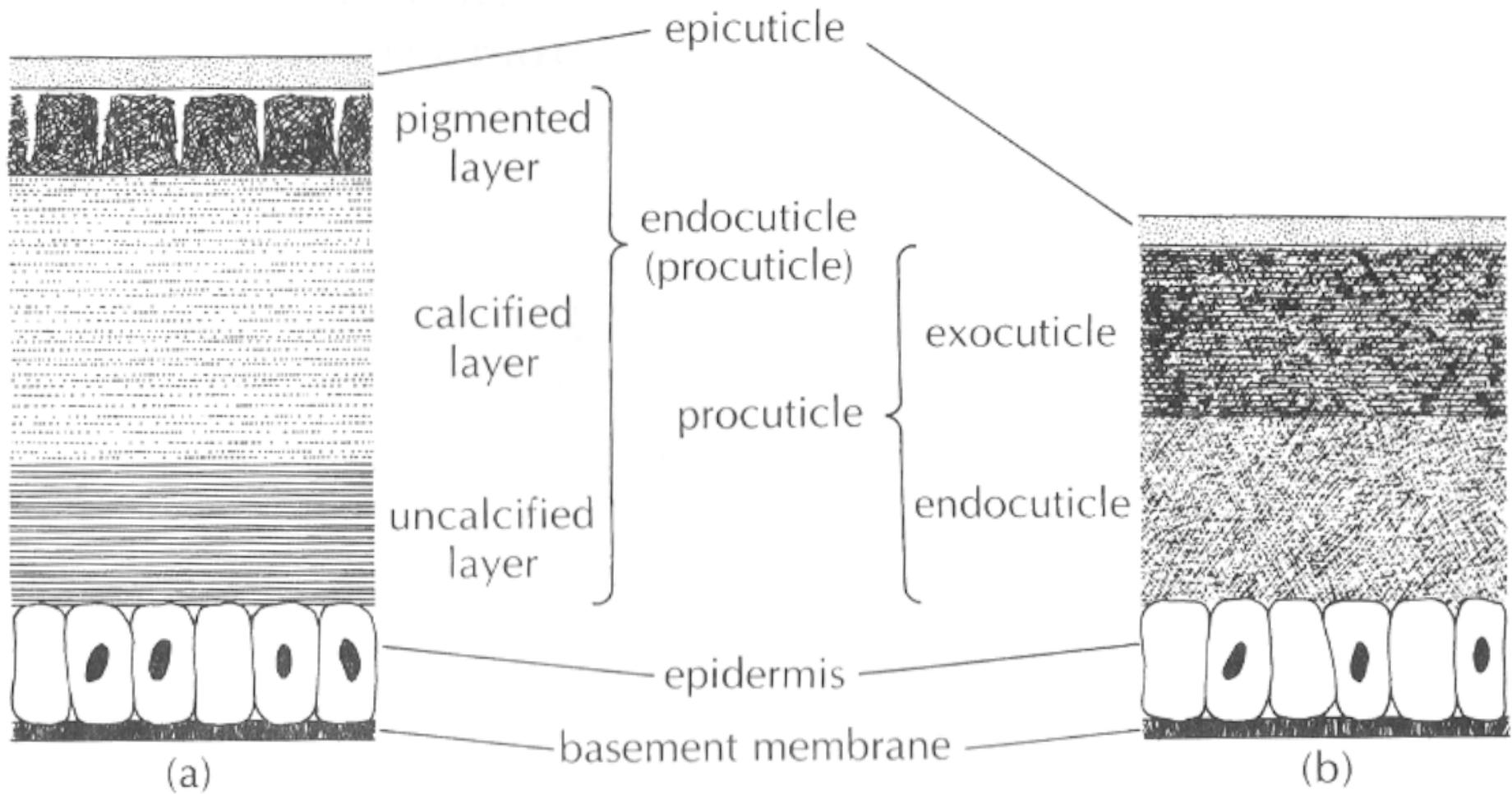


Intro to Arthropods



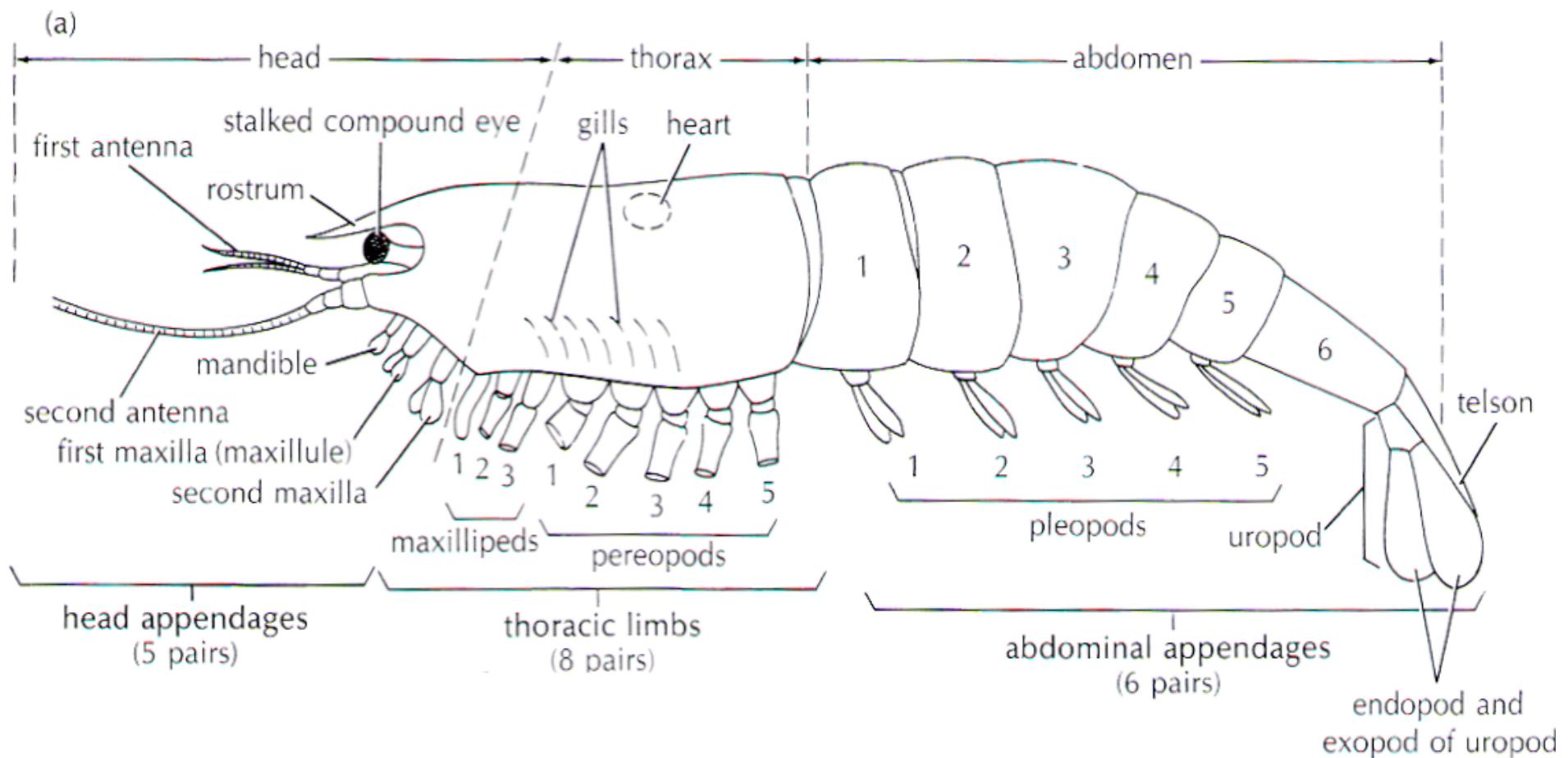
Defining Characteristics

- 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

Order Euphausiacea—euphausiids
(krill)

Order Stomatopoda—stomatopods

Order Decapoda—crabs, lobsters,
shrimp, hermit crabs

Subclass Branchiopoda—brine (fairy)
shrimp, clam shrimp, water fleas

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Class Arachnida



Class Merostomata



Class Pycnogonida



Zubi 07

Class Merostomata

