The Vanishing Honeybee:
Omen of Our Time

"The earth also is defiled under the inhabitants thereof."
—Isaiah 24:5

IN THIS SCRIPTURE, THE Prophet Isaiah points to the devastating effects of fallen man's irresponsible and careless behavior because of sin. The Old Testament Hebrew word that has been translated 'defiled' means to soil, and is variously translated profane, corrupt, or pollute in other versions of the Bible. In the context, the prophet also speaks of earth's inhabitants who profane the laws of God and ignore his holy standards of righteousness.

In recent years, the threat of pollution and its effects has become a major subject of concern as we witness the earth's air, soil, and water resources being contaminated. As these natural treasures become polluted at increasing levels, long-established wildlife habitats are also being disturbed in many parts of the world. Some of these disruptions are directly affecting the human family and the

food we eat. Concern has also been growing as the United States is turning to importing more of its food from foreign sources, some of which may be questionable.

NATURE'S MARVEL

Honeybees are scientifically known as Apis mellifera and are closely related to wasp and ant colonies. They are not native to North America, but were introduced here by early colonists who brought them from England, first to Virginia in 1622 and then to Massachusetts in 1630. They spread from there to other locations throughout the United States by natural swarming and by beekeepers. They are found on all of earth's continents except Antarctica, and in every habitat where flowering plants are found. Some of these habitats are now being threatened.

These marvelous little creatures have been especially adapted by the Creator for feeding on either nectar or pollen, depending upon their specific body needs at the time of their feeding. Bees are particularly noted for their function in the pollination of flowering plants as their hairy little bodies pick up pollen from one plant and transport it to another.

BUSY BEES

The familiar expression 'busy bee' describes the sterile female hive workers, and takes on new and added meaning when considered in the light of the important role they perform in the well-being and happiness of the human family. They also provide a vital link in the human food chain. Honeybees and flowering plants work in harmony with each other

as they carry out this elaborate and very important function. During the process, honey is produced that is also a valuable food commodity.

In a honeybee colony, there is a queen bee that lays her eggs in a honeycomb cell that has been prepared for her by the worker bees. She may lay as many as 3,000 eggs in one day during her peak season. Her life span is usually two to three years. The workers make the wax for the hive, build the honeycomb, and clean up the hive. They also maintain the temperature in the hive by fanning their wings. Worker bees collect nectar to feed the baby bees that grow rapidly and begin to climb out of their cells when they are fully grown, usually after 16-24 days. The average lifespan of a honeybee during the working season is approximately six weeks.

Honeybees are normally gentle insects and use their stingers only in self-defense when they are threatened or disturbed. Beekeepers who work with them on a regular basis understand and respect their colonies and develop a compatible working relationship with them. It is generally known by researchers who have studied honeybees' living habits that they have the ability to communicate with one another on a high level of sophistication. When foraging bees have found a new source of food they will return to the hive and communicate this information to other worker bees in the colony. One way they do this is by performing an elaborate and so-called 'language dance' that is oriented toward the sun, and indicates both the distance and direction to the newly found source of food. There are also other ways they communicate with each other by way of sound and aroma.

Honeybees eat nectar which is a sugary water solution, and pollen which is a yellow powdery protein, that are both produced by flowering plants. They are attracted to the plants by enticing colored petals, alluring aroma, or by very sweet nectar. When foraging, the bees pick up the dusty pollen from the male anther of one flower, and then transport it to the female stigma of another plant. Fertilization takes place and the seed begins its process of development. Successful pollination increases when there are more bees present during the time of peak flowering.

THE HUMAN FOOD CHAIN

Agriculturalists estimate that one third of the human food supply depends directly on insect pollination and, according to the United States Department of Agriculture, honeybees are responsible for the majority of that pollination. Certain species of beetles, butterflies, moths, and some breeds of birds are also common pollinators. Wind and water may also transport pollen. Recent statistics indicate that honeybees provide pollination for dozens of varieties of the most important fruit, citrus, berry, and nut crops that are commercially grown. These crops are estimated to be worth billions of dollars annually in this country alone, and include cherries, blueberries, apples, peaches, pears, kiwi, cranberries, strawberries, avocados, almonds, and macadamia nuts. In addition, many varieties of vegetable crops also depend upon honey bees, such as asparagus, broccoli, celery, squash, cucumbers, pumpkins, cantaloupe, melons and many other items.

