Insect classification and biodiversity
ENT-304

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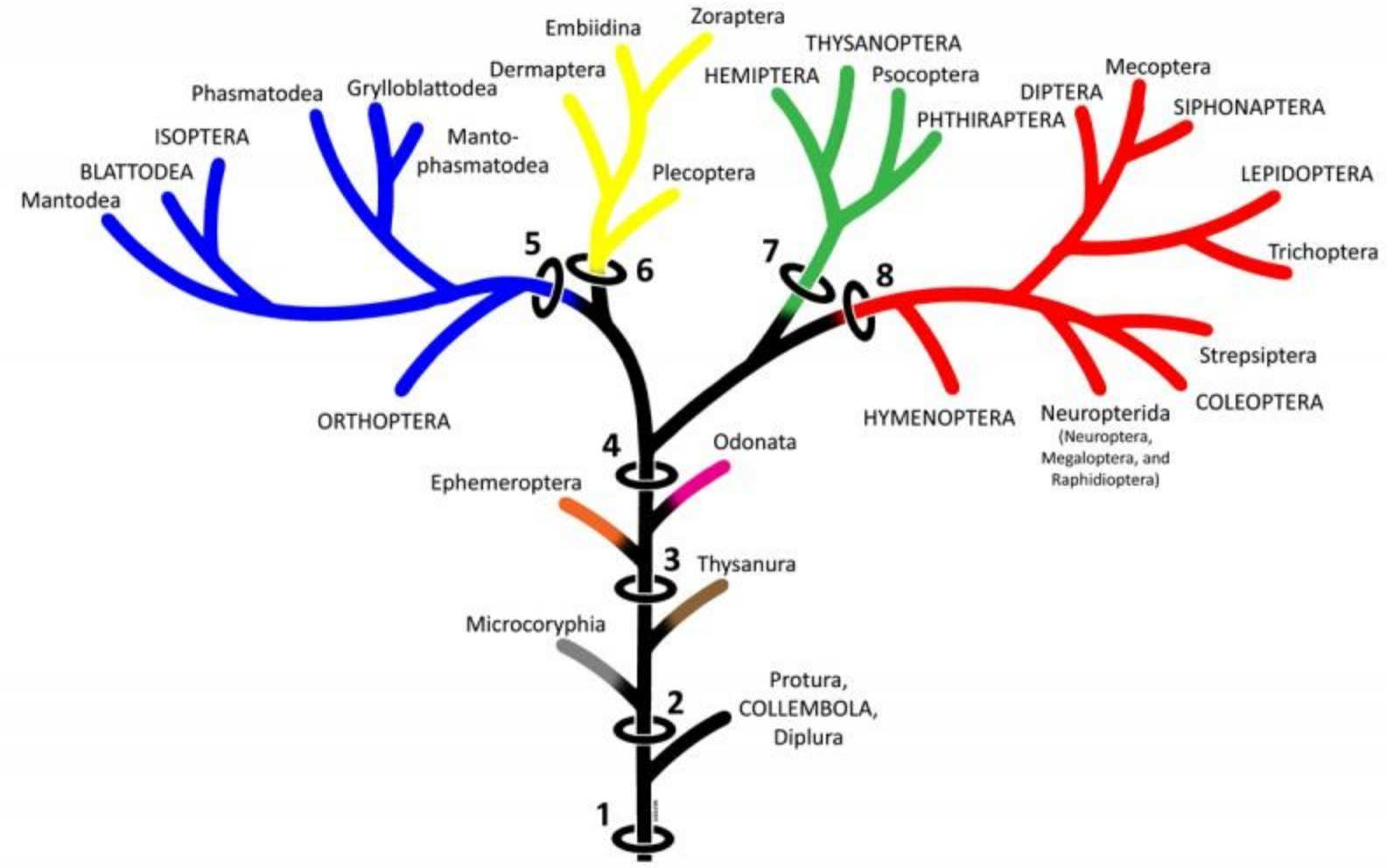
Insect Orders



Thysanura (Bristle or hair tail)

Head:

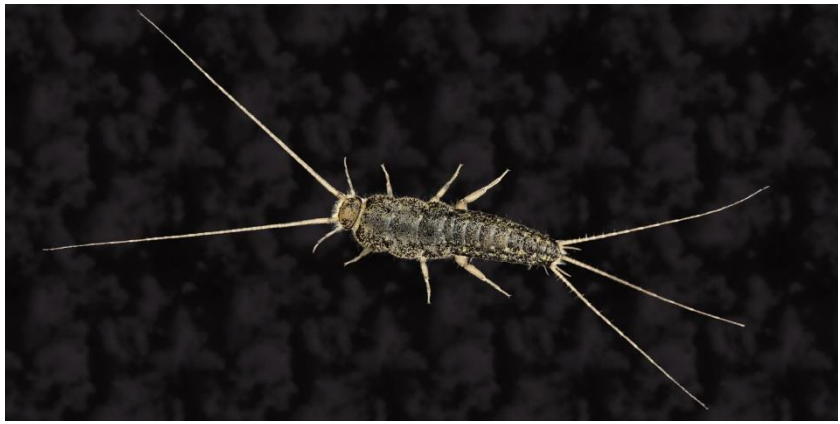
- Antenna long and setaceous
- Compound eye usually present
- Mouthparts are chewing and ectognathous

Thorax:

- Wingless

Abdomen:

- Styli present on number of abdominal segment
- Three caudal filaments are present



Classification of Thysanura

Microcoryphia

- Compound eye large and contiguous
- Ocelli are present
- Maxillary palpi are 7 segmented

