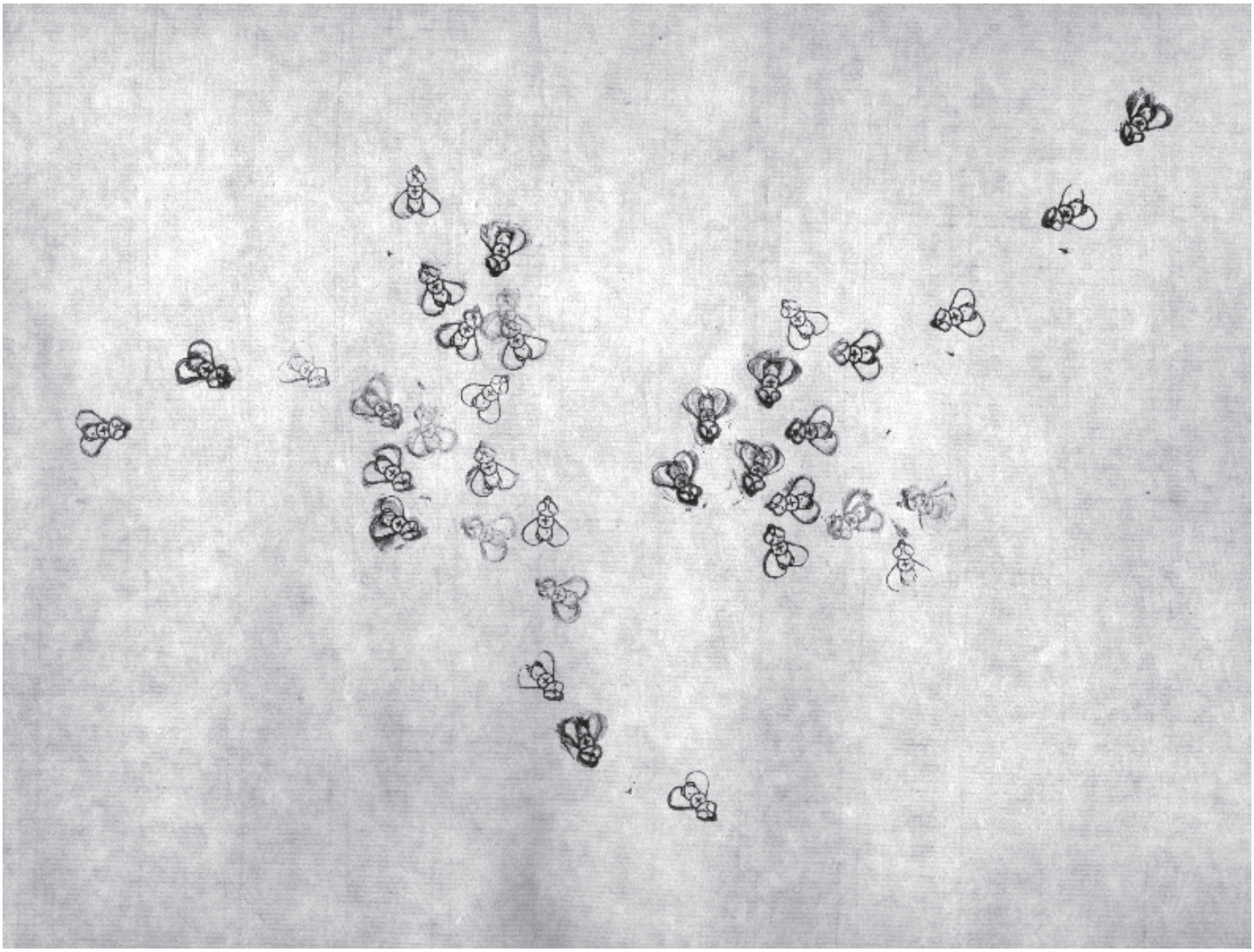
Bees' buzz

Now that it's spring (or almost), the sun's dipping down closer to the northern hemisphere. Sparrows, chickadees and crows no longer have the whole place to themselves. Here in Ontario, we might get a few more snow flurries, but that won't stop the chives from poking through. Macintosh apples, at this time of year, are the last thing on anyone's mind.



drawings & story
by Cindy Deachman

Yet springtime is a preparation for summer and fall. As the plants flower, butterflies and moths unfurl their wings and bees emerge from hibernation. Hummingbirds and bats return for the summer. These are the creatures that evolved along with flowering plants. It's a symbiotic process: the flowers feed animals their nectar while the animals take pollen from male plant to female. The seeds and fruit of many plants come to be through the ferrying of pollen.

Our knowledge of pollination began in 800 B.C. with the ancient Assyrians who knew that the fruit of a plant could only develop through pollination. (At the British Museum, you can see Assyrian stone reliefs that show the pollen of date palms being passed from the male to the female organs of the palm trees' flowers.) Greeks of the fifth century BC, like Herodutus and Aristotle, knew that the wasp pollinated the fig tree. By the 1800s, however, Americans and Europeans had somehow forgotten about such a relationship. It was zoologist Gustav Eisen who was sure, by 1887, that Californians ought to import wasps for their new fig trees, but he was jeered at for his trouble. It wasn't until three years later that Californian farmers finally did listen to a financier, Frederick C. Roeding, who persuaded them that indeed, figs must have their fig wasps.

Even nowadays, no one's sure how much pollination any plant needs in order to produce fruit. It was once thought that coffee could prosper without insect pollination yet now we know that coffee plants produce more beans after insects have foraged their flowers. Without proper pollination, apples are small and misshapen. And every cucumber flower needs about twenty bee visits to become a beautifully straight cucumber. Peter Kevan, professor in Environmental Biology at the University of Guelph, Ontario, explains our relationship to pollinators: "Pollination is one of the fundamental processes that occurs in agricultural settings. Because pollination is the means by which plants produce seeds and fruits, pollination is a critical and early step in food production."

