



# ✘ Biology of animals



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# ARTHROPODA

✘ system

+ Trilobita

+ Pycnogona

+ Chelicerata

+ Myria

+ Crust



University of Nebraska  
Department of Entomology



# MYRIAPODA

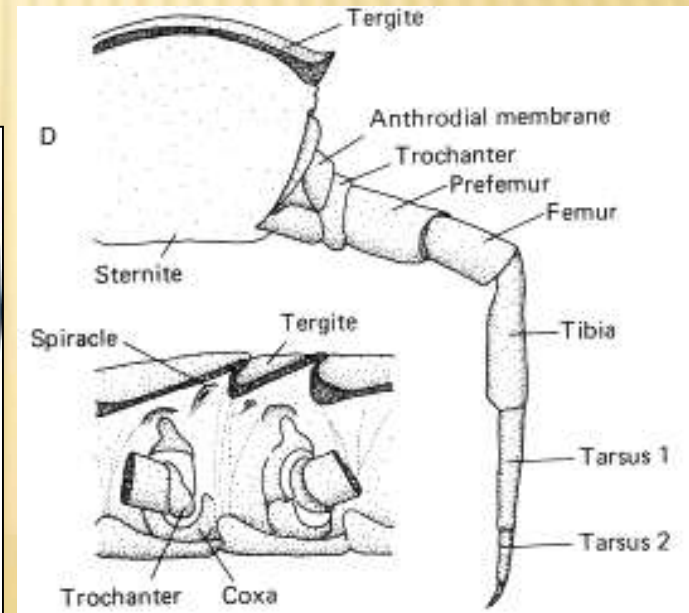
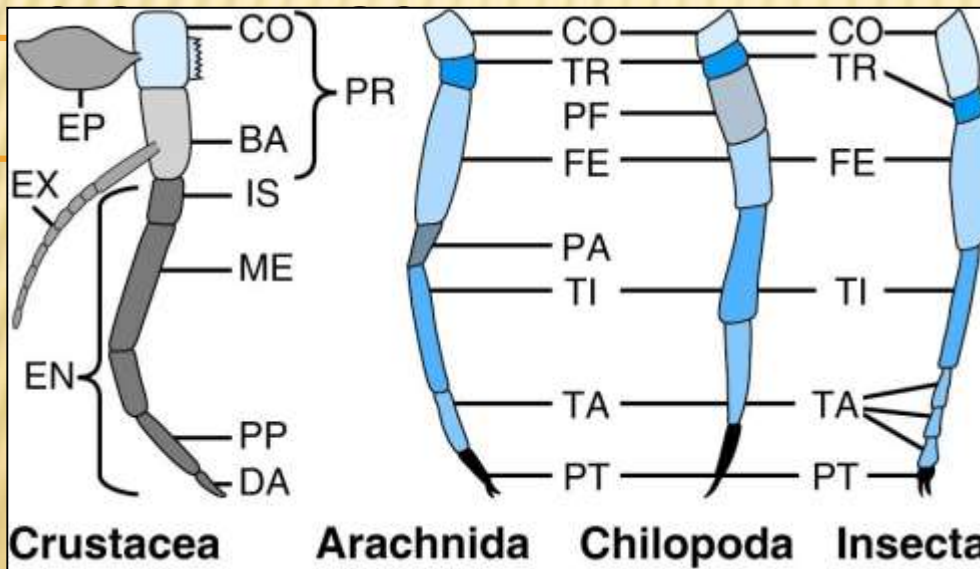
✘ body plan

+ head, trunk

✘ 1 pair antennae

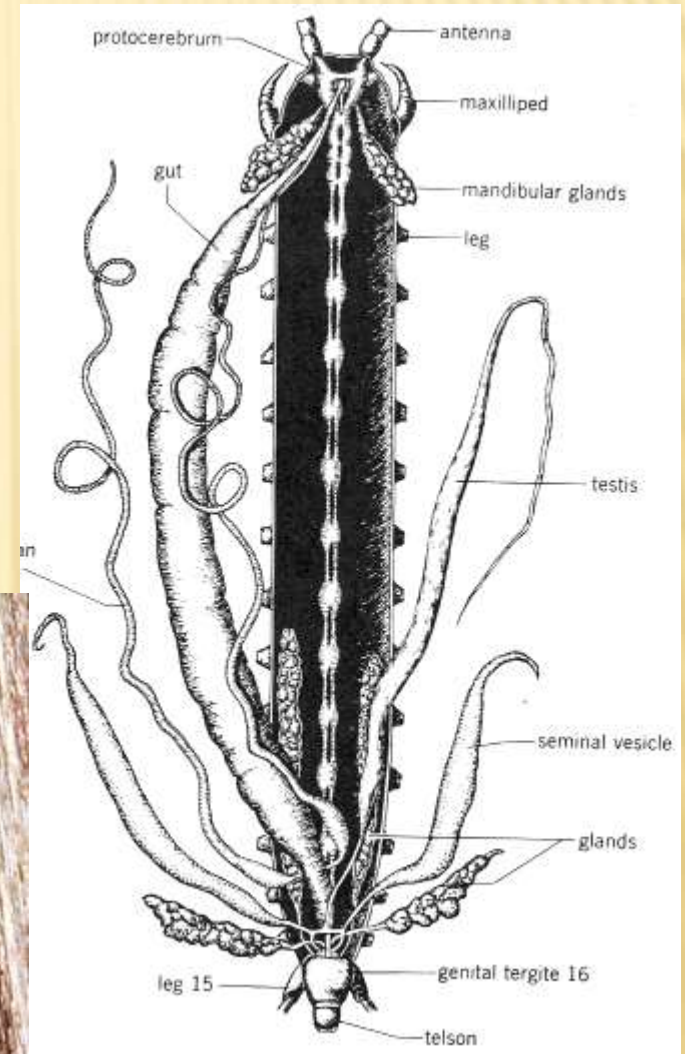
✘ mandibles

✘ 1-2 pairs maxillae



# MYRIAPODA

- cuticle
  - without wax
    - water permeable
  - calcified in millipedes



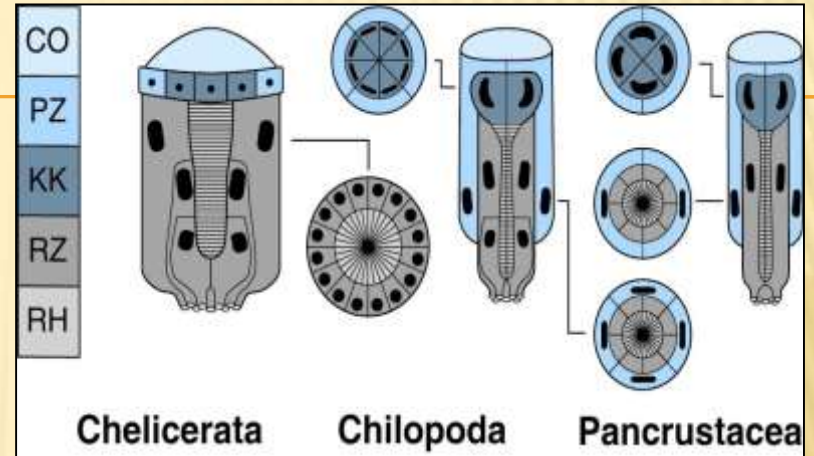
# MYRIAPODA

## ✗ senses

### + eye

✗ cornea, lens, retina

✗ simple or composed



## ✗ respiration

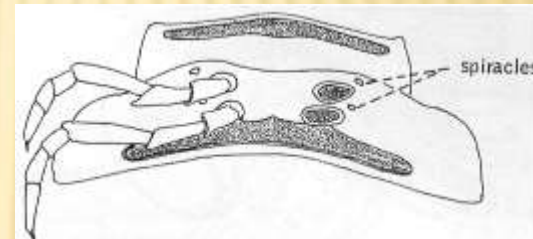
### + tracheae

✗ branched to tissues

+ spiraculum, atrium can be closed

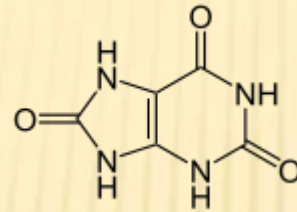
### + plastron

✗ survival in submerged state



# MYRIAPODA

- ✗ excretion
  - + Malpighian tubules
    - ✗ uric acid
- ✗ reproduction
  - + gonochorists
  - + courtship
- ✗ development
  - + anamorphy
  - + epimorphy



