Biology of animals

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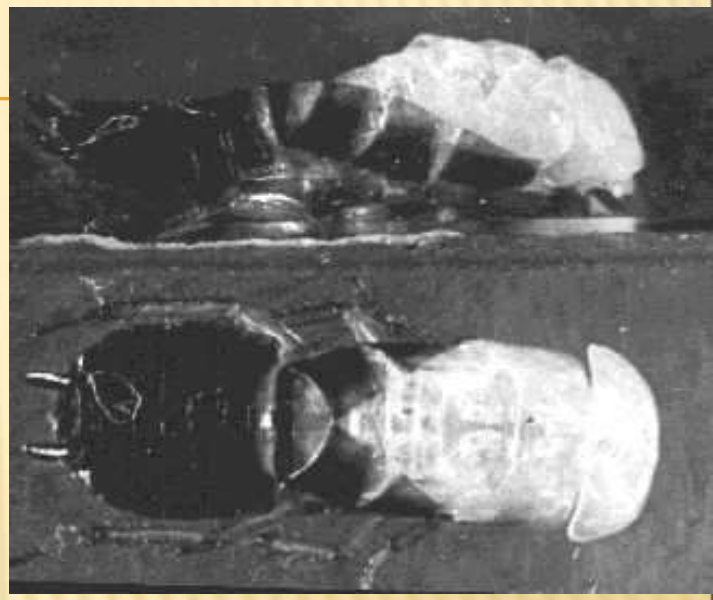
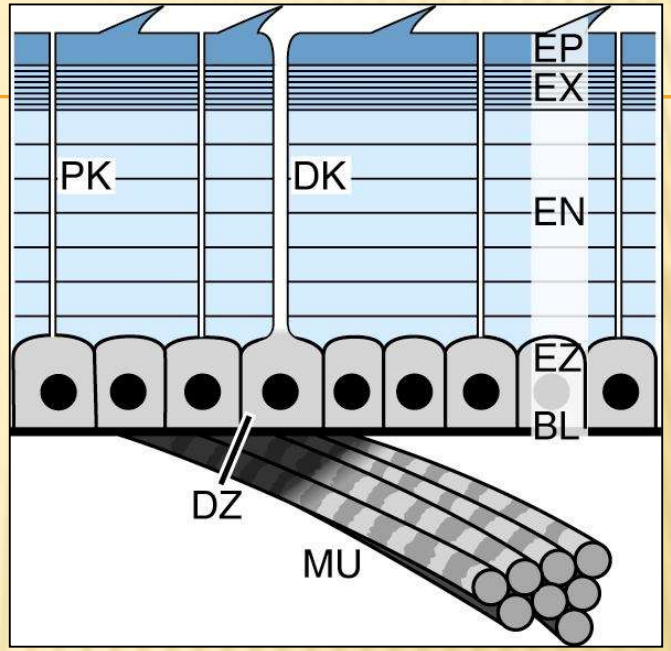
ECDYSOZOA

- cuticle
- ecdysis
- metamorphosis



ECDYSOZOA

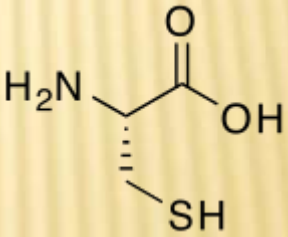
- cuticle
- extra-cellular = exoskeleton
- secreted by epidermis (hypodermis)
- epicuticle
- exocuticle
- endocuticle

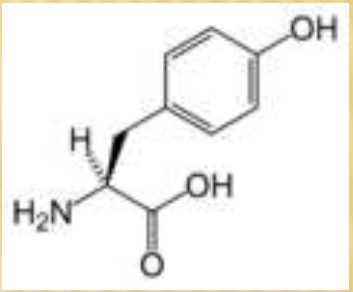


ECDYSOZOA

- Nematoda
  - collagen

  - cuticlin
    - cysteine-rich
    - cross-linked via tyrosine

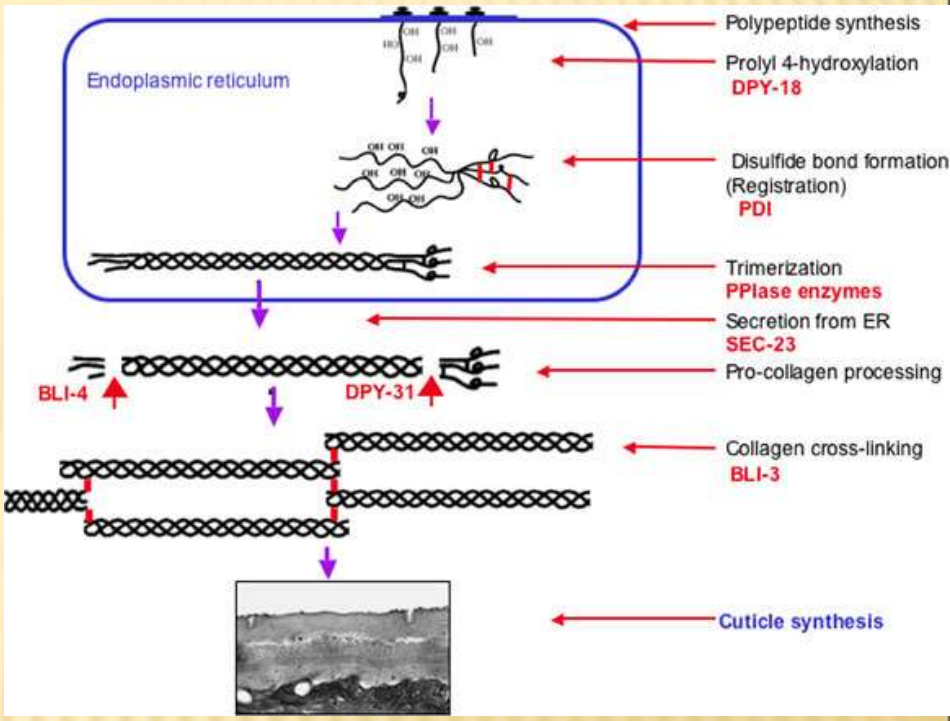




  - glycoproteins
  - lipids

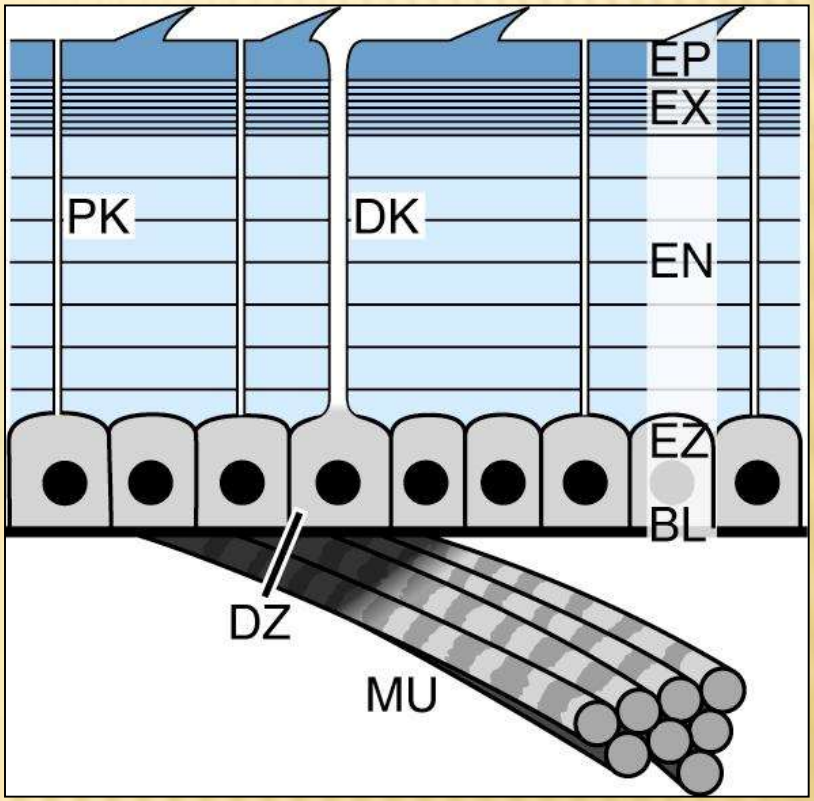
ECDYSOZOA

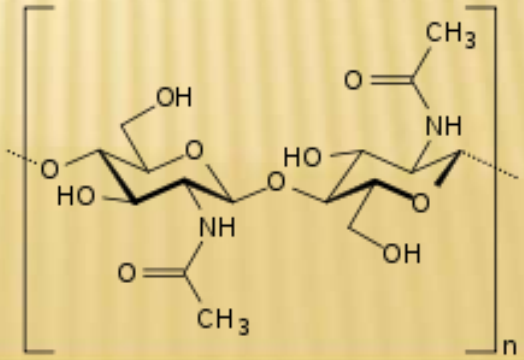
- Nematoda
- collagen



ECDYSOZOA

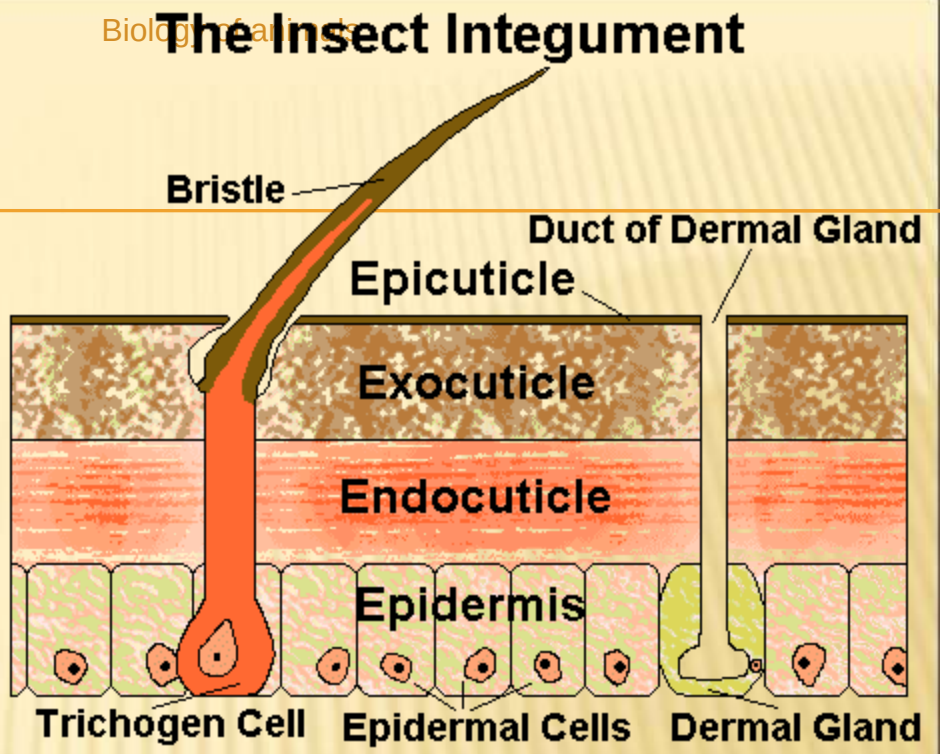
- Insects
  - epicuticle
  - exocuticle
  - endocuticle
  - chitin