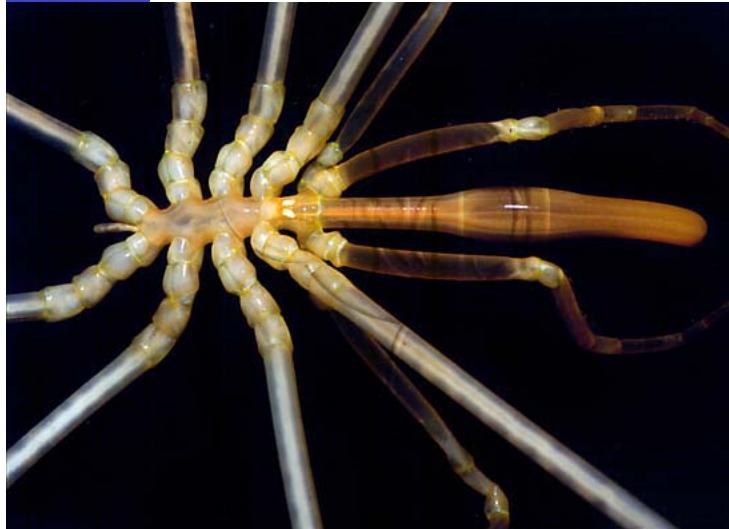
- Primarily extinct species - Only 4 living
- Horseshoe crab (*Limulus polyphemus*)
- All marine
- Have appendages on the opisthosoma known as “book gills” that are flattened and modified for gas exchange
- Telson drawn out into spike



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
- Ovigers

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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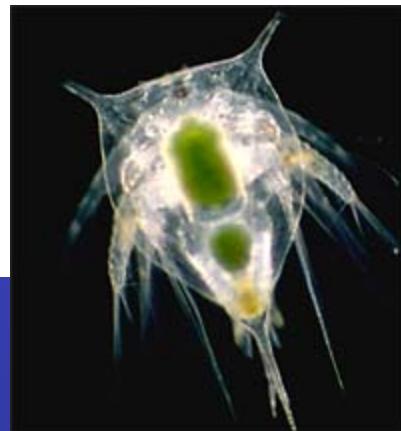
Subclass Copepoda—the copepods