# MYRIAPODA

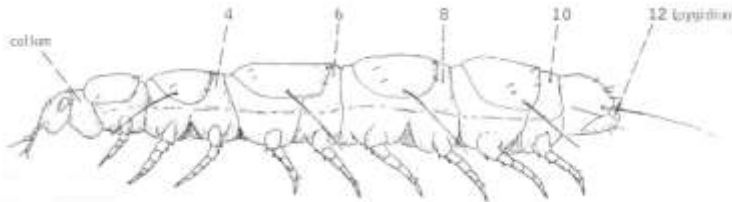
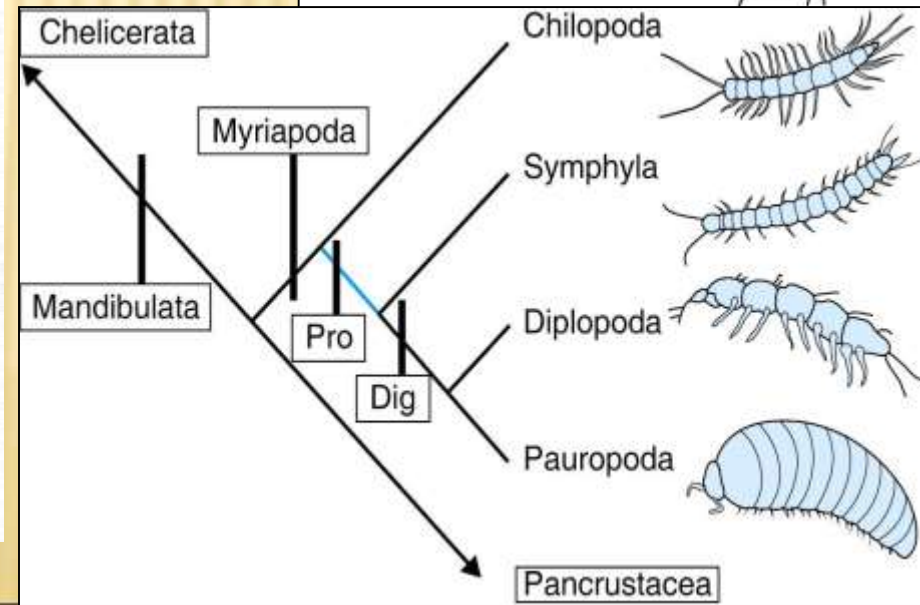
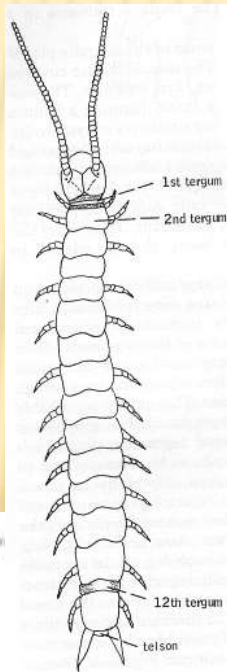
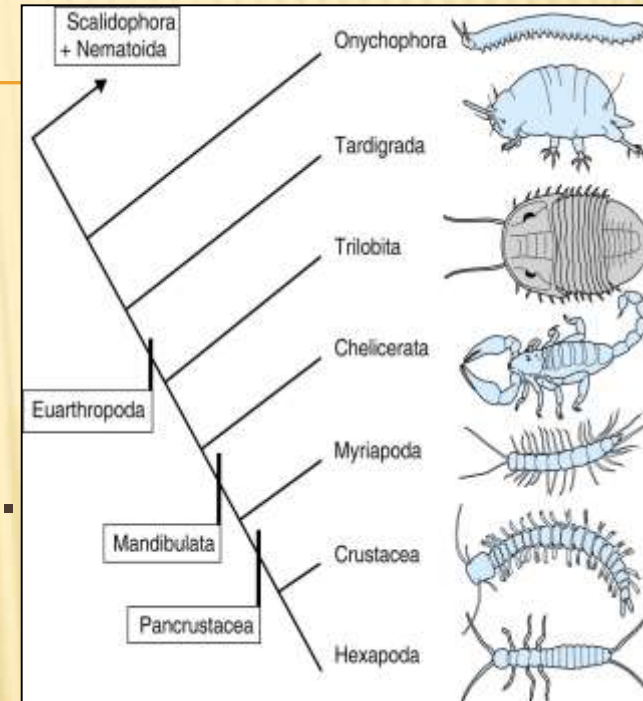
✘ system - 13 000 spp.

+ Chilopoda – centipedes: 3 000 spp.

+ Symphyla

+ Diplopoda – millipedes: 10 000 spp.

+ Pauropoda



# CHILOPODA

- +centipedes, stonôžky, Hundertfüße  
centopiedi, százlábú
- +сороконожки
- +1. trunk segment
  - ×maxillipedes = forcipules
  - ×venom gland
  - ×cytolysin
  - ×5-hydroxytryptamine
  - ×hemolytic phospholipase
  - ×cardiotoxic protein





# CHILOPODA

+Scolopendromorpha – (550 (2) spp.)

×21-23 leg pairs

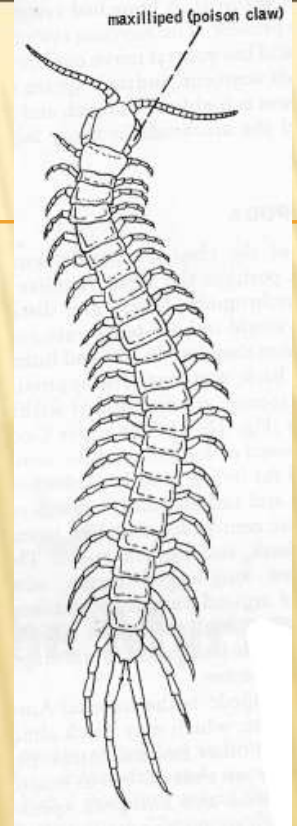
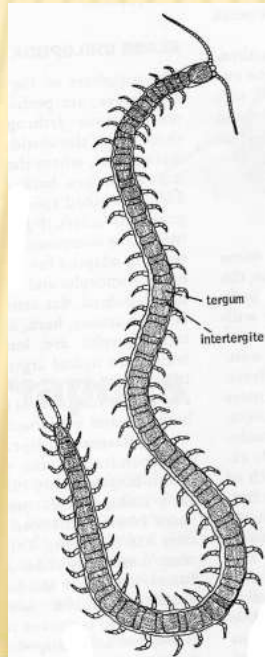
×epimorphic

×30 cm, tropical

+Geophilomorpha – (1100 (22) spp.)

×31-181 leg pairs

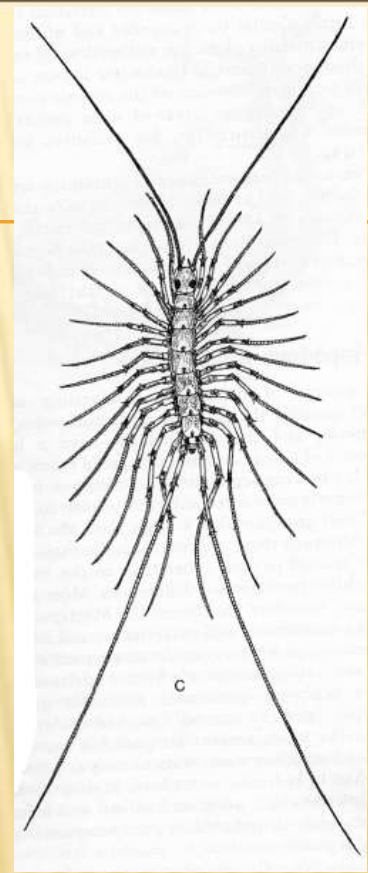
×epimorphic !



# CHILOPODA

## +Scutigeroidea – (80 (1) spp.)

- × 15 long leg pairs
- × anamorphic
- × hemocyanin
- × composed eyes
- × 42 cm/s



## +Lithobiomorpha – (1500 (40) spp.)

- × 15 leg pairs
- × anamorphic
- × 28 cm/s

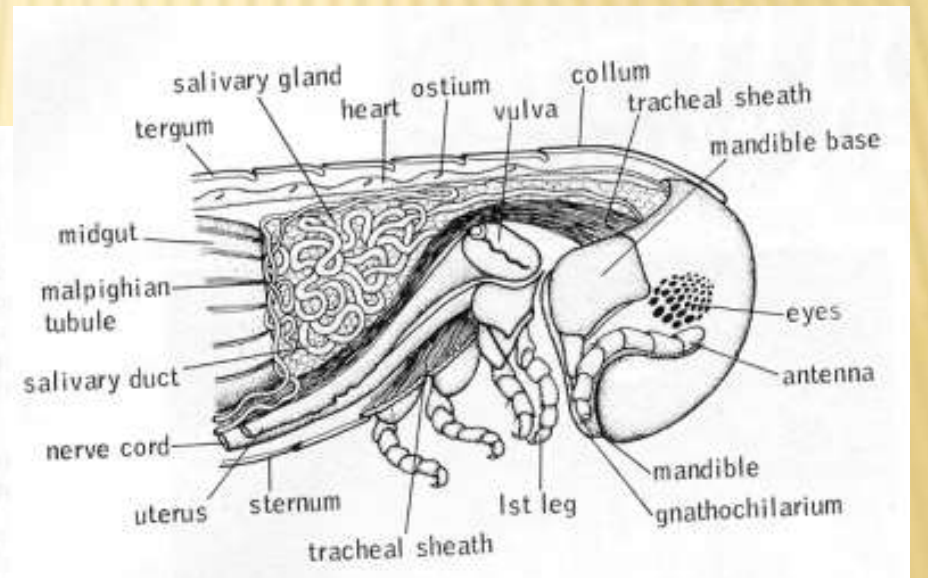
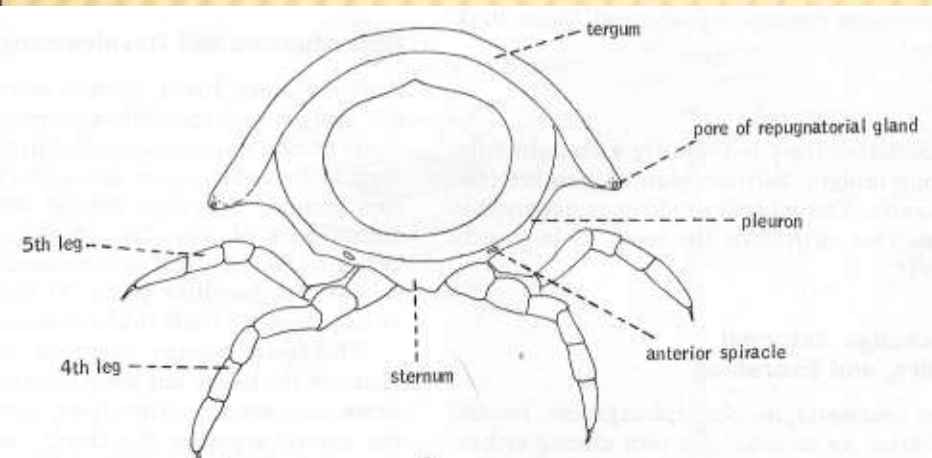
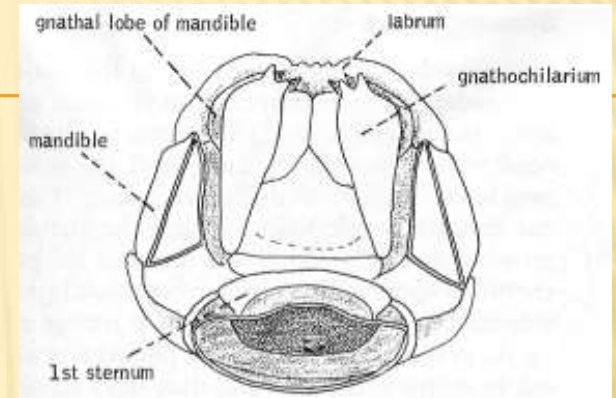


