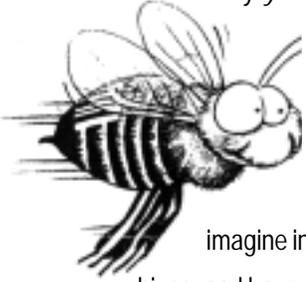


Let Me Tell You 'Bout the Bees

Did you know that for one of every three bites you take, you can thank a bee?



It's true! Over three quarters of the plants that feed us rely on pollination by animals and insects to produce food. Bees are responsible for pollinating more flowers than any other creature on earth. In fact, they pollinate one third of the food crops we eat! Without the work of bees we couldn't enjoy foods like avocados, apples, almonds, squash, melons, cherries, tomatoes, and blueberries.



What are Bees?

WHEN WE THINK ABOUT BEES we tend to imagine insects that produce honey, live in hives, and have a nasty sting. But only the honey bee fits this description. There are actually 20,000 to 30,000 different kinds of bees in the world. The bees that we see on the island can be divided into two groups...social bees and solitary bees. Honey bees and bumble bees are considered social bees because they live in colonies that are called hives. Each hive consists of a queen bee, a few male drones, and several female worker bees. However, all indigenous bees are actually solitary which means that they tend to live and nest alone. Unlike the honey bee, solitary bees are non-aggressive insects who only sting when being squeezed or attacked. Even then, this sting feels more like a mosquito bite than a wasp sting.



What is a Solitary Bee?

AS YOU CAN PROBABLY TELL by their name, most solitary bees have a lifestyle that is quite different from their honey and bumble bee relatives. Rather than living in highly populated hives, solitary bees live and lay eggs in their own separate nests. Depending on the species, indigenous bees will either *find* or *build* nests for their young. Once the nest has been prepared, the mother bee collects both pollen and nectar from nearby flowers and mixes them together to create a paste called a "pollen ball." This female bee then lays one egg onto each ball and uses mud to create a private, sealed off nests for the eggs. When the eggs hatch into larvae, the young bees begin to feed on the pollen ball that their mother has provided. Over the summer, this larvae will slowly begin a metamorphoses-- first into a pupae, then into an adult within a cocoon. The adult bee overwinters in the cocoon until the following spring when it emerges from its nest as a member of the new generation of solitary bees. These emerging bees continue the cycle of life by feeding on nectar, pollinating flowers, building nests, and laying eggs to produce bees for the next spring. Though solitary bees like to build their nests alone, they will often nest in fairly close quarters. This occurs because solitary bees are very fussy about where they build their nests...therefore, if there is only a small area that is suitable for nesting, then many bees will use that same space.

Why are bees so important?

Honey bees provide us with honey and beeswax while other bees concentrate on helping us to pollinate our backyard gardens and fruit trees. **Bees are the Earth's number one pollinator!** Bees pollinate over 1/3 of the food crops we eat as well as numerous other plants that play a vital role in maintaining a healthy ecosystem.

FACTS:

How many different species of bees are there in the world?

20,000 to 30,000

How many different species of bees live in the United States and Canada?

3,500 to 4,000

How many different species of bees live on Southern Vancouver Island?

Nobody knows for certain. There are at least 10 bumble bee species as well as numerous species of Mason, Leafcutter, Carpenter, and other indigenous pollinators.



