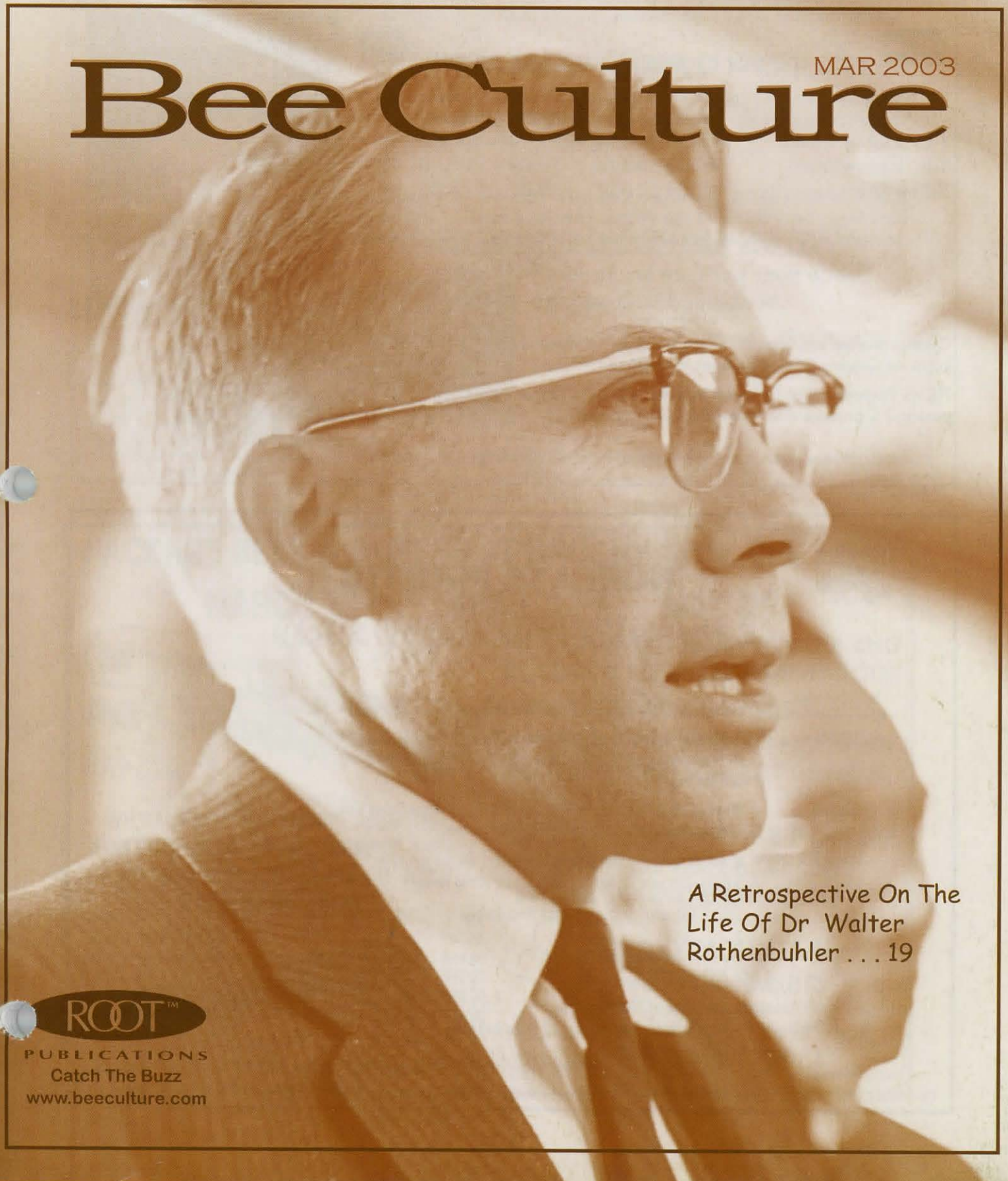
Russian Bees . 8
Past Pieces . 27
Evaluating Queen Stock 32
Wax Moth . 38



Bee Culture

MAR 2003

A Retrospective On The Life Of Dr Walter Rothenbuhler . . . 19

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Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

MARCH 2003 VOLUME 131 NUMBER 3

Walter Rothenbuhler. A pioneer in honey bee genetics. (photo by John Root)

FEATURES

THE LASTING INFLUENCE OF TWO MEN 19
A retrospective on the career of Dr. Walter Rothenbuhler
Malcolm T Sanford

SURVIVAL TRAITS OF THE EUROPEAN HONEY BEE 23
European honey bees are generally forest creatures. Here's what that means.
Walt Wright

PAST PIECES 27
The making of a beekeeping museum.
Wyatt Mangum

SIMPLE WAYS 30
Often, the simpler is the better Here are two tools you can make – a Swarm Box and a Hive Carrier
Lloyd Spear

EVALUATING QUEEN STOCK 32
Develop a criteria for what works for you.
Joe Latshaw

WAX MOTH 38
Know how they work, so you can control them.
Ann Harman

HARD TO GUARD 43
European bees build prisons for Small Hive Beetles, but overcrowding causes problems.
James D. Ellis, Jr.

CHANGEABLE BEEKEEPING 47
"Am I to become a honey bee guardian?"
James E Tew

DEPARTMENTS & COLUMNS

THE INNER COVER 8
More on the Russian bee. National meeting info.
Kim Flottum

NEW PRODUCTS & BOOK REVIEWS 12
Insect book; Publicity book; New bottom board & awning; Frame branding; Record keeping & Ag Help book.

RESEARCH REVIEWED 15
African bees and elephant behavior.
Steve Sheppard

FORM AND FUNCTION 17
I have always admired the female body. Those elegant curves, a few smoothly rounded and teasing bulges, and oh, those long, hairy legs.
Mark Winston

***BEE CULTURE'S* BEEYARD** 40
Our museum has a diversity of equipment, and a wealth of history.
James E Tew

BEE TALK 50
Swarm Choices. How do bees choose a new home?
Richard Taylor

DO YOU KNOW? 53
What do you know about Spring things?
Clarence Collison

BOTTOM BOARD 64
Kids'NBees.
Peter Sieling

MAILBOX - 5; MARCH HONEY PRICES - 10; GLEANINGS - 57; CLASSIFIED ADS - 61

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MAILBOX

KEEP IN TOUCH

Write: Editor, 623 W. Liberty St., Medina, OH 44256
FAX: 330-725-5624
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Renewable Energy?

I would like to make contact with any beekeepers who have experience extracting and packing honey using renewable energy (solar, wind, hydro) and propane.

Phil Laflamme
RR 2
Lanark, Ontario
K0G 1K0
Canada

Thats My Son!

Thank you for printing writings by my son, Peter Sieling. I was thrilled when he showed me your December issue of *Bee Culture* Magazine. He wouldn't give me the copy, though, so I accidentally let it slip down in my bag of Christmas presents. He forgot to ask for it back and I neglected to remind him. I didn't *actually* steal it!

The picture of the honey bears on the cover was lovely so I took the magazine to church to brag to everyone I could catch. One man was reading your Bottom Board during Sunday School class and didn't hear his wife, the teacher, when she asked him a question. She thought his hearing aid wasn't working!

I've shown the magazine to all my friends and pointed out Nancy's picture on the cover. So you see you have a much larger circulation than you know and your advertisers should be very happy.

Peter's Mom
Dorothy Sieling
Lyons, NY

Beekeeping Is Changing

Your article in the January '03 *Bee Culture* is very interesting. The older beekeepers are going out because of many reasons, but mainly our world is changing and we are hi-tech any more. There is increased incidence of disease, and many people do not know what to do about it or they prefer not to deal with it. It is becoming more expensive, and I am sure that many do not think it is worth it.

Like farming, only the strong survive, and the image and story of the backyard beekeeper is slowly going away. Young people today are better educated, but they are not exposed to beekeeping like we used to be. Their parents are not beekeepers, and the hands on experiences are not there. It is like changing a flat tire. If you have never done it before, then where do you start. I see it everyday in our society, and I am very aware of changes in our life styles.

When I was a boy, 10-14 years of age, I helped take care of 50-60 hives, and assisted with taking off honey, bottling or packaging. We worked hard as kids, and we mowed lawns, peddled papers, picked berries for sale, weeded gardens, cleaned office bathrooms, and worked on farms. I graduated from the College of Forestry in Syracuse, and I will never regret it.

I work at the honey booth at the New York state fair, and I see young people are more afraid of honey bees, and all kinds of insects today. I helped cut numerous bee trees, and hived many, many swarms. We took swarms out of attics, sidings, barns, etc. The young people of today do not care what you did or what you know. They are cold, hard and uncaring for the most part.

The world turns and the backyard beekeeper is going to become more educated, but less in touch with his basic surroundings. They lack the teachings, and experience that no one is there to give them. They are becoming more lookers and less achievers, and there are going to be fewer beekeepers. Most of them would not lower themselves to become an apprentice. The warmth, respect and interest to learn about basic knowledge concerning honey bees is waning with our internet world, and computer mania. As our population increases, our fields decrease, the small time beekeeper decreases, and our hands on approach changes to a hi-tech approach.

