The Diablo Bee

Newsletter of the Mount Diablo Beekeepers Association

JUNE 2008

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www.diablobees.org

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June's guest speaker:
Josh Fisher, co- creator of the intriguing movie "Pollen Nation", which follows the journey of a third-generation commercial beekeeper.

HIGHLIGHTS OF THIS ISSUE

What's the Buzz?

Much thanks to Laurie Davies Adams of the CoEvolution Institute for her enrapturing discussion on biodiversity and pollinators.

Meetings

Important DATE!

Our next meeting is June 12 at 7:30 pm at the Heather Farm Garden Center in Walnut Creek.

Announcements

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Please send interesting bee articles via email to:
ersten3@yahoo.com

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Membership Dues

Your $15 yearly dues should be sent to:

Jeff Peacock, Treasurer
Mount Diablo Beekeepers Association
3341 Walnut Lane
Lafayette, CA 94549

Or…. you can give Jeff your check at any monthly meeting.

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If you have an active email address, you will receive this newsletter by e-mail unless you inform Kim Coleman at:
Kdeem@caleng.com
that you wish to receive a hard copy.

Not receiving a hard copy? Contact Kim at the above e-mail address, or by calling her at 925-685-6849.

Lafayette School Studies Bees!

Storyline by Jonathan Winters

Kindergarten students at Lafayette Elementary School were exposed to one of our club's observation hives as they studied about bees recently. Being a club member and a science teacher, I always incorporate bees into my annual lessons with the children.

Every kindergartner had a bee story to share - good or bad - but by the end of the class, they were all bee lovers. Also, I still have yet to find a kindergartner who dislikes the taste of honey!

Bees are a perfect insect to introduce to young children to teach them about life cycles and insect parts. I usually show the students two models: one of a "cute" bee and one that is more

anatomically correct. Then we discuss what a real bee looks like. We make model bees, role play the different jobs bees have, and discuss the benefits of pollination. Club member Gary Lawrence used to come in to share his stories when he did classroom visits and the kids loved him because he resembles the bee man in a story we read.

The observation hives make a huge difference in bringing to life all that we study. The children really love trying out the equipment as well.

Promiscuity Produces More Productive Colonies

Why do queen honeybees mate with dozens of males? Does their extreme promiscuity, perhaps, serve a purpose?

An answer to this age-old mystery is proposed by Cornell scientists: Promiscuous queens, they suggest, produce genetically diverse colonies that are far more productive and hardy than genetically uniform colonies produced by monogamous queens.

"An intriguing trait of honeybee species worldwide is that each honeybee queen mates with an extraordinarily high number of males," said Heather R. Mattila, a Cornell postdoctoral fellow in neurobiology and behavior and co-author of the article with Thomas D. Seeley, Cornell professor of neurobiology and behavior.

In every honeybee species, say the researchers, queens mate with multiple males. The European honeybee -- the common species in North America -- mates with from six to 20 mates on average, for example, while the giant honeybee in Asia has a reported record of 102 mates.

To study the reasons for honeybees' promiscuity, the Cornell biologists inseminated 12 queens with sperm from 15 drones (a different set for each) and nine additional queens with sperm from a single drone (but a different one in each case). They then prompted the hives to swarm in early June to form new colonies.

"After only two weeks of building new nests, the genetically diverse colonies constructed 30 percent more comb, stored 39 percent more food and maintained foraging levels that were 27 to 78 percent higher than genetically uniform colonies," said Mattila.

By the end of the summer, the genetically diverse colonies had five times more bees, eight times more reproductive males and heavier average body weights, mostly because of larger amounts of stored food.

Heather R. Mattila

Worker honeybees construct a new comb, an important part of colony founding. Colonies of promiscuous queens tend to be far more successful in such chores and in surviving their first winter than colonies produced by monogamous queens, report Cornell researchers Tom Seeley and Heather Mattila in Science magazine.

By winter's end, 25 percent of the genetically diverse colonies survived to their one-year anniversary (only about 20 percent of new honeybee colonies make it that long in upstate New York). But all of the genetically uniform hives starved to death.

"These differences are noteworthy considering colonies had similarly sized worker populations when they were first formed," said Mattila.

"Undoubtedly, our results reveal enormous benefits of genetic diversity for the productivity of honeybee colonies."

For example, the researchers found that bees in the genetically diverse colonies used sophisticated mechanisms for communication, including waggle dancing, more often than bees in genetically uniform colonies to discover food sources and direct nest mates to food. Because there was more information available among nest mates about food discoveries, the diverse colonies gained far more weight than did genetically uniform colonies.

