

Natural Basingstoke

***Introduction  
to (Terrestrial)  
Invertebrates***

*'The little things that run the world' (Buglife)*



- **Course Lead:** Steve Goodwin (Natural Basingstoke, Advisor Board member for Invertebrates)
- This course assumes no previous knowledge!
- **Participants will be introduced to :**
  - ✓ How to identify the major invertebrate orders
  - ✓ How to tell a bug from a beetle
  - ✓ How to tell a fly from a bee or wasp

*We will only be considering Butterflies & Moths as an order – e.g. how to tell a moth from a bug*

- It's always good to know what you've got on your site.
- Some families are good indicators of the “health” of a conservation site
- Even “amateurs” can make a scientific contribution
- Jennifer Owen in her own garden in Leicester
  - 20 new records for Britain (7 parasitic wasps)
  - 6 species new to science! (4 parasitic wasps)

“In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we can identify”

With apologies to Baba Dioum

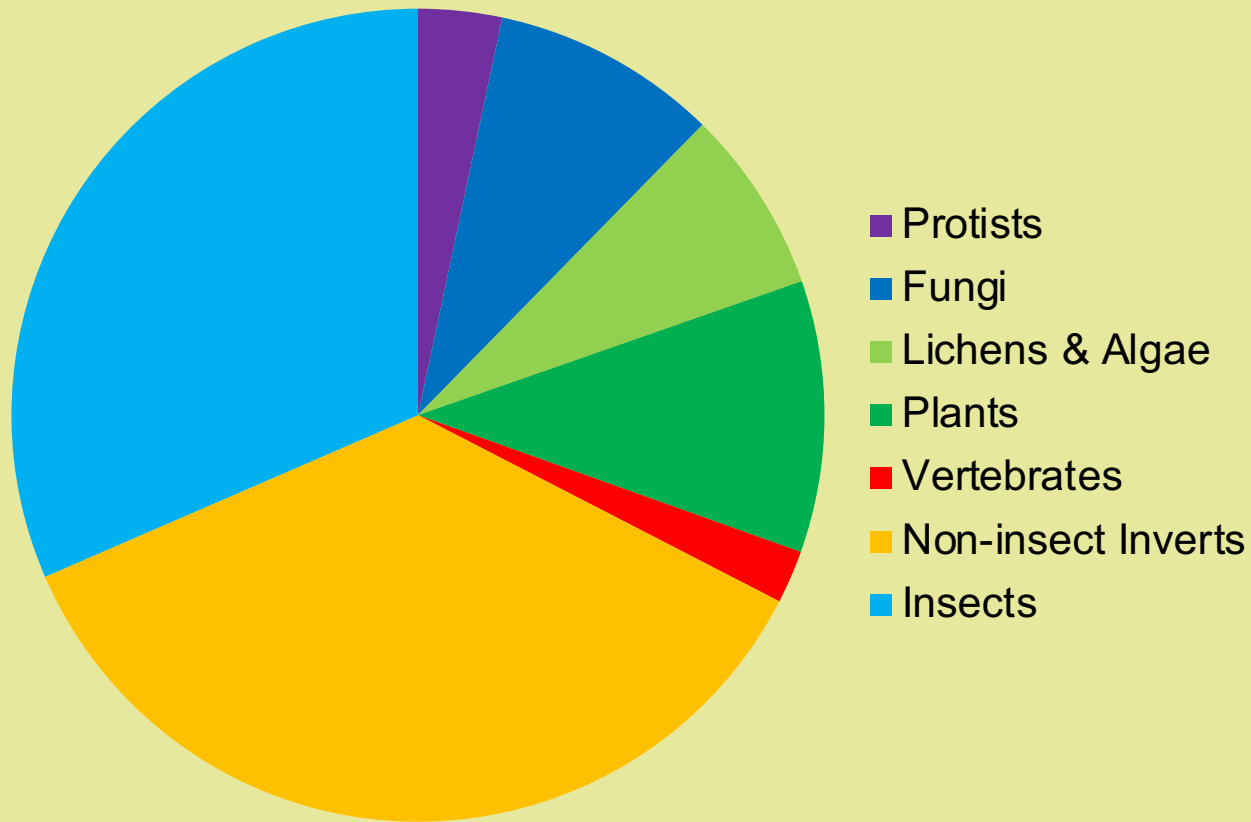
“But if we don't look after nature, nature can't look after us”

Natural History Museum Website

# WHAT ARE INVERTEBRATES

- Any animal without a backbone
- 1.3 million described species
- Represent
  - 75% of all Complex (Eukaryotic) Life
  - 96% of all animal species
- We have no idea how many species there are - could be anything between 5 and 30 million species!

# COMPLEX (EUKARYOTIC ) LIFE (~2 MILLION SPECIES)



- *Arthropoda* = Insects, Spiders, Crabs, etc.
- *Porifera* = Sponges
- *Cnidaria* = Stinging Jellyfish & Corals
- *Ctenophora* = Comb Jellies
- *Platyhelminthes* = Flatworms
- *Nematoda* = Round worms or Thread worms
- *Annelida* = Segmented Worms
- *Mollusca* = Cuttlefish, Snails, Mussels, etc.
- *Echinodermata* = Starfish, Sea-cucumbers, etc.
- *Protozoa* = Single-celled animals

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## ARTHROPODS (“JOINTED LEG”)

SubPhylum	Class
Chelicerata (“Claw – horn”)	Arachnida – Spiders, Mites, Ticks & Scorpions
Myriapoda (“100,000 legs”)	Centipedes & Millipedes
Crustacea (“Crust-like”)	Lobsters, crabs, shrimps, barnacles, fish lice, etc.
Hexapoda (“Six legs”)	<b>Insecta</b> = (winged) insects Entogathna = Wingless insects

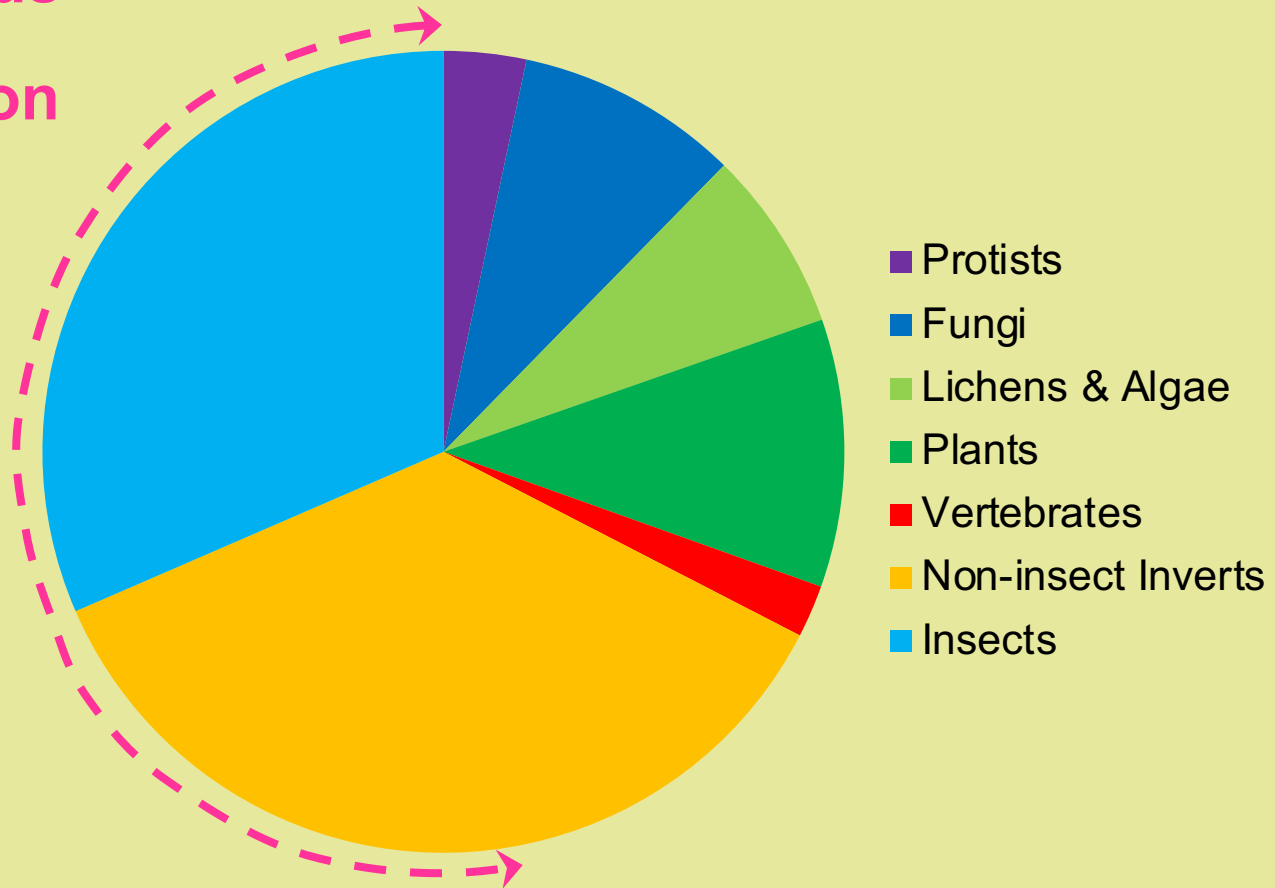
How Many Legs?

## ARTHROPODS (“JOINTED LEG”)

SubPhylum	Class	No. of Legs
Chelicerata (“Claw – horn”)	<b>Arachnida – Spiders, Mites, Ticks &amp; Scorpions</b>	<b>8</b>
Myriapoda (“100,000 legs”)	Centipedes & Millipedes	Varies
Crustacea (“Crust-like”)	Lobsters, crabs, shrimps, barnacles, fish lice, etc.	Varies
Hexapoda (“Six legs”)	<b>Insecta = (winged) insects</b> Entogathna = Wingless insects	<b>6</b>

# COMPLEX (EUKARYOTIC ) LIFE (~2 MILLION SPECIES)

**Arthropods**  
**>1.2 Million**  
**species**



- All species numbers now refer just to the UK
- “Really Primitive” - Wingless
  - Silverfish & Bristletails (9 species)
- “Primitive” - Cannot flex their wings over their bodies
  - Ephemeroptera (“Short-lived wing”) Mayflies (51 species)
  - Odonata (“Toothed”) Dragonflies & Damselflies (57 species)
- Neoptera (“New-winged”) - These can flex their wings over their bodies
  - All other winged insects (24,147 species!)

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## INSECT ORDERS (NEOPTRA)

- Hemiptera (“Half-winged”) Bugs (~1,830 species)
- Coleoptera (“Sheathed-winged”) Beetles (4,075 species)
- Diptera (“Two-winged”) - Flies (7,243 species)
- Hymenoptera (“Membrane-wing”) Ants, Bees & Wasps (~7,500 species)
- Lepidoptera (“Scale-winged”) Butterflies & Moths (~2,500 species)
- Others (~1,200 species)

- Gradual Metamorphosis
- Incomplete Metamorphosis
- Complete Metamorphosis

- **Gradual/No Metamorphosis**
  - Egg → Nymph → Adult
  - Primitive Insects = Silverfish and Springtails
- **Incomplete Metamorphosis**
  - Egg → Naiad or Nymph → Adult
  - Grasshoppers & true bugs
- **Complete Metamorphosis**
  - Egg → Larva → Pupae → Adult
  - Butterflies, moths, flies, bees, wasps & beetles

# INCOMPLETE METAMORPHOSIS

## Grasshoppers & true bugs

- Egg



Can last for a week to many months

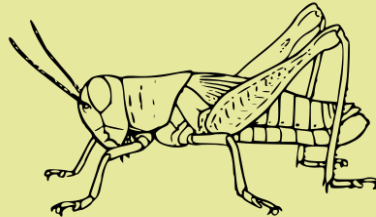
- Nymph or Naiad



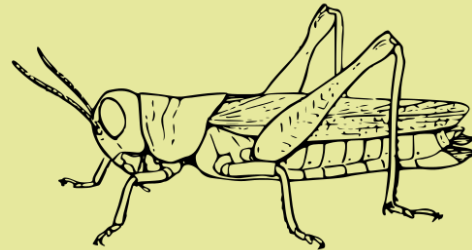
Look like smaller versions of the adult. Around 5 “Instars”



Some species can last years in this phase. Periodical Cicadas of North America stay in this stage for 13-17 years.



