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

Mini-biographies of the insect orders

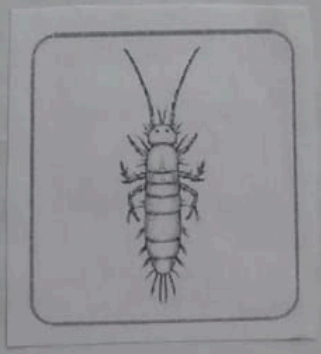
The Insecta and three other classes, the Protura, Diplura and Collembola, together comprise the arthropod superclass, Hexapoda. The class is divided into 30 orders, which are outlined below.

THE PRIMITIVE WINGLESS INSECTS (INFRACLASS APTERYGOTA)

ARCHAEOGNATHA

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

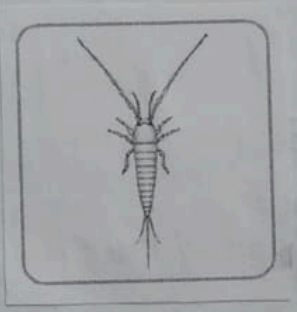
Bristletails are the most primitive living insects, having persisted for more than 400 million years. They are mainly nocturnal, living in leaf litter and under stones in a wide range of habitats from coastal to mountainous regions. The body, which is elongate with a cylindrical cross-section, is covered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



THYSANURA (ZYGIENTOMA)

- 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.

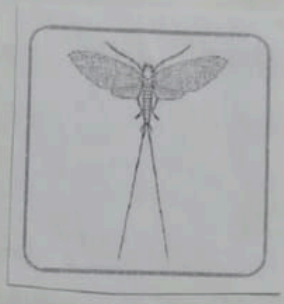


THE WINGED INSECTS

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 divisons are unable to fold their wings back along the body.

DIVISION I

EPHEMEROPTERA



- Mayflies
- ~2500 species
- Body length: 5-34 mm
- wingspan: up to 50 mm

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

- Damselflies and dragonflies
- <6000 species
- Body length: up to 150 mm
- wingspan: 18-200 mm

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

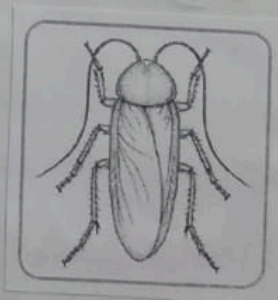
In all neopterans, flexor muscles attached to a third axillary sclerite at the base of the wings allow the wings to be folded back along the body. The evolution of a wing-folding mechanism allowed much better exploitation of the terrestrial environment without the risk of wing damage.

subdivison : Hemimetabola

PLECOPTERA

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

BLATTODEA (BLATTARIA)



- Cockroaches
- ~ 4000 species
- Body length : 3-100 mm

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.

ISOPTERA

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

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 reproductives (kings and queens) have two pairs of equal-sized wings, which are shed after a nuptial flight.

GRYLLOBLATTODEA (NOTOPTERA)

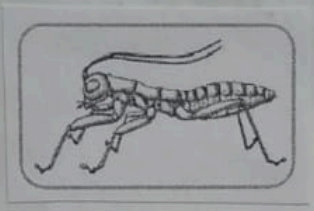
- Rock crawlers or ice crawlers
- 26 species (1 family: Grylloblattidae)
- Body length: 12–30 mm

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 Northern 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

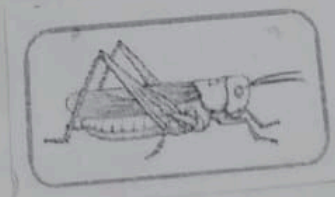
Discovered in 2002, the species that make up this small order live in dry, rocky habitats in Southern Africa and may be related to the Cryllo blattodea.



ORTHOPTERA

- crickets, grasshoppers and relatives
- ~ 22500 species
- Body length: 5-155 mm

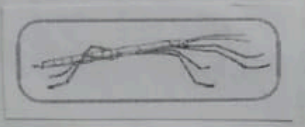
These distinctive, elongate insects typically have enlarged hindlegs used for jumping. The head has well-developed compound eyes and may have ocelli. They have biting mouthparts and an enlarged, saddle-or shield-shaped pronotum. The front wings are toughened and typically narrower than hindwings.



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. The head is characteristically domed and carries relatively long, thread-like antennae, chewing mouthparts, a pair of small compound eyes.



EMBIOPTERA (EMBIIDINA, EMBIODEA)

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

Webspinners are narrow-bodied, cylindrical or slightly flattened gregarious insects living in warm temperate and tropical regions. The head has small, kidney-shaped compound eyes, thread like antennae and biting mouthparts. The front legs of all life-stages and both sexes have swollen basal tarsal segments containing glands, which produce silk to make communal galleries in soil, litter and under bark.

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: 1-10 mm, mostly under 6 mm

Barlice and booklice are very common insects, which on account 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. The thorax is slightly humped and the wings, when present, are held roof-like over the body at rest.

PHTHIRAPTERA

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

These small, wingless, dorso-ventrally flattened ectoparasites live permanently on bird or mammal hosts, where they feed on skin debris, secretions, feathers or blood.

