# Bee Culture

JULY 1995

# Jul

## COLUMNS



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*Viruses, Pg. 392*

## FEATURES




*Dances with Bees, Pg. 403*



*Grandma's Harley, Pg. 409*

### Cover
Queens, queen biology, queen problems Clarence Collison tackles some of this in his monthly quiz on page 386. But queens, too, are prey to some of the more exotic diseases bees get, namely a very particular virus. Find out what, and why on page 392. All about queens, inside.

*photo by Kim Flottum*

*Mead, Pg. 410*

# INNER COVER

# More Than Bugs In A Box

The most often cited criticism of a monthly magazine is that it is not timely, at least in the sense of the morning paper, the six o'clock news or even weekly news magazines when it comes to getting needed information to its readers. This one is no different. And there's not much we can about that. There's just no changing the calendar.

As a result, monthly magazines, rather than compete with instant news, tackle information transfer from a somewhat different direction, or directions, as the case may be. One method is to prepare 'timely' articles out of sync. Thus, editors and writers of outdoors-type magazines put together articles about summer when most people are wrapping Christmas presents, and vice versa. This practice can play havoc with one's biological clock. But you adjust.

Another tact is to take information gathered over some period of time, small pieces, usually often seemingly independent and unrelated, and put them together in ways that make all these small bits into a larger story. The sum is greater than the parts, generally, and readers gain from getting some insight into how it all fits together.

The 'timely' report this spring would have been the early reports of *Varroa* devastation across much of the country. But those first reports always need to be checked, so some more time goes by, and then it's not 'timely' anymore.

So, rather than try and beat the *New York Times* to the punch about colony losses and pollination deficits, a good monthly magazine not only comments on the 'Event,' but looks for causes, both primary and secondary; looks for results, both immediate and long term; and looks for peripheral bits that reinforce the findings, support the conclusions, and then makes predictions based on all of the above. Well, that's the way it's supposed to go.

So, a belated 'timely' report is that colony losses in the U.S. this past spring were stellar, again. The California almond circus was particularly enlightening, but almost everywhere, commercial, sideline and hobby beekeepers endured 30-50% losses almost routinely. Those that is, that didn't take this nasty little creature (*Varroa*) seriously, or didn't in time, anyway.

Which brings us to why this happened. The easy answer has already been stated – treatment. You treat, correctly, and you have bees; don't, and you don't. Simple, right? Well, not quite.

Not long ago I was part of a two-day beginners workshop. We went through all the basics, but saved the pests and predators stuff for last. After that, someone in the class made a comment on how depressing it seemed that something so simple as a beehive could be so complicated. And, without a little more background it seems that way. But there are some comparisons that need to be made to put this opinion in perspective.

By itself, a colony of bees seems to be a fairly simple entity. After all, it's only a wooden box full of bugs, right?

Yes, you're correct. It is much more complex than that. My answer was to think of that wooden box full of bugs in the same way she thought of any other animal. Think of your cat or dog, cattle or horses, sheep and goats. They're simply animals that need care.

Do you have a cat, or a dog? I'll bet that most people spend as much on their pets as a hobby beekeeper spends on a colony of bees. Think about it. Flea collars, shots, ear mites, heart worm pills, injuries, kidney problems

the list goes on. And that doesn't take into account things like collars, carrying cases, beds, scratching posts and the other things pets are given.

Now, think of the farmers who have invested in cows for milk, pigs, chickens or other animals for meat or by-products. I have worked with cows and pigs and chickens, and for

*Continued on Page 417*

**KEEP IN TOUCH**

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# MAILBOX

## Antique Book Info

A friend of mine recently gave me a copy of what appears to be a very old book that she thought that I should have. It is titled "The Life of the Bee," and was written by Maurice Maeterlinck (translated by and dedicated to Alfred Sutro). It is approximately four inches wide, by 6.5 inches tall, and is wrapped in the most beautiful soft green leather cover complete with gold filigree.

The publisher is listed on the bottom of the spine as "MUSSON," confirmed on the title page as the "MUSSON BOOK COMPANY LIMITED (TORONTO)." Perplexing as it may be, on the flyleaf is the inscription "Made and Printed in Great Britain," and at the end of the Appendix, the phrase "Printed by Unwin Brothers, Ltd., London and Woking, Gr. Britain" is found. The book has 351 pages, plus an Appendix, for a total of 356 pages.

The only additional information that I have about the book is contained in a handwritten note on the inside of the front cover, identifying the book as a gift to someone for Christmas, 1926, so I know that it is at least that old. To identify it as an old book is easy, based solely on the wonderful manner in which it is written. For example:

"And indeed, in our endeavor to understand the intellect of the bees, we are studying in them what is most precious in our own substance: an atom of the extraordinary matter which possesses, whenever it attach itself, the magnificent power of transfiguring blind necessity, of organizing, embellishing, and multiplying life; and most striking of all, of holding in suspense the obstinate force of death and the mighty, irresponsible wave that wraps almost all that exists in an eternal unconsciousness." (pages 144-145)

Does anyone out there know the date that this book was published, and whether or not it is of any value, aside from the fact that it contains some of the most beautiful prose I have read in quite some time? I have looked from cover to cover and can find no additional information, except for the note that states "Part of Chapter IV. of "The Life of the Bee" appeared originally in the "Fornightly Review," and is included by the courtesy of Messrs. Chapman & Hall."

Thanks for any and all help that you may be able to provide.

Jim Anderson
27 Caillet Ln.
Carriere, MS 39926

## Round or Square?

I am trying the comb honey route this year – just cut comb so far. Richard Taylor really pushes the Ross Rounds, but the Hogg Half Comb cassette seems so much simpler, far more efficient and cheaper to boot. But I don't know from experience and would like to hear your readers input.

Great magazine. The day of it's arrival is always a good one. I agree with the sentiment of a recent letter – up the price, but don't you dare decrease the magazine size!

Thomas Gregory
Wenatche, WA

## Queen Finding

I have been a subscriber to *Bee Culture* for the past 20 years and am always pleased when it arrives.

In the May issue, Mark Winston had an article entitled "Three things I'll never see " The first thing he says he'll never see is a quick and easy way to find the queen.

That already exists! I am currently using a very effective queen magnet. It is called drone comb.

A frame of drone comb is inserted into the colony (it doesn't matter where and the top super is the easiest). The next day, 85% of the time, the queen will be found on that comb.

Dark combs seem to work the best and they can be easily obtained by placing a blank frame in a colony. I use frames that have been damaged by the extractor as the remnants of comb act as a guide for the bees to center the comb in the frame.

I'm sure that this method would not work at a time of the year when drones would not normally be raised but it is a big time saver at the times that it does work.

Rick Neilson
Stratton, Ont. Canada

## Three Hints

Following are three suggestions that might be helpful to beekeepers.

Suggestion #1 Skunk Control – Cut a piece of 1/4" hardware cloth into strips one inch wide and 16" long. In cutting the strips cut halfway between two parallel strands of wire. This will give a 1/8" protrusion on each side of the strip. On one side of the strip with a pair of plyers bend the protrusion up at a 90° angle. Staple this to the outside edge of the landing board. It will discourage the skunks from scratching or swatting.

Suggestion #2 Bear Control – Take nails, 4D galvanized would probably be O.K., and drive them all the way straight through one inch boards in such a pattern and close enough together that if a bear steps on the board his paw can't miss a nail. Place these around the beehives or bee yard. Good bye honey bear (but be careful beekeeper!).

Suggestion #3 Salt For Bees – Bees need salt. Nail a spool of mineralized rabbit salt to the bottom box just above the center of the landing board. The bees will use it, and it will help to keep the bees healthy.

Paul Jubb
Cottonwood, AZ

# MAILBOX

## Good People At Rossmans

I recently had an experience with one of your advertisers I feel you should know about.

I ordered three packages of bees from Rossman Apiaries located at Moultrie, GA. The bees were mailed on Monday, May 15. Our local Post Office called me when they arrived telling me they looked dead. They were clearly marked to expedite handling in the mail. Yet the bees were a week in transit arriving on May 22. They were is fact almost all dead on arrival. There may have been 100 live ones out of the lot.

In talking with the folks at Rossman they were sincerely apologetic and without hesitating, offered to refund the price of the bees and 50% of the postage. This was rather than attempting to ship another order and standing a chance of having them die too.

In my opinion, Rossman Apiaries has high business ethics and I would recommend them to anyone else. I thought you would like to know.

J. Claud Courtier, Jr.
Sequim, WA

## Questions, Questions

I love your magazine! I've been a hobbyist for three years now and came across your publication through a friend. I found *Bee Culture* so informative that I had to subscribe. I read and re-read each edition until the next one comes out. Of course I also read whatever I find on the subject of bees. The more I read, the more it seems like there are multiple "tell tale, best way hands down," of doing the same thing. I currently have 8 colonies. I would like to become more efficient in my beekeeping practices and methods to eventually enable me to increase to 20 colonies, without doubling my management time. To aide me in this endeavor, I am posing the following questions. I do have several questions I hope you or your readers can help with. They are as follows:

1. Often while re-queening a two-story brood chamber, I'm unable to locate the queen. At the risk of keeping the hive open for long periods of time, and chilling the brood, I went ahead with placing the queen cage in between the bottom brood frames. My rational was that here was a failing queen. Having destroyed all queen cells, the pheromone of the new queen would be sufficient to the acceptance of the colony over the old one. I am aware of three possible outcomes: 1. The new queen is killed by the colony; 2. The new queen kills the old queen; 3. The hive swarms with the old queen. What can I do under the above situation to be successful in re-queening?

2. I often hear honey being touted as more desirable and beneficial if it is not heated during bottling. This is no problem with a hobbyist as equipment investment is at a minimum. However, if it is not heated, then you end up with honey that begins to crystalize. I

# MAILBOX

don't know about you, but people are not willing to stand in line for crystallized honey. Consequenly, it is a job to heat it and bring it to a viscous state in order to sell, at the cost of "unheated quality." Is there a secret to keeping un-heated honey from crystallizing, or will I need to start heating?

3. Lastly, my 7-year-old daughter, Vanessa, asked me a question that I did not know. So I told her I would ask the "answer guys" of beekeeping. Queens are capable of stinging, and doing so multiple times, this I know. Why then don't they sting more often, especially when being handled?

Thank you for *Bee Culture*. Keep up the great work. I look forward with eager anticipation to each upcoming issue.

David Simeoli
Fremont, CA

**Editor's Note:** The best way is to make sure the old queen is gone. Isolate her in a brood box by placing queen excluders under and over the top box (since you use two), then look for eggs in a couple of days. Find the queen, remove her, install a new one.

Better straining will eliminate much of your problem. But not all. Use fine mesh nylon cloth, twice, and tolerate the few that granulate. Some honeys granulate faster than others, too.

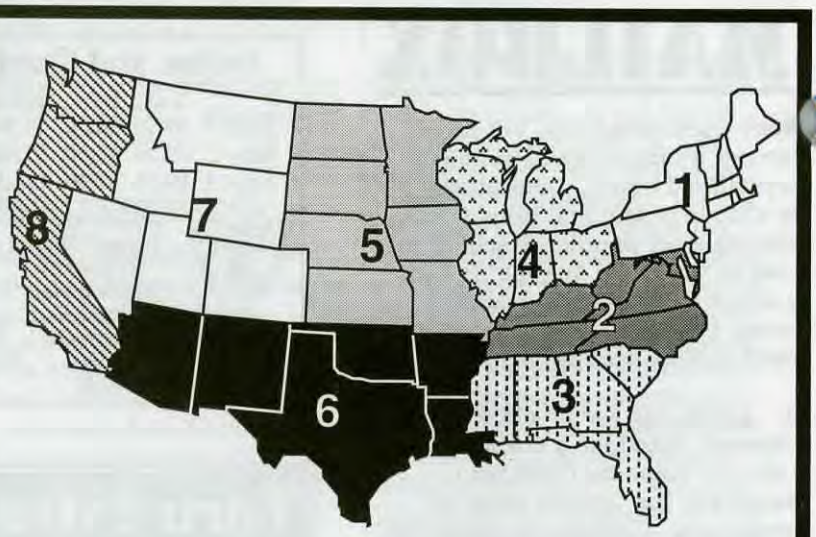
Queens sting rarely, and usually only when young. But queen producers all have stories about that. Generally, bees only sting for colony defense. Since queens don't 'guard, the opportunity rarely arrives.

# JULY Honey Report

JULY 1, 1995

## REPORT FEATURES

**Prices shown are averages from many reporters living in a region, and reflect that region's general price structure. The Range Column lists highest and lowest prices received across all regions, from all reporters.**




| | Reporting Regions | | | | | | | | Summary | | History | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | Last | Last |
| Extracted honey sold bulk to Packers or Processors | | | | | | | | | Range | Avg. | Month | Yr. |
| **Wholesale Bulk** | | | | | | | | | | | | |
| 60# Light | 45.61 | 48.42 | 45.56 | 47.50 | 54.00 | 37.33 | 42.92 | 45.56 | 27.00-63.00 | 46.68 | 41.49 | 45.75 |
| 60# Amber | 44.19 | 44.75 | 54.00 | 45.00 | 49.00 | 33.00 | 40.80 | 42.49 | 20.00-63.00 | 44.47 | 39.97 | 43.49 |
| 55 gal. Light | 0.58 | 0.50 | 0.64 | 0.65 | 0.64 | 0.51 | 0.54 | 0.64 | 0.40-0.90 | 0.61 | 0.57 | 0.58 |
| 55 gal. Amber | 0.55 | 0.53 | 0.49 | 0.64 | 0.73 | 0.45 | 0.52 | 0.57 | 0.34-0.80 | 0.58 | 0.53 | 0.53 |
| **Wholesale - Case Lots** | | | | | | | | | | | | |
| 1/2# 24's | 23.06 | 28.50 | 28.68 | 19.20 | 21.50 | 20.55 | 22.15 | 28.68 | 19.00-43.60 | 23.45 | 20.14 | 20.90 |
| 1# 24's | 32.50 | 32.23 | 36.00 | 33.73 | 36.27 | 31.90 | 31.22 | 36.47 | 28.00-48.00 | 33.40 | 30.10 | 30.95 |
| 2# 12's | 31.10 | 29.87 | 37.70 | 31.30 | 39.13 | 26.98 | 30.13 | 37.70 | 26.40-55.00 | 31.69 | 28.25 | 28.50 |
| 12 oz. Plas. 24's | 27.32 | 29.24 | 36.00 | 26.93 | 24.50 | 25.75 | 25.90 | 29.57 | 19.20-41.25 | 28.25 | 26.95 | 27.45 |
| 5# 6's | 31.35 | 32.42 | 36.00 | 33.30 | 35.25 | 27.43 | 29.30 | 33.94 | 27.35-41.80 | 32.66 | 30.16 | **30.07** |
| **Retail Honey Prices** | | | | | | | | | | | | |
| 1/2# | 1.49 | 2.04 | 2.00 | 1.12 | 1.20 | 1.52 | 1.20 | 2.15 | 0.99-3.99 | 1.46 | 1.33 | 1.35 |
| 12 oz. Plastic | 1.69 | 1.73 | 2.38 | 1.59 | 1.60 | 1.58 | 1.53 | 1.89 | 1.19-2.75 | 1.74 | 1.60 | 1.62 |
| 1 lb. Glass | 1.91 | 1.94 | 2.40 | 1.74 | 1.88 | 2.01 | 1.78 | 2.21 | 1.69-3.00 | 1.95 | 1.79 | 1.83 |
| 2 lb. Glass | 3.07 | 3.38 | 3.17 | 2.53 | 3.17 | 3.03 | 3.05 | 3.02 | 1.80-4.05 | 3.21 | 3.08 | 3.13 |
| 3 lb. Glass | 4.19 | 4.81 | 4.50 | 3.60 | 3.73 | 4.02 | 4.43 | 4.65 | 3.50-6.10 | 4.34 | 4.45 | 4.41 |
| 4 lb. Glass | 5.40 | 5.27 | 5.50 | 5.70 | 6.39 | 5.04 | 5.37 | 6.23 | 4.89-8.15 | 5.66 | 5.54 | 5.55 |
| 5 lb. Glass | 6.84 | 7.90 | 6.75 | 6.64 | 6.72 | 6.11 | 6.44 | 7.41 | 5.50-9.60 | 7.12 | 6.62 | 6.87 |
| 1# Cream | 2.80 | 2.96 | 2.75 | 3.68 | 1.99 | 3.22 | 1.90 | 3.86 | 1.56-7.25 | 2.78 | 2.19 | 2.37 |
| 1# Comb | 3.32 | 2.92 | 3.25 | 3.75 | 2.74 | 4.09 | 3.52 | 3.48 | 1.95-5.00 | 3.49 | 3.24 | 2.90 |
| Round Plastic | 2.85 | 2.75 | 2.50 | 3.00 | 3.39 | 3.75 | 2.65 | 3.17 | 2.00-4.50 | 3.01 | 3.04 | 2.66 |
| Wax (Light) | 1.89 | 1.70 | 1.65 | 1.55 | 2.37 | 1.54 | 1.42 | 2.39 | 1.25-4.00 | 1.91 | 1.66 | 1.85 |
| Wax (Dark) | 1.53 | 1.23 | 1.50 | 1.48 | 1.10 | 1.07 | 1.25 | 2.17 | 1.00-4.00 | 1.51 | 1.35 | 1.35 |
| Poll. Fee/Col. | 30.00 | 31.67 | 30.00 | 32.50 | 29.50 | 18.83 | 35.00 | 32.92 | 12.50-55.00 | 31.25 | 30.86 | 31.00 |

### MARKET SHARE

Early crop reports look exceptional. Excellent moisture and weather nearly everywhere to let bees fly. Mite losses still high, but splits building *real* fast and should make good crop. Highest number of swarms reported in years – good news, actually How high will honey go? 65¢, 68¢, 75¢, 99¢? All are reported, somewhere.

