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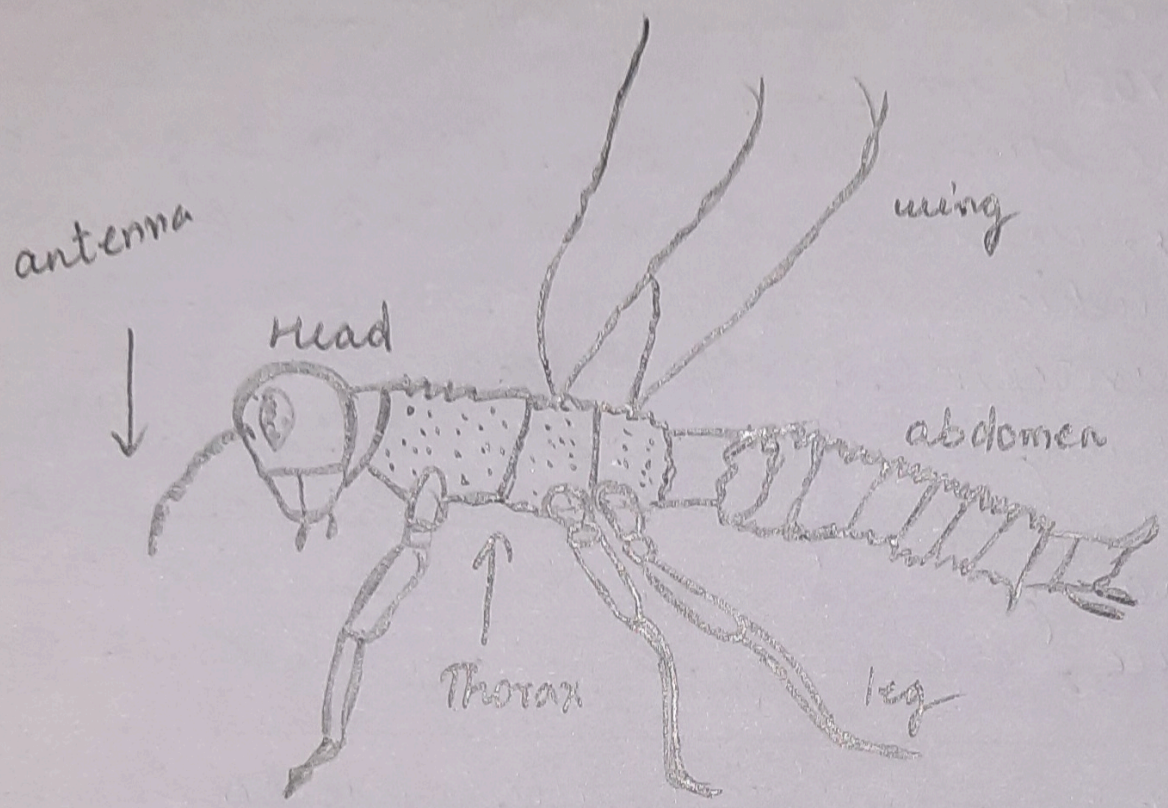
Insects, their distinguishing Characteristics

Insect, (class Insecta or Hexapoda), any member of the largest class of the phylum Arthropoda, which is itself the largest of the animal phyla. Insects have segmented bodies, jointed legs, and external skeletons (exoskeletons).

Insects are distinguished from other arthropods by their body, which is divided into 3 major regions: (1) the head, which bears the mouthparts, eyes, and a pair of antennae. (2) the three-segmented thorax, which usually has three pairs of legs (hence "Hexapoda") in adults and usually one or two pairs of wings; and (3) many-segmented abdomen, which contains the digestive, excretory, and reproductive organs.

In popular sense, "insect" usually refers to familiar pests or disease carriers, such as bedbugs, houseflies, clothes moths, Japanese beetles, aphids, mosquitoes, fleas, horseflies, and hornets. Many insects, however, are beneficial from a human viewpoint, they pollinate plants, produce useful substances, control pest insects, act as scavengers, and serve as food for other animals.

General Features: In number of species and individuals and in adaptability and wide distribution, insects are perhaps the most eminently successful group of all animals. Entomo-


antenna
wing
Head
abdomen
Thorax
leg

logists estimate the actual number of living insect species could be as high as 5 million to 10 million. The orders that contain the greatest numbers of species are Coleoptera (beetles), Lepidoptera (butterflies and moths), Hymenoptera (ants, bees, wasps), and Diptera (true flies).

Appearance and habits: The majority of insects are small, usually less than 6mm long, although the range in size is wide. In many species the difference in body structure between the sexes is pronounced, and knowledge of one sex may give few clues to the appearance of the other sex. In some, such as the twisted-wing insects (Strepsiptera), the female is a mere inactive bag of eggs, and the winged male is one of the most active insects known. Modes of reproduction are quite diverse, and reproductive capacity is generally high. Some insects advertise their presence to the other sex by flashing lights, and many imitate other insects in colour and form and thus avoid or minimize attack by predators that feed by day and find their prey visually, as do birds, lizards and other insects. Behaviour is diverse, from the almost inert parasitic forms, whose larvae lie in the nutrient bloodstreams of their hosts and feed by absorption,

Distribution and abundance:- Scientists familiar with insects realize the diffi-

culty in attempting to estimate individual numbers of insects beyond areas of a few acres or a few square miles in extent. The large populations and great variety of insects are related to their small size, high rates of reproduction, and abundance of food supplies. If the insects are counted on a square yard of rich moist surface soil, 500 are found easily and 2,000 are not unusual in soil samples in the north temperature zone. Only a few thousand species, those that attack peoples crops, herds and products and those that carry disease, interfere with human life seriously enough to require control measures. Insects are adapted to every land and freshwater habitat where food is available, from deserts to jungles, from glacial fields and cold mountain streams to stagnant, lowland ponds and hot springs.