Only difference between late instar nymphs and adults, nymphs cannot fly or reproduce

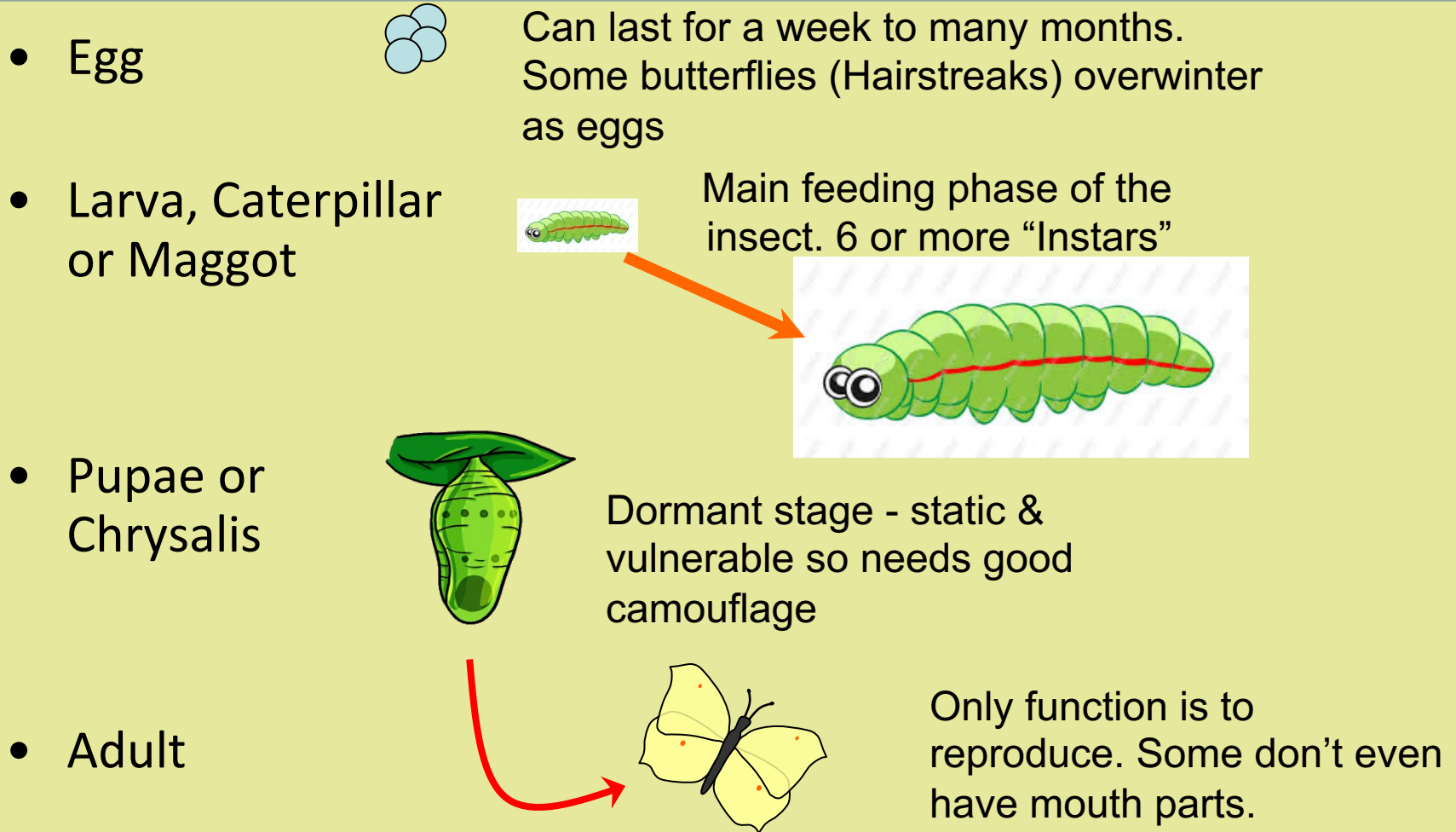


Nymphs and adults often feed on the same food.

- Adult

Only function is to reproduce.

# COMPLETE METAMORPHOSIS



- Cannot get away from scientific names!
- Many “inverts” do not have a common name (e.g. hoverflies – out of 281 species, only 11 have common names)
- Common names can be misleading and can be just as difficult to remember
- If starting from scratch, try to remember the scientific name

- It's the “scientific name” NOT the “Latin name”
- The scientific name can comprise Latin, Greek or totally made up, or a mix of any two
- Two parts – 1<sup>st</sup> the Genus – 2<sup>nd</sup> the Species
- Optional third part – sub-species or “race”
- Sub-species can inter-breed producing fertile progeny –  
Species can't

- Kingdom
- Phyla
  - Sub-phyla
- Class = Insecta
  - Sub-class
- Order = Coleoptera
  - Sub-order
- -- Super-family
- Family
  - Sub-family
- Genus
- Species
  - Sub-species or Race

- Kingdom = Animals
- Phyla = Invertebrates
  - Sub-phyla = Arthropods
- Class = Insecta
  - Sub Class = n/a
- Order = Coleoptera
  - Sub Order = n/a
- Family = Coccinellidae
  - Sub-family = n/a
- Genus = Coccinella
- Species = *Coccinella septempunctata*
  - Sub-species or Race = n/a

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- Family = Coccinellidae
  - Sub-family = n/a
- Genus = Coccinella
- Species = Coccinella septempunctata (7-spot Ladybird)
  - Sub-species or Race = n/a

*“Taxonomy is described sometimes as a science and sometimes as an art, but really it's a battleground”.*

Bill Bryson –  
from a Short History of Nearly Everything

# BASIC INSECT ANATOMY

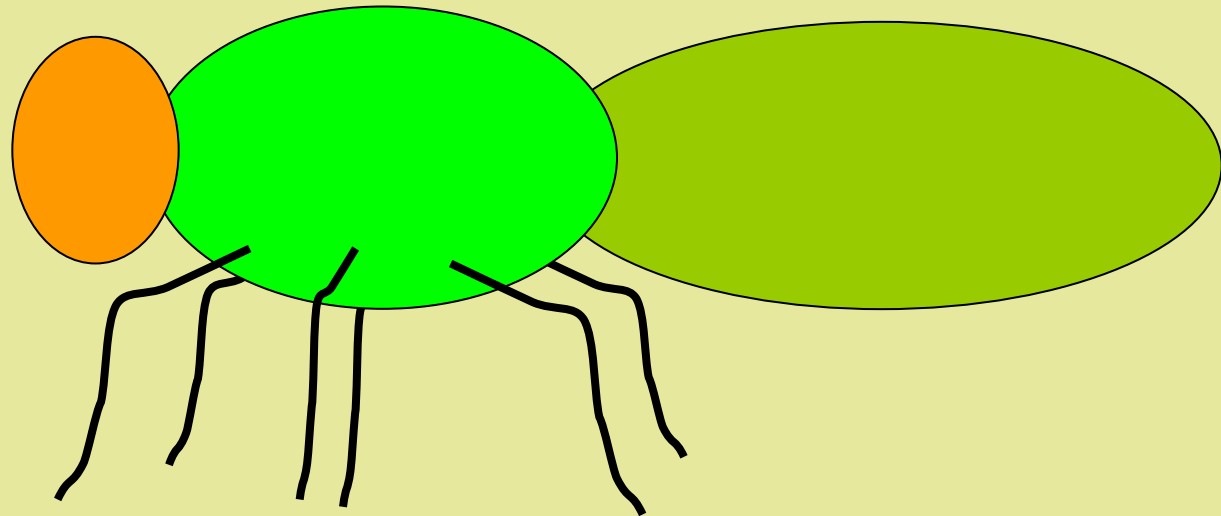
# BASIC INSECT ANATOMY (1)

Three  
Tagmas

**HEAD**  
Brain

**THORAX**  
Muscles

**ABDOMEN**  
Guts & Reproduction



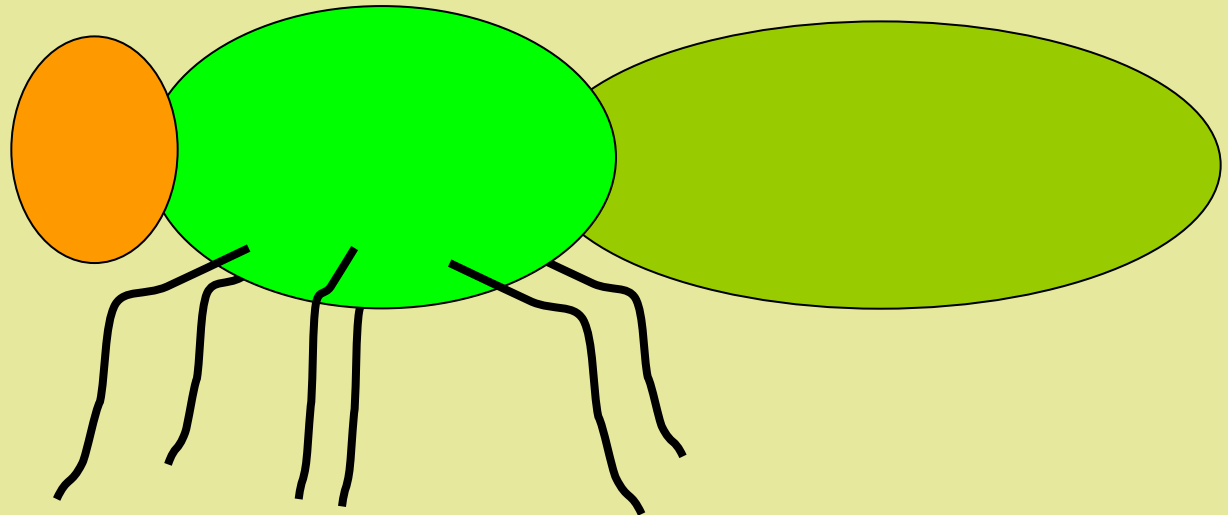
## BASIC INSECT ANATOMY (2)

