earthworms)
indirect transmission when infected worm eggs
in external environment (or in paratenic hosts)
are ingested by birds
Intermediate Hosts
(caecal worm [Heterakis])

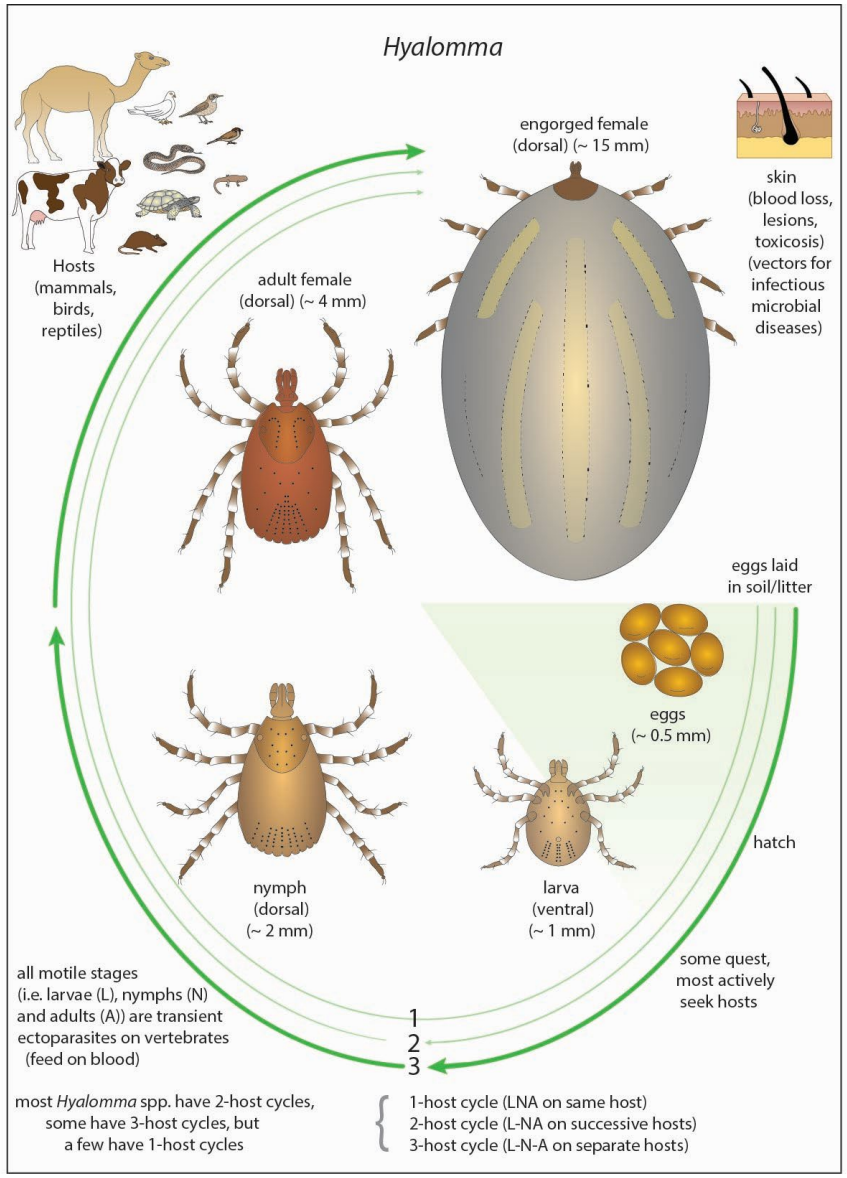




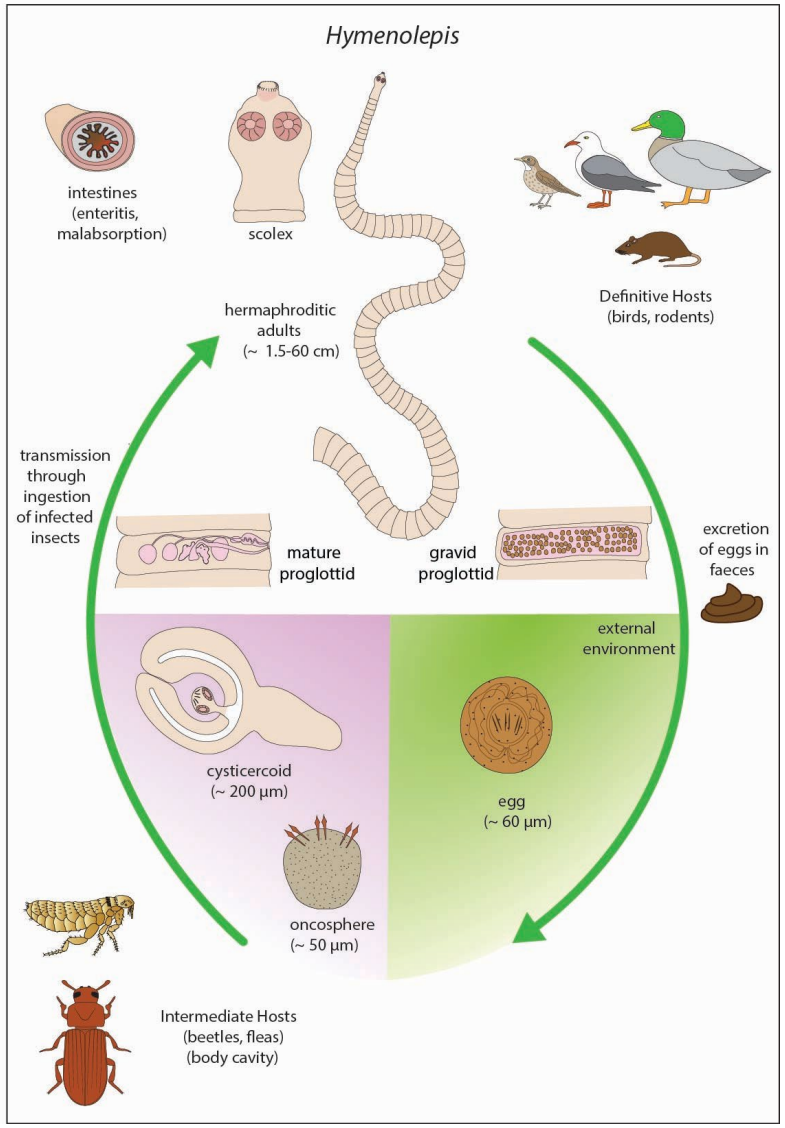



Holomenopon
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 2 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 0.9 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites



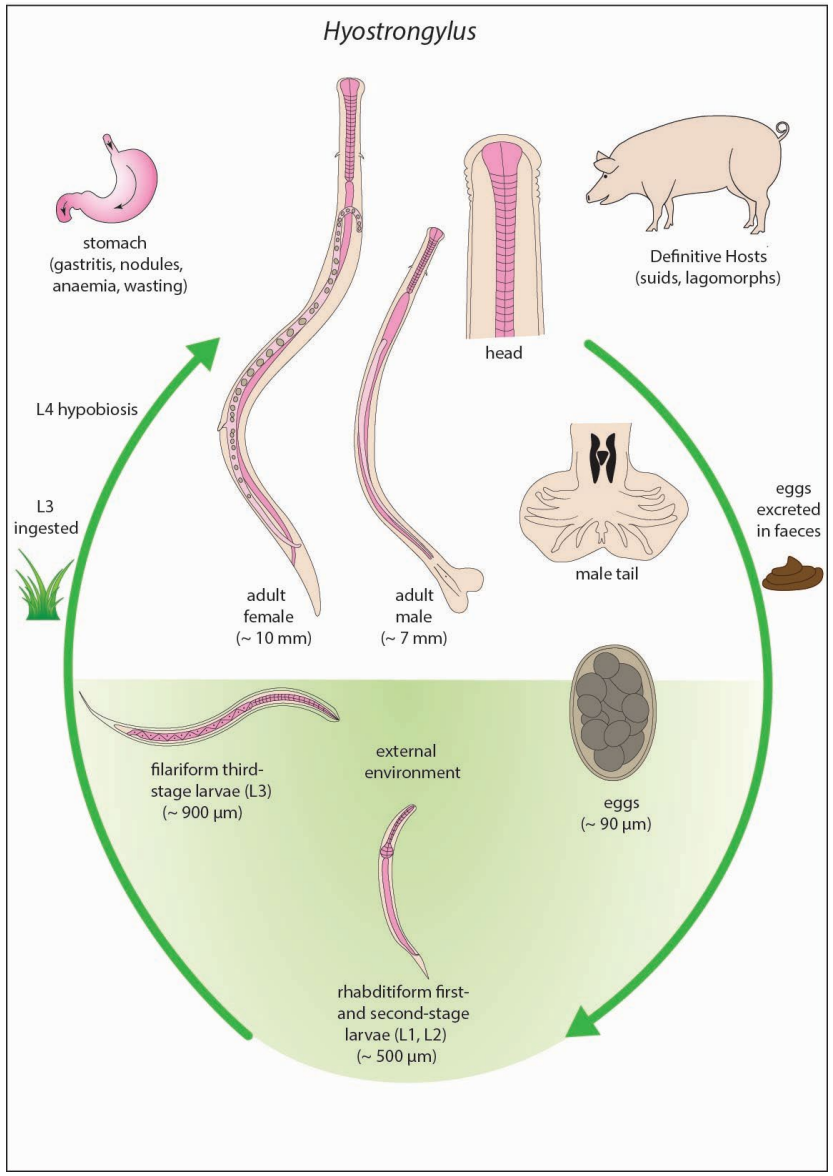

Hyalomma
Hosts
(mammals,
birds,
reptiles)
engorged female
(dorsal) (~ 15 mm)
skin
(blood loss,
lesions,
toxicosis)
(vectors for
infectious
microbial
diseases)
adult female
(dorsal) (~ 4 mm)
eggs laid
in soil/litter
eggs
(~ 0.5 mm)
hatch
nymph
(dorsal)
(~ 2 mm)
larva
(ventral)
(~ 1 mm)
some quest,
most actively
seek hosts
all motile stages
(i.e. larvae (L), nymphs (N)
and adults (A)) are transient
ectoparasites on vertebrates
(feed on blood)
1
2
3
most Hyalomma spp. have 2-host cycles,
some have 3-host cycles, but
a few have 1-host cycles
1-host cycle (LNA on same host)
2-host cycle (L-NA on successive hosts)
3-host cycle (L-N-A on separate hosts)

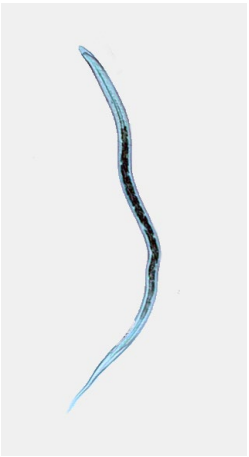

wiki

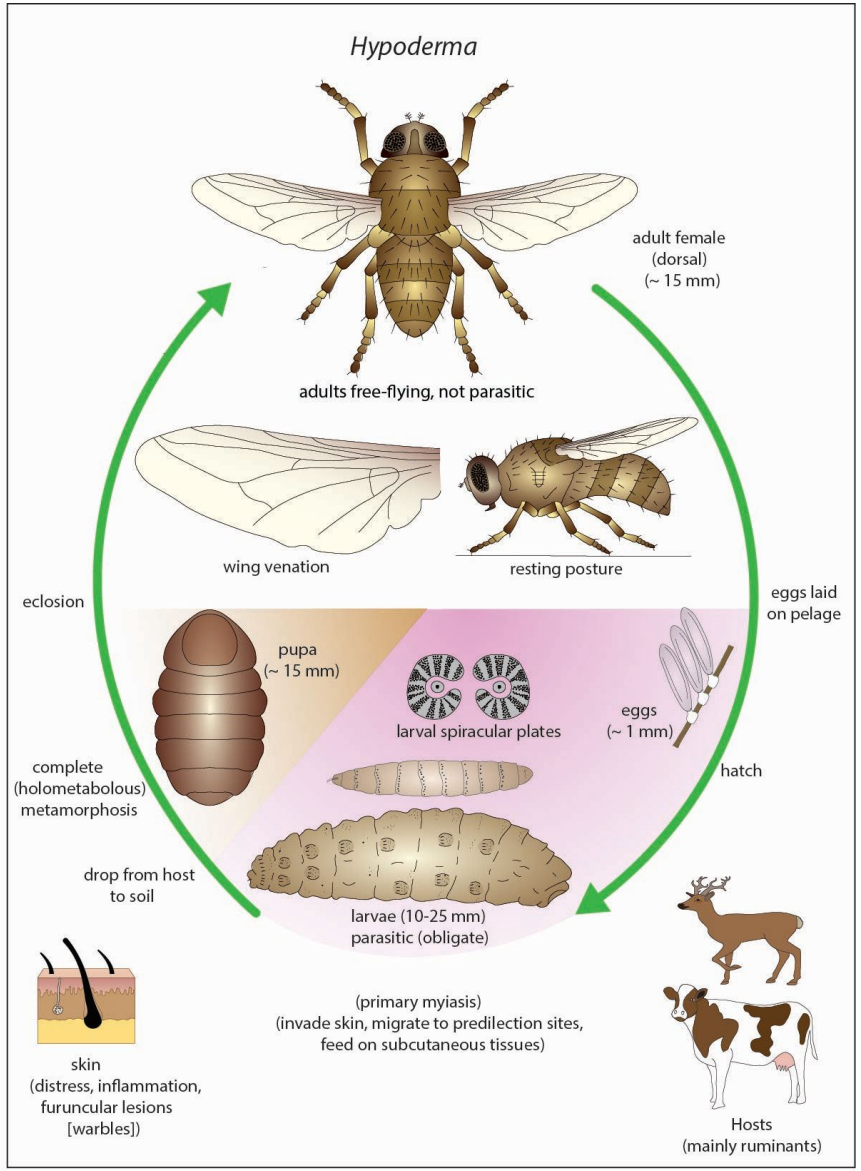

Hymenolepis
intestines
(enteritis,
malabsorption)
scolex
hermaphroditic
adults
(~ 1.5-60 cm)
Definitive Hosts
(birds, rodents)
transmission
through
ingestion
of infected
insects
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 200 µm)
egg
(~ 60 µm)
oncosphere
(~ 50 µm)
Intermediate Hosts
(beetles, fleas)
(body cavity)

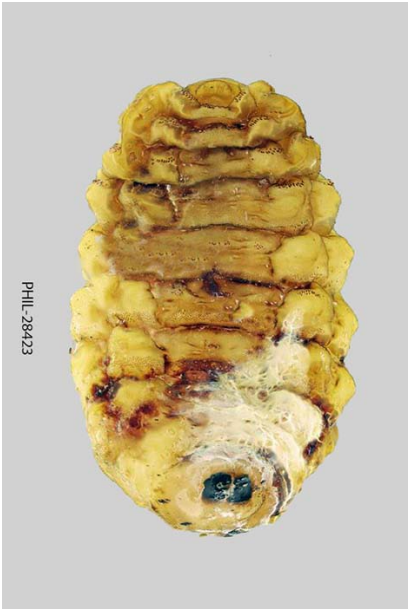

PHIL-370


PHIL-658


Hyostrongylus
stomach
(gastritis, nodules,
anaemia, wasting)
head
Definitive Hosts
(suids, lagomorphs)
L4 hypobiosis
L3
ingested
adult
female
(~ 10 mm)
adult
male
(~ 7 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 900 µm)
external
environment
eggs
(~ 90 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 500 µm)




Hypoderma
adult female
(dorsal)
(~ 15 mm)
adults free-flying, not parasitic
wing venation
resting posture
eclosion
eggs laid
on pelage
pupa
(~ 15 mm)
larval spiracular plates
eggs
(~ 1 mm)
hatch
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (10-25 mm)
parasitic (obligate)
(primary myiasis)
(invade skin, migrate to predilection sites,
feed on subcutaneous tissues)
skin
(distress, inflammation,
furuncular lesions
[warbles])
Hosts
(mainly ruminants)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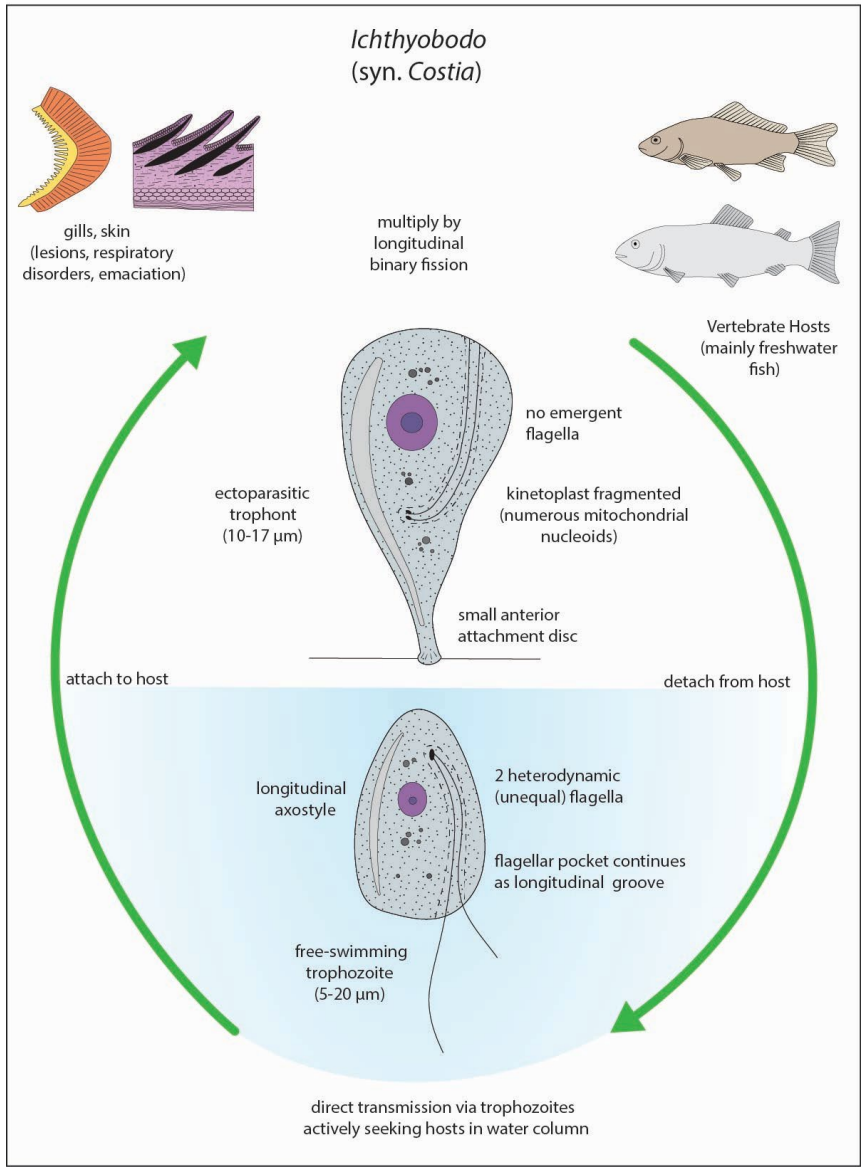
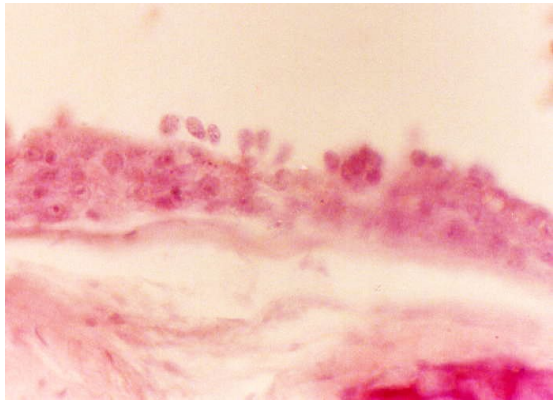
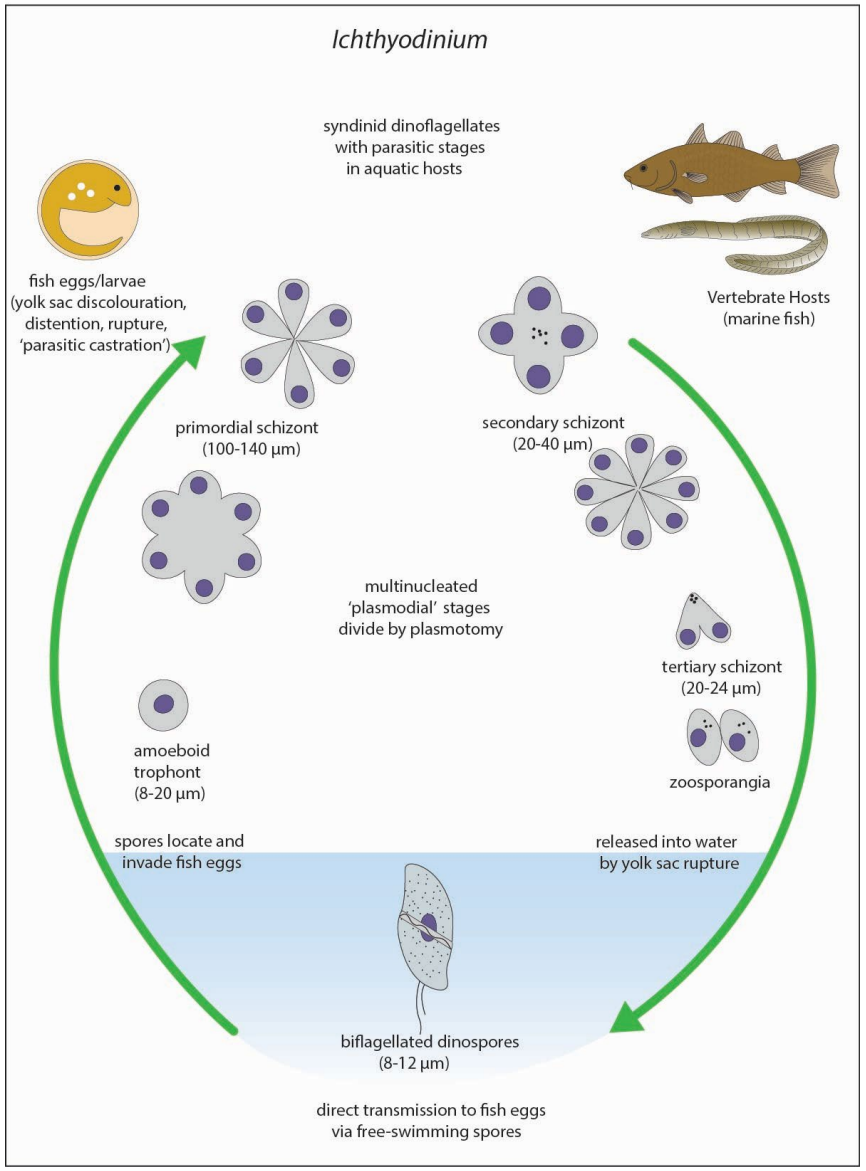
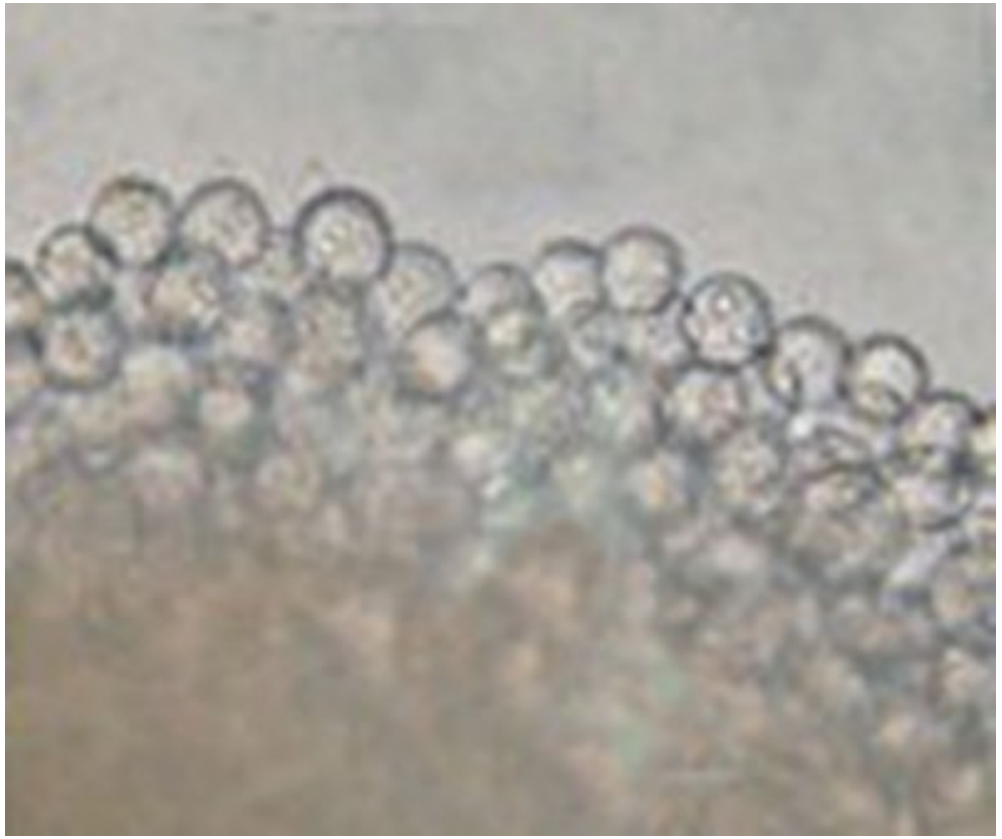
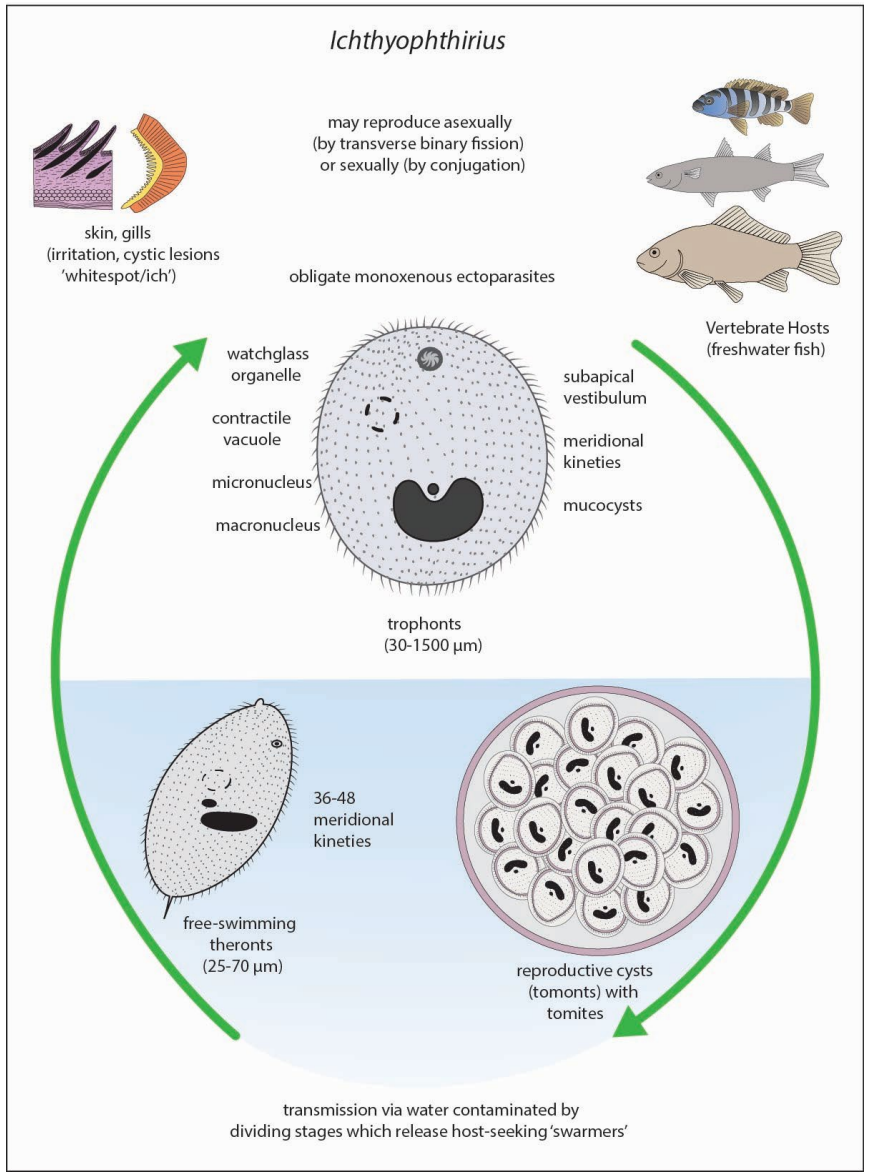
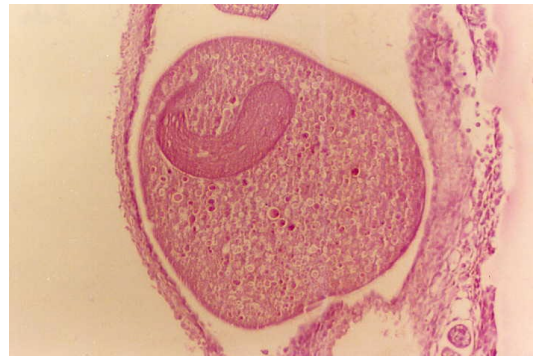

Ichthyobodo
(syn. *Costia*)
gills, skin
(lesions, respiratory
disorders, emaciation)
multiply by
longitudinal
binary fission
Vertebrate Hosts
(mainly freshwater
fish)
no emergent
flagella
ectoparasitic
trophont
(10-17 µm)
kinetoplast fragmented
(numerous mitochondrial
nucleoids)
small anterior
attachment disc
attach to host
detach from host
longitudinal
axostyle
2 heterodynamic
(unequal) flagella
flagellar pocket continues
as longitudinal groove
free-swimming
trophozoite
(5-20 µm)
direct transmission via trophozoites
actively seeking hosts in water column

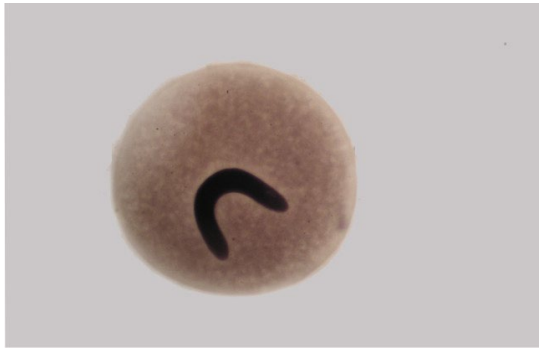


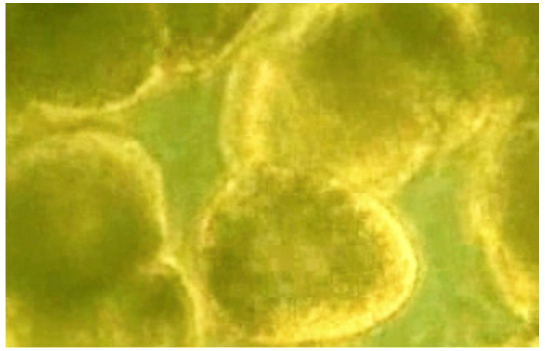

Ichthyodinium
syndinid dinoflagellates
with parasitic stages
in aquatic hosts
fish eggs/larvae
(yolk sac discolouration,
distention, rupture,
'parasitic castration')
Vertebrate Hosts
(marine fish)
primordial schizont
(100-140 µm)
secondary schizont
(20-40 µm)
multinucleated
'plasmodial' stages
divide by plasmotomy
tertiary schizont
(20-24 µm)
amoeboid
trophont
(8-20 µm)
zoosporangia
spores locate and
invade fish eggs
released into water
by yolk sac rupture
biflagellated dinospores
(8-12 µm)
direct transmission to fish eggs
via free-swimming spores

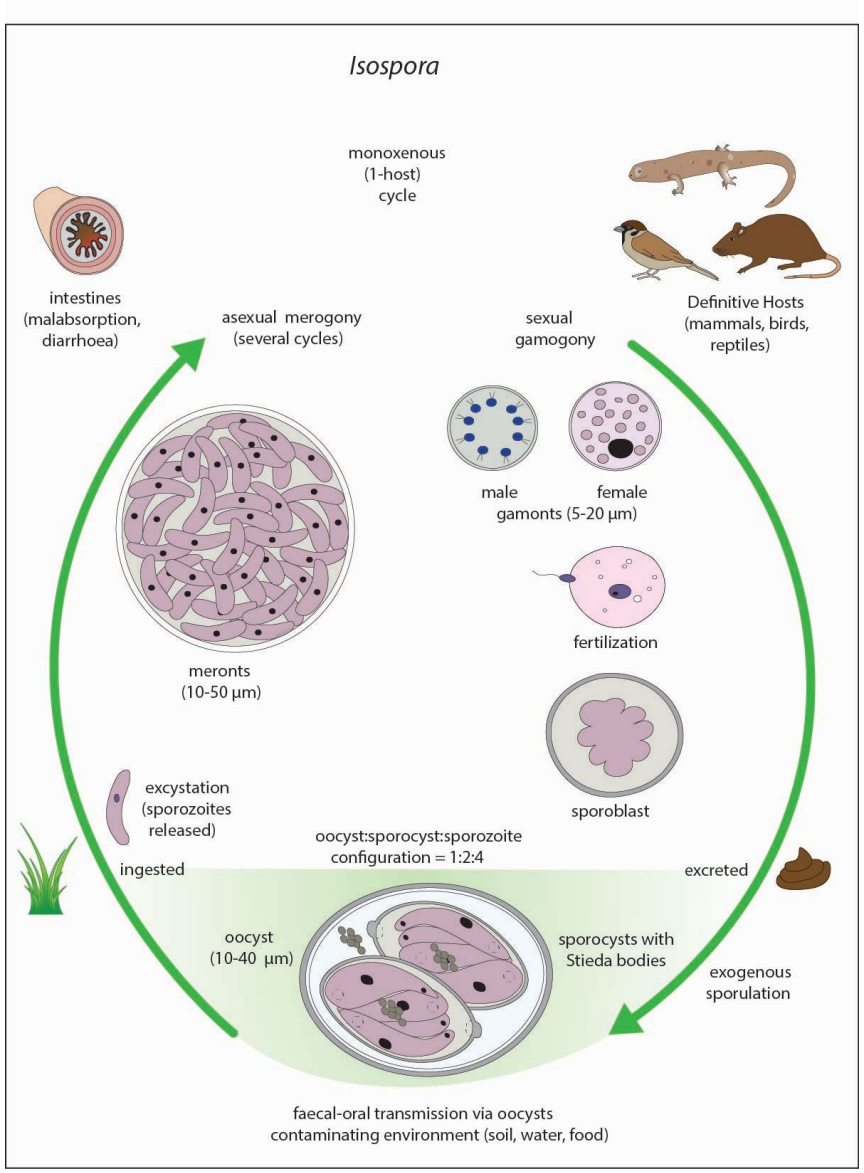


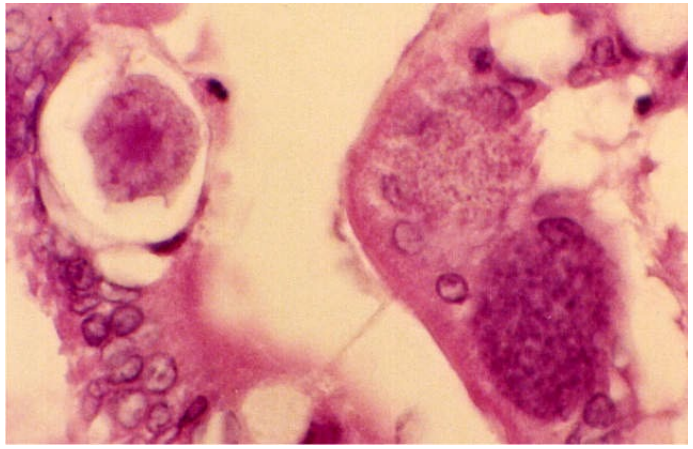

Ichthyophthirius
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
skin, gills
(irritation, cystic lesions
'whitespot/ich')
obligate monoxenous ectoparasites
Vertebrate Hosts
(freshwater fish)
watchglass
organelle
contractile
vacuole
micronucleus
macronucleus
subapical
vestibulum
meridional
kineties
mucocysts
trophonts
(30-1500 µm)
36-48
meridional
kineties
free-swimming
theronts
(25-70 µm)
reproductive cysts
(tomonts) with
tomites
transmission via water contaminated by
dividing stages which release host-seeking 'swarmers'

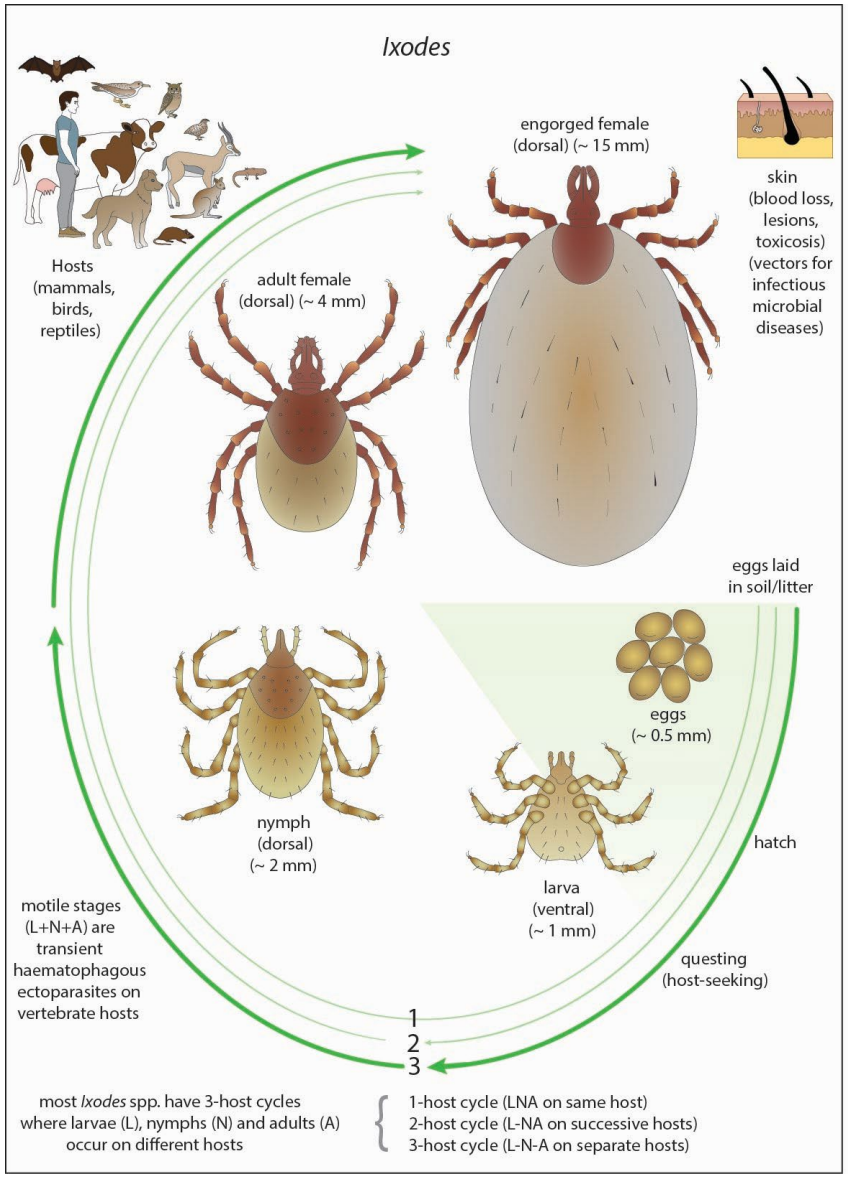







Isospora
monoxenous
(1-host)
cycle
intestines
(malabsorption,
diarrhoea)
asexual merogony
(several cycles)
sexual
gamogony
Definitive Hosts
(mammals, birds,
reptiles)
male
female
gamonts (5-20 µm)
meronts
(10-50 µm)
fertilization
sporoblast
excystation
(sporozoites
released)
oocyst:sporocyst:sporozoite
configuration = 1:2:4
ingested
excreted
oocyst
(10-40 µm)
sporocysts with
Stieda bodies
exogenous
sporulation
faecal-oral transmission via oocysts
contaminating environment (soil, water, food)




Ixodes
Hosts (mammals, birds, reptiles)
adult female (dorsal) (~ 4 mm)
engorged female (dorsal) (~ 15 mm)
skin (blood loss, lesions, toxicosis) (vectors for infectious microbial diseases)
eggs laid in soil/litter
eggs (~ 0.5 mm)
nymph (dorsal) (~ 2 mm)
larva (ventral) (~ 1 mm)
hatch
questing (host-seeking)
motile stages (L+N+A) are transient haematophagous ectoparasites on vertebrate hosts
1
2
3
most Ixodes spp. have 3-host cycles where larvae (L), nymphs (N) and adults (A) occur on different hosts
1-host cycle (LNA on same host)
2-host cycle (L-NA on successive hosts)
3-host cycle (L-N-A on separate hosts)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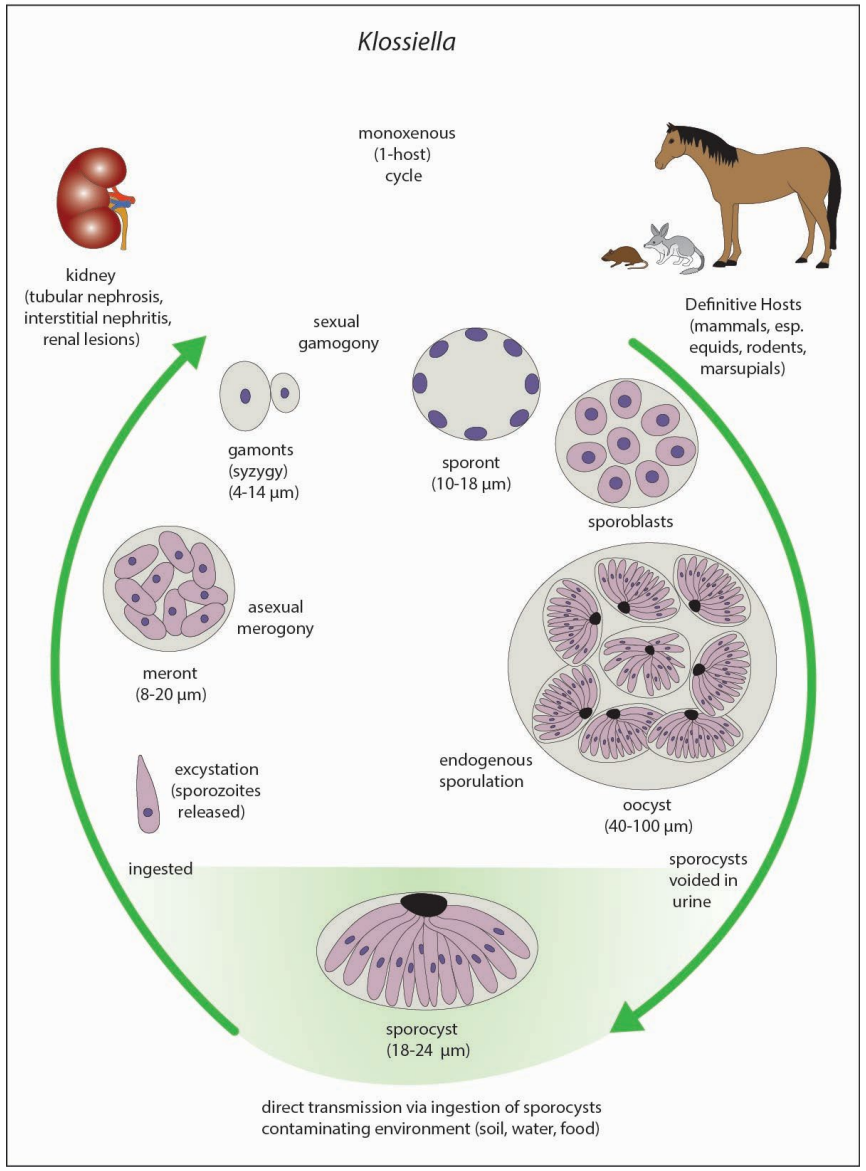
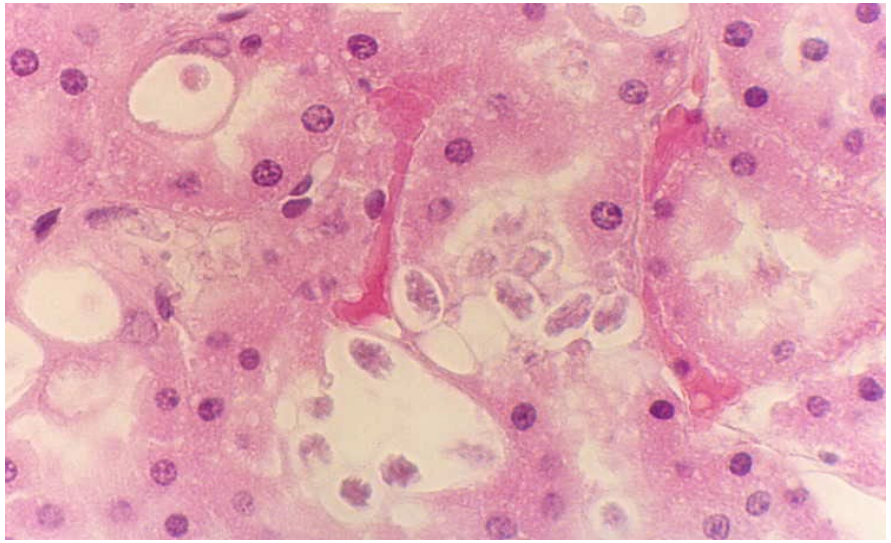
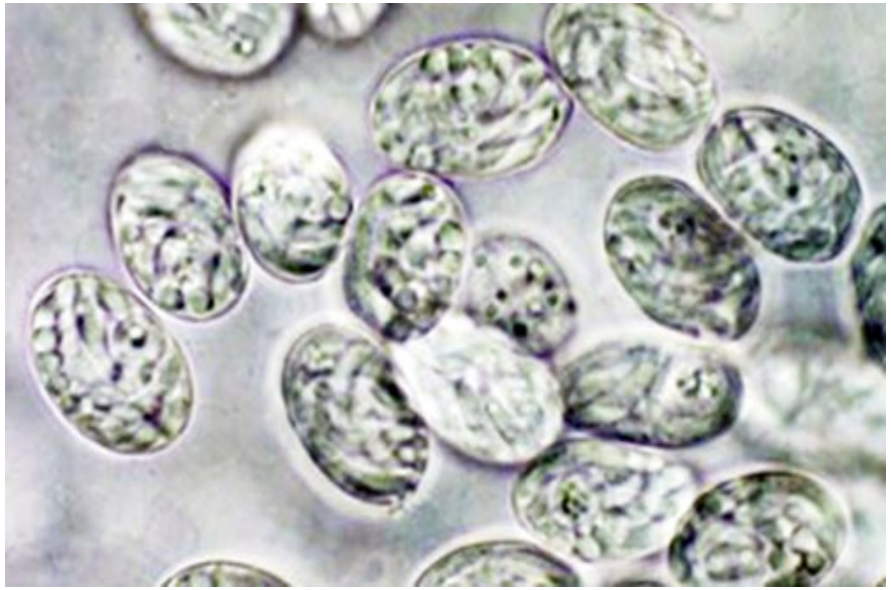
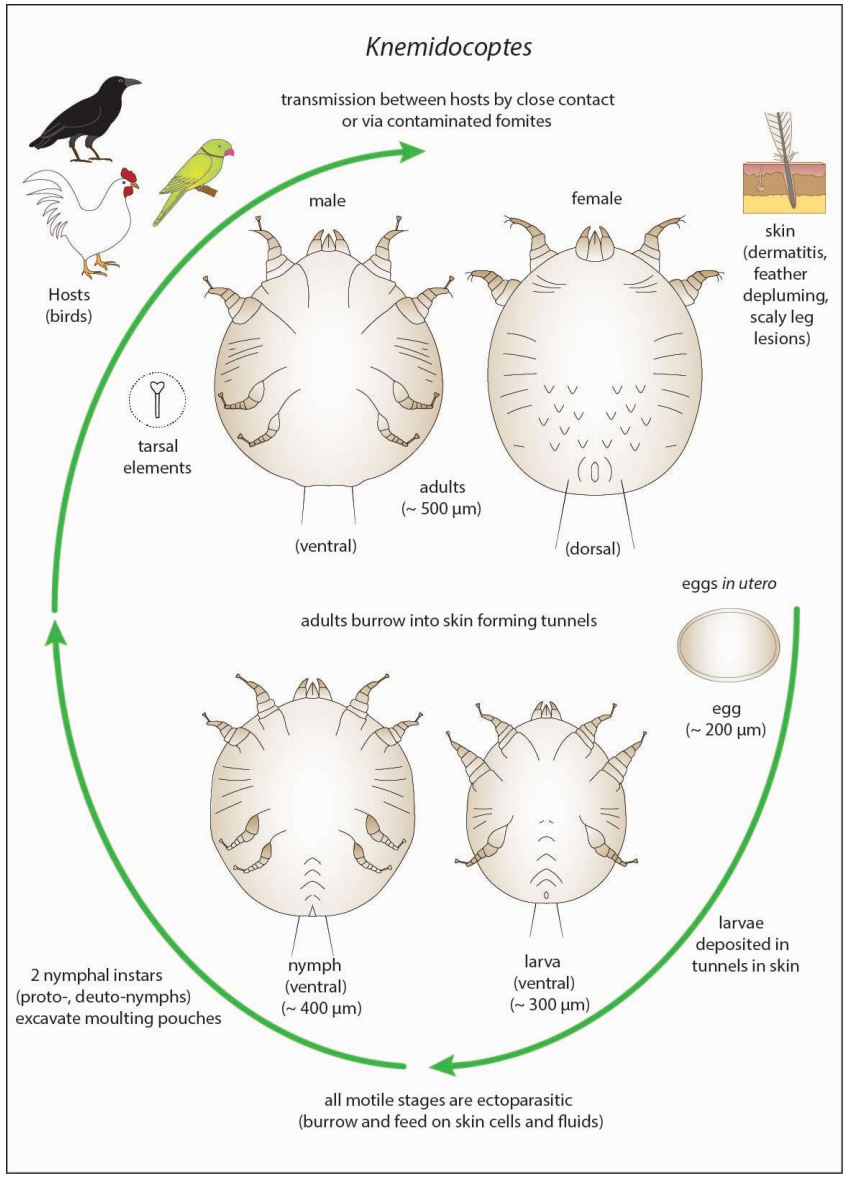
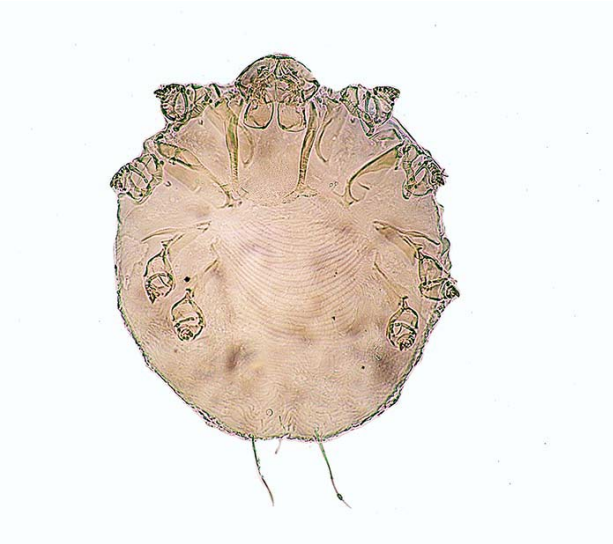
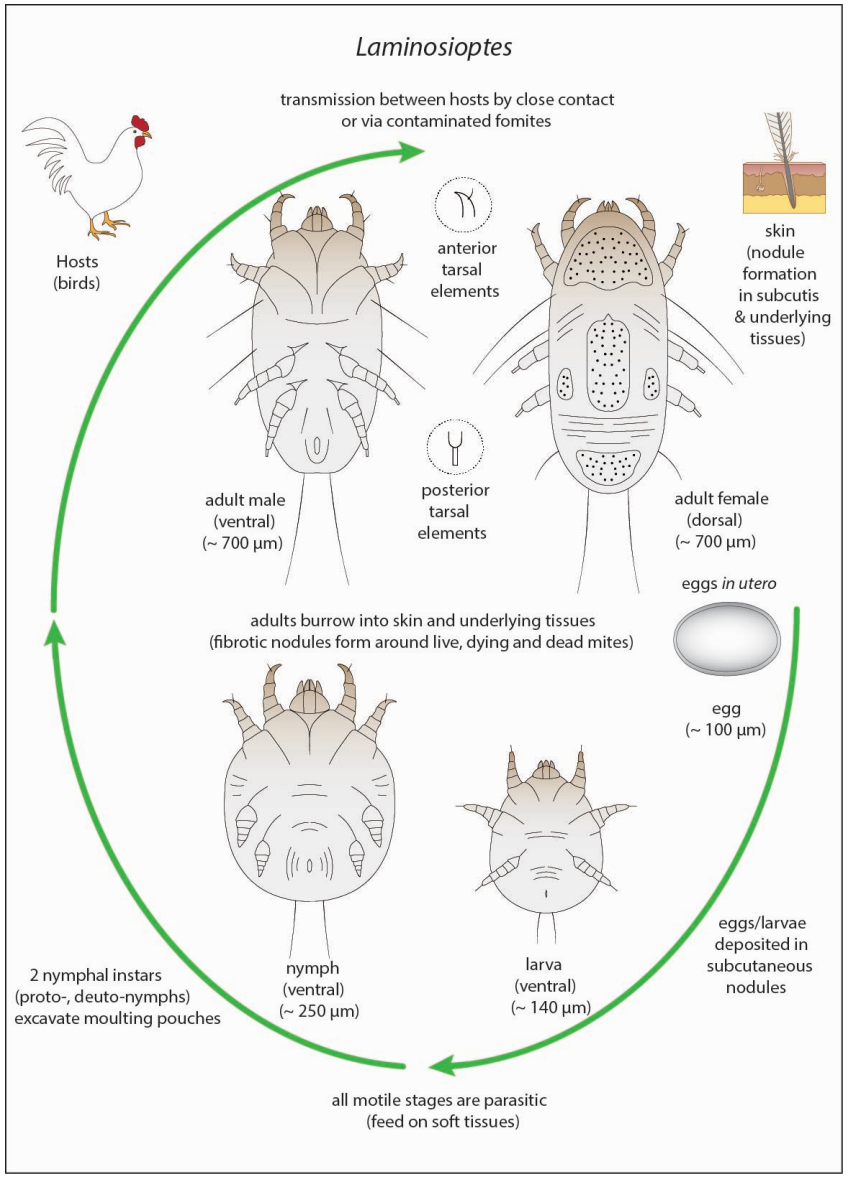

Klossiella
monoxenous
(1-host)
cycle
kidney
(tubular nephrosis,
interstitial nephritis,
renal lesions)
Definitive Hosts
(mammals, esp.
equids, rodents,
marsupials)
sexual
gamogony
gamonts
(syzygy)
(4-14 µm)
sporont
(10-18 µm)
sporoblasts
asexual
merogony
meront
(8-20 µm)
endogenous
sporulation
oocyst
(40-100 µm)
excystation
(sporozoites
released)
ingested
sporocysts
voided in
urine
sporocyst
(18-24 µm)
direct transmission via ingestion of sporocysts
contaminating environment (soil, water, food)

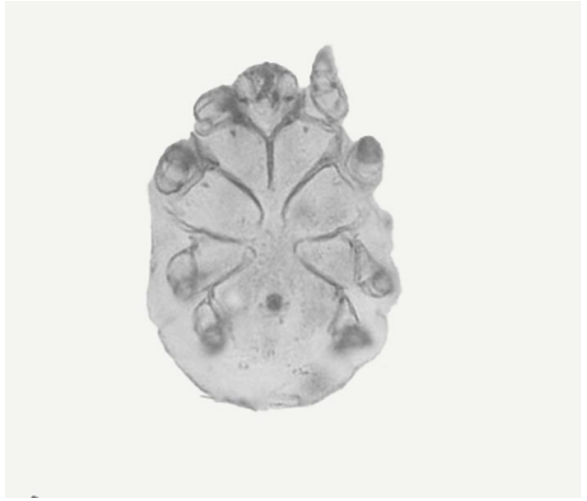


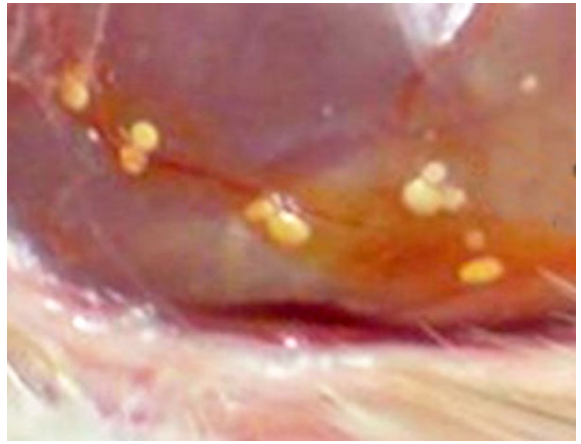


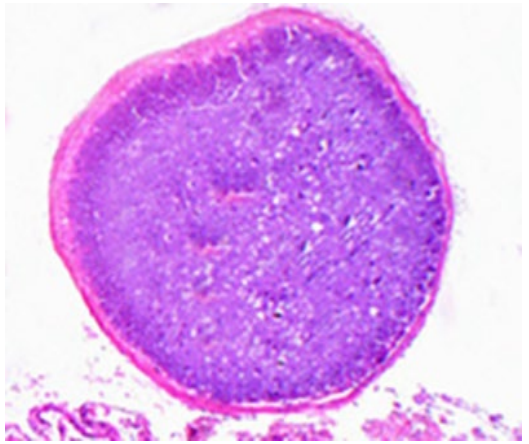

Knemidocoptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(birds)
male
female
skin
(dermatitis,
feather
depluming,
scaly leg
lesions)
tarsal
elements
adults
(~ 500 µm)
(ventral)
(dorsal)
eggs in utero
adults burrow into skin forming tunnels
egg
(~ 200 µm)
nymph
(ventral)
(~ 400 µm)
larva
(ventral)
(~ 300 µm)
larvae
deposited in
tunnels in skin
2 nymphal instars
(proto-, deuto-nymphs)
excavate moulting pouches
all motile stages are ectoparasitic
(burrow and feed on skin cells and fluids)

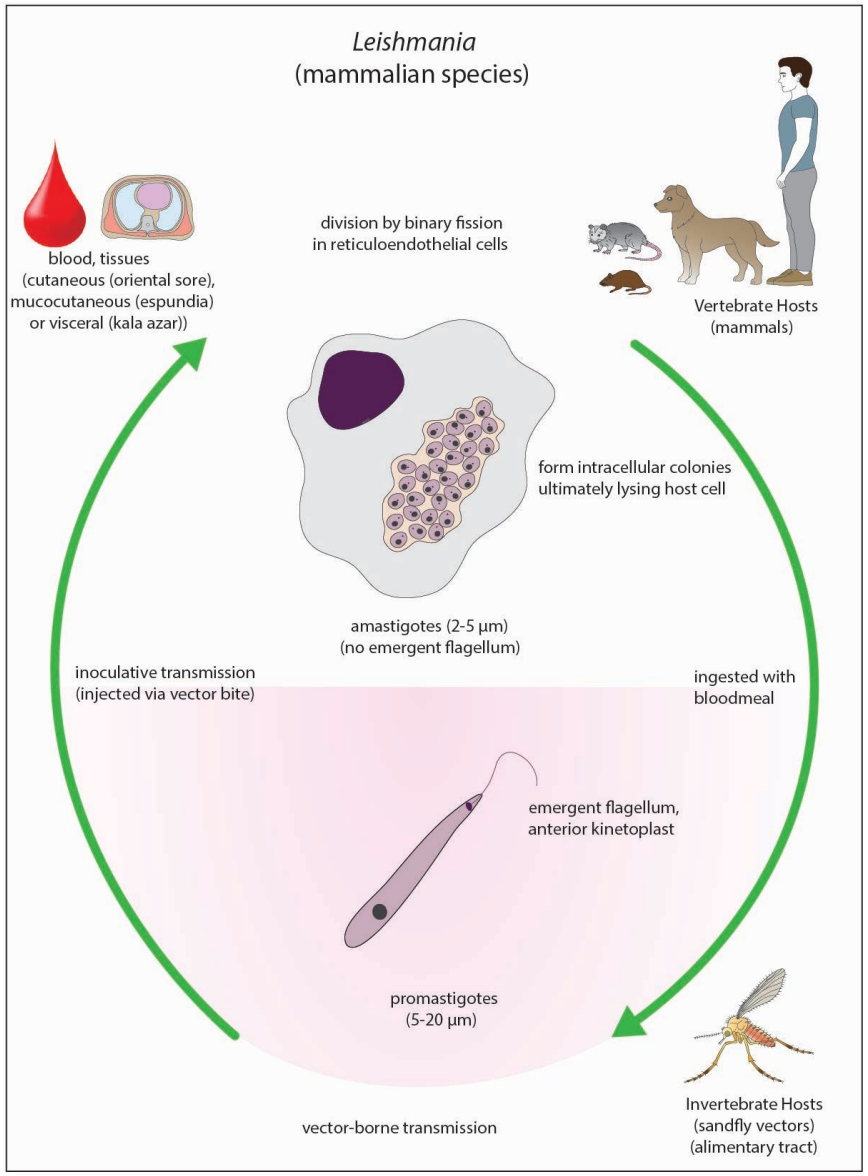


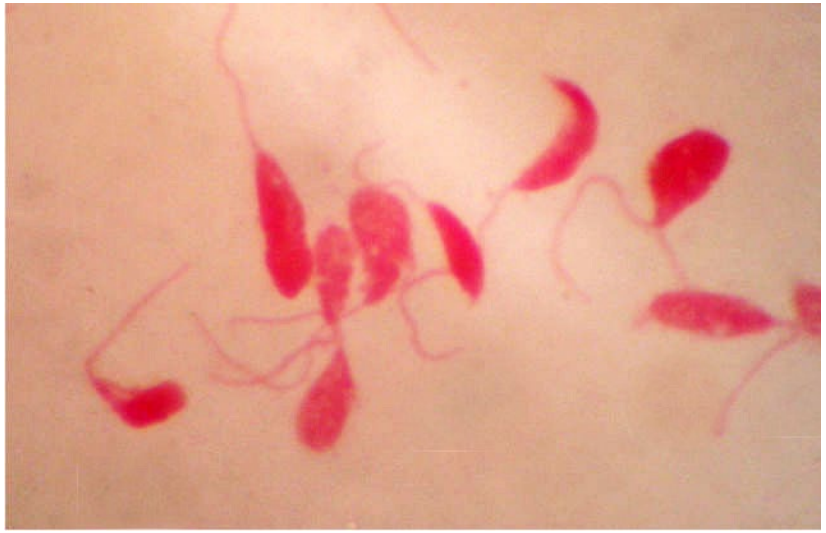

Laminosioptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(birds)
anterior
tarsal
elements
skin
(nodule
formation
in subcutis
& underlying
tissues)
adult male
(ventral)
(~ 700 µm)
posterior
tarsal
elements
adult female
(dorsal)
(~ 700 µm)
eggs in utero
adults burrow into skin and underlying tissues
(fibrotic nodules form around live, dying and dead mites)
egg
(~ 100 µm)
nymph
(ventral)
(~ 250 µm)
larva
(ventral)
(~ 140 µm)
2 nymphal instars
(proto-, deuto-nymphs)
excavate moulting pouches
eggs/larvae
deposited in
subcutaneous
nodules
all motile stages are parasitic
(feed on soft tissues)

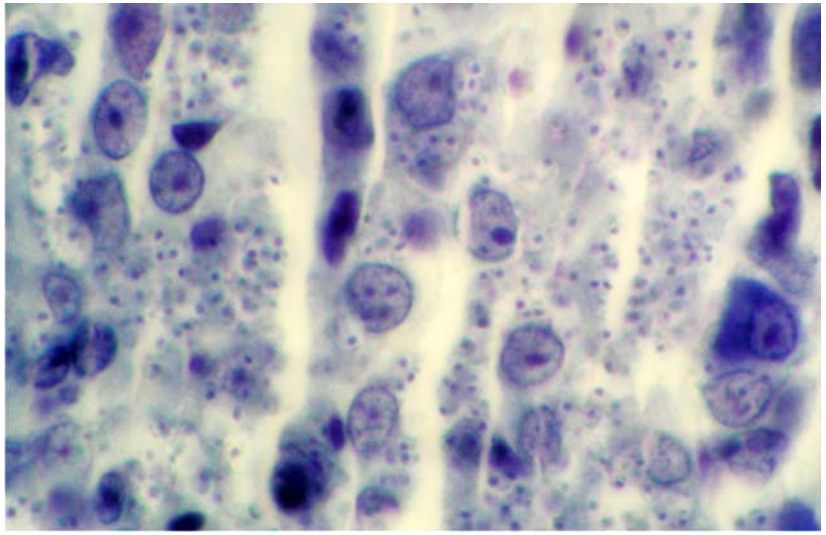


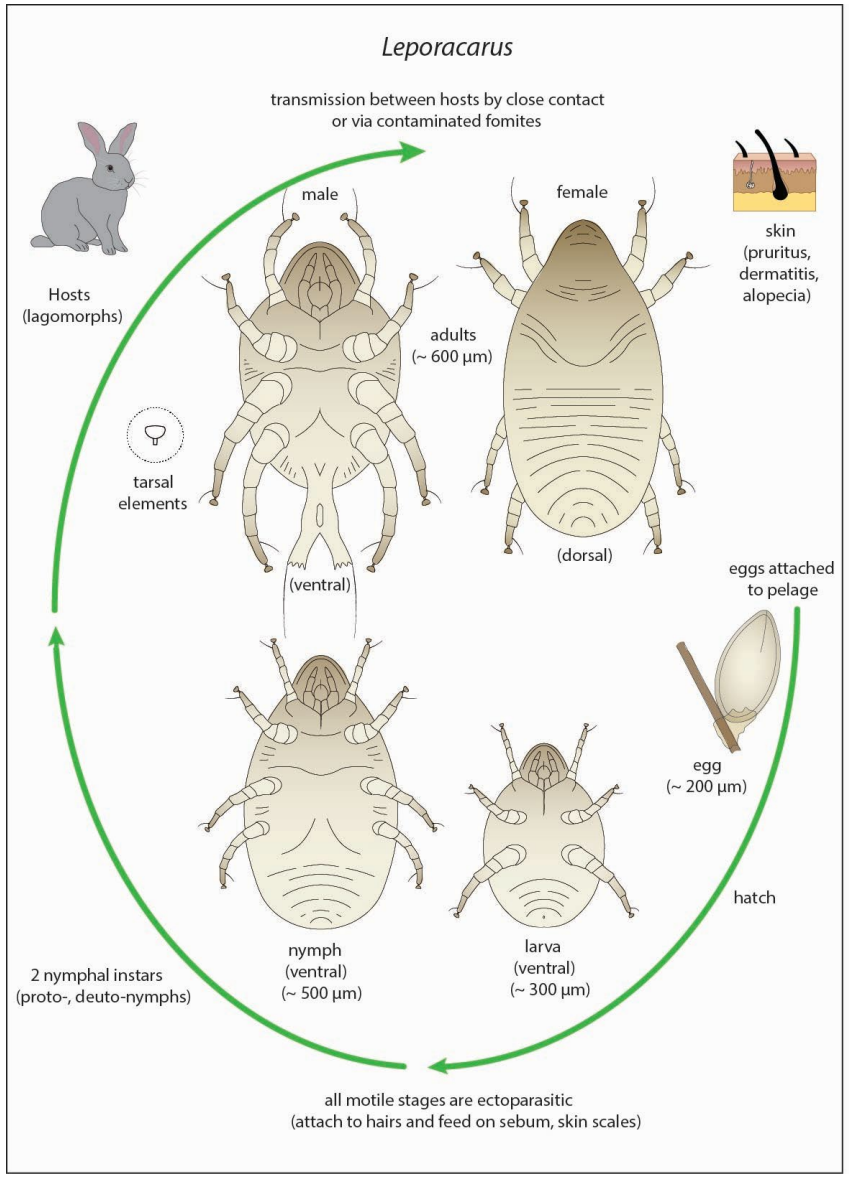


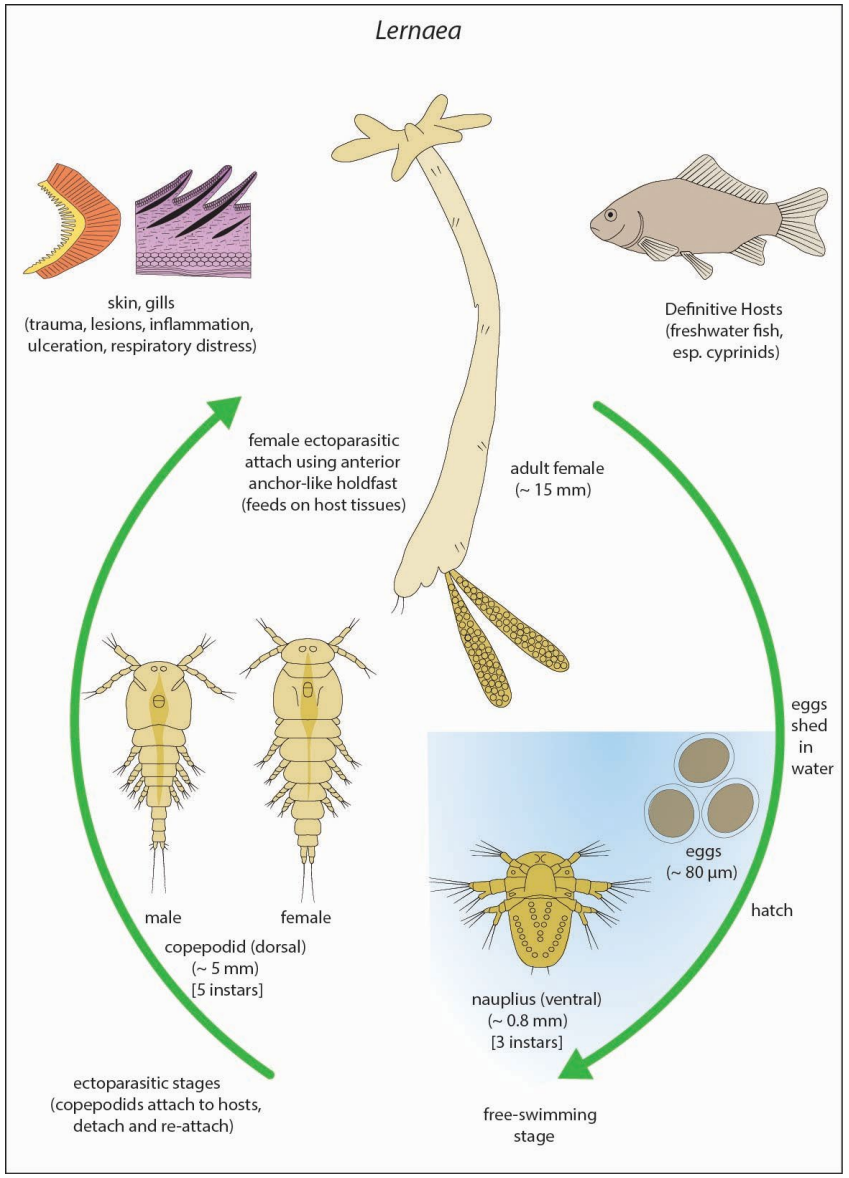



Leishmania
(mammalian species)
blood, tissues
(cutaneous (oriental sore),
mucocutaneous (espundia)
or visceral (kala azar))
division by binary fission
in reticuloendothelial cells
Vertebrate Hosts
(mammals)
form intracellular colonies
ultimately lysing host cell
amastigotes (2-5 µm)
(no emergent flagellum)
inoculative transmission
(injected via vector bite)
ingested with
bloodmeal
emergent flagellum,
anterior kinetoplast
promastigotes
(5-20 µm)
Invertebrate Hosts
(sandfly vectors)
(alimentary tract)
vector-borne transmission

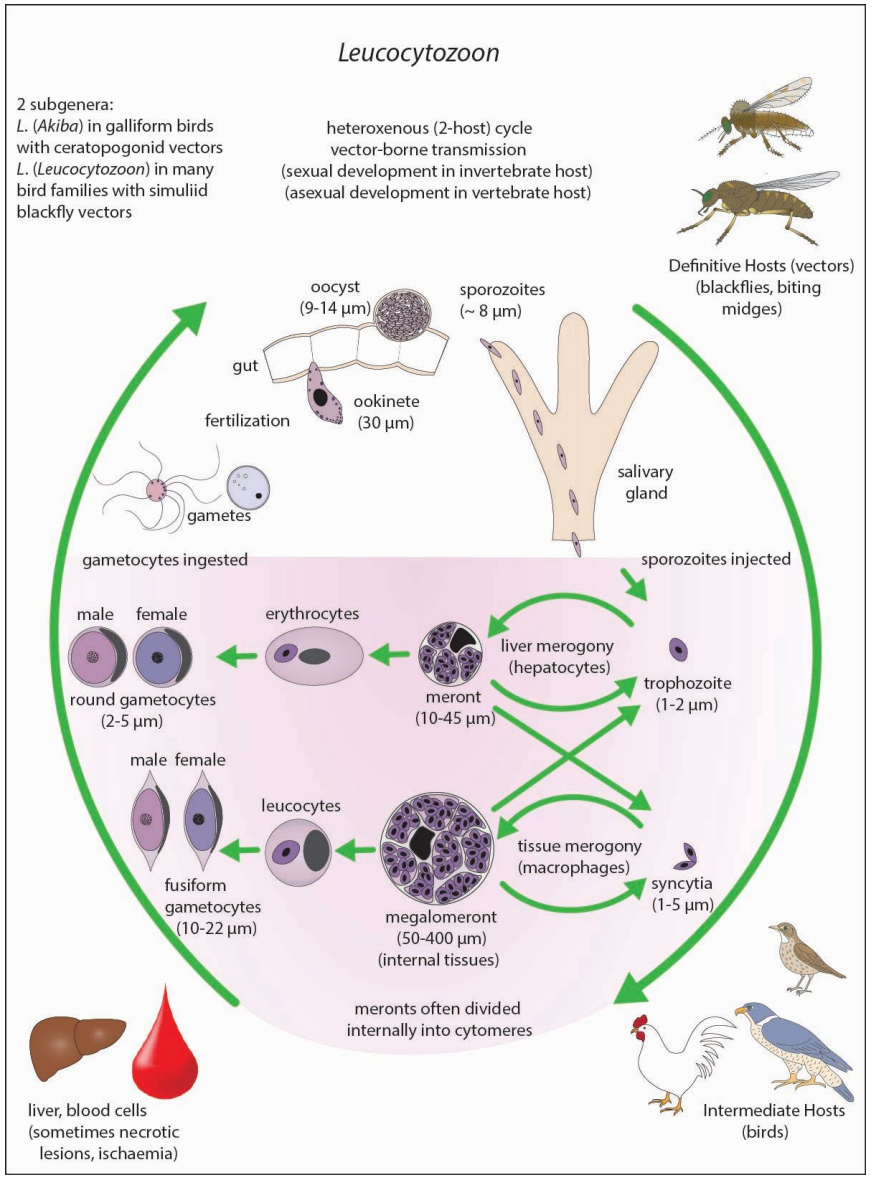


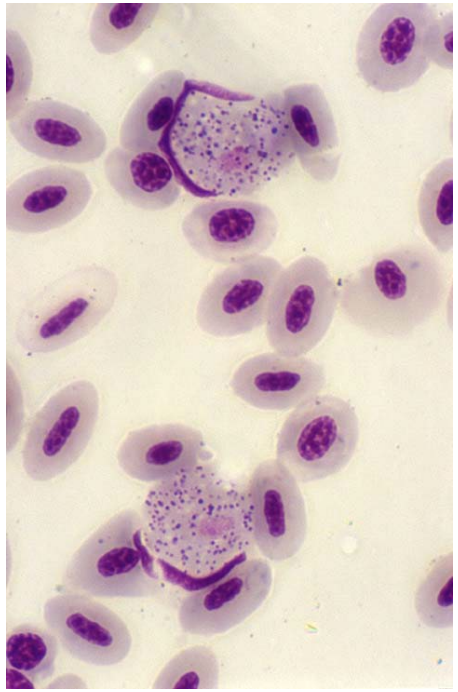


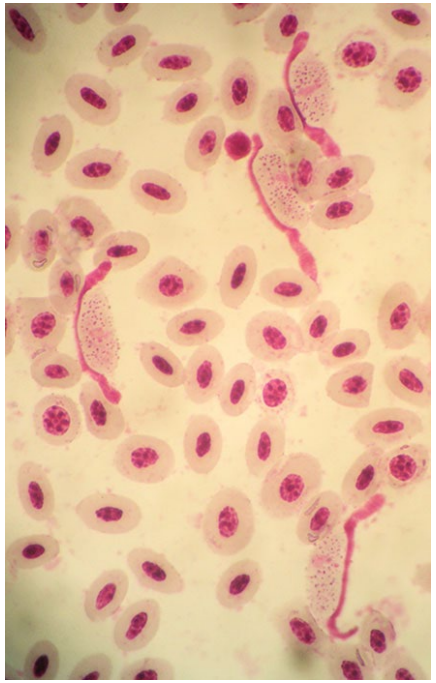

Leporacarus
transmission between hosts by close contact
or via contaminated fomites
Hosts
(lagomorphs)
male
female
skin
(pruritus,
dermatitis,
alopecia)
adults
(~ 600 µm)
tarsal
elements
(ventral)
(dorsal)
eggs attached
to pelage
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 500 µm)
larva
(ventral)
(~ 300 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(attach to hairs and feed on sebum, skin scales)

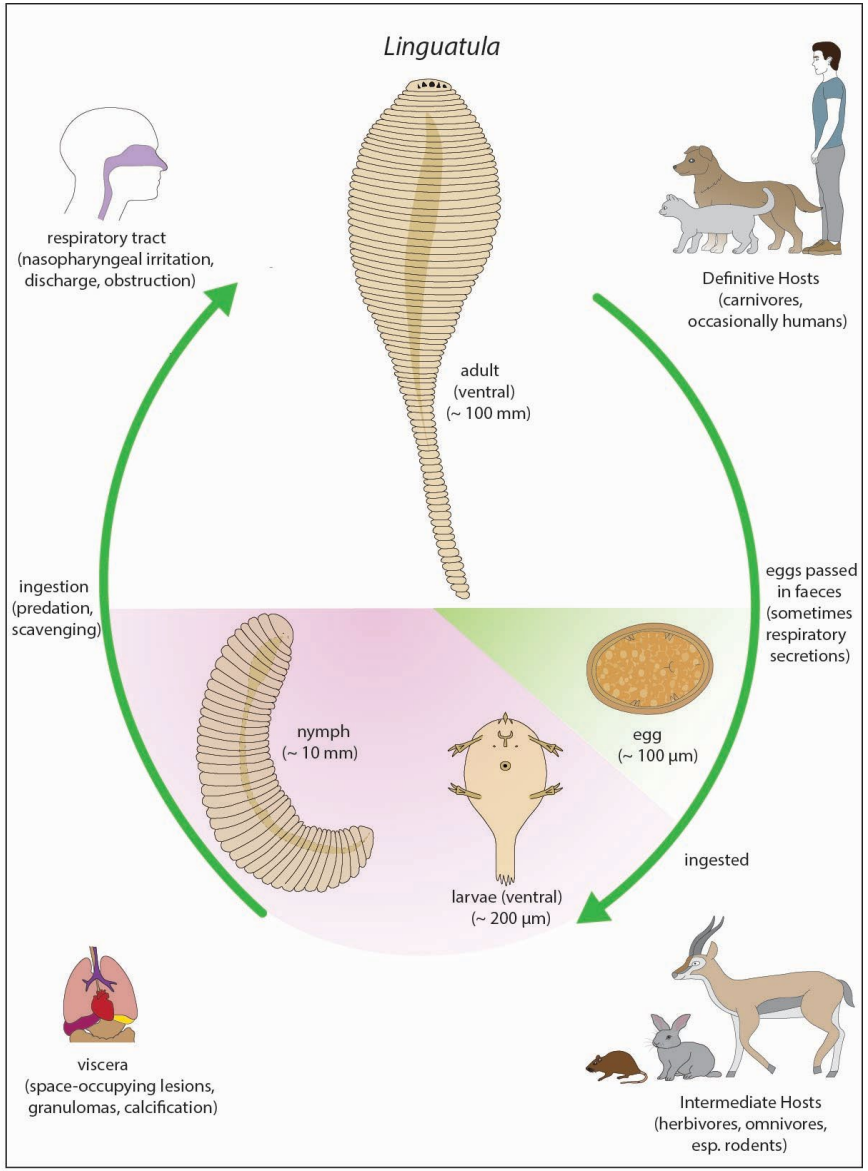

Lernaea
skin, gills
(trauma, lesions, inflammation,
ulceration, respiratory distress)
Definitive Hosts
(freshwater fish,
esp. cyprinids)
female ectoparasitic
attach using anterior
anchor-like holdfast
(feeds on host tissues)
adult female
(~ 15 mm)
eggs
shed
in
water
male
female
copepodid (dorsal)
(~ 5 mm)
[5 instars]
eggs
(~ 80 µm)
hatch
nauplius (ventral)
(~ 0.8 mm)
[3 instars]
ectoparasitic stages
(copepodids attach to hosts,
detach and re-attach)
free-swimming
stage

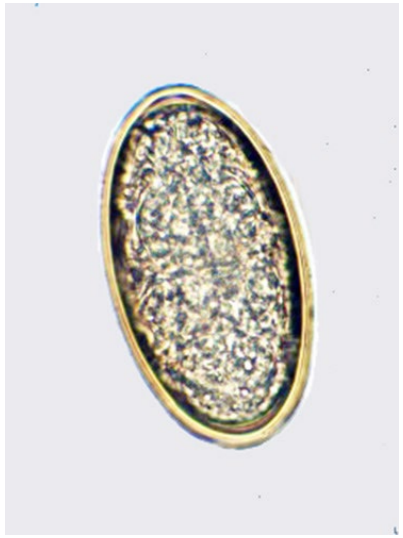

wiki

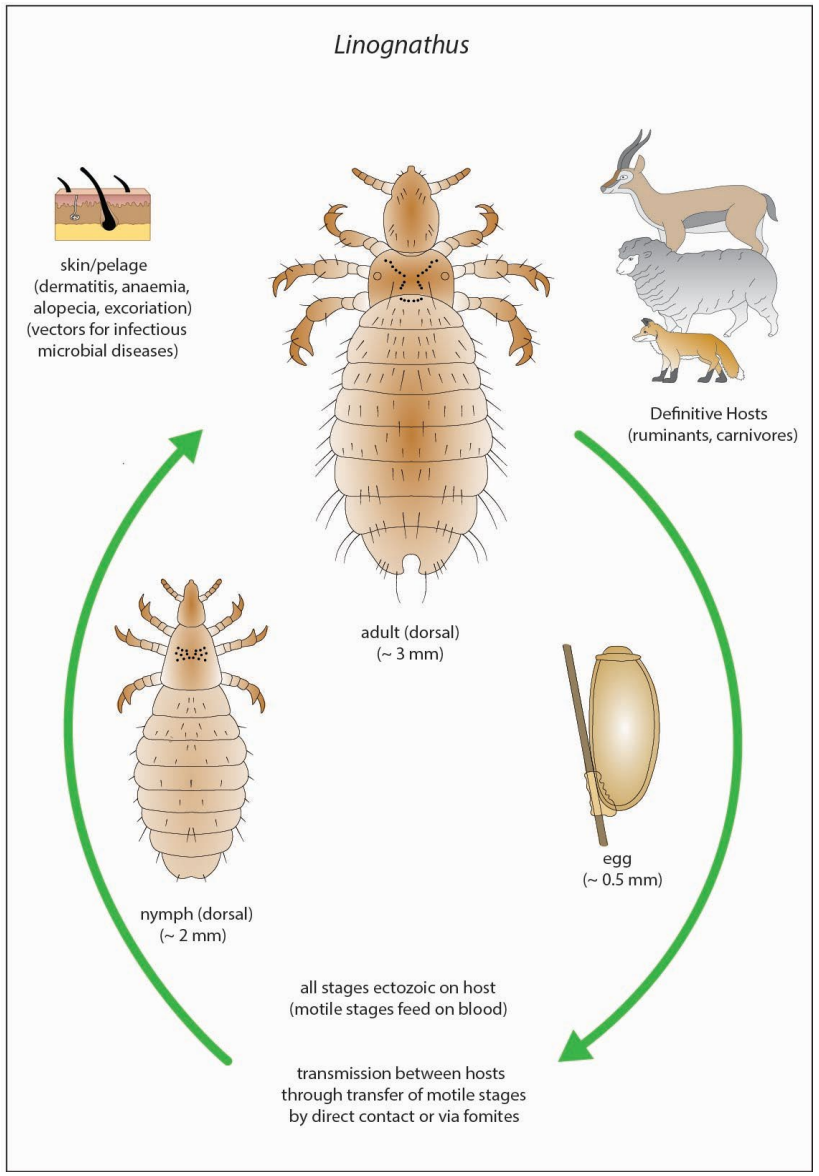

Leucocytozoon
2 subgenera:
L. (Akiba) in galliform birds with ceratopogonid vectors
L. (Leucocytozoon) in many bird families with simuliid blackfly vectors
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
Definitive Hosts (vectors)
(blackflies, biting midges)
oocyst
(9-14 µm)
sporozoites
(~ 8 µm)
gut
ookinete
(30 µm)
fertilization
salivary gland
gametes
gametocytes ingested
sporozoites injected
male
female
erythrocytes
liver merogony
(hepatocytes)
meront
(10-45 µm)
trophozoite
(1-2 µm)
round gametocytes
(2-5 µm)
male
female
leucocytes
tissue merogony
(macrophages)
syncytia
(1-5 µm)
fusiform gametocytes
(10-22 µm)
megalomeront
(50-400 µm)
(internal tissues)
meronts often divided internally into cytomeres
liver, blood cells
(sometimes necrotic lesions, ischaemia)
Intermediate Hosts
(birds)

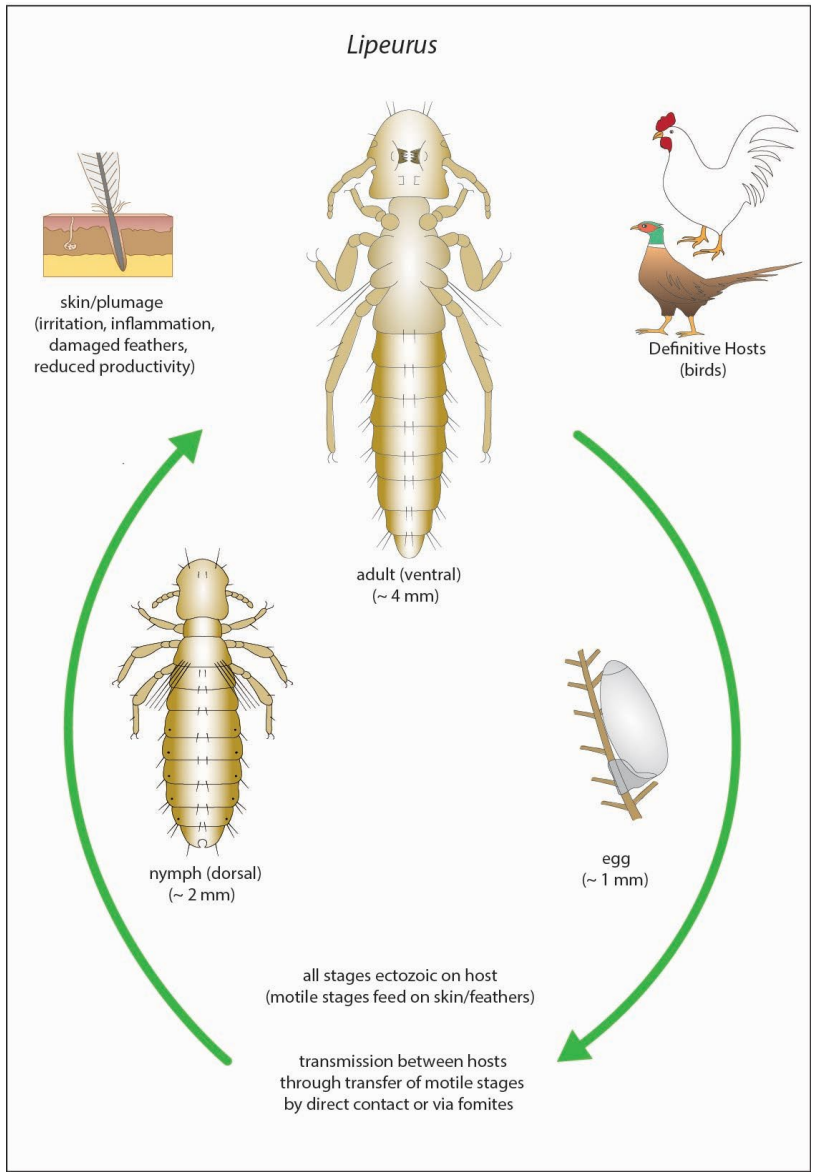


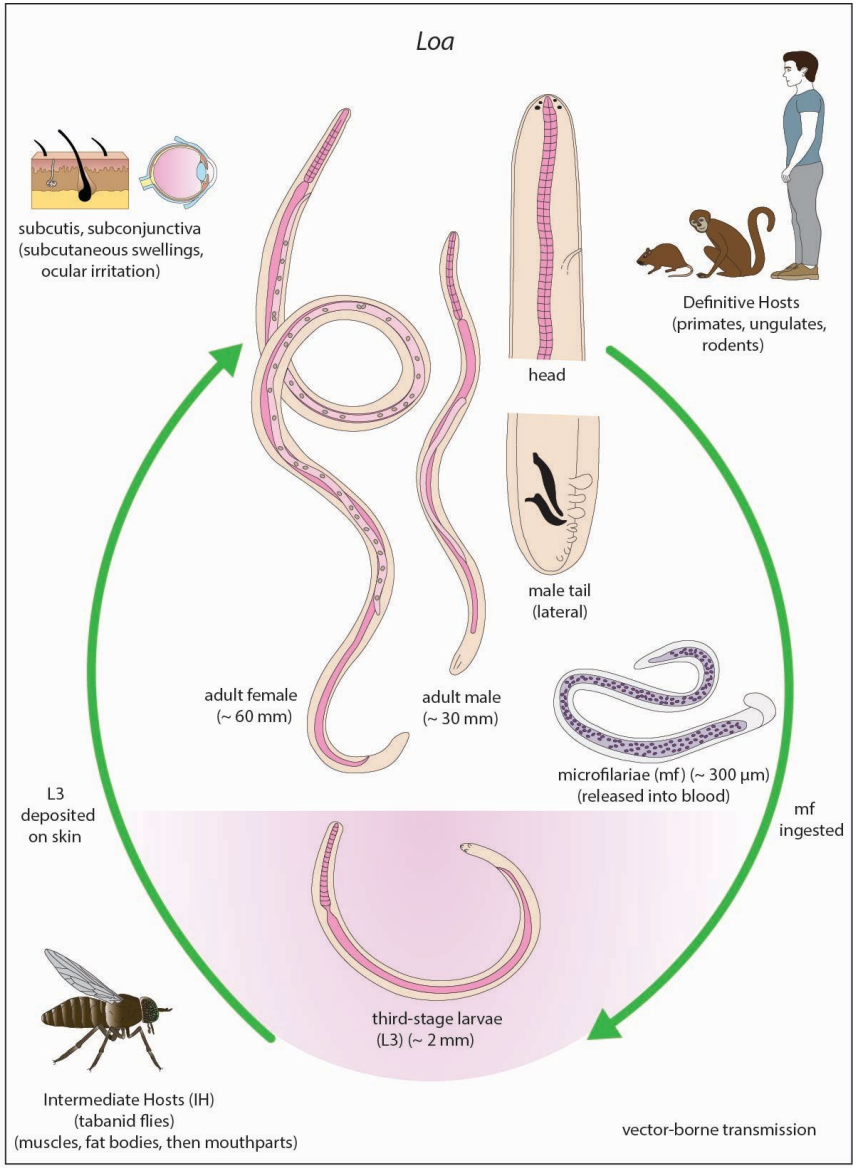



Linguatula
respiratory tract
(nasopharyngeal irritation,
discharge, obstruction)
adult
(ventral)
(~ 100 mm)
Definitive Hosts
(carnivores,
occasionally humans)
ingestion
(predation,
scavenging)
eggs passed
in faeces
(sometimes
respiratory
secretions)
nymph
(~ 10 mm)
egg
(~ 100 µm)
larvae (ventral)
(~ 200 µm)
ingested
viscera
(space-occupying lesions,
granulomas, calcification)
Intermediate Hosts
(herbivores, omnivores,
esp. rodents)



