The Diablo Bee

Newsletter of the Mount Diablo Beekeepers Association

April 2008

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rich6849@yahoo.com

Newsletter
Ersten Imaoka
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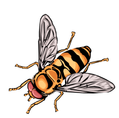
ersten3@yahoo.com

April's guest speaker:

Our very own expert, Steve Gentry, on basic and intermediate beekeeping

HIGHLIGHTS OF THIS ISSUE

What's the Buzz?



MUCH THANKS to members Jeff Peacock, Rich Coleman, and Mike Stephanos, for their informative and entertaining talk on swarm management, which included an impressive Powerpoint presentation.

Meetings

Our next meeting is April 10 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.

Integrated Virus Detection System

Ag Alert January 16, 2008. Excerpt taken from"First-time meeting creates a buzz in nation's bee sector" by Christine Souza

To gather as much information as possible about the strange phenomenon (CCD), researchers from all over the country met simultaneously for the American Bee Research Conference. With the researchers present, the bee organizations were informed about the latest research and technology in trying to solve CCD and to improve bee health.

To aid beekeepers and fellow researchers in solving this issue, Jerry Bromenshenk, a division of biological sciences research professor from the University of Montana, reported about new technology in California to detect and measure viruses in the beehive.

"Until recently there wasn't any good way to look for viruses. Although there are very good tools, they generally tend to be expensive technology and lake a lot of sample preparation," Bromenshenk said.

Bromenshenk and the inventors of the Integrated Virus Detection System (IVDS) plan this week to deliver the machine to the University of California, Davis Harry H. Laidlaw Jr. Honey Bee Research Facility. The IVDS will be available during almond pollination season so bees can be scanned and analyzed.

IVDS utilizes the physical properties of virus, virus-like and other nanometer particles to determine a concentration, distribution and information for discrimination and characterization of nanometer particles. Identification can be made for the many known virus families pathogenic to humans, as well as a new means for detecting unknown and emerging viruses.

You provide us with samples of bees from a single hive and IVDS breaks down bees to the smallest of particles. It puts an electrostatic charge on the particles and they are counted and sized," Bromenshenk said. "Here's the magic: Each virus has a characteristic size, so you'll see a 25 nanometer virus, a 33.4 nanometer virus and a 38 nanometer virus. IVDS tells you how much of a virus that you have. It doesn't give us a name, but the good news is once we put a name on it, then we are reasonably confident the next time we see it we know what it is. It takes about five minutes to get the analysis results."

Honey Bee Invaders Exploit The Genetic Resources Of Their Predecessors

ScienceDaily (Feb. 28, 2008) — Like any species that aspires to rule the world, the honey bee, Apis mellifera, invades new territories in repeated assaults. A new study demonstrates that when these honey bees arrive in a place that has already been invaded, the newcomers benefit from the genetic endowment of their predecessors.

In repeated invasions of a new territory, the honey bee, Apis mellifera, can benefit from the genetic endowment of those bees that arrived in earlier territorial expansions. (Credit: Photo by Amro Zayed)

The researchers, University of Illinois entomology professor Charles Whitfield and postdoctoral researcher Amro Zayed, analyzed specific markers of change in the genes of honey bees in Africa, Europe, Asia, and the Americas. They also focused on geographic regions -- such as Brazil in South America -- where multiple honey bee invasions had occurred.

The researchers were looking for tiny variations in the sequences of nucleotides that make up all genes. Certain versions of these single nucleotide polymorphisms (SNPs, or "snips") are more common to African honey bees, while others occur more frequently in honey bees in western Europe, eastern Europe, or Asia.

By comparing these SNPs in bees from different geographic territories, and by looking at the frequency at which particular alleles, or variants, occur in functional and nonfunctional parts of the honey bee genome, the researchers were able to determine that the invading bees were not just randomly acquiring genetic material from their predecessors by interbreeding with them, but that certain genes from the previously introduced bees were giving the newcomers an advantage.

An earlier study led by Whitfield and published in Science in 2006 showed that A. mellifera originated in Africa and not Asia, as some had previously hypothesized.

That study revealed that the honey bee had expanded its territory into Eurasia at least twice, resulting in populations in eastern and western Europe that were quite different from one another.

The earlier analysis also confirmed and extended results of previous studies showing that African honey bees had mixed with but largely displaced their predecessors in the New World, which were primarily of western European stock. When the European old-timers mixed with the African newcomers, their offspring looked, and in most respects behaved, like the African honey bees.

