The Nevada County Beekeepers Association

Local Buzz

January 2010

President's Message

Your new President Larry Merritt, sends along his greetings and best wishes for a Happy New Year, and says he is really looking forward to seeing everyone at the next meeting.

Your President, Larry Merritt

January 4th Meeting

Well, OK, last month we had to cancel the holiday party because of the storm (it was a tad frozen, wasn't it?). Because we had all this party stuff, and pent-up party demand—who wants to miss the annual NCBA holiday potluck and pirate gift exchange?—we decided to reschedule it for January 4th. Just think of the opportunity for getting rid of those white elephants from Christmas now!

Same deal as last month: starts at 6 PM at the Grass Valley Veteran's Hall. Main course items have been arranged for us, you bring a dish to share. Last names beginning with A-M bring a side dish; N-Z please bring a dessert. Bring your own place settings and drinks. A prize will be awarded for the best place setting, so bring your fancy settings!

After dinner we will have a pirate gift exchange. Please keep the gift value $15.00 or less (or that white elephant). Once again, Deborah Morawski will be overseeing the gift exchange and have numbers ready for people to pick.

Thanks to those who offered to bring our main dishes. Also, please note the earlier than usual starting time, potluck at 6 PM!

Bee Bits

By Randy Oliver

Some of you may have noticed a fair amount of dead bees in front of your colonies after our "Big Chill." A sudden cold snap is very rough on bees, and is often the kiss of death for those with problems. I've been hauling hives back from Nevada, where the temperatures are in the single digits. I've been looking into what happens in the winter cluster, and thought I'd share some of my observations (even though in Nevada County our winters are relatively mild).

Honey bees play it both ways during the winter—they act both as "cold-blooded" insects, and as a "warm-blooded" superorganism. There are a few reasons that this is advantageous. First, an individual bee reaches "chill coma" at about 44°F, and will die if held at the edge of freezing for a few days. So the cluster must generate and conserve enough heat to keep all members of the colony at least above that temperature for the duration of the winter. This process requires only a small amount of honey consumption—less than a pound a week, even under severely cold winter conditions. The cluster must also maintain the ability to warm up enough to move (often temporarily) to new areas of the larder in order to fill their bellies.

The colony would best conserve energy by remaining in a deep torpor. However, that would leave the precious reserves of honey unguarded.

The colony must maintain and protect the honey reserve that is critical for early spring broodrearing prior to nectar flows—***during that period, a colony can consume more than a half pound of honey per day!*** Left unguarded, mice or other predators would quickly plunder the honey stores. So the colony must keep at least some of the guard bees warm enough to respond to threats.

So this is how it appears that the winter cluster forms:

1. There is a fairly loose core of bees in the center that maintains a temperature of about 80°F if brood is not present, or about 94°F (and sometimes higher) if they are rearing brood. In small broodless clusters, the core temperature may drop to 60-70°F.

2. Around the core, there is a tightly-packed layer of bees that maintain a temperature of about 56°F. These bees fill any empty cells.

3. At the outside, or "mantle," of the cluster, individual bees do not allow their body temperatures to drop below about 44°F, which is just above their "chill coma" temperature. These bees may burrow deeper into the cluster from time to time and very rapidly raise their body temperature, then return to the mantle after several hours. This behavior may be a means for them to repair any physiological chill damage to their systems.

4. The actual cluster size is dependent upon the ambient temperature—it can expand or contract to an amazing extent (I see this when I move hives out of hard-frozen Nevada locations down to warmer California yards).

The core of the cluster is an otherworldly environment. The bees actually modify the atmosphere in order to allow themselves to enter into a "hypoxia-induced ultra-low metabolic rate" (Van Neuman 1997). They restrict ventilation in the core, and allow the oxygen content to drop from the normal 21% down to only about 15%, and allow CO_2 to rise to 5-6% (up from 0.038% in normal air). This atmosphere would be toxic to humans, but allows the bees to go into a form of suspended animation.

One must keep in mind the importance of water loss in the winter cluster. Insects lose water vapor with each breath, just as mammals do, but unlike us, they have no source of drinkable water within the winter hive. In cold winter areas, the extremely low moisture content of the air means that when the cluster creates heat, that the relative humidity of the cluster atmosphere drops extremely low (too low to rear brood).

