



**Trilobitomorpha**  
(extinct)



**Tracheata**

# Ph. Arthropoda

**Themes:** abundance, diversity,  
appendages, land invasion

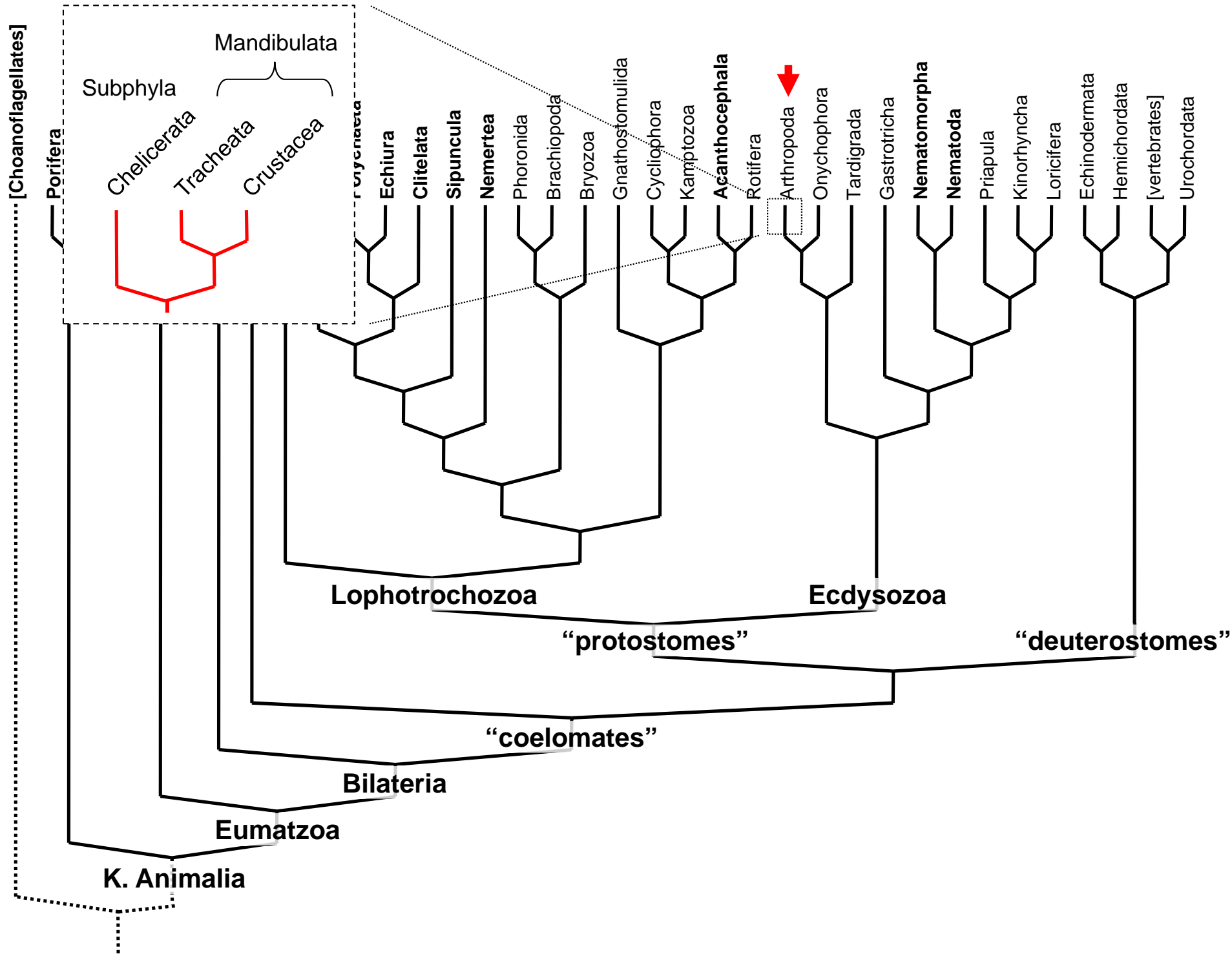


**Chelicerata**



**Crustacea**

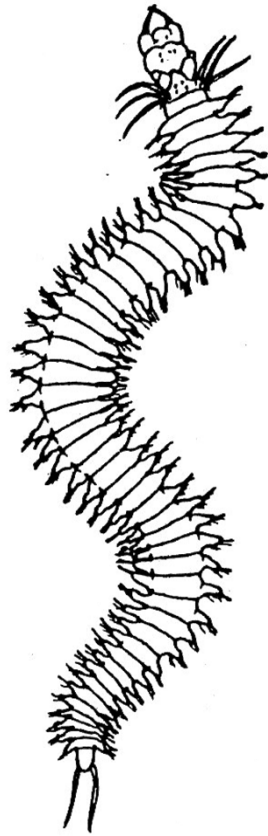




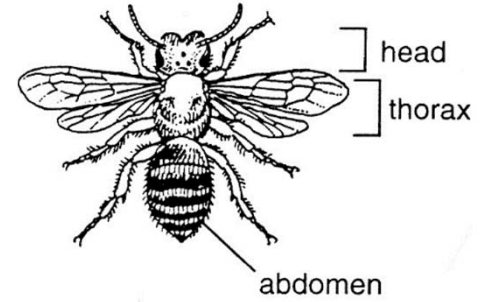
# Annelid

## Similarities:

- metameric segmentation
- paired appendages
- teloblastic development



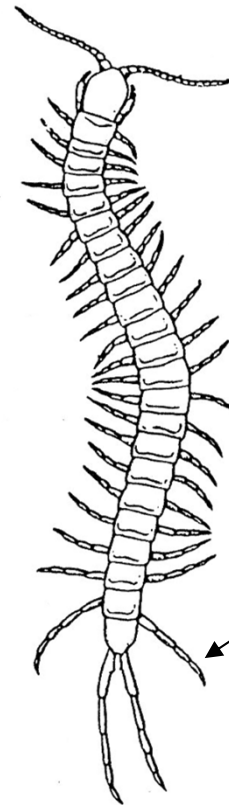
# Arthropod



• tagmatization

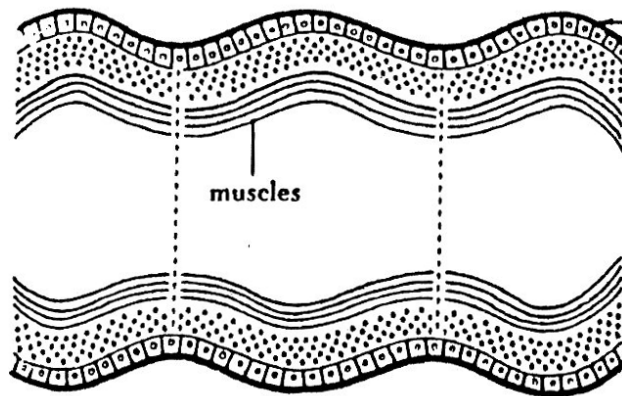
• jointed appendages

• sclerotized



## Differences:

- muscles
- body cavities



cuticle

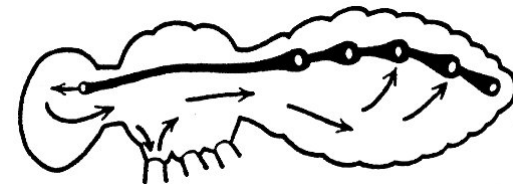
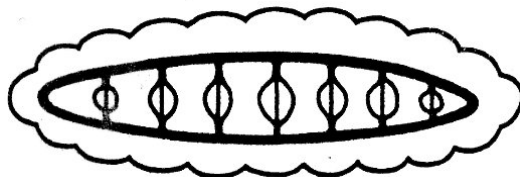