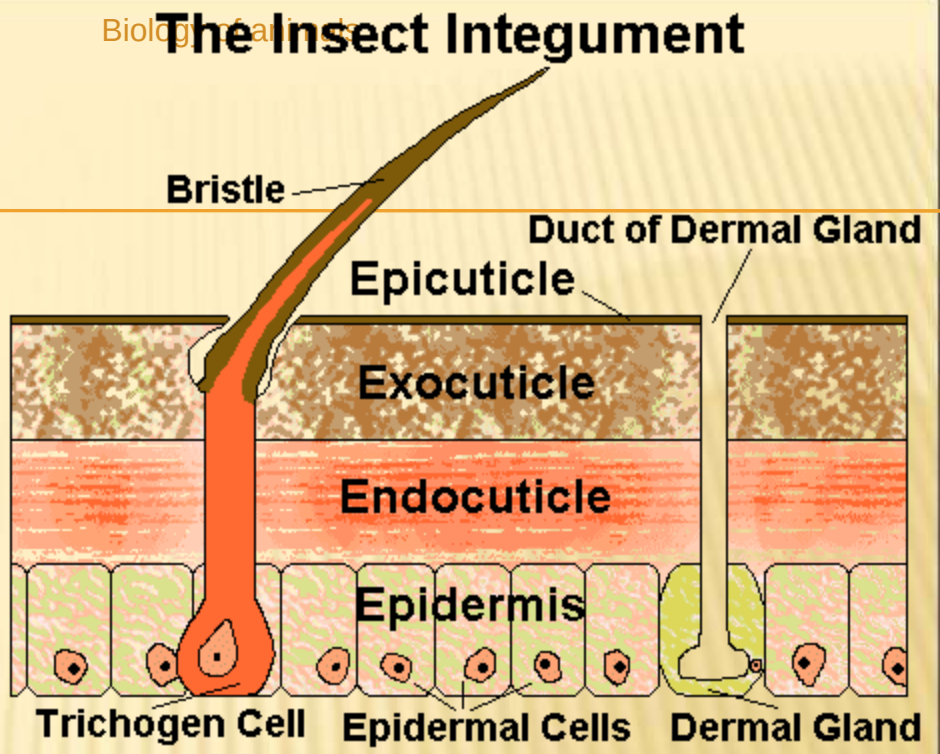
ECDYSOZOA

- epicuticle
  - deposited via pores
  - cement layer
  - wax layer (reduce water loss)
  - cuticulin layer
  - shed during moulting



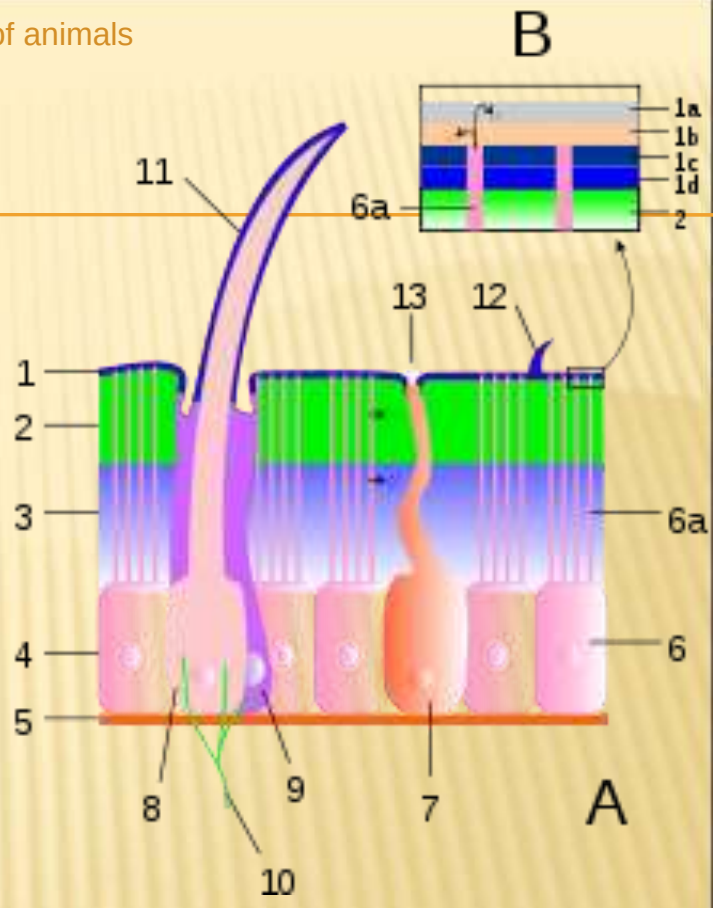
ECDYSOZOA

- Wax
  - Alkanes
  - Esters
  - Polyesters



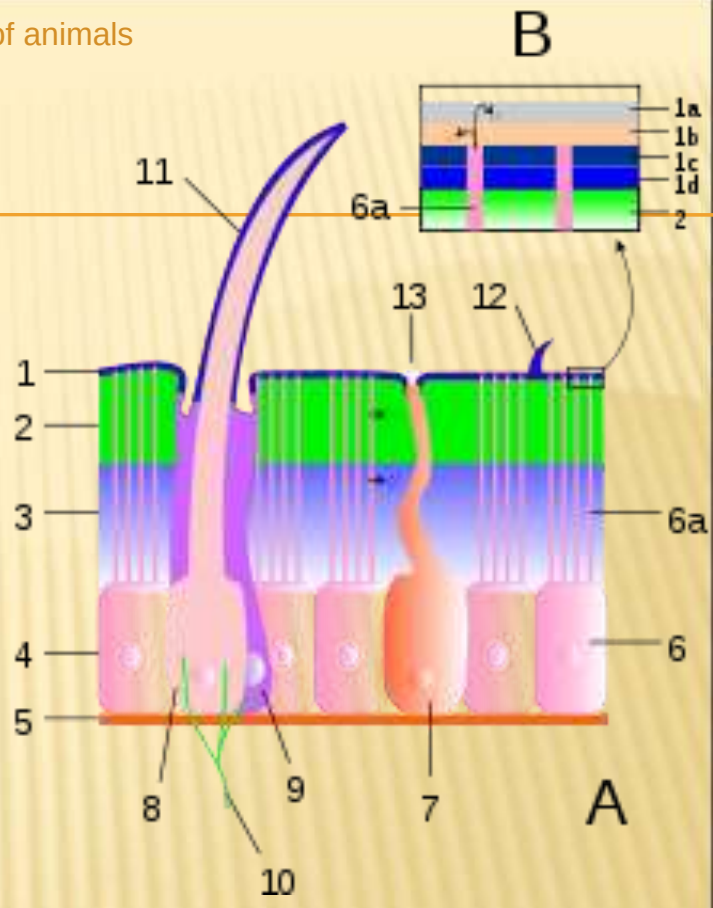
ECDYSOZOA

- exocuticle
  - chitin
  - protein
  - sclerotisation = hardening
  - Shed



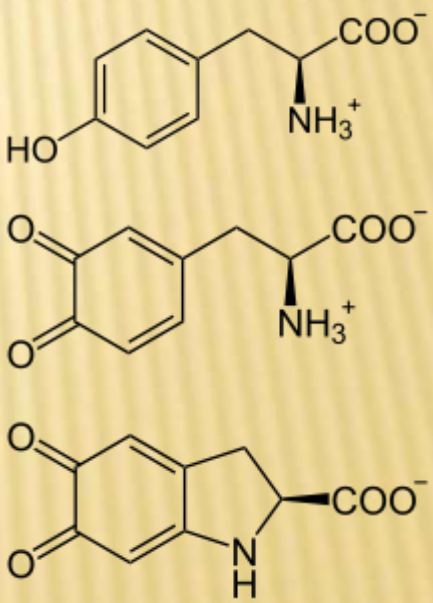
ECDYSOZOA

- endocuticle
  - chitin
  - digested, absorbed
  - Chitin cannot be digested in gut



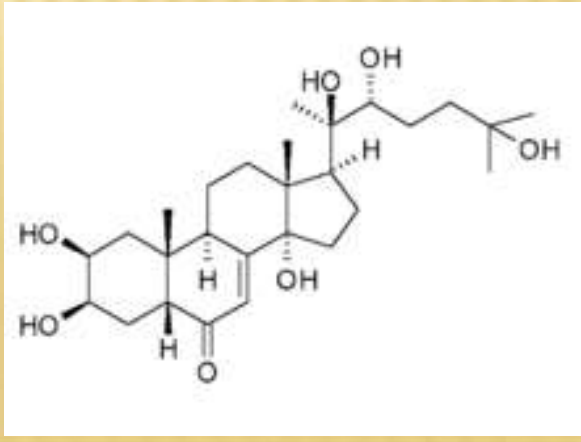
ECDYSOZOA

- exocuticle
  - melanin
  - Dopaquinone + cysteine ⟶ 5-S-cysteinyldopa ⟶ benzothiazine intermediate ⟶ pheomelanin
  - Dopaquinone ⟶ leucodopachrome ⟶ dopachrome ⟶ 5,6-dihydroxyindole-2-carboxylic acid ⟶ quinone ⟶ eumelanin



