Little Known

Solitary Pollen Bees of Sri Lanka

Any one who has tasted bee honey, seen a beehive or experienced the painful sting of a bee will know about the honeybees. '*Meemessa*', '*Bambara*', '*Danduwel messa*' and '*Kanameemessa*' are the well-known honeybees of Sri Lanka. The term 'honeybee' is a general term that refers to those bees that collect nectar from flowers and store nectar as honey in the waxy hives they build. Honeybees live in large colonies and hence a hive would have several hundreds of worker bees and a single queen. The great majority of bees in the world are not honeybees but solitary-pollen bees. Unlike the honeybees the solitary-pollen bees do not store honey or build impressive hives nor do they live as a colony. They are termed solitary-pollen bees because they nest singly or in small groups. Individual bees are either male or female bees with no queen bees or workers. Female bees gather pollen to feed themselves and provision their nests to feed their young. Hence, they are simply known as solitary-pollen bees.

The great majority of bees in the world are not honeybees, but solitary-pollen bees. Unlike honeybees, these do not store honey or build impressive hives. Nor do they live in colonies. There are about 17,000 species of solitary pollen bees in the world, twice the number of species of birds and five times the number of mammals! Though they have no role in honey production, they are valued for their silent service as pollinators.

Blue-green metallic *Ceratina*, one of the most colourful solitary-pollen bee in Sri Lanka resting on a *Crotolaria* flower

Since prehistoric times, primitive man has obtained honey from feral honeybee colonies. With the dawn of agriculture, honeybees were domesticated and managed by man. Two different species of honeybees are domesticated in different parts of the world. In Asia and Southeast Asia, as in Sri Lanka and India, the domesticated honeybee is scientifically called *Apis cerana* (the Asian honeybee). The honey bee species in the Near East, Africa, Europe and America is called *Apis mellifera* (the European honeybee). In Sri Lanka, apart from the well-known domesticated 'Meemessa' (*Apis cerana*) there are three other honeybees that build hives and store honey. They are *Apis dorsata* ('Bambara'), *A. florea* ('Danduwelmessa') and *Trigona iridipennis* ('Kanameemessa'). All of them build hives and live as a colony. Their hives are seen on trees, buildings and on rocks. In the colony, is a single queen (the only reproductive female), a few males (drones) and a large number of workers. These worker bees are females that are sterile and their egg-laying structure (ovipositor) is transformed into a sting. T. *iridipennis* or 'Kanameemessa' is of special interest among our honey bees as they are stingless species.

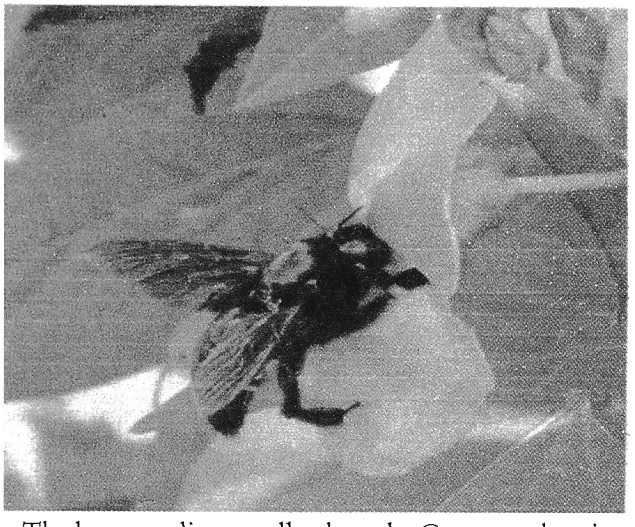
The role of honeybees as pollinators of flowers resulting in fruits and seeds has been valued ever since the beginning of civilization. But, honeybees are not the only bees that buzz around in your garden and bring

about pollination by delivering pollen from one flower to another. The solitary-pollen bees conduct themselves in the same manner but are silent and out numbered by the worker honeybees. Moreover, the solitary-pollen bees are valued only for their silent service as pollinators as they have no role in honey production. These less-known solitary-pollen bees are represented by about 17,000 species in the world. Thus, the solitary-pollen bees constitute about 80% of the bees known so far. This number corresponds to twice the number of birds (9,040 spp.) and five times the number of mammals (4,000 spp.) in the world.

