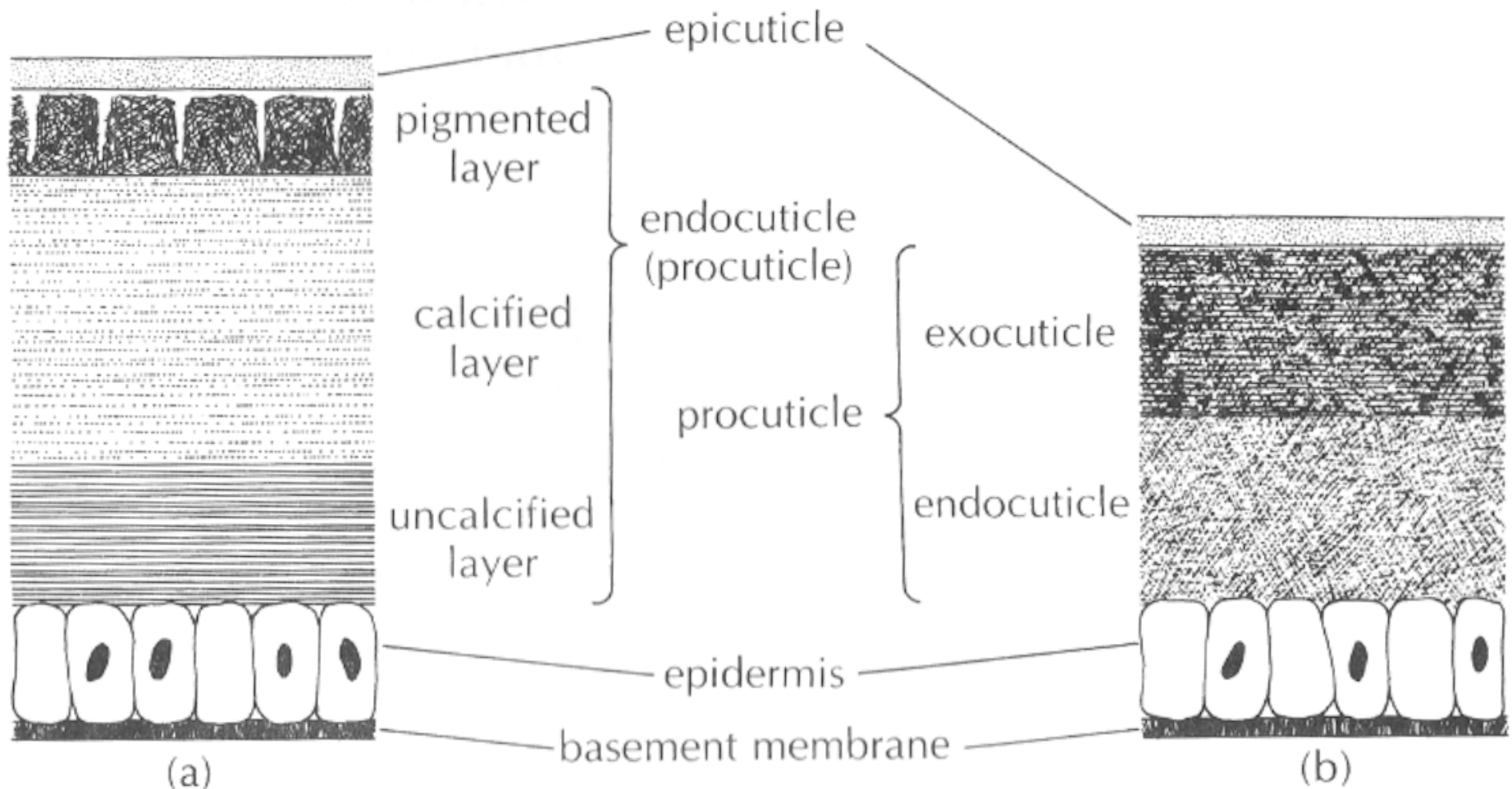


Intro to Arthropods



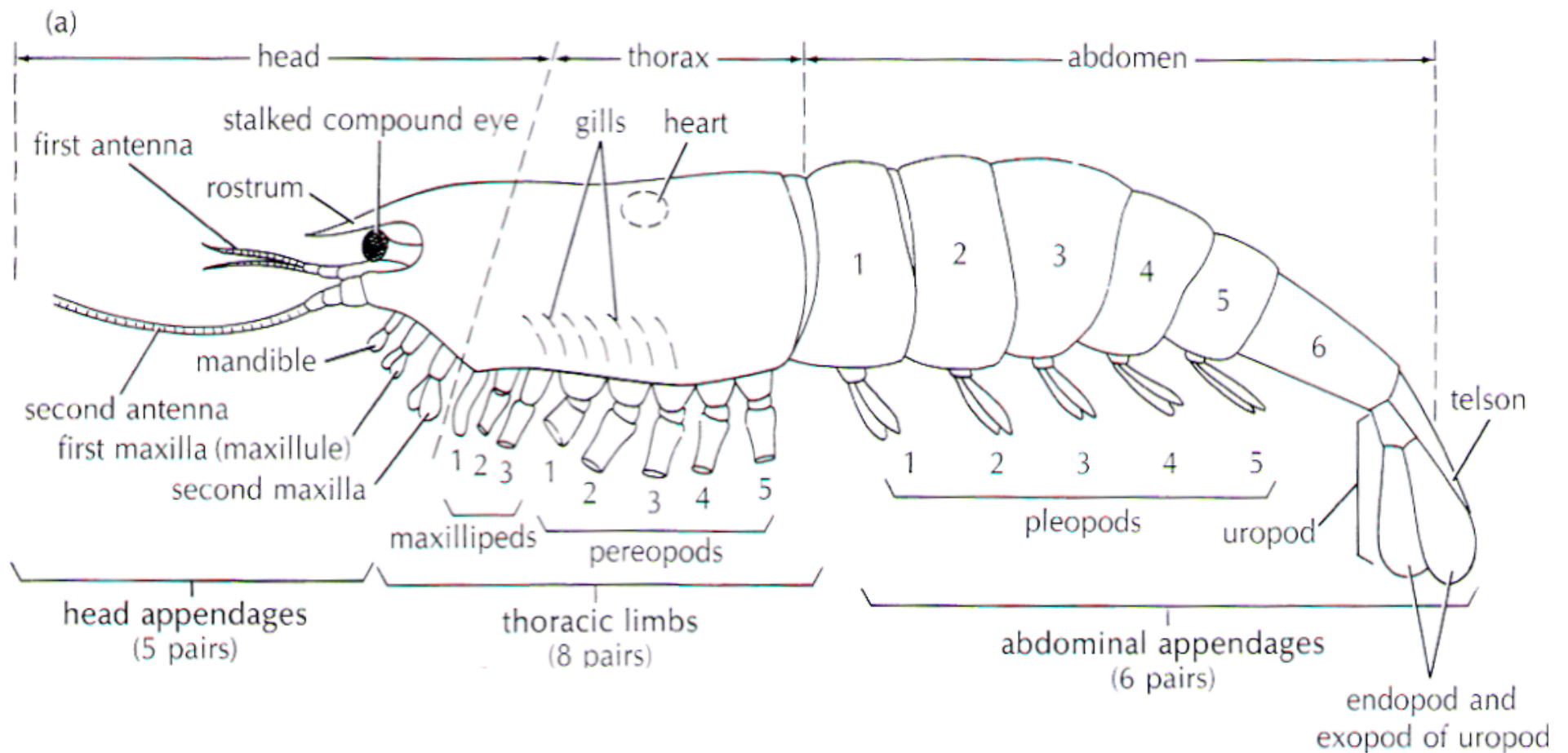
Defining Characteristics

- Complete **loss** of motile cilia in adult and larval stages
- Epidermis produces a segmented, jointed, and hardened (sclerotized) chitinous **exoskeleton**, with intrinsic musculature between individual joints of appendages



Epicuticle: outer layer- waxy, thin, made of lipid and proteins
Procuticle: inner layer- thick, strong, made of chitin and proteins

General External Anatomy of a Crustacean



Classification

Phylum Arthropoda

Subphylum Trilobitomorpha

Class Trilobita—the trilobites

Subphylum Chelicerata

Class Merostomata—horseshoe crabs

Class Arachnida—spiders, mites, ticks, scorpions

Class Pycnogonida (= Pantopoda)—sea spiders

Subphylum Mandibulata

Class Myriapoda

Order Chilopoda—centipedes

Order Diplopoda—millipedes

Class Insecta (= Hexapoda)

Subclass Apterygota—the wingless insects

Subclass Pterygota—the winged insects

Class Crustacea

Subclass Malacostraca

Order Isopoda—pillbugs, woodlice

Order Amphipoda—sand fleas

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Class Arachnida



Class Merostomata

