Raniganj Girls' College

Course Name: Biology of Insecta

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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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AMBAREEN FIROZ	KNU19113000586
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TRISHITA GHOSH	KNU1913000802

Place: Raniganj

Date: 18.12.2021

Umesh Chandra Halder

Assistant Professor, Department of Zoology

Signature of the supervisor with designation and department

Name → Ambareen firoz
Reg no → KNU1911300058 6
Roll no → 113190512204800 1
Paper name → Biology of insects

Mini-Biographies of the Insects Orders

The insecta an alhir three dhir classes, the protura, diplura and collembola together comprises the arthopods Super classes, Hexapoda. The class insecta is divided into 30 orders which are outlined below

The Primitive WINGLESS (INFRACLASS Apterygota)

*ARCHAEOGNATHA

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

Bristletails are the most primitive living insects, having persisted more than 400 million years. They are mainly nocturnal, living in leaf litter & underneath in a wide range of habitats pantropical to mountainous region. The body which is elongated cylindrical cross-section is covered in tiny scales and have a characteristically humped thorax.

*THYSANURA (Zygentoma);

- Silverfish
- < 400 species
- Body length

Although very similar to bristles, silverfish are actually more closely related to the winged insects. The body which may covering of scale is rather more flattened & the thorax is not humped. Silverfish are scavengers in soil, leaf litter on trees and sometimes in building, where they can be minor pests.

THE WINGED INSECTS

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

* DIVISION I

Ephemeroptera;

- Mayflies
- ~ 2500 species
- Body length 5-37mm
- Wingspan: upto 50mm

The Ephemeroptera are the oldest (basal) group of winged insects on Earth today and are unique in having a pre adult winged stages called Subimago- they are the only insects that molt after they developed functional wings. The habit was probably much more common in Extinct Carboniferous and permian taxa where immature stages had wing-like structure and molted throughout their lives

* DIVISION II;

* ODONATA;

- Damselflies & dragonflies
- <6000 species
- Body length upto 150mm
- wingspan: 18-200mm

These fast-flying insects, often seen near water are instantly recognizable. Odonates have a distinct elongated body and are often brightly coloured or metallic. They are have large, mobile head with very large compound eye three ocelli, short hair like antennae

DIVISION III- NEOPTERA

In all neopterans, flexor muscles attached to a third axillary sclerite at the base of the wing 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 damage

Subdivision- Hemimetabola

*PLECOPTERA;

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

BLATTODEA (Blattaria);

- cockroaches
- ~4000 species
- Body length : 3-10 cm

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 mouth parts, 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 toughened case or ootheca. A feature shared with the closely related but entirely predatory Mantodea.

*MANTODEA

- Mantids
- ~2800 species
- Body length: 8-150mm

These distinctive predatory insects have a triangular highly mobile with large compound eyes. Thread like antennae and usually three ocelli. The prothorax is typically elongated and carries the specialized, raptorial front legs. The front wings are narrow and thickened, 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 workers 15mm queens can be upto 100 mm

Generally pale & soft-bodied, termites are social insects living in permanent colonies with different castes both sexes. workers and soldiers are wingless while the reproductives (King & queen) 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.

*MANTOPHASMOTODEA

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

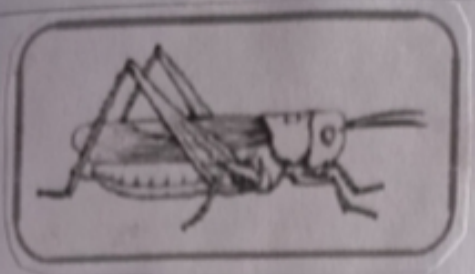
Discovered in 2002, the species that makeup this small order live in dry rocky habitats in Southern Africa & may related to the Grylloblattodea.