**Three  
Tagmas**

**HEAD  
Brain**

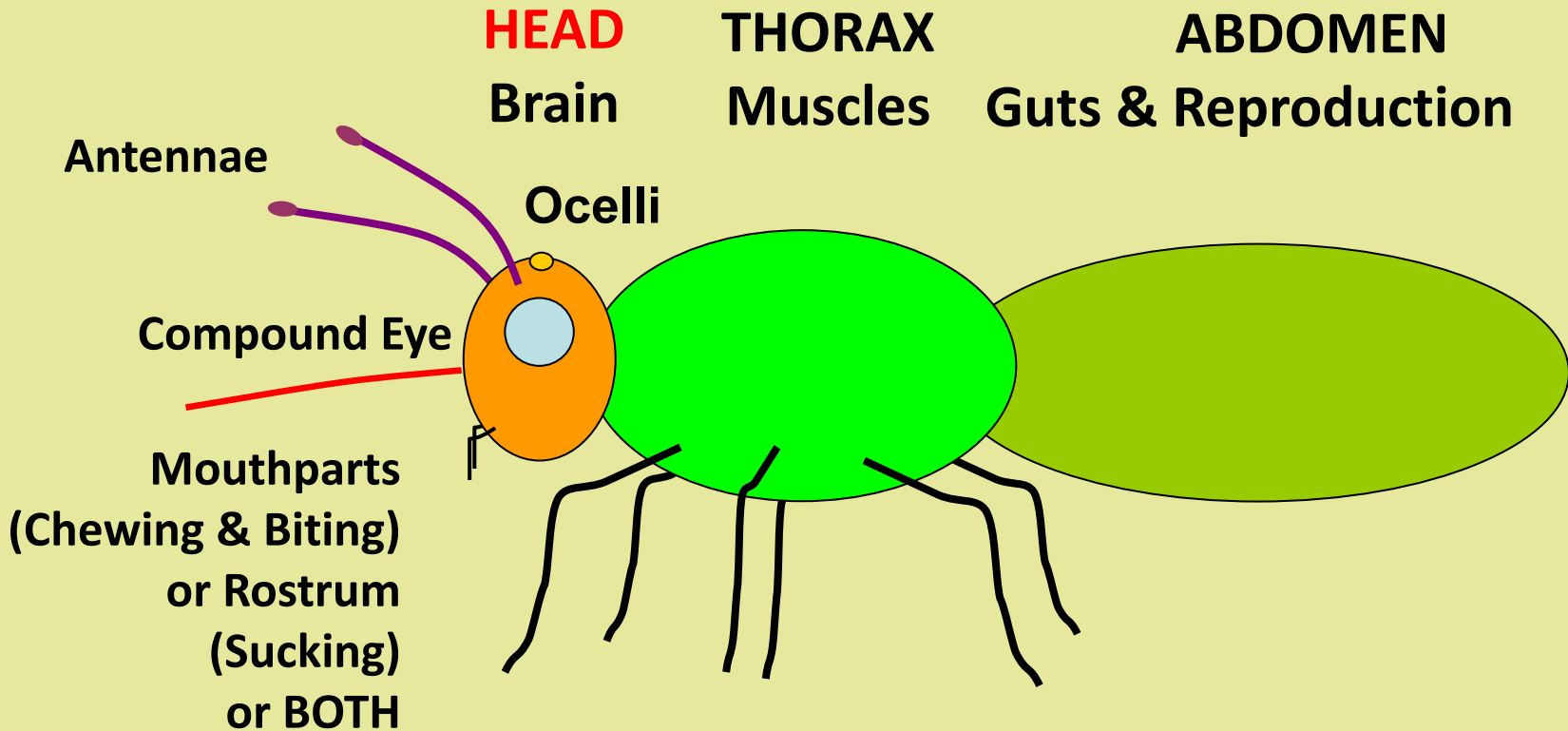
**THORAX  
Muscles**

**ABDOMEN  
Guts & Reproduction**

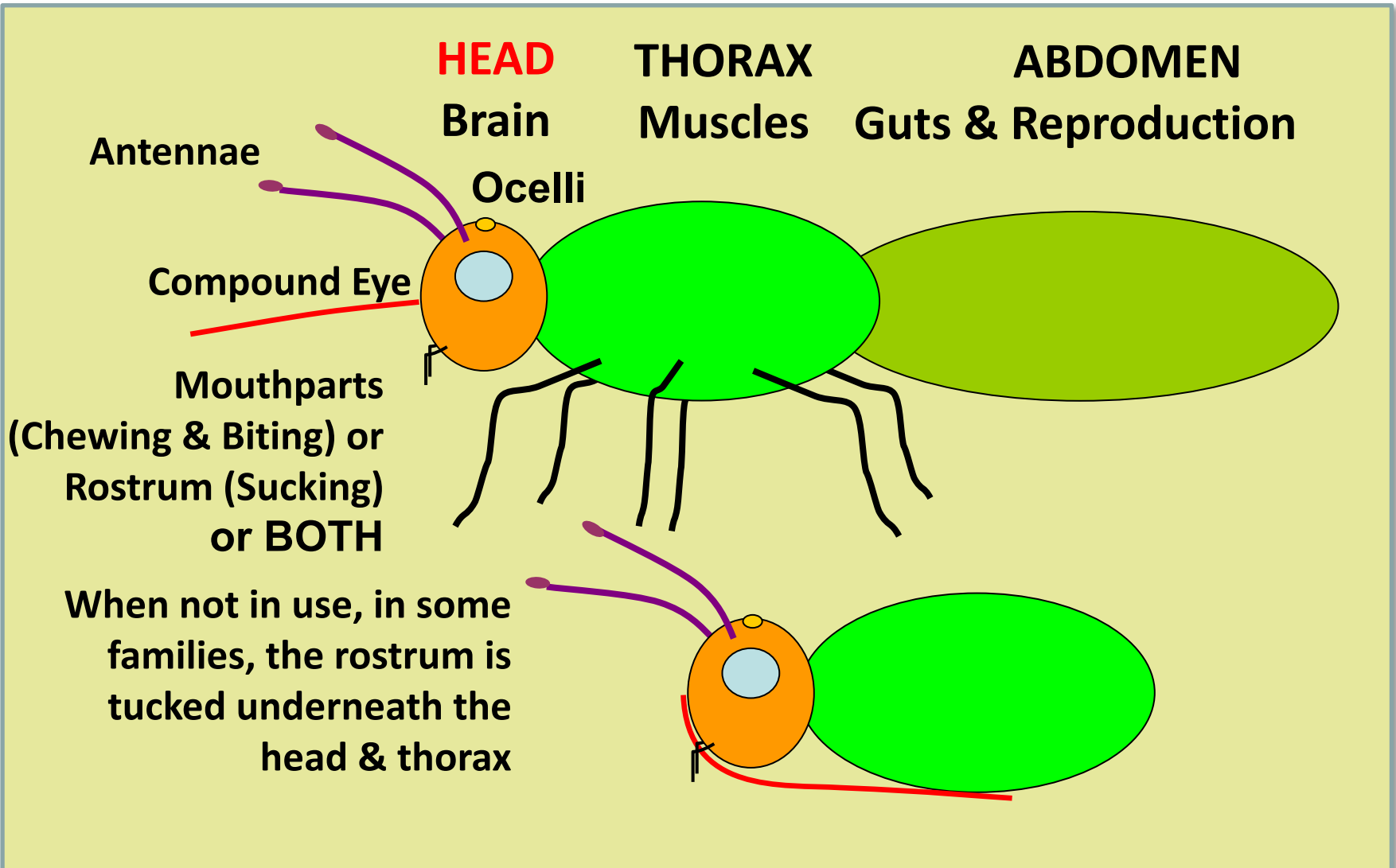


**The form and nature (morphology) of these  
junctions can be important for identification**

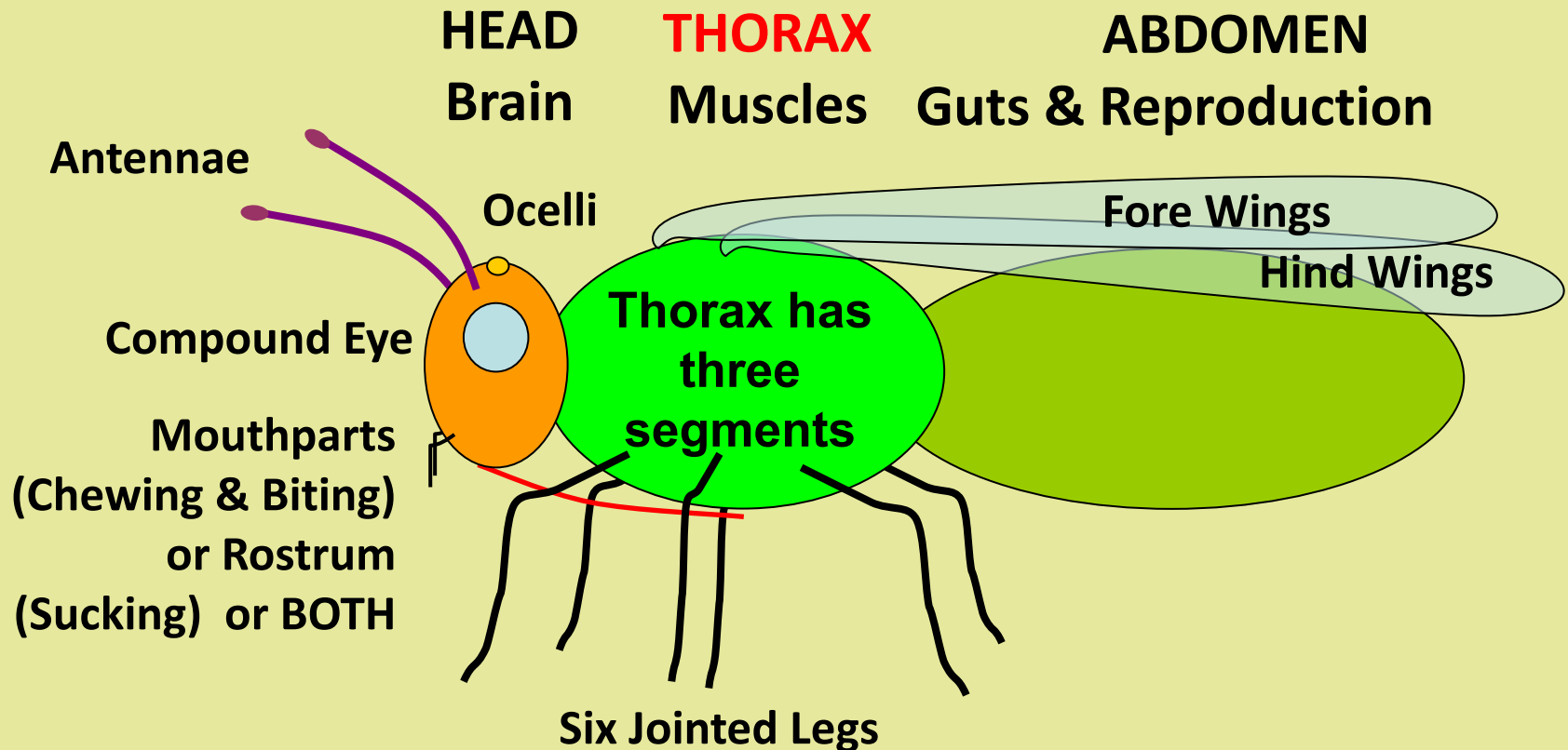
## BASIC INSECT ANATOMY (3)



## BASIC INSECT ANATOMY (4)

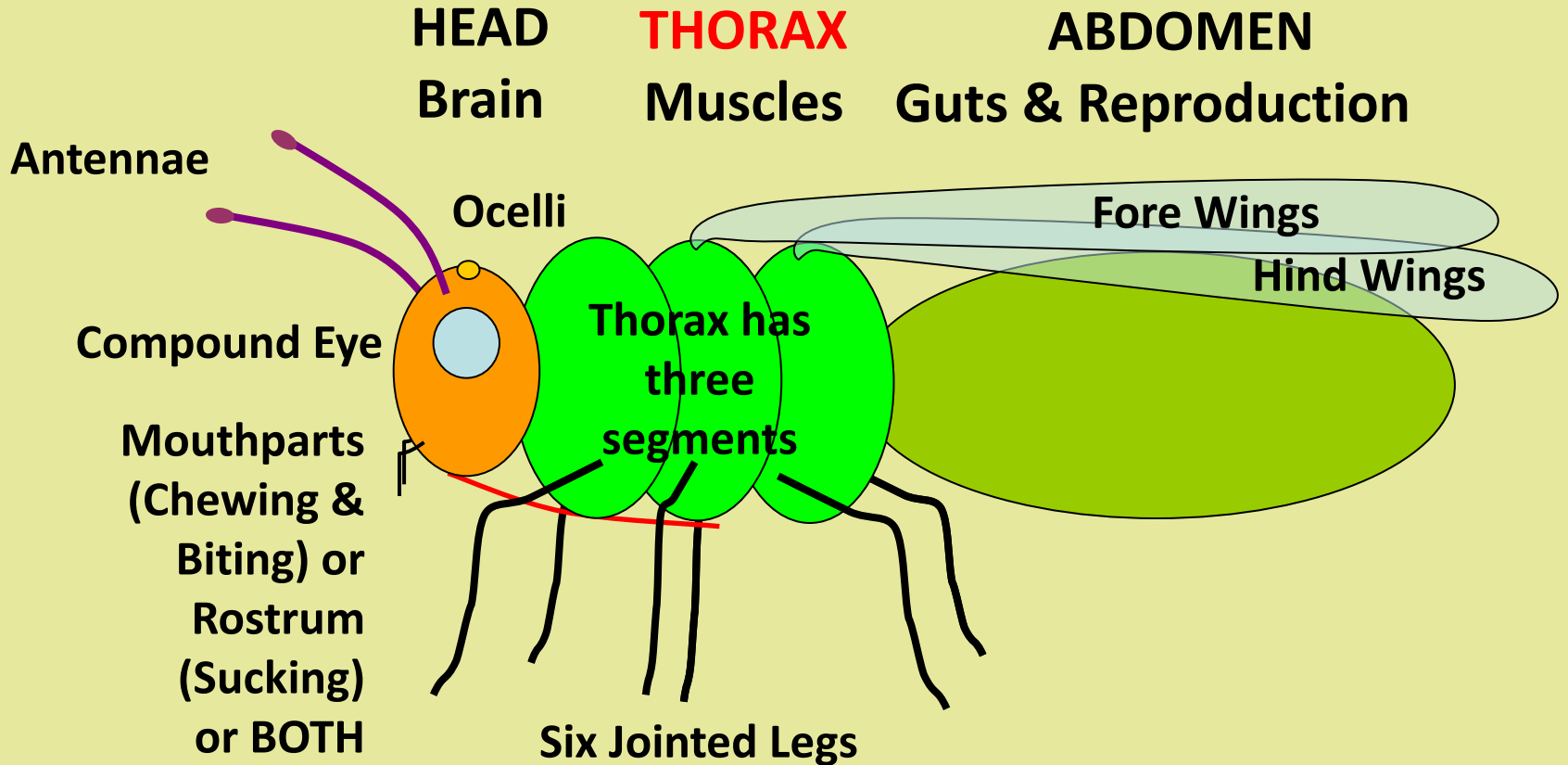


## BASIC INSECT ANATOMY (5)



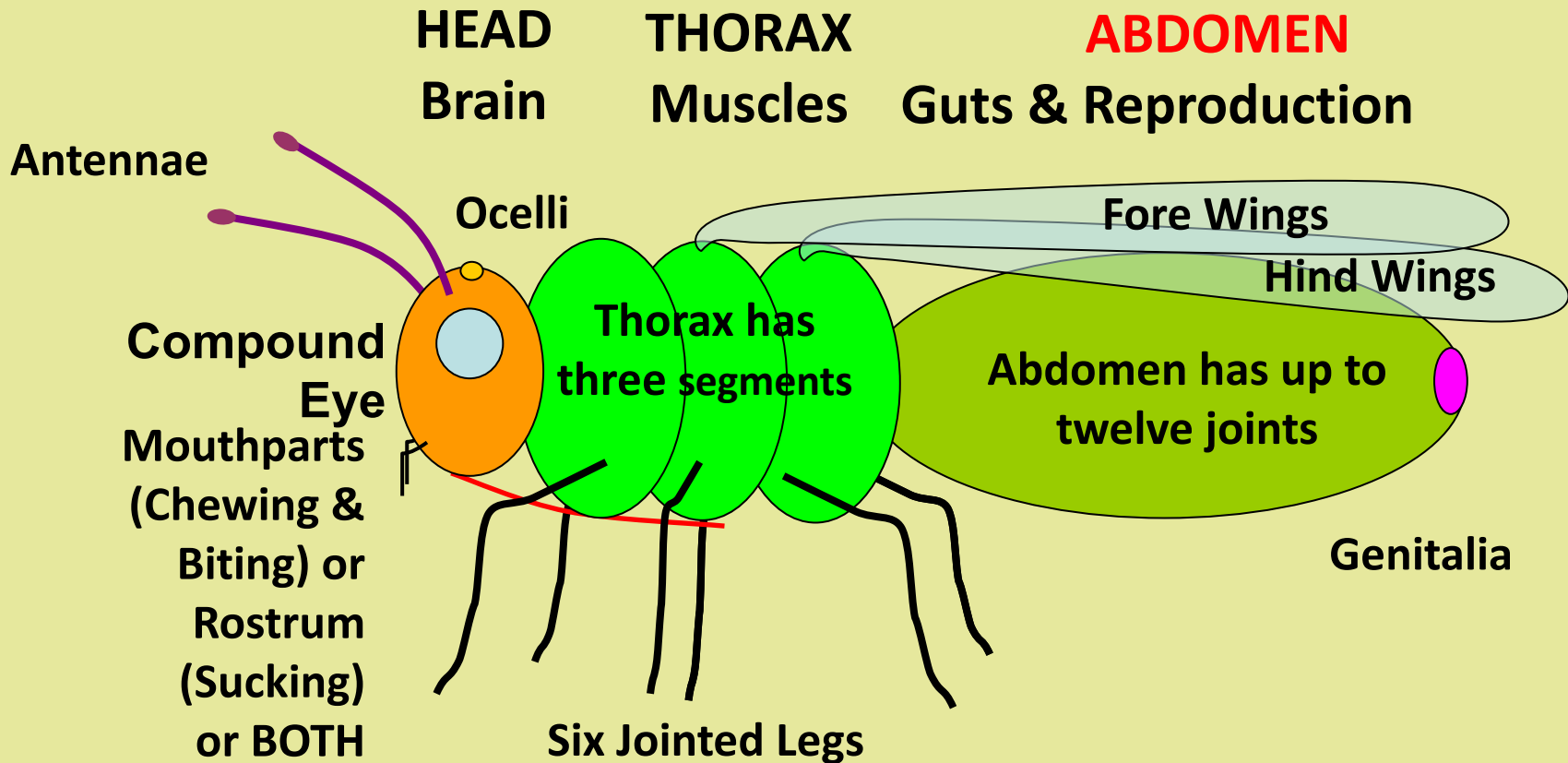
Note – All legs and wings are attached to the Thorax