These more aggressive, "Africanized" bees (so-called "killer bees") received a lot of media attention in the U.S. as they moved north from South America. According to the U.S. Department of Agriculture, the first Africanized honey bees appeared in Texas in 1990. In less than a decade they had also spread to southern California, Arizona, Nevada and New Mexico.

Whitfield and Zayed wanted to understand the evolutionary mechanism that allowed the African honey bees to move into these new territories and dominate the bees that had arrived in the New World centuries earlier from eastern and western Europe.

Their analysis of about 440 SNPs selected randomly from throughout the Africanized honey bee genome showed that most of the alleles were common to African honey bees. But of the alleles common to European bees, those found in functional parts of the genome (in genes) were showing up more frequently than those in nonfunctional regions (between genes).

"We asked the question: Is hybridization an essentially random process?" Zayed said. When the African honey bees mated with the western European honey bees that had been in South America for centuries, one might expect that the hybrid offspring would randomly pick up both the functional and nonfunctional parts of the genome, he said.

"But actually what we found was there was a preference for picking up functional parts of the western European genome over the nonfunctional parts."

It appeared that the Africanized bees that kept some of the functional western European genes were gaining an advantage, Whitfield said.

"Those African bees are doing better because there were western European honey bees there for them to mix with," he said. "Now we can say we have a signature for evolution in the genome."

While the researchers do not yet know how these European honey bee genes are enhancing the survival and fitness of the Africanized bees in the Americas, Whitfield said, it may be that specific traits from western Europe are beneficial, or it may be that being a hybrid is, in and of itself, a good thing for these bees.

In a separate finding, the researchers also discovered a genome-wide signature of evolution associated with the ancient expansion of honey bees from Africa into temperate regions of western and northern Europe. In this expansion, functional parts of the genome have changed more than nonfunctional parts.

Whitfield thinks that these changes may involve social adaptations to survive the hard winters.

"The way the honey bees survive in temperate regions is sort of the way humans do," Whitfield said. "They have a shelter. They store resources."

Not needing to survive in such cold weather, African bees store less food and reproduce more.

"So how does an animal that's basically tropical make it? How does it expand its territory and thrive in very harsh winter conditions in this temperate region?" Whitfield asked. "Humans did it, and Apis mellifera did it in some interestingly parallel ways."

The findings appear online the week of Feb. 25 in Proceedings of the National Academy of Sciences. Whitfield is also an affiliate of the Institute for Genomic Biology.

Adapted from materials provided by University of Illinois at Urbana-Champaign.

Mythology of Bees and Honey

Since time began, honey and bees have been part of the great myths of humanity and have always been extraordinarily potent symbols.

The birth of bees

According to the ancient Greeks, all of Nature's phenomena had divine origins. Bees were a source of great fascination, and their mysterious origins inspired the legend of Aristæus: *Aristæus, the son of the god Apollo, had a beehive. But he wanted to seduce Eurydice, Orpheus' wife, who died from a snake bite because she had refused Aristæus' advances. In revenge, Orpheus destroyed Aristæus' hive. To appease the wrath of the gods, Aristæus sacrified four bulls and four heifers. From their entrails, new swarms suddenly appeared, so Aristæus was able to rebuild his hive and teach beekeeping to men.* This legend is told by Virgil, the great Latin poet, in his famous "Georgics". Like the ancient Greeks, he believed that bees were born spontaneously from animal corpses.

In the texts of ancient Egypt, bees were born from the tears of Râ, the Sun God. When the tears fell onto the soil, they were transformed into bees that built honeycombs and produced honey.

Bee Symbolism

As the workers of the hive, bees are a symbol of an industrious and prosperous community governed by the queen bee. They have therefore symbolized all that is **royal and imperial**, in France and in ancient Egypt (associated with Râ, the Sun God). Three hundred gold bees were discovered in the tomb of Childeric I (in the year 481), which showed that the hive was the model of an absolute monarchy. Napoleon I used bees as a motif on all his carpets, as well as on his coronation robes.

As organizers of the universe between earth and sky, bees symbolize all vital principles, **and embody the soul**. In the Greek religion, the bee was sometimes identified with Demeter, the goddess of the earth and crops, who represented the soul sent to hell. The bee also symbolizes the soul that flies away from the body in the Siberian, Central Asian, and South American Indian traditions.

