Chapter XXII —Subphylum Crustacea

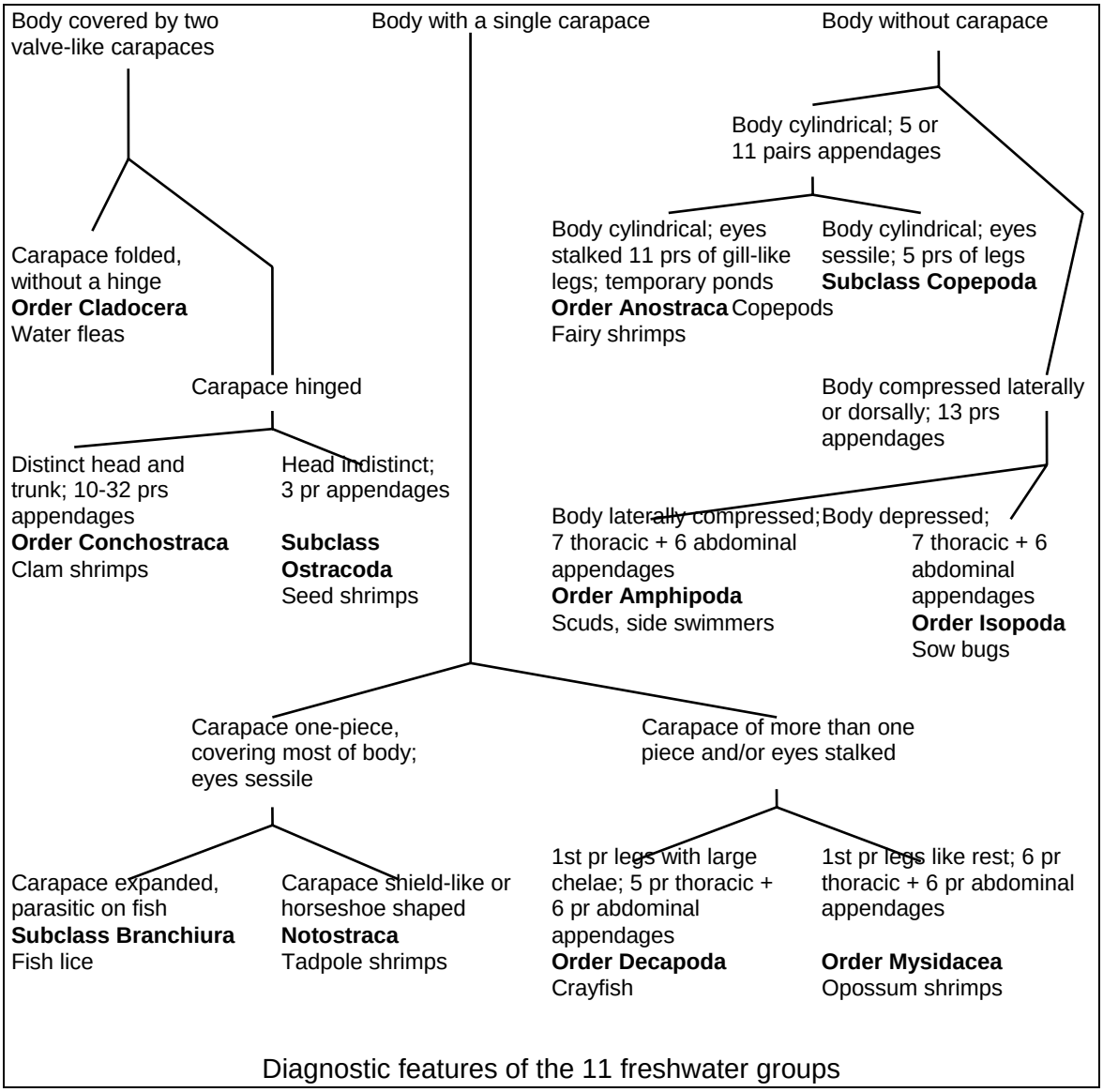
Superphylum: Arthropoda

- (Williams & Feltmate, 1992)
  - Superphylum Arthropoda
    - (jointed-legged metazoan animals [Gr, *arthron* = joint; *pous* = foot])
  - Phylum Entoma

