

MUNI
PHARM

Parasitology II

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Nematoda

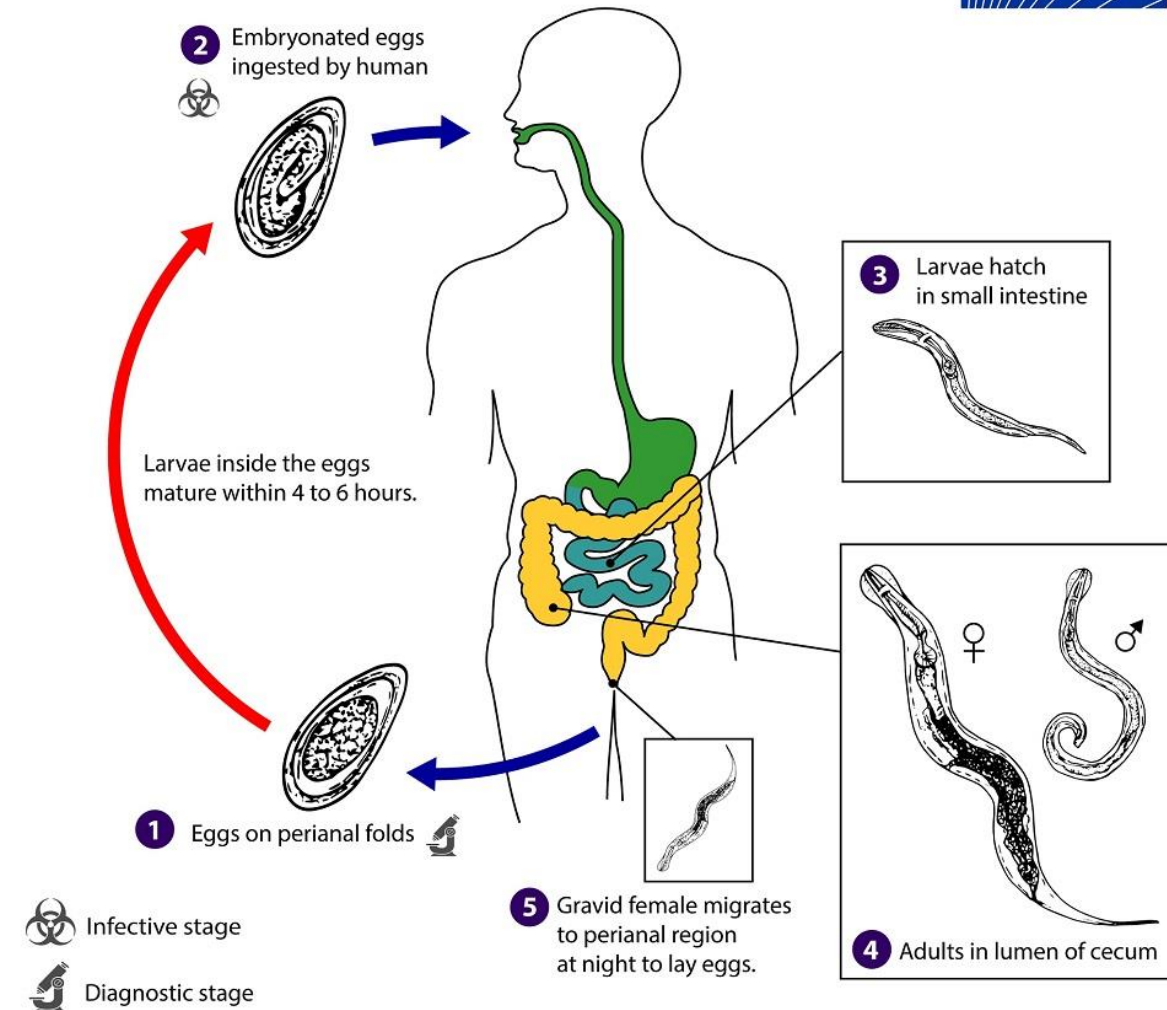
- cause of *nematodosis* – according to WHO upto 1.5 mld. pac.
- roundworms have nonsegmented, cylindrical body (cm to m)
- GIT begins with mouth, ends with anus
- separated sexes – from fertilized egg to larva, which can cause infection

Nematoda

- *Enterobius vermicularis* (pinworm) – cause of *enterobiosis*
- cosmopolite, no connection to hygiene (few cases in tropics, mainly in temperate areas)
- transmission: fecal-oral contact s infected patient
- only host is human
- Dg.: perianal smears, adhesive tape imprint – eggs
- treatment for the whole family