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

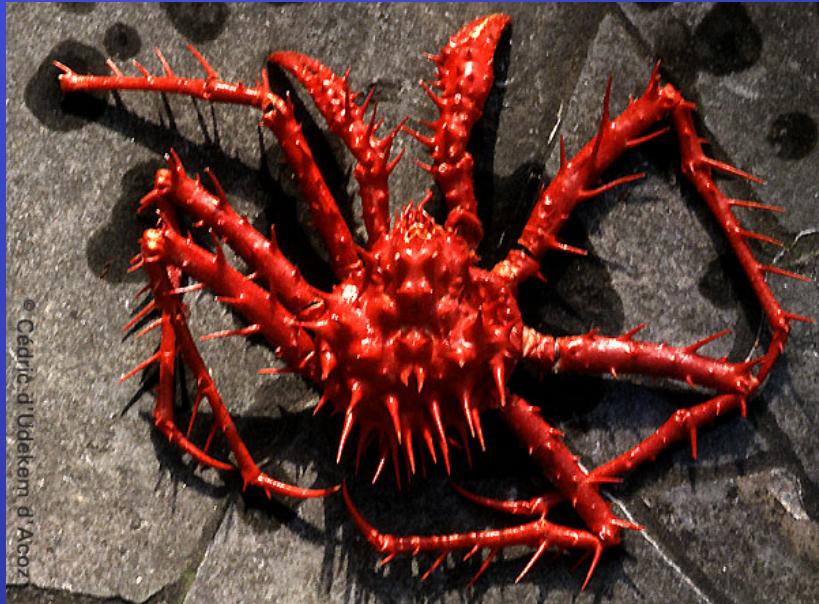
- Most familiar forms:
 - Shrimps
 - Crabs
 - Lobsters





“Lobster”

“Crab”





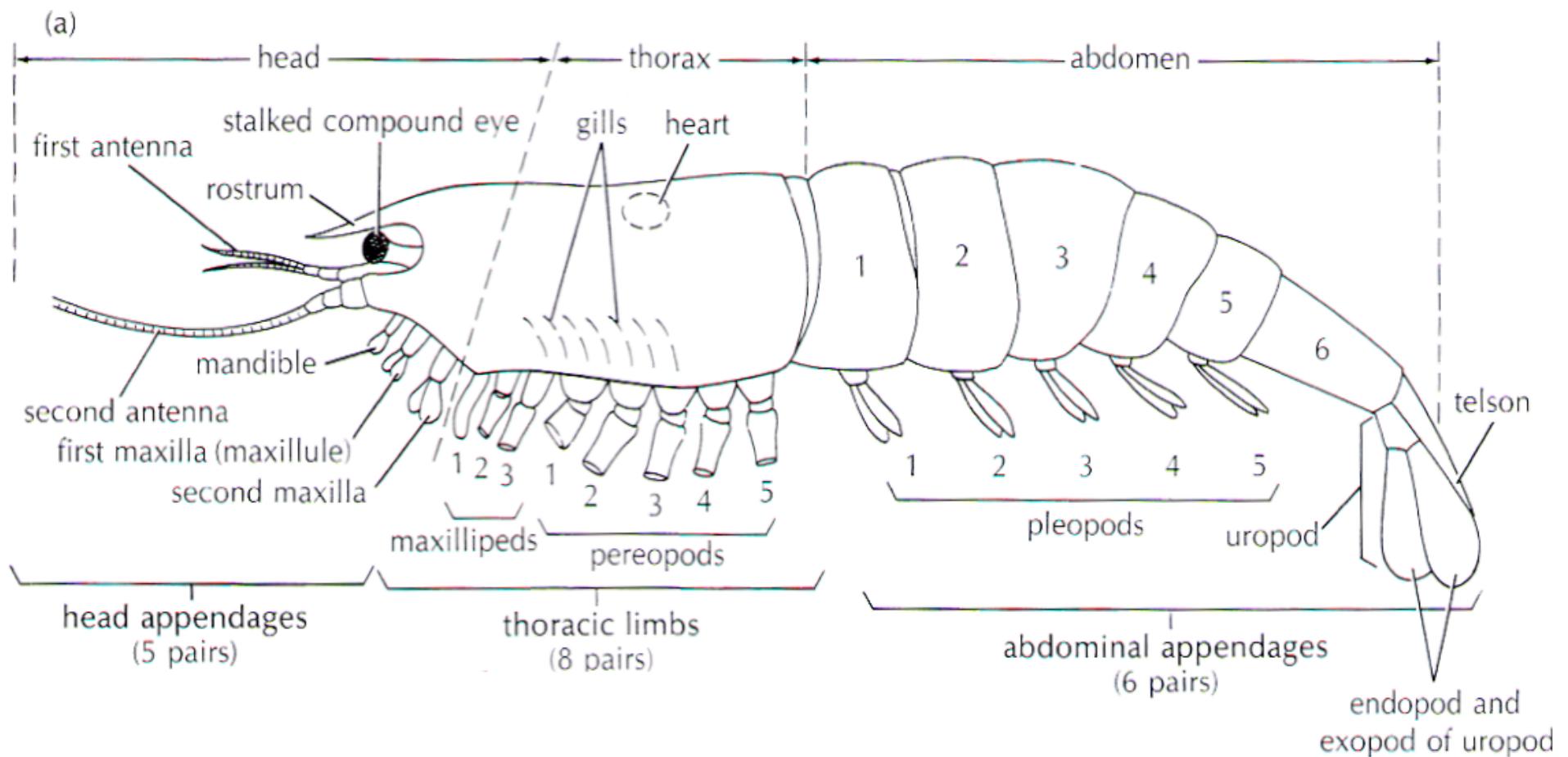
“Shrimp”