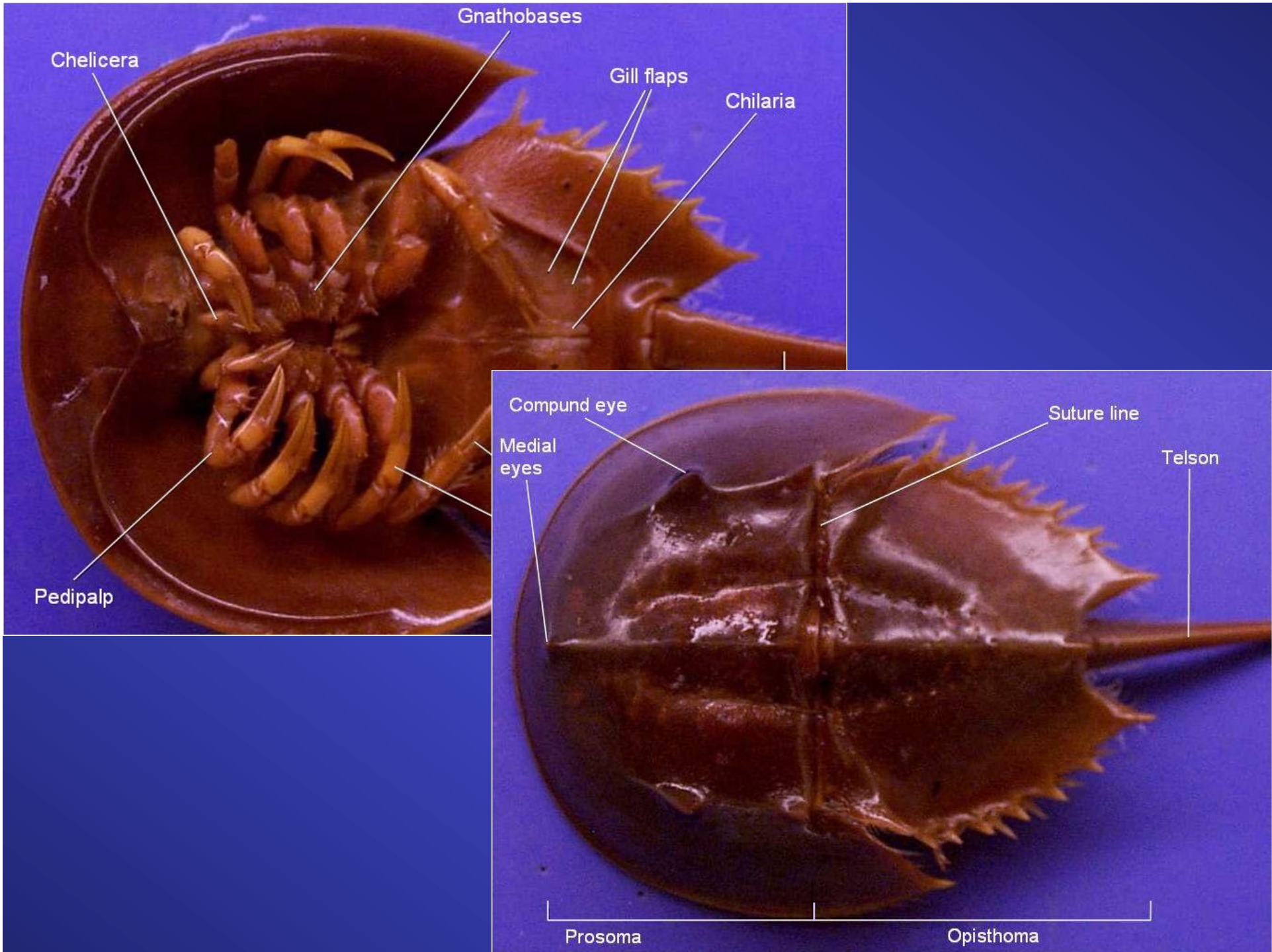


Class Pycnogonida



Class Merostomata

- Primarily extinct species - Only 4 living
- Horseshoe crab (*Limulus polyphemus*)
- All marine
- Have appendages on the opisthosoma known as “book gills” that are flattened and modified for gas exchange
- Telson drawn out into spike



Class Pycnogonida

- Sea spiders - all species are marine
- Very long legs (3-16 times body)
- Body not divided into distinct regions
- Unique proboscis at the anterior end
- Variable numbers of walking legs among species
- Ovigera

Class Pycnogonida



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Subphylum Mandibulata

- Bear mandibles on the head segment that are modified for chewing or grinding food
- Includes 3 classes; Myriapoda (centipedes & millipedes), Insecta, and Crustacea



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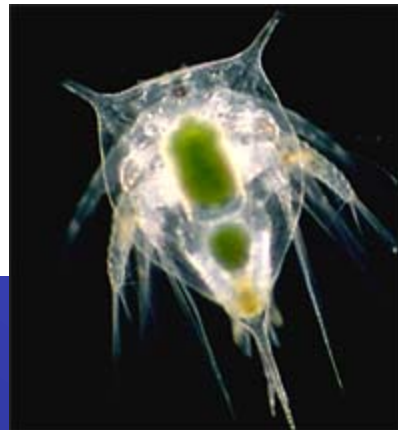
Subclass Copepoda—the copepods

Subclass Pentastomida

Subclass Cirripedia—the barnacles

Class Crustacea

- 45,000 crustacean species
- Divided among 6 major subclasses
- Head bears 5 appendages including 2 pairs of antennae
- Development includes a larval form called a nauplius.



