Raniganj Girls' College

Course Name: Biology of Insecta

Course Code: BSCHZOOLDSE502

Topic of the project: Insect Diversity

A Project Report

Submitted by Semester-V students (Academic Year 2021-22)

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CERTIFICATE

This is to certify that this project titled "Insect Diversity" submitted by the students for the award of degree of B.Sc. Honours is a bonafide record of work carried out under my guidance and supervision.

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Place: Raniganj

Date: 18.12.2021

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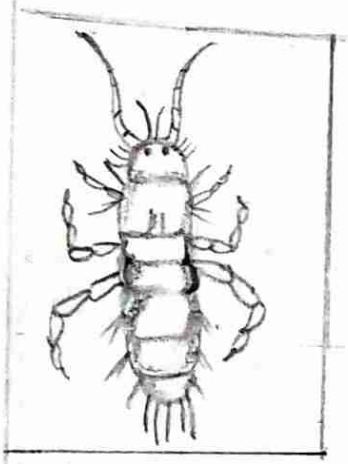
Signature of the supervisor with designation and department

The Insecta and three other classes, the protura, Diplura and Collembola, together comprise the arthropod Superclass, Hexapoda. The class Insecta is divided into 30 orders, which are outlined below.

The primitive wingless Insects (Infraclass Apterygota)

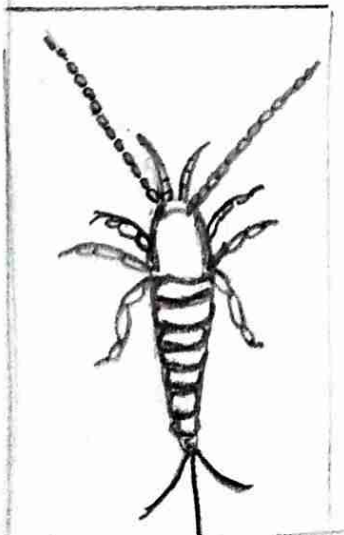
ARCHAEOGNATHA

- Bristletails
- ~500 species
- Body length : 7-15 mm



Bristletails are the most primitive living insects, having persisted for more than 400 million years. They are mainly nocturnal, living in leaf litter and under stones in a wide range of habitats from coastal to mountainous regions. The body, which is elongate with a cylindrical cross-section, is covered in tiny scales and has a characteristically humped thorax.

THYSANURA (ZYGENTOMA)



- Silverfish
- <400 species
- Body length : 2-22 mm

Although very similar to bristletails, Silverfish are actually more closely related to the winged insects. The body, which may have a covering of scales, is rather more

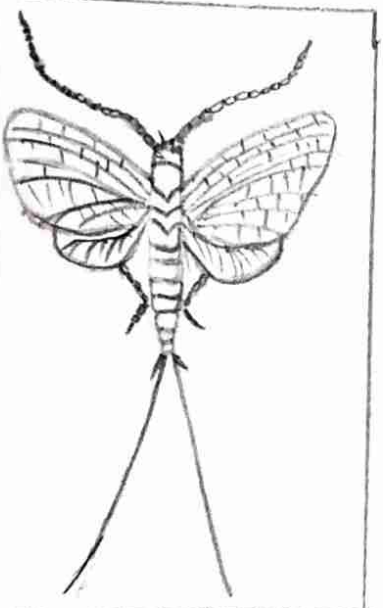
flattened and the thorax is not humped. Silverfish are Scavengers in Soil, leaf litter, on trees and Sometimes in buildings, where they can be minor pests.

THE WINGED INSECTS

The Infraclass pterygota is made up of three very unequal divisions. The mayflies (Ephemeroptera), Comprising <0.3% of all insects Species; and the dragonflies and damselflies (Odonata); Comprising ~0.5% of all insect Species, are each a division. Species in these two divisions are unable to fold their wings back along the body.