I have spent over 30 years working with wildlife and forestry. The behavior of young people today tells a story to me that I will never forget.

Don Cranston
East Meredith, NY

Thank You Malcolm

I have been following the "Wise Guy's" column and have had my doubts about his conclusions and some of his facts. Thanks to Malcolm Sanford who has taken the time and effort to dig out the facts, something I believe more of us should do. I hope the Wise Guy is not revealed, it may besmirch his/her reputation. I have no problem with someone expressing an opinion but to distort the facts I believe to be a disservice to the individual as well as the industry. I hope Colorado reconsiders at least one of their candidates for 'Beekeeper of the Year.'

Alden Marshall
Hudson, NH

Feral Colonies Again

It was encouraging to read Tom Seeley's article about finding feral colonies of bees on the Cornell University property again, after *Varroa* and Tracheal mite. I have seen no feral colonies in either the California Sierra or Northwest Washington where I now live and raise bees. They were common sights until the mid to late 1980s.

I had a swarm from a Carniolan hive take residence high in an old growth Fir, and in an effort to encourage them I fed

Continued on Page 7

MAILBOX

them through the Fall. Although they emerged in Spring, they soon died out.

I was happy when a friend in the Southern Oregon mountains told me he had a colony in an old Garry Oak tree. I stopped there in the late Summer with a feeder and we fed them, since there is little to no forage in late Summer. I examined about 20 under a botany lens and saw no evidence of *Varroa*. There was a little "K" wing. I saw that there was fighting between very light golden Italian bees and a gray or black Buckfast or Carniolan. With a ladder I could see two equally used entrances about six feet apart, and the lighter bees used one and the darker bees used the other. Perhaps this was two swarms or a daughter queen that took up residence in another part of the house. My friend fed them two gallons of syrup through the Fall and will follow up this Spring. Hopefully they will prosper. No beekeepers are known to be within flying range, and perhaps this is a relic colony. We shall watch and wait.

Tom Seeley's observations made me think back over 50 years of observing "Bee trees." In both the Foothills of Central Coastal California and the Sierra it seemed that bees preferred deciduous Oak when there were choices between Pine, Fir, Sycamore, Live Oak and miscellaneous others. More than once I have seen them fill up as much as 20 feet of hollow tree, both on vertical trees and horizontal on the ground. Very likely these were multiple swarms or colonies using various cracks and knot holes as separate entrances. I have experimented and know that given enough room I've kept up to three queens in a colony up to a month before dividing them. Sometimes they will lay eggs side by side on the same frame.

I hope you will report follow up on the feral colonies at Cornell.

Keith Jones
Olga, WA

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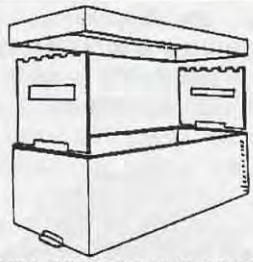

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INNER COVER

I've been laboring under a false assumption regarding the Russian honey bee, imported into the U.S. by U.S.D.A. researchers from the Baton Rouge Bee Lab several years ago. Maybe I just assumed (that *is* a dangerous word) or maybe somebody told me, that these bees were Carniolan, or at least Carniolan like. This past Summer that was shown to be incorrect, according to Dr. Tom Rinderer, who sent samples to Dr. Fredrick Ruttner, probably the world's foremost authority on honey bee taxonomy.

In fact, Dr. Ruttner has studied the bees of the Central Mediterranean and Southeastern Europe extensively. This group of bees is comprised of *Apis mellifera cecropia* (southern Greece), *A. m. macedonia* (northern Greece into USSR), *A.m. sicula* (from Sicily), *A.m. ligustica* (from Italy) and *A.m. carnica* (Yugoslav area). Ruttner himself defined, characterized and named the Macedonian bee during his studies so he is quite familiar with it.

Moreover, the location of this race of bees corresponds to some degree with the origin of the people who moved east from the central European area to colonize the far eastern part of Russia, and took their bees with them.

According to Ruttner, the Macedonian bee is named after the Kingdom of Alexander The Great. When compared to the Carniolan, the Macedonian has a smaller body and smaller wings, but longer legs and proboscis. It is more slender than any other European bee, but it is dark. However, it has more yellow at terg-ites and scutellum than Carniolans.

Brother Adam described their behavior during a trip to this region; very gentle, not inclined to swarm in spite of great colony strength, brood reduction in Summer, strong Winter population, watery cappings, ample propolis. Losses to Nosema were commonly recorded. Swarm cells are extremely numerous, and build up a bit slower than Carniolans, but not bad.

This may sound like there's not much difference between Carniolans and these Russians, but someone wise once said that to do anything correctly, you first had to call it by its right name. And there are differences – swarming behavior, Winter populations, propolis use, all those swarm cells and high susceptibility to Nosema.

While at the Baton Rouge Lab in January, I was able to find out much about this bee. Here's what I learned

Scientists have found that when compared to a typical domestic strain, Russian bees produced fewer *Varroa* mite daughters, more non-infested brood and fewer infested adults, when looking at over 40,000 cells. In Russian colonies there were fewer daughters produced in cells, thus reducing progeny. In domestic colonies it was 3:1 ratio mites in brood:on adults. For Russians it was 50:50. As noted above, the Russian bees are smaller, produce smaller colonies, and slow down when resources are limited. They have smaller brood areas too, all of which tend to keep mite populations reduced. When the Russians were crossed with the SMR line produced by Dr. John Harbo, the SMR/Russian hybrids were outstanding when it came to resistance. They were better than the control, the pure Russian and the Russian/domestic hybrid. There's a future for these.

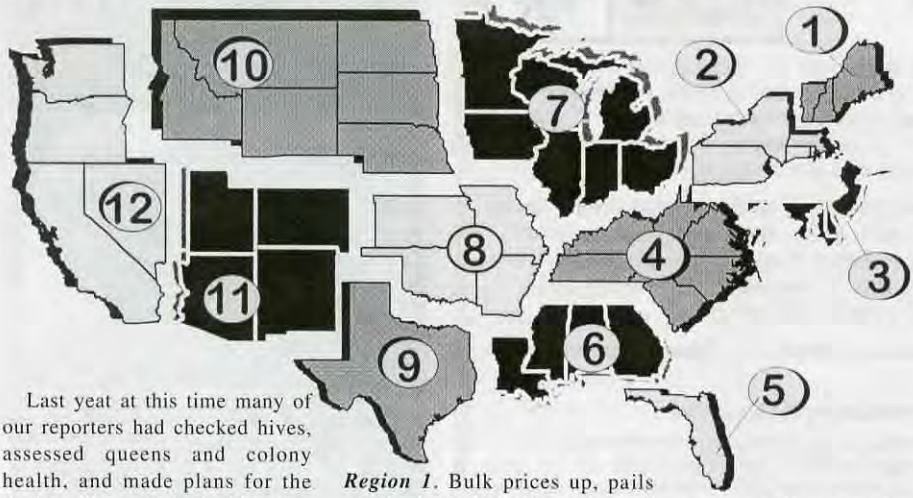
Back to the first part of this. Dr. Rinderer asked "What is a Russian Bee?" Well, it's not specifically a 'type' of bee, but rather a 'program' designed to produce a bee that is resistant to *Varroa* mites. Differences in what *you* can buy tend to be influenced by the actual producer, rather than the bee itself. It pays to ask producers all those questions you read here last month.

Other Russian findings: When colonies are in the sun, rather than part shade, supercedures were reduced, there were fewer *Varroa* in cells and on

Continued on Page 45

More On The Russian Bee . . . More From The National Meetings

MARCH – REGIONAL HONEY PRICE REPORT



Last yeat at this time many of our reporters had checked hives, assessed queens and colony health, and made plans for the Spring. No such luck this year. but, we'll share what we could find out.

Carniolans, especially New World Carniolans, are the big winners this year in the number of people who will be ordering queens. More this year than any past. Italians, from York, Miksa, Koehnan's, Wooten's and Hardemans among others mentioned were the greatest number ordered however.

Russians showed up enough to make noise this year, even ahead of Buckfast and SMRs, which were also popular. SMRs seem to be mentioned enough to gain attention, but those that just make honey still lead the pack.

Region 1. Bulk prices up, pails steady, but wholesale and retail down. Too cold to check bees, some feeding underway.

Region 2. Prices steady across the board since last month. Still cold, and only a few inspections in the very south possible. Feeding being done there.

Region 3. Prices steady for all products since last month. Some inspections underway, but very few. Colonies seem in good shape, so far.

Region 4. Barrell prices down, pails steady, wholesale up but retail steady. Inspections show where feeding necessary, HFCS, pails, frame and top feeders used commonly. Colony health seems O.K. so far.

Region 5. Prices steady except for retail, which is down a bit. Recent near-freeze was scary. Colonies gearing up for honey, splits, queens and moving. Resistance a major problem (to both *Varroa* and AFB drugs).

Region 6. Bulk prices steady, but pails, wholesale and retail up since last month. Colony health O.K. so far, many feed with HFCS.