### *Region 1*

Overall, prices increasing significantly over last month. Demand steady, which is good. New crop average to above and future prices seem to be heading higher, according to reporters. Excellent spring gave good build-up and early crops, and lots of swarms. Colony losses declining, treatments increasing.

### *Region 2*

Prices steady to increasing slowly over last month. Demand, however is increasing as new crops come in and prices will rise further. Mite losses over winter slowed buildup, but good flows helped packages and divides. Swarming stronger than in many recent years.

### *Region 3*

Prices increasing significantly over last month, the result of steeply increasing demand, both wholesale and retail. Early summer crops average to a bit lower, which will help prices rise more this summer. Mite losses higher than expected.

### *Region 4*

Prices steady to higher compared to last month, especially at wholesale level. Retail steady, but demand inching up. Prices expected to rise as summer moves on. Exceptional buildup and crops so far. Swarming higher than anyone expected!

### *Region 5*

Prices have jumped since last month, especially at wholesale, but retail not far behind. Producers say demand is average to increasing, but so far the crop is light. This will increase prices further this fall, although by July crop should be strong, and getting stronger.

### *Region 6*

Prices still only steady compared to last month, but wholesale ready to jump as new crop is harvested, which should be about average. Demand increasing, which will help prices rise later.

### *Region 7*

Prices steady compared to last month, but the season is early. Demand increasing dramatically, which will be met with what should be a good crop and higher prices later in the season.

### *Region 8*

Prices on the way up this month, especially at wholesale level, but retail moving up fast, too. Mixed crop reports – too wet, too cold, great flows perfect weather . . . Overall crop looks to be average, which is lots of honey, actually. Demand increasing at producer level, which will drive prices up.

# ? DO YOU KNOW ?

## *What Do You Know About Queen Biology?*

clarence collison

The role of the queen in the honey bee colony is directly related to colony productivity and survival. She is the most important single bee in the colony and colony attributes are determined by her and the drones she mated with. By merely changing the queen in the colony one can change characteristics such as color of the bees, degree of gentleness, resistance to disease, swarming tendencies etc. The queen is an animated egg-laying machine intimately regulated by environmental conditions within the hive and outside. Her pheromones also contribute to the social cohesiveness of the colony. Without her or sufficient brood from which to rear other queens, the colony is doomed to extinction.

Please take a few minutes and answer the following questions on queen rearing and biology to determine how well you understand these important topics.

---

*The first seven questions are true and false. Place a T in front of the statement if entirely true and F if any part of the statement is incorrect. (Each question is worth 1 point).*

1. ___ If you dequeen a colony and let the bees raise their own queen from the brood present, they will normally raise a high quality queen.
2. ___ In queen rearing, baby nucs are used as cell builders.
3. ___ The semen supply of the queen is periodically replenished after she begins laying eggs when she mates with drones within the hive.
4. ___ Queen bees can be reared from larvae found in worker-sized cells.
5. ___ A honey bee colony preparing to supersede their old queen will usually build more queen cells than when a colony is preparing to swarm.
6. ___ Carniolan bees build more queen cells than the Italians or Caucasians.
7. ___ Virgin queens pay little attention to unsealed queen cells.

Multiple Choice Questions (1 point each).

8. ___ Queen cage candy was developed by:
   A. C. J. Robinson
   B. L. L. Langstroth
   C. M. Quinby
   D. H. Alley
   E. I. R. Good
9. ___ Young queens emerge from their cells approximately ___ days after hatching from the egg.
   A. 21
   B. 18
   C. 16
   D. 10
   E. 13
10. ___ If under the emergency impulse, the bees construct a queen cell around a 48 hour old larva within a worker cell, the queen will emerge from her cell in ___ days.
    A. 16
    B. 13
    C. 21
    D. 11
    E. 12
11. Describe the two types of queen cells found in a honey bee colony. (2 points).
12. After a new queen emerges from her queen cell, explain what happens to the queen cell. (1 point)
13. Name the two materials often used in the commercial production of queen cell cups. (2 points)
14. When a new virgin queen emerges from her cell, explain how she handles rival queens still within their cells and those outside their cells. (2 points)
15. Name three conditions that are essential in a cell building colony whether it is queenright or queenless. (3 points)
16. What precautions should be taken when handling queen cells? (3 points)
17 Name two situations which will result in a colony being headed by a drone layer. (2 points).

ANSWERS ON PAGE 417

# RESEARCH REVIEW

roger morse cornell university ithaca ny

*"It appears that honey bees can hear. But what they hear is unclear, so far."*

Until a few years ago, researchers who studied hearing in honey bees agreed that they were totally deaf. Interestingly, after years of debate and negative statements, it has now been shown that the dance language, through which bees indicate the direction and distance to a food source, is an acoustical (sound) system. Arriving at this conclusion has not been an easy task and has involved a great deal of innovative research. There is long history.

Early in this century, Professor Karl von Frisch showed that honey bees used color and odor to locate a food source. He first determined that scout bees could be recruited to a food source by offering them a sugar syrup reward. Using their attraction to a sugar source, he undertook experiments to demonstrate that bees could associate a food with a color and an odor. As a result, we came to understand that flower color and odor are important factors in honey bee orientation. This information, plus his ability to "read" the dance language led to von Frisch's receiving the Nobel Prize in 1973. Still, though he searched long and hard, von Frisch could not find that sound was important or used in any way by bees.

Frisch was not the only person to state that bees could not hear and that sound was unimportant in their lives. In 1945, Hansson, a researcher in Sweden, conducted several experiments and wrote an often-referred-to paper on the honey bee's inability to use sound. However, Hansson showed that bees could detect vibrations, which have been called substrate-borne-sound.

## Dance Music

In the early 1960s, two researchers found that honey bees made sounds as they performed the dance language. They did their work independently, and each was unaware someone else was doing much the same research. One was Dr. Harold Esch, then a graduate student in Germany and now on the faculty at Notre Dame Univ. in IN. The other was Dr. Adrian Winner, then a graduate student in MI and now retired from the Univ. of CA system. Though they tried, neither could determine if the production of sound has any significance. The sound is produced while the bees are performing the straight part of the wag-tail dance.

## Aversive conditioning

In 1989 bees were first trained to a sugar-water feeder where they could be exposed to a sound signal and an electrical shock. The bees were exposed to the sound for five seconds, but after four seconds they were given an electrical shock. The shock caused them to stop feeding, and they learned that when they heard the sound they should stop feeding.

They learned slowly, sometimes taking a whole day to learn the relationship between sound and being shocked. As a result of this slow learning, a new system of determining if sound was important was devised.

## Y-shaped maze training

Worker bees were trained to enter a Y-shaped maze with a reward of sugar syrup offered at the end of one side of the Y When a sound was made on the side with the reward, the bees learned much more quickly to associate sound with food than they had with the aversion experiments. Most of the bees in the test chose the correct side of the maze after being trained for only an hour or two.

## How and where bees hear

Airborne sound may be carried in two ways. There may be a change of pressure or a movement of air particles. The sound we hear through our eardrums is a result of a change of pressure, but hearing sound in this manner requires us to have an organ such as an eardrum. One of the reasons people continued to believe that bees were deaf is that there is no such organ on their bodies. However, particle-borne sound, which we do not use, can be heard as a result of the bending or deflecting of air currents as can be done by hairs.

Further experiments showed hairs that pick up sound are located on the worker bee's antennae. It was found that removing one antenna reduced the bee's ability to find food associated with sound. When both antennae were removed, bees could no longer find food in a Y-maze where sound was used. These data concern worker bees only; no one has determined if drones or queens use sound.

Honey bees hear sounds with a low pitch only, and even then over a very short distance, probably less than their body length. At least, that is the state of our knowledge today. Despite the fact that honey bees are better studied than any other insect, there always appear to be more to learn about them. BC

References:
*The sense of hearing in honey bees.* Bee World 76: 6-17. 1995.

WE NEED ALTERNATIVES

# Pesticide Resistance

mark winston

The North American media have recently been highlighting a new scourge on humanity – flesh-eating bacteria. Here in Canada, a prominent politician lost his leg to these hungry consumers, generating a flurry of news reports about this and other diseases that are becoming resistant to antibiotics. Modern medicine has become the victim of its own ingenuity and success, and it seems that we are barely keeping ahead of evolution. Almost as soon as a new designer antibiotic hits the market, we begin to see new strains of bacteria appearing that are resistant to its effects. Old diseases such as tuberculosis are returning to plague us, and our high-tech, supposedly antiseptic hospitals are recording high mortality rates from people who should live but who are struck down by microbes that were easily controlled a few years ago by the first generations of antibiotics.

The honey bee world has mercifully been spared the dilemma of resistance, since to date none of the treatable bee diseases has shown any signs of becoming resistant to our antibiotic arsenal. The best example is American Foulbrood. Despite fears that the continued use of Terramycin would induce a resistant strain of the bacteria that causes this disease, Terramycin continues to be effective. Samples of AFB from contemporary hives are killed just as easily by Terramycin as are bacteria kept in the freezer for 50 years, indicating that this disease has not developed any noticeable resistance during that time.

*Varroa* mites may be another story, however. Recent reports from Italy suggest that *Varroa* has become resistant to fluvalinate, the pesticide in Apistan strips, after about 10 years of use. We expect 95 to 99 percent of *Varroa* to be killed by a proper application of Apistan, but the Italians are finding only about 80 percent mortality, which leaves enough *Varroa* to multiply and kill a colony within a few months. What is particularly frightening about this scenario is that there are no other registered, effective chemicals to use against *Varroa* in the United States, so that any resistance that does develop in North America would quickly devastate our industry. What is even more frightening is that many commonly used but improper management practices against *Varroa* are perfectly designed to select for resistant mites. If I wanted to do an experiment to produce resistant mites, I would do nothing more than what is being done *illegally* today by some North American beekeepers, and I could virtually guarantee that, within five years or less, I would have mites resistant to Apistan.

The development of resistance to miticides by mites is a fairly common and simple phenomenon. Mites feed on a wide variety of plant and animal food sources, and these foods have evolved numerous protective chemicals to dissuade the mites from feeding on them. In response, the hungry mites have evolved enzyme systems that can break down these chemical defenses so that the mites can access a food source. This ability to detoxify natural compounds is effective against artificial, human-produced compounds as well. Thus, when mites encounter a commercially produced miticide, a few of them will survive because they have the ability to break down these novel chemicals. The surviving mites reproduce and their offspring thrive because the more susceptible competing mites have been killed off, leaving a wide-open field for the resistant mites to take over. Ironically, our pest management response to these survivors is usually to throw ever-higher doses of chemicals at them, which further selects for even more resistant mites.

Apistan is just the type of product that could induce resistance even if it is properly used. Its active ingredient, fluvalinate, kills mites by disrupting their nervous system and is thought to be more deadly to *Varroa* than to bees because the mites are so much smaller, and a lethal dose to a mite won't kill a bee. Current recommendations across North America suggest two or even three applications of Apistan each season, for 42-45 days at each application. Spring and fall applications are recommended so that honey won't be contaminated and because the mites are more exposed to the chemical by being out of brood cells and on adult bees. Two or three annual treatments are necessary to keep mite levels down, and the consequences of less frequent or no treatments are severe. For example, beekeepers are recording about 70 percent colony loss without treatment.

These repeated applications of the same miticide within the short period of one season follow label and extension agent recommendations. However, even these properly applied treatments may quickly select for resistant mites, since the mites that survive and reproduce following the

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**"Although . . . proper applications of Apistan have some potential to select for resistant mites, . . . misuse will select for resistance at approximately the speed of light."**

*RESISTANCE ... Cont. From Pg. 389*

first exposure to Apistan are likely to be the ones most able to detoxify the fluvalinate. A second or third application of the same substance a few months later can select for even more resistant mites. Proper pest management against *Varroa* would involve alternating chemicals so that those few mites resistant to one substance would be killed later in the season by a second chemical. However, beekeepers in the United States don't have any alternative chemicals. Thus, beekeepers have a real dilemma; don't treat, and your colonies will die, but if you treat at the recommended levels, you face the possible development of resistant mites.

Shipping queens and packages with Apistan strips or tabs is another "recommended" use of Apistan that can select for resistance. Queen tabs and strips in packages kill most of the mites, but which ones do you think are most likely to remain alive? Ironically, shipping bees with Apistan could be a very strong selective agent for resistance because the mites have no refuge from the chemical, and those few that survive are most likely to be the ones that can deal with the chemical most effectively. Even worse, shipping mites around North America will increase the spread of resistant mites, just as it rapidly increased the original spread of both *Varroa* and tracheal mites.

Although even these proper applications of Apistan have some potential to select for resistant mites, it is the misuse of Apistan that will select for resistance at approximately the speed of light. For example, some beekeepers are keeping strips in their hives almost year-round, except for the honeyflow, so that mites may be exposed to Apistan for most of the fall, winter and spring. The reasoning behind continuous chemical application is twofold. First, putting strips in and taking them out is a lot of work, so why not just leave them in? Second, there seems to be some feeling out there that, if a 45-day exposure is effective, why not provide a 200-day exposure and really blast the dickens out of those mites? The reality: Long-term exposure to any agriculturally used chemical is a recipe for the rapid evolution of resistance. Miticides are powerful selective agents, and their continuous use will select very, very strongly for mites resistant to their effects. Also, continuous application results in residue buildup in comb so that exposure to fluvalinate may continue even after strips are removed, and honey could be contaminated.

Many beekeepers also reuse strips to save money and simply don't believe the company line that Apistan strips are not effective following one application. Most of the data on this subject are company property and have not been released to the scientific and beekeeping community. One independent study done in the state of Washington suggested that only about 20 percent of the active ingredient fluvalinate remains following an application, but additional work is needed to verify this conclusion under diverse treatment circumstances. Why is reuse of strips dangerous in terms of resistance? The continuous application of a chemical at sublethal dosages is as good a way to select for resistant mites as overdosing them with high amounts of chemical. Generally, good management against the evolution of resistance involves a short application of a moderate chemical dose. Prolonged applications of any dosage, or shorter but repeated applications of high dosages, will favor the survival of resistant mites and generate a problem that none of us want to deal with.

What can be done to minimize the possibility that resistant mites will evolve in our hives? The best long-term solution is to find alternative chemicals so that we can rotate exposure to these strong selective agents. We have two miticides licensed for use in Canada, Apistan and Formic Acid, and alternating the use of these chemicals would be highly desirable. Formic Acid is thought to act as a general caustic or desiccating agent rather than by disrupting a specific aspect of the mite's nervous system, so that resistance to Formic Acid is less likely to develop than resistance to Apistan. Formic Acid also has the advantage of being effective against tracheal mites as well as *Varroa*. However, Formic Acid is difficult to apply safely for the beekeeper, is not as effective against *Varroa* as Apistan and must be put on four or five times at weekly intervals in order to work at economically effective levels. Work is continuing with Formic Acid to provide a more effective, slow-release formulation that only needs a single application, and hopefully an improved Formic Acid release system will solve these problems.

The development of alternatives to Apistan may be the single most important research priority in North American beekeeping today. However, until Formic Acid is made more usable, or a new effective miticide is available, beekeepers need to exert all possible pressure on their peers to use Apistan only according to label directions. Proper use of Apistan may eventually lead to resistant mites, but improper use is guaranteed to unleash a strain of *Varroa* that none of us wants to deal with. Resistant *Varroa* mites would be much like flesh-eating bacteria; they would consume our hives almost as we watch, and there would be nothing we could do about it. BC

**"The best long-term solution is to find alternative chemicals so that we can rotate exposure to these strong selective agents."**

*Mark Winston is a professor and researcher at Simon Fraser University, Burnaby, B.C. Canada.*

# HONEY BEE VIRUSES

cynthia scott-dupree & julie mccarthy

*Nearly a dozen viruses affect honey bees in the U.S. and Canada. This is an overview of symptoms and treatments.*

All living organisms are susceptible to attack by viruses. Viruses, organisms composed of genetic material enclosed in a protein coat, are unable to multiply outside of the host cell. Once infected by a virus, the host's cellular components are used for viral replication. This can lead to cell damage, death, disintegration and the eventual release of microscopic, infective viral particles called virions. To date, 20 honey bee viruses have been identified.

Economic loss due to honey bee viruses is rare in the North American apicultural industry. However, the ability to distinguish symptoms in honey bees caused by viral infection from those of the major infectious diseases is important. Viral identification is expensive and requires highly technical laboratory procedures not accessible to most beekeepers, who therefore must rely on observed symptoms for diagnosis. Diagnosis based on observed symptoms is not always dependable, since many viruses are capable of remaining dormant for extended periods of time without any apparent harm to the host. The purpose of this article is to outline symptoms, modes of viral transmission and current means of control for the major honey bee viruses presently known to exist in continental North America.