# BASIC INSECT ANATOMY (6)

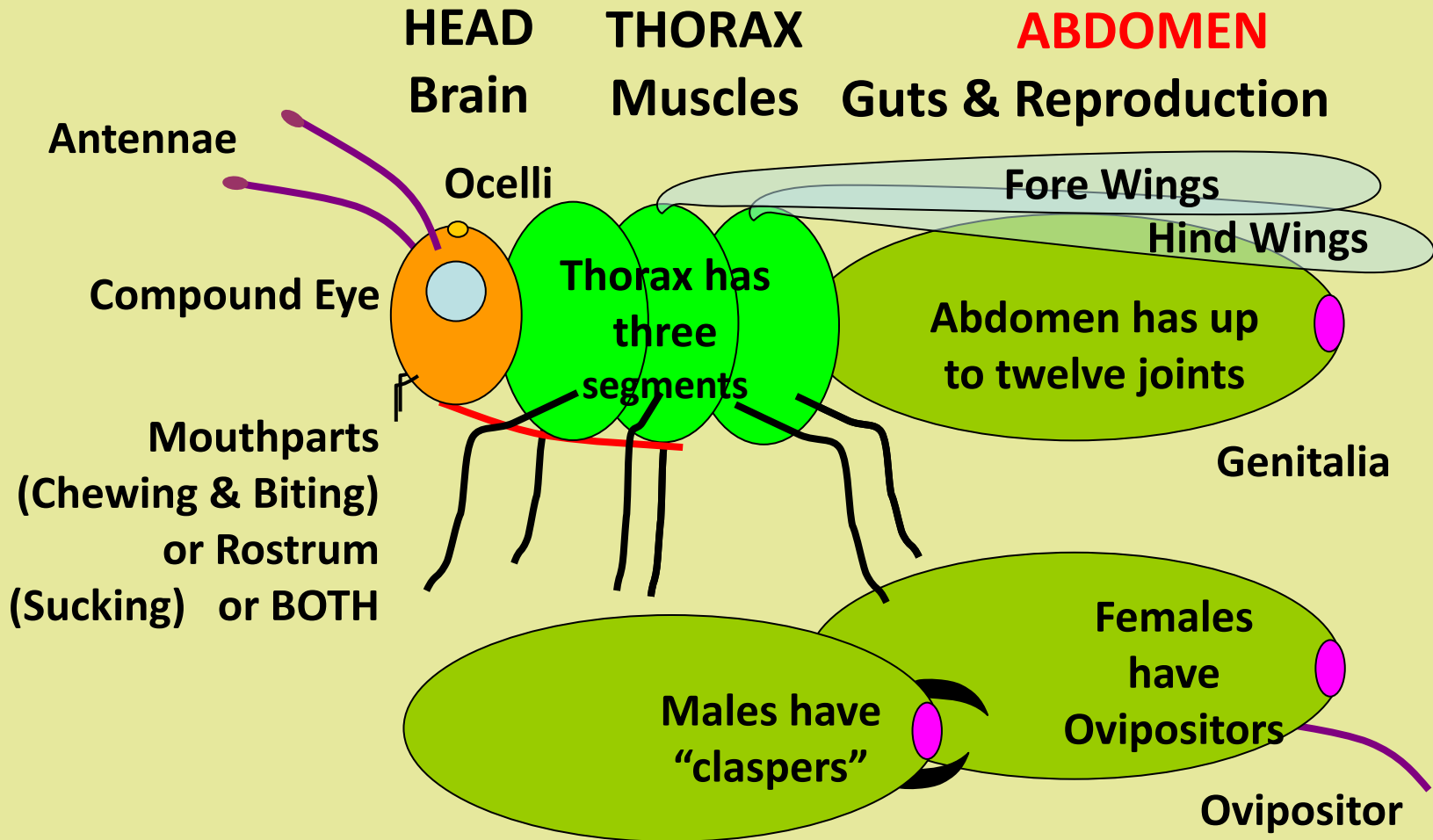


Each thoracic section has a pair of legs attached. The middle section has the forewings attached and the posterior section has the hind wings

# BASIC INSECT ANATOMY (7)



# BASIC INSECT ANATOMY (8)



- For today we will only consider the following:
  - Hemiptera = Bugs
  - Coleoptera = Beetles
  - Lepidoptera = Butterflies & Moths
  - Diptera = Flies
  - Hymenoptera = Ants, Bees & Wasps

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## NOT COVERING

Mayflies

Dragonflies & Damselflies

Stoneflies

Stick Insects

Grasshoppers & Crickets

Earwigs

Cockroaches

Lice & Thrips

Lacewings & Ant-lions

Alderflies & Snakeflies

Stylops & Sorpionflies

Caddisflies

- **Really Essential Equipment**
  - Hand Lens
  - Clear Plastic Pots
  - Notebook
- **Other Essential Equipment**
  - Ruler (Often printed on the back of field guides)
  - Handy Reference Books or Field Guides
  - Camera
- **Optional Equipment**
  - Sweep net
  - Beating Tray
- If you can't identify a specimen in the field
  - Take photos
  - Release specimen where it was caught

- For Serious Collecting:
  - “What’s Hit is History” (Take a specimen home)
  - “What’s Missed is a Mystery” (Who knows what it was?)
  - You probably kill more insects driving to site than you will ever take as specimens
- A microscope is essential to ID many species
- If you can’t identify the specimen under the microscope:
  - Take the sample to a curated collection for comparison
  - Collections include:
    - Hampshire Museum Service collection at Chilcombe House
    - Natural History Museum
    - British Entomological & Natural History Society at Dinton Pastures (Need to be a member)

## UK INSECTS

<b>ORDER</b>	<b>Sub-orders</b>	<b>Families</b>	<b>Species</b>
<b>Hemiptera – Bugs</b>	3	41	~1,830
<b>Coleoptera – Beetles</b>	2	74	4,075
<b>Lepidoptera – Butterflies &amp; Moths</b>	?	68	2,506
<b>Diptera - Flies</b>	4	51	7,064
<b>Hymenoptera - Ants, Bees &amp; Wasps</b>	3	20	~7,500

**SPOILER ALERT!**

# **SPOILER ALERT!**

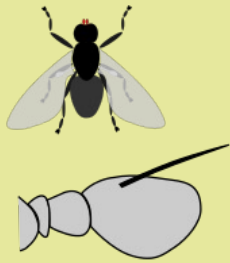
**THE FOLLOWING ID TIPS ARE ONLY A GUIDE**

**THEY ARE NOT RULES - THERE MANY EXCEPTIONS!**

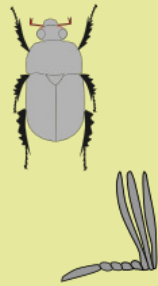
- **Antennae**
- **Wings**
- **Eyes & Shape of head**

# KEY POINTS OF INSECT ID

## Common Antennae Types



ARISTATE



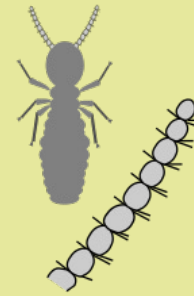
LAMELLATE



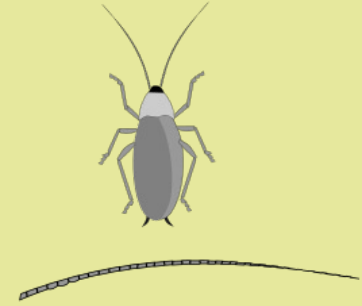
SERRATE



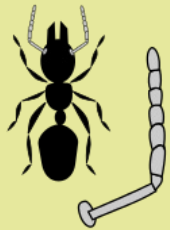
FLABELLATE



MONILIFORM



SETACEOUS



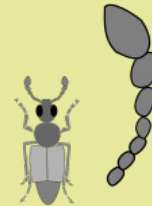
GENICULATE



PLUMOSE



PECTINATE



CLAVATE



STYLATE

- Antennae
- Wings
- Eyes & Shape of head
- Legs
- Junctions between body sections (articulation)

- Most of us think ladybirds are “small”
  - Typical 7-spot Ladybird is 5-8mm long
- Some gnats and flies are around 1-2mm
- Need to “focus” down the scale of the “specimens” we are looking at
  - Easy to overlook the really small stuff in a sweep net or beating tray

# **AT LAST – HOW TO ACTUALLY ID THE BEASTIES!**

# Hemiptera

(“Half-winged”) = True Bugs,  
Hoppers & Cicadas

## HEMIPTERA ("Half-winged") = Bugs

- All have a Rostrum for sucking
- Nearly all vegetarians
- Some are aquatic
- Three Sub-Orders
  - Heteroptera (True Bugs, inc Bed bugs)
  - Auchenorrhyncha (Plant, Tree, Leaf Hoppers & Cicadas)
  - Sternorrhyncha (Aphids & White Fly)

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  - **Auchenorrhyncha (Plant, Tree, Leaf Hoppers & Cicadas)**
  - Sternorrhyncha (Aphids, Whiteflies, Plant Lice, Scale Insects and Mealybugs )