muscles

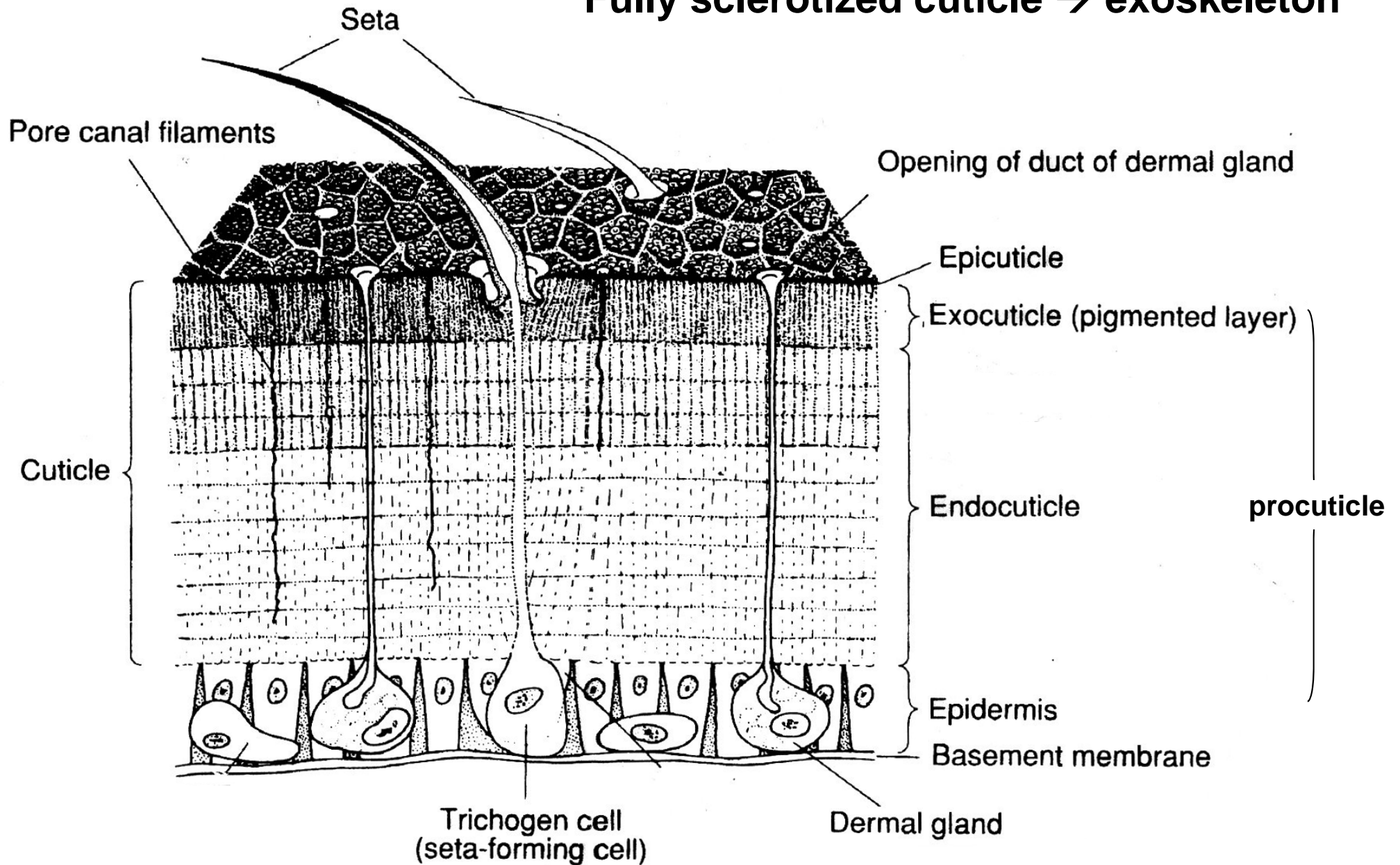
epidermis



• circulatory



# Fully sclerotized cuticle → exoskeleton



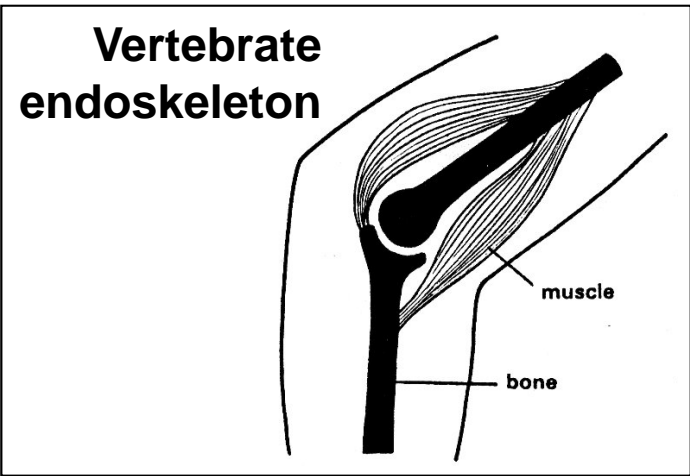
## Other components:

- glycolipids (water retention)
- mineral salts (hardness)

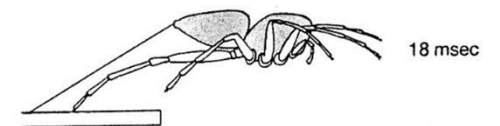
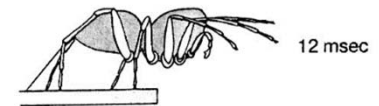
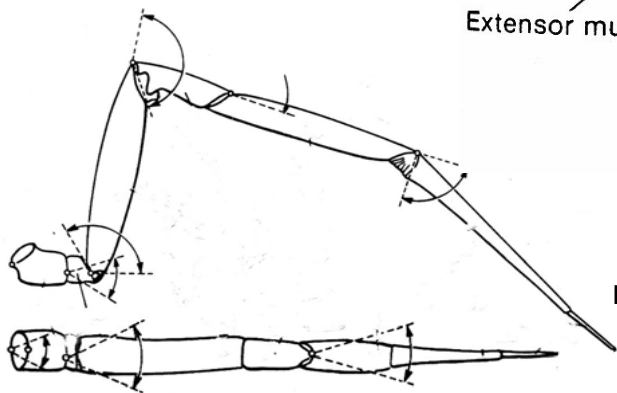
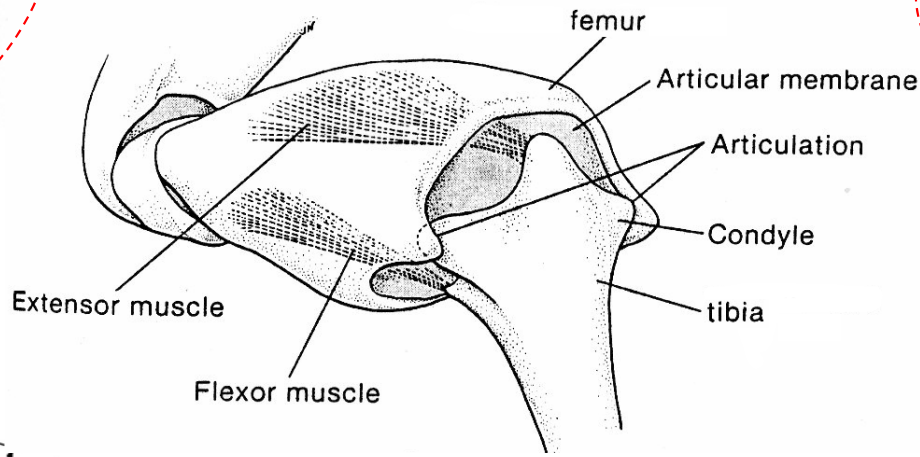
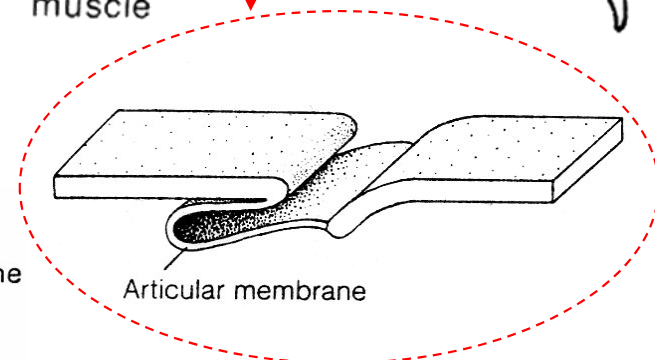
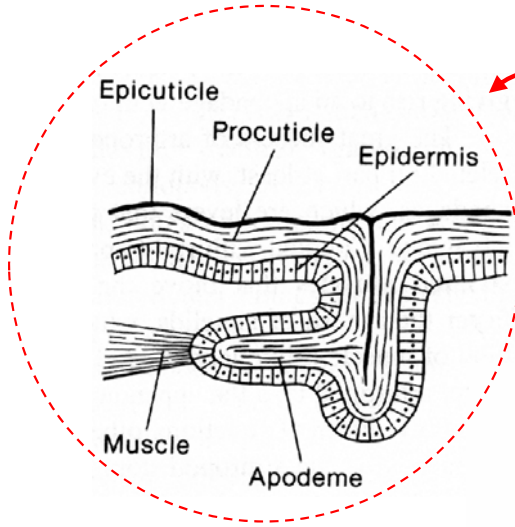
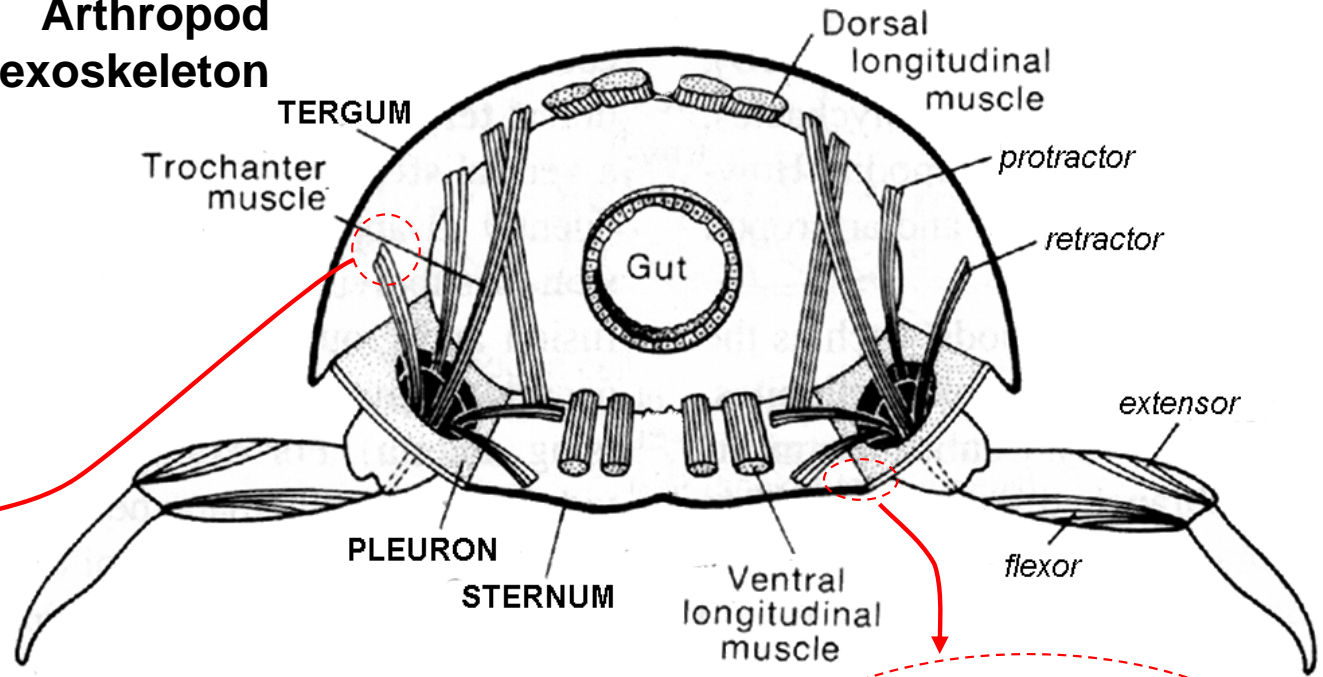




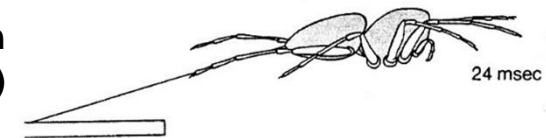
**Scorpions fluoresce  
under blacklight!**