POLLINATION

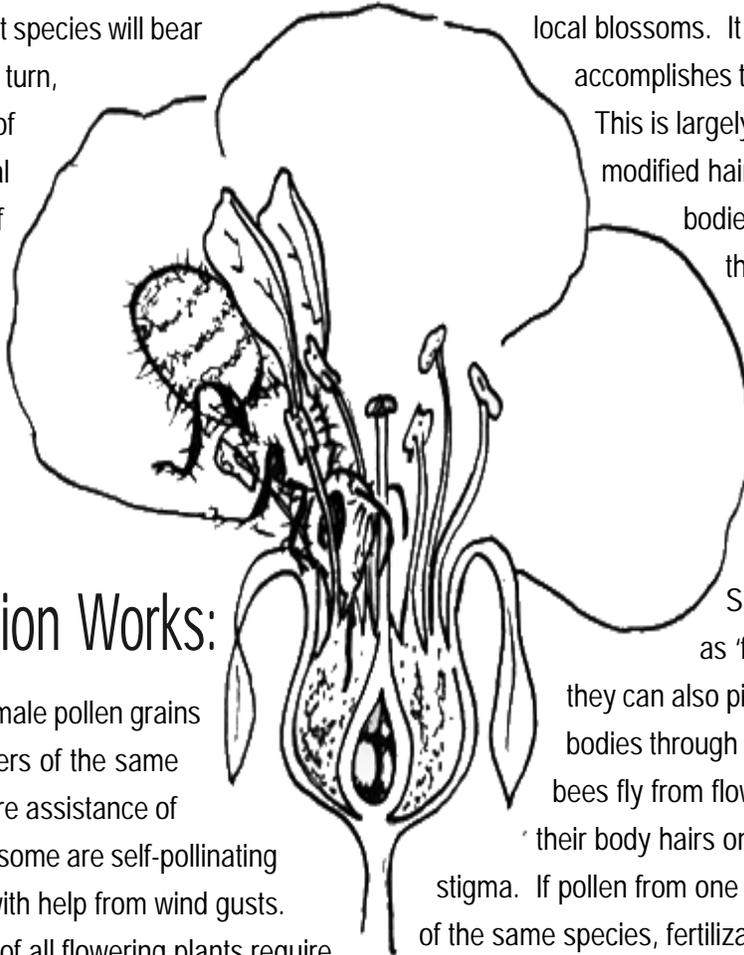
is the Key to the Cycle of Life!

Pollination is the process of transferring pollen from one flower to another. This simple process is not only the key to our food system but also to most ecosystems.

Pollination ensures that plant species will bear fruit, produce seeds and, in turn, produce future generations of plants. Pollination is essential for increasing the success of orchard and field crop production, urban gardening, ecological restoration, and the production of food for livestock.

How Pollination Works:

Pollination is the transfer of male pollen grains to the female stigma in flowers of the same species. Not all plants require assistance of pollination to produce fruit... some are self-pollinating while others are pollinated with help from wind gusts. However, about 80 percent of all flowering plants require that pollen be moved from the anther of one flower to the stigma of another by way of an animal or insect. This movement of pollen stimulates fertilization and promotes fruit production. Pollination primarily occurs when a bee, butterfly, mammal, or bird visits a flower in search of nectar or pollen. Pollen grains from the flower's anther (the male stamen of the flower) stick to the pollinator's tongue, head, wings, or legs. When the pollinator visits another flower of the same species, it deposits the fertilizing pollen on the stigma of the female pistil.



Why are B E E S such great pollinators?

Flies, beetles, butterflies, and other animals that travel around flowers only offer a small amount of pollination to local blossoms. It is the bee population that accomplishes the highest pollination rate! This is largely because of the specially modified hairs that they have on their bodies. These hairs are on the thorax (please see diagram) of the bee and look remarkably like small feathers. Pollen grains become tangled in these hairs when a bee visits a flower to extract nectar or collect pollen from anthers. Sometimes bees are referred to as 'flying dust mops' because they can also pick up pollen grains on their bodies through static electrical attraction. As bees fly from flower to flower, pollen rubs off of their body hairs onto the sticky surface of the stigma. If pollen from one plant is deposited onto a plant of the same species, fertilization occurs and the fruit, nut, or seed will form.

What happens if pollination does not occur?

When pollinated, a fertilized flower will produce full-bodied fruit containing regenerative seeds. If no pollination occurs, the plant will lose its ability to reproduce and flower blossoms will wither away without producing fruit. Low levels of pollination can result in reduced yields, slower maturing/smaller fruit, and an increase in disease. If all pollination ceased to occur, eventually all flowering plants and the creatures that they support would disappear. That's how important pollination is!

We Are Facing An Impending Pollination CRISIS:

We often assume that pollination is a 'free service' provided by nature and that it requires no investment or protection. We must erase this notion and recognize that our pollinators are under threat and need our help. We are facing an impending pollination crisis in which both wild and managed pollinators (such as honey bees) are disappearing at alarming rates. Threats to pollinators include habitat loss, poisoning from pesticides and herbicides, and the spread of pests and diseases. It is feared that a decline in pollinators may destabilize food production and ecosystems on a global scale. It is important that we realize that humans need to play an active role in protecting our pollinators...*before it is too late!* Both global biodiversity and the future of our food supply completely depend on it.

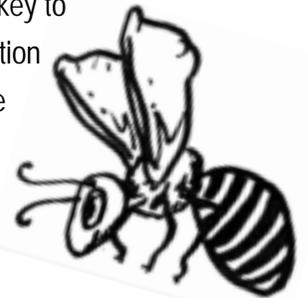
Honey Bees All Over the World are *Under Threat*.