- Antennae
- Wings
- Eyes

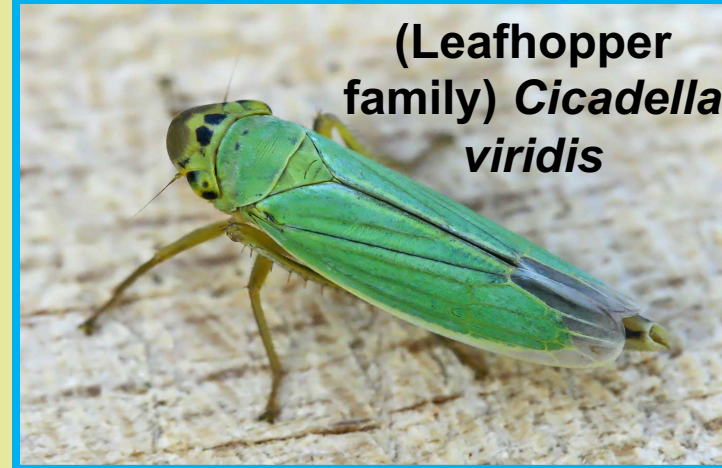
# HEMIPTERA

## HETEROPTERA



Hawthorn Shieldbug  
*Acanthosoma  
haemorrhoidale*

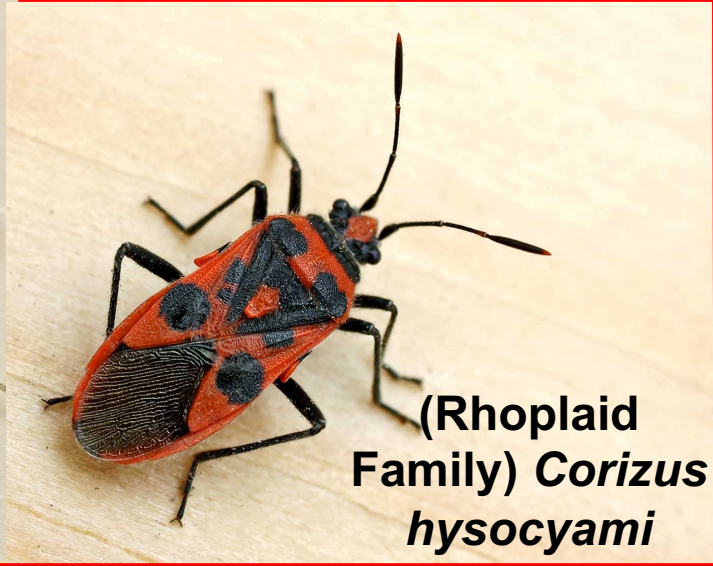
## AUNCHENORRHYNCHA



(Leafhopper  
family) *Cicadella  
viridis*



Common Green  
Capsid *Lygocoris  
pabulinus*



(Rhoplaid  
Family) *Corizus  
hysocyami*

## HETEROPTERA

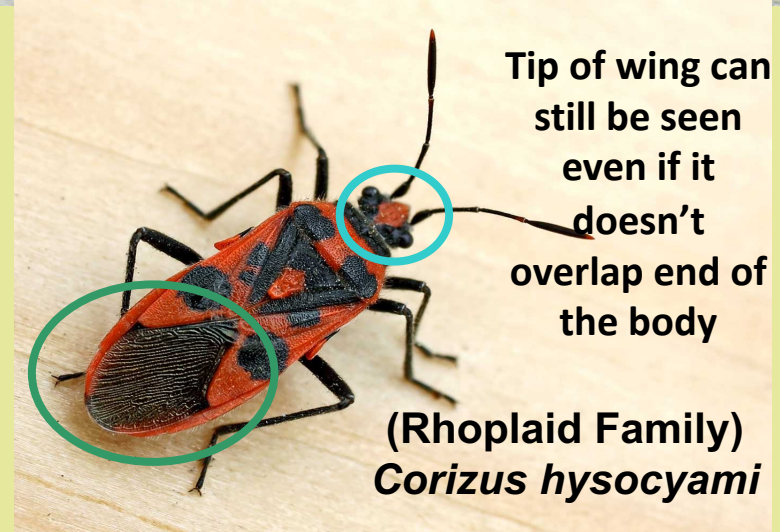
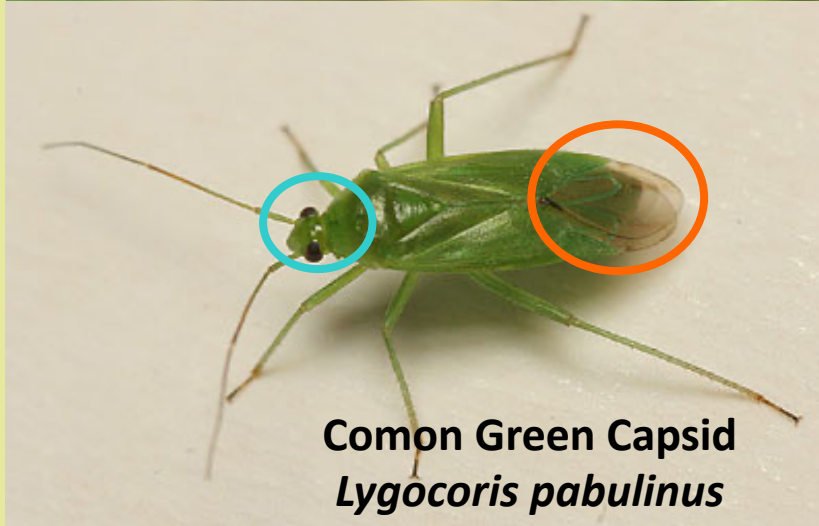
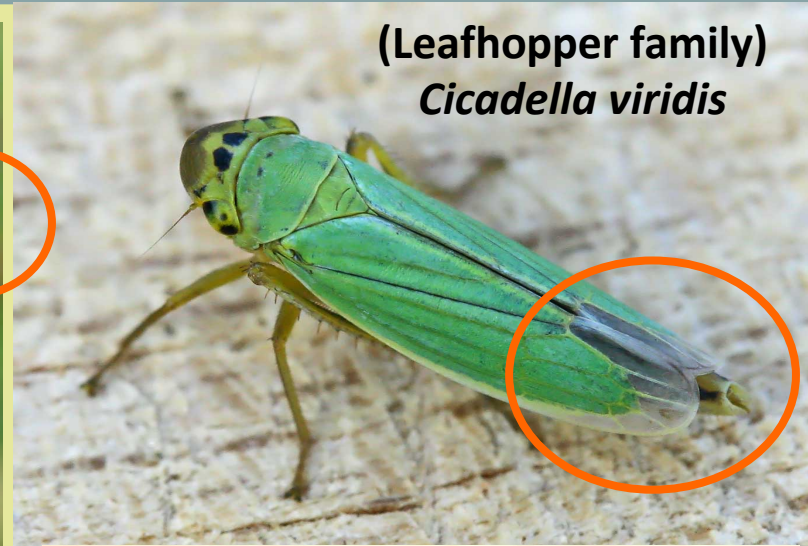
- Antennae have 3 or 4 segments (but segments can be quite long)
- Tips of the wings visible
- Eyes are small or tiny
- Eyes positioned on the side of the head
- Incomplete Metamorphosis – Nymphs can be found in early spring

## AUNCHENORRYNCHA

- Antennae have 3 or 4 segments (but quite SHORT)
- Wings fully visible (tent-like) or only at the tip
- Eyes are small or tiny
- Eyes positioned on the side of the head
- Incomplete Metamorphosis – Nymphs can be found in early spring

**STERNORRYNCHA** = Aphids, Whiteflies, Plant Lice, Scale Insects and Mealybugs

# HEMIPTERA



# Coleoptera

(“Sheathed-winged”) = Beetles

# COLEOPTERA ("Sheathed-winged") = Beetles

- All have wing cases = Elytra
- Some are aquatic
- Use complete metamorphosis
- Two Sub-Orders
  - Adephaga
  - Polyphaga

- Antennae
- Wings
- Eyes
- Legs
- Joints (between body segments)

# COLEOPTERA

Harlequin Ladybird  
*Harmonica axyridis*



Dor Beetle  
*Geotrupes stercorarius*



(Rove Beetle Family)  
*Tachyporus hyporum*

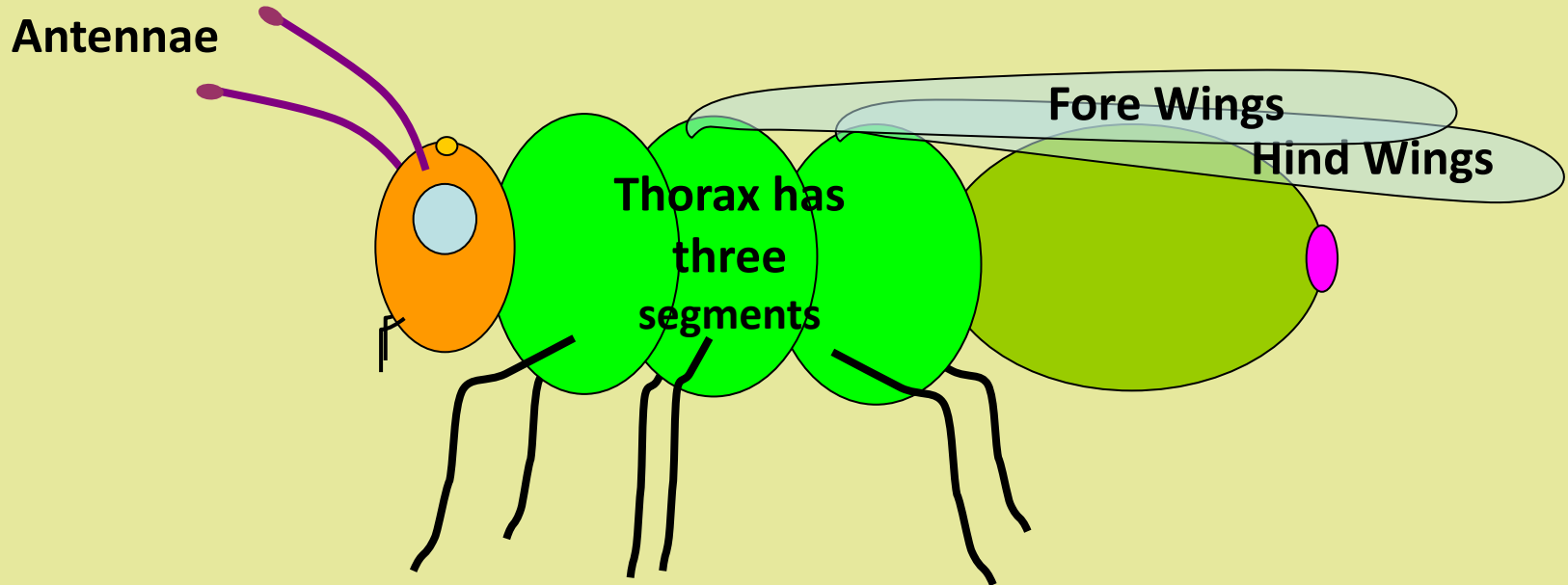


Hazel Leaf-rolling Weevil  
*Byctiscus populi*



- Thorax and wings covered in an exoskeleton
- Antennae have lots of segments – sometimes clubbed or have fancy appendages
- Wings not visible - (wings may not reach end of abdomen)
- Wings completely covered in wing cases (Elytra)
- Wing cases butt together with a straight joint
- Use Complete Metamorphosis

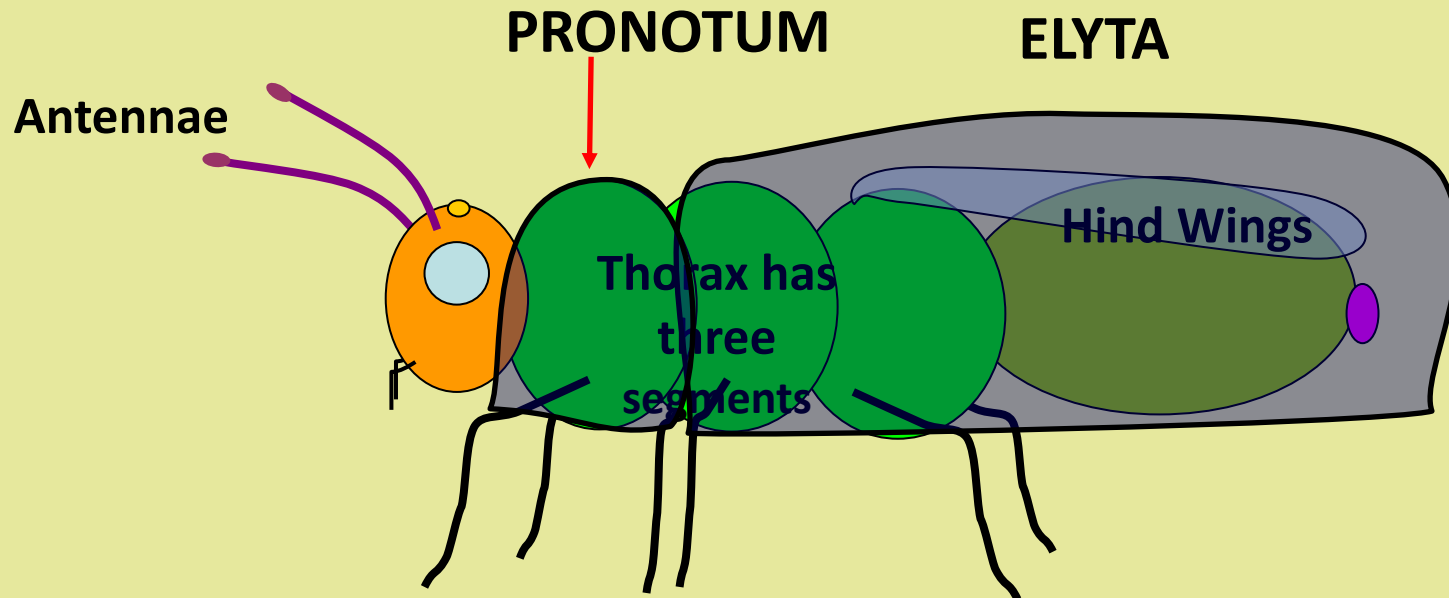
# BASIC INSECT ANATOMY



In Coleoptera the fore wings have become wing cases

The thorax tends to be larger than the abdomen hence the legs appear to be more spread out along the body

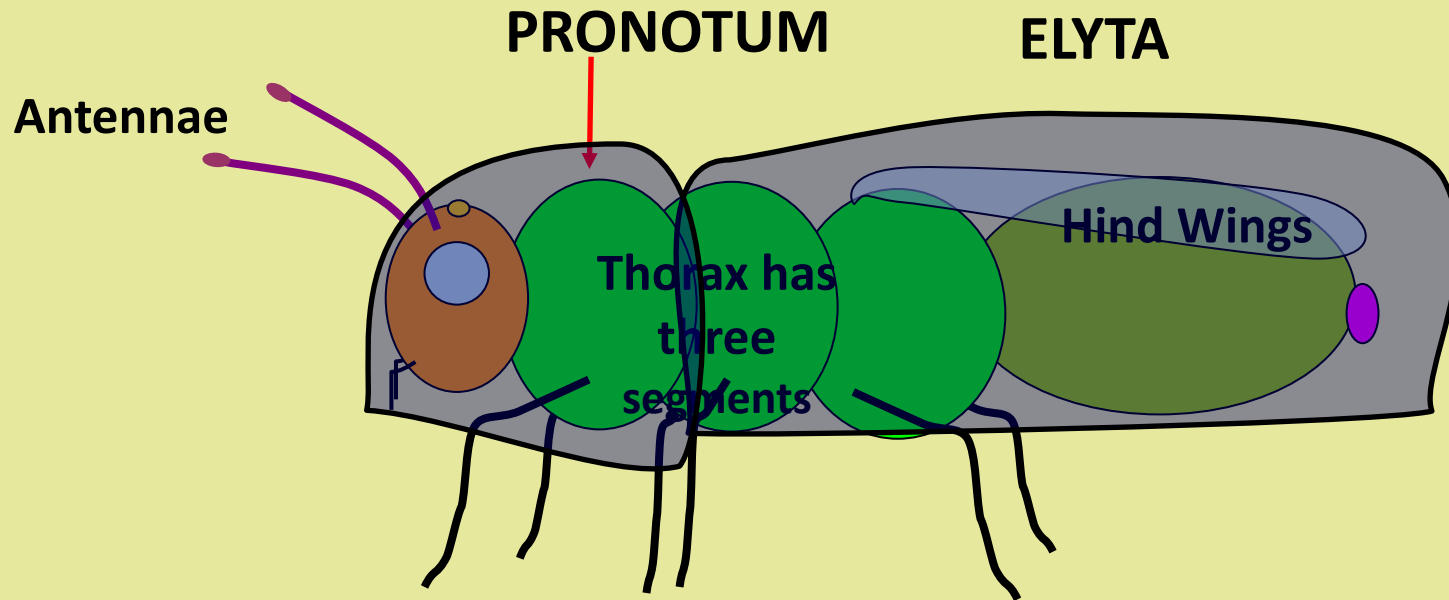
# BASIC BEETLE ANATOMY



Each thoratic section has a pair of legs attached. The anterior section (front) has its own protective exoskeleton [PRONOTUM]