Table XXII-1: Classification of Crustacea and estimates of their numbers in North American freshwaters (Thorp & Covich, 1991)

Taxa	Worldwide percentage found in freshwaters	Approximate number of species in the US and Canada
Subphylum Crustacea	<10%	ca. 1500
Class Cephalocarida	0%	o
Class Branchiopoda (8 orders; includes cladocerans)	>95%	>200
Class Remipedia	0%	0
Class Maxillopoda Subclass Branchiura	90%	23
Subclass Copepoda	<15%	>200
Class Ostracoda	>50%	420
Class Malacostraca	ca. 10%	
Superorder Pancarida (Order Thermosbaenacea)	ca. 50%	1
Superorder Peracarida (Orders Mysidacea, Amphipoda and Isopoda)	<10%	>300
Superorder Eucarida (Order Decapoda)	10%	334

Figure XXII-1: Class CRUSTACEA (Mackie, 1998)

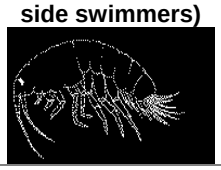
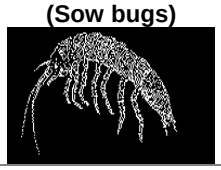
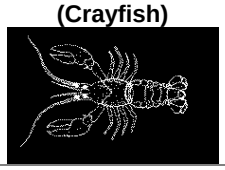


Diagnostic features of the 11 freshwater groups

The phylum Arthropoda contains 80% of all known species of animals. Although Insecta is the dominant class of arthropods on land, the class Crustacea dominates the water. Several features distinguish crustaceans from insects. Another difference between crustaceans and insects is that crustaceans continue to molt after they become adults. Most of the 35,000 known species of crustaceans are marine.

Many of the freshwater crustaceans rarely attain sizes greater than 1 mm and therefore are not readily collected with techniques effective for sampling aquatic insects. One feature common to all crustaceans is that they respire either through gills or through the general body integument. (Peckarsky, 1990)

Table XXII-2: Diagnostic features of four orders of benthic crustaceans (Mackie, 1998)

Features	Amphipoda (Scuds, side swimmers) 	Isopoda (Sow bugs) 	Decapoda (Crayfish) 	Mysidacea (Opossum Shrimps)
Body characteristics	Laterally compressed	Dorsoventrally compressed	Large carapace covers entire thorax	Carapace partly covers thorax
Type of eyes	Sessile	Sessile	Stalked	Stalked
No. and type of thoracic appendages	7 pr, 1st 2 pr are chelae-like, last 5 pr have a claw on each leg	7 pr, 1st pair have chelae, next 6 pr are similar	5 pr, 1st pr are large and chelate, next 2 pr have two claws on each leg, last 2 pr have 1 claw	6 pr, all modified for swimming, legs getting increasingly longer with each segment
No. and type of abdominal appendages	6 pr, 1st 3 pr used for swimming, last 3 pr have uropods on each	6 pr but all are gill-like and placed one above the other	5 pr, 1st pr modified as sex organs, next 5 pr used for swimming	6 pr, smaller than thoracic legs; 4th leg much longer in male than female
Feeding type	Scavengers or detritus feeders, omnivorous	Scavengers of dead and dying organisms	Mostly omnivorous, will prey upon snails, insects, small fish, but mostly herbivorous	Mostly filter feed on zooplankton, sometimes on raptorial

Subclass Eumalacostraca, Superorder Peracarida (Williams & Feltmate, 1992)

Order Amphipoda (Scuds, side swimmers) (Mackie, 1998)

The order name refers to the double leg types; the prefix “Amphi” is Greek for “both sides of” (i.e. both thorax and abdomen) or “double”, and the suffix “poda” is from the Greek word “podos”, meaning “foot”. Amphipods are somewhat laterally flattened, forcing them to swim on their sides. The term, scuds, refers to their role as scavengers and detritivores of bottom sediments.