Nematoda - Enterobius

- egg – larva – maturation in caecum – copulation – anus – laying eggs
- itching – reinfection - fingers
- lifespan 30 – 45 days
- asympto; nocturnal perianal itching - insomnia



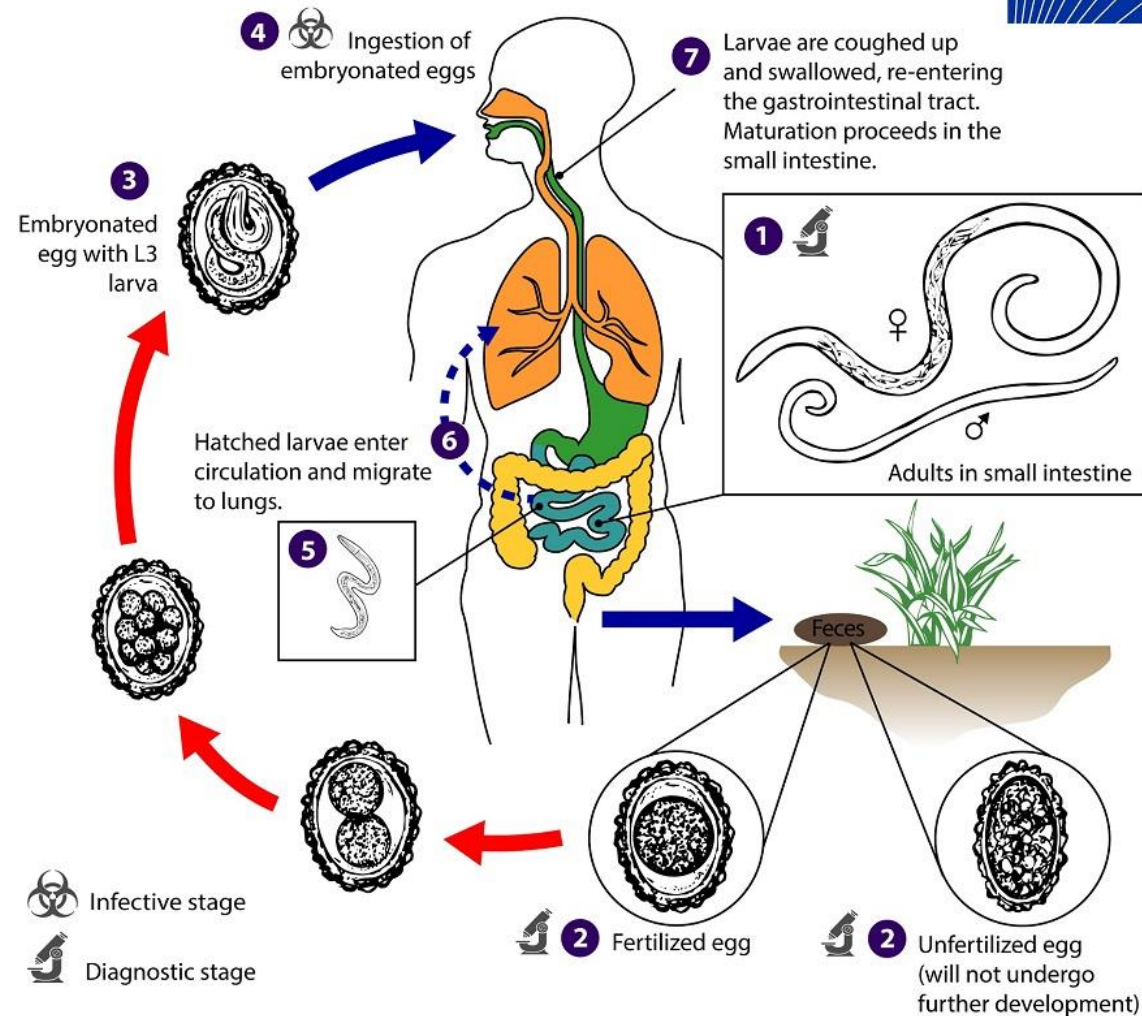
Nematoda

- *Ascaris lumbricoides* – cause of *ascariosis*
- cosmopolite, connected to hygiene – prevalence in Eur. low (high in SE and C. Asia and Lat. America) – mortality 60 – 100 tho./yr
- orofecal with eggs – lung phase (via blood, coughing and swallowing) – intestine: adults 10 cm in small in. (takes out nutrients – malnutrition, diarrhea, nausea; toxines, even epilepsy and allergy) – microscopy of stools

