

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)

Name of the student	Registration Number
AMBAREEN FIROZ	KNU19113000586
BIDISHA MONDAL	KNU19113000970
LIPI DAS	KNU9113000901
SHIPRA DUBEY	KNU19113001071
SRIJEETA GHOSH	KNU19113000967
TRISHITA GHOSH	KNU1913000802

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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TRISHITA GHOSH	KNU1913000802

Place: Raniganj

Date: 18.12.2021

Umesh Chandra Palda

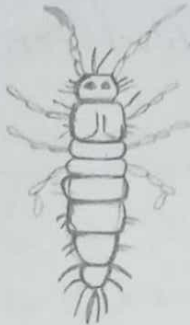
Assistant Professor, Department of Zoology

Signature of the supervisor with designation and department

Mini-biographies of the insect orders

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

The Primitive wingless insects (Infraclass Antermygota)



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 & 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 tiny scales & has a characteristically humped thorax.



THYSANURA (ZYGENTOMA)

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

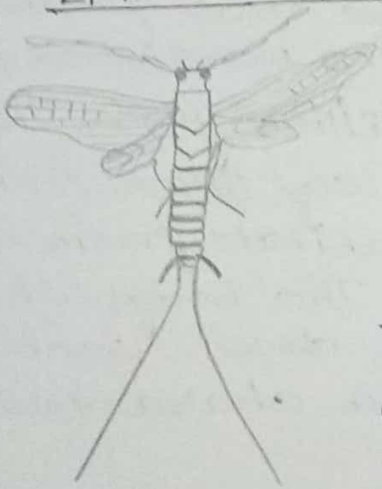
Although very similar to bristletails, silverfish are actually more closely related to the winged insects. The body, which may have a covering of scales, is rather more flattened & the thorax is not humped. Silverfish

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 3 very unequal divisions. The mayflies comprising $\sim 0.3\%$ of all insects species, and the dragonflies & damselflies (Odonata), comprising $\sim 0.5\%$ of all insect species, are each a division.

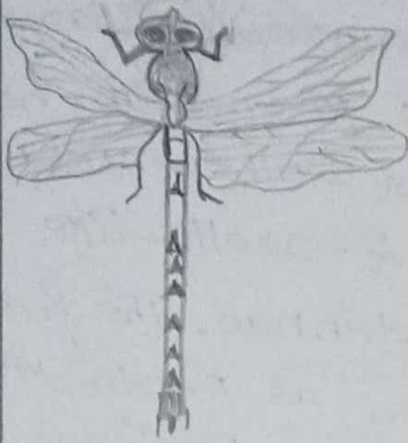
DIVISION-1
EPHEMEROPTERA



- 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 & only insects that molt after they have developed functional wings. This habit was probably much more common in extinct Carboniferous & Permian taxa, where immature stages had wing-like structures and molted them throughout their lives.

DIVISION II ODONATA

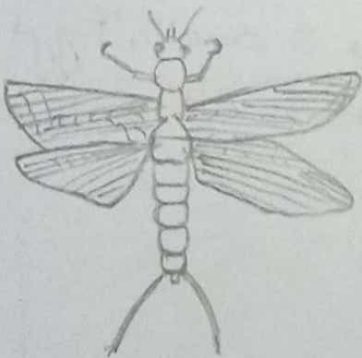


- Damselflies & dragonflies.
- < 600 species
- Body length: up to 150 mm.
- Wing span: 18 - 200 mm.

These fast-flying insects, often seen near water, are instantly recognizable. Odonates have a distinctive elongate body & are often brightly colored or metallic. They have a large, mobile head with very large compound eyes, 3 ocelli, short, hair-like antennae & biting mouthparts.

DIVISION III: NEOPTERA

In all neopterans, flexor muscles attached to a 3rd axillary sclerite at the base of the wings allow the wings to be folded back along the body.