### Arthropod exoskeleton

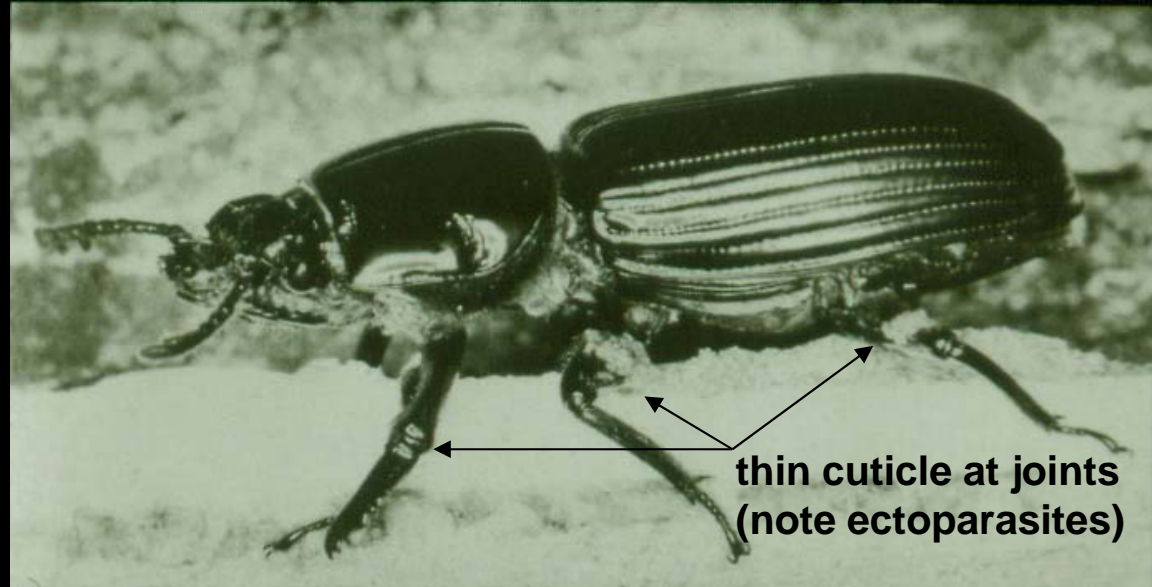
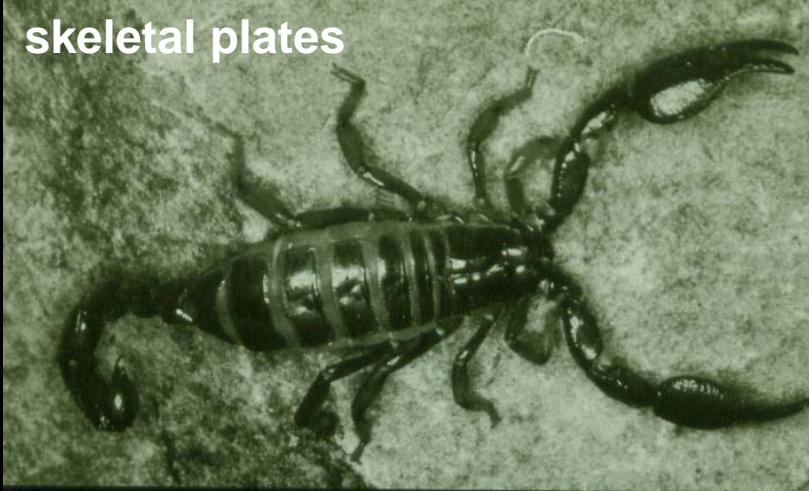


### Hydraulic propulsion (jumping spider)

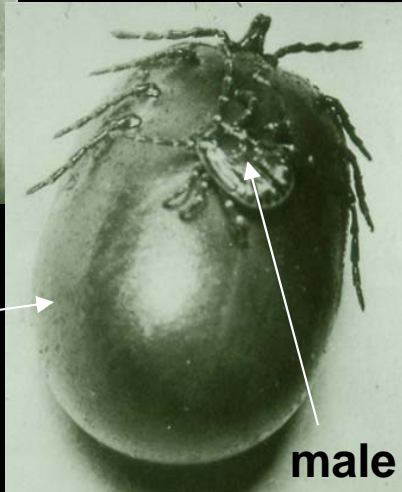


# Exoskeleton

skeletal plates



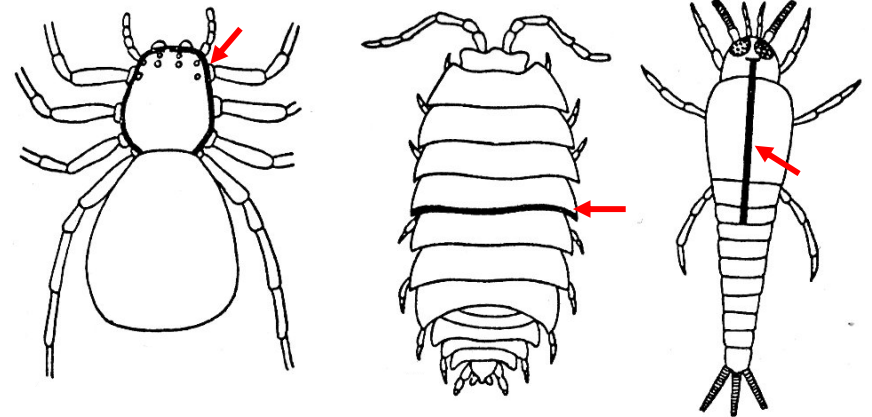
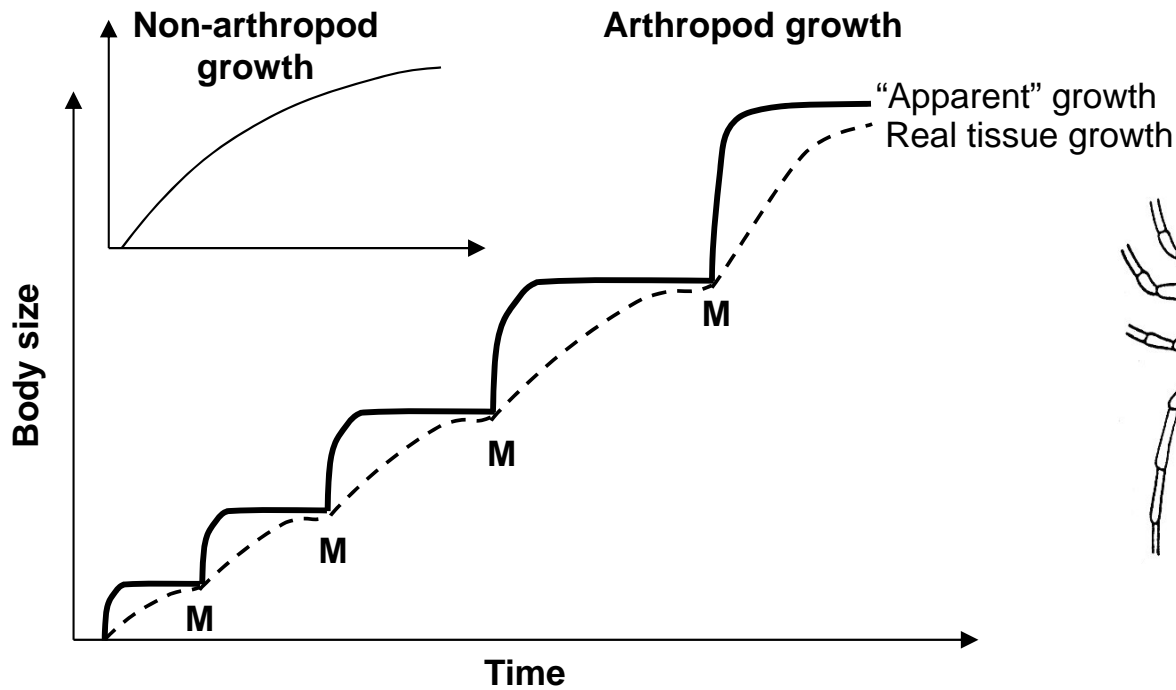
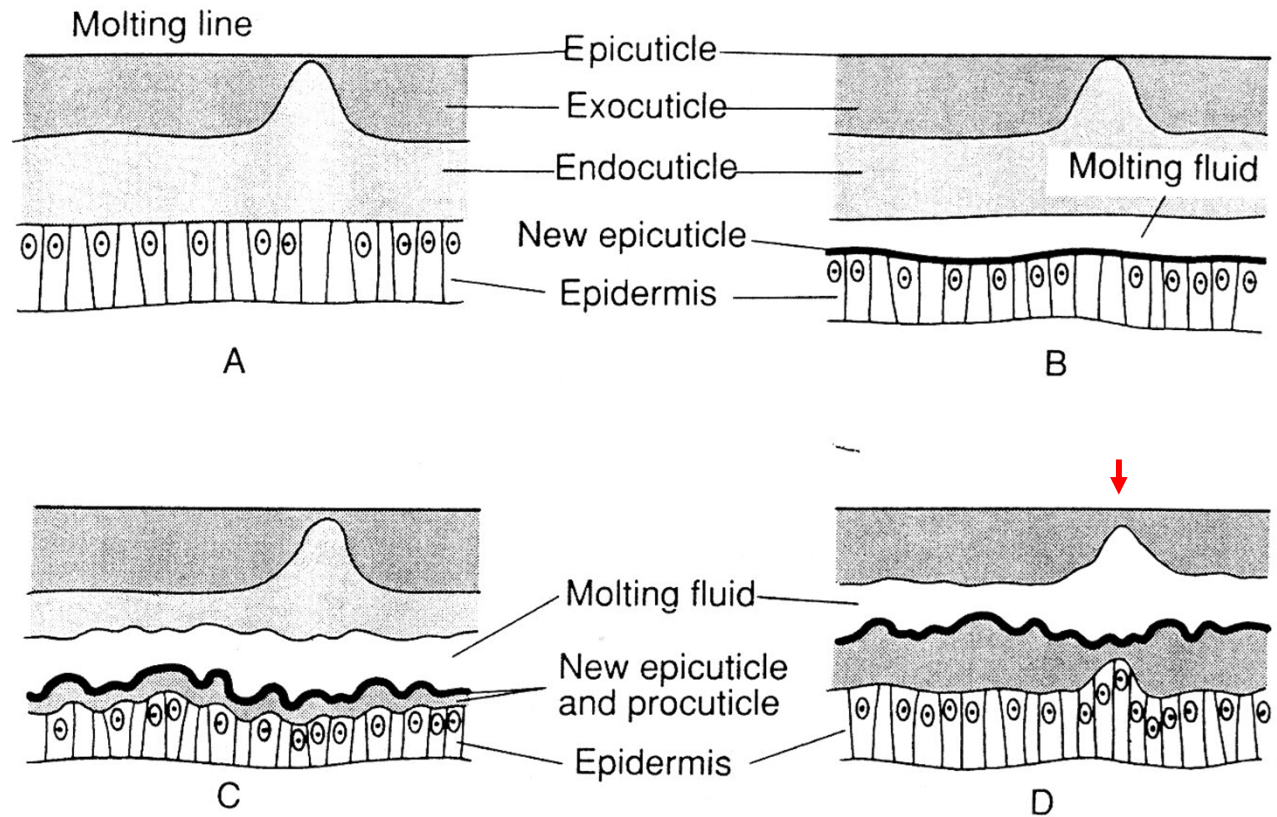
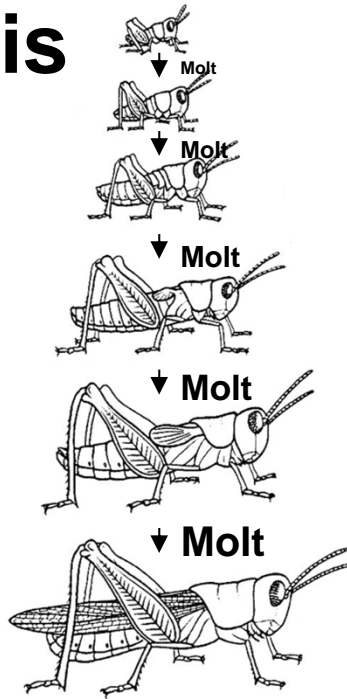
female tick  
with engorged  
abdomen