Region 7. Prices down across the board, but not by much. Cold weather has postponed most inspections, but Carniolans, Buckfast and Russians popular.

Region 8. Bulk and retail down, but pails and wholesale up since last month. Some inspections made, and feeding already underway. Candy boards, frame and pail feeders used, and some nosema already showing up.

Region 9. Prices down, across the board, but mostly in retail. Recent contaminated scare probably hasn't helped. Colonies appear healthy, and splits, queens and buildup getting underway.

Region 10. Prices stable for bulk, pails and wholesale, but down for retail. Early inspections show colonies in pretty good shape with little nosema showing. Lots of early feeding with HFCS, and lots use frame feeders.

Region 11. Bulk steady, pails down, wholesale steady and retail down since last month. Colonies in good shape early, but hungry. Lots of feeding to make up for drought.

Region 12. Bulk and pail prices up, wholesale down, retail steady. Not enough bees for pollination mean colonies pushed to the max. Feeding at full speed. Maybe a wet Spring, and El Niño letting up will help.

	Reporting Regions												Summary		History	
	1	2	3	4	5	6	7	8	9	10	11	12			Last	Last
Extracted honey sold bulk to Packers or Processors													**Range**	**Avg.**	**Month**	**Yr.**
Wholesale Bulk																
55 gal. Light	1.30	1.50	1.21	1.15	1.35	1.48	1.40	1.29	1.20	1.53	1.10	1.36	0.95-1.53	1.32	1.34	0.73
55 gal. Amber	1.10	0.95	1.13	1.11	1.05	1.36	1.35	1.23	1.15	1.13	1.23	1.28	0.90-1.36	1.17	1.24	0.66
60# Light (retail)	81.75	84.18	75.00	83.58	81.50	94.00	92.44	104.50	100.00	91.00	105.00	94.00	75.00-105.00	90.58	85.94	71.51
60# Amber (retail)	87.40	79.21	70.00	78.80	75.00	84.00	93.17	91.67	82.50	80.00	105.33	85.00	70.00-105.33	84.34	85.97	67.92
Wholesale Case Lots																
1/2# 24's	33.99	32.58	32.67	34.66	32.67	33.00	33.08	32.67	32.67	28.80	35.00	32.23	28.80-35.00	32.83	42.87	29.07
1# 24's	50.15	43.46	50.50	52.71	56.71	54.00	53.54	53.04	48.62	57.70	58.90	58.53	43.46-58.90	53.15	50.44	45.46
2# 12's	45.61	39.59	49.25	51.62	50.30	41.00	44.95	59.88	44.20	51.42	47.00	50.00	39.59-59.88	47.90	45.96	40.88
12 oz. Plas. 24's	46.19	37.58	48.00	41.54	44.20	46.00	42.80	44.16	39.80	47.33	52.90	44.53	37.58-52.90	44.59	40.83	36.99
5# 6's	50.83	43.49	58.50	48.40	48.62	56.00	49.18	42.00	54.60	49.68	52.00	61.50	42.00-61.50	51.23	54.79	42.87
Quarts 12's (**NEW**)	58.50	72.12	69.00	58.55	74.09	55.67	74.14	70.75	81.00	74.58	80.70	72.00	55.67-81.00	70.09	78.63	
Pints 12's (**NEW**)	45.00	37.35	52.83	40.10	52.83	55.50	38.25	46.53	45.00	55.44	48.00	48.00	37.35-55.50	47.07	47.64	
Retail Honey Prices																
1/2#	2.05	1.86	2.42	2.25	1.99	2.50	1.93	2.19	2.50	2.39	3.25	2.19	1.86-3.25	2.29	2.82	1.81
12 oz. Plastic	2.69	2.53	2.95	2.57	2.90	3.26	2.85	2.89	3.22	2.99	3.17	3.23	2.53-3.26	2.94	2.76	2.35
1 lb. Glass	3.05	2.89	3.25	3.30	3.10	3.50	3.23	3.85	4.43	3.62	4.38	4.11	2.89-4.43	3.56	3.38	2.93
2 lb. Glass	5.79	4.71	4.75	6.01	5.99	5.50	5.25	5.38	6.18	6.45	5.23	6.77	4.71-6.77	5.67	5.05	4.41
Pint (**NEW**)	6.50	4.50	5.75	4.31	5.60	5.00	4.96	4.39	5.07	7.20	5.15	5.50	4.31-7.20	5.33	5.22	
Quart (**NEW**)	8.50	6.45	7.50	6.88	11.07	8.50	8.00	7.61	8.62	11.62	7.70	8.55	6.45-11.62	8.42	7.60	
5 lb. Glass	11.45	10.12	12.50	11.67	10.00	12.50	10.54	10.66	11.17	13.99	10.21	16.62	10.00-16.62	11.79	11.15	9.92
1# Cream	4.00	3.75	4.49	4.07	4.49	3.80	3.34	3.75	4.00	4.44	4.76	4.08	3.34-4.76	4.08	4.35	3.73
1# Comb	4.50	3.94	3.95	4.73	4.09	4.00	4.32	3.82	4.09	4.63	6.55	4.50	3.82-7.00	4.43	4.38	4.42
Ross Round	4.56	3.45	3.60	4.18	4.38	3.00	4.29	3.63	4.38	5.00	5.25	3.50	3.00-5.25	4.10	4.14	3.64
Wax (Light)	1.57	1.55	2.00	1.56	1.42	1.50	1.77	2.75	1.50	1.60	1.32	2.00	1.32-2.42	1.88	2.57	1.63
Wax (Dark)	1.21	1.60	1.75	1.35	1.33	1.33	1.22	1.00	1.00	1.33	1.95	1.33	1.00-2.00	1.95	1.79	1.37
Poll. Fee/Col.	40.50	37.33	36.00	35.33	30.00	43.00	39.44	40.00	35.00	42.50	50.00	42.17	30.00-50.00	39.27	39.67	38.53

There's A Lot That's New

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- Managing Employee Performance
- Communication and Problem Solving
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- Articles and reports that elaborate on topics the book introduces
- More examples, short cases, and points for discussion
- Links to public agencies and service organizations that assist compliance with laws and regulations

The book is $25 and can also be purchased on CD-Rom for $10. Send your order to University of Wyoming, Department of Agricultural & Applied Economics, P.O. Box 3354, Laramie, WY 82071-3354. For more information visit AgHelpWanted.org

S&C Labesque has released their screened bottom board with molded plastic tray that is inserted from the rear for easy inspection ($22). Trays ($12) and bottom board sold separately or together. Fiberglass shade awnings ($15) available also. $5 and a SASE gets plans for the bottom boards. For more information contact S&C Labesque, 707.996.3149 or labesque@vom.com

Burkes Rapid Notes ia a record keeping system for beekeepers to use during the season. In the three-ring Notebook there is a page for every colony. Comments and observations have been reduced to checkmarks or circling items. The information gained answers what you saw, what you did and what you need to do next time. Date / Weather, supers queens, strength, swarming info and lots more can be noted.

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Insect Lives by Erick Hoyt & Ted Schultz. 6" x 9" 360 pages, paper cover. ISBN 0674009525. Harvard University Press. $18.95

If your curiosity runs deeper than the common honey bee when it comes to insects, the book *Insect Lives* was written just for you. Edited by Erick Hoyt, an accomplished author of 10 books and scores of articles on Natural History, and Ted Schultz, an entomologist for the Smithsonian Institution, this work is overwhelming in information.

Consisting of 10 chapters, the Editors have selected the most entertaining, historical, educational and important articles and topics from the insect world. You'll recognize many of the authors – Wordsworth, The Bible (Exodus, Leviticus), Roger Swain, May Berenbaum, Charles Darwin, Gary Larson, Steven Buchmann and Gary Nabhan, E.O. Wilson, Aristotle, Robert Snodgrass, Thoreau, and more than 75 more. Everything from Gary Larson's cartoon of insects taking over the world to Holland on moths to Wilson on societies to how Mexican Jumping beans jump to Thoreau's neighbors, is explored.

Nearly every classic article on honey bees ever published is included, I think. *Bee Bites* by Roger Swain, *A Pain Scale for Stings* by C.K. Starr, *The Spirit of the Hive* by Maeterlinck, *Hive Mind* by Kevin Kelley, and *Bee Cells* by von Frisch.

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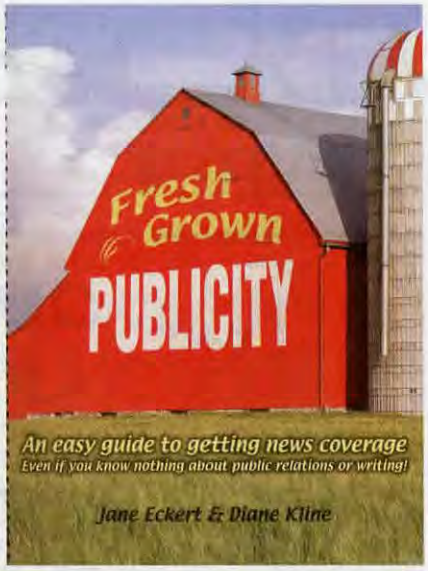

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RESEARCH REVIEWED

Explaining • Defining • Using

Steve Sheppard

"While we in the U.S. do not currently have much of an elephant overgrazing problem in forest or crop lands . . ."