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Subclass Malacostraca

- $\frac{3}{4}$ of the known crustaceans
- Total of 19 body segments: 5 in the head, 8 in the thorax, and 6-7 in the abdomen plus a telson
- Diverse variations on this basic body plan; modifications basis for taxonomy

Subclass Malacostraca

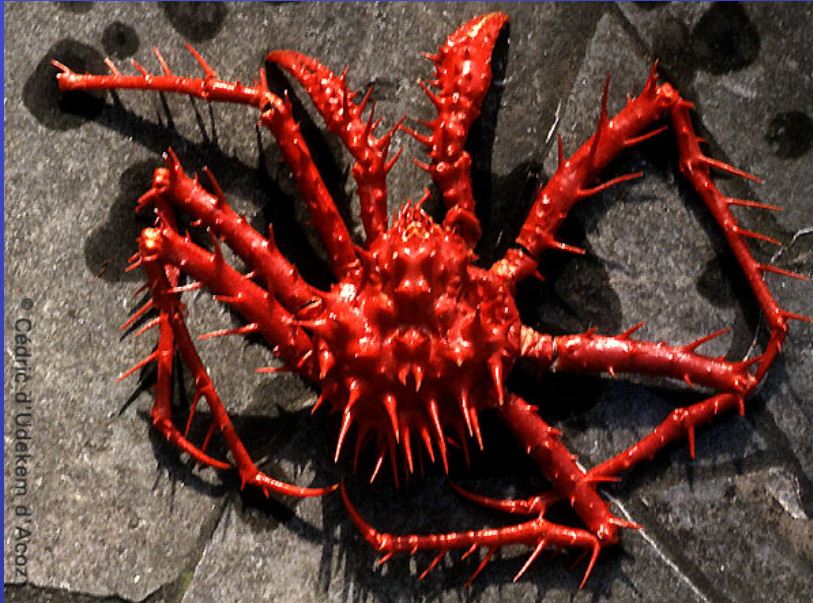
- Most familiar forms:
 - Shrimps
 - Crabs
 - Lobsters





“Lobster”

“Crab”





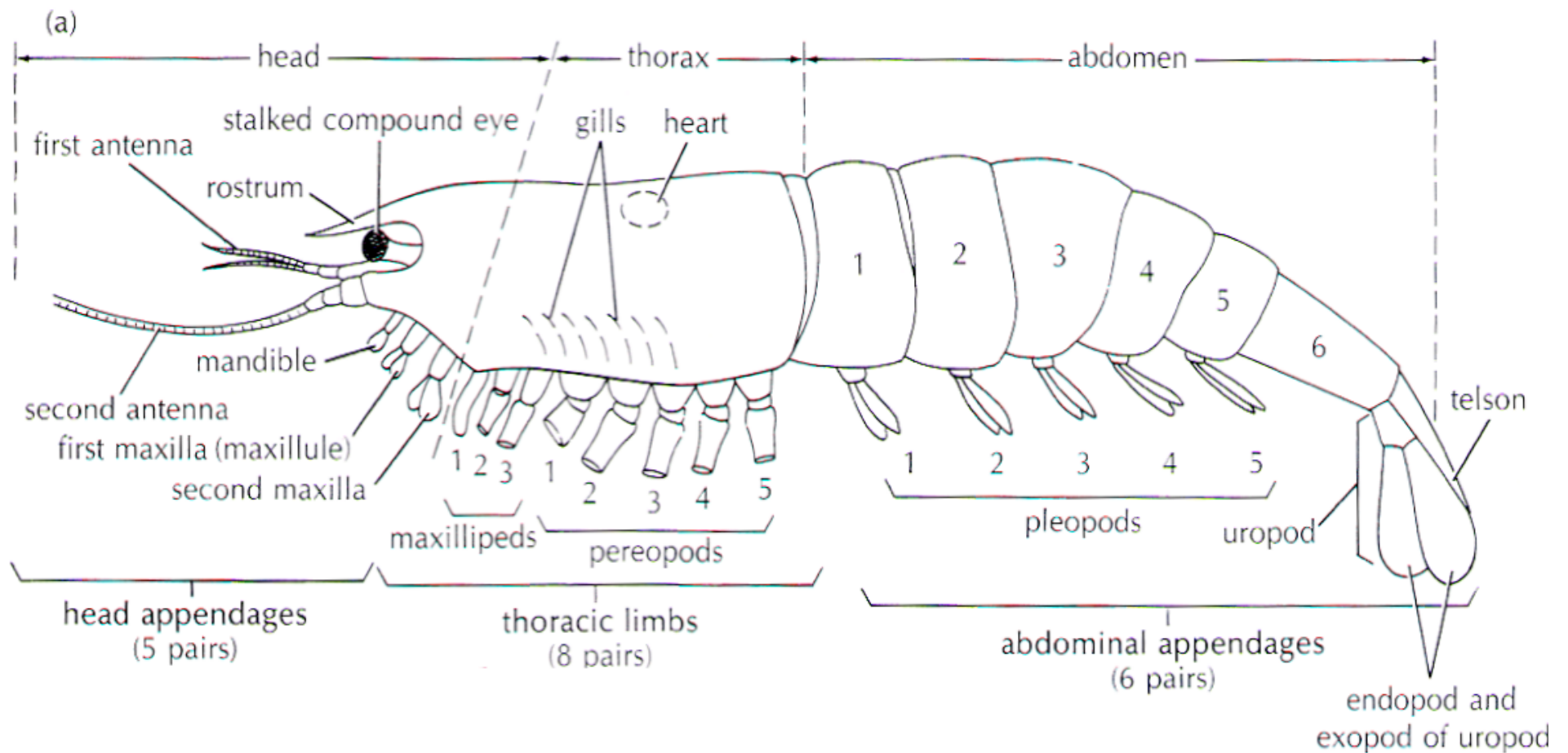
“Shrimp”



Characteristics of the Malacostraca

- **Total of 19 body segments**
 - **Five head**
 - (Characteristic of Crustacea)
 - **Eight thorax**
 - **Six abdominal**