Nematoda - Ascaris



Ascaris lumbricoides



Nematoda

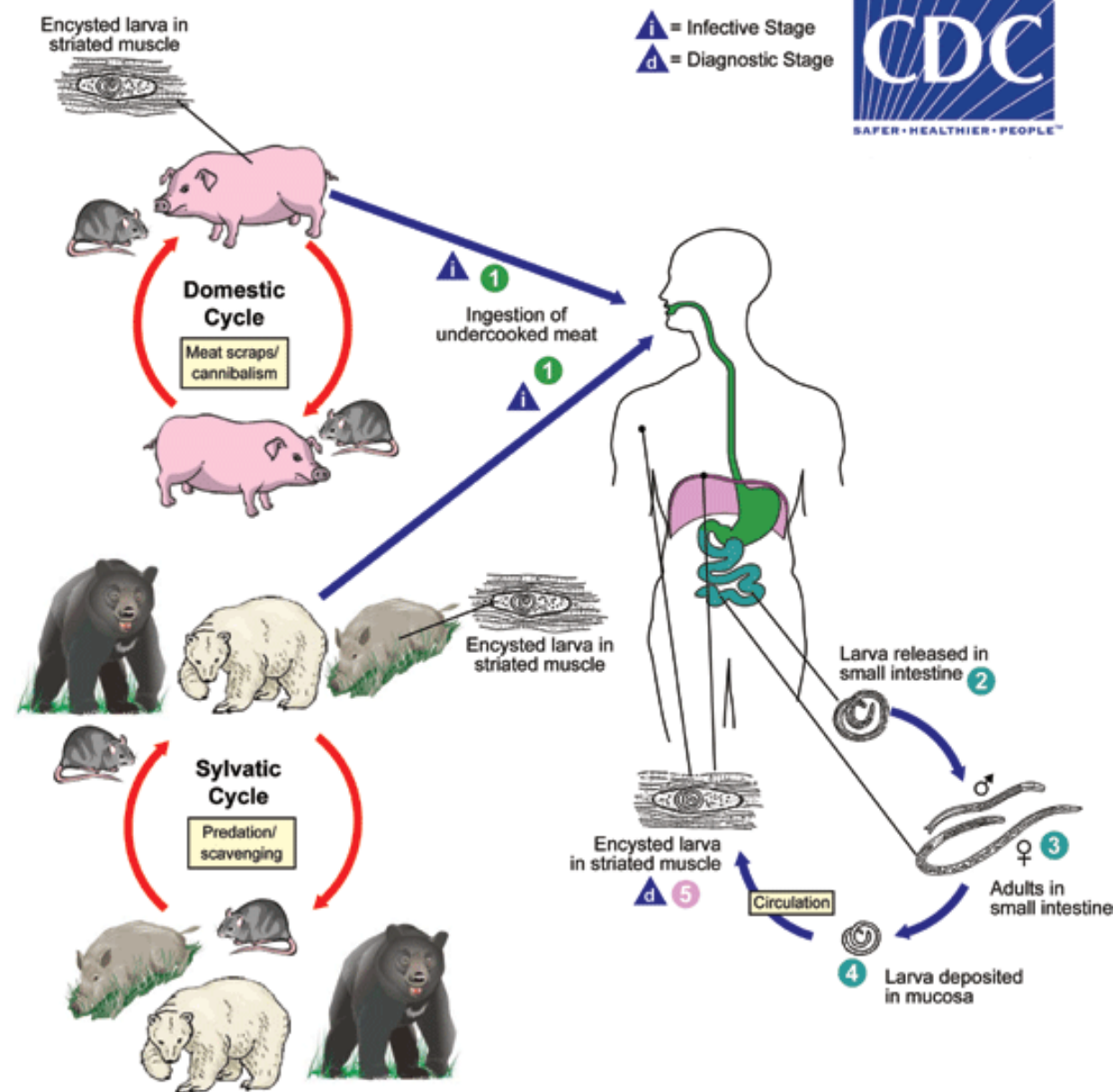
- *Toxocara canis* (dog roundworm) – cause of *toxocarosis*
- parasitic eggs eliminated in excrements of ill animals and mature in soil – contaminated food – larvae are attached in intestines – migrate to liver and lungs
- symptoms: fever, hepatosplenomegaly, lymphadenopathy and stuffiness; if enters into eye – permanent damage to sight
- Dg.: serology; in CZ positivity 18%

Nematoda

- *Trichinella spiralis* – cause of *trichinosis*
- cosmopolite, alimentary – intracellular parasitism (obligate) – inf. caused by larva in muscles of intermediate host (very resistant – even in dead body) - inf. is life threatening
- vast number of intermediates: pig, bear, fox, horse, walrus, crocodile