Family: Machilidae

Styli present on 2-9 abdominal segment

- Bristletails

Collection: Under concelaed condition like in buildings, under fallen leaves

Zygentoma

- Compound eye small and separated
- Ocelli are absent
- Maxillary palpi are 5 segmented

Family: Lepismatidae

Styli present on 7-9 abdominal segment

- Silverfish and firebrat

Dipulura (Double tail)

Head:

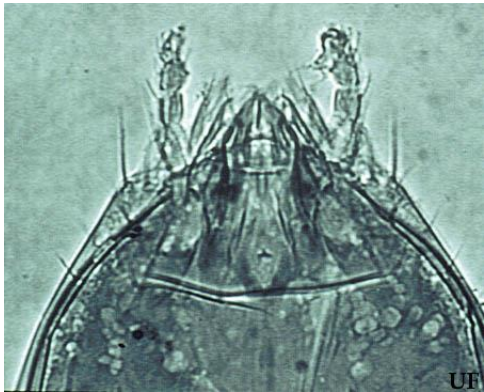
- Antenna long and Moniliform
- Compound eye or ocelli absent
- Mouthparts are chewing and entognathous

Thorax:

- Wingless

Abdomen:

- Styli present on number of abdominal segment
- Two long and many segmented caudal filaments are present



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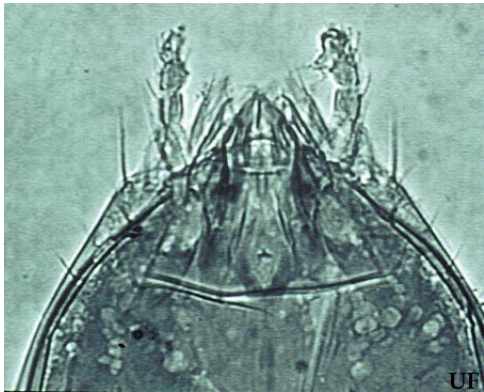


Protura (Single tail-Telsontail)

Head:

- No Antenna
- Compound eye or ocelli absent
- Mouthparts are peircing or sucking and entognathous

Thorax:

- Wingless
- 1st pair of legs – forward - function as antenna

Abdomen:

- Abdomen end slender like structure called telson
- At the time of hatching, abdomen 8 segmented plus telson
- Increase to 11 segment during their post-embryonic development
- The process of increasing 3 abdominal segment - anamorphosis

Classification of Protura

Families

Acerentomidae:

Not tracheated, - instead use cuticular gas exchange

Protentomidae:

2 pair of air sac

Collection: Under fallen leaves, Under stones, rotten woods

Collembola (Spring tail)

peg like structure or a collophore present on lower side of 1st abdominal segment

Head:

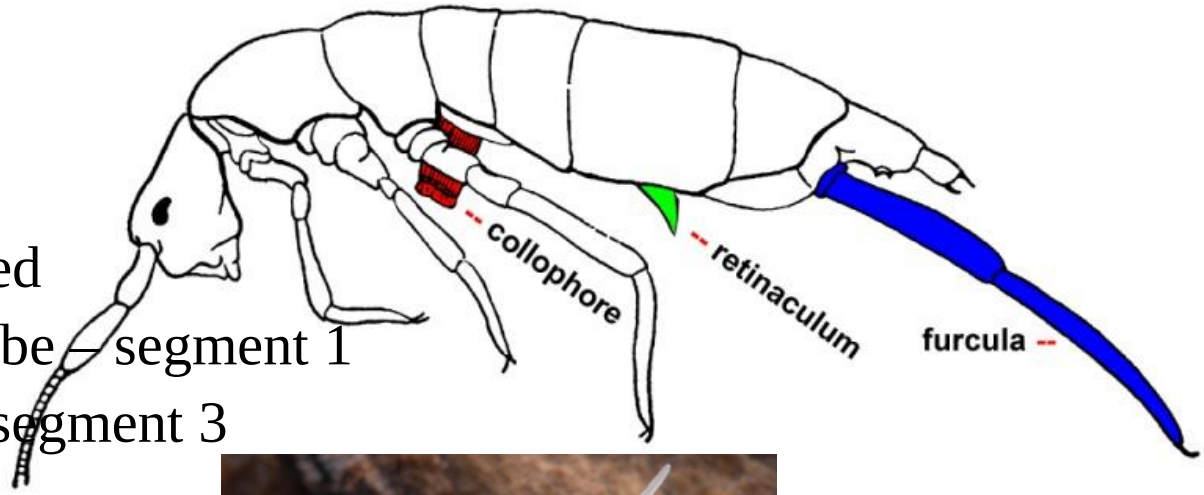
- Antenna usually 4-segmented
- Compound eye absent but group of ocelli present on each side of head
- Mouthparts are peircing-sucking or chewing and entognathous

Thorax:

- Wingless

Abdomen:

- Abdomen 6-segmented
- Collophore/ventral tube – segment 1
- Retinaculum/hook – segment 3
- Furcula – segment 4