DIVISION-1

EPHEMEROPTERA

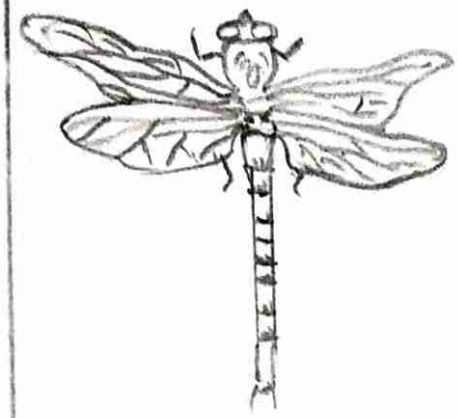


- Mayflies
- ~2500 Speeies
- Body length : 5-34mm
- Wingspan : up to 50mm

The Ephemeroptera are the oldest (basal) group of winged insects on Earth today and are unique in having a pre-adult winged stage called the Subimago - they are the only insects that molt after they have developed functional wings. This habit was probably much more common in extinct carboniferous and permian taxa, where immature Stages had wing-like structures and molted them throughout their lives.

DIVISION II

ODONATA

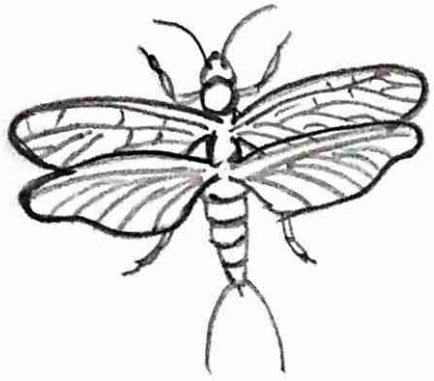


- Damselfies and dragonflies
- <6000 Species
- Body length : up to 150mm
- Wingspan : 18-200mm.

These fast-flying insects, often seen near water, are instantly recognizable. Odonates have a distinctive elongate body and are often brightly colored or metallic. They have a large, mobile head with very large compound eyes, three ocelli, short, hair like antennae and biting mouthparts. They have two pairs of similarly sized wings, which can be used out of phase with each other, allowing great maneuverability.

DIVISION III

NEOPTERA



In all neopterans, flexor muscles attached to a third axillary sclerite at the base of the wings allow the wings to be folded back along the body. The evolution of a wing-folding mechanism allowed much better

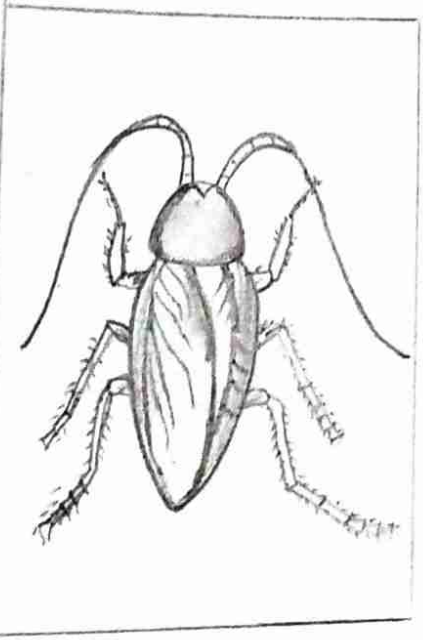
exploitation of the terrestrial environment without the risk of wing damage.

Subdivison: Hemimetabola

PLECOPTERA

- Stoneflies
- ~ 2000 Species
- Body length: 3-48 mm
- Maximum wingspan: about 100 mm.

BLATTODEA (BLATTARIA)

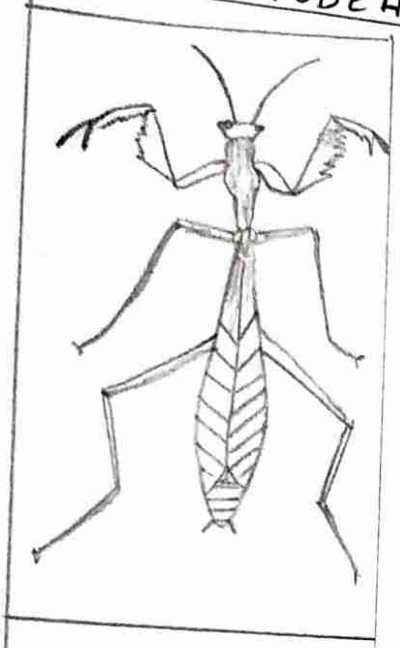


- Cockroaches
- ~4000 Species
- Body lenght: 3-100mm

Cockroaches are fast-running, flattened, broadly oval and leathery-bodied insects. The head, which is directed downwards and largely concealed by the pronotum, has biting mouthparts, well-developed compound eyes, two ocelli-like spots and long antennae. The front pairs of wings are toughened as protective "tegmina" to cover the larger, membranous hindwings. The abdomen carries a pair of one- or multi-segmented cerci. Eggs are typically

laid in a toughened case or ootheca, a feature shared with the closely related, but entirely predatory Mantodea.

