

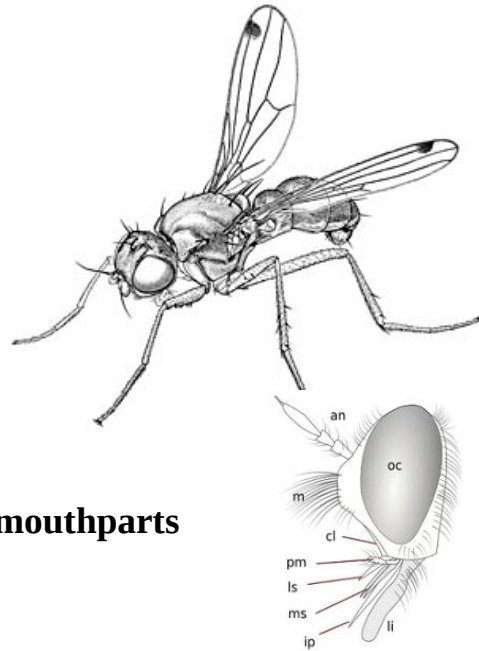
Compendium Insect order sorting SMTP 2018



Dave Karlsson and Jon Tinnert

Diptera: Brachycera (excl. Phoridae)

- **Two wings:** only fore wings functional (but brachypterous and wingless forms occur)
- **Halteres** (reduced hind wings)
- **Antennae with few segments**
 - often fewer than five
 - segments of dissimilar shape
- **Palps with 1 or 2 segments**
- **Proboscis → sucking/licking mouthparts**



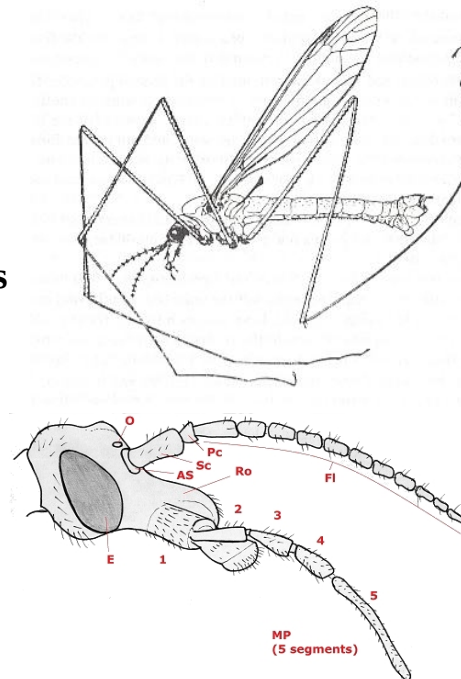
Diptera: Brachycera: Phoridae

- **Very characteristic wing venation** with strong, dark, well developed radial vein (R) which meets the strong, dark and well developed costal vein (C) about halfway along the anterior edge of fore wing
- **Costa with bristles**
- **No cross veins in wing**
- **Typically with stout femora**



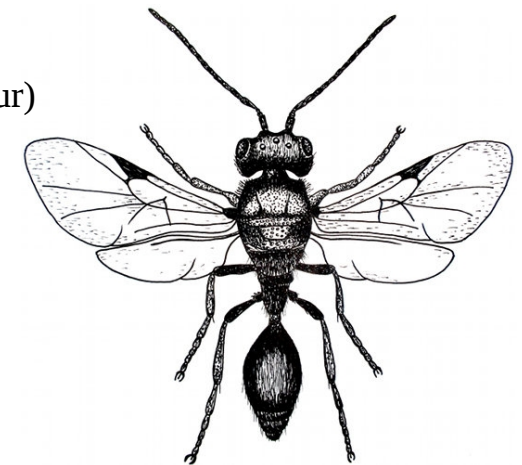
Diptera: Nematocera

- **Two wings:** only fore wings functional (but brachypterous and wingless forms occur)
- **Halteres** (reduced hind wings)
- **Antennae with more segments**
 - more than six segments
 - segments of similar shape
- **Palps often with 5 segments**
- **Proboscis → sucking mouthparts**