For the past twelve years, farmers and biologists have seen pollinator populations on the wane. As farming practices change, many pollinators, the bats, moths and wasps, are eking out a living, yes, but arduously. Bees and wasps, for instance, find few places to hide if there are no fence posts standing, or rubble left lying about. Crops may have plenty of flowers for butterflies and bees to enjoy, but if the fields are far from the insects' habitats, there won't be much visiting. And of course if the flowers have been heavily sprayed, pollinators, if they care anything about living, would do well to stay away.

In the 1970s, Kevan investigated the relationship between bumblebees, blueberries, and an insecticide called fenitrothion. Some New Brunswick fields next to blueberry crops had been sprayed with fenitrothion to keep the spruce budworm population at bay. It turned out that not only did the blueberry crop plummet, but during that same decade, the native bumblebee population decreased drastically. Kevan discovered that the usual number of bumblebees were not buzzing around because they'd either died or sickened from the insecticide fenitrothion. Then, because the blueberry bushes weren't pollinated properly, very little fruit was borne. Blueberry growers were losing up to a million pounds of blueberries a year. Other scientists examined the work Kevan had done on the New Brunswick forest as well as forests in Quebec and Ontario. Two decades after Kevan had begun his investigation, Forestry Canada banned fenitrothion.

Honey bees seem to be even worse off than bumblebees. Seventeen years ago, a mite was accidentally introduced into the United States, and since then, feral honey bees have been dying. Farmers now have to hire the services of beekeepers and their honey bees. But even these colonies are losing individuals to the parasites. Last year, American beekeepers saw over half their 2.65 million honeybee colonies die, mostly because of the mites: in order to pollinate their crops, California almond growers, for the first time ever, had to import bees from Australia.

The situation is not as bad in Canada — yet. To nip the mite problem in the bud, Dr. Medhat Nasr, Alberta's provincial apiculturist, is developing a package of techniques which includes both physical and chemical methods. His aim is to keep the mites down without harming the honey bees. To this end he is using alternative pesticides and breeding mite-resistant bees. He has even come up with hygienic bees that not only sense pathogens in the hive, but also remove them.

Six years ago, Russian bees were introduced into Canada. While they showed some resistance to mites, they didn't produce as much honey as our European bees. Rather than riding the conventional "chemical treadmill," as Dr. Nasr calls it, whereby stronger and stronger pesticides are used to combat the mites' increasing resistance, Dr. Nasr decided to use organic acids that are found naturally in honey. Oxalic acid is one that works well against the mites, while formic acid and thymol, an essential oil, are two that are still being tested. Although beekeepers have to spend more money on the application of the oxalic acid (the machines are expensive) and must spend more time monitoring their hives, they are nevertheless receptive to this new safer treatment. (Beekeepers actually donated hives to Dr. Nasr for experimentation.) Dr. Nasr notes that in Alberta there is a "25% increase in the yield of hybrid canola seed production when honeybees move the pollen from the male to female plants." Last year he wrote: "At our table, one third of the food that you and I eat is produced as a result of

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honey bee pollination." Dr. Nasr knows how much we depend on bees.

Other researchers are also investigating how to deal not only with mites, but how to beef up the domestic honey bees' health in general. Environmental biologist Abdolreza Saffari, Jim Atkinson, Associate Professor in Animal and Poultry Sciences at the University of Guelph, and Peter Kevan, have just come up with a natural pollen substitute that honeybees actually find tasty. As Saffari explains it, the honey bees use the energy from nectar for flying, but they also need pollen to survive; pollen gives them nutrients needed to maintain their bodies, and also to make royal jelly on which to raise their brood. In January, the queen is awake and ready to lay eggs, but there's still snow on the ground. According to Kevan, the bees have already stockpiled some pollen from the previous years to feed their families. But these days that's not enough. A cake of pollen substitute (also in powder and liquid form) put into the hives gives the brood that much more to live on, and therefore much more chance to survive. By the time the flowers bloom, the bees will have had a "rapid spring build-up."

Up to now, the bees haven't much enjoyed pollen substitutes. The patties have been made with soy powder, yeast and sugar, which not only taste wretched, but stint on nutrition. Saffari likens this pollen substitute to the burger you might get at McDonald's. He says, "I'm at an age when I don't need the fat: that food's not good for me." Over the last decade, Saffari has been busy testing, one by one, more than 225 ingredients, to figure out what it is that honey bees do like. He has tested apple seeds, rice bran, linseed, flower petals, capsicum seeds and all sorts of grains, fruit and vegetables. He even hired a professional food-taster to figure out what food tasted most like pollen. Finally, Saffari hit upon a pollen substitute the bees find delicious. He gave them a choice of three foods: natural pollen, his new product and an earlier pollen substitute. The bees enjoyed both pollen and the new pollen substitute, but didn't take to the old pollen cake. Not only that, but the colonies fed on Saffari's new product bred twice the number of bees, and even manufactured twice the amount of honey. Now other beekeeping countries — Australia, the United States, Brazil, Iran and Spain — are asking for *Feedbee®* to complement the diets of their own bee colonies. "You can't beat mixed pollen," Saffari says, "gathered from living plants, but when it's too cold for any vegetation to grow or if the rain's coming down, these new cakes will make a tasty nutritious addition for our honey bees."

It's true we need bees for honey. We love the sound of bees buzzing around as part of our experience in summertime. But most of all, we look to bees for our crop pollination — tomatoes, cucumbers and canola oil. We need those crops and we need those bees. ~