ECDYSOZOA

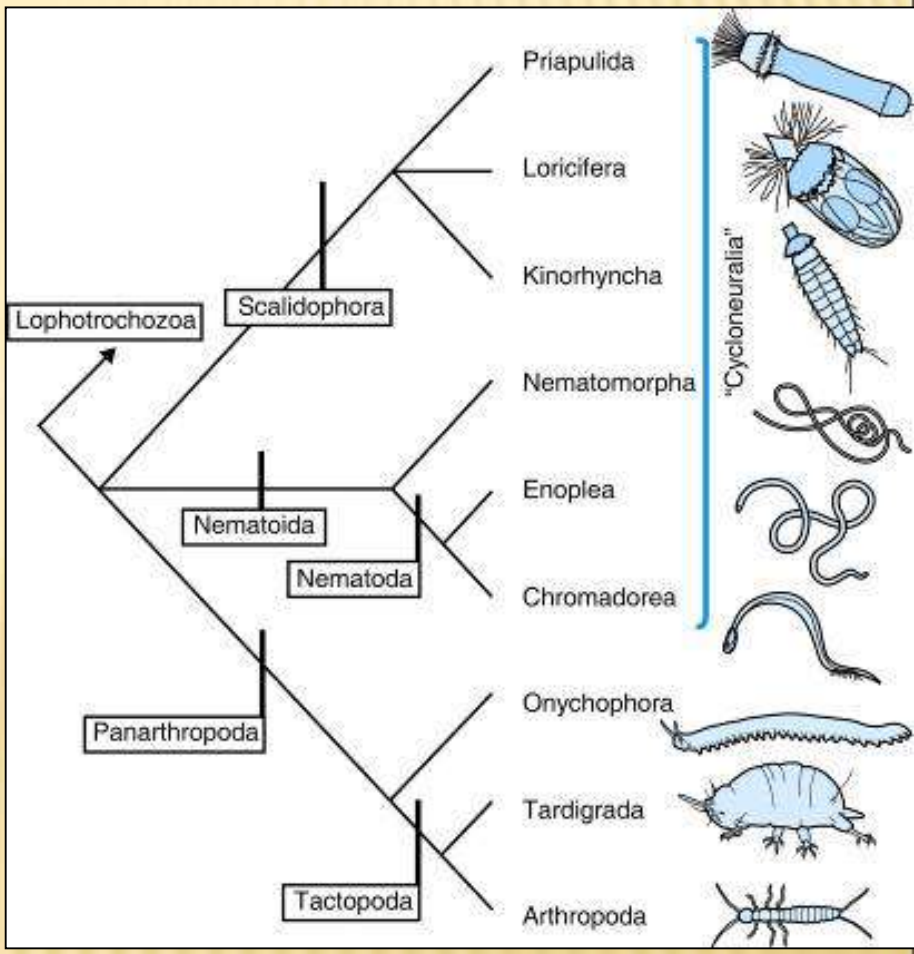
- apolysis
- secretion
- ecdysis = moulting
  - ecdysterone (20-hydroxyecdysone)
  - phytoecdysteroids
  - ecdysone receptor



ECDYSOZOA -

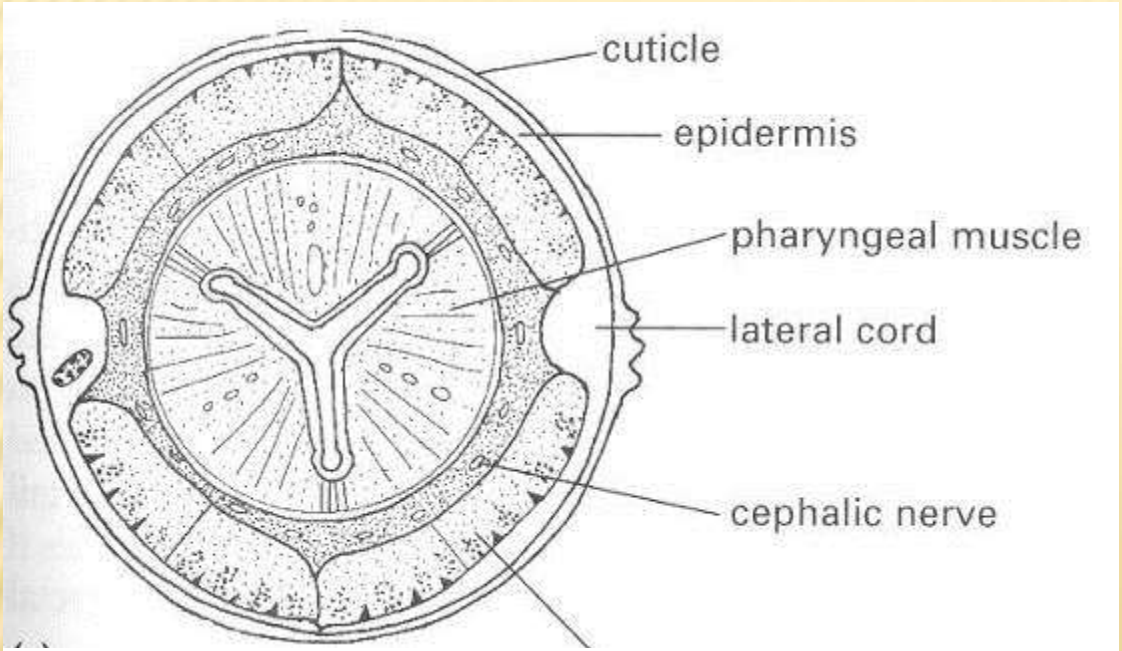
+system

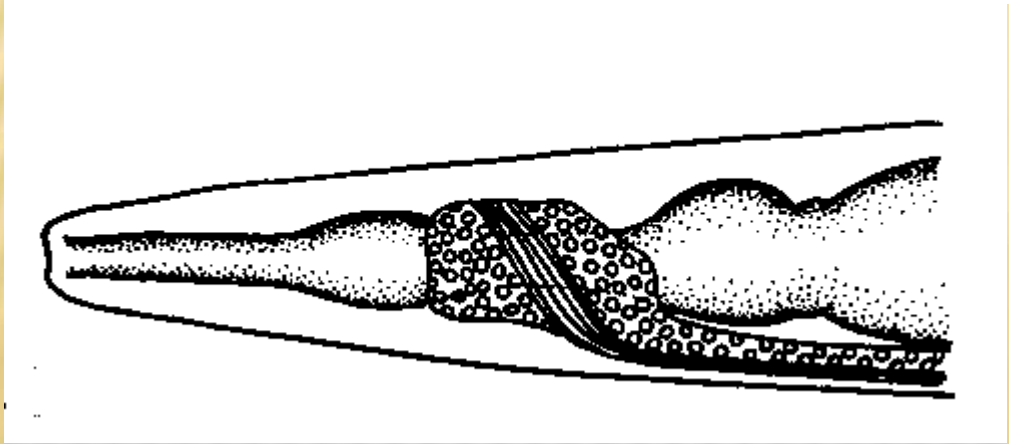
- Nematoda
- Nematomorpha
- Scalidophora = Cephalorhyncha
  - Priapula
  - Kinorhyncha
  - Loricifera
- Onychophora
- Tardigrada
- Arthropoda