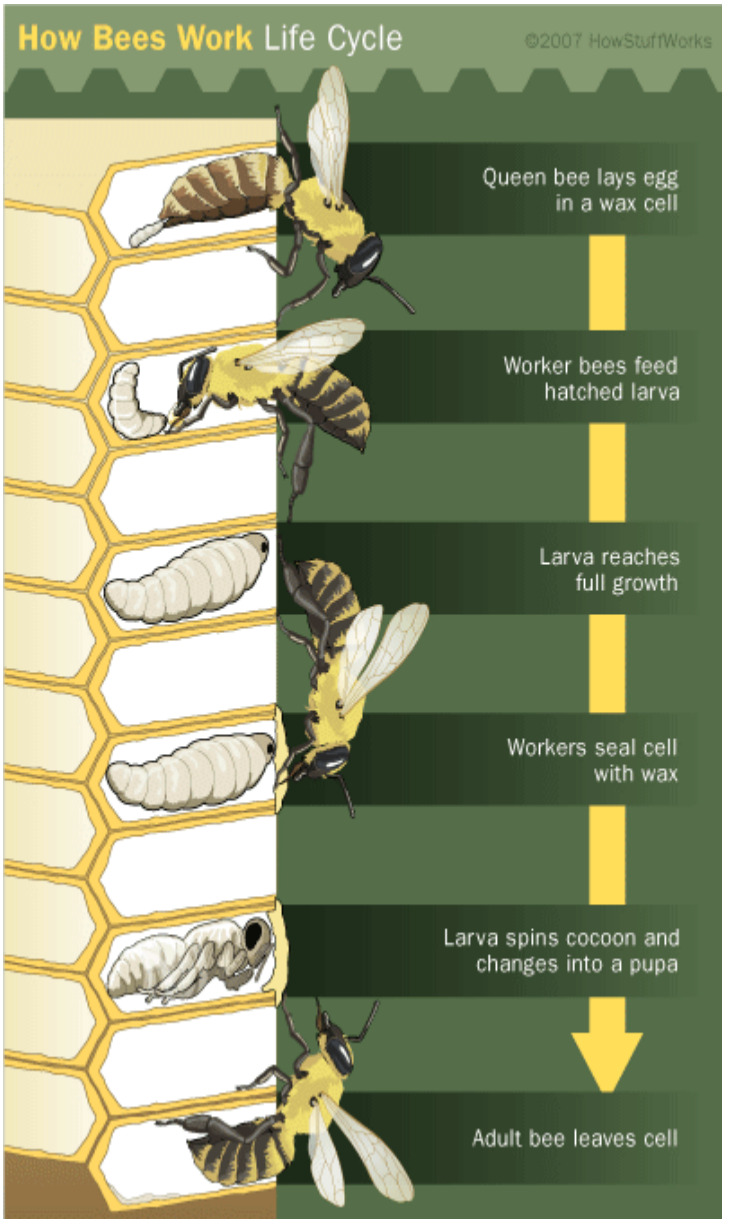
NEWBEE NUGGETS

HOW BEES WORK (Part 3 of a 4-part series)

The Honeycomb and Bee Reproduction

Regardless of whether they live alone or in groups, most bees have a similar approach to mating. In nearly every species, a male bee's only job is to mate with a female. Most male bees do not even have the structures necessary to make wax or carry pollen, so males in social species cannot contribute to the daily work that goes on in the hive. In fact, female honeybees usually force surviving males out of the nest before winter or when food becomes scarce.

Usually, a female bee mates with several male bees in midair, gathering all of the sperm she will need in her lifetime -- a few months for a solitary bee, or up to five years for a honeybee. Mating typically happens at a collective mating site, although scientists have not yet discovered how male bees choose a site. In some species, including honeybees, the males die shortly after mating because they leave their endophallus in the female's body, fatally injuring themselves in the process. In other species, males can mate with multiple females. Since females use sperm from several males to fertilize their eggs, this gives the male bees a better chance to father young.



After the female mates, she either retreats to a shelter for the winter or returns to her nest to lay eggs, depending on her species. Once she lays eggs, the eggs go through the same stages as caterpillars and butterflies do. First they hatch into larvae. The larvae eat before spinning cocoons and becoming pupae. They then emerge from the cocoons as adults.

Even though the steps are the same, the environment in which the developing bee grows can vary considerably. In solitary bees, the female builds a nest, places food inside and lays an egg. The food may include a mix of pollen and nectar called bee bread. It may also include a form of honey. Exactly how the bee positions her egg and its food varies depends on the species of the bee, as does the construction of

the nest itself. Some bees lay one egg in each nest, while others divide their nests into multiple brood chambers. In nests with multiple chambers, male eggs usually go in the front, allowing young male bees to travel to the mating site before the female bees hatch. Many solitary bees seal their nests after laying eggs and never see their young. Often, these species lay eggs in the fall -- the eggs hatch in the spring, but the mother bees do not survive the winter.