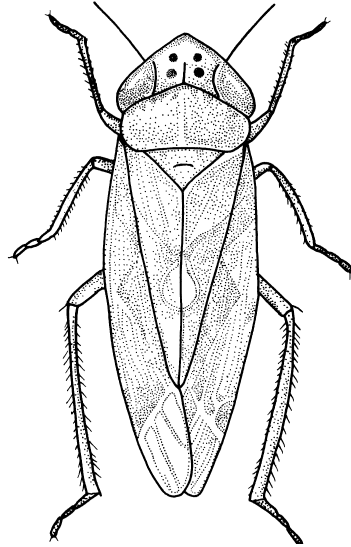
Hymenoptera

- **Two pairs of membranous, transparent wings** (brachyptery and aptery occur)
- **Hindwings much smaller** than forewings
- **Mandibles** (biting/chewing)
- **Often heavily sclerotised**
- **Often with pterostigma**
- **Often with long antennae**



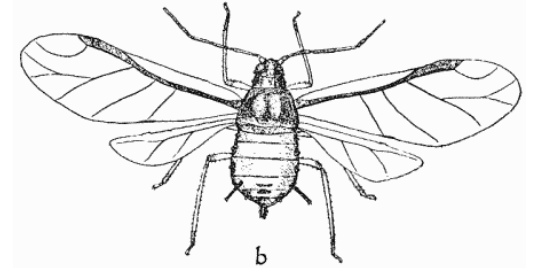
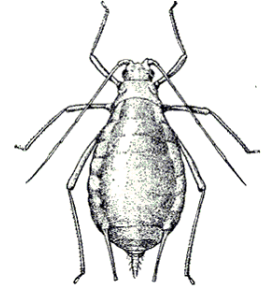
Hemiptera: Auchenorrhyncha

- **Piercing sucking mouthparts**
 - between head and front legs
- **Short antennae with few segments**
 - long bristle at the end
- **Antennae under the head**
- **Three tarsal segments**
- **Wings held roof-like**
- **Fore wings often leathery**
- **Triangular head**
 - (in dorsal view)



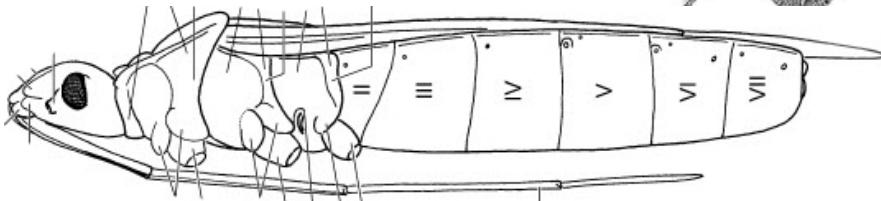
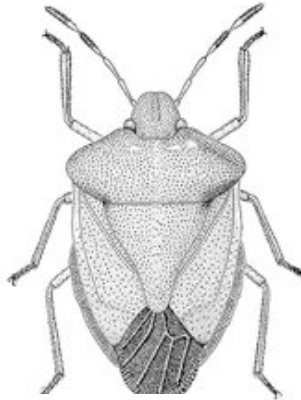
Hemiptera: Sternorrhyncha

- **Piercing sucking mouthparts**
 - between head and front legs
- **Long threadlike antennae with many segments**
- **Antennae in front or above head**
- **One or two tarsal segments**
- **Fore wings often membranous**
 - but often wingless