**Sacbrood**

Sacbrood virus (SBV), a larval disease, derives its name from the sac-like appearance of the diseased larvae resulting from the accumulation of moulting fluid between the body and unshed skin. Diseased larvae are unable to pupate, and they darken prematurely from white to yellow and finally dark brown once they are dead. Death usually occurs in the prepupal stage. Recognition of the following symptoms in developing brood will aid in the field diagnosis of SBV:

1) Partially uncapped cells scattered among capped brood or some cells remaining capped after surrounding brood has emerged.
2) Partially or fully uncapped cells containing bloated, fluid-filled larvae with darkened heads. Unlike the ropy consistency of larvae infected with American Foulbrood, those with sacbrood can retain their shape due to their leathery skin and therefore, can easily be removed intact from the cells.

Sacbrood-infected larvae become dry, dark brown, brittle, gondola-shaped scales following death. A single larva killed by sacbrood contains approximately 10 trillion (i.e. $10^{13}$) sacbrood virus particles, which is about one percent of the infected larva's body weight. Sacbrood virus particles have been shown to be abundant in the fat, muscle and tracheal cells of honey bee larvae infected under laboratory conditions.

Initial transmission of SBV occurs when young nurse bees remove larvae killed by the virus from the colony. At this time, the nurse bees may ingest some of the moulting fluid, which can leak from damaged infected larvae. After ingestion, the virus begins to multiply in the hypopharyngeal glands of the nurse bees. The infected bees can then spread the SBV throughout the colony by: 1) feeding young, uninfected larvae; 2) exchanging food (e.g. trophallaxis) with other adult bees; and 3) contaminating food stores.

Throughout the year, SBV infection in a colony remains at a low level primarily due to: 1) the rapid removal of infected larvae from the colony by housecleaning bees; 2) the rapid loss of virus viability in dead larvae; and 3) behavioral changes in infected adults. Although infected adults show no obvious pathological signs, they do experience behavioral changes such as the acceleration of the normal sequential changes of worker-performed tasks. In addition, infected adults no longer care for larvae and cease pollen collection and consumption, thereby reducing the potential for contamination of the food stores. Also SBV is known to reduce the life span of workers. Adult bees serve as a reservoir within which the disease can multiply and persist from year to year. If an outbreak of SBV occurs in a colony, it is more likely to happen prior to a honeyflow in the spring or early summer when the division of labor in worker bees is not well established.

Sacbrood virus, first described by White in 1917 in the United States, now has a worldwide distribution, and is one of the most commonly diagnosed honey bee viruses in North America. Unfortunately, as with all honey bee viruses, there are no chemical cures available. One Canadian researcher suggests using less-susceptible honey bee stocks in addition to minimizing stress by practicing good management techniques. Removal of comb showing large numbers of dead larvae infected with SBV will likely help the colony to overcome the virus since the diseased larvae serve as the main source of reinfec-

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*Any number of maladies can cause bees to die. Viruses should not be ruled out, but they are difficult to detect.*

tion. *Varroa jacobsoni* is thought to be a possible vector of this virus, therefore, controlling of *Varroa* mite populations in infested colonies may also reduce the incidence of SBV.

**Chronic Paralysis Virus**

There are two distinct sets of symptoms associated with chronic paralysis virus (CPV). The **Type I** symptoms include abnormal trembling of the adult bees, partial paralysis, failure to fly and bloated abdomens. In serious cases, thousands of bees can be seen crawling on the ground outside the hive. This behavior can lead to colony collapse because the queen and only a small number of bees remain in the hive to care for the brood. Uninfected workers can often be observed removing paralyzed bees from the colony. **Type II** symptoms are characterized by hairless, dark-black, shiny bees which are initially capable of flying. These bees are often subjected to attacks by healthy bees and denied reentrance into the hive by the guard bees. Eventually, the **Type II** infected bees begin trembling, lose flight capability and die. According to Bailey and Ball the type of symptoms displayed by different populations of bees infected with CPV is most likely dictated by genetic differences.

CPV spreads rapidly in overcrowded colonies, probably through the cytoplasm of broken cuticular hairs. Broken hair bristles leave the cytoplasm of epithelial tissue exposed allowing the virus to spread through the wound when bees are crowded together. Virus particles have been observed in the thoracic and abdominal ganglia (i.e. nerve masses) of bees infected with CPV. Severe outbreaks of CPV do not coincide with season but rather with incidents that impair the normal foraging activities of bees. Poor weather, dearth and high numbers of colonies per unit area are factors that can reduce foraging activity and result in crowded conditions in the colony, thereby increasing bodily contact between infected and healthy bees.

CPV has a worldwide distribution but is as yet of little economic importance in Canada or the U.S. Different strains of bees impart variable genetic resistance to this virus. As a result, requeening an infected colony with a more genetically resistant queen may help combat this virus.

**Acute Bee Paralysis Virus**

Acute bee paralysis virus (ABPV) was first discovered in 1963. Although the nature of ABPV is very similar to that of CPV, the viruses themselves are very different. ABPV, the more virulent of the two viruses, spreads as an unapparent disease, most likely by way of salivary gland secretions of adult bees and in food stores to which these secretions are added.

In Britain, ABPV has never been associated with honey bee disease or mortality in nature and is thought to be contained within nonvital tissues such as fat body cells. However, in continental Europe and North America, ABPV has been shown to kill adult bees and larvae in colonies infested with the *Varroa* mite. As the *Varroa* mite parasitizes an ABPV infected bee, it damages tissue, releasing ABPV particles into the honey bee's hemolymph (i.e. blood). Once in the bee's hemolymph, the ABPV is systemic and eventually fatal. Ball suggests that the *Varroa* mite's digestive enzymes may stimulate replication of ABPV and that the mite can act as a vector by transferring the virus from infected bees to healthy bees. ABPV can be transferred between colonies if infected adult female mites are carried by drifting bees. ABPV has not had a lethal impact on bees in Britain as the *Varroa* mite has only recently been found there.

Once ABPV has entered the hemolymph, symptoms are very severe, and the bees die quickly. Bees injected with approximately 100 particles of ABPV begin to tremble and become semiparalytic in two to three days and die one or two days after the onset of symptoms. ABPV has also been found in bumble bees and is the only bee virus known to have a natural alternate host.

**Kashmir Bee Virus**

In 1977, Kashmir bee virus (KBV-Type Strain) was discovered in Eastern honey bees (*Apis cerana*) originating from Kashmir. It was first discovered in European honey bees (*Apis mellifera*) in Australia shortly afterward. Since then, KBV has been detected in bees from Canada, Spain and New Zealand. Ball indicates that strains of KBV unique to Australia, Canada and Spain have since been identified.

Australian and New Zealand beekeepers have not experienced losses that can be attributed to KBV. The virus exists as an inapparent infection, causing no observable symptoms. In the laboratory, honey bee larvae and adults show no effects when fed the virus but are quickly killed when it is injected into their body cavities. In Australia and New Zealand, KBV persists in all life stages of the honey bee as a harmless, non-damaging pathogen. Evidence presented by Anderson and Gibbs indicates that during inapparent infections, KBV is contained in cells in a region of the bee's gut where it is able to multiply, but only at low levels. However, on occasion, the KBV has been known to cause minor losses during simultaneous infection with Nosema disease (Causal agent: *Nosema apis*, a microsporidian pathogen of adult bees) and European foulbrood disease (Causal agent: *Melissococcus pluton*). It is possible that these other pathogens damage the bee's gut, allowing KBV to move from the gut region into other tissues where it is capable of rapid replication, causing lethal effects. Because KBV is pathologically similar to acute bee paralysis virus, it may also cause losses when associated with *Varroa*. Con-

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*VIRUSES ... Cont. From Pg. 393*

"*Varroa* mites and Nosema disease are often associated with outbreaks of virus symptoms. Controlling these easily handled problems can reduce virus problems significantly."

trol of *Varroa* mite populations, in addition to control of both Nosema and European Foulbrood diseases, may avoid possible losses caused by KBV.

**Black Queen Cell Virus**

Black queen cell virus (BQCV), identified in bees from Britain, Europe, North America and Australia, affects developing queen pupae in the capped-cell stage. It is most prevalent in the spring and early summer. Diseased larvae are pale yellow and have a tough sac-like skin similar to that seen in sacbrood-infected larvae. BQCV-infected pupae rapidly darken following death, and eventually, the walls of the queen cell become dark brown to black in color. Unlike sacbrood virus, BQCV does not multiply when consumed by worker larvae but will, however, multiply if injected into pupae. BQCV will not multiply when injected into adult bees. It multiplies rapidly in bees infected with *Nosema apis* and is often associated with Nosema in non-beekeeping situations. According to Bailey *et. al.*, *N. apis* infects the bee's mid-gut epithelium, increasing the susceptibility of the alimentary tract to infection of BQCV. Bees infected with both BQCV and Nosema disease have shorter life spans than those infected with only Nosema disease. Nosema is transmitted through fecal matter which is deposited on the combs while bees are confined over winter and eventually ingested by housecleaning bees in the spring. Bailey and Ball indicate that the *Varroa* mite sometimes acts as a vector for BQCV. If BQCV is present in colonies to be used for queen-rearing, it can quickly spread to developing queens, resulting in poor queen hatch.

**Cloudy Wing Virus**

Cloudy wing virus (CWV) can cause severe symptoms and the loss of many bees on occasion. It is a common virus in Britain, infecting about 15 percent of the colonies. CWV is also found in Europe, Egypt and Australia and has recently been identified in honey bees from Ontario, Canada.

Symptoms of CWV include loss of transparency in wings, although this is not a reliable means of diagnosis. Confident identification of CWV can only be accomplished by serological laboratory tests. The virus multiplies in the heads and thoraxes of infected bees, shortening their lives and eventually causing colonies to dwindle and die.

CWV does not replicate when injected into or fed to bees. The virus is transmitted directly between bees, especially in overcrowded colonies, and is thought to be air-borne. Evidence from laboratory experiments supports this, since CWV spreads between incubated cages of bees which are slightly separated. There is no seasonal pattern to the incidence of CWV disease, but irregular factors, such as those causing the spread of chronic paralysis virus, may contribute to multiplication and spread within colonies (e.g. overcrowding due to reduced foraging or in queen-rearing colonies).

**Filamentous Virus**

Filamentous virus (FV), a disease of adult bees, has been identified in North America, Great Britain, the U.S.S.R., Australia and Japan, and is the most common but least pathogenic honey bee virus in Britain.

The symptoms of FV are very similar to rickettsial disease and include: milky white hemolymph, in infected bees full of microscopic FV particles, and dwindling colony populations. FV multiplies in the fat body and ovarian tissues, of infected bees. FV can multiply when injected into honey bees, but is most infective when consumed by bees infected with Nosema disease, often associated with FV in nature. The control of Nosema disease may help in controlling the spread of FV in infected colonies.

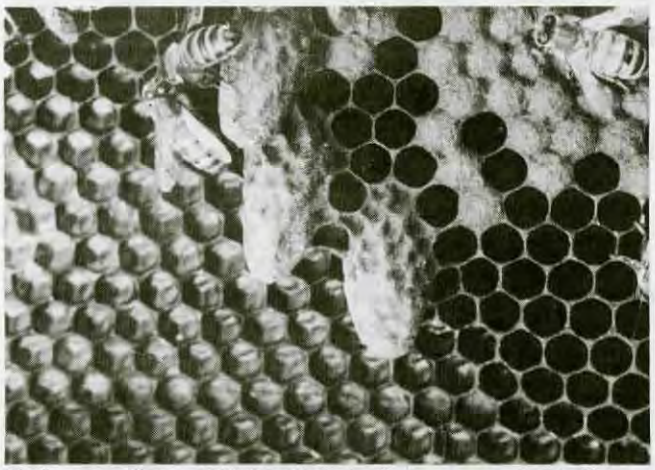
**Bee Viruses X and Y**

Bee virus X (BVX) and Bee virus Y (BVY) have the same-sized particles and are similar biologically in that both viruses occur only in the alimentary canals of adult bees. Both viruses occur in North America, Australia, mainland Europe and Britain. BVX is more lethal but less common than BVY. Neither virus causes any symptoms aside from shortening the lives of adult bees. These viruses differ in their ecological characteristics, BVY being most prevalent in May or June, while the incidence of BVX peaks in mid-winter in Britain.

Both viruses have associations with other bee pathogens in the field. Like filamentous virus, Kashmir bee virus and black queen cell virus, BVY has an association with Nosema disease. Laboratory tests indicate that BVY infects bees much more readily when ingested with *Nosema apis* spores than without. BVX occurs alone in field bees but is significantly associated with Amoeba disease (Causal agent: *Malpighamoeba mellificae*, a protozoan pathogen of adult bees) and is thought to have a greater virulence in occurrence with this pathogen than when found alone. At this time, BVX and BVY do not cause significant bee mortality and are not presently of economic importance.

**Arkansas Bee Virus**

The Arkansas bee virus (ABV) was originally detected as an inapparent infection of honey bees in the U.S. by injecting healthy bees with extracts of locally collected pollen loads removed from foragers. The injected bees exhibited no clearly recognizable symptoms; however, they all died after approximately 14 days. ABV has more recently been identified in association with chronic paralysis virus in dead bees collected from dwindling colonies in California. In nature, ABV always seems to be associated with newly identified Berkely bee picorna-virus (BBPV). ABV has never been detected anywhere other than the United States.



*Black queen cell virus (BQCV) affects developing queens when in the capped-cell stage.*

**Slow Paralysis Virus**

Slow paralysis virus (SPV) has been detected in extracts of adult bees in Britain and Canada. It appears to be unrelated to other viruses isolated from honey bees and exists as an inapparent infection in the host. Bees injected with SPV usually die in 12 days and typically suffer from paralysis of the forelegs and midlegs in the final few days prior to death.

**Conclusion**

As with most animal viruses, there are no known direct treatments for honey bee viral diseases. Indirect treatment of Kashmir bee virus, Bee virus Y, Filamentous virus and Black queen cell virus may be accomplished through control of Nosema disease. The spread of Acute bee paralysis virus and Kashmir bee virus may be indirectly reduced by controlling the populations of the vectoring mite, *Varroa jacobsoni.*

Much has still to be learned about honey bee viruses, not only with respect to their diagnosis and etiology, but also concerning their biological and economic impact on the beekeeping industry worldwide. BC

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# BARN BEES

peter sieling

"Sure, I can get them in the spring." I'd just read one of Dr. Morse's books and agreed with him. Removing bees from a building was worth doing at least once for the experience. The woman in the parking lot was delighted. "They've been in our barn as long as we can remember. I'm sure they'll still be there in the spring."

My dad and I had bees when I was a kid, eight hives at one point. But every year, one or two hives died, mostly through my own ignorance. It had been eight years since I lost the last one, and one day, I realized that the world of business had taken over my life and I had no hobbies. Ah, yes . I used to keep bees.

That winter, I consumed all the bee books I could find. I thought about

*"There on the barn, way, way, up through a crack in the wall, flew hundreds of bees."*

that nest away up in that dairy barn waiting for me. I developed a "Plan." It would take exactly three trips of 11 miles each, round trip, to capture those bees. On the first trip, I would check out the position of the nest and determine what tools I needed. On the second trip, I would seal all but one entrance, nail an exit cone to that entrance and put up a scaffold for a hive next to the cone. On the third trip, I'd pop that new hive into the car and head for home.

May came, finally, that year, and I lashed the 40-foot ladder to the roof of the little station wagon and headed for Green Haven Farm. There on the barn, way, way up, through a crack in the wall, flew hundreds of bees. I needed most of my 40-foot ladder to reach them. It must have been the rarefied air at that dizzying altitude that made my legs quiver while the ladder swayed in a strong wind that suddenly sprang up out of nowhere. Up close now, I could see that the crack extended for about six feet, and the bees used all of it as their entrance. It was an inch wide at its largest, too wide for caulking. Down the ladder for supplies, then back up through the clouds. I stuffed some of the crack with feed sacks, caulked the narrower portions and nailed a board over the widest part, then closed up a few knotholes. The bees were not too excited, a nice gentle bunch. After reducing the opening to one hole, I returned home.

The first trip hadn't gone as smoothly as planned, so I made an extra trip that evening. The bees had opened up several entrances along the crack. Not having the right equipment, I made a list for the next day.

On the third trip, I brought more lumber and covered the whole crack, resealed it with caulk and stuffed in more feed sacks. Now I was back on schedule. I headed home and took two brood frames from my other hive (accidentally taking the queen, also), placed them in a new hive and went back to Green Haven Farm with a scaffold I'd nailed together earlier. Everything went together well, and the screen cone was aimed straight at the hive entrance.

I had to check. On the next visit, everything was going nicely. Bees were swarming over the front door of the hive and trying to enter at the base of the cone.

The *ABC and XYZ of Bee Culture* said to wait four to five weeks for the bees to gradually leave the nest. So I waited nine days, sealed the opening and took the hive home.

Now that the bees were reduced to a "mere handful" according to the *ABC and XYZ* (if I had waited four weeks), I decided to open the wall and capture a second hive, plus the honey and brood that was left. That way, I'd acquire two hives in eight trips and I'd be almost back on my original schedule. I waited three days and went back with my eight-year-old son.