male

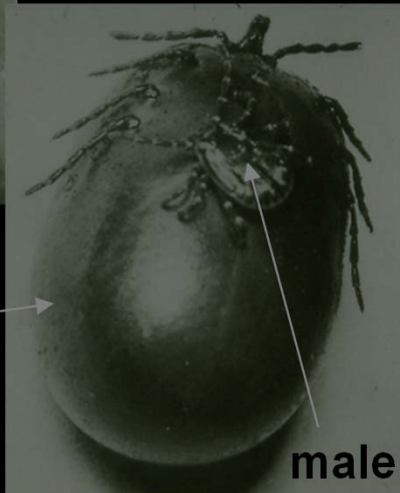
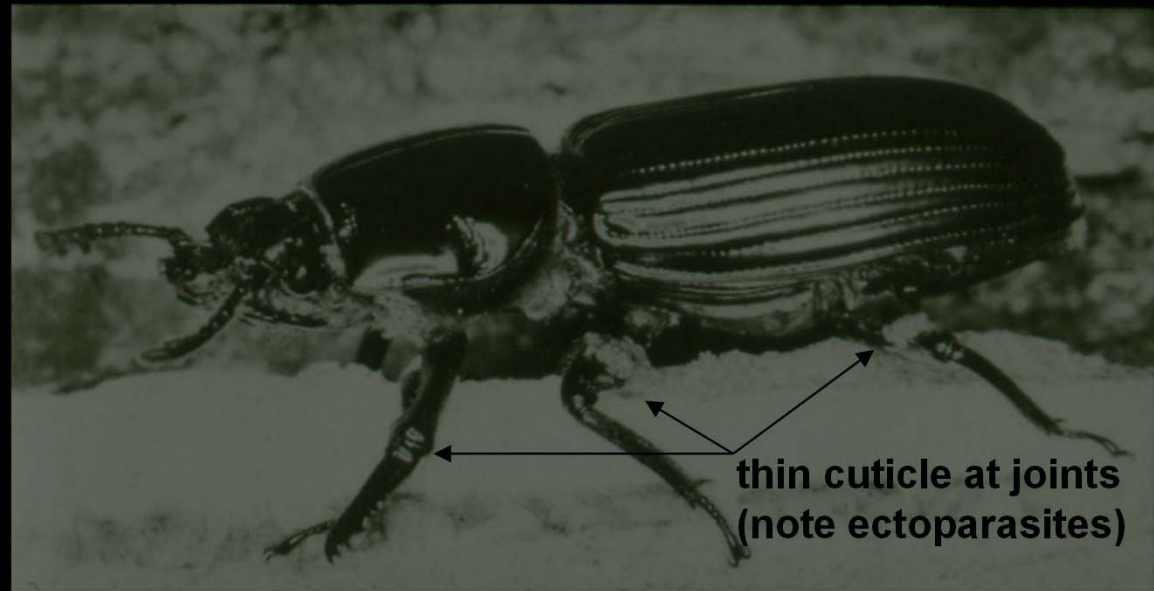
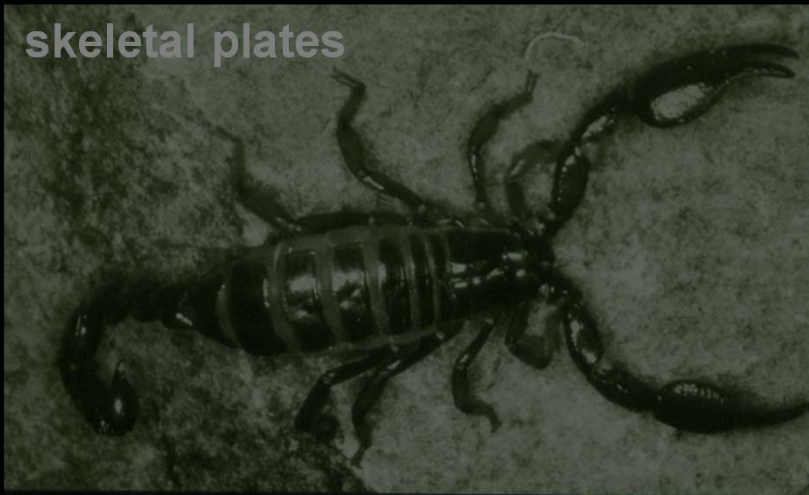


# Ecdysis



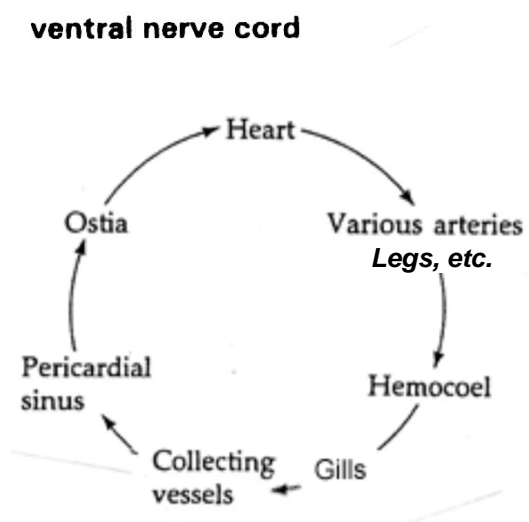
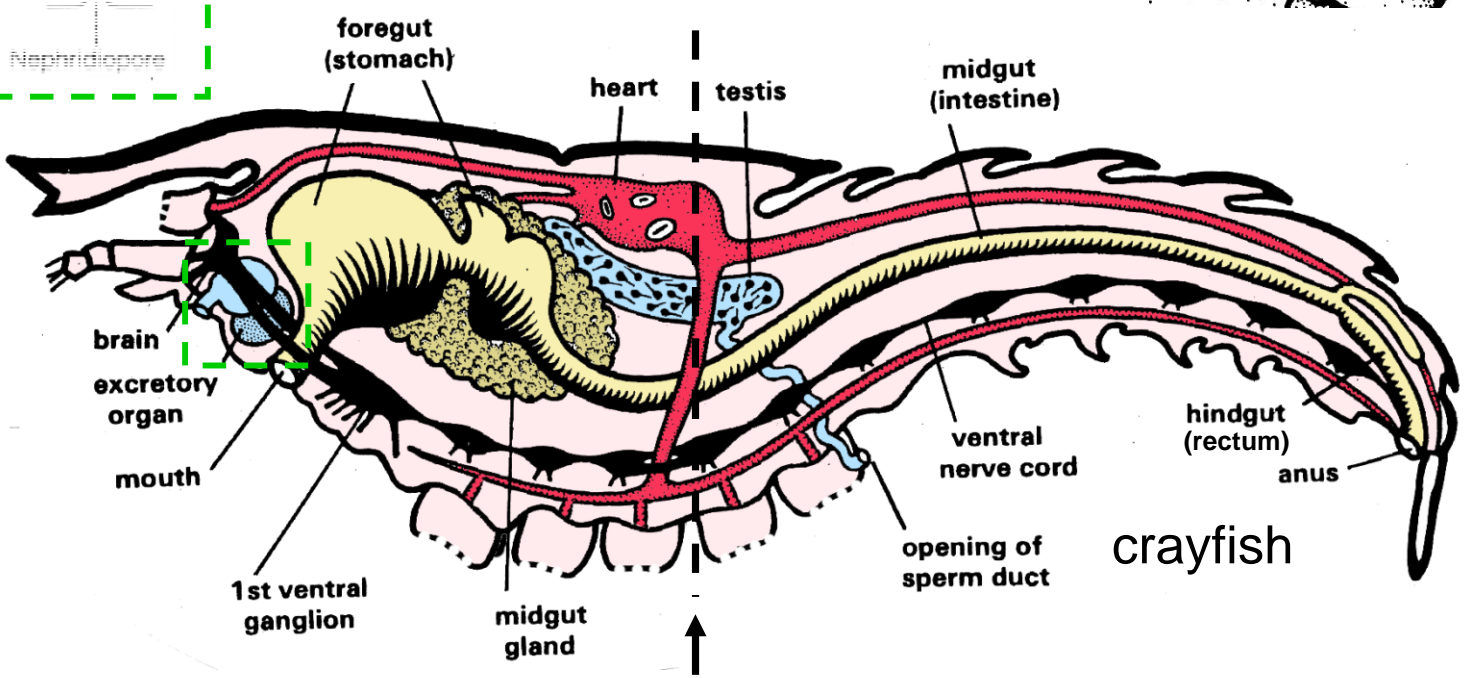
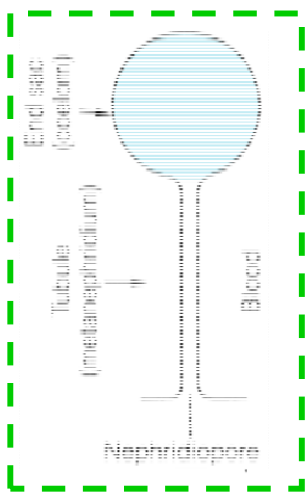
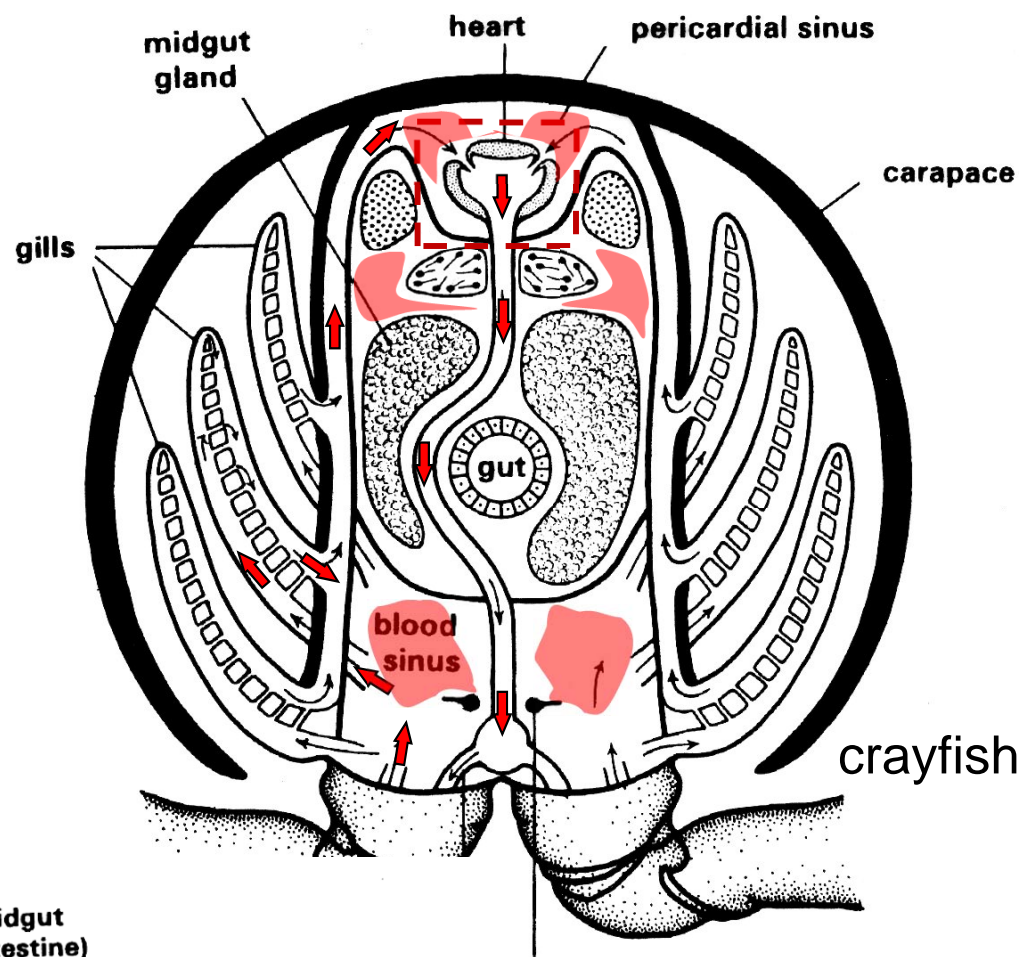
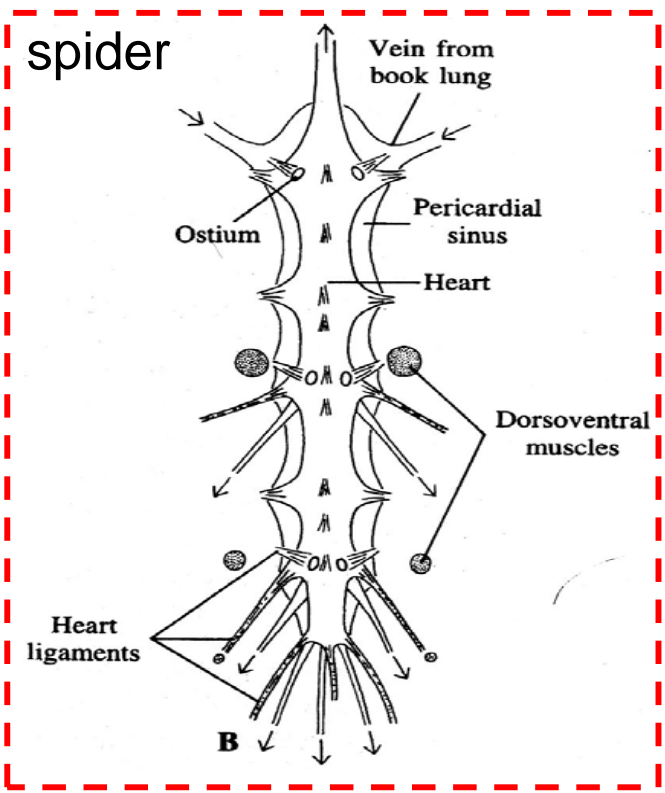