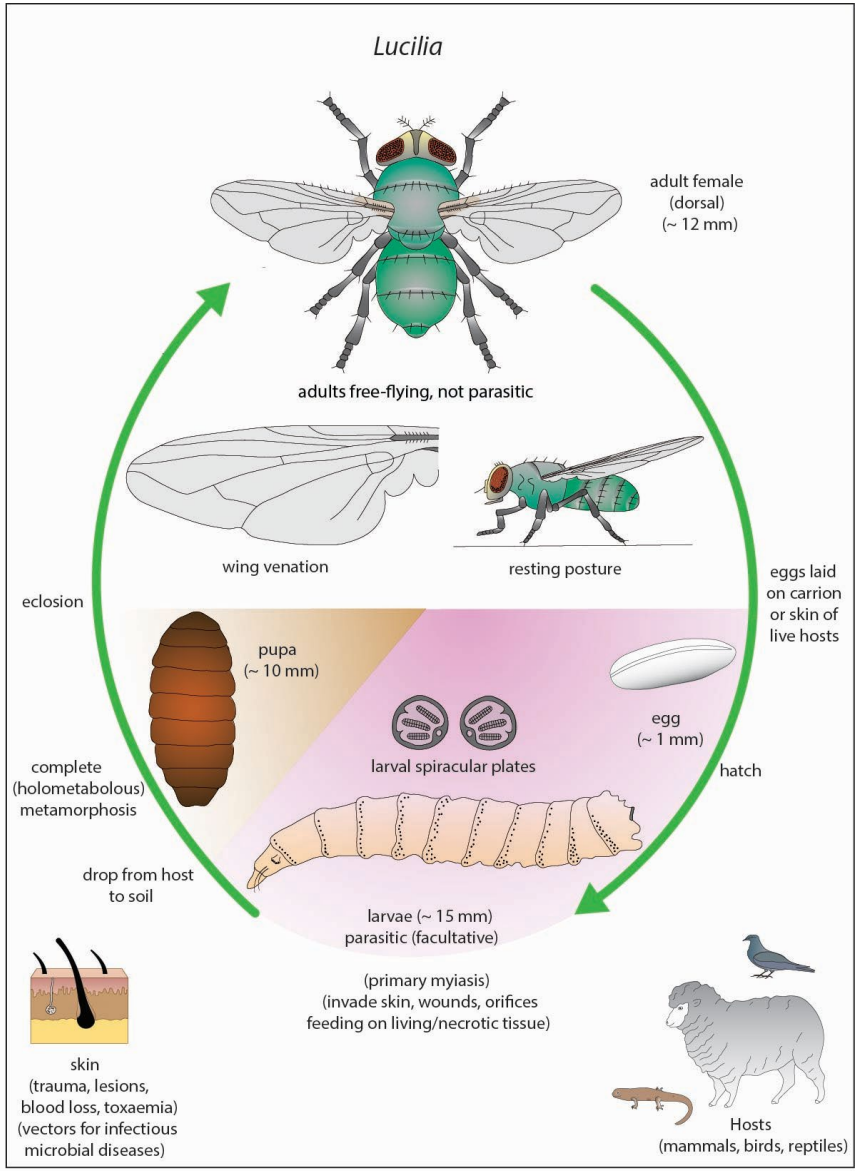

Linognathus
skin/pelage
(dermatitis, anaemia,
alopecia, excoriation)
(vectors for infectious
microbial diseases)
Definitive Hosts
(ruminants, carnivores)
adult (dorsal)
(~ 3 mm)
egg
(~ 0.5 mm)
nymph (dorsal)
(~ 2 mm)
all stages ectozoic on host
(motile stages feed on blood)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

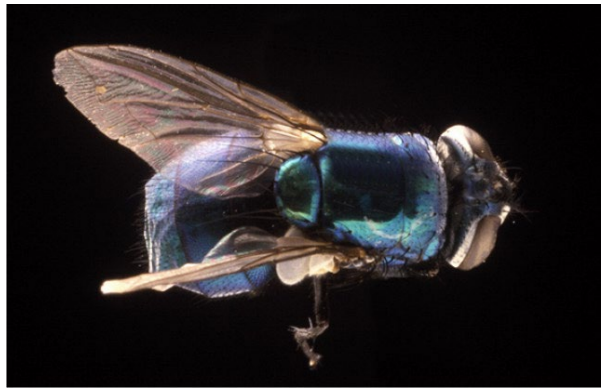

Lipeurus
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 4 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

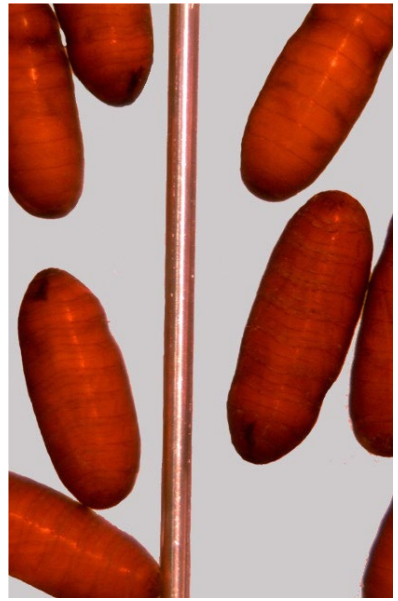

Loa
subcutis, subconjunctiva
(subcutaneous swellings,
ocular irritation)
Definitive Hosts
(primates, ungulates,
rodents)
head
male tail
(lateral)
adult female
(~ 60 mm)
adult male
(~ 30 mm)
microfilariae (mf) (~ 300 µm)
(released into blood)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 2 mm)
Intermediate Hosts (IH)
(tabanid flies)
(muscles, fat bodies, then mouthparts)
vector-borne transmission

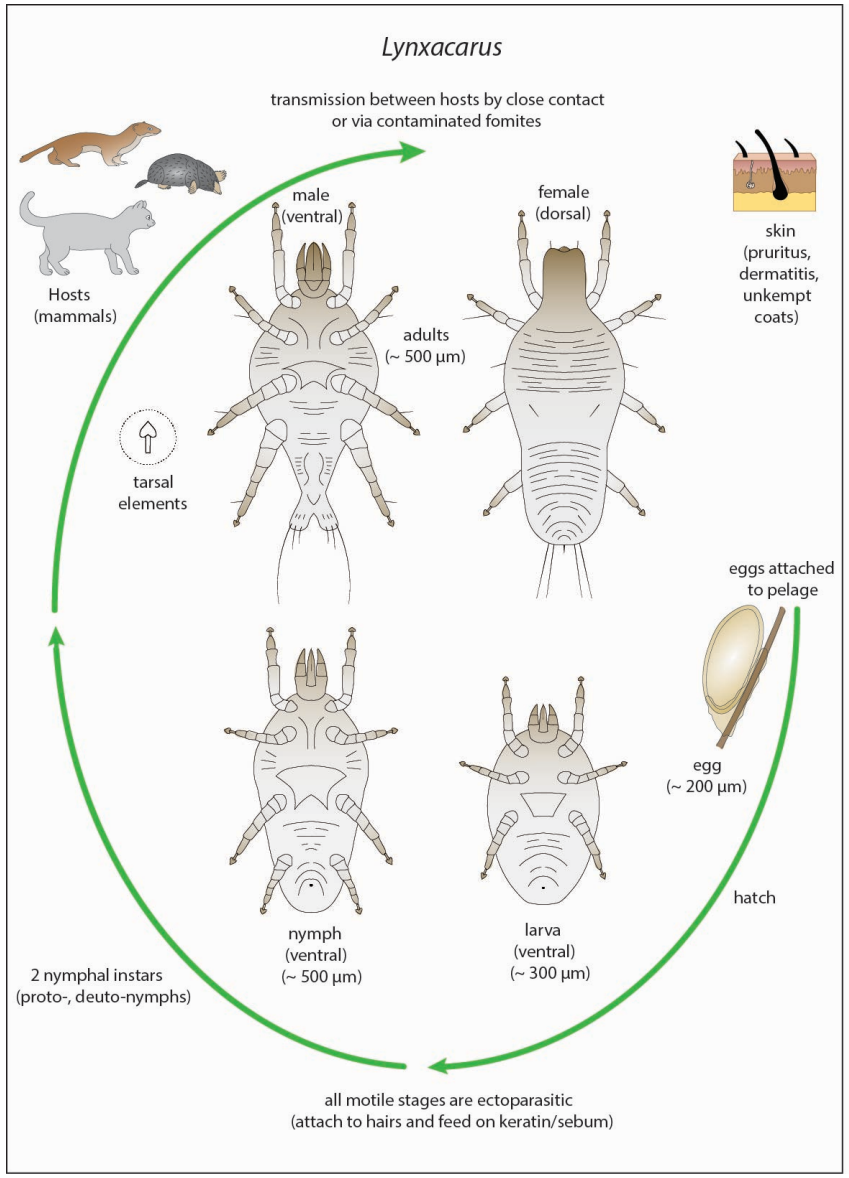

wiki

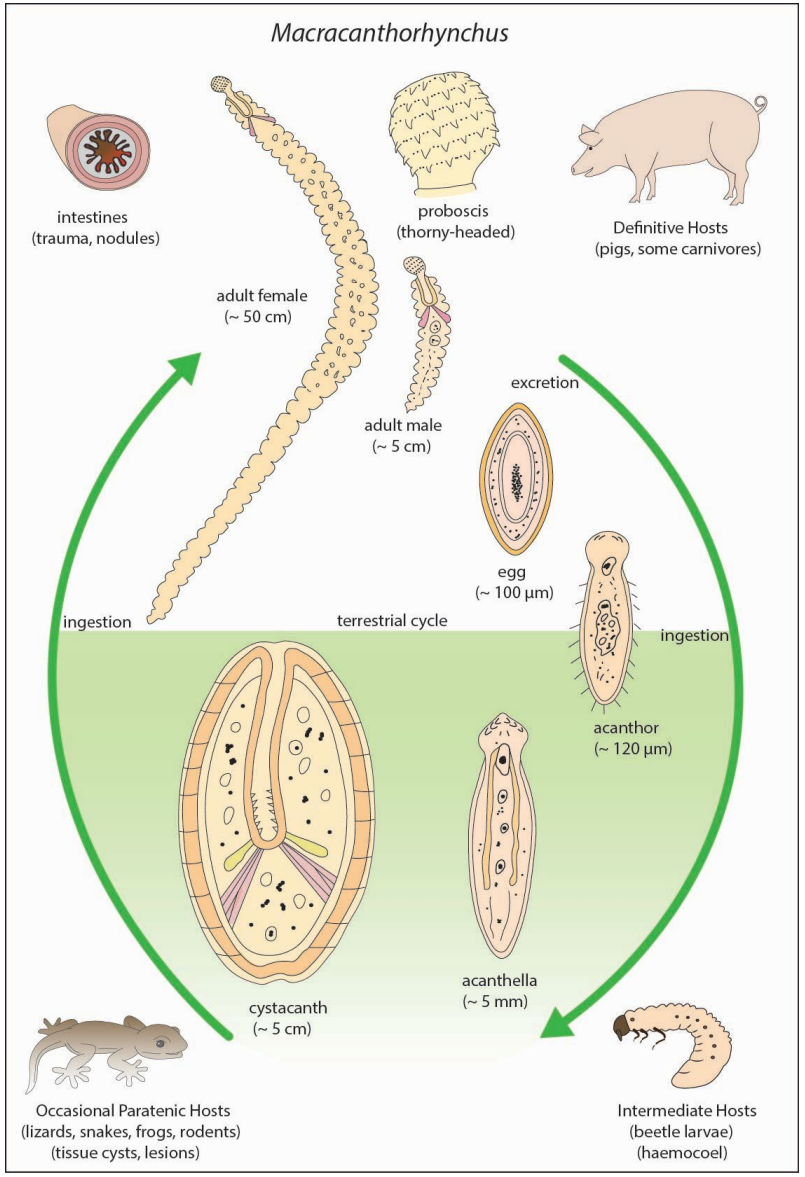

PHIL-21534

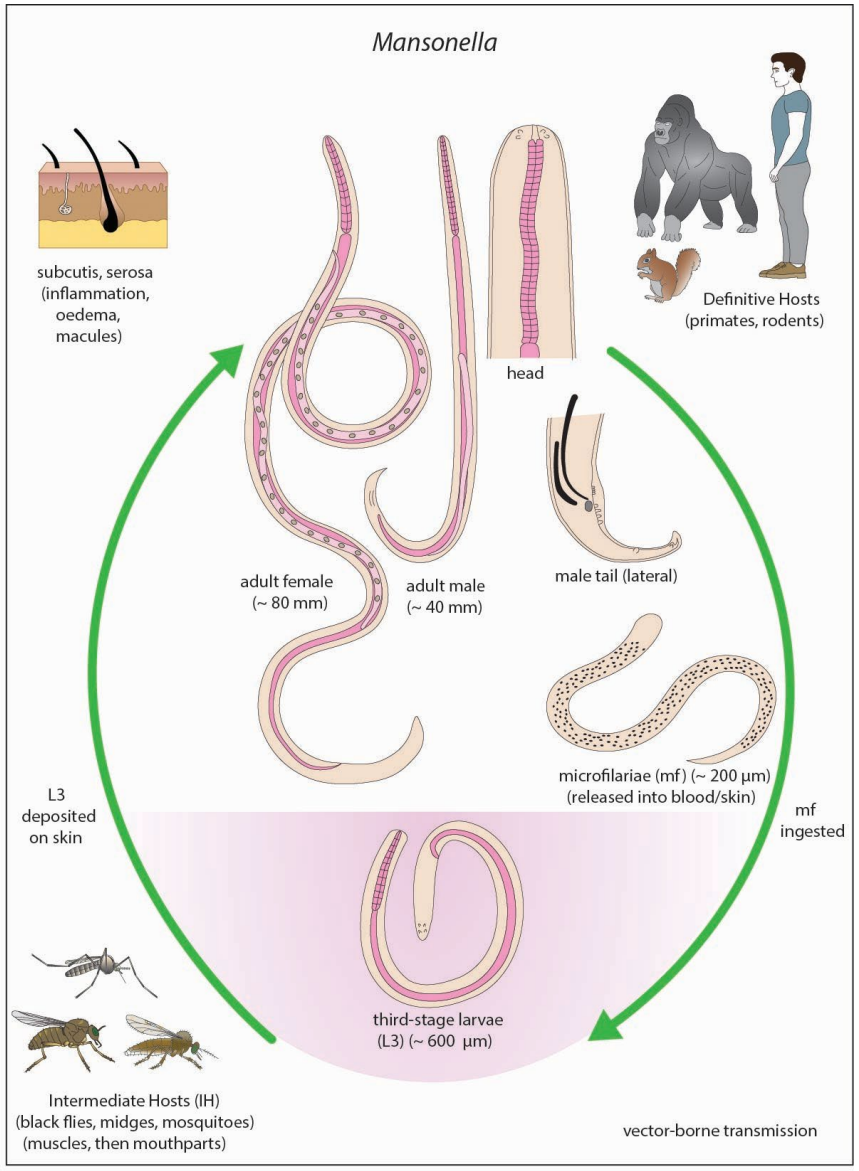

Lucilia
adult female
(dorsal)
(~ 12 mm)
adults free-flying, not parasitic
wing venation
resting posture
eggs laid
on carrion
or skin of
live hosts
eclosion
pupa
(~ 10 mm)
egg
(~ 1 mm)
larval spiracular plates
hatch
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (~ 15 mm)
parasitic (facultative)
(primary myiasis)
(invade skin, wounds, orifices
feeding on living/necrotic tissue)
skin
(trauma, lesions,
blood loss, toxaemia)
(vectors for infectious
microbial diseases)
Hosts
(mammals, birds, reptiles)



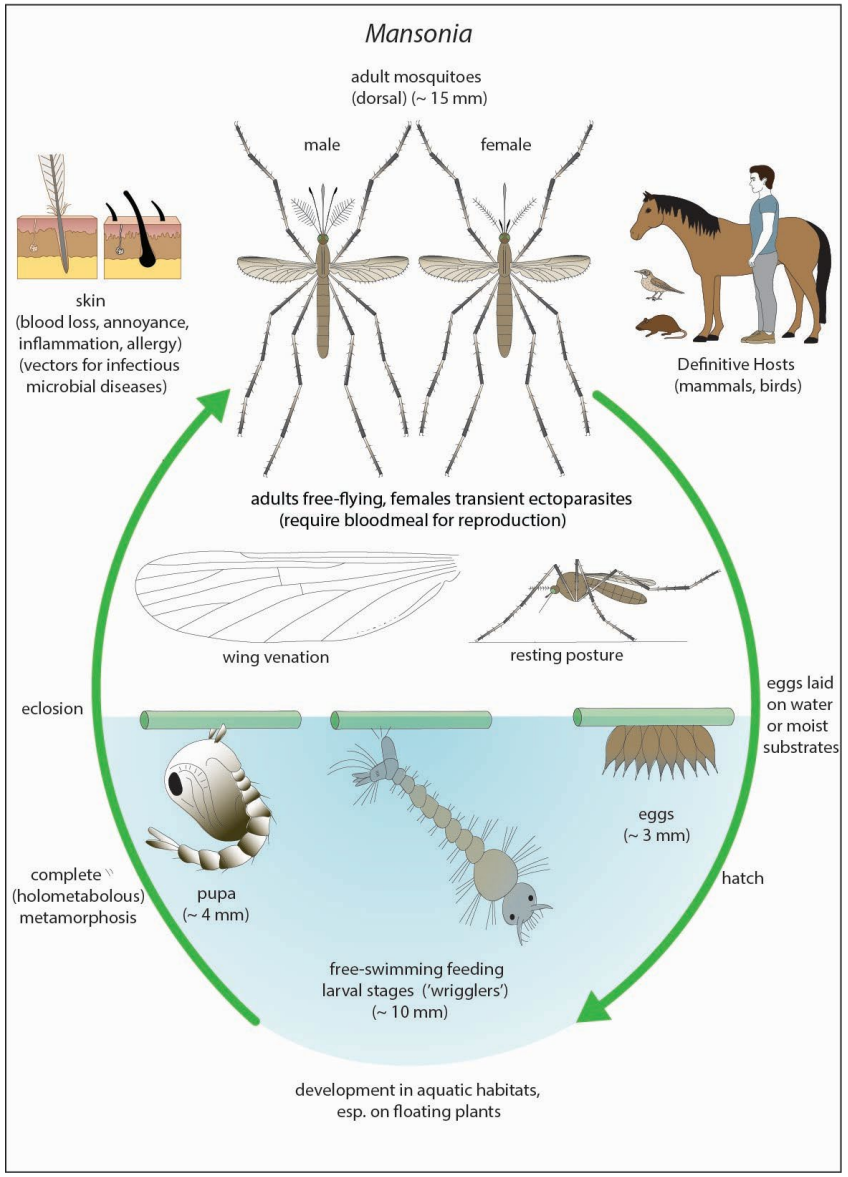


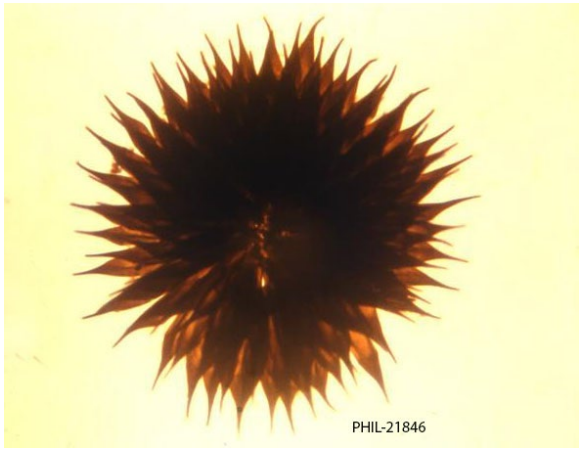

Lynxacarus
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
male
(ventral)
female
(dorsal)
adults
(~ 500 µm)
skin
(pruritus,
dermatitis,
unkempt
coats)
tarsal
elements
eggs attached
to pelage
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 500 µm)
larva
(ventral)
(~ 300 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(attach to hairs and feed on keratin/sebum)


Macracanthorhynchus
intestines
(trauma, nodules)
proboscis
(thorny-headed)
Definitive Hosts
(pigs, some carnivores)
adult female
(~ 50 cm)
adult male
(~ 5 cm)
excretion
egg
(~ 100 µm)
ingestion
terrestrial cycle
ingestion
acanthor
(~ 120 µm)
cystacanth
(~ 5 cm)
acanthella
(~ 5 mm)
Occasional Paratenic Hosts
(lizards, snakes, frogs, rodents)
(tissue cysts, lesions)
Intermediate Hosts
(beetle larvae)
(haemocoel)


Mansonella
subcutis, serosa
(inflammation,
oedema,
macules)
head
Definitive Hosts
(primates, rodents)
adult female
(~ 80 mm)
adult male
(~ 40 mm)
male tail (lateral)
microfilariae (mf) (~ 200 µm)
(released into blood/skin)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 600 µm)
Intermediate Hosts (IH)
(black flies, midges, mosquitoes)
(muscles, then mouthparts)
vector-borne transmission


PHIL-21537


Mansonia
adult mosquitoes
(dorsal) (~ 15 mm)
male
female
skin
(blood loss, annoyance,
inflammation, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
adults free-flying, females transient ectoparasites
(require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs laid
on water
or moist
substrates
eggs
(~ 3 mm)
hatch
complete
(holometabolous)
metamorphosis
pupa
(~ 4 mm)
free-swimming feeding
larval stages ('wrigglers')
(~ 10 mm)
development in aquatic habitats,
esp. on floating plants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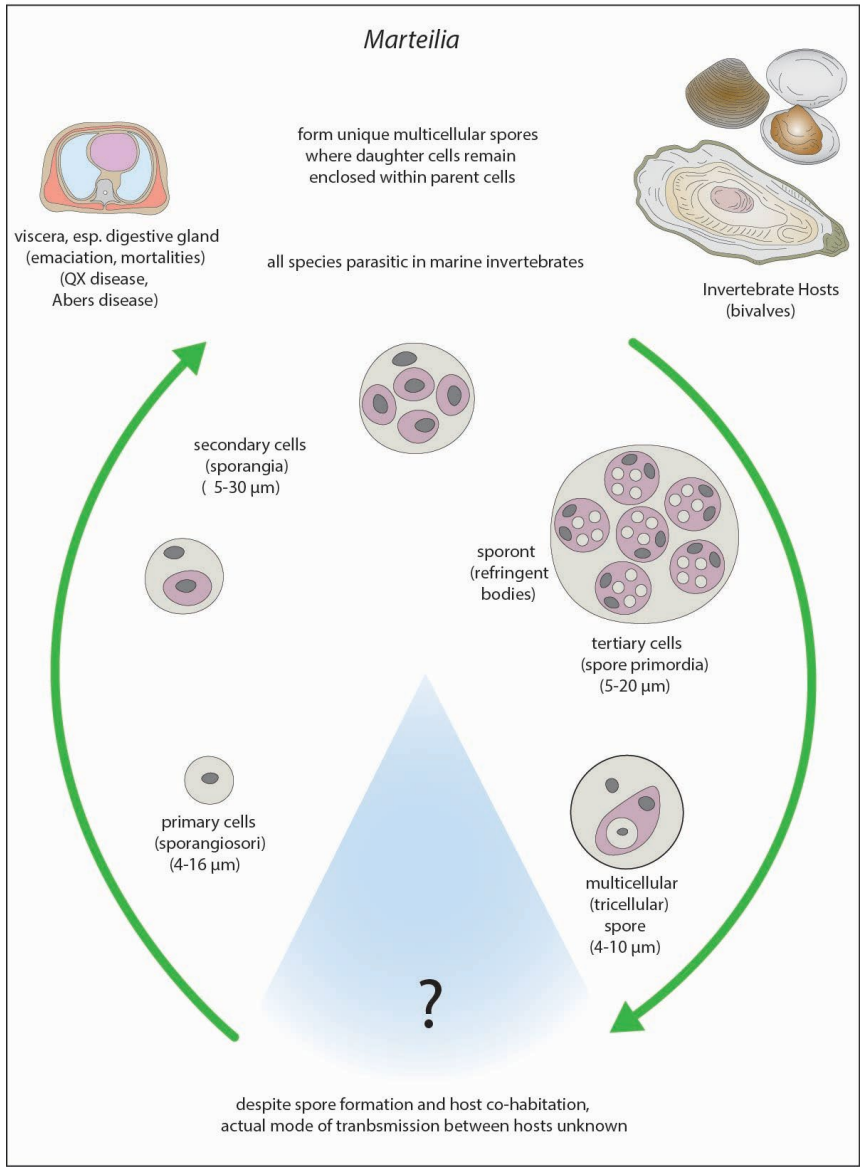
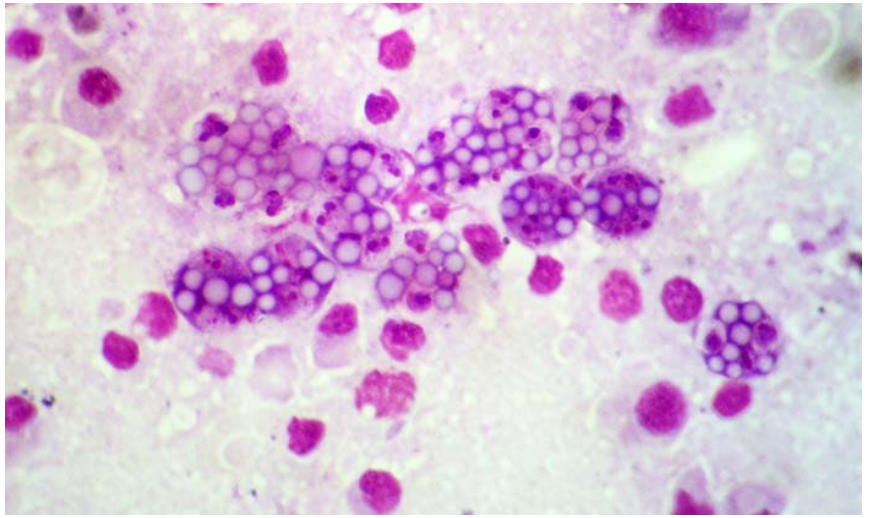
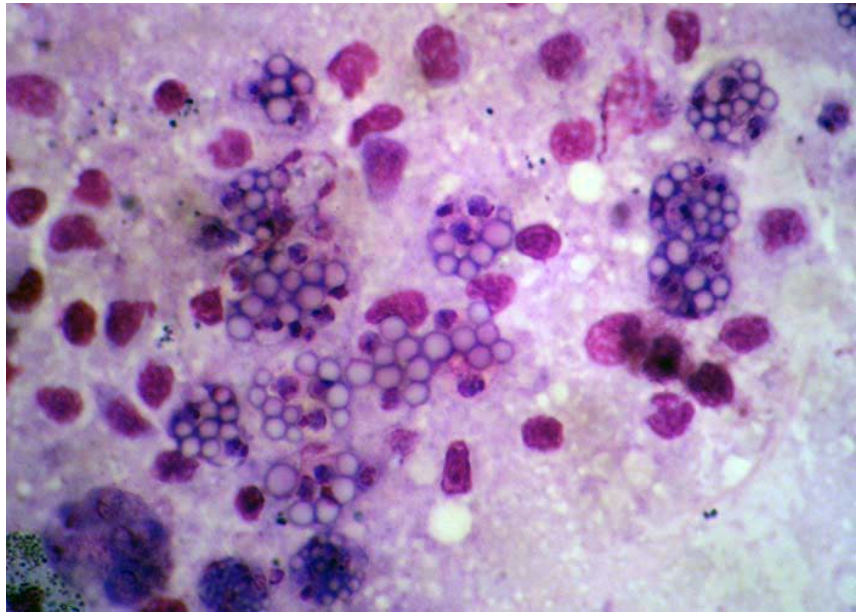
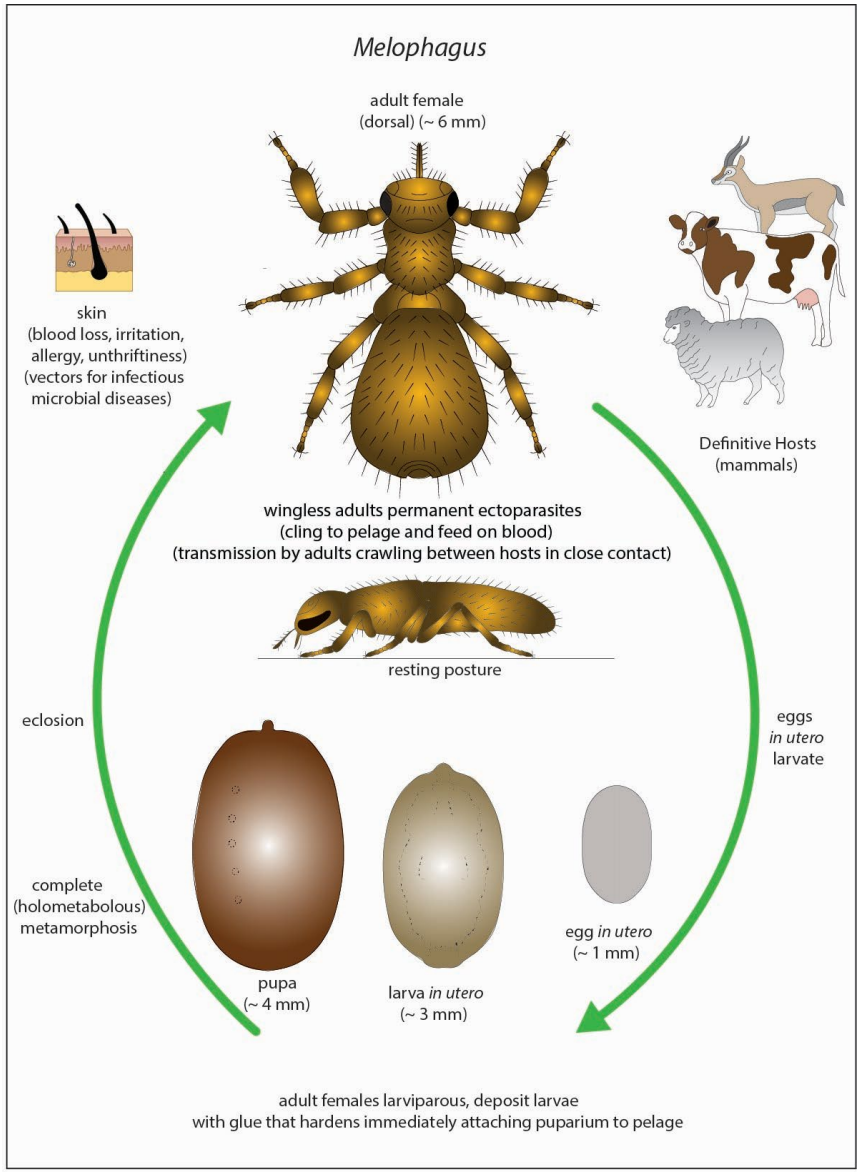
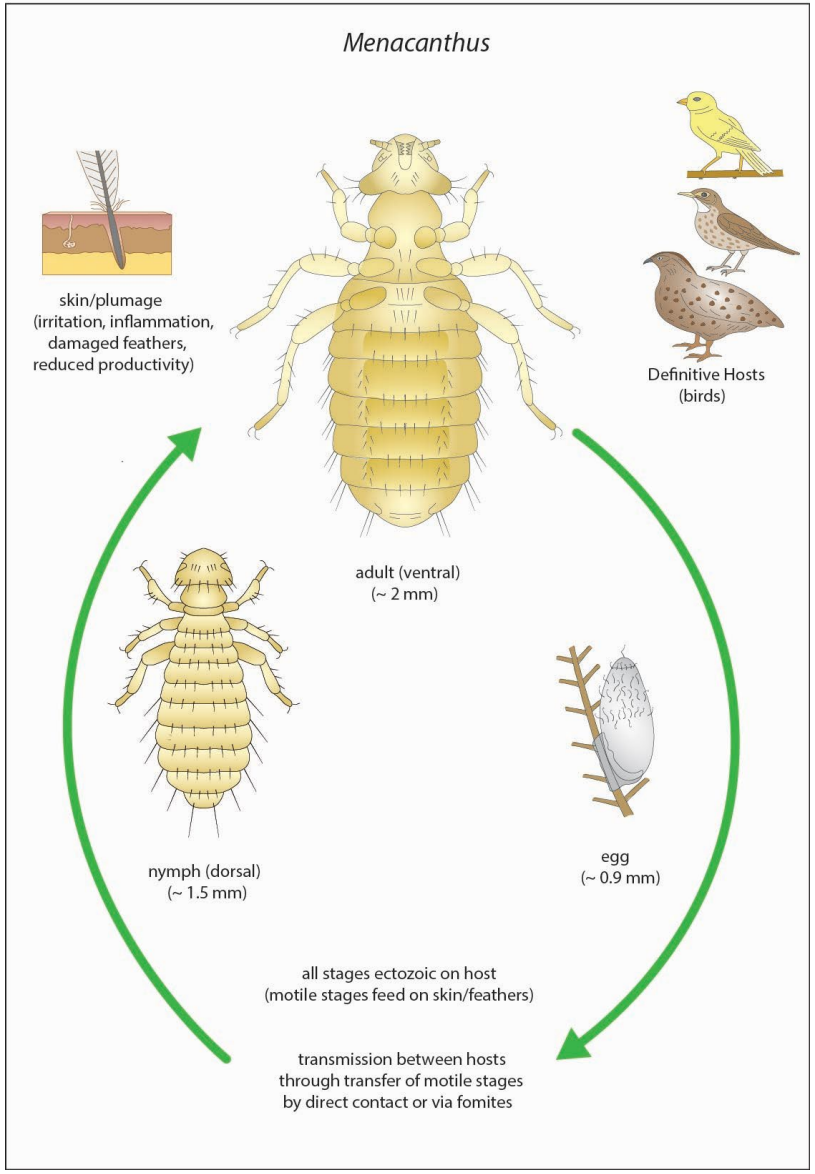

Marteilia
form unique multicellular spores
where daughter cells remain
enclosed within parent cells
viscera, esp. digestive gland
(emaciation, mortalities)
(QX disease,
Abers disease)
all species parasitic in marine invertebrates
Invertebrate Hosts
(bivalves)
secondary cells
(sporangia)
(5-30 µm)
sporont
(refringent
bodies)
tertiary cells
(spore primordia)
(5-20 µm)
primary cells
(sporangiosori)
(4-16 µm)
multicellular
(tricellular)
spore
(4-10 µm)
?
despite spore formation and host co-habitation,
actual mode of tranbsmission between hosts unknown

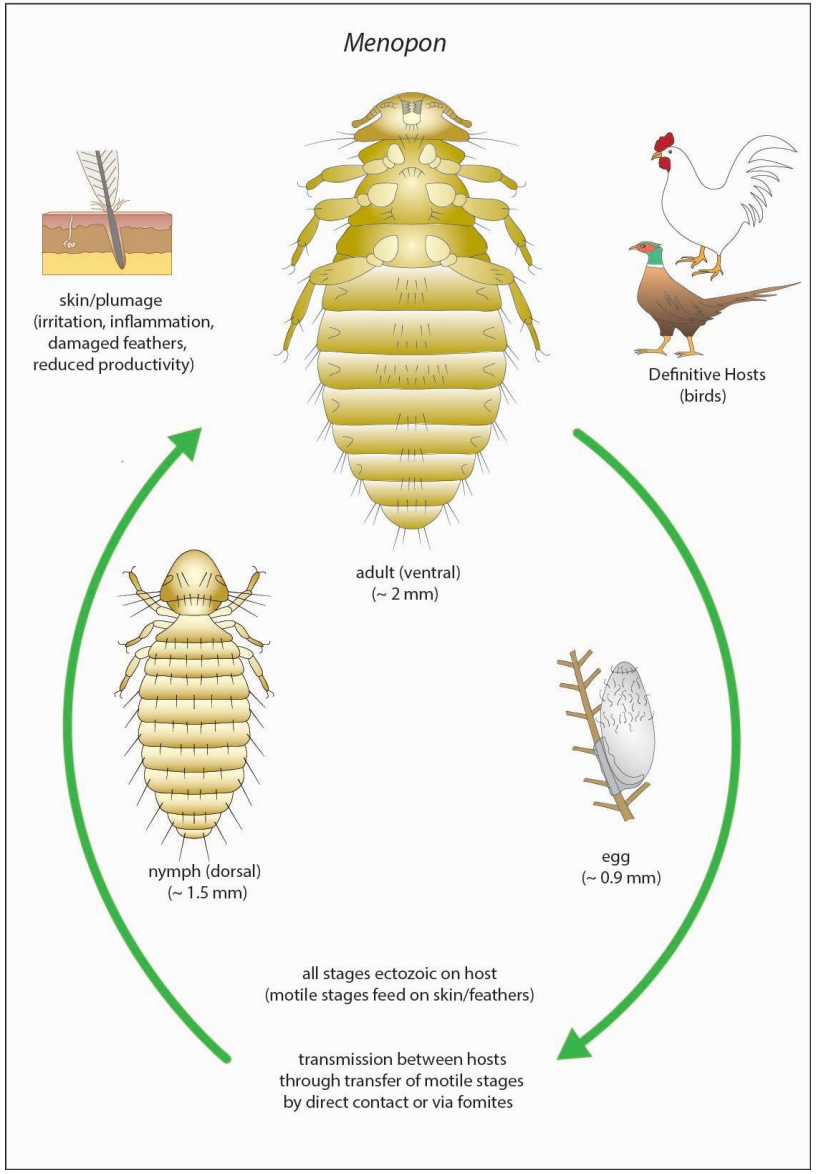


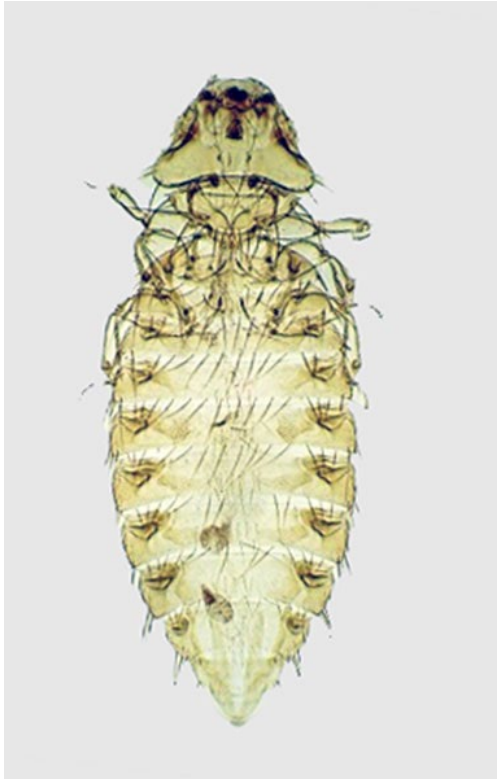


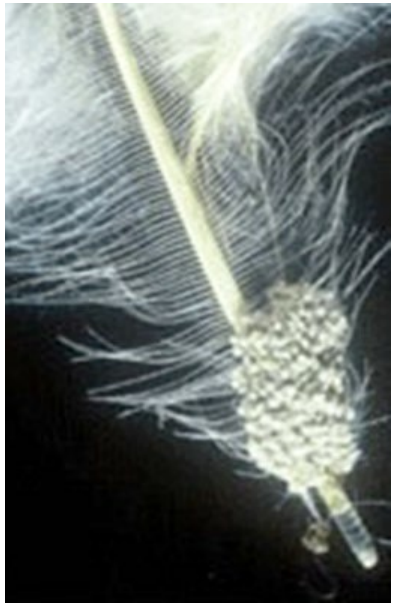

Melophagus
adult female
(dorsal) (~ 6 mm)
skin
(blood loss, irritation,
allergy, unthriftiness)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals)
wingless adults permanent ectoparasites
(cling to pelage and feed on blood)
(transmission by adults crawling between hosts in close contact)
resting posture
eclosion
eggs
in utero
larvate
complete
(holometabolous)
metamorphosis
pupa
(~ 4 mm)
larva in utero
(~ 3 mm)
egg in utero
(~ 1 mm)
adult females larviparous, deposit larvae
with glue that hardens immediately attaching puparium to pelage

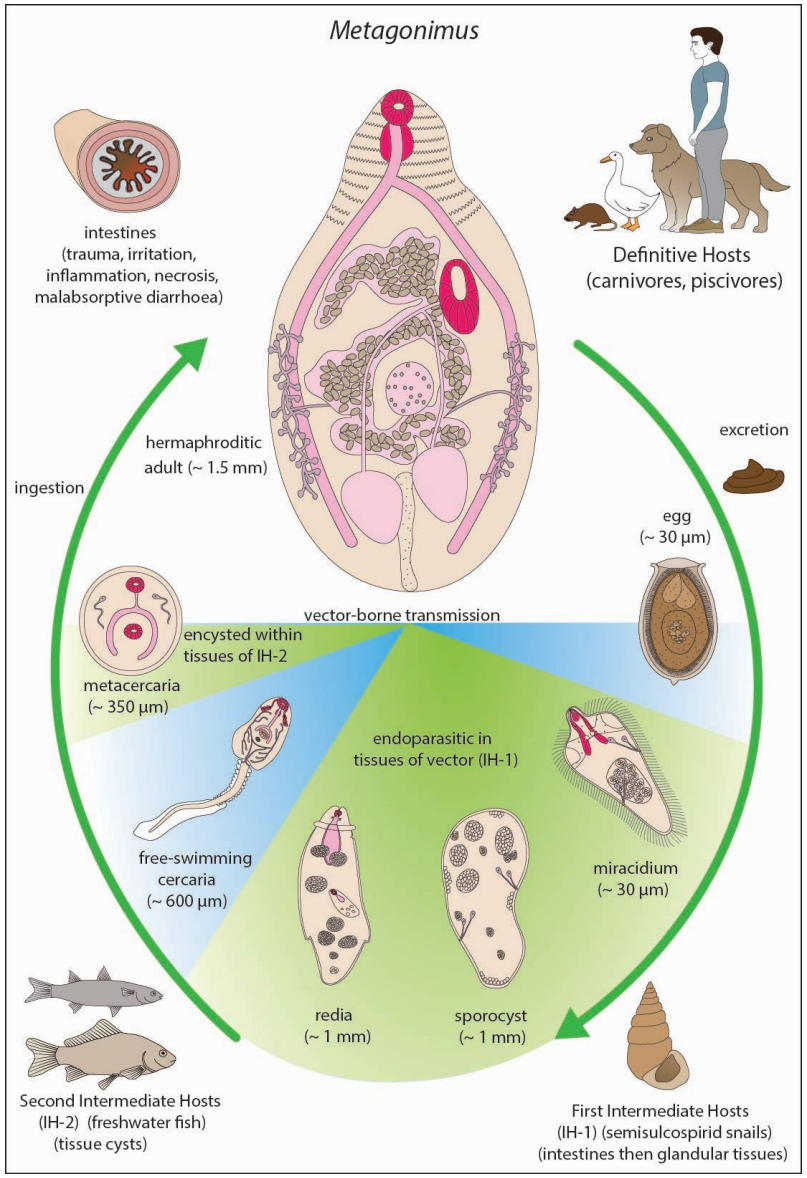

wiki


Menacanthus
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
Definitive Hosts
(birds)
adult (ventral)
(~ 2 mm)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 0.9 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

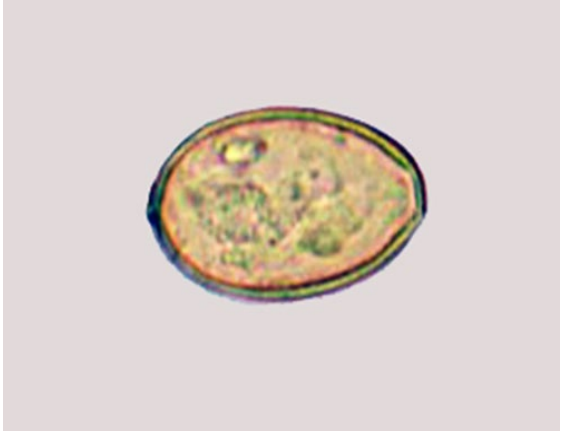

Menopon
skin/plumage
(irritation, inflammation,
damaged feathers,
reduced productivity)
adult (ventral)
(~ 2 mm)
Definitive Hosts
(birds)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 0.9 mm)
all stages ectozoic on host
(motile stages feed on skin/feathers)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

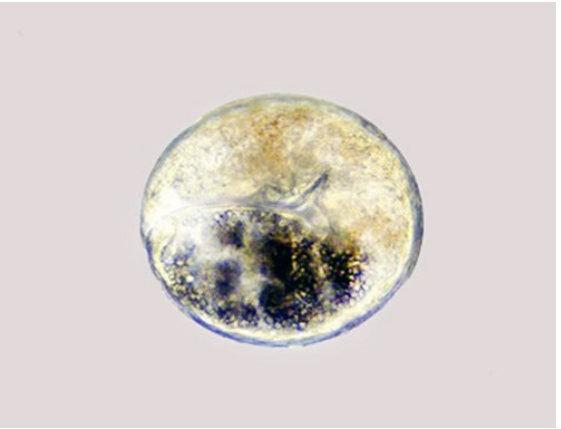


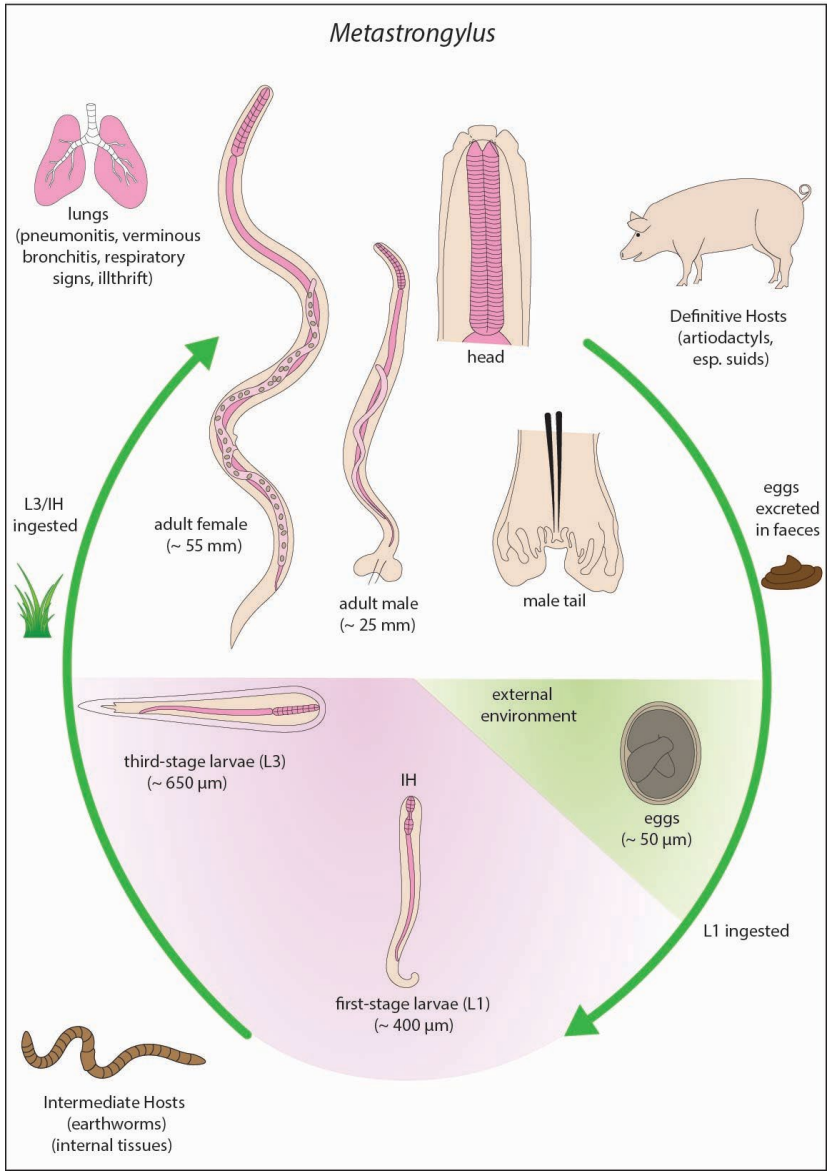


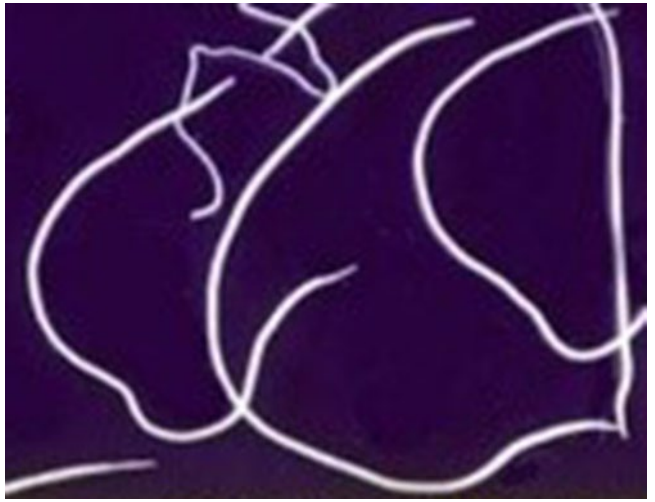

Metagonimus
intestines
(trauma, irritation,
inflammation, necrosis,
malabsorptive diarrhoea)
Definitive Hosts
(carnivores, piscivores)
excretion
hermaphroditic
adult (~ 1.5 mm)
ingestion
egg
(~ 30 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 350 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 600 µm)
miracidium
(~ 30 µm)
redia
(~ 1 mm)
sporocyst
(~ 1 mm)
Second Intermediate Hosts
(IH-2) (freshwater fish)
(tissue cysts)
First Intermediate Hosts
(IH-1) (semisulcospirid snails)
(intestines then glandular tissues)

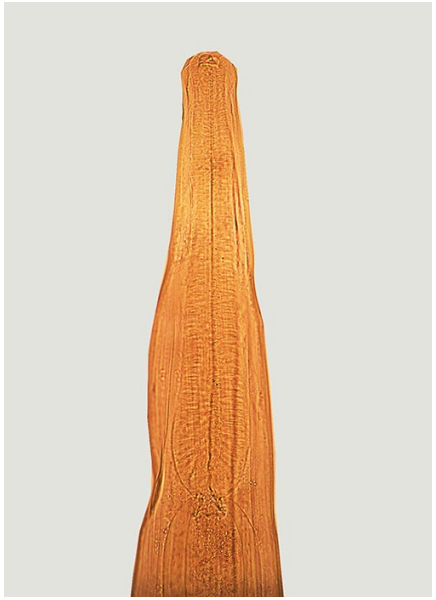

wiki

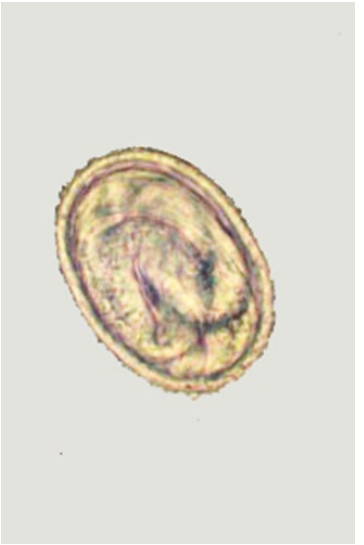


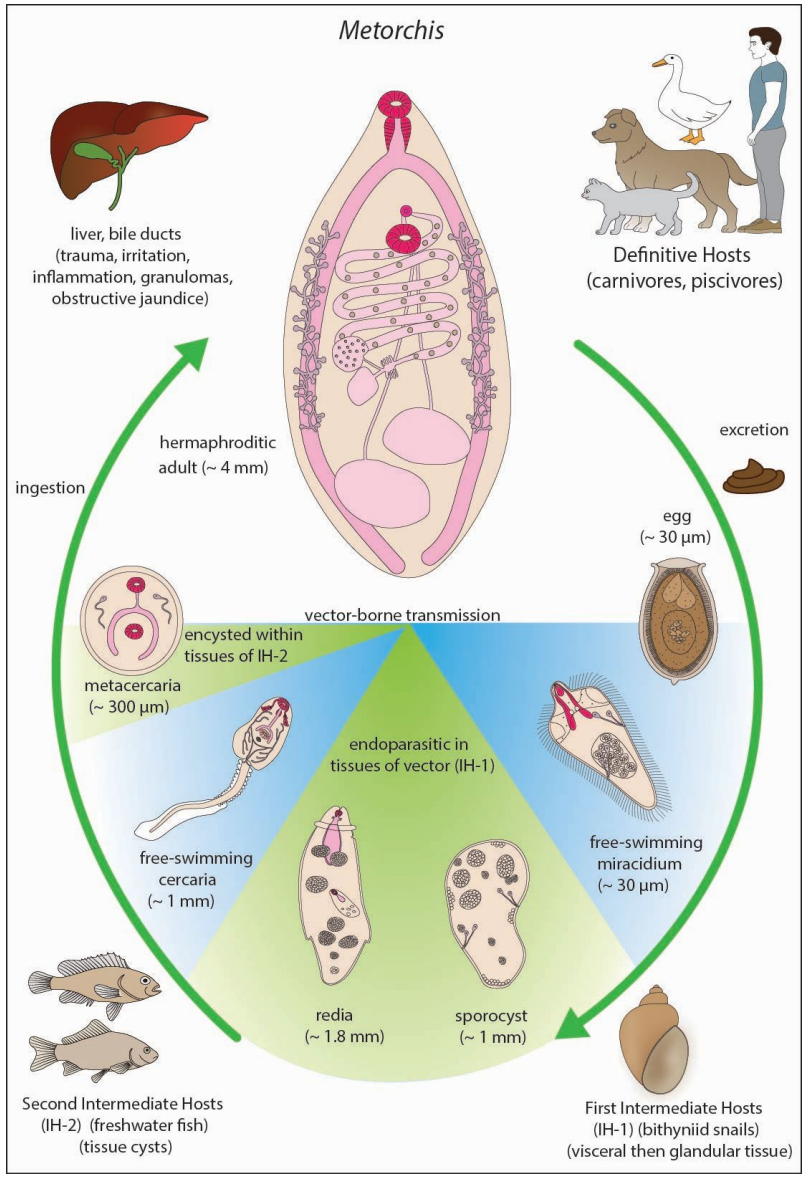


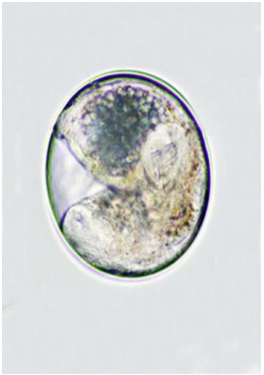

Metastrongylus
lungs
(pneumonitis, verminous
bronchitis, respiratory
signs, illthrift)
head
Definitive Hosts
(artiodactyls,
esp. suids)
L3/IH
ingested
adult female
(~ 55 mm)
adult male
(~ 25 mm)
male tail
eggs
excreted
in faeces
external
environment
third-stage larvae (L3)
(~ 650 µm)
IH
eggs
(~ 50 µm)
L1 ingested
first-stage larvae (L1)
(~ 400 µm)
Intermediate Hosts
(earthworms)
(internal tissues)

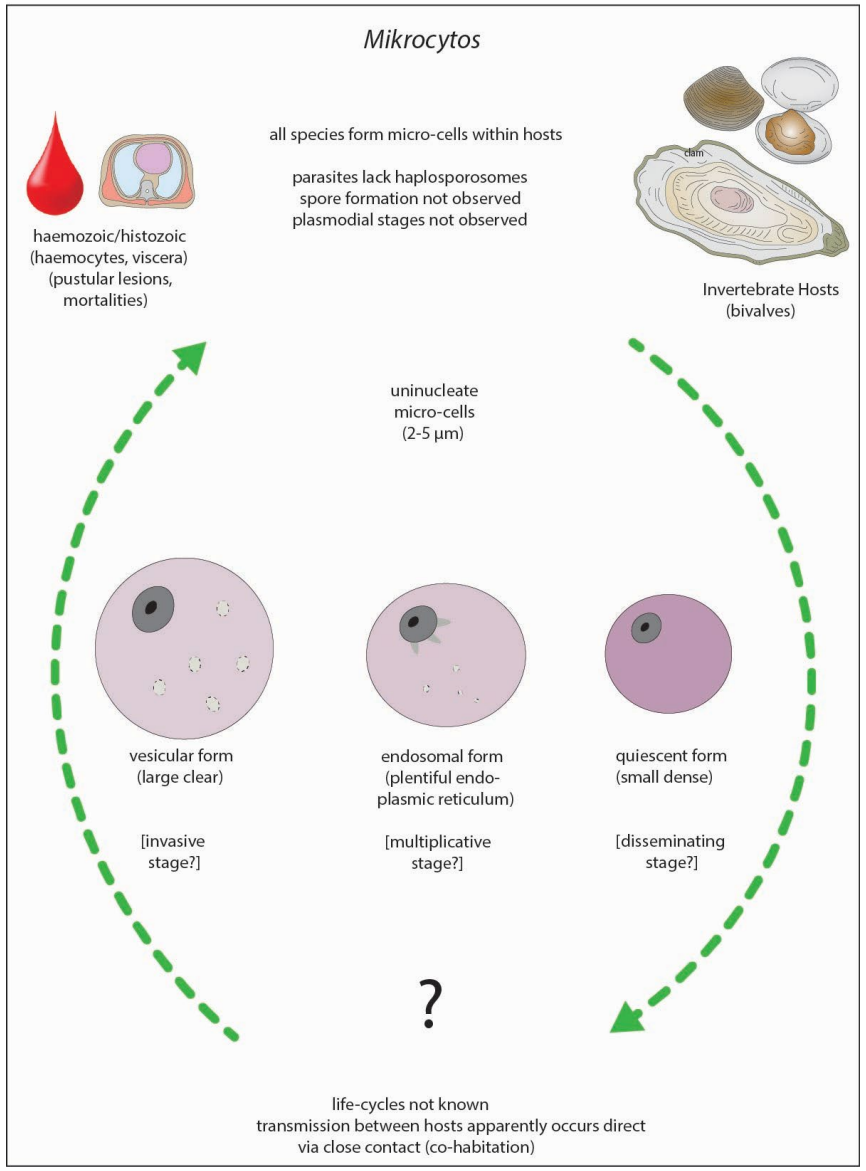


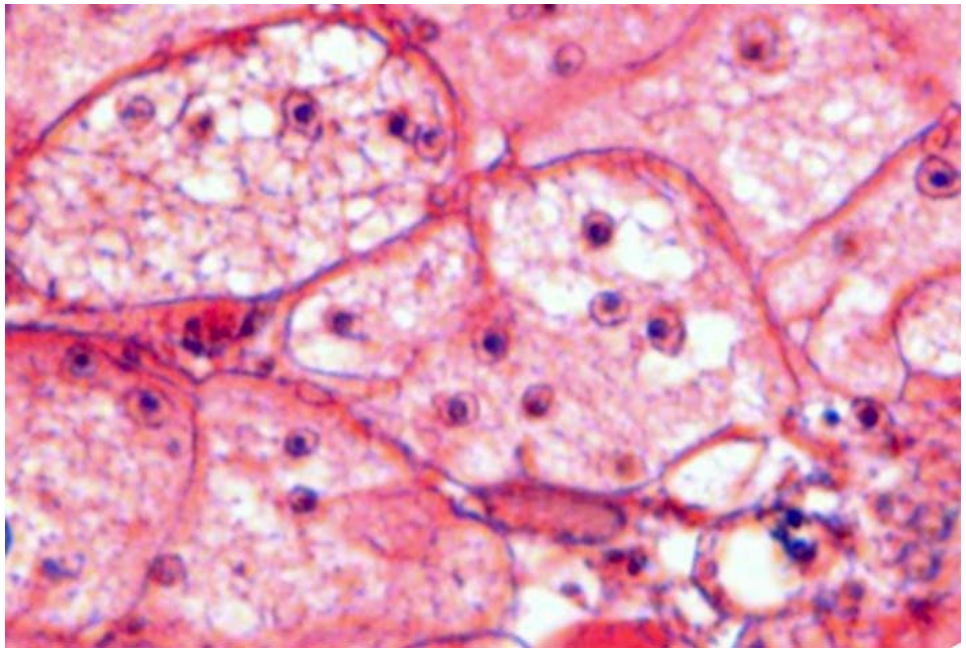


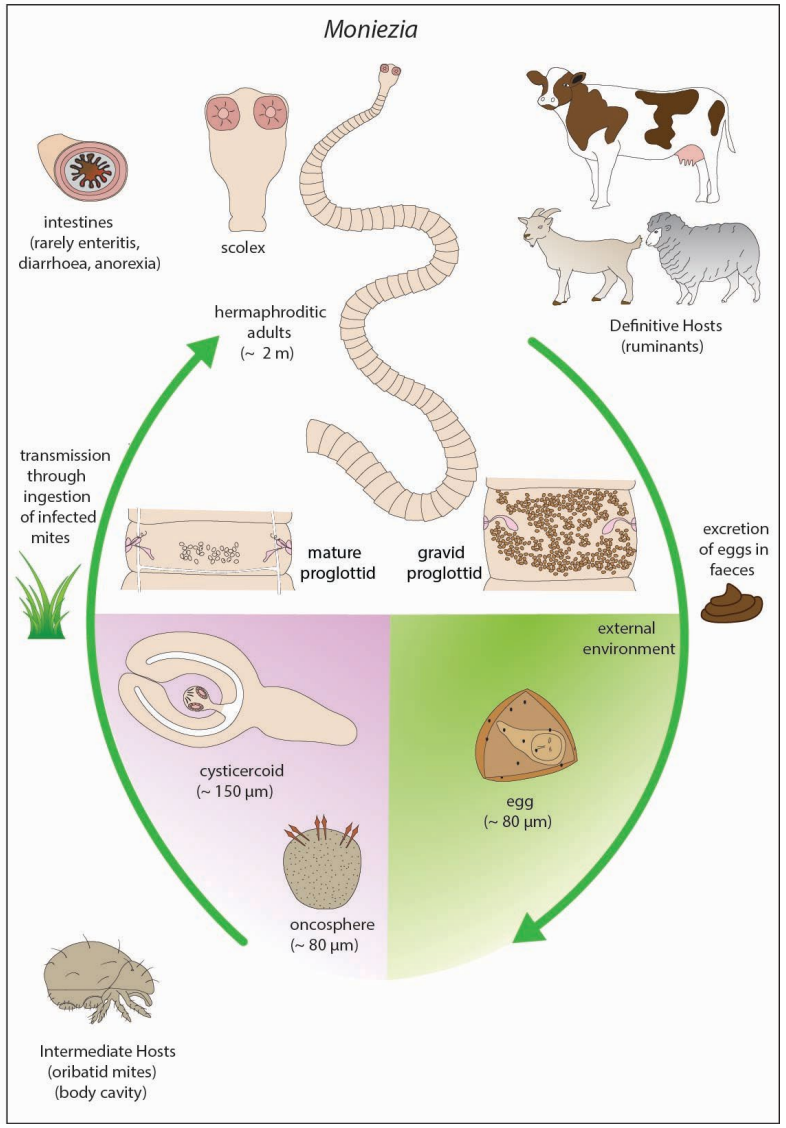


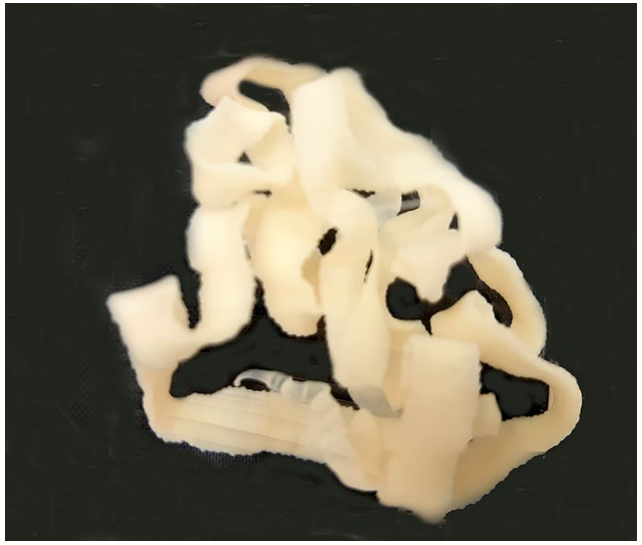

Metorchis
liver, bile ducts
(trauma, irritation,
inflammation, granulomas,
obstructive jaundice)
Definitive Hosts
(carnivores, piscivores)
hermaphroditic
adult (~ 4 mm)
excretion
ingestion
egg
(~ 30 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 300 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 1 mm)
free-swimming
miracidium
(~ 30 µm)
redia
(~ 1.8 mm)
sporocyst
(~ 1 mm)
Second Intermediate Hosts
(IH-2) (freshwater fish)
(tissue cysts)
First Intermediate Hosts
(IH-1) (bithyniid snails)
(visceral then glandular tissue)

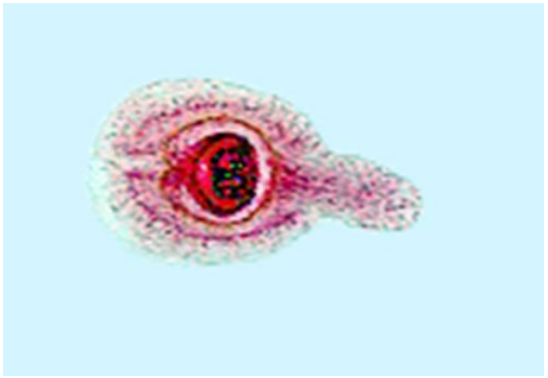


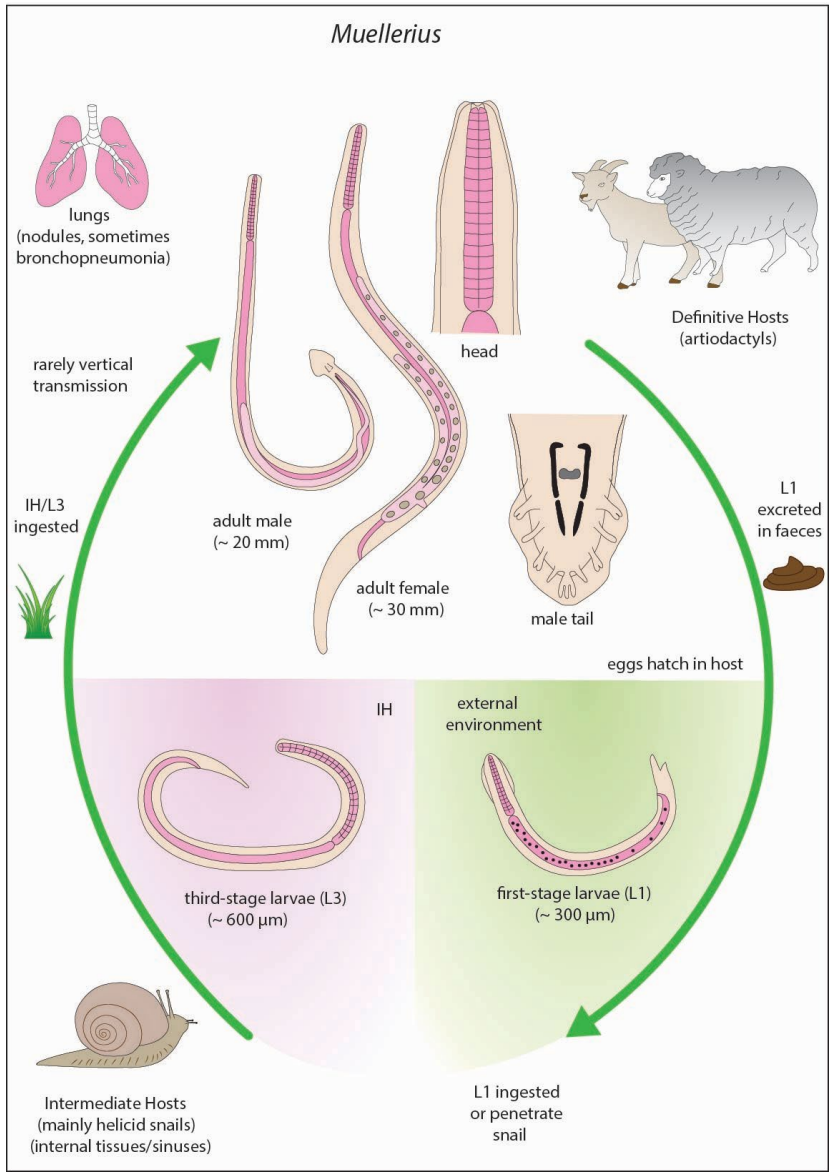

Mikrocytos
all species form micro-cells within hosts
parasites lack haplosporosomes
spore formation not observed
plasmodial stages not observed
haemozoic/histozoic
(haemocytes, viscera)
(pustular lesions,
mortalities)
clam
Invertebrate Hosts
(bivalves)
uninucleate
micro-cells
(2-5 µm)
vesicular form
(large clear)
[invasive
stage?]
endosomal form
(plentiful endo-
plasmic reticulum)
[multiplicative
stage?]
quiescent form
(small dense)
[disseminating
stage?]
?
life-cycles not known
transmission between hosts apparently occurs direct
via close contact (co-habitation)

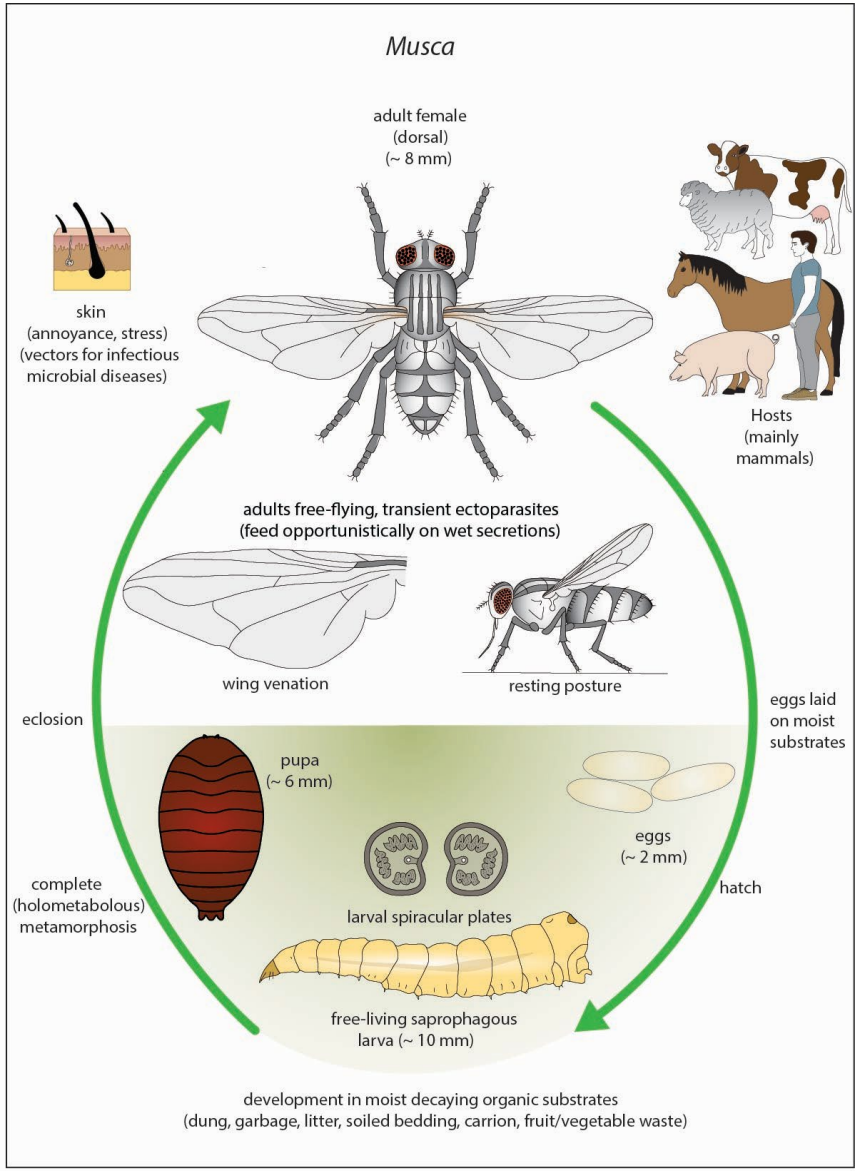



Moniezia
intestines
(rarely enteritis,
diarrhoea, anorexia)
scolex
hermaphroditic
adults
(~ 2 m)
Definitive Hosts
(ruminants)
transmission
through
ingestion
of infected
mites
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 150 µm)
egg
(~ 80 µm)
oncosphere
(~ 80 µm)
Intermediate Hosts
(oribatid mites)
(body cavity)

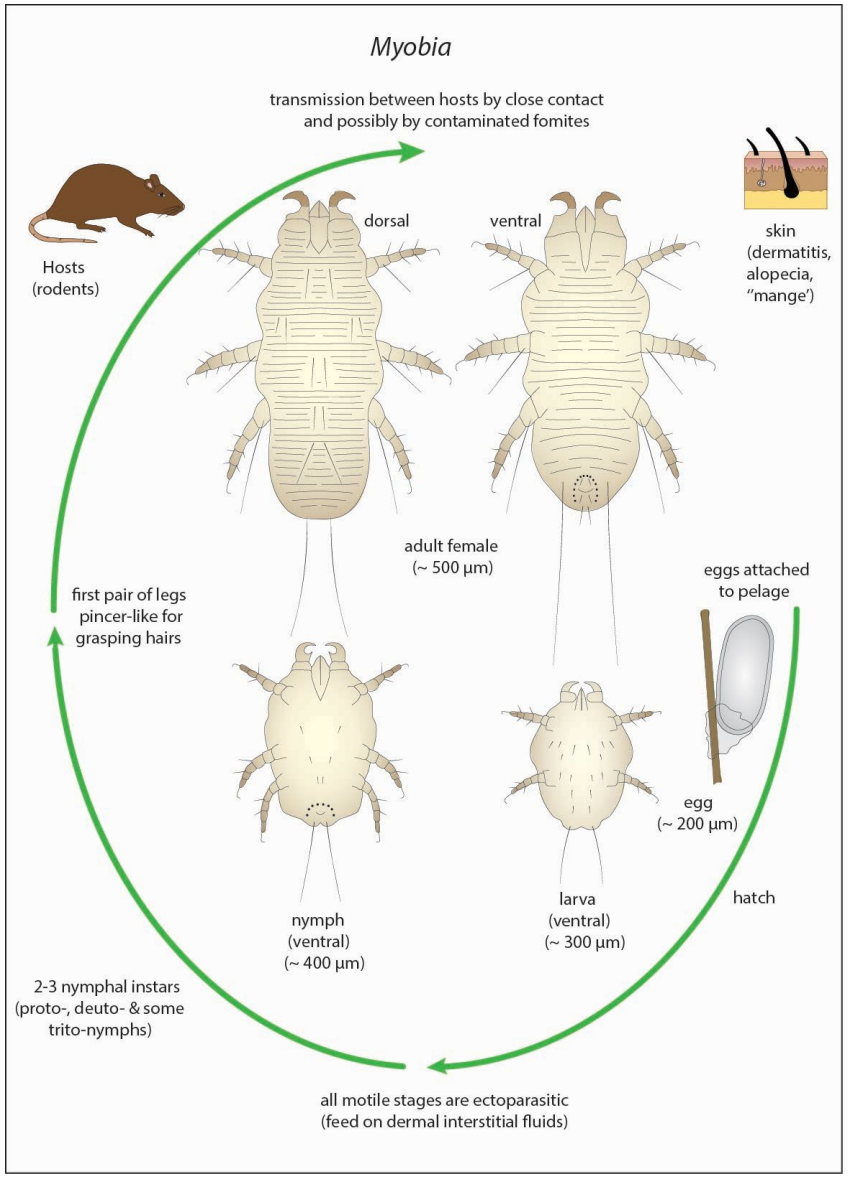


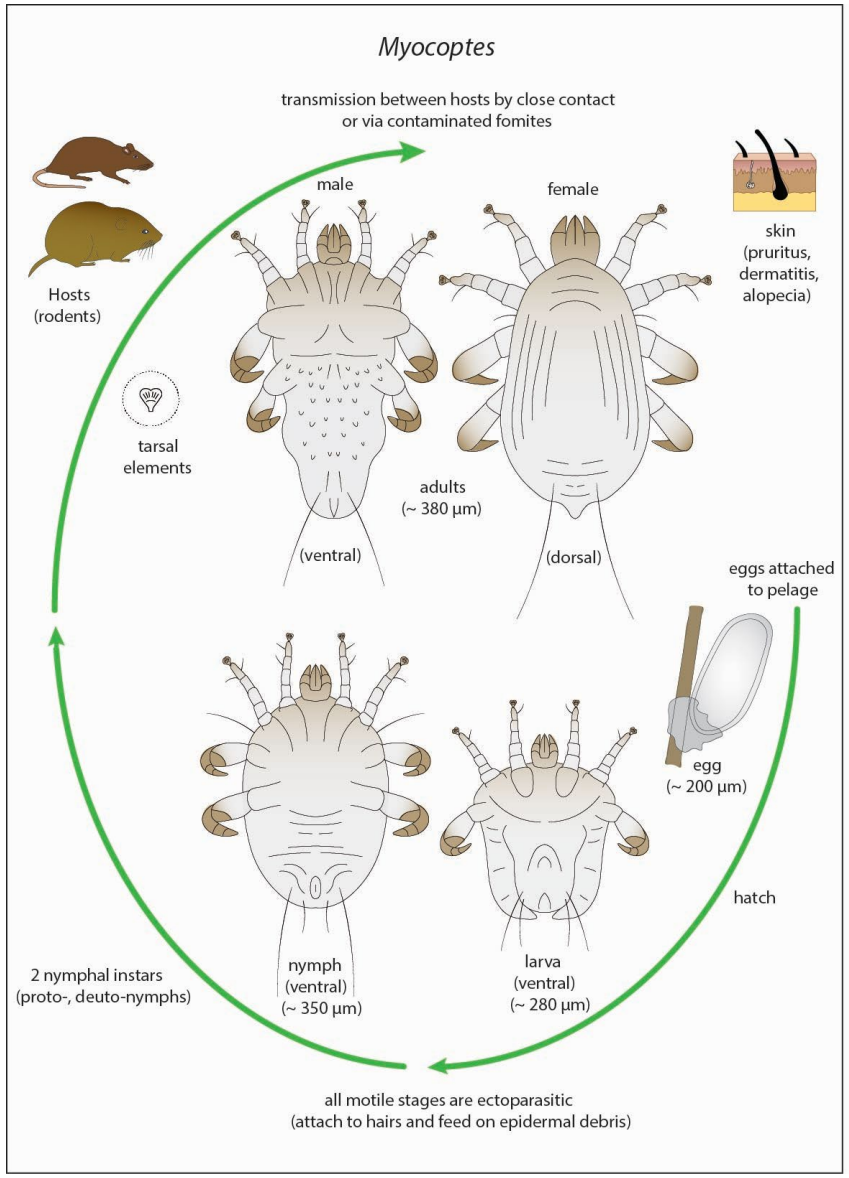


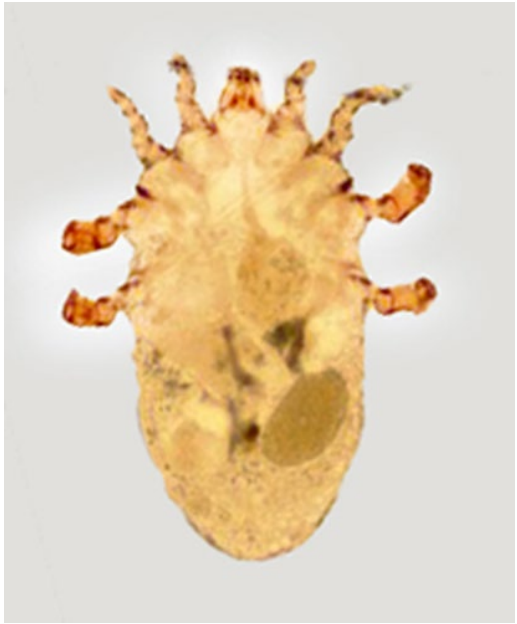

Muellerius
lungs
(nodules, sometimes
bronchopneumonia)
head
Definitive Hosts
(artiodactyls)
rarely vertical
transmission
IH/L3
ingested
adult male
(~ 20 mm)
adult female
(~ 30 mm)
male tail
L1
excreted
in faeces
eggs hatch in host
IH
external
environment
third-stage larvae (L3)
(~ 600 µm)
first-stage larvae (L1)
(~ 300 µm)
Intermediate Hosts
(mainly helicid snails)
(internal tissues/sinuses)
L1 ingested
or penetrate
snail

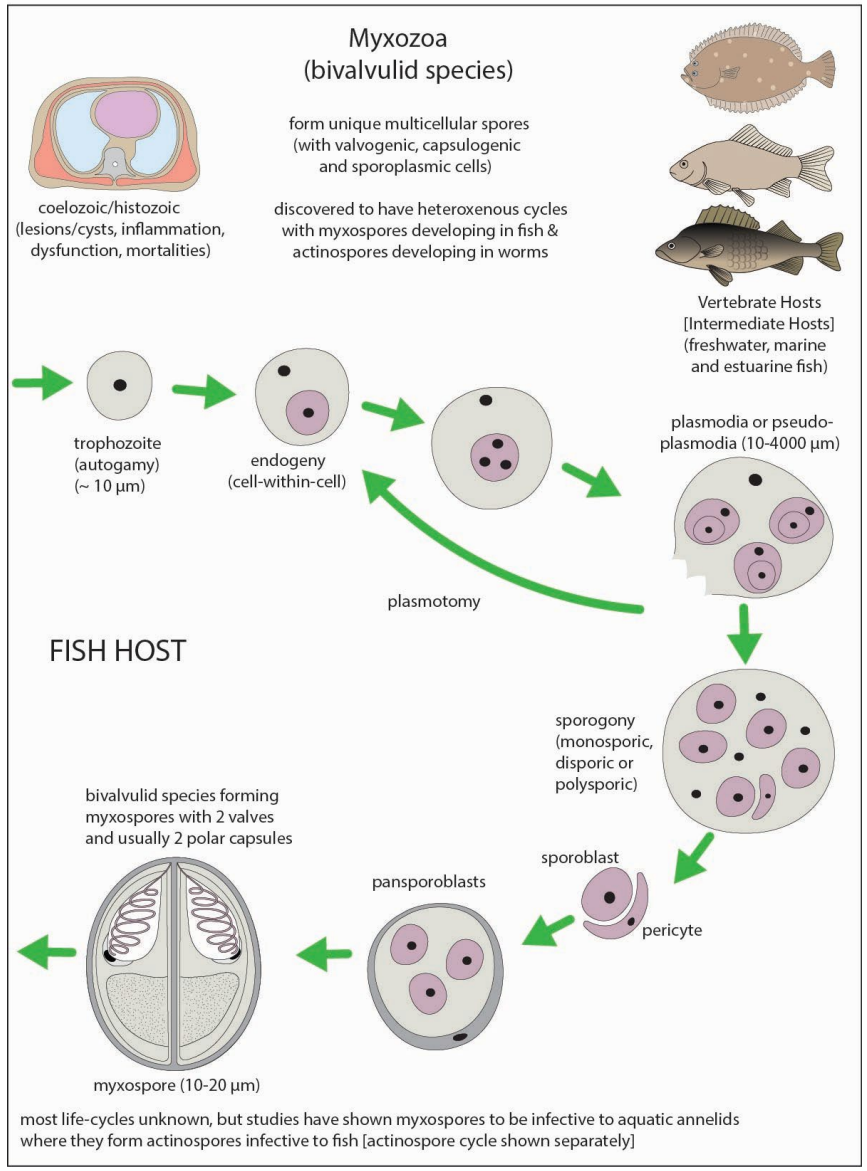

Musca
adult female
(dorsal)
(~ 8 mm)
skin
(annoyance, stress)
(vectors for infectious
microbial diseases)
Hosts
(mainly
mammals)
adults free-flying, transient ectoparasites
(feed opportunistically on wet secretions)
wing venation
resting posture
eclosion
eggs laid
on moist
substrates
pupa
(~ 6 mm)
eggs
(~ 2 mm)
complete
(holometabolous)
metamorphosis
hatch
larval spiracular plates
free-living saprophagous
larva (~ 10 mm)
development in moist decaying organic substrates
(dung, garbage, litter, soiled bedding, carrion, fruit/vegetable waste)

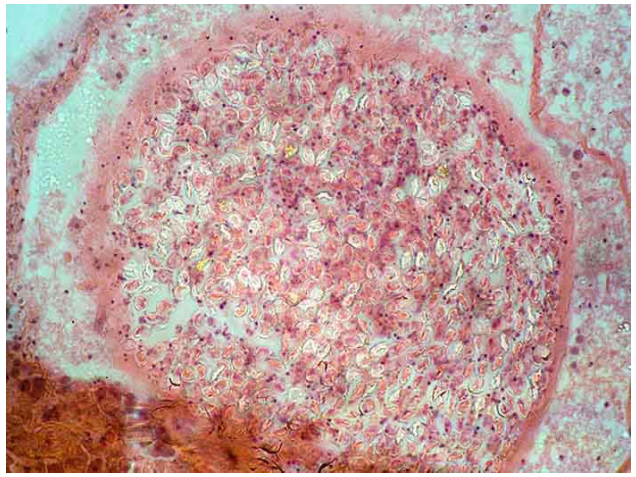

wiki

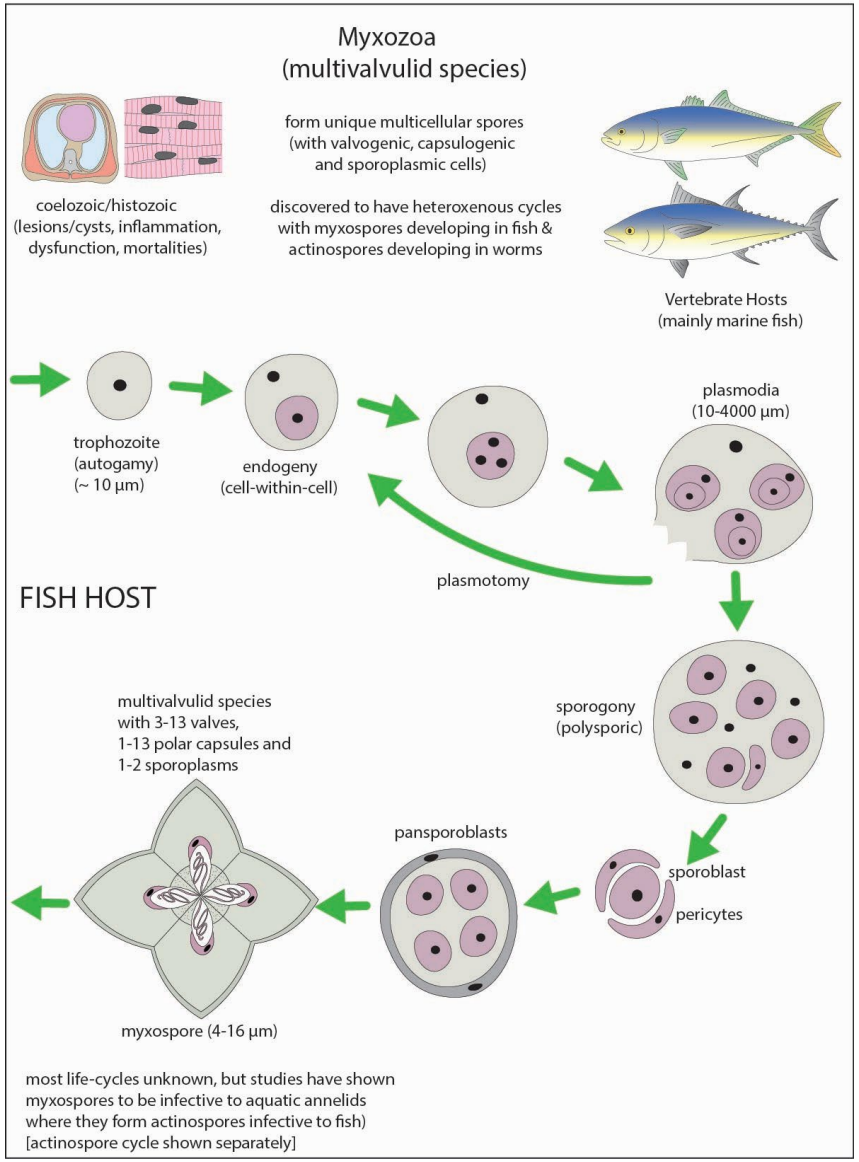

Myobia
transmission between hosts by close contact
and possibly by contaminated fomites
Hosts
(rodents)
dorsal
ventral
skin
(dermatitis,
alopecia,
"mange')
adult female
(~ 500 µm)
eggs attached
to pelage
first pair of legs
pincer-like for
grasping hairs
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 400 µm)
larva
(ventral)
(~ 300 µm)
2-3 nymphal instars
(proto-, deuto- & some
trito-nymphs)
all motile stages are ectoparasitic
(feed on dermal interstitial fluids)