# CHILOPODA



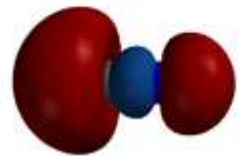
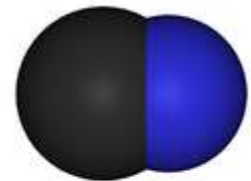
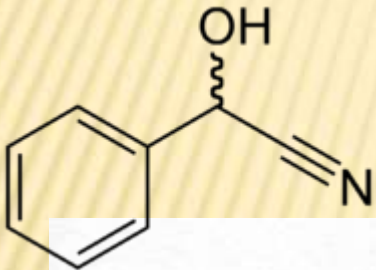
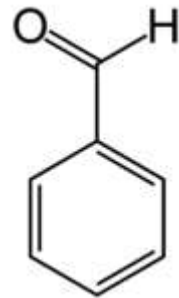
# DIPLOPODA

- + millipedes, mille-pattes, Tausendfüßler
- + anamorphic
  - × six legged larvae
- + diplosegments
  - × 2-280 mm



# DIPLOPODA

- defence: repugnatoric glands
- alkaloids
- chinones
- gas hydrocyanate
  - mandelonitrile -> HCN and benzaldehyde



# DIPLOPODA

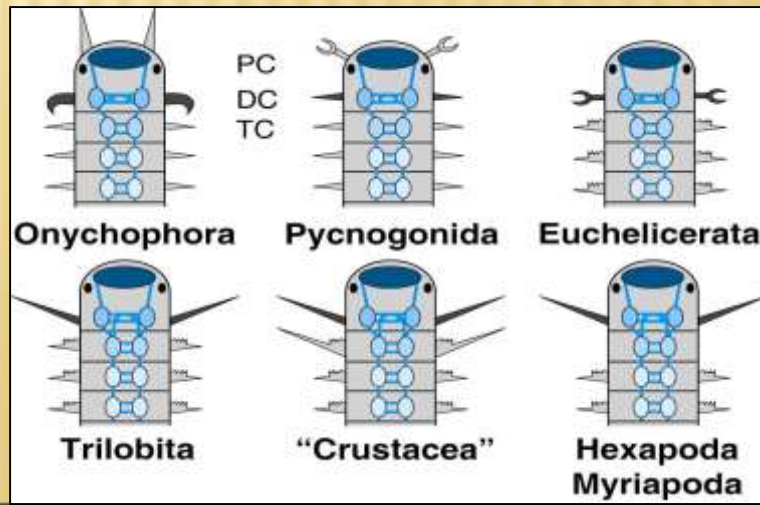
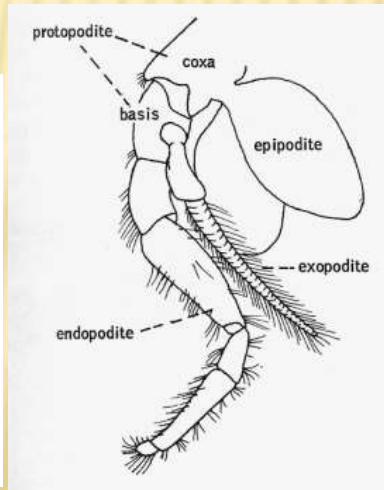
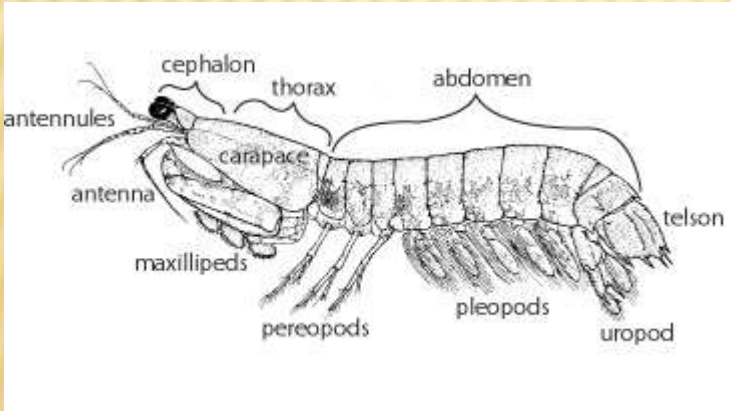
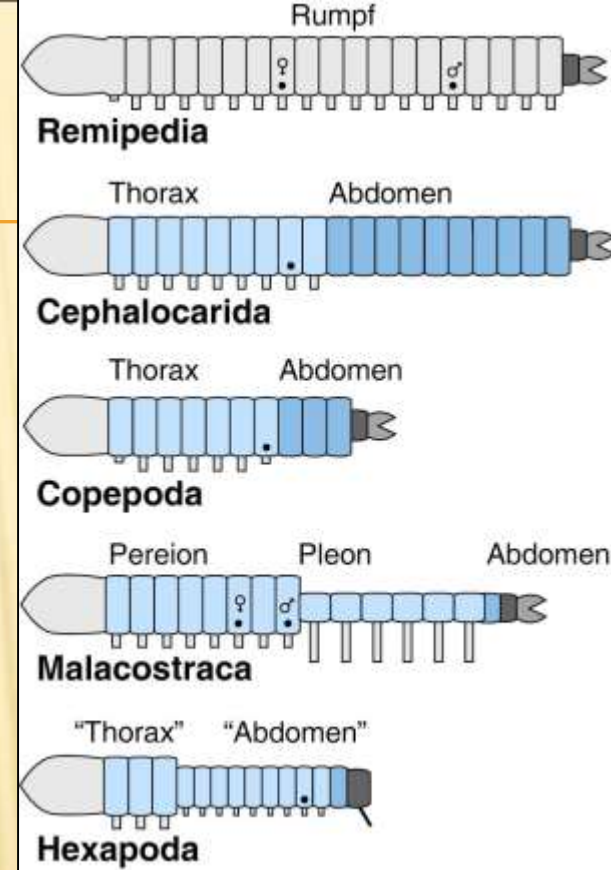
- + Polyxenida
- + Glomerida
- + Spirobolida
- + Spirostreptida
- + Julida
- + Polydesmida



# CRUSTACEA

## ✘ body plan

- +tagmatisation
- +appendages segmented, branching
- +head - caput, cephalon
- +carapax



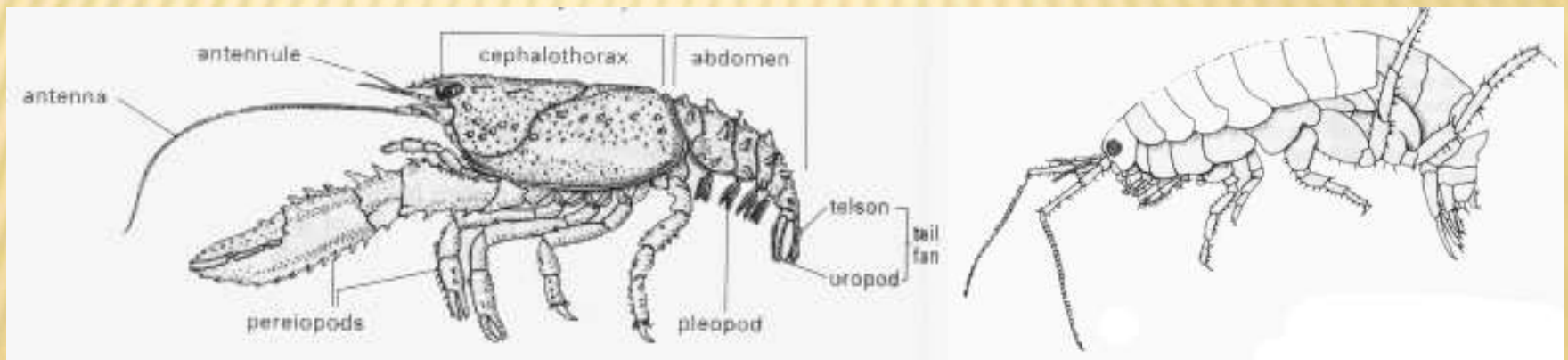
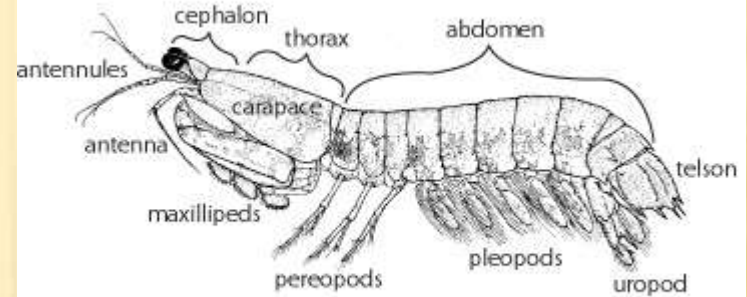
# CRUSTACEA