According to scientific classification all the honeybees of the world belong to a single family, Apidae. All other bees, the solitary-pollen bees of the world are grouped into 7 families. Of these 7 families, only 4 families of solitary-pollen bees are represented in Sri Lanka. Anthophoridae, Colletidae, Halictidae and Megachilidae are the families of solitary-pollen bees present in Sri Lanka. Unlike the honeybees of Sri Lanka, the pollen bees have not been well studied. During a recent study conducted over a period of 3 years, 137 species of solitary-pollen bees belonging to 35 genera have been identified. They have been collected from several areas of the country and on a variety of wild and cultivated crops. Although the solitary-pollen bees are far more numerous in terms of number of species, the honeybees appear to be far more numerous in terms of number of individuals of the worker cast that live in large colonies. One has only to observe closely and quietly a patch of flowering plants on a sunny morning and these busy solitary-pollen bees are sure to be there along with the honeybees. The males of solitary-pollen bees rest on plants or scout around flowers and nest sites, to find a passing female to mate!

Bees, among insects are unique in that they bear specialized, branched hairs on their body and legs that enable them to carry pollen. In honeybees, these hairs are found on the last pair of legs and are formed into a pollen basket into which pollen is collected. In solitary-pollen bees, pollen carrying hairs are found either on the under side of the body, on legs and around the waist. Thus, different families of pollen bees carry pollen on different parts of their body. With each visit to a flower, their bodies get dusted with pollen.

Solitary-pollen bees come in a variety of sizes and colours. Most of our solitary-pollen bees are small to medium sized and black in colour. However, the hairs, spots and stripes on their body may take all the colours of the rainbow. The blue-green metallic *Ceratina* is one of the most colourful of our solitary-pollen bees and so is the fast flying blue striped *Amegilla*. *Megachile* bees are black with orange/yellow/white/black hairs on different parts of the body. The largest of the solitary-pollen bees in Sri Lanka are the carpenter bees, locally known as 'Ambalanpaluwa' and scientifically as *Xylocopa*. Villagers consider them as beetles due to their hardened body, dark colour and large size. There are 13 different species of carpenter bees in Sri Lanka. They buzz while



The largest solitary pollen bee, the Carpenter bee, is often mistaken as a beetle.

flying and alight on specific flowers. They may look fearful while on flight but they are very attractive, as their wings appear iridescent when held at certain angles. Some have their body covered with golden hairs. The yellow, orange or white colours on their body may give the impression that they are carrying pollen but it is the hairs on them that gives this appearance. Carpenter bees carry large loads of pollen on their legs. They nest in old structural timber, and hence, the name.

Solitary-pollen bees construct their nests in the ground, in hollows of plant stems or in old wood. Each female constructs a nest by excavating a tunnel or gallery, which consists of a series of cells. In each cell, a ball of pollen is placed, and an egg is laid, after which, the cell is sealed. In a solitary-pollen bee nest only a few eggs are laid, unlike in honeybee hives where the queen lays hundreds of eggs. Ground nesting bees prefer to nest in bare sandy slopes where the morning sun falls. Only the opening to their nest, a very tiny hole in the soil with debris around it (similar to an ant hole), can be seen from outside. A closer look at these holes will take your eyes towards a small flying bee with a load of pollen on its legs and body. Wasps too nest in the ground but the female wasps do not carry pollen as their young are fed with spiders and caterpillars. The bee nest hole in the ground leads to a maze of branched galleries reaching deeper layers of soil. Finally, the galleries end in cells where eggs are laid and provisioned. In certain ground nesting solitary-pollen bees, large number of females make their nests close to each other forming 'bee villages'. Certain species of our ground nesting solitary-pollen bees are attracted to human sweat, hence they are commonly known as sweat bees. They are not known to sting under normal circumstances. The stem nesting solitary-pollen bees have specific preferences for the stem hole size (diameter) and they have been found to nest in cut stems of rose, *Gliricidia* and bamboo. A certain group of stem nesters, the *Megachile* bees (with 16 species in Sri Lanka) line the inside of the hollow stem with fresh leaves cut into circles from near by plants. Hence, they are commonly known as leaf cutter bees.