Bees also symbolize **eloquence, speech, and intelligence**. In Hebrew, the word for bee, Dbure, has its origins in the word Dbr, speech. They settled on the mouth of the child, Plato, " *announcing the sweetness of his enchanting soul* " (Pliny) and also settled also on the lips of Saint Ambrose, the patron-saint of beekeepers. According to Virgil, they have a grain of divine intelligence and the famous Pythia, the priestess of Apollo, was called "the bee of Delphi". In some texts from India, the bee represents the spirit becoming intoxicated with the pollen of knowledge.

Because of its honey and its sting, the bee is considered to be an **emblem of Christ**: it represents his mildness and mercy on one side and his justice on the other.

Honey

A basic foodstuff, but which can also be a drink - like milk with which it is often associated -, honey is a symbol of **richness and sweetness** in all traditions. In the sacred texts of East and West, milk and honey flow like a stream through the promised land. The Celtic traditions celebrate mead as an immortal beverage. In Greek mythology, in which honey is the drink of the gods of Olympus, it is the **symbol of knowledge, learning and wisdom.** It is a food reserved for the elect, the iniated, and to exceptional people in this world and the next. Greek tradition claims that Pythagoras ate nothing but honey throughout his entire life.

All the great prophets refer to honey in the Scriptures. Speech is honey, it represents softness, justice, virtue and divine goodness. The Koran uses holy terms to talk of bees and honey :"Honey is the first blessing that God gave the earth". Virgil calls honey the celestial gift of the dew, dew itself being a symbol of initiation. Honey even designates supreme bliss and the state of Nirvana. Symbol of all sweetness, **the honey of knowledge** creates the happiness of mankind.

The perfection of honey makes it a major element in many religions rituals. For the Egyptians, honey was the tears of the god Râ and was a part of all the religious offerings in pharaonic Egypt. In Islam, according to the Prophet, it restores sight, preserves health and resuscitates the dead. For the American Indians, it plays a great part in ceremonies and the rites of initiation and purification. A source of inspiration, honey gave Pindar the gift of poetry and Pythagoras the gift of science.

In modern psychoanalytical thinking, honey symbolizes the **"higher self"**, the ultimate consequence of work on one's inner self. As the result of the transmutation of ephemeral pollen into a delicious food of immortality, honey symbolizes the transformation by initiation, the conversion of the soul, and the complete integration of the person.

NEWBEE NUGGETS

HOW BEES WORK (Part 1 of a 4-part series)

INTRODUCTION

In the creation story of the Kalahari Desert's San people, a bee carries a mantis across a river. The river is wide, and the exhausted bee eventually leaves the mantis on a floating flower. The bee plants a seed in the mantis's body before dying, and the seed grows into the first human.

The San are not the only people to include bees in their myths and stories. According to Egyptian mythology, bees were created when the tears of the sun god Ra landed on the desert sand. The Hindu love god Kamadeva carries a bow with a string made of honeybees. Bees and their hives appear in religious imagery and royal regalia in multiple cultures, and people around the world use honey and pollen in folk medicine and religious observances.

Image courtesy MorgueFile

The sheer number of bees in colonies and swarms led some to believe that bees reproduced spontaneously.

The idea that there is something divine or mystical about bees isn't confined to religion and mythology. Until the 17th century, many people, including beekeepers, thought that bees reproduced spontaneously, without the aid of sexual reproduction. But in the 1660s, Jam Swammerdam examined a queen bee through a microscope and discovered female sex organs. Around the same time, Francesco Redi proved that maggots formed in meat only when flies had landed there. It became clear that bees and other insects reproduced by laying eggs, not by magic.

Even though they do not reproduce through **autogenesis,** or spontaneous generation, bees do exhibit many other traits found in stories and myths -- traits that have led many cultures to view them with reverence or awe. This is particularly true of **social** bees, or the species that live in **colonies**. Social bees are organized, industrious and intelligent. They work diligently all summer in order to produce enough food to survive the winter. Social bees are clean and fastidious, and they arrange their lives around one central member of the hive -- the **queen**.

But most bees aren't social. They don't live in hives or work together to support a queen. In this article, we'll look at how social bees are different from **solitary** bees.

BEE ANATOMY

Scientists suspect that bees and flowering plants both evolved around 100 million years ago, in the middle of the Cretaceous period. Before this period, many plants reproduced the way today's **conifers** do. They released seeds and pollen using **cones**. The wind carried the cones, and eventually the pollen came into contact with the seeds and fertilized them. During the Cretaceous period, some plants began to reproduce using flowers. Unlike conifers, these plants, called **angiosperms,** needed the help of insects and other animals to reproduce. Insects had to physically move pollen grains from plants' **anthers,** or their male structures, to their **stigmas,** or female structures.