# Exoskeleton and molting



female tick with engorged abdomen









**Trilobitomorpha**  
(extinct)



**Tracheata**



# Ph. Arthropoda



**Chelicerata**

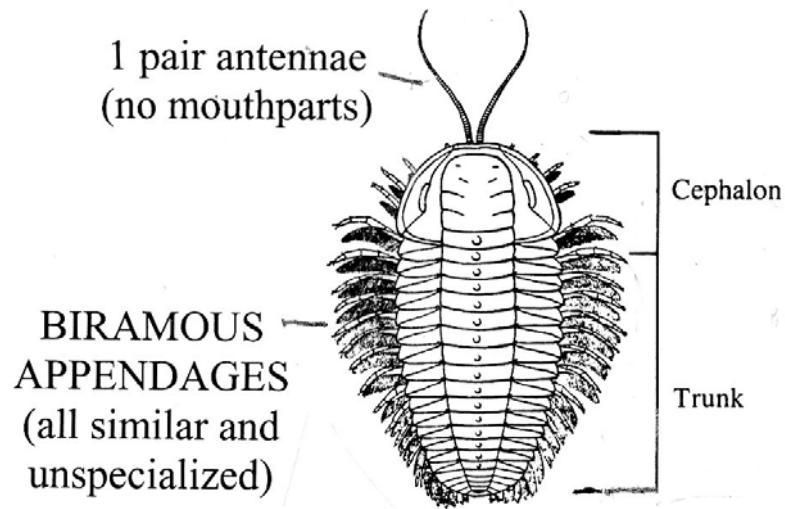


**Crustacea**

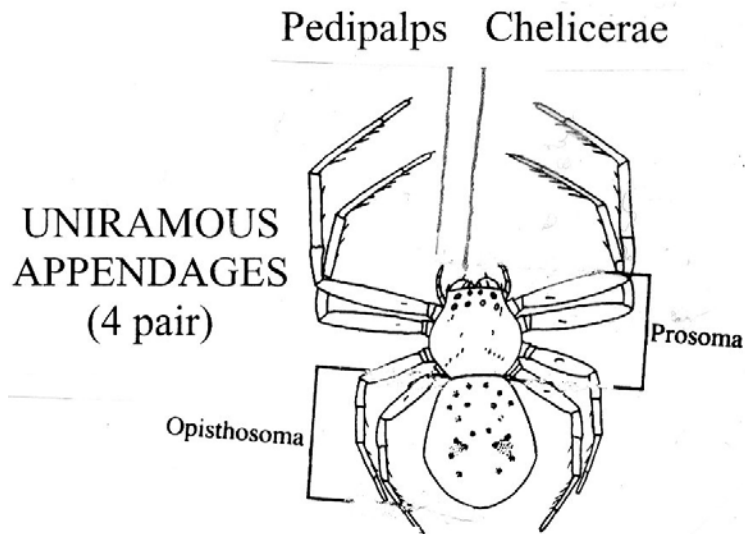




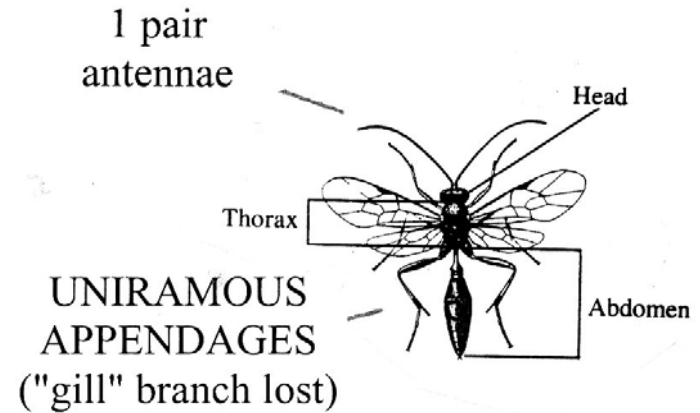
# ARTHROPOD SUBPHYLA



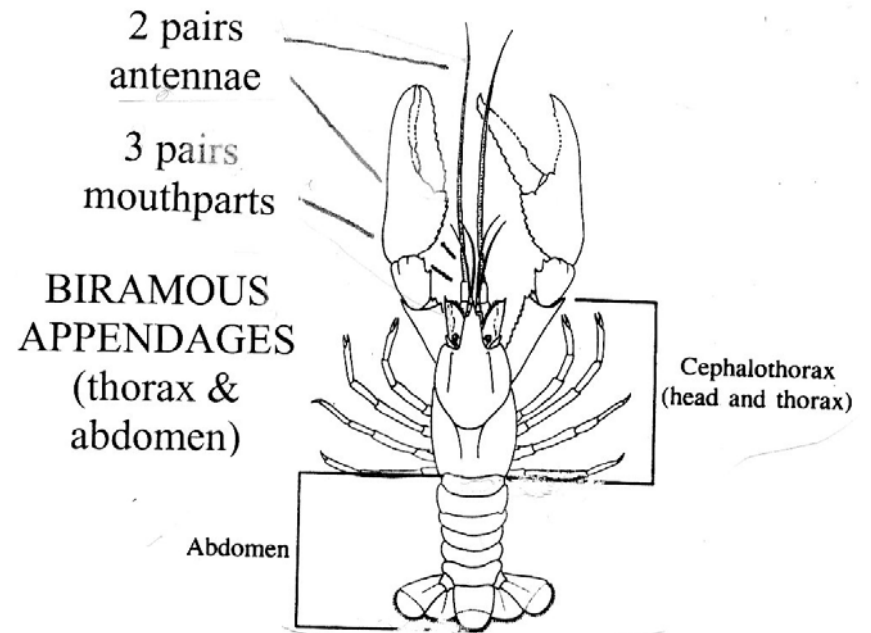
## TRILOBITOMORPHA (extinct)