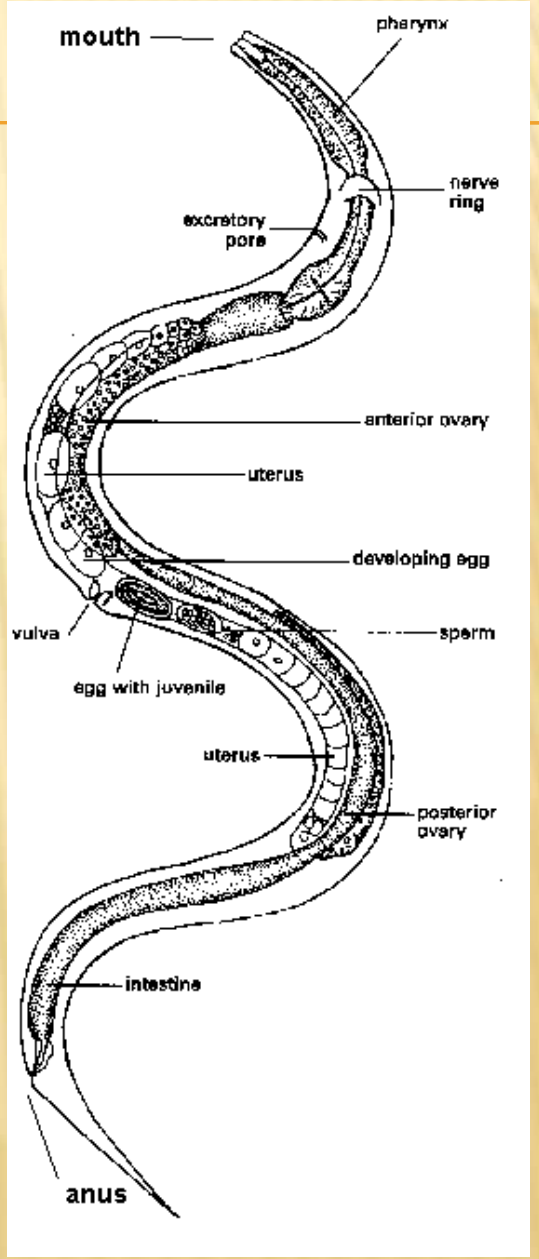


NEMATODA - ROUNDWORMS

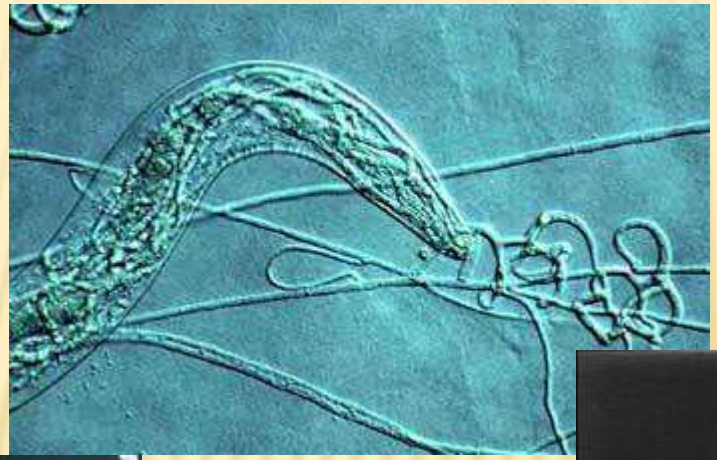
+body plan

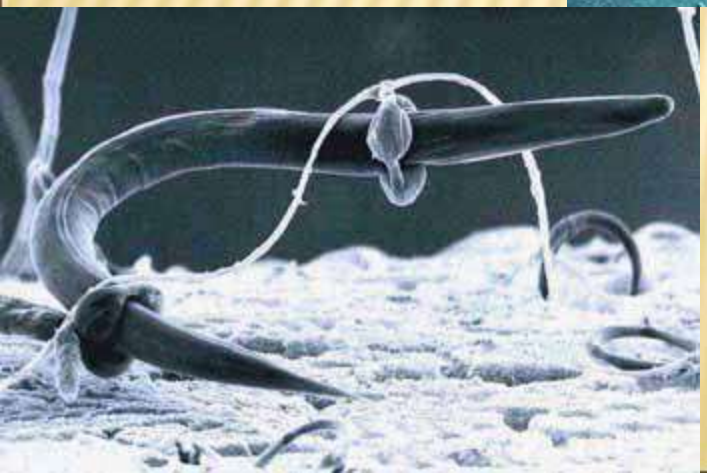




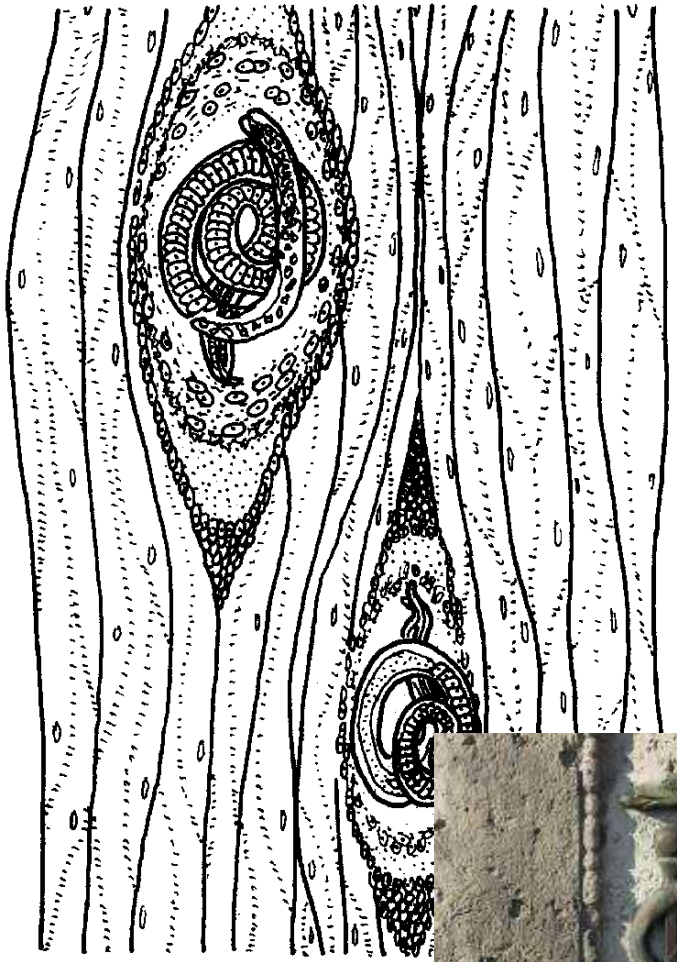


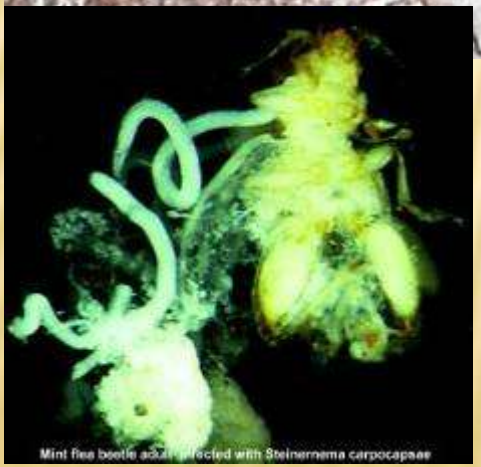
NEMATODA

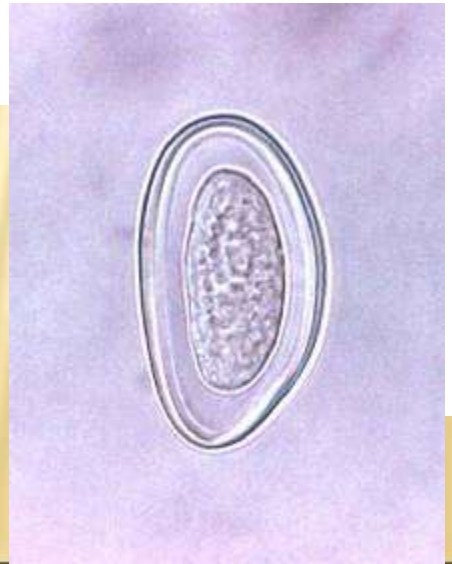




NEMATODA

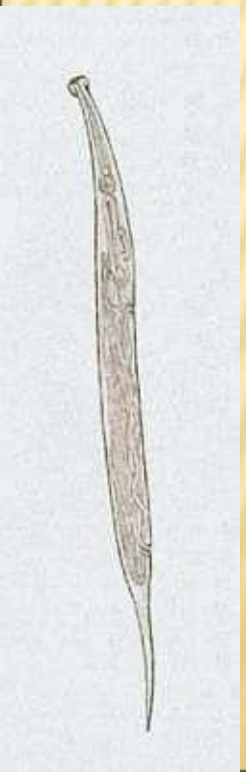



Mint flea beetle adult infected with Steinernema carpocapsae



NEMATODA

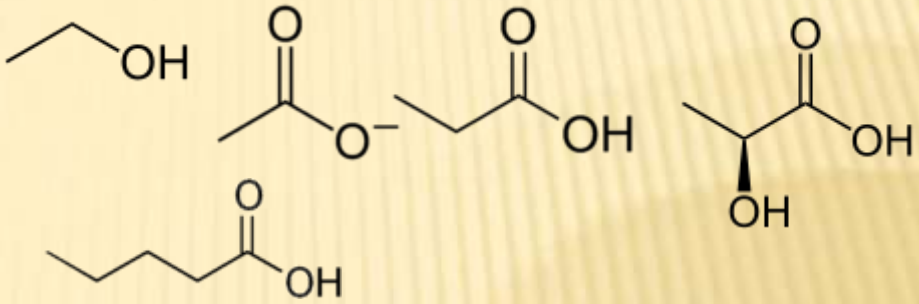
- *Ascaris*
  - 1/6 humans
- *Enterobius*
- anoxic metabolism

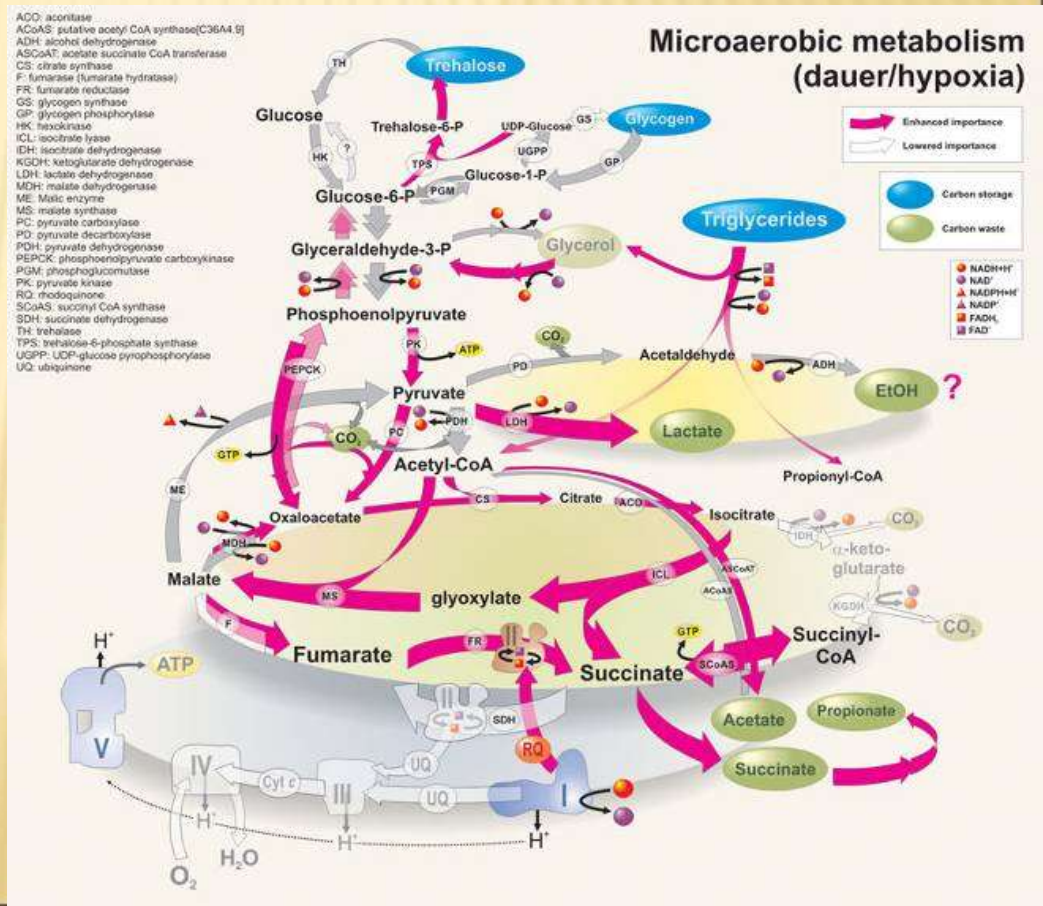


Massive Ascaris infection in child. A large bolus of roundworms expelled following anthelminthic treatment.

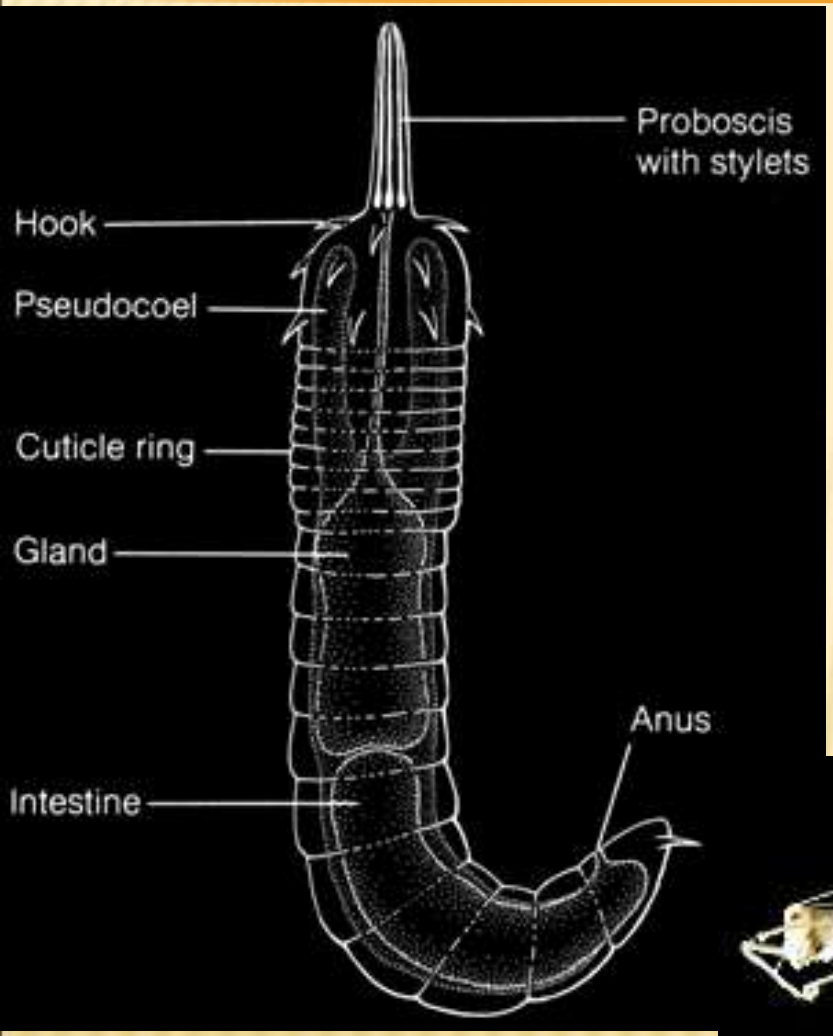
NEMATODA

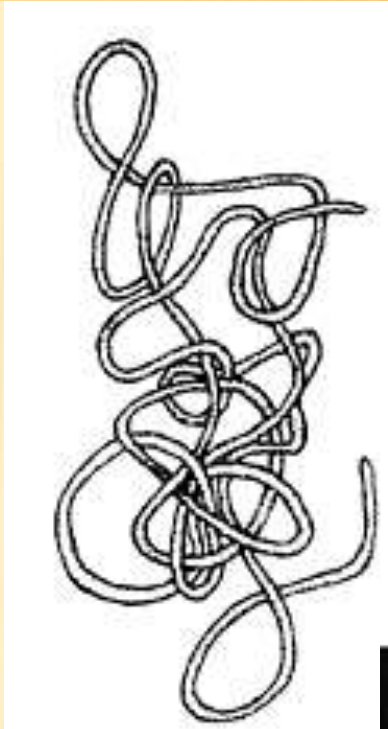
- *Ascaris, Enterobius*
- metabolism
  - hypoxic
  - = microaerobic