Honey bees have long been used by farmers to pollinate agricultural crops. This is due to the fact that they are good pollinators, easy to manage, and live in hives that can be moved around. However, over the past decade, bees worldwide have suffered an onslaught of new diseases, attacks from parasitic mites, and pesticide poisoning. As a result, honey bee populations are decreasing on a worldwide scale. Food crops and other plants that depend on bees for pollination are at risk of being left out of the pollination cycle. Although this is a global dilemma, we can see the devastating results right here on the island. A destructive mite has been introduced to Southern Vancouver Island which is having a large impact on local honey bee populations. These guilty mites are the varroa mite (*varroa jacobsoni*) and the tracheal mite (*acarapis*

woodi). Both of these pests spread very quickly and are difficult to eradicate. Aside from mite infestations, local honey bees are also being affected by the pesticides that we use in farming, forestry, and around our homes. These chemicals are toxic and the island's honey bee population is feeling the effects. As a result, the agricultural crops and backyard gardens that depend on pollination may not receive the service that they require.

Native Bees *to the Rescue!*

Luckily, honey bees are not the only pollinators available to us on the island. We have a number of indigenous bee species that are both effective and efficient pollinators. In fact, the indigenous blue orchard mason bee has a pollination rate of 95% which makes it the most heroic pollinator that Vancouver Island houses. This is due to the fact that the mason bee is a quick traveller (visiting up to 2000 blossoms a day) and has more hair on its body than a honey bee does. It should also be noted that honey bees use 'baskets' on their legs to carry pollen so that very little falls out when gathering food from flowers. This makes fertilization less likely to occur. Unlike the honey bee, the blue orchard mason simply stuffs pollen into its stiff belly hairs. This allows some of the pollen to fall out onto the next flower. Not only are native bees highly effective pollinators, they are also immune to the mites that currently plague honey bee populations. Indigenous bees such as the blue orchard mason bee could be the key to countering this decrease in pollination from honey bee losses. To ensure that these bees will help *us*, we have to help *them* by providing healthy habitats for them to live and nest in.



We Have an Impressive Line-Up of *NATIVE BEE SUPERSTARS!*

The Mason Bee: *Champion Pollinator*

The blue orchard mason bee (*osmia lignaria*) is a non-aggressive solitary bee that pollinates up to 65 times more efficiently than the European honey bee. This bee is a local hero because of its ability to help fruit trees increase their yield.

WHERE THEY LIVE:

The mason bee can be found on both coasts of North America. Since this is a wood dwelling bee, they generally nest in forested areas that offer hollow stems, woodpecker holes, and beetle holes. Unfortunately, with an increase in urban development, it has become more difficult for the mason bee to find natural nesting spaces. Fortunately for this bee, it will also nest in nail holes, dead branches that have been left in your yard, plastic straws, and nesting boxes that have been made especially for these threatened pollinators. Each bee will use one hole as a nesting site to lay their eggs. The female bee uses mud to line rough spots in the holes and to build protective walls around each egg. Homeowners sometimes become concerned when they see this bee entering holes in wood around the yard. Don't be alarmed... the blue orchard mason bees do not create these holes...they only nest in existing ones.



WHAT THEY LOOK LIKE:

These bees are slightly smaller than the honey bee and are a shiny blue-black colour. The blue orchard mason bee is often mistaken for a common fly due to their similar size and colour. The female mason bee is somewhat larger than the male, has short antennae, and a brush of hairs on her underside for transporting pollen. The male mason bee is quite small, has long, curved antennae, and a patch of white hair on his face.

LIFE CYCLE:

This bee emerges when the temperature reaches 14 ° C. This is the same temperature at which apple pollen first becomes viable. In Victoria, this usually occurs in the first two weeks of March. The bee reaches its peak activity in April when fruit trees are in full bloom. As soon as the female emerges, she quickly mates with an awaiting male, and starts laying eggs in the nesting hole. While moving from flower to flower gathering pollen and nectar, she also collects mud to build nesting cells. As each cell is built she lays a single egg in it which is given a pollen ball. Females lay both fertilized and un-fertilized eggs in the nesting holes. All of the fertilized eggs will produce female bees while the un-fertilized ones will produce males. The mother bee will lay an average of 6 eggs (making 6 cells) in each nesting hole. She then blocks the entrance off with mud to keep predators out. The egg will grow into an adult bee by September but will remain in the cell until temperatures reach 14 degrees in March. The mason bee has a limited foraging range of about 100 yards so it will mostly pollinate plants that are close to home.