Classification of Collembola

Arthropleona

- Body straight and elongate
- Abdomen clearly segmented

Family: Poduridae

- 8 ocelli
- Postantennal organ absent

Family: Onychuridae

- Ocelli absent
- Postantennal organ present

Symphyleona

- Body subglobular
- Abdomen not clearly segmented

Family: Neelidae

- Antenna shorter than head

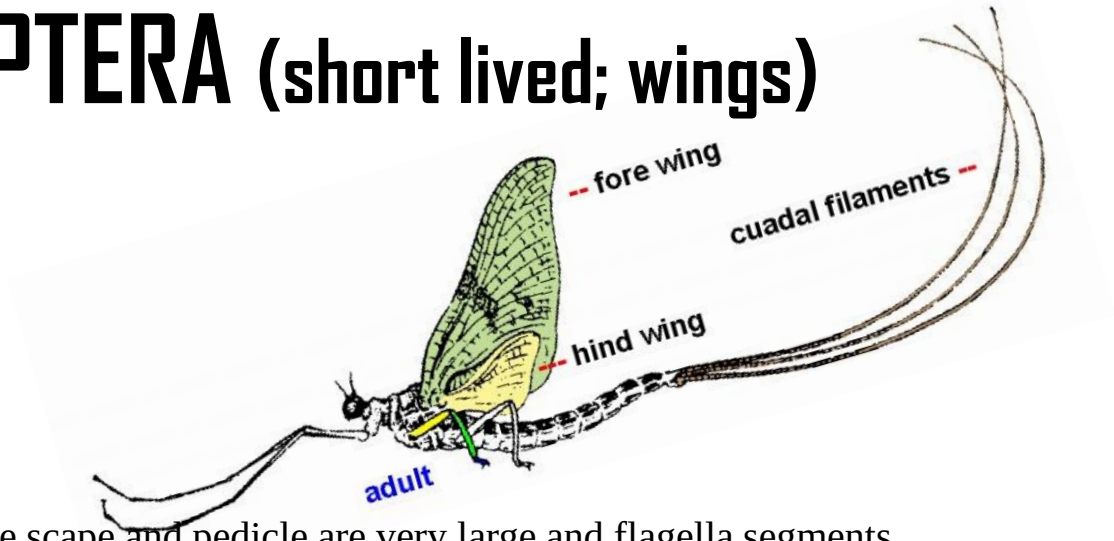
Family: Sminthuridae

- Antenna equal or longer than head

Collection: Found everywhere, Under fallen leaves, Under stones, rotten woods, soil

Hemi-metabolous Insect

EMPHEMEROPTERA (short lived; wings)



Adults - very short lived

Most species live - few hour or day

Mayflies

Characters:

Head:

- Antennae - short and styliformm (the scape and pedicle are very large and flagella segments are hair like without any segment).
- Mouthparts - chewing type (but poorly developed)

Thorax

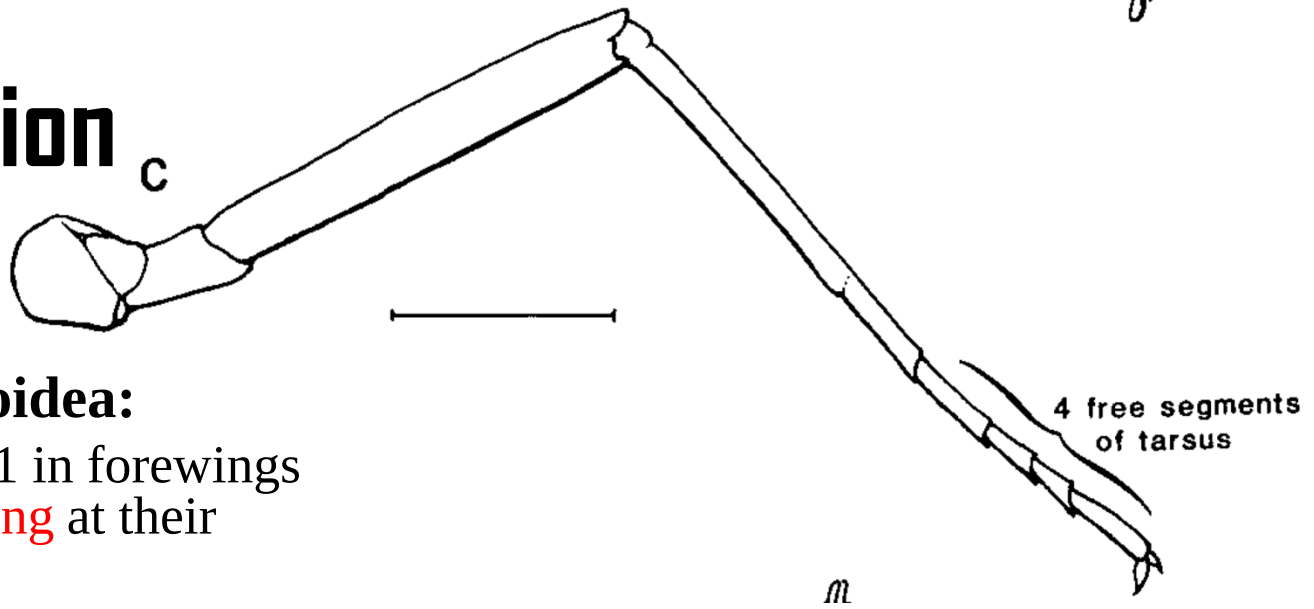
- Hind pair of wings is greatly reduced.