The state of California is the nation's largest producer of food crops, and has nearly 500,000 colonies of honeybees that are operated by 400 commercial and noncommercial beekeepers. In addition to this number, there are over 2,000 others who keep bees as a hobby, usually at or near their own homes. In California alone, the annual almond crop depends upon approximately 1.3 million colonies of honeybees for pollination and the figure is expected to rise substantially.

Contract beekeepers constantly move their bee colonies around the country as the growing season changes. They concentrate their hives in areas of pollination at appropriate times to enhance and sustain agricultural productivity. Without these wondrous little creatures that are small enough to move into the flowers, collect the pollen and deliver it where it is needed, there would be no fruit. Even cattle, which feed on alfalfa and other flowering grasses also depend on them. Certain crops, therefore, cannot be sustained to produce an adequate food supply for human consumption without them.

VANISHING HONEYBEES

Commercial apiaries have recently reported that large numbers of their bees have been disappearing. They explain that the usual procedure has always been to place their beehives near a flowering field crop for two or three weeks and then return to retrieve them. Now upon their return, they report finding only the queen and a few immature bees, and whatever worker bees that may have survived are too weak to perform their tasks.

Scientists who are studying the situation say that they have found abandoned hives in which the bees have left their hives along with the honey and their broods of baby bees. They are fleeing their hives to die elsewhere. One researcher, commenting on the phenomenon said it was like a mother going off somewhere and leaving her children behind.

Problems are being reported in many places in this country as well as in overseas locations. In many cases, beekeepers have lost half of their bees, and in some cases the percentage is even higher. This is causing serious concern because these insects are highly mobile, and can be quickly moved en masse to locations where crops are in bloom and ready for pollination.

COLONY-COLLAPSE DISORDER

Experts in the agriculture industry have identified the problem of rapidly disappearing adult worker bees over a very short period of time as 'colony-collapse disorder.' They point out that this is occurring during the season when a rapid die-off of workers is not expected, either in late fall or early spring. Insect ecologists are considering the possibility that the disappearance of honeybees may be related to disruptions in their orientation and navigation. Bees are also vanishing in other parts of the world, including many countries in Europe, South America, and elsewhere. It is noted that other insects such as wasps, flies, beetles, and some birds that are associated with pollination are also experiencing decreasing populations.

SEARCHING FOR CAUSES

Researchers have examined thousands of abandoned bee hives, dissected countless numbers of bees, and have tested for viruses, bacteria, mites, pesticides, and many other possible causes of CCD. They are struggling to discover the reason why honeybees are disappearing, and are looking to find a specific reason that may be responsible for the problem. They point out that the honeybee genome has only half as many genes to detoxify poisons and to fight off infections that some other insects have. They are also not equipped to fight poisons or disease because of their peculiar social habits which exposes them to ailments that other closely related species of insects may be affected with. The nature of bees has thus led to the loss of large numbers of genes associated with the immune system.

It has also been suggested that stress may play a part in the disorder. Honeybees are naturally used to having a variety of foods in their diets when left to forage for themselves. When their hives are packed onto flatbed trucks and hauled over long distant routes to pollinate a specific crop, they are thus reduced to surviving on a single source of food. Traveling long distances also exposes them to temperature fluctuations and high levels of carbon dioxide. These factors all contribute to a very high level of stress.

Specimens of bees have been studied by a team of scientists that are associated with the United States Department of Agriculture. They report that a recently discovered virus, known as the 'Israeli acute paralysis virus (IAPV)' which was

first identified in bee colonies in Israel in 2002, was present in more than 90% of the samples. They observed that bees were exhibiting unusual behavior such as twitching their wings when moving around outside of their hives. Those who studied the effects of the virus said this may be a possible indicator for the syndrome, but they acknowledge that it is not likely to be a direct cause.