*Dermaptera:

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

mostly drab, nocturnal and generally small land-dwelling the majority of these Elongate and slightly flattened insects are immediately recognizable on account of their distinct abdominal forceps-like cerci. The head which may have a pair of compound eye but no ocelli, has biting mouthpart and long antennae. The pair wings are short, leathery and veinless covering the large, semicircular hindwings

ORTHOPTERA;



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

→ These distinctive, elongate insects typically have elongated Enlarged hindlegs used for jumping. The head has well-developed compound eyes & may have ocelli. They have biting mouthparts and Enlarged saddle-shaped pronotum. The front wings are thickened and typically narrower than hindwings which are folded in longitudinal pleats beneath. The abdomen has a pair of short terminal cerci.

*PHASMATODEA;

- Stick and leaf insects
- > 3000 species
- Body length : upto 566mm, mostly 10-100mm

→ The Elongated body of insect can be short or large & prickly 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, Embioidea)

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

webspinners are generally narrow-bodied cylindrical or slightly flattened gregarious insects living in warm temperature & tropical regions. The head has small, kidney shaped compound Eye. Thread like structure antennae and biting mouthparts

*ZORAPTERA;

- Angle insects
- 32 species
- Body length : 2-3mm
- mostly associated with rotting wood these small, delicate bodied insects are termite. The adults are dimorphic being either Hind, pale and wingless

* PSOCOPTERA

- Barklice and Booklice
- <4500 species
- Body length: 1-10mm mostly under 6mm

→ Braklice 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 threed like antennae, biting mouth parts and forewinged species three ocelli. The thorax is slightly humped and the wings when present are held roof like over the body rest.

*THYSANOPTERA;

- Thrips
- ~5500 species
- Body length - 1-100mm mostly under 50mm

True bug range from minute, wingless scales insects to giants water bugs with raptorial front legs capable of catching fish and frogs. compounds Eye and are often prominent and ocelli may be present. Bugs lack maxillary but have labial palps and the mandible and maxillae which are enclosed by the labium. The mouthparts form hemipterans like stylets & are used to sukkup liquid food.

* HEMIPTEA

- 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 & frogs. Compound eyes are often prominent and ocelli may be present. Bugs lack maxillary and labial palp and the mandible and maxillae which are enclosed by the labium, take the form of elongated grooved stylets through which saliva can be injected and liquids sucked up. Two pairs of wings are usually present.

* PHTHIRAPTERA ;

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

These small wingless dorso-ventrally flattened ectoparasite live permanently on birds and mammals host where they feed on skin debris, secretion, feathers or blood. The eyes are very small or absent, there are no skin debris no ocelli and the antennae are short with maximum five segments. The legs are short and robust with the tarsi and claws typically modified for grasping hairs or feathers. Several species are significant vectors of human and animal disease

Subdivision : Holometabola

The following megpteran orders comprises the most advanced and successful of all insects. The mature larvae and lack very different lifestyles to the adults. The wings develop internally & metamorphosis from larvae to adult take place during a pupal stages.

* MEGALOPTERA ;

- Alderflies and dobsonflies
- ~ 220 species
- Body length : 6 - 28mm

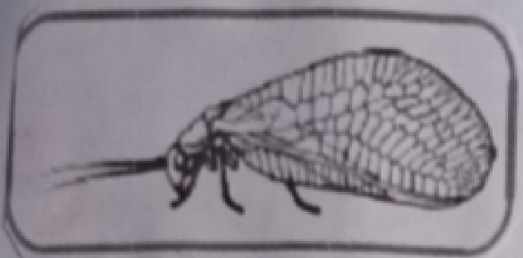
The two families the comprise this small order (alderflies [Sialidae] and dobsonflies [Corydalidae]) are the most primitive insects with complete metamorphosis. The head has conspicuous compound eyes & long thread like antenna. Ocelli are present in corydalids but absent in Sialids. Despite having well developed jaws.

* RAPHIDIOPTERA ;

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

→ confirmed to cool, temperature woodlands This order comprises just two families The Raphidiidae and Inocelliidae. The large head, which is supported by an Elongate prothorax is slightly flattened broad on the middle and tapers to the rear. The antennae are Setaceous and the compound Eyes are conspicuous.