From the inside of the barn, the access was simple. I plugged in the double extension cord in the dairy. Playing out the cord, we walked up a short flight of steps into the milking parlor, then jumped up to a four-foot ledge, squeezing between two horizontal iron pipes. We continued out the cow exit onto the two-inch-deep

*"The sweat tickled my face, and my glasses fogged up under the veil. My legs threatened to buckle from the climbing. My son started to get bored. Back I sloshed through the milking parlor and out to the car, then back up with more empty buckets."*

manure-slick floor of the main barn. We slipped and slid along the wall with the gear and climbed another four-foot ledge into a narrow alley. Partway down the alley, a rickety ladder was wedged, and at the top of the ladder was a large, dark, empty granary with steeply sloping walls. We squeezed through a tiny access door and slid down the sides to where it came to a point at the base, sending up billows of dust that had been accumulating since the Flood. Here and there were large holes where the grain used to drop to the floor below. You find those the same way you find a land mine – by sticking your foot into it. It took about three trips to haul hive bodies, buckets, coolers and light, rope and tools. I didn't carry a smoker as one spark could ignite the dust and destroy the barn.

The inside wall was a patchwork of plywood panels and one, two feet square, was approximately on the

*"I waited nine days, sealed the opening and took the hive home. Maybe I should have been a bit more patient."*

*Continued on Next Page*

*BARN BEES ... Cont. From Pg. 399*

center of the nest. I had already caulked a crack in here earlier. In five minutes, the panel creaked and pulled from the wall, exposing a solid mass of combs and a solid mass of bees as far up as the light could reach. Immediately, the stale air was filled with the buzzing of confused bees. They flew into the light and were caught between the bulb and the reflector. Barbecued bee isn't a bad smell, exactly. My son stayed at the opposite end of the granary, enjoying the spectacle of his father in a dark cloud. "Ouch! One just stung through the glove Ouch! one just got my ankle." I cut and sorted combs. Honey, dust and squirming bees stuck to my gloves, trousers and shirt. There was no way to find the queen in this "handful of bees." Brood went into the cooler, honeycombs into buckets, until all were full. Then I heaped more combs on top of the bucket lids and hauled it all down to the ground floor, sloshed back through the manure, jumped down into the milking parlor and down the steps into the dairy. The sweat tickled my face, and my glasses fogged up under the veil. My legs threatened to buckle from the climbing. Gary started to get bored. Back I sloshed through the milking parlor and out to the car, then back up with more empty buckets.

I got all I could reach without removing more plywood and found a large cluster had formed on the wall. I brushed them into a hive, slapped on a lid and nailed the plywood back in place. Four more trips to the car and we headed home. As the sun set on that long day, I cut and tied the brood comb into frames and stuffed the extra pieces above an inner cover to give them a chance to hatch.

Later, I returned to the farm and sealed everything again to prevent more bees from moving in, leaving the remaining bees trapped forever between the walls.

That final trip was the 11th, 121 miles and 20 to 30 hours of time for two hives. Not bad, eh? A few weeks later, the farmer told me a new swarm had made a new entrance and moved in. I suspect the original bees chewed their way out and rebuilt. I'll get those next year! BC

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*Peter Sieling lives in Bath, NY and acquires his hives just about any way he can.*

# When Bees Must Die

Removing bees from residences other than your own has become complicated – more so in some places than others – due to the regulatory nature of insect control generally, and the liability problems associated with structural damage or personal injury nearly everywhere.

Moreover, removing bees with a pesticide has come under increasingly tighter control for the same reasons. Before you attempt to remove bees from a house or other building check with local or state authorities on the legality of such an action. This applies whether you charge for the service or not. Check before you do ANYTHING.

If the situation calls for destroying honey bees with a pesticide, and you are cleared to do so, there are guidelines to follow that will make the job easier, and safer, for you and the homeowner.

1) Use only an insecticide specifically approved for use on bees, and read and follow label directions. Treating bees with a pesticide that does not list bees as a target insect and the site of application on the label is illegal and may be dangerous. Regulations and registrations of pesticides change through the years as new information becomes available, so make sure that the product you are using is appropriate. At present, a number of aerosol-type sprays are on the market that state on the label that they are effective against bees (and wasps). These products are available in hardware stores, farm feed stores, and even many pharmacies and supermarkets.

2) All of the bees in the colony should be killed. Bees that are exposed to an insecticide but do not die will be irritable and especially likely to sting, because the insecticide affects their nervous system. To make sure that all bees are killed, apply the insecticide after dark, when none of the bees are out flying. An alternative time is during the day in very cool or rainy weather, because bees generally will not fly under those conditions, either. Spraying in the general area of the nest entrance is not good enough. To be effective, the insecticide must reach the center of the nest where the bees cluster; the nozzle of the spray can should be inserted as deeply as possible into the entrance opening. In some cases, it is necessary to drill an opening in the wall or tear off some siding on a building in order to reach the main group of bees, and such activity certainly stirs the bees up and increases the risk of being stung. Check the nest area on a sunny day after spraying; if bee flight continues, another application of insecticide may be necessary.

3) The wax combs, honey, and dead bees should be removed and carefully disposed of within 12 to 24 hours, if possible, after the bees are killed, because bees from other colonies – as well as other insects – will be attracted by the odor of the beeswax and honey. Also, these materials may contain toxic insecticide residues, so it is important to make sure that no children or animals will find and eat any of the honey. All materials should be placed in plastic bags inside garbage cans with tight-fitting lids.

It is often easier to remove the plaster or plaster and lath from the inside of a house to expose a nest than it is to remove the siding. After the nest has been removed and the nest area cleaned and filled, the plaster or plasterboard may be replaced and painted.

Residual odors from a previously used nest space may be attractive to bees for many years. To prevent other bee colonies from moving into the same space in the future, the cavity should be scraped out, washed down with soap and water, and filled in with insulation of some sort. If the entire space cannot be filled in, make sure to caulk or otherwise seal all cracks and openings that could serve as bee entrances. Spray-foam insulation type materials are excellent for filling a space so that it cannot be used again as a nest site.

# OBSERVATION HIVES

thomas webster — dewey caron

## Part VII

# BEE LANGUAGE

On a nice day, an actively foraging observation beehive is a fascinating sight. Bees are rushing out and zooming back in. Some of the returning bees are bringing in nectar in their honey stomachs. Other bees are bringing loads of pollen on their legs. Foraging is exciting to watch and probably just as exciting for the bees, too. Not a split second seems to be wasted.

As you watch foragers, you might wonder where they are going. Foraging is not random. Bees know where they are going and where they have been. Most amazing of all is that the bees can tell their nestmates where to go for the flowers they've found, whether the nectar and pollen resources are really good or just OK and even what the flower smells like! Bees have a "dance language."

The dances of honey bees have been an object of wonder ever since the Austrian biologist Karl von Frisch discovered their meaning several decades ago. He won the Nobel Prize for his work, the only time the prize has been awarded for a study of honey bees.

**Foraging**

Imagine the scene – a honey bee forager discovers a food source. She could be a scout bee, specifically looking for forage opportunities, or she could be an experienced forager that has been visiting a poor or declining forage situation. The foraging bee first fills her honey stomach and/or packs her pollen baskets with the resources of the flowers she has just discovered and then flies a beeline directly back to her hive. In the hive, she will use the food and her information to recruit additional hive mates to this new resource. The behavior of the returning bees are called "dances."

Honey bee dances are ritualized behaviors with special meanings to other members of the hive. There are actually several different types of dances in the hive. To pass the word, the forager repeats the same pattern over and over. The two most recognizable dances are the "waggle dance" and a related one called the "round dance." These are best seen in your observation hive on nice days when the bees are flying in and out at a great rate.

**Waggle Dance**

The waggle dance (also termed wag-tail or figure-8 dance) is the easiest to see. Look for bees moving in a figure-8 pattern with a vigorous waggling in the middle. In diagram form, it will look like Figure 1.

The dancing bee performing the waggle dance repeats the pattern again and again while other bees follow her movements. The dancing bee makes a narrow half-circle to one side, does a sharp turn and then does an exaggerated waggling movement ("dance") in a straight line. She then makes a half-circle in the opposite direction, completing a full circle. The straight portion, characterized by vigorous side-to-side movement of the abdomen (waggling) and sound production, is always with the same orientation relative to the vertical. The bee may not start the waggling position of this dance at the same point each time due to variations in the half-circle portion. There is very little variation in the direction the waggling is performed or in its duration.

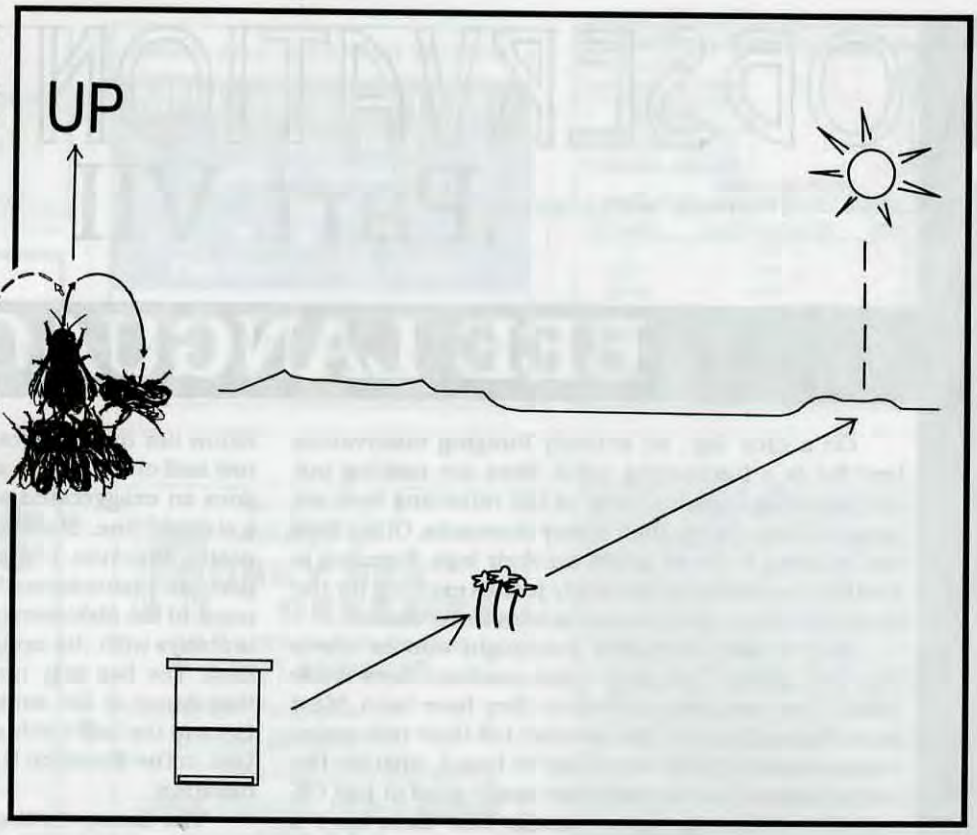
The interpretation of the waggle dance supplies distance and direction information. The dancing bee is telling the others that the flowers are at a certain angle direction from the position of the sun when they venture outside. Inside the dark hive, the bees can't see the sun, so she can't point toward the food since she must do her dancing on the vertical comb surface. To indicate direction, the bee does the waggle part of her dance at a constant angle, relative to UP (gravity) inside the hive. Bees interpret the gravity angle and then follow a sun compass when foraging outside.

When they are outside, bees use the sun as their compass for direction. Their eyes can detect polarized light and, using planes of polarization, they accurately fix on the location of the sun. Some internal mechanism helps them adjust to the continuous movement of the sun throughout the day. Thus, at any time, they are able to fix the location of a food source from their home by using the position of the sun. As the sun changes, they adjust so that they can still find food or hive and their way from one to the other.

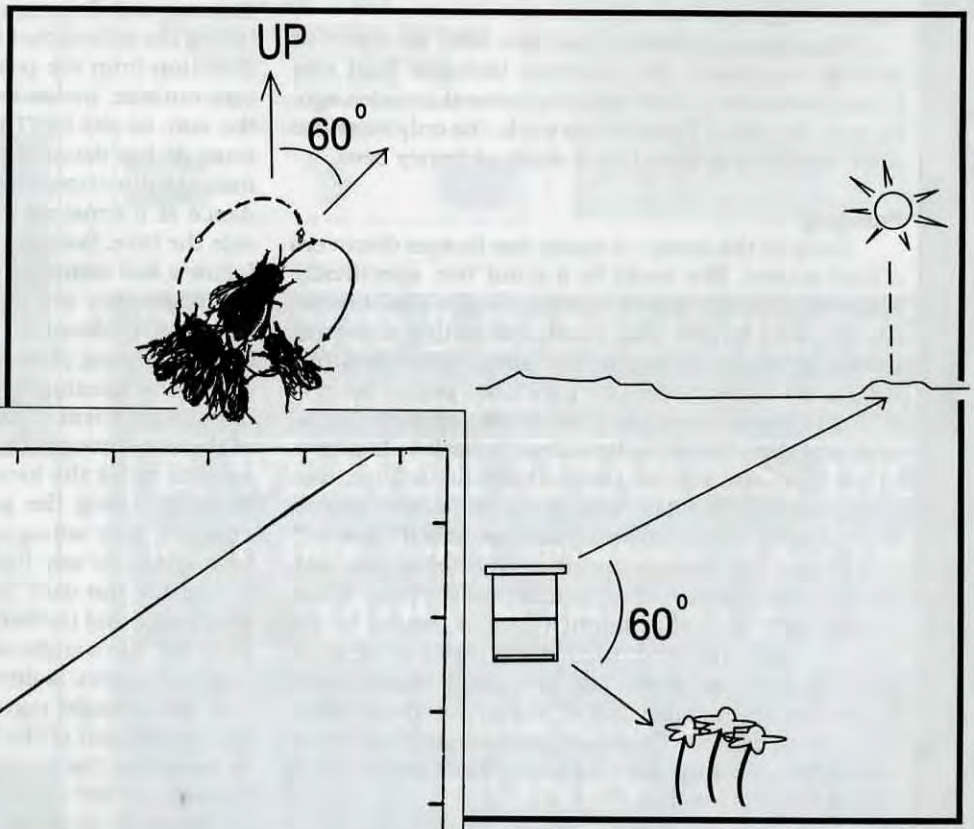
Inside the dark hive, where the wag-tail dance is performed and the bees cannot see the sun they transform the sun's angle outside to a gravity orientation. If the food source is directly toward the direction of the sun, the straight run is downward. Food locations to the right or left of the sun's direction, are indicated by transposing the angle to the line of gravity. Thus, a food source 60° to the left of the sun would cause bees to dance 60° to the left vertical on the comb.

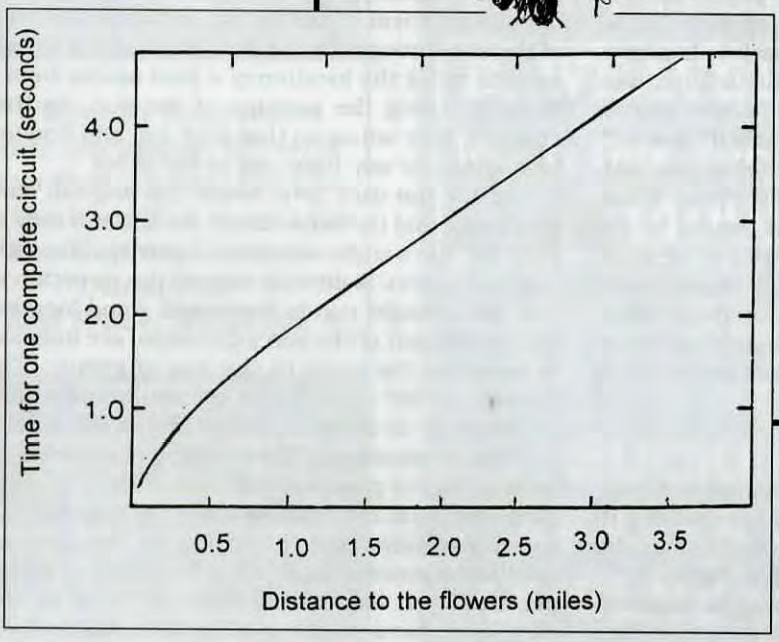
The orientation of the waggling relative to gravity is important to give information on direction. The waggling portion of the dance is also important in distance communication. During her waggle, the dancing bee produces a series of sounds at a frequency of 250 cycles per second. It has been shown that there is a direct correlation between the sound production time and the

Example 1. Bee is pointing straight UP when it waggles. This means the flowers are in the same direction as the sun.




Example 2. Bee waggles 60° to the right of up. This means the flowers are in the direction of 45° to the right of where the sun is.