Insects in diapauses typically cold their breaths (for up to a day at a time) in order to prevent water loss. The bees in the cluster likely do the same. However, when animals metabolize carbohydrates, such as sugar, they create "metabolic water" as a byproduct. If an organism can conserve that metabolic water enough to be in excess of that lost to body waste and respiration, then it can actually realize a net gain of water in its system! That's how kangaroo rats can live without ever drinking liquid water.

So how much water do bees get out of honey? By my math, a pound of honey at 83% sugars, contains 0.17 lb of water, and creates 0.48 lb of metabolic water, for a total of 0.65 lb of water freed from each pound of honey consumed. That means that a colony consuming 0.8 lb of honey a week (Holte 1970) would produce about a half a pound (1 cup) of water per week. As you can see, it is a challenge for a large colony (say 8 lbs of bees) to live on a half cup of water a week under exceedingly dry conditions.

Such metabolically-produced water would diffuse from the heat-generating bees in the dry core to the cooler bees in the mantle, where it would tend to condense, due to the lower temperature. I can't find any studies that have attempted to trace the recycling of such water within the cluster.

Some researchers have suggested that desiccation is a problem for very large clusters, due to the fact that their basal metabolism produces so much heat, which requires the exhausting of warm,

moisture-laden air. Others have suggested that one stimulus for midwinter broodrearing is to generate more metabolic water. I find the research, and practical suggestions to often be contradictory and confusing.

In very cold climates, the moisture-laden air, due to its warmth and lesser density (water vapor is less dense than dry air) rises from the cluster, and the water freezes into ice. This is said to later become a problem when it melts and drips onto the bees . It appears to me that this would only occur if there were enough of an uninsulated space above the cluster. This is likely the reason that a piece of insulation board below the cover is beneficial.

Many also recommend a small upper entrance. The benefit to this may be that it might help to vent some moisture, or likely that it allows waste-bloated bees to take cleansing flights, and for sick bees to simply fly away. I have not found upper entrances to be necessary in our climate.

Randy Oliver

For Sale: Country Rubes Combo Screened Bottom Boards

Special NCBA Club Price!
Call Janet for details. 530-913-2724 or email at rubes@countryrubes.com.

Bee Trivia

Bee venom was used in ancient times to treat illnesses ranging from skin diseases to rheumatic disorders. Today, it is commonly used to treat people with severe allergic reactions to bee stings.

Researchers have isolated 18 different components of bee venom that have pharmacological properties.

The potency of venom depends on the quality of pollen the bee has come in contact with. Because there is less pollen available in cold weather, bee venom is less potent in winter.

Honey bees must consume about 17-20 pounds of honey to be able to biochemically produce each pound of beeswax.

Honey bees are entirely herbivorous when they forage for nectar and pollen but can cannibalize their own brood when stressed.

The brain of a worker honey bee is about a cubic millimeter but has the densest neuropile tissue of any animal.

Worker honey bees weigh about a tenth of a gram and are usually between ½ to 5/8 inch long. Beekeepers who purchase bees buy them by the pound. There are on an average about 3500 bees in a pound.

Honeydew is a sweet liquid excreted by some insects like aphids which may be collected by honey bees. In some parts of Europe honey made from honeydew is called Forest Honey and can be very expensive to purchase.

The Nevada County Beekeepers Association is dedicated to apiculture education and promotion of the art and science of beekeeping among beekeepers, agriculturists, and the general public. This is a "not for profit" organization. Meetings are held the first Monday of each month at 7 PM at the Grass Valley Veteran's Memorial Building at 255 South Auburn Street in Grass Valley. All visitors are welcome. The newsletter is published monthly as a service to the membership. Articles, recipes, commentary, and news items are welcomed and encouraged. Submission by email is encouraged. Please submit to Leslie Gault at lesliegault@yahoo.com . The deadline for the February 2010 edition is January 21st . A limited amount of advertising space (business card size 3" by 2") is accepted and need not be bee-related. Rates are $1 per issue or $7 per year for NCBA members and $16 per year for non-members. All revenue from advertising goes to the Association treasury and helps offset the cost of producing and distributing this newsletter. To receive the *Local Buzz* via email: please email your request to lesliegault@yahoo.com

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c/o Steve Reynolds
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January 4th Meeting

For the January 4th meeting we have rescheduled the December potluck and pirate gift exchange party, which was cancelled due to the weather. The party will start at 6 PM (earlier than usual) at the Grass Valley Veteran's Hall. Details inside.