Occasionally something comes along in the scientific literature that is of general interest to readers outside the specialized field of the researcher who set up, conducted and reported the experiments. In some cases, interest may stem from the universal potential of the research to change the world as we know it (remember cold fusion?). In other cases, the work may catch our attention because the research provides a refreshing new approach or point of view to a subject that has been well-studied from other aspects. A recent paper by Vollrath and Douglas Hamilton (2002) involving the defensive behavior of African honey bees certainly appears to fall within the latter category.

The authors first provide some background by informing readers that the numbers of elephants in Africa and Asia have declined substantially over the past 30 years. In contrast, the numbers of humans on both continents have increased. One of the results of expanded land use by the growing human population has been an increased level of interaction between people and elephants, including increased antagonism caused by elephants feeding on farmer's crops. Although the tourist industry depends on elephants in many areas where they occur, small farmers are having an increasingly difficult time protecting their fields from these animals, which require 110 tons of forage per individual per year.

Based on numerous eyewitness reports of elephants fleeing aggressive honey bee colonies, the authors hypothesized that honey bees could have a deterrent effect on feeding activities of African elephants. In one case, a mature bull elephant was temporarily blinded from swelling caused by stings he received from an aroused colony. To test their hypothesis, the authors set up an experiment using traditional log beehives to "mine" selected trees within an Acacia forest in Kenya that was a favorite elephant foraging area. The experimental set-up consisted of placing beehives in 36 trees spaced throughout two acres of forest. The hives were located in the trees at heights that were close to elephant "eye level" (two meters). A control tree (no beehive) was designated for each tree containing a beehive and was located an average of 19 meters away. Thirty of the beehives were unoccupied (but contained some honey and had been smoked) and six contained active honey bee colonies. The trees were examined three times weekly for 40 days and the elephant feeding damage was assessed and ranked from absent to strong. The damage in the highest rank included up to a 50% loss in total mass of the tree.

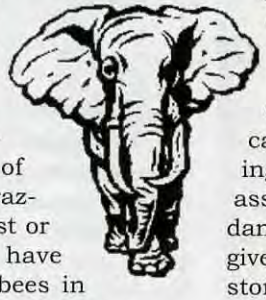
The six trees with hives containing live bee colonies experienced no elephant feeding damage during the 40 day experiment. Interestingly, even the trees with empty hives received some protection compared to control trees. In the group of trees with hives, empty or occupied, 33% were undamaged by elephants during the 40 day experiment. However, only 8% of the 36 control trees (without hives) were left undamaged by elephants. Further, the level of severity of the feeding damage was highly significantly different, with the control trees experiencing more severe damage than trees with hives. Overall, the results showed that occupied beehives provided full protection from elephant feeding damage, while unoccupied hives provided less protection, although significantly more than trees without hives.

The authors noted that elephants have a keen sense of smell, but also wondered if their excellent hearing might play a role in learning to avoid trees with bees. They reported that they have unpublished data (experiments not yet written for publication) that showed some elephants ran away and some ignored the sound of "angry bee humming" when played back on a tape player. However, when they played the same tape for the previously mentioned bull elephant that had been temporarily blinded by bee stings (some four years earlier), he backed away immediately with "obvious alarm" When exposed to a "control" taped sound (a Bach violin concerto), the same elephant ignored it. The authors conclude "whatever the mechanism...African bees can confer on both small and mature trees some direct and efficient protection against foraging elephants" They suggest that bees could be used to protect small farm fields through "strategically placed hives that are easily disturbed" and that the cost of the elephant con-

Continued on Next Page

RESEARCH ... Cont. From Pag. 15

trol could be offset by honey sales. As the method makes use of something that is already a part of the elephant's natural environment, the authors explain that using bees for "strategic defense against elephant" could sustain a negative association (in the elephant's mind) between being stung and specific locations or crops.



While we in the U.S. do not currently have much of an elephant overgrazing problem in forest or crop lands, we do have Africanized honey bees in some southern states. In fact, Africanized bees in the U.S. are derived from the same African subspecies used by the authors in the Kenya study. While the defensive behavior of Africanized honey bees is well-known and mostly disliked by U.S. beekeepers, that same behavior makes them well-suited to defend trees and crops from elephant feeding damage. (Reminds me of a fellow in South Carolina who kept a couple of colonies in front of the door of his vacation cabin to act as "guard bees" for the property when he was absent – but that is a different story). Actually, the use of bees for protection isn't novel, as there are engravings from the Middle Ages showing straw skeps full of bees being thrown down on an attacking force by castle residents in their attempt to defend the wall. However, the potential for a practical application of honey bee stinging behavior in the 21st century to assist in the preservation of an endangered elephant population does give a different perspective on an old story... BC

Vollrath F. and I. Douglas-Hamilton. 2002. *African Bees to control African elephants.* Naturwissenschften 89:508-511.

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Mark Winston

Form And Function

"I was seduced long ago by bee anatomy, first by the mouthparts, then the legs, and eventually every nook and cranny of that so-beautiful but yet so-functional body."

I have always admired the female body. Those elegant curves, a few smoothly rounded and teasing bulges, and oh, those long, long hairy legs. And I haven't even begun to fantasize about her thin, tapered waist, and her eyes, so mysterious and impenetrable, behind which lie her bee brain.

I was seduced long ago by bee anatomy, first by the mouthparts, then the legs, and eventually every nook and cranny of that so-beautiful but yet so-functional body. My mouthpart fetish began with an assignment from one of my graduate supervisors, the legendary Charles Michener, to begin a study of bee tongues. That study eventually grew into a colossal publication describing the evolution of various structures in and around bee mouthparts, and another paper that described bee legs and their pollen-collecting hairs, baskets, and related structures.

I spent much of my wayward academic youth peering into microscopes, making detailed drawings and speculating about the purposes of the intricate and interconnected pieces of bees. Form, and function, came to be a subtext in my scholarly endeavors. This tiny and arcane world of structural details and task-based functions deepened my respect for the natural world, and often left me gasping in awe at the magnificent adaptations that nature's creatures bring to the global table.

Thus, it was with considerable excitement that I received a copy of Lesley J. Goodman's book *Form and Function in the Honey Bee* in the mail. Goodman was a reader in Zoology at the University of London until 1996, a specialist in bee vision, and another great admirer of up-close-and-personal vistas of bee anatomy. She had almost completed this book in 1998 when she unfortunately and prematurely passed away, leaving a trust fund behind to finance the book's completion.

Her former student Richard J. Cooter now has completed the book, with the assistance of Pamela Munn from the International Bee Research Association, which published it at the end of 2002. *Form and Function* focuses on detailed descriptions of bee body parts and how they work, but the title is woefully inadequate to describe the magnificent photographs, drawings, and paintings that adorn this book's pages. I might have titled the book *Elegance, Beauty, and Reverence*, because this is an astoundingly beautiful and evocative work of art as much as a scientific discourse about bee anatomy.

Goodman's ambitious dream was to write a book about bee anatomy that would be accessible to beekeepers, inexpensive, and comprehensive. Although the writing can be detailed, dense, and terminology-heavy in places, the illustrations make up for the average quality of the text. Goodman left behind a sumptuous visual legacy that weaves the microscopic photographs of Keith Pell with the opulent paintings and labeled diagrams of Michael J. Roberts to make bee form and function easily approachable and deeply moving for any reader.

The chapters are organized by either body part or function, beginning with the antennae and ending with defense. In between, she describes the bees' visual systems, mouthparts, glands, respiration, flight, and the structures associated with gravity perception. I wouldn't call the book comprehensive, since many anatomical traits are not described, and many behaviors remain outside the book's scope. This is more of a "best-of" book, in which Goodman indulges herself, and us, with her favorite parts and the behaviors associated with those structures.

I, too, had favorites, beginning with her description of how bees perceive gravity. Goodman shows us how the body parts of bees positioned in different orientations put pressure on tiny clumps of hairs located at joints and between segments. These hair plates bend and thereby send signals to the nervous system that inform the bee of where she is relative to gravity.

Goodman's diagrams, photos, and paintings contribute to one of the finest discussion of gravity perception that I have seen in any textbook. Close-up photographs of the hair plates on different body parts are integrated with larger views of bees in different orientations, coupled with a discussion of

Continued on Next Page

FORM ... Cont. From Pg. 17

how the whole system works. This chapter was among the most elegant in the book, perhaps because it described the bee's anatomical response to the simplest of issues: how to tell up from down.

The section on flight was another stunner. Goodman presents us with beautiful close-up photographs of wings, many of which would be not be out of place hanging in an art gallery. Again she asks simple questions and provides useful diagrams and paintings to describe how wings evolved, how bees stay in the air, and aerodynamics during flight. Her detailed depictions of wing bases, fine photos of the hooks that attach wings together during flight, and charts detailing every motion of the wing will reward patient readers with a full understanding of how bees fly.