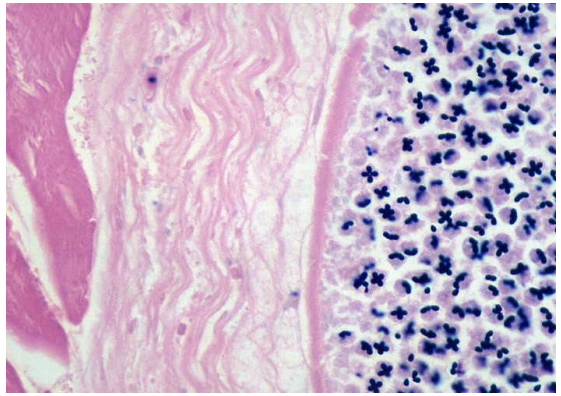

Myocoptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(rodents)
male
female
skin
(pruritus,
dermatitis,
alopecia)
tarsal
elements
adults
(~ 380 µm)
(ventral)
(dorsal)
eggs attached
to pelage
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 350 µm)
larva
(ventral)
(~ 280 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(attach to hairs and feed on epidermal debris)

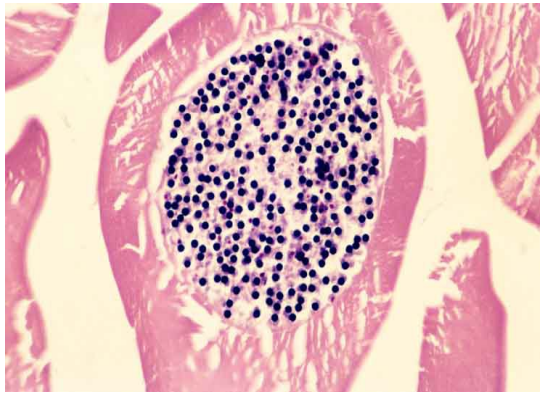


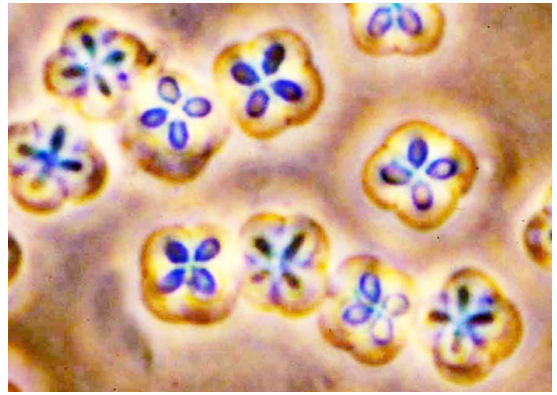

Myxozoa
(bivalvulid species)
form unique multicellular spores
(with valvogenic, capsulogenic
and sporoplasmic cells)
discovered to have heteroxenous cycles
with myxospores developing in fish &
actinospores developing in worms
coelozoic/histozoic
(lesions/cysts, inflammation,
dysfunction, mortalities)
Vertebrate Hosts
[Intermediate Hosts]
(freshwater, marine
and estuarine fish)
trophozoite
(autogamy)
(~ 10 µm)
endogeny
(cell-within-cell)
plasmodia or pseudo-
plasmodia (10-4000 µm)
plasmotomy
FISH HOST
sporogony
(monosporic,
disporic or
polysporic)
bivalvulid species forming
myxospores with 2 valves
and usually 2 polar capsules
sporoblast
pansporoblasts
pericyte
myxospore (10-20 µm)
most life-cycles unknown, but studies have shown myxospores to be infective to aquatic annelids
where they form actinospores infective to fish [actinospore cycle shown separately]

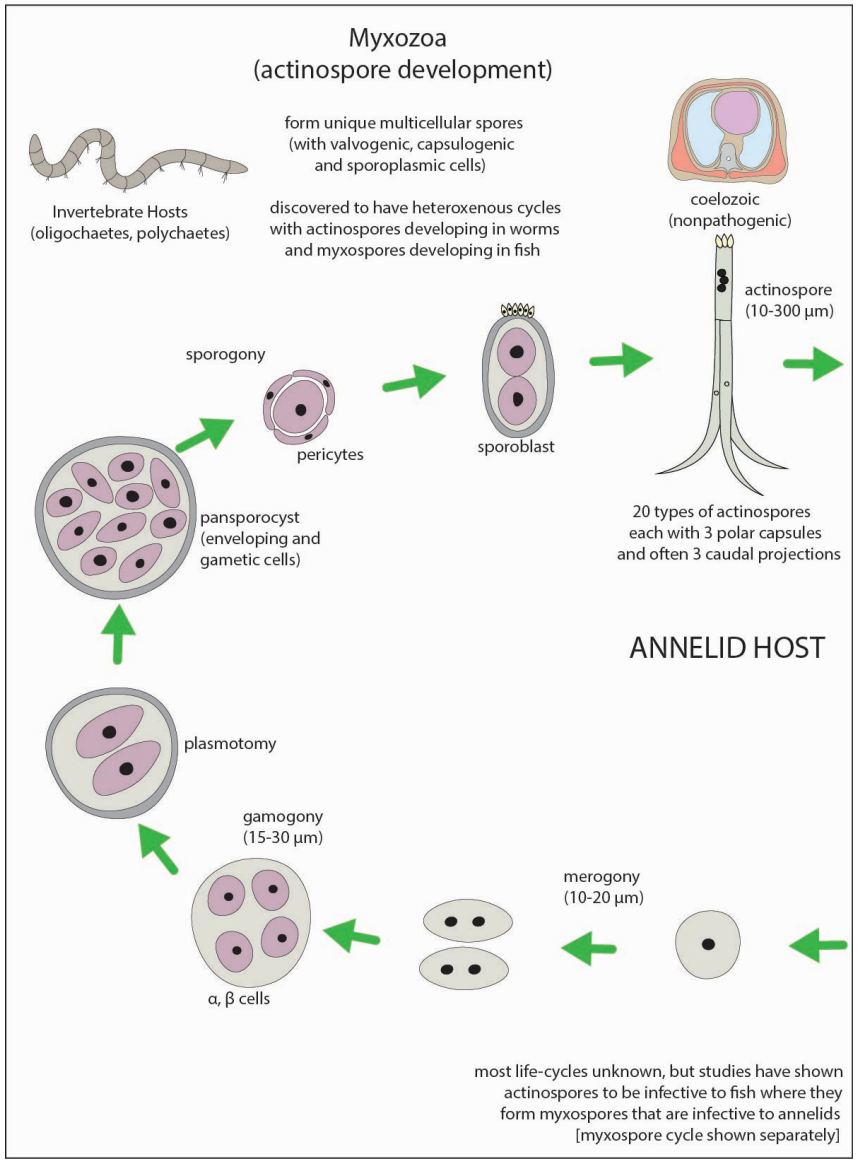


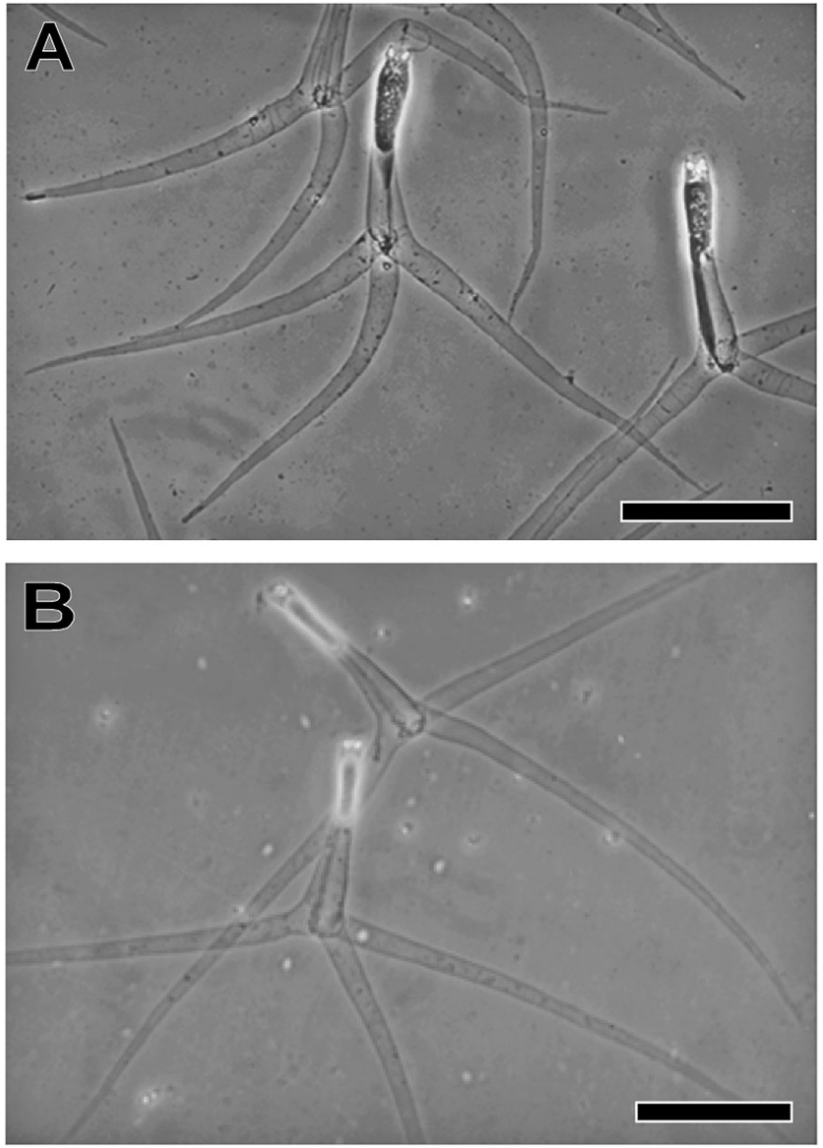

Myxozoa
(multivalvulid species)
coelozoic/histozoic
(lesions/cysts, inflammation,
dysfunction, mortalities)
form unique multicellular spores
(with valvogenic, capsulogenic
and sporoplasmic cells)
discovered to have heteroxenous cycles
with myxospores developing in fish &
actinospores developing in worms
Vertebrate Hosts
(mainly marine fish)
trophozoite
(autogamy)
(~ 10 µm)
endogeny
(cell-within-cell)
plasmodia
(10-4000 µm)
plasmotomy
FISH HOST
sporogony
(polysporic)
multivalvulid species
with 3-13 valves,
1-13 polar capsules and
1-2 sporoplasms
pansporoblasts
sporoblast
pericytes
myxospore (4-16 µm)
most life-cycles unknown, but studies have shown
myxospores to be infective to aquatic annelids
where they form actinospores infective to fish)
[actinospore cycle shown separately]

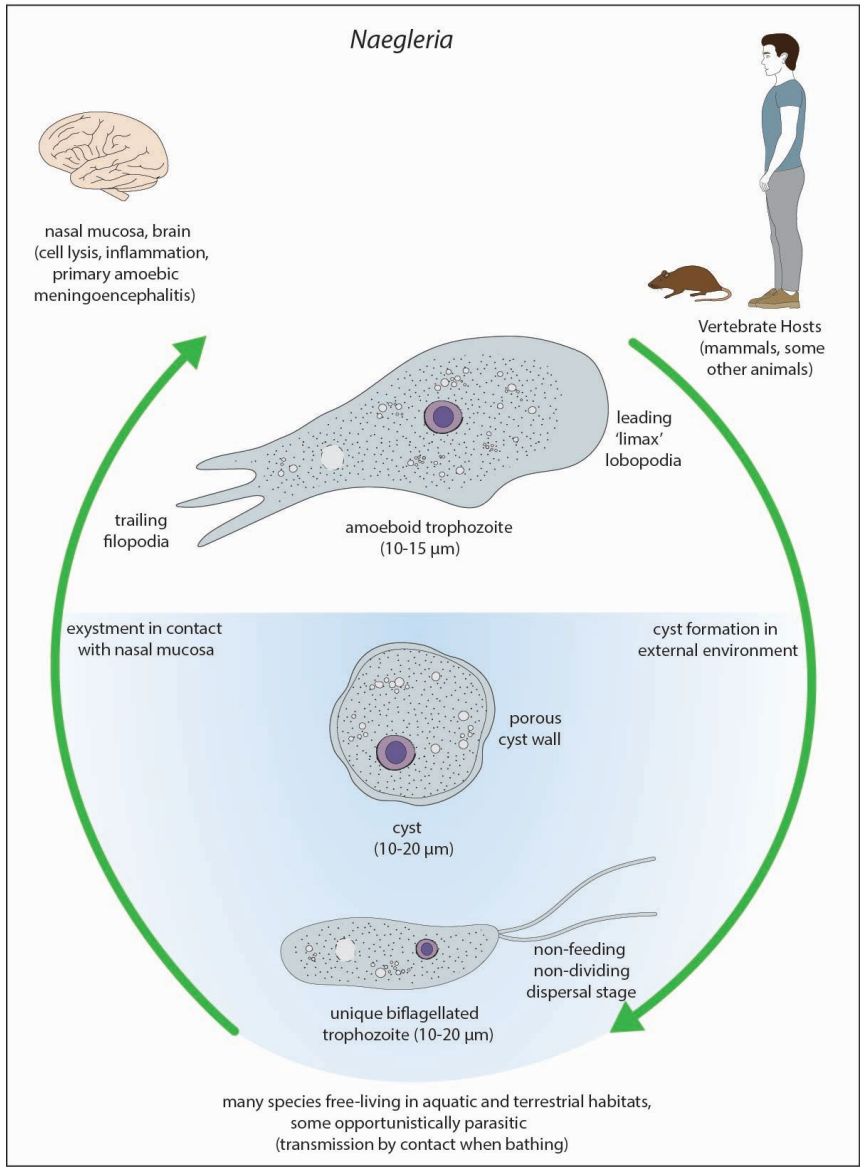


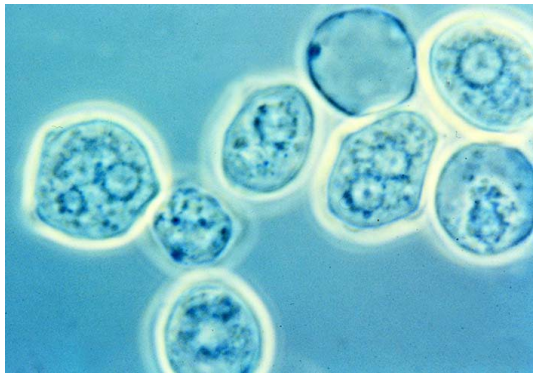


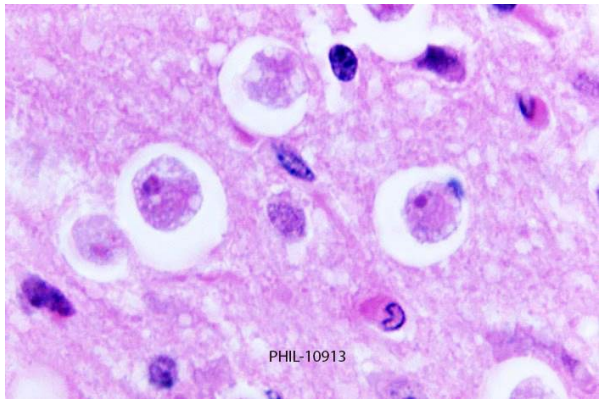


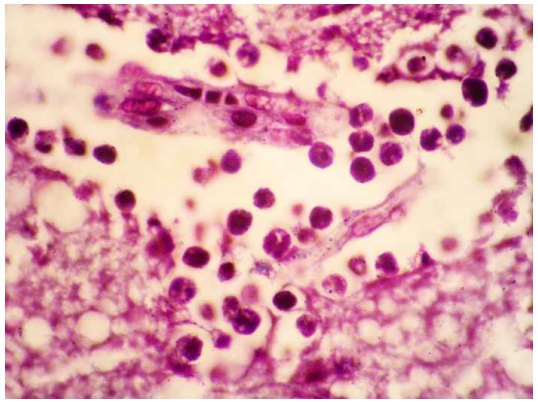

Myxozoa
(actinospore development)
form unique multicellular spores
(with valvogenic, capsulogenic
and sporoplasmic cells)
discovered to have heteroxenous cycles
with actinospores developing in worms
and myxospores developing in fish
Invertebrate Hosts
(oligochaetes, polychaetes)
coelozoic
(nonpathogenic)
actinospore
(10-300 µm)
sporogony
pericytes
sporoblast
pansporocyst
(enveloping and
gametic cells)
20 types of actinospores
each with 3 polar capsules
and often 3 caudal projections
ANNELID HOST
plasmotomy
gamogony
(15-30 µm)
merogony
(10-20 µm)
α, β cells
most life-cycles unknown, but studies have shown
actinospores to be infective to fish where they
form myxospores that are infective to annelids
[myxospore cycle shown separately]

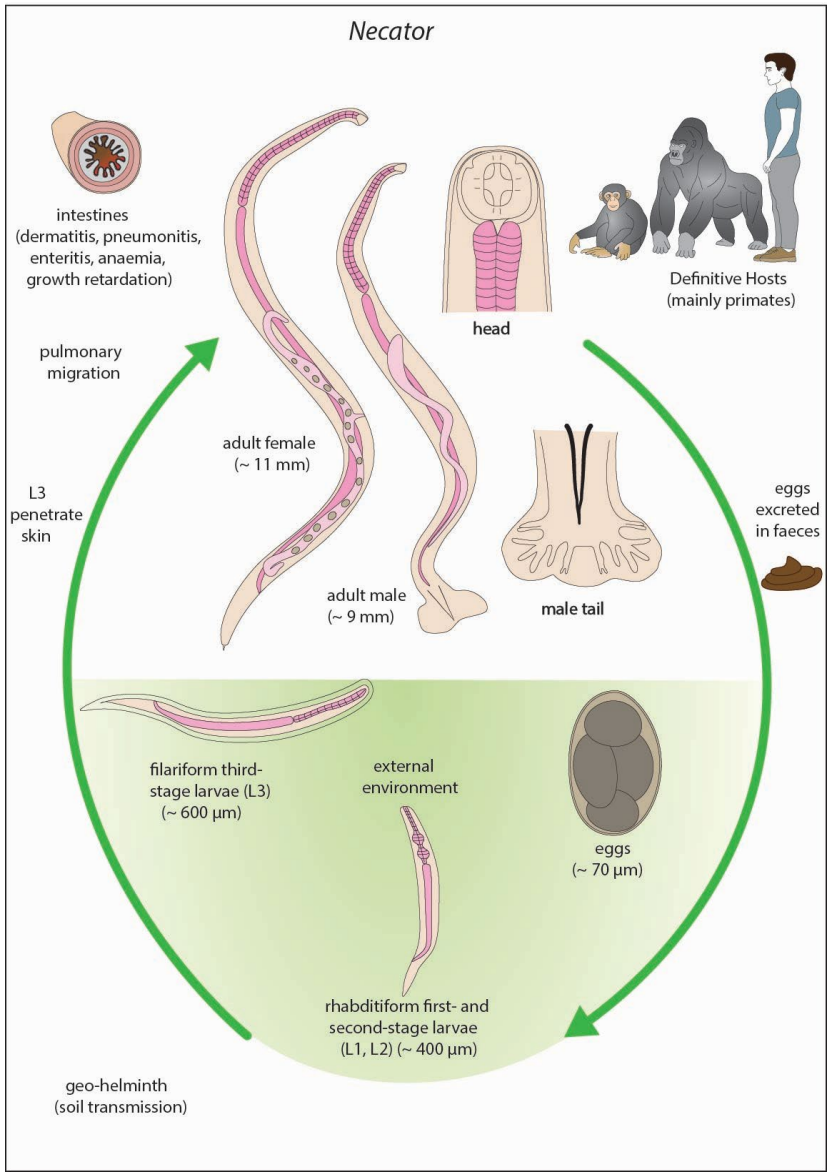

A
B

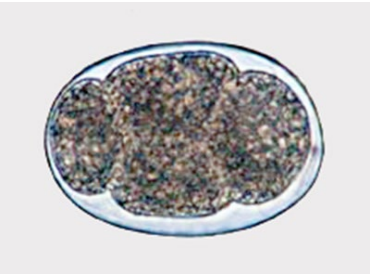

Naegleria
nasal mucosa, brain
(cell lysis, inflammation,
primary amoebic
meningoencephalitis)
Vertebrate Hosts
(mammals, some
other animals)
leading
'limax'
lobopodia
trailing
filopodia
amoeboid trophozoite
(10-15 µm)
exystment in contact
with nasal mucosa
cyst formation in
external environment
porous
cyst wall
cyst
(10-20 µm)
non-feeding
non-dividing
dispersal stage
unique biflagellated
trophozoite (10-20 µm)
many species free-living in aquatic and terrestrial habitats,
some opportunistically parasitic
(transmission by contact when bathing)

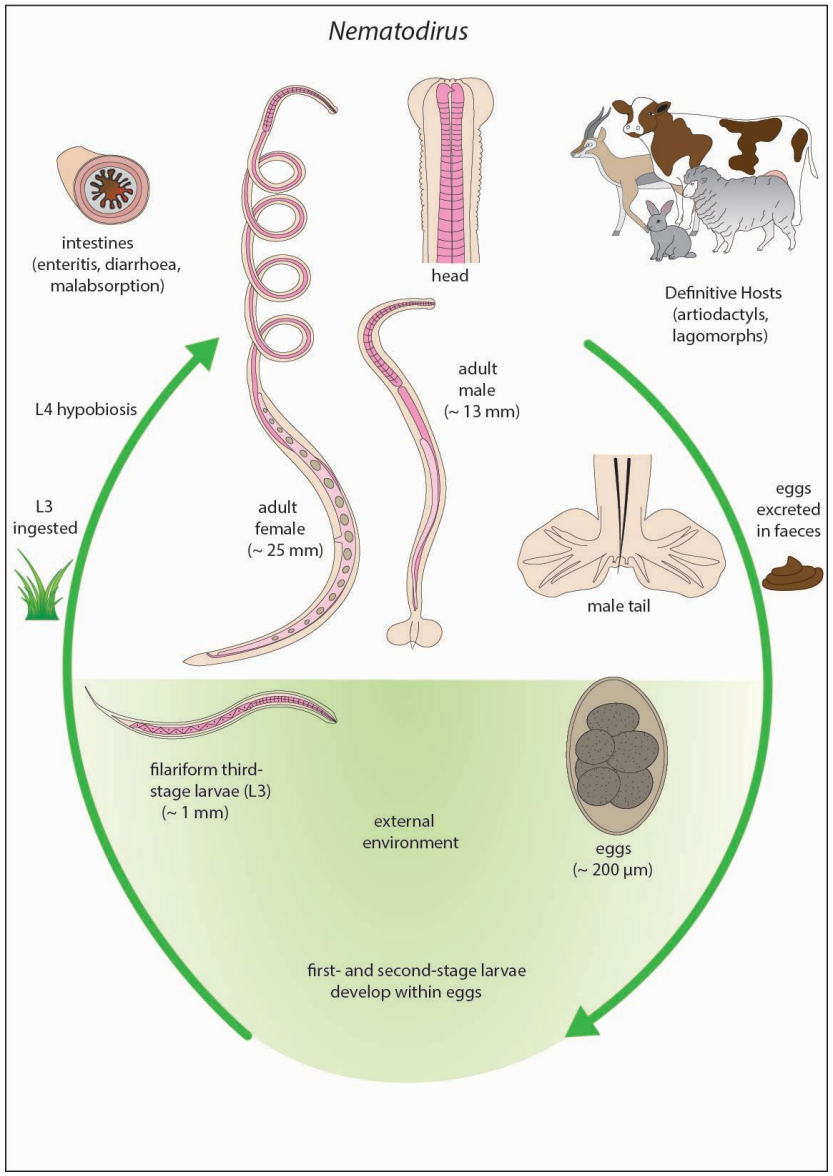



PHIL-10913

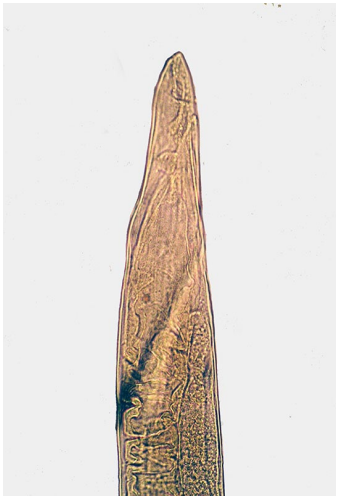


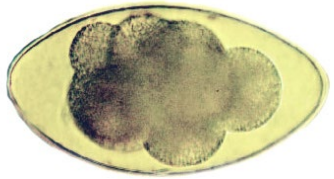

Necator
intestines
(dermatitis, pneumonitis,
enteritis, anaemia,
growth retardation)
pulmonary
migration
L3
penetrate
skin
adult female
(~ 11 mm)
adult male
(~ 9 mm)
head
male tail
Definitive Hosts
(mainly primates)
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 600 µm)
external
environment
eggs
(~ 70 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 400 µm)
geo-helminth
(soil transmission)

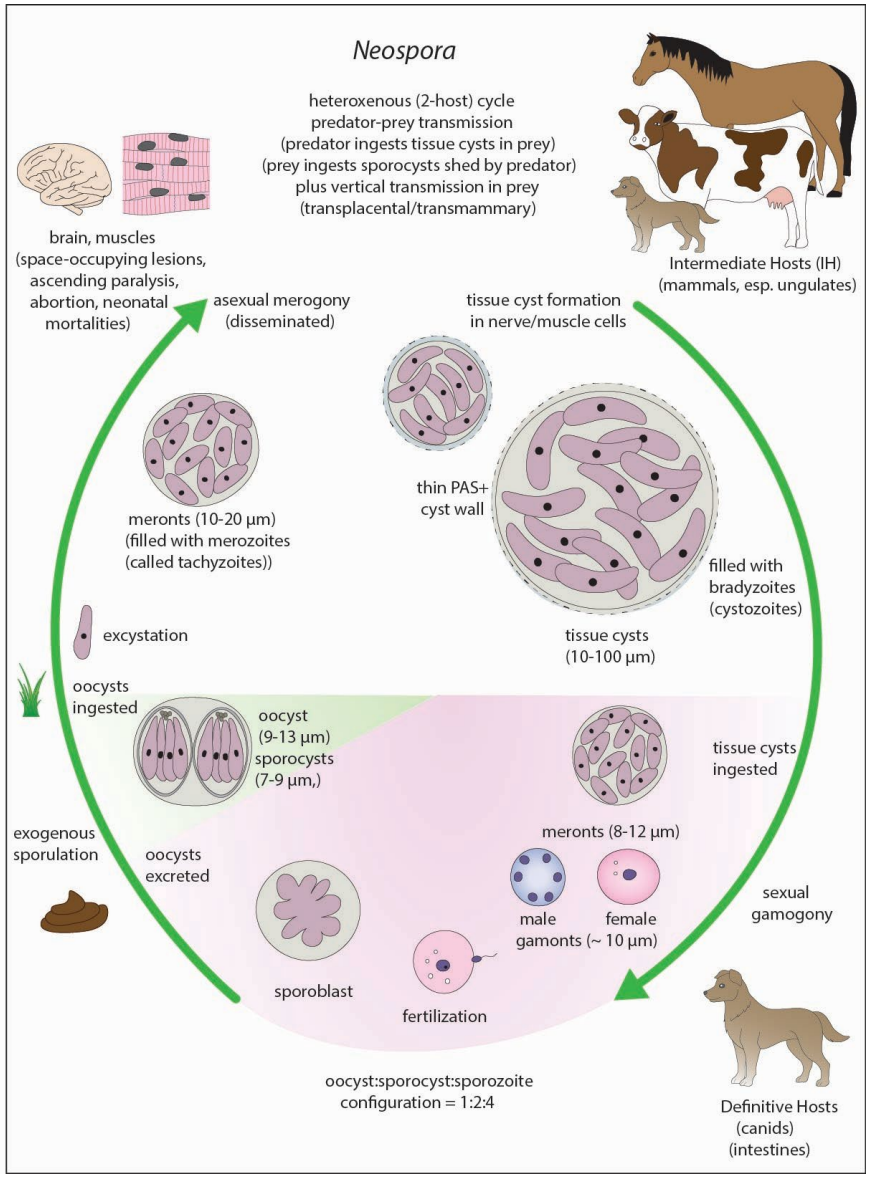


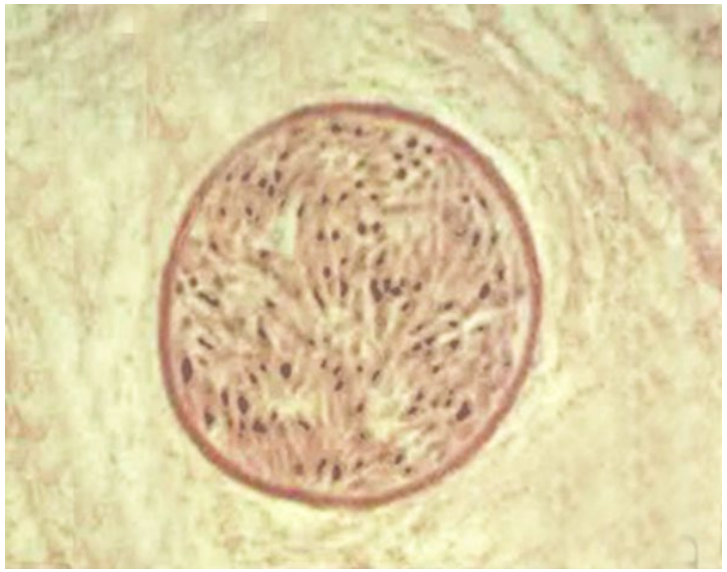

Nematodirus
intestines
(enteritis, diarrhoea,
malabsorption)
head
Definitive Hosts
(artiodactyls,
lagomorphs)
adult
male
(~ 13 mm)
L4 hypobiosis
L3
ingested
adult
female
(~ 25 mm)
eggs
excreted
in faeces
male tail
filariform third-
stage larvae (L3)
(~ 1 mm)
external
environment
eggs
(~ 200 µm)
first- and second-stage larvae
develop within eggs

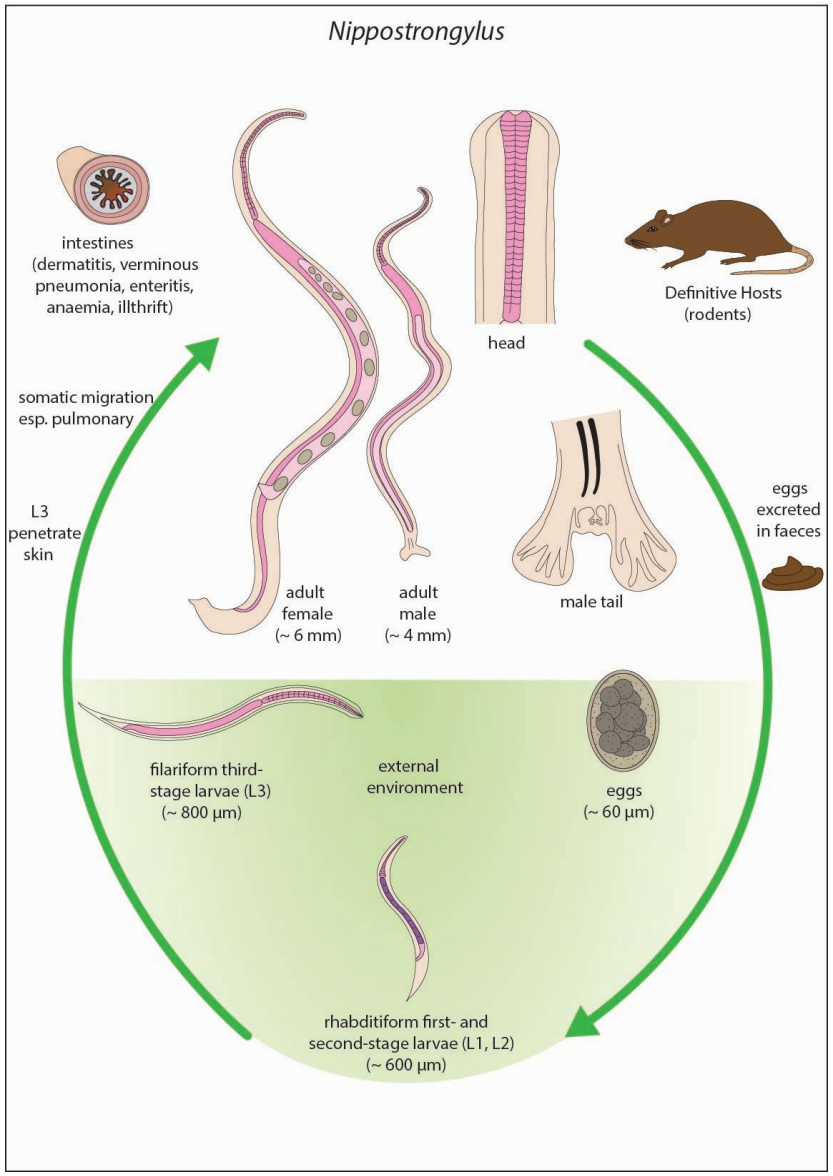

wiki

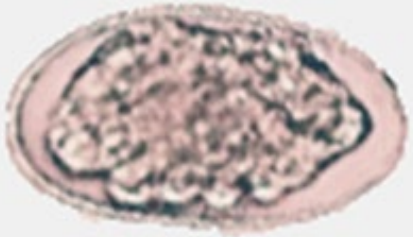


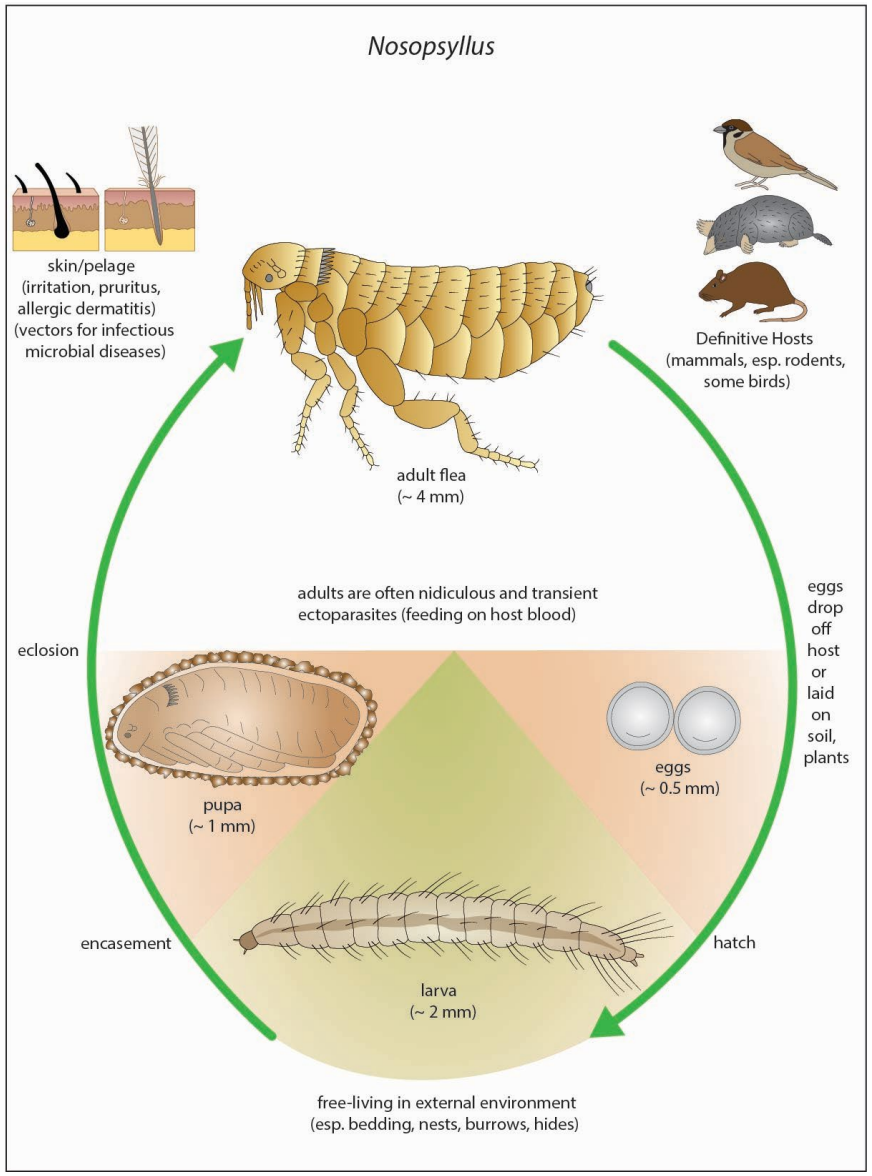


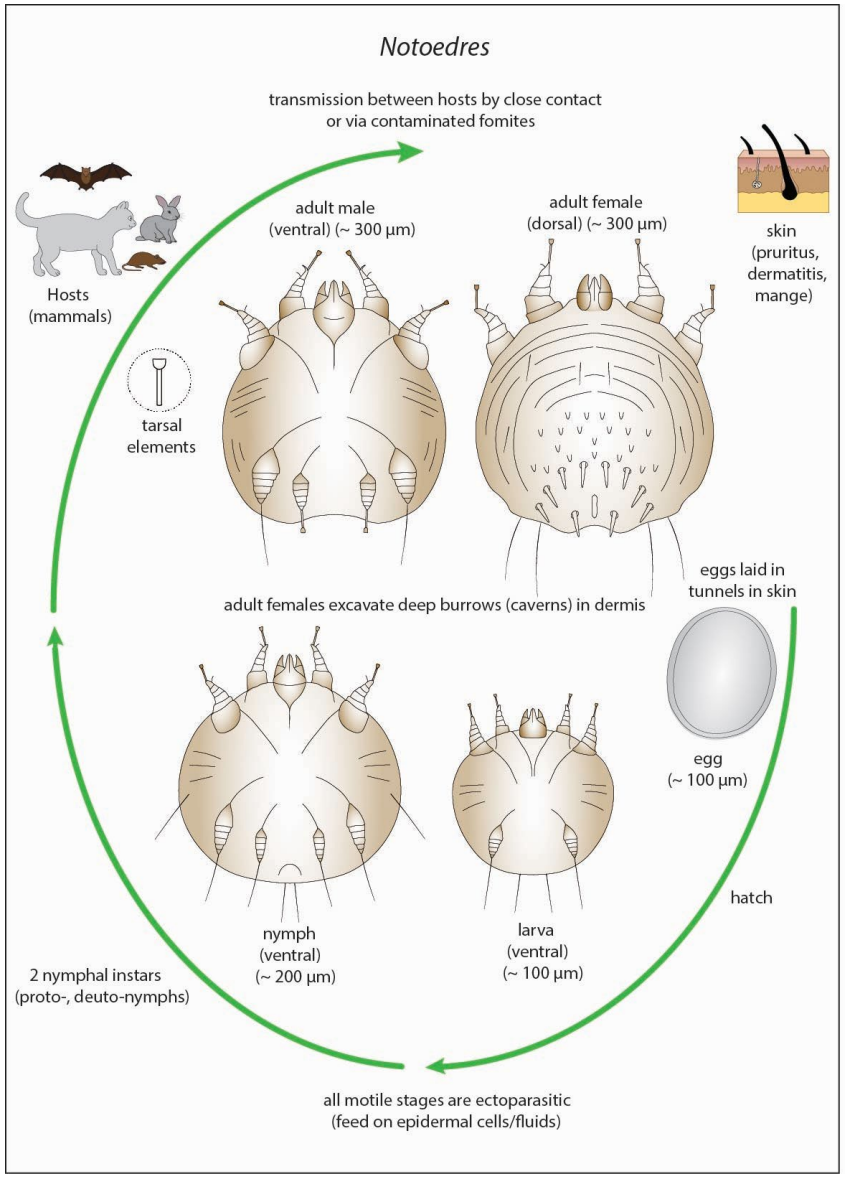

Neospora
heteroxenous (2-host) cycle
predator-prey transmission
(predator ingests tissue cysts in prey)
(prey ingests sporocysts shed by predator)
plus vertical transmission in prey
(transplacental/transmammary)
brain, muscles
(space-occupying lesions,
ascending paralysis,
abortion, neonatal
mortalities)
Intermediate Hosts (IH)
(mammals, esp. ungulates)
asexual merogony
(disseminated)
tissue cyst formation
in nerve/muscle cells
meronts (10-20 µm)
(filled with merozoites
(called tachyzoites))
thin PAS+
cyst wall
filled with
bradyzoites
(cystozoites)
tissue cysts
(10-100 µm)
excystation
oocysts
ingested
oocyst
(9-13 µm)
sporocysts
(7-9 µm,)
tissue cysts
ingested
meronts (8-12 µm)
exogenous
sporulation
oocysts
excreted
male
gamonts (~ 10 µm)
female
sexual
gamogony
sporoblast
fertilization
oocyst:sporocyst:sporozoite
configuration = 1:2:4
Definitive Hosts
(canids)
(intestines)

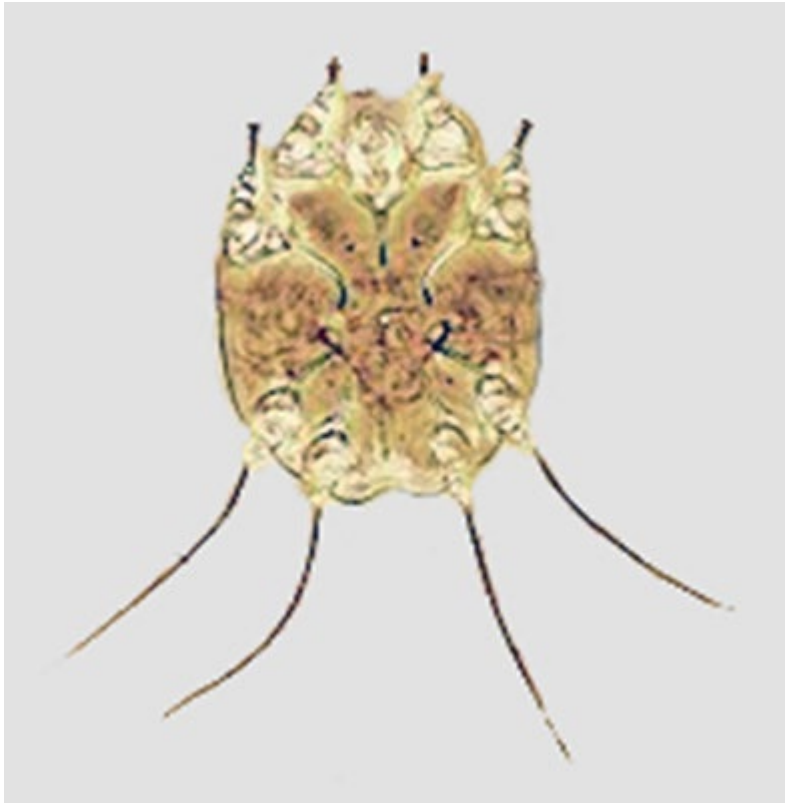


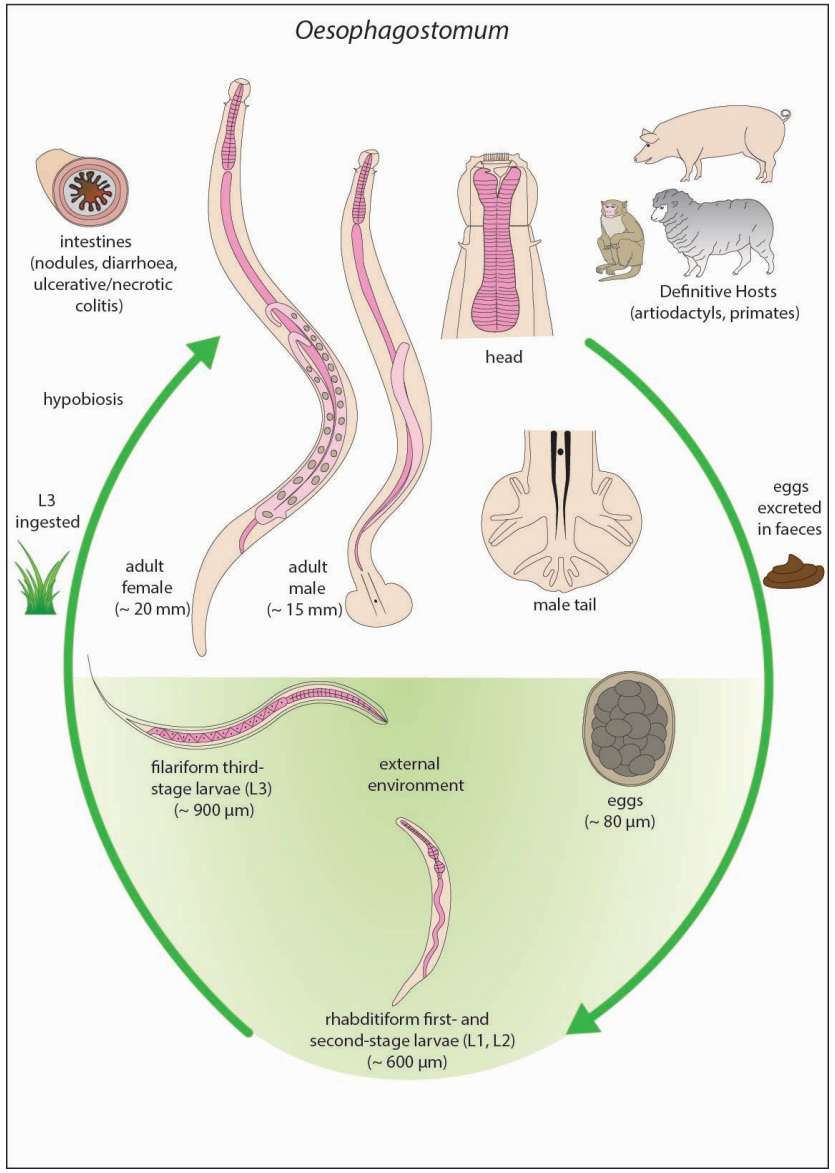

Nippostrongylus
intestines
(dermatitis, verminous
pneumonia, enteritis,
anaemia, illthrift)
head
Definitive Hosts
(rodents)
somatic migration
esp. pulmonary
L3
penetrate
skin
eggs
excreted
in faeces
adult
female
(~ 6 mm)
adult
male
(~ 4 mm)
male tail
filariform third-
stage larvae (L3)
(~ 800 µm)
external
environment
eggs
(~ 60 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 600 µm)

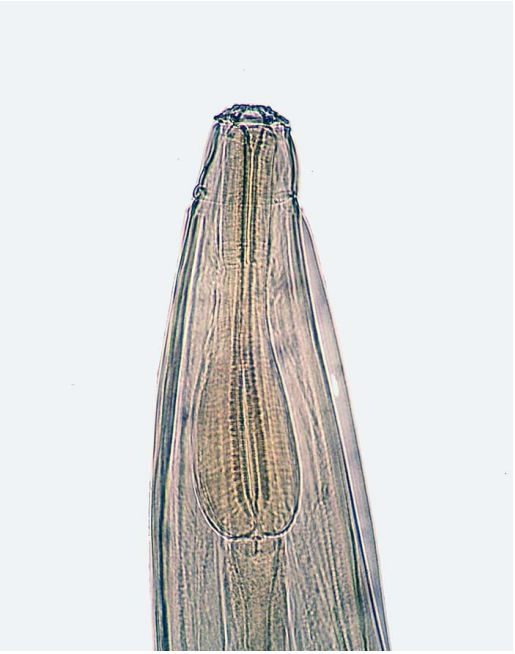


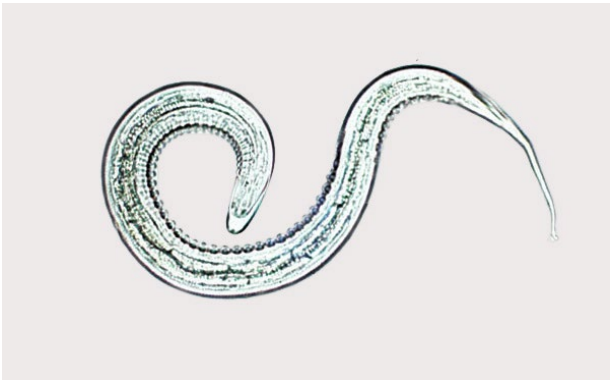

Nosopsyllus
skin/pelage
(irritation, pruritus,
allergic dermatitis)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, esp. rodents,
some birds)
adult flea
(~ 4 mm)
adults are often nidiculous and transient
ectoparasites (feeding on host blood)
eggs
drop
off
host
or
laid
on
soil,
plants
eclosion
pupa
(~ 1 mm)
eggs
(~ 0.5 mm)
encasement
hatch
larva
(~ 2 mm)
free-living in external environment
(esp. bedding, nests, burrows, hides)

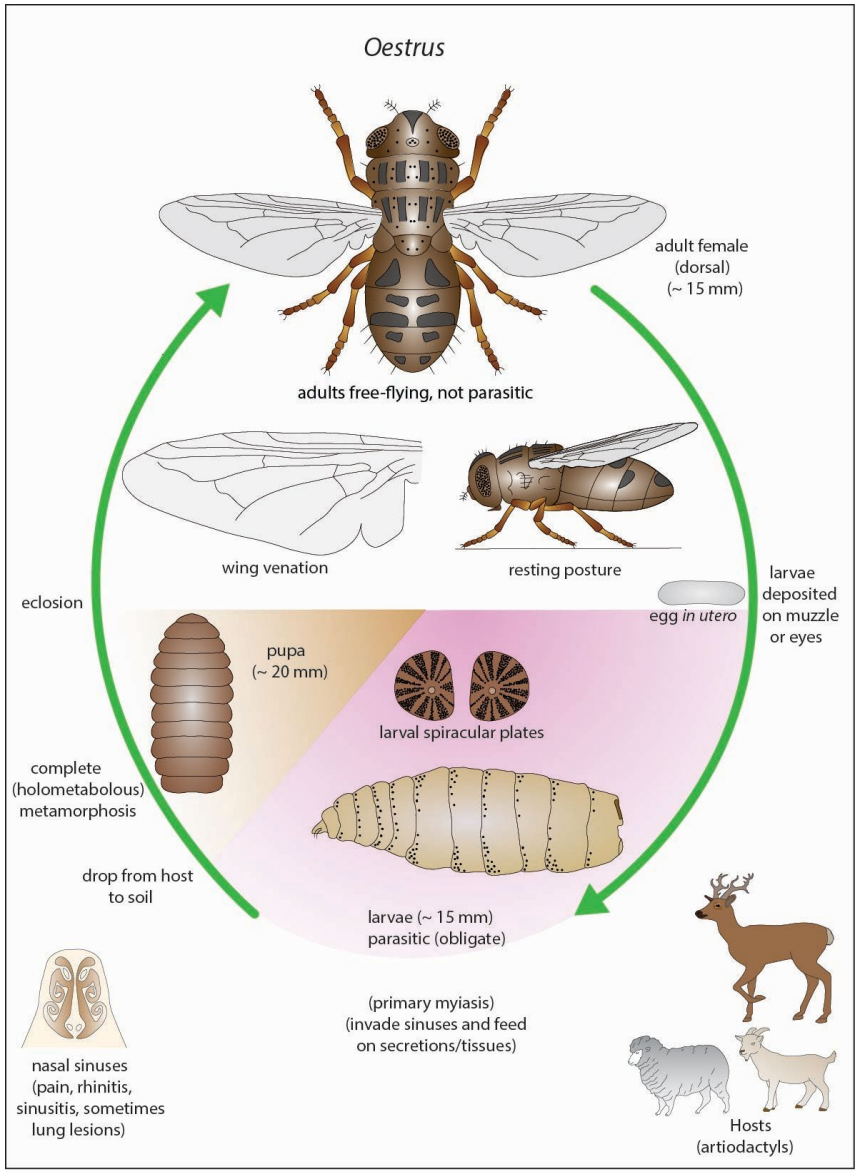

Notoedres
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
adult male
(ventral) (~ 300 µm)
adult female
(dorsal) (~ 300 µm)
skin
(pruritus,
dermatitis,
mange)
tarsal
elements
eggs laid in
tunnels in skin
adult females excavate deep burrows (caverns) in dermis
egg
(~ 100 µm)
hatch
nymph
(ventral)
(~ 200 µm)
larva
(ventral)
(~ 100 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on epidermal cells/fluids)



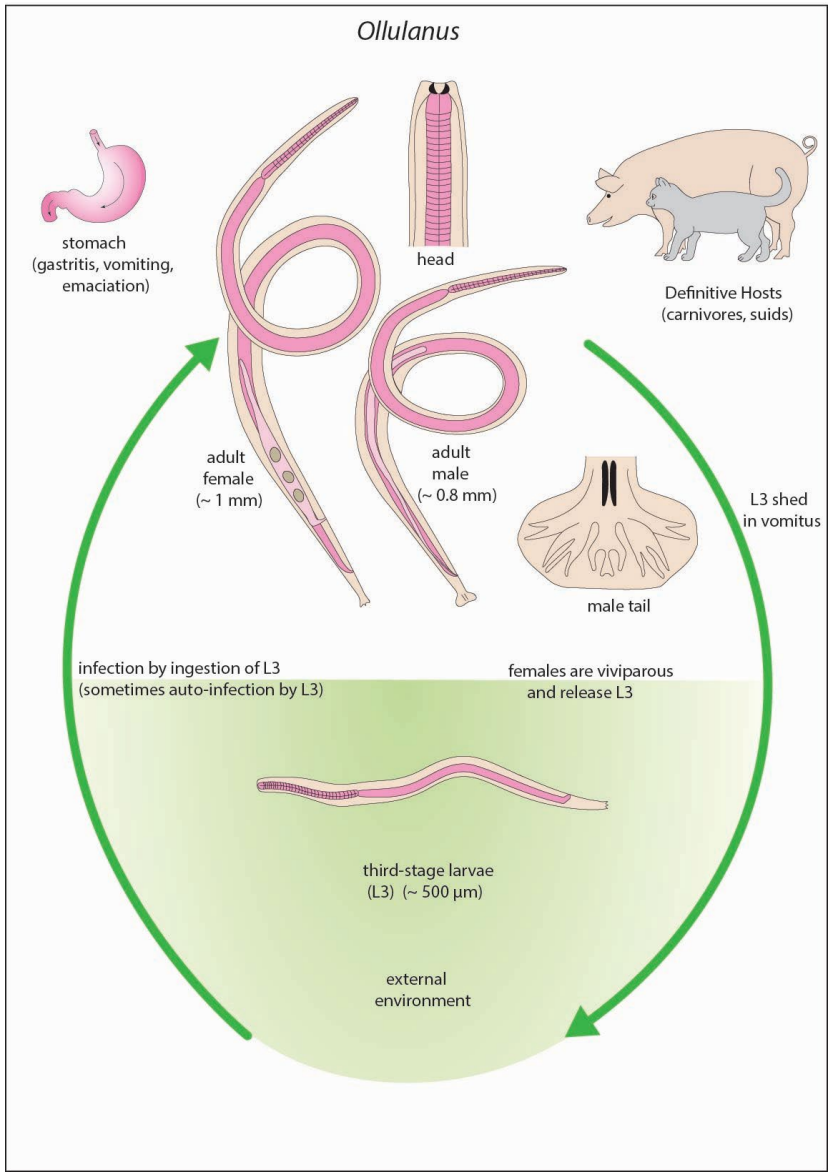

Oesophagostomum
intestines
(nodules, diarrhoea,
ulcerative/necrotic
colitis)
Definitive Hosts
(artiodactyls, primates)
head
hypobiosis
L3
ingested
adult
female
(~ 20 mm)
adult
male
(~ 15 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 900 µm)
external
environment
eggs
(~ 80 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 600 µm)

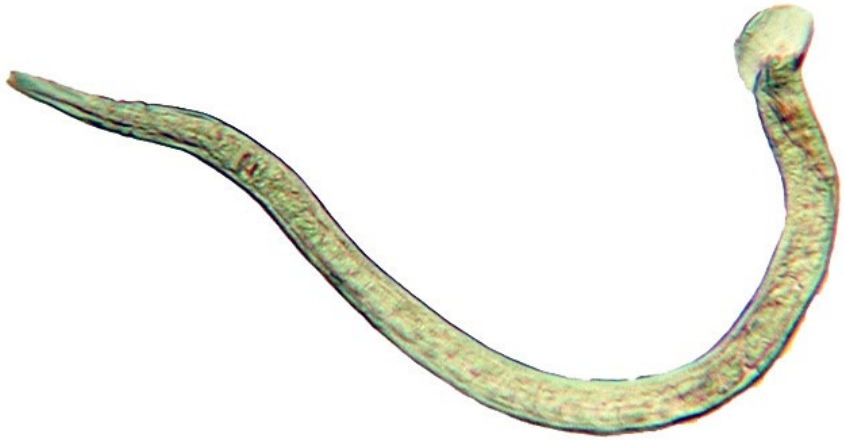


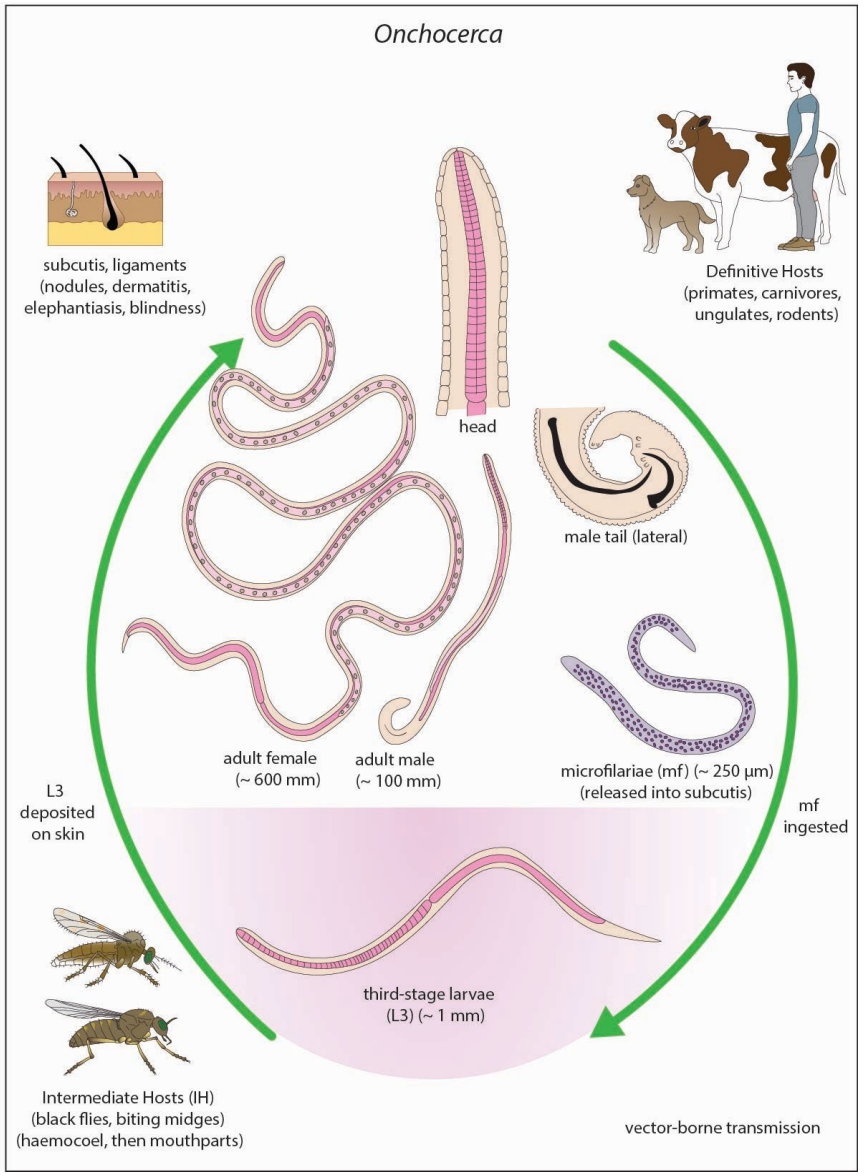


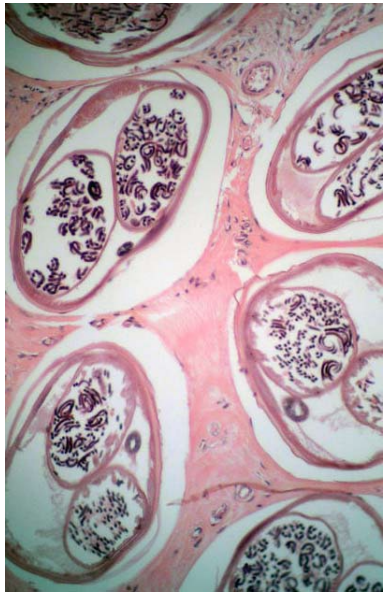

Oestrus
adult female
(dorsal)
(~ 15 mm)
adults free-flying, not parasitic
wing venation
resting posture
eclosion
egg *in utero*
larvae
deposited
on muzzle
or eyes
pupa
(~ 20 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (~ 15 mm)
parasitic (obligate)
(primary myiasis)
(invade sinuses and feed
on secretions/tissues)
nasal sinuses
(pain, rhinitis,
sinusitis, sometimes
lung lesions)
Hosts
(artiodactyls)


wiki


Ollulanus
stomach
(gastritis, vomiting,
emaciation)
head
Definitive Hosts
(carnivores, suids)
adult
female
(~ 1 mm)
adult
male
(~ 0.8 mm)
male tail
L3 shed
in vomitus
infection by ingestion of L3
(sometimes auto-infection by L3)
females are viviparous
and release L3
third-stage larvae
(L3) (~ 500 µm)
external
environment




Onchocerca
subcutis, ligaments
(nodules, dermatitis,
elephantiasis, blindness)
head
Definitive Hosts
(primates, carnivores,
ungulates, rodents)
male tail (lateral)
adult female
(~ 600 mm)
adult male
(~ 100 mm)
microfilariae (mf) (~ 250 µm)
(released into subcutis)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 1 mm)
Intermediate Hosts (IH)
(black flies, biting midges)
(haemocoel, then mouthparts)
vector-borne transmission

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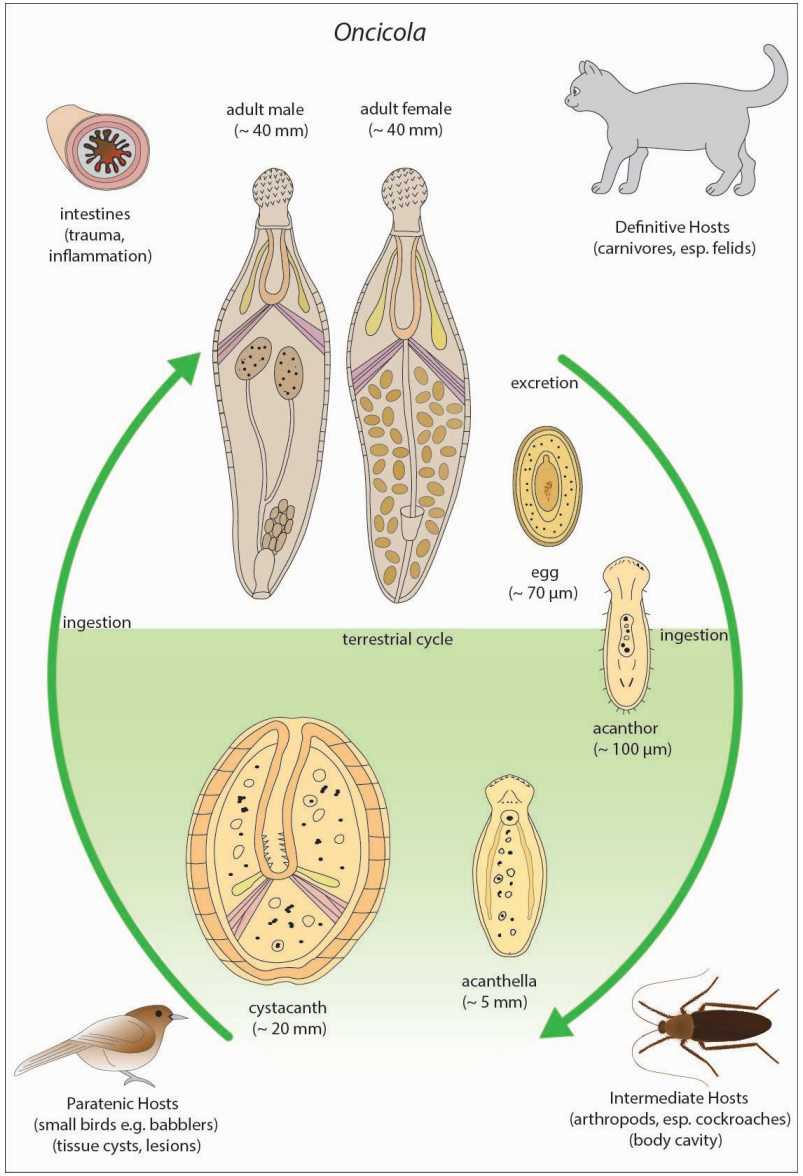
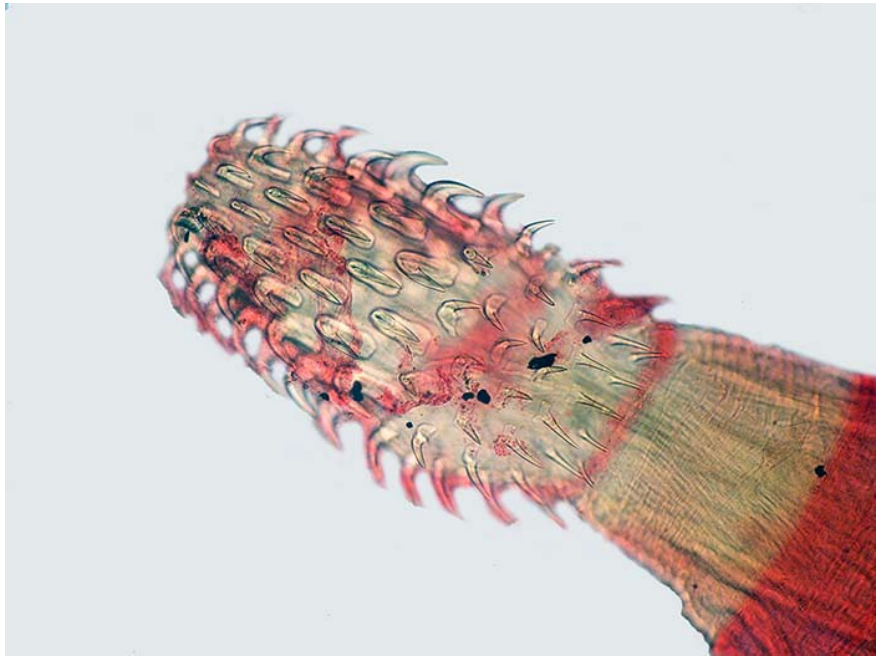
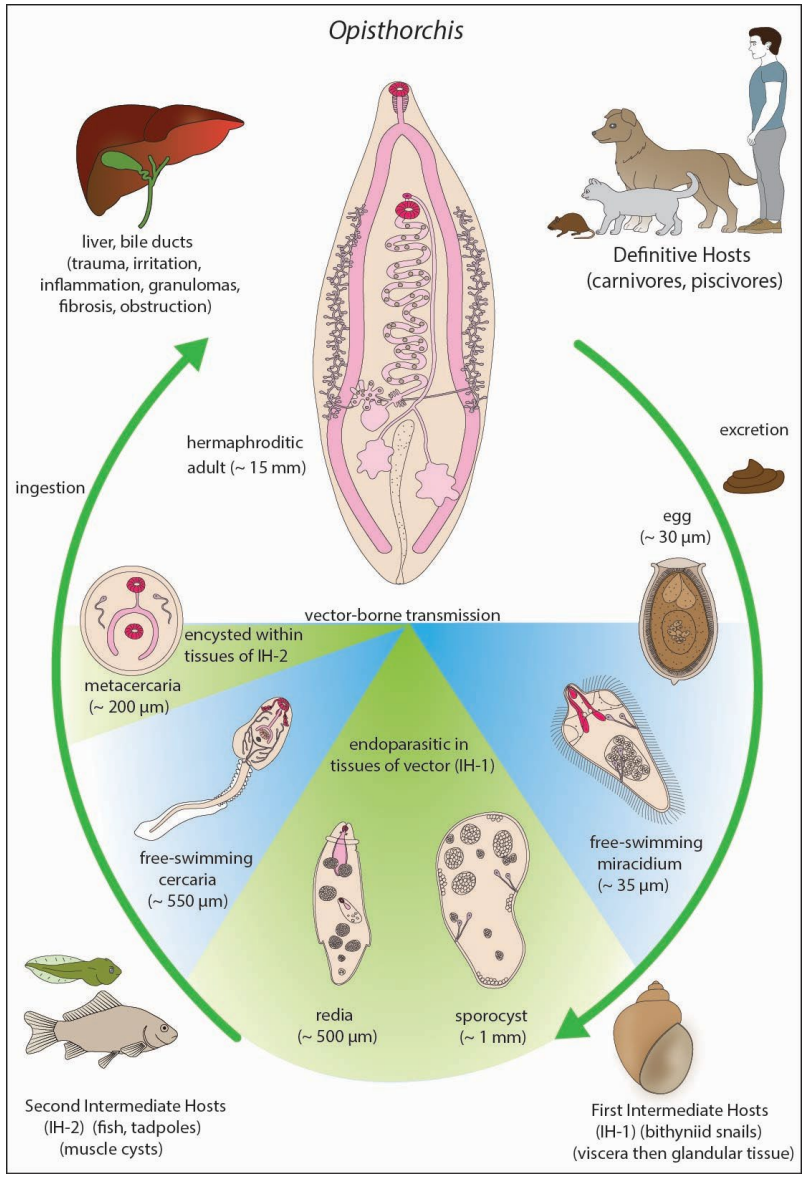
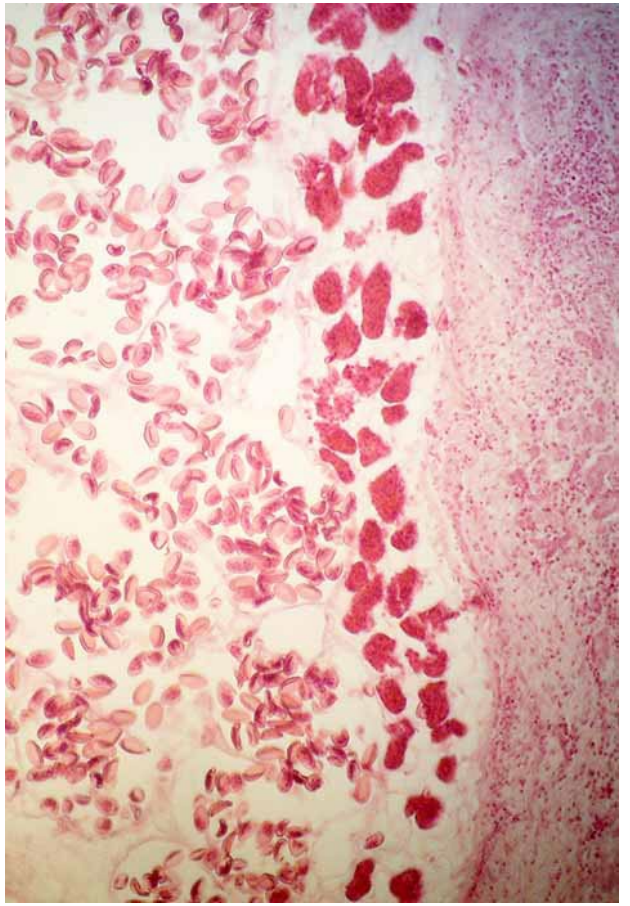
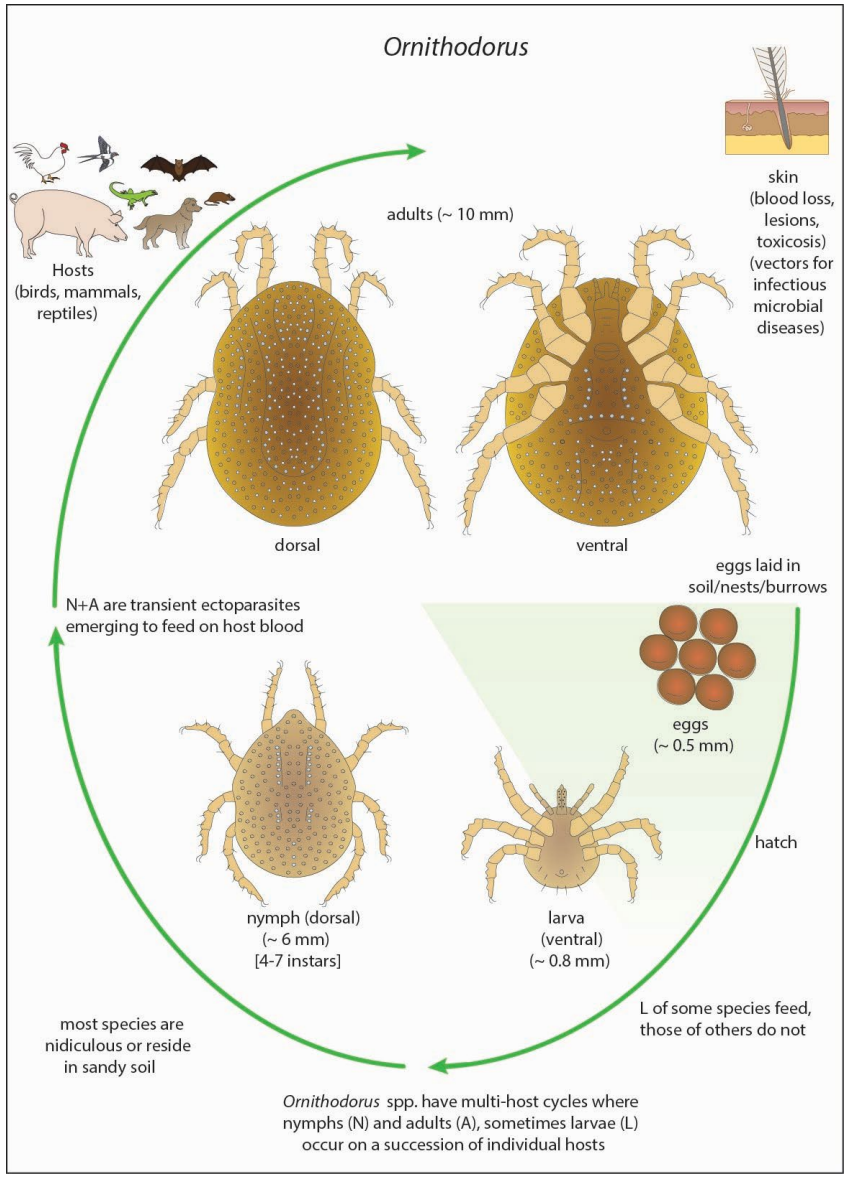

Oncicola
adult male
(~ 40 mm)
adult female
(~ 40 mm)
intestines
(trauma,
inflammation)
Definitive Hosts
(carnivores, esp. felids)
excretion
egg
(~ 70 µm)
ingestion
terrestrial cycle
ingestion
acanthor
(~ 100 µm)
cystacanth
(~ 20 mm)
acanthella
(~ 5 mm)
Paratenic Hosts
(small birds e.g. babblers)
(tissue cysts, lesions)
Intermediate Hosts
(arthropods, esp. cockroaches)
(body cavity)




Opisthorchis
liver, bile ducts
(trauma, irritation,
inflammation, granulomas,
fibrosis, obstruction)
Definitive Hosts
(carnivores, piscivores)
hermaphroditic
adult (~ 15 mm)
excretion
ingestion
egg
(~ 30 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 200 µm)
endoparasitic in
tissues of vector (IH-1)
free-swimming
cercaria
(~ 550 µm)
free-swimming
miracidium
(~ 35 µm)
redia
(~ 500 µm)
sporocyst
(~ 1 mm)
Second Intermediate Hosts
(IH-2) (fish, tadpoles)
(muscle cysts)
First Intermediate Hosts
(IH-1) (bithyniid snails)
(viscera then glandular tissue)




Ornithodorus
skin
(blood loss,
lesions,
toxicosis)
(vectors for
infectious
microbial
diseases)
Hosts
(birds, mammals,
reptiles)
adults (~ 10 mm)
dorsal
ventral
eggs laid in
soil/nests/burrows
N+A are transient ectoparasites
emerging to feed on host blood
eggs
(~ 0.5 mm)
hatch
nymph (dorsal)
(~ 6 mm)
[4-7 instars]
larva
(ventral)
(~ 0.8 mm)
most species are
nidiculous or reside
in sandy soil
L of some species feed,
those of others do not
Ornithodorus spp. have multi-host cycles where
nymphs (N) and adults (A), sometimes larvae (L)
occur on a succession of individual hosts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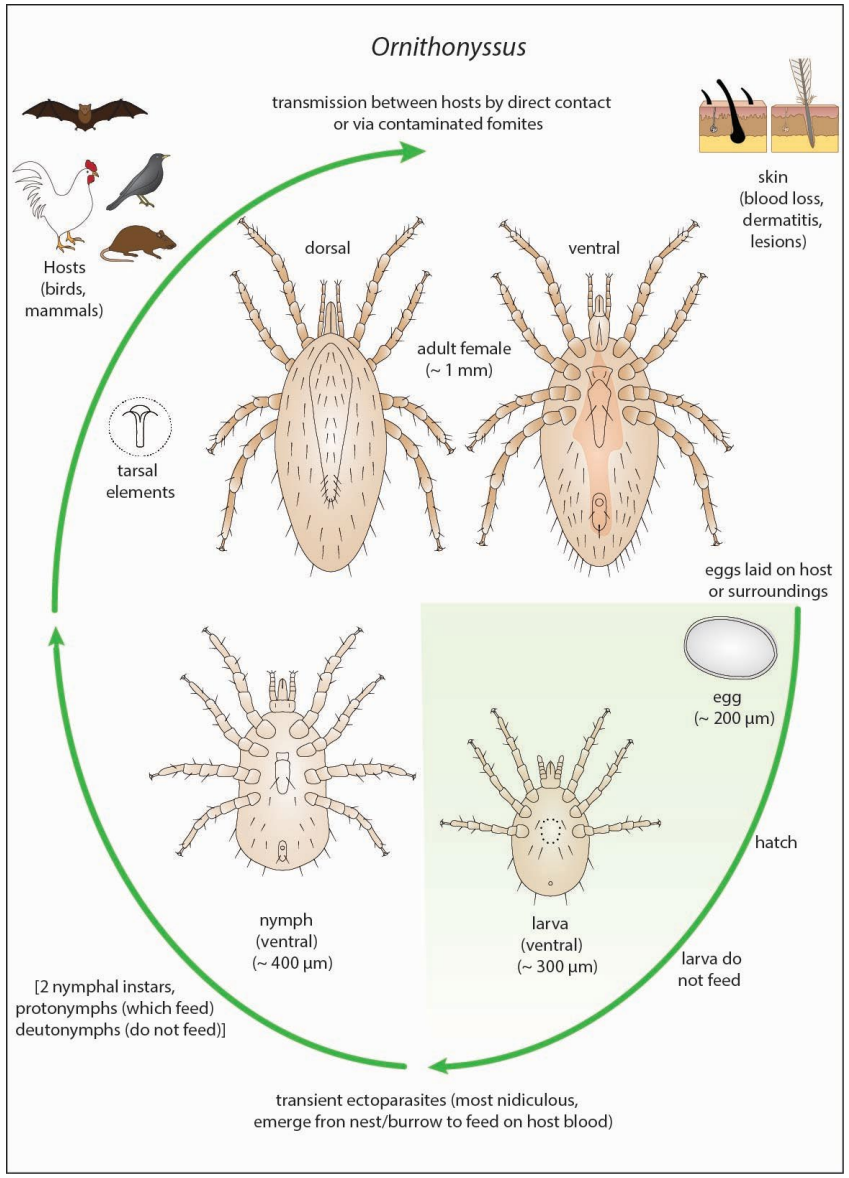
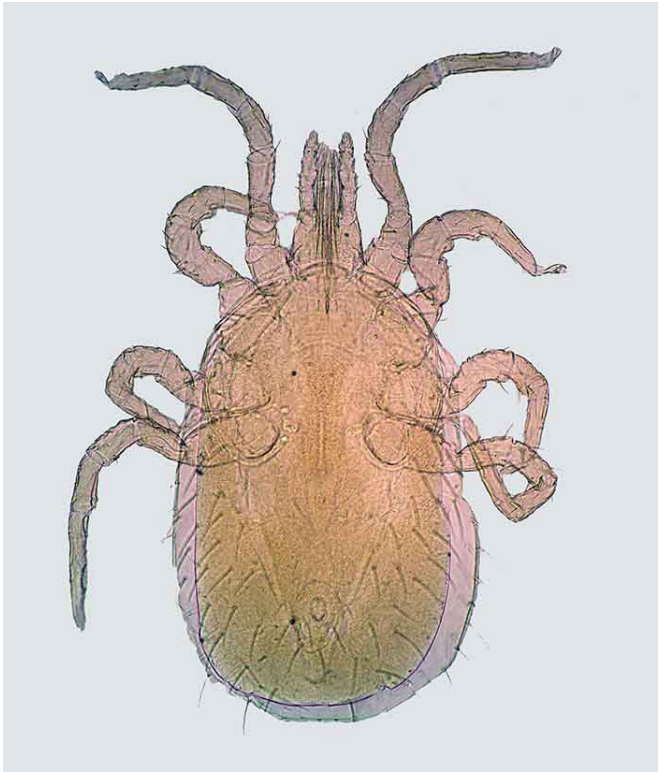
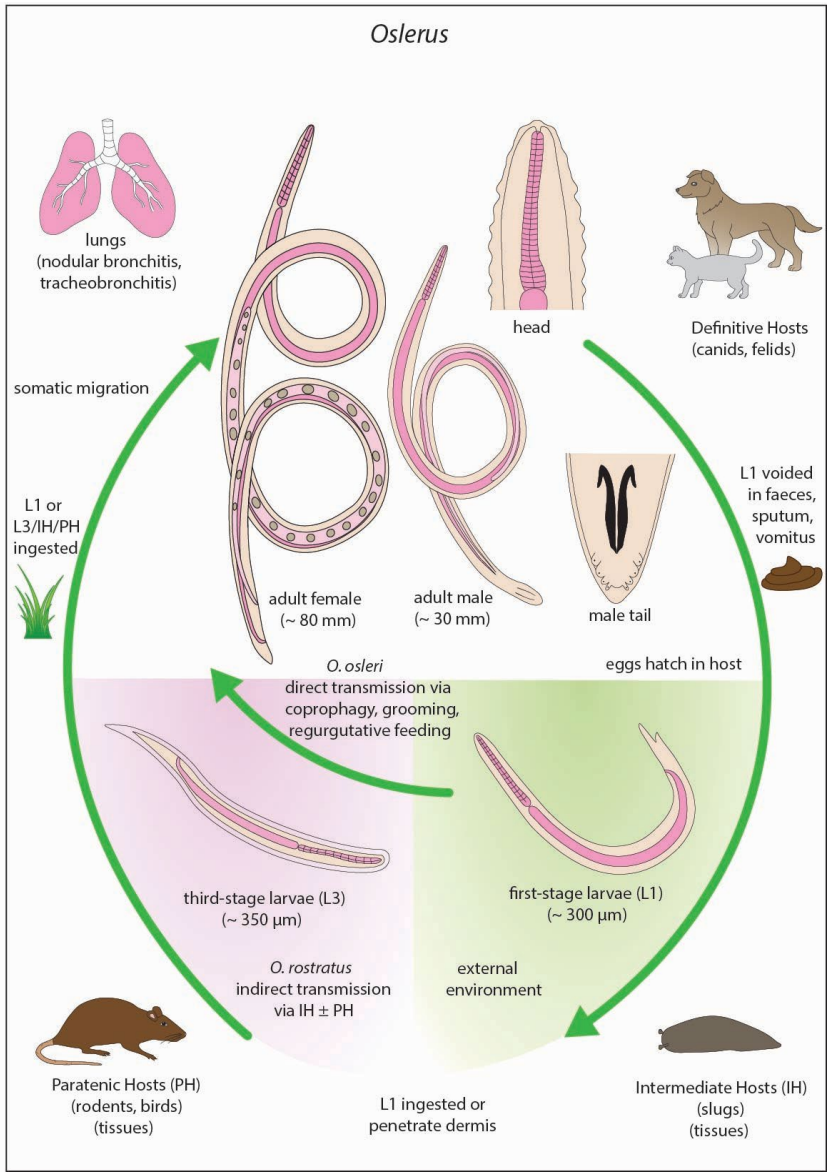
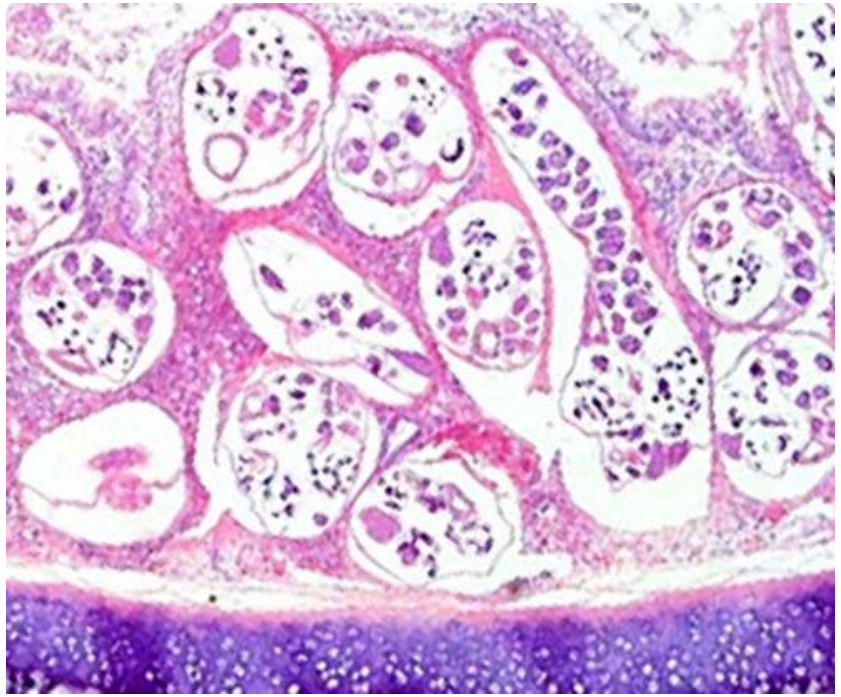
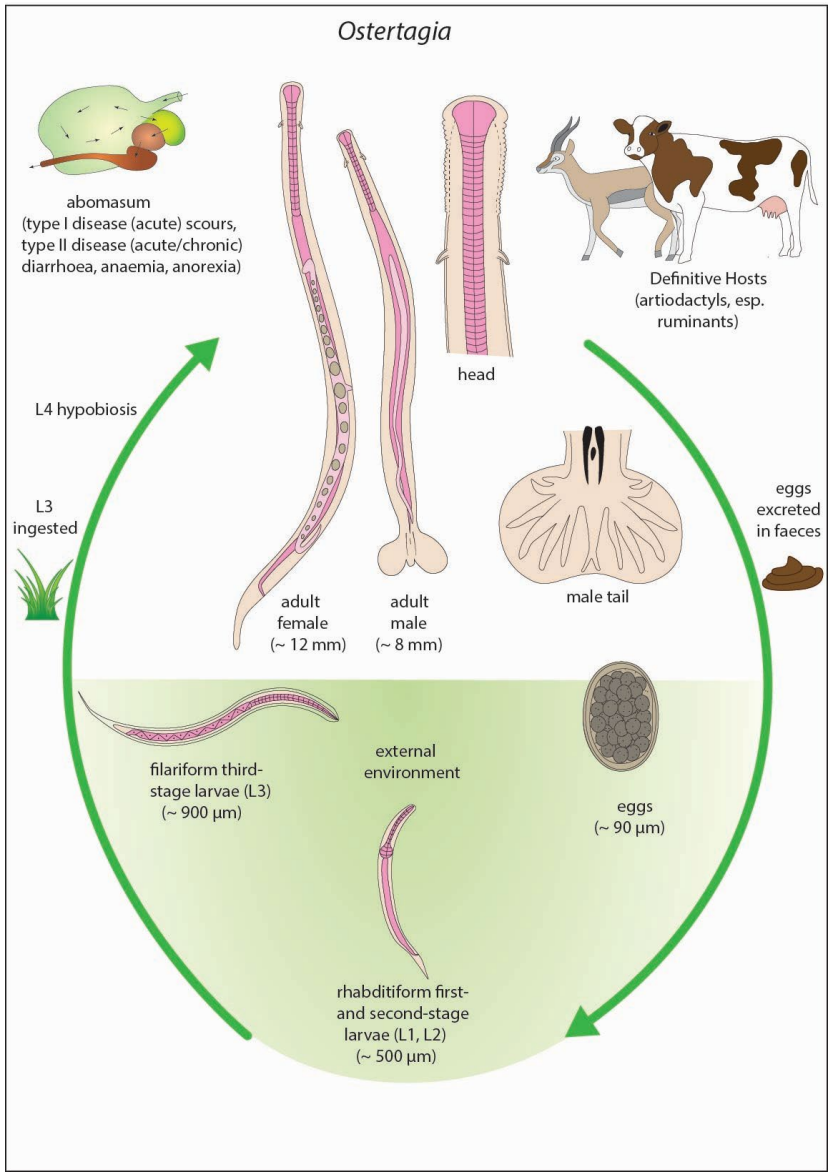
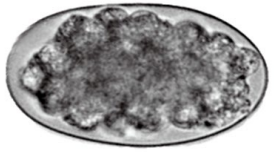