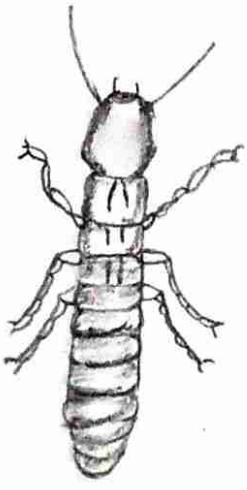
MANTODEA



- Mantids
- ~2300 Species
- Body length : 8-150mm

These distinctive predatory insects have a triangular, highly mobile head with large compound eyes, thread-like antennae and usually three ocelli. The prothorax is typically elongate and carries the specialized, raptorial front legs. The front wings are narrow and toughened, protecting the much larger membranous hindwings. Eggs are laid in a papery, foam- or cellophane-like ootheca.

ISOPTERA



- Termites
- <3000 Species
- Body length : 3-20mm, mostly under 15mm : queens can be up to 100mm

Generally pale and soft-bodied, termites are social insects living in permanent colonies with different castes of both sexes. Workers and soldiers are wingless, while the reproductive have two pairs

of which are shed after a nuptial flight.

GRYLLOBLATTODEA (NOTOPTERA)

- Rock crawlers or ice crawlers
- 26 species (1 family : Grylloblattidae)
- Body length : 12 - 30 mm.

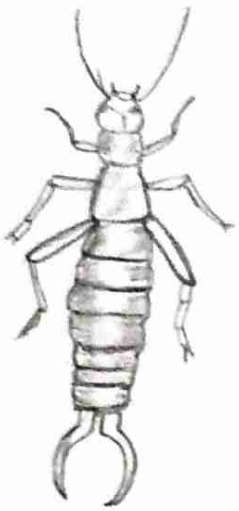
These slender, wingless, slightly hairy insects were first discovered in the Canadian Rockies in 1913 and are a relict group confined to certain high-altitude regions across the Northen Hemisphere. The head has small compound eyes, although these are sometimes absent, no ocelli, slender, thread-like antennae and simple, chewing mouthparts. The abdomen is cylindrical, with a pair of slender multi-segmented cerci.

MANTOPHASMATODEA

- Gladiators, African rock crawlers or heel-walkers
- 15 species (1 family : Mantophasmatidae)
- Body length : 12 - 35 mm

Discovered in 2002, the species that make up this small order live in dry, rocky habitats in Southern Africa and may be related to the Grylloblattodea.

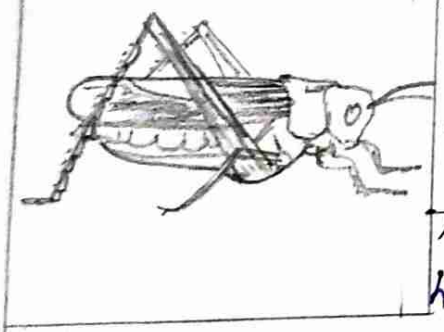
DERMAPTERA



- Earwigs
- ~ 1900 Species
- Body length : 5-54 mm

Mostly drab, nocturnal and generally reluctant to fly, the majority of these elongate and slightly flattened insects are immediately recognizable on account of their distinctive abdominal forceps-like cerdi. The head, which may have a pair of compound eyes but no ocelli, has biting mouthparts and long antennae. The front wings are short, leathery and veinless, covering the large, semicircular hindwings.

ORTHOPTERA



- Crickets, grasshoppers and relatives
- ~ 22 500 species.
- Body length : 5-155 mm.

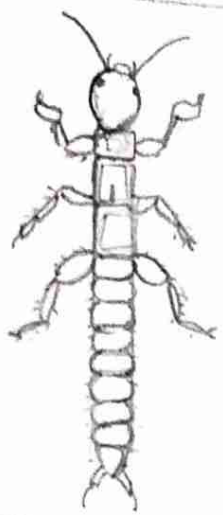
These distinctive, elongate insects typically have enlarged hindlegs used for jumping. The head has well-developed compound eyes and may have ocelli. They have biting mouthparts and an enlarged, saddle-or shield-shaped pronotum.

PHASMATODEA

- Stick and leaf insects
- >3000 Species
- Body length : up to 566 mm, mostly 10-100 mm

The elongate body of stick insects can be short and smooth or large and very spiny or leaf-like.