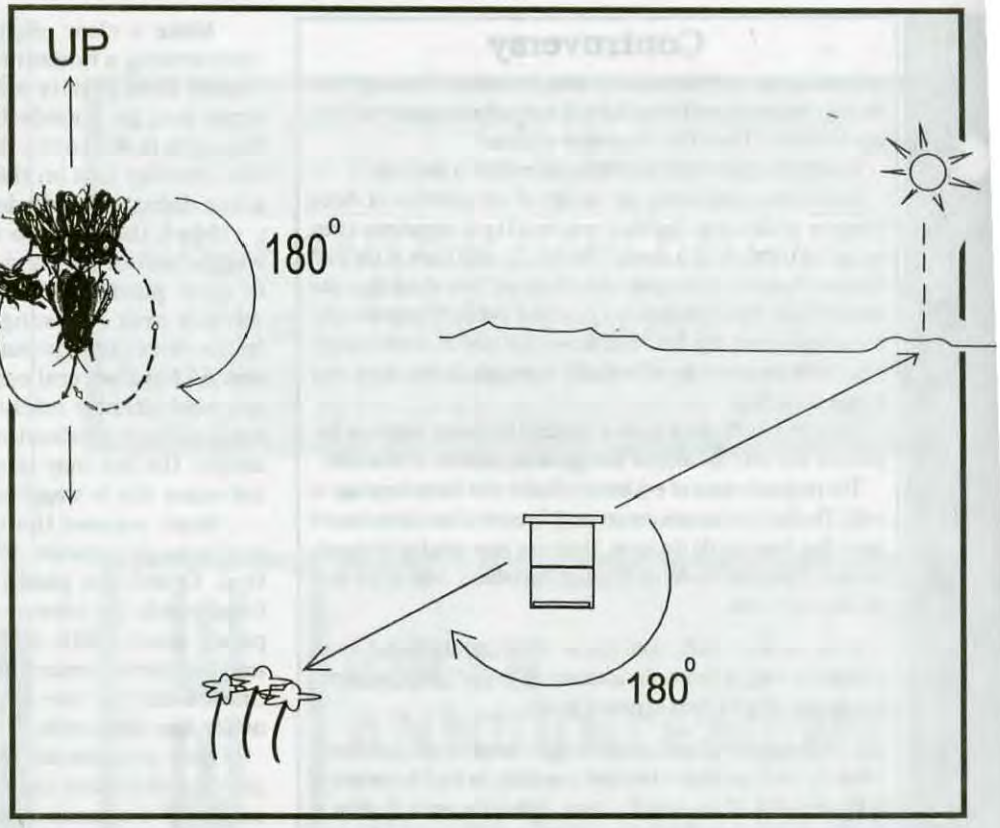


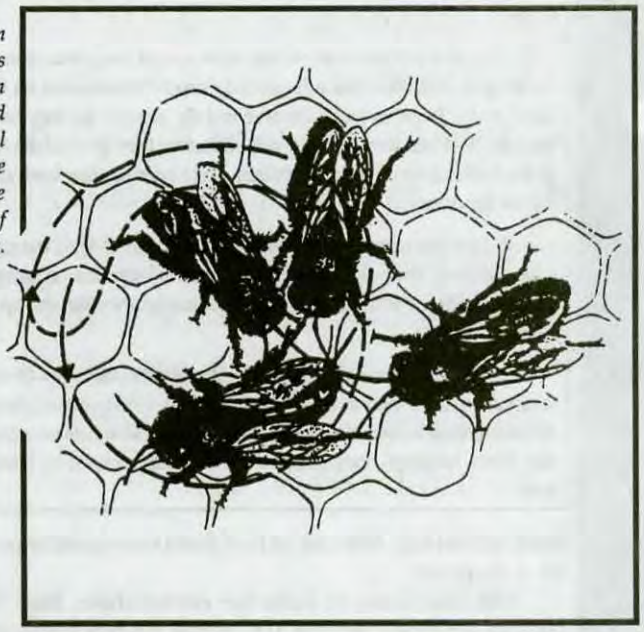

***Waggle Dance Chart***

*This chart is used to determine the distance to the flowers, as indicated by the waggle dance of the bee. Use the average duration of the straight run of the waggle dance to determine the distance (in meters). One mile is 1600 meters.*

Example 3. The bee waggles pointing down, 180° from the up direction. This means flowers are 180° from the direction of (opposite) the sun.




*The round dance: The bee will run in a circle, then turn around and run in the opposite direction. The bee repeats this dance to show the food is relatively close. No direction information is given by the round dance. In this dance, and for the waggle dance, the bee is usually followed by several "recruit" bees that are learning where to search for the flowers. This diagram and those for the waggle dance are modified from The Dance Language and Orientation of Bees, by Karl von Frisch (Harvard University Press).*



distance a bee must travel to a food source (see figure). The further the distance to the food source, the longer the waggling segment of the dance and its sound. Bees can measure that time segment and translate it into distance.

The quality of the food source is indicated by the vigor of the waggle portion of the dance. A great patch of flowers with very sweet nectar or easily collected pollen will elicit a vigorous dance. This will be especially true if the hive has been hungry for a while, such as following a rainy period. A so-so floral source will produce a more sluggish dance. Can you see the difference in dances you see in the hive? Can you see the dancer stop to offer a drop of nectar to a "recruit" bee attending the dance?

Smell is also part of the bee language. The scent of the flowers is carried on the body of the bee. Since bees are hairy, they retain the flower scents pretty well. The following bees use the scent cues when they are outside searching for the flower source they just received information about.

**Round Dance**

The second dance behavior you should watch for in your observation hive is the round "dances." In the round dance, the dancing bee, with quick, short steps, runs around in narrow circles on the comb, often changing direction and then repeating the behavior. A bee may dance for several seconds or as long as a minute; then she may stop and begin the dance at a different place on the comb. She generally alternates her turns clockwise, then counterclockwise but may consistently turn in one

## Controversy

Dance language has been studied by researchers in biology, psychology, linguistics and other fields. It is described in nearly all biology textbooks. But is the information accurate?

How can we prove that this behavior really is a language?

Researchers questioning the validity of interpretation of dance behavior say that bees find their way by: (1) past experience (they recognize odors on on a dancer's body), (2) odor clues in the field (such as Nasanov and footprint chemicals) or (3) by visual clues like other bees or flower patterns or a geometric pattern of experiments. Some researchers say their data shows that bees overwhelmingly favor odor cues over the information in waggle dances when they forage in the field.

Have they sufficient evidence to scrap the dance language hypothesis and elect the simpler biological explanation of olfaction?

The preponderance of evidence indicates that dance language is valid. The fact that humans can correctly interpret a bee dance doesn't prove that bees can do the same. There is a large number of experiments that support the dance language hypothesis. Four major supporting points are:

1. As the food shifts from 2m to 100m and the round dance changes to waggle dance, the accuracy of "naive" (inexperienced) foragers finding the food improves greatly.

2. On a horizontal surface, the waggle dance is still performed. When the sun's position is blocked, searching for food is random as is the direction of the waggle dance. When the sun's position is viewed, the accuracy of dancing orientation and finding food is very high.

3. Detour experiments show that when a scout bee goes around a building or mountain she still can only supply information on the direct route. Recruits leave the hive and fly directly (as they have been told). When they encounter the obstacle, they go over the top of the building or over the mountain. Only later do they learn and follow the detour.

4. If an experiment is established forcing scouts to walk through a tube to food, their dancing gives distance information on energy expanded. Flying foragers using this distance information end up at correct distances.

The evidence for dance language is strong. Bees certainly do obtain and use odor cues to find food. They may prefer certain pieces of information in the dance over others. Most biologists conclude that dance language does indeed exist and that it is used by honey bees.

direction more than the other. See the opposite page for a diagram.

The round dance tells the recruit bees that the flowers are close, within 100 yards. No more specific distance information is given. As with the waggle dance, the recruits may learn the quality of the forage by the vigor of the dance; they will be offered a taste of the nectar by the dancer and smell the scent of the flowers on her.

**Can you interpret "bee"?**

See if you can crack the bee dance code in your observation hive. The main challenge is to see how the bees convert direction information outside the hive to gravity information inside the hive. For the bees UP inside the hive means toward the direction of the sun outside the hive.

Make a clear plastic overlay. Mark a vertical line intersecting a horizontal line (a "+"). Use one line for UP – away from gravity (which will be 0° or toward the sun when you go outside the hive). The horizontal line to the right is 90° to the right of UP, the hive below is 180°, etc. Overlay this on the observation hive side on top of a bee doing a waggle dance.

Mark the angle to the vertical as performed by the waggle part of the dance. You do this by taping the sheet of clear plastic onto the transparent wall of the hive, directly over a dancing bee. Draw an arrow over the bee in the direction she points her body when waggling. You should have several opportunities to do this as the bee will consistently orient the same angle after each half circle. Use a protractor to measure the angle. For example, the bee may be pointing 45° to the right of vertical when she is waggling.

Next, remove the transparent sheet from the hive and take it outside. First, determine the sun's direction. Orient the plastic sheet so that the UP direction from inside the hive overlays the "sun" direction on the paper sheet. With a compass, determine north. Draw another arrow toward north. You now have two insecting lines, a line for the angle the bee was dancing and another line for north.

Now you should see how these two angles add to give the direction indicated by the dancing bee. For example, if we measured the bee dancing at 45° to the right of vertical, and the sun is 135° to the right of north, then we find that the flowers are in the direction that is 135° + 45° = 180° from north. In this example, that would be due south.

Angles to the left of vertical are calculated similarly. For instance, a bee dancing 120° to the left of vertical is indicating the direction 120° to the left of the sun's direction.

Now, you should try to figure out the distance information. Remember, this is indicated by the duration of the waggle dance. Use a stopwatch and time the waggle portion. It is better to time 10 waggles by turning the stopwatch on and off. Calculate the average by dividing the total time by 10 (if you timed 10 different dances – remember each one needs to be a dancer with her waggle dance oriented in same exact direction). The time varies a little bit, so taking an average is more accurate. Remember to time only the waggle portion, not the time the bee is turning around between waggles. Then use the graph to figure out the distance that the dancing bee is communicating to the recruits.

Now, with the direction and distance information and a map of the area, you can figure out where the bees are going! You might even go out to try to find the bees on the flowers. Mark them and return to the observation hive. Can you see any of your marked bees performing the waggle dance you are measuring and timing? If you followed all the steps, you should have interpreted dance language correctly. You now can communicate "like a bee." Congratulations! BC

*Thomas C. Webster is a researcher & extension specialist in apiculture at KY State University.*

*Dewey Caron is Professor & Extension Specialist in apiculture at The University of Delaware.*

# Better Beeswax

travis lane

## *Make your dark wax better with this simple technique*

Does some of your beeswax appear too dark or too dirty to be of any use? Would you like to see it clean and bright so you can make it into candles or ornaments or use it in polishes or creams? There is a way!

Beeswax, when secreted from the wax glands of the bee is almost pure white. But color can begin to change as soon as the wax scales come in contact with the multitude of products found in a colony, like pollen oils and other hive contaminants. Though some pollen oils have little effect on coloring wax, others readily cause color change as these oils are absorbed into the wax. Yellow pollens seem to have the dominating influence in coloring wax; hence the general accepted color of natural beeswax tends to lie from straw to lemon yellow. Older brood combs when rendered usually yield a deep yellow to orange color wax because it becomes contaminated and discolored by coming in contact with other sources such as honey, propolis, debris, overheating, or by using containers of iron, brass, zinc, or copper to process the wax. The proper use of a solar wax melter can be beneficial in rendering clean wax.

Various methods of cleaning or bleaching beeswax have been developed by processors of large amounts, however, equipment needed for these operations preclude their economical use on a small scale. If you are interested in clean and bright wax in small quantities the following procedures give amazing results.

First, CAUTION is a must due to wax being highly flammable when melted. Never expose melted beeswax to an open flame. An electric burner along with a water barrier between the wax container and the heat source, such as a double boiler, is strongly recommended. Stainless steel containers are best, but aluminum, tin, nickel, or enamelware may be used successfully.

Heat two pounds of beeswax in the container to about 170°F. Then, slowly add four liquid ounces of 3.0% hydrogen peroxide ($H_2O_2$). This can be purchased at many stores in 16 oz. bottles for about 40¢. At this concentration the hydrogen peroxide is easy, and safe to use. Once the Hydrogen peroxide is heated in the wax, keep it agitated throughout the mixture by stirring continually. A bubbling action will begin as the free oxygen (0) is released. This oxygen reacts with the organic contaminants causing them to oxidize and separate from the wax.

After 15 to 20 minutes there should be a noticeable clarifying of the wax. When the Hydrogen peroxide has been expended the bubbling action will cease. The water ($H_2O$) that remains will settle to the bottom along with any foreign matter that has solidified and been released.

Strain the wax through light colored sweat suit material (smooth side down), a paper towel, or your own favorite straining method. The remaining water may be put through the strainer also and allowed to settle underneath the wax as it cools.

The result should give you a clean and bright block of wax. If desired, a repeat of the process will further lighten the color of the wax.

If your facilities permit, larger quantities of wax may be cleaned with a lessor ratio of 3.0% $H_2O_2$. Twenty pounds of wax can be cleaned using 20 ounces of 3.0% Hydrogen Peroxide. A little bit of experience will improve this procedure for you. Characteristics of beeswax vary from one geographical area to another and between different floral sources. So expect response to any cleaning process to vary to some degree with different beeswaxes. The end result, however, is cleaner wax, and a more profitable product. BC

*Light beeswax sells for more, whether in bulk or in candles, than dark wax.*

*Travis Lane has been making better beeswax using this technique for several years, demonstrating at local and national meetings. He lives in San Angelo, TX.*

# Grandma Drove A Harley

marshall dunham

Hobby and sideline beekeepers who need a light utility vehicle should consider customizing a golf cart. The vehicle shown here is a gasoline-powered Harley Davidson three-wheel golf cart with a plywood flatbed designed and built by the late Scotty LeFore and his wife, Trudy, now retired.

For many years, Scott and Trudy ran "Scott's Berry Farm" near Portland, Oregon. They raised a variety of fruits, berries, nuts and vegetables on a converted dairy farm. They sold most of their produce directly to the public at their own roadside stand.

To insure pollination on their farm, Scott and Trudy kept from 20 to 40 hives of bees. Trudy was the beekeeper in the family. They converted an old milk-processing building to a honey room, did all their own extracting and bottling and sold directly to the public through their produce stand.

When they needed a light utility vehicle for farm work, they bought several used gas and electric golf carts from a country club that was investing in newer models. Some of the carts were used as sources of repair parts to keep the rest working.

The gasoline-powered Harley Davidson flatbed became the workhorse of their fleet. It could haul several hundred pounds of honey. The flatbed also served as a convenient working surface for jobs like blowing the bees out of the boxes and scraping burr comb.

The gasoline golf cart engine is so quiet that it can barely be heard when idling. The gas carts can haul more weight farther than electrics, but they require more maintenance to keep them running.

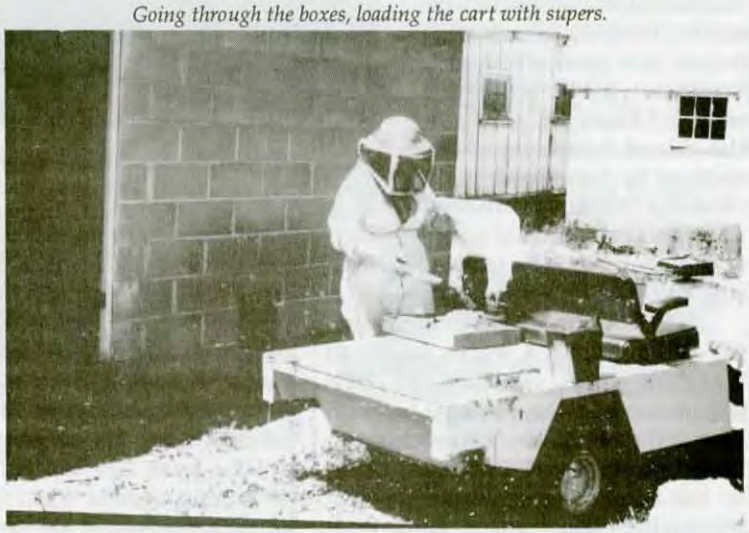
For short trips around the farm without heavy loads, electric golf carts were ideal. With an overnight charge, a cart could zip around making short trips all day. The electric carts are virtually silent, require very little maintenance, are easy to start and cost pennies a day to run. An electric cart can carry a load, but doing so drains the batteries faster and requires more frequent recharging.

Designed to run on vast lawns, golf carts are relatively low-impact vehicles. With fat, pneumatic tires, they can roll on soft soils. The three-wheel design is quite stable at moderate speeds on flat ground but requires some operator discretion on slopes. BC

*Marshall Dunham is a freelance writer and sometimes beekeeper from Blodgett, OR. He is a frequent contributor to these pages.*

*Trudy LeFore and her flatbed Harley Davidson golf cart.*

*Going through the boxes, loading the cart with supers.*



*Bees fill the air as Trudy blows off the last of the honey outside the honey house.*

# Mead Indeed!

linda mccandless

After a hard day pillaging and plundering, Celtic warriors in 500 A.D. would help themselves to robust tankards of mead, or honey wine, a drink that probably tasted as harsh as their lifestyle. Today's mead drinkers may fight traffic, day care and the shrinking dollar, but they won't be fighting taste. Food scientists at Cornell University's Agricultural Experiment Station in Geneva have transformed mead into a drink so improved that it is quickly gaining acceptance in commercial markets across the country.

The technique of ultrafiltration of honey was developed by research support specialist Bob Kime, who is working with food scientists Mark McLellan and C.Y Lee. They published their first paper on the process in 1991 and are still waiting to hear about the patent they applied for under the aegis of the Cornell Research Foundation. In the meantime, though, requests for information about ultrafiltration have been pouring in from all over the world.

"It is great to see the successful transfer of our research results and knowledge into a new product in New York state's food industry," said McLellan. He points to the recent adoption of the method by Lakewood Vineyards, in Watkins Glen, NY as "a good example of cooperation between the university and a small company."