© 2001 Jeffrey Johnson

Characteristics of the Malacostraca

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

General External Anatomy of a Crustacean

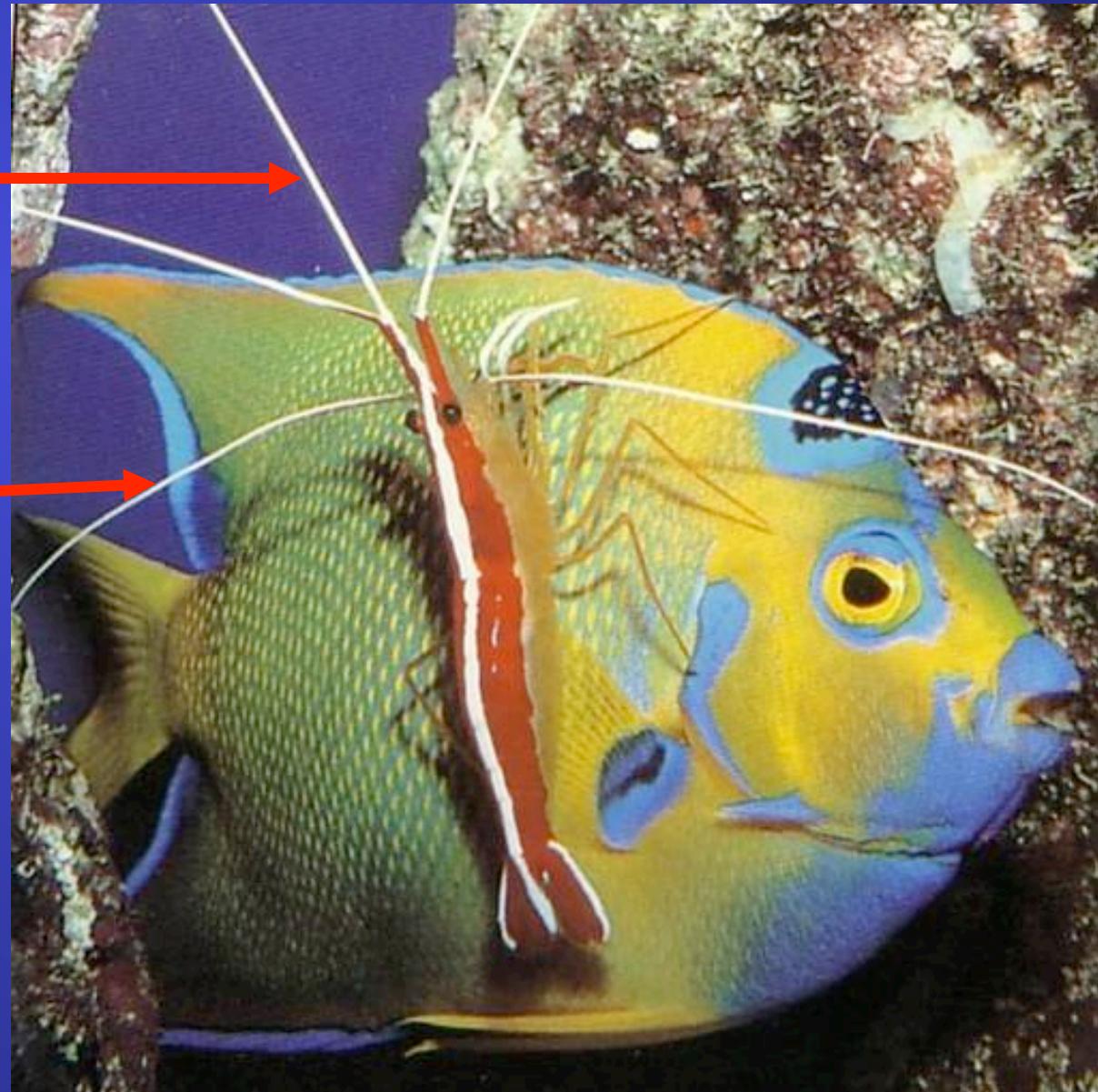


Head Appendages

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

Antenna 1