* NEUROPTERA ;



- Antlions, lacewings & relative
- ~5000 species
- Bodylength : 2-90mm
- wingspan : 5-150mm

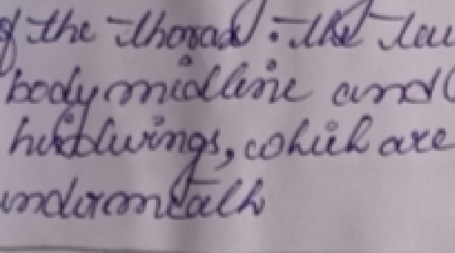
Adult neuropterans having biting mouthparts, a pair of conspicuous, laterly placed compound Eyes and may have ocelli. The antennae are generally long and thread like and is some owlflies & Antlions the end of the antenna may be swollen to form a club.

* COLEOPTERA ;

- Beetles
- ~370000 species
- Bodylength : 0.1-18mm, mostly under 25mm

This is very large order make upto atleast 40% of all insects species

The head has conspicous compound Eye antennae usually with less than 11 segments and biting mouthpart. ocelli are typically absent. The prothorax is usually large and freely articulated with the rest of the thorax. The toughned front wings or elytra, meet in the body midline and cover the larger membranous hindwings, which are folded length wise and cross wise underneath



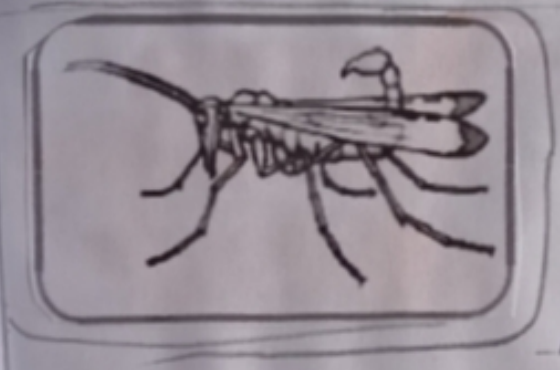
* STREPSIPTERA ;

- strepsipterans
- ~600 species
- Bodylength : 0.4-35mm, mostly under 6mm

Strepsiptera are highly specialized Endoparasite of other insects in more Than 30 insects-families belonging

belonging to the orders Thysanura, Blattodea, Mantodea, Isoptera Hemiptera, Diptera and Hymenoptera. The adults are dimorphic females are typically Endoparasite without Eyes, antennae mouthparts, legs

* MECOPTERA



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

Scorpionflies are Elongate insects found mostly in damp woodlands. the head which characteristically Extended downwards to form a beak, has biting mouthparts, slender thread like antennae, large compound Eyes & three ocelli. They usually have two pairs of large, narrow wings but some species are short-winged or wingless

* SIPHONAPTERA ;

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

found wherever there are suitable hosts, fleas are distinctive and readily recognizable group - with over 90% of flea species feed on the blood of land mammals The remainder are birds Ectoparasites. fleas are Small wingless laterally flattened.

* Diptera ;

- True flies
- ~ 122 000 species
- Body length : 0.5 - 60mm
- wingspan : upto 75mm

most of the species that make up this huge an diverse

Order are beneficial to ecosystem function as pollinators parasites and predators and are vital to the process of decomposition and nutrient recycling.

* TRICHOPTERA :

- caddisflies
- > 11000 species
- body length = 2-38mm

Caddisflies are mainly nocturnal and can be found almost every where there is freshwater. The elongated adults are moth like in appearance with long slender legs. The body and wings particularly the front wings are covered with hairs

* LEPIDOPTERA :

- Butterflies and moths
- ~ 200000 species
- wingspan : 3-300mm mostly under 75mm

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 coloured or iridescent. The compound eyes are large and the mouth parts typically take the form of 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 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 & ants
- >150000 species
- Body length : 0.25 - 76mm

Abundant and ubiquitous, it is almost certain that the true no of living species of hymenoptera may exceed 500000 species within the order Exhibit immediate diversity of lifestyle, solitary or social herbivorous, carnivorous or parasite The Hymenoptera must be regarded as the most beneficial of all insects for the control of natural insects population exerted by parasite and predatory wasp species and the pollination services of bees.