The chapters about vision are particularly compelling, as expected because of Goodman's personal expertise in that area. She provides detailed explanations of how bees see, discussion of what they see well and what they see poorly, and of course the expected great diagrams. One painting is particularly compelling, an illustration of a beekeeper with a compound eye about a yard in diameter, the equivalent size for a human of the bee eye. Goodman certainly had that dry British sense of humor.

The paintings were particularly notable and unusual, partly because of their quality but also due to their cost. It is prohibitively expensive to reproduce color paintings in a book, and Goodman must have provided a substantial legacy to insure that *Form and Function in the Honey Bee* was well-endowed with artwork. The paintings include images of bees collecting pollen on a flower, a depiction of two human hands exchanging an apple next to two bees with extended tongues that are exchanging liquids, bees on comb in various orientations as part of the gravity section, a dynamic take-off sequence of a bee taking flight and then landing that cascades down the printed page, and many others.

Why are we so fascinated by this miniature world of bee anatomy? I have had the opportunity to teach anatomy to innumerable students from elementary school age up to postdoctoral fellows, and beekeepers from every background imaginable. Invariably, their first close-up look through the microscope is accompanied by that quick intake of breath reserved for our most startling moments, followed by long hours of reverential study as the intricate world of bee machinery unfolds.

This same astonished but thoughtful reaction blossoms when any previously invisible vista is revealed to our human eyes, and the world of bee anatomy is almost invisible until magnified. By eye alone we can see wings, three body parts, eyes, a long tongue, and a few other things, but expanding our own visual abilities ten to a hundred times with a microscope makes us realize just how little we really see. A first-time viewer does not need names or functions for these mini bee structures. Magnification reveals an astonishing complexity that inspires our deepest sense of awe for the deep beauty and elegance of the natural world that we too-often overlook.

We also react to the expanded bee because of the tiny size of each part, much like an expertly crafted ship-in-a-bottle amazes us with the detail built into every structure. We can just barely make out the fact that compound eyes have lenses as we look at a bee unaided, but under the microscope discover that there are over 6000 facets in these already-small structures. We can see that bees are hairy, but close-up discover that bee hairs themselves are structured, each with plumose projections designed to manipulate and carry pollen. We think we know the smooth sting intimately, yet under the microscope can see the barbs at the tip, and then understand just how firmly the stinger is anchored in our flesh when we are jabbed.

Another astounding aspect of magnified bees is how expertly crafted each part is, superbly structured for its function. Miniscule fasteners designed to hook front and hind wings together, claws on the legs to grasp the substrate, jaws that can manipulate wax to construct comb that rivals the finest of human architecture, soft and rigid hairs surrounding the breathing holes to prevent water loss, all of these structures astonish us with their sheer utility.

Lesley Goodman has provided us with a fine entrée into this tiny but magnificent world, a glimpse into the combined glory of creation and the wonder of evolution. Perhaps unintentionally, she has merged the spiritual and the scientific, the artistic and the functional. Goodman provides us with a close-up view of form and function, but also an opportunity to voyage into the deep, profound magnificence of nature where we too-rarely travel.

If you're interested in taking this trip into nature's glory, you can obtain ordering information for *Form and Function* by visiting the International Bee Research Association's Web site **http://www.ibra.org.uk/** The price is £25 for the paperback and £55 for the hardback plus delivery & packing costs (£5 to UK, £8 to EU, £15.50 rest of world). **BC**

Mark Winston is a Professor at Simon Fraser University, Burnaby, B.C. Canada.

The Lasting Influence Of Two Men

Malcolm T Sanford

"In more than one sense the lives of Walter Rothenbuhler and O.W. Park were linked."

In February, 1986, when this magazine was called *Gleanings in Bee Culture*, Dr. Walter Rothenbuhler at The Ohio State University (OSU) wrote an article entitled: "The Lasting Influence of A Man," based on a presentation celebrating the Entomology Centennial Symposium at Iowa State University. It was dedicated to his mentor Oscar Wallace Park. Dr. Rothenbuhler said the lasting influence of O.W Park came from several channels, including his personal as well as academic family. The latter category included his colleagues and academic children such as Roy A. Grout, and of course, Dr. Rothenbuhler himself. Seven students in total were listed in the article.

Walter Rothenbuhler had six times as many (44) academic children, who by extension are then O.W 's academic grandchildren. Some of O.W 's great academic grandchildren are also on the horizon. Richard Helmich, now at Iowa State University, says, "Dr. Rothenbuhler meant the world to me. I find myself passing these words of wisdom on to my own graduate students – as if from a grandfather. I appreciate the way he always wanted to simplify the message and, of course when writing, eliminate unnecessary 'the's. He once said that at a meeting a person came up to him and said 'at least I understood what you said.' At first he thought that person meant his research was so simple anybody could understand it. But then he knew he did such a good job of explaining his research, even if it was complicated, everybody could understand."

In more than one sense, therefore, the lives of Walter and O.W Park were linked. Both trained their students in a similar manner, the subjects of their published papers were parallel, and their views on the importance of both biological and academic family the same. Thus, I have chosen to title this retrospective on Dr. Rothenbuhler's career, "The Lasting Influence of Two Men."

Dr. Walter Rothenbuhler began beekeeping on July 8, 1925, according to his resume. The fact that the very day is noted points to the importance of attention to detail that is so significant in any scientist's life, and was the hallmark of Walter's career. Another example: On June 3, 1980 at the Iowa Centennial Entomology Symposium, Walter said, "Forty one years ago on a day in July or August, O.W Park sat at his desk and addressed **this** envelope to bring a set of reprints to a farm kid in Ohio." Walter did indeed have that very envelope in his hand. No doubt both Dr. Lloyd Watson, who is credited with bringing instrumental insemination (II) of queen bees to bee breeding, and later, Dr. Otto Mackenson, for whom a current II machine is named, saw that same trait in Walter when he worked under their tutelage. This employment would lead Walter to look in greater depth at the genetics of the honey bee, first under the guidance of O.W Park, and then in collaboration with his colleagues and students.

Walter did a stint of commercial beekeeping in 1941 and 1942, where he worked first for Mr. S.E. Bailey and then Dr. Winston Dunham. This was an important phase in his career. Throughout his employment at both Iowa and Ohio state universities as a premier researcher he always took time for reflections on the practical side of beekeeping. He stated in his June *1980 Gleanings in Bee Culture* obituary of W.A. Stephen, long time Ohio state beekeeping extension specialist, "Some of my most pleasant memories relate to Steve's and my traveling together occasionally to do his short courses." And in the same issue, in Dr. Dunham's obituary he wrote, "...he recommended that I get experience in a large commercial beekeeping operation...I have always been grateful for his guidance."

It was at a beekeepers meeting in South Georgia that I first met Walter and saw his characteristic smile. We talked into the night about both the academic and practical side of beekeeping. This conversation led to my being interviewed and hired as extension specialist in beekeeping at The Ohio State University in 1978. In a sense, I was one of his academic nephews, for we had a good many chats in his office, and he was unfailing helpful to me as my extension program matured. I will always be grateful that he weighed in on my side or I probably would not have been hired. He and his first academic son and

Continued on Next Page

TWO MEN ... Cont. From Pg. 19

colleague, Victor Thompson, took me in and made me feel very much a part of the University's beekeeping family. He wished me well when I decided rather abruptly to take a job at the University of Florida, even though he knew that the beekeeping extension program he had worked hard to develop would be in jeopardy with my departure.

Walter's academic career began in 1945 when, after a tour in the Army Medical Department, he visited O.W Park at Ames, Iowa. As Walter said, "I arrived at Iowa State on April Fools Day, 1946, but was not an April Fool for doing so. I could not have had a better place to go to school." Again, the influence of Park's work in behavior, genetics and breeding is palpable. Thirty-four years later Walter was to say, "Looking at his work...it remains for us to follow, to reap the great practical and theoretical benefits of bee behavior and genetics."

After receiving his Ph.D. degree in 1954, Walter quickly ascended the academic ladder, becoming full professor at Iowa State University five years later. In 1962, The Ohio State University invited him to join that faculty where he had appointments not only in entomology, but also in the departments of zoology and genetics. A look at his resume suggests that a turning point in his career may have been the Behavior Genetic Conference at the Center for Advanced Study in Behavioral Sciences held in Stanford, CA in August of 1962. A tribute to him published by the OSU Department of Entomology said that Walter's "work on honey bees was the first to establish a genetic basis for behavior, and his seminal work in the this field during the 1960's is rightly considered to have laid the foundation for the current discipline of behavioral genetics."

Many of us in the beekeeping arena are now reaping the benefit of Walter's research. It was in determining the resistance mechanisms honey bees have built into themselves to fend off one of apiculture's most feared diseases, American foulbrood, that his work would have the most importance. Here Walter might demur, giving credit as well to his students who played a great role in helping him find many of the details of what is collectively called "hygienic behavior." Especially important contributions came from those in his Iowa days like Victor Thompson, Hachiro Shimanuki, and John Bamrick.