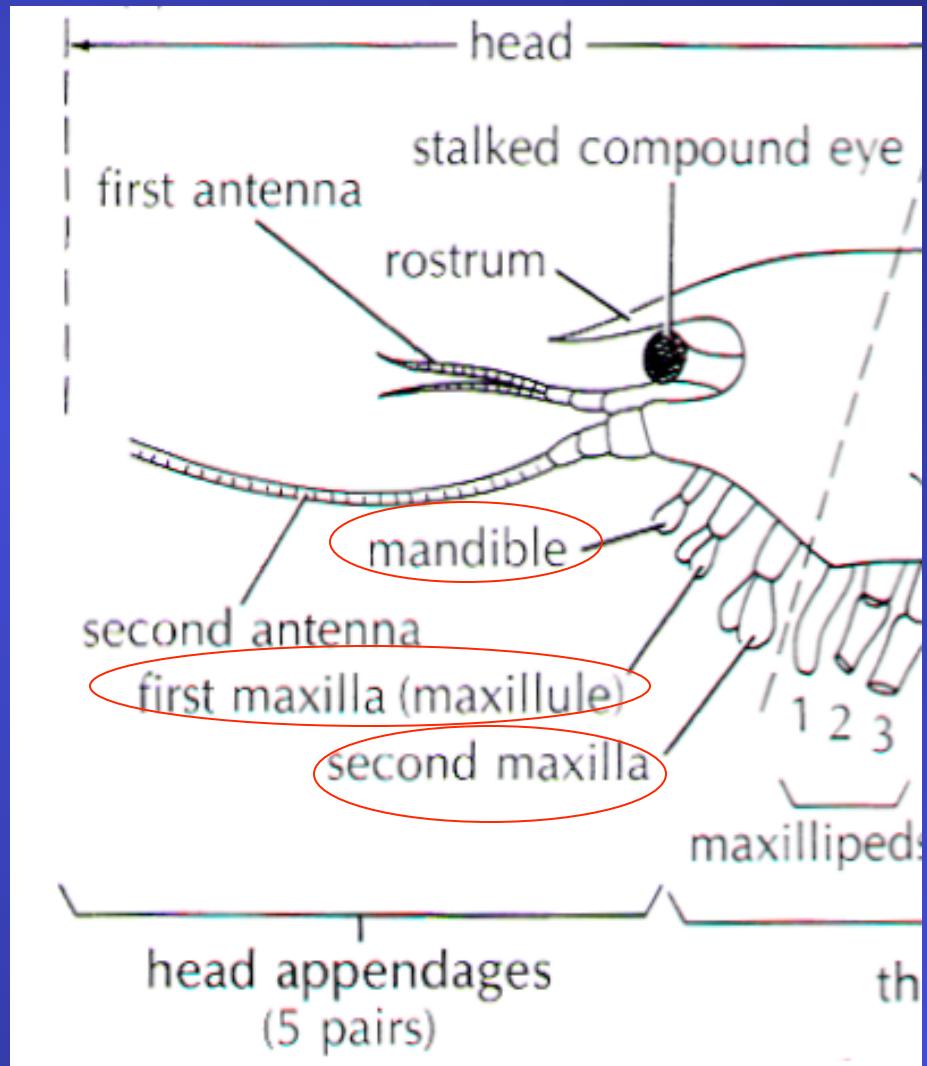
Antenna 2



D. Perrine

Head Appendages

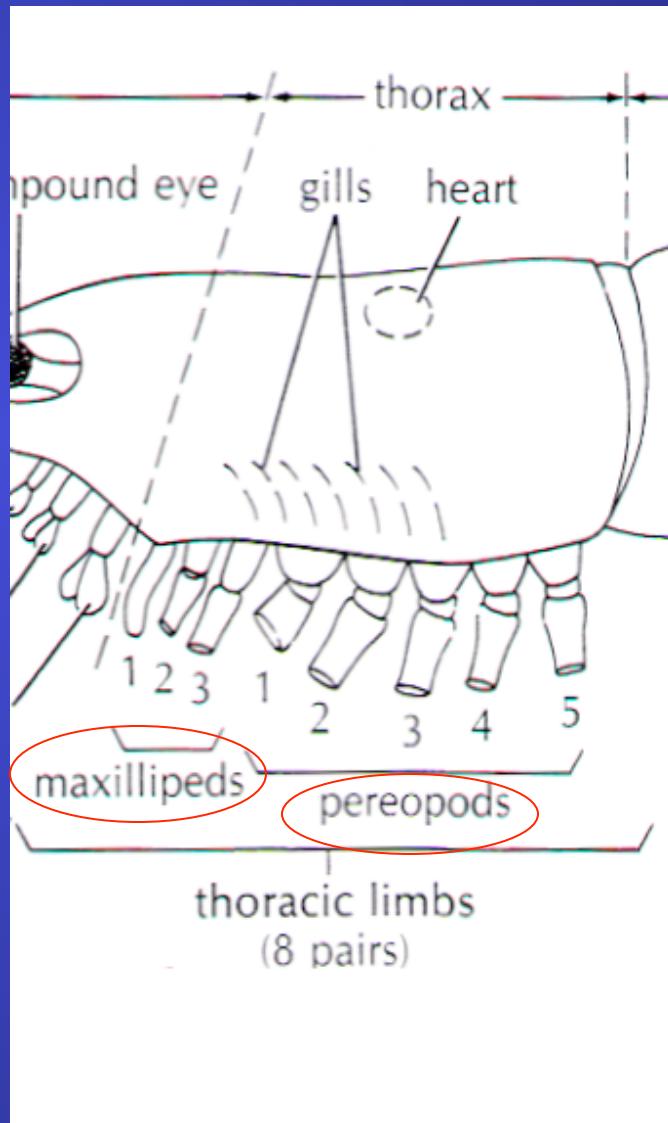
- **Mandibles**
 - Shred food
- **First maxilla (maxillule)**
 - Food manipulation
- **Second maxilla**
 - Food manipulation
 - Gill bailer-
scaphognathite;
drives respiratory
currents