## ✘ body plan

+thorax, pereion

+abdomen, pleon

+telson – locomotory function





# CRUSTACEA

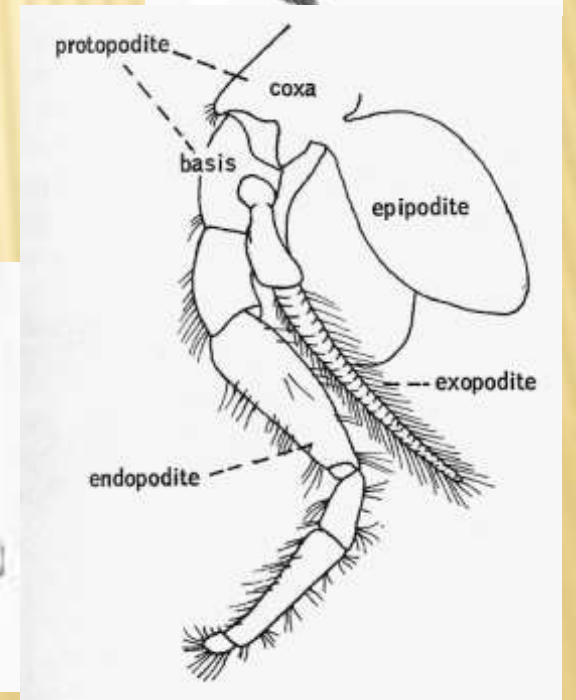
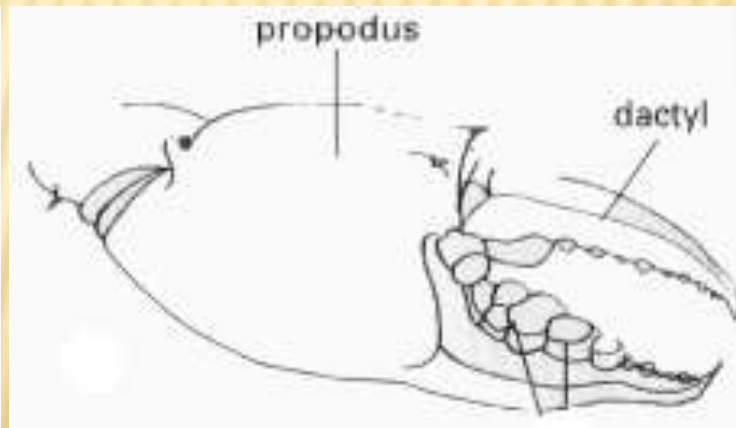
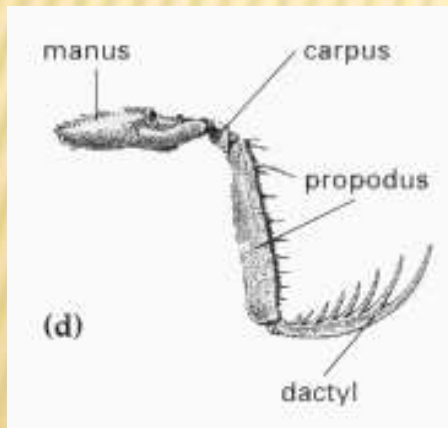
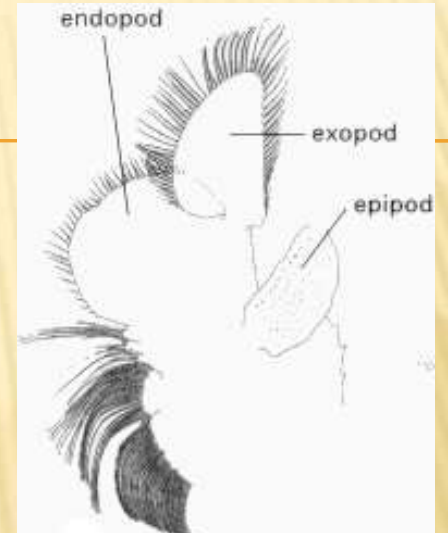
## ✗ body plan

+leg: 1-3 branches:

✗ endopod

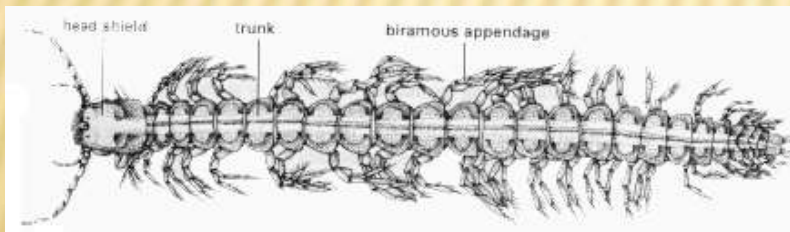
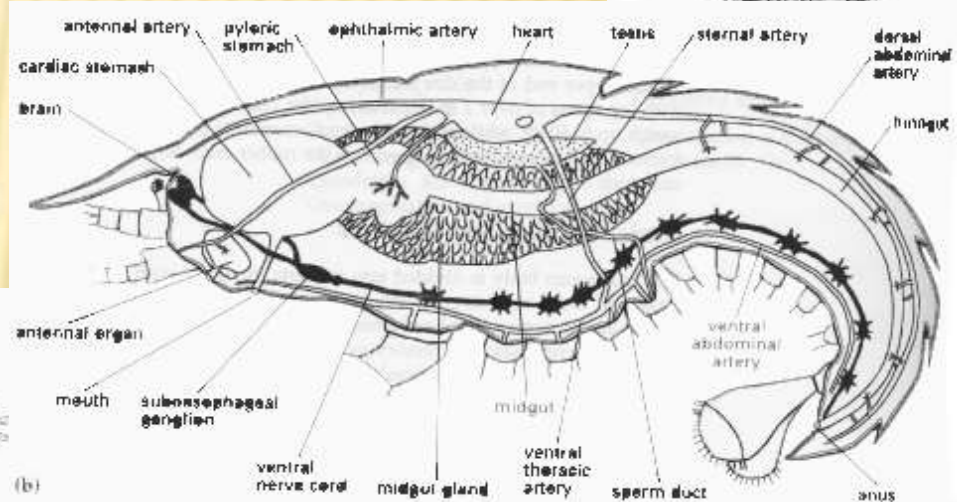
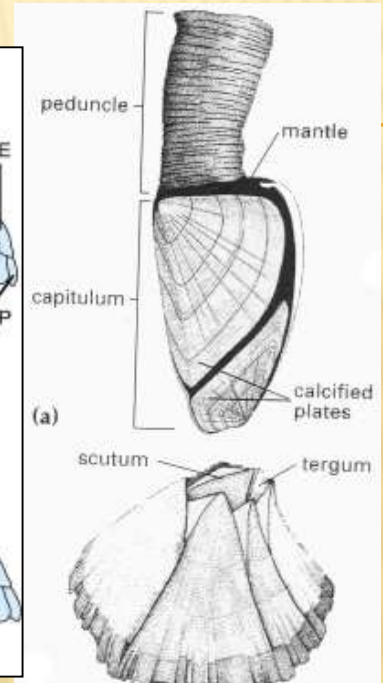
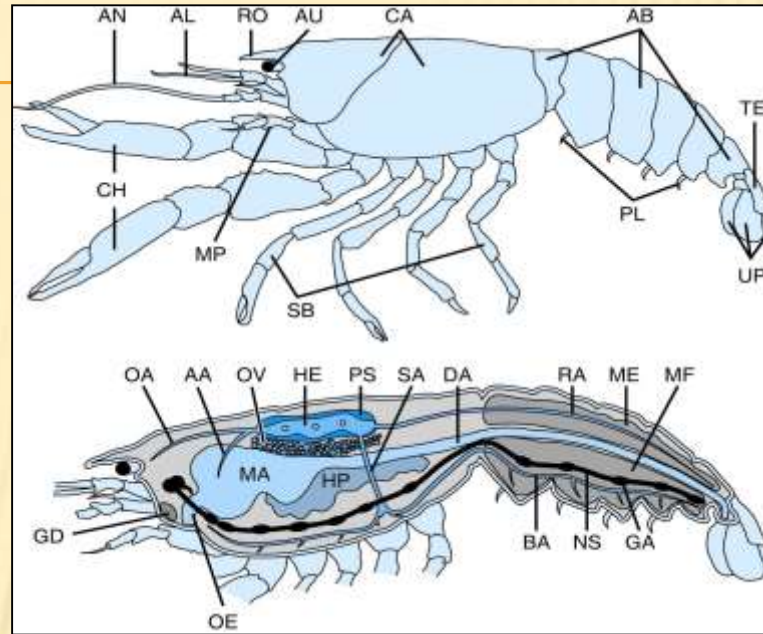
✗ epipod

✗ exopod

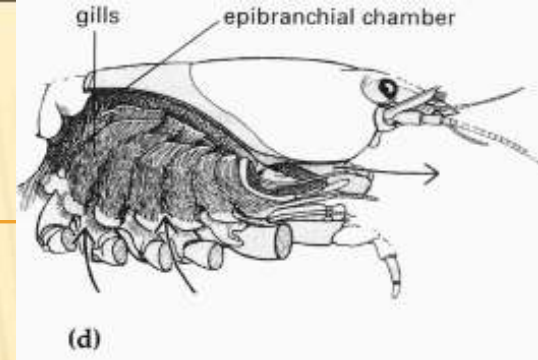


# CRUSTACEA

- ✘ cuticle
  - + calcified
- ✘ movement
  - + crawling
  - + swimming
  - + sedentary



# CRUSTACEA



## ✗ respiration

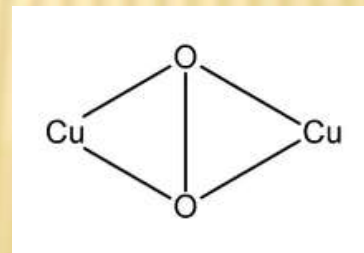
+ gills - branchiae (= Branchiata x Tracheata)