The middle and posterior thoratic sections AND the abdomen are covered by the wing cases [ELYTRA]

# BASIC BEETLE ANATOMY



In some species, the pronotum extends to cover the head giving the impression of only having two sections rather than three

- Visible part of the thorax is called the pronotum
- Middle & posterior segments of the thorax and the abdomen are hidden underneath the wing cases (Elytra)
- Things to look out for:
  - Geometry & colour of head, pronotum & elytra
  - Form of junctions between:
    - Head & pronotum
    - Pronotum & elytra
- Geometry of antennae:
  - Length and the number of segments
  - End of antennae: clubbed, thickened, pectinate, flabellate, other
- Ladybirds can be a good group to start studying

# COLEOPTERA

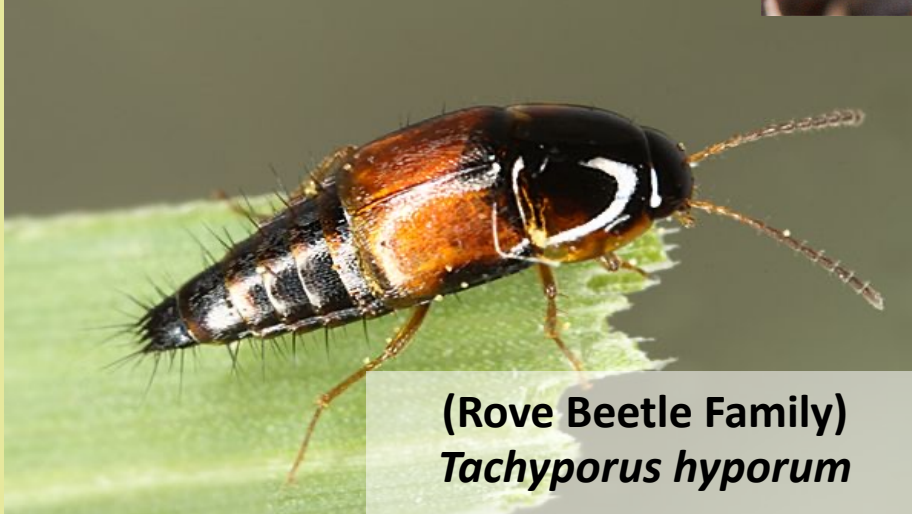
Harlequin Ladybird  
*Harmonica axyridis*



Wing cases form a straight joint



Dor Beetle  
*Geotrupes  
stercorarius*



(Rove Beetle Family)  
*Tachyporus hyporum*



Hazel Leaf-rolling Weevil  
*Byctiscus populi*

# INSECT SPECIMENS - COLEOPTERA

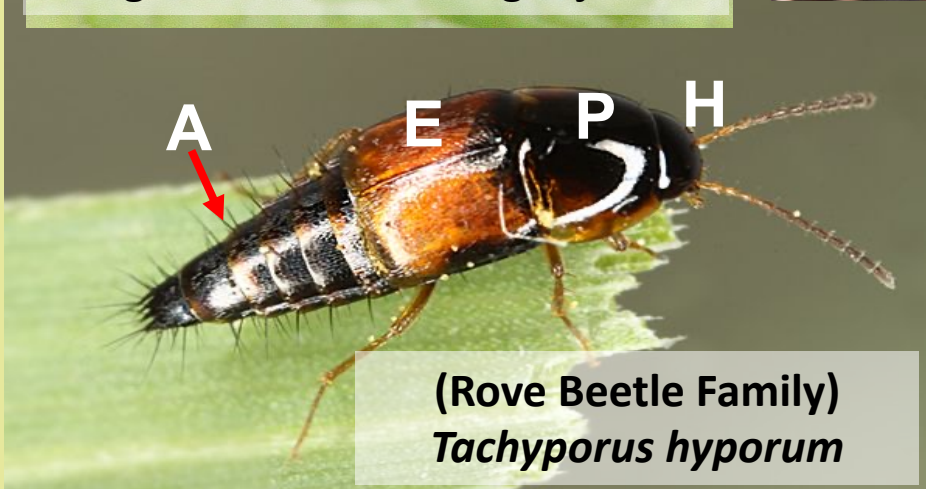
Harlequin Ladybird  
*Harmonica axyridis*



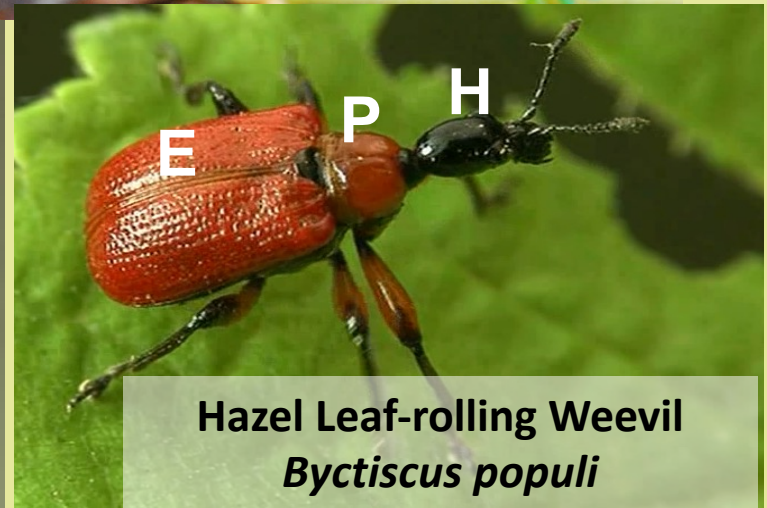
Wing cases form a straight joint



Dor Beetle  
*Geotrupes stercorarius*



(Rove Beetle Family)  
*Tachyporus hyporum*



Hazel Leaf-rolling Weevil  
*Byctiscus populi*

# Diptera

(“Two-winged”) = Flies

## DIPTERA ("Two-winged")

- All have a single pair of wings
- Rear pair of wings have evolved into **HALTERES**
- Use complete metamorphosis
- Two Sub-Orders
  - Nematocera (Crane-flies, Midges, Mosquitoes)
  - Brachycera (Hoverflies, Horseflies, Bee-flies Bluebottles & the rest)

- Antennae
- Wings
- Eyes & Shape of head

- Antennae
- Wings
- Eyes & Shape of head
- Wing Venation
- Hairs/Bristles on Thorax & Abdomen

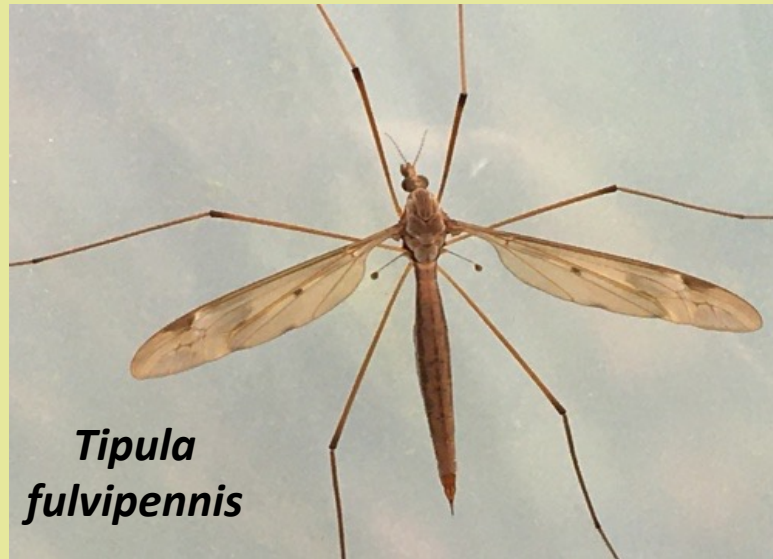
# DIPTERA



Notch-horned Cleg *Haematopota pluvialis*



*Herina nigrina*



*Tipula fulvipennis*



*Chrysotoxum cautum*

## NEMOTOCERA

- Antennae have more than 6 segments (sometimes quite long)
- Eyes are small or tiny
- Eyes positioned on the side of the head
- 2892 species

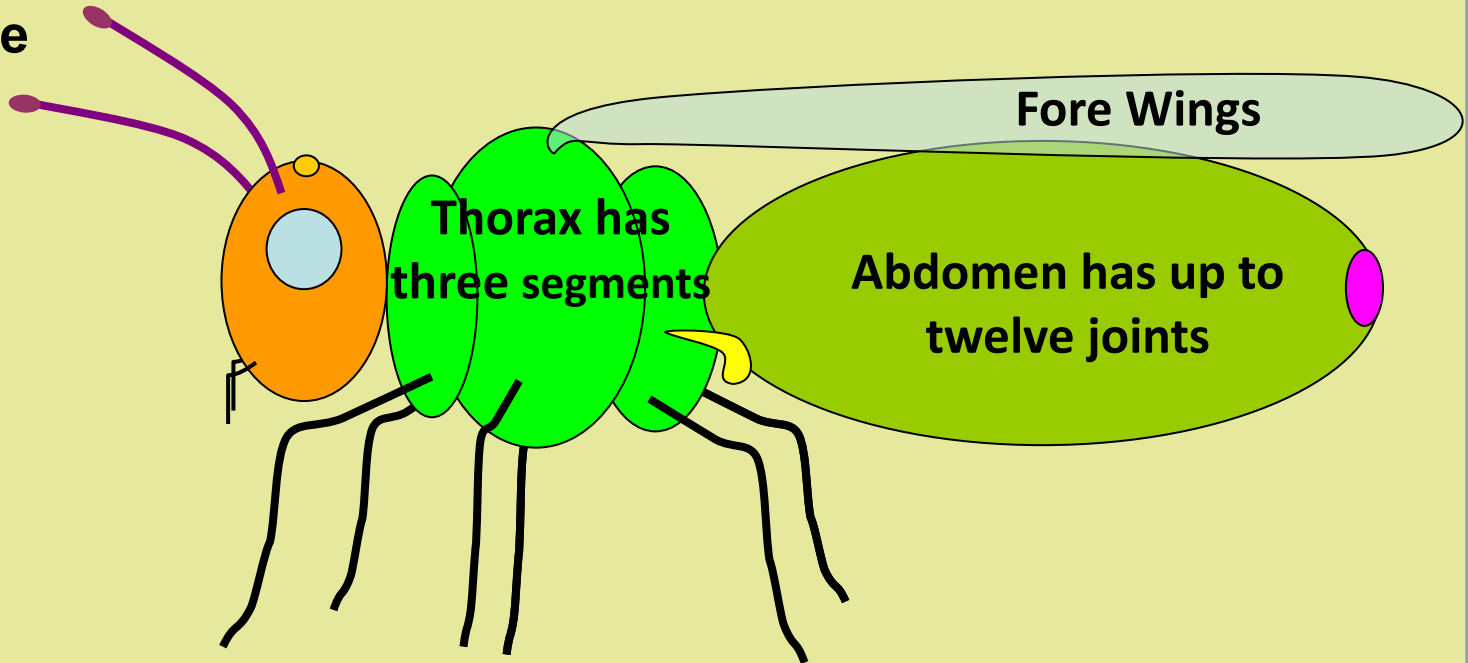
## BRACHYCERA

- Antennae have 6 or less segments (often quite SHORT)
- Most have just three segments
- Positioned close together in centre of head
- May have an (Whisker) Arista
- Eyes are HUGE
- Eyes pointed forward
- 4048 species

- **BRACHYCERA** - A group of three super-families
- **Larger Brachycera** (1637 species)
  - Have un-scarred faces i.e. do not have a ptilinal suture
  - Hoverflies, Bee-flies, Soliderflies and loads of others
- **Acalyperates** (1209 species)
  - Have scarred faces i.e. have a ptilinal suture
  - Picture-winged flies, Thick-headed Flies, and loads more
- **Calyperates** (1202 species)
  - Also have scarred faces i.e. have a ptilinal suture
  - Often covered in bristles
  - Houseflies & Parasitic Flies