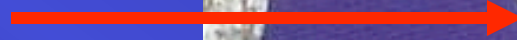
General External Anatomy of a Crustacean



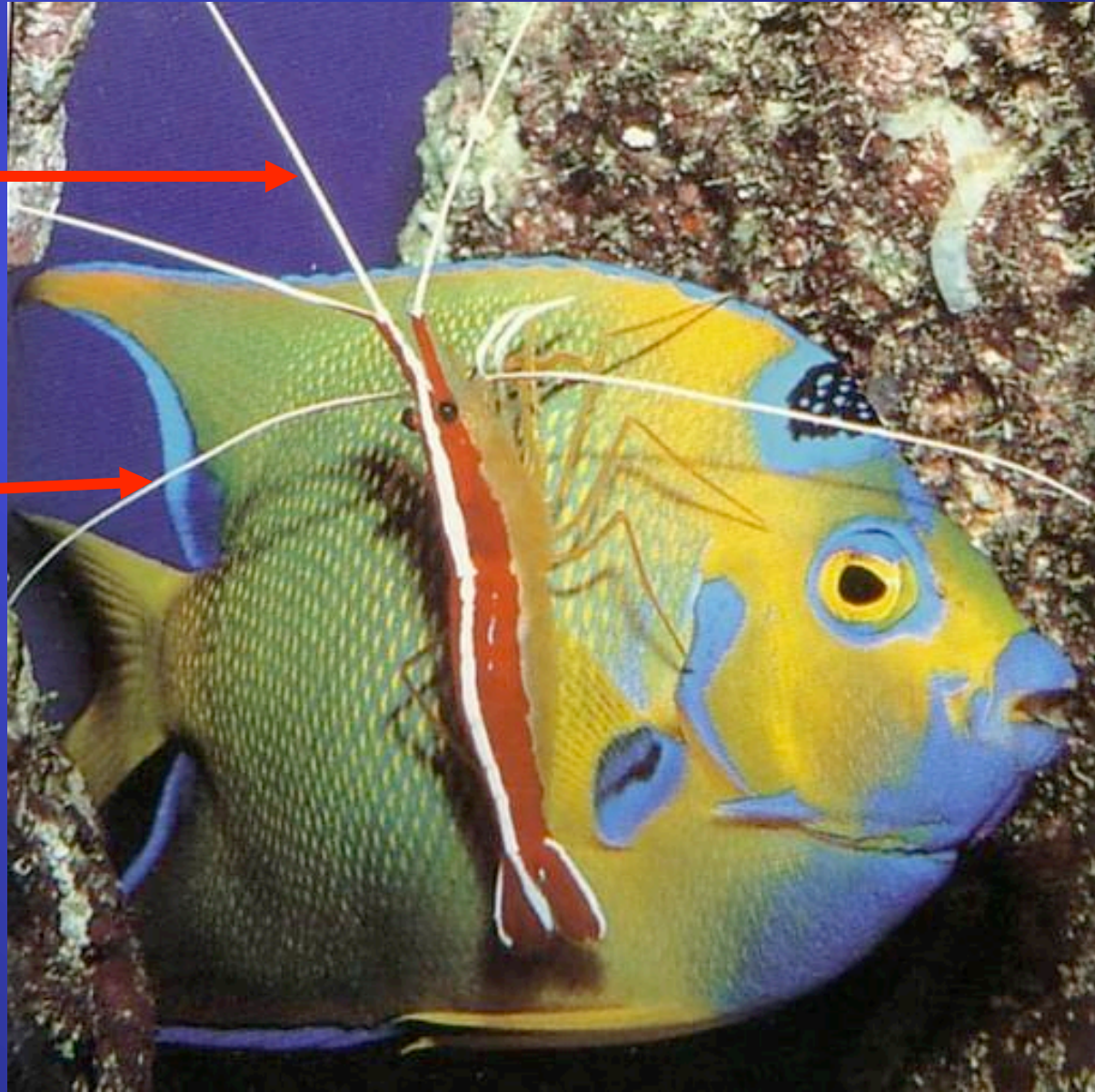
Head Appendages

- **First antenna (antennule)**
 - chemosensory
- **Second antenna**
 - Tactile
- **Modifications: swimming, grasping mates, feeding, defense**

Antenna 1

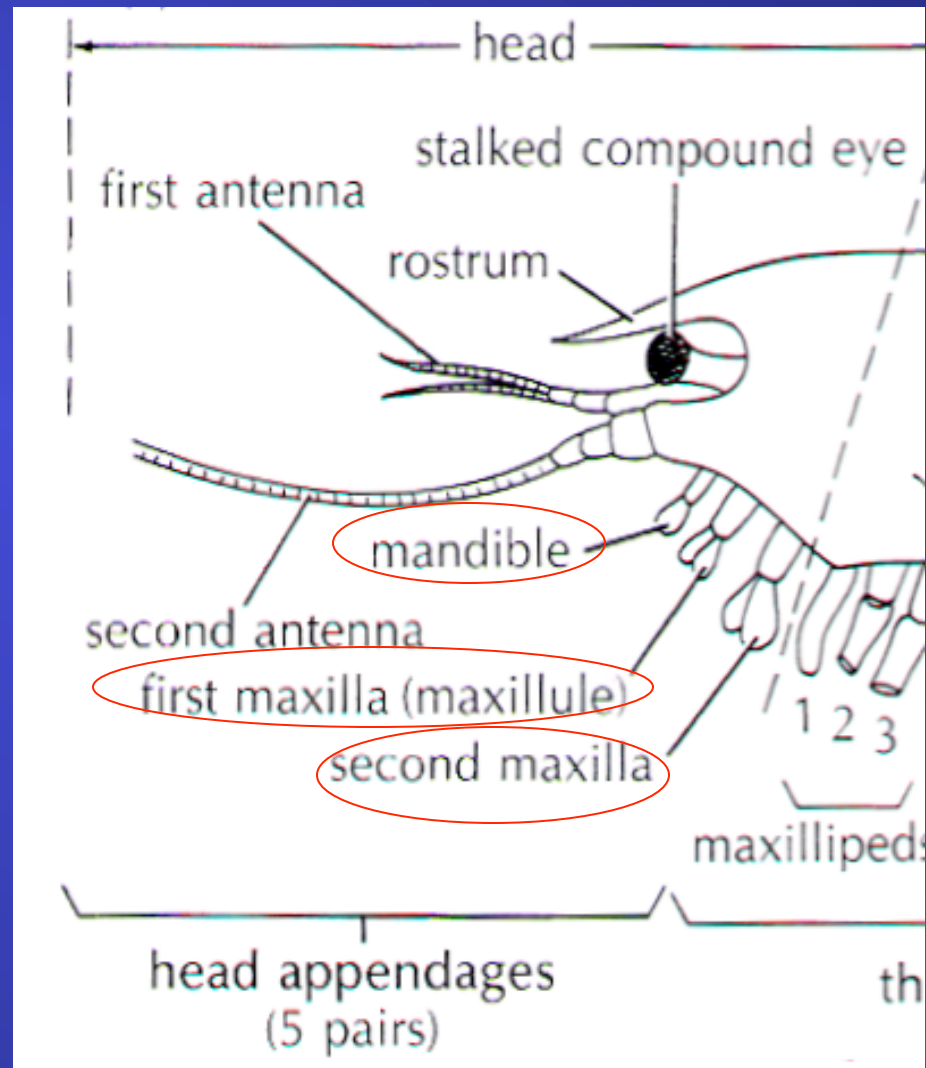


Antenna 2



Head Appendages

- **Mandibles**
 - Shred food
- **First maxilla (maxillule)**
 - Food manipulation
- **Second maxilla**
 - Food manipulation
 - Gill bailer-scaphognathite; drives respiratory currents