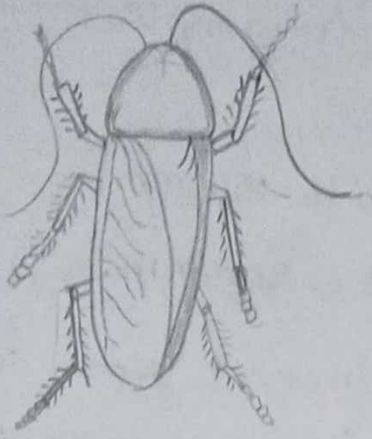
Subdivision: Hemimetabola

PLECOPTERA

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

BLATTODEA (BLATTARIA):

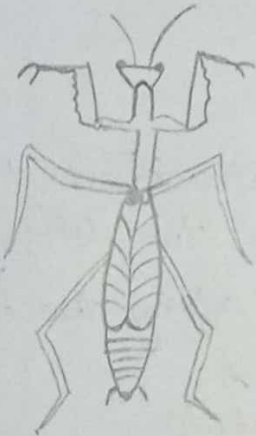
- Cockroaches.
- ~ 4000 species.
- Body length: 3-100 mm.



Cockroaches are fast-running, flattened, broadly oval & leathery bodied insects. The head, which is directed downwards & largely concealed by the pronotum, has biting mouthparts, well-developed compound eyes, 2-ocelli-like spots & long antennae. The front

pairs of wings are toughened as protective "tegmina" to cover the larger, membranous hindwings.

MANTODEA :



- Mantids.
- ~ 2300 species.
- Body length : 8-150 mm.

These distinctive predatory insects have a triangular, highly mobile head with large compound eyes,

thread-like antennae & usually 3 ocelli. Eggs are laid in papery, foam- or cellophane-like ootheca.

ISOPTERA :



- Termites.
- < 3000 species.
- Body length.

Generally pale & soft bodied, termites are social insects living in permanent colonies with different castes of both sexes.

GRYLLOBLATTODEA (NOTOPTERA):

- Rock crawlers or ice crawlers.
- 26 species.
- Body length: 12-30 mm.

These slender, wingless, slightly hairy insects were first discovered in the Canadian Rockies in 1913 & are a relict group confined to certain high-altitude regions across the Northern Hemisphere.

MANTOPHASMATODEA:

- Gladiators, African rock crawlers or heel-walkers.
- 15 species.
- Body length: 12-35 mm.

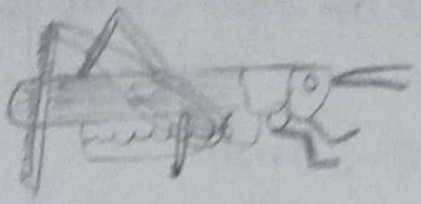
Discovered in 2002, the species that make up this small order live in dry, rocky habitats in Southern Africa & may be related to Grylloblattodea.

DERMAPTERA:

- Earwigs.
- ~1900 species.
- Body length: 5-54 mm.

Most drab, nocturnal & generally reluctant to fly, the majority of these elongate & slightly flattened insects are immediately recognizable on account of their distinctive abdominal forcep-like cerci.

ORTHOPTERA:



- Crickets, grasshoppers & relatives.
- ~ 22500 species.
- Body length : 5-155 mm.

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

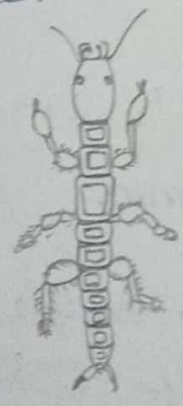
PHASMATODEA



- Stick & leaf insects.
- > 3000 species.
- Body length: up to 566 mm, mostly 10-100 mm.

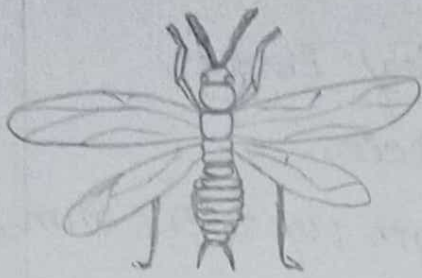
The elongate body of stick insects can be short & smooth or large and very spiny or leaf-like.