At about the same time, bees **differentiated** themselves from their wasp-like ancestors. Prehistoric wasps were carnivores that lay their eggs in the bodies of their prey. Bees became herbivores, eating pollen and nectar from the newly-evolved plants and pollinating flowers as they went. Fossil evidence supports this theory -- the oldest known bee fossil is 100 million years old, and the preserved bee has several wasp-like features. This doesn't necessarily mean that bees evolved from wasps. It's more likely that bees and wasps both evolved from a mutual, wasp-like ancestor.

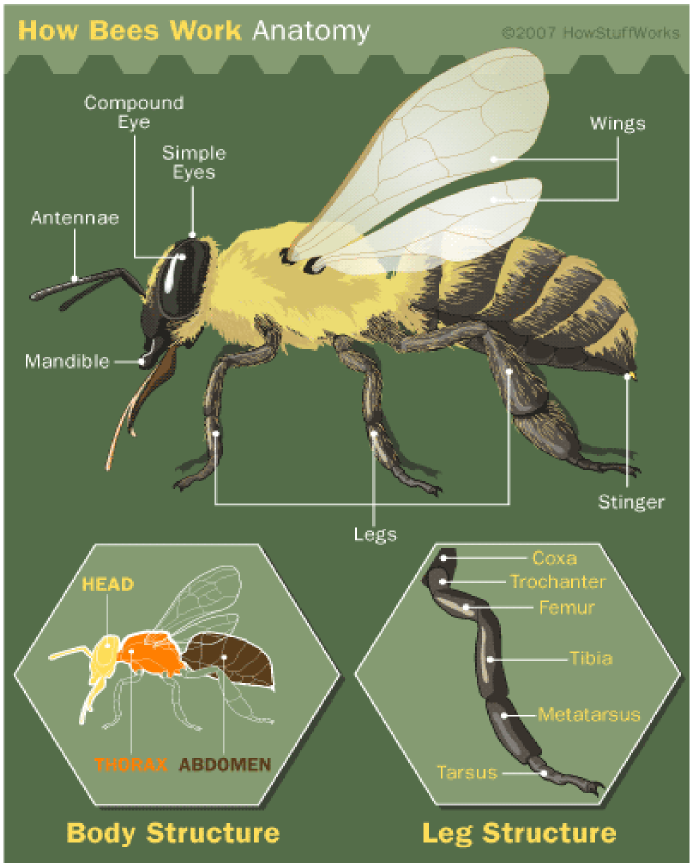
Today, bees still have several physical features in common with their wasp cousins. They also share some traits with ants. Together, bees, wasps and ants make up the insect order *Hymenoptera,* which means "membranous wings."

Image courtesy MorgueFile

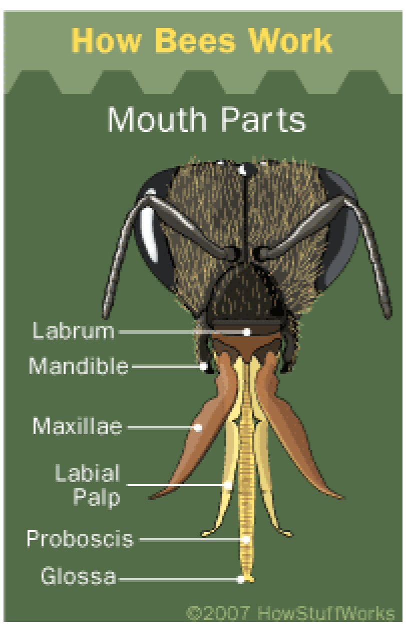
Flowering plants need the help of pollinators, like bees, to reproduce.

A bee's body has a lot in common with the bodies of other insects. Much of it is covered in an **exoskeleton** made from small, movable plates of **chitin.** A bee's body is also covered in lots of fuzzy, branched hair, which collects pollen and helps regulate body temperature. The body also has three sections -- the **head**, the **thorax** and the **abdomen**.

The head houses the brain, a collection of about 950,000 **neurons**. These neurons are specialized, and they communicate with specific neighboring neurons. This division of tasks is



part of why a bee's brain, which is a fraction of the size of the bee's head, can perform complex tasks that might ordinarily require a bigger brain. A system of nerves allows the brain to communicate with the rest of the body.