## CHELICERATA (e.g., spider)

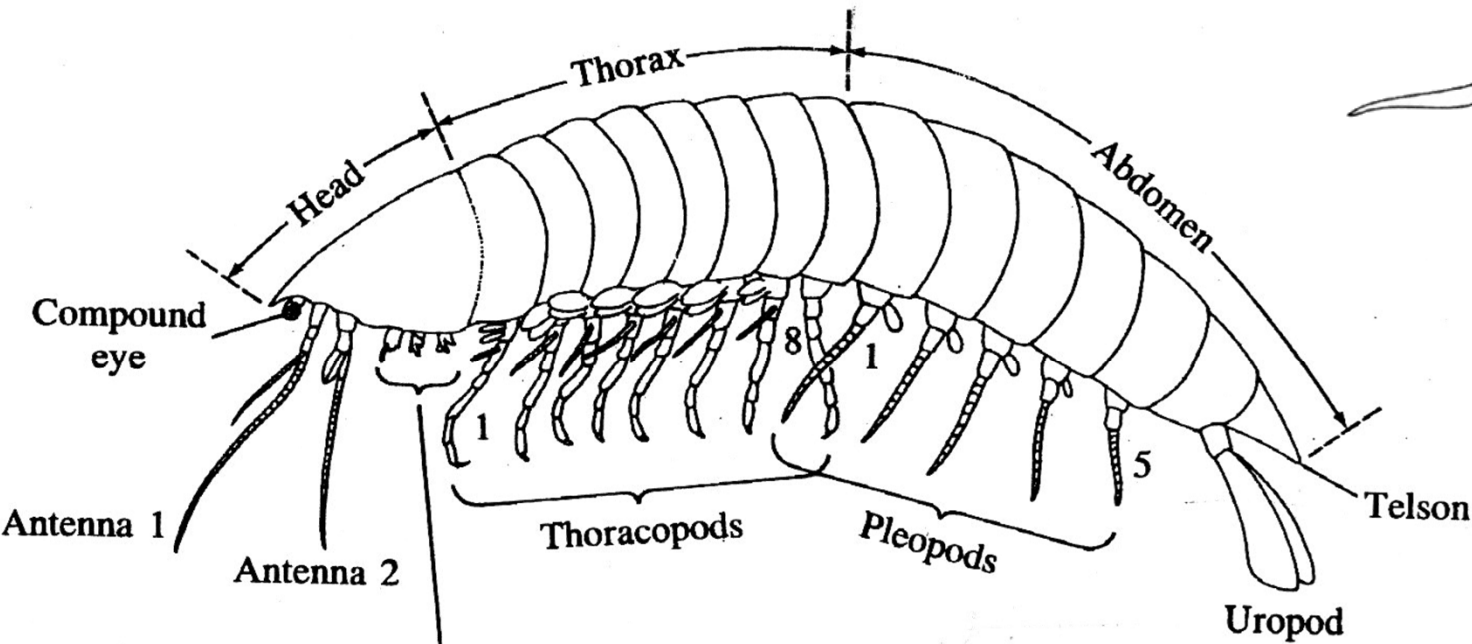
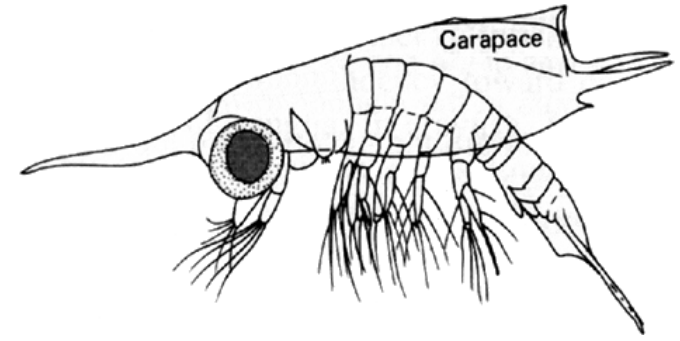


## TRACHEATA (e.g., insect)

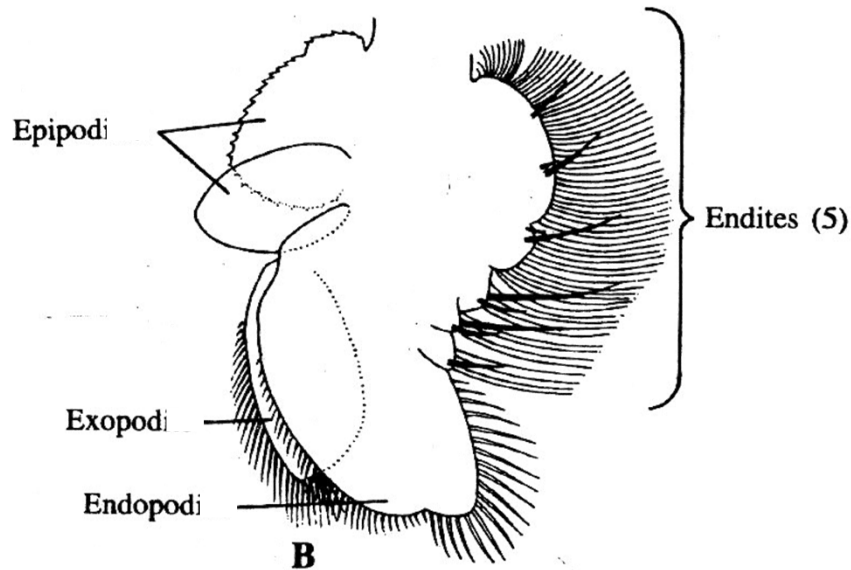


## CRUSTACEA (e.g., lobster)

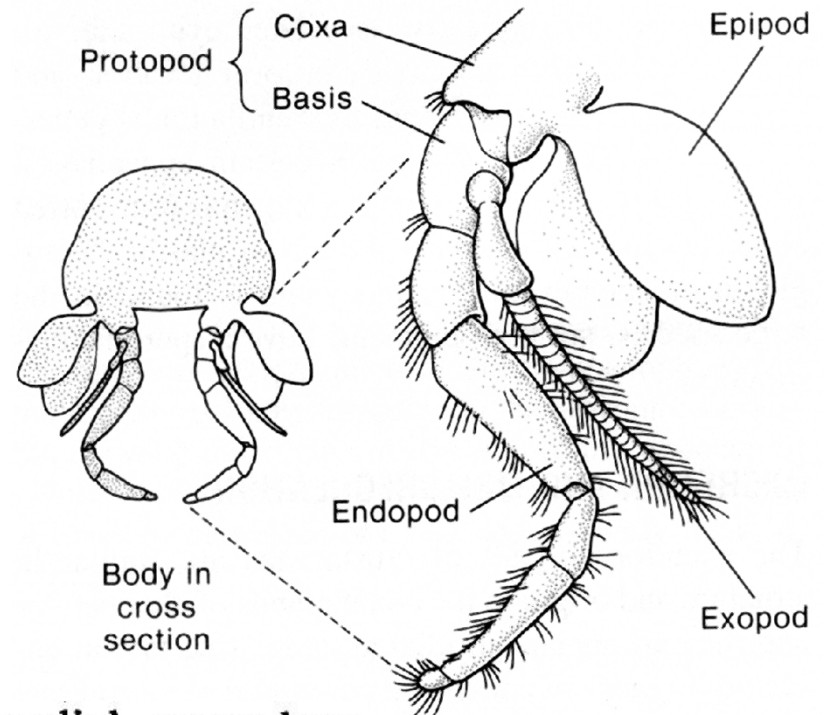
# “Generalized” Malacostracan crustacean



Mouthparts:  
Mandible, maxilla 1, maxilla 2

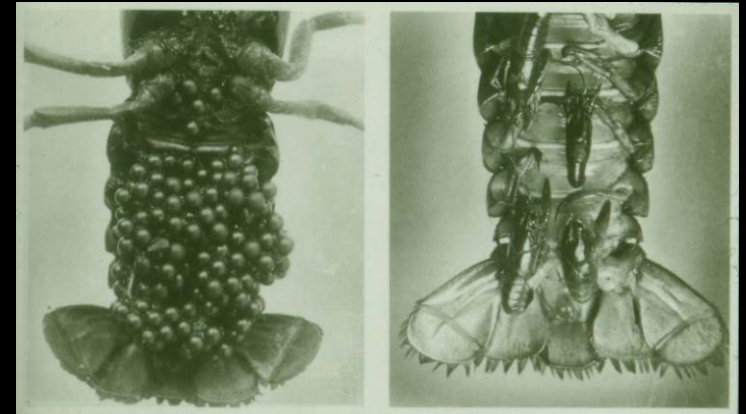
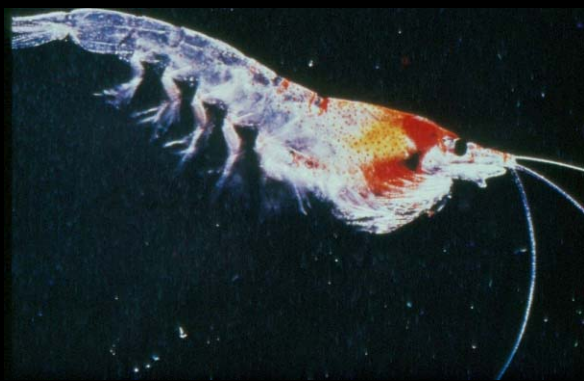
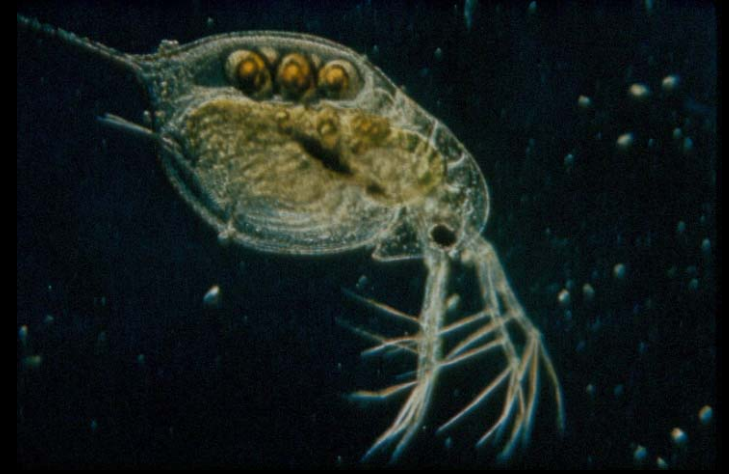


phyllopodal appendage



Stenopodial appendage.

# *Diversity in tagmata and jointed appendages*





Cheat-sheet for select crustacean classes, subclasses, superorders, orders, & infraorders

**Arthropoda (3)**

Class	Antennae	Tagmata	Mandibles	Appendages
Chelicerata	none	prosoma, opisthosoma	absent	uniramous (4 pr.)
Tracheata (Uniramia)	1 pair	head, thorax, abdomen	tip functional	uniramous
Crustacea	2 pairs	head, thorax, abdomen*	base functional	typically biramous

\* head, thorax often fused into cephalothorax

**Within Crustacea (5)**

Class	Description
Malacostraca	19 segments, abdominal appendages
Maxillopoda	10 or fewer segments, no abdominal appendages

**Within Maxillopoda (7)**

Subclass	Features
Copepoda	Body divided into cephalosome, metasome, urosome
Branchiopoda	Repeated phyllopodial appendages (except cladocerans)
Cirripedia	Barnacles: highly reduced abdomen, calcified plates; several parasitic orders
Ostracoda	Bivalved carapace

**Within Malacostraca (2)**

Subclass	Abd. segments	Carapace	Example
Phyllocarida	7	Joined by adductor muscle	O. Leptostraca (e.g. <i>Nebalia</i> )
Eumalacostraca	6		

**Within Eumalacostraca (5)**

Superorder	Carapace fused...	Eye	Brood pouch
Hoplocarida	to 3 segments, covers 4	stalked	absent
Peracarida	variable, to no more than 4	unstaked	formed from oostegites
Eucarida	to all 8 = cephalothorax	most stalked	absent

**Within Eucarida (3)**

Order	First 3 thoracopods...	Example
Euphausiacea	Pleopods (legs)	krill
Decapoda	Maxillipeds (leaving 10 pereopods)	shrimp, crab, lobster