Insects dominance: There are several ways to measure or assess the dominance of insects. Perhaps the simplest approach is to compare the total number of insect species with similar totals for other taxonomic groups. By such as accounting, entomologists estimate that over 800,000 insect species have been named and described since Carolus Linnaeus (1707-1778) founded the modern system of nomenclature (genus and species) for all plants and animals. The entire plant kingdom, by comparison, contains between 400,000 and 500,000 species. In the animal kingdom, the "lower" invertebrates account for around

200,000 species, while vertebrates account for around 50,000 species. Thus, insects present more than half of the 1.5 million species of living organisms known to science. But millions of undiscovered insect species are still hiding in the soil, in the canopies of tropical rain forests, and even right in our own backyards. Entomologists describe hundreds of these new species each year, and still estimate. In the final analysis, two of every three living species may be insects.

Number of individuals:- Another way to look at the dominance of insects is to consider the distribution and density of individual species or populations. Because of their small size and high reproductive potential, insect populations often grow to epic proportions. A single colony of Australian termites can swell to several million individuals with an earthen mound 20-25 feet tall. A swarm of migratory locusts may contain up to 10 billion individuals, cover an area of several thousand hectares, and have a total biomass of over 30,000 metric tones. Above the arctic circle, hordes of mosquitoes and black flies can make life miserable for any warm-blooded animal. In some cases, these biting flies are so abundant and persistent that large animals, such as reindeer, have been known to die from the massive loss of blood (desanguination). In the tropics, ants are the most pervasive and diverse of all animal species.

Distribution:- A third way to assess the dominance of insects is to examine their abundance and diversity in a wide range of ecological habitats. Indeed, insects are found in virtually every terrestrial and fresh-water environment on the face of the earth. They live everywhere from mountain tops in the Himalayas to tide pools at the seashore. Dozens of cavers species spend their entire lives in the total darkness of underground caverns. Insects live both above and below the surface of rivers, streams, lakes and pounds. Infact, the only place on earth where insects are not plentiful is in the ocean depths. Most marine environments are filled by another succesful group of arthropods. the Crustacea.

Importance of insects in Agriculture

For as long as humans practiced crop agriculture, pests have occured on their crops and insects have been predominantly perceived as competitors in the race for survival. The insect plant relation-ship is the dominant biotic interaction and approxi-mately 50% of the insect species are herbivorous, with most herbivorous species feeding on plants in one or a few related plant families. Herbivorous insect damage 18% of world agricultural production and this is mainly controlled by chemical methods. Despite these damages, less than 0.5% of the

total number of the known insect species are considered pests. Aside from anthropocentric perception and societal prejudice, insects are not pests in an ecological or evolutionary context. Insects are vital for human survival, because crops cannot be produced without the ecosystem functions provided by insects. Around 72% of the world's crops are dependent on insects for pollination. Pollinating insects improve or stabilize the yield of three-quarters of all crop types globally - one third of global crop production by volume. A variety of insect taxa have been linked with increasing seed set. Insect pollinators includes hundreds of species of solitary bees, bumblebees, flies, beetles and butterflies, and in several crops, wild bee species are more important for pollination than the honey bee, Apis mellifera. Globally pollination services by insects are estimated to contribute 9.5% to yield of crop production. Pest control is an inevitability in agriculture. Predatory insects contribute significant ecosystem functions by controlling pest insects in cultivated crops. It was indicated in 75% of field studies that generalist predators reduce pest populations in arable farmland significantly, with ground beetles being dominant generalist predators in arable crops and effectively reducing population sizes of economically significant agricultural pests such as aphids, slugs, root feeding flies and phytophagous beetles.

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• grasshopper

General body Structure:- The insect morphology is the study and description of the physical form of insects. The terminology used to describe insect is similar to that used for other arthropods due to their shared evolutionary history. Three physical features separate insects from other arthopods: they have a body divided into 3 regions (head, thorax, and abdomen), have three pairs of legs, and mouthparts located outside of the head capsule. Is this position of the mouthparts which divides them from their closest relatives, the non-insect hexapods, which includes Protura, Diplura and collembola.

Body Structure of Cockroach:- Immature cockroaches look roughly the same as adults, but are smaller and sometimes have different coloration. For the purposes of understanding the basic anatomy of a roach, it is easiest to look at the adult. Its body is divided into three segments: head, thorax and abdomen.

Cockroaches have a long pair of antennae that help them to pick up smells and vibrations. The antennae are connected to the head, which also includes the brain, strong mouthparts for scraping and chewing food and compound eyes. They have poor vision and dislike light, which is why most species are nocturnal.

After the head comes the thorax. It includes three

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pair of legs - cockroaches have six legs total and two pair of wings. Additionally, there is a plate behind the head called the pronotum. It is important because that is where many species have differentiating markings. Most adult cockroaches have wings, but only a few species fly. However, cockroaches can crawl at speed of upto 3 miles per hour. They are also able to transverse wall and ceilings due to the fact that their legs have short, spiky protrusions that stick to surfaces.

The abdomen is the final piece, and it contains reproductive organs. At the back of the abdomen are two short protrusions called cerci. They functi like rear antennae and are connected to the roach's legs by the abdominal nerve ganglia. This allows their legs to start moving when vib- rations are sensed, often before their brain even processes a threat.

Detailed