Walter Rothenbuhler

Dr. Bamrick states, "Whenever a student had some problem whether in academics, research, personal life or whatever Walter was always willing to take the necessary time to help the student work things out. He was the same way if you goofed up in your research but then he didn't expect you to make that mistake again! He had a couple of favorite sayings that he liked to use...One was "I don't want you to work beyond your capabilities, but I have no problem with you working up to them!" The other one had to do with running some experiment for the first time. You would get some good results and would be all excited about it. When you showed it to him he would always look it over carefully. If he agreed, he would be quick to congratulate you. Then he would look at you and say 'Anything can happen once.' You didn't have to ask what he meant, you just did it again, and maybe a couple times."

Hygienic behavior has only recently been rediscovered by bee breeders, and it looks to be something that is correlated not only with foubrood resistance or tolerance, but also may be important in controlling other bee maladies, including *Varroa* mites. The idea languished for years in obscurity due to widespread use of antibiotics and a tragic consequence of the bee breeding process itself, the total loss of the foulbrood-resistant stock Dr. Rothenbuhler had labored so long to develop. The story as related to me was that aggressive inbreeding of the stock to concentrate the foulbrood-resistant genes caused it to become susceptible to what is called hairless black syndrome, a viral condition. In short, the stock, resistant to one disease, was eliminated by another, because both expressed themselves through concentration of resistant genes via inbreeding. This is an important lesson for those who would breed bees in the contemporary beekeeping environment. It is a characteristic of many scientists' work that even failure can result in an important legacy.

A full list of Walter's academic children is not possible here, but some that are perhaps most recognizable for their considerable contributions to the beekeeping community include: H. (Shim)

Shimanuki (retired Research Leader Beltsville, MD lab); William T. (Bill) Wilson (retired Research Leader Weslaco, TX lab), Anita Collins (currently at the Beltsville lab); Tom Rinderer (current research leader Baton Rouge, LA lab); Frank Eischen (currently at the Weslaco lab); Nick Calderon (a faculty member at Cornell University).

Significantly, several of Walter's students work outside the practical beekeeping field, and so are making his educational efforts felt in the larger academic and scientific community. Richard Hellmich, who wrote his Ph.D. thesis on pollen hoarding in honey bees, and worked for a time at the Baton Rouge lab, now hangs his hat at Walter's alma mater. He says, "Ironically, Chris, my daughter Allyse, and I live in the town where Dr. Rothenbuhler started his honey bee research (Ames, Iowa), but my research has switched to corn insects and monarch butterflies. Often I drive by their house on Ash Avenue and think of all the wonderful memories and all the important lessons I learned from him."

Keith Waddington began his graduate school training with Walter, writing his thesis on the effects of hairless black syndrome. He now teaches at the University of Miami and also does research on other pollinators (bumble bees, carpenter bees) as well as honey bees. About his mentor he says, "I was an MS graduate student at OSU for just 1.5 years, yet on reflection the duration seems long because of all I learned from Walter. He took me under his wing and trained me to think, to design experiments, to analyze data and to write. I idolized him. All of Walter's students know how he meticulously read and commented on their writing. He used a mechanical pencil to rearrange sentences, write paragraph-length notes in the margins, and otherwise undo twisted prose. He was a master and he did all of this in that well known animated, almost theatrical fashion, as I sat and watched by his side. He gave much to his students and treated us as family. I last saw Walter in 1995; he was sitting in the front row of the audience with Claire (his wife) at my departmental seminar at OSU. I started by thanking them for attending, and I remember proudly acknowledging that I had worked with Walter 25 years before. And I said, 'Dr. Rothenbuhler is my hero' he will be always."

O.W. Park

It is difficult to get anything but the highest praise for Walter from his students. William (Bill) Wilson says, "there are humanitarian aspects that I like to remember about him. Dr. Rothenbuhler had a sincere interest in each of his students. He not only strengthened their ability to do meaningful research but he taught students how to live well. He believed in being honest and noble. He had high ethical standards and he expected these traits from those who trained under his guidance. He encouraged the very best performance from everyone and he was never satisfied until each student demonstrated that he/she was a quality person." And Tom Rinderer concludes, "There is no way that I can condense what he did for me to a story of how he helped me achieve one or two accomplishments or a single fond memory. There are far too many memories for one or two to stand as hallmarks. Doc's influence on me constitutes a body of work not amenable to distillation."

One of Walter's most significant colleagues (an academic brother if you will), whom I met while at the Ohio State University, was Dr. Jovan Kulincevic. Jovan (most knew him as "John") was a great source of bee knowledge that both the students and I could call on. He is now Professor Emeritus of the biology faculty, University of Belgrade. He writes: "Walter and his family were longer than a decade a part of my life. In the sixties of the last century, with his generous help, I came to USA as a post-doctoral student to study honey bee genetics, honey bee diseases and honey bee behavior. During this unforgettable time I learned a lot from Dr Rothenbuhler and we worked hard on many bee projects, that resulted in quite a few scientific publications concerning selection for resistance and susceptibility to virus diseases in honey bees, successful selection for fast and slow hoarding in the honey bee, and for long and short length of life..." And he concludes: "As long as I am alive I will keep Walter in my deep recollection and I will be very thankful for everything [that] he has done for me to improve my knowledge in the science and art of apiculture."

It was Jovan Kulincevic, Victor Thompson and Walter together who designed the new bee laboratory that was to be erected at the agri-

Continued on Next Page

TWO MEN ... Cont. From Pg. 21

cultural campus on the University grounds. This process was often interrupted after Walter retired in 1985, and affected by the Parkinson's disease that was to be responsible for his death on August 14, 2002. When the laboratory was finally finished in 1989, it was named in Walter's honor. His influence continues to permeate the Rothenbuhler Honey Bee Laboratory atmosphere, and his photo and tribute to his career adorn one wall.

Beyond a legacy of human capital in colleagues and students, any great scientist also leaves a body of published work. Walter's official resumé lists 51 refereed papers, ten invited papers, twelve abstracts, and thirteen non-refereed papers that appeared in a variety of publications such as *Annual Review of Entomology*, *Annual Review of Genetics*, *American Zoologist*, *Genetics*, *Bulletin of the Entomological Society of America*, *Journal of Apicultural Research*, *American Bee Journal*, [*Gleanings In*] *Bee Culture* and various proceedings of Apimondia congresses. From a practical standpoint, I believe his most influential paper is "Necessary Links in the Chain of Honey-bee Stock Improvement," published as two installments in the 1980 edition of *American Bee Journal* (Vol. 120, pp. 223-5, 304-305). This outlines the rules for the coming of age of a genetic revolution in bee breeding that will help beekeeper's exit the chemical treadmill they have been on for the last four decades.

Walter also served as editor for the *Journal of Apicultural Research*, and *Revista Brasileira de Genetica*. He was science editor of the *American Bee Journal* from 1958 to1964 and throughout his career, he peer-reviewed papers for over ten journals in as many disciplines. He was also a fellow of the American Association for the Advancement of Science and took part in the historic National Research Council's investigation of the African bee in 1971. During his 29 years at OSU, Walter delivered some 100 invitational lectures in a wide variety of settings from the scientific fraternity, Sigma Xi to national and local beekeeping associations.

Although his academic family consumed a great deal of energy, Walter was not one to slight his biological one. He and Claire had four children, resulting in six grandchildren. Again, we see a parallel to O.W. Park, who took his entire family (wife and two daughters) to West Texas in 1937 as part of an attempt to rear a new generation of resistant bees. At IA State University O.W also promulgated a custom called the "breakfast picnic," to which all members of both biological and academic family were invited. The Rothenbuhlers also had many picnics in their backyard for both their families. It seems more than fitting that the hymn, "Shall We Gather at the River," was featured at Walter's memorial service. **BC**

Dr. Sanford is a former Extension Specialist in Apiculture at the University of Florida. He publishes the APIS newsletter: ***http://apis.shorturl.com***

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SURVIVAL TRAITS OF THE EUROPEAN HONEY BEE

European honey bees are generally forest creatures. Here's why!

Walt Wright

Every action and reaction of the honey bee colony is based on survival instincts. The species has had eons to perfect their survival instincts. Those instincts even govern lack of activity in some circumstances. Every aspect of the colony activities are oriented toward survival. That concept may sound like over statement to the beekeeper who has not considered the subject at all, but this series will attempt to substantiate that position.

Honey bees are wild creatures that man has elected to use for his own purposes. To effectively harness the energies of this wild creature, we need to be familiar with the survival characteristics that motivate them. The more you know about the survival traits of this species, the better beekeeper you will be. Instead of fighting the natural instincts of colonies in your care, you can work within their normal operations. You will find that working "with" the bees is less time consuming and improves your bottom line.

The reference literature, for reasons unknown, has very little definition of survival traits. Most management recommendations of the popular literature are oriented to imposing your will on the wild creatures. Its also recognized in that same literature that the approach produces limited success. Some colonies will succeed in fulfilling their survival instincts in spite of your best efforts to undermine their progress.

This series will start so basic as to be boring to the reader. We feel we need to build from the ground up. The content of the first segments provide the background to be applied to detailed information coming later. The detailed information in later segments has met considerable resistance from "experts" and experienced beekeepers. Perhaps the proper foundation will help support the more controversial concepts.

