CHAPTER 1
INTRODUCTION TO THE INSECT WORLD

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ISBN 978-967-960-348-4

WORLD OF INSECTS

Earth is the greatest living puzzle in the world which is a collection of worlds within world. One of the most intriguing and mysterious of all is the world of insects. Insects dominate by over 80% of all living creatures on our planet. They can be found almost in every possible environment from aerial spaces, on land and the aquatic environment.

What are insects?

The common misconception of most laymen is to consider spiders, millipedes and centipedes as insects. Although they are of the same group called Arthropod which means having jointed limbs and segmented body, but there are certain features that separate the insects from the rest. The major characteristics of an insect are having three pairs of legs, three body parts namely head, thorax and abdomen, and also a pair of antennae.

There are 29 to 31 insect orders worldwide. Majority of insects have wings such as the butterflies, dragonflies, mosquitoes and crickets. Human lice, mealybugs, ants and termites are examples of wingless insects.

Why are insects so successful?

They have been on this planet for over 400 million years ago, surpassing the existence of dinosaurs and yet they still survive up till today. They have a combination of unique characteristics that contribute to their unparalleled success in survivorship. Unlike vertebrates, the insect's supporting system is located on the outside of its body. The outer skeleton, so called exoskeleton, is a magnificent structure that not only gives the support and shape for the insect, but also plays an important role in protecting the inner soft tissues from injury and attack. This 'suit of armour" can resist both chemical and physical attack. The surface is covered with wax that helps to minimize the loss of body fluids. The flexibility and elasticity of the structure gives full freedom in movement where all the important appendages such as the wings and legs are located. The muscles attached to the insect's wall provides mechanical

strength that enables insects to do things beyond their petit miniature size.

The size of insects mostly ranges between 2 -20 mm. Being small in size gives them full advantage to avoid predation. They can easily hide in tiny openings, in between cracks of rocks, or between leaves. Moreover they only require minimal food resources for survival and reproduction. Imagine the larva of a leaf miner spends their entire larval stage feeding by tunneling in between layers of a single leaf! In other words, to them, a crumb is a feast, a droplet quenches the thirst and a pebble provides shade.

Insect is the only invertebrates that can fly. Most species have wings which increase their ability to disperse in various habitats and environments and furthermore it is a highly effective mode of escape from predators. Some species are able to fly long distance for example the migratory locust, *Schistocerca gregaria* Forskal can fly for up to 9 hours without stopping!

Insects undergo a series of transformations in their life that includes changes in forms, textures and physical appearances which is called metamorphosis. Most insect groups experience complete metamorphosis which the immature and adult insect neither look nor behave similarly. This life strategy proved remarkably beneficial as the young and adult insects do not compete for the same food resources or habitats. For instance immature butterflies, called caterpillars, feed on leaves and other plant parts. They have a pair of strong tooth-like structure called mandible that allows them to chew solid materials. However the diet changes once it turns to a full adult. Adult butterfly consumes nectar which is in liquid form and their mouth structure changes to a long narrow tube called proboscis, that acts as a straw.

Reproductive success is one of the most significant measures of an organism's fitness. Since the life cycle of an insect is relatively short, generally between 2-4 weeks, therefore female insects are able to produce many eggs at one time and remarkably most of the eggs hatch. A typical female lays between 100-500 eggs in her lifetime, but in some species, such as the queen of an African termite colony produces thousands or millions of eggs

ISBN 978-967-960-348-4

NYAWA 2013

during her entire lifespan. Since most insects die before they ever have an opportunity to reproduce, a high reproductive potential is the species' best chance for survival. Female insect reproductive tract has an organ, called spermatheca that can store sperm for months or years. A single mating can supply a female with enough sperm to fertilize all the eggs she will produce in her lifetime. The female even can decide the fate of its offspring whether to become male or female.

Conclusion

Small does not mean weak. Tiny does not mean irrelevant. Human should learn to appreciate the existence of insects on our planet Earth. In fact there are many fantastic things that we can learn from insects especially in terms of survivorship. The relationship of these creepy crawlers with the rest of living and non-living things, makes the Earth a better place to live in.

ISBN 978-967-960-348-4