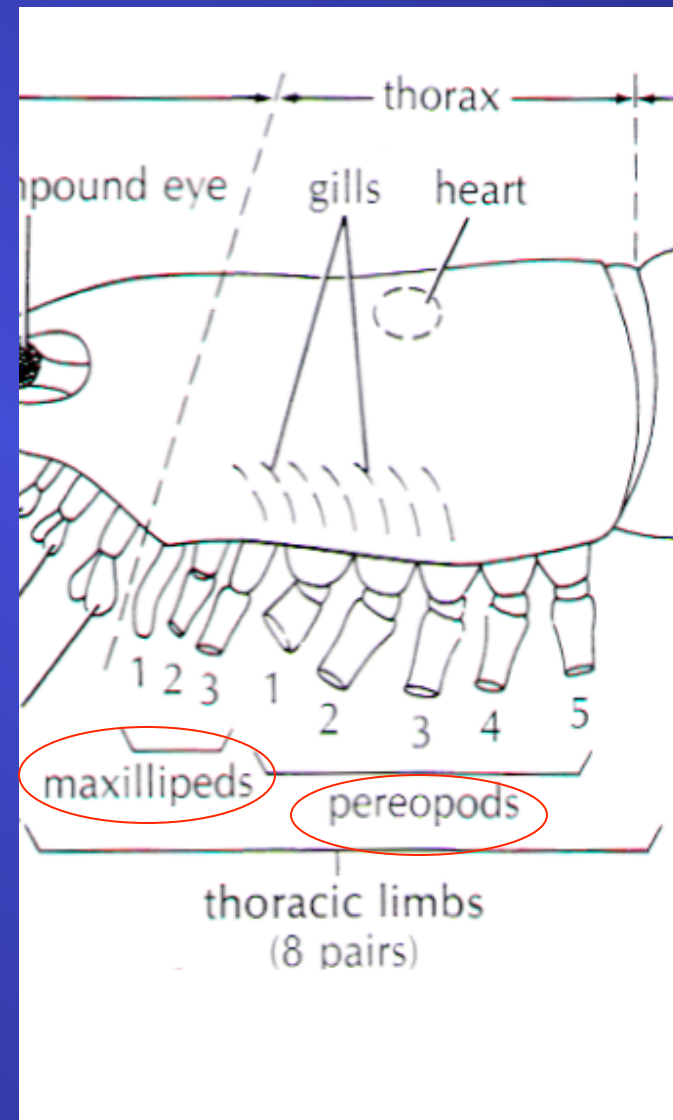
Thoracic Appendages

Maxillipeds

modified to function
as mouthparts

Pereopods

used for locomotion:
walking or swimming

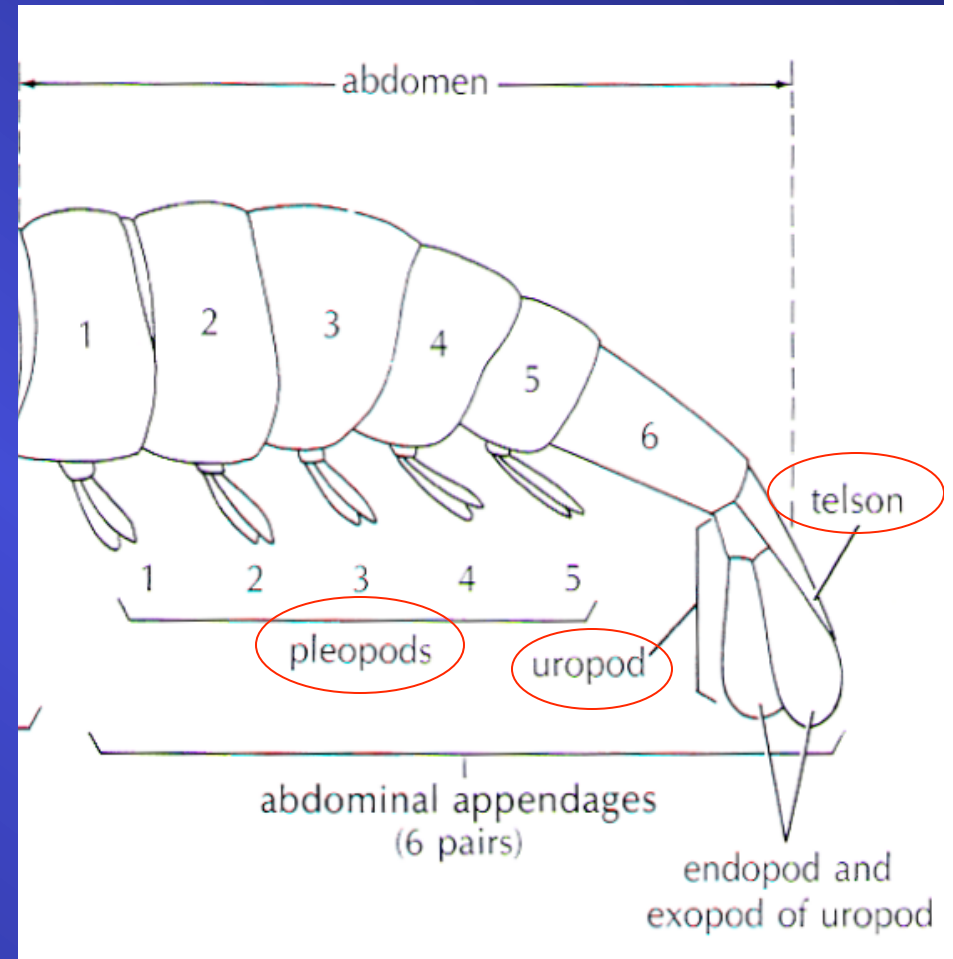


Abdominal Appendages

Pleopods (“swimmerets”)
swimming, generating
respiratory current, also
egg bearing