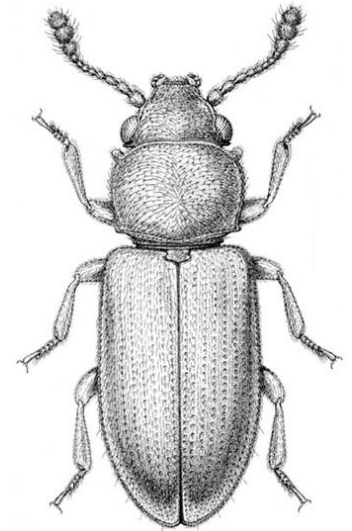
Hemiptera: Heteroptera

- **Piercing/sucking mouthparts**
 - starts in anterior part of head
- **Overlapping wings held flat over abdomen**
- **Hemelytra (fore wings)**
 - both membranous and leathery
- **Large scutellum**



Coleoptera

- **Mandibles (biting)**
- **Elytra (fore wings)**
 - hard schlerotised
 - meet in a straight median line
- **Heavily schlerotised**
- **Small scutellum**



Lepidoptera

- **Two pairs of wings covered in scales**
 - rarely clear or transparent
- **Proboscis** coiled, rarely absent



Trichoptera

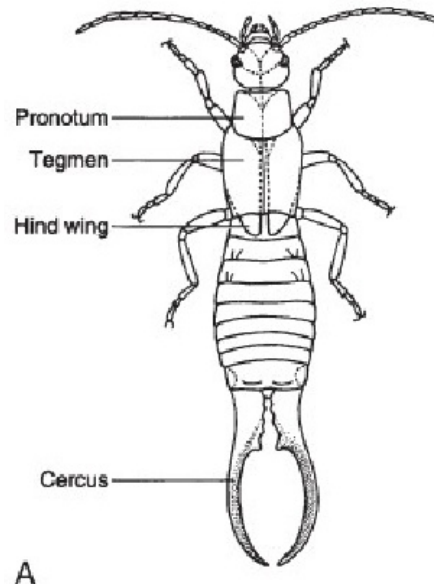
- **Biting mouthparts (mandibles)**
- **Hairs on wings and body**
- **Wings held roof-like**
- **Long, filiform antennae**

Mismatch risk: the lepidopteran family Micropterigoidea is a group of mandibulate moths and hard to differ from trichopterans. They are thus generally much smaller than trichopterans



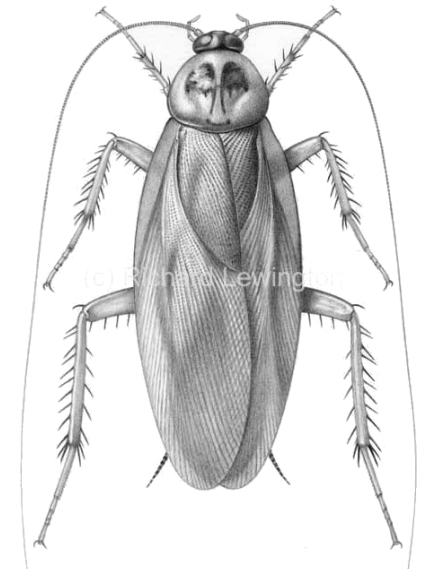
Dermaptera

- **Cerci is characteristic**
 - forceps-like pincers
- **Elytra (fore wings)**
 - softly sclerotised
 - meet in straight line
- **Biting mouthparts**



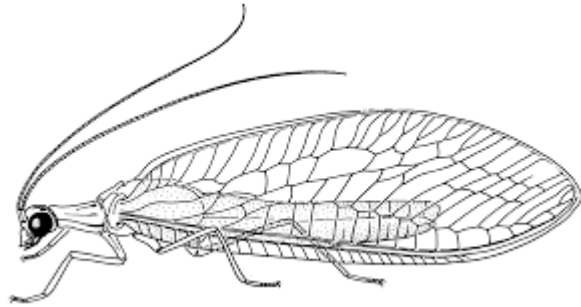
Blattodea

- **Characteristic cerci**
 - many segments
- **Tegmen (fore wings)**
 - leathery
 - overlapping
- **Long, spiny legs and long, thin antennae**
- **Large pronotum**
 - extends over the head
- **Dorsoventrally flattened**
- **Biting mouthparts**