HEMIPTERA

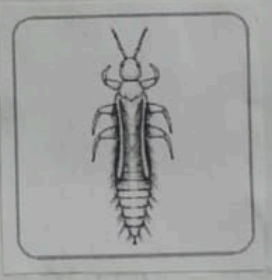
- True bugs
- >82000 species
- Body length: 1-100 mm, mostly under 50 mm

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. Bugs lack maxillary and labial palps and the mandibles and maxillae, which are enclosed by the labium. Two pairs of wings are usually present.

THYSANOPTERA

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

Thrips are small or very small, slender-bodied insects with prominent, large-faceted eyes, short antennae and asymmetrical piercing and sucking mouthparts. One mandible is very small and non-functional while the other is sharp and stylet-like and used to penetrate plant tissue or sometimes the bodies of minute insects.



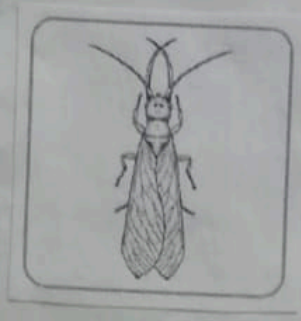
Subdivison: Holometabola

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. The wings develop internally and metamorphosis from larva to adult takes place during a pupal stage.

MEGALOPTERA

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

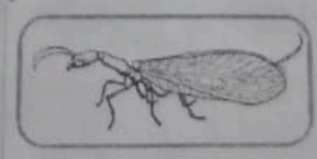
The two families that comprise this small order (alderflies [Sialidae] and dobsonflies [Corydalidae]) are the most primitive insects with Complete metamorphosis. The head has conspicuous compound eyes and long, thread-like antennae. Ocelli are present in Corydalids but absent in Sialids.



RAPHIDIOPTERA

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

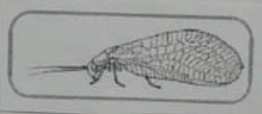
Confined to coal, temperate woodlands, this order comprises just two families, the Raphidiidae and the Inocellidae. The large head, which is supported by an elongate prothorax, is slightly flattened, broad in the middle and tapers to the rear. The antennae are slender and the compound eyes are conspicuous.



NEUROPTERA

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

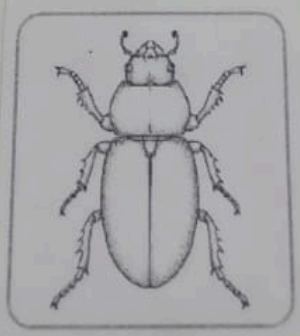
Adult neuropterans have biting mouthparts, a pair of conspicuous, laterally placed compound eyes and may have ocelli. The antennae are generally long and thread-like, and in some owlflies and antlions the end of the antennae may be swollen to form a club.



COLEOPTERA

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

This very large order makes up at least 40% of all insect species. The head has conspicuous compound eyes, antennae usually with less than 11 segments and biting mouthparts. Ocelli are typically absent. The prothorax is usually large and articulated with the rest of the thorax.



STREPSIPTERA

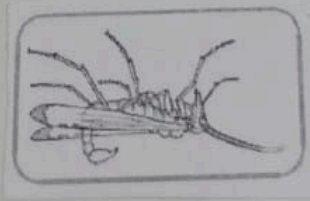
- Strepsipterans
- ~600 species
- Body length: 0.4–35 mm, mostly under 6 mm

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. The adults are dimorphic. Females are typically endoparasitic without eyes, antennae, mouthparts, or legs.

MECOPTERA

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

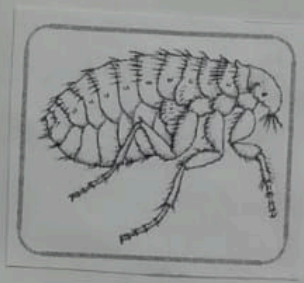
Scorpionflies are elongate insects found mostly in damp woodlands. The head, which is characteristically extended downwards to form a beak, has biting mouthparts, slender, thread-like antennae, large compound eyes and three ocelli.



SIPHONAPTERA

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

Found wherever there are suitable hosts, fleas are a distinctive and readily recognizable group. well over 90% of flea species feed on the blood of land mammals - the remainder are bird ectoparasites. 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 process of decomposition and nutrient recycling.

TRICHOPTERA

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

Caddis flies are mainly nocturnal and can be found almost everywhere there is freshwater. The elongate adults are rather moth-like in appearance with long, slender legs. 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 75 mm

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. The compound eyes are large and the mouthparts typically take the form of a coiled proboscis through which liquids such as nectar can be sucked. The larvae, known as caterpillars, are typically herbivorous and have a number of abdominal prolegs in addition to the three pairs of thoracic legs. When fully grown they spin a silk cocoon in which they pupate. Some species are significant plant pests.

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. Species within the order exhibit an incredible diversity of lifestyles. Solitary or social, herbivorous, carnivorous or parasitic. The Hymenoptera must be regarded as the most beneficial of all insects for the control of natural insect populations exerted by parasitic and predatory wasp species and the pollination services of bees.