+ blood pigments dissolved in hemolymph

✗ hemocyanin - Cu

+ lungs in terrestrial crabs

+ pseudotracheae in pleopods of woodlice



# CRUSTACEA

## ✘ circulatory organs

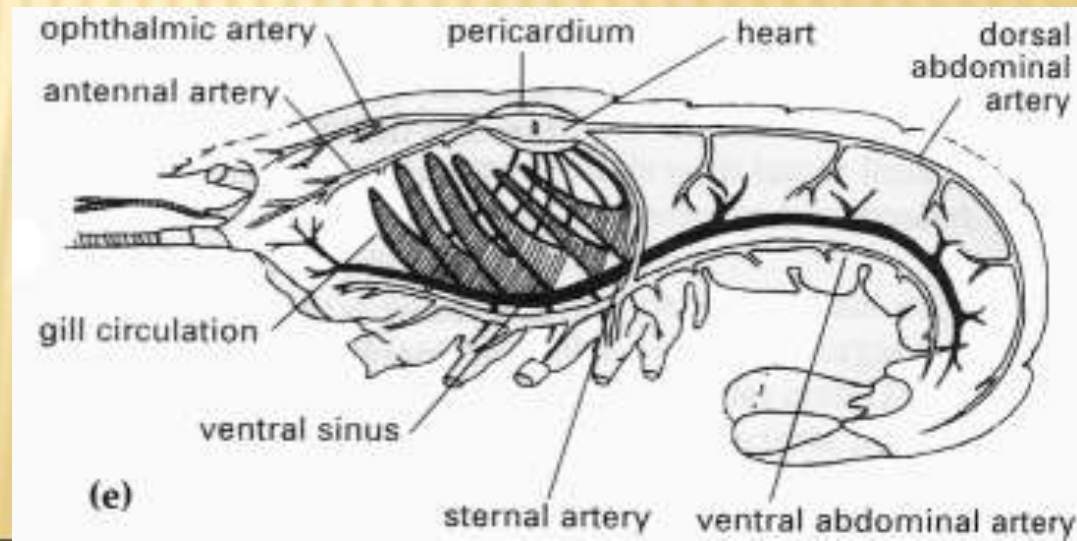
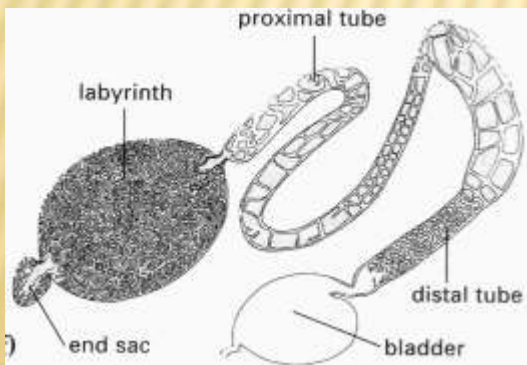
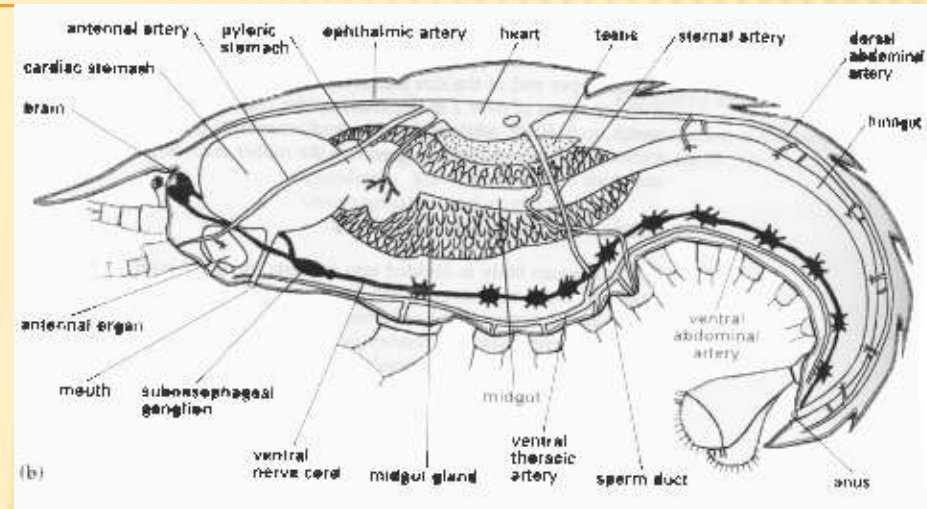
+open

+dorsal artery, heart

## ✘ excretory organs

+antennal or maxillary gland

+osmotic equitability



# CRUSTACEA

## ✘ nervous system

+ ladder

## ✘ senses

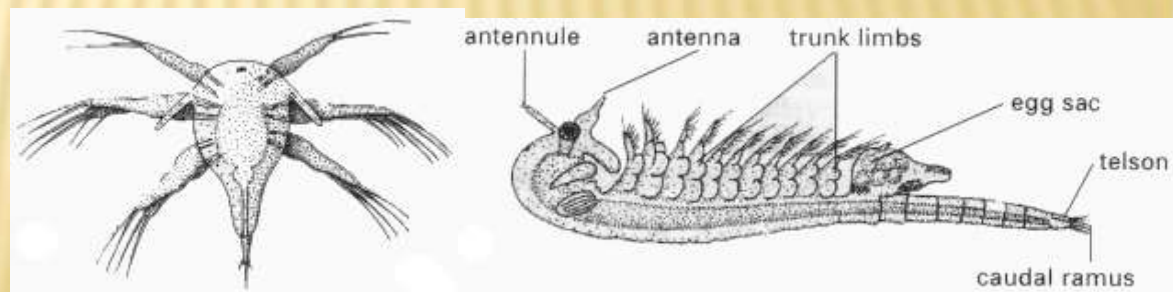
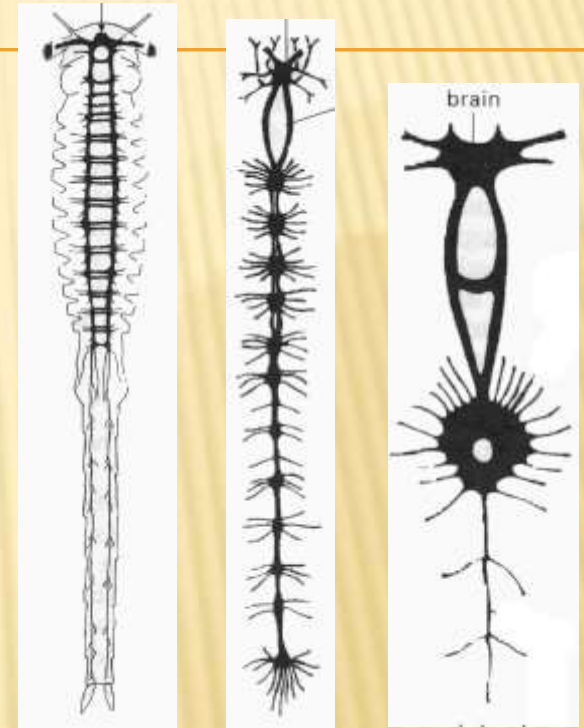
+ nauplius eye

+ composed eyes

+ sensoric hairs

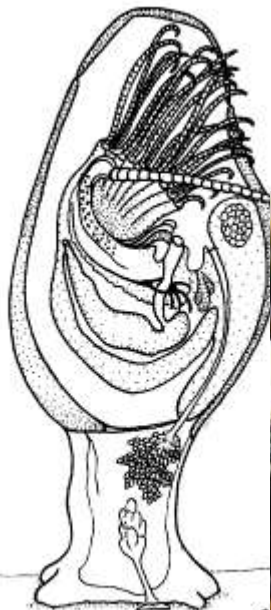
+ statocysts

+ magnetoreceptors



# CRUSTACEA

- ✗ reproduction
  - +gonochorists
  - +fertilisation inner or outer
    - ✗ pleopods in Decapoda
    - ✗ penis in barnacles



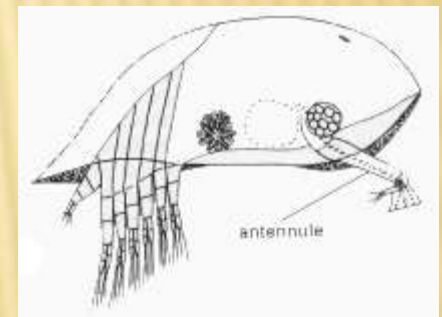
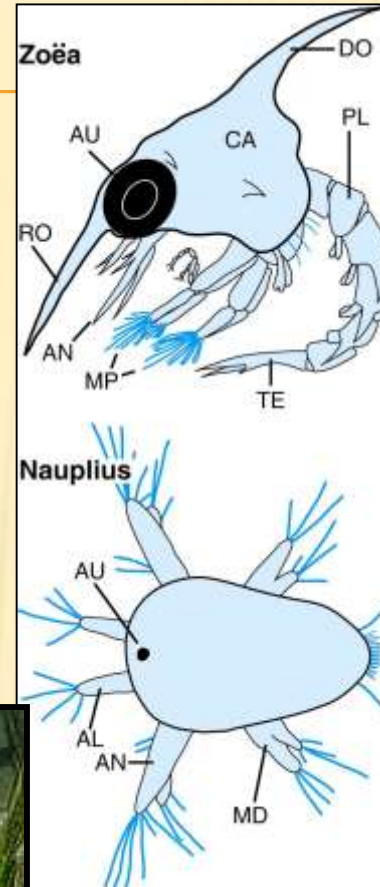
# CRUSTACEA