Neuroptera

- **Wings are often net-veined**
- **Wings with "Y's" at wing edge**
- **Anterior edge of wings with squares**
- **Wings similar in size and held roof-like**
- **Biting mouthparts**
- **Large lateral compound eyes**



Megaloptera

- **Wings are net-veined**
 - thick wing veins
- **Anterior edge of wings with squares**
- **Wings held roof-like**
- **Biting mouthparts**
- **Long, soft, flexible bodies, usually dark coloured**



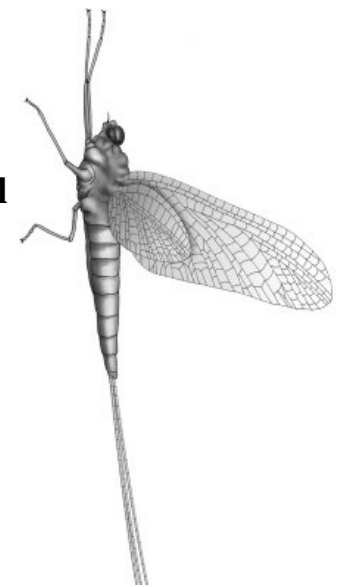
Plecoptera

- **Two tail-like appendages**
 - two cerci with many segments
 - often long, sometimes missing
- **Wings held flat over the body**
 - overlapping
- **Wings with "double ladder"**
 - sometimes lacking
- **Hind wings broader than fore wing**
 - folded like a hand fan
- **Biting mouthparts**



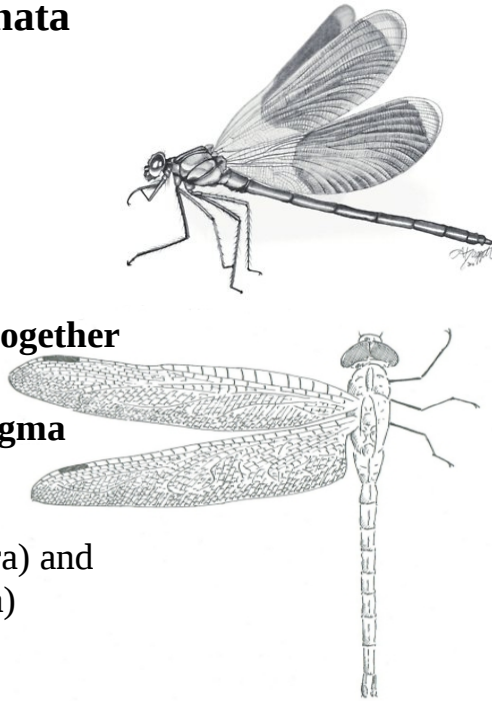
Ephemeroptera

- **Three (or two) tail-like appendages**
 - two cerci and one terminal filament that sometimes can be lacking
- **One or two pairs of upright, triangular wings, extensively covered with veins**
- **Hind wings (if present) smaller**
- **Large compound eyes**
- **Short antennae**
- **Non-functional mouthparts.**



Odonata

- **Large heads**
- covered by compound eyes
- **Short antennae**
- **Biting mouthparts**
- **Long, thin body**
- **Legs with spines and close together**
- **Wings in similar size, with dense venation and pterostigma**



Dragonflies (suborder Anisoptera) and damselflies (suborder Zygoptera)

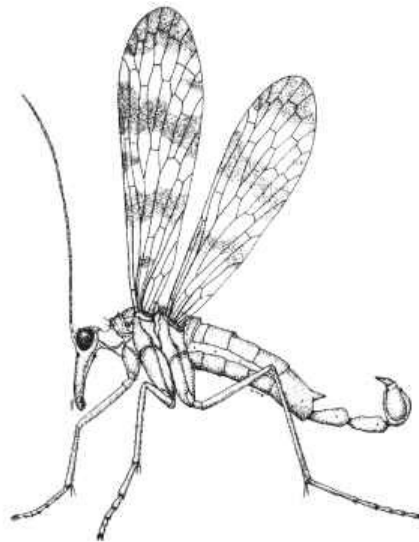
Orthoptera

- **Pronotum** (tergite of the first thoracic segment) **large and saddle-shaped**
- **Hind legs for jumping**
- long legs and thick femur
- **Tegmen (fore wing)** often present and leathery
- **Biting mouthparts**