Abdomen:

- Abdomen ends in very long and many segmented two cerci.
- The median caudal filament may or may not be present.
- **Sub-imaginal molting** is present.
- The fresh adults molt or shed wings from their entire body are called sub-imaginal molting
- After this molting the shape of insect is called **sub-imaginal instars**
- The nymphs of mayflies are aquatic and called **naiads.**

Classification

3 superfamilies



Superfamily Ephemeroidea:

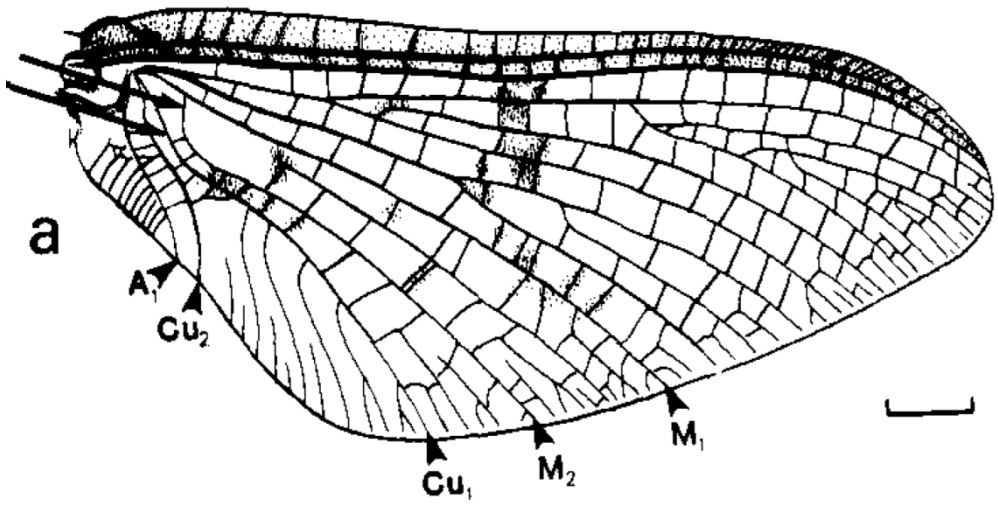
- Vein M1+2 and Cu1 in forewings are strongly diverging at their bases
- Hind tarsi are with 4 moveable segments.

Superfamily Baetoidea:

- Veins M1+2 and Cu1 in forewings are not strongly diverged at their base but parallel at their bases and then diverge.
- Hind tarsi are with 4 segments

Superfamily Heptagenioidea:

- Veins M1+2 and Cu1 in forewings are parallel at their bases.
- Hind tarsi with 5 moveable segments.



Families of Superfamily Ephemeroidea:

1. Ephemeridae

Vein M in forewings is not forked

Families of superfamilies Baetoidea:

1.Family Baetidae:

Vein M in forewings is not forked

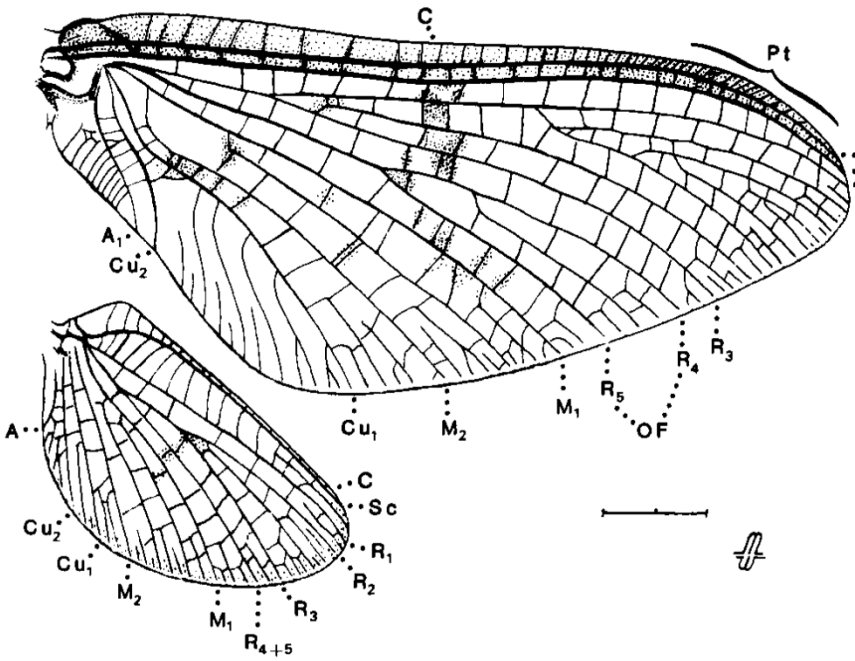
Wings are clear-without spot

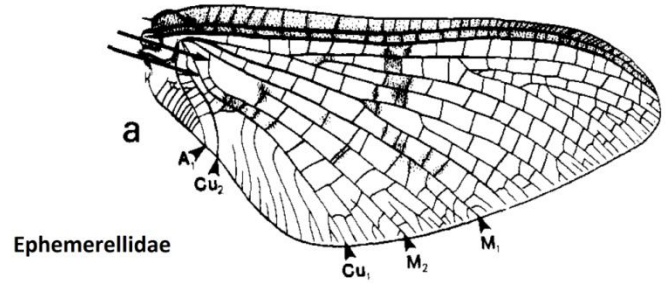
3:Family Ephemerellidae:

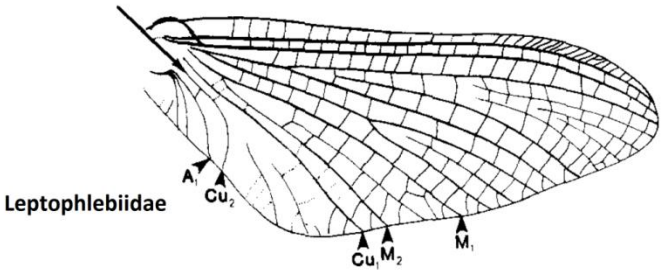
Cu_2 in forewings is very close to Cu_1 at the base, but it is widely separated from 1A

4:Family Leptophlebiidae:

Cu_2 in forewings is separated from Cu_1 at the base, but lying close to 1A



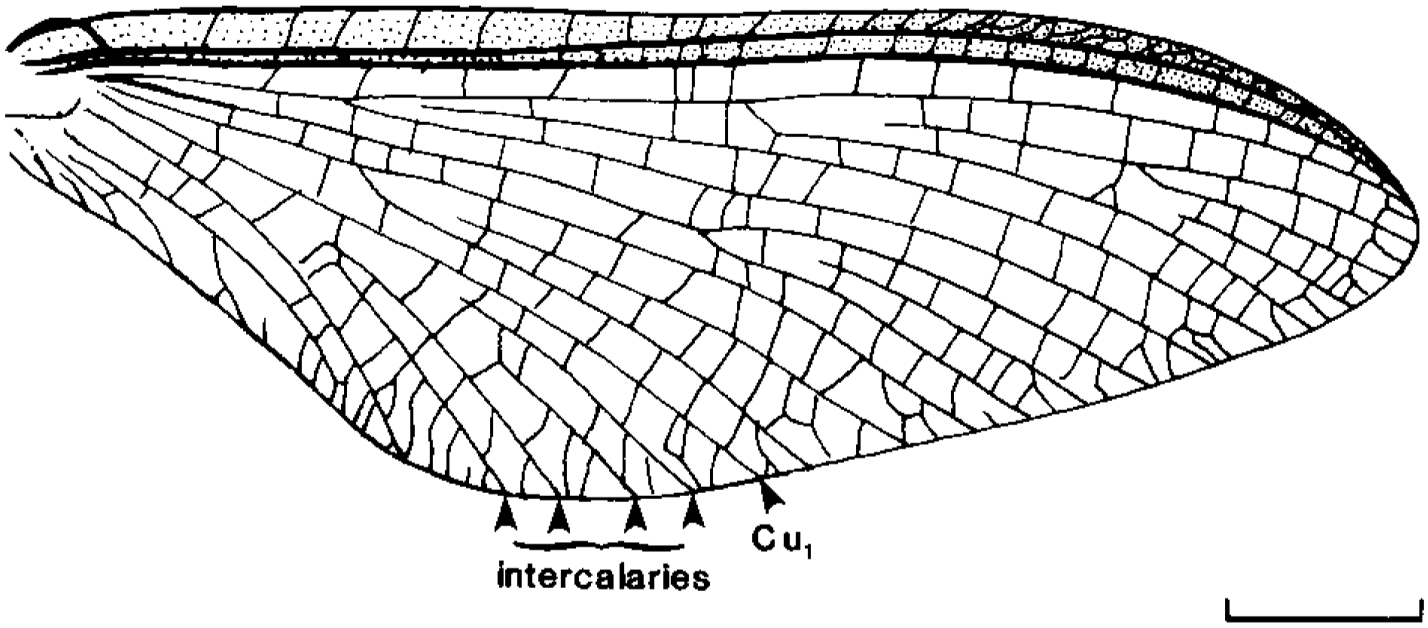




Families of the Superfamily Heptagenioidea

Family Heptageniidae:

- Two caudal filaments are present
- Fore wings with 2 pair of intercalary cubital veins



Collection:
The adults can be collected near the water sources like stream, canals, lakes, rivers etc.

Odonata

Discal cell: A cell between the branches

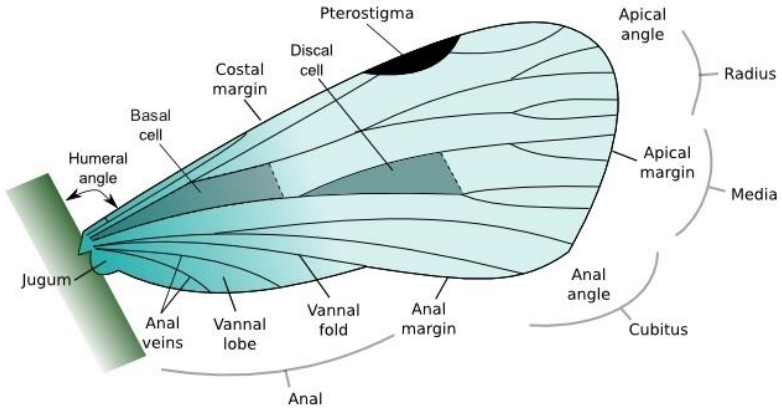
The presence/absence and the shape of the discal cell is very important and can be used to identify different species of insect.

