Crustacea: 5 Major Classes

1. Remipedia - look like centipedes
2. Cephalocarida - well developed head shield
   3. Branchiopoda - water fleas, etc.
4. Maxillopoda - copepods and barnacles
5. Malacostraca - higher crustacea
**Class Maxillopoda**

1. Mostly small crustaceans, with some exceptions
2. Shortened bodies, reduced abdomen, with few or modified legs

**Class Maxillopoda**

3. A "naupliar" eye in many groups
   a. Or "maxillopodan eye"
   b. Retention of larval characteristics - *paedomorphosis*
   c. Possible role of this process in producing this group
4. Possibly polyphylectic too.

**Class Maxillopoda**

5. Systematics
   a. 6 major subclasses
      1. Ostracoda -
      2. Mystacocarida -
      3. Copepoda
      4. Branchiura
      5. Cirripedia
      6. Tantulocarida
**Class Maxillopoda**

5. Systematics
   a. 6 major subclasses
      1. Ostracoda -
      2. Mystacocarida -
      3. Copepoda
      4. Branchiura
      5. Cirripedia
      6. Tantulocarida

**Subclass Copepoda**

1. Large and diverse, again mostly quite small.
   2. Usually teardrop shaped or elongate.
      a. Large antennae.
      b. Often with single maxillopodan eye.
      c. Females with dangling egg sacs.

Caligus spp.
Ectoparasites of fish
### Species of parasitic sea lice currently affecting farmed fish

<table>
<thead>
<tr>
<th>Species</th>
<th>Known range</th>
<th>Hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lepeophtheirus salmonis</em></td>
<td>North Atlantic and north Atlantic, affecting farms in Atlantic salmon</td>
<td>Specific to salmonid species e.g. Pacific salmon, <em>Oncorhynchus</em> sp. Arctic charr, <em>Salvelinus</em> sp.</td>
</tr>
<tr>
<td><em>Salmo salar</em></td>
<td>Canada, USA, Japan &amp; Europe</td>
<td>Pacific salmon, <em>Oncorhynchus</em> sp. Arctic charr, <em>Salvelinus</em> sp.</td>
</tr>
<tr>
<td><em>Caligus elongatus</em></td>
<td>Atlantic coast of Canada</td>
<td>Not host specific - found on &gt; 80 species of fish including salmonids</td>
</tr>
<tr>
<td><em>Caligus curtus</em></td>
<td>Atlantic coast of Canada</td>
<td>Not host specific - occasionally found on salmonids</td>
</tr>
<tr>
<td><em>Caligus clavatus</em></td>
<td>Pacific coast of Canada, USA</td>
<td>Not host specific - occasionally found on salmonids</td>
</tr>
<tr>
<td><em>Caligus crassicaudatus</em></td>
<td>Pacific coast - Chile</td>
<td>Not host specific - found mostly on salmonids in Chile (previously <em>C. flexispina</em>)</td>
</tr>
<tr>
<td><em>Caligus teres</em></td>
<td>Pacific coast - Chile</td>
<td>Occasionally found on salmonids in Chile</td>
</tr>
<tr>
<td><em>Caligus lacustris</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Caligus lacustris

![Image of Caligus lacustris](image-url)
*Ergasilus* has a direct life cycle using only the fish as a host.

*Ergasilus* can spend prolonged periods swimming free, and mating takes place while the male and female are swimming. The male then dies.

Egg incubation occurs while the egg clusters are attached to the female.
Order Monstrilloida

Subclass Branchiura

1. Entirely parasitic.
2. Includes *Argulus*.
3. Now appears to include the Pentastomida
Subclass Cirripedia

1. Bodies highly modified for attachment
   a. Extreme reduction of posterior body and appendages
   b. Body attached to substrate with "test"
   c. Body also may be attached by stalk.

Subclass Cirripedia

2. Huge and diverse group - most of systematics by Charles Darwin.
   a. Much of his work remains intact today.

3. Larval stages are motile, then settle on substrates.

Phylum Arthropoda, Subphylum Crustacea, Class Maxillopoda, Subclass Cirripedia, Order Rhizocephala
Entirely parasitic on other crustaceans.

1. Mostly on mysids and krill.

2. Life cycles similar to rhizocephalans except it has parthenogenetic and sexual reproductive cycles.
Class Malacostraca

1. Huge and diverse group - the most familiar crustaceans
   a. Over 20,000 species - probably many more
2. Generally with well developed head, thorax and abdomen
   a. Serial modification of appendages
**Subclass Peracarida**

1. Isopods, amphipods and tanaids
   a. Contain most of parasitic malacostracan taxa.

**Order Amphipoda**

1. Laterally compressed
   a. Lots of diversity.
Cyamus, Paracyamus
Ectoparasites of cetaceans

Order Isopoda 1. Dorsoventrally compressed
a. Also lots of diversity.

Gnathiidae:
Praniza are parasitic on fish.
Adults live in cavities
Extreme sexual dimorphism
**Order Isopoda**

**Bopyridae:**
Parasitic on decapod crustaceans.
Environmental sex determination.
Extreme sexual dimorphism of a different kind.

**Order Isopoda**

Aegidae, Cymothodae and Cirolanidae:
Parasitic on crustaceans or fish or opportunistically on predaceous or parasitic.

**Order Isopoda**

1. Dorsoventrally compressed
a. Also lots of diversity.
Subphylum Hexapoda (Insecta)

1. Characteristics
   a. Six legs,
   b. Head, thorax abdomen
   c. Often with winged adults

2. Main Parasitic Orders
   a. Mallophaga
   b. Anoplura
   c. Hemiptera
   d. Siphonaptera
   e. Diptera

Order Mallophaga
Order Anoplura

1. Vectors of disease
   a. Rickettsia (typhus)
   b. Rhochalimaea (trench fever)
   c. Borrelia (relapsing fever)

2. Important species
   a. Pediculus humanus humanus (clothing)
   b. Pediculus humanus capitus (smaller, head)
   c. Phthirius pubis