Other studies show that there is a host of microscopic bugs that afflict honeybees, including the vampiric Varroa destructor, which sucks the blood from bees. Although the mites don't kill the bees, their bites leave open wounds for further infections to set in. Investigators report that it is more likely that Varroa is working in conjunction with other parasites or pathogens that wear down the bees' immune systems until even the smallest infection can kill them. Also under study is the Tracheal mite, which attacks the bee's respiratory system.

CHEMICAL POISONS

Many causes for CCD have been under investigation including environmental changes that may be related to the breakdown of the bee's immune system. Other possible causes have included exposure to limited or contaminated water supply. One investigator who was studying the effects of the syndrome traveled from one part of the country to the other while collecting specimens of adult bees, young and immature broods, as well as nectar, pollen and honeycombs from both sick and healthy colonies. In a coordinated study of these specimens, over one hundred chemical pesticides that are used to poison mites, funguses, and other pests were

investigated with no apparent link established to CCD.

Scientists have also focused on a new group of pesticides known as neonicotinoids. These are being studied because they have been found to be safe when used in human populations, but have the potential to kill honeybees. They found that using these pesticides leads to confusing the bee's ability to navigate and to become acquainted with their environment, but no recognizable underlying cause of CCD has yet been found.

A study of chemical poisons has been conducted that relates to honeybees' extreme sensitivity to odors, which is about forty times greater than that found in human beings. Scientists explained that when a colony of bees is exposed to a new chemical odor, they create sounds within their hives that can be recorded. Studying these sounds may indicate a change in volume and frequency which gives them a unique audio signature. However, no definite conclusions have been reached so far to connect these recorded changes in sound to Colony-Collapse Disorder.

The wholesale use of powerful pesticides that are used in large scale farming operations to control unwelcome insects, are believed by many beekeepers and researchers to be a direct cause of CCD. Honeybees that are exposed to an overdose of chemicals potent enough to kill other insects could very easily trigger the syndrome. This includes the use of nicotine-based Imidacloprid, an insecticide ingredient produced by Bayer laboratories. When used to control termites and other problem insects, it is known to damage the immune system and

disorient the insect's memory so that they cannot find their way back home. The substance is now banned in France where it has been blamed for triggering declining honeybee populations in that country. However, Bayer has denied any connection to CCD.

ICE CREAM FLAVORS AFFECTED

As evidence of the extent of potential damage to our food industry, we note an interesting news item carried by CNN (February 17, 2008) and submitted by senior writer Parija Kavilanz under the caption "Disappearing Bees Threaten Ice Cream Sellers." The report said that Haagen-Dazs, a premium ice cream maker, has stated that vanishing honeybee colonies in the United States may lead to fewer available flavors and higher prices for their products. The company warned that the tiny honeybee is responsible for this unprecedented problem.

Kavilanz reports, "At issue is the disappearing bee colonies in the United States, a situation that continues to mystify scientists and frighten foodmakers." That's because, according to Haagen-Dazs, one-third of the U. S. food supply—including a variety of fruits, vegetables, and even nuts—depends on pollination from bees. Haagen-Dazs, which is owned by Nestle, said bees are actually responsible for 40% of its 60 flavors, such as strawberry, toasted pecan, and banana split. "These are among consumers' favorite flavors," said Katty Pien, director with Haagen-Dazs. "We use 100% all natural ingredients like strawberries, raspberries, and almonds which we get from California. The bee problem could badly hurt supply from the Pacific Northwest."