Each cell in the comb of a honey bee hive can hold honey, pollen, or a single developing bee

Social bees, on the other hand, have a different approach to raising young. While a female solitary bee lays only a few eggs in her lifetime, a queen honeybee lays thousands. She places one egg into each cell in the brood area of the hive. The queen bee has control over whether she lays male or female eggs, and she lays male eggs in slightly larger cells. If she uses stored sperm to fertilize the egg first, the larva that hatches is female. If she leaves the egg unfertilized, the larva that hatches is male. This means that female bees inherit genes from their mothers and their fathers while male bees inherit only genes from their mothers.

Once the eggs hatch, the youngest worker bees in the hive take care of them. For the first two days of the larvae's lives, the workers feed them royal jelly. After that, the larvae eat pollen or bee bread. The only exception is the queen bee -- when the workers raise a new queen, they feed her royal jelly until she spins her cocoon. Bee larvae molt several times before spinning cocoons, at which point the workers cap their cells with tiny plates of beeswax to protect the developing brood.

The length of a female honeybee's life depends on when she emerges from her cocoon. If she emerges in the early spring, she may only live for a few weeks as she prepares the hive for lots of new bees. Workers who emerge later may live through the winter. But no matter when she is born, a female honeybee starts her life as a nurse, taking care of other bees. As she gets older, she begins to perform other important duties around the hive, such as cleaning out empty cells. She also learns to make honey and forage for food.

Dinner and Dancing: Bee Navigation

Bees find food the same way other animals find food -- through sensory input and an understanding of the features of their environments. Bees have an acute sense of smell, and they can remember and recognize patterns, such as the patterns of colors that are likely to be near good food. They can also recognize symmetry, a trait that scientists typically associate with more intelligent life forms. All of these abilities help bees find and recognize flowers, which produce the pollen they use for protein and the nectar they use for energy.

A solitary bee's life and the life of her young depend on her ability to find food, gather it and return it to the nest. For a scouting social bee, her colony's survival depends on the same things, as well as her ability to tell her hive mates how to find the food. Some social bees do this by marking a trail with aromatic flower oils or by guiding their hive mates part of the way. Honeybees tell their sisters how to find food, water, resin and new nest sites using one of the most-studied animal languages -- dancing.

When a honeybee scout finds food, she uses two known tools to understand where it is. One is her solar compass, which lets her remember where things are in relation to the sun. The bee's ability to see polarized light lets her determine where the sun is regardless of whether it is

obscured by clouds.

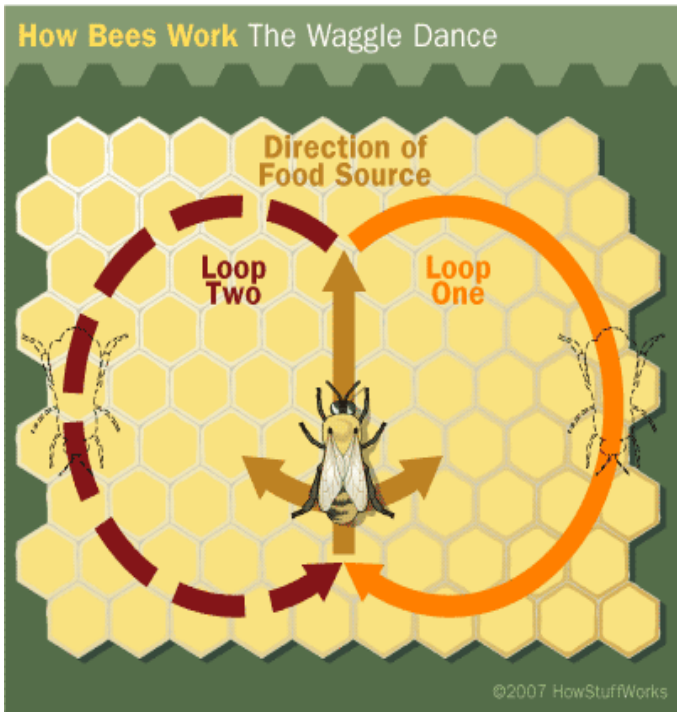
A drinking bee

The other tool is her internal clock, which lets her keep track of how far she has flown. Her internal clock also lets her determine of how much the sun moves during her journey. In other words, when she returns to the hive, she can tell her sisters exactly where the food is in relation to the current position of the sun, not the position of the sun when she found the food. As a bee matures, she also learns about how the sun's path across the sky changes during different seasons of the year and at different latitudes if her hive is moved. She can incorporate these changes into her measurements.

When she returns to the hive, the scout bee recruits her sisters to carry the food back to the nest. They, like the scout, are the oldest bees in the hive. The scout distributes samples of the food, which will help her sisters find the food when they reach their destination. Then, she performs a dance on the vertical surface of the combs in the hive. The area on which she performs the dance is commonly known as the dance floor, and the worker bees who observe the dance are followers.