The hives we use today may be more tree-like than we think.

The activities of the colony are tailored to two main levels of survival objectives. Short-term survival is top priority and involves survival of the existing colony. Perpetuation of the species by reproductive swarming is a long-term survival requirement that is a lower-level priority. However, reproductive swarming runs a close second priority. Those that can safely swarm, in any given season, do just that.

Rating of colony survival above species survival can be seen readily. A weaker colony or one in poor build-up forage areas does not entertain swarm ambition. They protect their own survival as best they can. Seasonal variations in forage availability cause "swarmy" or low-swarming years. Only the colony that can afford it, in any given year, produces a reproductive swarm. They do not jeopardize survival of the existing colony to reproduce.

Its not generally recognized in the popular literature that the honey bee is a forest creature. Their survival format was developed for life in the primordial forest of Europe. Home was a hollow tree, and tailoring of their survival format for that circumstance can be seen in almost all of the seasonal activities of the colony. They can survive and reproduce in a forested area where there is a solid canopy of treetops within their flight range. Agricultural sources, such as clovers, are not needed in their survival strategy, but the colony takes advantage of the nectar bonanza and stores more than they need when provided extra space. When space is restricted in the tree hollow, they could ignore clovers. Survival requirements are typically satisfied prior to agricultural source appearance, but they might use some of the bonanza to

Continued on Next Page

Bees deisgn their own destiny.

maintain stores on hand.

The bees and trees derive mutual benefit from the relationship. The majority of trees bloom in the period of Spring leaf-out. Others lead and lag that period somewhat. Leaf-out is the period that the honey bee has built strength for division by the reproductive swarm. From the tree's perspective, the honey bee has peak strength when they need pollination most. From the bees' perspective, the trees provide forage sources when the offspring swarm needs them for establishment in a new location.

The honey bee's survival format is tailored to life in a hollow tree that is located in unbroken miles of forest. All tree hollows are not the same size. Their format is flexible enough to be applied to cavities of different volumes. Once the cavity is filled with functional comb, they must regulate stores and population to conform to that fixed volume. Other species, such as wasps or bumblebees, have no limit on colony strength. They get as strong as conditions will support each season. Their seasonal objective is to rear as many mated queens in the Fall as possible. Those mated queens will hibernate over the Winter and start from scratch in the Spring.

The wasp/bumble bee season objective can be broken down into several phases. Initially, the overwintered queen does all the work herself. She gathers nest material, building the beginning nest, and gathers feed for the first group of helpers that she rears single-handedly. With emergence of the first group of workers, the queen can retire from field work (risky business). The workers will continue to build colony strength in population and nest size. At some point in late Summer, the emphasis shifts to rearing queens for next Spring and the drones for Fall mating.

The simplistic lifestyle of those species have at least three seasonal periods when colony activities are different. All three periods reflect a change in activities that are oriented to colony survival and reproduction. We are inclined to call those activities "internal operations." Internal operations, or differences in population objectives and activities, are much more complex for the social insect lifestyle of the honey bee.

In contrast, the honey bee must regulate strength to a fixed volume, reproduce by population division, and Winter as a colony. The internal operations of the honey bee colony change more often as a result of their more complicated survival format. We will treat those changes in a separate article. But before we get to a description of changes in internal operations of the honey bee colony, we need to discuss special skills to accomplish the survival format they have chosen. The reference literature provides very little insight on those special skills.

The honey bee's adaptation to inhabiting tree hollows has endowed them with many special skills. If a wasp or a squirrel chooses the tree hollow for a nest site, it imposes no special problems for either. The social insect lifestyle of the honey bee, however, is tailored to use *all* of the cavity available space. The swarm moving into a cavity will clean up punky wood or debris left by former residents down to the live wood. Concurrently with clean up, they will start comb construction at the top. Comb construction is top priority for the swarm in a new location. They must have comb for stores and brood to become established. The establishment goal is to fill the whole cavity with functional comb. A large cavity may take longer to fill than the first season.

The description of establishment above is included to make the point that the new (first year) colony is not fully established until their quarters are furnished with functional comb. The special skills described below are pertinent to the established colony. When the cavity is filled with functional comb, limits are set for colony strength.

The colony must regulate population in balance with food supplies. Its easy to understand that balance is a firm requirement. Serious out-of-balance conditions are a formula for colony disaster. The colony must maintain adequate food stores reserve for periods when forage sources are not available. The need for adequate reserve is particularly acute in the Fall when the colony must feed itself over the Winter. Not only must adult bees be fed, but they are going to start brood rearing in the dead of Winter. But, of course, that is not news.

What you may not have considered is that regulation of population in balance with stores and overall space is an on-going, *everyday* effort. Cell use in the fixed cavity is apportioned to brood or stores on a proportional basis. Brood volume controls population, and is adjusted up or down to accomplish season objectives. In the Spring build up, brood volume is increased to support division by the reproductive swarm. During the main flow, brood volume is reduced to a level that just generates replacement

bees. In the early Fall, if there is an increase in forage, brood volume is increased to generate young bees for wintering. In late Fall, the brood nest is shut down completely to conserve resources in early Winter. Through all these seasonal variations, the population is maintained in proportion to stores and overall cavity space. The special skill of the honey bee in making this come out right is awesome. For those of you who have a difference of opinion about the swarming season, be patient. We'll get to that in due time.

Another colony skill is conservation of stores. On the main flow, Winter rations are stored. Their heritage as forest creatures dictates storage of supplies while field forage is available. In the extended forest, Fall forage is minimal – not many trees bloom in the Fall. This can be seen by the extra pollen stored for Winter on the main flow. The current feed pollen will be dry and bright colored. Winter pollen will be glazed with honey to preserve it until needed.

After storing Winter rations on the main flow, the colony becomes very miserly on consumption of those stores. Most of the adult bees are quiescent during any period of low field forage. Inactive bees use less food. Minor forage sources are exploited to the extent that Winter stores are supplemented, and active brood rearing is using some of the stores. But they do not send the whole forager force for maintaining Winter rations.

However, when field forage is showing a sustained increase that simulates the Spring season, some colonies will entertain swarm ambition. It is not obvious to the colony that the Fall flow will end abruptly with freezing weather, and an offspring swarm doesn't have a prayer of establishment. But, as mentioned earlier, a strong Fall flow would be uncommon in the established forest.

The Fall brood nest closeout serves several purposes, and one of those advantages is conservation of stores. By stopping brood rearing while forage is still available, those cells can be filled with nectar. In this way, the whole cavity is filled with stores in early Winter. Elimination of the need to maintain brood nest temperatures is the conservation advantage. Not only is less honey consumed as thermal fuel, but the cooler cluster temperature causes some bees to go into a state near suspended animation. Like other wintering insects, they use very little food in that state. In my area, the first Winter brood volume is often quite small. Consumption of feed in the center of the cluster makes empty cells for the first brood cycle in mid-Winter. When the first brood volume is only softball sized, it shows how little was consumed in two months by a cluster starting with more than a deep super full of bees.

Another special skill is synchronizing the colony activities to the vegetative growing season. They are quite proficient at doing the right things at the right time to insure both colony survival *and* reproduction. Without going into great detail, we can offer a couple of examples. About midway of the build up, without a hint of green anywhere, the colony starts rearing large numbers of drones. To get mature drones on the wing takes longer than queens, so they start earlier. In anticipation of the mating season, drone rearing leads the swarm preparation season by about a month.

The target reproductive swarm issue period was discussed in an earlier article. The peak forage availability in the forest is green-up or leaf-out in the Spring. They want the offspring swarm to have the advantage of that peak forage availability. Perhaps I give them *too much* credit, but it seems to me that the colony has the ability to speed up or slow development to hit that window of opportunity. In late Winter, the well-provisioned colony forages primarily for pollen and water. They need to consume honey to add space for brood volume. Later, they approach the swarm preparation season, and maximum safe brood nest expansion, the colony is feeding on incoming nectar only. It seems to me (and I can't defend this with supporting data) that the colony has the ability to adjust percentages of honey or nectar consumption to arrive at the swarm preparation season with the right brood/stores ratio. What I *have* seen is that some colonies consume large amounts of capped honey, and some consume almost none in the week ahead of the swarm preparation season. Although most of the information in this series is based on solid observation, this entry is more in the realm of the "gut feel."

Most of the special skills discussed above imply yet another special skill. Controlling the activities of the colony in consonance with the growing season and their fixed volume implies some judgment on the part of the colony. We will treat judgment and decision making as separate entities. BC

Walt Wright is a sideline beekeeper and enthusiastic experimenter, who lives in Elkton, Tennessee.

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Past Pieces

The Making Of A Beekeeping Museum

Wyatt Mangum

Two of my life-long interests, somewhat unexpectedly, came together to produce probably the largest collection of antique beekeeping equipment in the United States. So how did the Mangum bee museum come about and what were these interests? Well of course one was beekeeping. I started at the tender age of ten. Since I did not come from a beekeeping family, I had to learn the intricacies of honey bee life from books and other beekeepers. To help satisfy my love for bees, I even had three observation hives in my bedroom. Occasionally while I was away, my observation hives would leak, filling the room with irritated bees. My mother, whose understanding was beyond measure, knew the drill. After closing the bedroom door, she stuffed a towel under it, tightly filling the crack between the door and floor. The towel trick was critical and came about from experience.