**Within Decapoda (8)**

Infraorder	Eyes	8 <sup>th</sup> thoracopod	Abdomen
Anomura	Int. to 2 <sup>nd</sup> antennae	Reduced	Variable
Brachyura (true crabs)	Ext. to 2 <sup>nd</sup> antennae, stalked	Visible	Tightly oppressed to shell

**Within Peracarida (9)**

Order	Eye	Carapace	Special appendages
Mysidacea	Stalked	Yes	1 or 2 maxillipeds
Cumacea	"Sessile"	Yes	3 maxillipeds; no pleopods in female
Tanaidacea	"	Short	Gnathopods
Isopoda	"	No	7 "same" thoracopods
Amphipoda	"	No	3 pairs uropods, gnathopods

## MAJOR TAXA

Ph. Arthropoda (>1,000,000 spp)

Subph. Crustacea (68,000)

→ **Cl. Malacostraca** (22,600)

Subcl. Eumalacostraca

Supero. Eucarida (10,000)

→ **O. Euphausiacea** (krill)

→ **O. Decapoda**

(Caridea (shrimps)

Astacidea (lobsters, crayfishes)

Brachyura (crabs)

Anomura (pagurids, lithotids,  
porcellanids, galatheids)

Thalassinida (ghost/mud shrimp))

Supero. Peracarida (8,000)

→ **O. Isopoda, O. Amphipoda**

[gammarids, caprellids,  
hypderiids], cumaceans,  
tanaids, mysids

Supero. Haplocarida (300)

→ **(O. Stomatopoda)**

Subcl. Phyllocarida (20)

→ **Cl. Maxillopoda**

→ Subcl. Copepoda (8405)

(Calanoida, Harpacticoida, Cyclopoida)

→ Subcl. Ostracoda (5650)

→ Subcl. Branchiopoda (900, cladocerans)

→ Subcl. Cirripedia (900)

Thoracica (acorn & goose barnacles)

Acrothoracica (boring barnacles)

Ascothoracica (parasites of cnidarians,  
echinoderms)

Rhizocephala (parasites of crustaceans)

*Subph. Tracheata (=Uniramia,  $\approx 1 \times 10^6$ )*

*Cl. Myriopoda*

*Cl. Hexapoda*

Subph. Chelicerata (70,000)

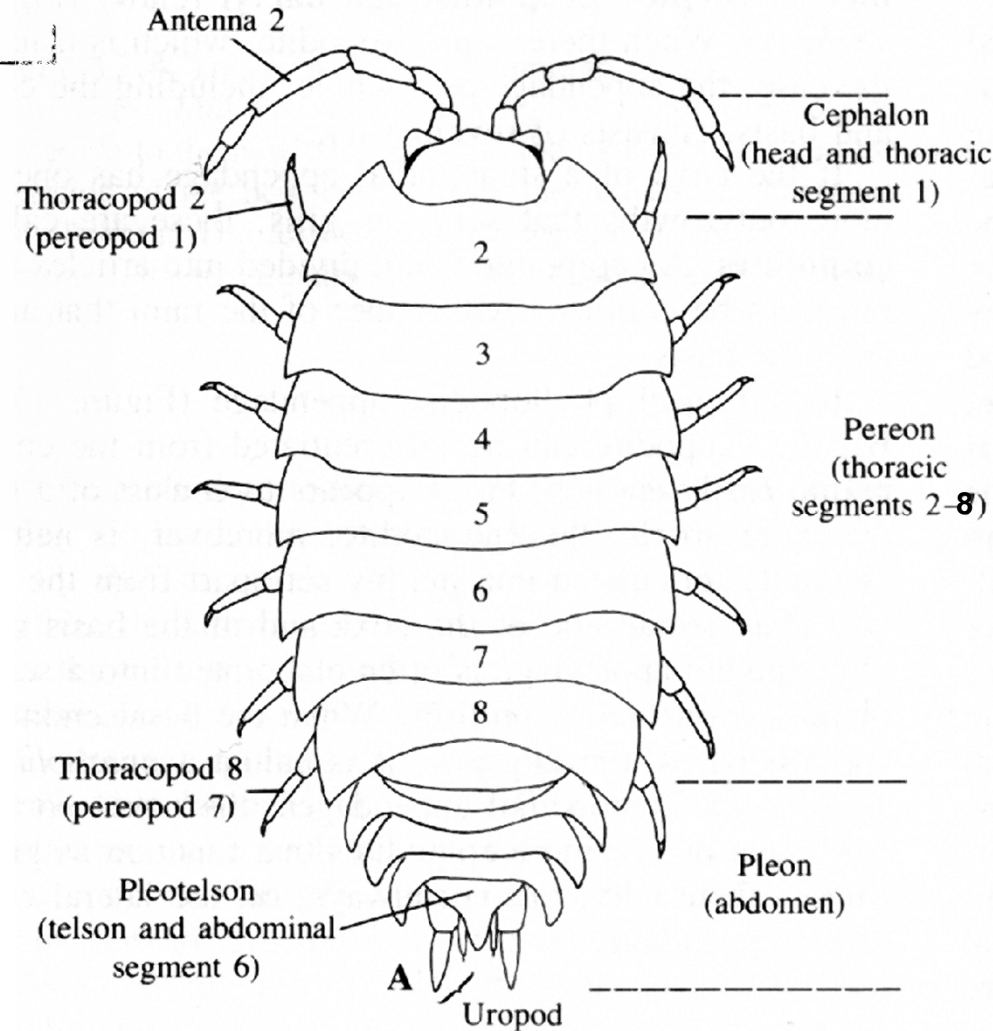
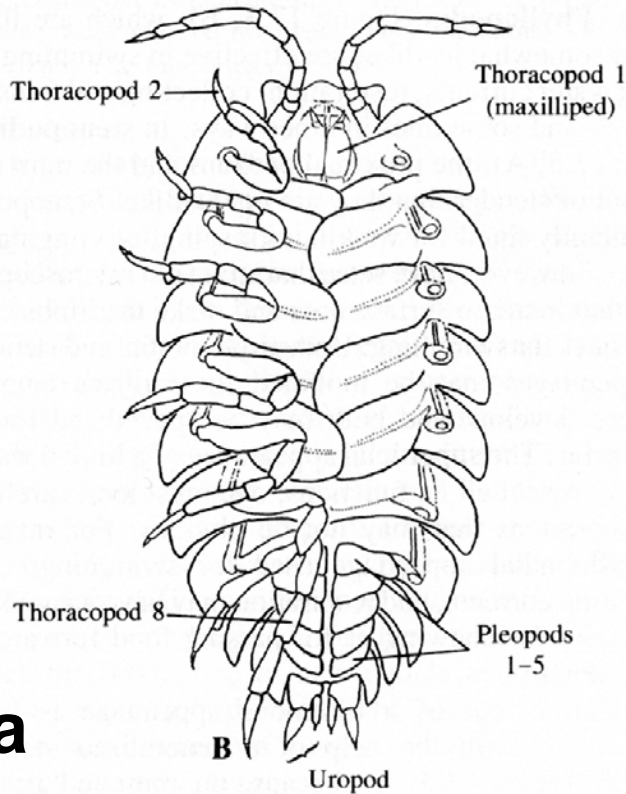
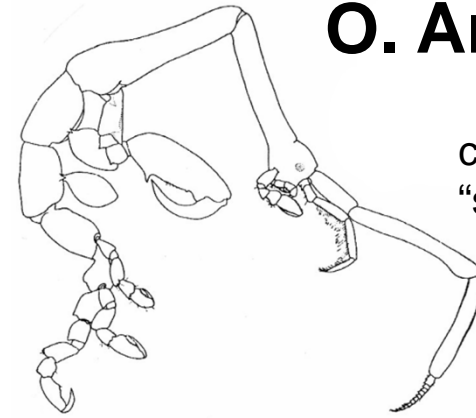
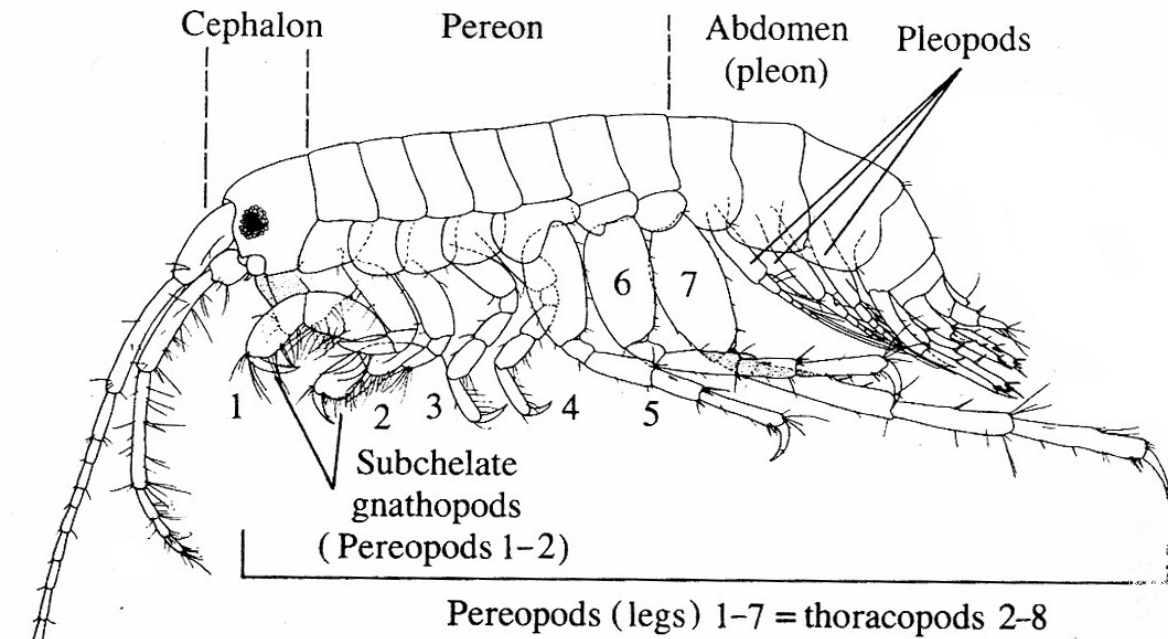
Cl. Merostomata (4, horseshoe crabs)

Cl. Pycnogonida (1000, sea spiders)