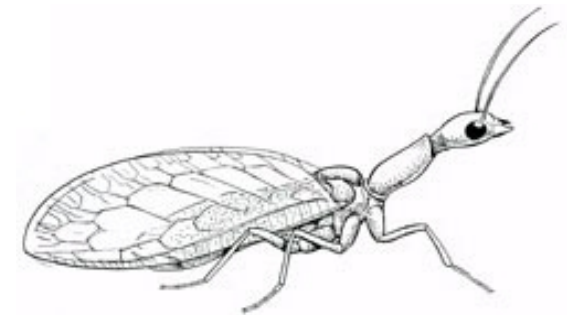
Mecoptera

- **Head with elongate rostrum, like a beak**
- **Biting mouthparts**
- **Narrow wings with numerous cross-veins** (brachypterous and wingless forms occur)
- **Abdomen cylindrical, typically curved upwards in males, resembles a scorpion tail**



Raphidioptera

- **Unmistakable with their long, snake-like “neck” (prothorax)**
- **Biting mouthparts**
- **Fore and hind wings similar**
- **Wings with pterostigma**
- **Wings held roof-like**



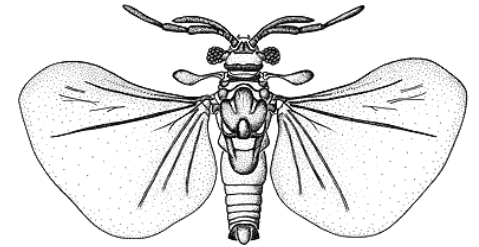
Thysanoptera

- **Tiny, slender (cigar-shaped) insect**
- **Wings surrounded by a fringe of bristles**
 - sometimes wingless
- **Unique asymmetrical mouthparts: right mandible reduced or completely absent, left mandible as a large stylet**



Strepsiptera (males)

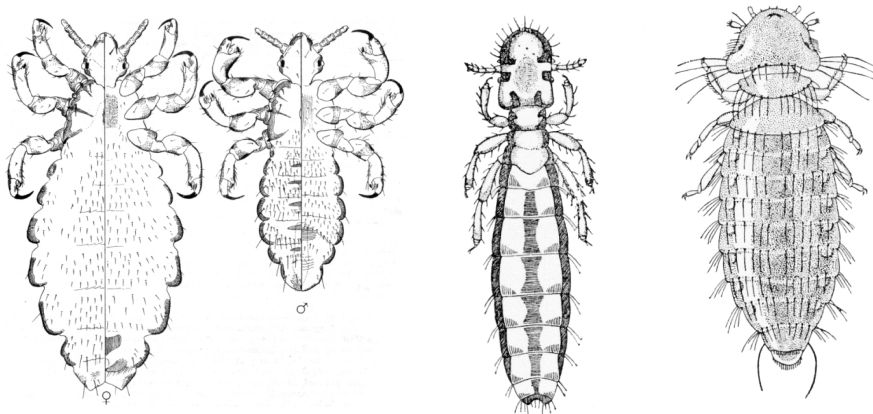
- **Two broad flight wings**
 - hind wings
- **Halteres**
 - evolved from fore wings
- **Antenna branched**
- **Large bulging eyes**
 - (raspberry shaped)



- Females as an egg sack with sclerotized head protruding between abdominal sclerites of social wasps and Auchenorrhyncha.