## ✗ vývoj

+ larva - nauplius

+ anamorphic -  
metamorphosis

✗ zoea, cypris, copepodit



# CRUSTACEA

## ✕ecology

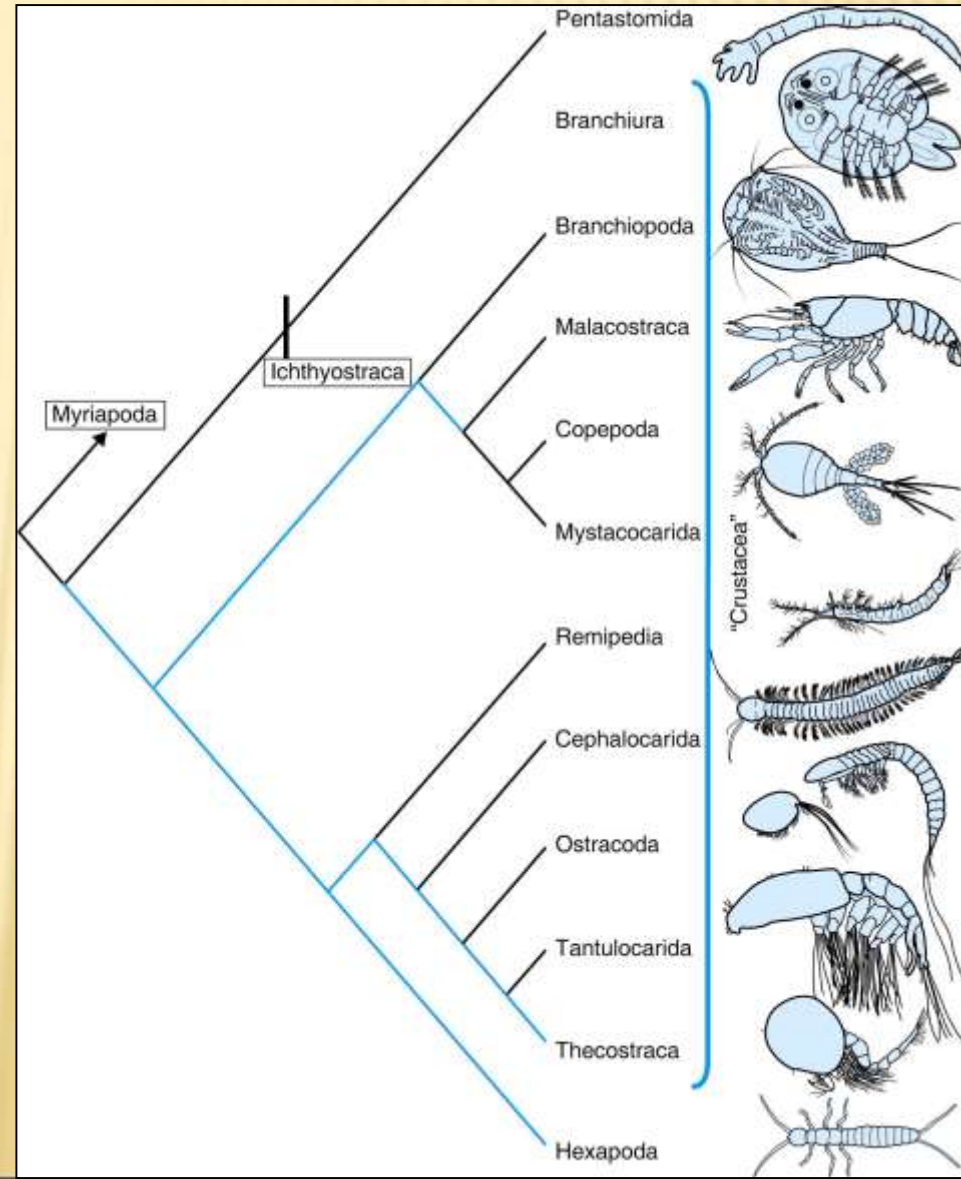
- +primarily marine
- +widespread (except inside plants)
- +benthic
- +pelagic
- +terrestrial





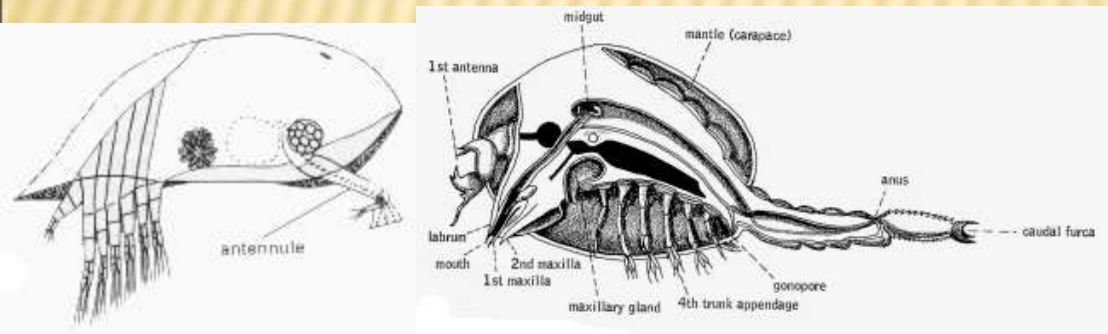
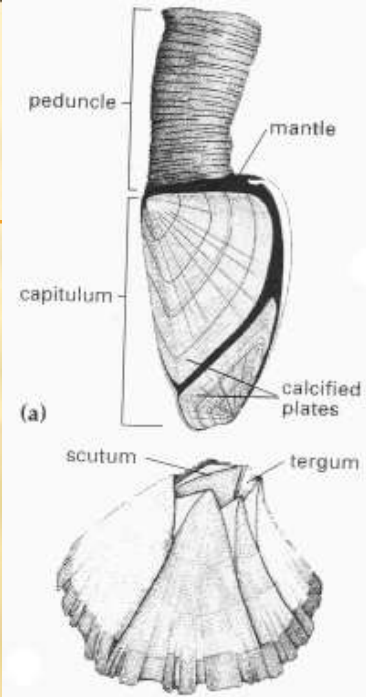
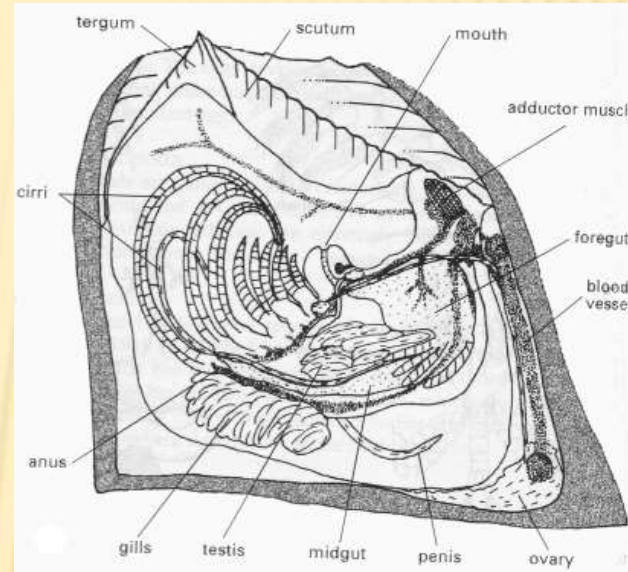
# CRUSTACEA SYSTEM - 75 000 SPP.

- + Remipedia - 12
- + Malacostraca - 21 000
- + Phyllocarida
- + Cephalocarida
- + Branchiopoda - 800
- + Maxillopoda - 18 000
  - × Tantulocarida
  - × Branchiura
  - × Pentastomida
  - × Ostracoda
  - × Copepoda
  - × Thecostraca



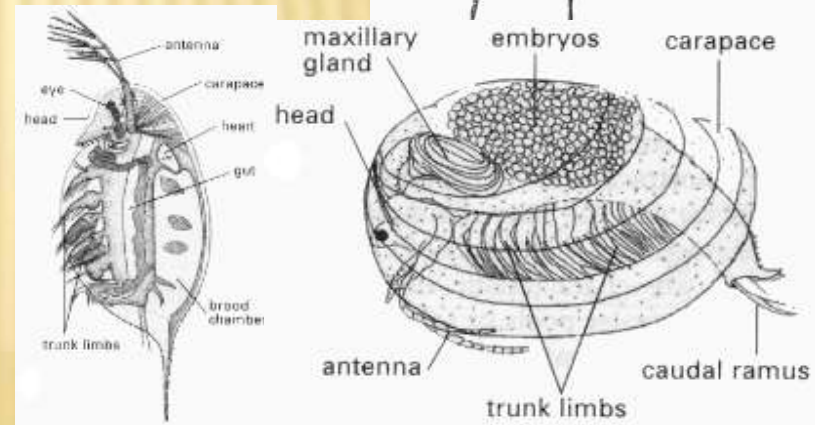
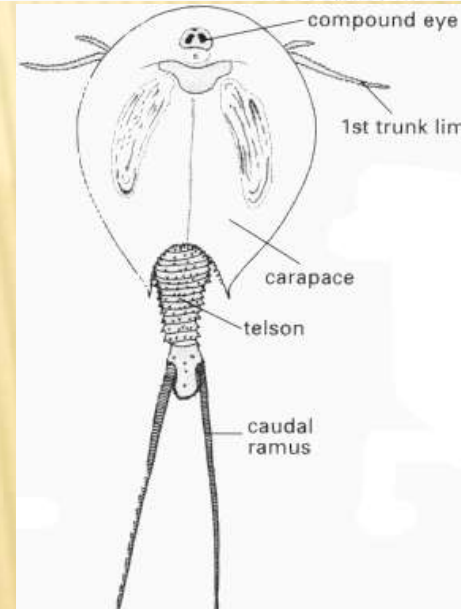
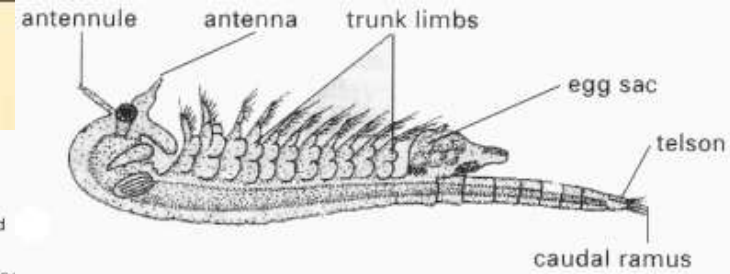
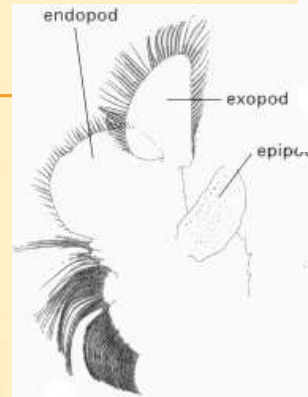
# THECOSTRACA