Leafcutter Bee

INTRODUCTION:

The leafcutter bee gets its name from their habit of cutting leaves and flowers (though not killing them!) to use as material to line their nesting tunnels. One type of leafcutter, *megachile rotundata* (alfalfa leafcutter bee) was accidentally introduced to the east coast of North America in the early 1930s. It became established and began migrating across to the Pacific Northwest prior to 1950. Soon afterwards, alfalfa seed growers began noticing the bee visiting the blooms in their fields. Subsequent studies have established the leafcutter's unique value in Alfalfa pollination.

WHERE THEY LIVE:

Like the mason bee, leafcutters are a solitary, wood-dwelling bee. Alfalfa leafcutters build their nests in deep holes and hollow stems. Other leafcutters, such as our local Western Leafcutter, nest in the ground or rotting wood.

WHAT THEY LOOK LIKE:

Leafcutters are about half the size of honey bees and has stripes of light coloured hair on its abdomen. The female is shiny and brown with prominent white hairs on its underbelly that carry pollen. The male is a flat brown colour.



LIFE CYCLE:

Leafcutters are summer bees with one or more generations per year. They tend to prefer temperatures of 20° C or higher.

FACT:

According to Steve Buchman, author of *The Forgotten Pollinators*, 70-90% of the indigenous bee population in the United States has been lost due to urban sprawl and wide-spread pesticide use.

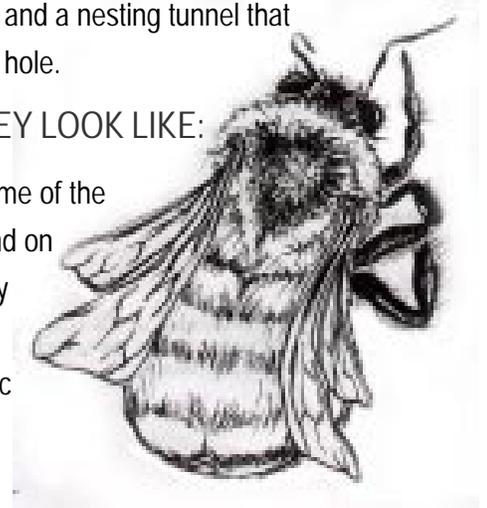
Carpenter Bee

WHERE THEY LIVE:

These bees excavate their own nest tunnels in wood, rather than nesting in pre-existing cavities. They either burrow into dry wood or re-use an old nesting site. Carpenter bees will not make holes in wood that has been painted or is covered in bark. The nest consists of a round entrance hole from 1/8" to 1/2" in diameter and a nesting tunnel that extends back from this hole.

WHAT THEY LOOK LIKE:

Carpenter bees are some of the largest bees we can find on Vancouver Island. They have a blue-black, green, or purple metallic sheen.



LIFE CYCLE:

They become active in early spring and pollinate while collecting nectar for their young well into the summer months.

...DO THESE BEES STING?

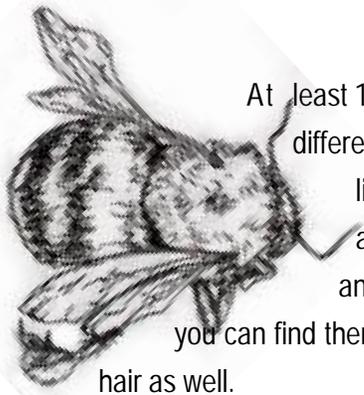
All of these indigenous, solitary bees are completely non-aggressive. Only the female bee has a stinger and she will only use it if she is being pinched between fingers or is caught under clothing. But don't fret because this sting is very mild and feels more like a misquito bite than anything else. On the other hand, bumble bees are fairly aggressive around their nest site. A bumble bee sting is similar to that of a honey bee...PAINFUL.

Bumble Bee:

WHERE THEY LIVE:

While some bumble bees (*bombus*) live in the ground, others will nest anywhere that offers insulating materials. They have been known to nest in old mattresses, compost heaps, and in the walls of houses. Currently, subdivision housing and ploughed fields pose a threat to the bumble bee's natural habitat as the overwintering queen needs an undisturbed site to hibernate. These quiet nesting spaces are becoming increasingly difficult for the queen to find.