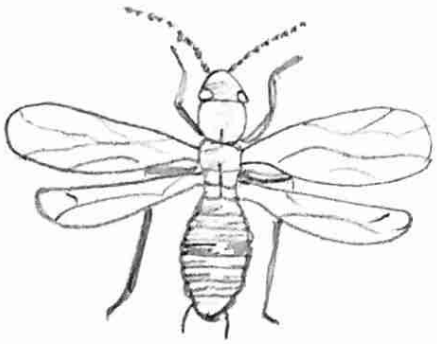
EMBIOPTERA (EMBIIDINA, EMBIODEA)



- webspinners.
- ~350 species.
- Body length : 3-20mm, mostly under 12 mm.

Webspinner are narrow-bodied, cylindrical or slightly flattened gengarious insects living in warm temperate and tropical regions. The head has small, kidney shaped compound eyes, thread-like antennae and biting mouthparts.

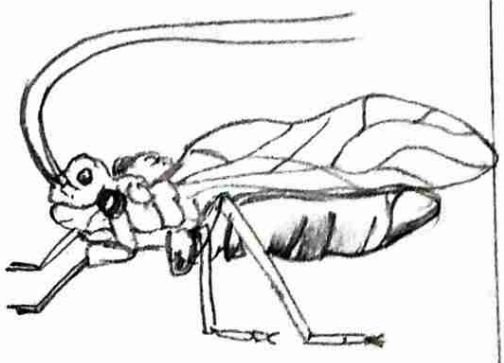
ZORAPTERA



- Angel insects
- 32 species.
- Body length : 2-3 mm

Mostly associated with rotting wood, these small, delicate-bodied insects are termite-like. The adults are dimorphic being either blind, pale and wingless.

PSOCOPTERA



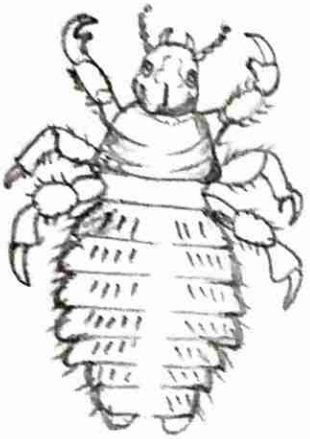
- Barklice and booklice.
- <4500 species.
- Body length : 1-10mm, mostly under 6mm

Barklice and booklice are very common insects, which on account

diversified.

of their small size and cryptic coloration, are often overlooked. The head is relatively large, with bulging compound eyes, long, thread-like antennae, biting mouthparts and, in winged species, three ocelli.

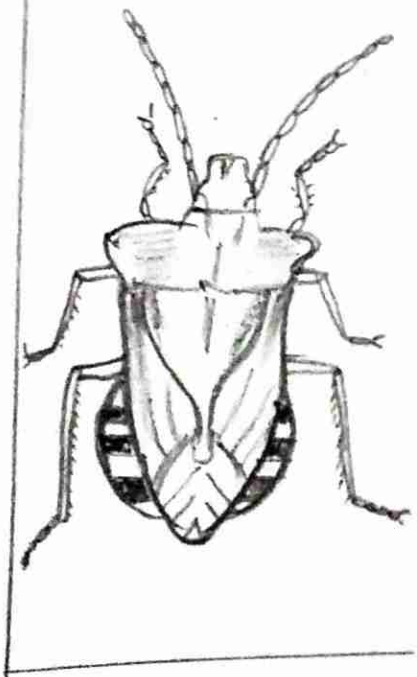
PHTHIRAPTERA



- Parasitic lice
- ~5000 species
- Body length: 1-10mm, mostly under 6mm

These small, wingless, dorso-ventrally flattened ectoparasites live permanently on bird or mammal hosts, where they feed on skin debirs, secretion, feathers or blood. The legs are short and robust, with the tarsi and claws typically modified for grasping hair or feathers.

HEMIPTERA



- True bugs
- >82000 species
- Body length: 1-100mm, mostly under 50mm

True bugs range from minute, wingless scale insects to giant water bugs with raptorial front legs capable of catching fish and frogs, compound eyes are often prominent and ocelli may be present. Two pairs of wings are usually present.

flattened.