*Cl. Arachnida (spiders, etc.)*

*Subph. Trilobitomorpha (extinct; 4000)*

# O. Amphipoda



# O. Isopoda



# Cl. Malacostraca

## O. Isopoda



isopods

## O. Amphipoda



amphipods

## O. Decapoda

crabs



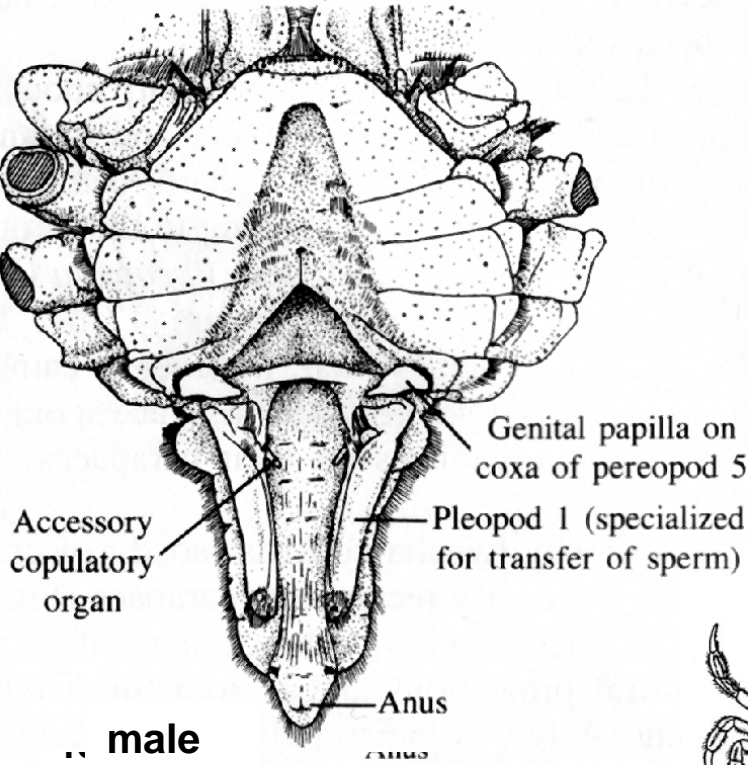
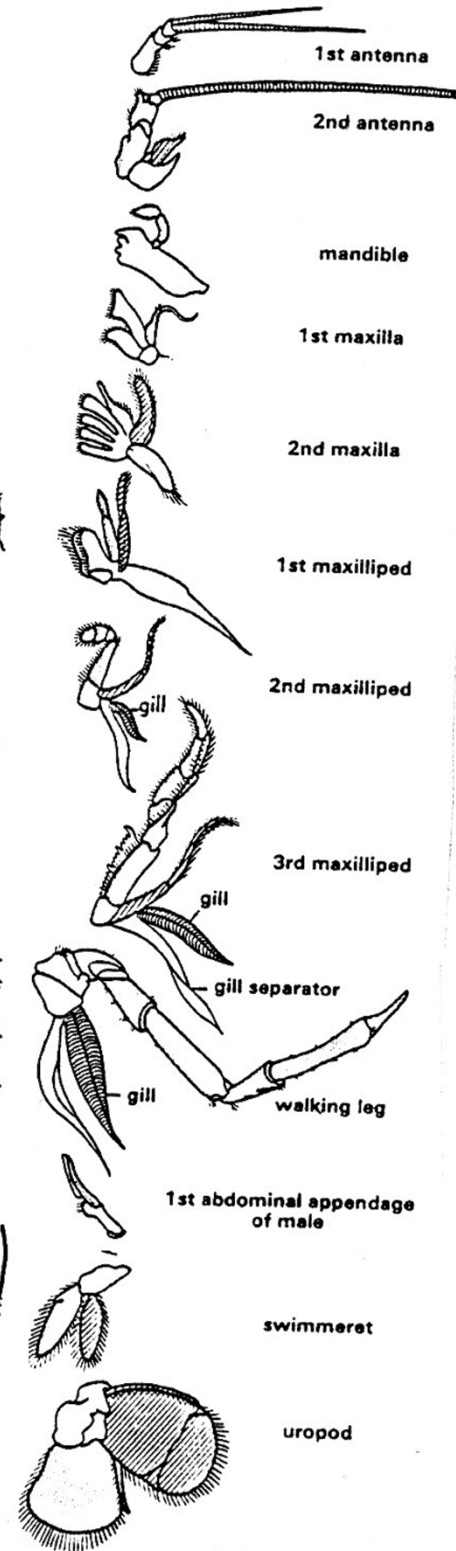
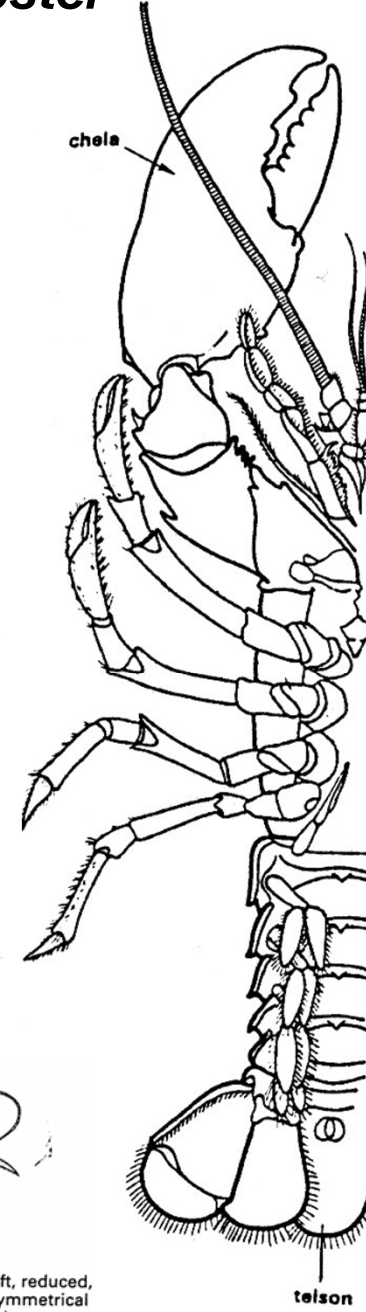
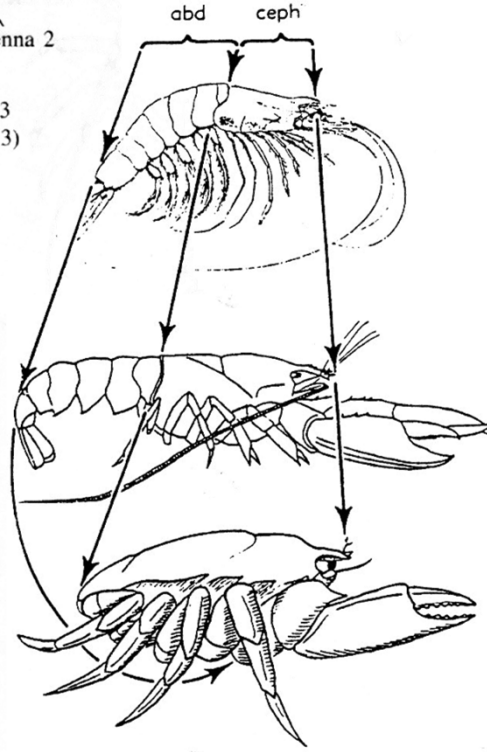
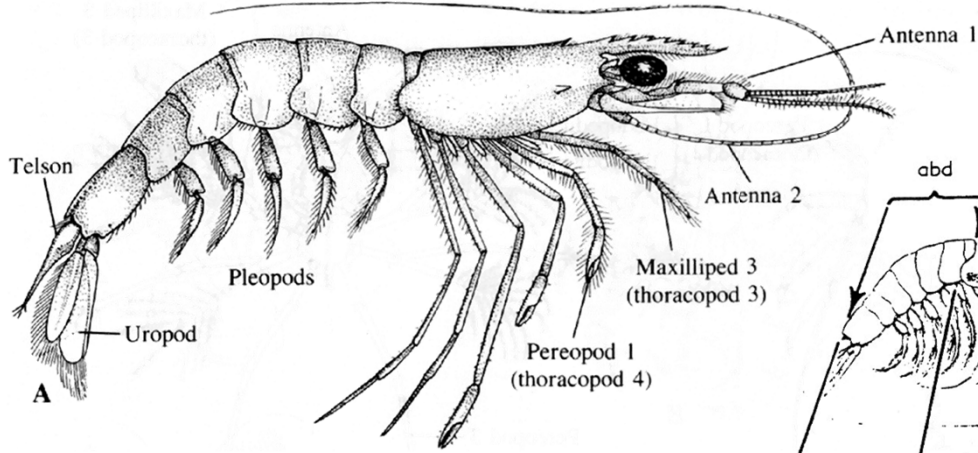
shrimp



# O. Decapoda

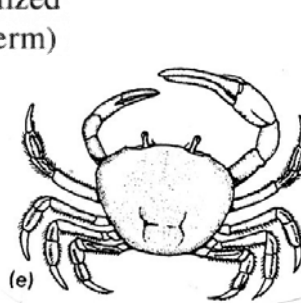
*shrimp*

*lobster*

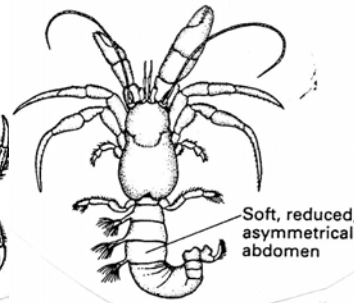


male

*crab*



"true"



"hermit"



# Cl. Malacostraca



isopods

## O. Isopoda



amphipods

## O. Amphipoda



*mantis shrimp*

## O. Stomatopoda

## O. Decapoda

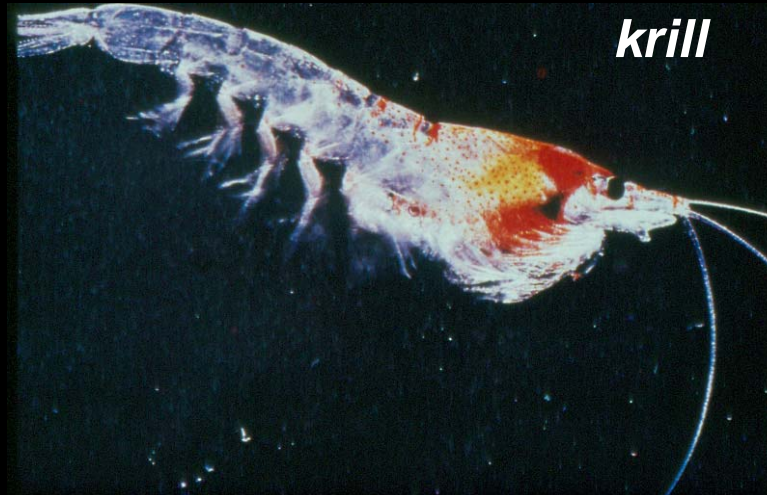


crabs



shrimp

## O. Euphausiacea



krill