Ornithonyssus
transmission between hosts by direct contact
or via contaminated fomites
skin
(blood loss,
dermatitis,
lesions)
Hosts
(birds,
mammals)
dorsal
ventral
adult female
(~ 1 mm)
tarsal
elements
eggs laid on host
or surroundings
egg
(~ 200 µm)
hatch
nymph
(ventral)
(~ 400 µm)
larva
(ventral)
(~ 300 µm)
larva do
not feed
[2 nymphal instars,
protonymphs (which feed)
deutonymphs (do not feed)]
transient ectoparasites (most nidiculous,
emerge fron nest/burrow to feed on host blood)

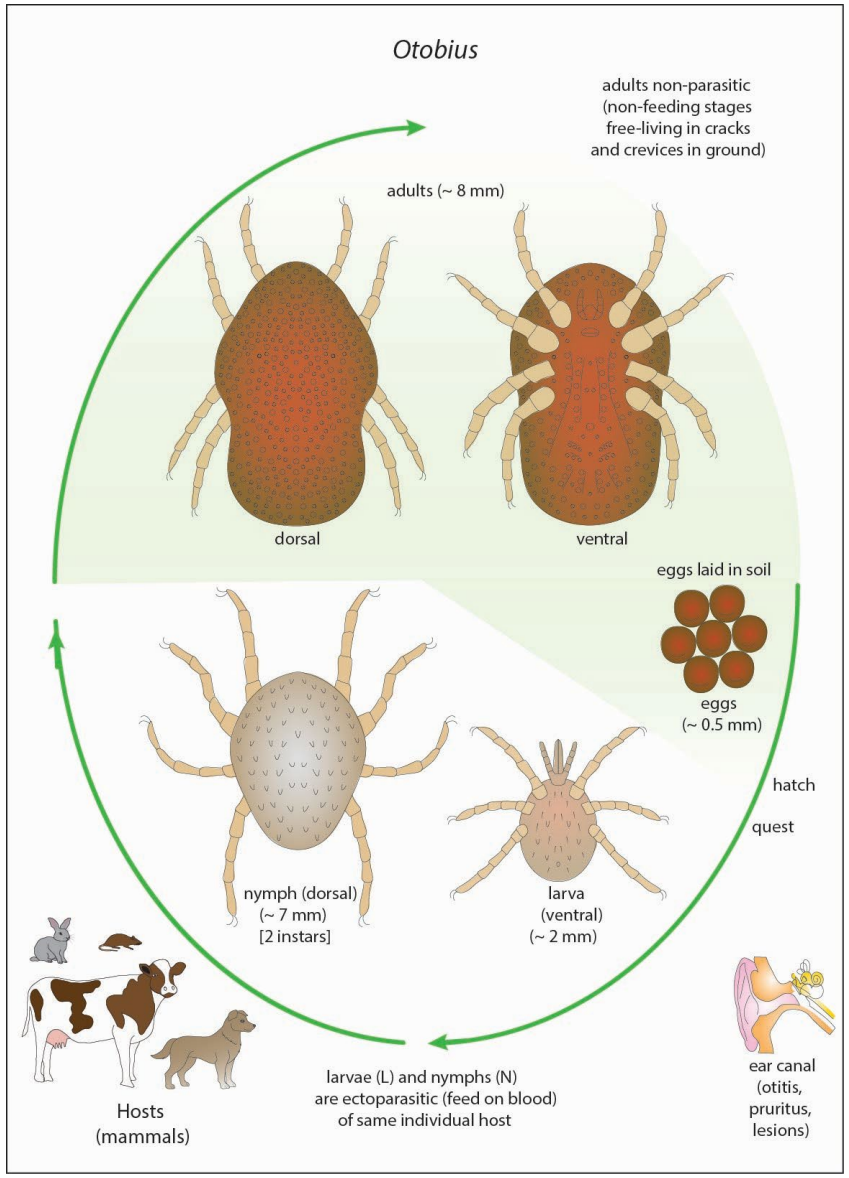



Oslerus
lungs
(nodular bronchitis,
tracheobronchitis)
head
Definitive Hosts
(canids, felids)
somatic migration
L1 voided
in faeces,
sputum,
vomitus
L1 or
L3/IH/PH
ingested
adult female
(~ 80 mm)
adult male
(~ 30 mm)
male tail
O. osleri
direct transmission via
coprophagy, grooming,
regurgutative feeding
eggs hatch in host
third-stage larvae (L3)
(~ 350 µm)
first-stage larvae (L1)
(~ 300 µm)
O. rostratus
indirect transmission
via IH ± PH
external
environment
Paratenic Hosts (PH)
(rodents, birds)
(tissues)
L1 ingested or
penetrate dermis
Intermediate Hosts (IH)
(slugs)
(tissues)




Ostertagia
abomasum
(type I disease (acute) scours,
type II disease (acute/chronic)
diarrhoea, anaemia, anorexia)
head
Definitive Hosts
(artiodactyls, esp.
ruminants)
L4 hypobiosis
L3
ingested
eggs
excreted
in faeces
adult
female
(~ 12 mm)
adult
male
(~ 8 mm)
male tail
external
environment
filariform third-
stage larvae (L3)
(~ 900 µm)
eggs
(~ 90 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 500 µm)




Otobius
adults non-parasitic
(non-feeding stages
free-living in cracks
and crevices in ground)
adults (~ 8 mm)
dorsal
ventral
eggs laid in soil
eggs
(~ 0.5 mm)
hatch
quest
nymph (dorsal)
(~ 7 mm)
[2 instars]
larva
(ventral)
(~ 2 mm)
Hosts
(mammals)
larvae (L) and nymphs (N)
are ectoparasitic (feed on blood)
of same individual host
ear canal
(otitis,
pruritus,
lesions)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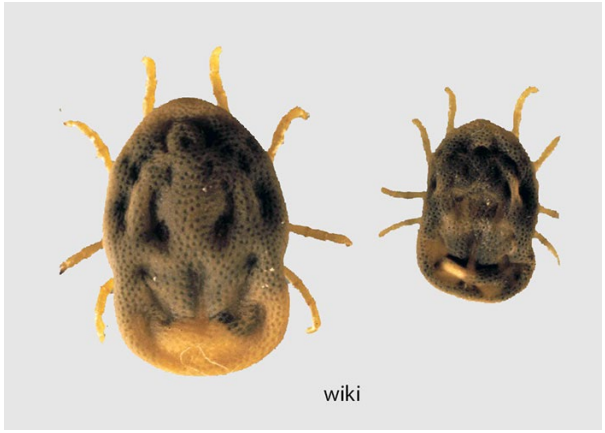
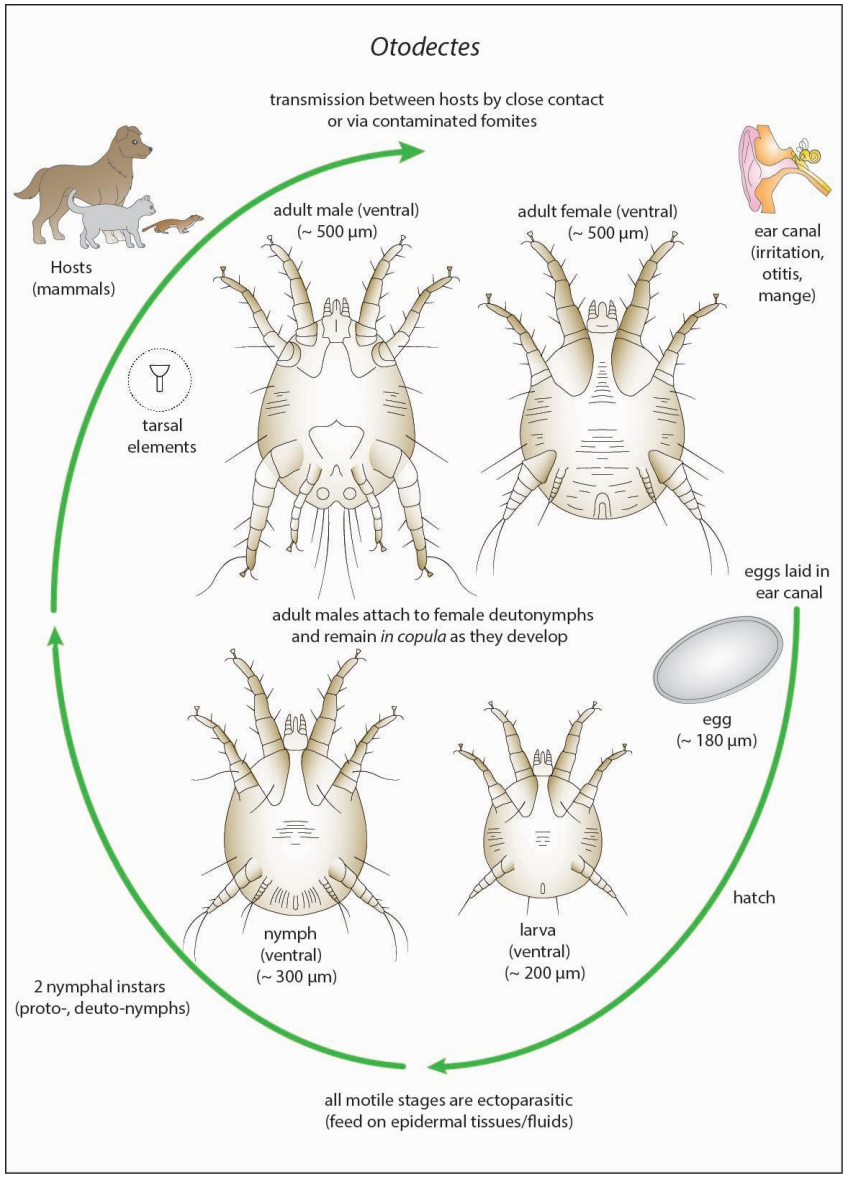
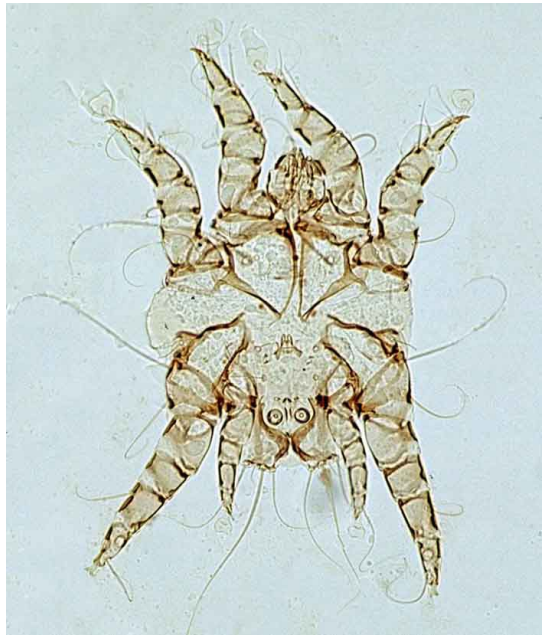
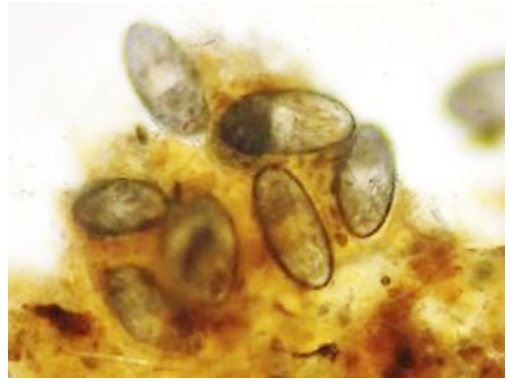
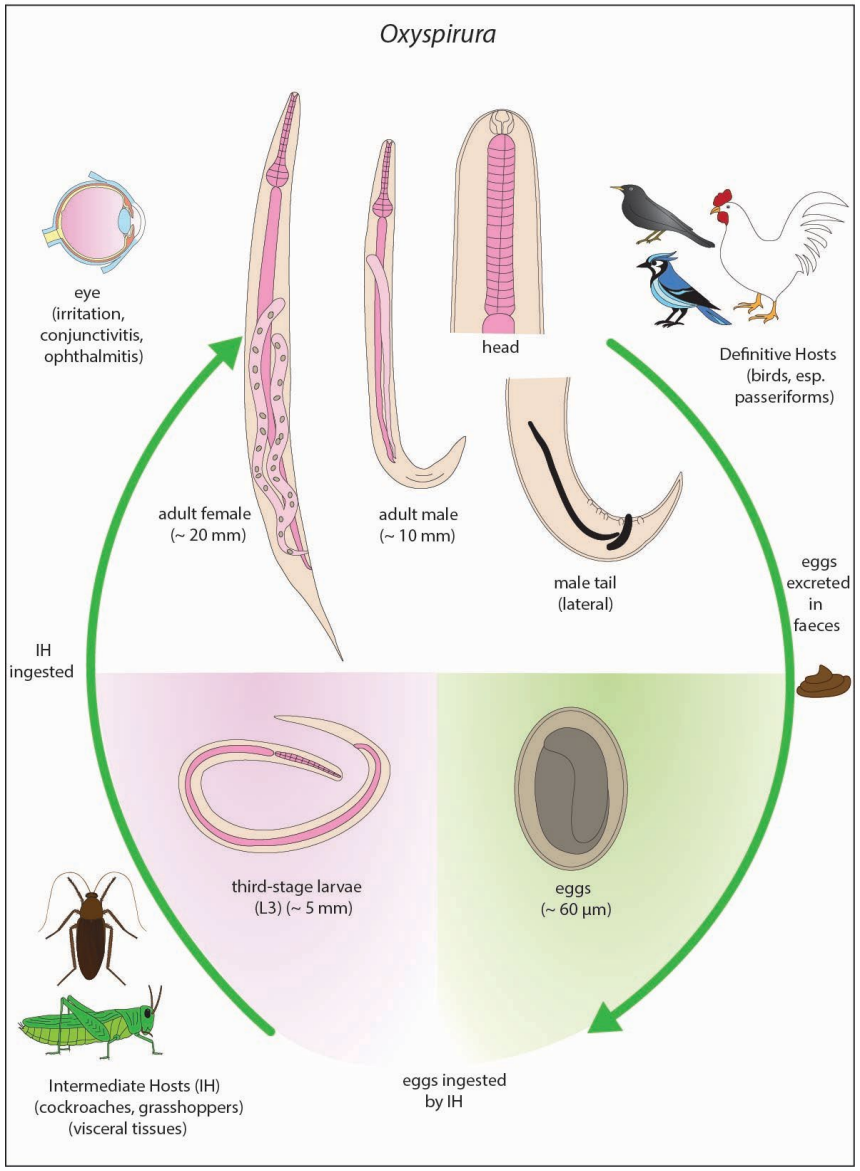
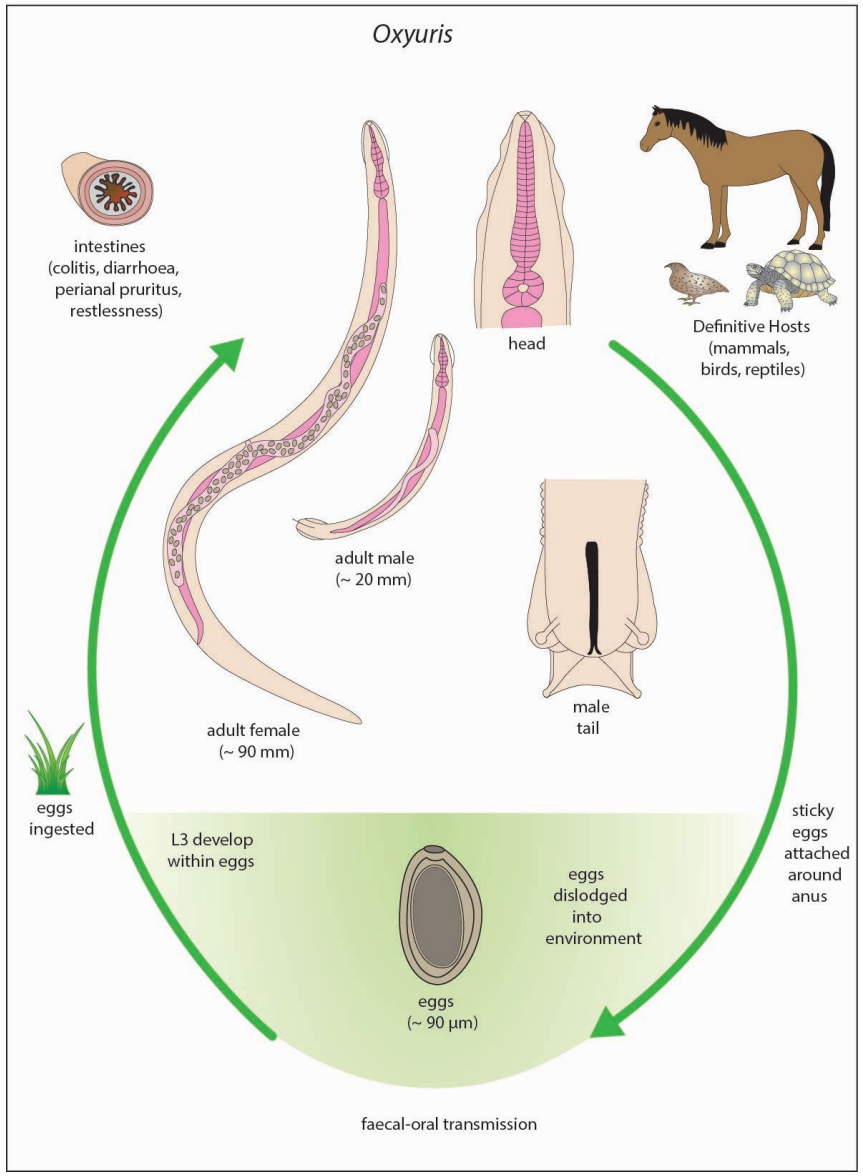

wiki

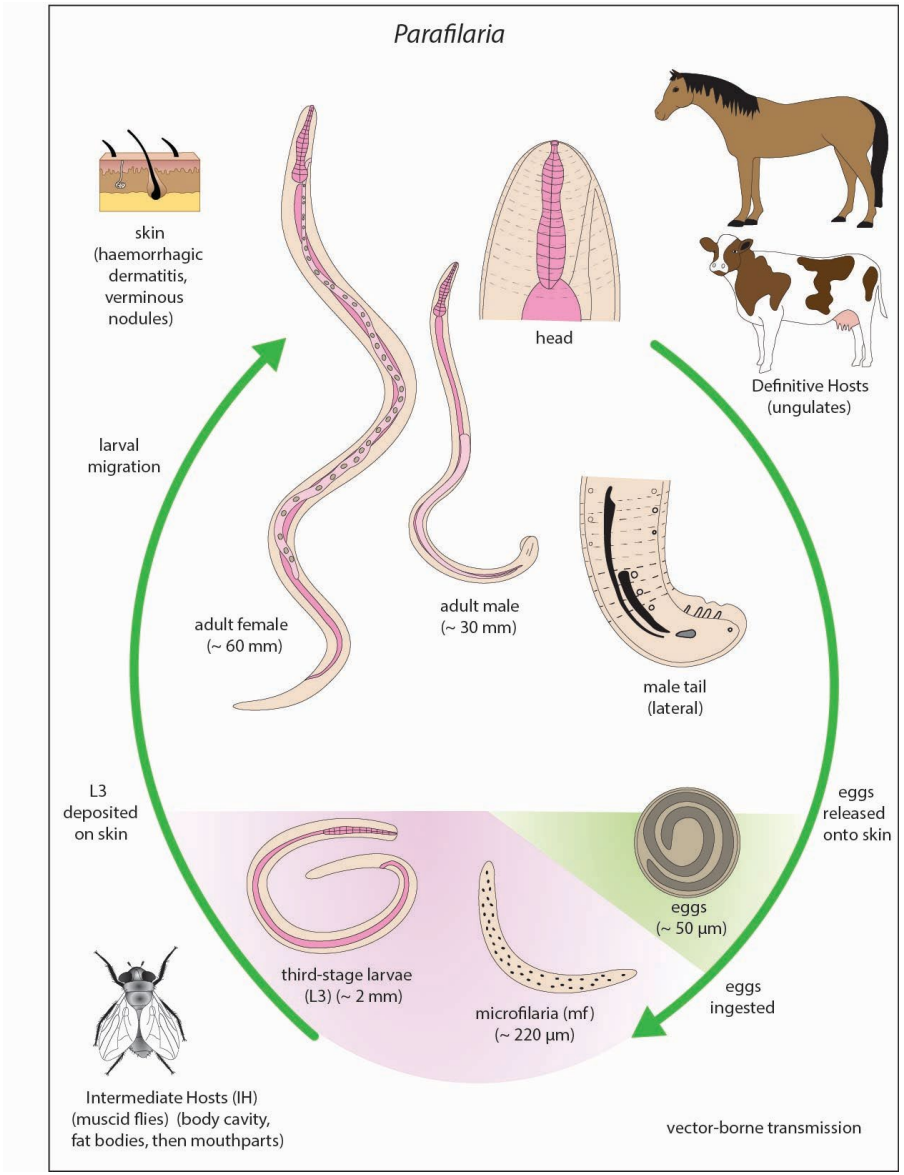

Otodectes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
adult male (ventral)
(~ 500 µm)
adult female (ventral)
(~ 500 µm)
ear canal
(irritation,
otitis,
mange)
tarsal
elements
eggs laid in
ear canal
adult males attach to female deutonymphs
and remain in copula as they develop
egg
(~ 180 µm)
hatch
nymph
(ventral)
(~ 300 µm)
larva
(ventral)
(~ 200 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on epidermal tissues/fluids)

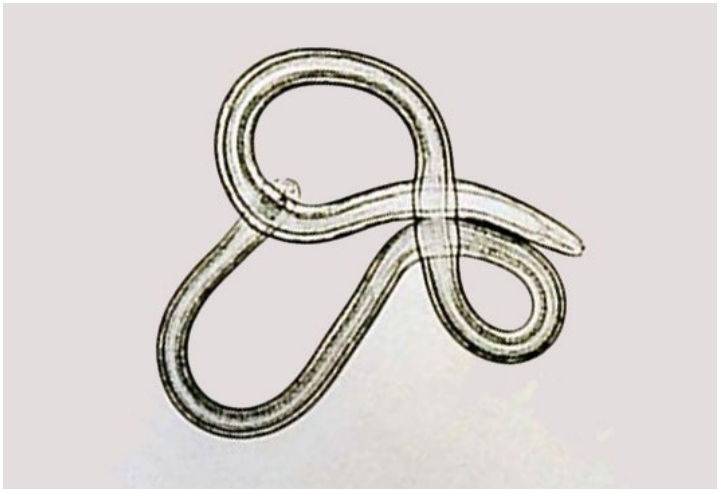


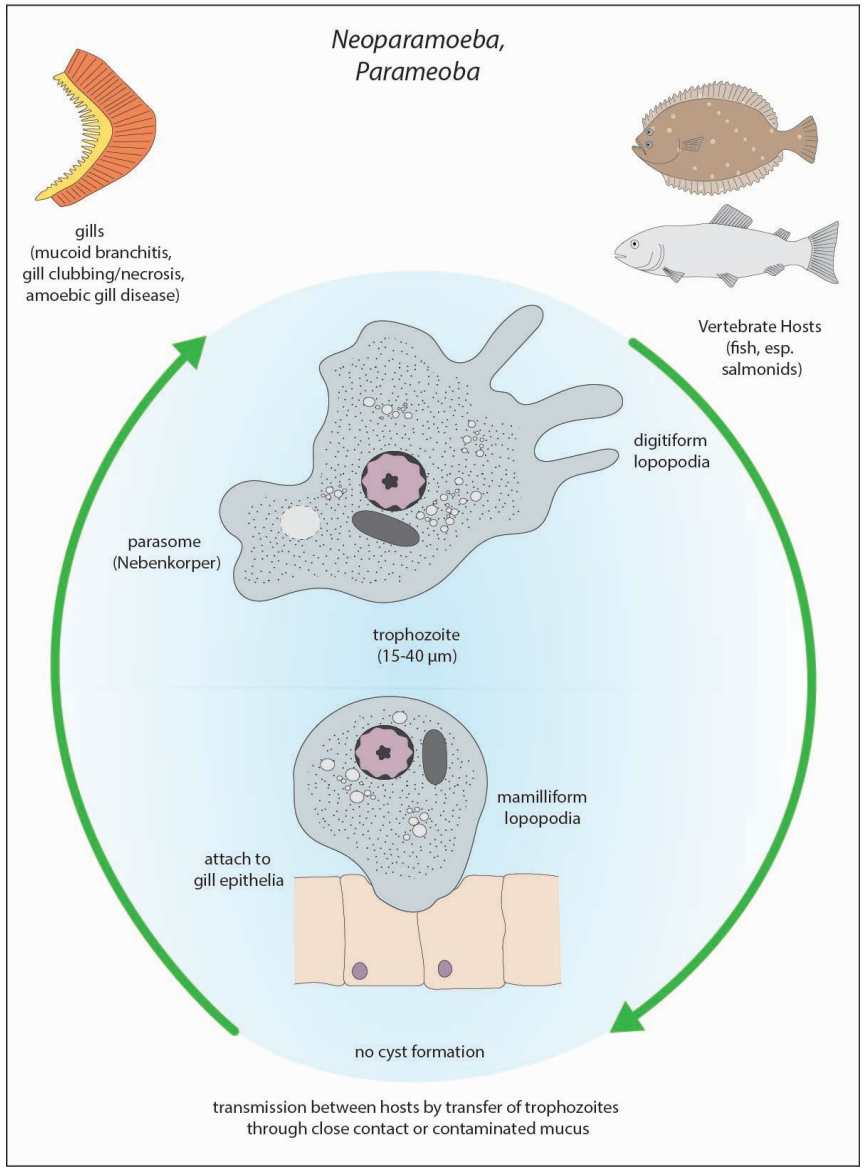


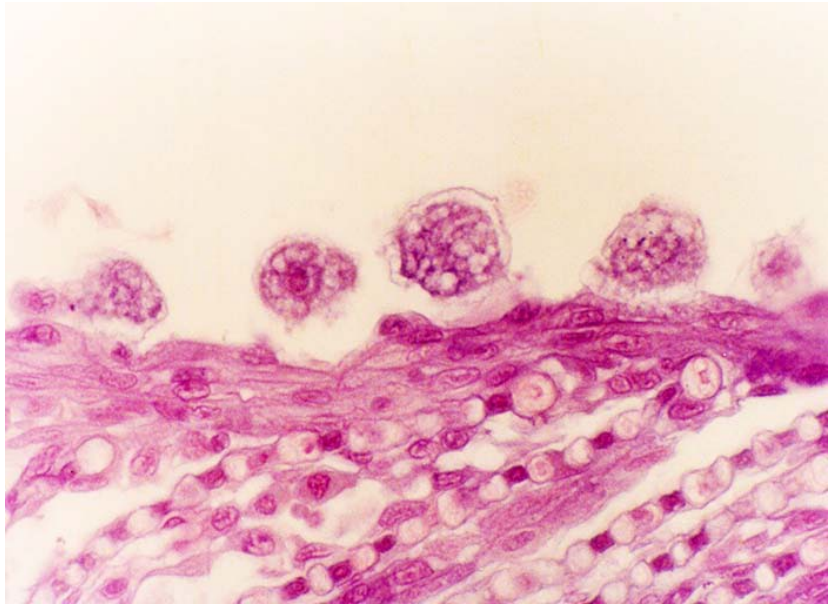

Oxyspirura
eye
(irritation,
conjunctivitis,
ophthalmitis)
adult female
(~ 20 mm)
adult male
(~ 10 mm)
head
male tail
(lateral)
Definitive Hosts
(birds, esp.
passeriforms)
eggs
excreted
in
faeces
IH
ingested
third-stage larvae
(L3) (~ 5 mm)
eggs
(~ 60 µm)
Intermediate Hosts (IH)
(cockroaches, grasshoppers)
(visceral tissues)
eggs ingested
by IH

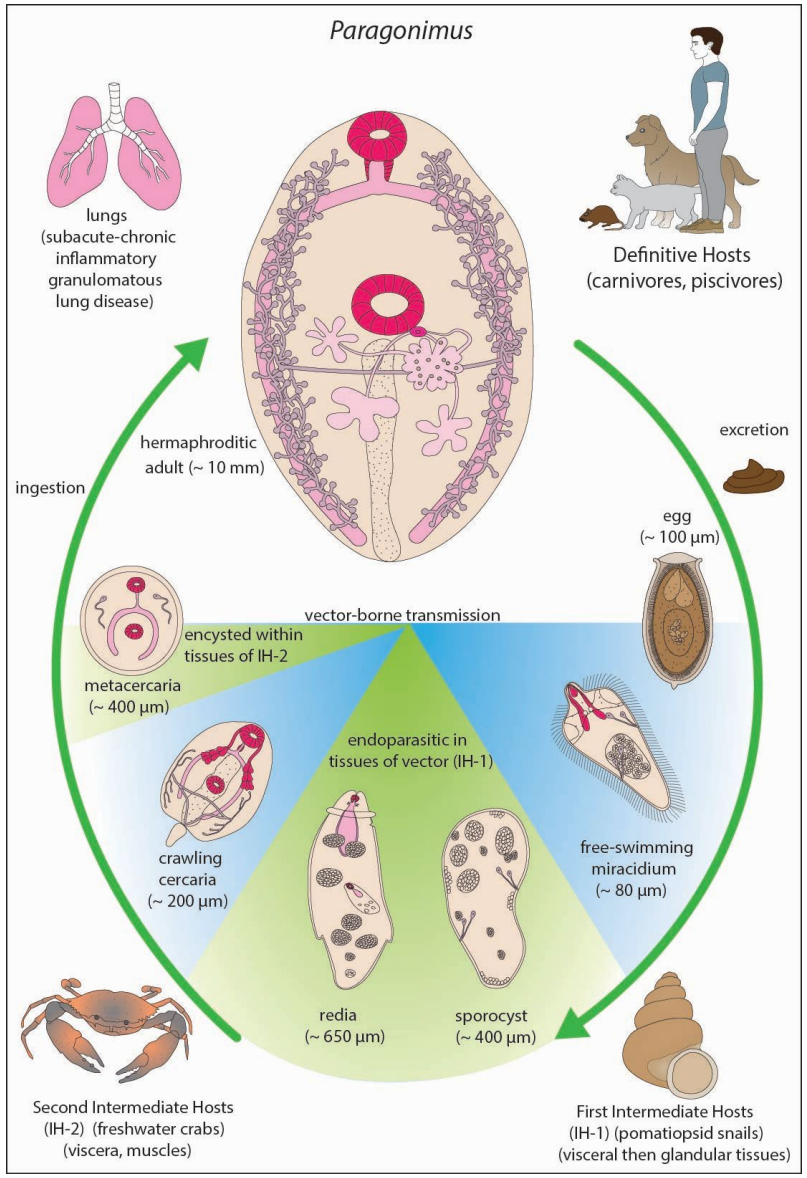

Oxyuris
intestines
(colitis, diarrhoea,
perianal pruritus,
restlessness)
head
Definitive Hosts
(mammals,
birds, reptiles)
adult male
(~ 20 mm)
adult female
(~ 90 mm)
male
tail
eggs
ingested
L3 develop
within eggs
eggs
dislodged
into
environment
sticky
eggs
attached
around
anus
eggs
(~ 90 µm)
faecal-oral transmission

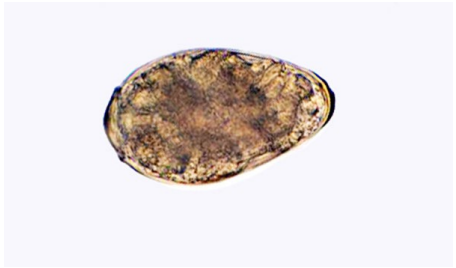

Parafilaria
skin
(haemorrhagic
dermatitis,
verminous
nodules)
head
Definitive Hosts
(ungulates)
larval
migration
adult female
(~ 60 mm)
adult male
(~ 30 mm)
male tail
(lateral)
L3
deposited
on skin
eggs
released
onto skin
eggs
(~ 50 µm)
third-stage larvae
(L3) (~ 2 mm)
microfilaria (mf)
(~ 220 µm)
eggs
ingested
Intermediate Hosts (IH)
(muscid flies) (body cavity,
fat bodies, then mouthparts)
vector-borne transmission

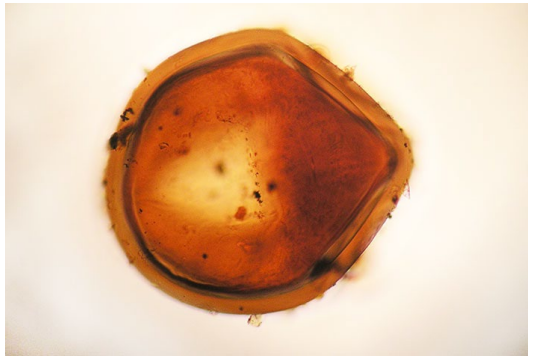


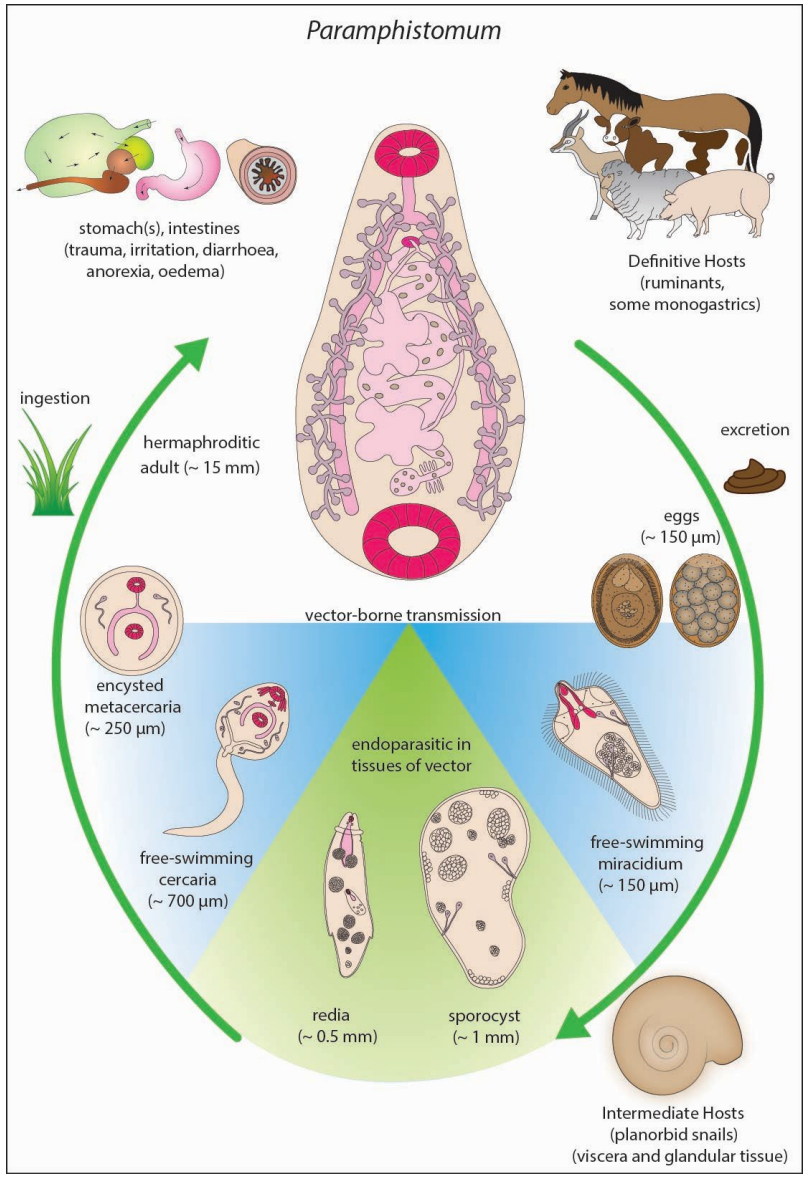

Neoparamoeba,
Parameoba
gills
(mucoid branchitis,
gill clubbing/necrosis,
amoebic gill disease)
Vertebrate Hosts
(fish, esp.
salmonids)
digitiform
lopopodia
parasome
(Nebenkorper)
trophozoite
(15-40 µm)
mamilliform
lopopodia
attach to
gill epithelia
no cyst formation
transmission between hosts by transfer of trophozoites
through close contact or contaminated mucus

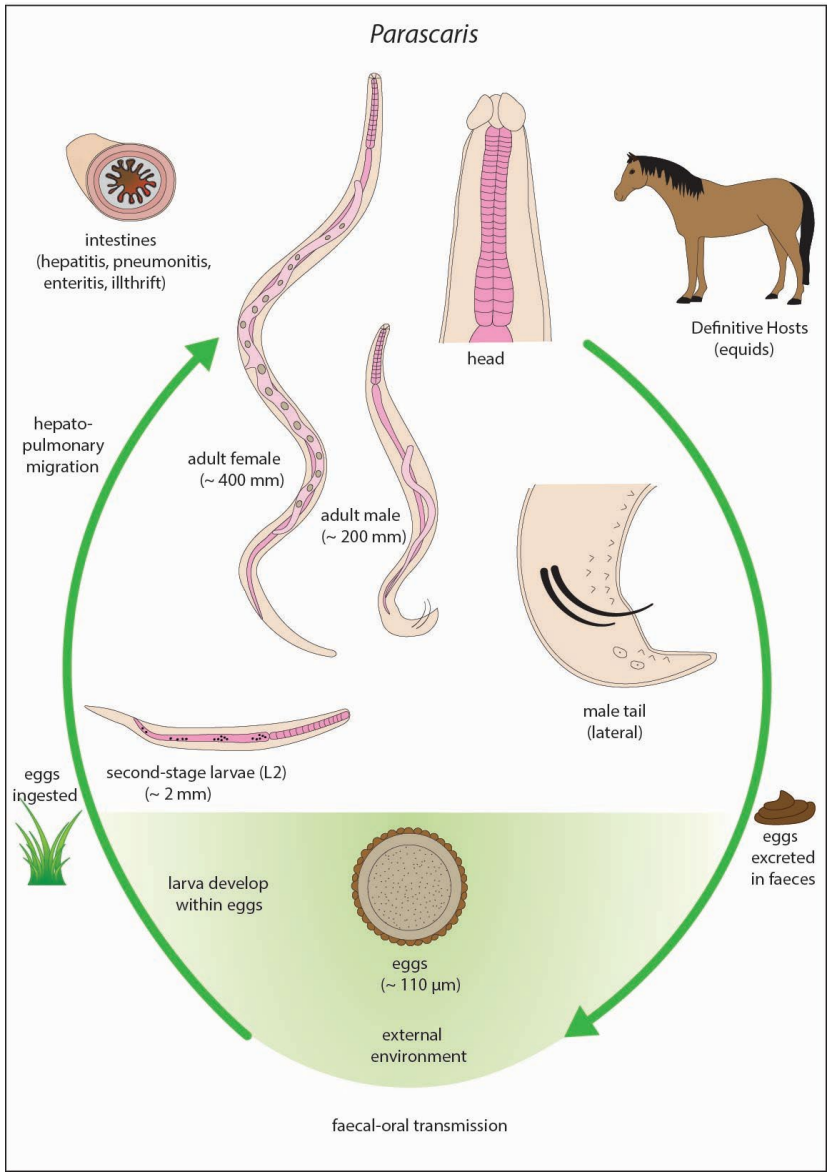


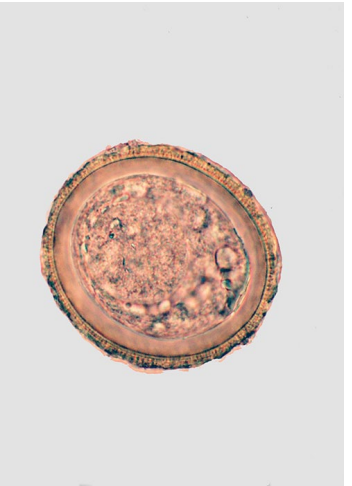

Paragonimus
lungs
(subacute-chronic
inflammatory
granulomatous
lung disease)
Definitive Hosts
(carnivores, piscivores)
hermaphroditic
adult (~ 10 mm)
excretion
ingestion
egg
(~ 100 µm)
vector-borne transmission
encysted within
tissues of IH-2
metacercaria
(~ 400 µm)
endoparasitic in
tissues of vector (IH-1)
crawling
cercaria
(~ 200 µm)
free-swimming
miracidium
(~ 80 µm)
redia
(~ 650 µm)
sporocyst
(~ 400 µm)
Second Intermediate Hosts
(IH-2) (freshwater crabs)
(viscera, muscles)
First Intermediate Hosts
(IH-1) (pomatiopsid snails)
(visceral then glandular tissues)

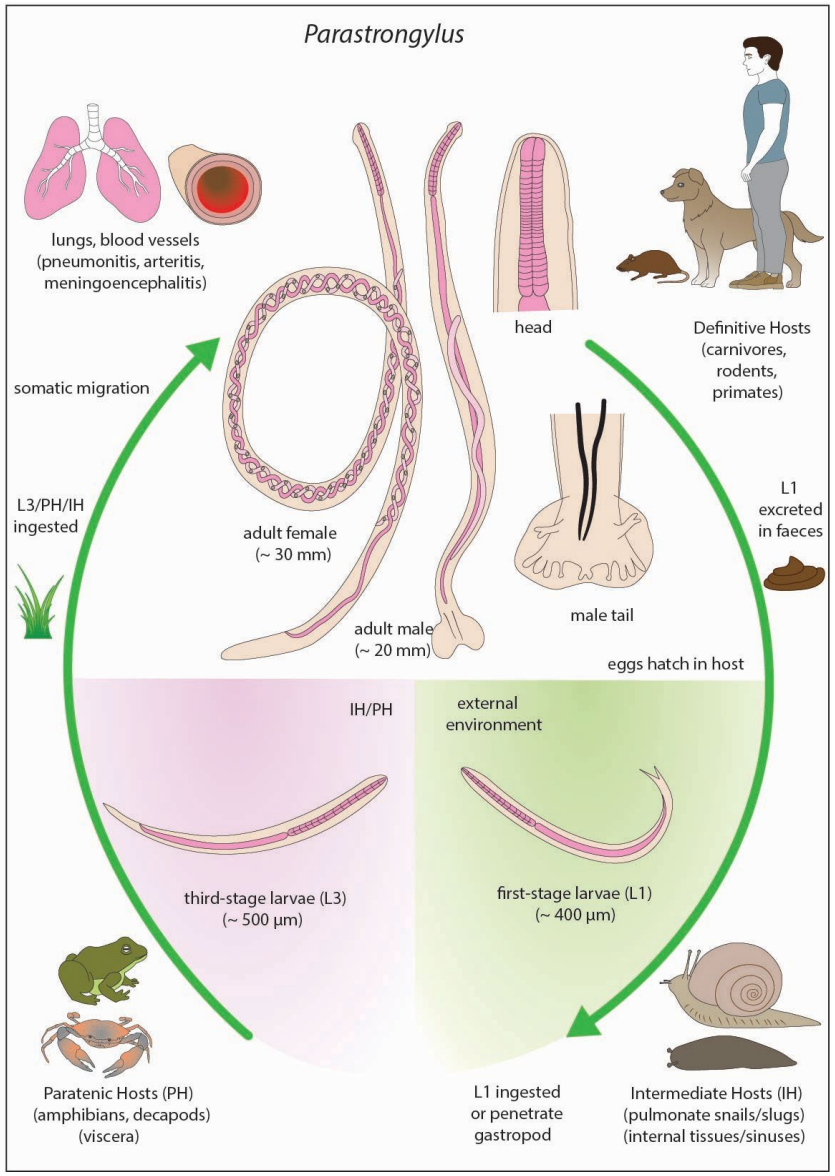


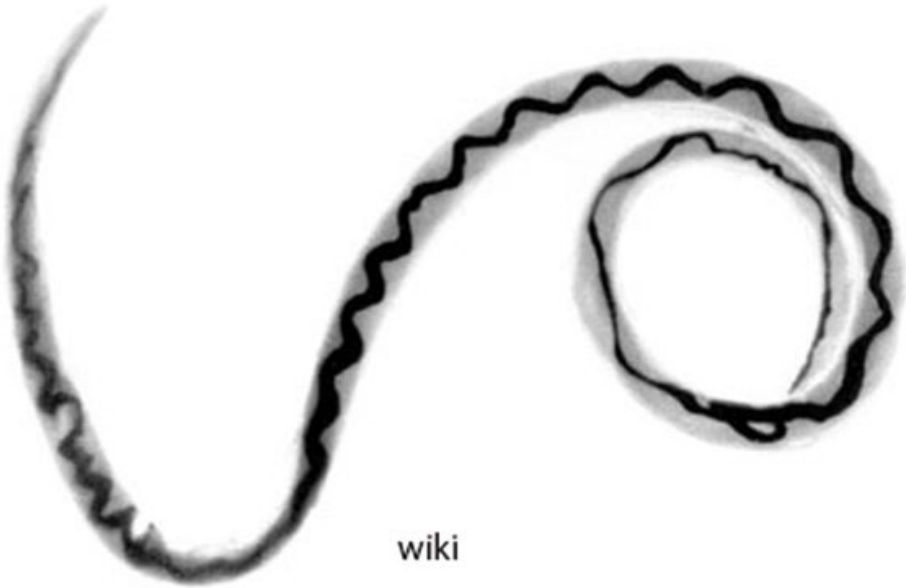


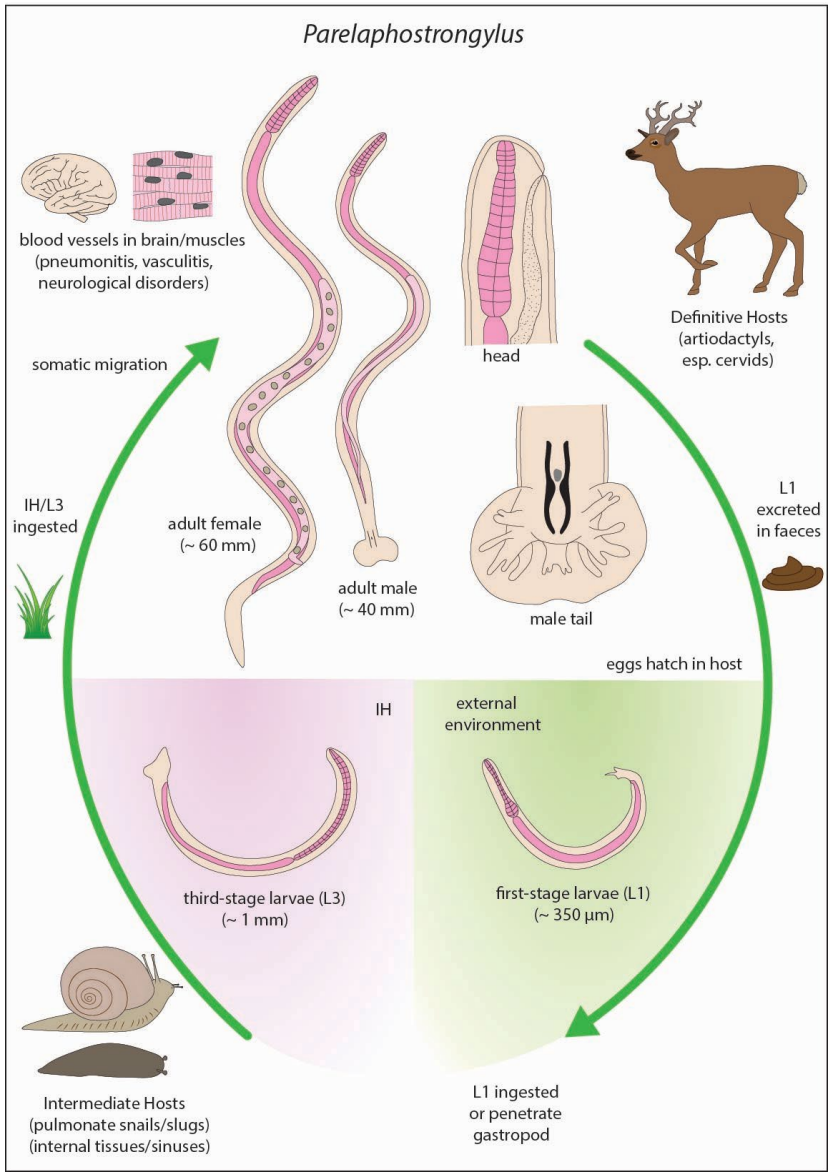

Paramphistomum
stomach(s), intestines
(trauma, irritation, diarrhoea,
anorexia, oedema)
Definitive Hosts
(ruminants,
some monogastrics)
ingestion
hermaphroditic
adult (~ 15 mm)
excretion
eggs
(~ 150 µm)
vector-borne transmission
encysted
metacercaria
(~ 250 µm)
endoparasitic in
tissues of vector
free-swimming
cercaria
(~ 700 µm)
free-swimming
miracidium
(~ 150 µm)
redia
(~ 0.5 mm)
sporocyst
(~ 1 mm)
Intermediate Hosts
(planorbid snails)
(viscera and glandular tissue)

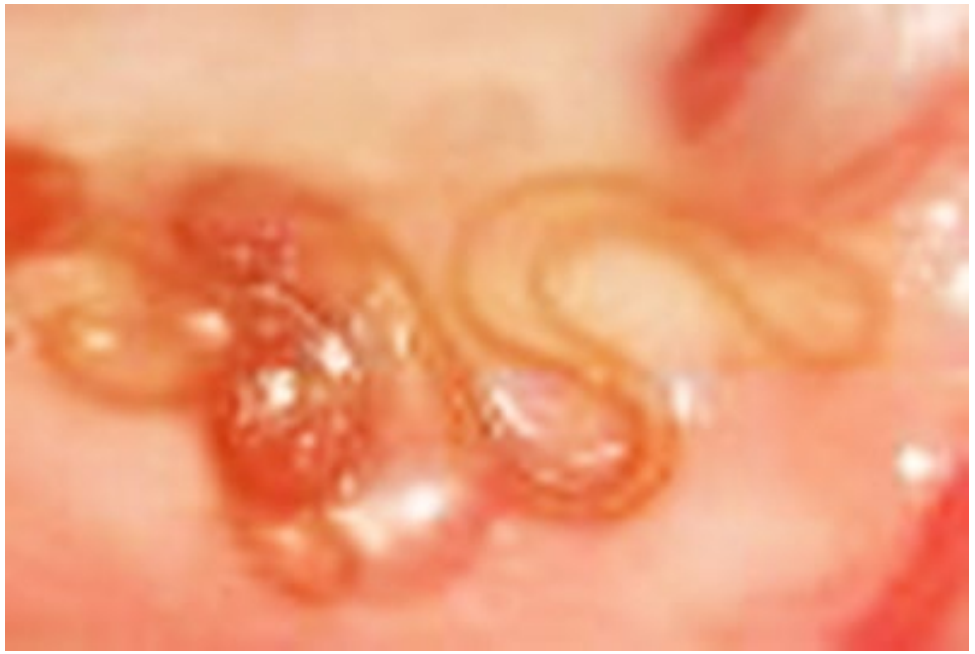

Parascaris
intestines
(hepatitis, pneumonitis,
enteritis, illthrift)
head
Definitive Hosts
(equids)
hepato-
pulmonary
migration
adult female
(~ 400 mm)
adult male
(~ 200 mm)
male tail
(lateral)
second-stage larvae (L2)
(~ 2 mm)
eggs
ingested
eggs
excreted
in faeces
larva develop
within eggs
eggs
(~ 110 µm)
external
environment
faecal-oral transmission

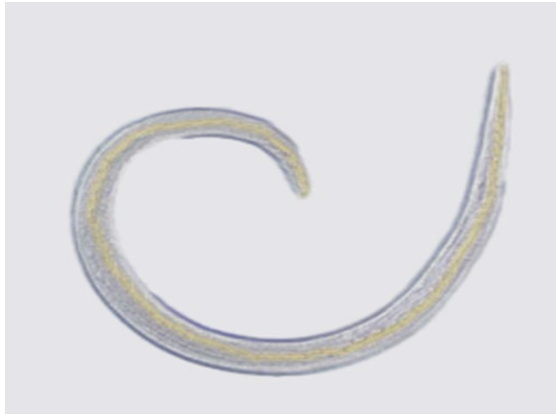


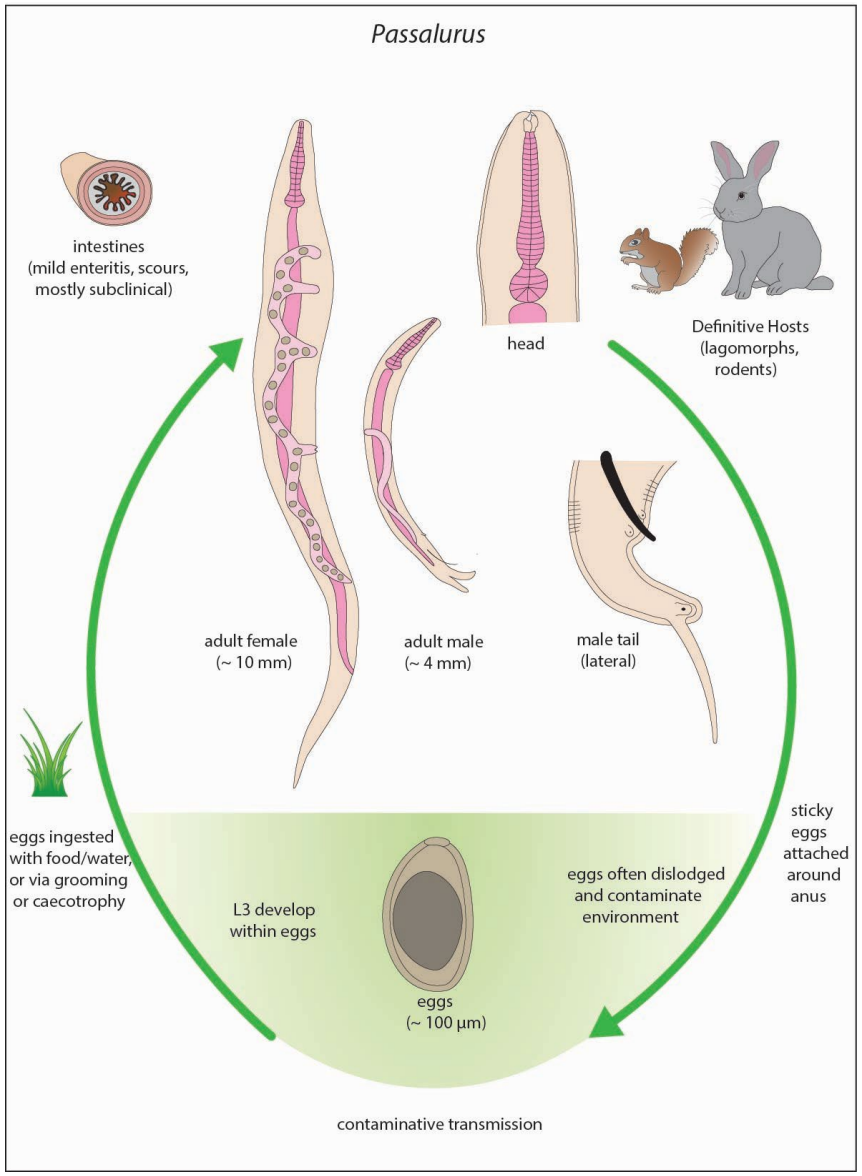

Parastrongylus
lungs, blood vessels
(pneumonitis, arteritis,
meningoencephalitis)
head
Definitive Hosts
(carnivores,
rodents,
primates)
somatic migration
L3/PH/IH
ingested
adult female
(~ 30 mm)
adult male
(~ 20 mm)
male tail
L1
excreted
in faeces
eggs hatch in host
IH/PH
external
environment
third-stage larvae (L3)
(~ 500 µm)
first-stage larvae (L1)
(~ 400 µm)
Paratenic Hosts (PH)
(amphibians, decapods)
(viscera)
L1 ingested
or penetrate
gastropod
Intermediate Hosts (IH)
(pulmonate snails/slugs)
(internal tissues/sinuses)

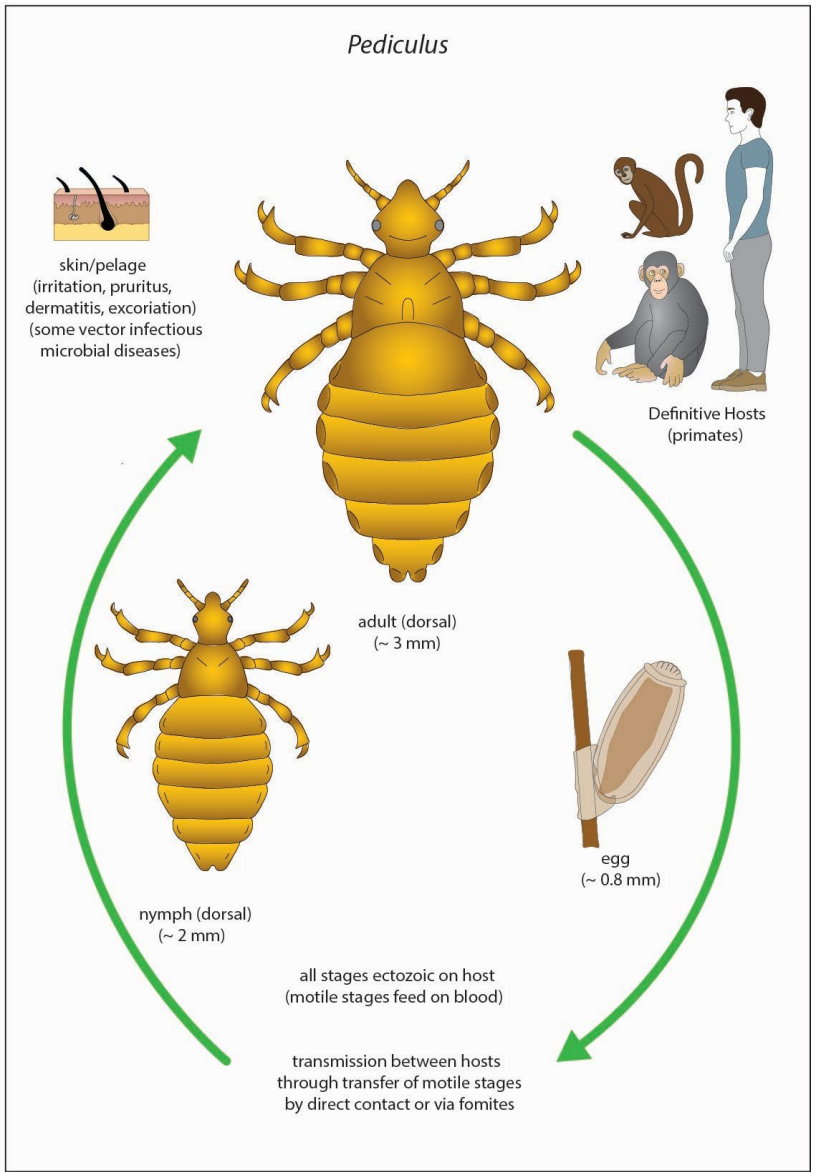

wiki

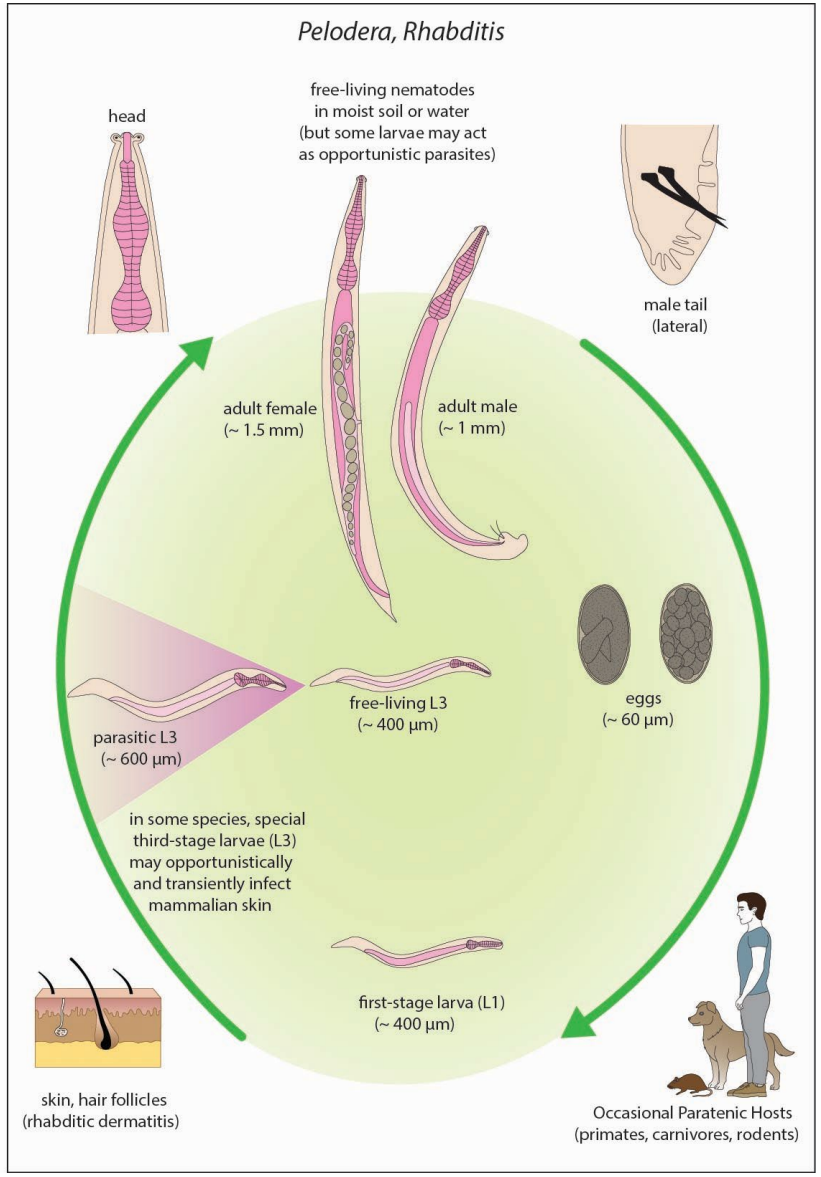

Parelaphostrongylus
blood vessels in brain/muscles
(pneumonitis, vasculitis,
neurological disorders)
somatic migration
IH/L3
ingested
adult female
(~ 60 mm)
adult male
(~ 40 mm)
head
male tail
Definitive Hosts
(artiodactyls,
esp. cervids)
L1
excreted
in faeces
eggs hatch in host
IH
external
environment
third-stage larvae (L3)
(~ 1 mm)
first-stage larvae (L1)
(~ 350 µm)
Intermediate Hosts
(pulmonate snails/slugs)
(internal tissues/sinuses)
L1 ingested
or penetrate
gastropod

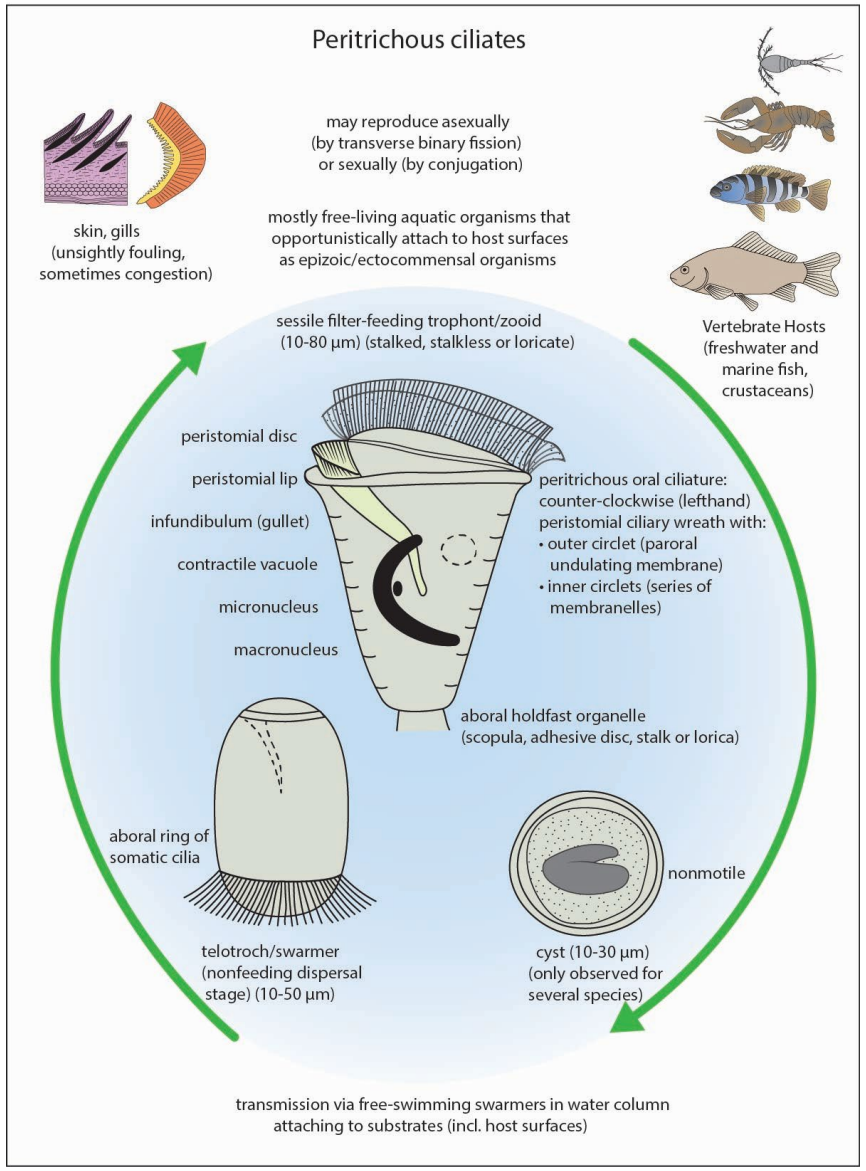


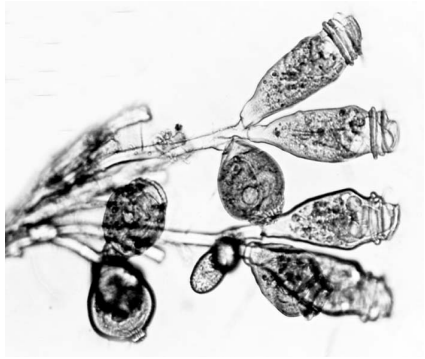


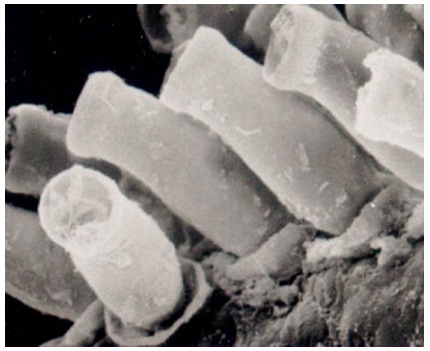

Passalurus
intestines
(mild enteritis, scours,
mostly subclinical)
head
Definitive Hosts
(lagomorphs,
rodents)
adult female
(~ 10 mm)
adult male
(~ 4 mm)
male tail
(lateral)
eggs ingested
with food/water,
or via grooming
or caecotrophy
L3 develop
within eggs
eggs
(~ 100 µm)
eggs often dislodged
and contaminate
environment
sticky
eggs
attached
around
anus
contaminative transmission

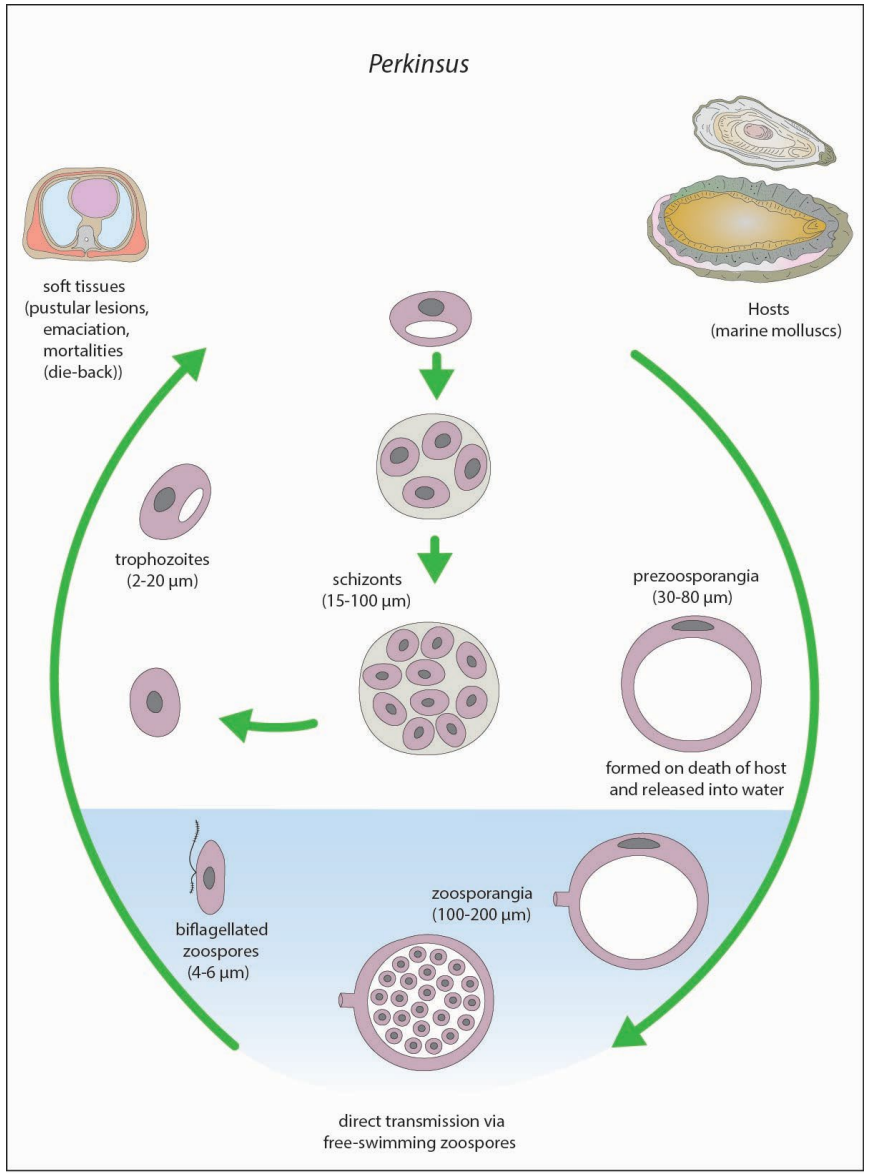

Pediculus
skin/pelage
(irritation, pruritus,
dermatitis, excoriation)
(some vector infectious
microbial diseases)
Definitive Hosts
(primates)
adult (dorsal)
(~ 3 mm)
egg
(~ 0.8 mm)
nymph (dorsal)
(~ 2 mm)
all stages ectozoic on host
(motile stages feed on blood)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

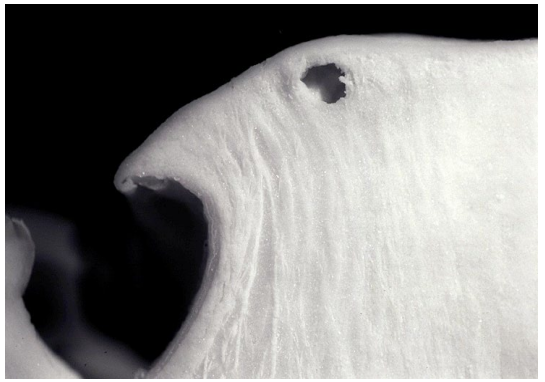

Pelodera, Rhabditis
head
free-living nematodes
in moist soil or water
(but some larvae may act
as opportunistic parasites)
male tail
(lateral)
adult female
(~ 1.5 mm)
adult male
(~ 1 mm)
eggs
(~ 60 µm)
free-living L3
(~ 400 µm)
parasitic L3
(~ 600 µm)
in some species, special
third-stage larvae (L3)
may opportunistically
and transiently infect
mammalian skin
first-stage larva (L1)
(~ 400 µm)
skin, hair follicles
(rhabditic dermatitis)
Occasional Paratenic Hosts
(primates, carnivores, rodents)

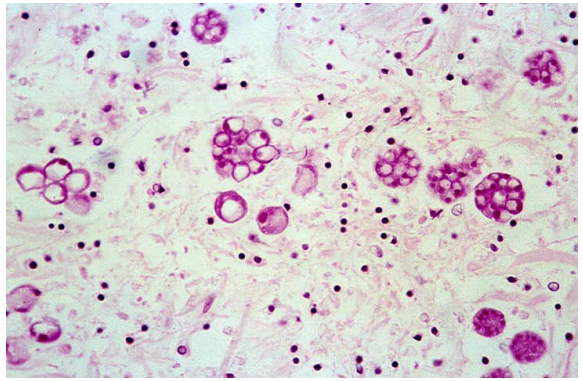

Peritrichous ciliates
skin, gills
(unsightly fouling,
sometimes congestion)
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
mostly free-living aquatic organisms that
opportunistically attach to host surfaces
as epizoic/ectocommensal organisms
Vertebrate Hosts
(freshwater and
marine fish,
crustaceans)
sessile filter-feeding trophont/zooid
(10-80 µm) (stalked, stalkless or loricate)
peristomial disc
peristomial lip
infundibulum (gullet)
contractile vacuole
micronucleus
macronucleus
peritrichous oral ciliature:
counter-clockwise (lefthand)
peristomial ciliary wreath with:
• outer circlet (paroral
undulating membrane)
• inner circlets (series of
membranelles)
aboral holdfast organelle
(scopula, adhesive disc, stalk or lorica)
aboral ring of
somatic cilia
telotroch/swarmer
(nonfeeding dispersal
stage) (10-50 µm)
nonmotile
cyst (10-30 µm)
(only observed for
several species)
transmission via free-swimming swarmers in water column
attaching to substrates (incl. host surfaces)

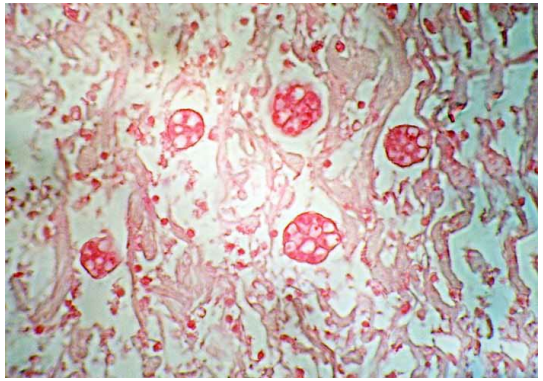


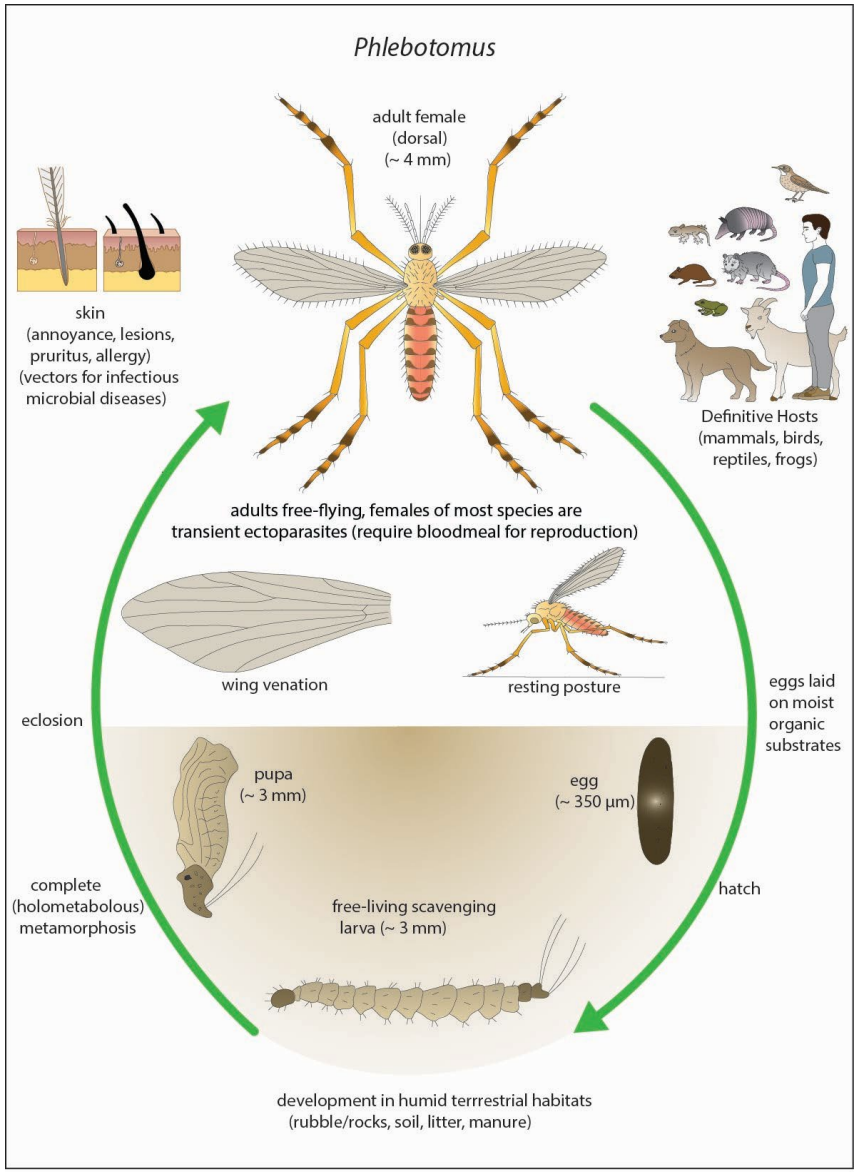



Perkinsus
soft tissues
(pustular lesions,
emaciation,
mortalities
(die-back))
Hosts
(marine molluscs)
trophozoites
(2-20 µm)
schizonts
(15-100 µm)
prezoosporangia
(30-80 µm)
formed on death of host
and released into water
biflagellated
zoospores
(4-6 µm)
zoosporangia
(100-200 µm)
direct transmission via
free-swimming zoospores

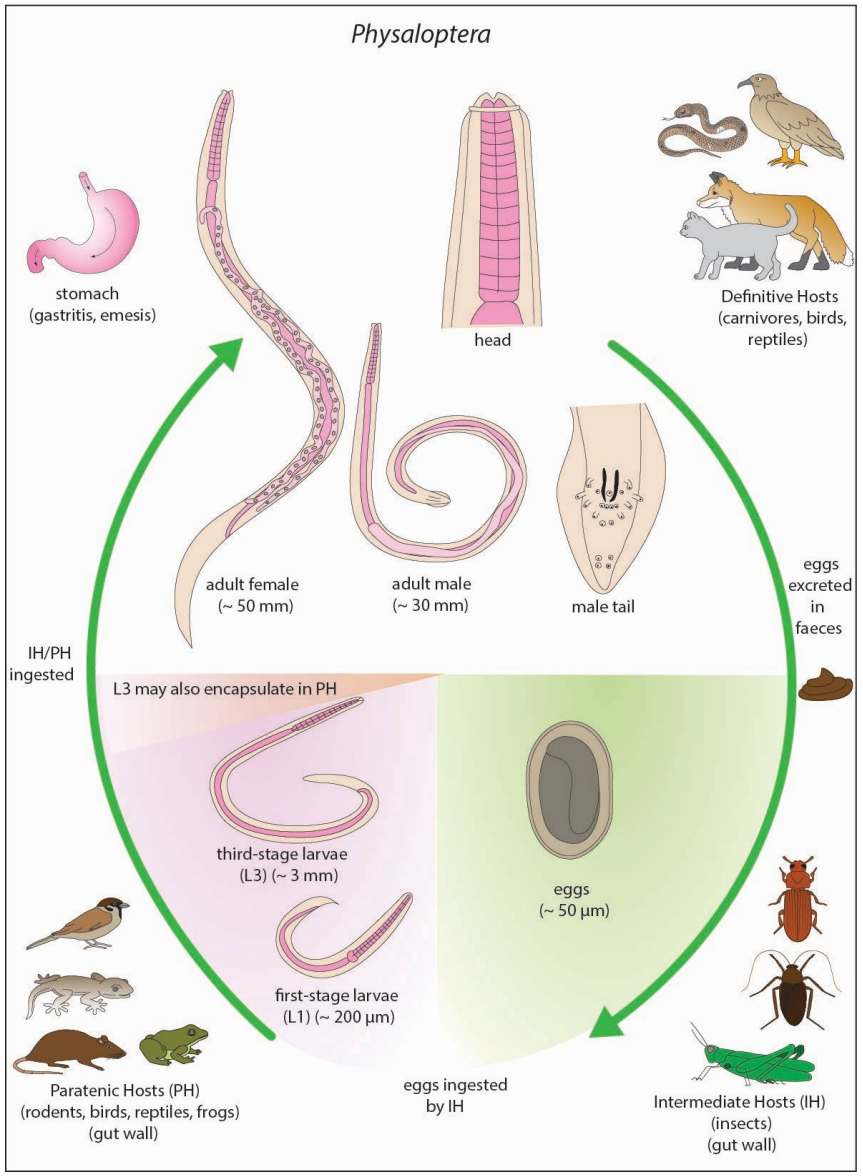


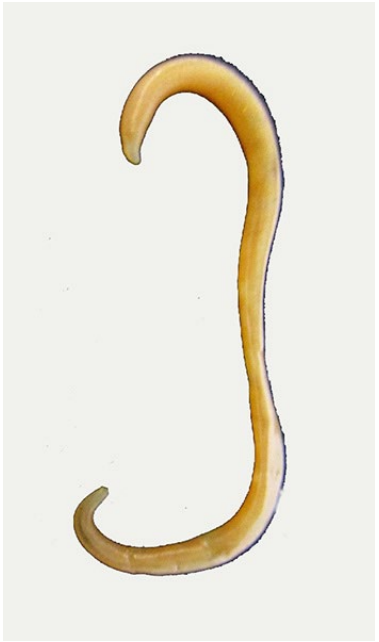


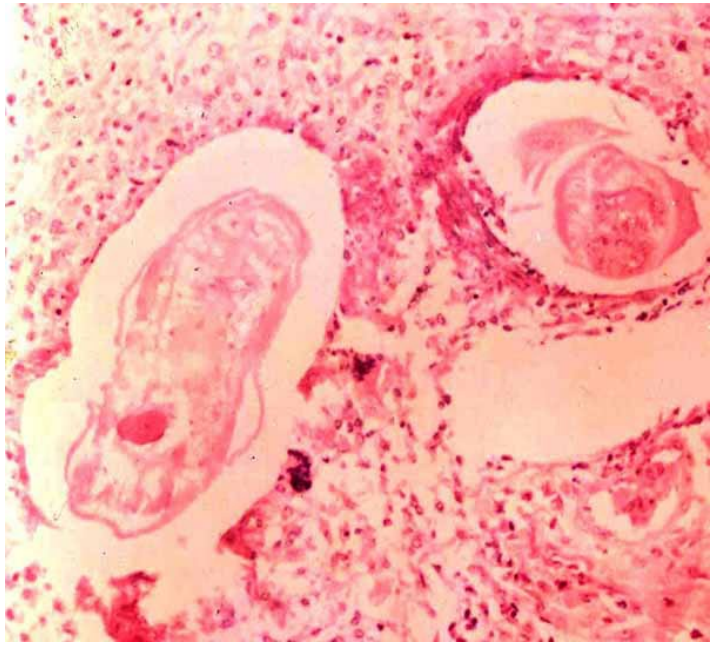


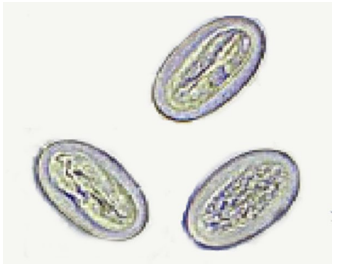

Phlebotomus
adult female
(dorsal)
(~ 4 mm)
skin
(annoyance, lesions,
pruritus, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds,
reptiles, frogs)
adults free-flying, females of most species are
transient ectoparasites (require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs laid
on moist
organic
substrates
pupa
(~ 3 mm)
egg
(~ 350 µm)
complete
(holometabolous)
metamorphosis
free-living scavenging
larva (~ 3 mm)
hatch
development in humid terrrestrial habitats
(rubble/rocks, soil, litter, manure)

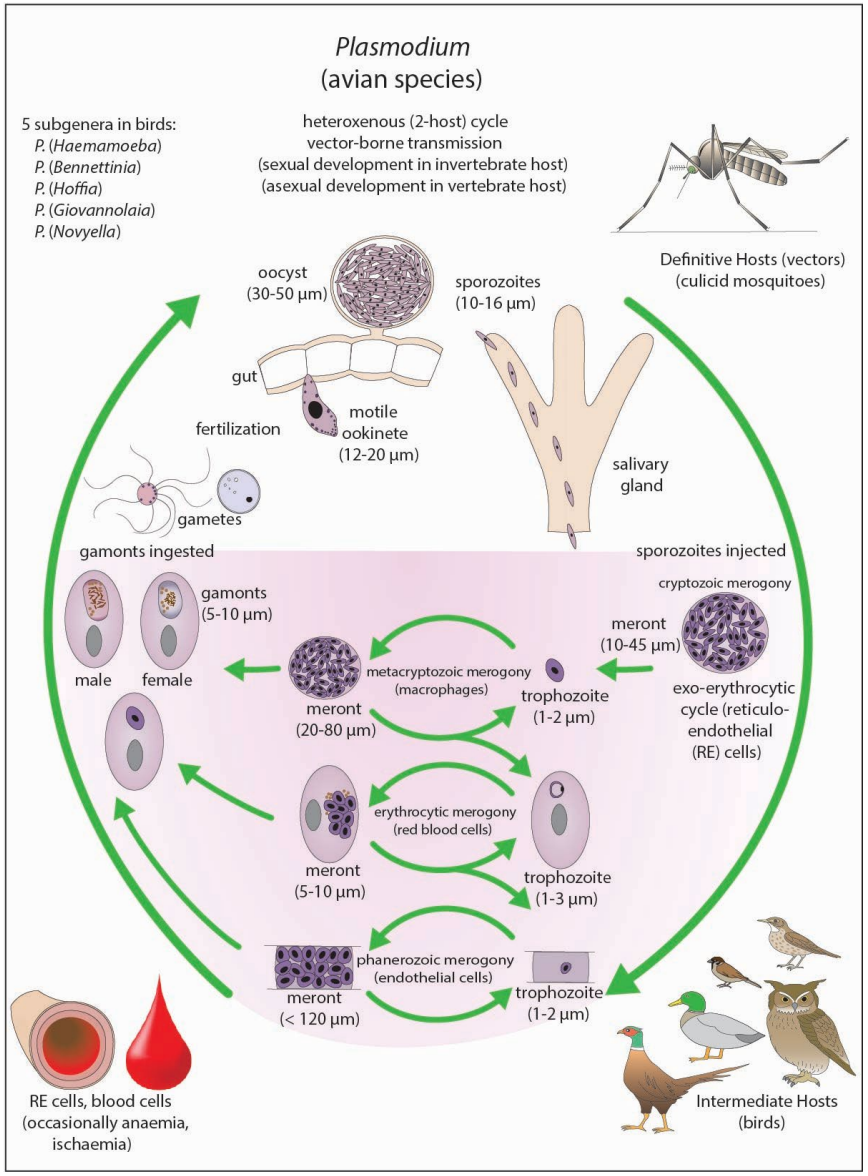

PHIL-10275

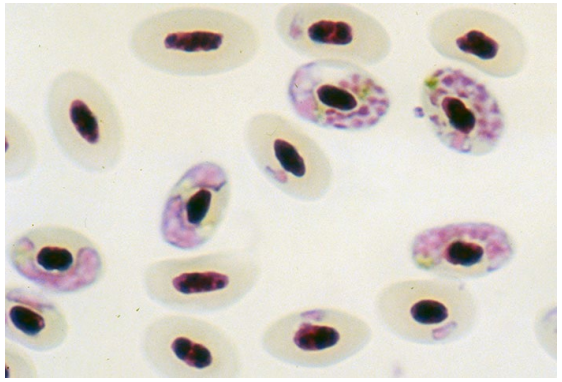

Physaloptera
stomach
(gastritis, emesis)
head
Definitive Hosts
(carnivores, birds,
reptiles)
adult female
(~ 50 mm)
adult male
(~ 30 mm)
male tail
eggs
excreted
in
faeces
IH/PH
ingested
L3 may also encapsulate in PH
third-stage larvae
(L3) (~ 3 mm)
first-stage larvae
(L1) (~ 200 µm)
eggs
(~ 50 µm)
Paratenic Hosts (PH)
(rodents, birds, reptiles, frogs)
(gut wall)
eggs ingested
by IH
Intermediate Hosts (IH)
(insects)
(gut wall)