Chris Stamp of Lakewood Vineyards, located 14 miles north of Watkins Glen, is one of five winemakers in the country to commercially apply the ultrafiltration technique to mead. The Stamp family has been growing grapes for four generations and crafting wines from Vinifera, French-American and Labrusca grapes for six years. Two years ago, they started investigating the idea of making mead. Chris processed his first 50 gallons of honey juice at the Experiment Station's Food Pilot Plant in cooperation with the three scientists from the Food Science and Technology Department. He processed another 100 gallons at the station in order to create product for a test market. In March he produced a 500-gallon batch on his own, with used ultrafiltration equipment he bought from a grape juice company in Alabama. He later finished bottling his second 500 gallons on the farm. The conventional way of making mead is to boil it for at least an hour to destroy the proteins that cause haziness and instability. "Prolonged boiling results in a harsh flavor that has traditionally been masked by the addition of more sugar," said Kime, a beekeeper himself, who first got interested in the ultrafiltration of honey after Robert Stevens, of Odin's Mead, in Greenwich, NY who he met at a New York Honey Producers' meeting asked him if boiling honey affected the flavor of mead. Using the traditional method, fermentation takes five or six months, and it can take another five to seven years to age out the bitterness and the astringency. "Some monks and mead companies still age it that long," said Kime.

*Bob Kime (left), Food Science & Technology Research Support Specialist at Cornell's New York State Agricultural Experiment Station in Geneva, confers with Chris Stamp of Lakewood Vineyards in Watkins Glen, NY, about the honey being pumped into the ultrafiltration unit to make mead.*

The semi-permeable membranes in the filter cartridges of the ultrafiltration unit separate out the larger proteins without heating, leaving in flavor components, sugars and small peptides. After the honey is filtered, yeast, acid (either malic, citric or tartaric) and a yeast nutrient are added to produce a crystal-clear honey wine that can be bottled and consumed in just 10 days – a product "people rate right up there with the finest grape wine," said Kime.

A paste-like sludge, which contains all the protein, constitutes the five gallons of waste after ultrafiltering 6,000 pounds of honey. "The waste contains antioxidants and clarifying agents, which means it may have significant commercial uses in the wine and juice industry " said Kime. Additional research is being planned jointly with the Enology Program in Geneva, NY in order to expand our understanding of the mead-making process, including making mead from particular flavors of honey, such as clover and buckwheat honey.

"We were interested in this filtration unit and making mead because

our production facility was underutilized six months of the year," explained Chris Stamp when we visited his facilities. The food scientists from the Experiment Station were on hand to examine the equipment and consult with Stamp as he processed his second batch of honey.

Because this was only the second batch ever filtered on the farm, Chris was being extremely methodical and careful in the start-up and operation of the stainless steel ultrafiltration unit. Filtering honey and water at 30 psi requires tightly clamped hoses and valve lines that are open so filtration cartridges valued at $1,500 (20 of them) don't blow.

Fruit juice companies have been commercially applying ultrafiltration to apple and grape juice since the 1970s. The membrane crossflow technique was developed in 1959. New ultrafiltration equipment retails for between $15,000 and $200,000.

"Ultrafiltration processing directly benefits the rural economy," said Stamp. "Not only does it benefit farm wineries by allowing us to diversify our product line with a new and unusual type of wine; it also benefits our neighbors who keep bees because they can count on marketing honey to us." Just recently, Stamp planned on ultrafiltering 6,000 pounds of honey from Wixon's, a neighboring bee company.

In addition to bottling straight honey mead, Stamp also combines the mead with raspberry or cherry juices that he buys from local fruit farmers to make fruit mead, or Melomel, which is also gaining acceptance with consumers.

The Stamps have been test-marketing the 12 percent alcohol wine in New York under the name "Mystic Mead." "We sell it for $6.99 for a 750 ml bottle," said Liz Stamp, who runs the tasting room at Lakewood. She conducts taste tests to determine which foods go well with mead. "So far, we've found mead is a good accompaniment to ham, barbecued foods, and Oriental foods particularly sweet and sour dishes," she said. Sweeter meads, like those flavored with fruit juices, can be sipped as dessert wines.

Of the 15 U.S. companies that currently produce mead, three are located in New York state. Odin's Mead in Greenwich, NY, and Earle's Mead, in Locke, NY are also collaborating with the Food Science and Technology Department at the Experiment Station.

By improving the taste of mead so that it competes well in upscale wine markets and decreasing the amount of time it takes to produce mead, farm wineries can expect to make year-round use of their equipment and take advantage of honey, which is a plentiful and under-marketed commodity. Current production and use of honey in the United States is steady at about 200 million pounds per year.

Meanwhile, the outlook is good for the "new" mead, whose growing popularity among wine drinkers has much to do with its improved taste. As Liz and Chris Stamp happily admit: "We can't keep up with the demand!" BC

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*Linda McCandless is a communications specialist at the New York State Agricultural Experiment Station for Cornell University.*

# DISCOVER NEW MARKETS

r t edwards

## You'll Never Know If You Don't Ask

A few months back, an article entitled *Prospecting For Prospects* covered new ideas concerning business location opportunities.

If you didn't have the opportunity to read the article, the gist of it was this: A list of 20 different small businesses who might be receptive to the idea of allowing you space to sell honey was provided, along with a theoretical sales presentation to the owner of a pharmacy.

Since it's easy to say that a theoretical sales presentation will work for you, *Bee Culture* decided to test the waters and go to the streets with the idea.

In fact, this is the first of three articles designed to help you get your honey on the shelves and sold.

**Proof Is In The Pudding.**

*Bee Culture* selected three small business ventures listed in the article in the small town of Westlake, Louisiana. What *Bee Culture* discovered basically boils down to this: It works.

Two out of three points of contact voiced a definite interest in providing space for honey. The third wanted to know "Why aren't you already back here with some?"

Bottom line: The pudding is sweet. Honey sweet.

**Survey Said**

You might want to entertain the idea of using a survey approach first before trying to sell these small business owners on the idea of devoting shelf space to your product. This approach is less formal and easy to carry out.

When *Bee Culture* approached Mr. Garrett Caraway of Caraway Pharmacy, Westlake, Louisiana, we used an informal survey technique. It basically boils down to discovering the business decision maker's attitude toward, and knowledge of, the product.

**Background**

Mr. Caraway is a well-established, independent pharmacist and pharmacy store owner in a town of fewer than 30,000 inhabitants. His customer base is diversified. However, half of his pharmacy space is devoted to appealing to local, well-to-do families' social and party needs.

He sees an average of 10 customers in his store per hour. Collectively, on a monthly basis, he has an average of 2,400 customers.

From your perspective, if just one percent of these customers purchase honey, you can expect to sell 24 units monthly.

> *"Small businesses can be a gold mine, but you have to get your foot in the door."*

Furthermore, by making the product more accessible, your current customers are apt to purchase more.

So, from your point of view, a display area with 100 units of honey and honey products available at this particular location is definitely worthwhile.

Now, let's take a look at Mr. Caraway's perspective:

***BC:*** Mr. Caraway, if a beekeeper walked into your pharmacy today, and asked if you would like to devote some shelf space for honey, how would you react?

***GC:*** I'd be interested.

***BC:*** Why?

***GC:*** Because my business is based upon making people healthier and offering products which are healthier for them. Honey is a natural, healthy sweetener.

***BC:*** What if that same beekeeper offered to help you increase your customer levels?

***GC:*** I'd be more than interested.

***BC:*** Why?

***GC:*** Any increase in customers through my pharmacy is a potential increase in cash flow for me.

***BC:*** Do you think the space would have to stand alone?

***GC:*** No. Fact is, I can add additional product displays – perhaps beeswax candles – side by side the beekeeper's honey and the two will work to help sell both products.

***BC:*** Apparently, you know something about honey.

***GC:*** I have a friend who sells his dark honey to other beekeepers to mix with their light. But more importantly, I'm aware of the need to offer my customers natural products which aren't chemically refined.

***BC:*** How many beekeepers have contacted you?

***GC:*** None.

***BC:*** If you didn't know anything about honey, wouldn't you be skeptical about selling it at your pharmacy?

***GC:*** Assuming that I knew nothing about honey, honey byproducts or beekeeping, that I wasn't interested in maintaining a natural, healthy preventive medicine image and that I was happy with my current customer levels, you would have a tough time selling me on devoting shelf space to it.

***BC:*** Why?

***GC:*** Because, from that point of view, you'd have to sell me on the product as a local product with an attractive sales record – product which could compete against existing inventory. You'd have to teach me enough about the product to get

*Continued on Next Page*

## *"Every business 'sells' differently. You need to learn how each works."*

me interested and then show me, on paper, how the product would increase my pharmacy volume. It has to make money, be safe to sell and never become a *sticky* liability.

***BC:*** What if more than one beekeeper decided to contact you?

***GC:*** That would be interesting. I suppose if the two offered different kinds of honey – like a light and a dark – or if the products were packaged differently, then I might devote space to both. Otherwise, two offering similar products in similar packaging would simply be redundant.

***BC:*** So, you're serious about devoting shelf space to honey?

***GC:*** Yes, indeed.

After talking with Mr. Caraway, our next stop was a large mom and pop grocery store owned and operated by Edward "Butch" Marcantel. He was also receptive to stocking local honey, but he already had national and regional brands being offered to his customers.

Marcantel's is a volume store. Since 1981, if you mention the word Marcantel to his competitors, they start shaking. He sells over a million pounds of beef per year. His gross, for a 6,000-square-foot store, is in the eight digits.

The way you approach this man is by having your customers come into his store and ask for your honey by name. Marcantel believes in providing his customers with what they ask for. So, if they ask for your honey, chances are good you'll get a phone call from him, and you'll acquire space in his store where you can sell your honey.

Figure on giving Marcantel 28 percent of retail. However, you're looking at volume here, not at a situation where you have a couple hundred units of honey to sell annually.

If you can handle it – if you have from 2,500 to 5,000 units of honey you can shelve annually – a high-volume small mom and pop grocery store such as Marcantel's is worth pursuing.

When you combine this opportunity with other unique promotional concepts and ideas, you're adding the additional community awareness and visibility which enhances customer volume and sales for both you and the small business owner willing to help you sell your honey.

With this concept in mind, *Bee Culture* decided to visit James Misse in Sulphur, Louisiana. Misse, who owns Jim's Conoco on Arizona Street, enjoys discovering new ways he can sell his Cajun Style – a natural, all-purpose Cajun seasoning.

If you know anything about cooking chicken, you know that honey, butter and barbecue sauce mixed together and used on chicken is a great flavor enhancer.

It just so happens that James Misse's Cajun Style also works extremely well on chicken and other meats.

This situation offers a variety of opportunities, and *Bee Culture* thought it would be appropriate to cover them first.

They are:

1. Creating a mix of butter, honey and seasoning and packaging it as a separate product.
2. Adding a sample of the seasoning to the side of the honey container and including a recipe.
3. Adding a discount coupon for Cajun Style to the honey container.
4. Adding a discount coupon for the honey to Cajun Style.
5. Selling Cajun Style at your honey sales location in exchange for having James Misse allow you space at his deli.
6. Touching base with James Misse, acquiring a sample of his product and then taking both to gourmet shops in your local area. Offer to supply both.

James Misse operated a deli in Sulphur for many years before he decided to purchase a Conoco gas station convenience store combination. He pointed out that while he was definitely receptive to helping other small business owners – including beekeepers – sell their products and services, he never had a beekeeper approach him with honey or honey-related products.

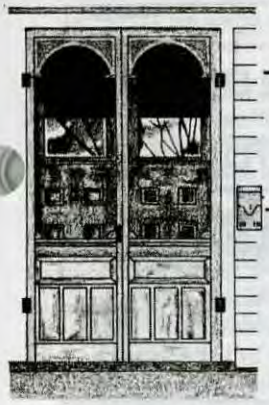
He said, "As long as the honey is properly packaged, processed and labeled, I'm interested in talking with a beekeeper about shelving his or her product at my store."

All three of these small business operations were receptive to allowing space for honey, but each sees the activity of selling honey differently.

Also, all three were receptive to allowing promotional activities within their places of business. Taste tests and showing how honey can be used with recipes – substituting honey for refined sugar – and with other products to enhance the flavor of food are a couple of ideas worth thinking about.

Our next article will address some of those promotional concepts and discuss, in detail, how they'll improve customer volume and sales for both you and the small business owner. BC

*R.T. Edwards is a freelance marketing specialist, and an occasional contributor to these pages.*



# HOME HARMONY

ann harman

## *The Apple of Love*

We all have heard the story about tomatoes being once thought poisonous, but we never hear who was the first courageous person to eat one. True, the tomato is related to the deadly nightshade, but the tomato itself is one of the world's most popular foods. Here in the United States, the consumption per person is about 60 pounds per year. Yes, I know you gorge on your own home-grown tomatoes in July and August, but 60 pounds? You're forgetting ketchup, tomato juice, pizza, and spaghetti sauce, eaten all year around. Even so, we eat about 17 pounds of fresh tomatoes per year, not including those gobbled in our gardens. In the grocery stores, the tomato is number three on the list of consumer purchases, exceeded only by potatoes and lettuce.

The tomato, native to the Americas, was cultivated by the Aztecs and Incas as early as 700 A.D. Those tomatoes were not the luscious red globes we see today; instead, the early tomatoes were small and yellow. The conquistadors took seeds from this highly attractive plant back to the old world where, for a century, it remained an ornamental plant. The Spanish Moors took the plant to Italy, where the Italians named it pomo del moro, "Moor's apple." From Italy, the *pomo del moro* was taken to France, where the name became *pomme d'amour*, the "apple of love." With a name like that, it was easy to believe that the tomato had aphrodisiac powers and therefore, was given as a love token. Today, we still give tomatoes as gifts when our plants produce a bumper crop.

The tomato was brought to Colonial America, but it was not used in food there until the early 1800s, when the Creoles in New Orleans used it in gumbos and jambalayas. Soon the use of the tomato spread throughout America, even to Maine where it was used with seafood. By 1850, the tomato was found in every home garden and was being raised commercially. Today, the tomato comes in many sizes, shapes and colors. Just look through the seed catalogs - the assortment is truly amazing!

By the way, just what **is** a tomato? Evidently, some squabble arose over its actual designation. Botanically, the tomato is a fruit because the flesh surrounds the seeds, and it is correctly a berry because the seeds are scattered, not in a central core like a plum. However, the tomato is used as vegetable. In 1893, the United States Supreme Court declared the tomato to be a vegetable, not a fruit. So today, many recipes are found using tomatoes in soups, salads, sauces, casseroles and pickles, but only a very, very few for tomato desserts.

Tomatoes are highly nutritious. One medium tomato contains only 35 calories and gives us 40 percent of our daily requirement of vitamin C and 20 percent of Vitamin A. Tomatoes are also rich in fiber, potassium, iron, phosphorus and some B vitamins; they are low in sodium, have no cholesterol and contain only one gram of fat. Sounds like an ideal food!

Tomatoes are fragile. The Florida Tomato Committee has excellent recommendations for caring for tomatoes. First and most important: **"Remember - Refrigeration kills flavor in fresh tomatoes."** Tomatoes should not be put into the refrigerator until they are fully ripe. Even then, refrigerate them only for a few days so the flavor will not deteriorate. Keep tomatoes at room temperature until they're fully ripe. Putting unripened tomatoes in the refrigerator will result in mushy tomatoes, lacking in flavor. Store tomatoes stem end up, and serve them at room temperature for maximum flavor. Be nice to tomatoes, and you will be rewarded with excellent flavor and texture.

Now for some tips on things to do with those wonderful ripe tomatoes. Most people slice tomatoes crosswise. However, if you slice them lengthwise, you will retain more of the juice. That will improve not only sandwiches, but your salads, too. Avoid seeding the tomatoes if possible, since the seeds contain some of the tomato's nutritional value. Do not freeze whole, ripe tomatoes. When thawed, they are mushy. However, stewed tomatoes and tomato juice can be frozen successfully. If fresh tomatoes are to be cooked, the skin will slip away from the flesh, so it is best to peel them before cooking. To peel fresh tomatoes dunk them in boiling water for about 30 seconds. Then transfer to cold water. Now you can literally slip the skins off.

Although tomatoes are a "vegetable," many recipes call for a small amount of sugar, frequently brown sugar. If you have a favorite recipe, just substitute honey for the sugar. Doing so will enhance the flavor. Homemade barbecue sauces generally start with tomatoes and are sweetened with brown sugar. Just use honey instead, but watch carefully when grilling to prevent burning. Substitute honey in your recipes for ketchup, chili sauce and pickles. Remember that the juice content of tomatoes differs - some are very juicy, others less so. Italian-type or plum tomatoes have less juice than the large beefsteak types. Choose the type of tomato to fit the recipe.

*Continued on Next Page*

*HOME ... Cont. From Pg. 415*

## Potato Salad With Tomatoes & Roast Beef

Recipes for tomatoes are about as abundant as the tomatoes themselves, so it is very hard to choose only a few. But perhaps you will like to try these. We'll start with a potato salad that is different and delicious. It has the advantage of being a meat salad, too.