EMBIOPTERA (EMBIIBINA)



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

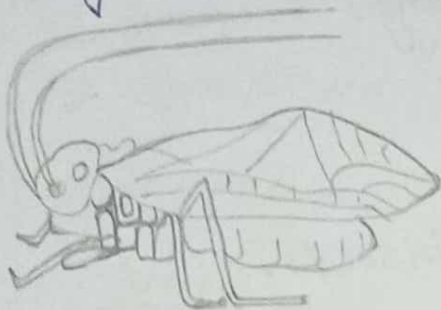
Webspinners are narrow-bodied, cylindrical or slightly flattened gregarious insects living in warm temperate and tropical regions.



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 & wingless.



PSOCOPTERA:

- Barklice & booklice.
- < 4500 species.
- Barklice & 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, ocelli.



PHTHIRAPTERA:

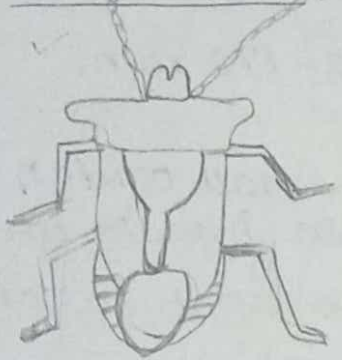
- Parasitic lice.
- ~5000 species.
- Body length: 1-10 mm, mostly under 6 mm.

These small, wingless, dorso-ventrally flattened ectoparasites live permanently on bird and mammal hosts. The eyes are very small or absent, there are no ocelli and the antennae are short, with a maximum of 5 segments.

width 6 mm.

These are small, dorso-ventrally flattened ectoparasites, live permanently on bird or mammal hosts, where they feed on skin debris, secretions, feathers or blood. The eyes are very small & absent. Several species are significant vectors of human & animal diseases.

HEMIPTERA:



- True bugs.
- > 82 000 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 & frogs. Compound eyes are often prominent & ocelli may be present. 2-pairs of wings are usually present.

THYSANOPTERA:



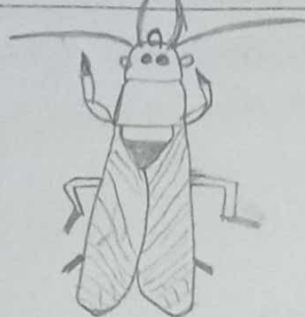
- Thrips.
- ~ 5500 species.
- Body length: 0.5-12 mm, mostly under 3 mm.

Thrips are small, slender-bodied insects with prominent, large-faceted eyes, short antennae & asymmetrical piercing & sucking mouthparts.

Subdivision: Holometabola

The following neopteran orders comprise the most advanced & successful of all insects. The immature stages are called larvae & look very different & have different lifestyles to the adults. The wings develop internally & metamorphosis from larva to adult takes place during a pupal stage.

MEGALOPTERA:



- Alderflies & dobsonflies.
- ~ 300 species.
- Body length: 10-150 mm.
- Wingspan : 18-170 mm.

The two families that comprise this small order & dobsonflies are the most primitive insects with complete metamorphosis. Ocelli are present in conydatids but absent in sialids. Despite having well-developed jaws.