Scuds are most commonly found associated with aquatic vegetation. Scuds are sometimes confused with sowbugs, but scuds are higher than they are wide and swim rapidly on their sides, while sowbugs have flattened, oblong shaped bodies and crawl slowly along surfaces. (Kellogg, 1994)

Hyalella Azteca is so ubiquitous and abundant that their absence in considered a reliable indicator of lake acidification. They can tolerate pH’s down to 6.5, at which point they begin to disappear. *Diporeia hoyi* is found only in deep, cold, oligotrophic lakes. However, their preference for deep waters appears to depend upon their requirement for cold water because they have been found in profundal zones with less than 7% oxygen saturation.

Order Isopoda (Sow bugs) (Mackie, 1998)

The Isopoda are dorsoventrally flattened. When disturbed they roll up into a ball, much like the garden pill bugs. The legs of isopods are similar, hence the order name “Iso” from the Greek word “isos” meaning equal or similar, and “poda” from the Greek word “podos”, meaning “foot”.

Sowbugs are sometimes confused with scuds, but sowbugs are wider than they are high and walk slowly along surfaces. (Kellogg, 1994)

Isopods are scavengers and detritivores, feeding mostly on dead or dying animals. The common species, *Caecidotea* (formerly *Asellus*) *communis* and *C. racovitzai* can be found in huge numbers in waters that are subpolluted with organic wastes. Other species are restricted to other kinds of habitats. For example, *Thermosphaeroma* is found only in hot springs, *Caecidotea kenki* is confined to cold streams and spring-fed creeks and *Lirceus garmani* is confined to temporary ponds and springs and are reliable indicators of those kinds of habitats.

Order Cladocera (Water fleas)

Cladocerans are mainly a freshwater group, with only a few predaceous species in marine environments. Most cladocerans are filter feeders, such as the omnipresent *Daphnia, Ceriodaphnia, Bosmina, Chydorus, Alona* and *Semocephalus*. The largest species, such as *Leptodora* (up to 18 mm long), *Polyphemus* (up to 15 mm long) and the introduced European species to the Great Lakes, *Bythotrephes* (up to 20 mm long), are predaceous. some species have unique features; *Holopedium* is readily identified by its huge carapace enclosed in a large gelatinous mantle (often transparent and almost invisible in light) and is fairly large in size (1-2 mm across the gelatinous mantle), easily visible to the naked eye.

Some species have sexual forms, but males tend to be smaller than females. The male form is generally short lived and is adapted for reproduction. For example, the antennules and appendages are modified for grasping the female during mating and are of little use as filter feeding organs.

Holopedium gibberum is characteristic of acidifying lakes and waters low in calcium.

Subclass Copepoda

Table XXII-3: Characteristics of 3 orders of copepods (Mackie, 1998)

Criteria	Cyclopoida	Calanoida	Harpacticoida
Body shape	Club-shaped	Anterior much broader than posterior	Uniform width throughout
Antennal length	As long as or shorter than first segment	Nearly as long as entire body	Distinctly shorter than first segment
Egg sac number and location	Two, carried laterally	One, carried medially	One, carried medially
Degree of constriction and body location	Marked, between 4th and 5th legs	Marked, between 5th leg and genital segment	No constrictions
Structure of 5th leg	Vestigial	Similar to other legs	Vestigial
Habitat	Mainly littoral, some planktonic	Mostly planktonic, rarely littoral	Exclusively littoral, on macrophytes and sediments
Feeding habits	Raptorial predator or raptorial grazer	Filter feeders of algae	Filter feeders of algae or grazers of epiphytes

Subclass Branchiura (Fish lice), Order Arguloida

These are represented in North America by one genus, *Argulus* (fish lice). Adult *Argulus* are parasitic on freshwater fish.

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