Leaf-lined *Megachile* bee nest within a bamboo-stem (spilt opened)

Other solitary-pollen bees such as *Braunsapis* and *Hylaeus* are very small bees that nest in tiny punctures found on wooden structures like window and door frames of buildings and fence-posts.

Certain species of solitary-pollen bees are of special significance as they are solely responsible for pollinating specific types of crops having a specialized flower structure. The flowers of the plant family Solanaceae that includes vegetables like brinjal, tomato, potato and chilly have their pollen tucked away in anthers. Their concealed pollen is released only when the pollen bearing anthers are vibrated. Bees adapted to obtain pollen from such flowers hang on to the anthers with their tiny legs and vibrate their body enabling pollen to be released from the anthers. Due to the buzzing noise produced during vibration of the body, these bees are referred to as buzz pollinators. Certain species of the genera *Xylocopa*, *Lasioglossum*, *Amegilla, Patellapis* and *Hoplonomia* have been observed to buzz pollinate. Vegetables like ladies fingers ('Bandakka') have flowers bearing unusually large pollen grains and only the solitary-pollen bees that have sparsely set hairs could carry such pollen. *Lithurgus* is one such bee. These are some of the pollen specialist bees but the great majority of solitary- pollen bees are generalists visiting a variety of flowering plants for pollen and nectar. Thus, solitary-pollen bees, although not conspicuous, are silent pollinators of many crops and plants. Not all solitary-pollen bees are interested in collecting pollen for feeding their young. Among them there are cuckoo bees that lay their eggs in provisioned nests of other bees. *Coelioxys*, *Euaspis*, *Thyreus*, *Sphecodes* and *Nomada* are such parasitic bees. They lack pollen-carrying hairs and hence resemble wasps.

Lasioglossum bee buzz at anthers of *Osbeckia* ('bowitia') flowers

Although solitary- pollen bees are little known, they constitute the great majority of bee species. Unfortunately the life of solitary-pollen bees and honeybees are at risk due to modern agricultural practices and urbanization that destroy their nesting sites and foraging plants. The agro-chemicals affect the foraging

bees and their young. Considering the economic and commercial values of solitary-pollen bees as pollinators, they are vital members in the natural and cultivated habitats and deserve protection and encouragement.

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Pollen bees, pollen bees,
People will ask, "What are these?"
We can't take their honey,
We can't use their wax.
All they've got going are pollination attacks.

Roll in that pollen, bees.
Shake out that pollen, bees.
Stuff that pollen
Into neat hind leg packs!

In your fuzz, as you buzz.
Dust it all around the world from your knees.
Golden grains.....
They won't make us sneeze,
When they're on pollen bees!

Dr. Suzanne Batra
A bee specialist, USA

In a lighter vein . . . . .

Murphy's laws on scientific experiments

1) In any field of scientific endeavor, anything that can go wrong, will.
2) If the possibility exists of several things going wrong, the one that will go wrong is the one that will do the most damage.
3) Everything will go wrong at one time. That time is always when you least expect it.
4) If nothing can go wrong, something will.
5) Nothing is as easy as it looks.
6) Everything takes longer than you think.
7) Left to themselves, things always go from bad to worse.
8) Nature always sides with the hidden flaw.
9) If everything seems to be going well, you have obviously overlooked something.
10) If in any problem you find yourself doing an immense amount of work, the answer can be obtained by simple inspection!

Source: adapted from iNet
http://www.xs4all.nl/~jcdverha/scijokes/

Do you know?

Why do we age.....

The answer may lie in our cells. Actually cells senesce (the process of becoming old) at different rates among different organisms and among different people. Geneticists have recently been able to isolate genes that make certain cells to act differently, either age faster, or slowly. Scientists are looking for a senescent factor that may turn out to be the reason why cells stop dividing, and thus, age. Several theories have been proposed. The 'damage theory' assumes that ageing is the result of damage to tissues caused by free radicals. Free radicals are atoms, ions and molecules that contain an unpaired electron. They are generated during metabolic processes. Thsee are implicated in age-related diseases such as cancers as well. Longer-lived species seem to have lower rates of free radical generation than do species with shorter life spans. The 'programmed theory' suggests that the senescent factor is genetically regulated. Many scientists believe that we are programmed to have a fixed, maximum life span of between 120-130 yrs!