WHAT THEY LOOK LIKE:



At least 10 different species and 30 different subspecies of bumble bees live in British Columbia. They are large and fuzzy with yellow and black stripes. On occasion, you can find them with red-orange or white hair as well.

LIFE CYCLE:

A bumble bee colony starts its life with a solitary overwintering queen. In the spring, she emerges from a sheltered area (bark, logs, deep grass) and starts visiting flowers looking for a nest site to house her future colony. When she finds a dry, fluffy, sheltered hollow she begins to collect pollen. She shapes this pollen into a lump on the floor with an open space to lay her eggs in. The queen will lay several eggs on this mound and covers it with a ball of wax. In between foraging trips for nectar and pollen, she will sit on this lump and incubate the eggs...much like a nesting bird. The first bees to emerge are the workers to help the queen with her foraging. By late summer, the colony will begin producing males and few new queens. These bees then mate and the new queens eventually leave to find an overwintering site. The workers, males, and old queen die within the summer months. Bumble bees are excellent pollinators of blueberry, cranberry, red clover, peppers, eggplant, and tomatoes. This is due to

their long tongues which can reach into deep flowers and the fact that they use 'buzz pollination'. Buzz pollination is when a bee vibrates the blossom which stimulates it to release pollen. Plants such as tomatoes, eggplants, and peppers only release pollen when the flower is buzz pollinated. Bumble bees are larger than most other bees and need a great deal of food energy from the flowers they visit. As a result, bumble bees have evolved to forage before and after the other bees (in the morning and evening) when it is assured that each blossom will have an adequate supply of nectar.

Berry Bee:

WHERE THEY LIVE:

These bees (*osmia texana cresson*) have similar nesting habits as the blue orchard mason bee. They will use the pre-existing holes of a nesting block or in dead branches.

WHAT THEY LOOK LIKE:

These black-blue coloured bees have a few light hairs on each segment of their upper abdomen which gives them a striped appearance. This allusion is enhanced when the small body hairs have pollen stuck to them. The female berry bee is about half the size of a honey bee while the male is even smaller than the female.



LIFE CYCLE:

These bees come out of their nests around the time when the mason bee is finishing up for the season. The females begin their work in the middle of May and finish laying eggs in early August. Some berry bees emerge after one season of hibernation while others take up to two years to emerge. There is not much known about the berry bee and it is believed that these could be two separate species. In general, the berry bee is attracted to the blossoms of blackberry, raspberry, and loganberry bushes.

NATIVE BEES NEED OUR HELP!

Though they are not affected by the same mites as honey bees, there are other factors which are causing harm to native bee populations in Victoria. These include habitat and food loss through urbanization and deforestation, as well as poisonings from pesticide use. There are a number of things that we can do to help protect Victoria's indigenous bee population and the invaluable service of pollination that it provides.