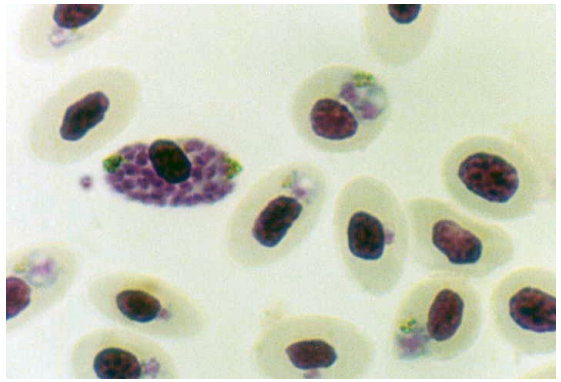


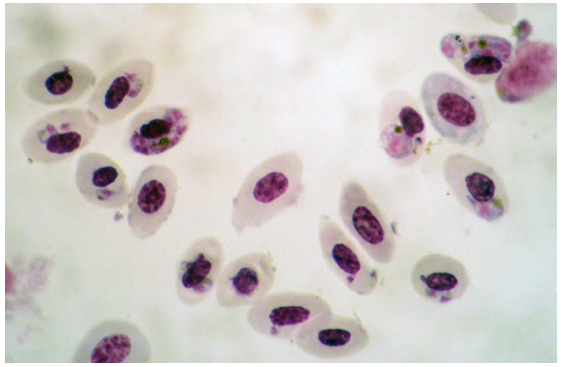


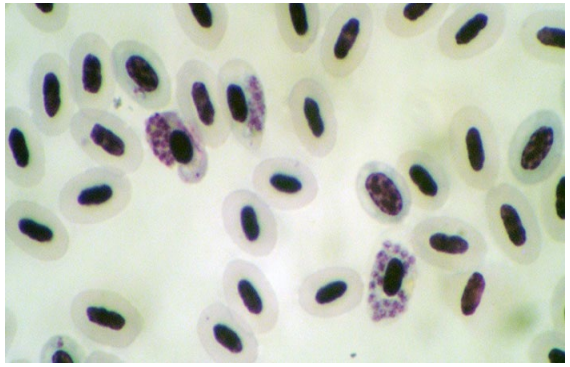


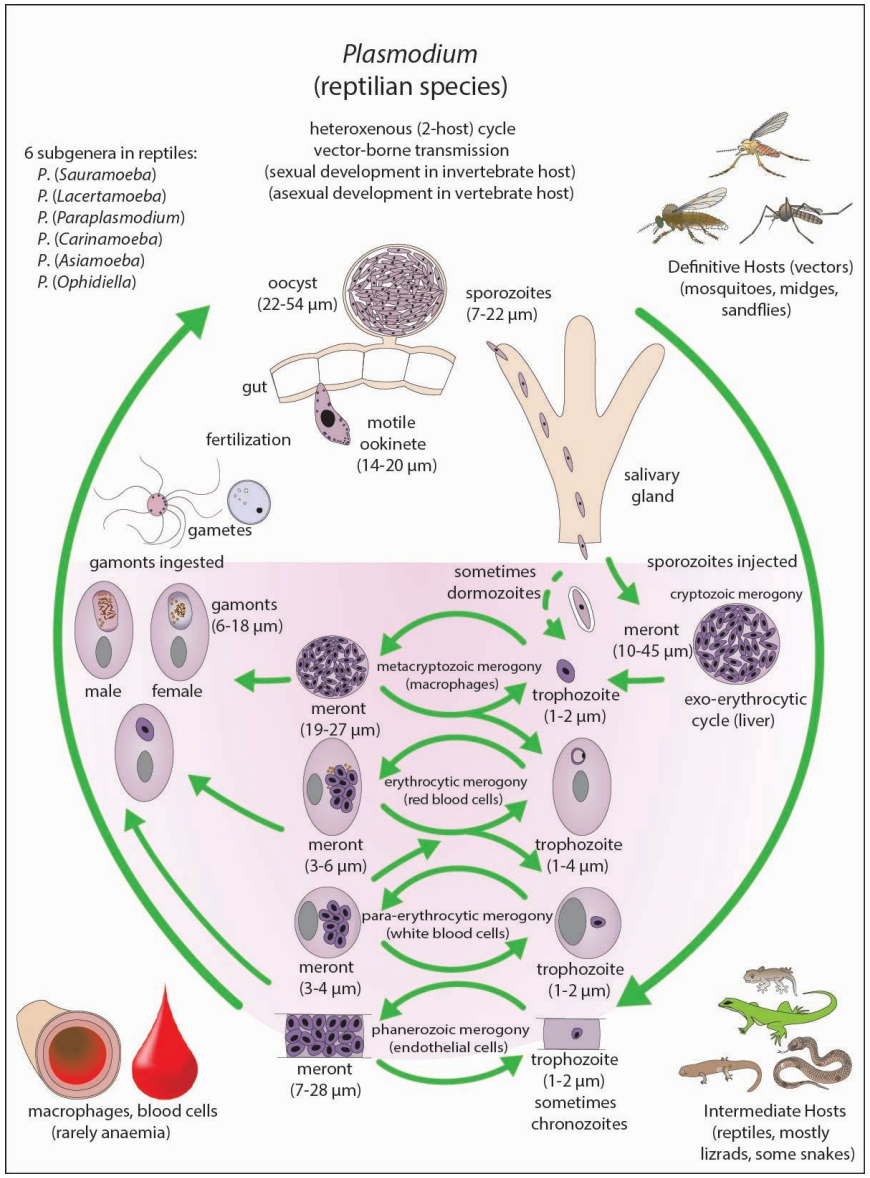

Plasmodium
(avian species)
5 subgenera in birds:
P. (*Haemamoeba*)
P. (*Bennettinia*)
P. (*Hoffia*)
P. (*Giovannolaia*)
P. (*Novyella*)
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
Definitive Hosts (vectors)
(culicid mosquitoes)
oocyst
(30-50 µm)
sporozoites
(10-16 µm)
gut
motile
ookinete
(12-20 µm)
fertilization
salivary
gland
gametes
gamonts ingested
sporozoites injected
gamonts
(5-10 µm)
male
female
cryptozoic merogony
meront
(10-45 µm)
metacryptozoic merogony
(macrophages)
trophozoite
(1-2 µm)
meront
(20-80 µm)
exo-erythrocytic
cycle (reticulo-
endothelial
(RE) cells)
erythrocytic merogony
(red blood cells)
meront
(5-10 µm)
trophozoite
(1-3 µm)
phanerozoic merogony
(endothelial cells)
meront
(< 120 µm)
trophozoite
(1-2 µm)
RE cells, blood cells
(occasionally anaemia,
ischaemia)
Intermediate Hosts
(birds)

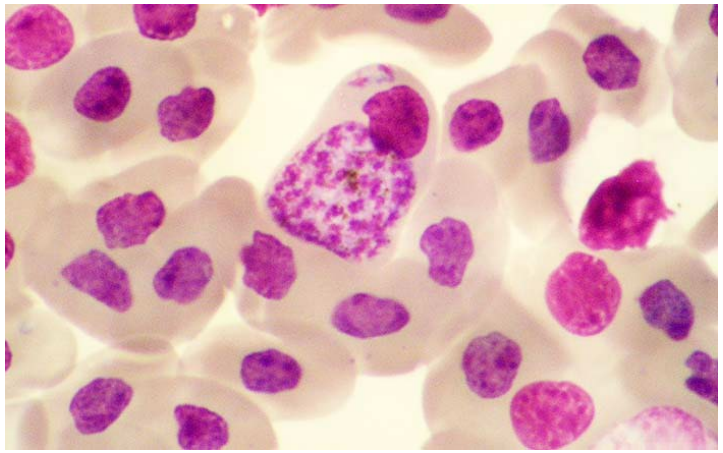


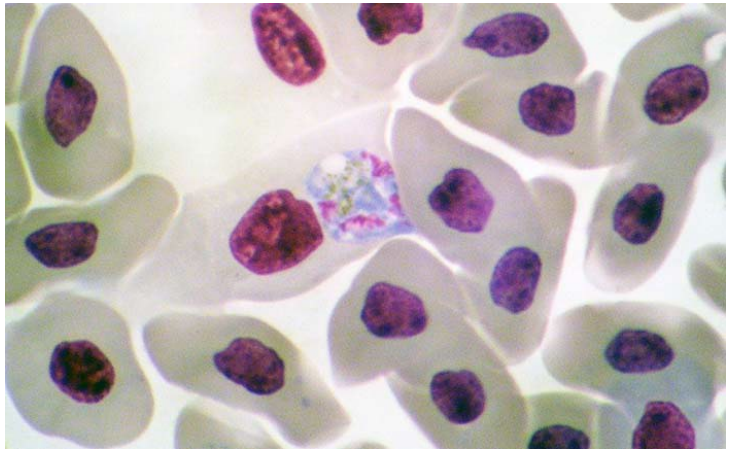


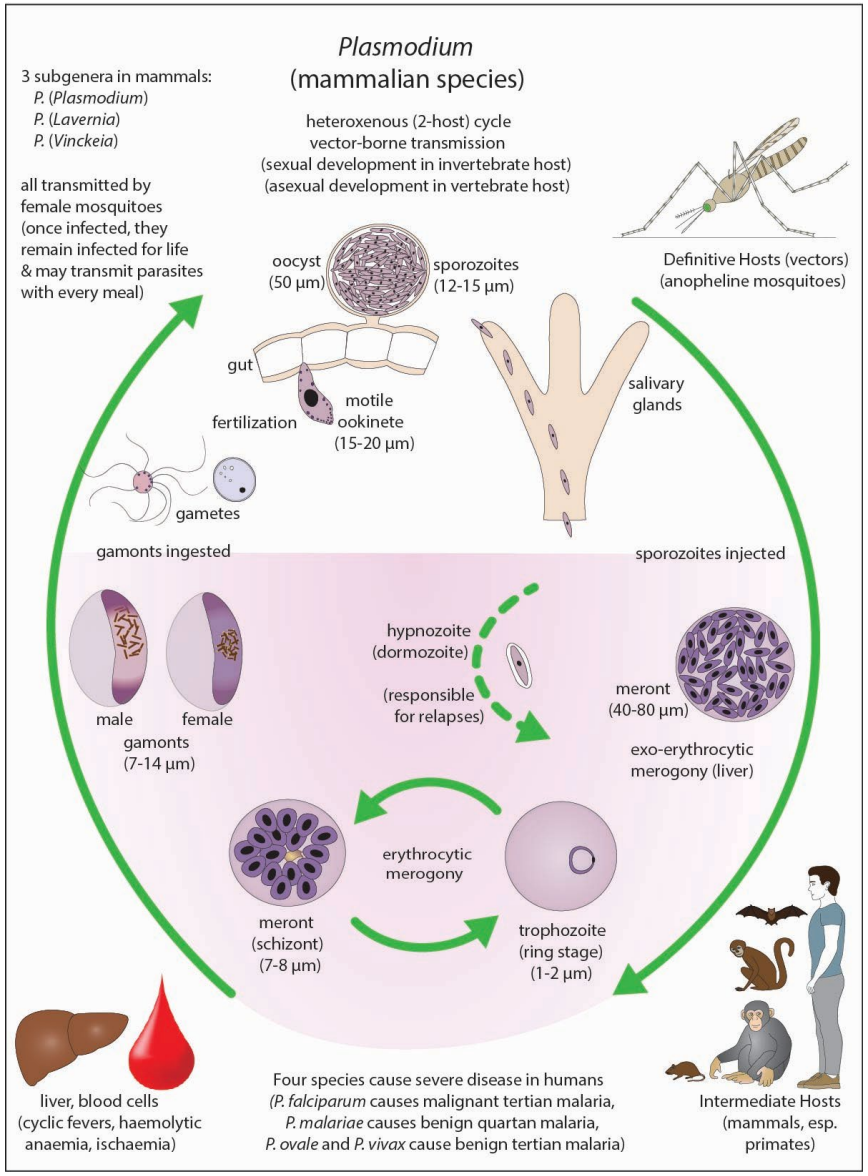


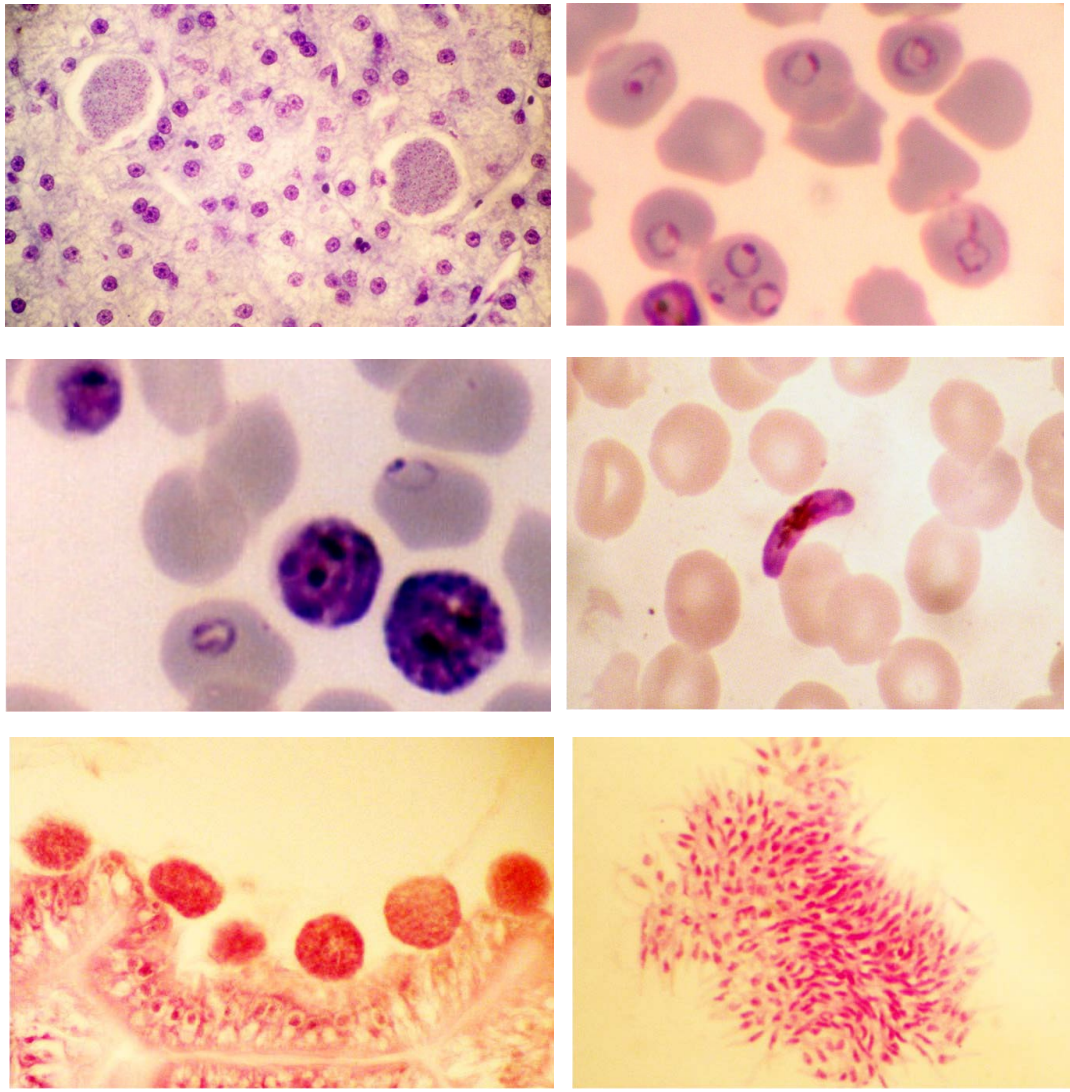


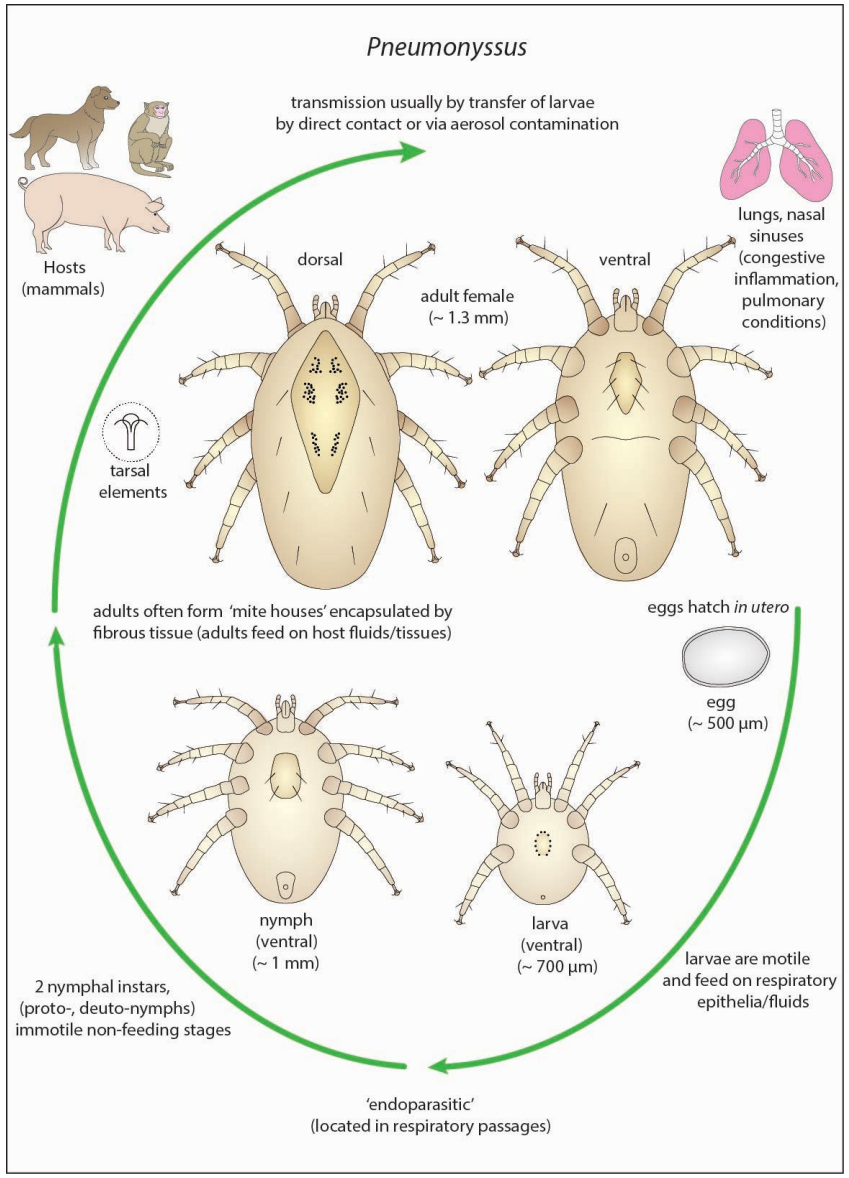

Plasmodium
(reptilian species)
6 subgenera in reptiles:
P. (*Sauramoeba*)
P. (*Lacertamoeba*)
P. (*Paraplasmodium*)
P. (*Carinamoeba*)
P. (*Asiamoeba*)
P. (*Ophidiella*)
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
Definitive Hosts (vectors)
(mosquitoes, midges, sandflies)
oocyst
(22-54 µm)
sporozoites
(7-22 µm)
gut
motile
ookinete
(14-20 µm)
fertilization
salivary
gland
gametes
gamonts ingested
sporozoites injected
sometimes
dormozoites
cryptozoic merogony
meront
(10-45 µm)
gamonts
(6-18 µm)
male
female
metacryptozoic merogony
(macrophages)
meront
(19-27 µm)
trophozoite
(1-2 µm)
exo-erythrocytic
cycle (liver)
erythrocytic merogony
(red blood cells)
meront
(3-6 µm)
trophozoite
(1-4 µm)
para-erythrocytic merogony
(white blood cells)
meront
(3-4 µm)
trophozoite
(1-2 µm)
phanerozoic merogony
(endothelial cells)
meront
(7-28 µm)
trophozoite
(1-2 µm)
sometimes
chronozoites
macrophages, blood cells
(rarely anaemia)
Intermediate Hosts
(reptiles, mostly
lizrads, some snakes)

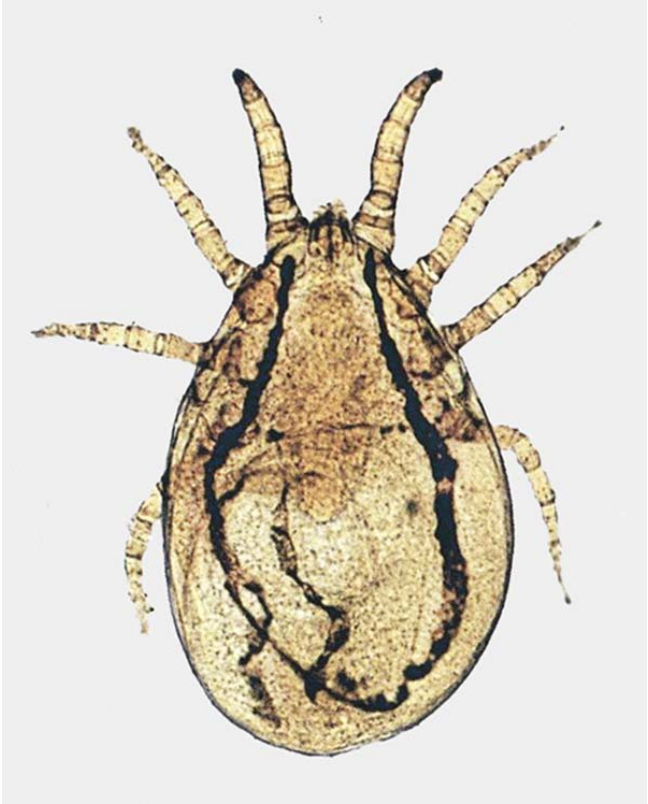


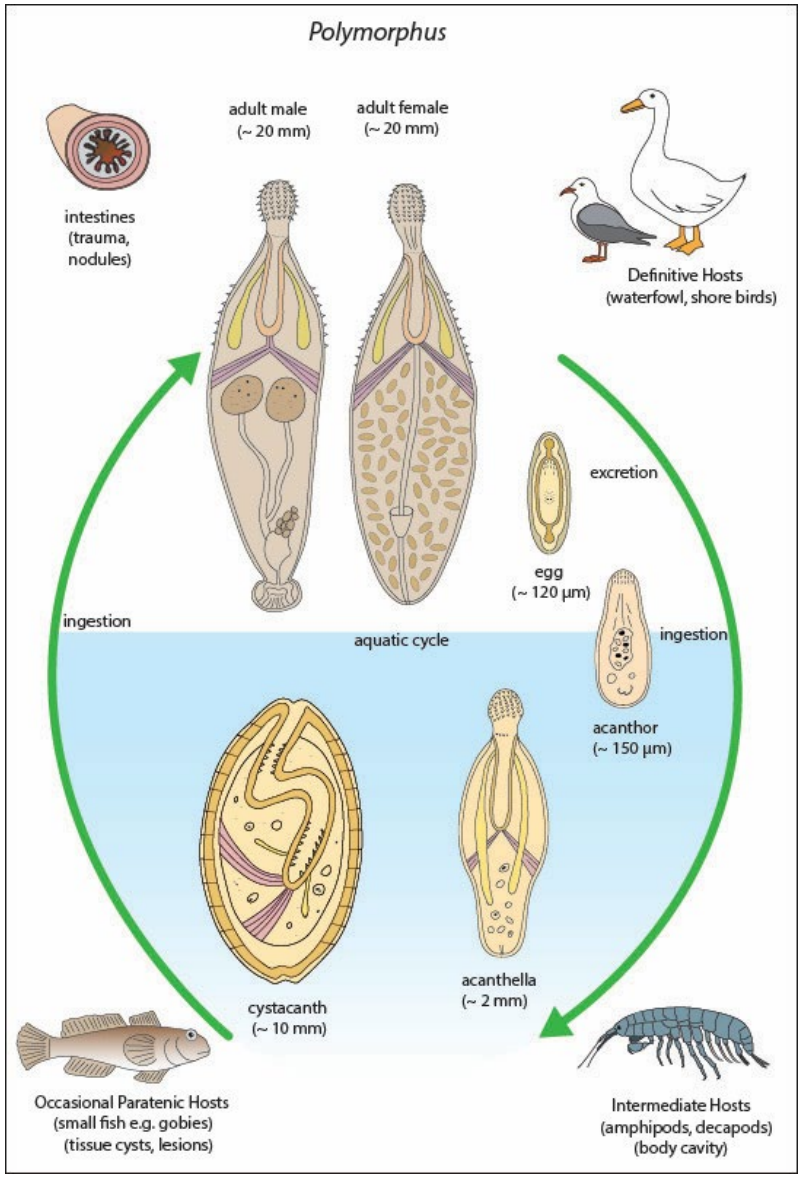


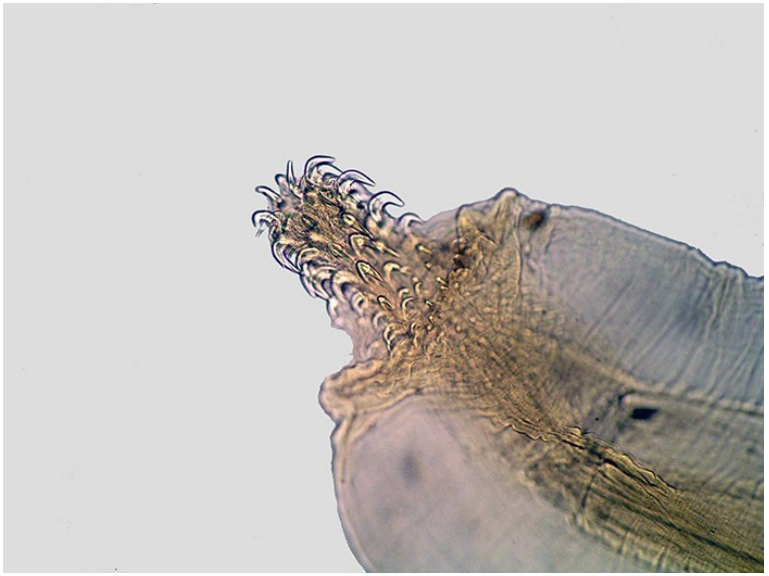

Plasmodium
(mammalian species)
3 subgenera in mammals:
P. (*Plasmodium*)
P. (*Lavernia*)
P. (*Vinckeia*)
all transmitted by female mosquitoes (once infected, they remain infected for life & may transmit parasites with every meal)
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
Definitive Hosts (vectors)
(anopheline mosquitoes)
oocyst
(50 µm)
sporozoites
(12-15 µm)
gut
motile
ookinete
(15-20 µm)
fertilization
salivary
glands
gametes
gamonts ingested
sporozoites injected
male
female
gamonts
(7-14 µm)
hypnozoite
(dormozoite)
(responsible
for relapses)
meront
(40-80 µm)
exo-erythrocytic
merogony (liver)
erythrocytic
merogony
meront
(schizont)
(7-8 µm)
trophozoite
(ring stage)
(1-2 µm)
liver, blood cells
(cyclic fevers, haemolytic
anaemia, ischaemia)
Four species cause severe disease in humans
(*P. falciparum* causes malignant tertian malaria,
P. malariae causes benign quartan malaria,
P. ovale and *P. vivax* cause benign tertian malaria)
Intermediate Hosts
(mammals, esp.
primates)

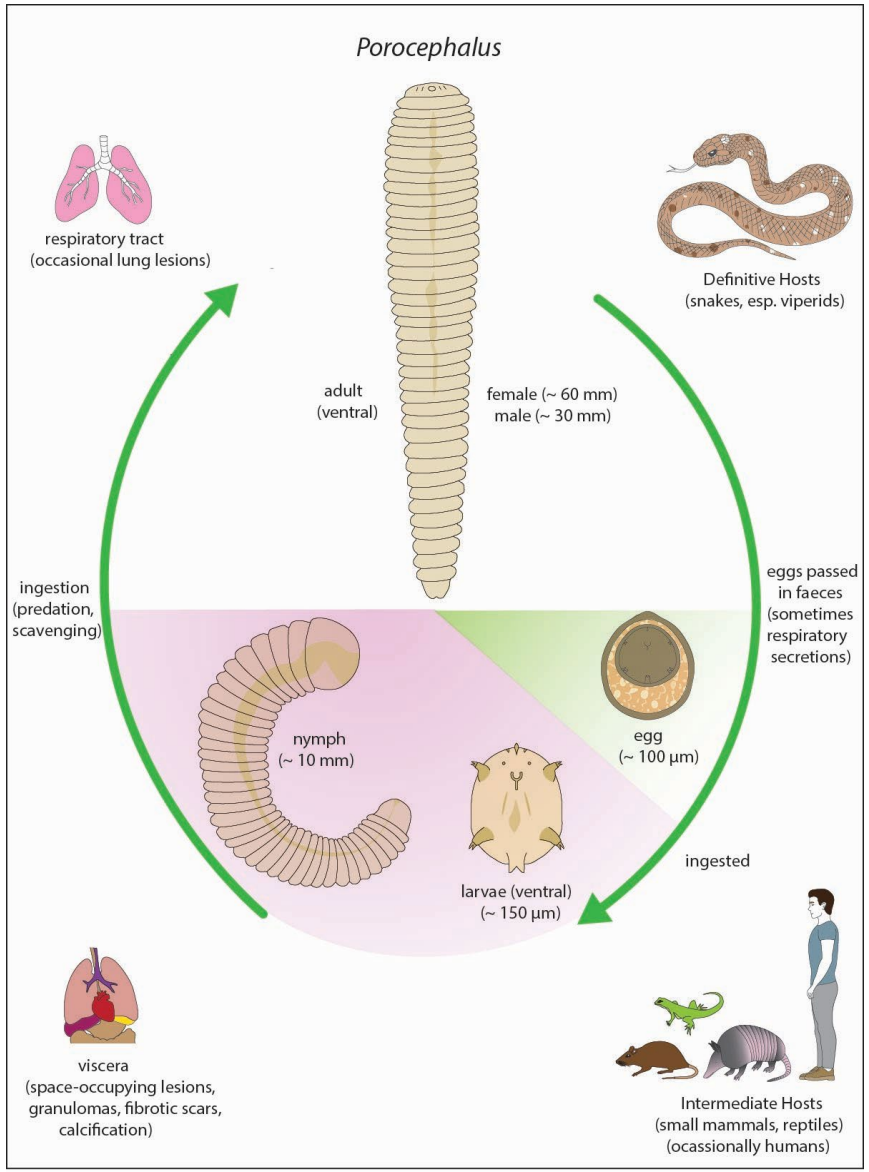


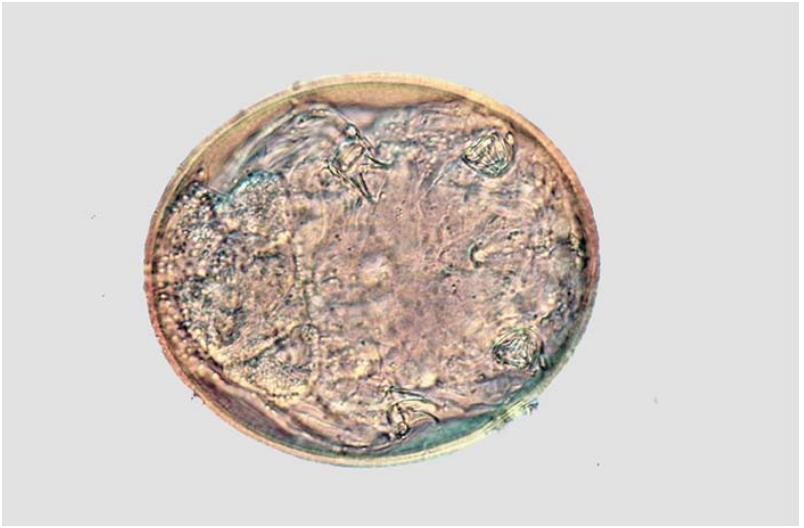

Pneumonyssus
transmission usually by transfer of larvae
by direct contact or via aerosol contamination
Hosts
(mammals)
lungs, nasal
sinuses
(congestive
inflammation,
pulmonary
conditions)
dorsal
ventral
adult female
(~ 1.3 mm)
tarsal
elements
adults often form 'mite houses' encapsulated by
fibrous tissue (adults feed on host fluids/tissues)
eggs hatch *in utero*
egg
(~ 500 µm)
nymph
(ventral)
(~ 1 mm)
larva
(ventral)
(~ 700 µm)
larvae are motile
and feed on respiratory
epithelia/fluids
2 nymphal instars,
(proto-, deuto-nymphs)
immotile non-feeding stages
'endoparasitic'
(located in respiratory passages)

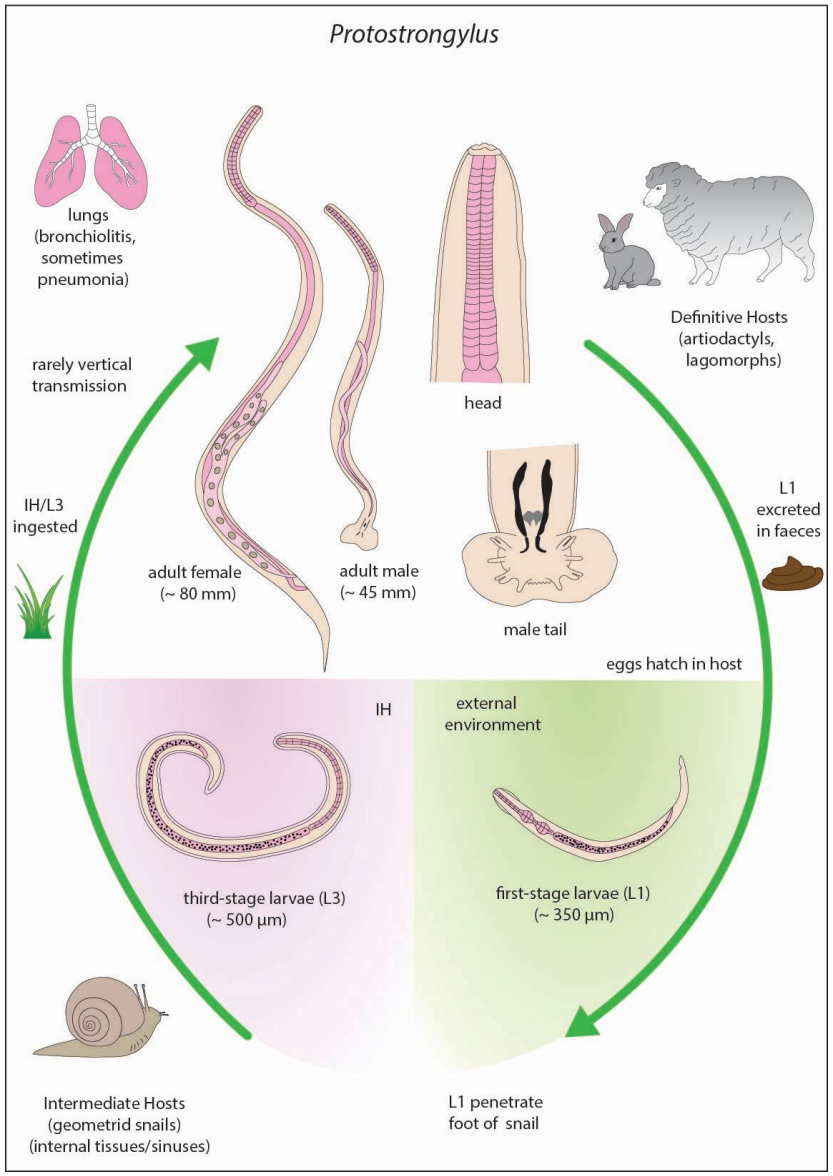


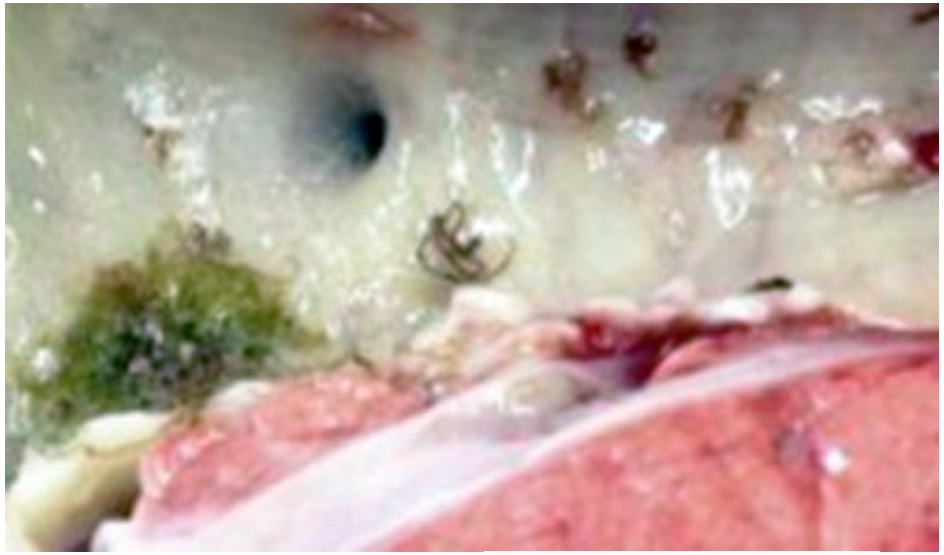

Polymorphus
adult male
(~ 20 mm)
adult female
(~ 20 mm)
intestines
(trauma,
nodules)
Definitive Hosts
(waterfowl, shore birds)
excretion
egg
(~ 120 µm)
ingestion
aquatic cycle
ingestion
acanthor
(~ 150 µm)
cystacanth
(~ 10 mm)
acanthella
(~ 2 mm)
Occasional Paratenic Hosts
(small fish e.g. gobies)
(tissue cysts, lesions)
Intermediate Hosts
(amphipods, decapods)
(body cavity)

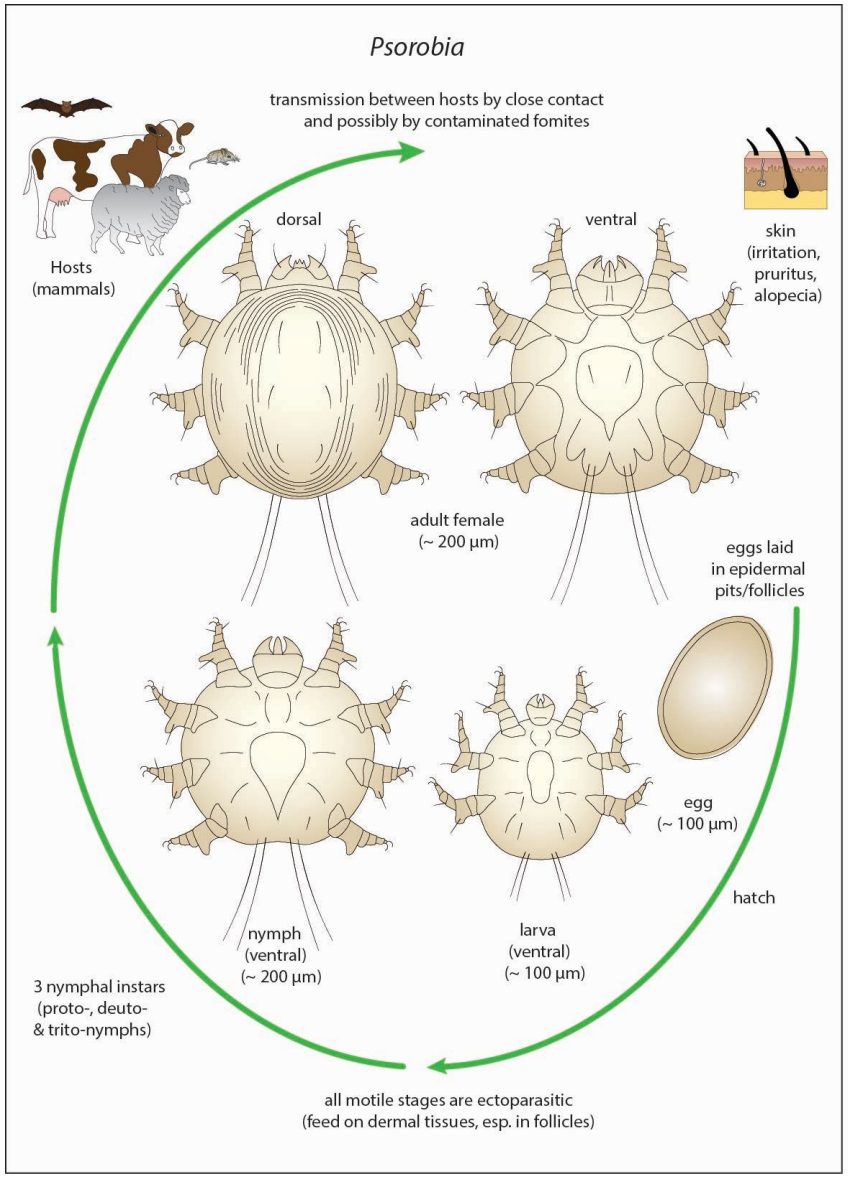


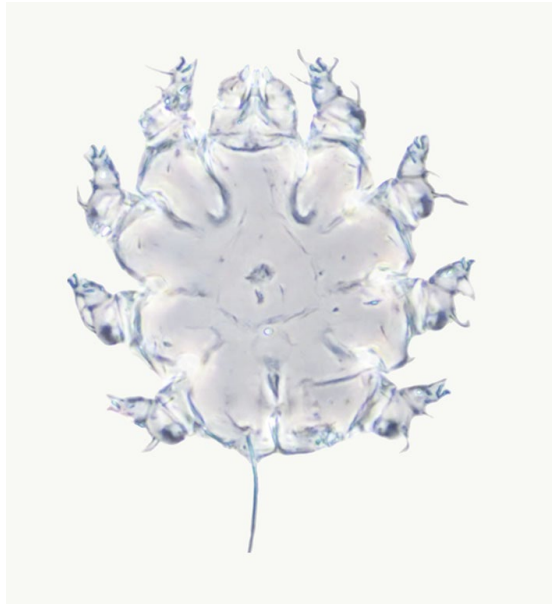

Porocephalus
respiratory tract
(occasional lung lesions)
Definitive Hosts
(snakes, esp. viperids)
adult
(ventral)
female (~ 60 mm)
male (~ 30 mm)
ingestion
(predation,
scavenging)
eggs passed
in faeces
(sometimes
respiratory
secretions)
nymph
(~ 10 mm)
egg
(~ 100 µm)
ingested
larvae (ventral)
(~ 150 µm)
viscera
(space-occupying lesions,
granulomas, fibrotic scars,
calcification)
Intermediate Hosts
(small mammals, reptiles)
(ocassionally humans)

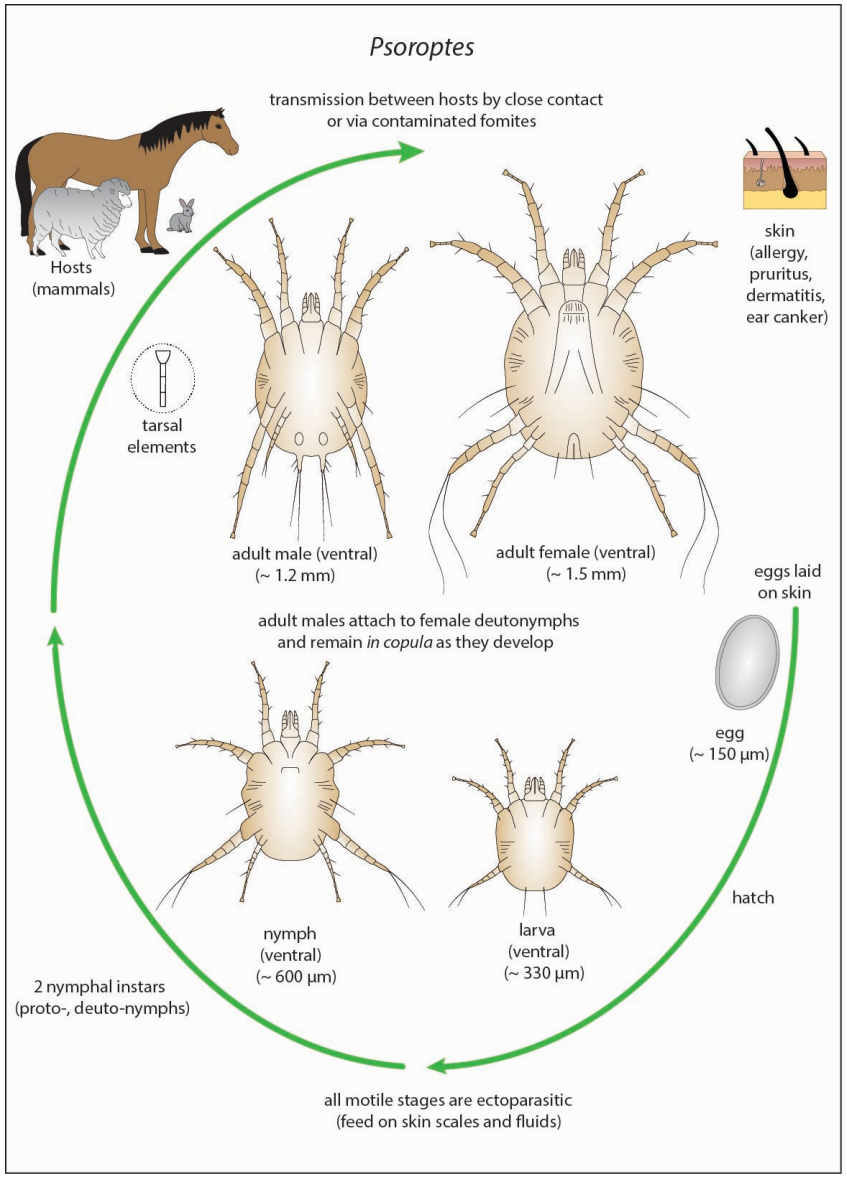


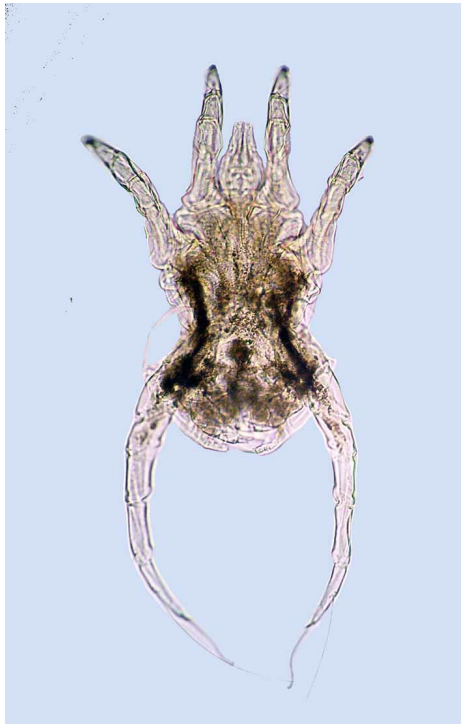

Protostrongylus
lungs
(bronchiolitis,
sometimes
pneumonia)
rarely vertical
transmission
IH/L3
ingested
adult female
(~ 80 mm)
adult male
(~ 45 mm)
head
male tail
Definitive Hosts
(artiodactyls,
lagomorphs)
L1
excreted
in faeces
eggs hatch in host
IH
external
environment
third-stage larvae (L3)
(~ 500 µm)
first-stage larvae (L1)
(~ 350 µm)
Intermediate Hosts
(geometrid snails)
(internal tissues/sinuses)
L1 penetrate
foot of snail

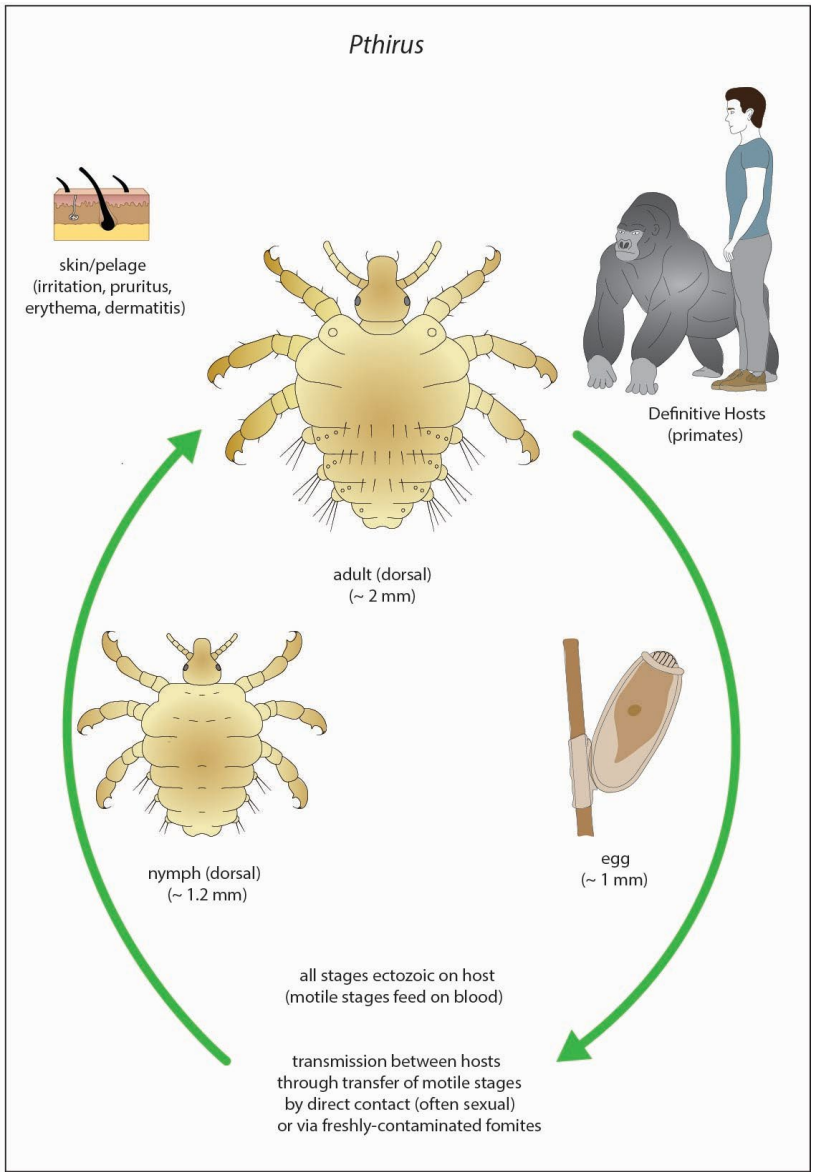


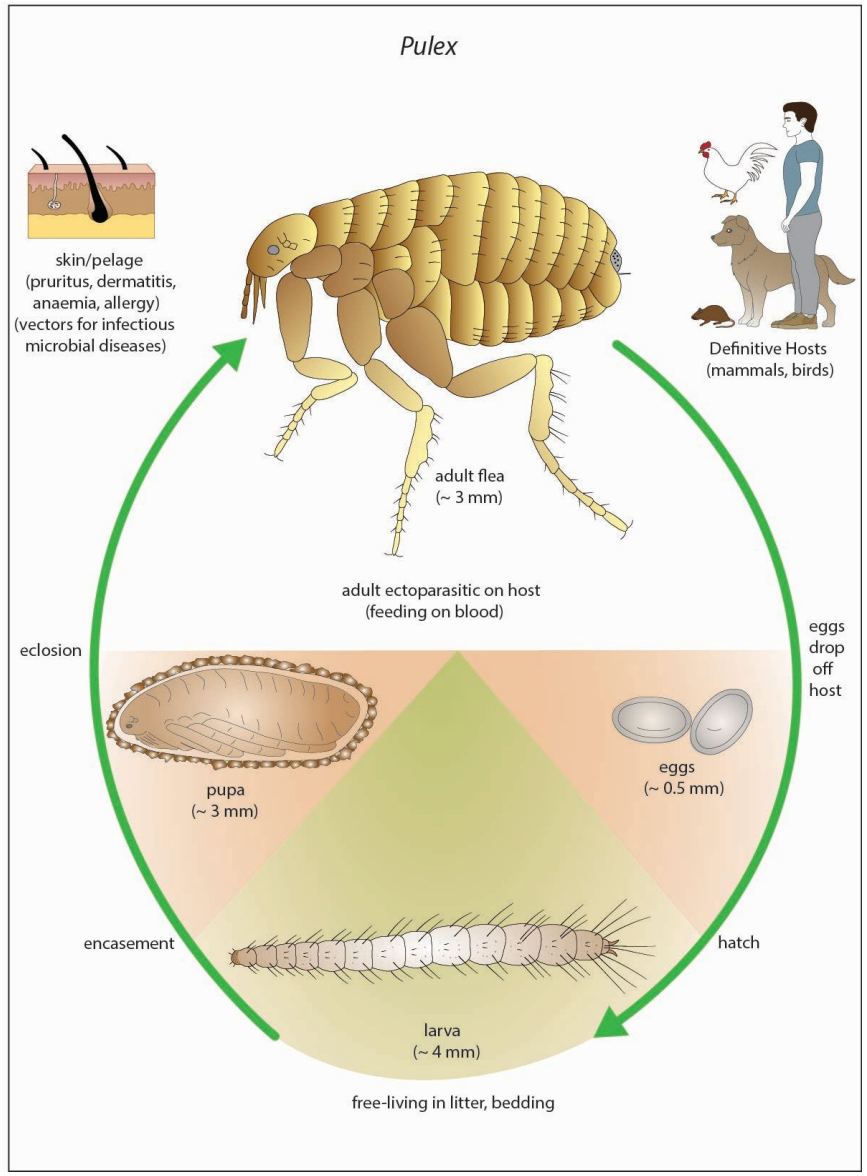

Psorobia
transmission between hosts by close contact
and possibly by contaminated fomites
Hosts
(mammals)
dorsal
ventral
skin
(irritation,
pruritus,
alopecia)
adult female
(~ 200 µm)
eggs laid
in epidermal
pits/follicles
egg
(~ 100 µm)
hatch
nymph
(ventral)
(~ 200 µm)
larva
(ventral)
(~ 100 µm)
3 nymphal instars
(proto-, deuto-
& trito-nymphs)
all motile stages are ectoparasitic
(feed on dermal tissues, esp. in follicles)

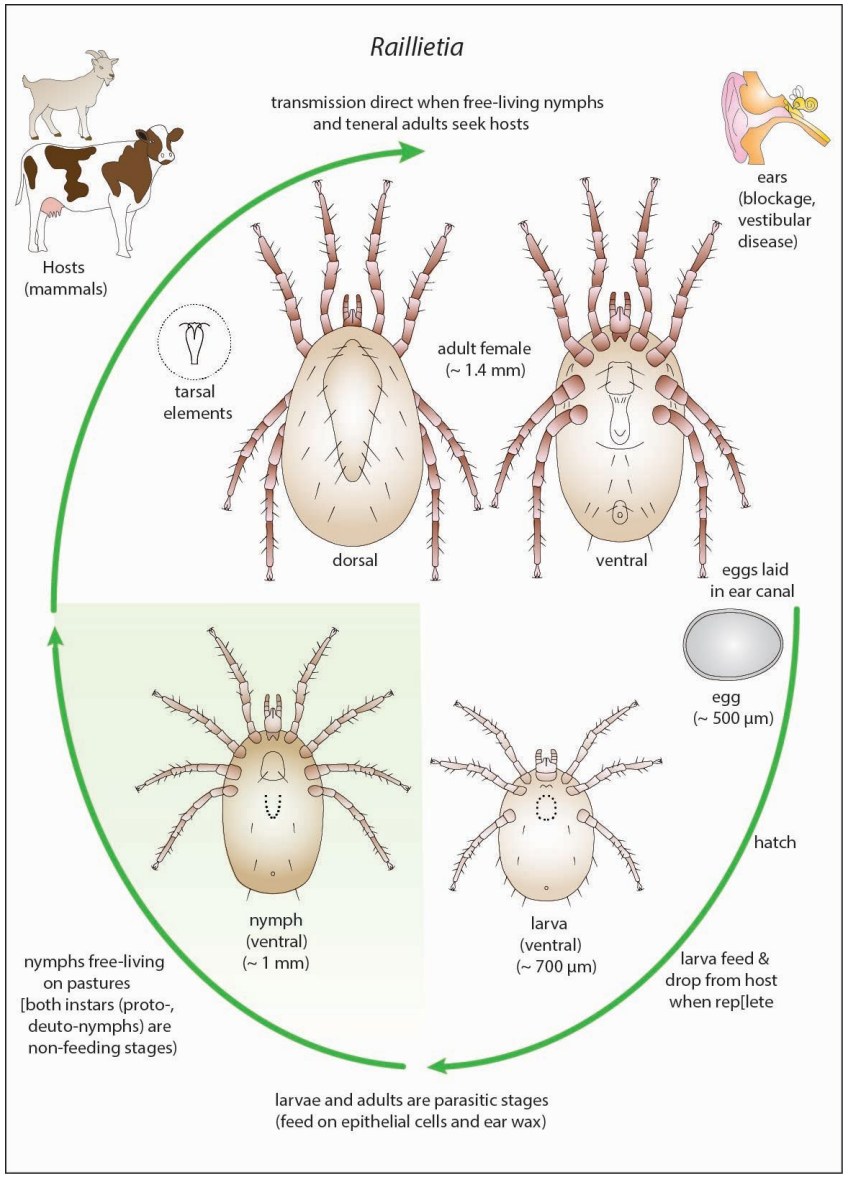


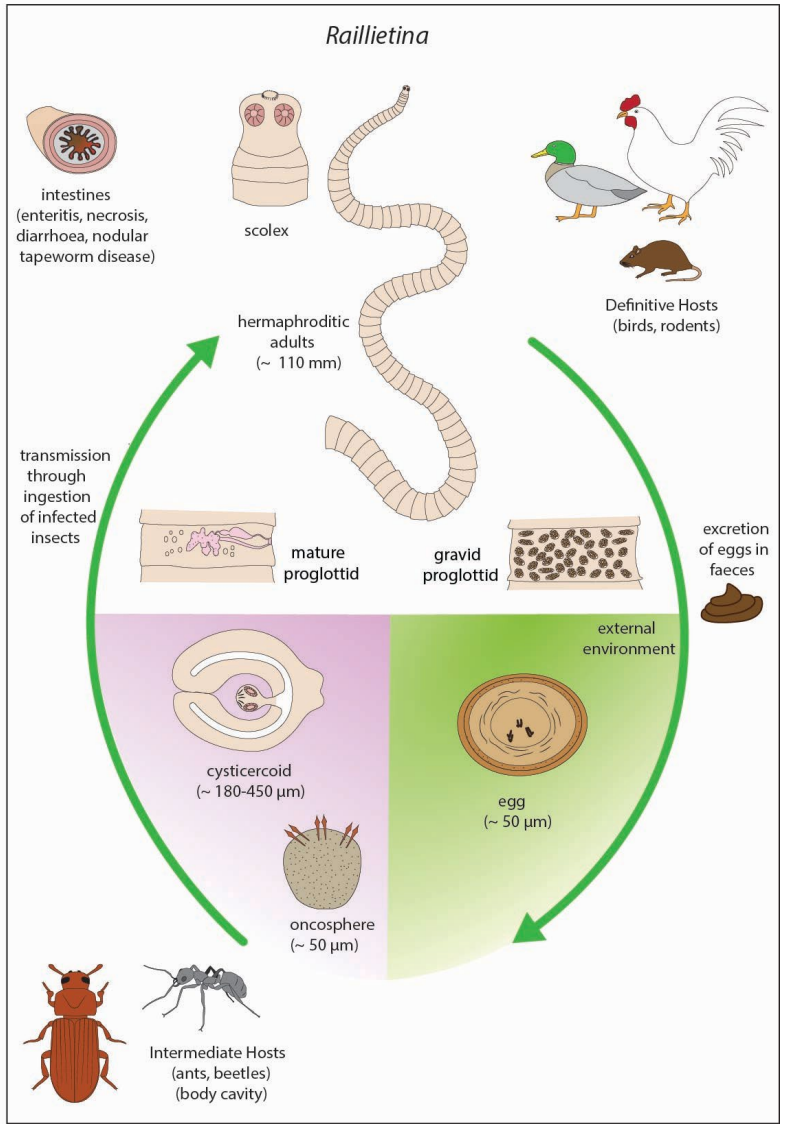

Psoroptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
skin
(allergy,
pruritus,
dermatitis,
ear canker)
tarsal
elements
adult male (ventral)
(~ 1.2 mm)
adult female (ventral)
(~ 1.5 mm)
eggs laid
on skin
adult males attach to female deutonymphs
and remain in copula as they develop
egg
(~ 150 µm)
hatch
nymph
(ventral)
(~ 600 µm)
larva
(ventral)
(~ 330 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on skin scales and fluids)

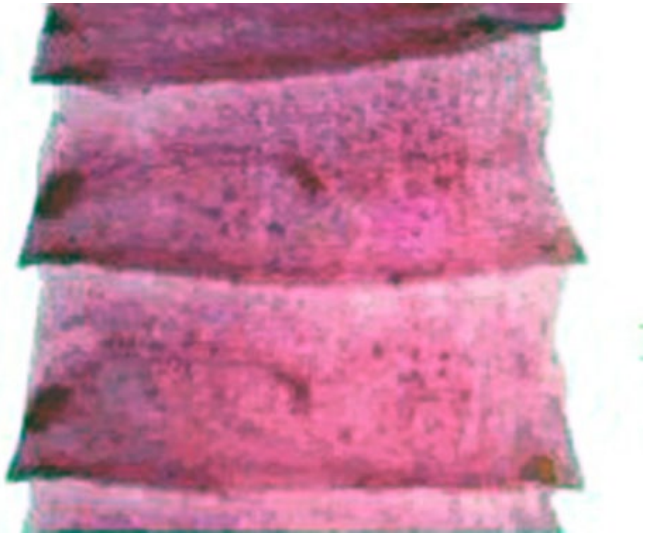


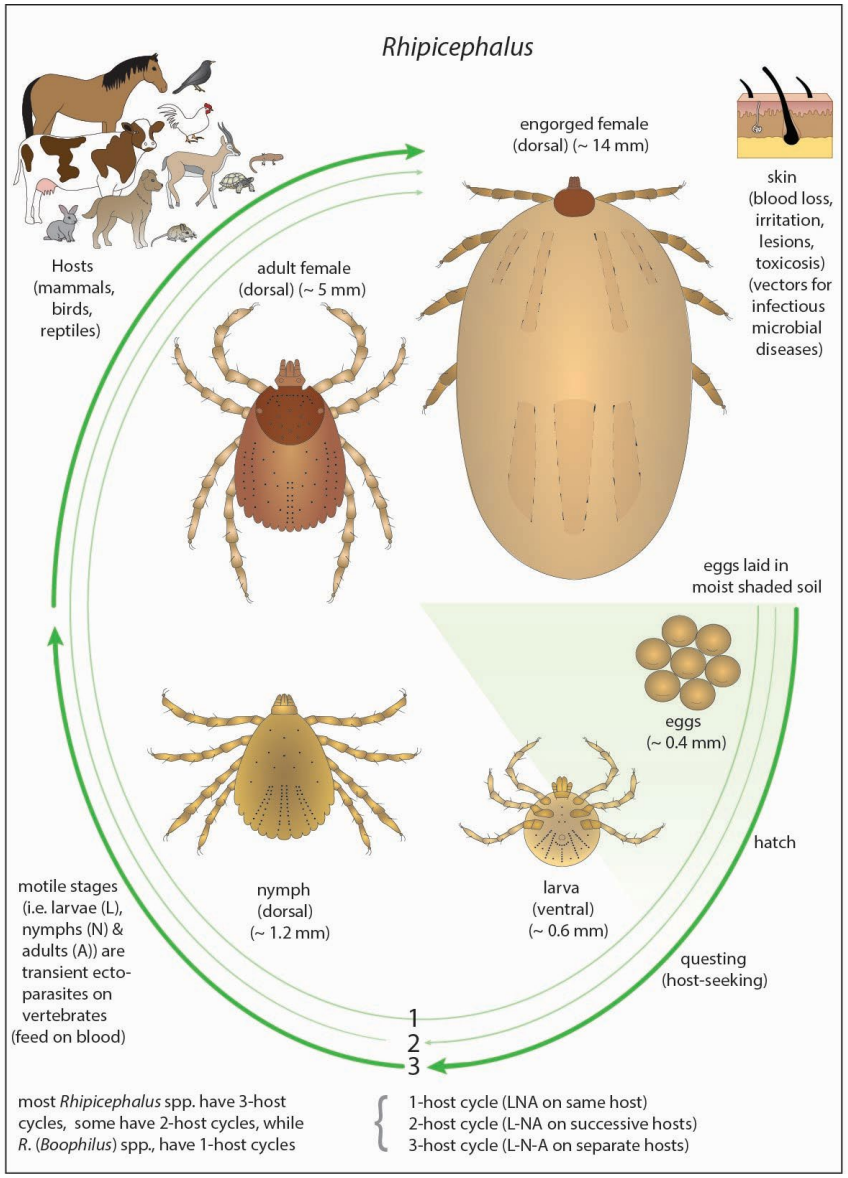

Pthirus
skin/pelage
(irritation, pruritus,
erythema, dermatitis)
Definitive Hosts
(primates)
adult (dorsal)
(~ 2 mm)
nymph (dorsal)
(~ 1.2 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on blood)
transmission between hosts
through transfer of motile stages
by direct contact (often sexual)
or via freshly-contaminated fomites

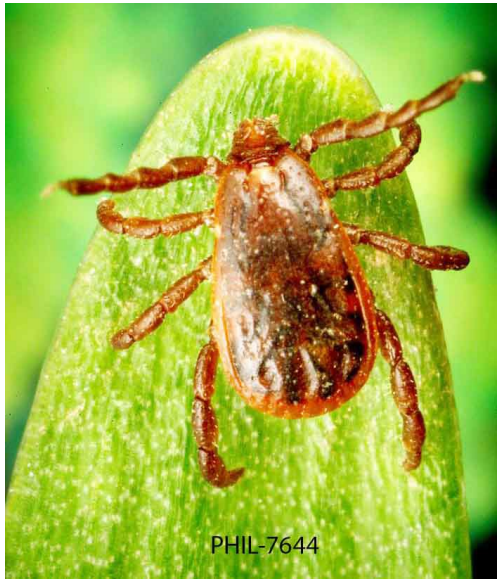

Pulex
skin/pelage
(pruritus, dermatitis,
anaemia, allergy)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
adult flea
(~ 3 mm)
adult ectoparasitic on host
(feeding on blood)
eclosion
eggs
drop
off
host
pupa
(~ 3 mm)
eggs
(~ 0.5 mm)
encasement
hatch
larva
(~ 4 mm)
free-living in litter, bedding


Raillietia
transmission direct when free-living nymphs and teneral adults seek hosts
Hosts (mammals)
ears (blockage, vestibular disease)
tarsal elements
adult female (~ 1.4 mm)
dorsal
ventral
eggs laid in ear canal
egg (~ 500 µm)
hatch
nymph (ventral) (~ 1 mm)
larva (ventral) (~ 700 µm)
nymphs free-living on pastures [both instars (proto-, deuto-nymphs) are non-feeding stages)
larva feed & drop from host when rep[lete
larvae and adults are parasitic stages (feed on epithelial cells and ear wax)


Raillietina
intestines
(enteritis, necrosis,
diarrhoea, nodular
tapeworm disease)
scolex
hermaphroditic
adults
(~ 110 mm)
Definitive Hosts
(birds, rodents)
transmission
through
ingestion
of infected
insects
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercoid
(~ 180-450 µm)
egg
(~ 50 µm)
oncosphere
(~ 50 µm)
Intermediate Hosts
(ants, beetles)
(body cavity)




Rhipicephalus
Hosts (mammals, birds, reptiles)
adult female (dorsal) (~ 5 mm)
engorged female (dorsal) (~ 14 mm)
skin (blood loss, irritation, lesions, toxicosis) (vectors for infectious microbial diseases)
eggs laid in moist shaded soil
eggs (~ 0.4 mm)
hatch
larva (ventral) (~ 0.6 mm)
nymph (dorsal) (~ 1.2 mm)
questing (host-seeking)
motile stages (i.e. larvae (L), nymphs (N) & adults (A)) are transient ecto-parasites on vertebrates (feed on blood)
1
2
3
most Rhipicephalus spp. have 3-host cycles, some have 2-host cycles, while R. (Boophilus) spp., have 1-host cycles
1-host cycle (LNA on same host)
2-host cycle (L-NA on successive hosts)
3-host cycle (L-N-A on separate hosts)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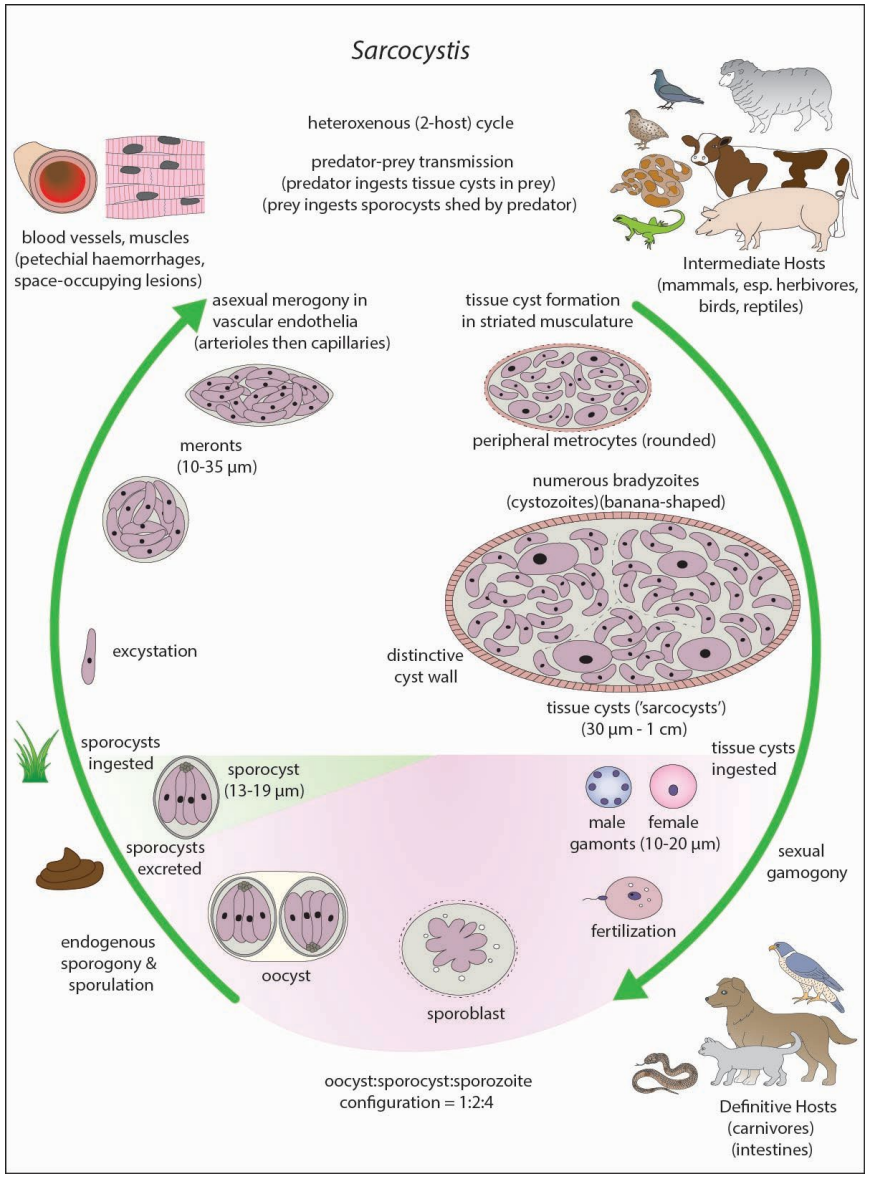
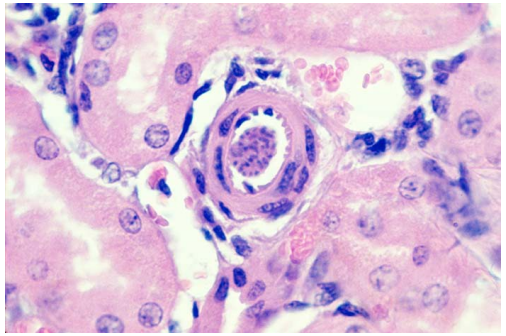
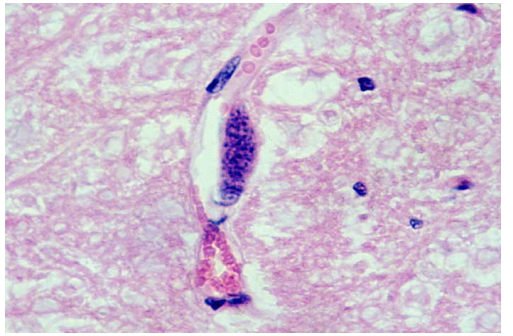
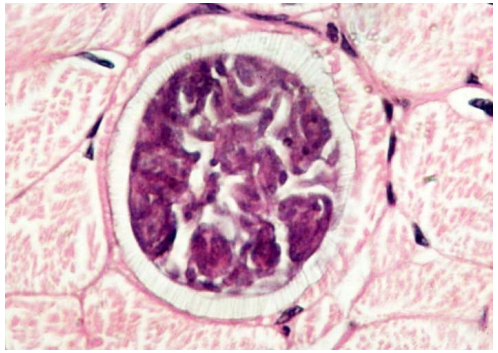
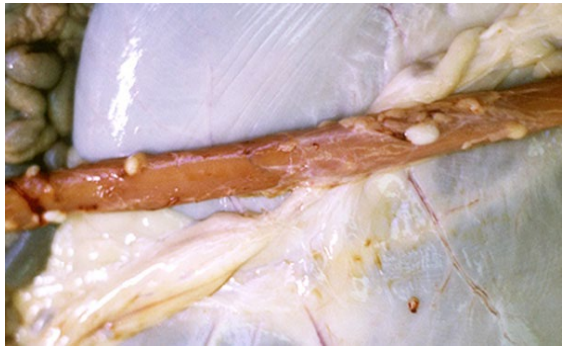
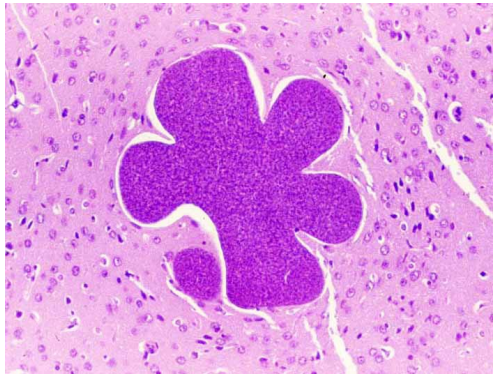

Sarcocystis
heteroxenous (2-host) cycle
predator-prey transmission
(predator ingests tissue cysts in prey)
(prey ingests sporocysts shed by predator)
blood vessels, muscles
(petechial haemorrhages,
space-occupying lesions)
Intermediate Hosts
(mammals, esp. herbivores,
birds, reptiles)
asexual merogony in
vascular endothelia
(arterioles then capillaries)
tissue cyst formation
in striated musculature
meronts
(10-35 µm)
peripheral metrocytes (rounded)
numerous bradyzoites
(cystozoites)(banana-shaped)
excystation
distinctive
cyst wall
tissue cysts ('sarcocysts')
(30 µm - 1 cm)
sporocysts
ingested
sporocyst
(13-19 µm)
tissue cysts
ingested
male
gamonts (10-20 µm)
female
sporocysts
excreted
sexual
gamogony
fertilization
endogenous
sporogony &
sporulation
oocyst
sporoblast
oocyst:sporocyst:sporozoite
configuration = 1:2:4
Definitive Hosts
(carnivores)
(intestines)

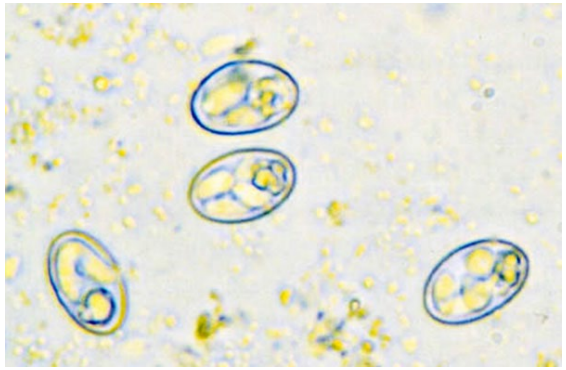


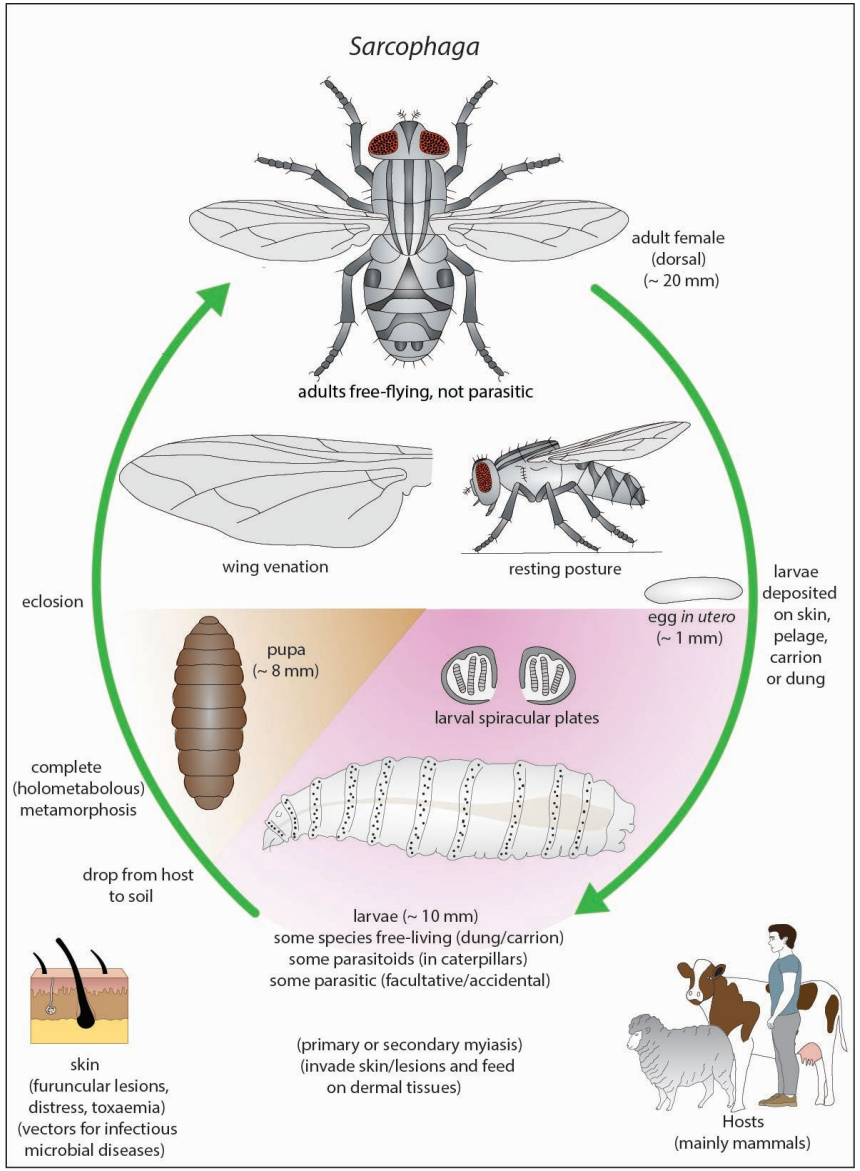


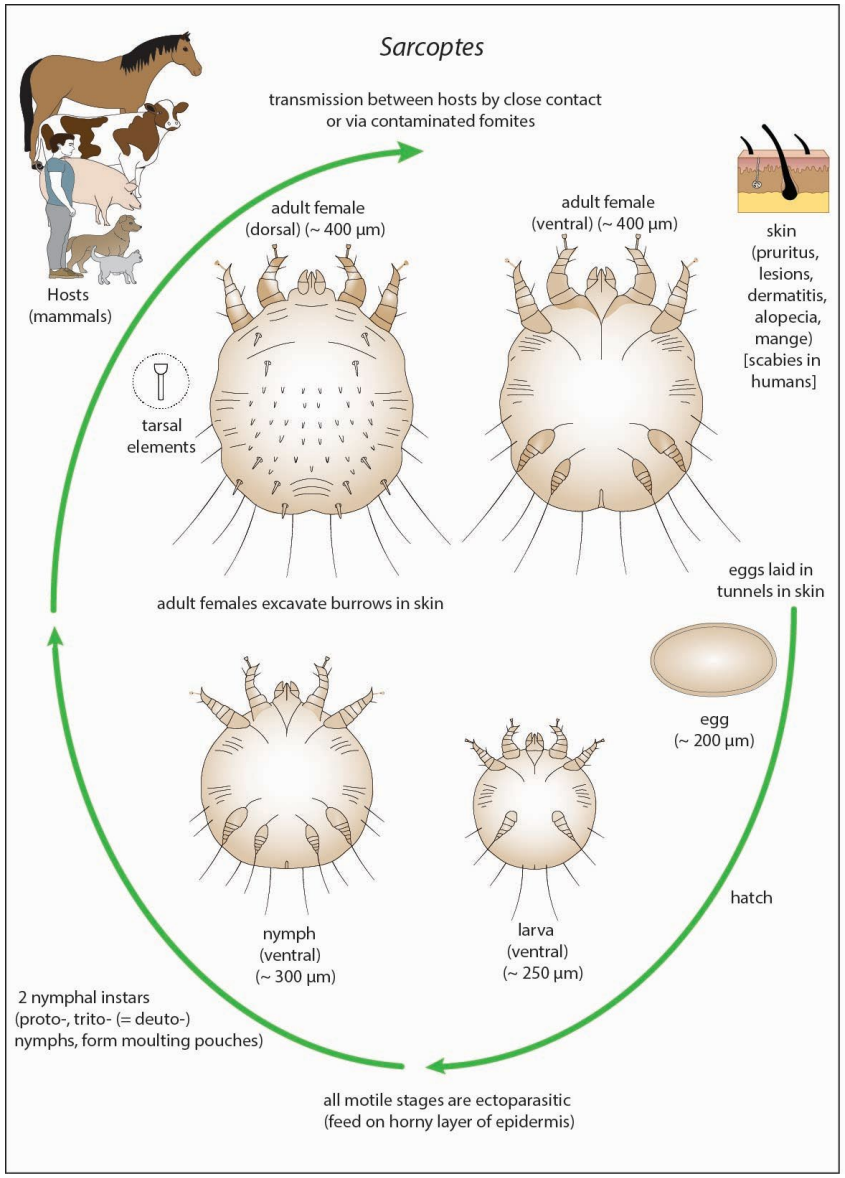


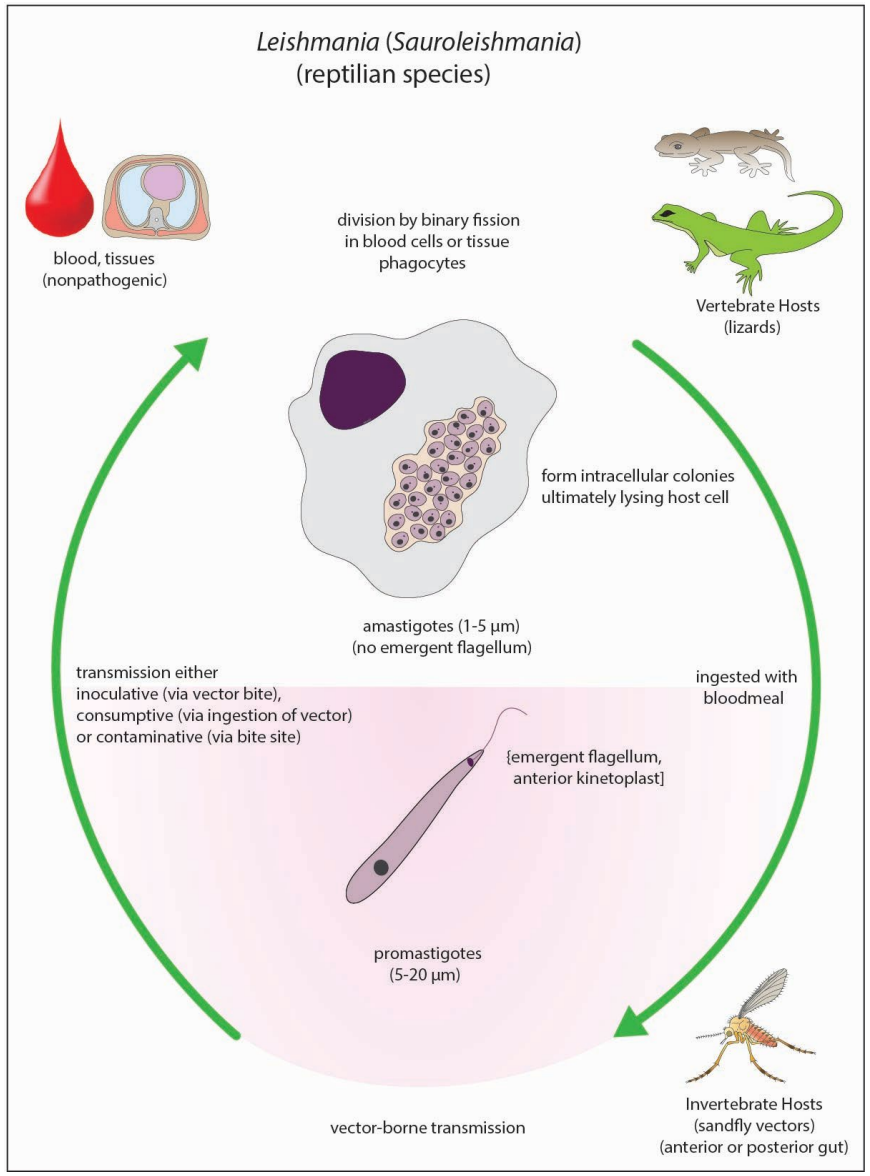


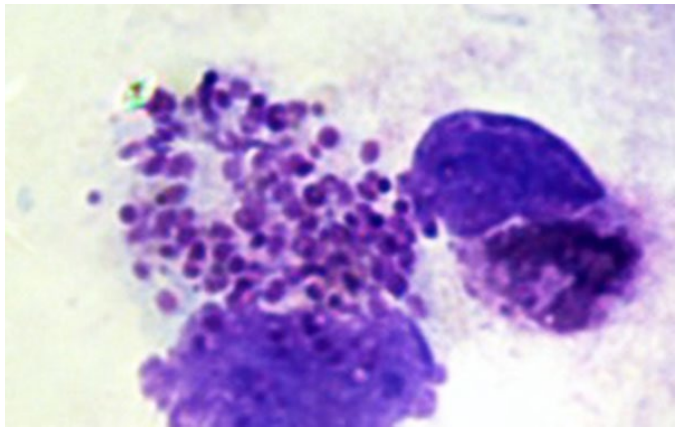


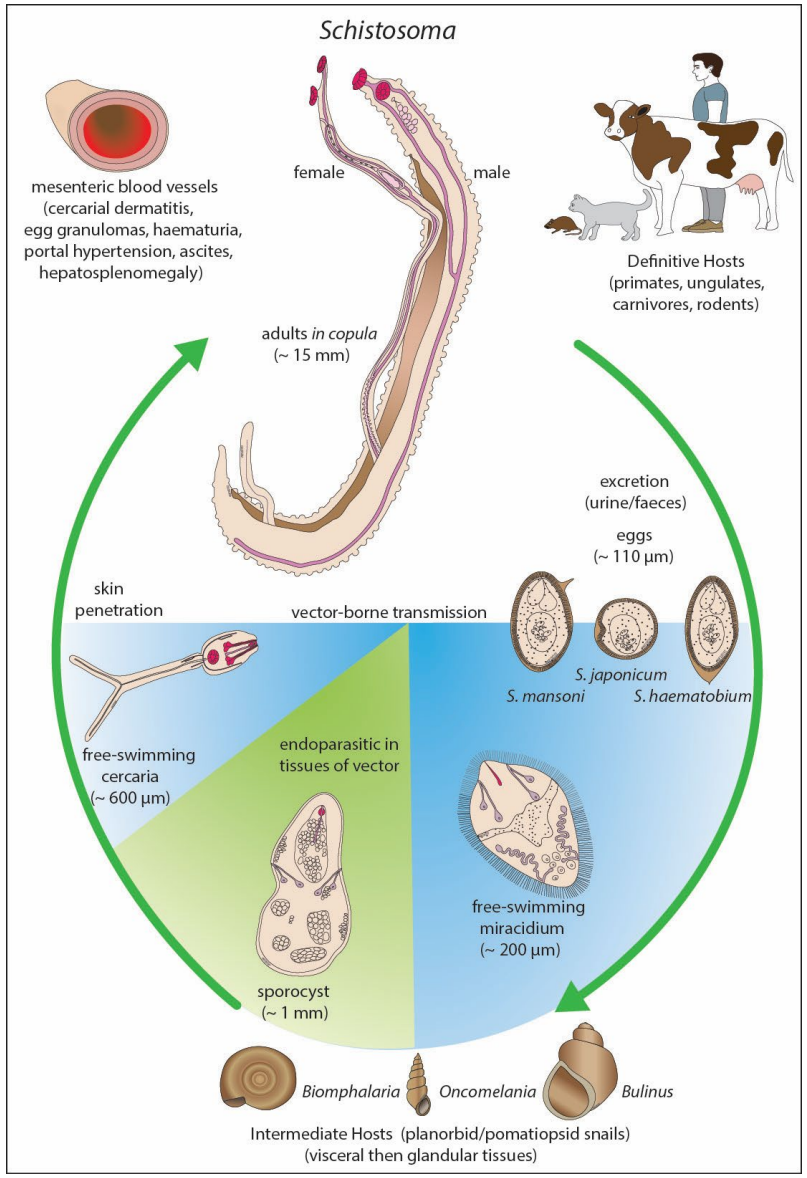


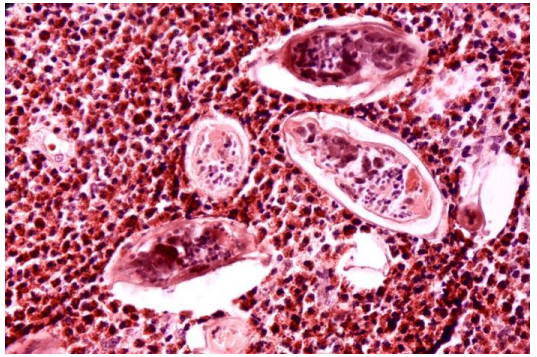

Sarcophaga
adult female
(dorsal)
(~ 20 mm)
adults free-flying, not parasitic
wing venation
resting posture
eclosion
egg *in utero*
(~ 1 mm)
larvae
deposited
on skin,
pelage,
carrion
or dung
pupa
(~ 8 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (~ 10 mm)
some species free-living (dung/carrion)
some parasitoids (in caterpillars)
some parasitic (facultative/accidental)
(primary or secondary myiasis)
(invade skin/lesions and feed
on dermal tissues)
skin
(furuncular lesions,
distress, toxaemia)
(vectors for infectious
microbial diseases)
Hosts
(mainly mammals)