Nematoda - Trichinella

- insufficient heat – larva in GIT
- maturation and sexual reproduction – fertilized female digs into intestinal wall and produces small larvae (1000 – 1500 in 4 days) – enter into blood, lymph and organs



Nematoda - Trichinella

- into cells and hatch in cytoplasm – influence the cellular metabolism – nurse cell – after one year calcification
- symptoms: asympto.; intestinal phase (10% of pac. diarrhea, vomits, hemorrhagic ulcers; 8 – 10 days after infection) – migration, muscle phase (fever, exanthema, edema of face, visual disturbances)
- Dg.: detection of antibod., larvae in stools, parasit. DNA
- prevention: ctrl of meat, lar. death at 60°C, freezing (USA)

AD 3 - Annelida – ringed worms

- here belong *leeches* – freshwater ectoparasites – suck blood from small animals (some of them also feed on them)
- in tropical wetlands also terrestrial – could be dangerous
- flat body segmented, suction discs on both sides (pinwheel movement), hermaphrodites, clitellum (belt) in first half (eggs)
- *Hirudo medicinalis* (European medicinal leech): dark olive colour, upto 15 cm, Southern Bohemia, Kokořínsko; hirudin (anticoagulant, binds thrombin)

AD 3 - Annelida - ringed worms

- *hirudotherapy*: in history
- nowadays used, but limited
 - therapy of bruises, poor blood circulation (varicose veins, shin ulcers)

CC: GlebK



AD 4 - Anthropods

- cca 85% of all animal species
- segmented body: 3 bigger parts – head, thorax, abdomen
- external skeleton (chitin)
- digestive tract (gut), open circulatory system
- development: egg – larva – imago (adult)
- noxiousness: direct parasites (mainly ecto), hematophagous vectors, causes of intoxications, allergies (anticoagulants; mites), pollution

Acari (mites)

- *Ixodes ricinus* (castor bean tick): in nature from April to October (upto 1000 m) – two peaks: Apr - June and Sept - Oct; lifecycle two or more years
- vector for many diseases: flavivirus TBE, animal orbiviruses, borrelias, anaplasmas (dis. ehrlichiosis, rarely in CZ, fatigue, changes in BC) and babesia (protozoa – 25% together with LB, fatigue, anorexia, fevers)

Acari (mites)

- *Sarcoptes scabiei* var. *hominis* (parasitic mites): cause of *scabies* (lat. *scabere*, scratch)
- itching – abrasions, papules and spots on skin (worst during night)
 - between fingers, area of genit., buttocks, breasts, armpits
- transmission: contact, sex, contaminated objects (low level of hygiene); first symptoms after 4 – 6 weeks
- female (0,5 mm) – burrows in skin and deposits 40 – 50 eggs – larvae – in 2 weeks adults

Acari (mites)

- in the place of injury – excoriation, sloughs; secondary pyodermy (bacterial)
- th.: permethrin 5%; sulfur ointments (20% in vaseline)
- bedclothes, clothes and towels wash up and heat up; vacuum beds, insecticides; treat all family members and close persons
- most often parasitic disease in CZ; report to RHS

Acari (mites)



CC: Kalumet

Insecta (insects)

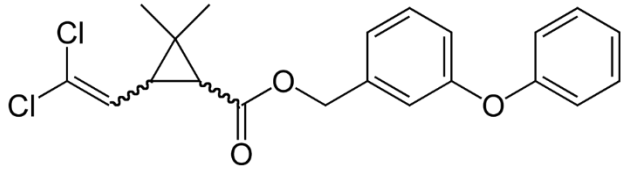
- *pediculosis* (infestation of lice): itching dermatosis cause by:
- *Pediculus capitis* (head louse) – most often (2 – 4 mm) – reprod. through eggs (nits) – attached to hairs – larvae after 6 days – adults in 2 – 3 weeks; preschool and school children + families – directly or indirectly (comb, cap) – blood-sucking (endemic typhus) – itching, petechie, secondary infections

Insecta (insects)

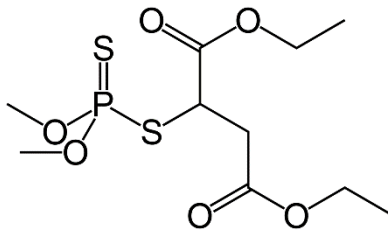
- *Pediculus corporis* (body louse) – on clothes (3 – 4.5 mm), there also nits – practically not present in developed countries (homeless, emergency situations) – transfer through clothes and bedclothes – sucking where the clothes is on skin (end. typh.)
- *Pthirus pubis* (pubic louse): 1,5 – 2 mm, Δ tvar – pubic hair – sex or indirectly through clothes – greyblue spots in place of bite (*maculae coeruleae*) – degradation of hemoglobine with enzymes from saliva

