



# THE LITTLE THINGS THAT RUN THE



Edward O Wilson, Naturalist, 1987



**‘The little things that run the world’** is a compilation that has emerged from a study of arthropod diversity in agro-forest landscapes of the Nilgiri Biosphere Reserve, Western Ghats. It is a brief, simple, non-technical guide to insects and the diversity of critical ecosystem functions they perform. It is hoped that the booklet will reach out to indigenous farmers, estate field officers and young children alike, and help promote organic farming for a healthier planet.

The booklet title is inspired by how naturalist and evolutionary biologist Edward O Wilson described invertebrates as ‘the little things that run the world’. The insect images on the cover design are not of species found in the Indian subcontinent; they have only been used for an aesthetic value.

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## Why Insects Matter

Insects form a large part of the biodiversity on earth. And biodiversity is important for the resilience of this planet we all inhabit. A large proportion of biodiversity exists in agricultural landscapes close to forests. It is crucial to protect these bees and birds that forage in such ecosystems. Insects are tiny and their numbers run to millions. Yet we often easily overlook their value. There is an entire range of arthropods (insects, spiders, millipedes, etc.) that live in such systems and perform specific roles to maintain the ecological harmony of the habitat.

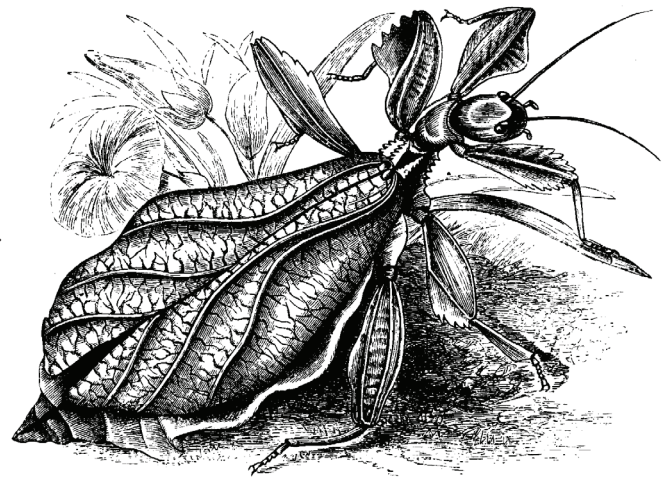


## The Role Insects Play

Without insects working themselves day and night, this living planet of ours would not have been the same. Many arthropods are beneficial: spiders and parasitic wasps predate or parasitise crop pests, bees and butterflies pollinate a range of crops, dung beetles and earthworms break down organic matter (thus helping nutrient recycling). A large number of insects act as prey for other wildlife, especially birds.

Unfortunately, the tendency in human societies is to think of insects and bugs as harmful or as pests. In fact, very few insect species cause damage to agricultural crops. Farmers can benefit from using techniques to attract beneficial insects to assist them with pest control and more efficient pollination.

So what exactly are these ecologically valuable roles and functions the hundreds of arthropod families are busy with?



## Functional Guilds

### PARASITOIDS AND PREDATORS: The Natural Enemies

**Parasitoids** are insects that parasitise eggs and larvae of other insect Orders such as beetles and butterflies. Most of them are wasps and some flies. Since they predate on insects, they are good pest control agents. A parasitoid wasp uses its ovipositor to probe and lay eggs within its host. Then the larva of the parasitoid develops inside the host body and eats it from within, then emerges as an adult from the host.



Bee fly (Bombyliidae) larvae are parasites on other insects.



Ichneumonid wasps are one of the many families of parasitoid wasps. Their larvae develop within host insects.



**Predators** are normally carnivorous and capture other insects as their prey. Spiders are a dominant non-insect predator group. Many wasps, beetles, ants and flies predate upon pests like aphids and borers. A farm is greatly benefitted from the presence of a diversity of natural enemies.

A jumper spider (Salticidae); its diet is composed of insects.