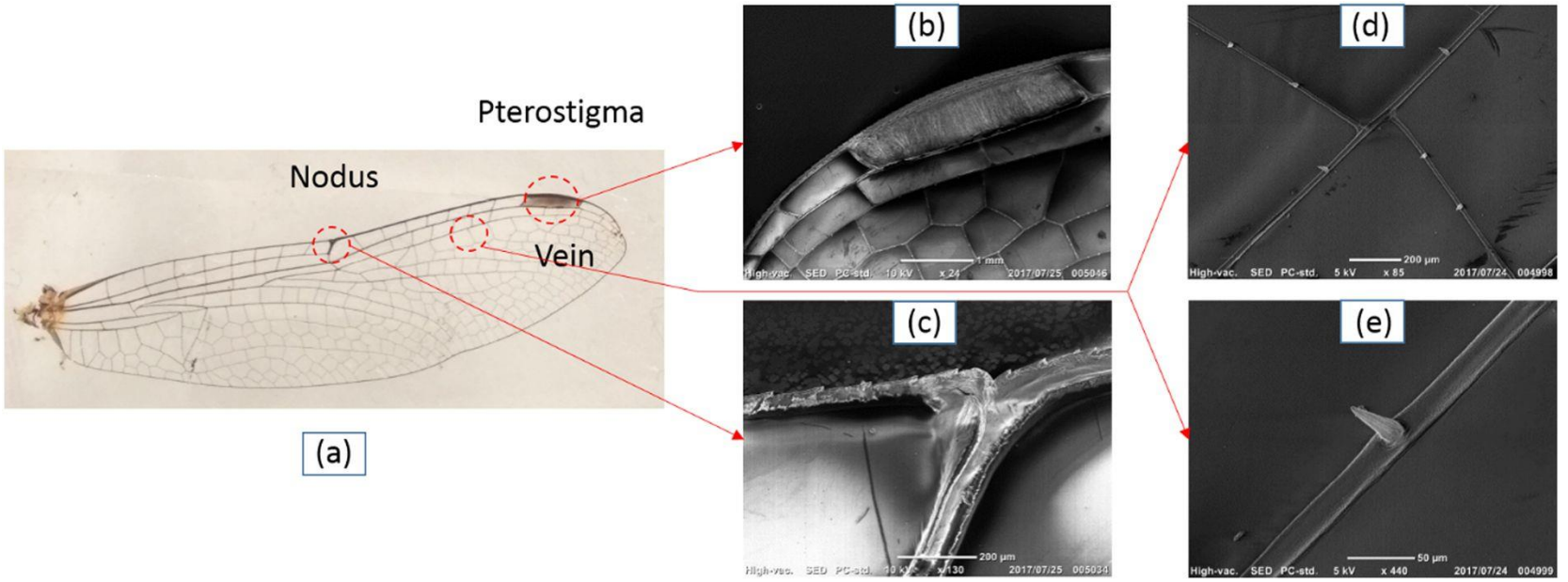
Pterostigma: The pterostigma is a group of specialized cells in the outer wings of insects, which are often thickened or coloured.

Help in balance during vibrations

Nodus: node is observed near the middle of the vein structure

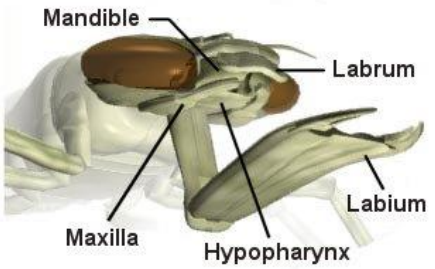
Help in flexibility of wing





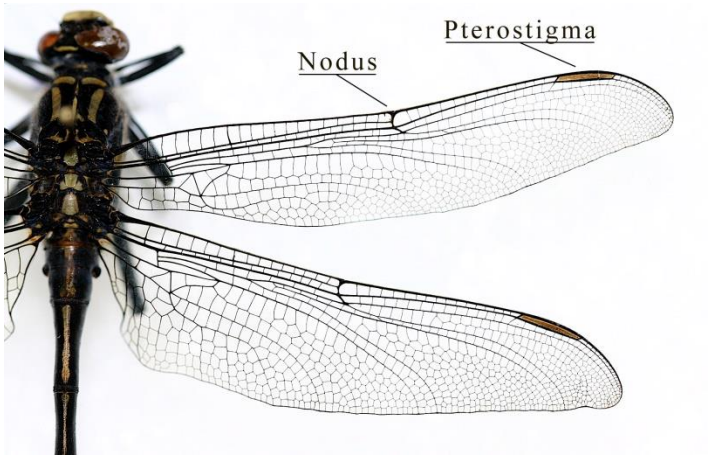
ODONATA (Odontos - A tooth)

1. The mandibles are largely developed and well functional
2. Dragonflies and Damselflies



Characters:

1. Predaceous insects
2. Young ones - naiads
3. Prehensile labium



Head:

1. Antennae - short and setaceous
2. Mouthparts - strongly chewing type
3. Eyes are very large

Thorax:

1. Wings are equal and sub-equal - (Equal in damselflies and sub-equal in dragonflies)
2. Pterostigma and a nodus – present in both pair of wings
3. Legs - trochantor is two segmented.

Abdomen: Thin and long

Classification

3 suborders

1.Anisoptera (dragonflies)

2.Zygoptera (damselflies)

3.Anisozygoptera:

Only two species found - India and Japan.

Its members have their bodies exactly like a dragonfly while the wings are similar to those of damselfly

Anisoptera - Dragonfly

1.Compound eyes - contiguous or separated.

2.Hind wings base is much broader than the base of the front wings.

3.The nodus is present in the centre of the costal border.

4.Discoidal cell is present in the middle near the base of the wings and divided into a triangle and a supra-triangle.

5.The wings are held horizontally when the insect is sitting.

6.The abdomen in the male ends in two superior and one inferior anal appendage

Zygoptera - Damselfly

1.compound eyes - greatly separated

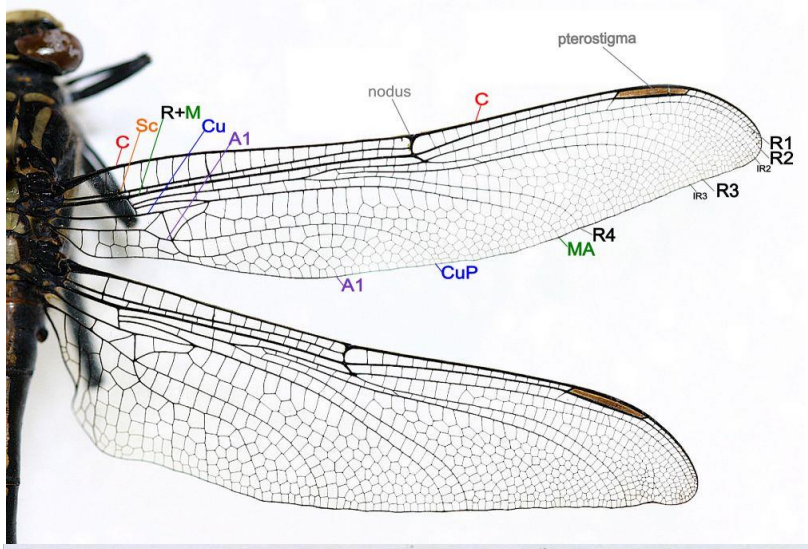
2.The bases of hind and front wings are equal