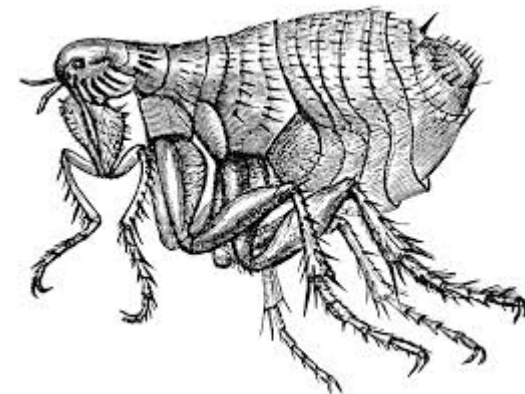
Phthiraptera

- **Wingless (apterous)**
- **Prominent head**
- **Well developed claws and strong legs**
- **Dorsoventrally flattened body**



Siphonaptera

- **Wingless (apterous)**
- **Laterally flattened body**
- **Strong jump legs**
- **Piercing sucking mouthparts**

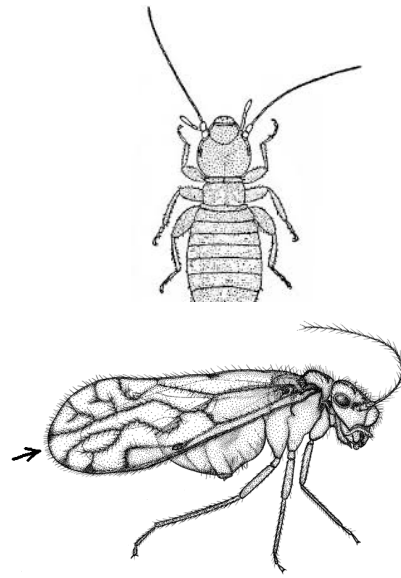


Psocoptera

- **Large bulging forehead**
- **Wing veins form a "U" shape**
 - Rs and M veins branch of
 - forming characteristic pattern
- **Wings held roof-like**
 - sometimes lacking
- **Smaller hind wings**
- **Biting mouthparts**

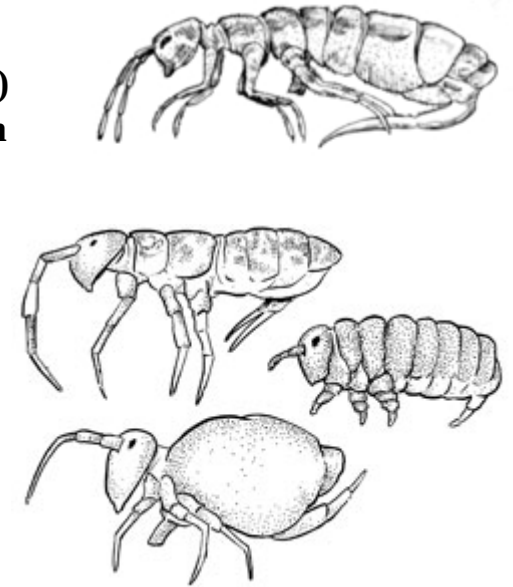
Winged (Barklice) or wingless (Booklice)

Mismatch risk: Barklicees can be confused with jumping plant lice (Sternorrhyncha: Psylloidea) from which they are most easily distinguished by the wing venation and the bulbous postclypeus.



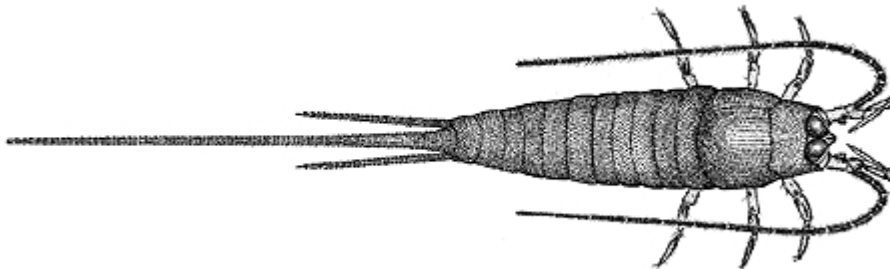
Collembola

- **Wingless (apterous)**
- **Furculum (jumping fork)**
- **Few-segmented abdomen and antennae**
- **Have eyes**
- **Internal mouthparts**