Insecta (insects)

- th.: shampoo with 1% malathion or permethrine (repeated)



- insecticide
- like comp. from *Chrysanthemum*
- neurotoxine – longer activation of Na⁺ channels



- insecticide;
organophosphate
(parasympatomimetic) –
irev. inh. AChE



CC: GilesSM

Insecta (insects)

- *bugs*:
- *Cimex lectularis* (bed bug) – incomplete metamorphosis, hematophagous, „half-winged“ – pale brown body, size 4 – 5 mm
 - during day hide in house (furniture, walls, floors) – at night blood-sucking – blisters (but not vectors), psychic stress, insomnia – liquidation in hiding places
- family *Reduviidae* – Chagas disease

Insecta (insects)



CC: Etotalora

Insecta (insects)

- *flea: Pulex irritans* (human flea) – typ. for humans, but also others
- complete metamorphosis – adults are yellow, brown or black, 3 mm – ability to suck blood – female deposits eggs (in floor) – legless larvae (feed on organic deposits) – formation of pupa – adult
- red spot in place of bite, itch, annoying – fleas = vectors (*Y. pestis*; rickettsiae, etc.) - insecticides

Insecta (insects)



CC: Katja ZSM



Insecta (insects)

- *two-winged insect* – family *Culicidae*:
- world-wide, reproduction in pools, splashes - backwater
- after the female bites there is very itching bud on skin; might be strong reaction; but systemic anaphylaxis is rare
- transmission of diseases (dengue, yellow fever, arboviral encephalitides, malaria and filariasis)
- in CZ there are 40 – 50 species (floodplain forests)

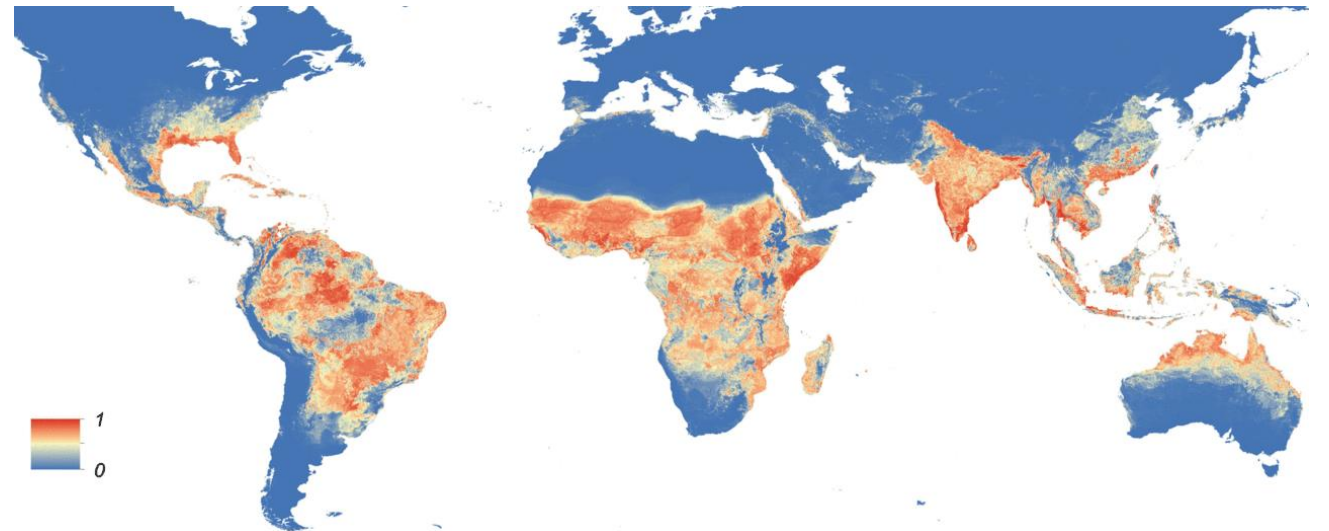
Insecta (insects)

- *Culex pipens molestus*
(common house mosquito):
frequent in CZ; size 5 mm;
pale brown; hibernation during
winter
- possibility of transmission of
West Nile fever (birds)



Insecta (insects)

- *Aedes aegypti* (yellow fever mosquito): tropics or subtropics (Schiphol)
- vector: dengue, chikungunya, yellow fever, virus zika



CC: LuisCarlosRubino

Insecta (insects)

- *Anopheles*: 400 species
- some of them transmit malaria; present in CZ (but not infected)