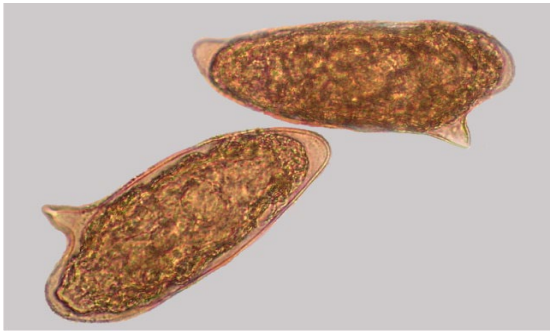

Sarcoptes
transmission between hosts by close contact
or via contaminated fomites
Hosts
(mammals)
adult female
(dorsal) (~ 400 µm)
adult female
(ventral) (~ 400 µm)
skin
(pruritus,
lesions,
dermatitis,
alopecia,
mange)
[scabies in
humans]
tarsal
elements
eggs laid in
tunnels in skin
adult females excavate burrows in skin
egg
(~ 200 µm)
nymph
(ventral)
(~ 300 µm)
larva
(ventral)
(~ 250 µm)
hatch
2 nymphal instars
(proto-, trito- (= deuto-)
nymphs, form moulting pouches)
all motile stages are ectoparasitic
(feed on horny layer of epidermis)

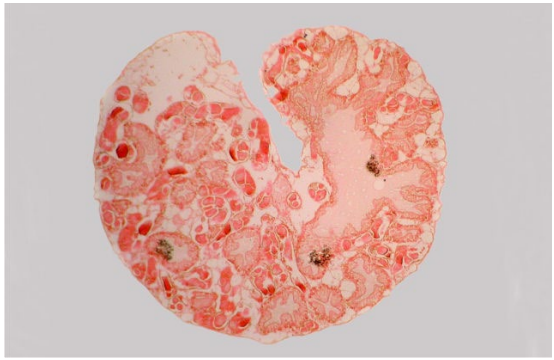

Leishmania (*Sauroleishmania*)
(reptilian species)
blood, tissues
(nonpathogenic)
division by binary fission
in blood cells or tissue
phagocytes
Vertebrate Hosts
(lizards)
form intracellular colonies
ultimately lysing host cell
amastigotes (1-5 µm)
(no emergent flagellum)
transmission either
inoculative (via vector bite),
consumptive (via ingestion of vector)
or contaminative (via bite site)
ingested with
bloodmeal
{emergent flagellum,
anterior kinetoplast]
promastigotes
(5-20 µm)
vector-borne transmission
Invertebrate Hosts
(sandfly vectors)
(anterior or posterior gut)

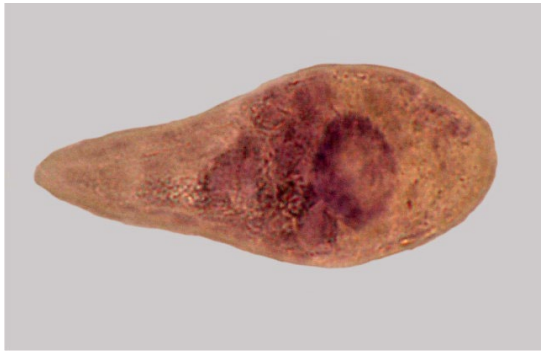


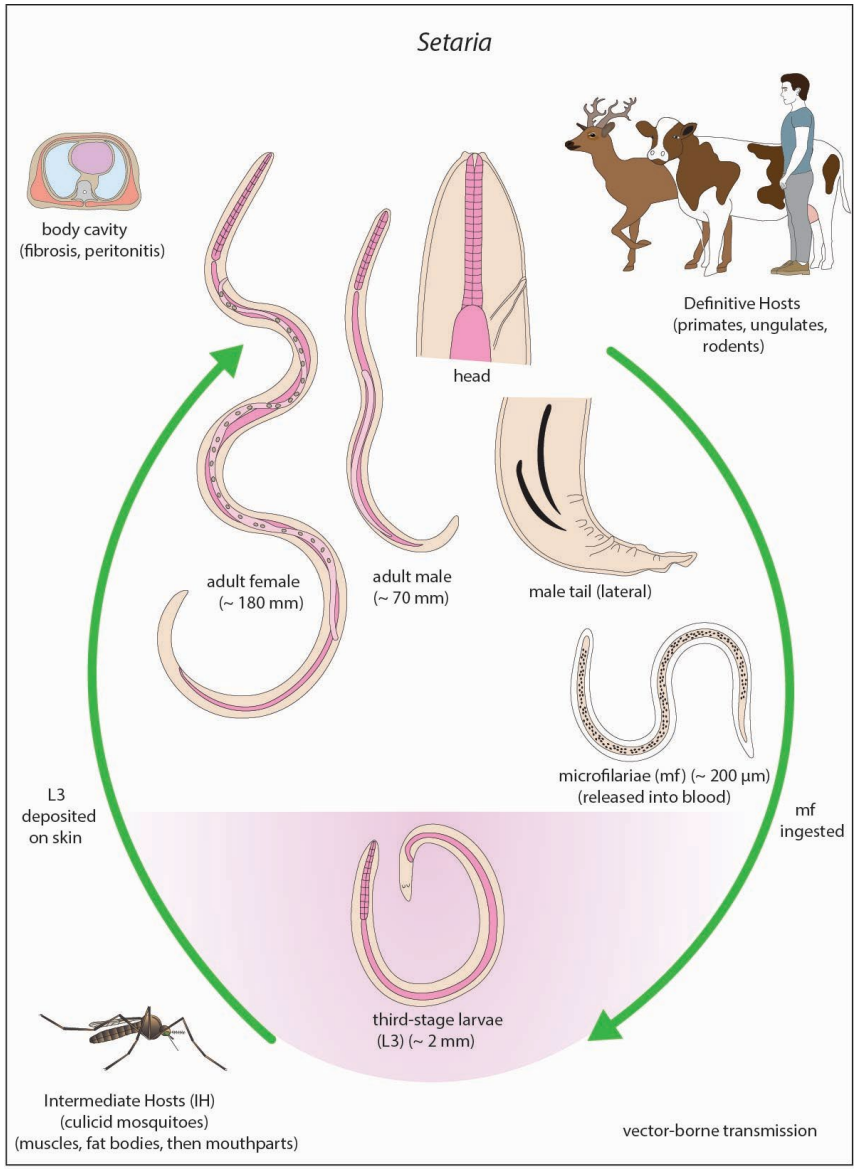

Schistosoma
mesenteric blood vessels
(cercarial dermatitis,
egg granulomas, haematuria,
portal hypertension, ascites,
hepatosplenomegaly)
female
male
adults in copula
(~ 15 mm)
Definitive Hosts
(primates, ungulates,
carnivores, rodents)
excretion
(urine/faeces)
eggs
(~ 110 µm)
skin
penetration
vector-borne transmission
S. japonicum
S. mansoni
S. haematobium
free-swimming
cercaria
(~ 600 µm)
endoparasitic in
tissues of vector
free-swimming
miracidium
(~ 200 µm)
sporocyst
(~ 1 mm)
Biomphalaria
Oncomelania
Bulinus
Intermediate Hosts (planorbid/pomatiopsid snails)
(visceral then glandular tissues)

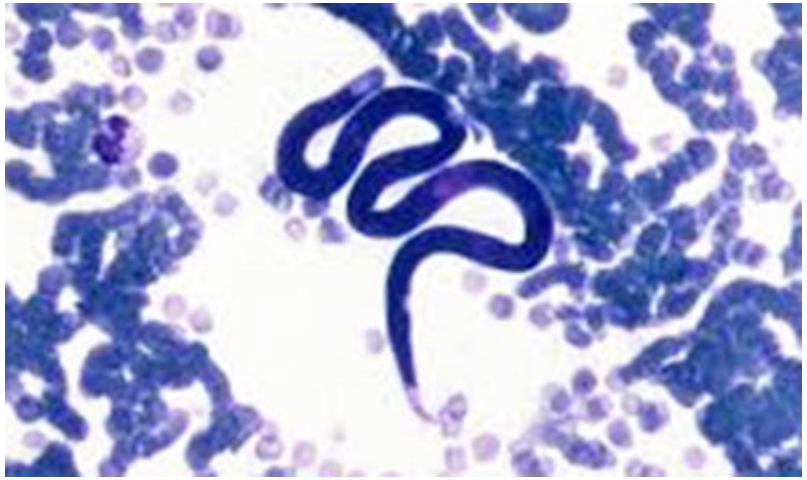


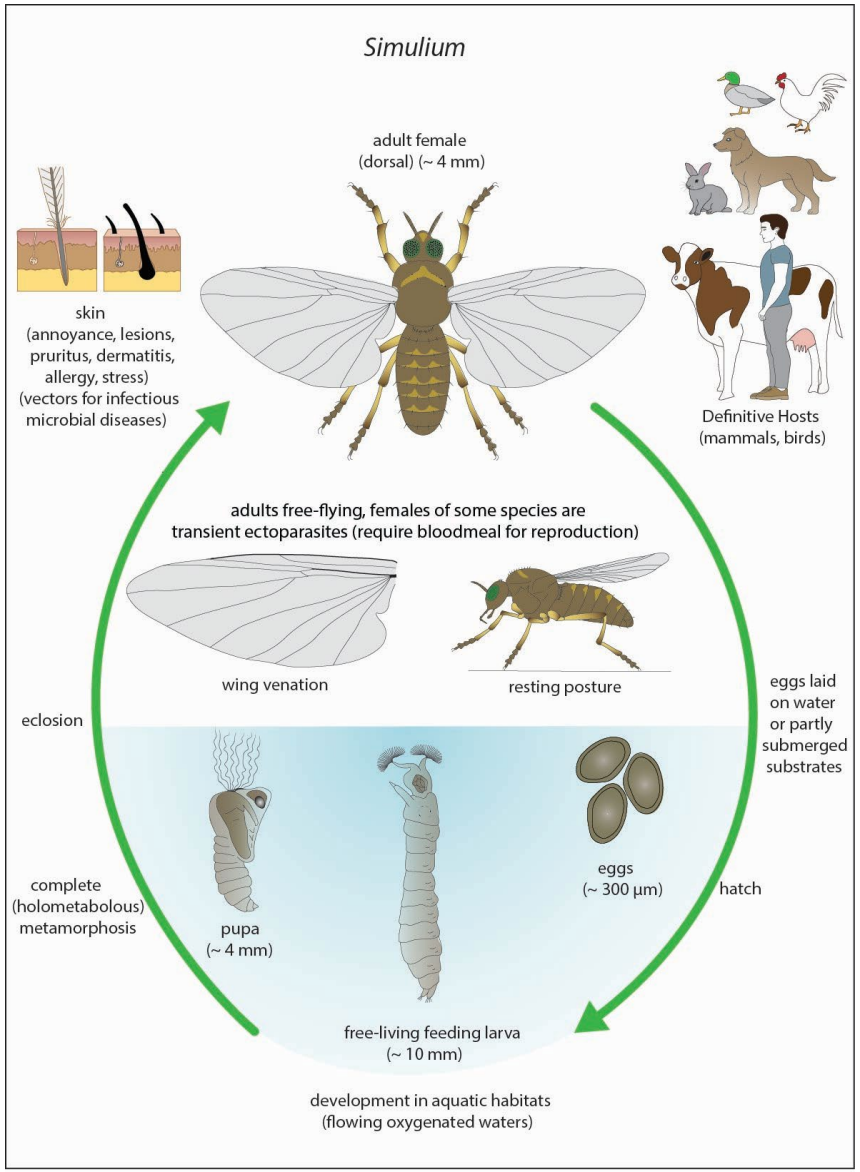


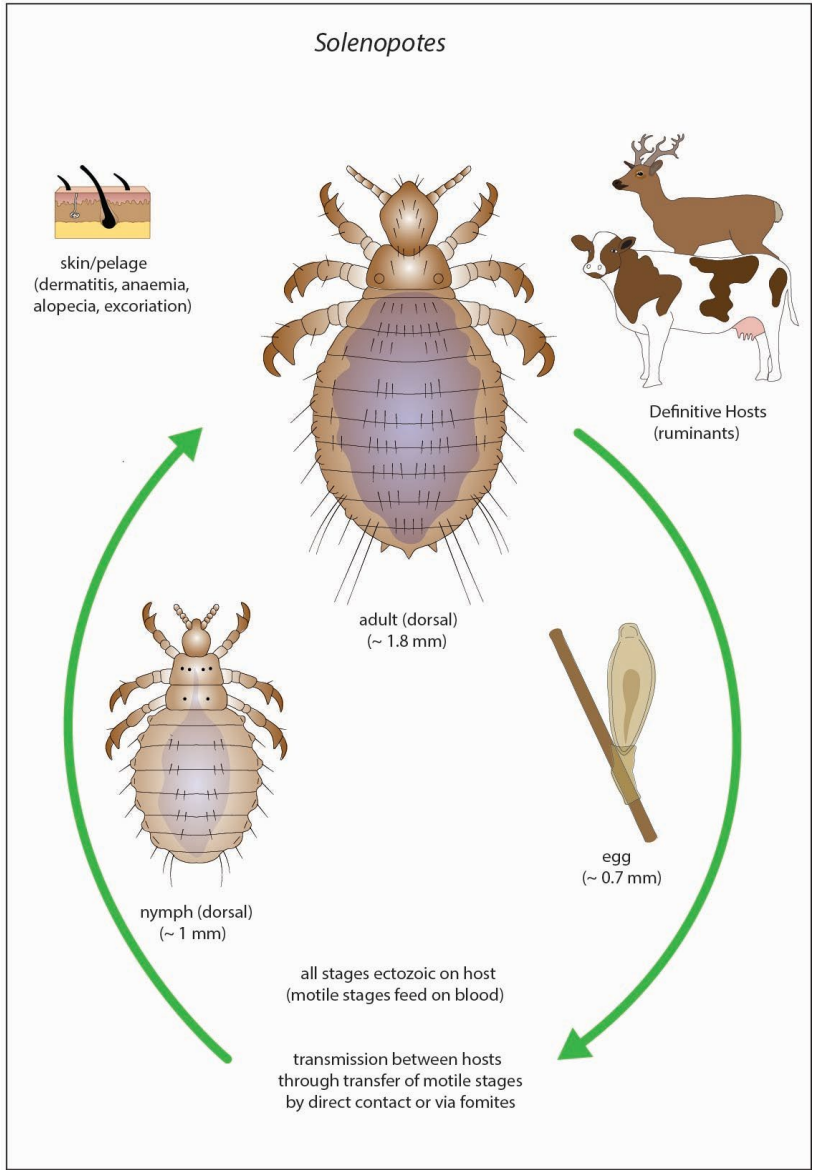


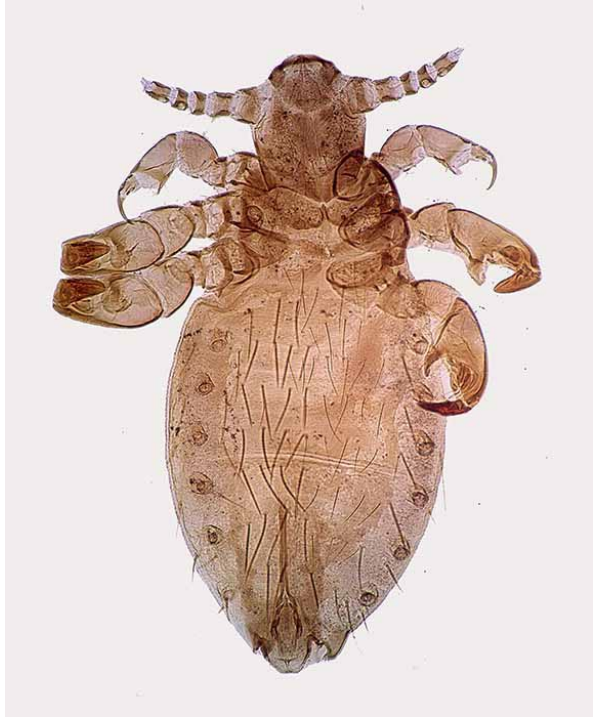


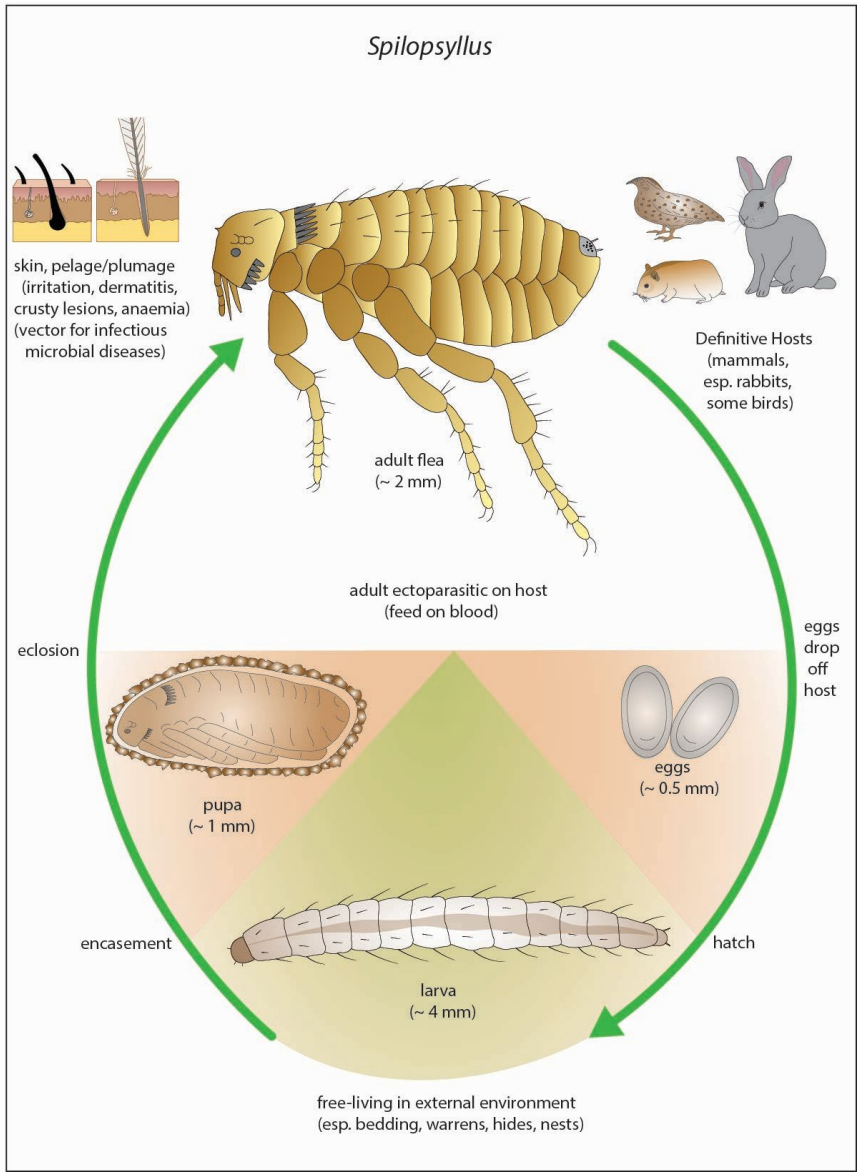

Setaria
body cavity
(fibrosis, peritonitis)
head
Definitive Hosts
(primates, ungulates,
rodents)
adult female
(~ 180 mm)
adult male
(~ 70 mm)
male tail (lateral)
microfilariae (mf) (~ 200 µm)
(released into blood)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 2 mm)
Intermediate Hosts (IH)
(culicid mosquitoes)
(muscles, fat bodies, then mouthparts)
vector-borne transmission

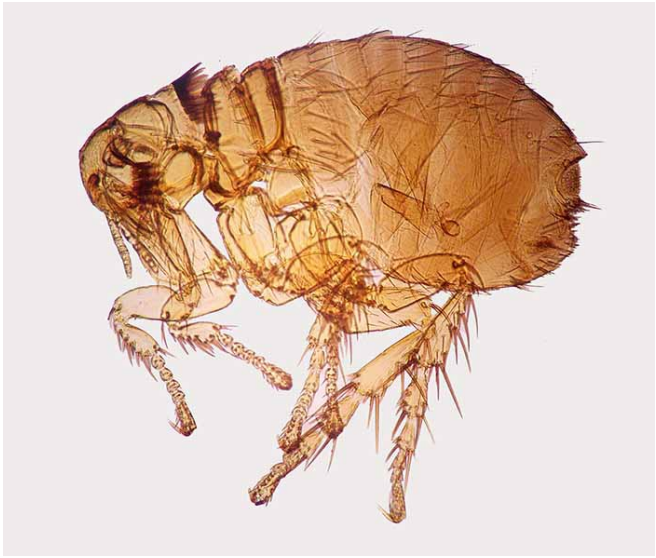


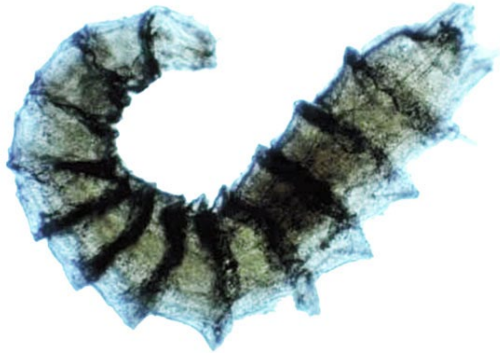

Simulium
adult female
(dorsal) (~ 4 mm)
skin
(annoyance, lesions,
pruritus, dermatitis,
allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds)
adults free-flying, females of some species are
transient ectoparasites (require bloodmeal for reproduction)
wing venation
resting posture
eclosion
eggs laid
on water
or partly
submerged
substrates
complete
(holometabolous)
metamorphosis
pupa
(~ 4 mm)
eggs
(~ 300 µm)
hatch
free-living feeding larva
(~ 10 mm)
development in aquatic habitats
(flowing oxygenated waters)

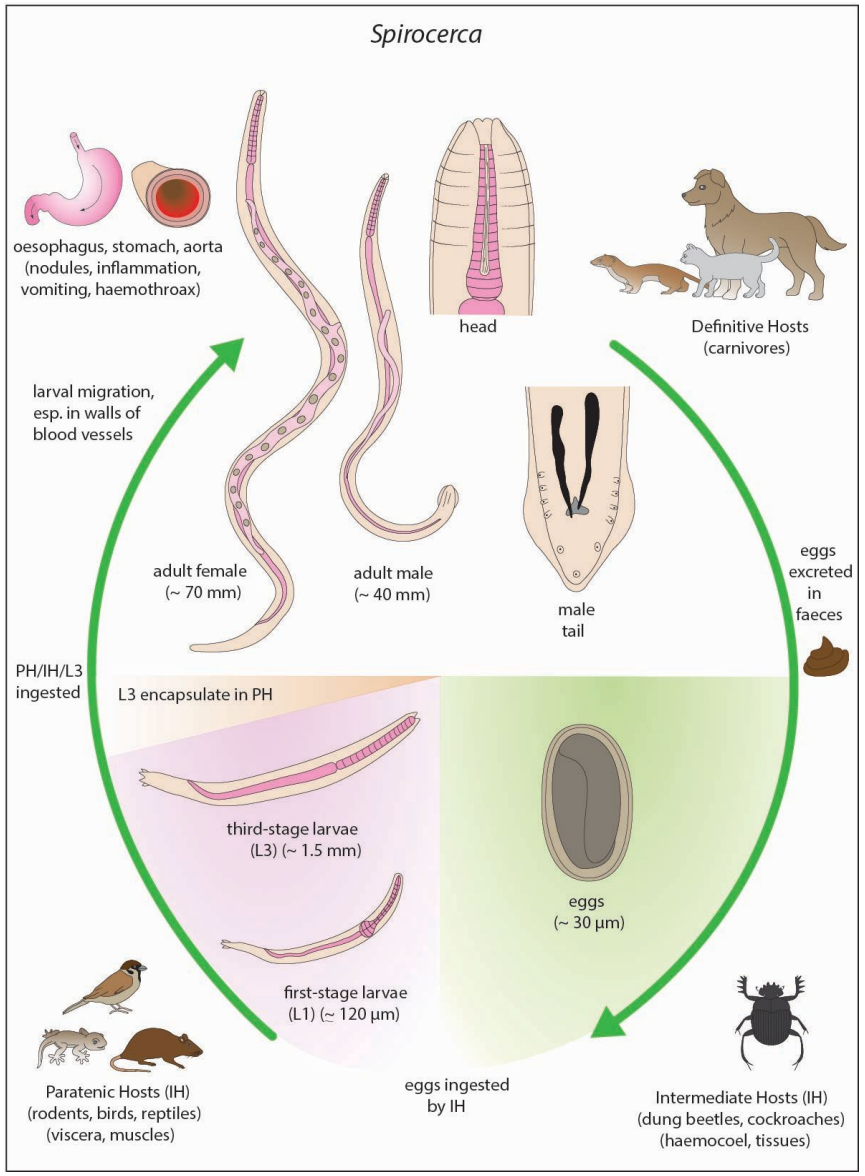

Solenopotes
skin/pelage
(dermatitis, anaemia,
alopecia, excoriation)
Definitive Hosts
(ruminants)
adult (dorsal)
(~ 1.8 mm)
egg
(~ 0.7 mm)
nymph (dorsal)
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on blood)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

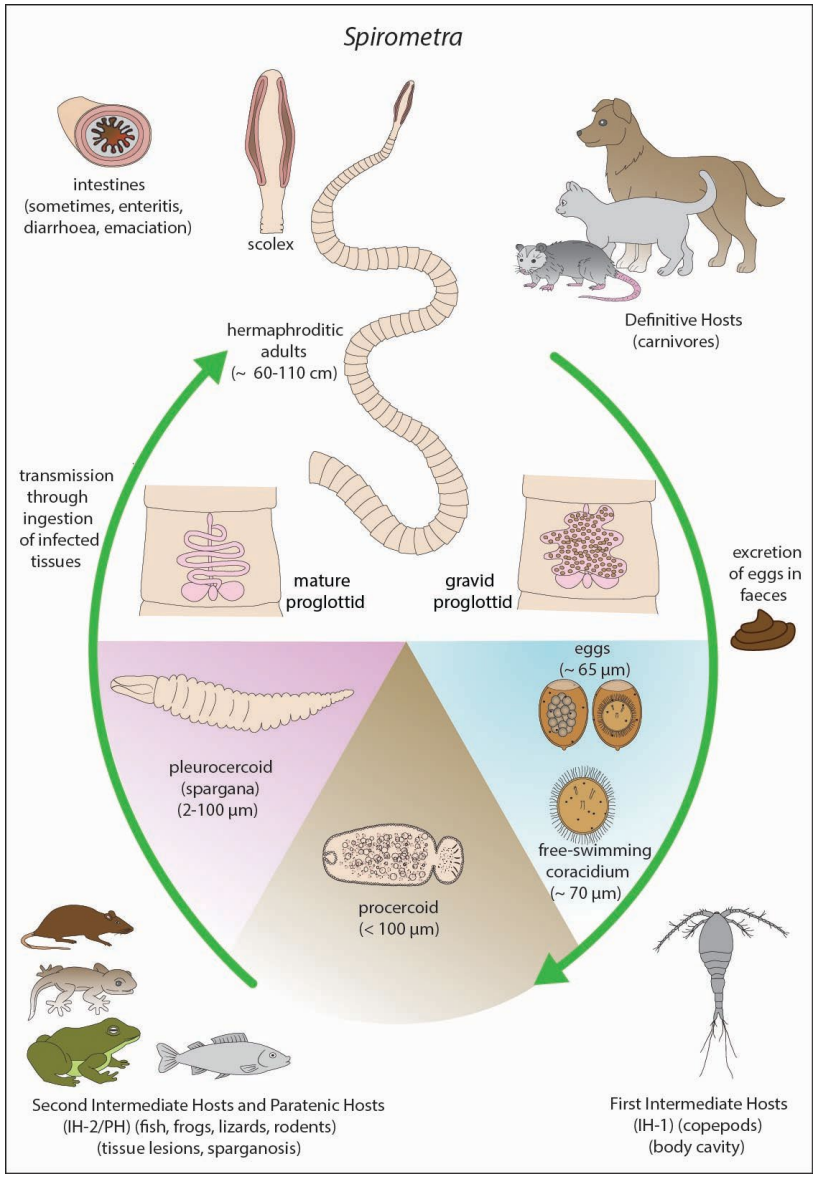


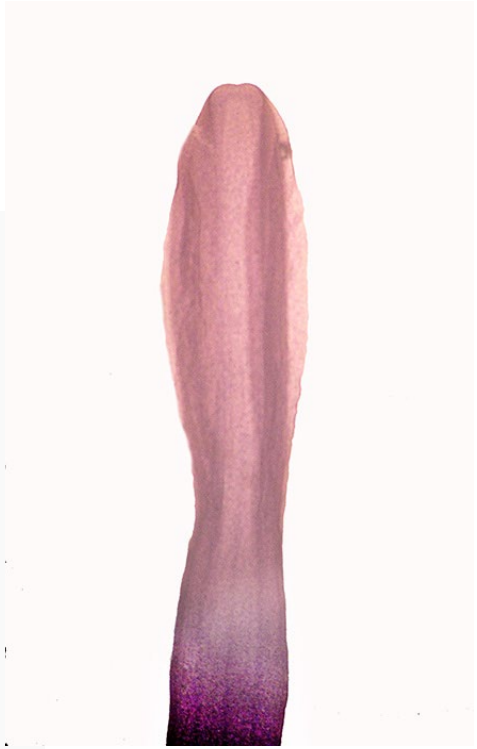

Spilopsyllus
skin, pelage/plumage
(irritation, dermatitis,
crusty lesions, anaemia)
(vector for infectious
microbial diseases)
adult flea
(~ 2 mm)
Definitive Hosts
(mammals,
esp. rabbits,
some birds)
adult ectoparasitic on host
(feed on blood)
eggs
drop
off
host
eggs
(~ 0.5 mm)
pupa
(~ 1 mm)
eclosion
encasement
hatch
larva
(~ 4 mm)
free-living in external environment
(esp. bedding, warrens, hides, nests)

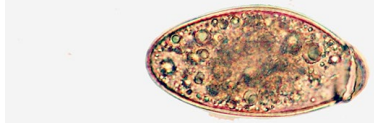


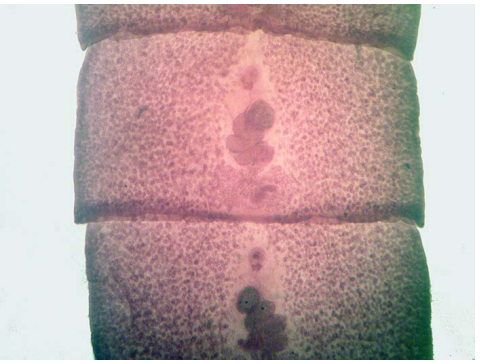


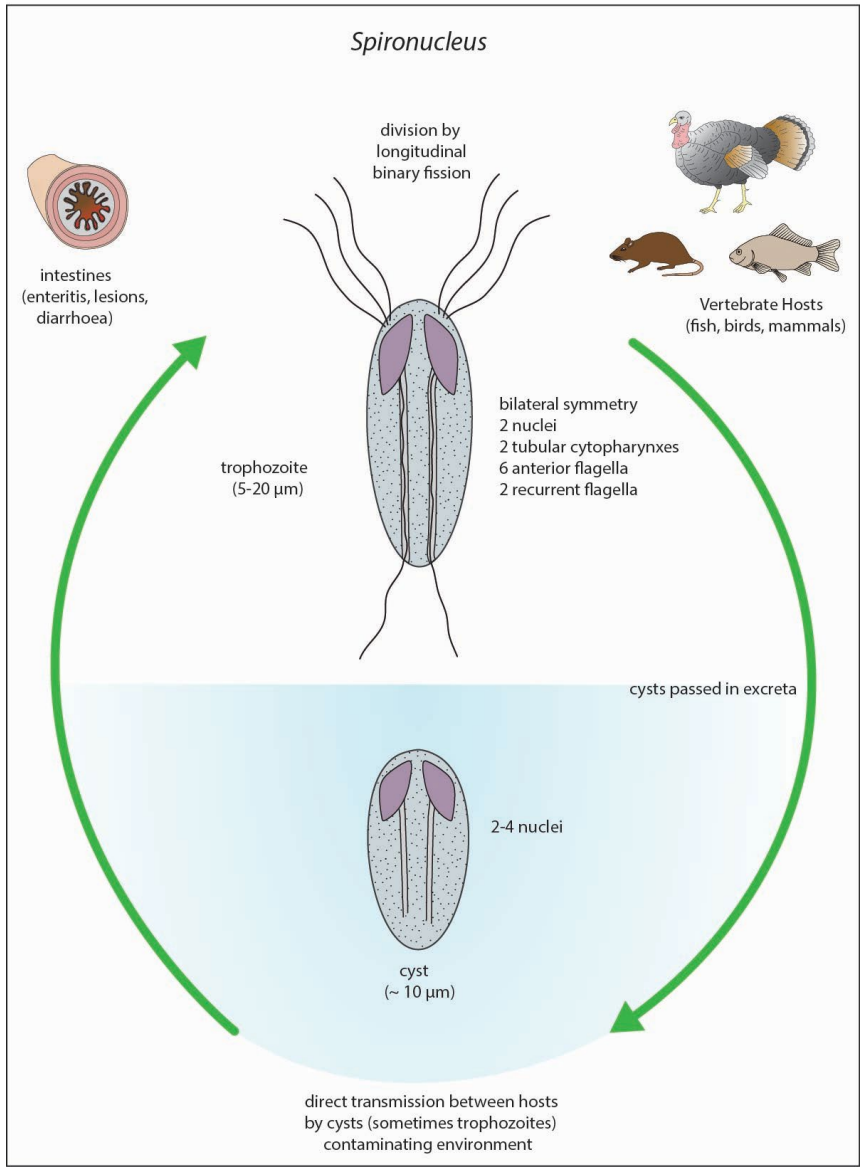

Spirocerca
oesophagus, stomach, aorta
(nodules, inflammation,
vomiting, haemothroax)
head
Definitive Hosts
(carnivores)
larval migration,
esp. in walls of
blood vessels
adult female
(~ 70 mm)
adult male
(~ 40 mm)
male
tail
eggs
excreted
in
faeces
PH/IH/L3
ingested
L3 encapsulate in PH
third-stage larvae
(L3) (~ 1.5 mm)
eggs
(~ 30 µm)
first-stage larvae
(L1) (~ 120 µm)
Paratenic Hosts (IH)
(rodents, birds, reptiles)
(viscera, muscles)
eggs ingested
by IH
Intermediate Hosts (IH)
(dung beetles, cockroaches)
(haemocoel, tissues)

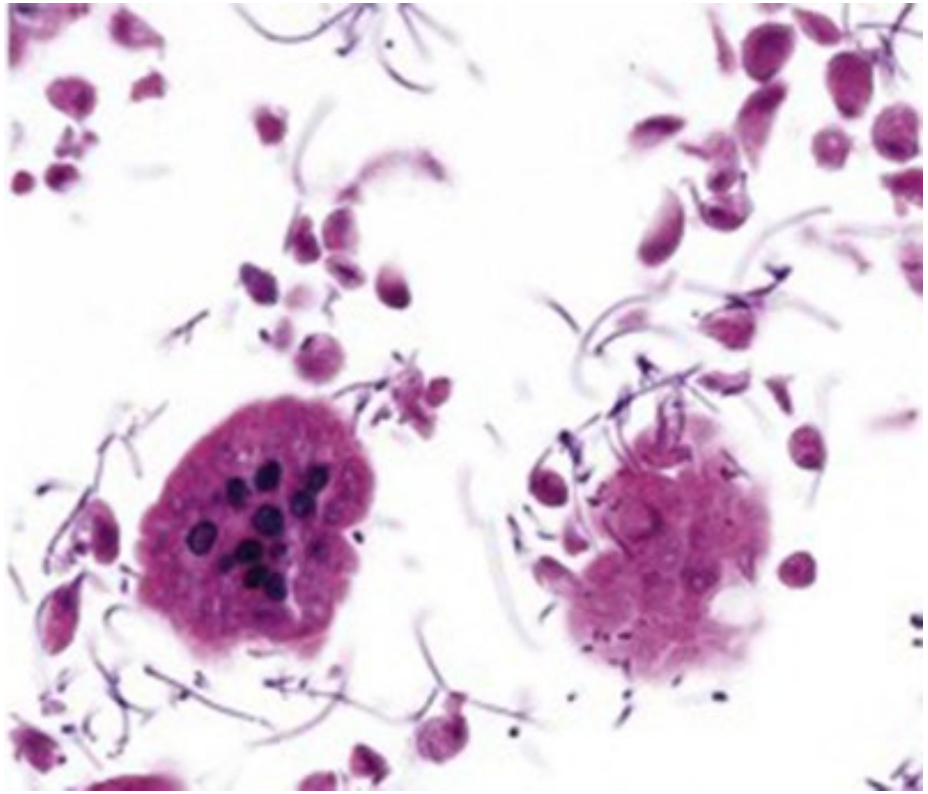

Spirometra
intestines
(sometimes, enteritis,
diarrhoea, emaciation)
scolex
Definitive Hosts
(carnivores)
hermaphroditic
adults
(~ 60-110 cm)
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
eggs
(~ 65 µm)
pleurocercoid
(spargana)
(2-100 µm)
free-swimming
coracidium
(~ 70 µm)
procercoid
(< 100 µm)
Second Intermediate Hosts and Paratenic Hosts
(IH-2/PH) (fish, frogs, lizards, rodents)
(tissue lesions, sparganosis)
First Intermediate Hosts
(IH-1) (copepods)
(body cavity)

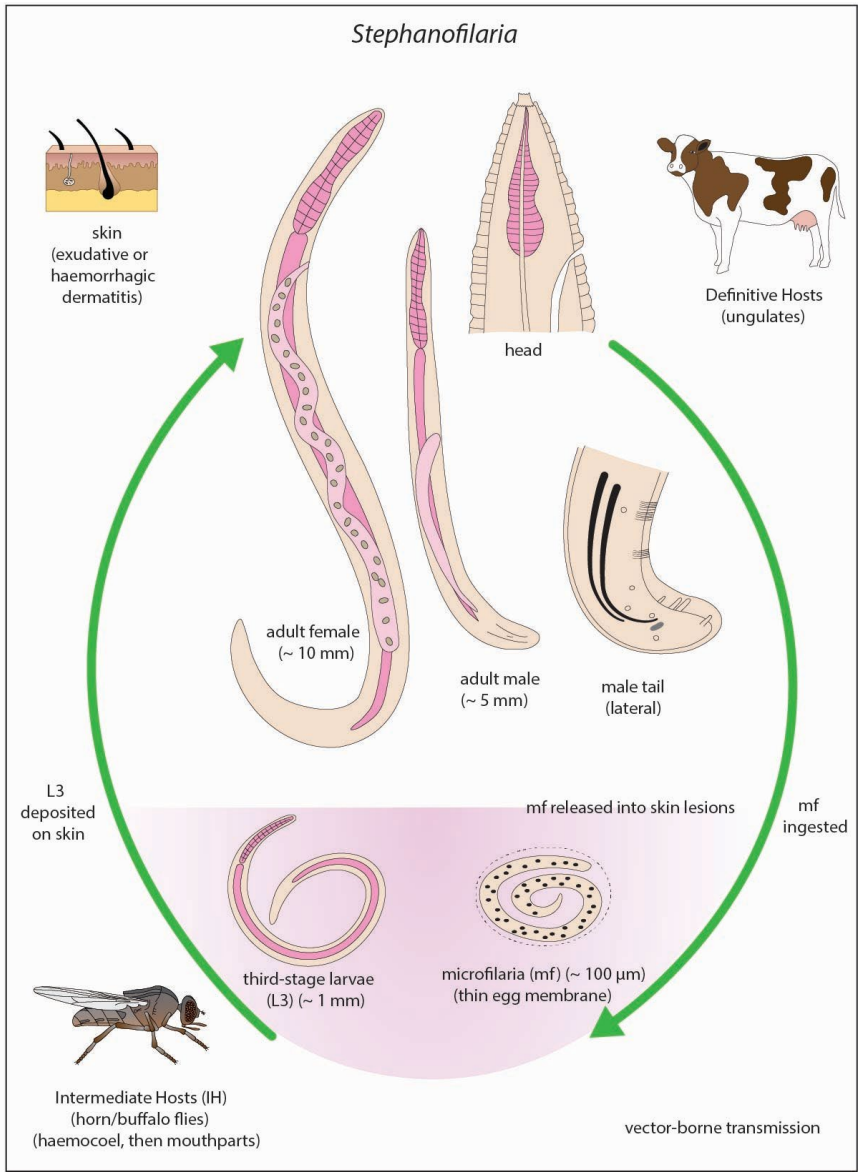


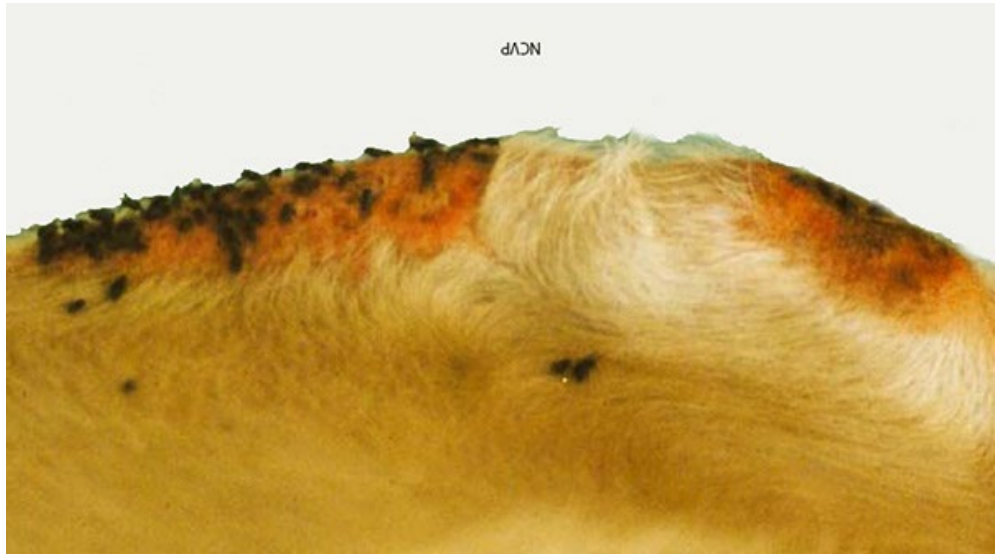


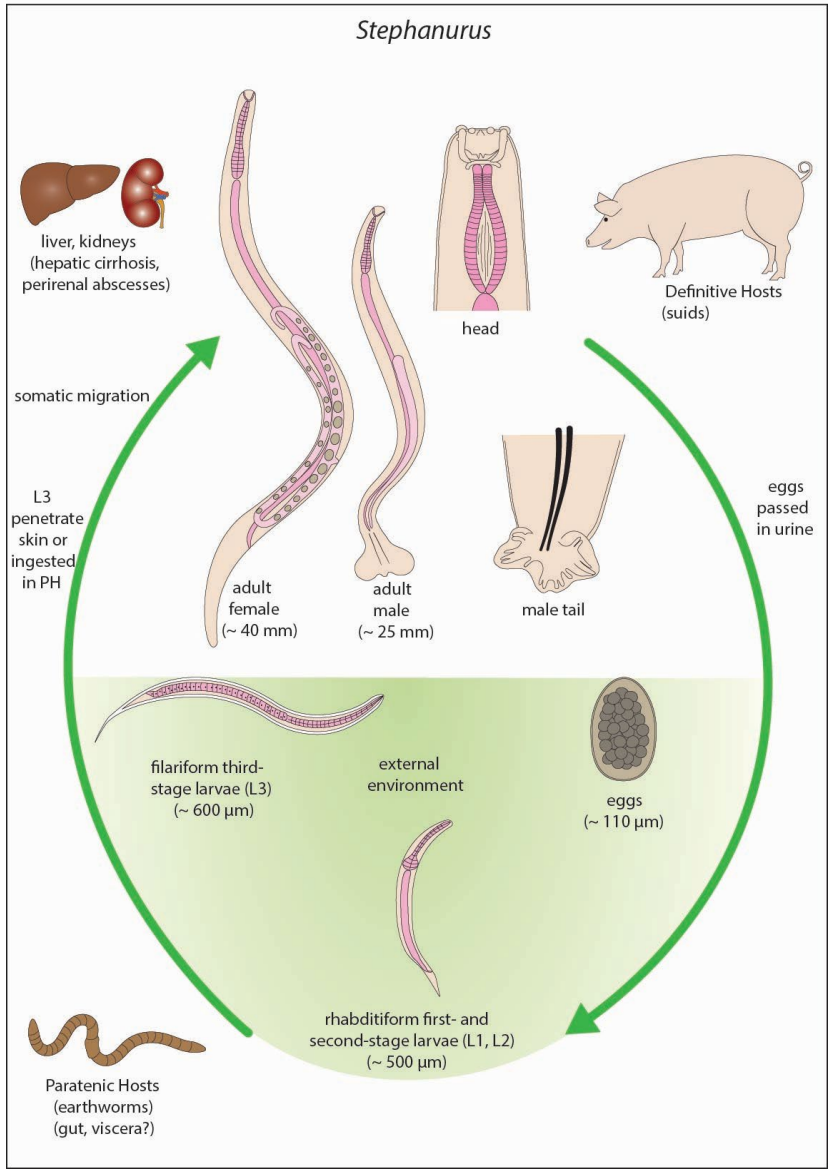


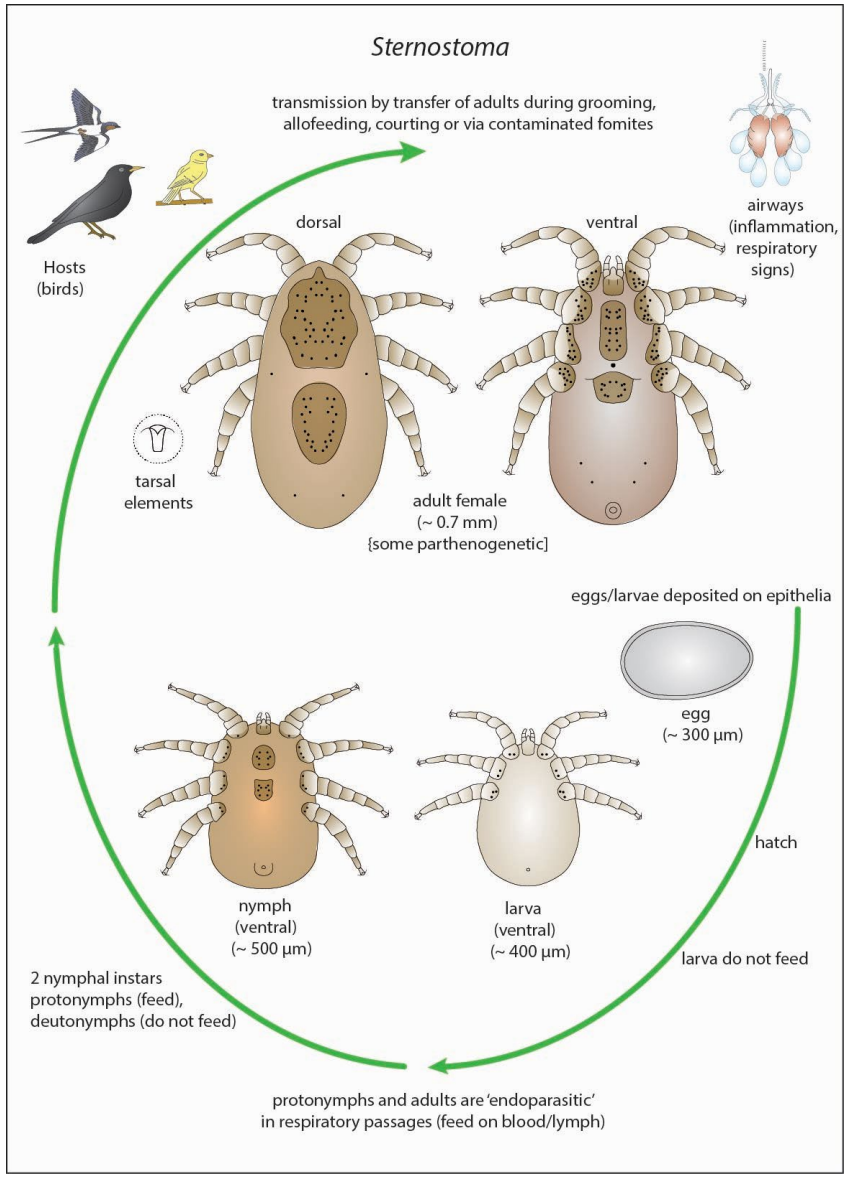

Spironucleus
division by
longitudinal
binary fission
intestines
(enteritis, lesions,
diarrhoea)
Vertebrate Hosts
(fish, birds, mammals)
bilateral symmetry
2 nuclei
2 tubular cytopharynxes
6 anterior flagella
2 recurrent flagella
trophozoite
(5-20 µm)
cysts passed in excreta
2-4 nuclei
cyst
(~ 10 µm)
direct transmission between hosts
by cysts (sometimes trophozoites)
contaminating environment

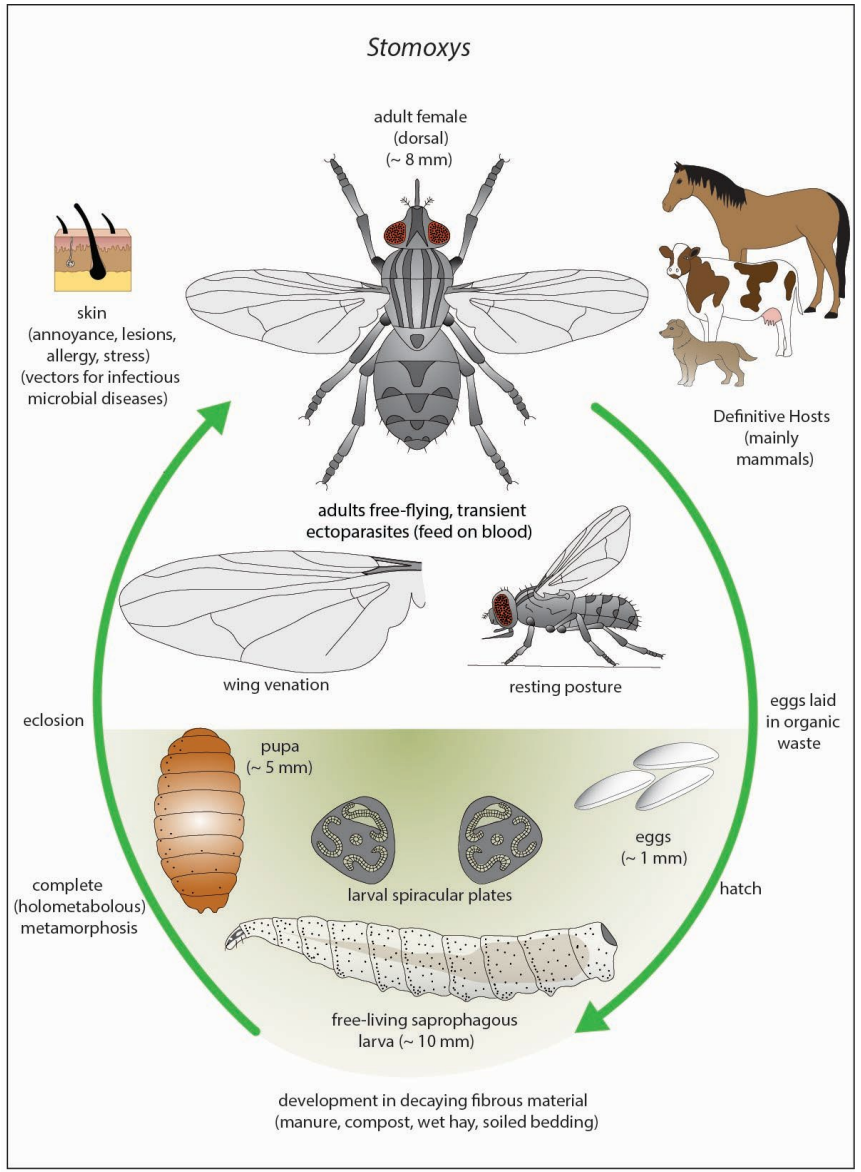


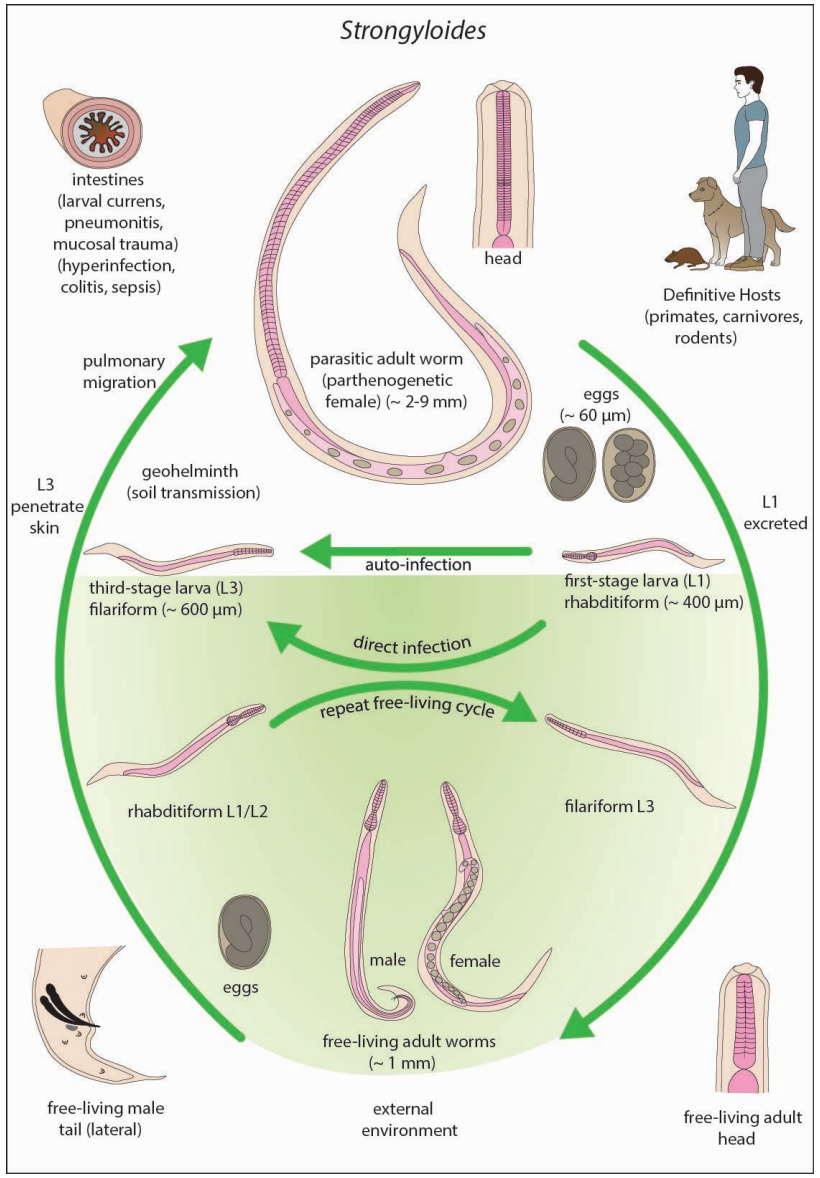

Stephanofilaria
skin
(exudative or
haemorrhagic
dermatitis)
head
Definitive Hosts
(ungulates)
adult female
(~ 10 mm)
adult male
(~ 5 mm)
male tail
(lateral)
L3
deposited
on skin
mf released into skin lesions
mf
ingested
third-stage larvae
(L3) (~ 1 mm)
microfilaria (mf) (~ 100 µm)
(thin egg membrane)
Intermediate Hosts (IH)
(horn/buffalo flies)
(haemocoel, then mouthparts)
vector-borne transmission

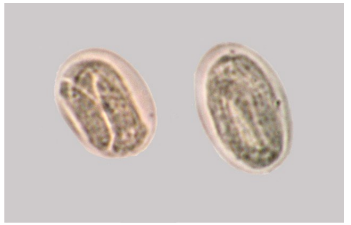


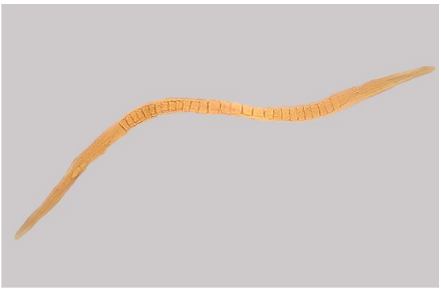

Stephanurus
liver, kidneys
(hepatic cirrhosis,
perirenal abscesses)
head
Definitive Hosts
(suids)
somatic migration
L3
penetrate
skin or
ingested
in PH
eggs
passed
in urine
adult
female
(~ 40 mm)
adult
male
(~ 25 mm)
male tail
filariform third-
stage larvae (L3)
(~ 600 µm)
external
environment
eggs
(~ 110 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 500 µm)
Paratenic Hosts
(earthworms)
(gut, viscera?)

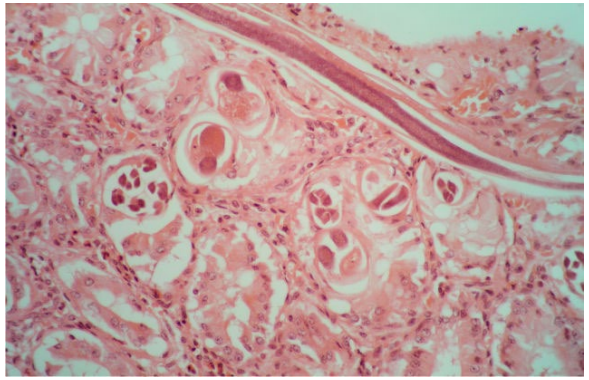

Sternostoma
transmission by transfer of adults during grooming, allofeeding, courting or via contaminated fomites
Hosts (birds)
airways (inflammation, respiratory signs)
dorsal
ventral
tarsal elements
adult female (~ 0.7 mm) {some parthenogenetic]
eggs/larvae deposited on epithelia
egg (~ 300 µm)
hatch
nymph (ventral) (~ 500 µm)
larva (ventral) (~ 400 µm)
larva do not feed
2 nymphal instars protonymphs (feed), deutonymphs (do not feed)
protonymphs and adults are 'endoparasitic' in respiratory passages (feed on blood/lymph)

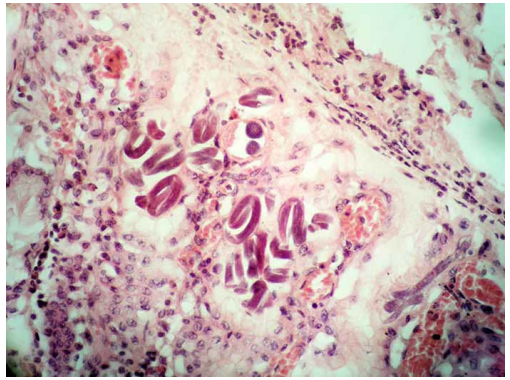

Stomoxys
adult female
(dorsal)
(~ 8 mm)
skin
(annoyance, lesions,
allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mainly
mammals)
adults free-flying, transient
ectoparasites (feed on blood)
wing venation
resting posture
eclosion
eggs laid
in organic
waste
pupa
(~ 5 mm)
eggs
(~ 1 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
hatch
free-living saprophagous
larva (~ 10 mm)
development in decaying fibrous material
(manure, compost, wet hay, soiled bedding)

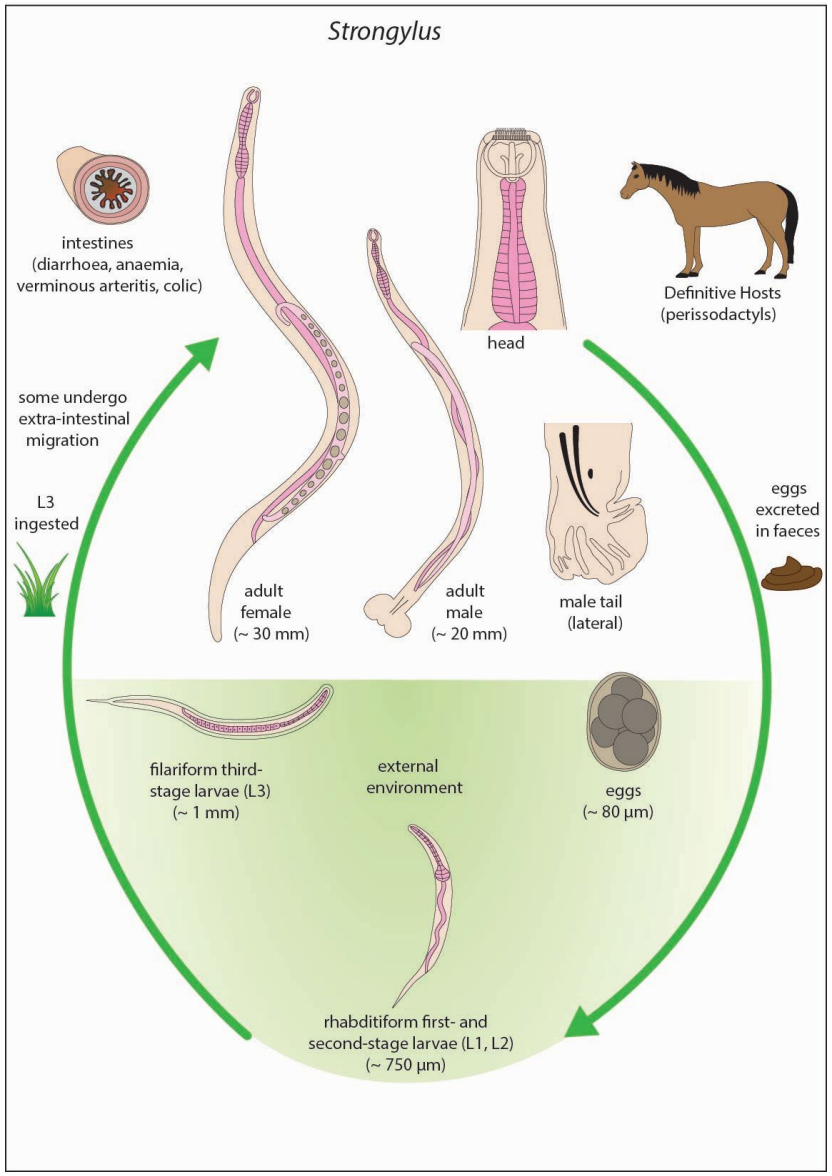

Strongyloides
intestines
(larval currens,
pneumonitis,
mucosal trauma)
(hyperinfection,
colitis, sepsis)
head
Definitive Hosts
(primates, carnivores,
rodents)
pulmonary
migration
parasitic adult worm
(parthenogenetic
female) (~ 2-9 mm)
eggs
(~ 60 µm)
L3
penetrate
skin
geohelminth
(soil transmission)
L1
excreted
auto-infection
third-stage larva (L3)
filariform (~ 600 µm)
first-stage larva (L1)
rhabditiform (~ 400 µm)
direct infection
repeat free-living cycle
rhabditiform L1/L2
filariform L3
male
female
eggs
free-living adult worms
(~ 1 mm)
free-living male
tail (lateral)
external
environment
free-living adult
head

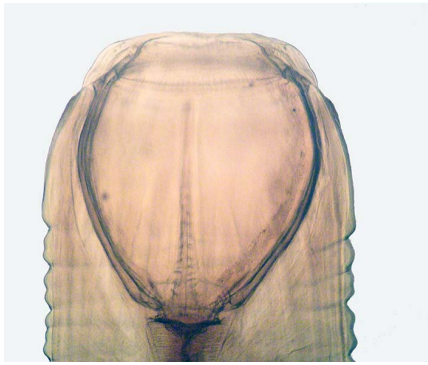


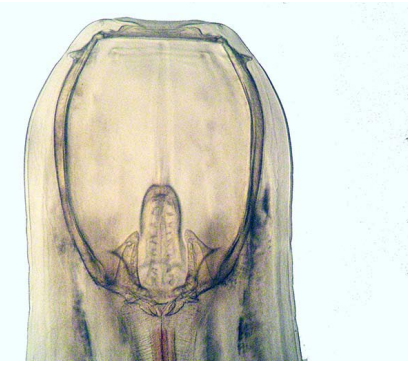


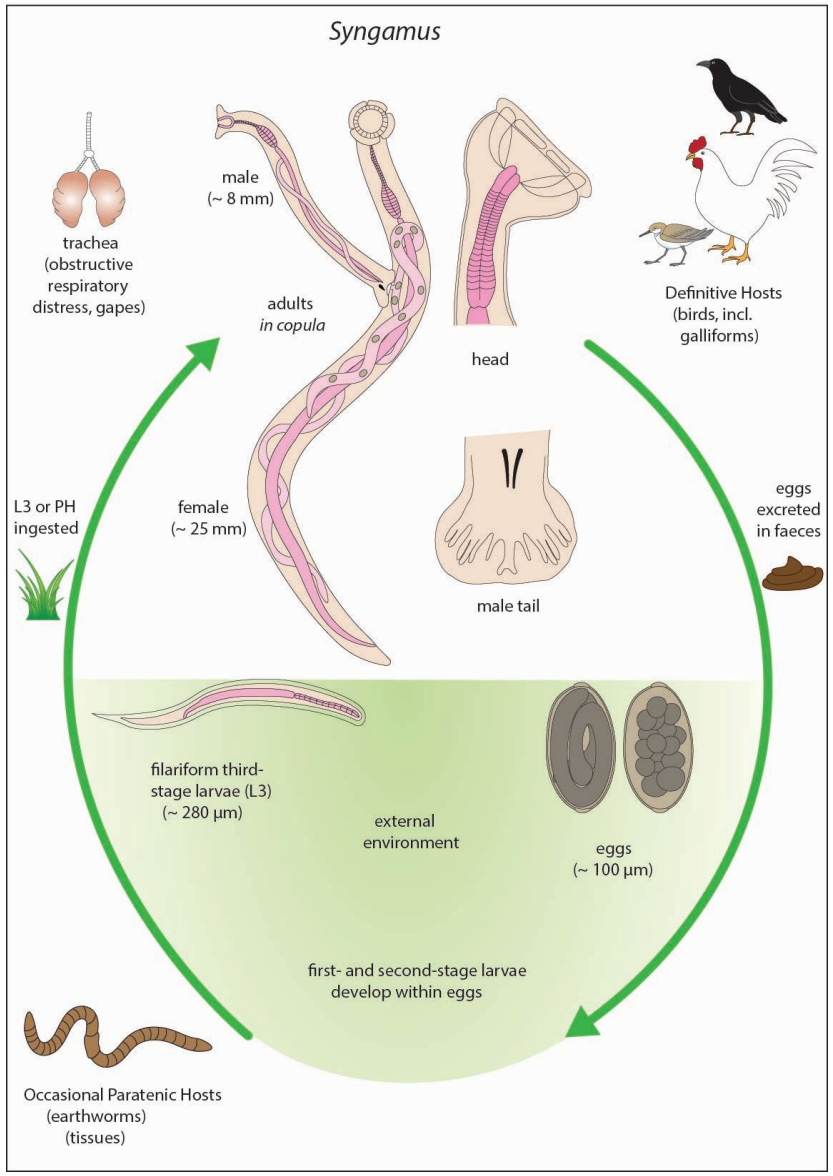


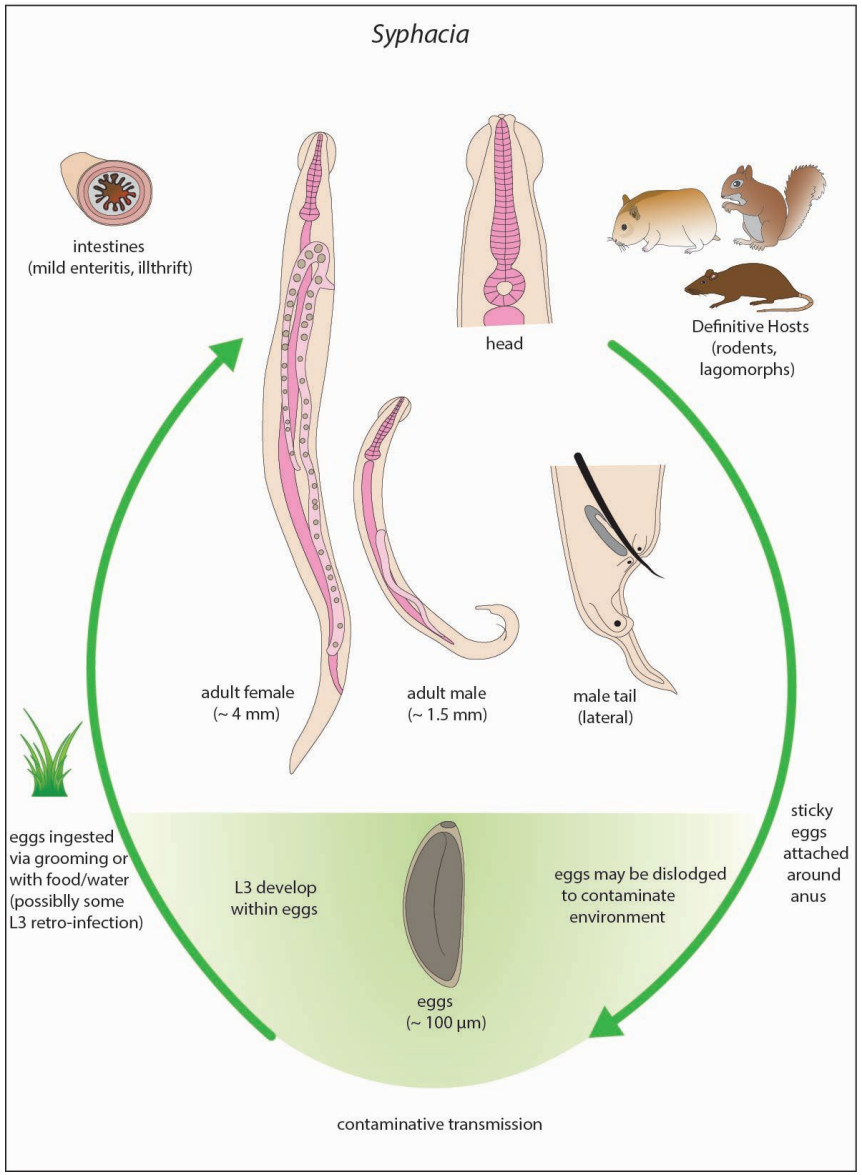


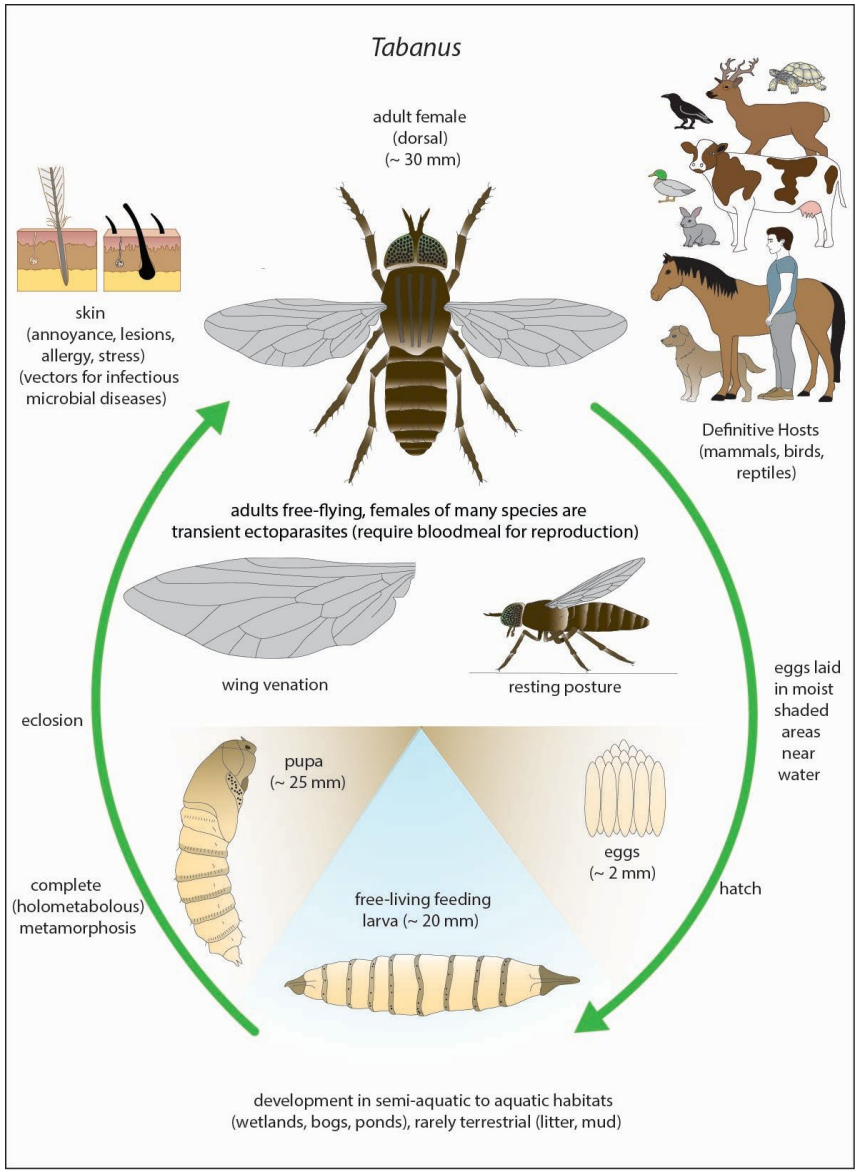

Strongylus
intestines
(diarrhoea, anaemia,
verminous arteritis, colic)
head
Definitive Hosts
(perissodactyls)
some undergo
extra-intestinal
migration
L3
ingested
adult
female
(~ 30 mm)
adult
male
(~ 20 mm)
male tail
(lateral)
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 1 mm)
external
environment
eggs
(~ 80 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 750 µm)

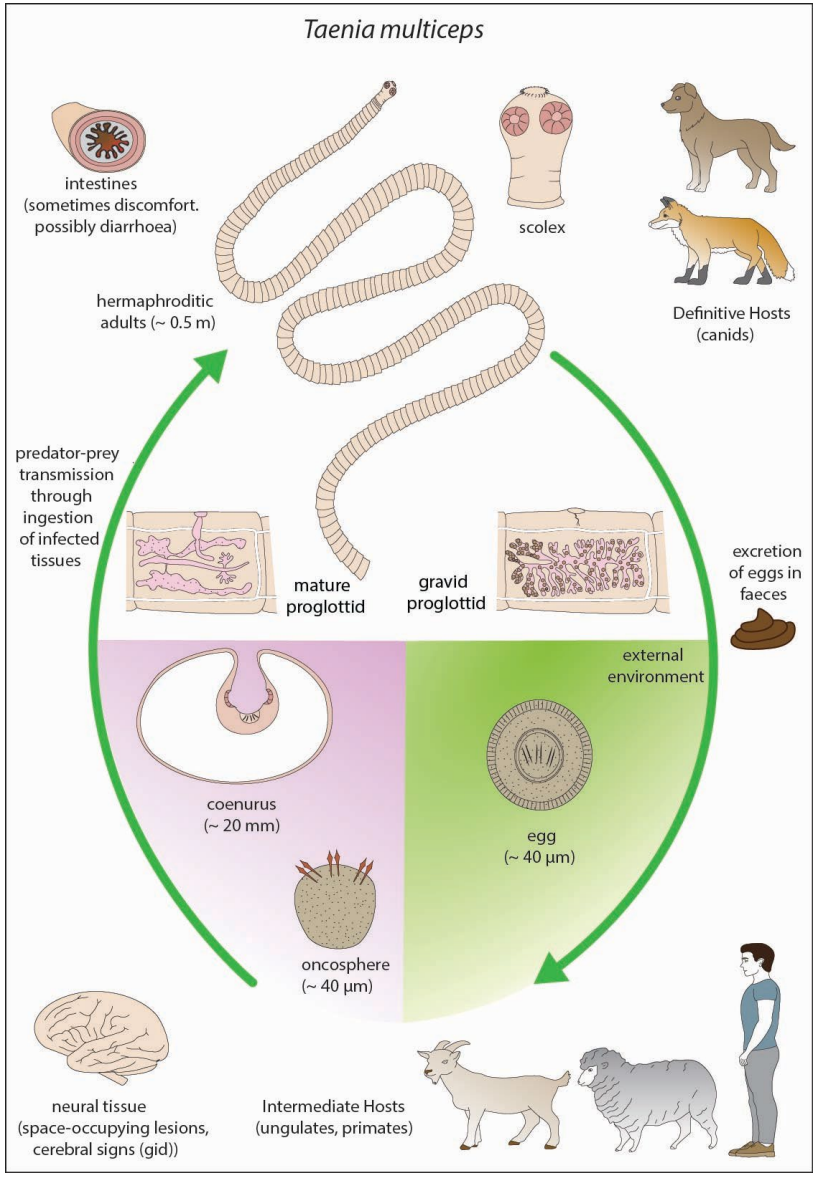


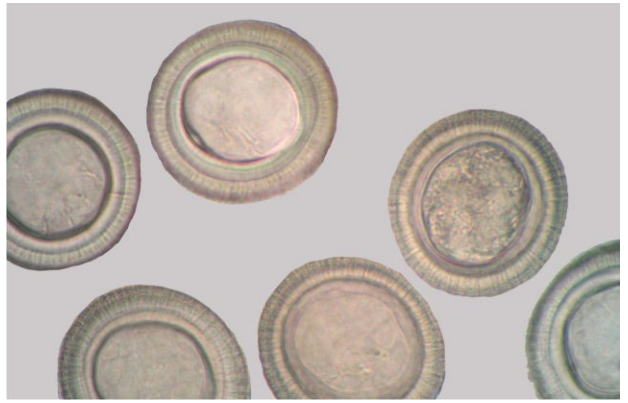


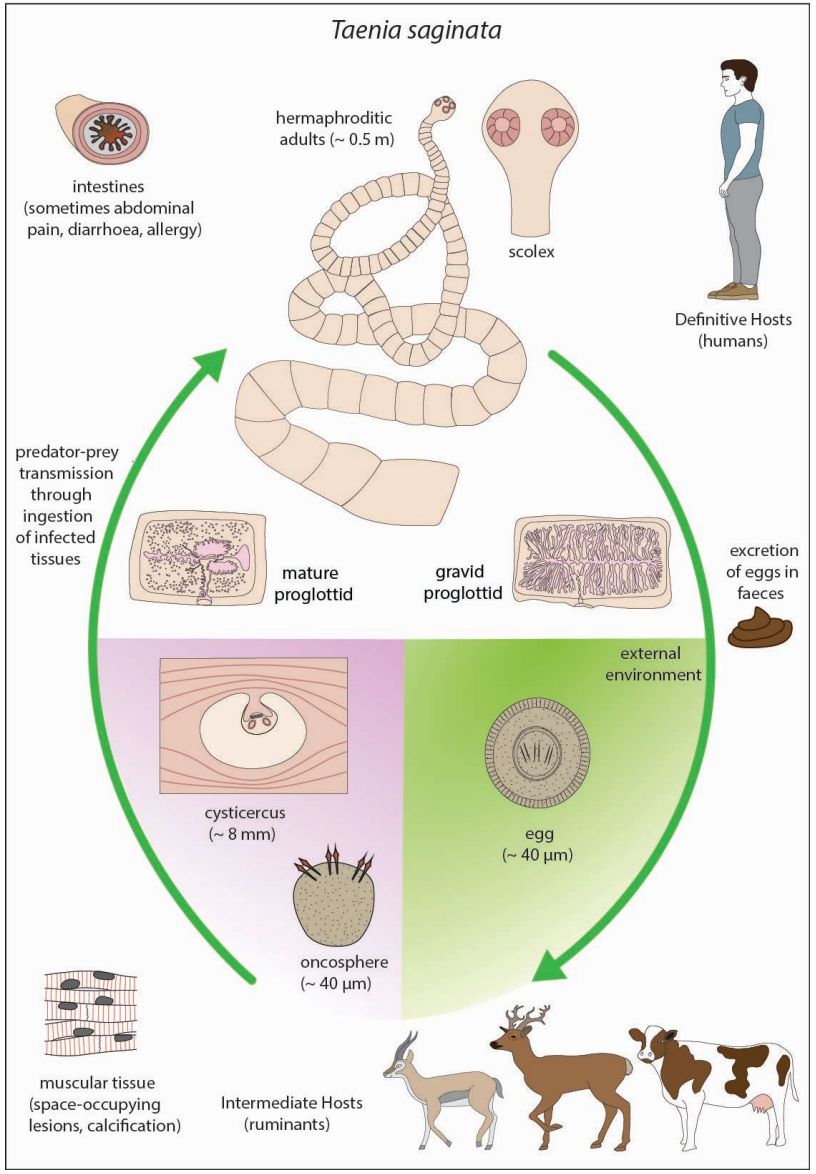

Syngamus
male
(~ 8 mm)
trachea
(obstructive
respiratory
distress, gapes)
adults
in copula
head
Definitive Hosts
(birds, incl.
galliformes)
L3 or PH
ingested
female
(~ 25 mm)
male tail
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 280 µm)
external
environment
eggs
(~ 100 µm)
first- and second-stage larvae
develop within eggs
Occasional Paratenic Hosts
(earthworms)
(tissues)

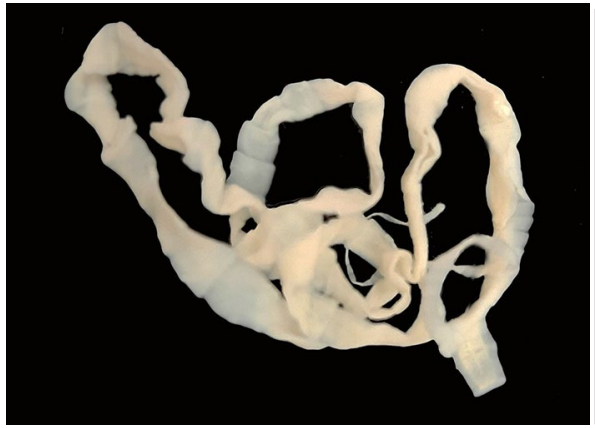

Syphacia
intestines
(mild enteritis, illthrift)
head
Definitive Hosts
(rodents,
lagomorphs)
adult female
(~ 4 mm)
adult male
(~ 1.5 mm)
male tail
(lateral)
eggs ingested
via grooming or
with food/water
(possiblly some
L3 retro-infection)
L3 develop
within eggs
eggs
(~ 100 µm)
eggs may be dislodged
to contaminate
environment
sticky
eggs
attached
around
anus
contaminative transmission

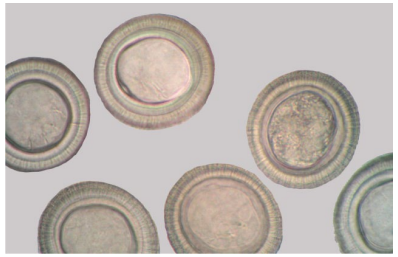

Tabanus
adult female
(dorsal)
(~ 30 mm)
skin
(annoyance, lesions,
allergy, stress)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, birds,
reptiles)
adults free-flying, females of many species are
transient ectoparasites (require bloodmeal for reproduction)
wing venation
resting posture
eggs laid
in moist
shaded
areas
near
water
eclosion
pupa
(~ 25 mm)
eggs
(~ 2 mm)
complete
(holometabolous)
metamorphosis
free-living feeding
larva (~ 20 mm)
hatch
development in semi-aquatic to aquatic habitats
(wetlands, bogs, ponds), rarely terrestrial (litter, mud)

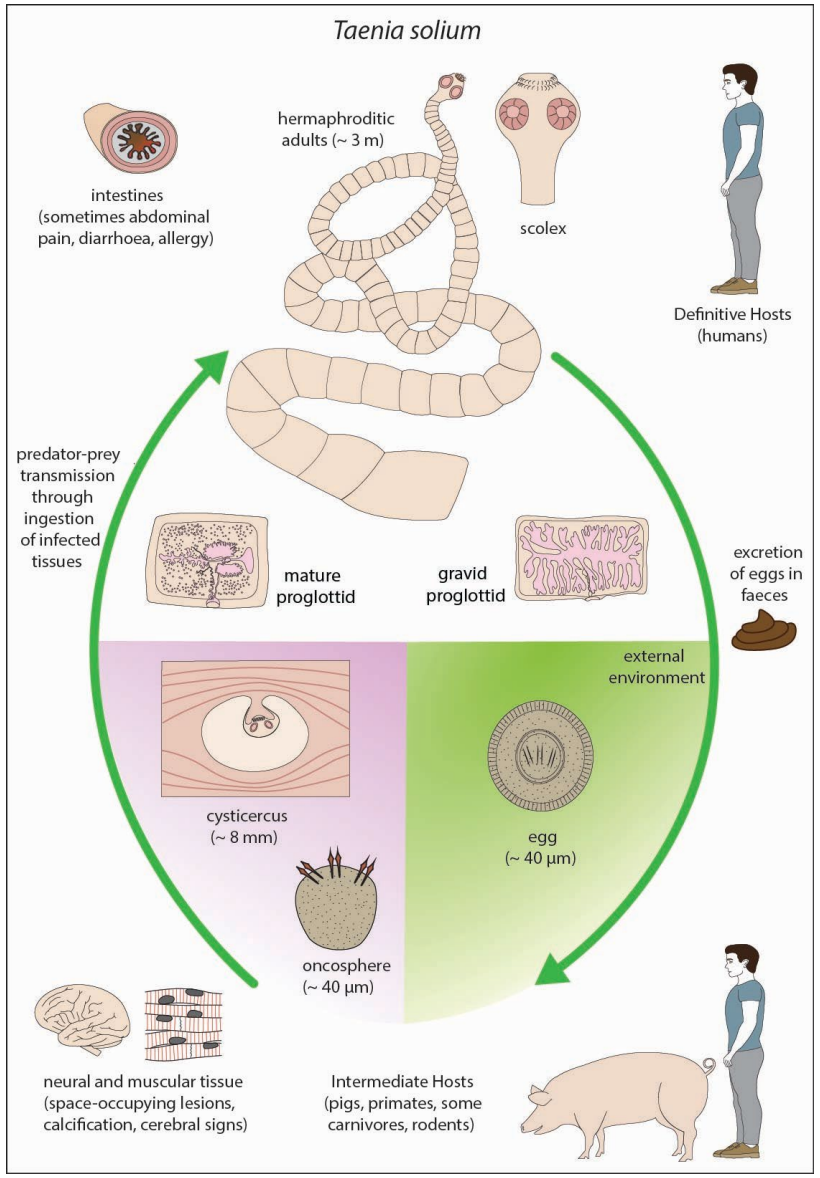

Taenia multiceps
intestines
(sometimes discomfort.
possibly diarrhoea)
scolex
hermaphroditic
adults (~ 0.5 m)
Definitive Hosts
(canids)
predator-prey
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
coenurus
(~ 20 mm)
egg
(~ 40 µm)
oncosphere
(~ 40 µm)
neural tissue
(space-occupying lesions,
cerebral signs (gid))
Intermediate Hosts
(ungulates, primates)

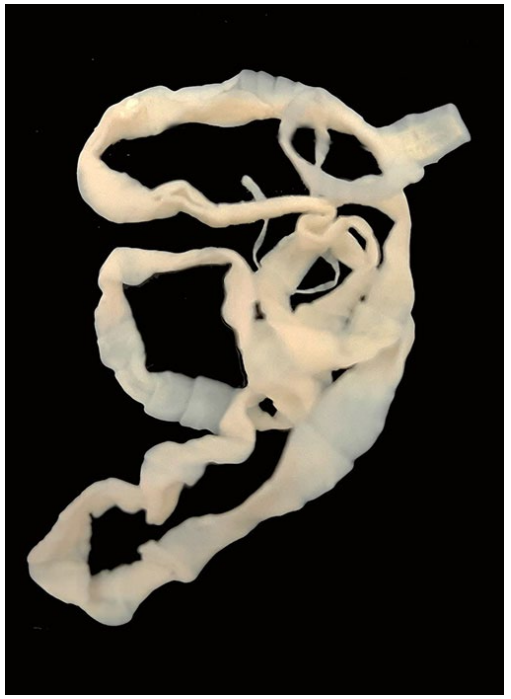


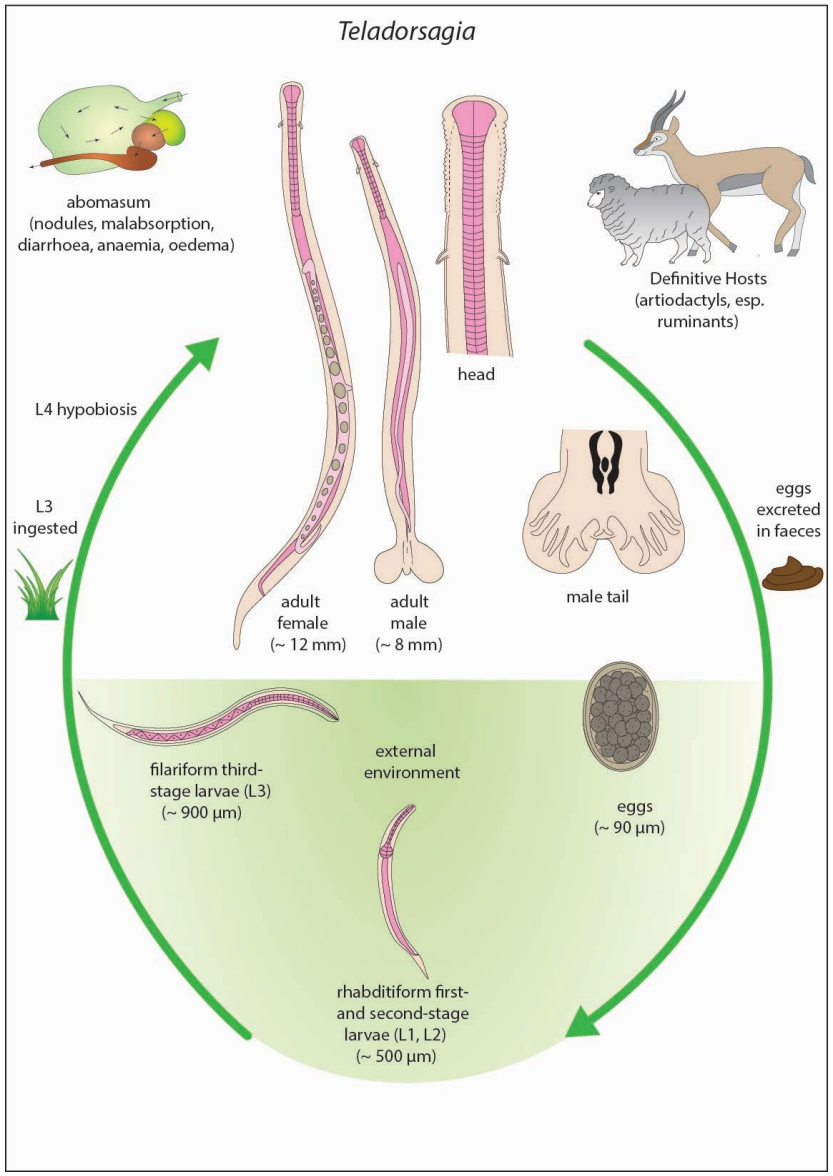

Taenia saginata
intestines
(sometimes abdominal
pain, diarrhoea, allergy)
hermaphroditic
adults (~ 0.5 m)
scolex
Definitive Hosts
(humans)
predator-prey
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercus
(~ 8 mm)
egg
(~ 40 µm)
oncosphere
(~ 40 µm)
muscular tissue
(space-occupying
lesions, calcification)
Intermediate Hosts
(ruminants)