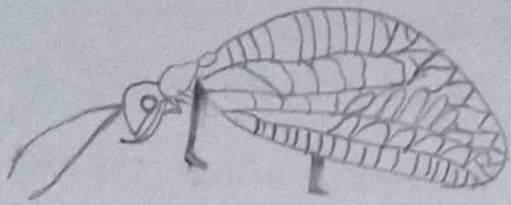
RAPHIDOPTERA:



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

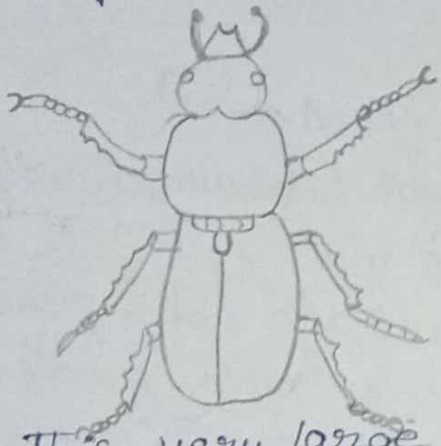
Confined to cool, temperate woodlands, this order comprises just 2 families, the Raphidiidae & the Inocellidae. The antennae are slender & the compound eyes are conspicuous.

NEUROPTERA:



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

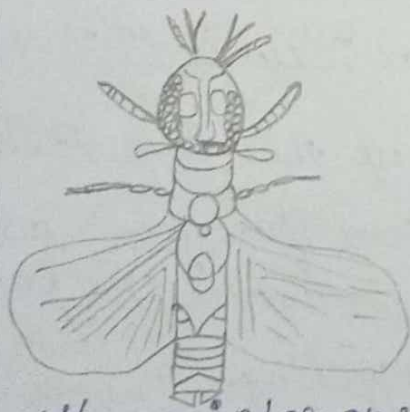
Adult neuropterans have biting mouthparts, a pair of conspicuous, laterally placed compound eyes & may have ocelli.



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. Ocelli are typically absent. The prothorax is usually large & freely articulated with the rest of the thorax.

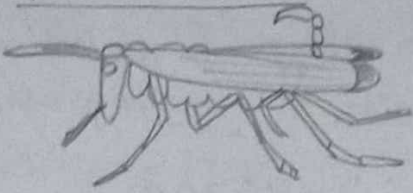


STREPSIPTERA:

- Strepsiptera
- ~ 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, Mantodea.

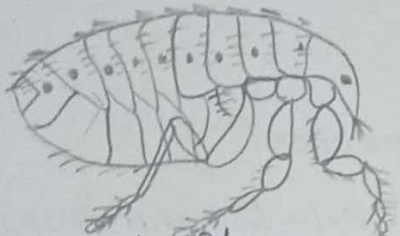
MECOPTERA:



- ~ 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, 3 ocelli.

SIPHONAPTERA:



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

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

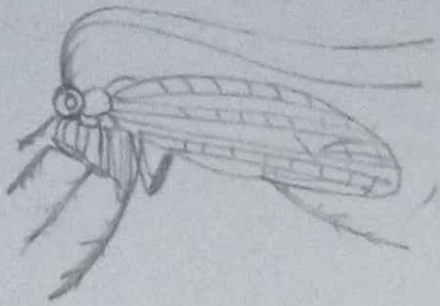
DIPTERA:



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

Most of the species that make up this huge & diverse order are beneficial to ecosystem function as pollinators, and predators & are vital to the process of decomposition & 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.

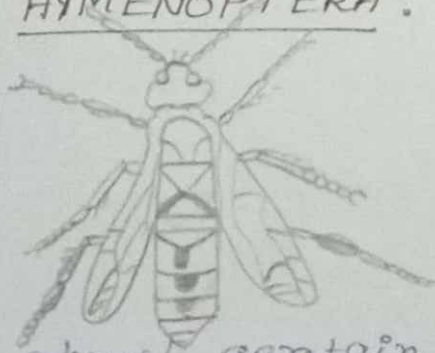
LEPIDOPTERA:



- Butterflies & 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 & wings of these familiar insects are covered with minute scales, which may be colored. The larvae, known as caterpillars, are typically herbivorous & have a number of abdominal prolegs in addition to the 3 pairs of thoracic legs.

HYMENOPTERA:



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

Abundant & ubiquitous, it is

almost certain that the true no. of living species of Hymenoptera may exceed 500,000. Species within the order exhibit an incredible diversity of lifestyles; solitary or social, herbivorous, parasitic.