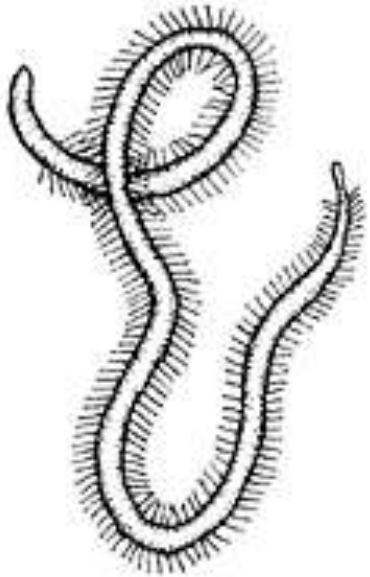




NEMATOMORPHA – HORSEHAIR WORMS





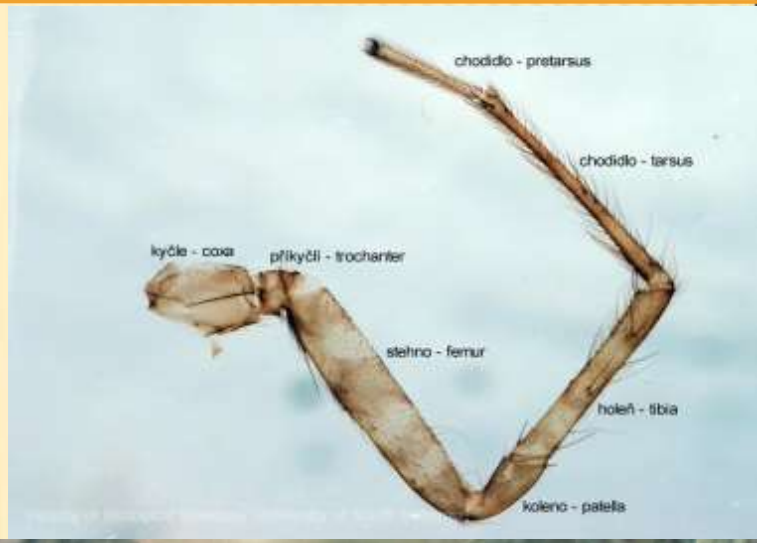


CEPHALORHYNCHA

- system
  - 180 species
  - Priapula
  - Kinorhyncha
  - Loricifera

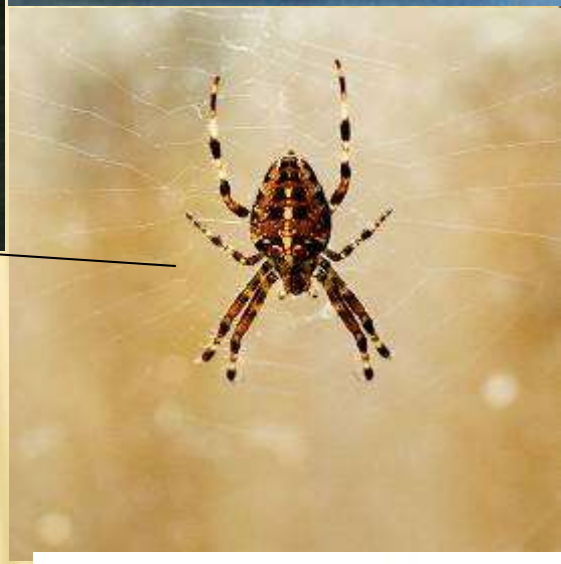
ARTHROPODA

- body plan
  - body segmented
  - appendages segmented



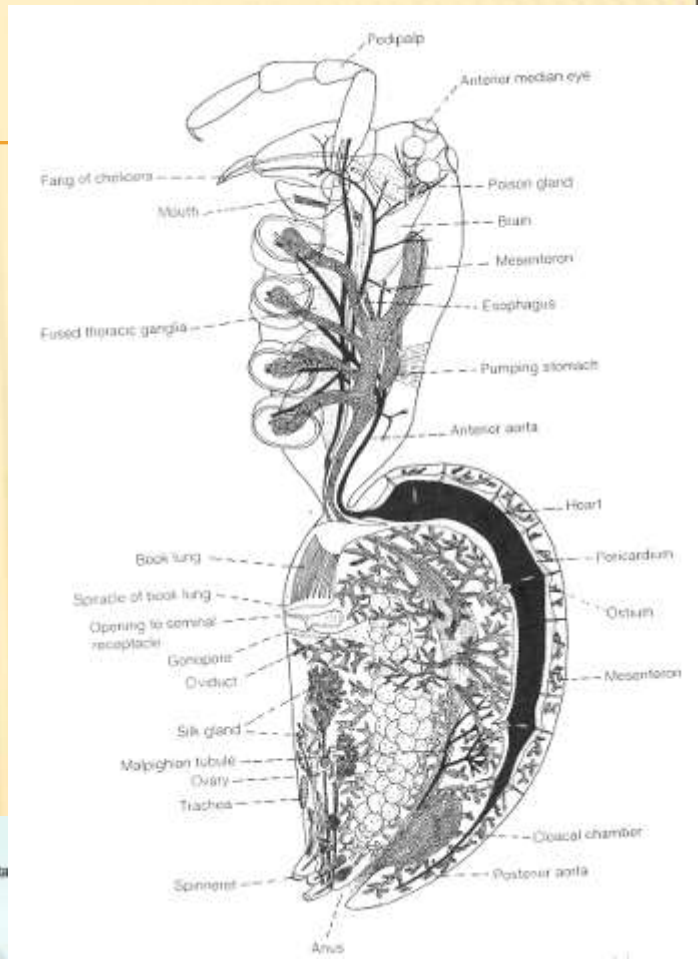
ARTHROPODA

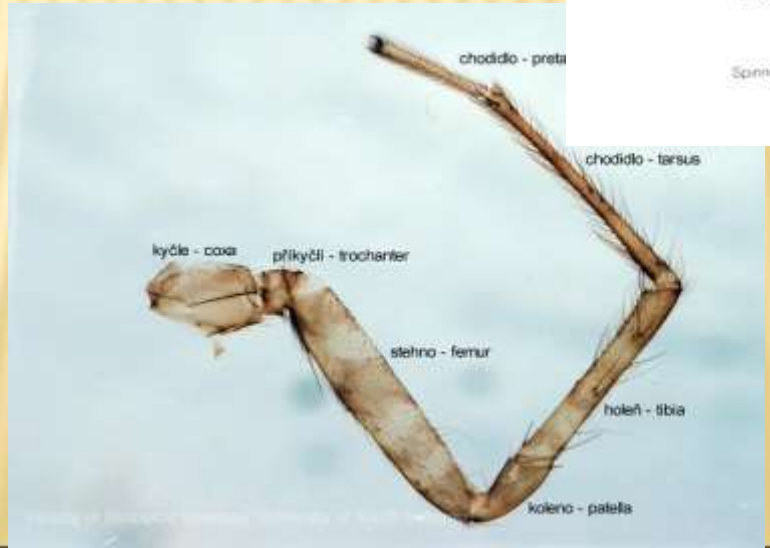
- system
  - Trilobita
  - Pycnogona
  - Chelicerata
  - Myriapoda
  - Crustacea
  - Insecta



CHELICERATA

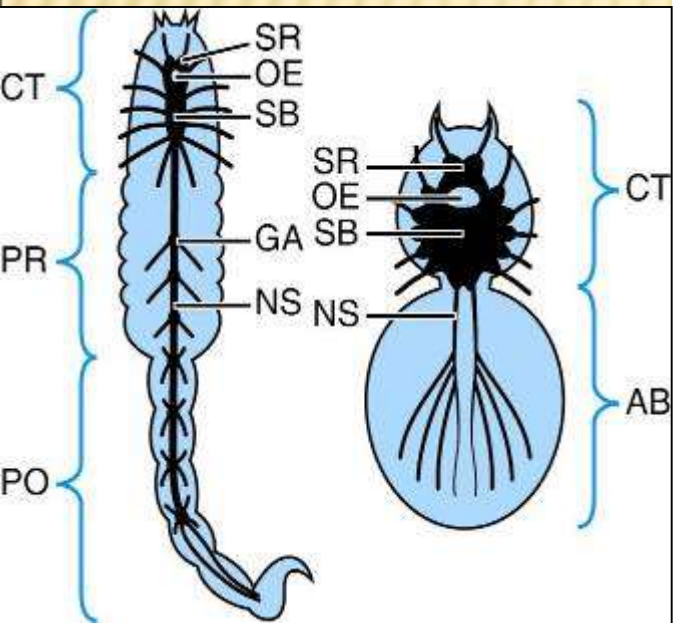
- body plan
  - prosoma, opisthosoma
  - legs
    - coxa
    - trochanter
    - femur
    - patella
    - tibia
    - (meta)tarsus
    - (pre)tarsus
    - claws