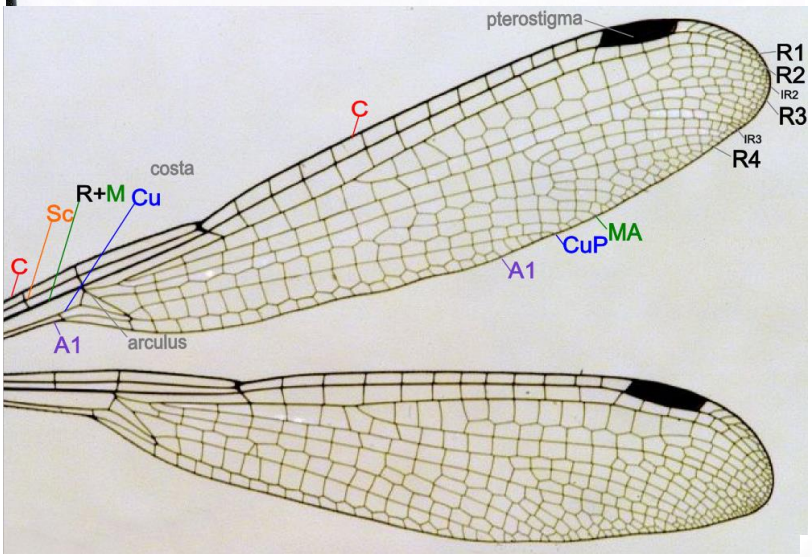
3.Nodus is shifted towards the base of wings and not present in the centre of the costal border.

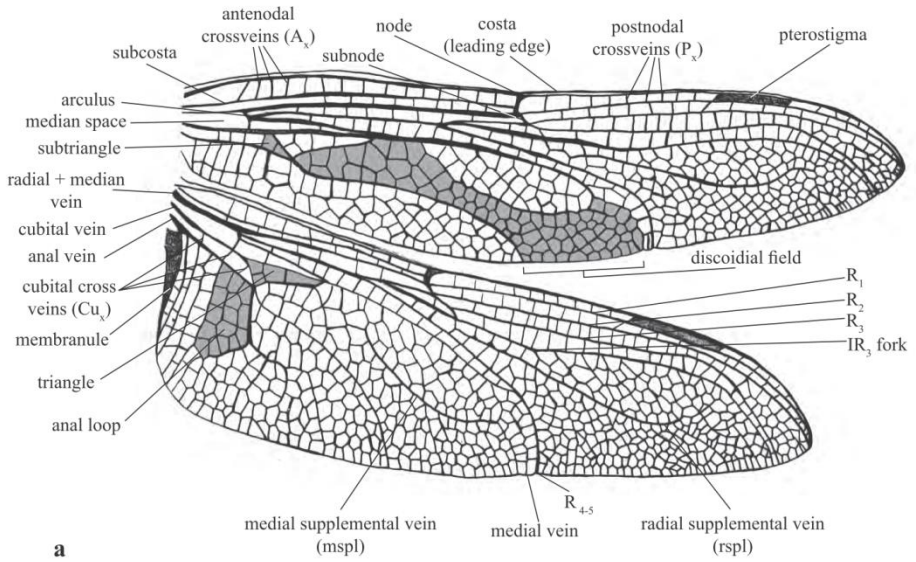
4.The discoidal cell is present near the anal margin and base of the wings and it is not divided into triangle and supra-triangle but called quad-angle.

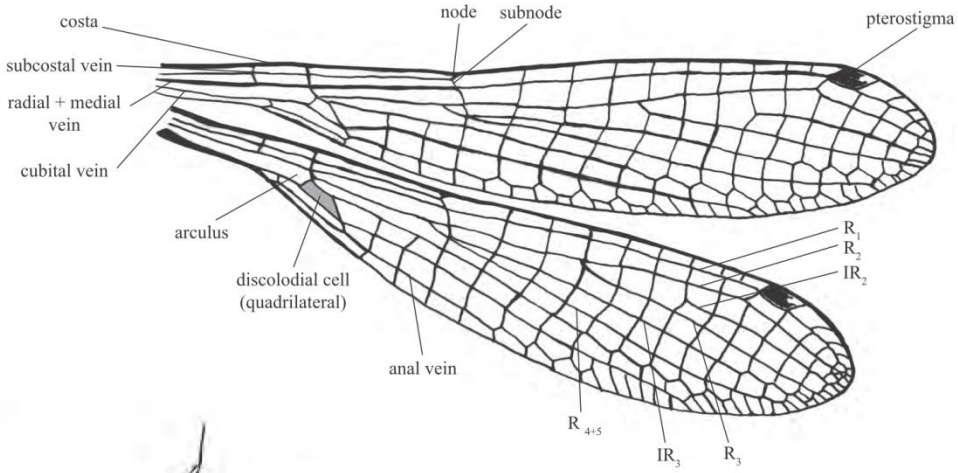
5.The wings are completely folded on abdomen when the insect is sitting.