Pien said Haagen-Dazs is hoping scientists get a breakthrough in this mystery soon. Otherwise, she said, "The company may have to reexamine the flavors that we currently offer our customers. We have to ensure that we have enough supply to maintain our variety." Additionally, a supply shortage of key ingredients could push up retail prices for its products. Pien said the company is donating $250,000 to both Pennsylvania State University and the University of California, Davis to fund research into bee Colony-Collapse Disorder (CCD). She said Haagen-Dazs is also rushing to raise consumer awareness about the problem by launching a new flavor this spring called Vanilla Honey Bee. She said, "We'll use part of the sales from this flavor to help the honeybees. We are taking this very, very seriously because it impacts not just our brand but the entire food industry."

FLOWERS AND SEEDS

In addition to the food crop industry, there are also numerous commercial flower and seed growers that send their products all over the world. Many of these seeds, plants, and flowers are used to provide areas of recreation in city and town parks, and for beautification around public buildings throughout the country.

It is estimated that one half of all American households have a small garden plot somewhere on their property. Many of these contain both flowers and vegetables. Growing varieties of annual and perennial flowers, planting flowering shrubs and trees as well as many other species is an outdoor pastime that is enjoyed by many home owners.

Others find pleasure in preparing a place to grow a few vegetables. However, most of these gardens depend upon the vanishing honeybee to perform the necessary pollination. This simple act of nature provides us all with a better quality of life.

THE WEAKENED NATIONS

Corruption, violence, and the power to destroy is everywhere prevalent in our polluted and violated world today. The Prophet Isaiah speaks of Satan, who is the author of this tragedy, and writes, "How you have fallen from heaven, O star of the morning, son of the dawn! You have been cut down to the earth, You who have weakened the nations!"—Isa. 14:12, *New American Standard Bible*

God had once created a beautiful and harmonious environment for mankind and the animal creation that would share it with him, but now we see it defiled beyond measure. The honeybee has suffered much during this progressive degeneration. This has come about by way of countless numbers of diseases, infections, bacteria, and viruses. The list includes exposure to violent environmental and adverse weather changes as well as contaminated water and food sources. Bees have had to cope with forced travel over long distances to do their work, and also to overcome powerful chemical agents that are designed to destroy the immune systems and cause the death of other unwanted species of insects.

In our present society, honeybees are becoming overstressed and overworked. At the same time, they are also being exposed to a variety of debilitating conditions that now cause them to become

disorientated, abandon their hives along with their babies and honey supply, and fly away to suffer and die in some unlikely place that neither scientists nor modern technology has been able to find or to understand.

HARMONY OF A PERFECTED EARTH

We believe that our loving Heavenly Father has full knowledge of the terrible calamity that has come upon his earthly creation because of disobedience to his laws of righteousness. We know that he has a glorious plan to restore the earth to harmony and peace during the future kingdom of his Son, our Lord Jesus. The psalmist says, "Then shall the earth yield her increase; and God, even our own God, shall bless us." (Ps. 67:6) During the administration of that blessed kingdom, sin and death shall be no more, and the whole creation will then rejoice in the ultimate plan and purpose of God.

The Prophet Isaiah also speaks of this wonderful time soon to come. In prophetic language, he says, "The wolf also shall dwell with the lamb, and the leopard shall lie down with the kid; and the calf and the young lion and the fatling together; and a little child shall lead them. And the cow and the bear shall feed; their young ones shall lie down together: and the lion shall eat straw like the ox. And the sucking child shall play on the hole of the asp, and the weaned child shall put his hand on the cockatrice' [adder's, *Marginal Translation*] den."—Isa. 11:6-8

Although the honeybee is not specifically mentioned by the prophet in this passage of scripture,

we nevertheless rejoice in the eternal purpose of God that will include the blessing of this tiny creature to share in the glories of a perfected earth. We may trust our loving God to provide a safe and peaceful environment for the humble insect that performs such a wondrous task in the cycle that he has provided for the enjoyment of the family of man.

We continue to look forward with increasing anticipation to the fulfillment and ultimate purpose of our all-wise Heavenly Father that will soon be manifest to the whole world. "They shall not hurt nor destroy in all my holy mountain: for the earth shall be full of the knowledge of the LORD, as the waters cover the sea."—vs. 9 ■