THYSANOPTERA

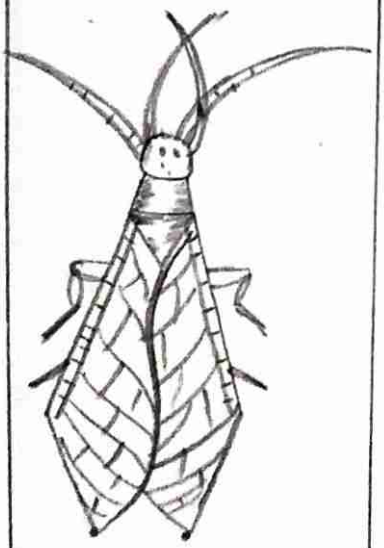
- Thrips
- ~5500 Species
- Body length: 0.5-12 mm, mostly under 3mm

Thrips are small or very small, slender-bodied insects with prominent, large-faceted eyes, short antennae and asymmetrical piercing and sucking mouthparts. The other mouthparts form hemipteran-like stylets and are used to suck up liquid food.

Subdivision: Holometabola

The following neopteran orders comprise the most advanced and successful of all insects. The immature stages are called larvae and look very different and have different lifestyles to the adults.

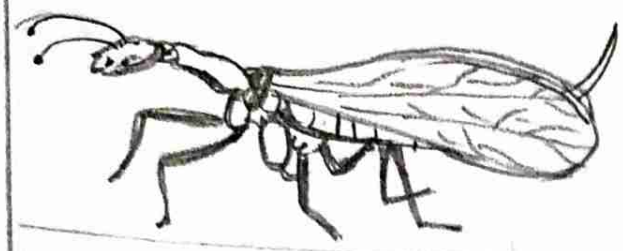
MEGALOPTERA



- Alderflies and dobsonflies
- ~300 Species
- Body length: 10-150 mm
- Wingspan: 18-170 mm

The two families that comprise this small order and dobsonflies are the most primitive insects with complete metamorphosis. The head has conspicuous compound eyes and long, thread-like antennae.

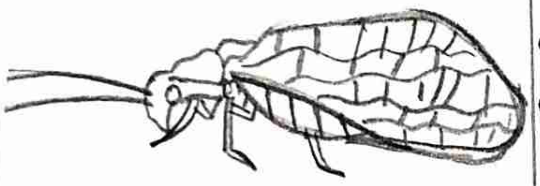
RAPHIDIOPTERA



- Snakeflies
- ~220 species
- Body length : 6-28 mm

Confined to cool, temperate woodlands, this order comprise just two families, the Raphidiidae and the Inocellidae. The large head, which is supported by an elongate prothorax, is slightly flattened, broad in the middle and tapers to the rear.

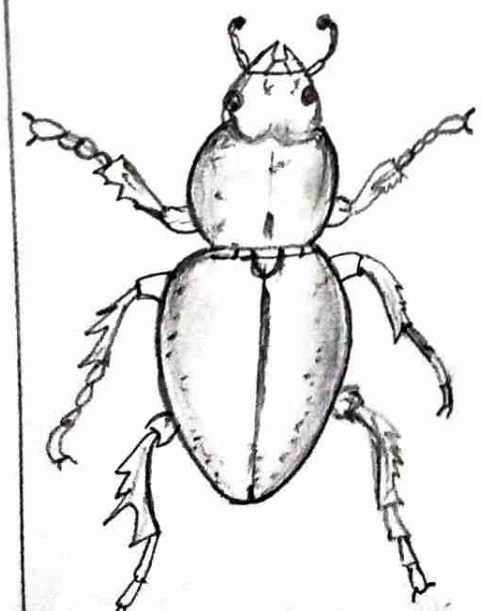
NEUROPTERA



- Antlions, lacewings and relatives
- ~5000 species
- Body length : 2-90 mm
- Wingspan : 5-150 mm

Adult neuropterans have biting mouthparts, a pair of conspicuous, laterally placed compound eyes and may have ocelli.

COLEOPTERA



- Beetles
- ~370000 species.
- Body length : 0.1-180 mm, mostly under 25 mm.

This is very large orden makes up at least 40% of all insect species.