Bees and Pesticides

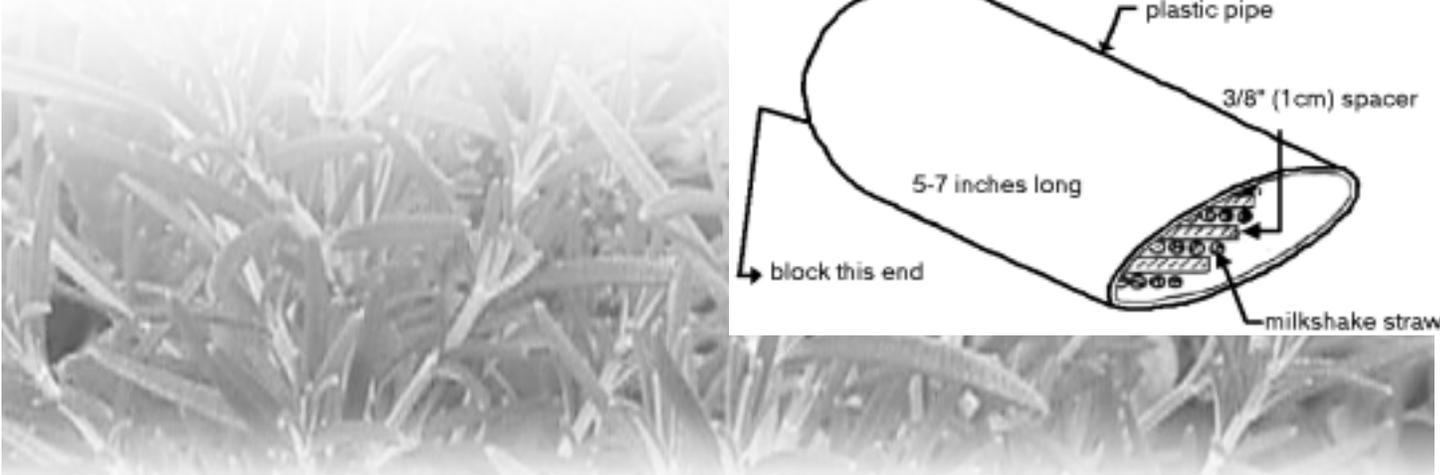
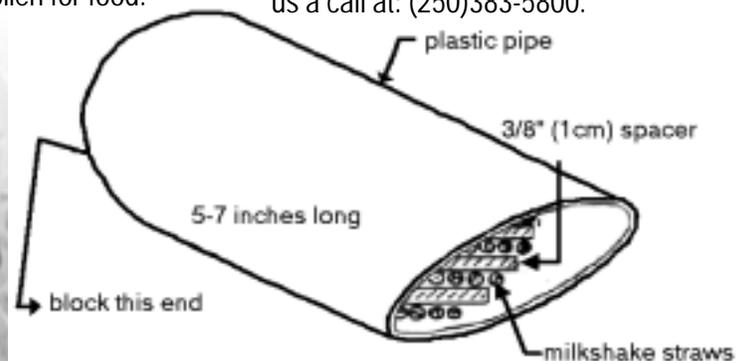
Both honey bees and indigenous bees are susceptible to chemical pesticides. The wide-spread use of dangerous pesticides in our yards and gardens has caused a dramatic drop in the size of bee populations. The blue orchard mason bee and other native pollinators are at the greatest risk due to the high number of blossoms that they visit each day. You can help stop unnecessary bee deaths by learning about chemical pesticides and turning to less harmful methods of pest control. For more information on pesticide-free gardening, contact CityGreen at: (250)381-9995.

Bee Gardens

Pollination is not a free service! If we want indigenous bees to improve the productivity of our gardens and fruit trees, we have to provide safe and healthy habitats for them to live in. Bee gardens are a simple measure and besides looking lovely, they will also attract indigenous pollinators to the safe nesting place that you have provided. To build a bee garden in your yard, simply grow a diverse array of plants and flowers. The blue orchard mason bee is particularly attracted to single blossom blue, yellow, and purple flowers. They will use these attractive flowers to gather nectar and pollen for food.

Native Bee Homes

Since many native bee species are wood dwelling (yet not capable of making their own nesting holes) it is important to provide bee boxes for your neighbourhood pollinators to lay their eggs in. Bee homes are simple to make and are a very convenient and attractive home for the busy bees. Also ensure that your yard offers nesting materials such as dead wood, leaves, and undisturbed soil. Below is a simple bee box design that is inexpensive and easy to make! If you need any aid or advice on building a bee box for your yard, give us a call at: (250)383-5800.



THESE FACT SHEETS HAVE BEEN BROUGHT TO YOU BY:

LifeCycles Project Society:

LifeCycles is a non-profit organization dedicated to cultivating awareness and initiating action around food, health, and urban sustainability in the Greater Victoria community. If you have any questions or comments about the bee project, or any other projects that we support, please stop by our office or give us a buzz:



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web: www.lifecyclesproject.ca

STAY TUNED FOR MORE LIFECYCLES INFORMATION SHEETS ON THESE TOPICS.....

>> **providing habitat for indigenous bees**

>> **how to build a bee garden in *your* yard**

>> **the importance of pesticide-free gardening**

USEFUL BEE INFORMATION CONTACTS :

- * ***LifeCycles on the web:*** www.lifecyclesproject.ca (All references for the information found in this fact sheet may be found on our web site, as well as downloadable PDF files of all our publications!)
- * ***LifeCycles resource library:*** You can reach us at 383-5800 or visit us at 527 Michigan Street.
- * ***Cowichan Community Land Trust Society:*** #6-55 Station St. Duncan, B.C. V9L 1M2 phone: 746-227
- * ***BeeDiverse:*** Margriet Dogterom, Ph.D. Phone: (604) 936- 3919 toll free: 1-800-794-2144
e-mail: cpc@intergate.bc.ca
- * ***B.C. Fruit Testers Association:*** P.O. Box 48123, 3575 Douglas St., Victoria B.C. V8Z 7H5

THANKS TO:

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Helping communities create a healthy environment