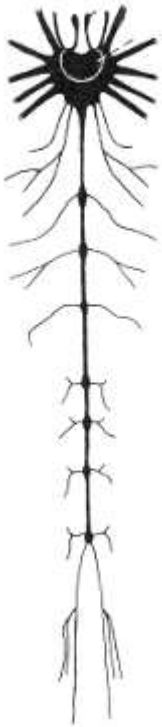




CHELICERATA

- circulatory system
- excretory system
- nervous system
- senses





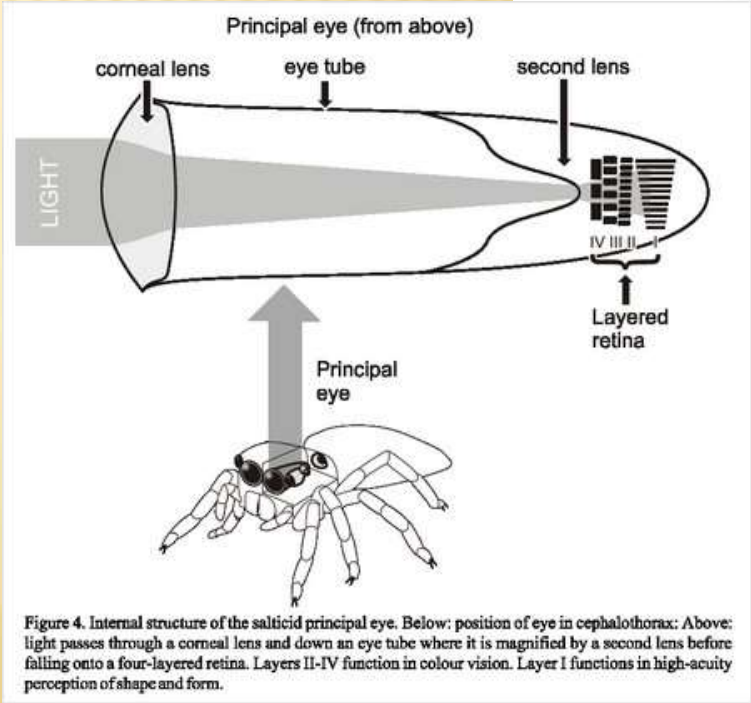
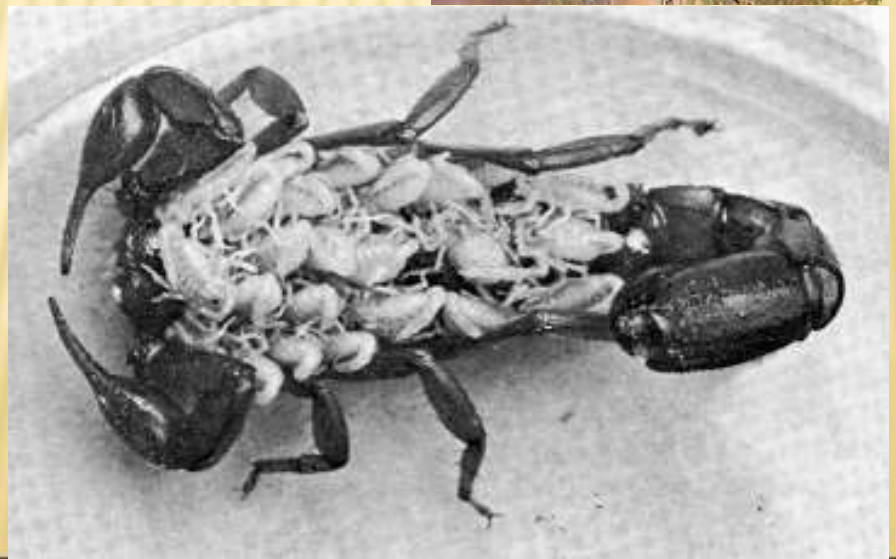


Figure 4. Internal structure of the salticid principal eye. Below: position of eye in cephalothorax: Above: light passes through a corneal lens and down an eye tube where it is magnified by a second lens before falling onto a four-layered retina. Layers II-IV function in colour vision. Layer I functions in high-acuity perception of shape and form.

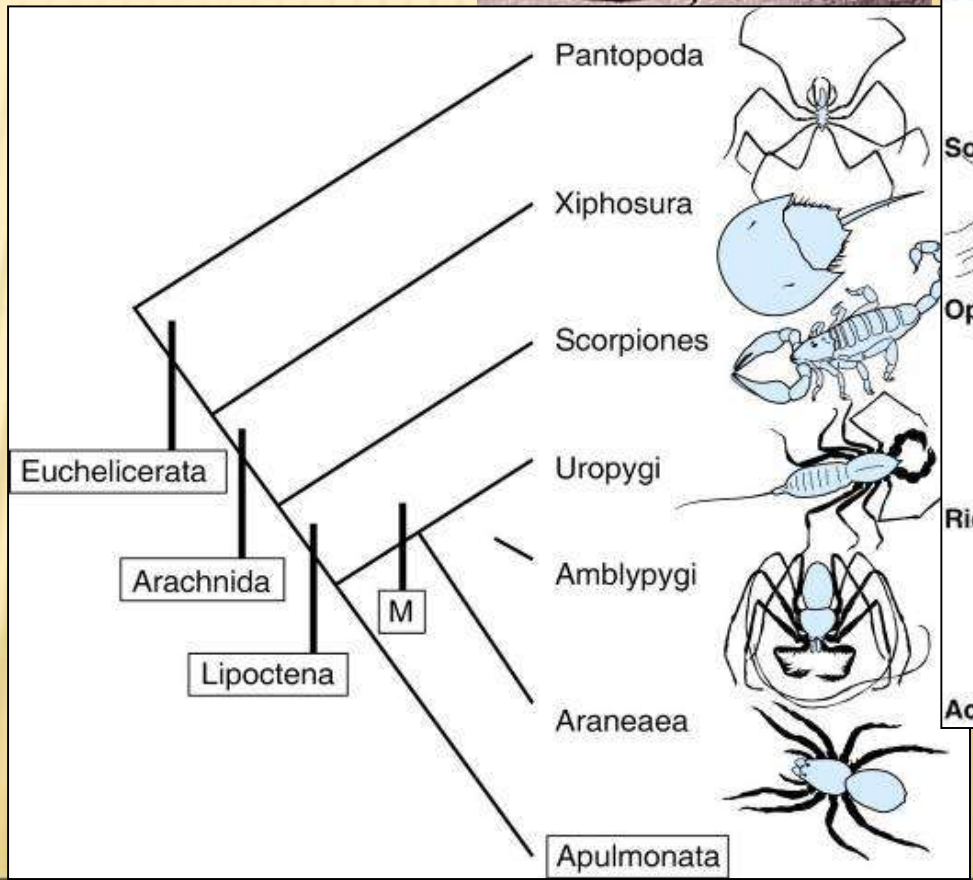
CHELICERATA - KLEPÍTKATCI

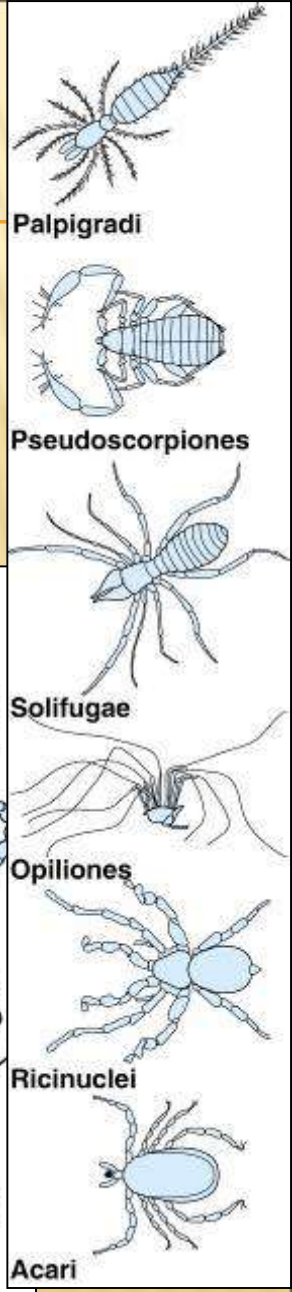
- ecology
  - Merostomata - marine
  - Arachnida - terrestrial
- reproduction



CHELICERATA

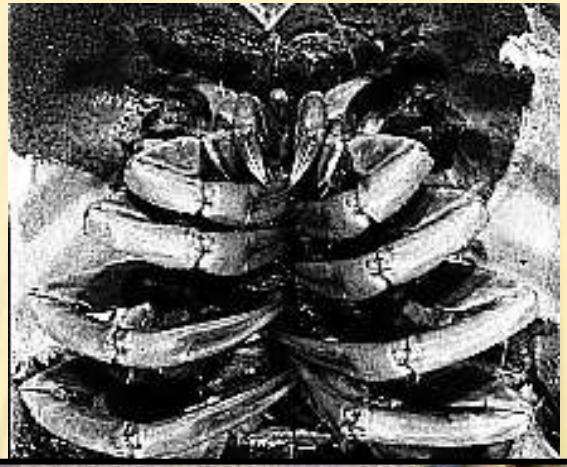
- system - 74 000 spp.
- Merostomata
  - Xiphosura, Eurypteryda +
- Arachnida
  - Schizomida
  - Uropygi
  - Amblypygi
  - Aranea – 34 000
  - Palpigradi
  - Acari - 30 000
  - Ricinulei
  - Solifugae - 900
  - Pseudoscorpiones
  - Scorpiones - 1 300
  - Opiliones - 5000