Uropods

last pair of abdominal
appendages; combine
with telson to form tail
fan



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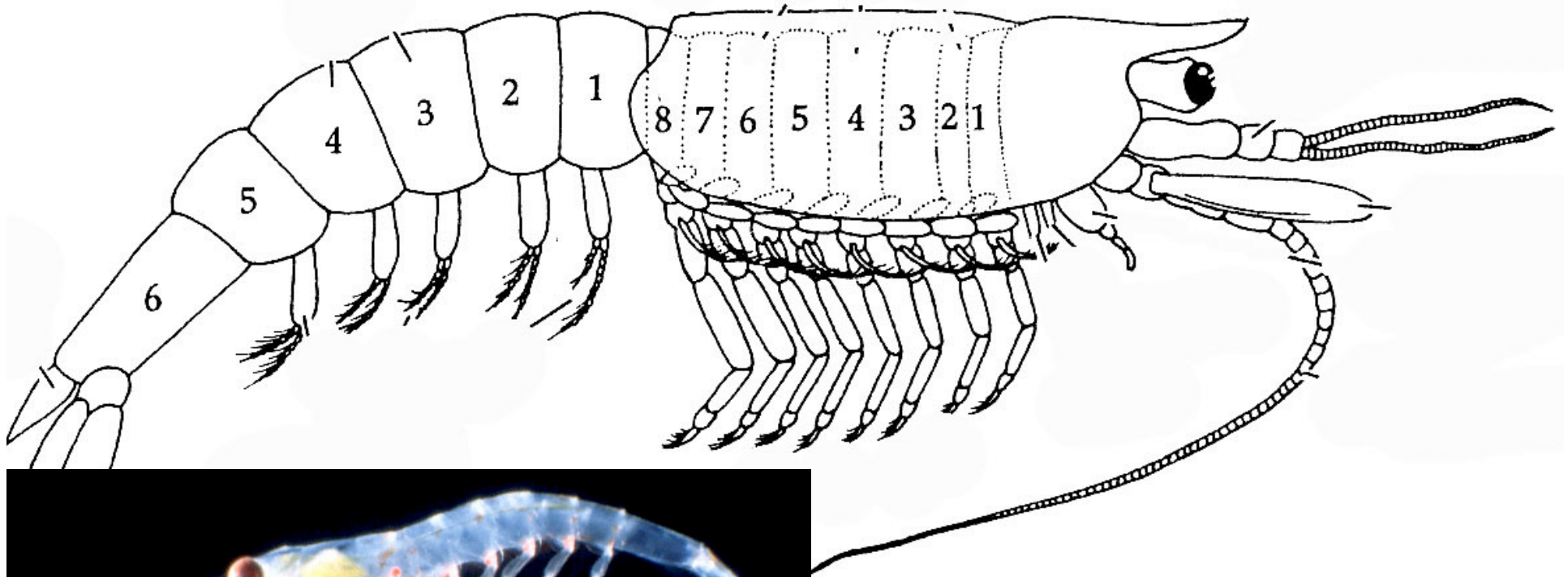
Subclass Cirripedia—the barnacles

Order Euphausiacea

- Krill, Euphausiids
- 85 species worldwide
- All marine; open ocean



Euphausiid- krill



No maxillipeds; eight pairs of undifferentiated legs- used to form filtering basket for straining water for food

Order Isopoda

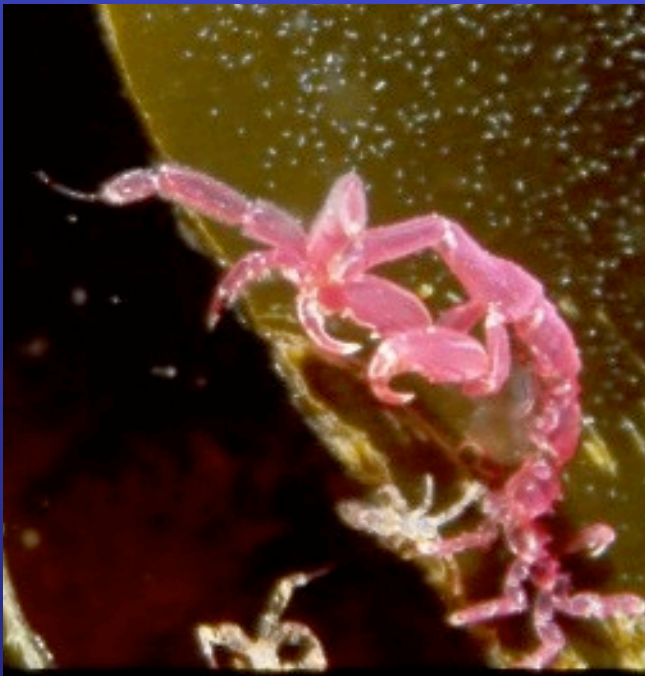
Isopods
Woodlice
Pillbugs



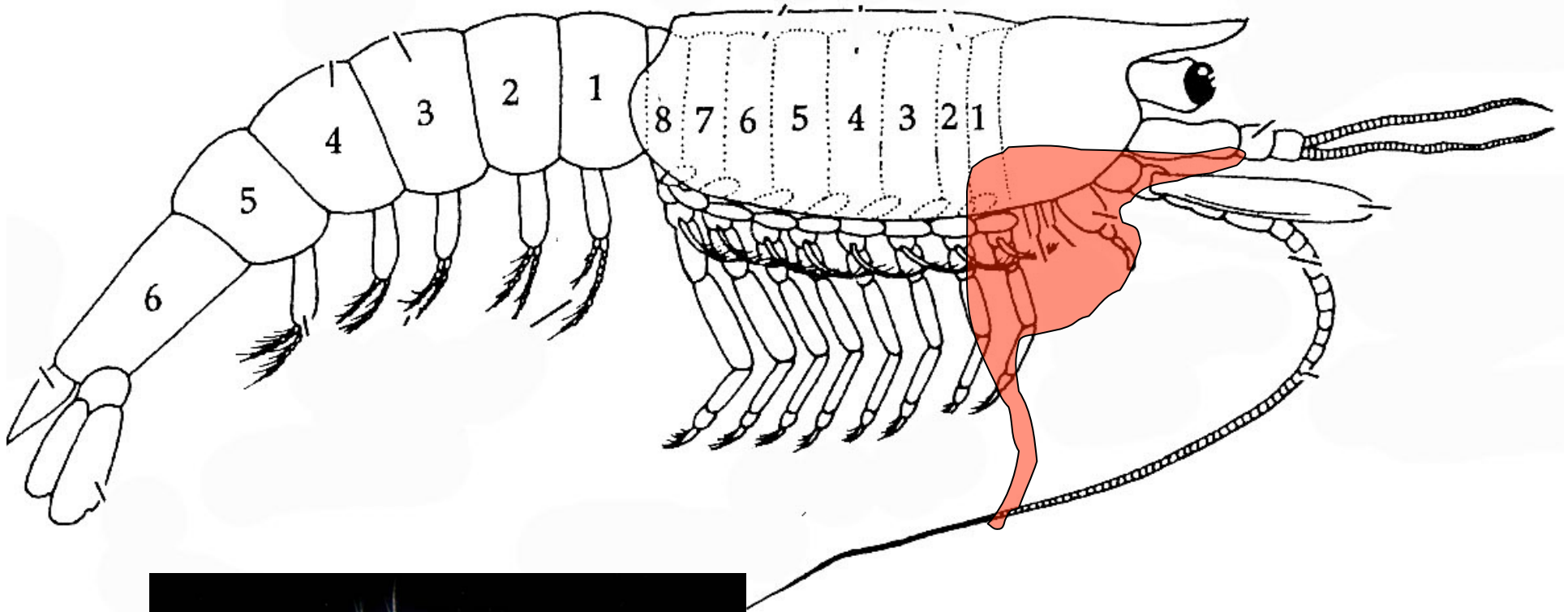
- 10,000 species
- Only terrestrial malacostracans
- Some are parasites
- Most common deep sea malacostracans (1.5 ft)
- Males reduced; live in female pouch or attached to antennae