- + Cirripedia - barnacles
- + sedentary (sessile)
- + parasites (ecto- endo-)



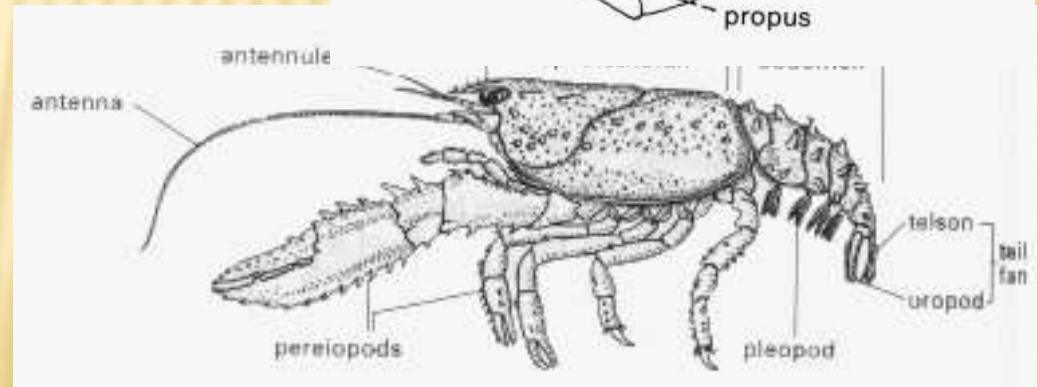
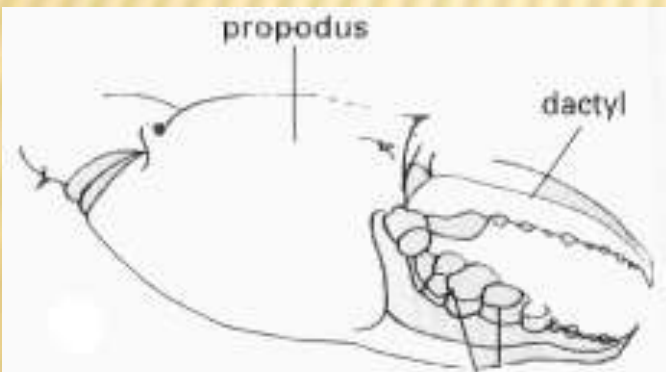
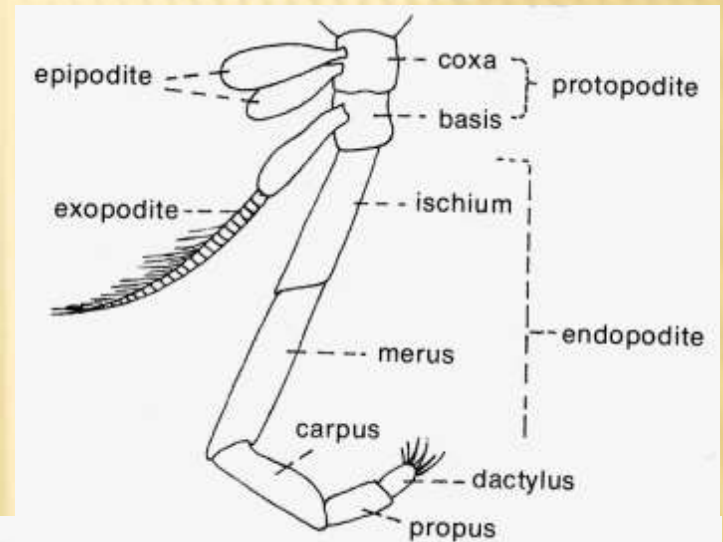
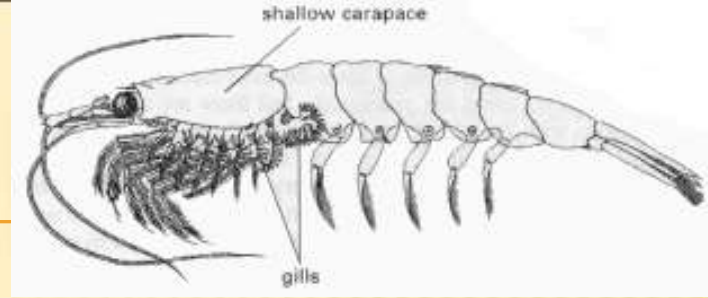
# BRANCHIOPODA

- + = Phyllopoda
- + leaf-like appendages
- + fresh water
- + Anostraca (=Sarcostraca) - fairy shrimps
  - × no carapax, upside-down, salt lakes
- + Notostraca - tadpole shrimps
  - × flat carapax, periodic ponds
- + Conchostraca - clam shrimps
- + Cladocera - water fleas
  - × non-paired composed eye
  - × heterogony, cyclomorphism, fresh water



# MALACOSTRACA

- +21 000 spp.
- +crayfish, lobster, prawn, crab, shrimp, woodlouse...
- +head forming carapax
- +pereion - 8 segments
  - × maxillipeds
  - × pereopods
  - × claws
- +pleon - 6 segments
  - × pleopods, uropods

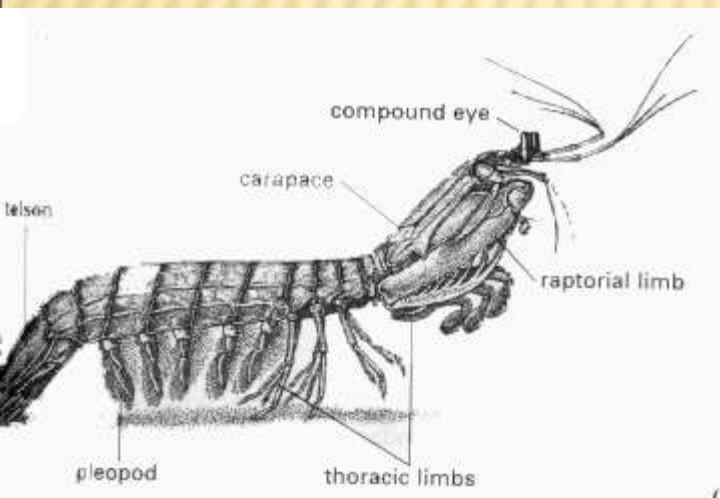
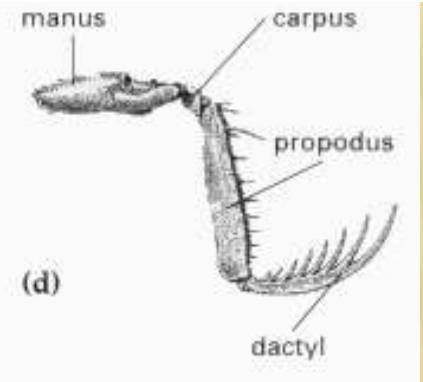


# MALACOSTRACA

+Stomatopoda – mantis shrimps

×predators

×polarized light vision



# MALACOSTRACA

## +Amphipoda

- ✗ maxilipeds and 7 pairs of pereopods
  - \* brood chamber
- ✗ laterally flattened
- ✗ marine, fresh water and terrestrial



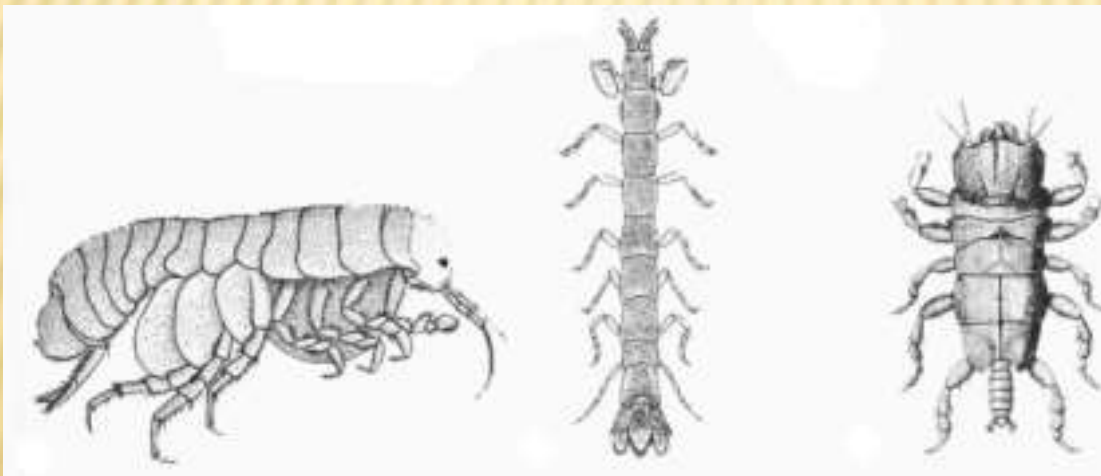
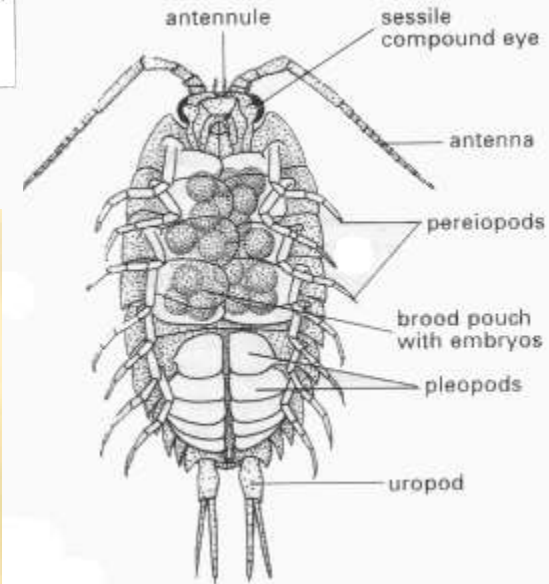
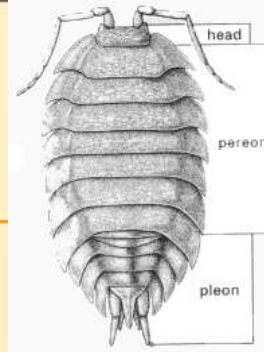
*Jassa slatteryi*