2 large (1 pound total) fresh tomatoes
1 pound small red-skinned potatoes, cut in 1-inch cubes (about 3 cups)
6 ounces deli-style roast beef cut in 1/2-inch wide strips OR about 1-1/4 cups chunks of roast beef
1 cup broccoli florets
1/4 cup sliced radishes
1/2 cup plain lowfat yogurt
3 tablespoons prepared horseradish
2 tablespoons mayonnaise
2 tablespoons honey
1/2 teaspoon salt

Cut tomatoes in wedges; set aside. Boil potatoes until tender. Drain and cool slightly, and add the beef, broccoli, radishes and tomato wedges. In a small bowl, combine yogurt, horseradish, mayonnaise, honey and salt. Pour over potato mixture; toss to mix and coat. Cover and refrigerate until cold, about 2 hours. Yield: 4 portions, 6 cups

*Red Ripe Tomato Salads*
Florida Tomato Committee

## Tomato Stir Fry

5 medium (1-3/4 pounds) fresh tomatoes
1-1/4 cups chicken broth, divided
1 tablespoon cornstarch
4 cups green or yellow bell peppers, or combination of both, cut in wedges
2 teaspoons crushed garlic
1/2 cup golden raisins
1 teaspoon honey
1/4 teaspoon freshly ground black pepper
1/4 cup toasted pine nuts (pignolias)

Cut tomatoes in wedges (about 5 cups); set aside. In a cup, combine until smooth 3/4 cup chicken broth and the cornstarch; set aside. In a large skillet, bring remaining 1/2 cup chicken broth to a boil; add bell peppers and garlic; reduce heat and simmer, covered, until peppers are crisp-tender, about 5 minutes. Add reserved tomatoes, raisins, honey and pepper. Cook, stirring constantly, until mixture boils and thickens, about 2 minutes. Stir in pine nuts. Yield: 6 portions

*Favorite Tomato Recipes*
Florida Tomato Commission

## Oriental Tomato Salad & Dressing

**Salad:**
1 pound fresh tomatoes (about 2 large), diced
1 pound cooked chicken breasts, sliced (3 cups)
1 cup celery, sliced
1/2 cup roasted cashew nuts

**Dressing:**
1/3 cup oil
2 tablespoons rice wine vinegar
1-1/2 tablespoons soy sauce
1 teaspoon honey
3/4 teaspoon ground ginger
1/2 teaspoon garlic powder

Arrange chicken slices on serving platter. In a bowl, combine tomatoes, celery and cashews. Toss with dressing until evenly coated. Arrange vegetable combination with chicken on the serving platter. For dressing: Combine ingredients in blender and blend until smooth. Yield 4 portions.

*Tomato Recipes*
Florida Tomato Commission

## Tomato Conserve

This next recipe is quick and easy - and it nicely takes care of a bumper tomato crop.

18 cups ripe tomatoes (about 6 pounds)
4 teaspoons ground ginger
3 cups honey
3 lemons, thinly sliced

Cook the tomatoes for about 45 minutes. Add the honey, ginger and lemons. Cook until thick and smooth. Spoon hot mixture into 4 pint-size, hot, sterilized jars to within 1/2 inch from top. Complete seals and process in a boiling-water bath for 10 minutes.

*Putting It Up With Honey*
Susan Geiskopf

## Vermont Green Tomato Pie

And finally, a dessert recipe.

Pastry crust for top and bottom of 9-inch pie
2 pounds green tomatoes, thinly sliced
1 cup honey
1/2 teaspoon each ground cinnamon and allspice
1 tablespoon cornstarch
1/4 cup cider vinegar
2 tablespoons butter

Place bottom pastry crust in 9-inch pie pan. Place a layer of tomato slices on pastry shell. Combine honey, spices and cornstarch and drizzle some of this on top of tomatoes. Repeat layers until tomatoes and spice mixture are used up. Sprinkle vinegar over top and dot with butter. Put top crust on and make vent slits. Bake at 425° for 20 minutes. Reduce oven temperature to 375° and continue baking for 40 minutes. Serve lukewarm with a slice of cheddar cheese if desired.

*Tomatoes*
Margaret Gin

In case you are wondering what honey bees have to do with tomato plants - not much. But we can use honey in our tomato cookery.

# ?Do You Know? Answers

1. **False** A colony that raises a new queen under an emergency impulse will not normally rear a high quality queen. The bees will construct a number of queen cells around older larvae which means they were not supplied with an excessive amount of royal jelly during the first two days of their life.
2. **False** Baby nucs are used for housing virgin queens after they have emerged from their queen cells. Individual capped queen cells are transferred to the baby nucs containing a handful of bees plus food prior to queen emergence.
3. **False** Virgin queens mate with several drones while on the wing outside of the hive, never within the hive. During her mating flight(s) she receives a supply of semen that will have to last her for her entire productive life since she will never mate again once she begins laying eggs.
4. **True** All female larvae which hatch from fertilized eggs can develop into workers or queens depending on the food and care given them during their early larval stages.
5. **False** A colony preparing to swarm will typically produce more queen cells than a colony producing supersedure queen cells. In addition, swarm cells are commonly found along or near the bottom bars of combs in the upper brood chambers. Supersedure queen cells are found on the comb surface.
6. **True** Some strains of bees build more queen cells than others. Carniolan bees typically build more queen cells than the Italians or Caucasians.
7. **True** While virgin queens seek out capped queen cells when they emerge, they pay little attention to unsealed queen cells and the worker bees soon discontinue their construction and care.
8. E) I. R. Good
9. E) 13
10. D) 11
11. Queen cells may be started prior to the deposition of the egg or may be built around a cell containing an egg or larva. Those built in advance usually occur as cell bases and look something like a small acorn cup. Those built around a cell are simply enlargements of the worker cell.
12. After a new virgin queen emerges from her cell, the worker bees tear the queen cell down within a few days and often leave the base as a cell cup.
13. Beeswax, Plastic
14. Newly emerged virgin queens are very active and, if not prevented by the workers, will destroy all other capped queen cells present in the hive. The queen's powerful mandibles are used to make an opening in the side wall of the cell. She inserts her abdomen into the opening and stings her rival to death. Worker bees dispose of the carcass and destroy the queen cell. Virgin queens outside of their queen cells will fight until only one survives.
15. An abundance of bees of all ages and especially strong in nurse bees.
    A good supply of nectar, honey or sugar syrup (carbohydrates).
    A good supply of pollen or pollen supplement (proteins).
16. Queen cells should be handled with great care at all times. Development may be disrupted by heat, cold or by jarring the cells. Soon after a queen cell is capped until approximately 24 hours before the virgin queen emerges, queen cells should not be handled or disturbed.
17. Several situations can result in a colony being headed by a drone layer. If a virgin queen has not made a successful mating flight within three to four weeks after emergence, she usually becomes incapable of mating and becomes a drone layer. When the queen's supply of sperm in the spermatheca is depleted she also becomes a drone layer. In addition their are numerous diseases and physiological problems that can prevent the queen from laying fertilized eggs. These problems are often divided into four categories: lack of fertilization, unsatisfactory fertilization exhaustion of the sperm in old age and pathological drone-laying.

There were a possible 25 points in the test this month. Check the table below to determine how well you did. If you scored less than 12 points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of Points Correct
25-18 Excellent
17-15 Good
14-12 Fair

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*INNER ... Cont. From Pg. 378*

the people who owned them. Not one, not a single one gambled on whether those animals would stay healthy. Cows were tested for brucellosis, chicks fed antibiotics, baby pigs given preventative medications and calves treated for all manner of maladies.

In all cases the health, care and lives of these animals resides in the hands of the people who own them. Cows don't think, pigs don't go to the vet, and chickens would starve if someone didn't feed them, daily. It is a given when you own one of these.

Beehives, and the bees in them, like those pets and commercial animals, are no different. Hobbyists can, and usually do, lavish more attention and spend more money on their hobby (like those cats and dogs). Commercial outfits need the scales of size and efficiency in dispensing protection for their investments, but with the same affect.

But for some reason, the assumption has been made (by many) that these aren't living things, not in need of the best care as opposed to minimum care, that the responsibility for living rests with the bees, not the keeper. They are, after all, only bugs.

And, not surprisingly, I too often hear that a dead colony is 'not my fault. No more, I guess than a calf dead of scours, or a dog dead from heart worm.

A fundamental change in how a box of bees is perceived is necessary before the right (legal and approved) types of care are given, at the right time, in the right amount, by the people responsible for those bees.

Don't you agree?

Kim Flottum

# BEE TALK

richard taylor

*"In beekeeping, it's always later than you think."*

This Spring the local newspaper did a piece on our beekeeping club. That produced phone calls from a couple of gentlemen who thought they would like to have a try at beekeeping, starting out with just one or two hives. I have long had serious doubts about encouraging people to take up beekeeping because I have, over the years, seen what usually - indeed, almost always - happens. The beginner starts out with great enthusiasm, but then, after a year or so, the bees get neglected, and what you have there is a derelict apiary. I once thought, long ago, that all you had to do was show someone a hive of bees and that person would be so instantly fascinated that he or she would be ready to drop everything to take up the beekeeper's craft and then stay with it for life. But alas! The years have taught me that not everyone thinks and feels about everything just the way I do. I still do not understand how anyone could have even the briefest look at the world of the honey bee and not be overwhelmed, but that just shows, once again, how very different people are. To me, some people seem simply blind; but then, I'm sure I seem, in some ways, blind to them too.

Anyway, these two gentlemen seemed intelligent, serious and resourceful, so once again I undertook to get people started with bees. I got them set up with the beginner's equipment and was appalled by the cost. Still, that is the way to start - with new equipment. That way the beginner learns how to use foundation, wire frames, and so on, and also gets things that are of the right size. And I got them their packages of bees - again, the best way to start, I've decided. But before they installed them, they needed a lesson in one of my apiaries.

So off we went, and I installed a package of my own - a very good and basic lesson. My students saw instantly how gentle the bees are - I wore no veil or gloves - and they saw their first queen bee, and all that.

And they got a lesson about beekeeping in general, a very important one, I think. One of my hives in that apiary, right next to where we installed the package, has a cover that is in pretty bad shape. Two of the sides have dropped off, and the top is covered with rust. This does not matter. The bees do not care what the cover looks like. Neither do I. Neither should they. All that matters is that it does its job. I once knew a beekeeper who used scraps of tar paper held down by rocks for hive covers, and he got fine honey crops.

Nor are my hive stands in that apiary very fancy. Each hive stand holds two hives, and consists of nothing but two big concrete chimney blocks with two, two-by-fours laid across them. They cost me nothing, and do the job - they hold the hives up high and dry, above the grass and weeds, which is all that matters. I have seen hive stands offered for sale, about two or three inches high, each built to hold only one hive, and each with a little sloping access ramp leading to the hive entrance. What could be the point of that?

There are several hives in that apiary that have both front and rear entrances, these latter being cracks that have developed in the backs of the hive. In most cases the bees somehow prefer those rear entrances over the front ones. Fine! The honey is going to be the same from whatever entrance it comes into the hive, and there will also be just as much of it. The bees don't care how they get in and out of the hive, so long as they can do it with ease, and I do not care either.

So is that a decrepit looking apiary? Not at all; at least, not to me. It has the one thing that makes a hive of bees beautiful, and that is, the bees themselves - lots of them.

And that is the lesson I tried to drive home to my students. What is important about a hive of bees, and by far the most important thing, is the bees themselves. The colony must be strong. You won't get much from the nicest hive in the world if it is less than full strength. You need lots of bees. A hive bursting with population will not only gather a good crop, but will also be more resistant to the pests and diseases that bees are vulnerable to.

In that apiary, and indeed in all my apiaries, the deep super is on top and the shallow one on bottom, which is the reverse of the usual arrangement. That does not bother the bees. And I find many advantages to having the deep story on top. It is much easier to make nucs and splits, and foundation gets drawn out much better if in the top story rather than the bottom. Often when I remove combs to make nucs or whatever, I replace them with frames of foundation which, if it were down near the bottom, would likely get chewed up.

The management of colonies for honey production does not need to be terribly complicated. About all you need to concentrate on is swarm control and disease prevention. The latter is pretty easy, but swarm control takes some doing, since the basic requirement of beekeeping is to keep colonies strong. I'm not going to go into swarm control here because I have done it many times, but I should note that every effective swarm control method I know of, which does not

involve more work than is worthwhile, involves splitting a colony in one way or another. Even if all you do is remove, say, three combs of brood to make up a nuc, then you have, in effect, split the colony.

As for diseases, it has been years since I have had any problem of American foulbrood. This is a disease that seems to plague certain areas, while other areas, fairly nearby, rarely see it. Moreover, it seems to be impossible to eradicate it in those areas that have it. A beekeeper can take preventive measures in those areas and keep it under control, but if he lets down his guard, then it begins to reappear. Well, perhaps I should knock on wood, but my apiaries seem to be in good areas. I nevertheless take the basic precaution. Each Spring I give each colony a bit of Terra early on, then do it again a week or so later. This costs very little and takes almost no time at all - maybe a half hour for each apiary. I don't worry about nosema, never have. Strong, well-ventilated colonies seem to have no trouble with this. And I don't worry about tracheal mites either. I thought these would be a big problem, but they don't seem to be, at least for me. And as for *Varroa*, the Apistan strips seem to provide complete control for this. When I made quite a few nucs and splits this Spring, I occasionally damaged drone brood, and there was no trace of *Varroa* in any of it. That's probably the easiest way to tell whether you have *Varroa* mites – just uncap a few patches of drone brood. You'll see the mite infection if it is there, but if you have used Apistan strips you probably won't see it at all.

I got my first comb honey supers on by the time the dandelions bloomed this Spring, and it is a good thing I did. It was pretty cold, week after week, and I was sure the bees could not be getting any nectar. But lo! When I checked, I found the hives heavier than ever and quite a bit of honey had come into some of the supers already. And I was reminded of something I have long known: In beekeeping, it is always later than you think. You've got to hustle to keep ahead of the bees. BC

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*Richard Taylor raises bees, and comb honey, writes beekeeping books from his home near Interlaken, NY.*

# Questions?

## Pollen = Queen?

**Q** **I have heard that bees collect pollen only when the colony is queenright. Is this true?**

**James Tipton**
**Glade Park, CO**

**A** This is essentially correct. Pollen pellets on the legs of incoming bees is an *almost* sure sign of brood, and brood in a hive is an almost sure sign of a laying queen. I have never known this to fail.

## Drying Honey

**Q** **I have been keeping bees in the Southwestern Pacific for over thirty years, currently on the Island of Palau. A perpetual problem is the high moisture content of extracted honey. How does one make a small honey drying facility?**

**J. Victor Hobson, Jr.**
**Koror, Palau**

**A** Other beekeepers facing this problem - myself among them - have solved it with a small dehumidifier. These are quite inexpensive and easily remove over a gallon of water from the air in less than a day. Supers can be stacked, staggered for air circulation, in a closed room, and the dehumidifier left running for a day or two, making the air in the room quite dry and significantly lowering the moisture in the honey still in the combs. Some beekeepers, as an alternative method, stack the supers on a rack and gently blow warm air through them with an electric fan, using light bulbs for heat, so as not to melt the combs with excessive heat. Or the two methods can be combined.

## Slowing Granulation

**Q** How do you prevent granulation in comb honey?

George Bailey
Mansfield, CT

**A** First of all, most early nectar flows, especially those from trees such as basswood, yield honey that is slow to granulate and these are the flows you should try to get comb honey from for various reasons. The Fall flows, such as from aster and goldenrod, are quick to granulate. Moreover, honey in the combs is, for some reason, much slower to granulate than strained honey, even when it comes from the same source. But the best way to retard granulation is to store the comb honey in a deep freezer.

## Small Harvest How-To

**Q** **What is the best way to harvest a small honey crop from just one hive?**

**Kevin Snyder**
**Tiffin, OH**

**A** It is not worth it to buy an extractor for only one or a few hives. So join your local bee club and borrow one. Or, if the honey is for home consumption, raise cut comb honey and pack it in one-gallon jars. As for getting it off the hive, simply shake and brush the bees from the combs. Simple!

## Comb Honey Leakage

**Q** **I produced some beautiful comb honey in round sections, placed them in boxes on edge, sealed the boxes and then left them in a freezer for several days. When I opened the boxes, I found that honey had drizzled onto the insides of the covers and, in some cases, begun to seep out between the rings. How come?**

**Max W. Griffie**
**Newville, PA**

**A** Your mistake was storing the sections on edge. Circular sections *should be kept flat.* Sometimes a bit of honey will drizzle onto the bottom cover, but this makes no difference if the cover is opaque. Tiny seepages from the sides are also not a serious problem as they can be wiped with a damp cloth. It seems that freezing does sometimes cause comb honey to "weep" a bit. I think this depends on how the bees capped it over. But I do not consider it a serious problem.

## Why Slotted Racks?

**Q** **What is the purpose of the slotted bottom board that some beekeepers use?**

**George Bailey**
**Mansfield, CT**

**A** These were used by C. C. Miller, one of the best known of American beekeepers at the turn of the century. He thought you should use a deep, that is two-inch, bottom board, with the idea that this would improve ventilation and reduce swarming. But without a slotted (sometimes called 'slatted' rack) rack in this deep space, the bees build comb there creating problems for hive manipulation. I have used these deep bottom boards (homemade) quite extensively, but decided long ago that there is no advantage to them at all. My advice, once again: Stick with standard equipment.

## Next Nectar Taker

**Q** **After a bee has taken the nectar from a flower, how long does it take before another bee will find nectar in that flower?**

**G. A. Delicata**
**Stockton Springs, ME**

It depends on the plant species and, of course, on the weather. Also, it does not have to be another bee, for once a bee has found nectar in a given plant, it tends to return to that same plant. The important point this question raises is that nectar secretion is a continuous process and is stimulated by lots of sunlight, and adequate moisture.

