

# THE LIVING BUG COLLECTION - NATURAL ECOSYSTEMS:

With the flip of a fly swat or a swish of toxic spray, it is easy to dismiss the most abundant life form on earth—the insects. But we dispense with creepy crawlies at our peril. Did you know that most life on earth would perish if insects and land dwelling arthropods were to disappear?

Natural ecosystems are the basis of a healthy environment, and insects provide many of the ecological services that have been in operation for millions of years. Many insects and soil organisms recycle organic waste, household garbage, and animal dung, building soil and providing nutrients in the process. Without soil there would be no plants to provide fresh air, food, climate control, soil stability and the beauty we take for granted.

Insects form a critical part of food webs supplying food for other insects, birds, animals and fish. And these minute marvels pollinate crops providing us with vegetables, fruits, nuts, seeds, oils, timber, honey, wax and fibres.



Nymph of the passion vine hopper

Insects also provide us with the predators we need to gobble up those sap suckers and leaf eaters. Where would we be without parasitic wasps, spiders, lady bugs and praying mantis, to name but a few pest busters?

We are surrounded by insects, nature's engineers who have spent millions or years on research and development. Nature's tiny organisms, each a masterpiece of design, hold many keys to unlocking our own environmental problems. In fact scientists all over the world are studying the designs and processes used by insects to discover how to manufacture new products and invent new technologies. This new science is called Biomimetics.



Two spined spider

Many insects are chemical laboratories making dangerous chemicals inside their bodies. A stunning example is the Bombardier beetle with a bomb making factory in his abdomen. Millipedes also protect themselves by releasing toxic substances from pairs of defense glands found on most body segments. And one species of termites called "Globitermes sulphureus" is a suicide bomber. Blowing themselves up and splashing sticky termite fluids over invading ants! Now there's a bug repellent for you!

Flies are masters of aerial maneuvers and have a lot to teach us about insect flight. When flies flap their wings the air above the wings swirls like mini

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whirlpools. These whirlpools are called leading edge vortices. Now the air above the wing has less pressure than the air below the wing. The low pressure vortices create suction, pulling the fly upward and giving lift.

Flies are the only insects that have a single pair of wings, the hind wings being only tiny stubs that act like gyroscopes and tell the fly how its body is rotating. Scientists have discovered that the muscles in these little gyroscopes are connected to the fly's eyes.

The compound eyes on the side of the fly's head have more than 4000 lenses in each eye, and they can see movement ten times faster than the human eye. Although each lens captures its own tiny piece of data, all the data images are processed simultaneously, giving the fly panoramic vision.

When the taste cells on the feet tell the fly there is something tasty to eat, the fly simply extends its proboscis, soaks up the liquid with the two sponge-like pads on the end, and then sucks it up just like using a straw.

Have you ever noticed how the eyes of moths glow a dark red colour at night? Night flying moths have eyes made of microscopic cones, so small they are called "nano-structures". The hexagonal pattern of the cones results in a 'super-black' structure which absorbs light so effectively that predators have difficulty seeing the moth. Scientists have developed a revolutionary anti-reflective, anti-glare moth-eye film which is used on the lens of space telescopes, cameras and instrument panels.

I recently found a giant female centipede when turning the compost. She was a fierce protective mother, curled around her young which had recently hatched from the eggs that she had guarded for weeks. During that time she had constantly licked them to destroy fungal and bacterial contamination. Imagine if we could keep our children safe from disease by simply licking them.

In order to survive, insects sense the world around them. They use sight, sound, smell, hearing, taste, vibrations and touch. Insect bodies are often covered with fine hairs attached to nerve



Katydid moulting and eating the old skin



Katydid the last moult the new wings are visible

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fibres which send messages to the brain. But it is the insect antennae, these long thin projections on the head, constantly twitching and moving, searching for telltale chemical signals and vibrations which really interpret the insect's environment. Antennae are so important that this sensory equipment must always be kept clean. Just watch those constant hunters, the wasps, using their back legs to keep their antennae clean.

Scientists have even found a specialist job for honey bees which have such an acute sense of smell that they are being trained to detect bombs.

Organic gardening is a key to building habitats for the living bug collection. We need to make the 21st century the "Century of the Environment" and what better place to increase insect biodiversity than in your own backyard organic garden.



Praying mantis mating

Many of the pest insects will need flowering plants for nectar, shade, shelter and a place to raise their young. The beneficial insects will come into your garden for the same reason and more to the point they will come because they have a food source—the pests sheltering on your plants.

Insects face increasing pressure from human activity and habitat loss is the number one threat to all wildlife today. The way in which we manage our gardens has a major effect on insect habitats. Insects as well as birds and plants are increasingly dependent on your choices and the Organic backyard is really the first step towards the Organic nation.

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