# DIPTERA ANATOMY

**Antennae**



**Fore Wings**

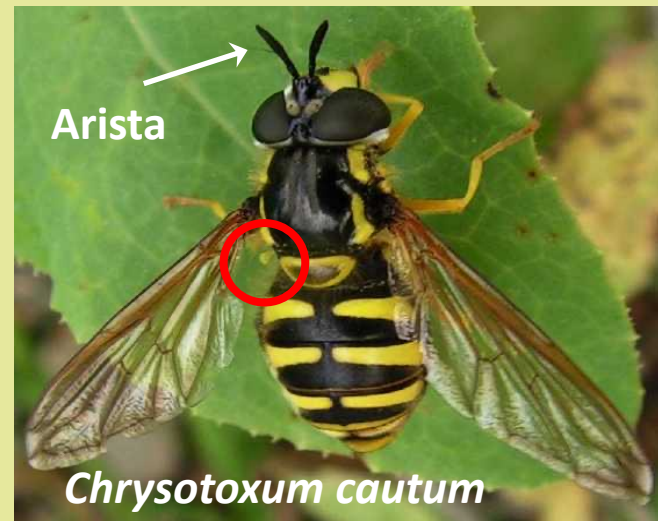
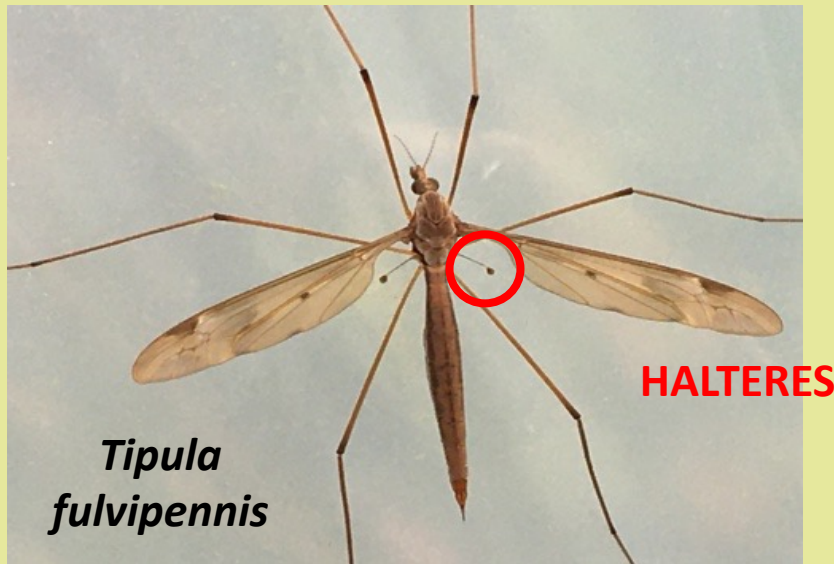
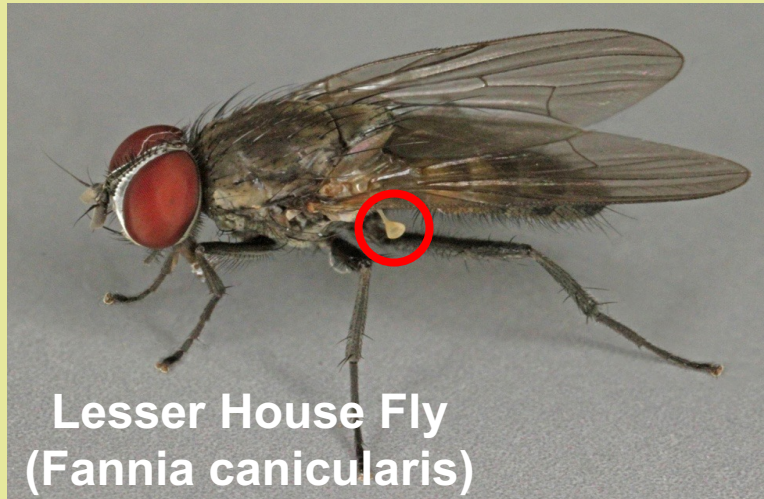
**Thorax has  
three segments**

**Abdomen has up to  
twelve joints**

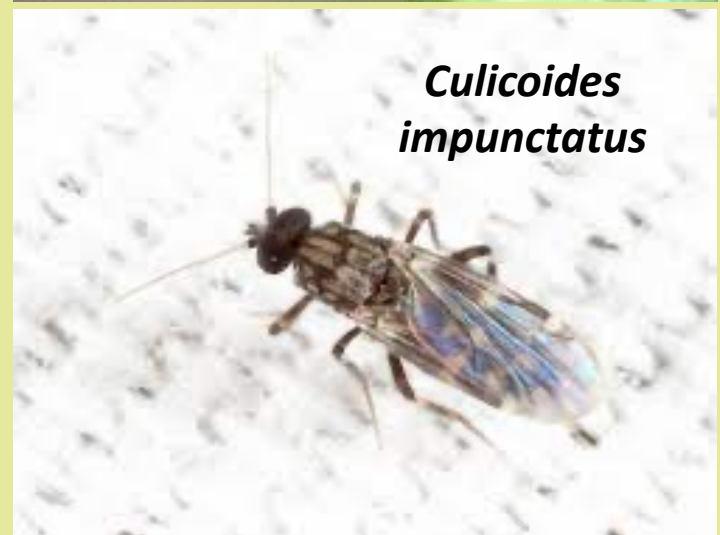
**Only one pair of wings attached an enlarged middle Segment**

**HALTARES are attached to the third segment**

# DIPTERA



## DIPTERA – NEMOTOCERA



## Larger Brachycera



*Volucella zonaria*

## Acalypterates and Calypterates (with Ptilinal Suture)



*Fannia canicularis*

# LARGER BRACHYCERA



*Volucella zonaria*



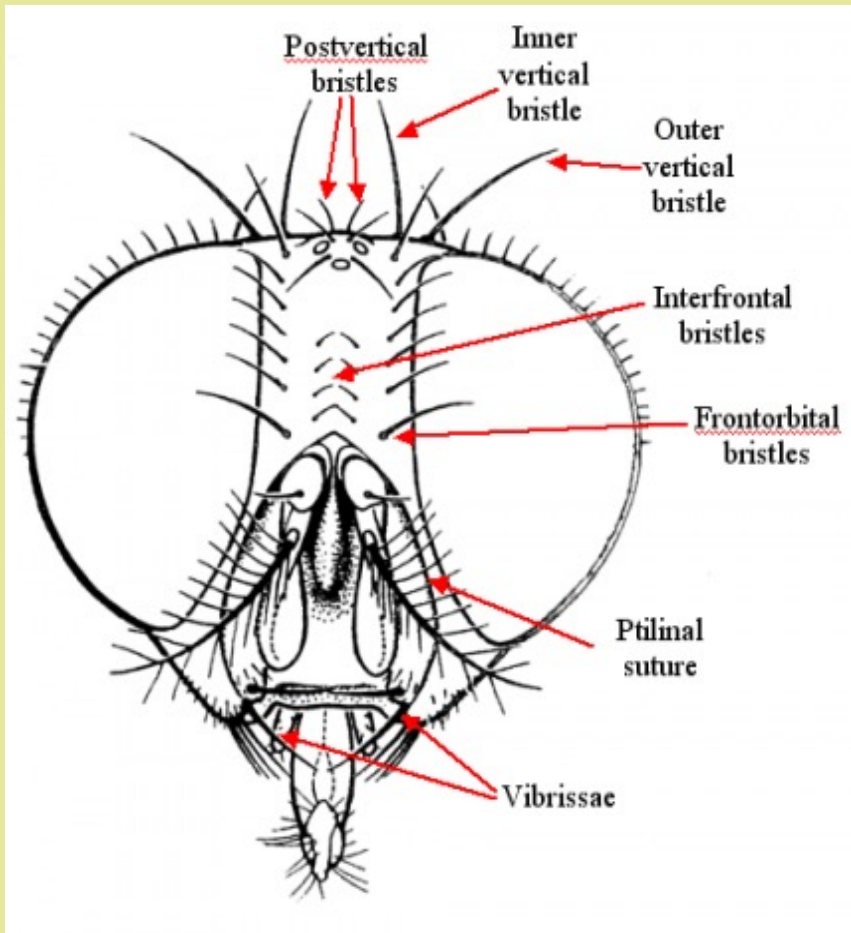
Marmalade Fly  
*Episyrphus balteatus*

Twin-lobbed Deerfly  
*Chrysops relictus*



Banded General  
*Stratiomys potamida*

# ACALYPTERATES & CALYPTERATES



*Fannia canicularis*

# ACALYPTERATES & CALYPTERATES



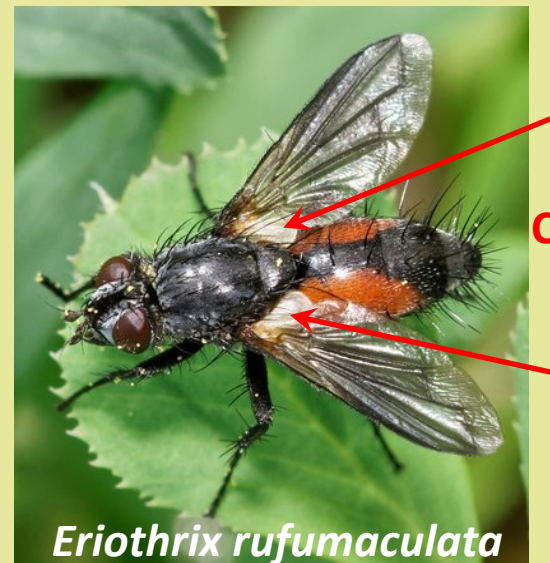
*Canops flavipes*



*Herina nigrina*



*Xyphosia  
miliaria*



**Calypters**

*Eriothrix rufumaculata*

# Hymenoptera

(“Membrane-winged”) = Bees, Ants  
& Wasps

- All have two pair of wings
- Use complete metamorphosis
- Two Sub-Orders
  - Symphyta (Sawflies and Woodwasps) 540 species
  - Apocrita
    - Parasitica (Chalcid, Braconid, Ichneumeon,  
– & Gall Wasps) 5716 species
    - Aculeates (Bees, Ants & Wasps) 1504 species

- Antennae
- Wings
- Eyes & Shape of head
- Legs
- Joints (between body segments)
- Amount of fur/hair

# HYMENOPTERA

*Ectemnius literatus* (Digger Wasp)



Figwort Sawfly *Tentredo scrofularia*



*Ichneumon srcitorius*



Tawny  
Mining Bee  
*Andrena  
fulva*

- Wide variation in shape (morphology)
- Two pairs of wings
- Medium to Long antennae with multiple segments
- Antennae set apart on the front of the head (Frons)
- Smaller and more varied eye shapes (compared with flies)

- If you can count the three segments (head, thorax & abdomen) – it's probably a bee or a wasp
- If you can't see the join between the thorax and the abdomen – it's probably a Sawfly or Woodwasp
- If it has a highly articulated thorax/abdomen – it's probably a wasp
- Because of the variation in Sawflies, these can be a good group to start studying (They are also slow flyers!)
- If it has a very long antennae – it's probably a parasitic wasp
- Parasitic wasps have characteristic venation

# SYMPHYTA

## Sawflies & Woodwasps

- Most primitive of the Hymenoptera
- Female Sawflies have turned their “sting” into a saw
- Female Woodwasps have turned their “sting” into a hypodermic needle for piercing bark
- Slow fliers so an easy group to start with

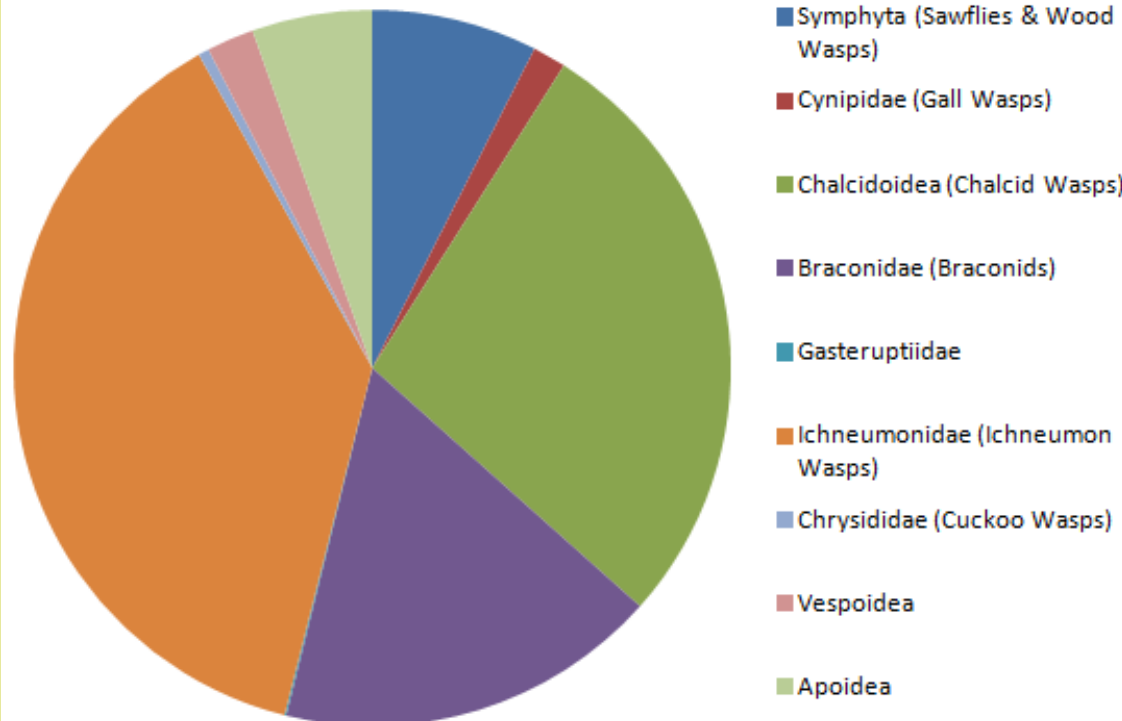


## APOCRTIA – Parasitica (Gall, Calcid, Braconid & Ichneumon Wasps)

- A HUGE collection of insects – represent over 2/3s of ALL Hymenoptera!
- Some species have very long ovipositors
- Study is difficult - ID documentation patchy
- A very difficult group to study – need to know what prey is being hunted
- Don't start here!