Thoracic Appendages

Maxillipeds
modified to function
as mouthparts

Pereopods
used for locomotion:
walking or swimming

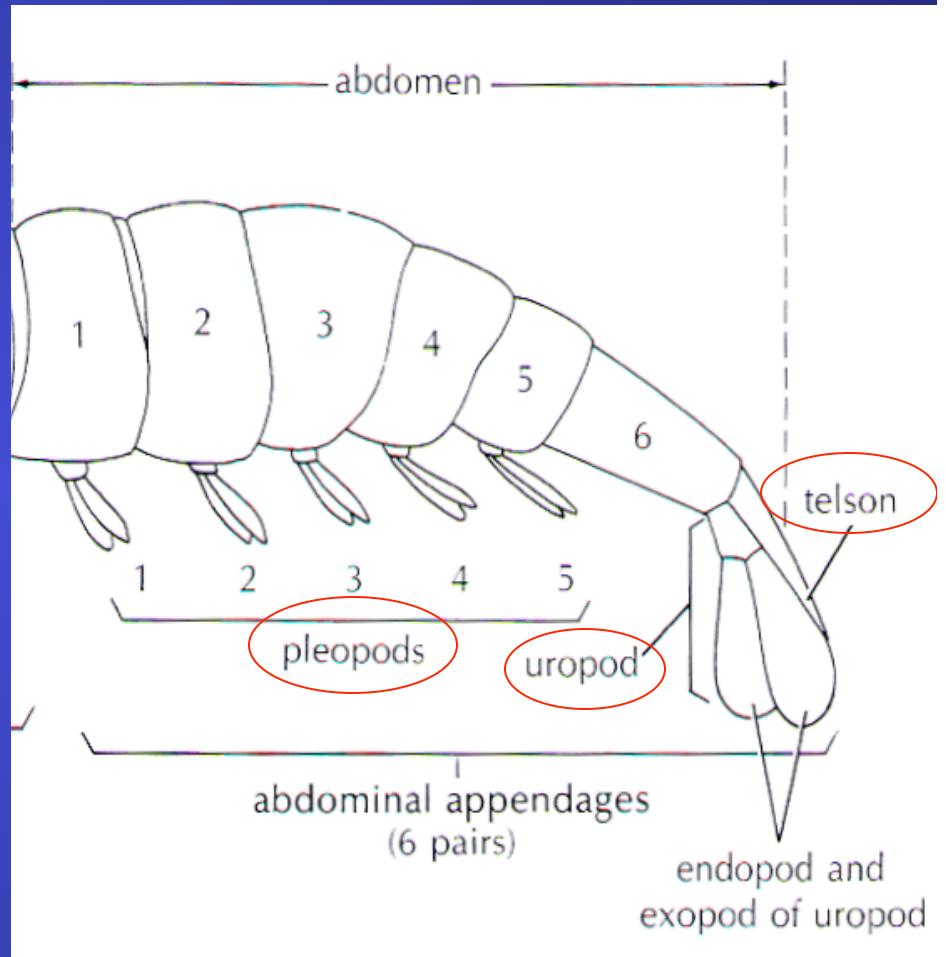


Abdominal Appendages

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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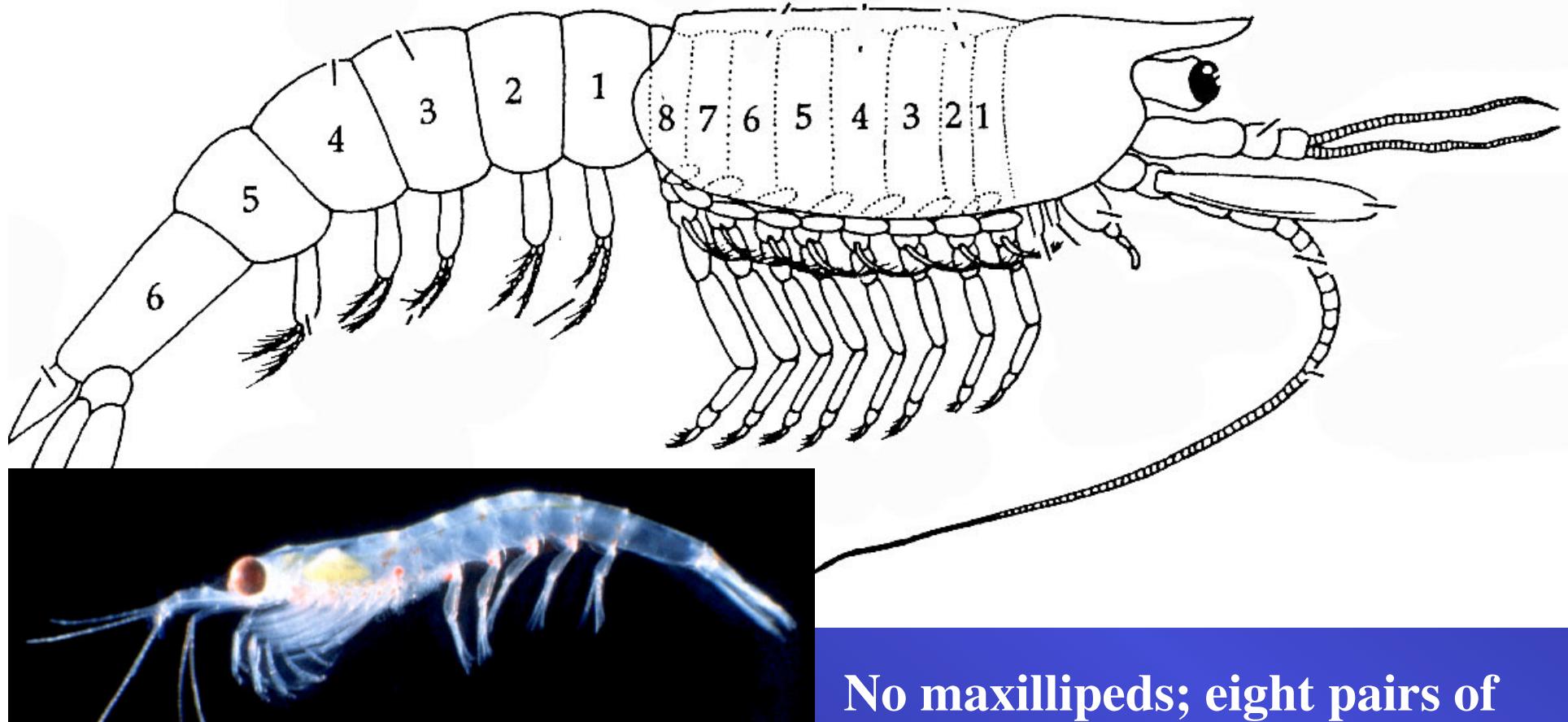
Subclass Cirripedia—the barnacles