### White Comb Honey

**Q** **How do you get comb honey white?**

**Chip Tuggle**
**Mt. Vernon, OH**

**A** There is no way to restore the whiteness of comb honey that has become darkened. To get snow-white comb honey you need a fast honey flow, then get the honey off the hive before it gets darkened by constant and prolonged contact with the bees, called "travel stain." Never insert a comb honey super under a super containing brood.

### Paint or Not

**Q** **Would painting the front of extracting supers black help the moisture content of the honey?**

**Andrew K. Watson**
**Freeport, MI**

**A** No. I assume the idea here is that the super would be warmer inside and that this would reduce moisture, but I am sure it would have no effect whatsoever.

*The response to our appeal for questions has been good. Keep them coming! Address questions to Dr. Richard Taylor, Box 352, Interlaken, NY 14847, enclosing a stamped envelope for a prompt reply.*

# Answers!

Richard Taylor

# Gleanings

JULY, 1995 • ALL THE NEWS THAT FITS


## Leinenkugels Realease Results

# NEW HONEY BEER SURVEYS BEEKEEPERS

The word's out. If you're seeking excitement, love, fine cuisine, and even a little danger, beekeeping's the route to go.

According to a new Leinenkugel's Honey Weiss Beekeepers Survey, beekeepers are stung an average of 500 times annually, overwhelmingly call their loved ones "honey," and rub everything from meat tenderizer to fresh onions on the inevitable bee sting.

The nationwide survey celebrates the introduction of a new summer beer, Honey Weiss (pronounced vis), brewed by The Jacob Leinenkugel Brewing Company in Chippewa Falls, WI.

"After we brewed our Honey Weiss, and realized the wonders of honey, our curiosity was heightened about the people who help produce it," said T.J. "Jake" Leinenkugel, president of the 128-year-old brewery. "Based on some of the responses, we're a bit sorry we asked."

Leinenkugel's surveyed 400 members of The American Beekeeping Federation, Inc. between April 15 and May 6, 1995.

**"Beekeepers – A Warm Bunch"**

Proving conclusively that even beekeepers sometimes take their work home with them, 71 percent of beekeepers nationwide claimed they call their loved one "honey." Other variations included "honey bun," "hon" and "honey bee."

**A Hard Day's Work**

That beekeeping can be an extremely hard (and painful) day's work is no exaggeration. Beekeepers responded that *on average* they're stung at least **500** times per year.

One unlucky respondent endured **10,000** bee stings in just one year, while several reported having been stung only once in that time.

**"On Your What!"**

When asked to list the worst places they had ever been stung, beekeepers mentioned, among other places, that they had been stung on their eyeballs, under their fingernails, and inside their noses and ears. Several apiarists (beekeepers) also reported they had been stung on their, ahem, "private parts," – and not just once.

**"Look Mom, No More Sting!"**

With 400 beekeepers accounting for more than 1 million bee stings annually, the Leinenkugel's Honey Weiss survey found no shortage of home remedies for this natural work hazard. Among them:

1) Meat tenderizer mixed with water
2) Ammonia and baking soda paste
3) Fresh onion
4) Liquid soap
5) Vinegar

**"Honey and Chicken Liver Paté, Anyone?"**

When asked "What is the most unusual food to which you add honey?" beekeepers demonstrated a real taste for their work. Among the foods they say are enhanced by a touch of honey are:

1) Grapefruit
2) Cole slaw
3) Cornbread
4) Hot chocolate
5) Pizza
6) Salsa
7) Corn
8) Cottage cheese
9) Beef stew
10) Chili
11) Cucumber salad
12) Broccoli
13) Lasagna
14) Beans
15) Spaghetti sauce
16) Summer sausage
17) Sauerkraut
18) Shrimp
19) Orange juice and ginseng powder
20) Chicken liver paté

**"Leinenkugel's Honey Weiss – A Honey of a Beer"**

Leinenkugel's Honey Weiss Bier is available in select markets throughout the country May through August. It's brewed with carefully selected malted wheat providing for a light, crisp, very drinkable taste. Choice hops from Washington's hop-rich Yakima Valley and a hint of honey give the beer a well-balanced, sweet finish.

Jake Leinenkugel encourages beer drinkers to try his summer seasonal with a lemon or lime, or over ice.

Other brands produced by the Jacob Leinenkugel Brewing Company include Leinenkugel's Red Lager, Leinenkugel's Original Premium, Leinenkugel's Light, Leinenkugel's Limited and a full line of seasonals in addition to Leinenkugel's Honey Weiss: Leinenkugel's Genuine Bock, Leinenkugel's Autumn Gold and Leinenkugel's Winter Lager.

## Will Honey Benefit?

# CALORIES INCREASING

If you're looking for evidence of consumer self-denial in the supposedly austere 90s, don't bother with the dessert tray. A report from London-based Datamonitor finds the sweets and desserts market growing from $17.7 billion to $22.2 billion between 1990 and 94. And, as the chart indicates, most dessert categories are expected to continue growing through the end of the decade, with yogurt – which at least has an aura of healthiness – leading the pack.

| Real value ($m) 1994 prices | 1994 | 2000 | Growth rate 1995-2000 |
|---|---|---|---|
| Forzen desserts | 5,727 | 6,178 | 1.3% |
| In-store bakery | 4,501 | 6,103 | 4.8% |
| Ice cream | 3,654 | 3,879 | 1.0% |
| Cakes & pies | 4,189 | 3,870 | -1.2% |
| Yogurt | 2,400 | 3,311 | 5.2% |
| Shelf stable desserts | 1,009 | 804 | -3.7% |
| Refrigerated desserts | 740 | 693 | -1.2% |
| Total | 22,220 | 24,838 | 1.8% |

# HONEY BOARD NEWS


The Honey Board has developed hang tags for honey containers.

The full-color, eight-panel hang tags include honey use and storage information as well as four easy, delicious honey recipes. The front panel features the honey industry's familiar spokesbear proclaiming "Let's Get Cooking." Each tag is folded to 2-1/4" x 2-1/4" and has an elastic cord for easy attachment to the necks of queenline jars and squeeze bears.

The tags are sold in packs of 500 at a price which defrays the Honey Board's actual printing and shipping costs only – four cents per tag (totaling $20 for each 500-tag package).

"Hook" new customers by adding these attractive and informative tags to your containers.

# HONEY BOARD SHARES CHEF

The National Honey Board will be calling on selected foodservice chains to present a honey education and menu concept program showcasing the value-added benefits of honey.

Larry D. Benares, a chef and affiliate of Culinary Core Consulting, will represent the Honey Board at these critical, hands-on meetings. As the executive chef of the Town & Country Hotel and Convention Center in San Diego, Chef Benares is a nationally-recognized culinary figure. To date, Chef Benares has concentrated his career in hotel operations, working as executive chef of the Disneyland Hotel in Anaheim and the Hotel Queen Mary in Long Beach, California. He is also an award-winning member of the 1986 and 1992 USA culinary Olympic teams. In addition, Chef Benares has served as a chef instructor at Orange Coast College in Costa Mesa, CA and has participated in many workshops, seminars and public appearances. He is an active member of the American Culinary Federation and has served as president of his local chapter.

Chef Benares will be spreading the honey messages to restaurant chains around the country.

# BEE-ART ON DISPLAY

200,000 live bees honeycombing a glass wedding dress at the Winnipeg Art Gallery! Not your average art exhibition – and not your average artist. Manitoba artist Aganetha Dyck is one of Canada's most innovative artists whose uninhibited attitude and unconventional materials result in powerfully tactile objects. The exhibition, which provides a 20-year overview of Dyck's work, is free, running from May 11 until October 15.

The wedding dress is the focal point of *The Extended Wedding Party*, and is in an observatory hive and visitors will actually be able to watch the bees at work, charting their artistic progress during the course of the exhibition.

Dyck has been working with bees since 1991, discovering that introducing foreign objects into the hives results in elaborate honeycomb sculptures. For *The Extended Wedding Party* she has taken hive blankets, "brocaded" by bees with resin and wax, and turned them into garments for the bridegroom, attendants and guests. This major work is concerned with society's often failed expectations of marriage and family.

Following its installation at the Winnipeg Art Gallery, the Aganetha Dyck exhibition will tour to the Mackenzie Art Gallery, Regina; the Glenbow Museum, Calgary; the Vancouver Art Gallery; and the MacDonald Stewart Art Centre, Guelph. The bees may be too busy to travel!

# HONEY WEAR DEBUTS

A new line of casual wear bearing original artwork designs and targeted at the honey industry recently debuted. Marketed by "The Outpost," in Umatilla, FL, the new line of t-shirts and sweatshirts has been designed to give honey enthusiasts the opportunity to possess original artwork while also showing their support of the honey industry.

The full color designs are the creation of artist Holly Palmer-Newby, a graduate of Florida State University and a lifelong resident of the honey-rich Umatilla area. "I am really excited at the opportunity to supply my neighbors and honey producers like them all over the country with an affordable way to show their support of the honey industry," she said.

Palmer-Newby's artistic creations and accompanying slogan: "Honey – the natural choice," are a must see for anyone who loves the honey industry. For information on the new, expanding line, call (904) 669-4644.

## Honey Exporters Gain

# EXPORT PROGRAM ENHANCED

The final rule to amend the Export Enhancement Program (EEP) and the Dairy Export Incentive Program (DEIP) was issued by the U.S. Dept. of Agr. The regulations are amended to eliminate the requirement for exporters to have experience in order to participate in the two programs. Removing this requirement allows more companies to participate in the EEP and DEIP. The regulation will also establish when new program participants would be eligible for bonus payments. EEP and DEIP help U.S. agricultural producers, processors and exporters gain access to foreign markets and makes possible the sale of products that otherwise were not possible because of subsidized prices offered by competing countries.

# NJ PAST PRES. RECOGNIZED

Inga Littig, immediate Past President received a gavel/plaque from president Tim Schuler in recognition of her service to the N.J.B.A. She is the second Littig to serve as President as her husband Edward also served as President and received the "Citation Award" several years ago for his many years of dedicated service to NJ Beekeepers. They are the first husband and wife team to be State Beekeeper Presidents in NJ and perhaps in the U.S.

## Honey, I Shrunk The Class

# ABF 4-H ESSAY CONTEST WINNER

In a case of "Honey, I shrunk the class," the top essayist in the 1995 American Beekeeping Federation 4-H Essay Contest takes a school class into a beehive to learn the wonders of the honey bee.

"Adventure in the Beehive," the essay by 16-year-old Rebekah Lynn Ross of Campbell, Texas, was judged the best of 26 entries in the contest. Rose Kohl, 9, of Storm Lake, Iowa, wrote the second place essay, and the third place writer was Audrey Powell, 12, of Havanna, FL. More than 1,000 4-H'ers entered the contest.

The topic for the 1995 contest was an original story which is suitable for a teacher to read to second grade students. Rebekah and Rose used fantasy as their vehicles; Audrey told of a father and daughter robbing a hive.

In Rebekah's story, once "Mrs. Murrey" and her class were sprayed with the odor of the colony and zapped down to the appropriate size, honey bees came to the classroom to give them all a ride to the hive. A home-schooled 10th grader, Rebekah is involved in numerous activities in 4-H and her church. She plans to get an English degree in college. Her first place essay earned her a $250 cash prize.

In "The Busy Little Bee," Rose told the story of Bethany and Beatrice, worker bees who emerge from adjacent brood cells and work together at hive tasks, including scouting a new location for their swarm. Rose, a fourth grader and also a home-schooler, lives on a small farm where her father keeps about 30 hives of bees. Her second place essay won a $100 cash award.

Audrey's essay, "A Honey of a Day," tells the story of 7-year-old Rosa, whose father takes her along as he gathers honey from a beehive. As they go through the hive, Pa explains to Rosa how the bees work. Her cash award for the third place essay is $50.

The three winners and each of the other 23 state winners will receive a copy of Dr. Roger Morse's "The New Complete Guide to Beekeeping." Special recognition is made of the artwork Sarah Corbett, 15, of Lake Park, GA, used to illustrate her story, "Alabama Jones and the Search for the Golden Gallberry."

For the 1996 Essay Contest, 4-H'ers will be asked to write an essay titled "How Honey Bees Ensure Our Food Supply." The object is to develop an essay exploring the role honey bees play, through their pollination of crops, in ensuring a plentiful, varied, and inexpensive food supply for Americans. Complete rules and details on entering are available from local 4-H agents.


*"Does Anybody Sell Stale Honey?"*

# HONEY QUEENS


Teresa Marie Swamba from Berlin, Michigan is the 1995 Michigan honey Queen. She is a junior at Capac High School, and will represent the beekeepers of Michigan at fairs, parades, luncheons, schools, stores and all of the various events in which the Michigan beekeepers become involved.

The Maryland State Beekeepers Assn. hosted a visit by the American Honey Queen to the 7th Annual Open House held by the MD Dept. of Agriculture on March 18. The Honey Queen, Esther Wright of Dallas, TX, spoke at the opening ceremonies following Agriculture Secretary Louis Riley and Lt. Gov. Kathleen Kennedy Townsend, stressing the importance of bees to today's agriculture. Millions of dollars in food crops need honey bee pollination in Maryland.

The Texas Beekeepers Association crowned Miss Wendy Riggs as their 1995 Honey Queen at the state convention held in Kerrville in November, 1994. Wendy is the 20-year-old daughter of Weldon and Sally Riggs of Elmendorf, Texas.


Cheri Guthal was crowned the Missouri State Honey Queen at Fall Convention of the Missouri State Beekeepers in October of 1994. She is the daughter of Doug and Linda Guthal, and she will be a Junior at MU this fall.

### Notice

If you stopped by to visit me,
and gently made my doorbell ring,
I cannot hear it, so you see,
I am outside doing honey things.

Out behind the mulberry tree,
where little birds stop to sing,
and where beehives sit all in a row,
and tall, green vitex bushes grow.

I will pop the lids on all my hives,
while bees defend, attack and dive,
and take some honey just for me,
and leave a lot for my honey bees.

*Wyvonne Robertson*

# Display Index

# The Strange Case Of Sweet Clover

richard dalby

Taken together, the yellow and white biennial sweet clovers are generally considered the most important honey plants in America. They yield a white honey of heavy body and exquisite flavor that has become a standard of excellence. And modern farmers are well aware of sweet clover's value as a forage crop and soil improver. But such was not always the case.

American beekeepers were swift to recognize the potential of the sweet clovers as a honey source. Early issues of the bee journals discussed the plant's merits. Beekeepers took to sowing sweet clover seed along roadsides and rivers, on canal banks and other barren places, and the plant thrived. But for some strange reason, farmers in the latter half of the 19th century came to consider sweet clover an undesirable weed. And they did not look with favor on beekeepers who scattered the seed. many states went so far as to pass laws declaring sweet clover a noxious weed not to be planted or grown. This situation prevailed for many years.

The sweet clovers are introduced species and it is not clear just how nor when they first appeared in this country. The plants were known to the ancient Greeks and wild plants growing in Virginia were described in 1739. Subsequent early American references to sweet clover often mention its attractiveness to bees and it was sometimes known just as the "Bee Plant" or "Honey Plant." But even avid beekeepers were slow to realize that the sweet clovers had any value apart from their importance as honey plants.

Nonetheless, in the first two decades of the 20th century, a few progressive farmers who were also beekeepers discovered the value of sweet clover as a forage crop and soil builder. Iowa farmer and beekeeper Frank Coverdale began planting sweet clover on a large scale, despite the protestations of neighbors. He found that cattle pastured on sweet clover could compete with corn-fed animals. His success with sweet clover created much publicity for the plant. Other farmers began planting test plots with similar good results. Coverdale became known as an authority on the culture of sweet clover and his views are quoted at length in the 1923 *ABC of Bee Culture*.

E.E. Barton of Kentucky was another early proponent of sweet clover for forage and soil rejuvenation. He proved that sweet clover, planted on land depleted by tobacco growing, added humus to the soil and made it profitable for other crops again. Barton's success became known far and wide and created a demand for sweet clover seed which he and his neighbors provided.

Slowly the prejudice against sweet clover turned to a realization of its virtues. When farmers on the Great Plains found crop rotation necessary, sweet clover turned out to be the best legume for that region. Thus the plant's virtues became well known as the old prejudice against it was proven unfounded. And as planting of sweet clover became widespread, beekeepers experienced dramatic increases in honey yields. For example, around 1920, F.C. Bennett of North Dakota produced 360 pounds of comb honey from a single hive. With boom prices following the recent World War, he sold this honey for the tidy sum of $150. When the story of his success was published in *Gleanings in Bee Culture*, beekeeping in the Red River Valley took off. Amazingly, the 1920 census listed only 708 hives of bees in the whole state of North Dakota. Largely because of sweet clover, this situation soon changed dramatically. With thousands of acres of sweet clover planted, commercial beekeeping on a large scale soon developed. Huge honey yields became the order of the day. And the demand for package bees which the rise of commercial beekeeping created did much to develop and advance the package bee industry in America.

Today sweet clover is a plant valued by beekeepers and farmers alike. Its superiority as a forage crop and soil rejuvenator (adding nitrogen and humus) is widely known. Gone are the days when sweet clover was considered a weed. And, as beekeepers continue to discover, sweet clover remains one of the premier honey plants Weed indeed!