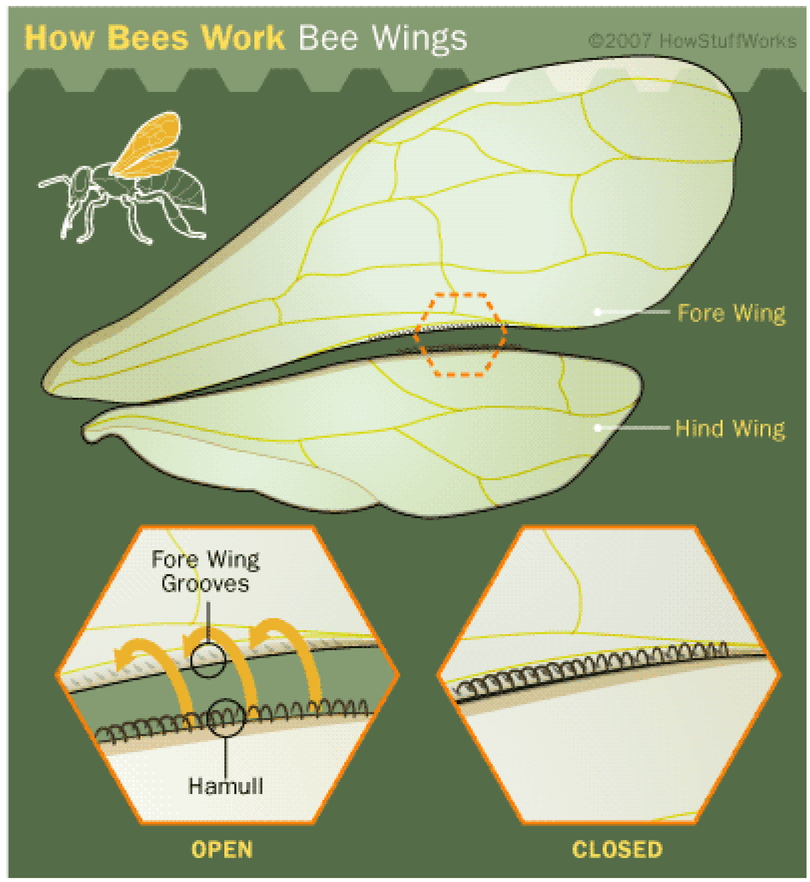


On its head, a bee has two sensory **antennae**. It also has five eyes -- three simple eyes, or **ocelli**, and two compound eyes. The compound eyes are made of lots of small, repeating eye parts called **ommatidia.** In each compound eye, about 150 ommatidia specialize in seeing patterns. This allows bees to detect **polarized** light -- something human beings cannot do.

Like most insects, a bee has complex **mouth parts** that it uses to eat and drink. The sizes and shapes of these parts can vary from species to species, but in general, most have:

- Paired **mandibles,** or jaws
- A **glossa**, or tongue
- A **labrum** and two **maxillae**

The labrum and maxillae are like lips. They support a **proboscis,** or tube for collecting nectar.



A bee's two pairs of wings and three pairs of legs connect to its **thorax**. The wings are extremely thin pieces of the bee's skeleton. In many species, the front wings are larger than the back wings. A row of hooks called **hamuli** connect the front and rear wings so they beat together when the bee is flying.

NEXT MONTH: Bee Legs and Stingers, and Types of Bees

RECIPE OF THE MONTH

A HONEY OF A CHILI (Makes 8 servings)

1 Package (15 oz.) firm tofu
1 Tablespoon vegetable oil
1 Cup chopped onion
¾ Cup chopped green bell pepper
2 Cloves garlic, finely chopped
2 Tablespoons chili powder
1 Teaspoon ground cumin
½ Teaspoon dried oregano
1 Teaspoon salt
½ Teaspoon crushed red pepper flakes
1 Can (28 oz) diced tomatoes, undrained
1 Can (15-1/2 oz) red kidney beans, undrained
1 Can (8 oz) tomato sauce
¼ Cup honey
2 Tablespoons red wine vinegar

Using a cheese grater, shred tofu and freeze in zippered bag or airtight container. Thaw tofu; place in a strainer and press out excess liquid. In large saucepan or dutch oven, heat oil over medium-high heat until hot; cook and stir onion, green pepper and garlic 3 to 5 minutes or until vegetables are tender and begin to brown. Stir in chili powder, cumin, salt, oregano and crushed red pepper. Stir in tofu: cook and stir 1 minute. Stir in diced tomatoes, kidney beans, tomato sauce, honey and vinegar.

Bring to a boil; reduce heat and simmer, uncovered, 15 to 20 minutes, stirring occasionally.

The Diablo Bee
21 Newell Ct
Walnut Creek, CA 94595