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



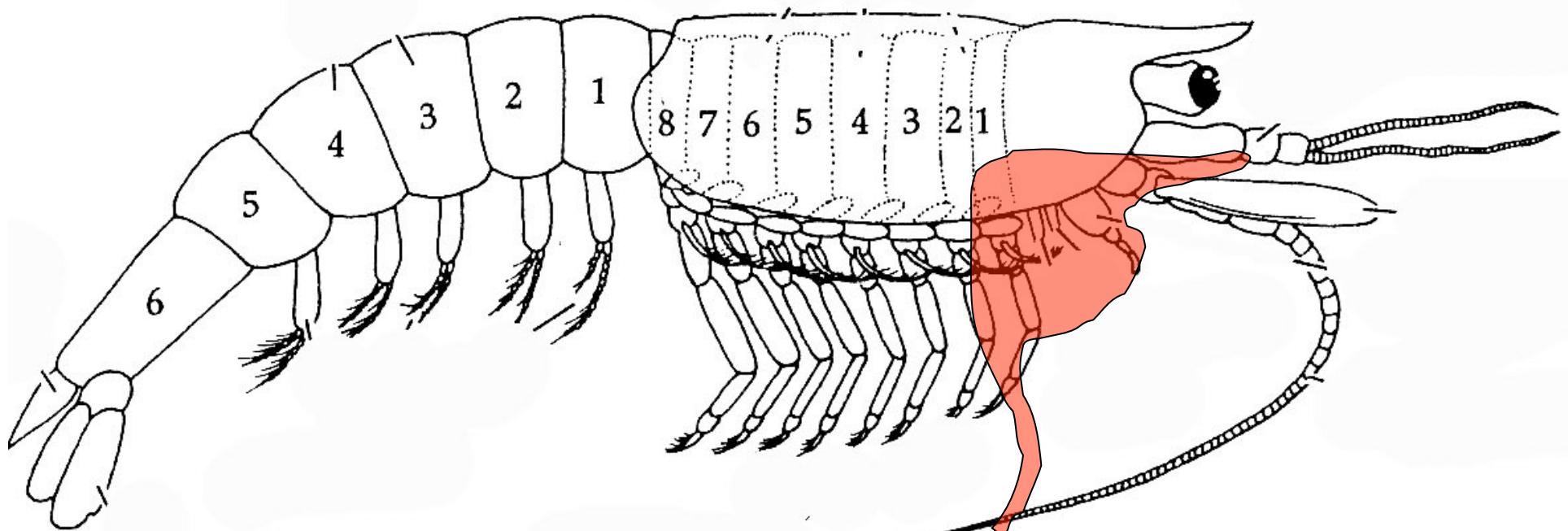
- 10,000 species
- Only terrestrial malacostracans
- Some are parasites
- Most common deep sea malacostracans (1.5 ft)
- Males reduced; live in female pouch or attached to antennae