Order Amphipoda

- Sand fleas, skeleton shrimp
- 6,000 species
- Freshwater; caves & underground streams
- Shallow temperate marine water



Isopods & Amphipods



Mysid

CAS

1 pair of maxillipeds;
leaving 7 thoracic legs

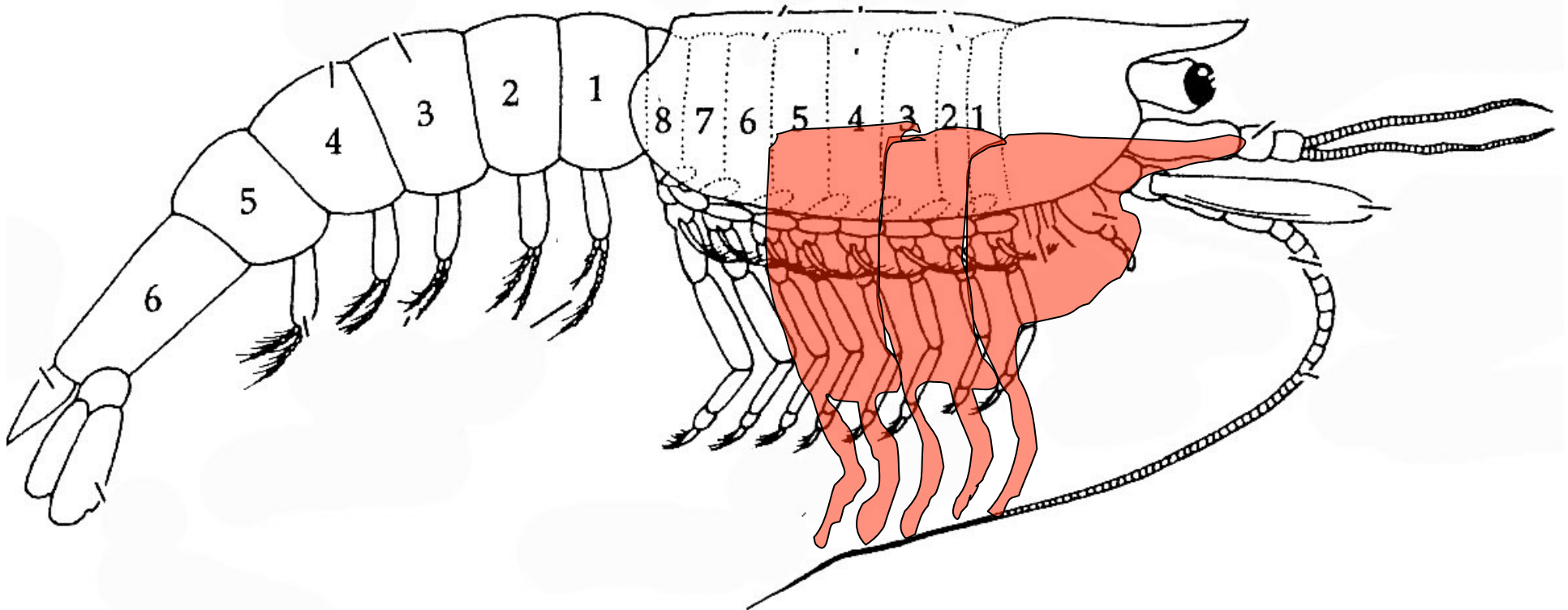
Order Stomatopoda

- Mantis shrimp
- 350 species
- Voracious predators



[http://video.google.com/videoplay?
docid=2500843136893486803&q=mantis+shrimp&ei=uWQeSI-
PMITmrQOFz_WrAQ](http://video.google.com/videoplay?docid=2500843136893486803&q=mantis+shrimp&ei=uWQeSI-PMITmrQOFz_WrAQ)

Stomatopods- mantis shrimps



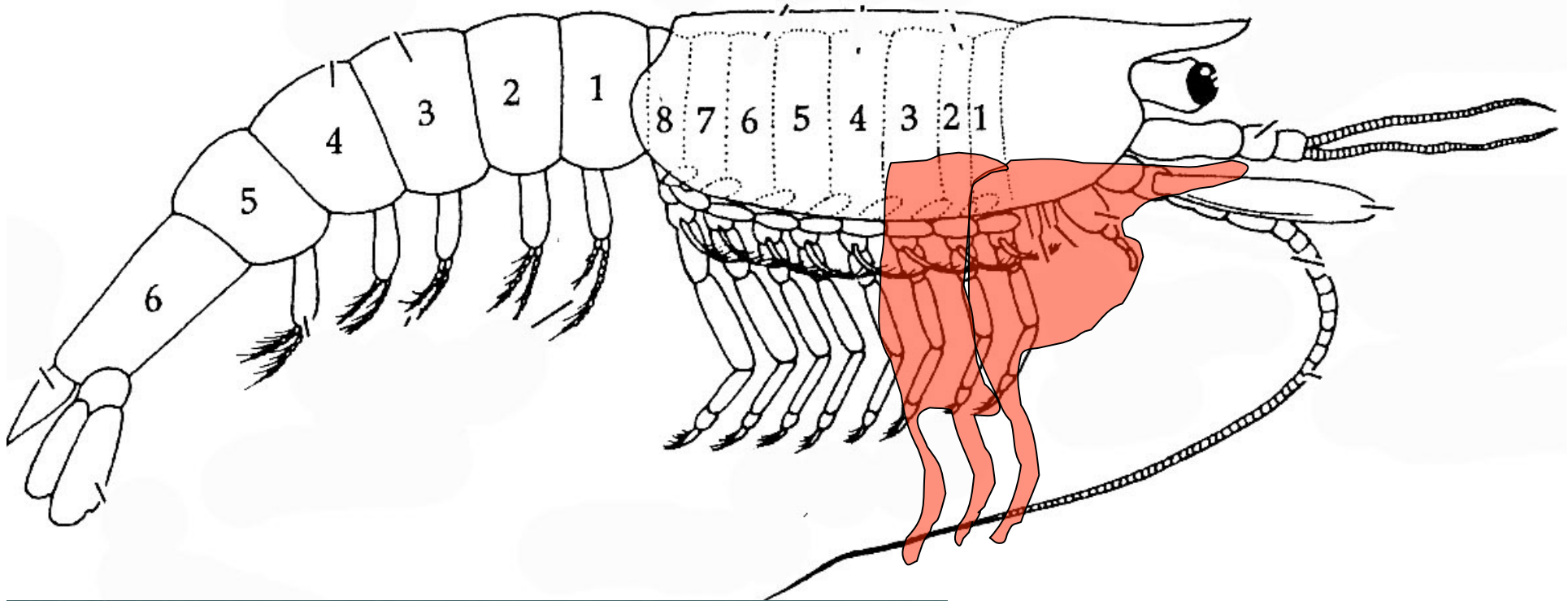
5 pairs of maxillipeds;
three pairs of legs