The spider wasp (Pompilidae) is ground dwelling, stings a spider, places it in a burrow and lays an egg on it.

Vespid wasps: They make nests in mud and their larvae feed on insects.





## HERBIVORES: The Most Despised by Farmers

Several beetles such as the ones under Family Scolytidae are borers and important pests. Trees filled with birds are a major asset to farmers, since insectivorous birds like warblers can cut down crop infestations in crops like coffee. Not all herbivores are agricultural pests but farmers generally dread them. Many species of ants and cicadas are herbivores and harmless to crops.



The coffee berry borer beetle (Curculionidae).



Spur-throated grasshopper (Acrididae), another common pest.



A cicada (Cicadellidae) out of its moult – a harmless herbivore.

## POLLINATORS: We All Know Them

Social and solitary bees are efficient pollinators of many crops and all farmers have seen them. In natural forests, there are many other species in addition to bees that take on this role of carrying pollen so that plants can reproduce – butterflies, moths, wasps, flies, thrips, ants, and even birds and bats. In fact wild banana is bat pollinated.



*Ceratina* sp., a solitary bee that visits many crops.



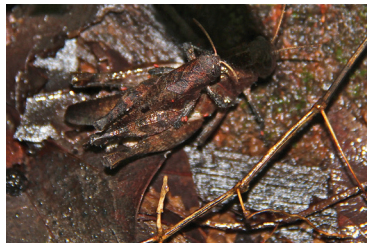
*Apis florea*, pollinators in many habitats.

## DECOMPOSERS: Somewhat Familiar

This group is largely composed of litter fauna and creatures that live in decaying vegetation and fungi. Some examples – thrips, ants, some flies and dung beetles. They live in the forest floor, soil, under bark, and habitats that are wet and rich in organic matter. Many of them are important in nutrient cycling.



A pill millipede (*Sphaerotheriida*), common in wet forests among leaf litter.



An Acrididae member (grasshopper) camouflaged on the forest floor.



Scavenger flies (*Sarcophagidae*) are found in moist habitats. Larvae scavenge on carrion.

## GUILD OVERLAPS: The Multi-tasking Little Creatures

Some insect Families have functionally diverse species: they are efficient at more than one business. Thrips are generally predators but frequently visit flowers for nectar (pollinators) but their larvae mine into leaves (herbivores) and some adults are fungal feeders (decomposers). Beetles are another Order with a range of functional experts. Some are parasites and predators and others are decomposers. Ants too combine the role of herbivore and carnivore (predator) but many of them are detritivores.



Weaver ants (*Formicidae*) are predators of spiders and beetles. Bioindicators of moist natural forests, not found in plantations or dry forests.

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Thrips (*Thysanoptera*) are decomposers since they feed on fungi, but they are also predators, herbivores and pollinators.





## Insect Friendly Practices

Small farmers depend on biodiversity for their livelihoods and survival, and they are its main guardians, be it inside forests or on their agricultural land. Farming practices which use and enhance this diversity are common, yet agriculture can also be the greatest destroyer of biodiversity. Monocrops destroy native forest tree diversity as well as agro-biodiversity. Agricultural intensification through chemical fertilizers, pesticides and weedicides kill many sensitive species.



A flycatcher with its insect prey near a vegetable farm.



Solitary bee emerges out of a mudwall.

### **Insects have many potential benefits. How can we enhance the presence of pollinators, predators of pests and detritivores in our landscape?**

- ◆ Maintain high hedge diversity – they are great foraging sources for pollinators and home range for spiders.
- ◆ Keep the crop free of pesticides during flowering. Bees would be safer.
- ◆ Retain large native trees since social bees prefer making their hives on them.
- ◆ Maintain old bamboo and cane roof panels, mud banks and clay surfaces: these are excellent nesting sites for solitary bees.
- ◆ Keep bird and spider habitats away from insecticides – these creatures help control borers and miners that are pests.
- ◆ Leave leaf litter on the crop floor – the insects in there only make your soil nutrient rich.

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