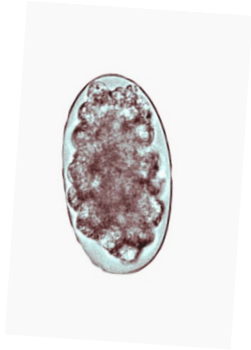


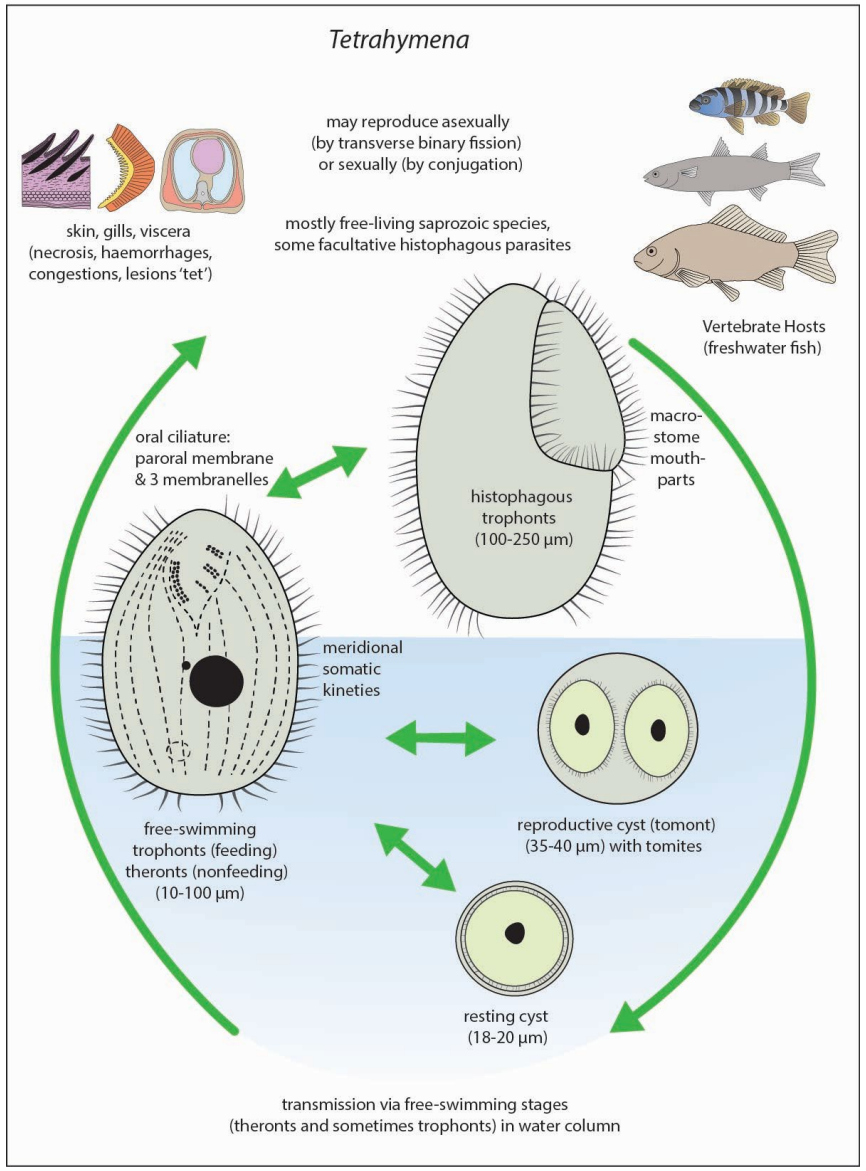


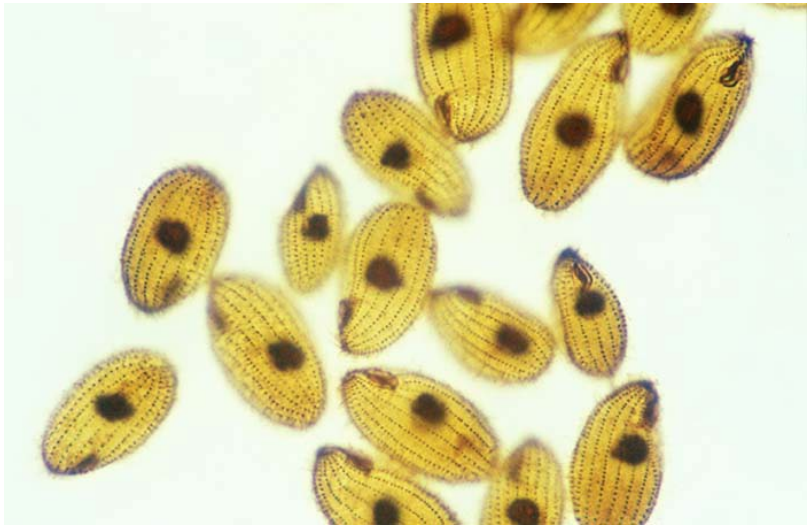

Taenia solium
intestines
(sometimes abdominal
pain, diarrhoea, allergy)
hermaphroditic
adults (~ 3 m)
scolex
Definitive Hosts
(humans)
predator-prey
transmission
through
ingestion
of infected
tissues
mature
proglottid
gravid
proglottid
excretion
of eggs in
faeces
external
environment
cysticercus
(~ 8 mm)
egg
(~ 40 µm)
oncosphere
(~ 40 µm)
neural and muscular tissue
(space-occupying lesions,
calcification, cerebral signs)
Intermediate Hosts
(pigs, primates, some
carnivores, rodents)

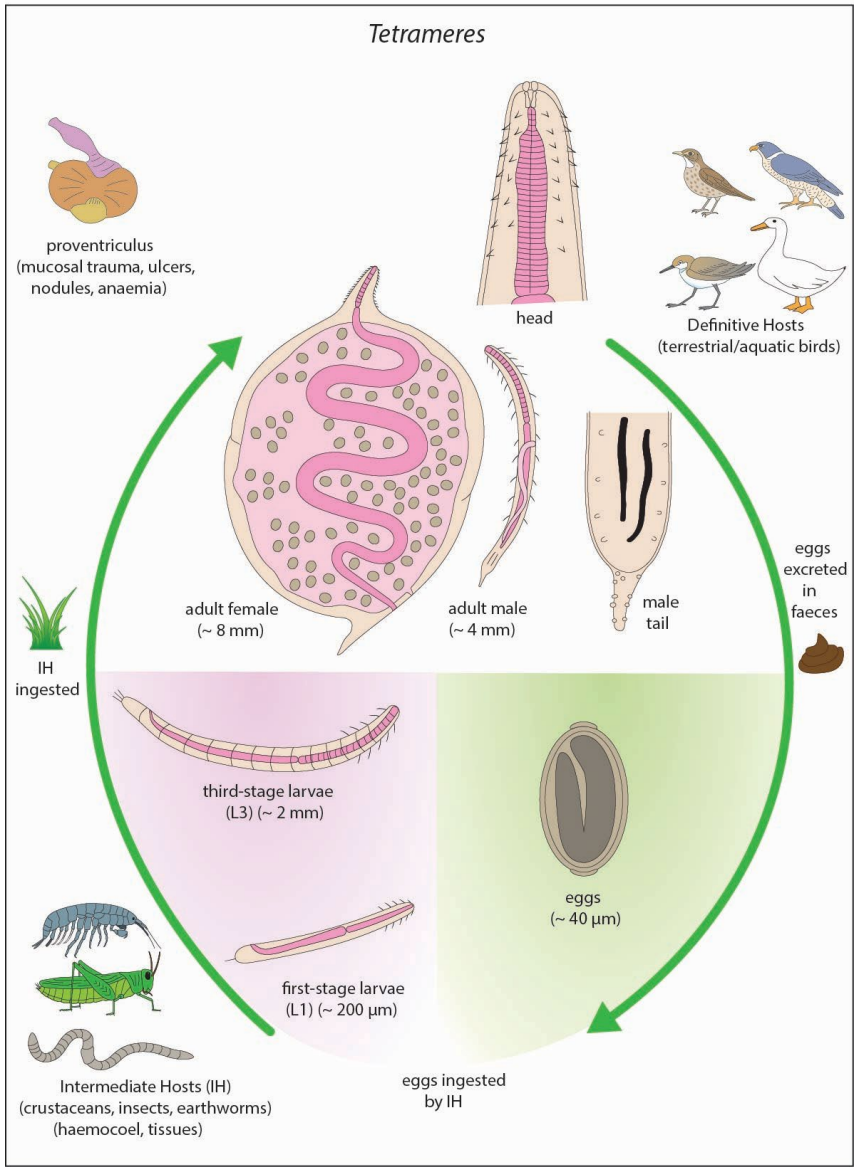


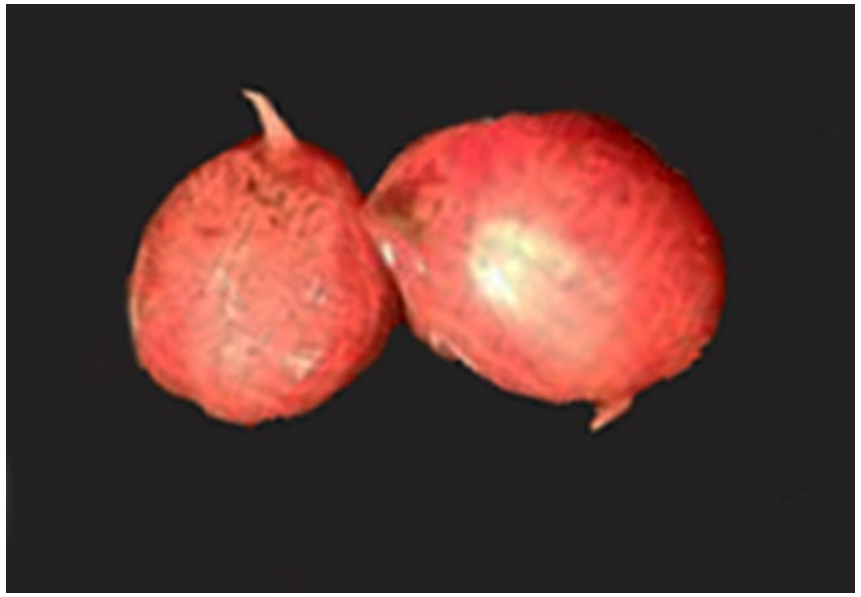

Teladorsagia
abomasum
(nodules, malabsorption,
diarrhoea, anaemia, oedema)
head
Definitive Hosts
(artiodactyls, esp.
ruminants)
L4 hypobiosis
L3
ingested
eggs
excreted
in faeces
adult
female
(~ 12 mm)
adult
male
(~ 8 mm)
male tail
filariform third-
stage larvae (L3)
(~ 900 µm)
external
environment
eggs
(~ 90 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 500 µm)

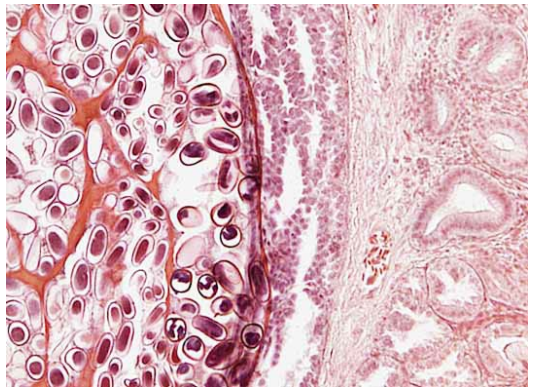


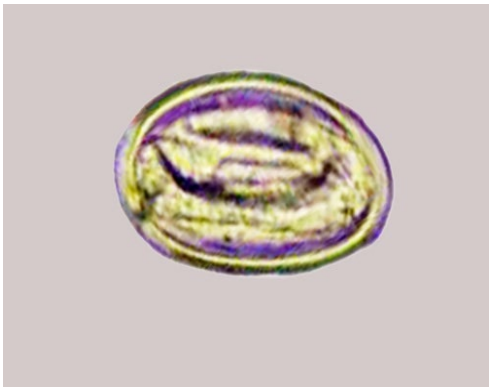

Tetrahymena
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
mostly free-living saprozoic species,
some facultative histophagous parasites
skin, gills, viscera
(necrosis, haemorrhages,
congestions, lesions 'tet')
Vertebrate Hosts
(freshwater fish)
oral ciliature:
paroral membrane
& 3 membranelles
macro-
stome
mouth-
parts
histophagous
trophonts
(100-250 µm)
meridional
somatic
kineties
free-swimming
trophonts (feeding)
theronts (nonfeeding)
(10-100 µm)
reproductive cyst (tomont)
(35-40 µm) with tomites
resting cyst
(18-20 µm)
transmission via free-swimming stages
(theronts and sometimes trophonts) in water column

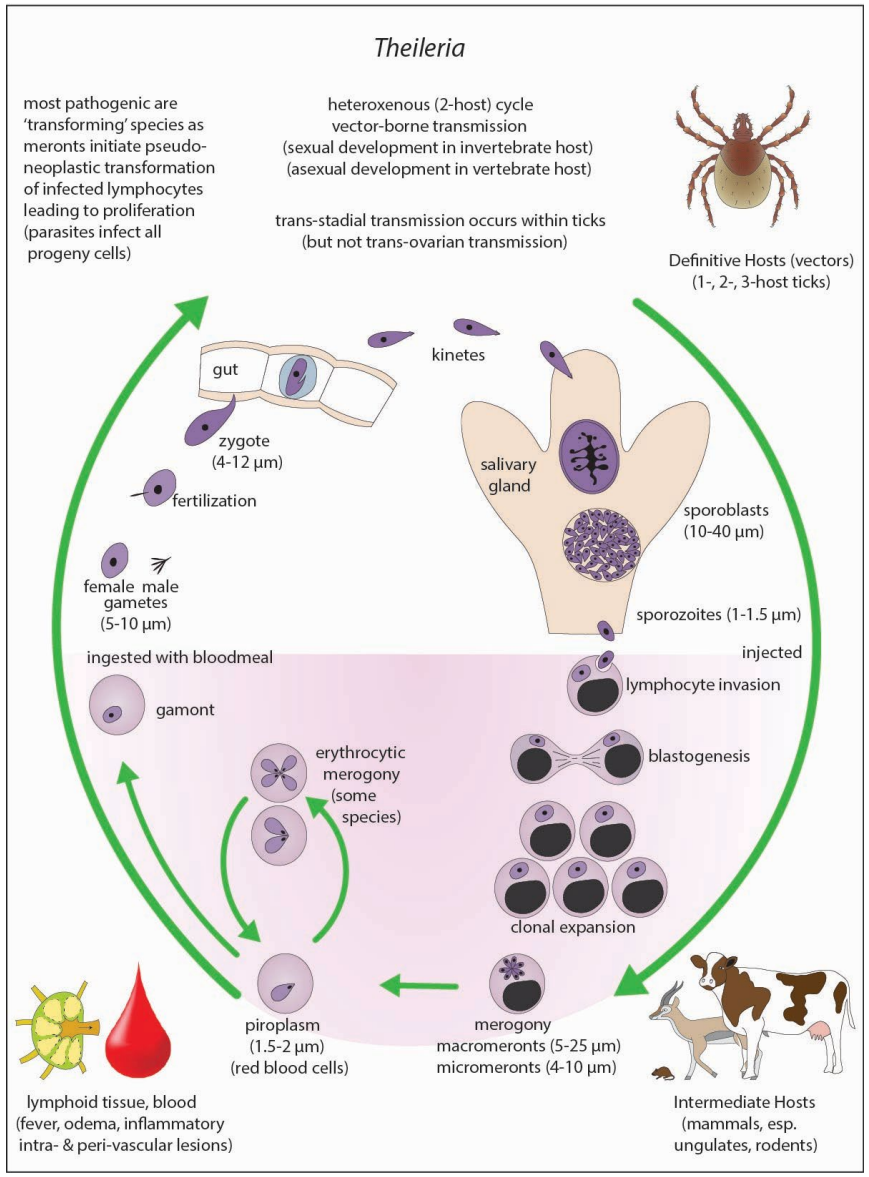


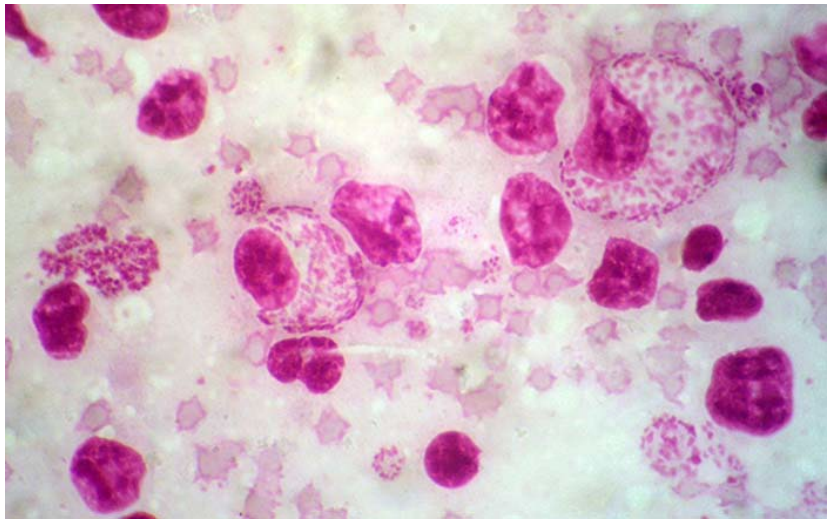

Tetrameres
proventriculus
(mucosal trauma, ulcers,
nodules, anaemia)
head
Definitive Hosts
(terrestrial/aquatic birds)
adult female
(~ 8 mm)
adult male
(~ 4 mm)
male
tail
eggs
excreted
in
faeces
IH
ingested
third-stage larvae
(L3) (~ 2 mm)
eggs
(~ 40 µm)
first-stage larvae
(L1) (~ 200 µm)
Intermediate Hosts (IH)
(crustaceans, insects, earthworms)
(haemocoel, tissues)
eggs ingested
by IH

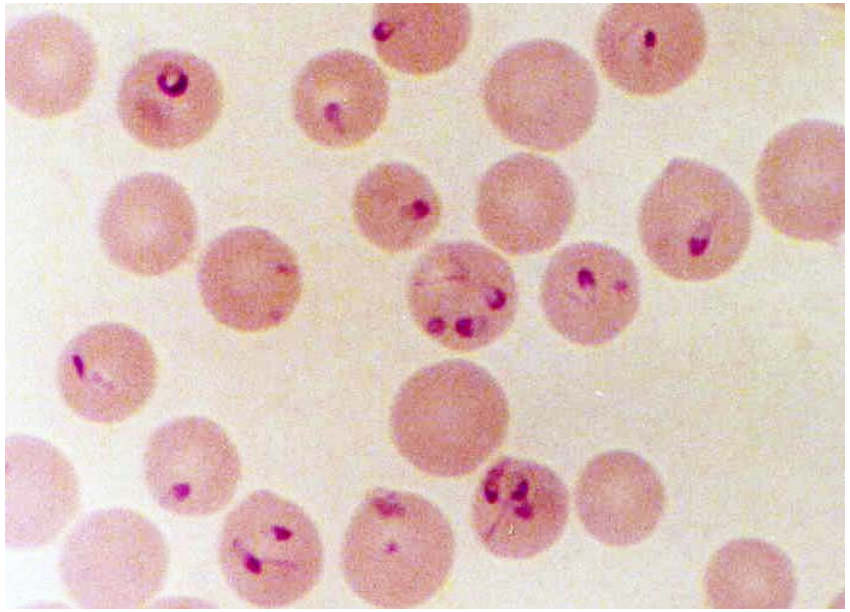


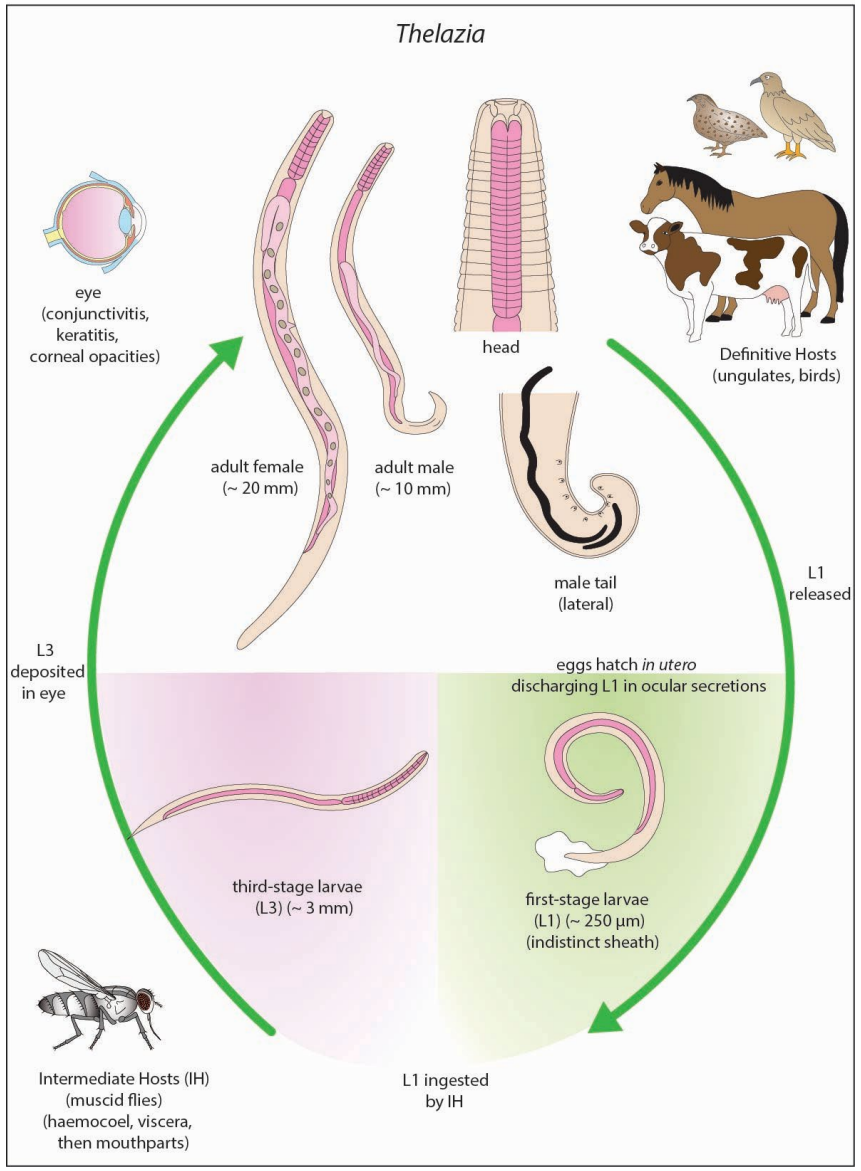


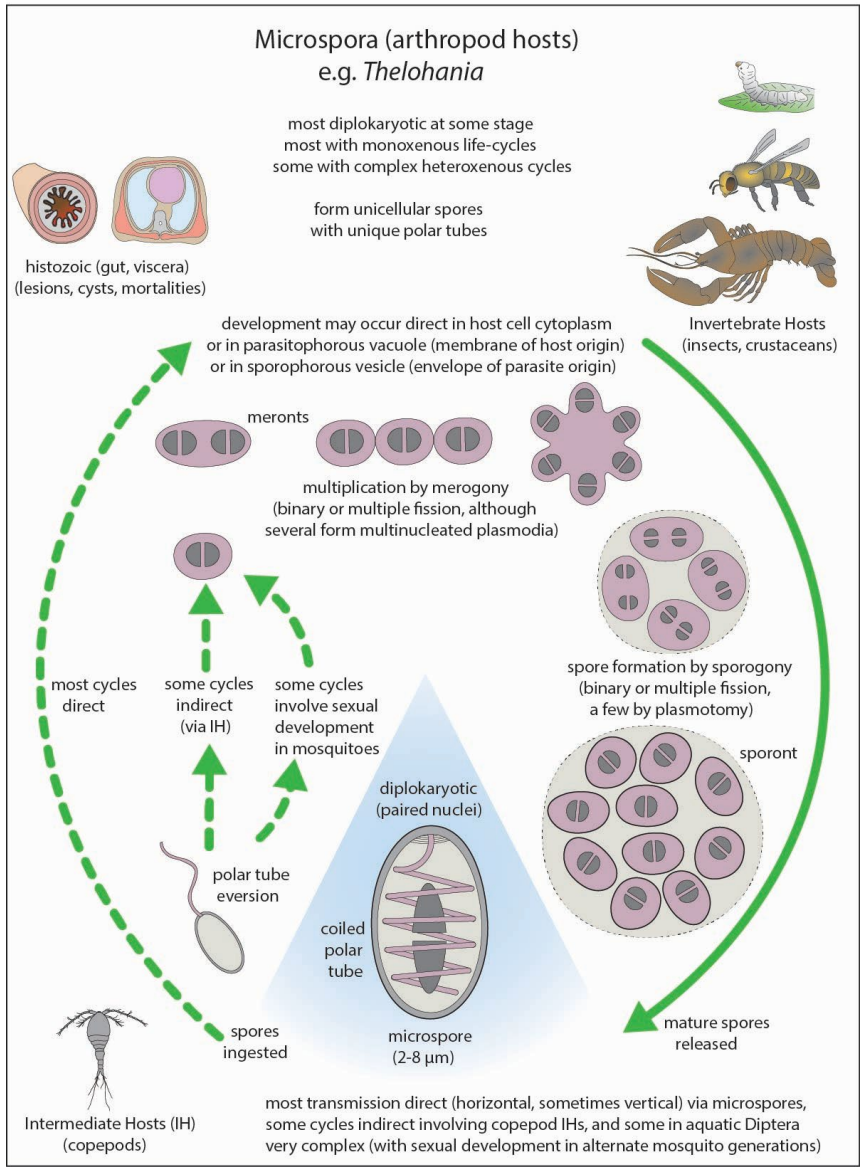


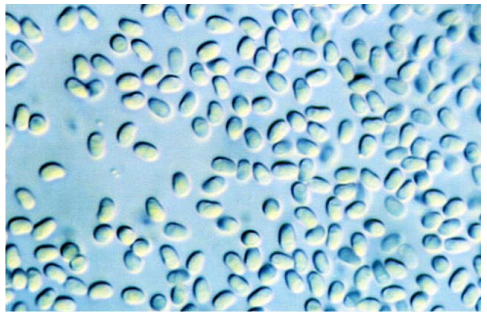

Theileria
most pathogenic are 'transforming' species as meronts initiate pseudo-neoplastic transformation of infected lymphocytes leading to proliferation (parasites infect all progeny cells)
heteroxenous (2-host) cycle
vector-borne transmission
(sexual development in invertebrate host)
(asexual development in vertebrate host)
trans-stadial transmission occurs within ticks
(but not trans-ovarian transmission)
Definitive Hosts (vectors)
(1-, 2-, 3-host ticks)
kinetes
gut
zygote
(4-12 µm)
fertilization
salivary gland
sporoblasts
(10-40 µm)
female gametes
(5-10 µm)
male
sporozoites (1-1.5 µm)
injected
ingested with bloodmeal
lymphocyte invasion
gamont
erythrocytic merogony (some species)
blastogenesis
clonal expansion
piroplasm
(1.5-2 µm)
(red blood cells)
merogony
macromeronts (5-25 µm)
micromeronts (4-10 µm)
lymphoid tissue, blood
(fever, odema, inflammatory
intra- & peri-vascular lesions)
Intermediate Hosts
(mammals, esp.
ungulates, rodents)

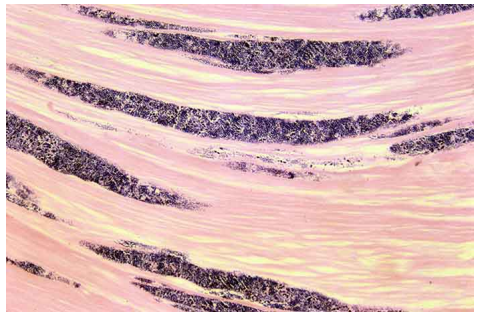


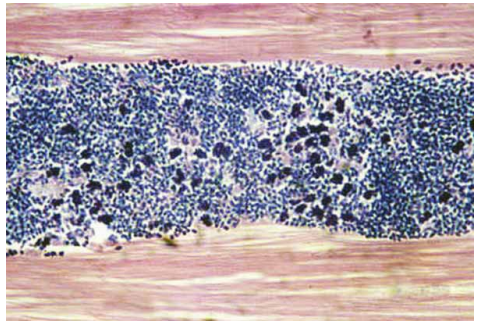


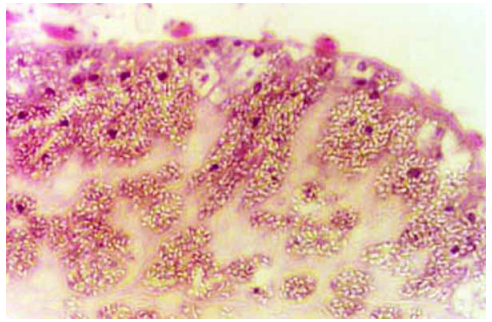

Thelazia
eye
(conjunctivitis,
keratitis,
corneal opacities)
head
Definitive Hosts
(ungulates, birds)
adult female
(~ 20 mm)
adult male
(~ 10 mm)
male tail
(lateral)
L1
released
L3
deposited
in eye
eggs hatch in utero
discharging L1 in ocular secretions
third-stage larvae
(L3) (~ 3 mm)
first-stage larvae
(L1) (~ 250 µm)
(indistinct sheath)
Intermediate Hosts (IH)
(muscid flies)
(haemocoel, viscera,
then mouthparts)
L1 ingested
by IH

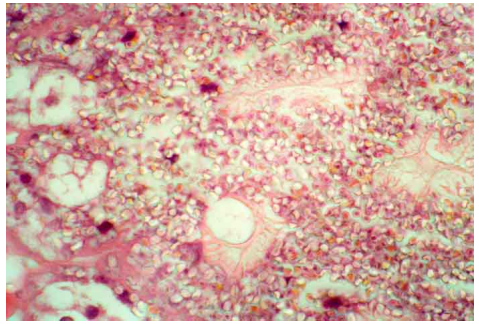

Microspora (arthropod hosts)
e.g. *Thelohania*
most diplokaryotic at some stage
most with monoxenous life-cycles
some with complex heteroxenous cycles
form unicellular spores
with unique polar tubes
histozoic (gut, viscera)
(lesions, cysts, mortalities)
Invertebrate Hosts
(insects, crustaceans)
development may occur direct in host cell cytoplasm
or in parasitophorous vacuole (membrane of host origin)
or in sporophorous vesicle (envelope of parasite origin)
meronts
multiplication by merogony
(binary or multiple fission, although
several form multinucleated plasmodia)
spore formation by sporogony
(binary or multiple fission,
a few by plasmotomy)
sporont
most cycles
direct
some cycles
indirect
(via IH)
some cycles
involve sexual
development
in mosquitoes
diplokaryotic
(paired nuclei)
polar tube
eversion
coiled
polar
tube
microspore
(2-8 µm)
spores
ingested
mature spores
released
Intermediate Hosts (IH)
(copepods)
most transmission direct (horizontal, sometimes vertical) via microspores,
some cycles indirect involving copepod IHs, and some in aquatic Diptera
very complex (with sexual development in alternate mosquito generations)

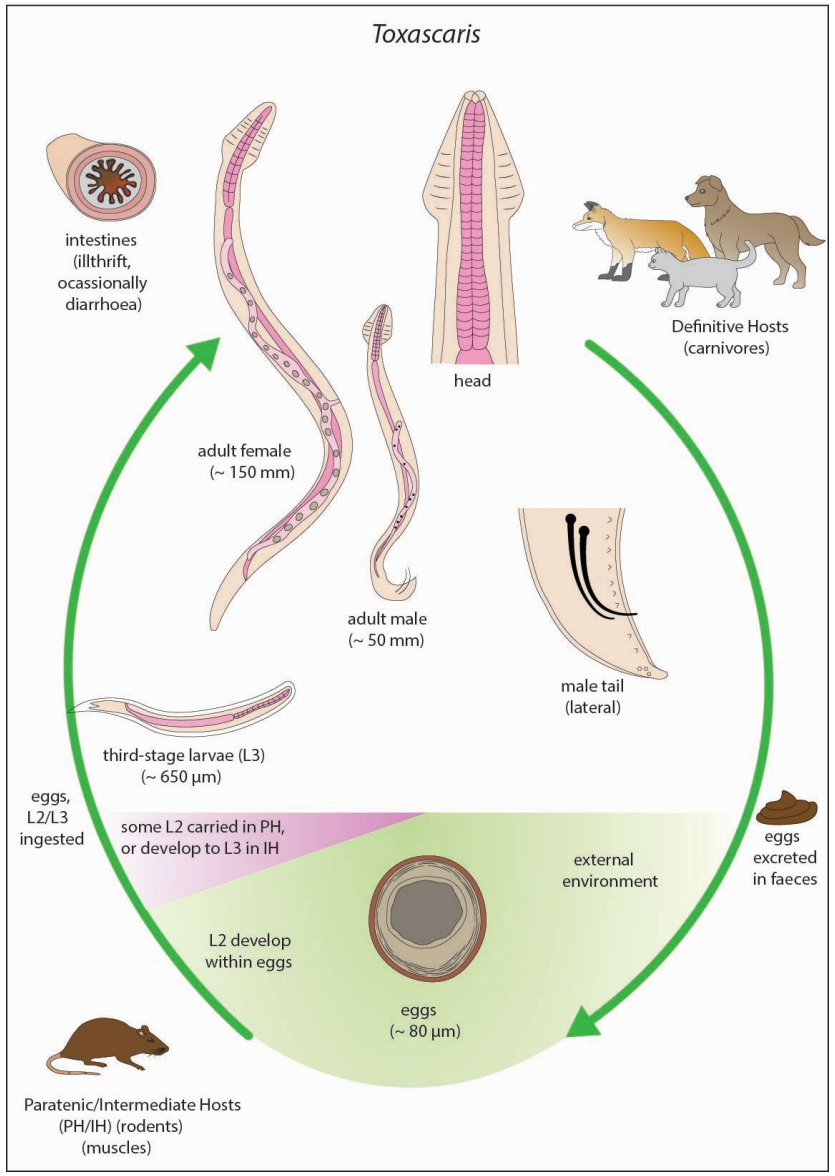


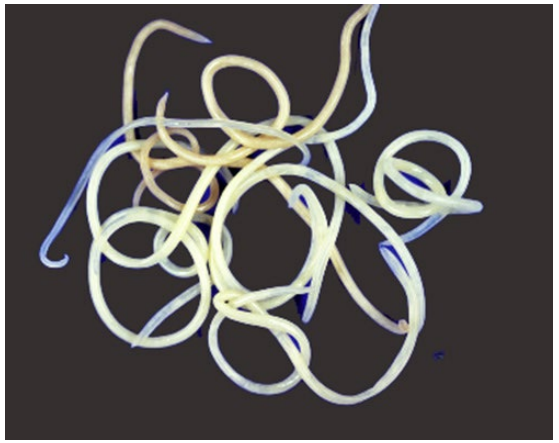


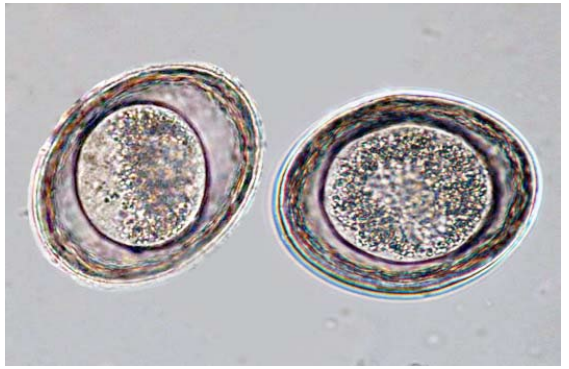


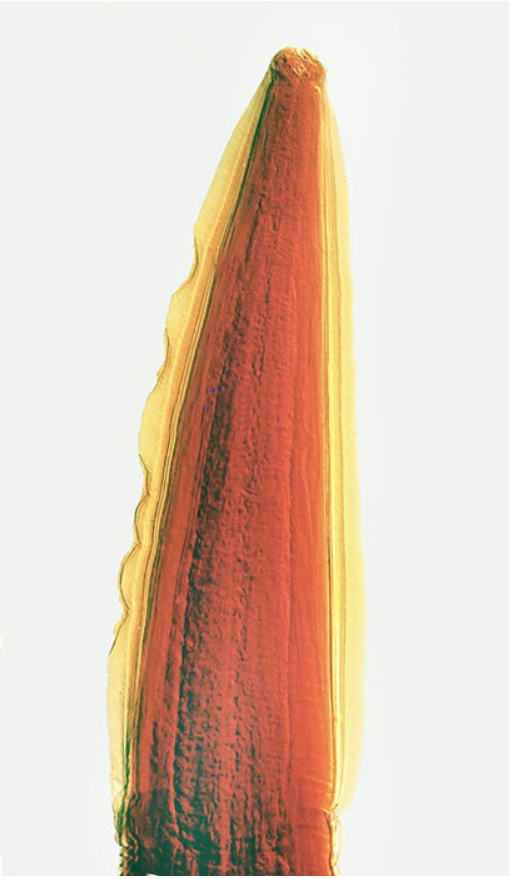


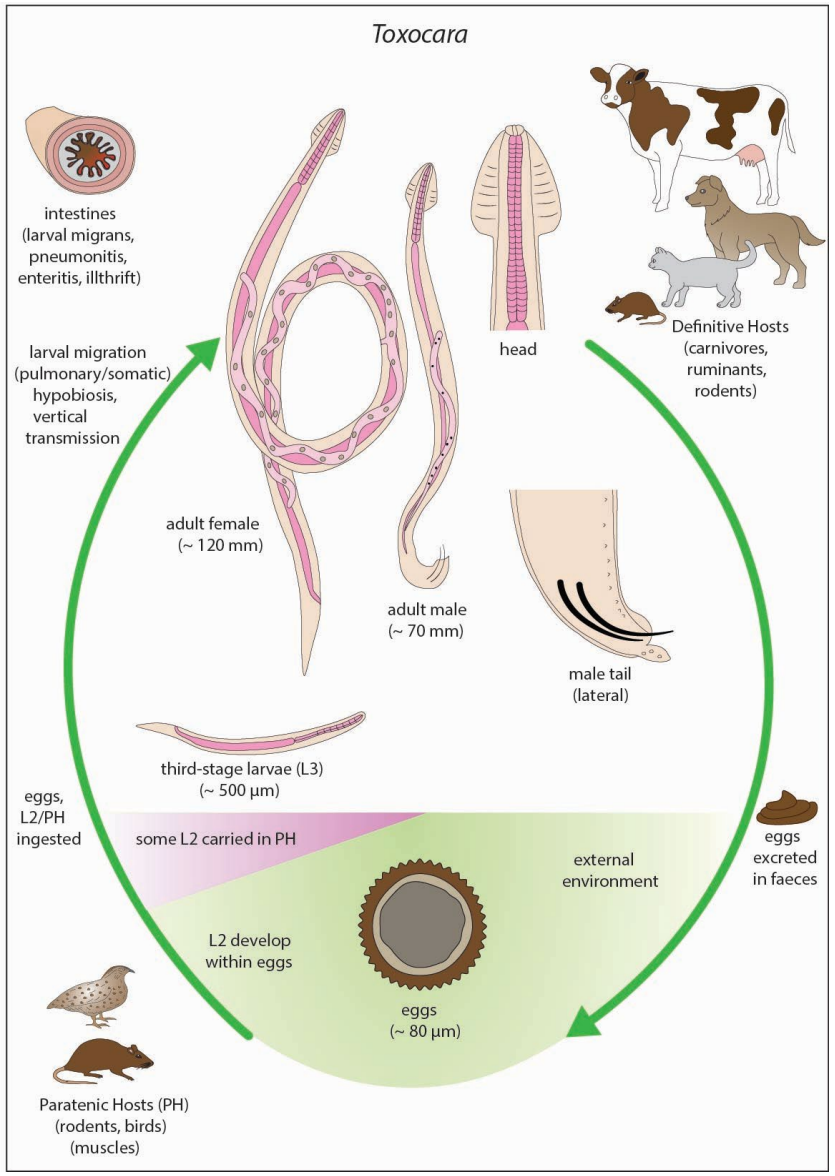


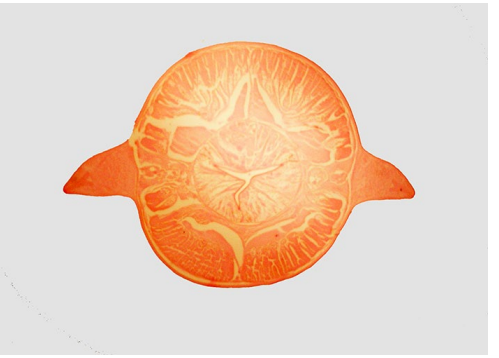

Toxascaris
intestines
(illthrift,
ocassionally
diarrhoea)
head
Definitive Hosts
(carnivores)
adult female
(~ 150 mm)
adult male
(~ 50 mm)
male tail
(lateral)
third-stage larvae (L3)
(~ 650 µm)
eggs,
L2/L3
ingested
some L2 carried in PH,
or develop to L3 in IH
external
environment
eggs
excreted
in faeces
L2 develop
within eggs
eggs
(~ 80 µm)
Paratenic/Intermediate Hosts
(PH/IH) (rodents)
(muscles)

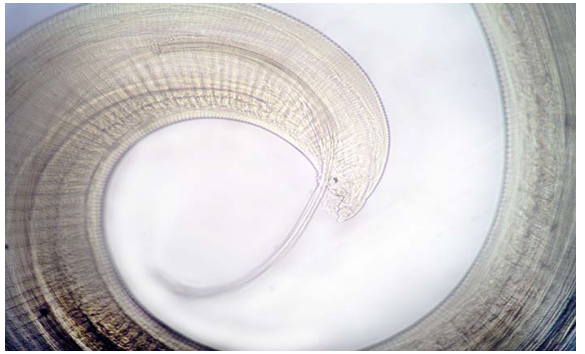


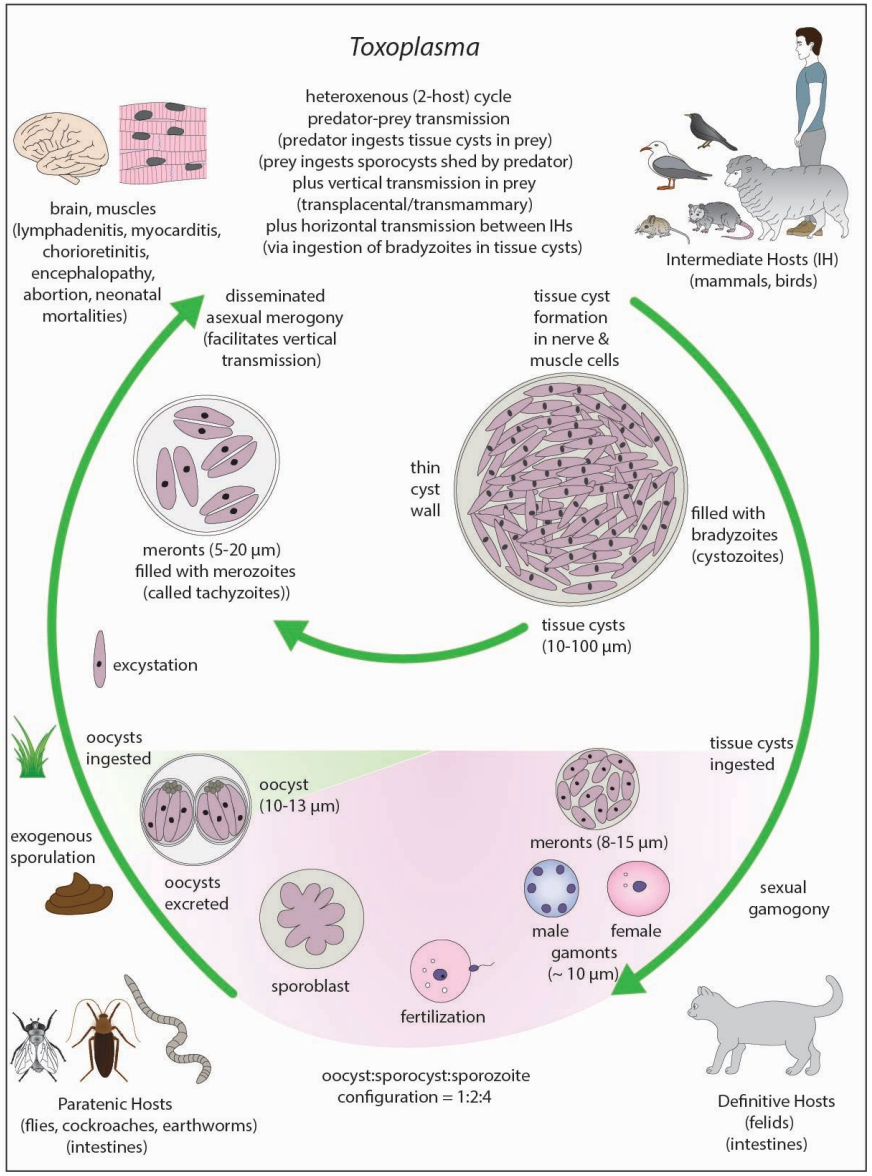


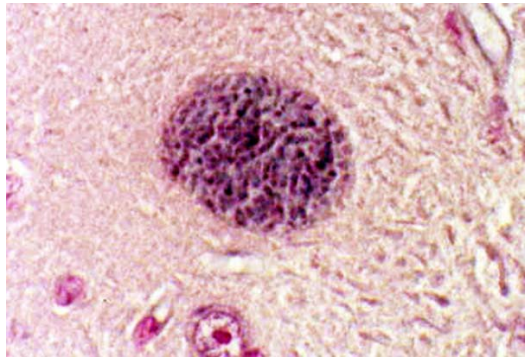


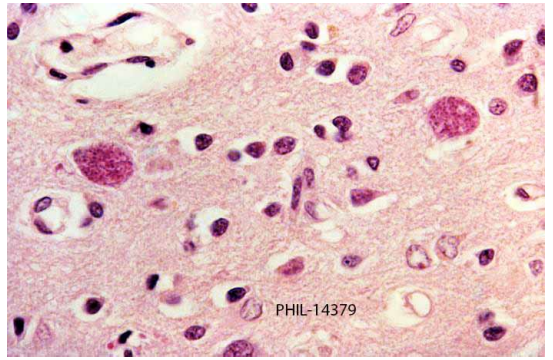

Toxocara
intestines
(larval migrans,
pneumonitis,
enteritis, illthrift)
larval migration
(pulmonary/somatic)
hypobiosis,
vertical
transmission
adult female
(~ 120 mm)
adult male
(~ 70 mm)
head
Definitive Hosts
(carnivores,
ruminants,
rodents)
male tail
(lateral)
third-stage larvae (L3)
(~ 500 µm)
eggs,
L2/PH
ingested
some L2 carried in PH
external
environment
eggs
excreted
in faeces
L2 develop
within eggs
eggs
(~ 80 µm)
Paratenic Hosts (PH)
(rodents, birds)
(muscles)

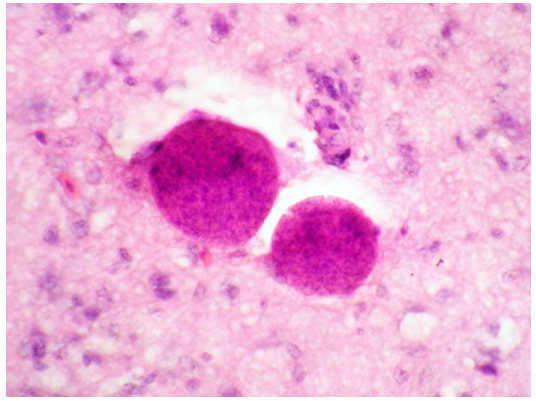


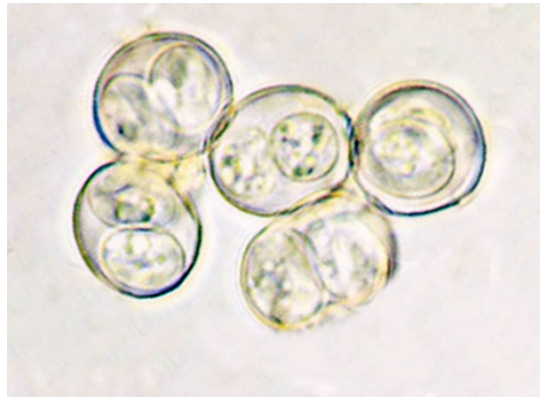


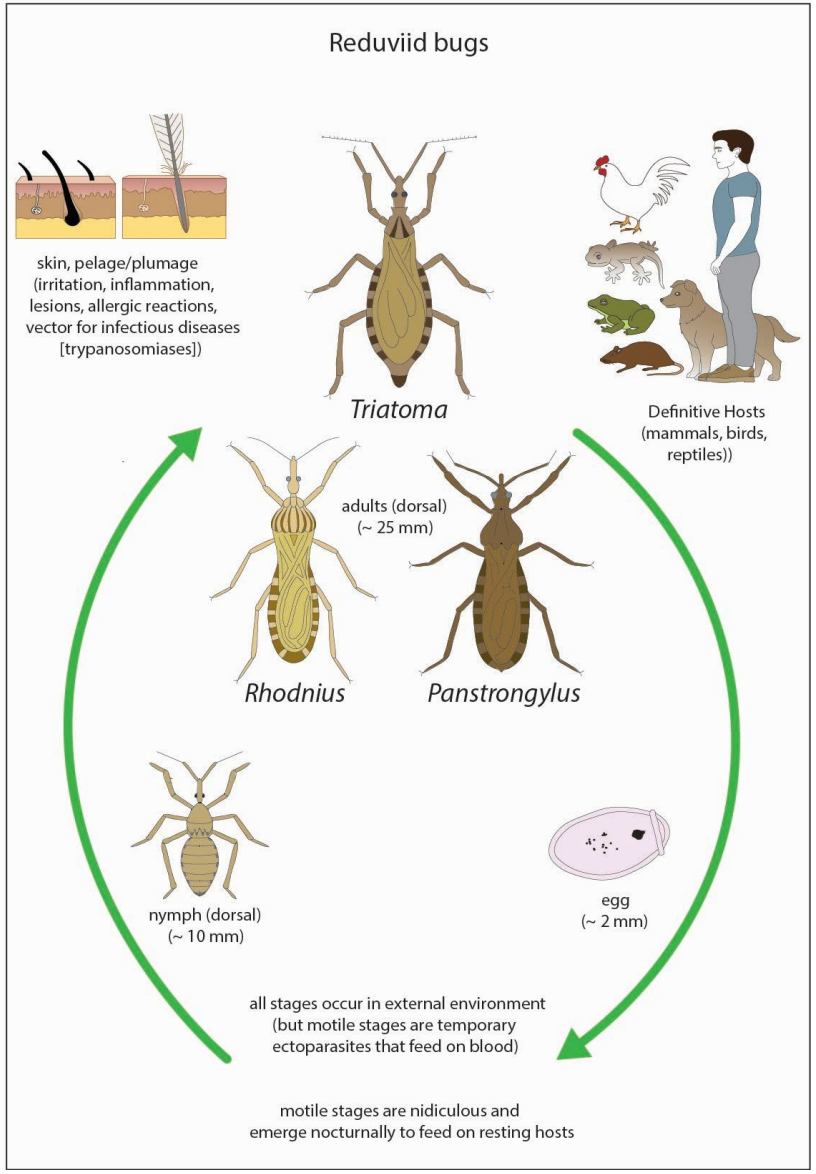

Toxoplasma
heteroxenous (2-host) cycle
predator-prey transmission
(predator ingests tissue cysts in prey)
(prey ingests sporocysts shed by predator)
plus vertical transmission in prey
(transplacental/transmammary)
plus horizontal transmission between IHs
(via ingestion of bradyzoites in tissue cysts)
brain, muscles
(lymphadenitis, myocarditis, chorioretinitis, encephalopathy, abortion, neonatal mortalities)
Intermediate Hosts (IH)
(mammals, birds)
disseminated asexual merogony (facilitates vertical transmission)
tissue cyst formation in nerve & muscle cells
meronts (5-20 µm) filled with merozoites (called tachyzoites))
thin cyst wall
filled with bradyzoites (cystozoites)
tissue cysts (10-100 µm)
excystation
oocysts ingested
oocyst (10-13 µm)
tissue cysts ingested
meronts (8-15 µm)
exogenous sporulation
oocysts excreted
sporoblast
male gamonts (~ 10 µm)
female
sexual gamogony
fertilization
oocyst:sporocyst:sporozoite configuration = 1:2:4
Paratenic Hosts
(flies, cockroaches, earthworms)
(intestines)
Definitive Hosts
(felids)
(intestines)



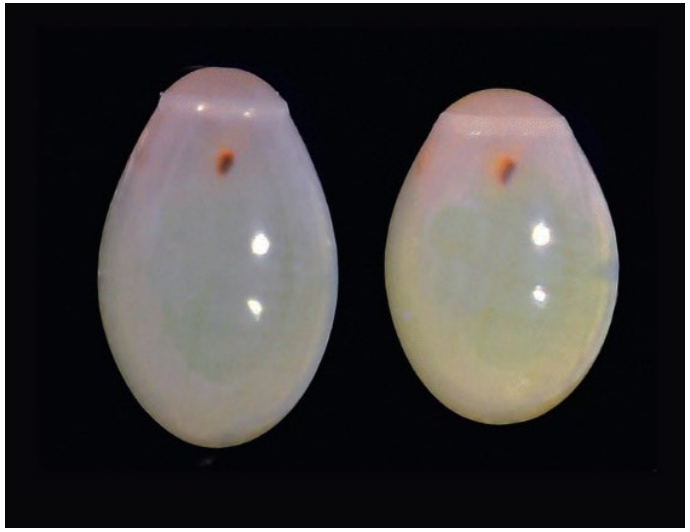

PHIL-14379

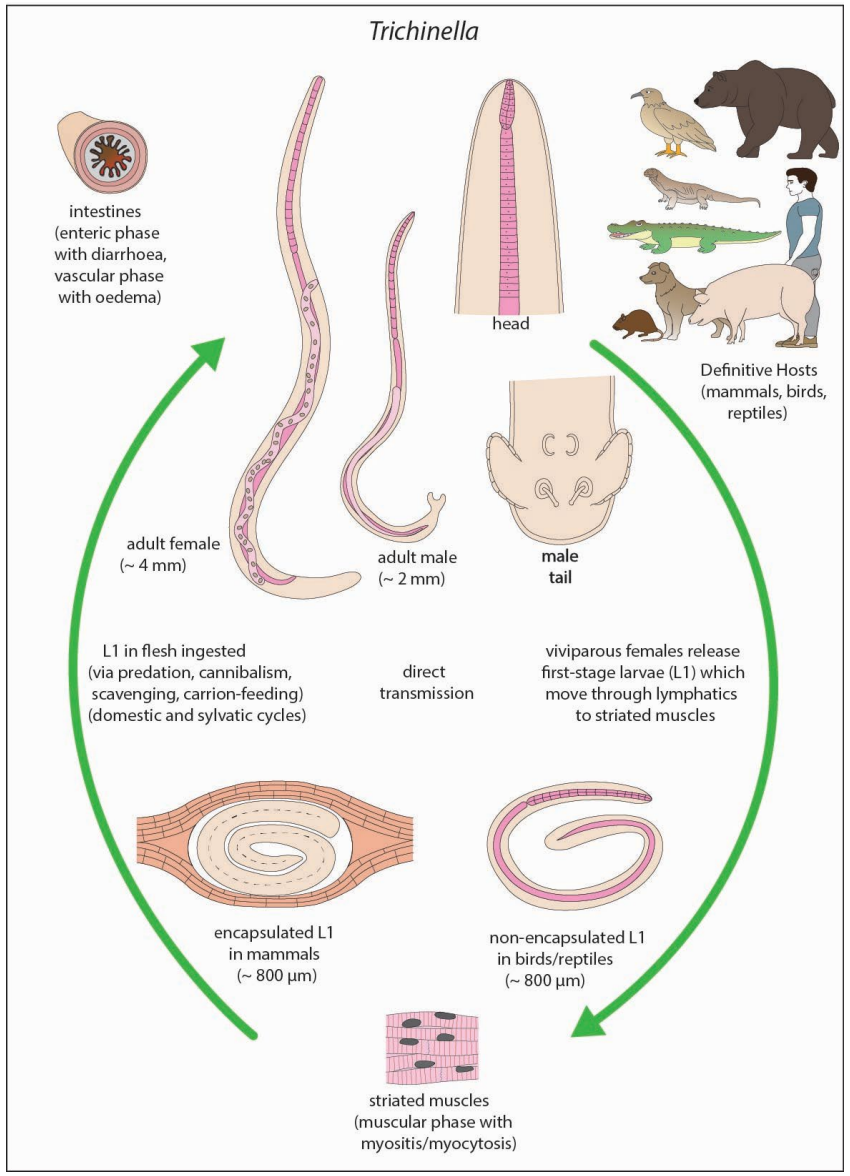




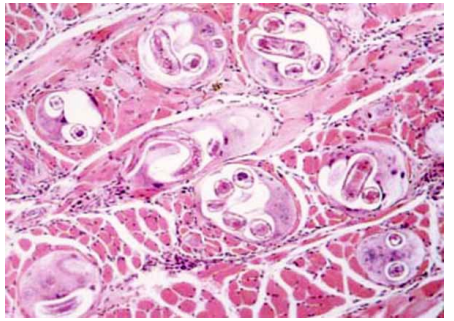

Reduviid bugs
skin, pelage/plumage
(irritation, inflammation,
lesions, allergic reactions,
vector for infectious diseases
[trypanosomiases])
Triatoma
Definitive Hosts
(mammals, birds,
reptiles))
adults (dorsal)
(~ 25 mm)
Rhodnius
Panstrongylus
nymph (dorsal)
(~ 10 mm)
egg
(~ 2 mm)
all stages occur in external environment
(but motile stages are temporary
ectoparasites that feed on blood)
motile stages are nidiculous and
emerge nocturnally to feed on resting hosts

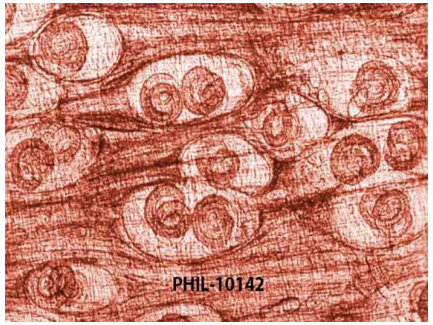

PHIL-28201

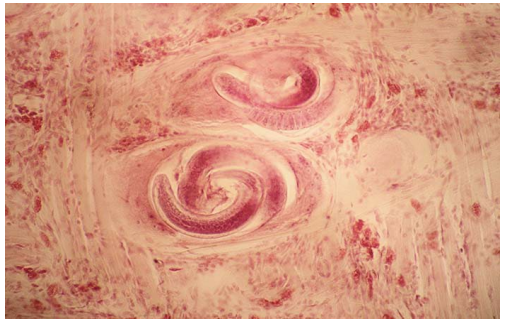


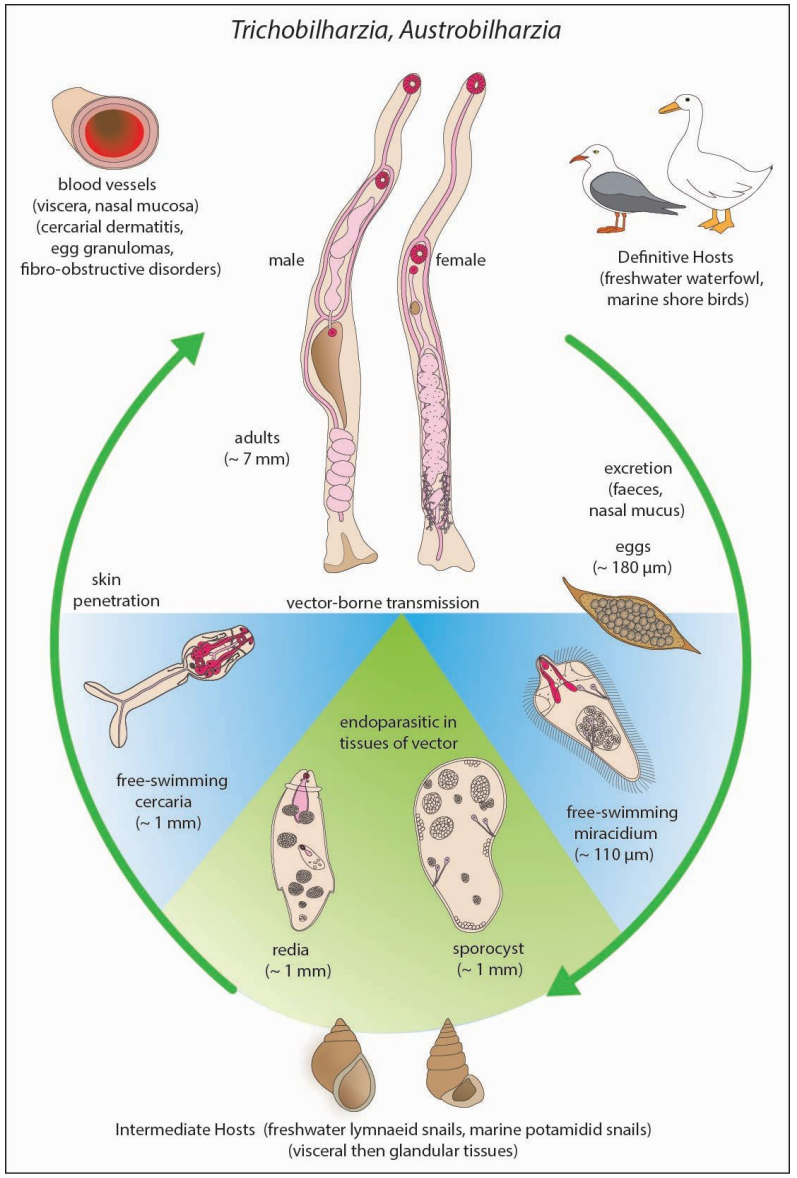



PHIL-14931

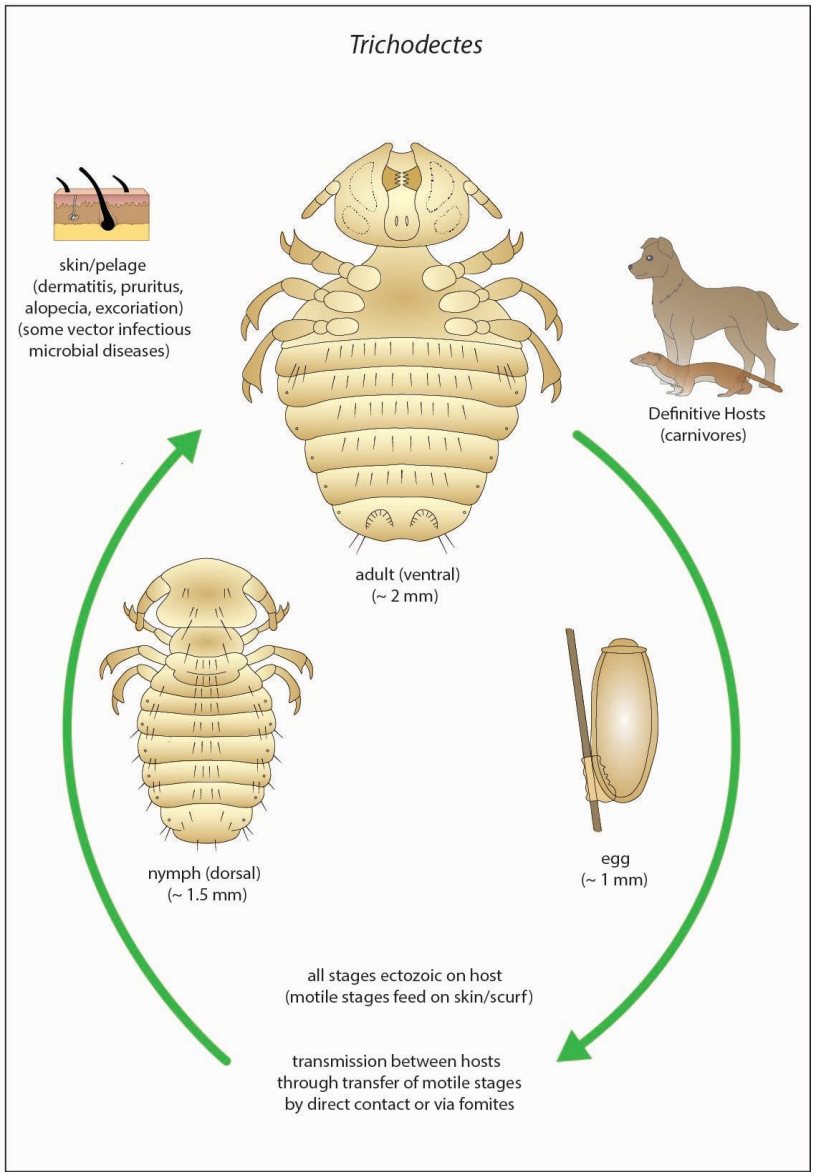


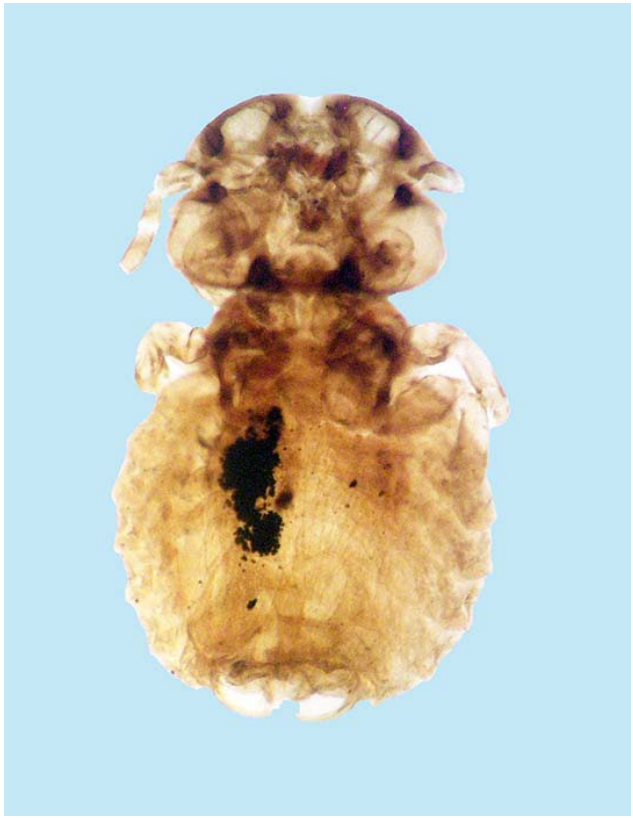

PHIL-10142

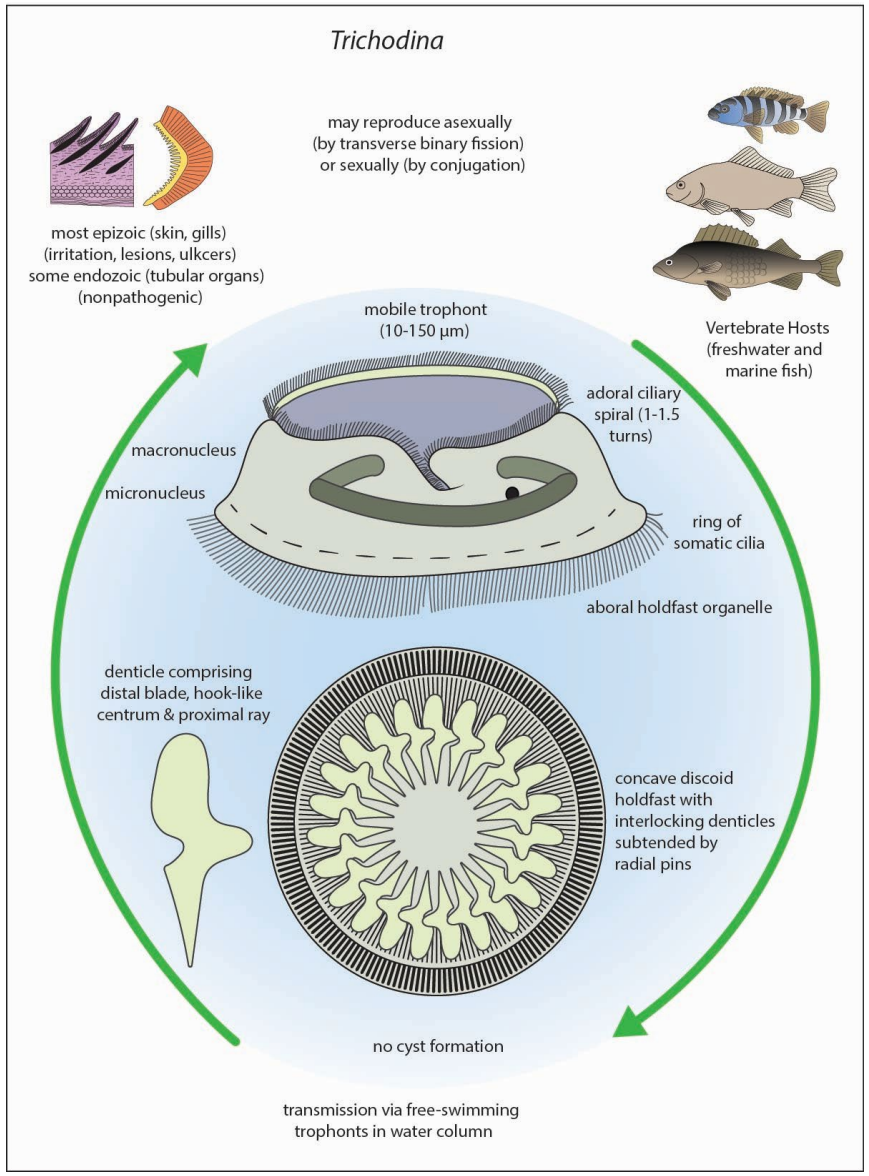


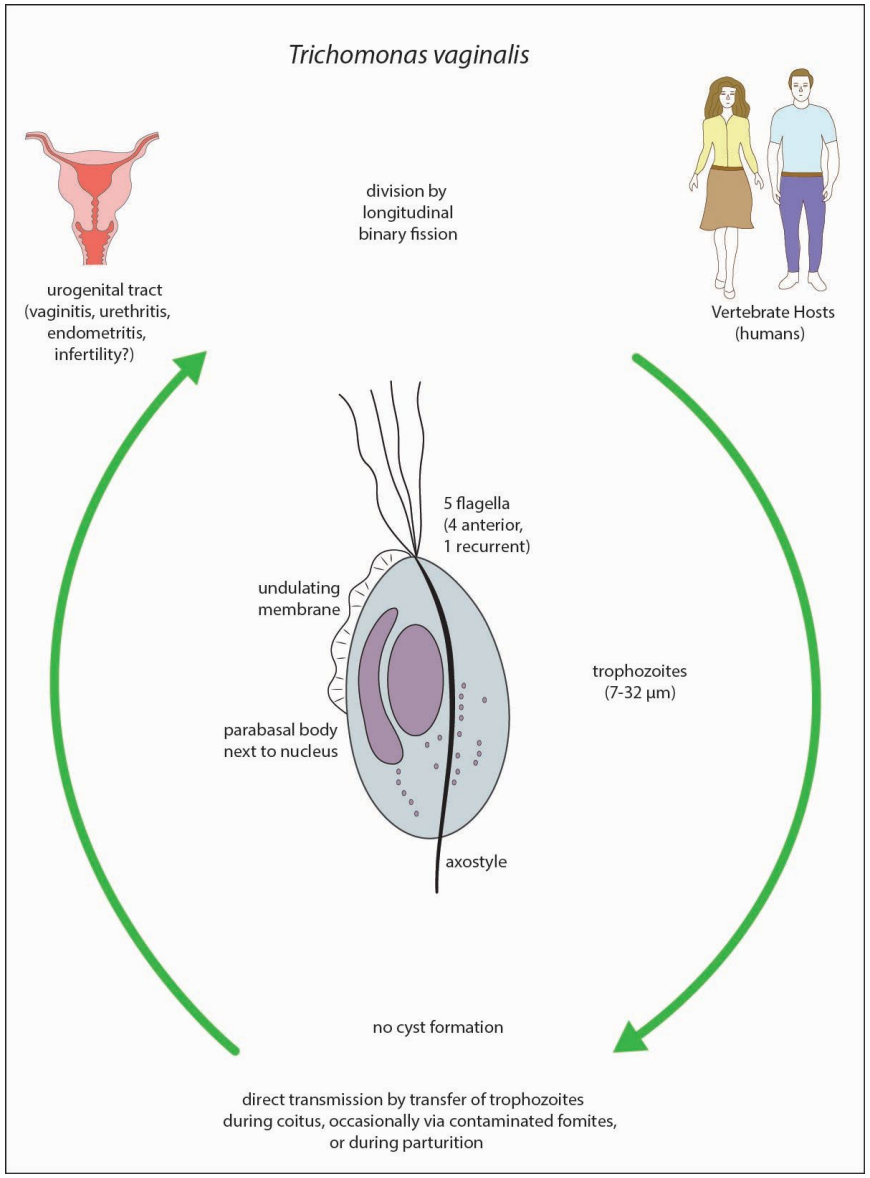

Trichobilharzia, Austrobilharzia
blood vessels
(viscera, nasal mucosa)
(cercarial dermatitis,
egg granulomas,
fibro-obstructive disorders)
male
female
Definitive Hosts
(freshwater waterfowl,
marine shore birds)
adults
(~ 7 mm)
excretion
(faeces,
nasal mucus)
eggs
(~ 180 µm)
skin
penetration
vector-borne transmission
endoparasitic in
tissues of vector
free-swimming
cercaria
(~ 1 mm)
free-swimming
miracidium
(~ 110 µm)
redia
(~ 1 mm)
sporocyst
(~ 1 mm)
Intermediate Hosts (freshwater lymnaeid snails, marine potamidid snails)
(visceral then glandular tissues)

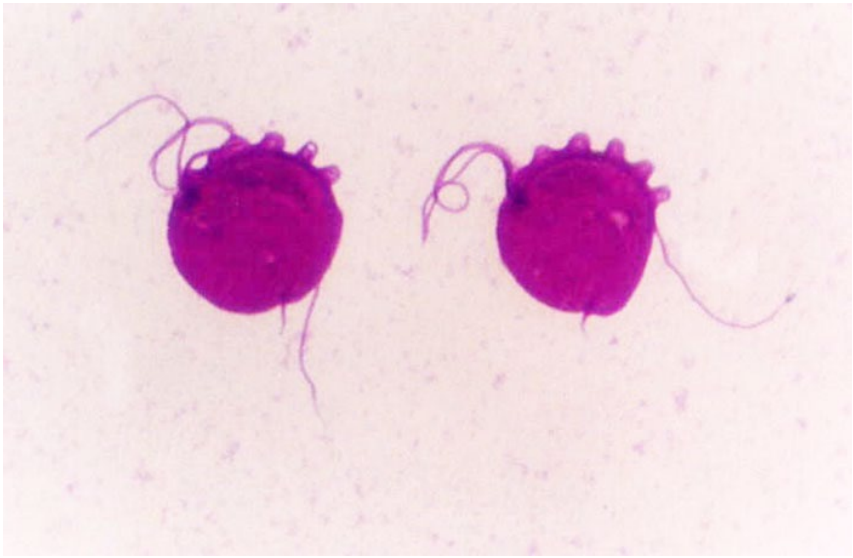

wiki

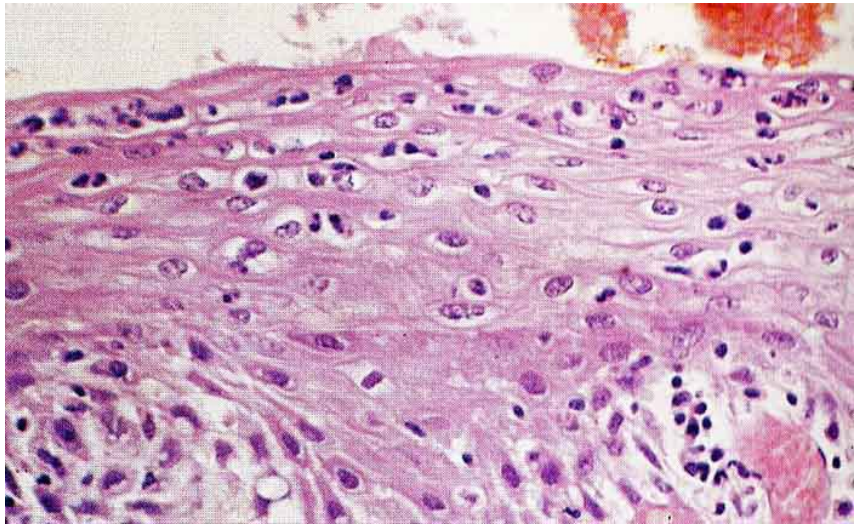

Trichodectes
skin/pelage
(dermatitis, pruritus,
alopecia, excoriation)
(some vector infectious
microbial diseases)
Definitive Hosts
(carnivores)
adult (ventral)
(~ 2 mm)
nymph (dorsal)
(~ 1.5 mm)
egg
(~ 1 mm)
all stages ectozoic on host
(motile stages feed on skin/scurf)
transmission between hosts
through transfer of motile stages
by direct contact or via fomites

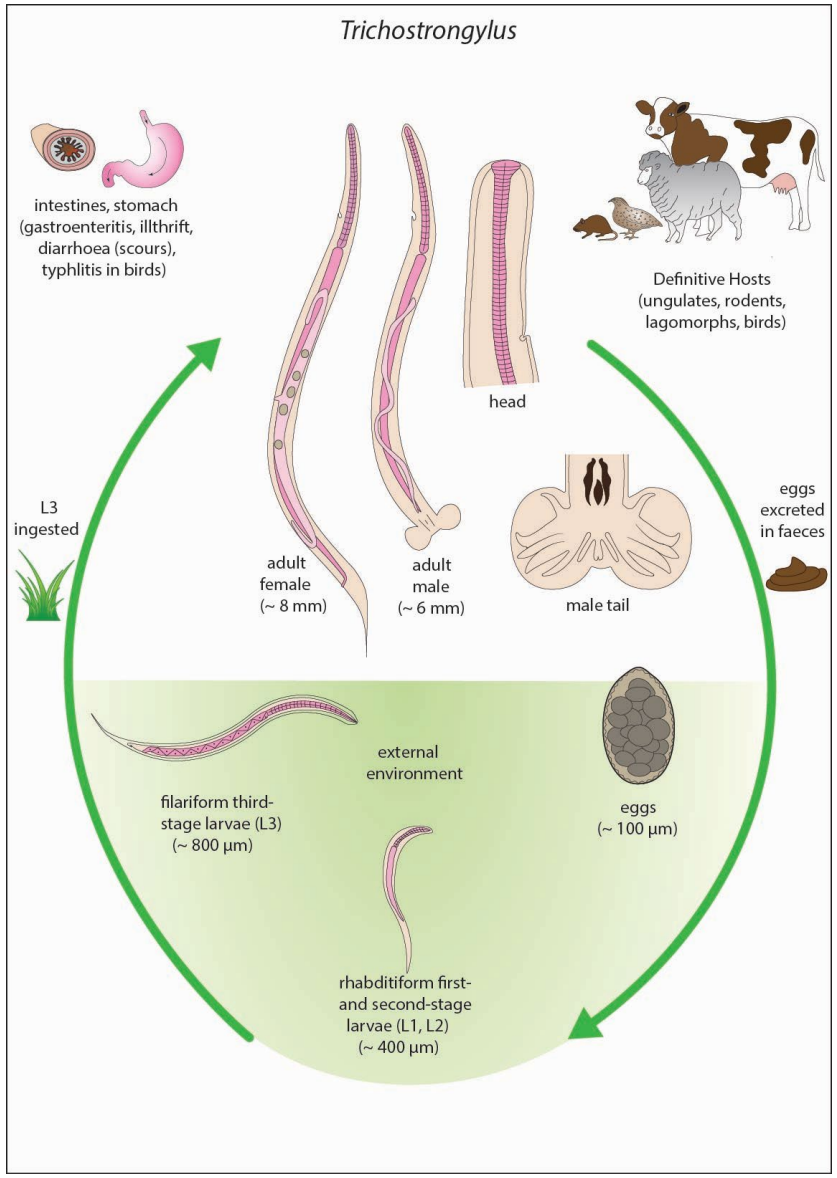


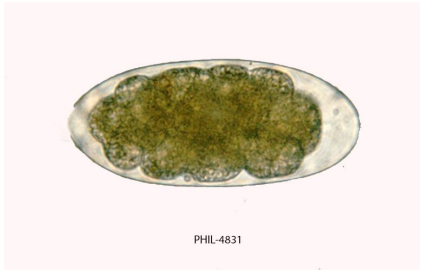

Trichodina
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
most epizoic (skin, gills)
(irritation, lesions, ulkcers)
some endozoic (tubular organs)
(nonpathogenic)
Vertebrate Hosts
(freshwater and
marine fish)
mobile trophont
(10-150 µm)
adoral ciliary
spiral (1-1.5
turns)
macronucleus
micronucleus
ring of
somatic cilia
aboral holdfast organelle
denticle comprising
distal blade, hook-like
centrum & proximal ray
concave discoid
holdfast with
interlocking denticles
subtended by
radial pins
no cyst formation
transmission via free-swimming
trophonts in water column

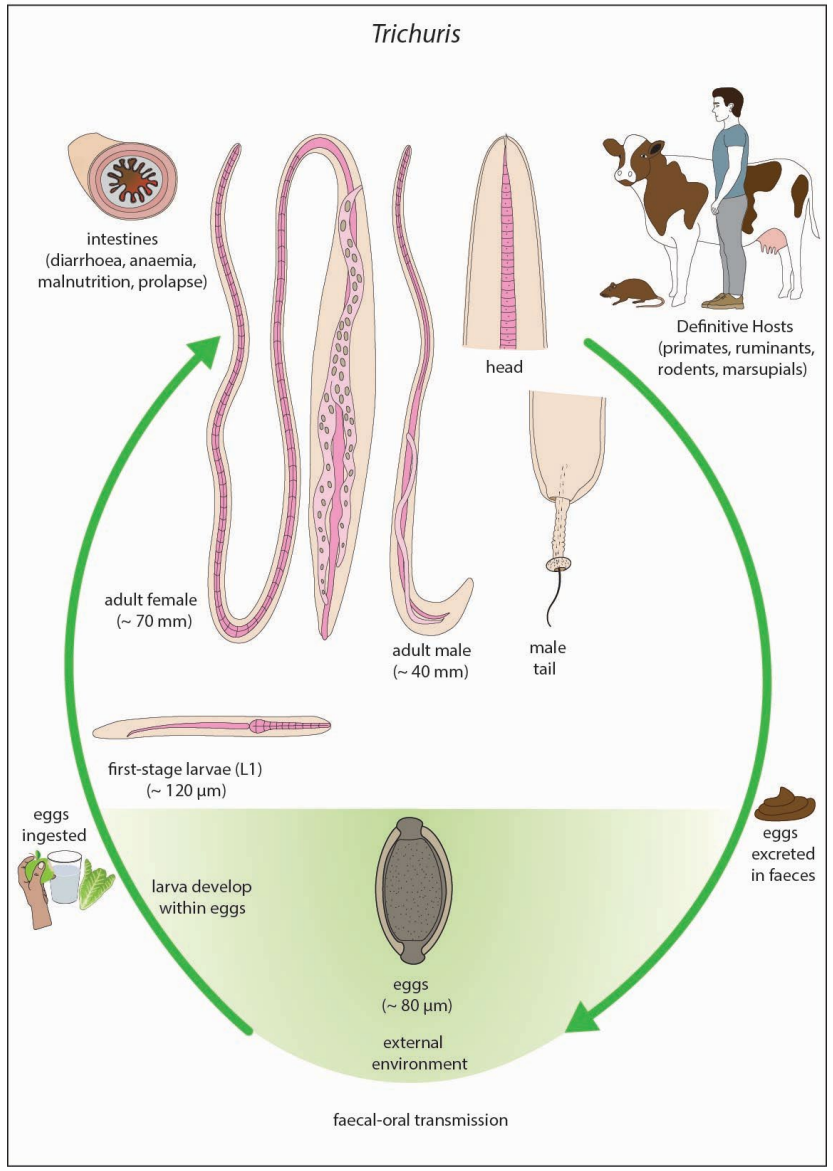

Trichomonas vaginalis
division by
longitudinal
binary fission
urogenital tract
(vaginitis, urethritis,
endometritis,
infertility?)
Vertebrate Hosts
(humans)
5 flagella
(4 anterior,
1 recurrent)
undulating
membrane
parabasal body
next to nucleus
axostyle
trophozoites
(7-32 µm)
no cyst formation
direct transmission by transfer of trophozoites
during coitus, occasionally via contaminated fomites,
or during parturition

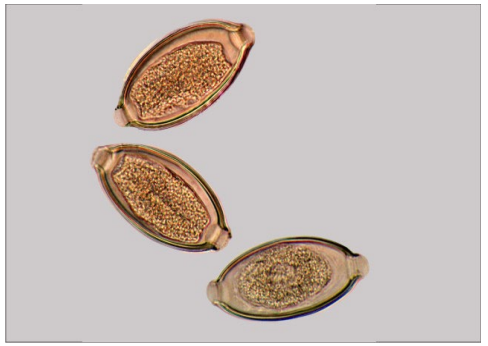


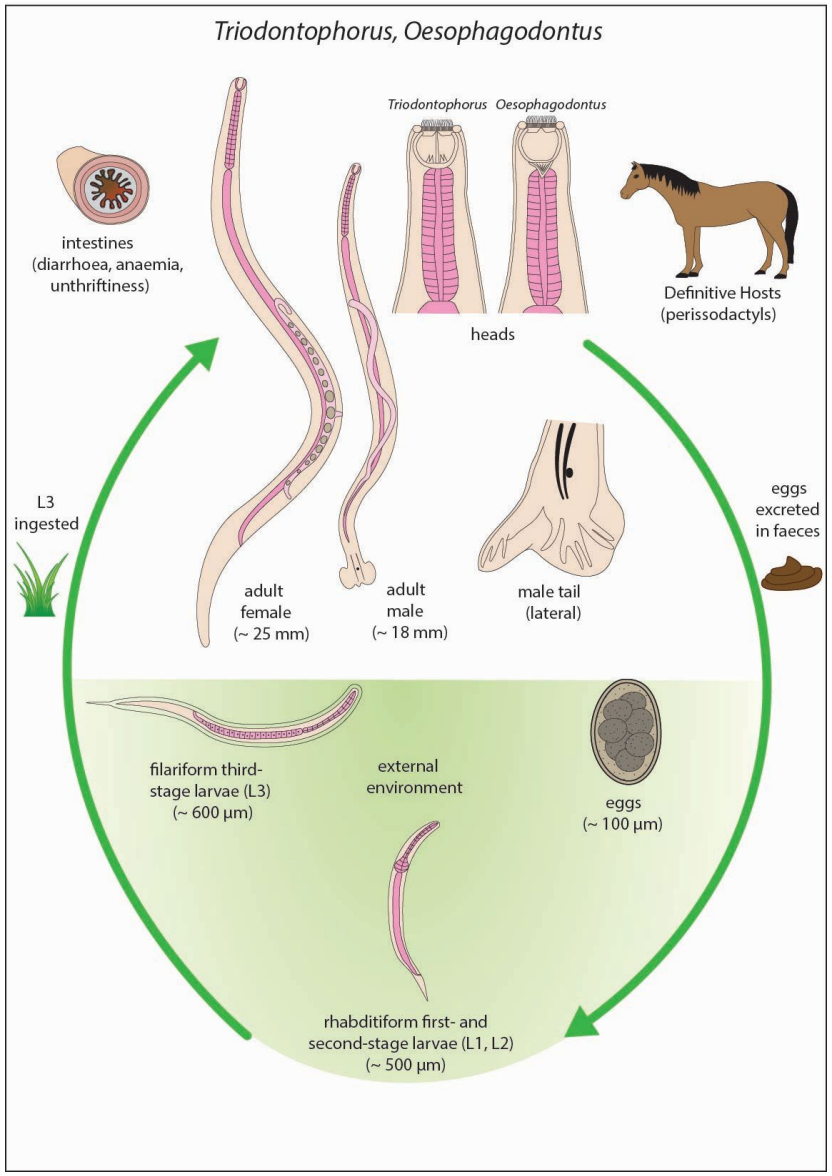


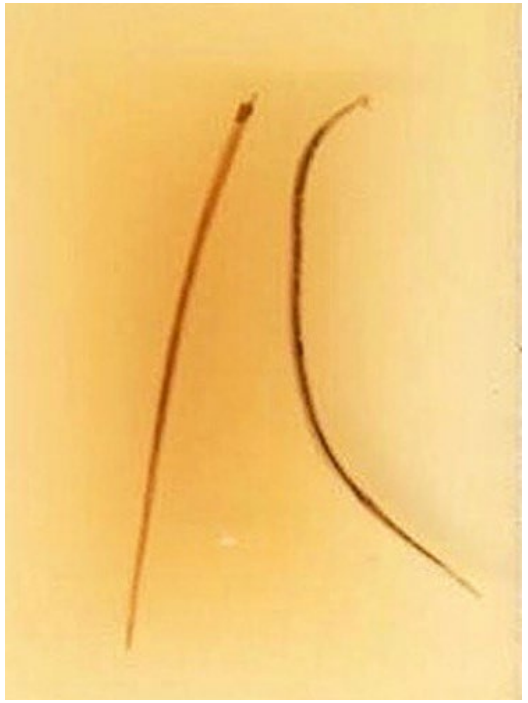

Trichostrongylus
intestines, stomach
(gastroenteritis, illthrift,
diarrhoea (scours),
typhlitis in birds)
Definitive Hosts
(ungulates, rodents,
lagomorphs, birds)
head
L3
ingested
adult
female
(~ 8 mm)
adult
male
(~ 6 mm)
male tail
eggs
excreted
in faeces
external
environment
filariform third-
stage larvae (L3)
(~ 800 µm)
eggs
(~ 100 µm)
rhabditiform first-
and second-stage
larvae (L1, L2)
(~ 400 µm)