## Hymenoptera Species



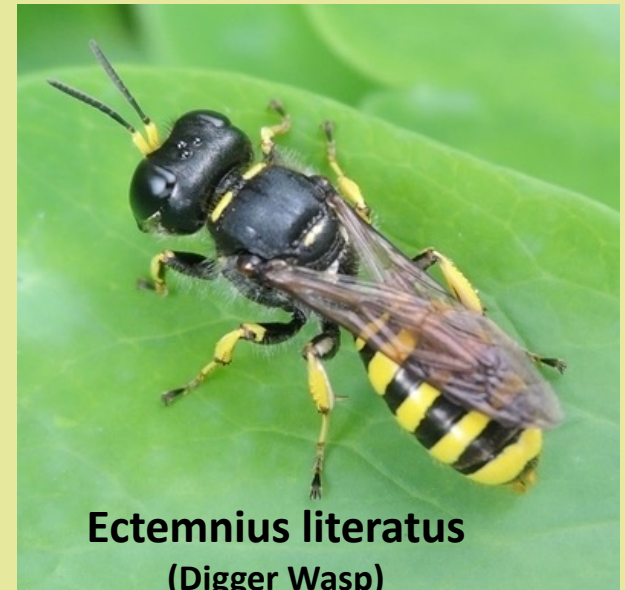
**Parasitica**

## APOCRTIA – Aculeates (Bees, Ant & Wasps)

- Wide variation in size, coloration and the amount of fur/hair
- Most bees have fur or at least hairs
- Some Wasps have a hairs but most don't
- ID documentation is patchy
- Bumble Bees are a popular group to start with



**Tawny Mining Bee**  
*Andrena fulva*



**Ectemnius literatus**  
(Digger Wasp)

# Lepidoptera

(“Scale-winged”) = Butterflies &  
Moths

- Antennae
- Wings

# LEPIDOPTERA



*Polygonia  
c-album*



*Timandra comae*



*Zygaena  
trifolii*



*Autographa  
gamma*



*Pterophorus  
pentadactyla*

- All have “scaled-wings”
- Scales reflect light giving rise to wide variation in wing colour for day flying species
- Night flying species have more muted colours
- Wide variety of wing shapes
- Moth Antennae have wide variation vs Clubbed antennae of butterflies
- Makes it a relatively easy Order to ID – especially butterflies
- Some Micro moths need dissection and microscopic analysis to get an ID

# SUMMARY - Simple Insect ID Tips

Group	Antennae	Wings	Eyes
<b>Bugs (Half-winged)</b>	Short – Long but only have 3 or 4 segments – set on side of head	Appear to have the wing split with front half solid and the rear half transparent. The wings overlap. <b>Can always see at least the tip of the wing</b>	Tiny or small eyes on side of head
<b>Beetles (Sheath-winged)</b>	Short – Medium but have lots of segments - more than 5 – set on side of head Some are clubbed or fringed	<b>Totally covered by armour-plated wing cases.</b> Join in the middle with a <b>straight joint</b>	Tiny or small eyes on side of head
<b>Flies (Two-winged)</b>	Short – Long Appear to emerge from a spot in the centre of the head Some can	Only one pair of transparent wings – Specimens tend fly in straight lines and some hover	<b>Huge</b> sometimes covering most of the head.
<b>Ants, Bees &amp; Wasps (Membrane-winged)</b>	Medium – lots of segments but difficult to determine – <b>Appear to emerge from the centre of the head but are separated</b>	Two pairs of transparent wings – Specimens have complete manoeuvrability	Small to medium – generally looking forward
<b>Butterflies &amp; Moths (Scaled-winged)</b>	Butterflies = Clubbed      Moths = wide variety of morphologies	Two pairs of wings with “scales” = <b>non-transparent</b>	Tiny or small eyes on side of head

**EXAM TIME!**

# TEST SPECIMENS - 1



*Clytus arietis*



*Tenthredo  
scrophulariae*



*Grypocoris stysi*



*Stratyiomys potamida*

## TEST SPECIMENS - 2



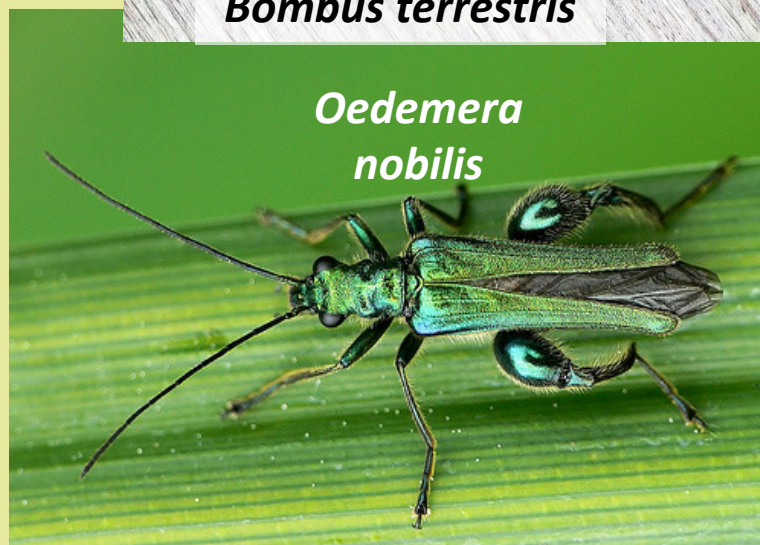
*Volucella  
bobylans*



*Bombus terrestris*



*Zicrona caerulea*



*Oedemera  
nobilis*

## MORE PITFALLS FOR THE UNWARY!

- Bumble bee Mimics (Hoverflies) vs Bumble bees vs Cuckoo Bees
- Wasp mimics (Hoverflies) vs Soldier Flies vs the real thing!

# BUMBLE-BEE CONFUSION!

*Merodon equestris*



*Volucella bombylans*



*Bombus terrestris*



*Bombus vestalis*



# HONEY-BEE CONFUSION!

*Eristalis tenax*



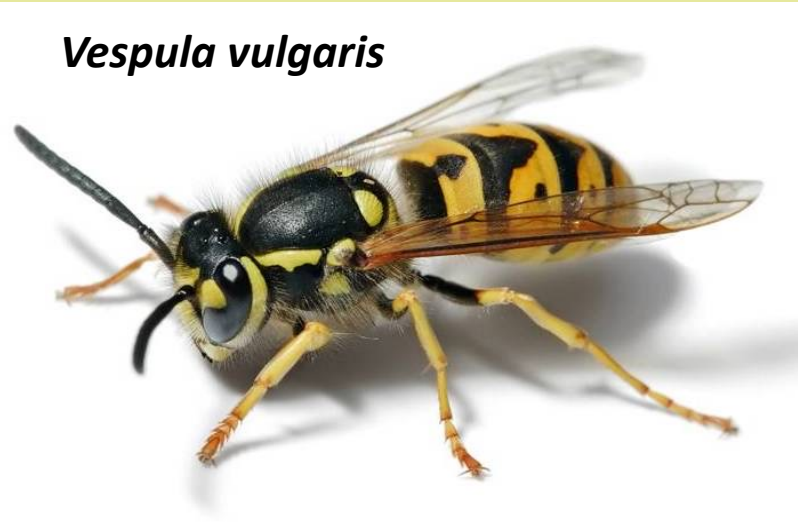
*Apis mellifera*



# WASP CONFUSION!



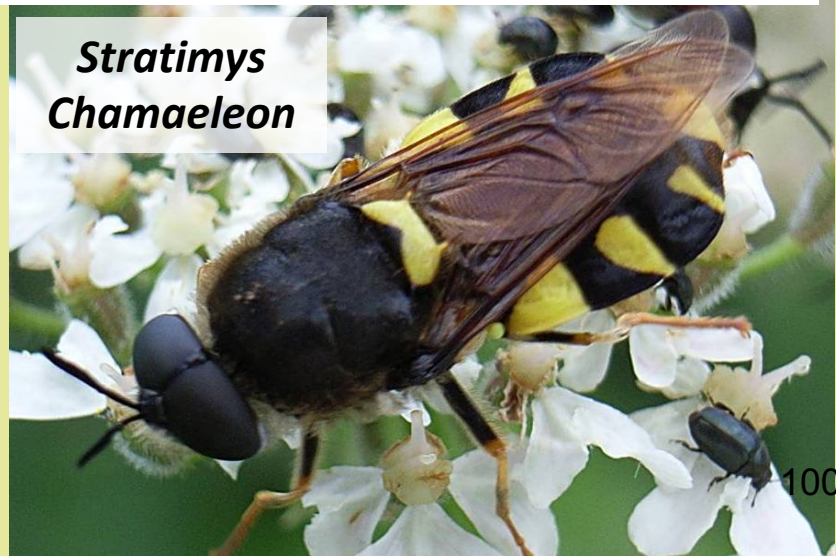
*Chrysotoxum cautum*



*Vespula vulgaris*



*Volucella  
inanis*



*Stratimys  
Chamaeleon*

100

## MORE WASP CONFUSION!

*Sesia bembeciformis*



*Argiope bruennichi*

# NYMPHS

## SELECTION OF NYMPHS - 1



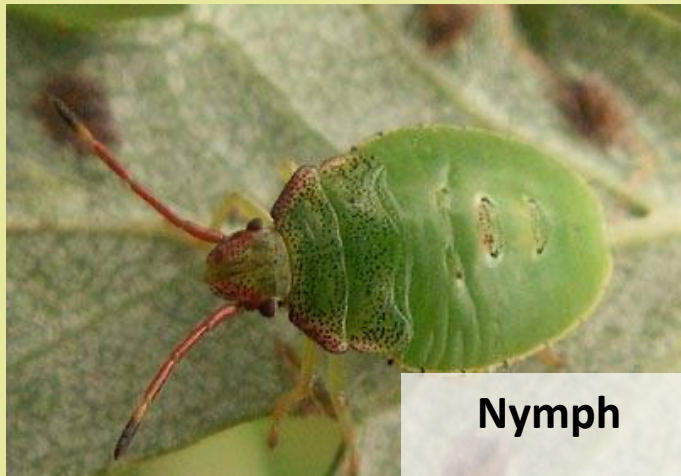
**Harlequin Ladybird**  
*Harmonica axyridis*



**7-spot Ladybird** *Coccinella septempunctata*



## SELECTION OF NYMPHS - 2



Nymph

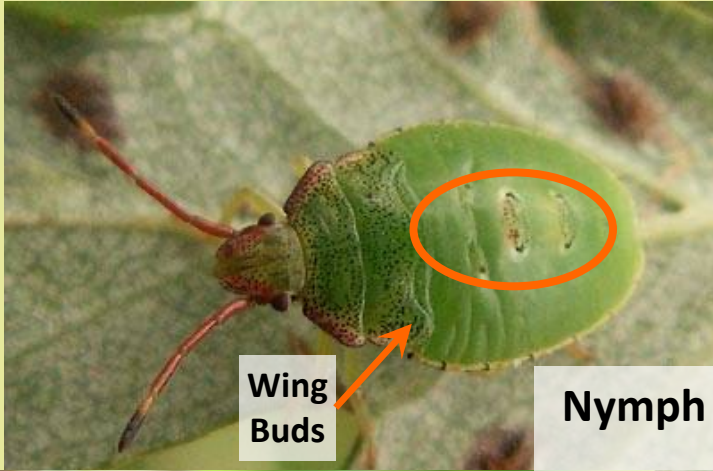


Adult

Hawthorn Shieldbug  
*Acanthosoma haemorrhoidale*

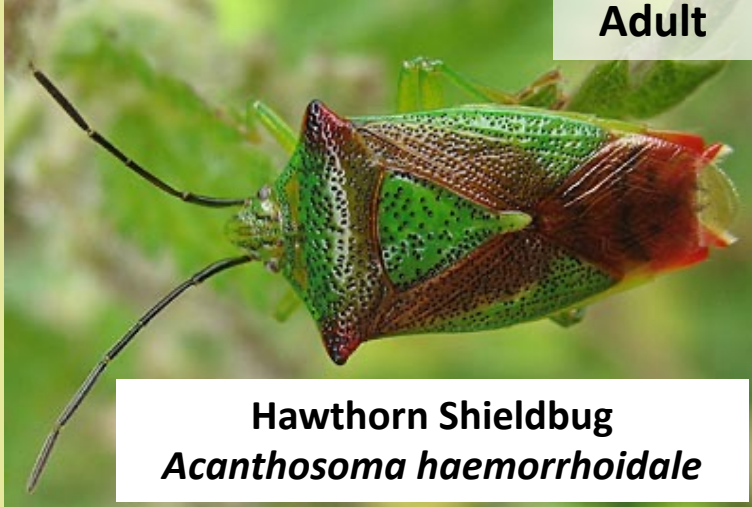


# SELECTION OF NYMPHS - 2



Wing  
Buds

Nymph  
Adult



**Hawthorn Shieldbug**  
*Acanthosoma haemorrhoidale*



- Geographical Location
- Habitat
- Flower/Shrub species being used
- Location within Habitat
- Time of Year

# RESOURCES

- Keys – need to get used to using them!
- Some families are well catered for – books, other literature, keys, etc. e.g. Hoverflies BUT some families are a nightmare (e.g. Midridae) with no up-to-date keys available
- Specialist books often out of date (second-hand and sometimes expensive)
- Internet – first & last resort!
  - <https://sites.google.com/view/mikes-insect-keys> - local lad with comprehensive keys
  - The default is the Royal Entomological Society out of print keys are available for free. They have a number of drawbacks, they are often 50 years out of date and they tend to be quite or very technical and not particularly “user-friendly”, especially for beginners <https://www.royensoc.co.uk/publications/handbooks/> just scroll down to the “Download out-of-print handbooks for free” button

## WHAT NEXT?

- Choose a group, such as:
  - Ladybirds
  - Shield-bugs
  - Bumble-bees
  - Butterflies
- Lots of material available
  - Collections at Chilcomb House & BENHS Dinton Pastures (Reading)
  - BENHS run training courses
  - Books & keys
- Groups worth looking at
  - Dragonflies
  - Day Flying Moths
  - Sawflies
- Groups to avoid
  - Flies (Hoverflies are OK)
  - Parasitic Wasps

Always choose the lesser of two  
weevils!



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