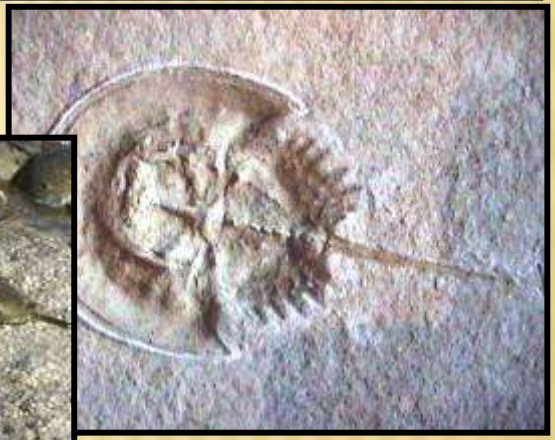




CHELICERATA

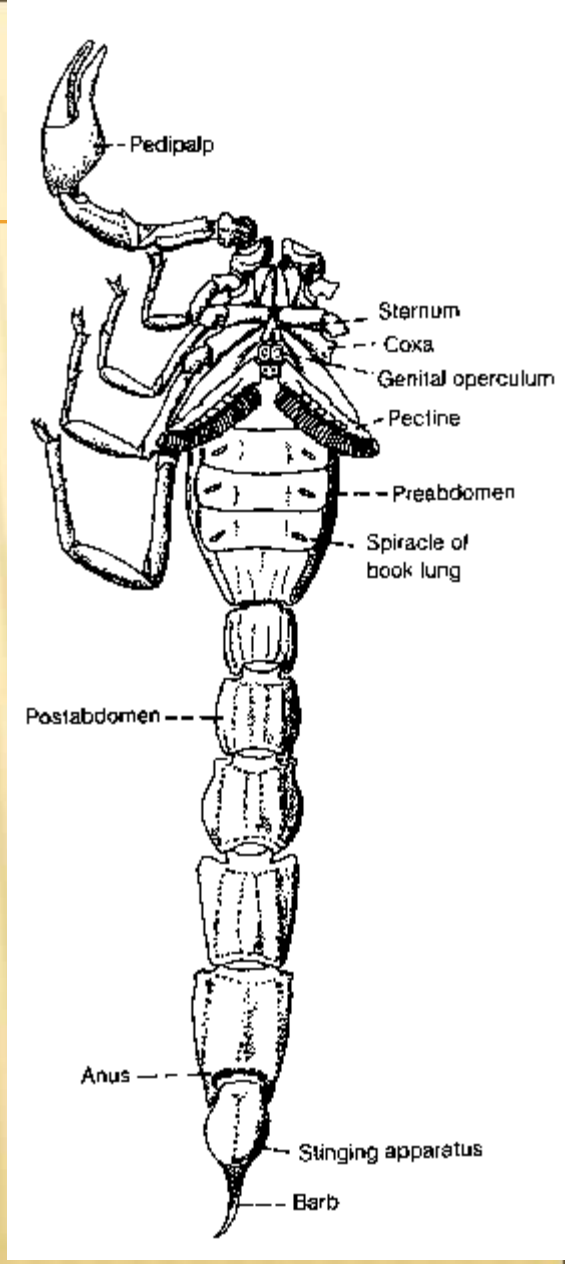
- Xiphosura - horseshoe crabs





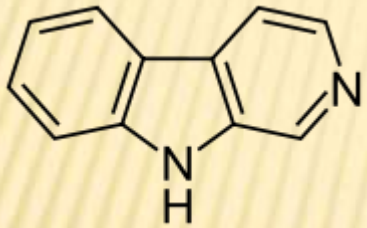
CHELICERATA - KLEPÍTKATCI

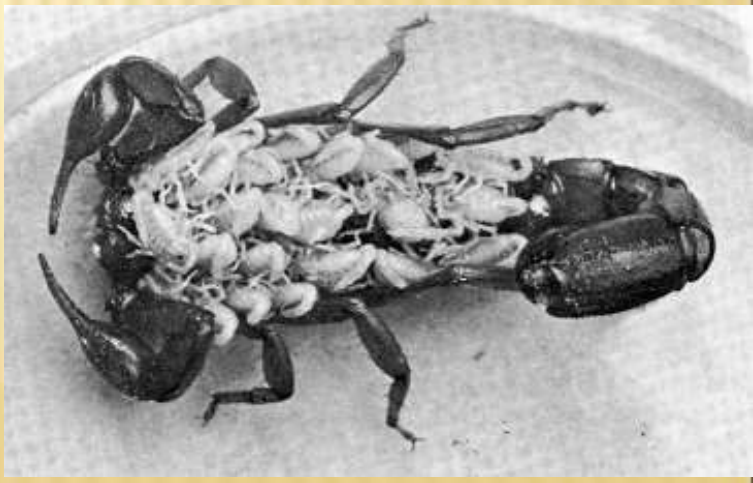
- Scorpiones – scorpions
  - venom
    - neurotoxins
      - potassium (K+) channel blocking peptides
      - small-conductance chloride channels
    - enzyme inhibitors



CHELICERATA - KLEPÍTKATCI

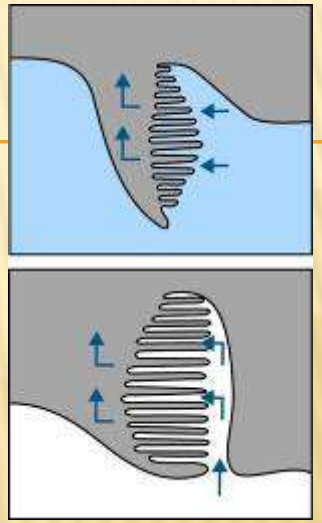
- Scorpiones – scorpions
  - UV glowing
    - beta-carboline

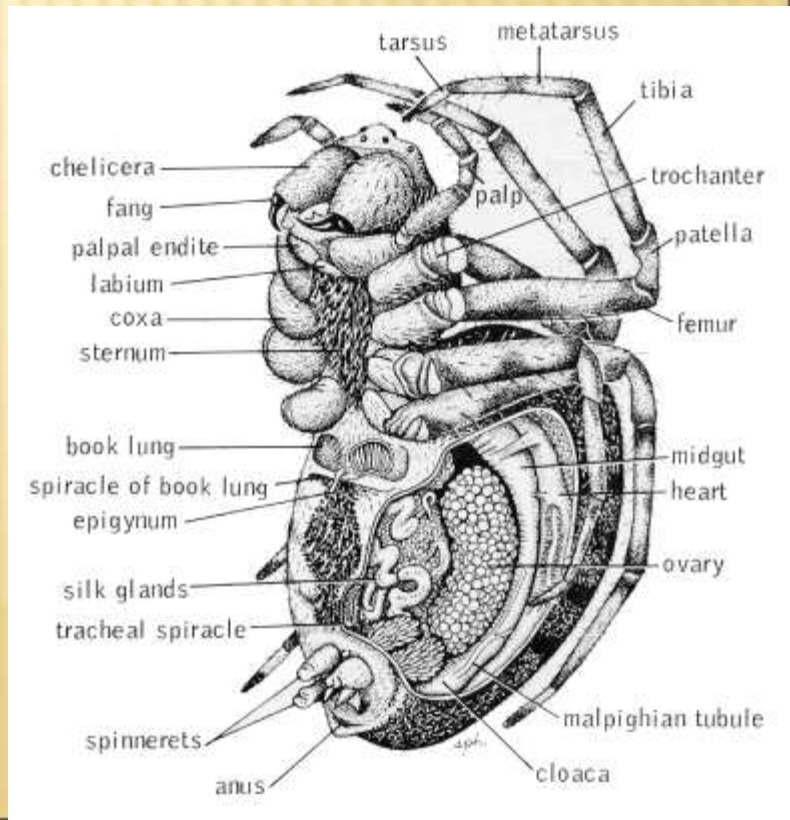




CHELICERATA

- breathing
  - book lungs from gills
    - lamellae
  - pseudotracheae
    - spiracles
  - hemocyanin
  - excretion: Malpighian tubules
    - guanine



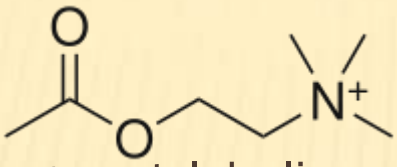


CHELICERATA

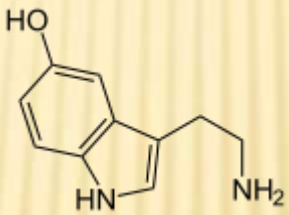
- Aranea - spiders

CHELICERATA

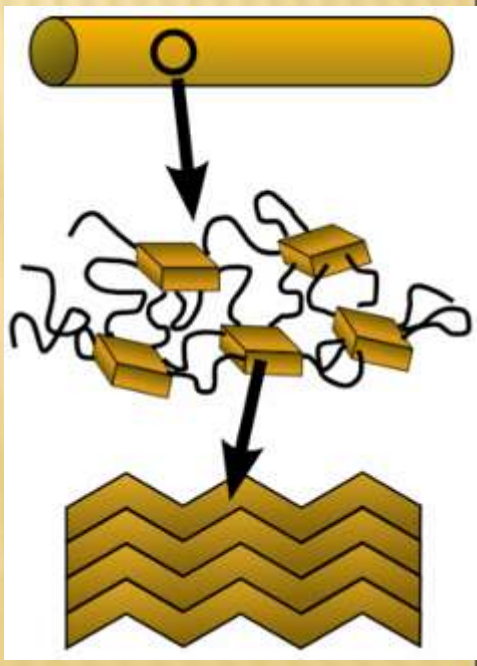
- Aranea - spiders
  - venom
    - neurotoxic



      - protein, releasing acetylcholine
      - opening sodium channels



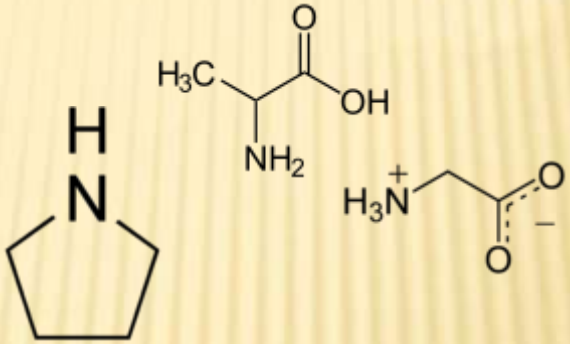
      - serotonin
    - necrotic
      - sphingomyelinase
  - external digestion (liquid feeders)
    - digestive enzymes

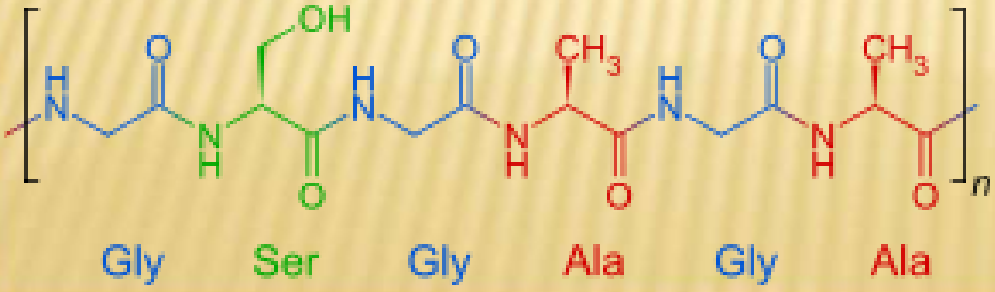


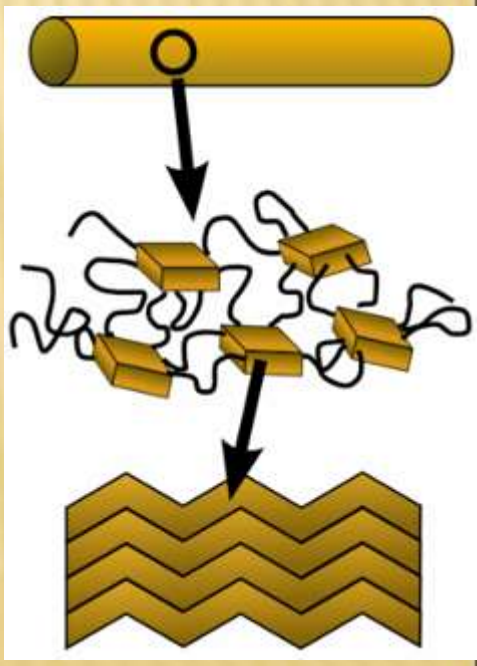
CHELICERATA

- Aranea - spiders

  - web: silk
    - fibroin, sericin
    - glycine and alanine
    - pyrrolidine (moist glue)
    - potassium hydrogen phosphate
      - (acidic antimicrobial)