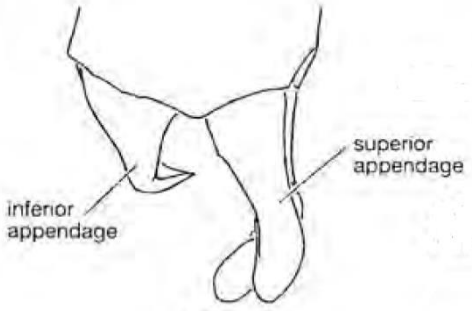
6.The abdomen in male ends in two superior and two inferior anal appendages.









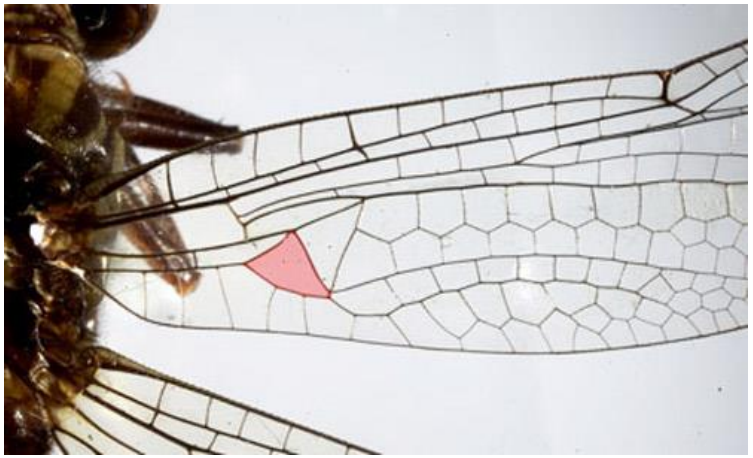


nisoptera (*Anax imperator*); **b**: Zygoptera (*Ischnura genei*).

Anisoptera

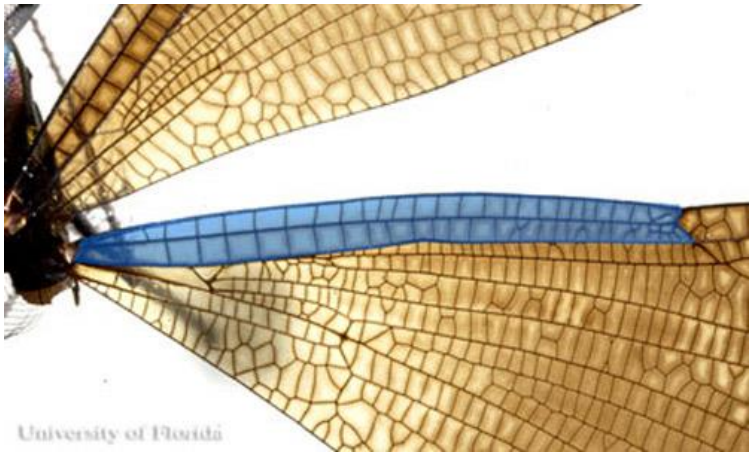
Family Gomphidae

1. Dragonflies - small to large size.
2. Compound eyes - widely separated on the head
3. Triangle of forewing single celled



Family Aeshnidae

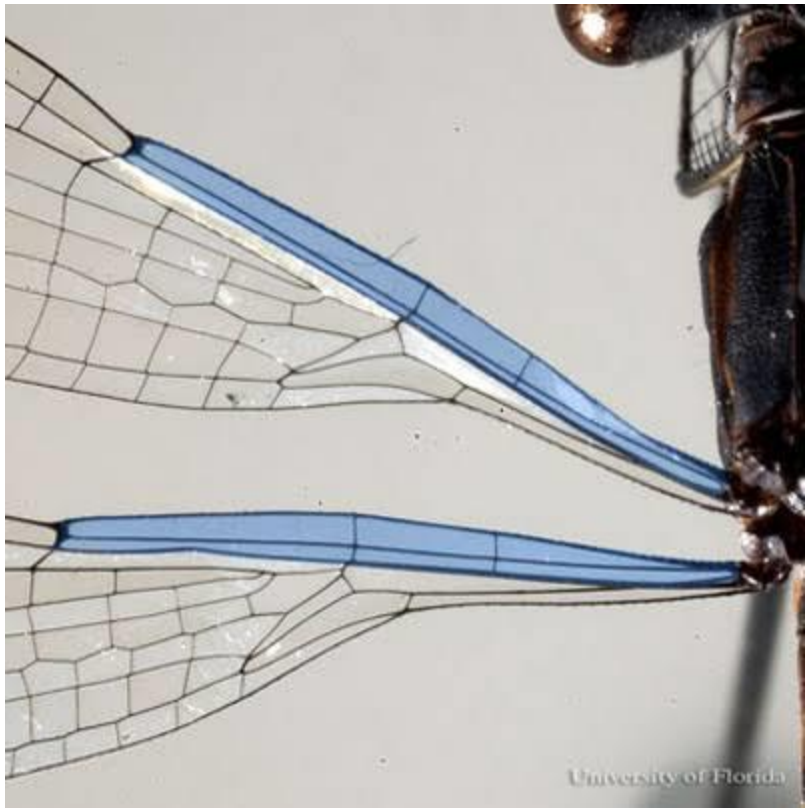
1. Largest sized dragonflies
2. Eyes broadly touch on the upper side of the head
3. Antinodal cross veins in costal and subcostal space are not coinciding (in line)



Zygoptera

Coenagrionidae

1. Small sized damselflies.
2. Only two antinodal cross veins are present in the costal and subcostal spaces.



Collection:
Near all sources of water i.e. water ponds, streams, water channels, canals, rivers etc.