Order Amphipoda

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



Isopods & Amphipods



1 pair of maxillipeds;
leaving 7 thoracic legs

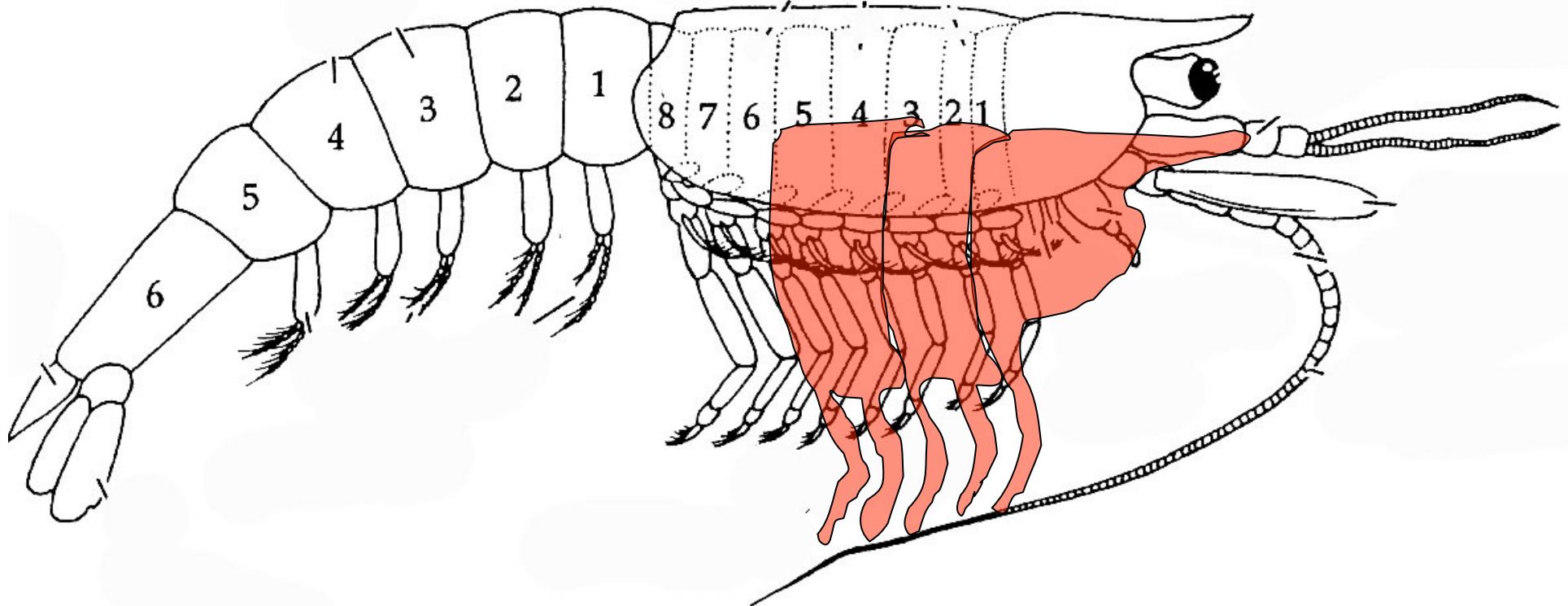
Order Stomatopoda

- 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



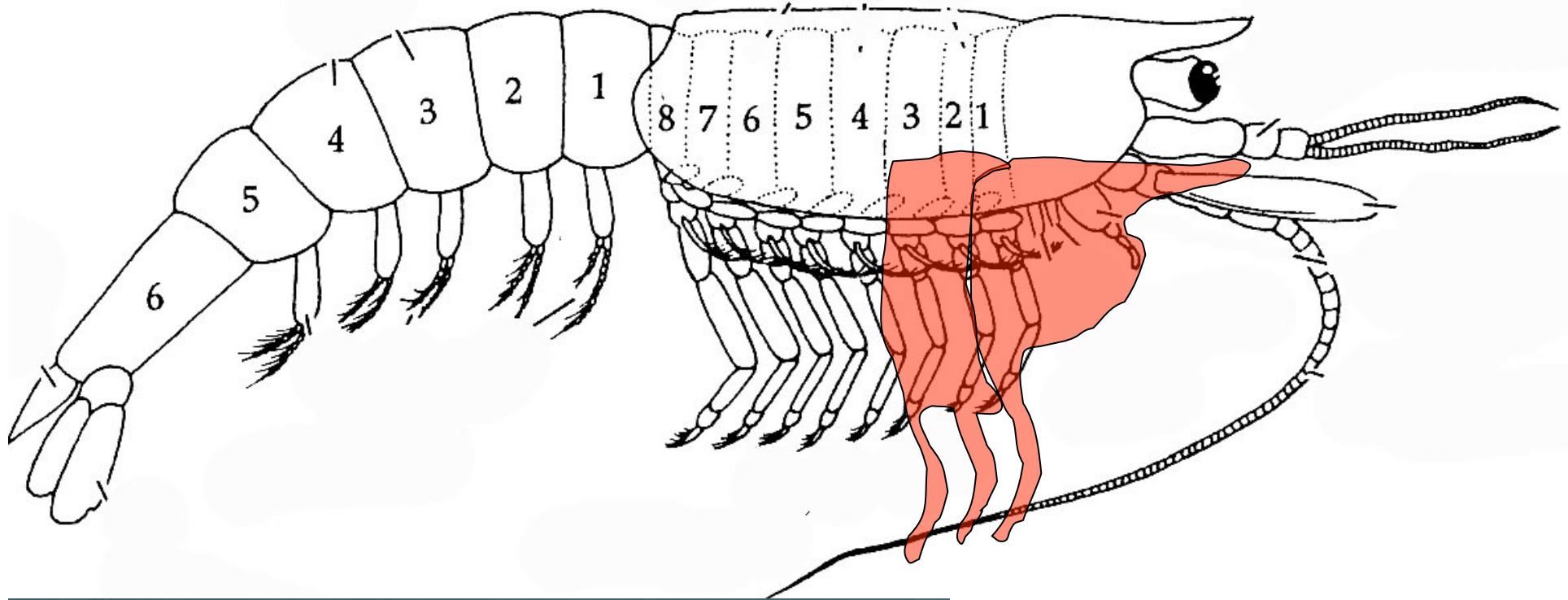
5 pairs of maxillipeds;
three pairs of legs

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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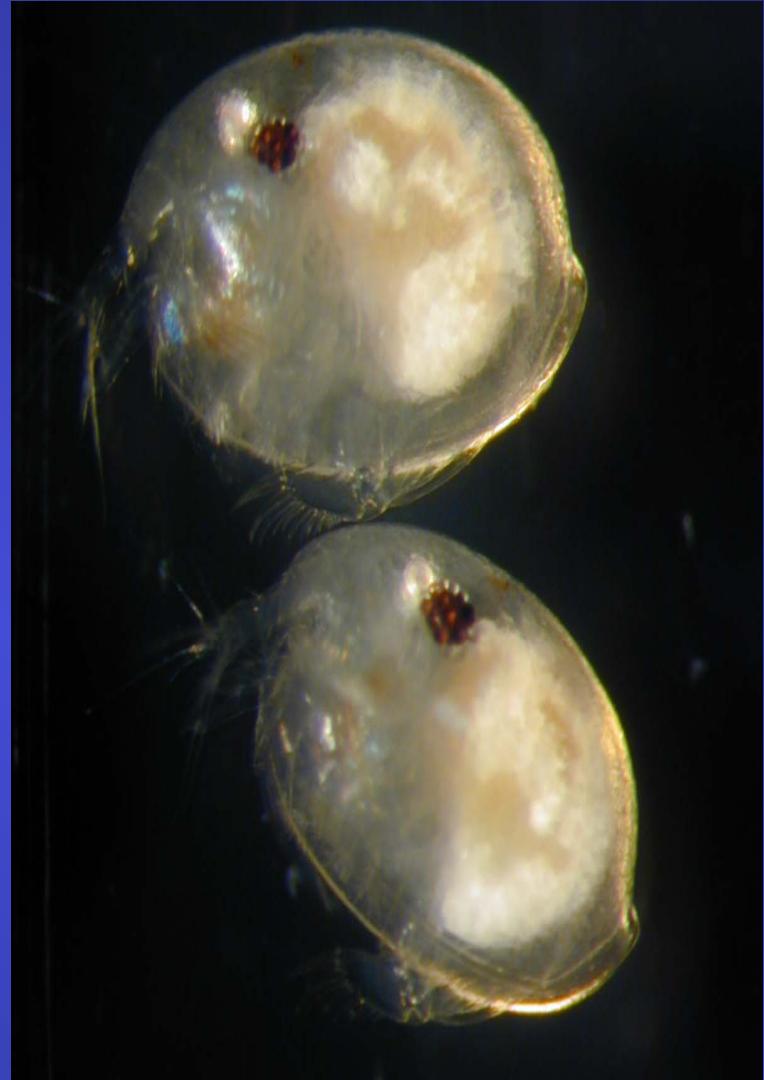
Subclass Branchiopoda

- 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



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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