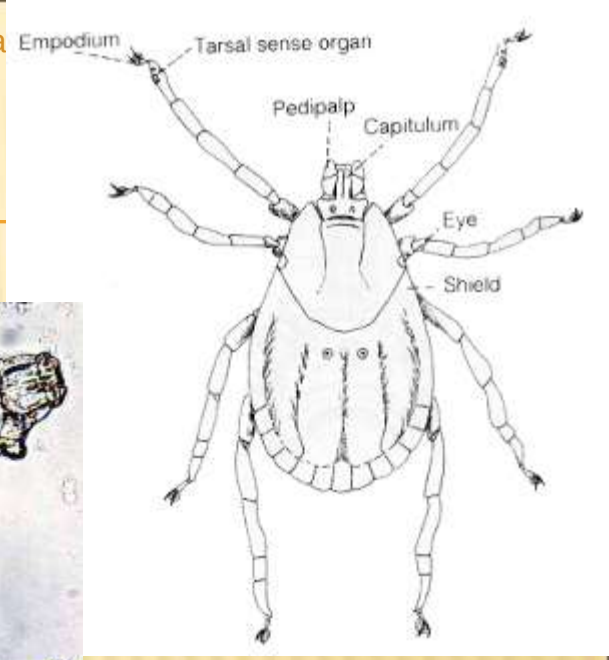






CHELICERATA

- Acari - ticks, mites

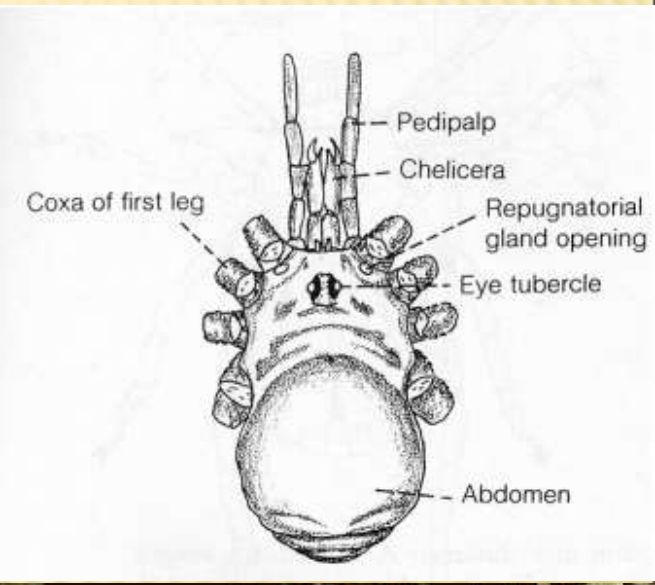


CHELICERATA

- ticks: *Ixodes*, *Dermacentor*,
  - neurotoxin produced in the tick's salivary gland
  - paralysis
  - failure of acetylcholine release

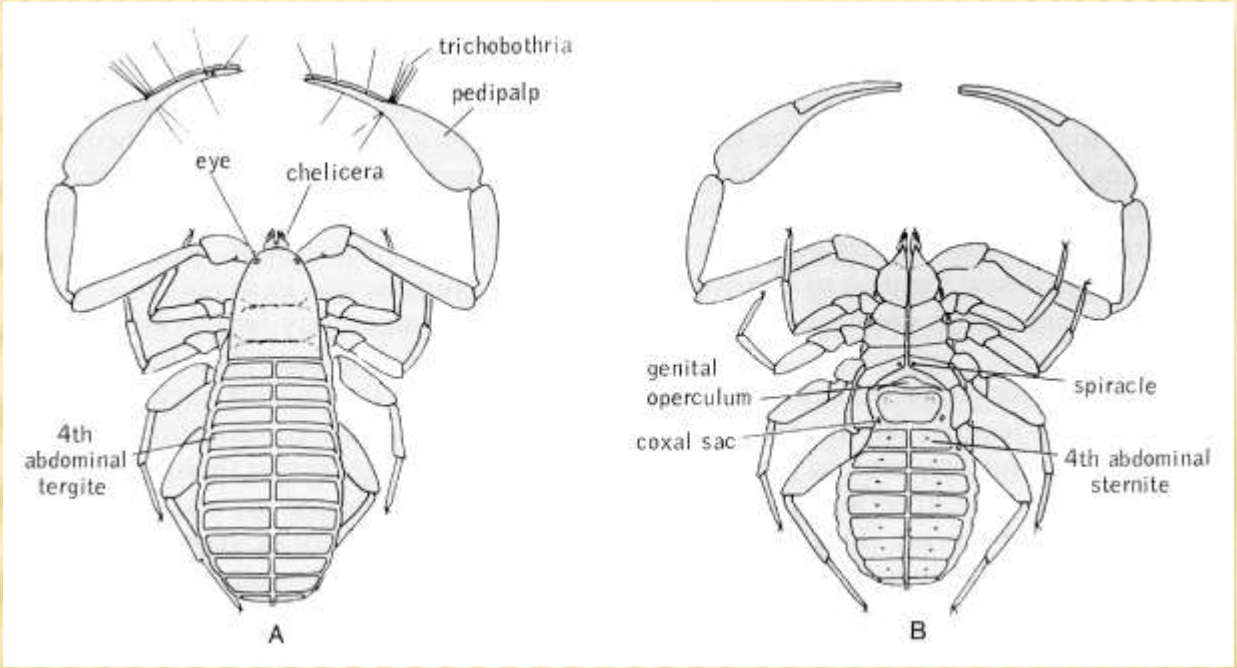
CHELICERATA

- Opiliones – harvestmen
- (Daddy Longlegs)



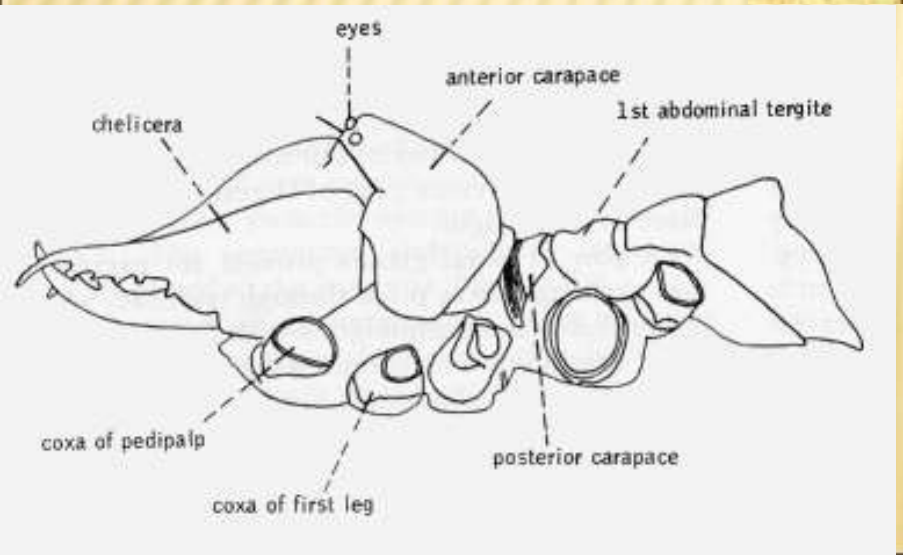
CHELICERATA

- Pseudoscorpiones - false scorpions



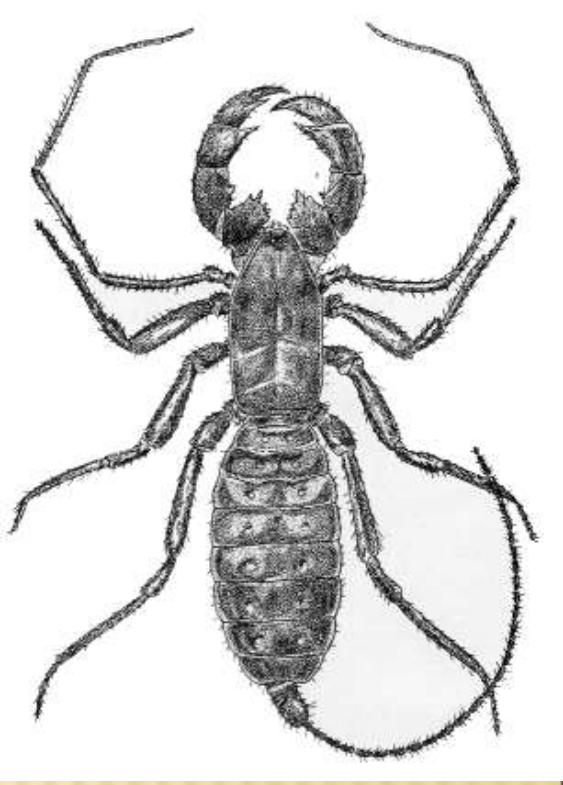
CHELICERATA

- Solifugae = Solpugida – camel spider

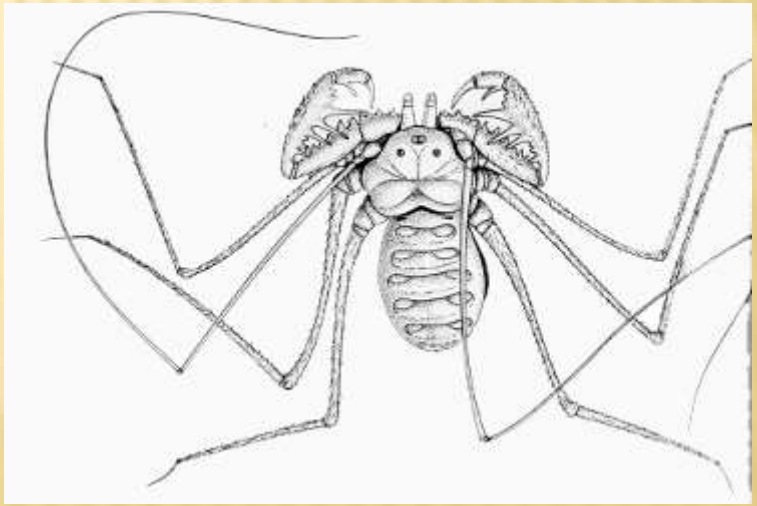


CHELICERATA

- Uropygi - whip scorpions



- Amblypygi -



CHELICERATA

- Palpigradi
- Schizomida
- Ricinulei