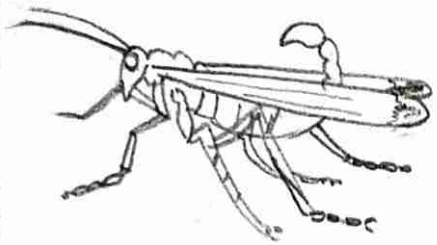
The head has conspicuous compound eyes, antennae usually with less than 11 segments and biting mouthpart

STREPSIPTERA

- Strepsipterans
- ~600 species.
- Body length : 0.4 - 35mm, mostly under 6mm

Strepsipterans are highly specialized endoparasites of other insects in more than 30 insect families belonging to the orders Thysanura, Blattodea, Mantodea, orthoptera, Hemiptera, Diptera and Hymenoptera.

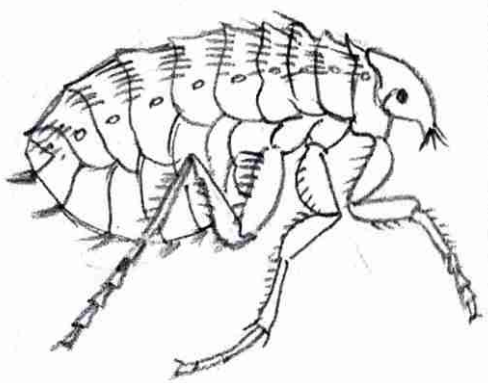
MECOPTERA



- Scorpionflies
- ~600 species
- Body length : 3-28 mm

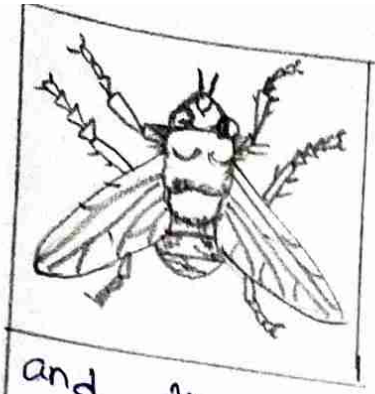
Scorpionflies are elongate insects found mostly in damp woodlands. The head, which is characteristically extended downwards to form a beak, has biting mouthparts, slender, thread-like antennae, large compound eyes and three ocelli.

SIPHONAPTERA



- Fleas
- ~2500 species
- Body length : 1-8mm, mostly under 5 mm

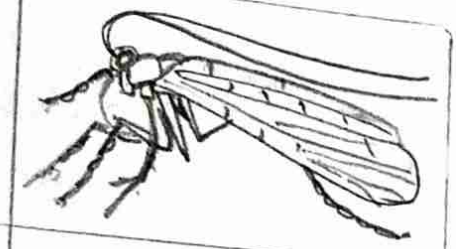
Found wherever there are suitable hosts, fleas are a distinctive and readily recognizable group. Fleas are small, wingless, tough-bodied and laterally flattened.



DIPTERA

- True flies
- ~122000 species
- Body length: 0.5-60 mm
- Wingspan: up to 75 mm

Most of the species that make up this huge and diverse order are beneficial to ecosystem function as pollinators; parasites and predators, and are vital to the processes of decomposition and nutrient recycling.



TRICHOPTERA

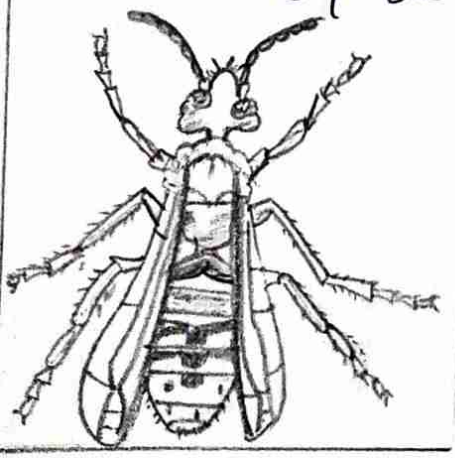
- caddis flies
- >11000 species
- Body length: 2-38mm

caddis flies are mainly nocturnal and can be found almost everywhere there is freshwater. The body and wings, particularly the front wings, are covered with hairs.

LEPIDOPTERA

- Butterflies and moths
- ~200 000 species
- Wingspan: 3-300 mm, mostly under 75mm

members of this readily recognizable order occur everywhere there is vegetation. The body and wings of these familiar insects are covered with minute scales, which may be colored or iridescent.



HYMENOPTERA

- Sawflies, wasps, bees and ants
- >150 000 species
- Body length: 0.25-70 mm

Abundant and ubiquitous, it is almost certain that the true number of living species of Hymenoptera may exceed 500 000.