Archaeognatha

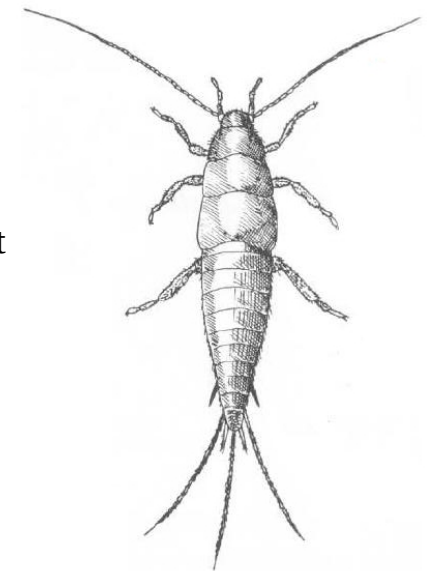
- **Wingless (apterous)**
- **Compound eyes meet**
- **Prominent maxilla palps**
- **Three terminal filaments**
 - two cerci and a middle epiproct
 - cerci shorter than half of epiproct



Mismatch risk: Zygentoma, but body is flat

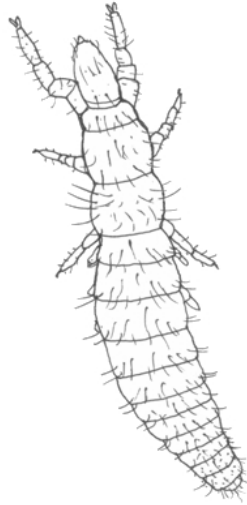
Zygentoma

- **Wingless (apterous)**
- **Small compound eyes**
- **Silvery scales on body**
- **Three terminal filaments**
 - two cerci and a middle epiproct
 - cerci longer than half of epiproct



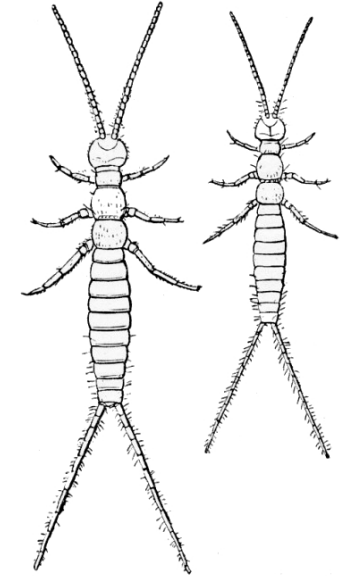
Protura

- **Wingless (apterous)**
- **Lack antennae**
- **Front legs directed forwards**
 - much longer than other legs
 - located close to the head
- **Lack eyes**
- **Ca 1-1.5 mm in length**
- **Elongated body covered in hair**



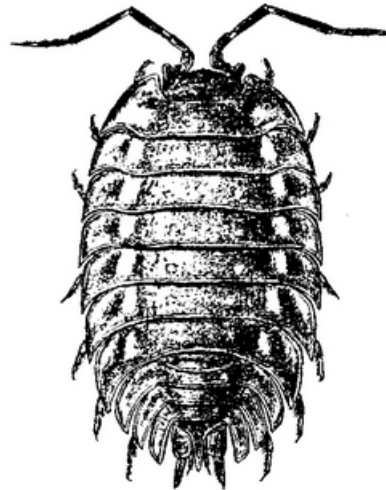
Diplura

- **Wingless (apterous)**
- **Lack eyes**
- **Long antennae**
- **Two long cerci**
 - many segments
- **Elongated body**