If the food is nearby, the bee performs a round dance by traveling in loops in alternating directions. The round dance doesn't convey much information about exactly where the food is. However, it's generally close enough that the worker bees can smell it fairly quickly.

When the food is far away, the scout performs a waggle dance. During the waggle dance, the scout runs in a straight line while waggling her abdomen, and then returns to the starting point by running in a curve to the left or right of the line. The straight line indicates the direction of the food in relation to the sun. If the bee runs straight up the hive wall, then the foragers can find the food by flying toward the sun. If she runs straight down the wall, then the foragers can find the food by flying away from the sun. As the dance progresses, the dancing bee adjusts the angle of the waggle run to match the movement of the sun.



The speed of the returning loops lets the other bees know about the quality of the food source, but the bees learn where to go by following the waggle run. By vibrating her wings and waggling her abdomen, the dancing bee moves a lot of air. The bees around her can feel this air movement. The ones directly behind her, where the air movement is greatest, get a clear idea of where to fly and how far to travel. Once they reach the described position, they begin flying in a search

pattern until they find the food source. After that, they make up to a dozen trips back and forth between the hive and the food, remembering the food's position each time. During each trip, each bee can carry half her weight in pollen or nectar. If necessary, they perform a tremble dance, in which they run in many directions while trembling, to encourage the other bees to begin unloading nectar.

Bees in the hive unload the pollen and nectar and store it in the beehive's cells. These bees are younger than the foragers, but older than the nurse bees. It's up to these workers to determine when the hive has enough of a type of food or building material and to inform the foraging bees. They do this by changing the way they accept the material. If they accept it eagerly, the foragers know that the hive needs more. But if the workers are reluctant to unload the material, the foragers know that the hive has plenty.

In order to conserve space and preserve their food, bees transform the nectar into honey. The process gives honey some unique properties -- we'll look at them in the final installment of this series.

NEXT MONTH: Honey Production and Beekeeping

RECIPE OF THE MONTH

The following helpful guide will allow you make the best use of honey as a substitute for granulated sugar in cooking:

1. Use equal amounts of honey for sugar up to one cup. Over one cup, replace each cup of sugar with 2/3 to 3/4 cup of honey, depending upon the sweetness desired.

2. In baked goods, add 1/4 teaspoon of baking soda per cup of honey if baking soda is not already included in the recipe. This will reduce the acidity of the honey, as well as increase the volume of your product.

3. Reduce the amount of liquid in the recipe by ¼ cup for each cup of honey used.

4. Lower the baking temperature 25 degrees and watch your time carefully since products with honey brown faster.

Moisten a measuring spoon or cup first with oil or an egg before measuring the honey to prevent it from sticking to the measuring utensil. Honey is heavy by weight. A 12 ounce jar equals one standard 8 ounce cup. A quart weighs 3 pounds.

HONEY-PACKED PEACHES

(Makes 6 pints)

Ingredients

- 2-3/4 cups water, divided
- 1/4 cup lemon juice
- 5 lbs. peaches*, peeled, pitted and cut into wedges
- 1-1/4 cups honey
- 2 tablespoons vanilla extract
- 6 small strips lemon zest

Directions

In a large bowl, mix 1/4 cup water and lemon juice. Stir fruit in gently, coating all pieces. Set aside. In a small saucepan, bring honey and remaining water to a boil. Remove from heat; stir in vanilla. Cover pan to keep contents hot. Pack fruit gently into 6 hot sterilized pint jars, filling to

1/4 inch from top of jar, and place a piece of lemon zest in each jar. Fill jars with honey mixture up to 1/4 inch from tops. Wipe rims of jars; top with lids. Screw on bands. Place jars on rack in canning kettle of hot water, adding water if necessary to bring water level to 1 inch above tops of jars. Bring water to a rolling boil; boil for 25 minutes. Remove jars carefully and cool on a wire-rack.

*Apricots or nectarines may be substituted

CLASSIFIEDS

Major Branzel has 4 nucs for sale. He can be reached at 707-643-9433.

Judy Casale (510-881-4939) has a four-frame electric extractor and stand she's selling for $250.

Your Editor would like to purchase new or used small and medium supers (frames optional). He can be reached at ersten3@yahoo.com, 510-464-6489 (weekdays), 925-687-7350 (evenings).

MISCELLANEOUS

Lois Kail has kindly offered her renowned seamstress services to repair members' bee suits. Lois will donate the money she collects to the club. The only thing Lois asks is that before giving her your suits for repair, please wash them (wow, shouldn't that be obvious to us all?!). Contact her at 925 356-2602, or lkail@juno.com.

Steve Gentry (925-254-8063) is looking for help to sell his bee products (honey, creams, lotions, candles, etc) at several farmers markets.

The Diablo Bee
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