Order Decapoda

- 10,000 species
- Shrimp, crab, hermit crabs, lobsters



Decapods- crabs, shrimps, lobsters



3 pairs of maxillipeds;
five pairs of legs
deca = 10, pod = foot

- Infraorder Penaeidea
- Infraorder Caridae
- Infraorder Astacidae
- Infraorder Palinura
- Infraorder Anomura
- Infraorder Brachyura

**Include penaeid & sergestid shrimp;
only decapods that do not brood**

More shrimp

**American lobster & freshwater
crayfish**

Spiny lobsters

**Mud & ghost shrimp, hermit crabs,
king crabs, squat lobsters, porcelain
crabs, sand crabs**

**Spider, cancer, green, mud, pea,
& fiddler crabs**

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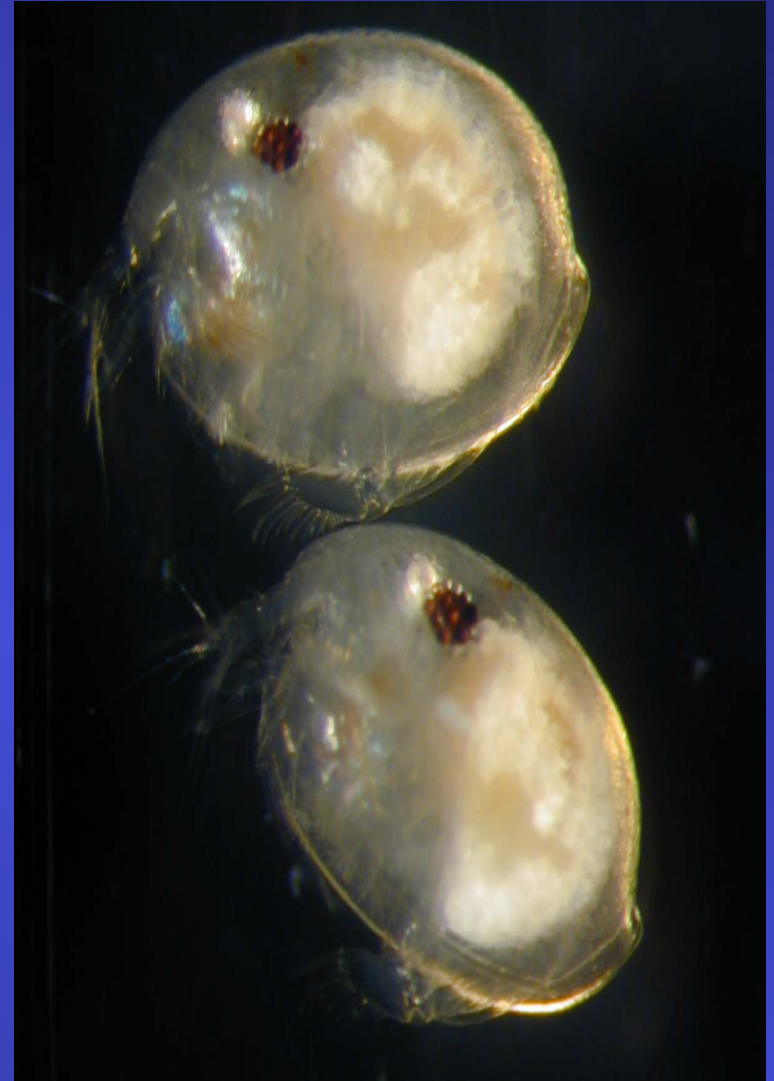
Subclass Branchiopoda

- Diverse, small, primarily freshwater crustaceans; water fleas (*Daphnia*) and brine shrimp (*Artemia*)
- Thoracic appendages modified to form large flattened paddles; functions in gas exchange and locomotion



Subclass Ostracoda

- Marine and freshwater
- Head and body are enclosed in a partially calcified, bivalve carapace
- Most species are free living, some commensal with other crustaceans or echinoderms

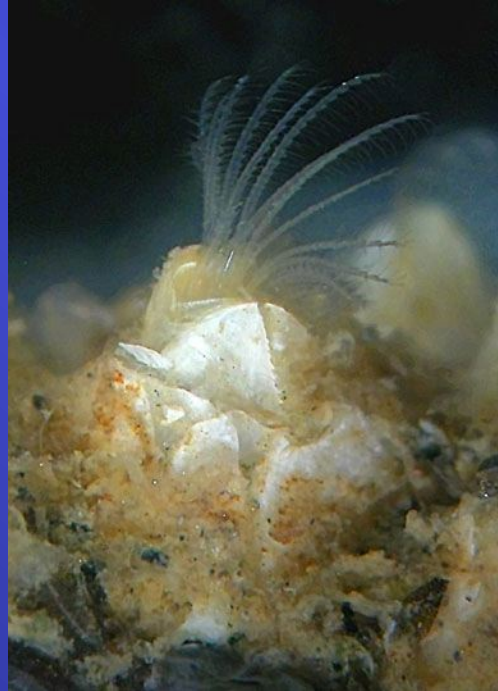


Subclass Copepoda



- Most abundant animals on earth
- 8,500 species
- Most marine and feed on phytoplankton; major component of zooplankton & base of food chain
- Lack gills and abdominal appendages

Subclass Cirripedia



- Exclusively marine
- highly modified for attachment to hard substrates
- Lack abdominal segments, gills, & heart
- Modified thoracic appendages called cirri used for filter feeding
- Shell composed of numerous plates

General External Anatomy of a Crustacean