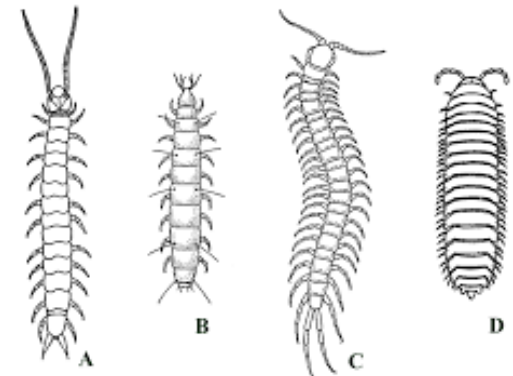
Isopoda

- **Not an insect**
- **Covered by overlapping plates**
- **Dorsoventrally flattened**
- **Seven pairs of legs**
- **Two pairs of antenna**
 - (only one pair is easy to see)



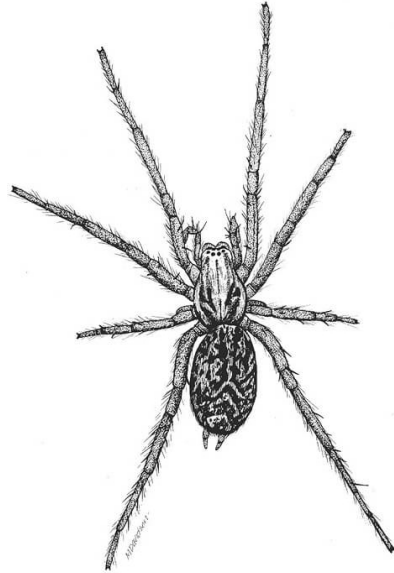
Myriapoda

- **Not an insect**
- **Elongated body**
- **Many legs**
 - between 8 and 117 pairs
- **One pair of antenna**



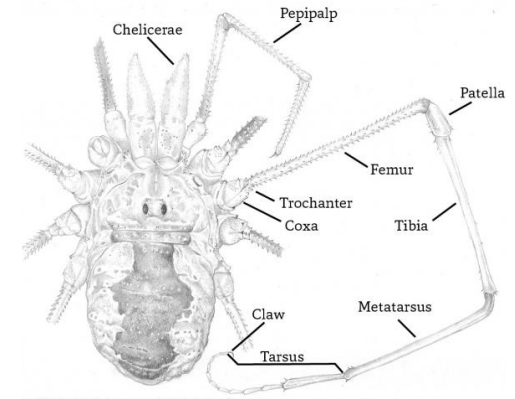
Araneae

- **Not an insect**
- **Two body parts**
- cephalothorax and abdomen
- **Four pairs of legs**
- **One pair of pedipalps**
- **Spinnerets**
- **Six to eight eyes**



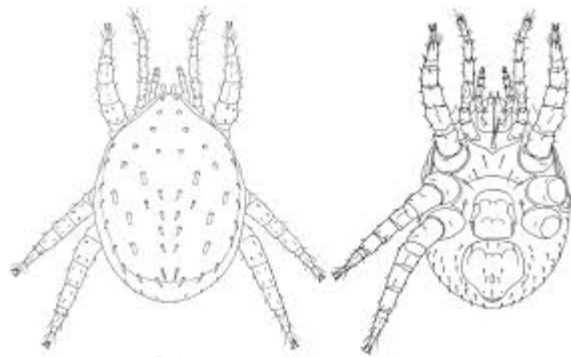
Opiliones

- **Not an insect**
- **One body part**
- cephalothorax and abdomen fused
- **Four pairs of legs**
- often very long legs
- **One pair of eyes**
- on top of the body! Similar to a periscope...
- **One pair of pedipalps**
- **Chelicerae are pincer-like**
- (mouthparts)



Acari

- **Not an insect**
- **One body part**
- cephalothorax and abdomen fused
- **Four pairs of legs**
- sometimes fewer
- **Often eyeless**



Pseudoscorpiones

- **Not an insect**
- **Four pairs of legs**
- **One pair of pedipalps**
- pincer-like (scorpions)
- **Two body parts**
- cephalothorax and abdomen