(Foto: S.G.L. Siqueira)

# MALACOSTRACA

## +Isopoda

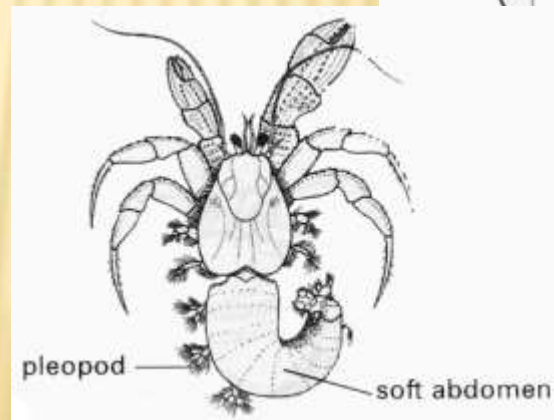
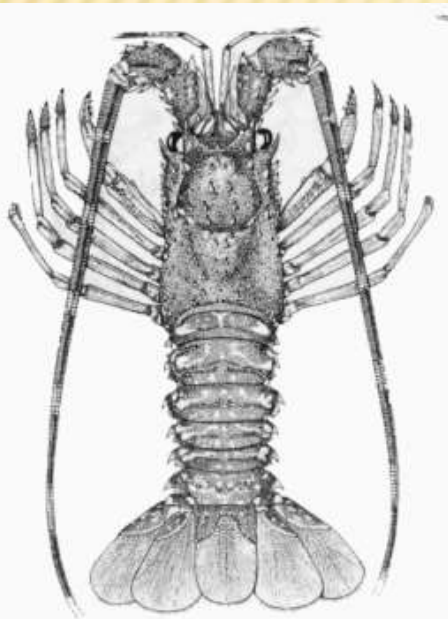
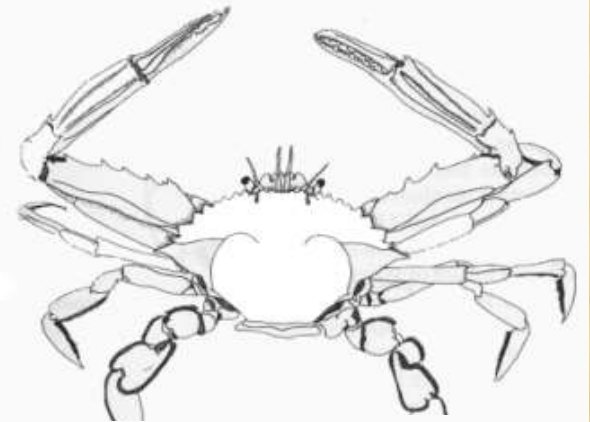
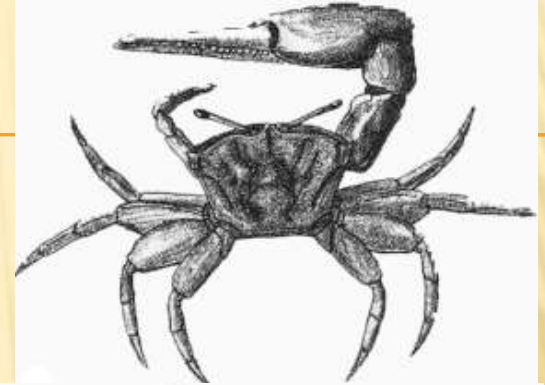
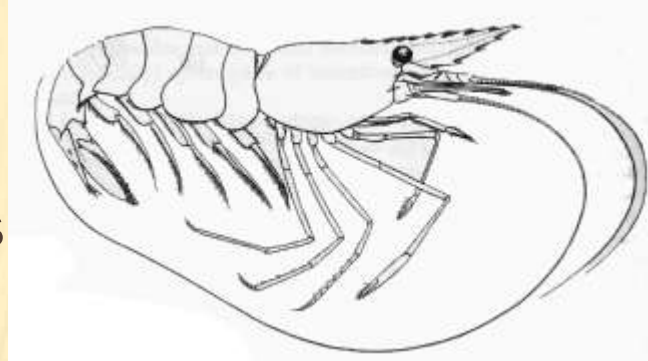
- ✗ maxillipeds and 7 pairs of pereopods
  - \* brood chamber
- ✗ dorsoventrally flattened
- ✗ marine, fresh water and terrestrial
- ✗ parasites



# MALACOSTRACA

## +Decapoda

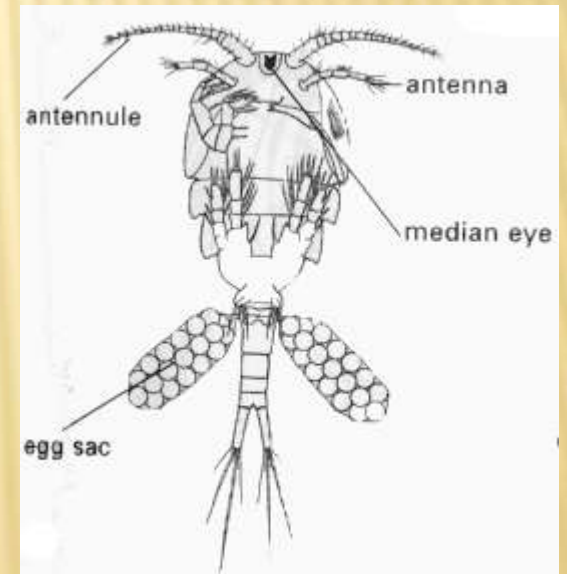
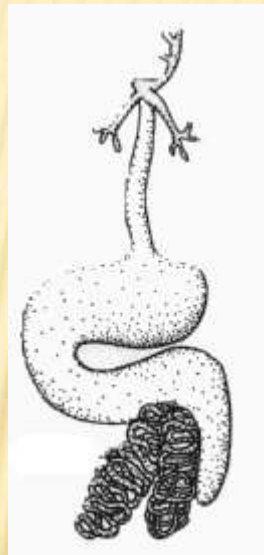
- × 3 x maxillipeds
- × 5 x pereopods
- × carapax
- × pleopods bear eggs





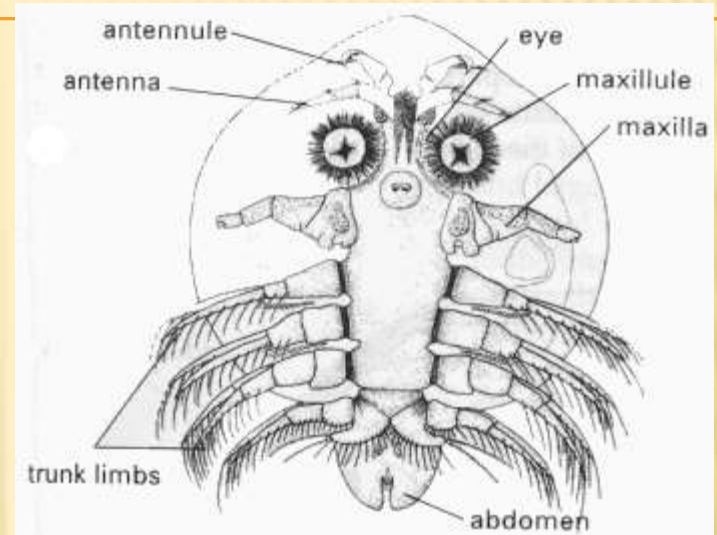
# COPEPODA

- +nauplius eye
- +planktonic filtrators
- +ectoparasites



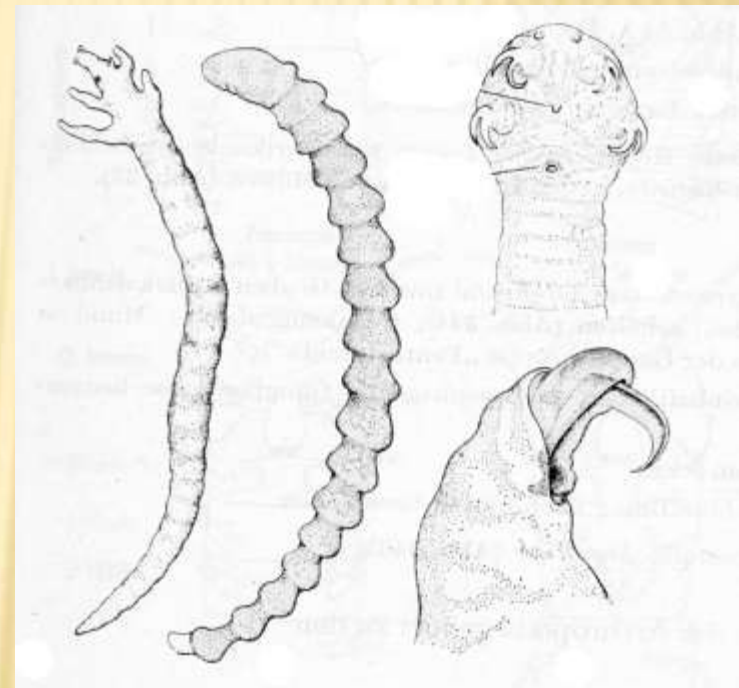
# BRANCHIURA

- + short body
- + mandibles = piercing stylets
- + maxillae = suckers
- + fish parasites



# PENTASTOMIDA

+parasites of terrestrial vertebrates



# CRUSTACEA

+edible