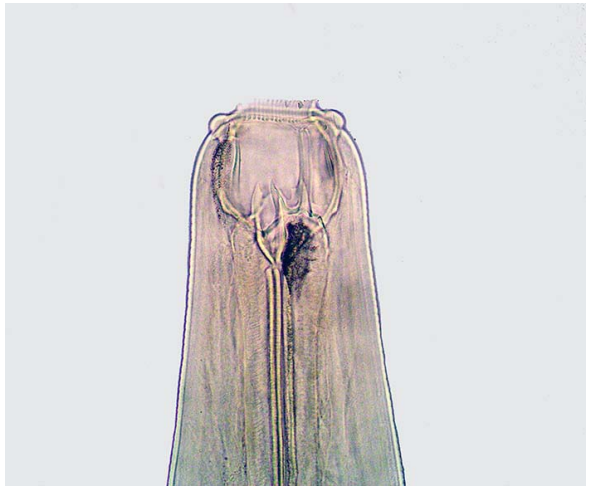

PHIL-4831

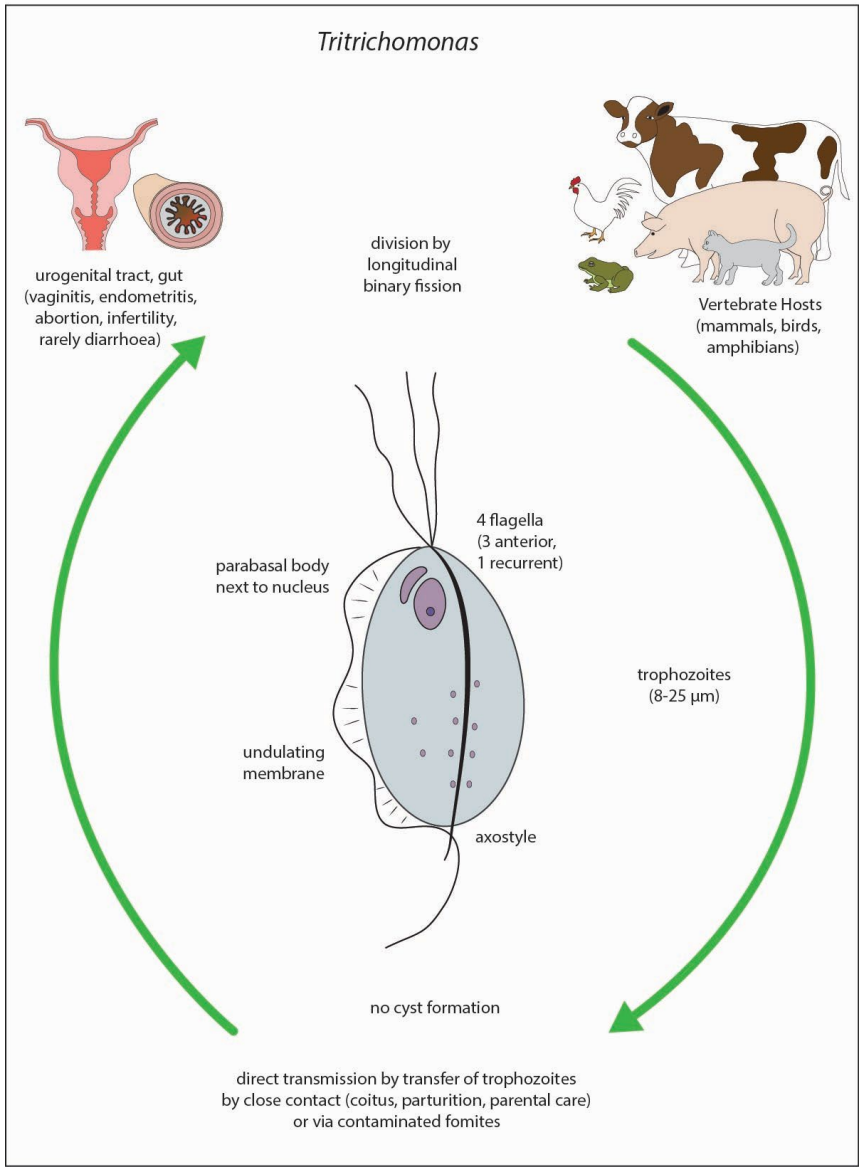

Trichuris
intestines
(diarrhoea, anaemia,
malnutrition, prolapse)
head
Definitive Hosts
(primates, ruminants,
rodents, marsupials)
adult female
(~ 70 mm)
adult male
(~ 40 mm)
male
tail
first-stage larvae (L1)
(~ 120 µm)
eggs
ingested
larva develop
within eggs
eggs
excreted
in faeces
eggs
(~ 80 µm)
external
environment
faecal-oral transmission

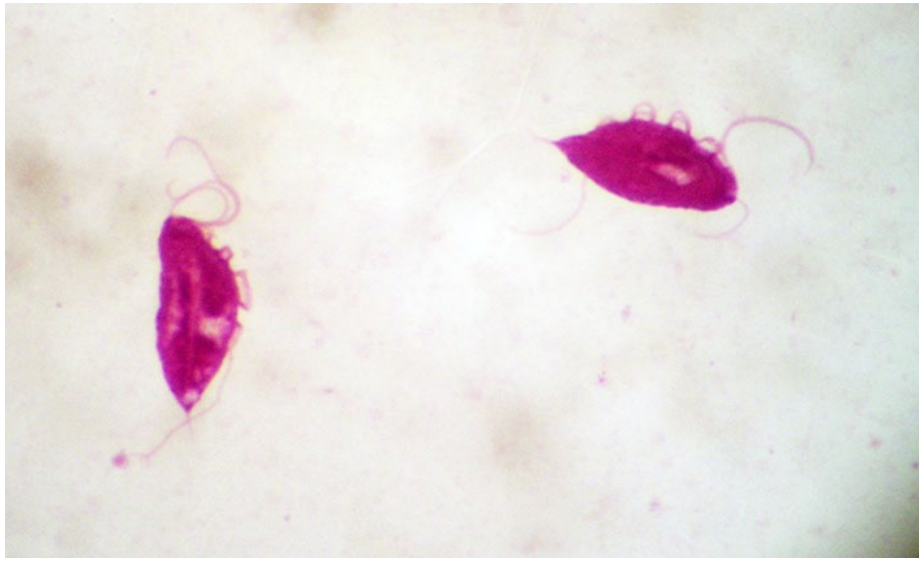


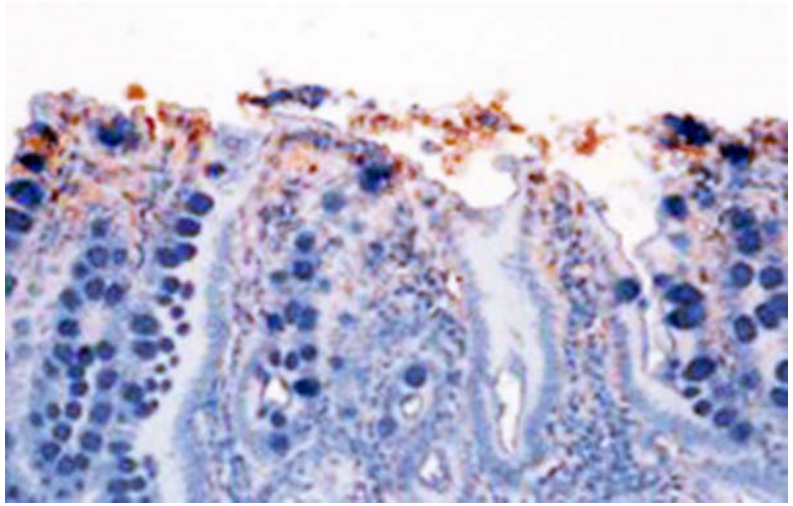

Triodontophorus, Oesophagodontus
Triodontophorus
Oesophagodontus
intestines
(diarrhoea, anaemia,
unthriftiness)
Definitive Hosts
(perissodactyls)
heads
L3
ingested
eggs
excreted
in faeces
adult
female
(~ 25 mm)
adult
male
(~ 18 mm)
male tail
(lateral)
filariform third-
stage larvae (L3)
(~ 600 µm)
external
environment
eggs
(~ 100 µm)
rhabditiform first- and
second-stage larvae (L1, L2)
(~ 500 µm)

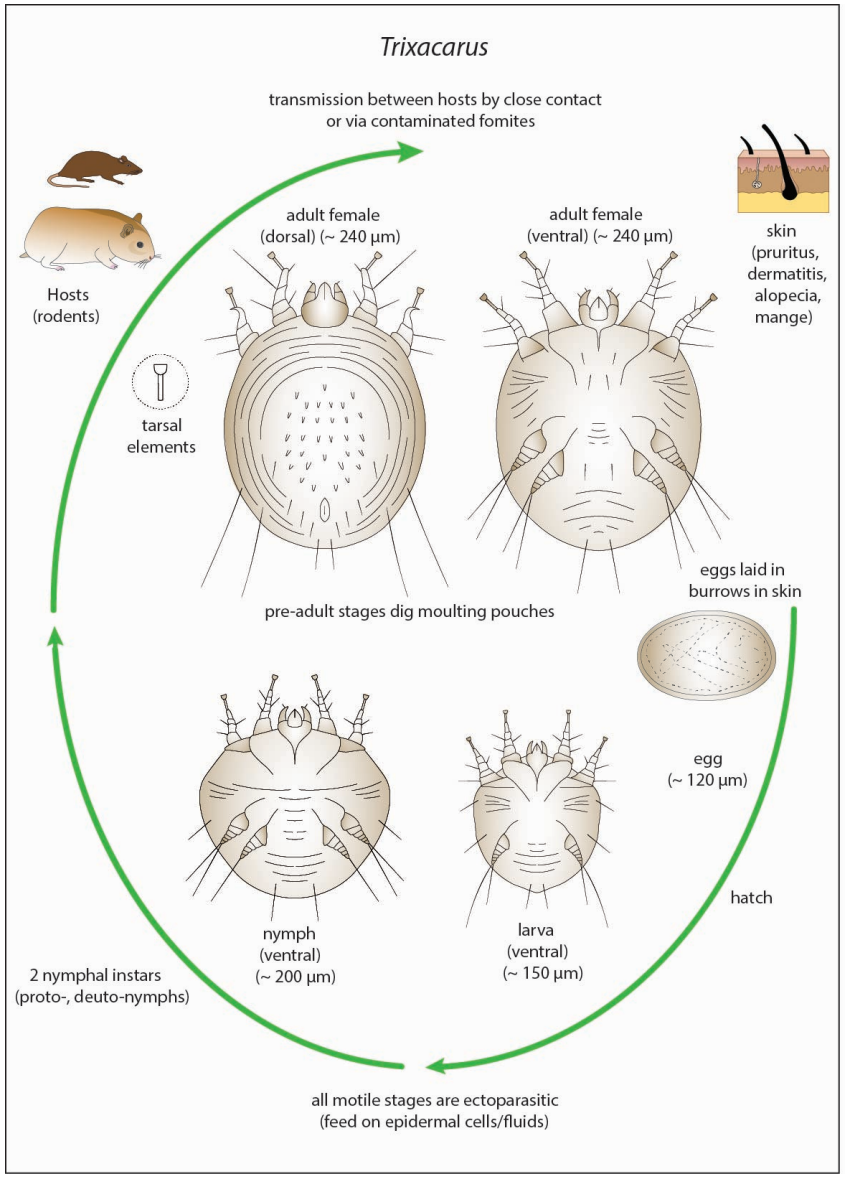


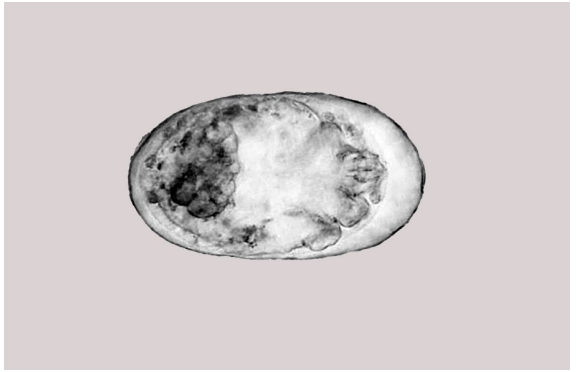


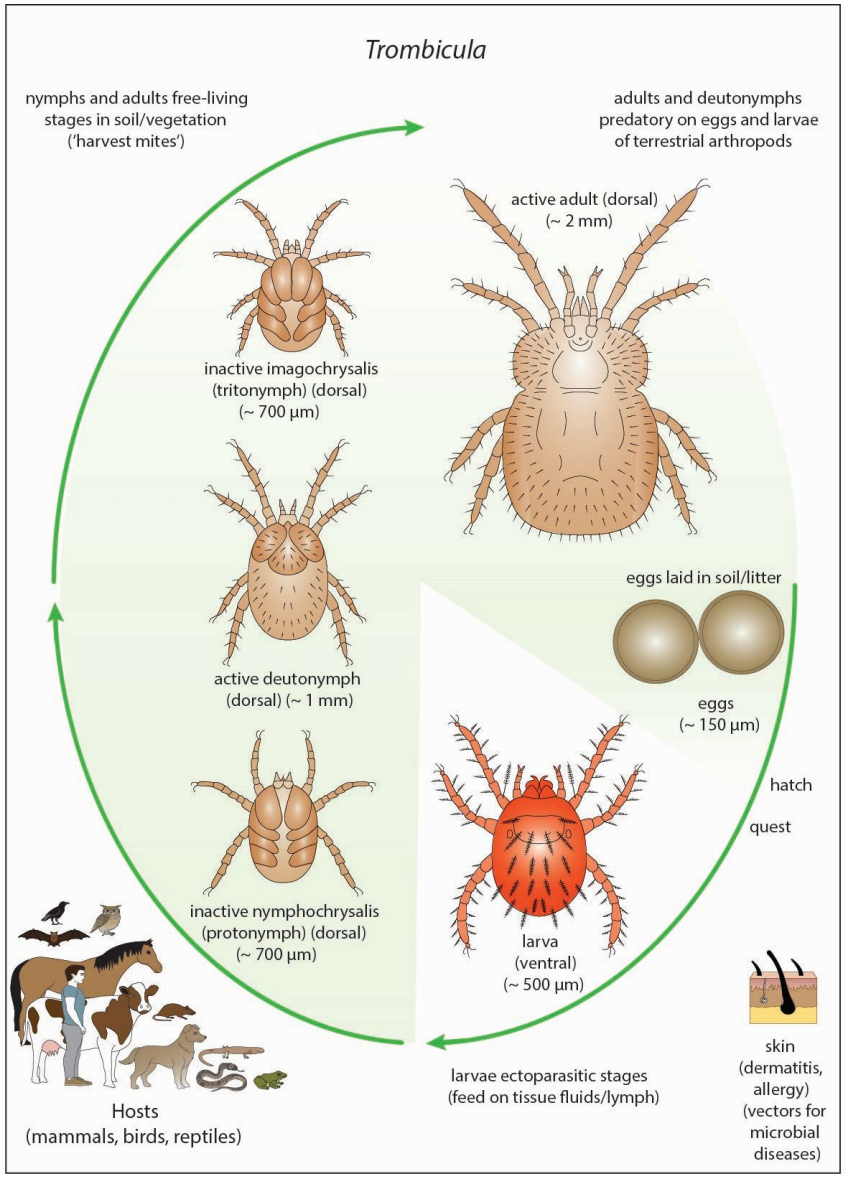

Tritrichomonas
urogenital tract, gut
(vaginitis, endometritis,
abortion, infertility,
rarely diarrhoea)
division by
longitudinal
binary fission
Vertebrate Hosts
(mammals, birds,
amphibians)
4 flagella
(3 anterior,
1 recurrent)
parabasal body
next to nucleus
trophozoites
(8-25 µm)
undulating
membrane
axostyle
no cyst formation
direct transmission by transfer of trophozoites
by close contact (coitus, parturition, parental care)
or via contaminated fomites

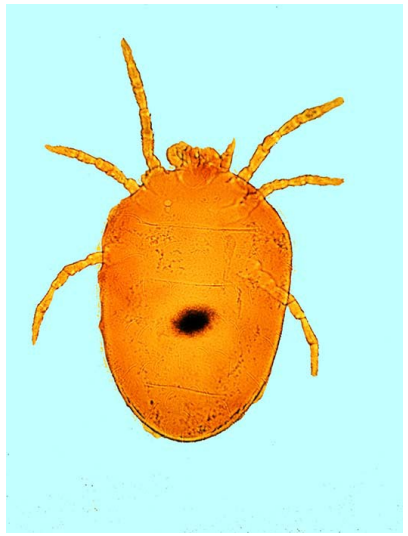


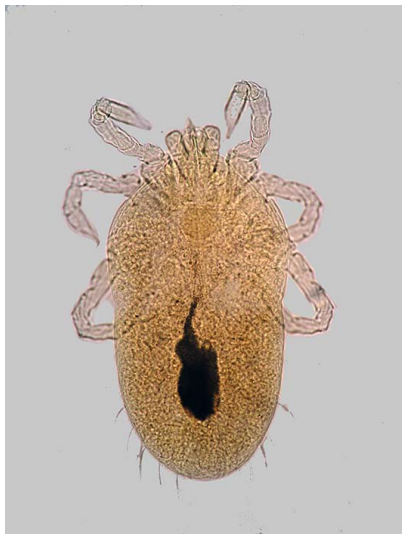


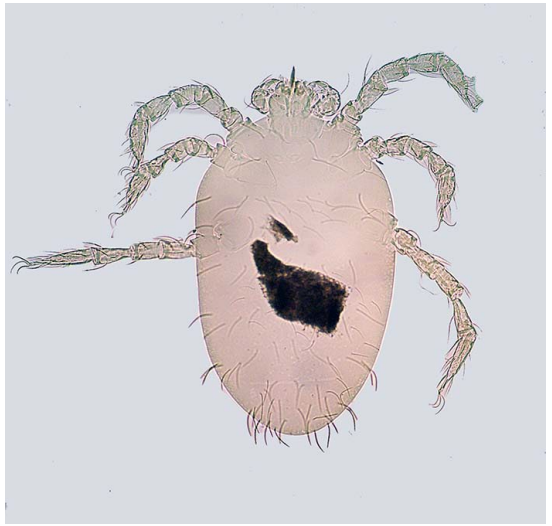

Trixacarus
transmission between hosts by close contact
or via contaminated fomites
Hosts
(rodents)
adult female
(dorsal) (~ 240 µm)
adult female
(ventral) (~ 240 µm)
skin
(pruritus,
dermatitis,
alopecia,
mange)
tarsal
elements
eggs laid in
burrows in skin
pre-adult stages dig moulting pouches
egg
(~ 120 µm)
hatch
nymph
(ventral)
(~ 200 µm)
larva
(ventral)
(~ 150 µm)
2 nymphal instars
(proto-, deuto-nymphs)
all motile stages are ectoparasitic
(feed on epidermal cells/fluids)

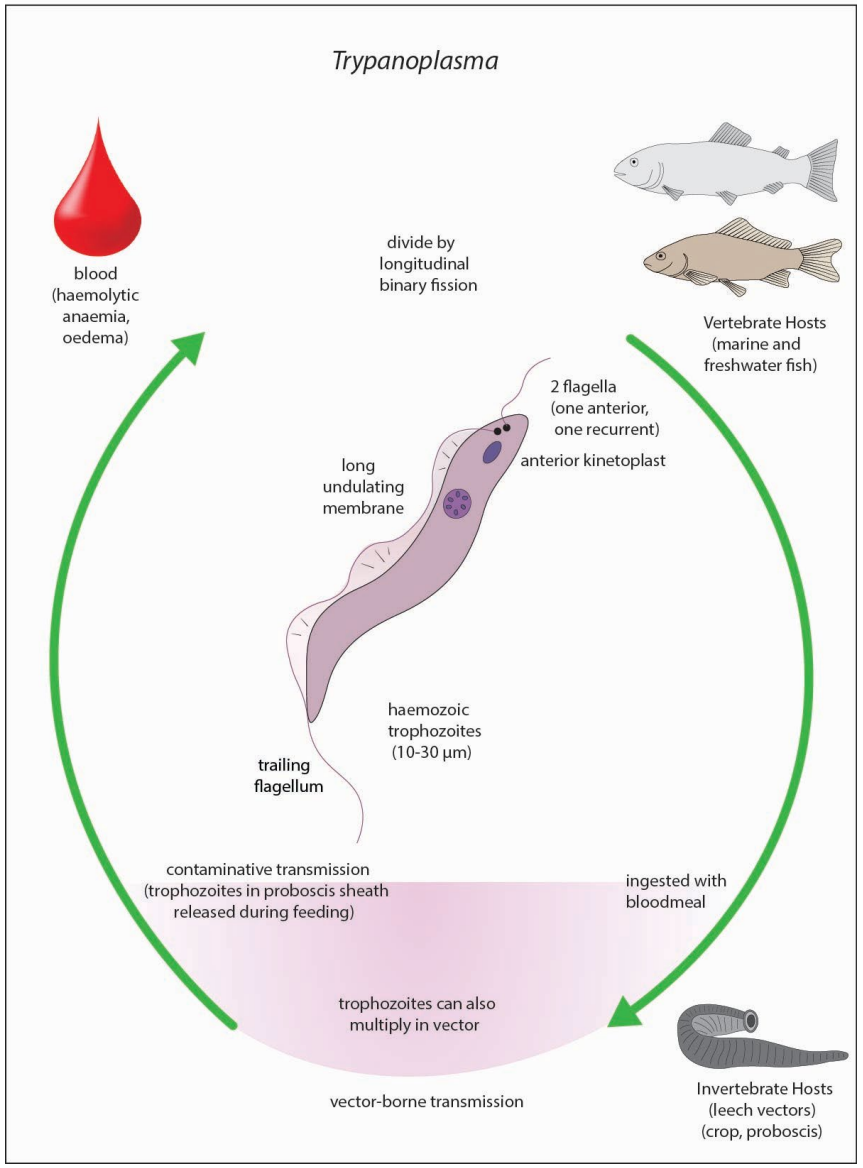


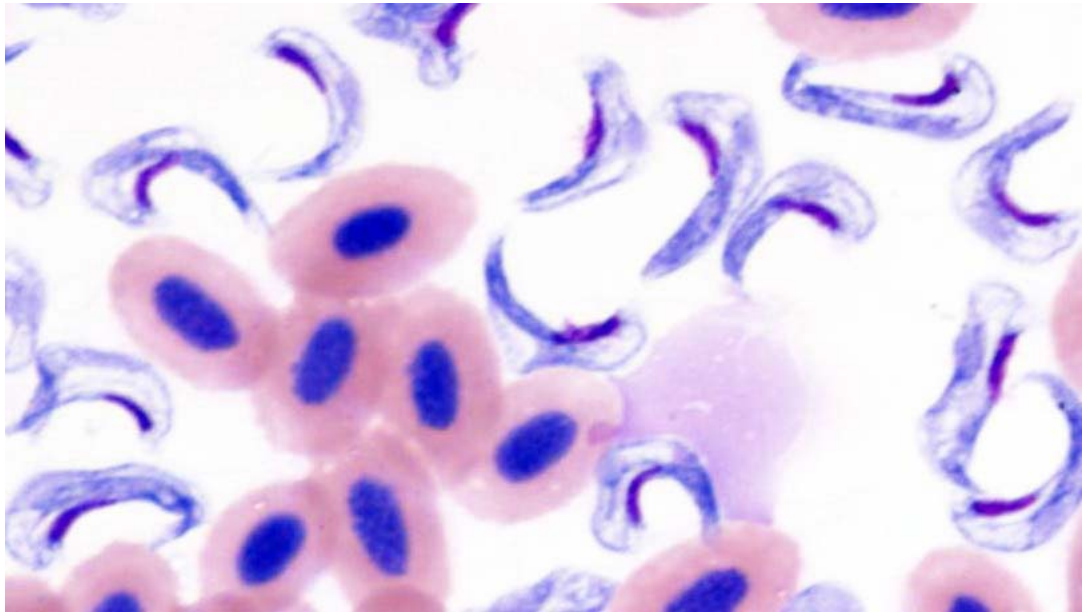

Trombicula
nymphs and adults free-living stages in soil/vegetation ('harvest mites')
adults and deutonymphs predatory on eggs and larvae of terrestrial arthropods
active adult (dorsal) (~ 2 mm)
inactive imagochrysalis (tritonymph) (dorsal) (~ 700 µm)
active deutonymph (dorsal) (~ 1 mm)
eggs laid in soil/litter
eggs (~ 150 µm)
hatch
quest
inactive nymphochrysalis (protonymph) (dorsal) (~ 700 µm)
larva (ventral) (~ 500 µm)
skin (dermatitis, allergy) (vectors for microbial diseases)
larvae ectoparasitic stages (feed on tissue fluids/lymph)
Hosts (mammals, birds, reptiles)

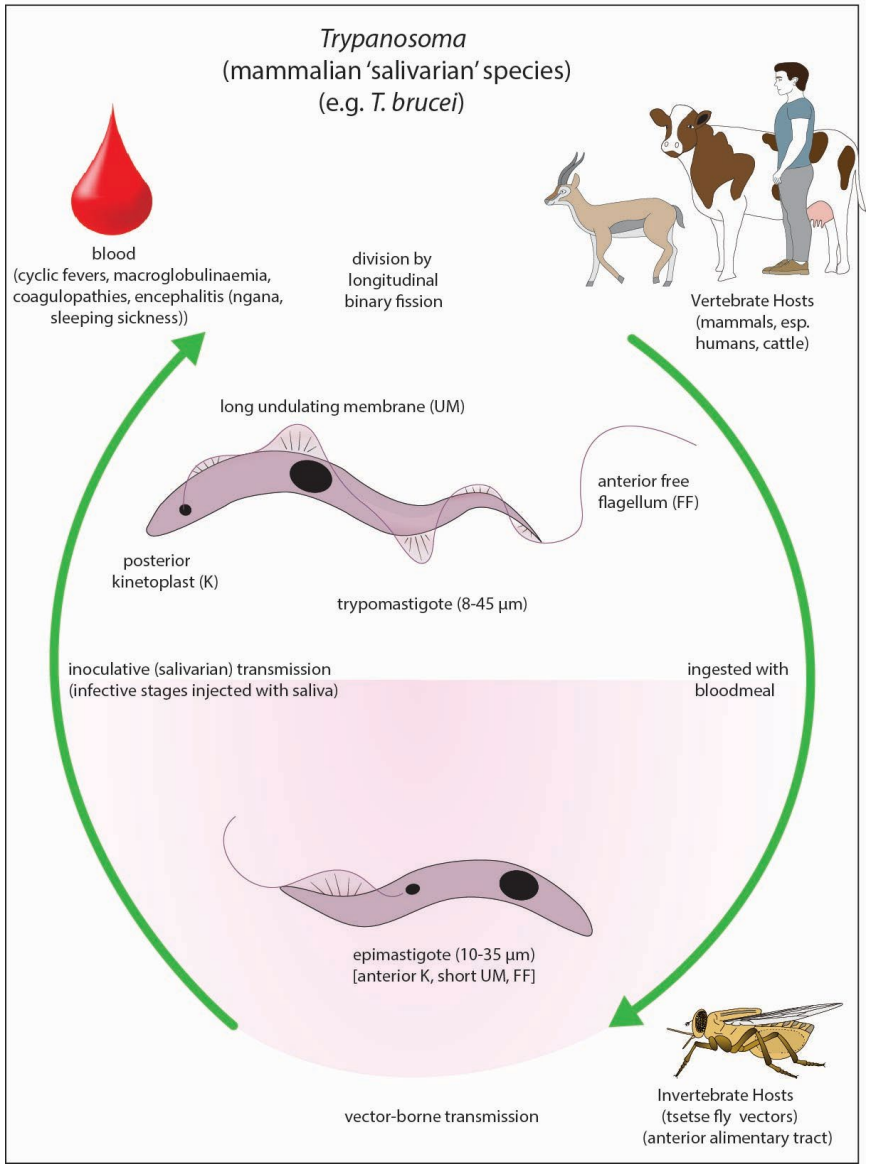


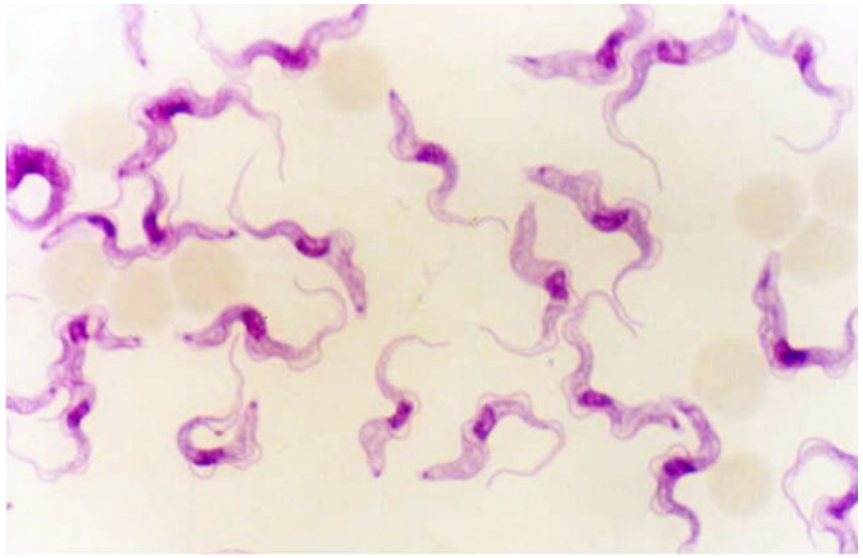


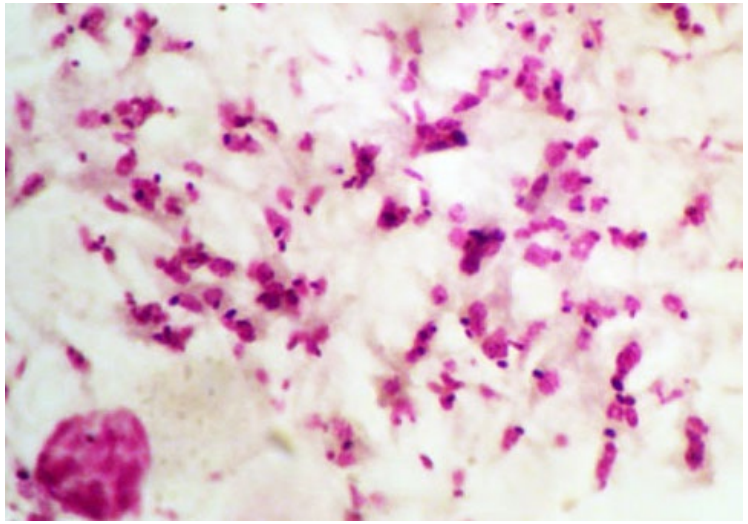


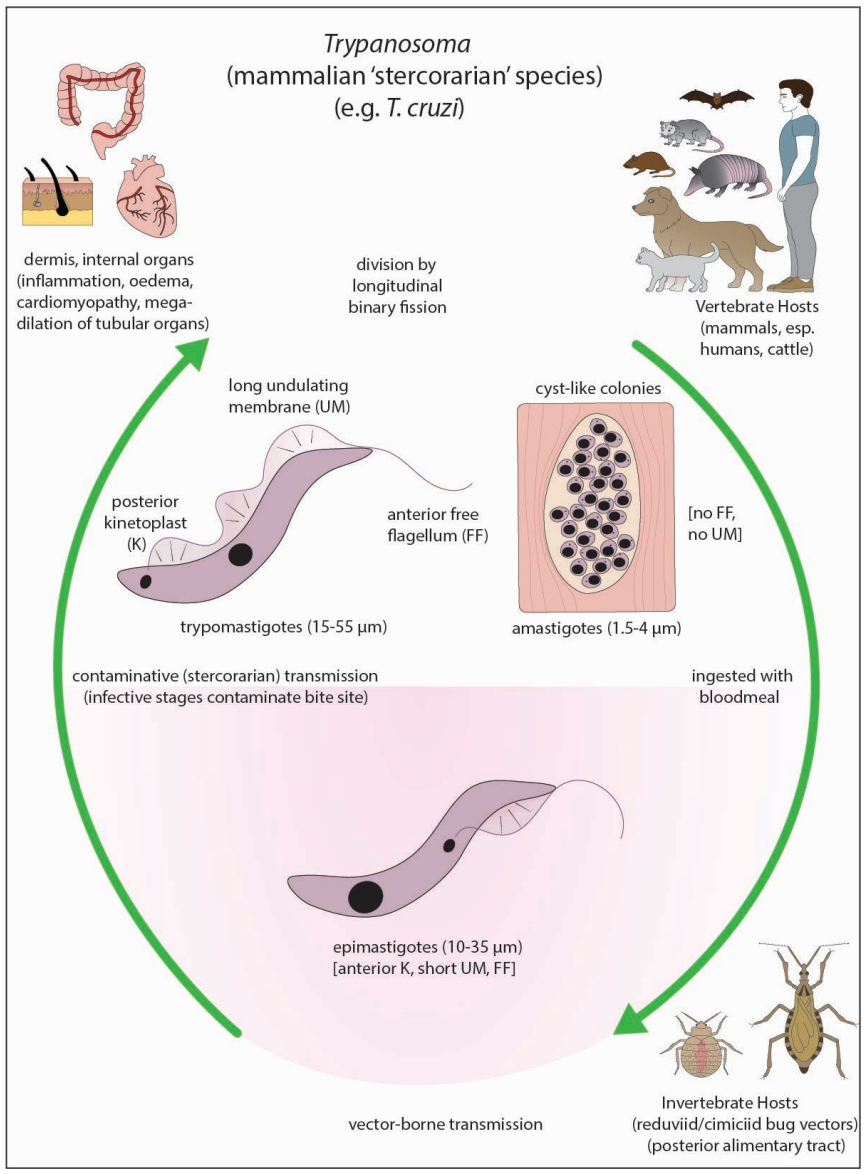

Trypanoplasma
blood
(haemolytic
anaemia,
oedema)
divide by
longitudinal
binary fission
Vertebrate Hosts
(marine and
freshwater fish)
2 flagella
(one anterior,
one recurrent)
anterior kinetoplast
long
undulating
membrane
haemozoic
trophozoites
(10-30 µm)
trailing
flagellum
contaminative transmission
(trophozoites in proboscis sheath
released during feeding)
ingested with
bloodmeal
trophozoites can also
multiply in vector
vector-borne transmission
Invertebrate Hosts
(leech vectors)
(crop, proboscis)

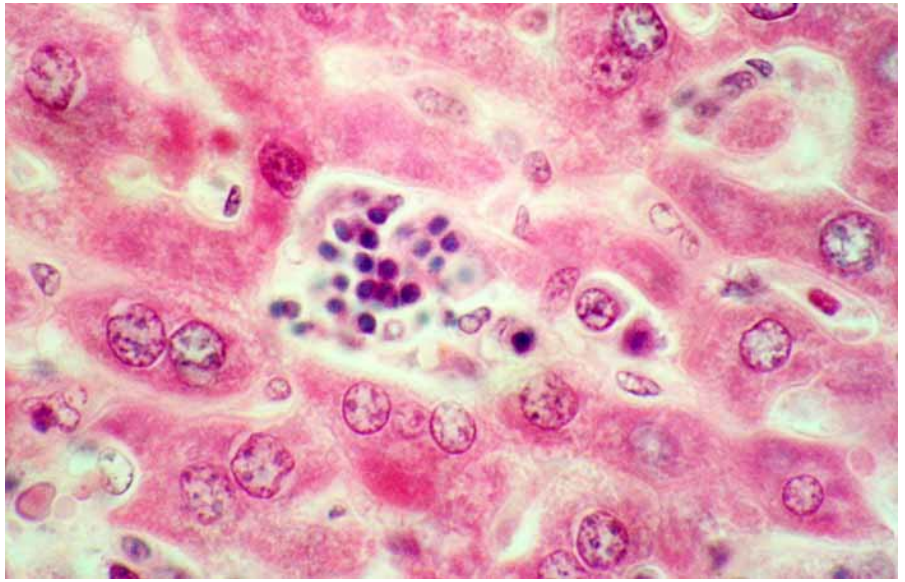


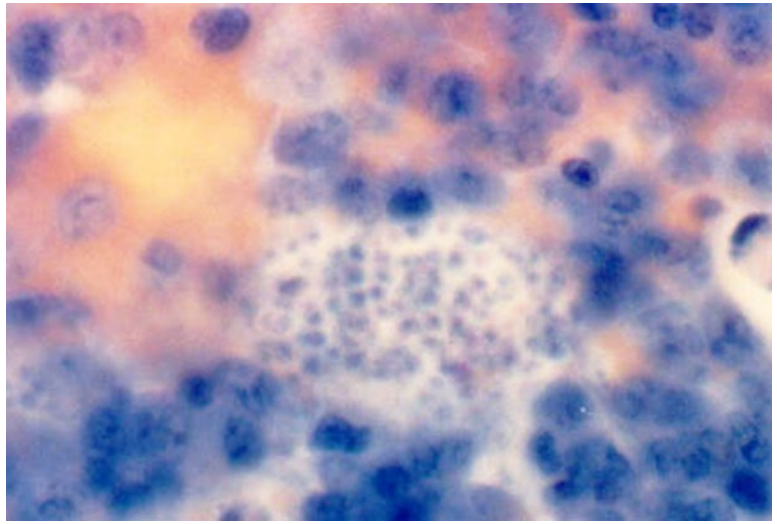

Trypanosoma
(mammalian 'salivarian' species)
(e.g. *T. brucei*)
blood
(cyclic fevers, macroglobulinaemia, coagulopathies, encephalitis (ngana, sleeping sickness))
division by longitudinal binary fission
Vertebrate Hosts
(mammals, esp. humans, cattle)
long undulating membrane (UM)
anterior free flagellum (FF)
posterior kinetoplast (K)
trypomastigote (8-45 µm)
inoculative (salivarian) transmission
(infective stages injected with saliva)
ingested with bloodmeal
epimastigote (10-35 µm)
[anterior K, short UM, FF]
vector-borne transmission
Invertebrate Hosts
(tsetse fly vectors)
(anterior alimentary tract)

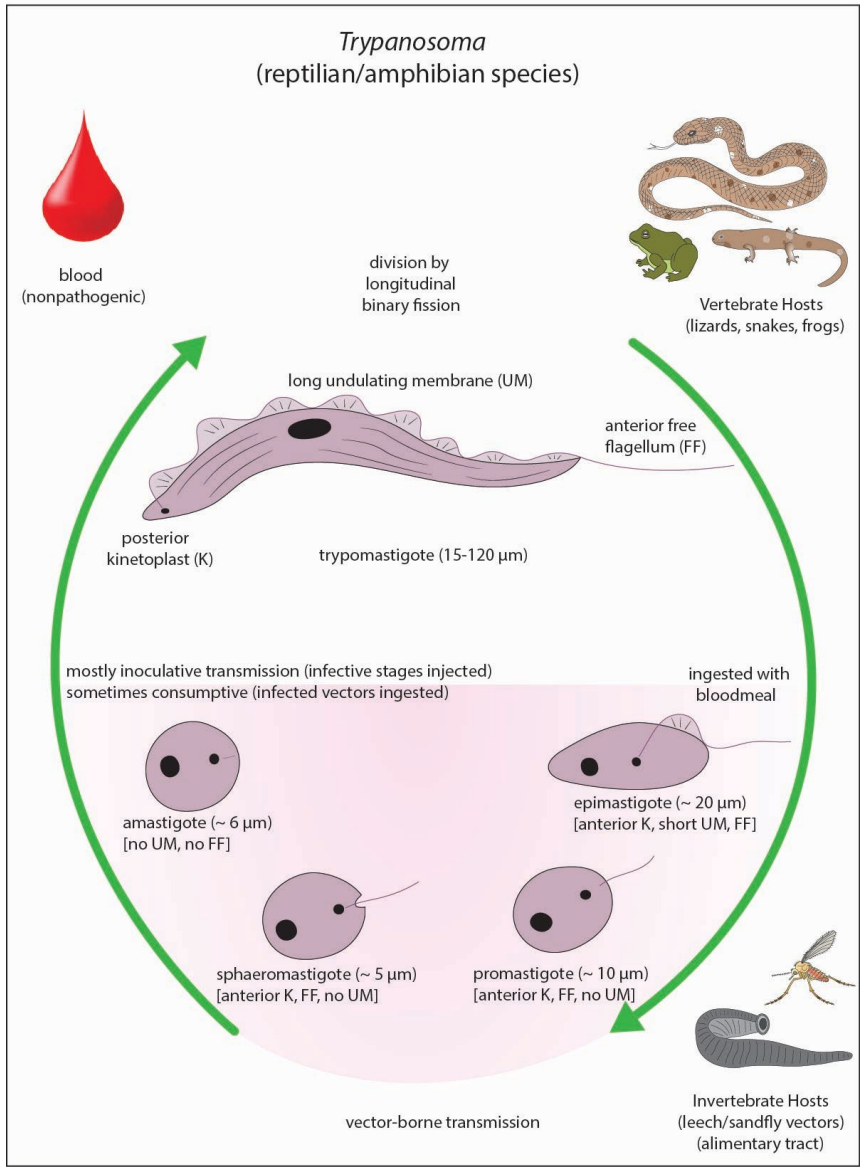


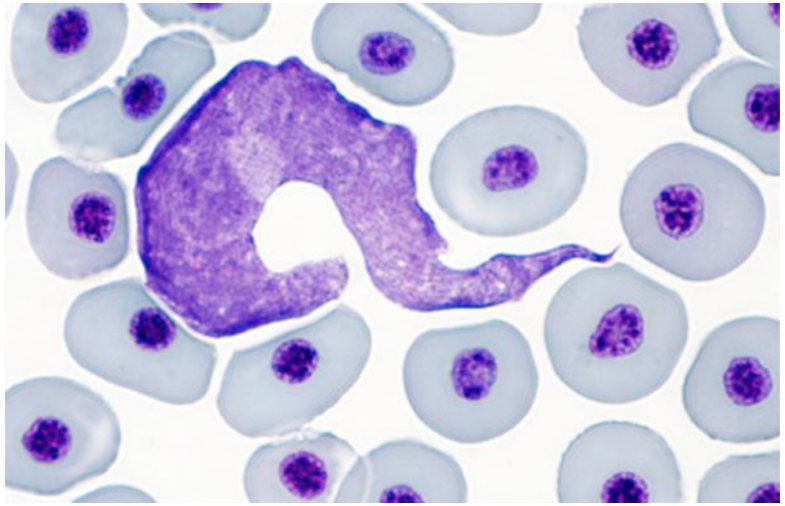


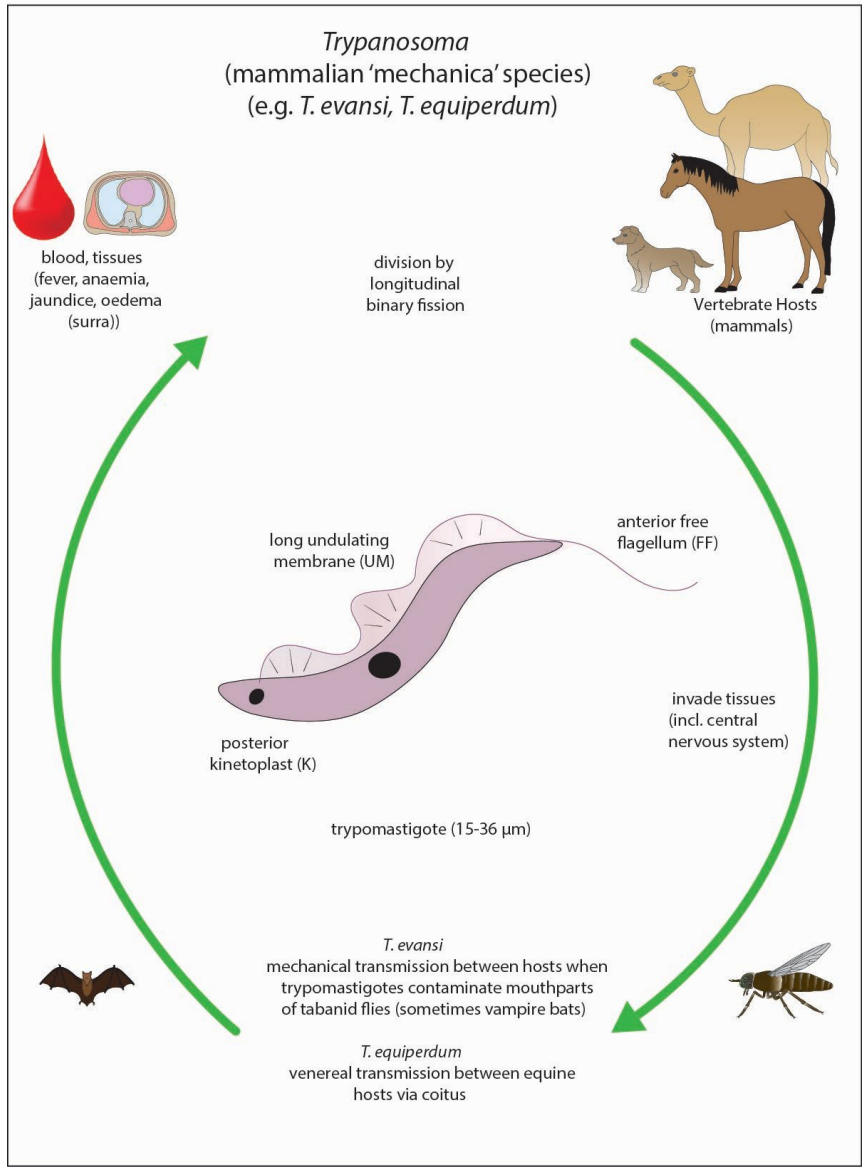

Trypanosoma
(mammalian 'stercorarian' species)
(e.g. *T. cruzi*)
dermis, internal organs
(inflammation, oedema,
cardiomyopathy, mega-
dilation of tubular organs)
division by
longitudinal
binary fission
Vertebrate Hosts
(mammals, esp.
humans, cattle)
long undulating
membrane (UM)
cyst-like colonies
posterior
kinetoplast
(K)
anterior free
flagellum (FF)
[no FF,
no UM]
trypomastigotes (15-55 µm)
amastigotes (1.5-4 µm)
contaminative (stercorarian) transmission
(infective stages contaminate bite site)
ingested with
bloodmeal
epimastigotes (10-35 µm)
[anterior K, short UM, FF]
vector-borne transmission
Invertebrate Hosts
(reduviid/cimiciid bug vectors)
(posterior alimentary tract)

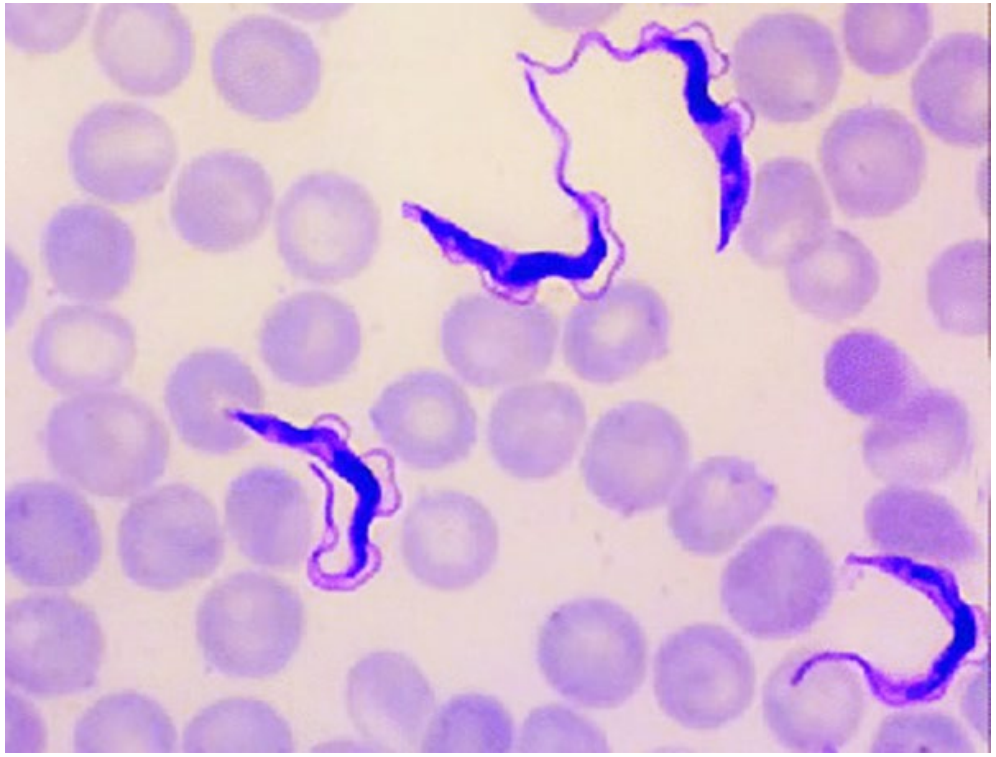


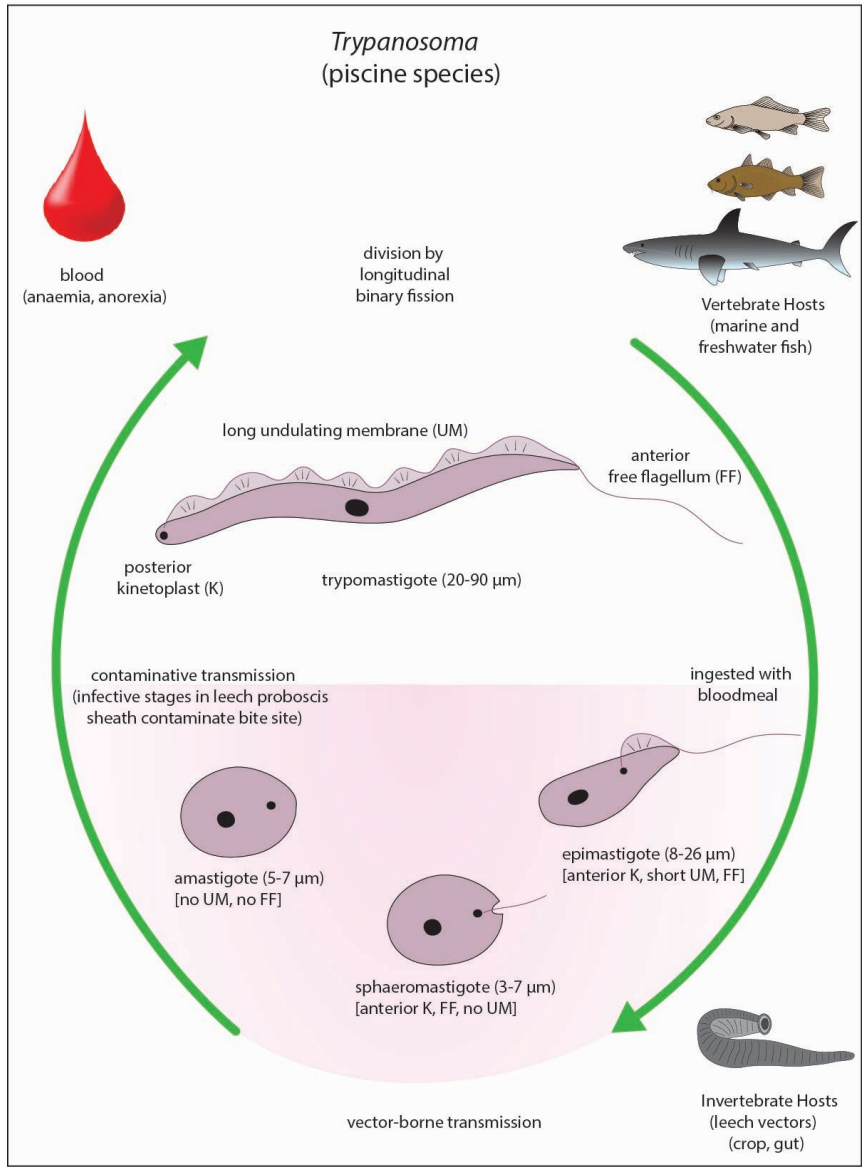


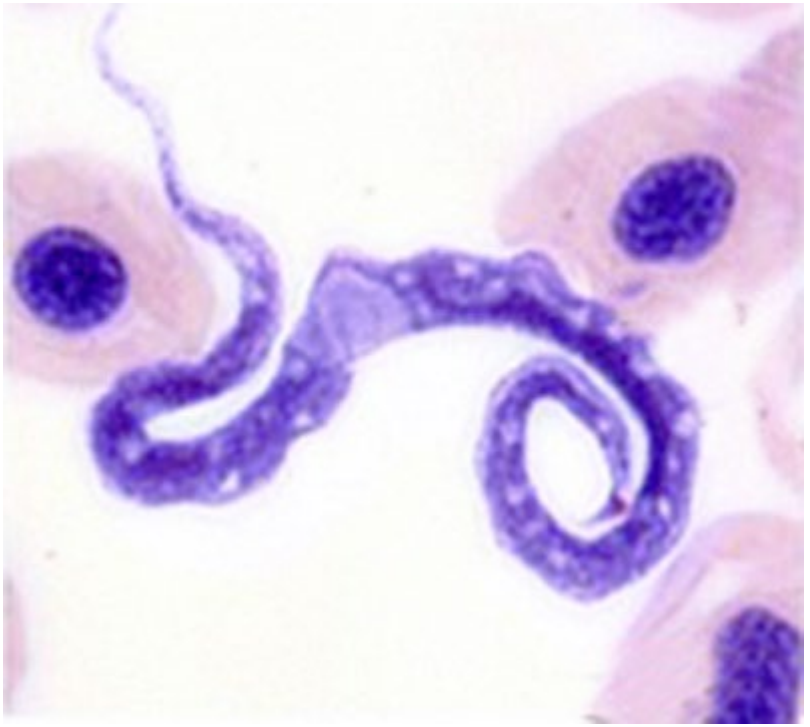

Trypanosoma
(reptilian/amphibian species)
blood
(nonpathogenic)
division by
longitudinal
binary fission
Vertebrate Hosts
(lizards, snakes, frogs)
long undulating membrane (UM)
anterior free
flagellum (FF)
posterior
kinetoplast (K)
trypomastigote (15-120 µm)
mostly inoculative transmission (infective stages injected)
sometimes consumptive (infected vectors ingested)
ingested with
bloodmeal
amastigote (~ 6 µm)
[no UM, no FF]
epimastigote (~ 20 µm)
[anterior K, short UM, FF]
sphaeromastigote (~ 5 µm)
[anterior K, FF, no UM]
promastigote (~ 10 µm)
[anterior K, FF, no UM]
vector-borne transmission
Invertebrate Hosts
(leech/sandfly vectors)
(alimentary tract)

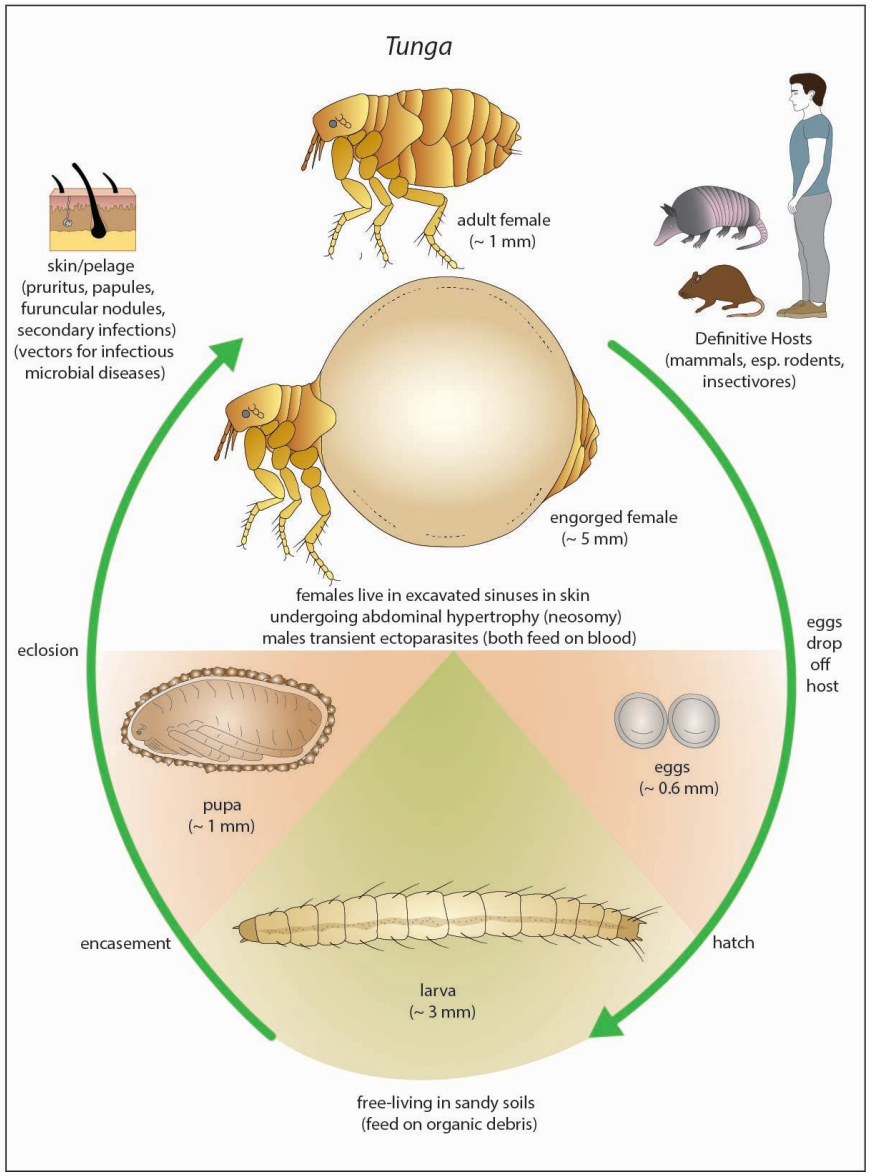


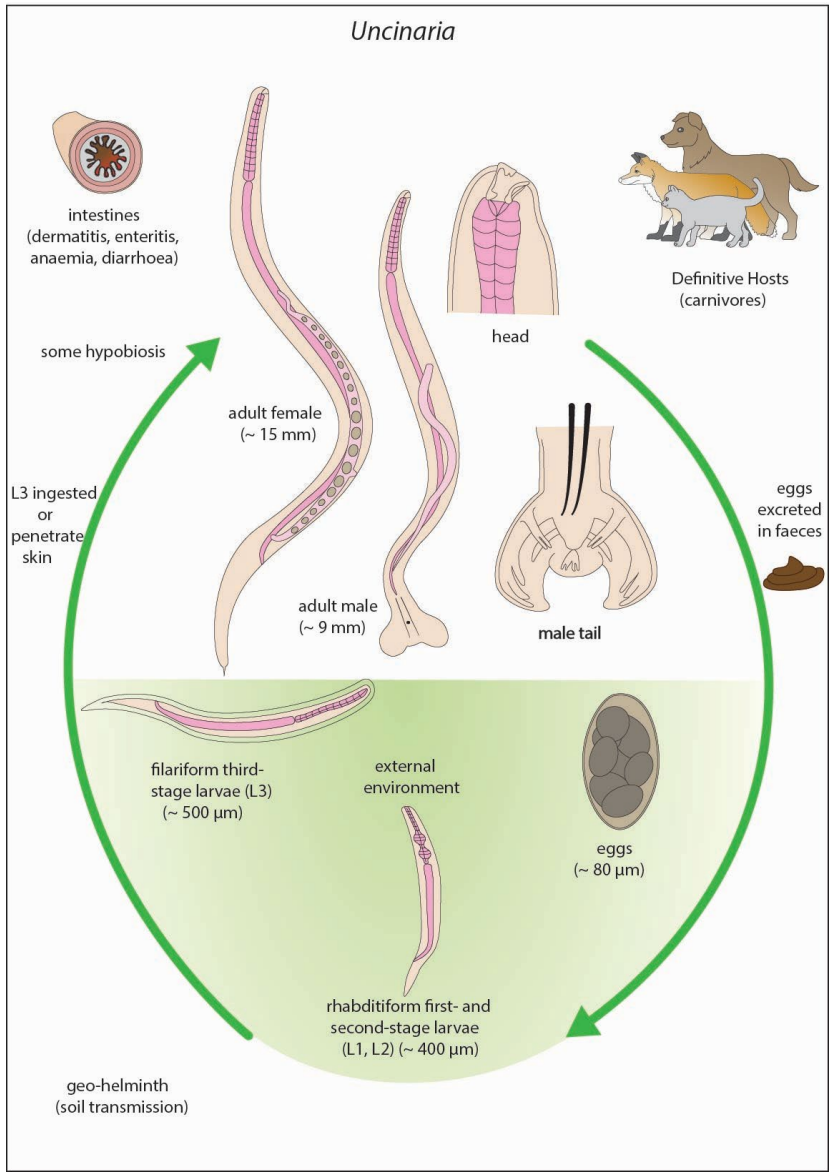

Trypanosoma
(mammalian 'mechanica' species)
(e.g. *T. evansi, T. equiperdum*)
blood, tissues
(fever, anaemia,
jaundice, oedema
(surra))
division by
longitudinal
binary fission
Vertebrate Hosts
(mammals)
long undulating
membrane (UM)
anterior free
flagellum (FF)
posterior
kinetoplast (K)
invade tissues
(incl. central
nervous system)
trypomastigote (15-36 µm)
T. evansi
mechanical transmission between hosts when
trypomastigotes contaminate mouthparts
of tabanid flies (sometimes vampire bats)
T. equiperdum
venereal transmission between equine
hosts via coitus

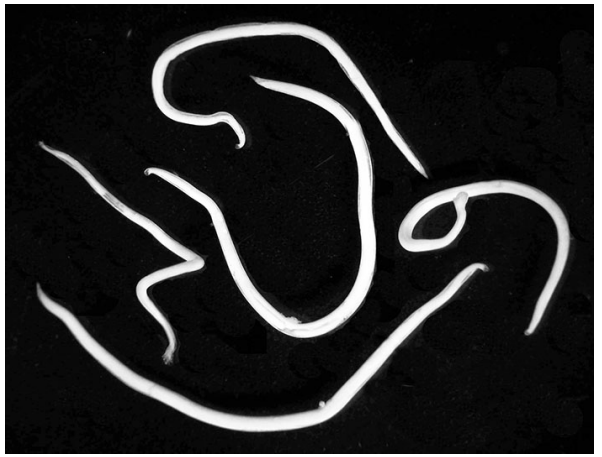


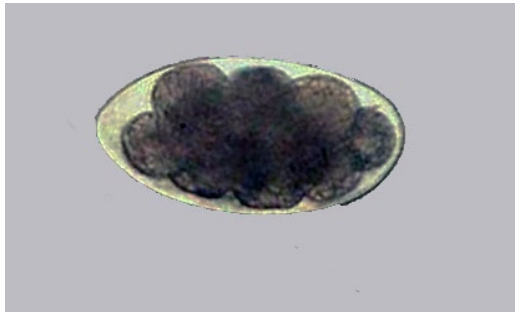

Trypanosoma
(piscine species)
blood
(anaemia, anorexia)
division by
longitudinal
binary fission
Vertebrate Hosts
(marine and
freshwater fish)
long undulating membrane (UM)
anterior
free flagellum (FF)
posterior
kinetoplast (K)
trypomastigote (20-90 µm)
contaminative transmission
(infective stages in leech proboscis
sheath contaminate bite site)
ingested with
bloodmeal
amastigote (5-7 µm)
[no UM, no FF]
epimastigote (8-26 µm)
[anterior K, short UM, FF]
sphaeromastigote (3-7 µm)
[anterior K, FF, no UM]
vector-borne transmission
Invertebrate Hosts
(leech vectors)
(crop, gut)

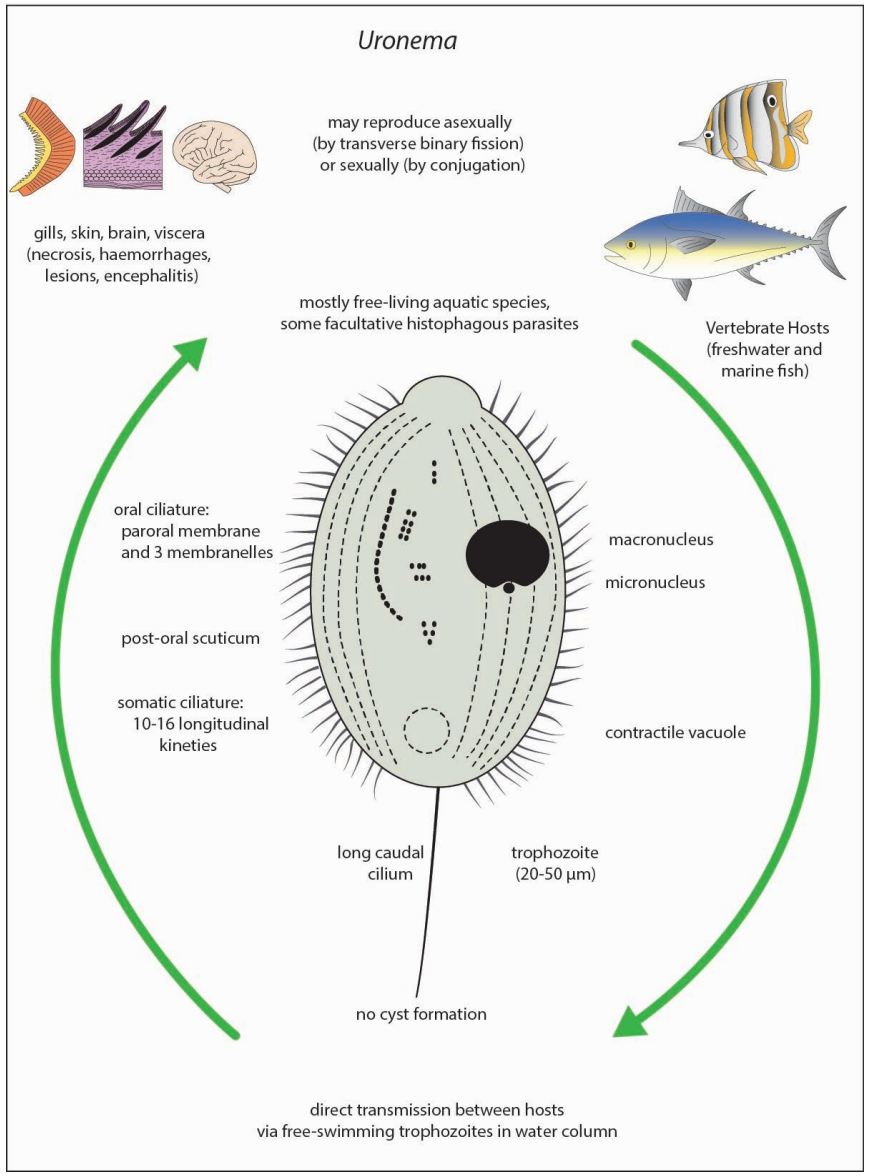


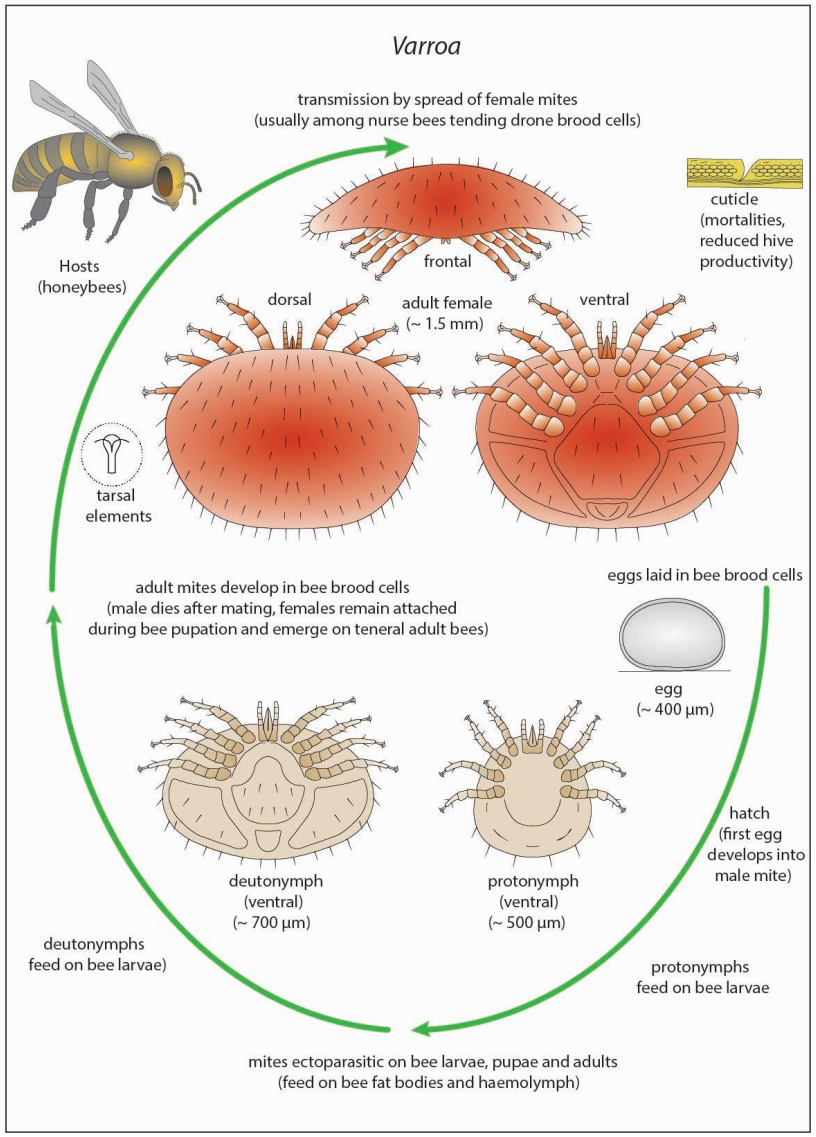

Tunga
adult female
(~ 1 mm)
skin/pelage
(pruritus, papules,
furuncular nodules,
secondary infections)
(vectors for infectious
microbial diseases)
Definitive Hosts
(mammals, esp. rodents,
insectivores)
engorged female
(~ 5 mm)
females live in excavated sinuses in skin
undergoing abdominal hypertrophy (neosomy)
males transient ectoparasites (both feed on blood)
eclosion
eggs
drop
off
host
pupa
(~ 1 mm)
eggs
(~ 0.6 mm)
encasement
hatch
larva
(~ 3 mm)
free-living in sandy soils
(feed on organic debris)

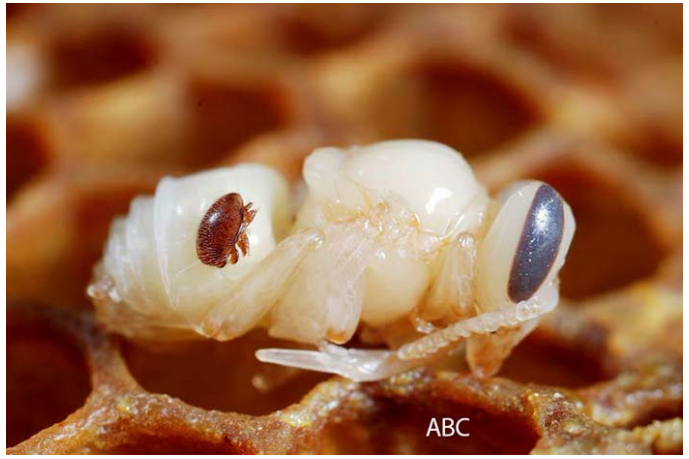

Uncinaria
intestines
(dermatitis, enteritis,
anaemia, diarrhoea)
some hypobiosis
L3 ingested
or
penetrate
skin
adult female
(~ 15 mm)
adult male
(~ 9 mm)
head
male tail
Definitive Hosts
(carnivores)
eggs
excreted
in faeces
filariform third-
stage larvae (L3)
(~ 500 µm)
external
environment
eggs
(~ 80 µm)
rhabditiform first- and
second-stage larvae
(L1, L2) (~ 400 µm)
geo-helminth
(soil transmission)



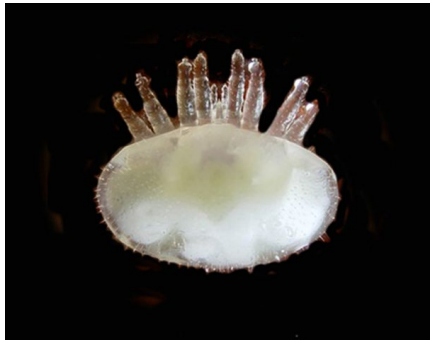


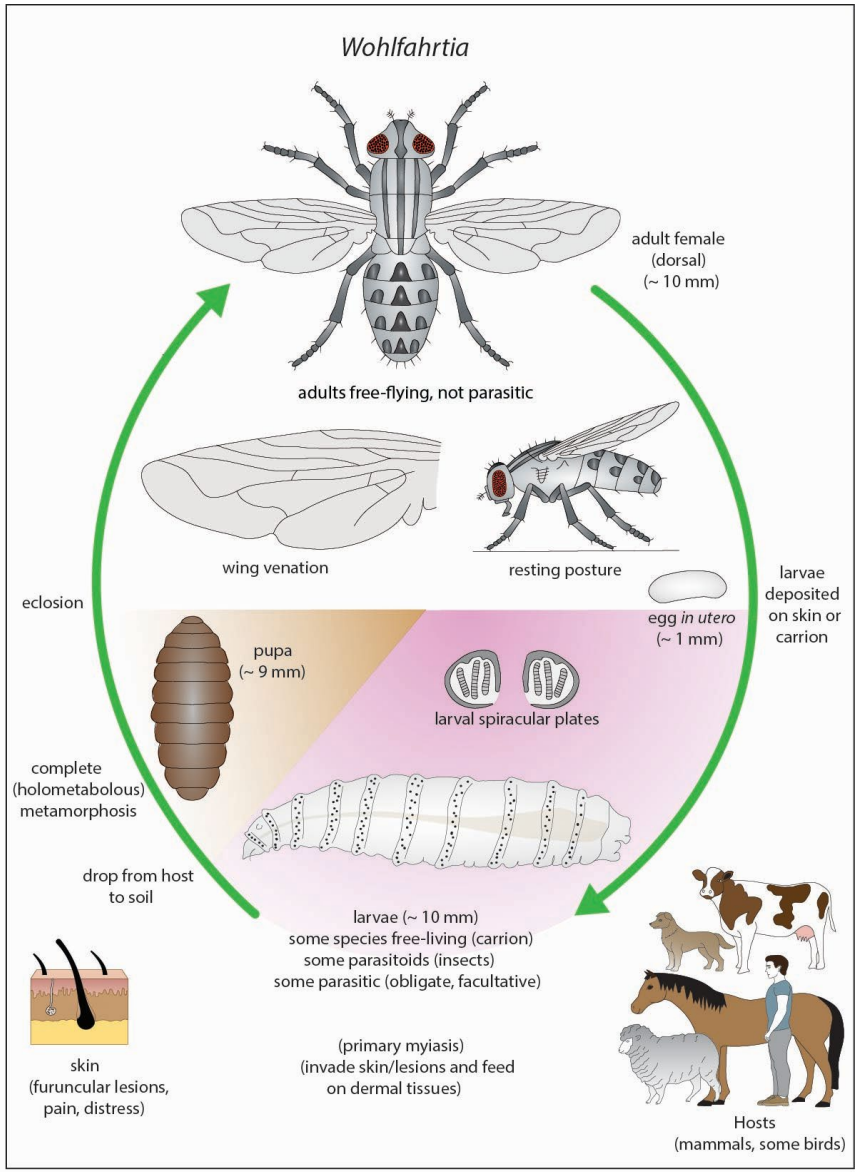

Uronema
may reproduce asexually
(by transverse binary fission)
or sexually (by conjugation)
gills, skin, brain, viscera
(necrosis, haemorrhages,
lesions, encephalitis)
mostly free-living aquatic species,
some facultative histophagous parasites
Vertebrate Hosts
(freshwater and
marine fish)
oral ciliature:
paroral membrane
and 3 membranelles
post-oral scuticum
somatic ciliature:
10-16 longitudinal
kineties
macronucleus
micronucleus
contractile vacuole
long caudal
cilium
trophozoite
(20-50 µm)
no cyst formation
direct transmission between hosts
via free-swimming trophozoites in water column

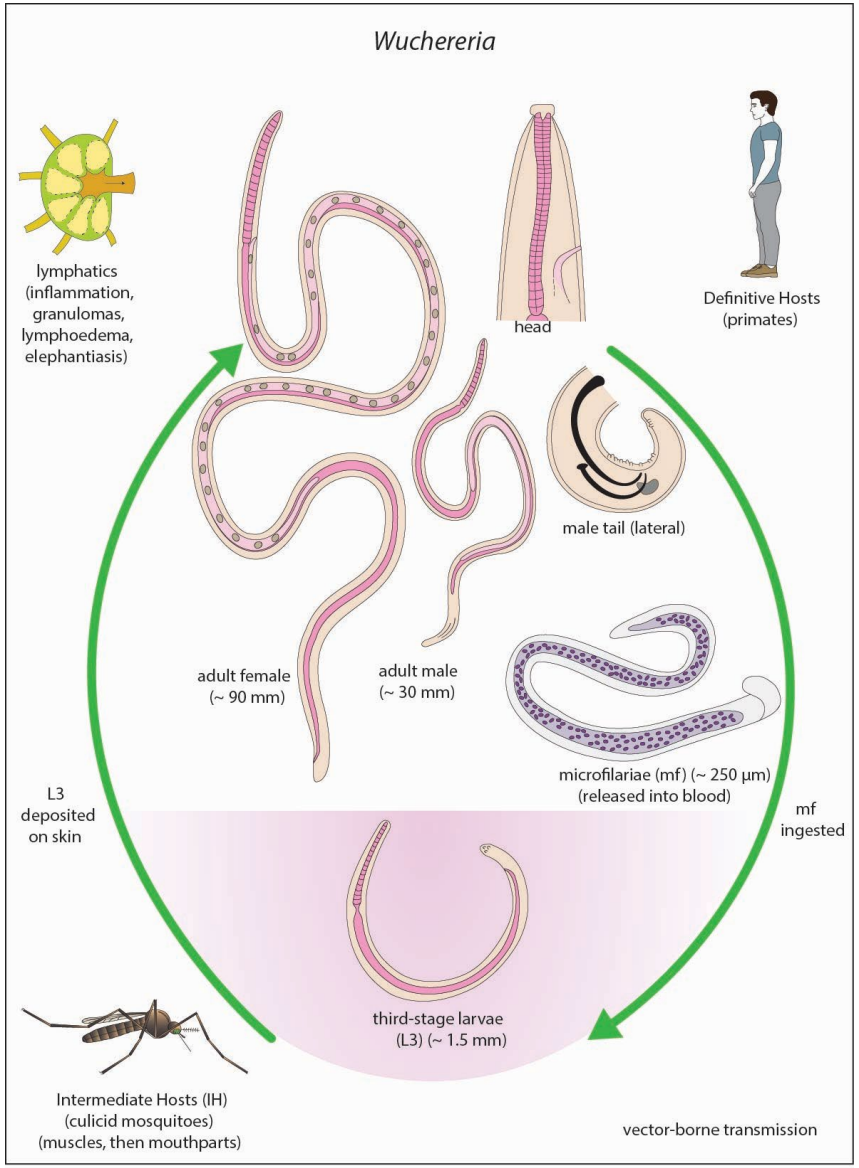

Varroa
transmission by spread of female mites
(usually among nurse bees tending drone brood cells)
Hosts
(honeybees)
frontal
cuticle
(mortalities,
reduced hive
productivity)
dorsal
adult female
(~ 1.5 mm)
ventral
tarsal
elements
adult mites develop in bee brood cells
(male dies after mating, females remain attached
during bee pupation and emerge on teneral adult bees)
eggs laid in bee brood cells
egg
(~ 400 µm)
deutonymph
(ventral)
(~ 700 µm)
protonymph
(ventral)
(~ 500 µm)
hatch
(first egg
develops into
male mite)
deutonymphs
feed on bee larvae)
protonymphs
feed on bee larvae
mites ectoparasitic on bee larvae, pupae and adults
(feed on bee fat bodies and haemolymph)

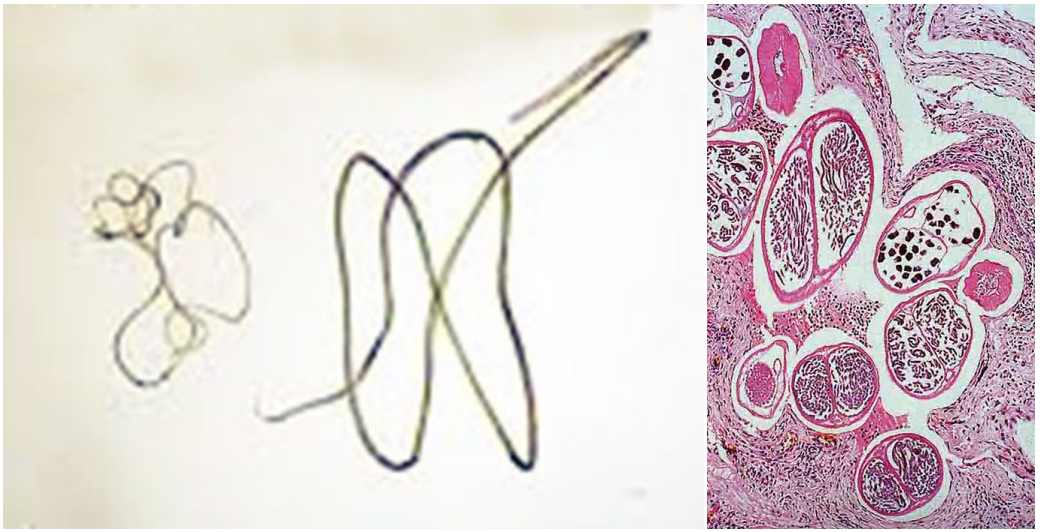

ABC

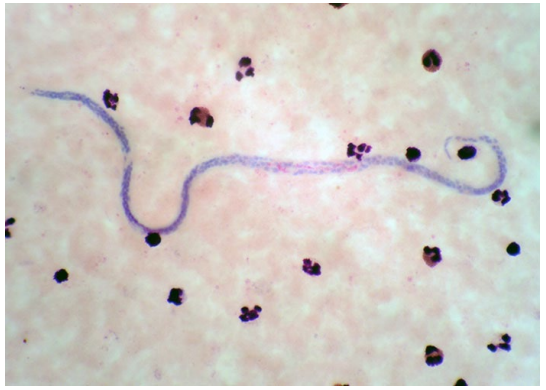

wiki

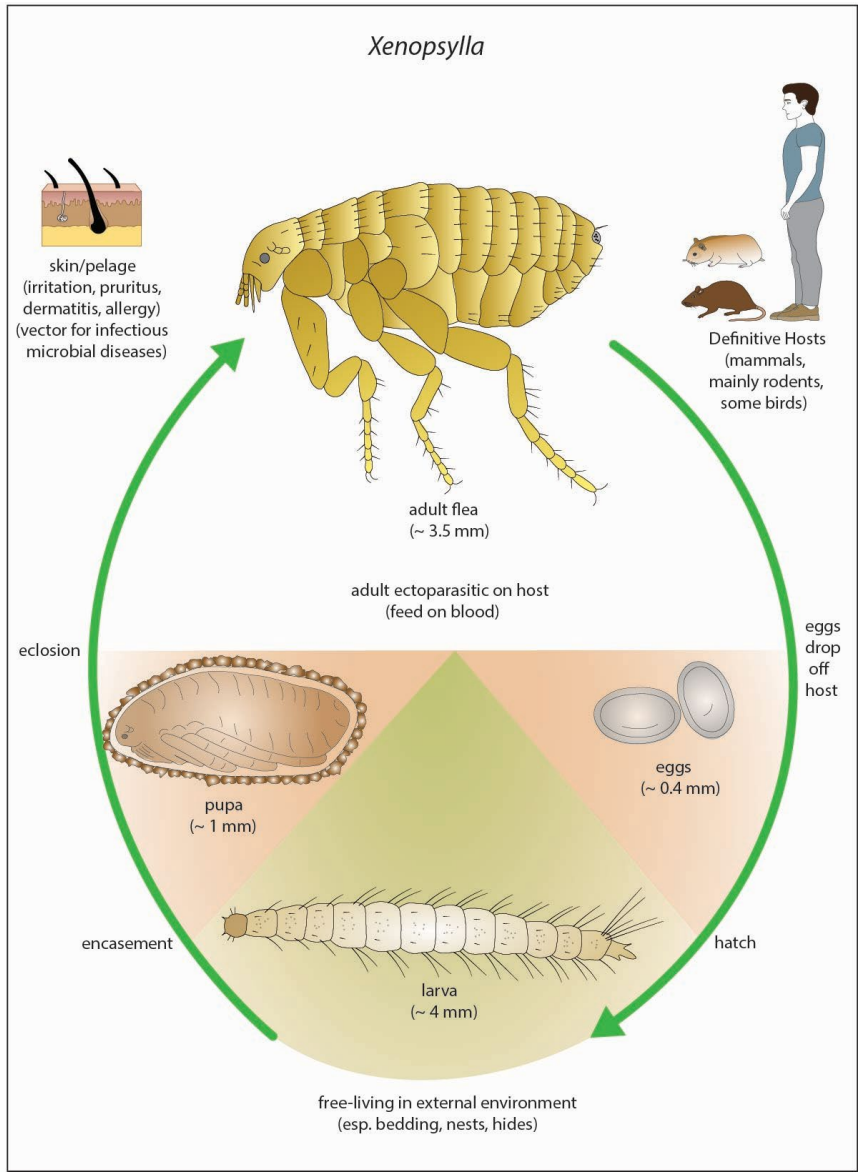



Wohlfahrtia
adult female
(dorsal)
(~ 10 mm)
adults free-flying, not parasitic
wing venation
resting posture
egg *in utero*
(~ 1 mm)
larvae
deposited
on skin or
carrion
eclosion
pupa
(~ 9 mm)
larval spiracular plates
complete
(holometabolous)
metamorphosis
drop from host
to soil
larvae (~ 10 mm)
some species free-living (carrion)
some parasitoids (insects)
some parasitic (obligate, facultative)
skin
(furuncular lesions,
pain, distress)
(primary myiasis)
(invade skin/lesions and feed
on dermal tissues)
Hosts
(mammals, some birds)


Wuchereria
lymphatics
(inflammation,
granulomas,
lymphoedema,
elephantiasis)
head
Definitive Hosts
(primates)
male tail (lateral)
adult female
(~ 90 mm)
adult male
(~ 30 mm)
microfilariae (mf) (~ 250 µm)
(released into blood)
L3
deposited
on skin
mf
ingested
third-stage larvae
(L3) (~ 1.5 mm)
Intermediate Hosts (IH)
(culicid mosquitoes)
(muscles, then mouthparts)
vector-borne transmission







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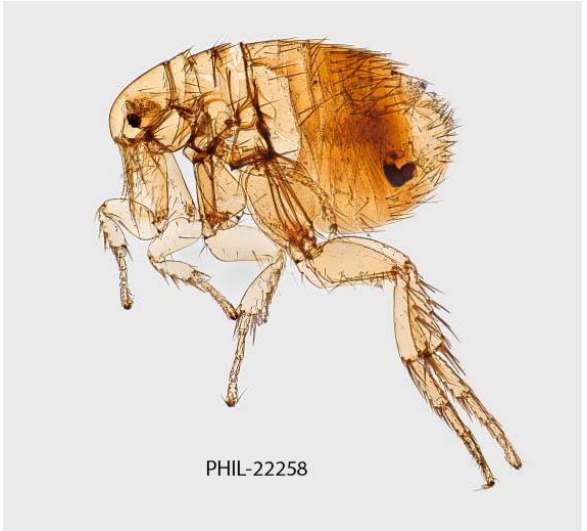

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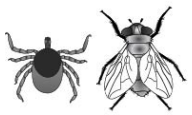
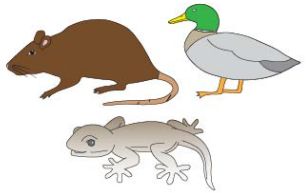
BIOTA

vectors



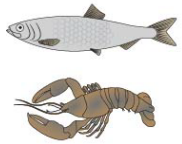
arthropods

wildlife



mammals, birds
reptiles

aquaculture

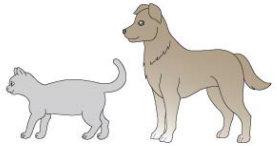


fish, shellfish

agriculture

domestic animals

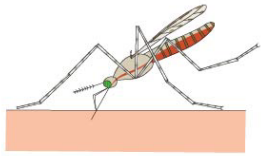
companion animals



pets

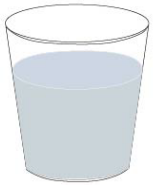
humans

inoculation,
contamination



vector-borne

ingestion



water-borne

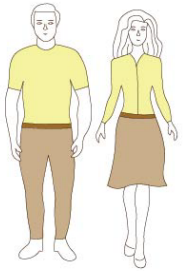
contamination

faecal-borne

ingestion

food-borne

contact



direct (touch/fomites,
venereal, vertical)

MODES OF TRANSMISSION