It stopped the bees from slipping under the door and invading the entire house.

Then there was the other interest, so vastly different from quietly watching little bees in glass hives. That was my fondness for trains. Perhaps I was drawn to the railroad when my grandfather took me to the station just to watch trains. I was enthralled by those massive engines that shook the ground and filled the atmosphere with the blasts from their horns. Surely, those effects must be magnified in the mind of a small boy gazing up at those magnificent machines, born only to pull tonnage. At any rate, I was hooked for life. Even today my two favorite outyards are by railroad tracks, where I check my colonies immersed in the soothing hum of hard-working bees, occasionally interrupted by a thunderous train. (I'm probably one of the few beekeepers who includes a nearby railroad as one of the criteria in selecting outyard sites.)

Figure 1. One corner of the smoker collection, which includes four original Quinby smokers. Below the shelves of smokers are some old hives from the 1800s.

As that early interest in railroading continued, it naturally led to an interest in railroad history, given the easily acquired nostalgia for the great railroads of the past. But here one could do more than just read about these railroads, one could buy little pieces of them.

So I began collecting various items bought at antique stores and flea markets: oil-burning lanterns, timetables and even china marked with different railroad emblems. For me there was something powerful, mysterious, almost magical, about having a railroad lantern from, say, the turn of the century. A long time ago, that lantern lit the way for some unknown brakeman working lonely nights around big freight cars in the bitter winter cold or oppressive summer heat, where death and dismemberment were constant threats.

Then there came a pivotal event around 1974, as best as I can remember, where beekeeping and collecting railroad memorabilia combined to launch me in another direction. While looking for lanterns in an antique store, I came across two old smokers, both of which had seen years of hard work. Most remarkably, they were much different from the standard smoker of today. One smoker was even shaped like a cone. And here I realized that our trusty modern smoker did not spring forth miraculously in some sort of

Continued on Next Page

Figure 2. Honey jars displayed in a window. The sunlight helps show off the jars. The china pieces on the shelf above have skeps in their patterns.

spontaneous generation, but rather there was a historical development behind it.

Until then I had not given the matter much thought. I just ordered smokers, hives and other beekeeping equipment from supply catalogs, being more concerned with future prospects of honey crops rather than anything from the past. But that would change, for in my quest to learn as much as possible about beekeeping, I needed to also learn its history.

So the bee museum began with old smokers, two little pieces of beekeeping history. And like the lanterns, it was quite compelling to own a smoker that once protected some never-to-be-known beekeeper from the 1800's. But as one can imagine, collecting smokers and eventually all sorts of beekeeping equipment is much more difficult than collecting items from the railroads. Typically I would need to look through the wares of several hundred antique dealers just to find a couple of good pieces. In most cases, I would just come home empty-handed. Yet for a while at least, time was on my side. After collecting for almost thirty years, patience and persistence have paid off. Now over 100 old smokers of different designs and sizes are all displayed in one room. They date back to the original smokers invented by Moses Quinby in 1875 (see Figure 1). But that's not all.

As the smoker collection grew, I also collected all sorts of beekeeping equipment, and central to any history of beekeeping is, of course, the old hives. In most educational displays showing the development of the hive, just three types are seen: the modern moveable frame hive, a fixed-comb wooden box hive, and a dome-shaped skep. It's tempting to think those three designs represent the historical development of the beehive. But that's so vastly wrong!

Those hives are only a tiny slice of the many that were tried. In my collection are about 30 hives dating back to the 1840's. Some are so fancy and well made they look more like furniture than hives. Others are so complicated and bizarre one needs to search the old beekeeping literature to figure out how they actually worked. But there were even more hive designs. I maintain files of beehive patents issued in the United States before 1900, a time when many novel designs were tried. Some of these hives are so strange, they look more like spaceships. Numbering about 1000 patents in all, if those pages are piled up, it makes a stack of paper a little over a foot high. And that's nothing but different hive designs! But still there is more.

In addition to the smokers and hives are many other collections of various things a beekeeper would use. For example, the windows in one room of the museum are fitted with shelves to display a collection of honey jars dating back to the 1800's. The jars catch the sunlight and make an impressive display (Figure 2). Some collections don't occupy much space like my collection of queen introduction and shipping cages. Ever heard of a Peet queen cage? Well if you kept bees in the 1880's, you probably would have had a couple of these cages (see Figure 3). On the other hand, if you want to use up all of your storage space and even crowd your living space, start collecting *Honey Extractors* (see Figure 4). My smallest extractor holds only one frame, but the largest extractor holds fifty frames. Some people find it hard to believe, but yes, I even collect those big heavy extractors. After all they are a part of our beekeeping history.

Figure 3. A collection of queen cages. Many types of queen cages were tried over the years. The Peet cage is at the upper right corner.

Then we have the foundation mills, about a dozen in all, whose rollers resemble the wringers on an old washing machine. These mills emboss the honey comb pattern on wax sheets, making foundation. Instead of using rollers, other machines use flat plates to press the pattern into the wax. In fact, one press looks like a printing press. But still there is more.

There's all that intricate obscure odd-looking equipment for making comb honey in the wooden section boxes. This equipment comes from a time when comb honey was king and liquid honey was suspected of adulteration. Making comb honey was labor intensive and beekeepers used all kinds of ingenious section folders, foundation fasteners, and special

supers to make their work easier. And the list goes on, there are collections of bee hunting boxes, swarm catchers, hive tools, bee feeders, advertising signs, queen-drone traps, not to mention the things with the skep on them: banks, advertising signs, old clocks, old money, and even fine china from the early 1800's. But there is *still* even more.

To document when and where old beekeeping equipment was made, I use a number of literature sources. In addition to the patents, I use beekeeping books, supply catalogs, and bee journals. Old bee books sometimes describe how odd hive designs worked, eliminating guesswork, and giving much insight into past beekeeping practices. Manufactured beekeeping equipment (as opposed to homemade) can sometimes be identified with supply catalogs. Currently I have about 500 catalogs dating back to the 1870's representing dozens of bee supply businesses that have long vanished.

Now we come to the bee journals. Much of our beekeeping history is written in two long-standing journals: *Bee Culture* formerly known as *Gleanings in Bee Culture*, which started in 1873, and the *American Bee Journal*, which started in 1861. Years ago I got a rare chance to buy master collections of both journals, virtually complete, all the way back to their first issues. To swing the finances for such an acquisition, I even took out a bank loan. I remember applying for that loan, dreading the part where the bank officer asks, "Reason for the loan?" Expecting some typical answer like a car, he didn't get it that day. I calmly said "old beekeeping magazines," half expecting to be tossed out on the street. But amazingly I got the loan, which has long since been paid off. Yet those journals continue to be a fountain of knowledge into past beekeeping.

In the months ahead we will journey into this past, as beekeepers, our past. We will learn not only about all sorts of old equipment, but also about the beekeepers who invented, developed and promoted it, as well as their trials and tribulations, successes and failures. In the process, we will acquire not only a better understanding of our beekeeping history, but perhaps we will learn something about ourselves as well. In the next article, we will begin with that most trusted companion, -the bee smoker. BC

Invasion of the honey extractors! There were many styles, sizes and manufacturers of extractors.

Acknowledgments

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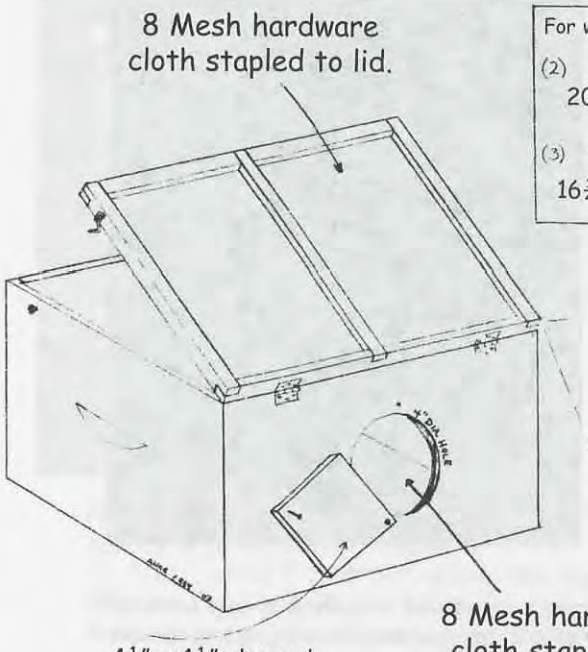


One of the most useful tools I have is a Swarm Box made from a design I picked up from Richard Taylor. It is nothing but an ordinary deep hive body, with a screen door on one side and a permanent screen on the other. The one shown was made from a new deep, but an old one that will not 'leak bees,' and is clean, will work just as well.

Make both screens out of 8-mesh hardware cloth, sold by many bee equipment dealers and a few hardware stores. A stake midway across the length adds considerable stability. The screen door will be considerably more stable if lap joints are used, as shown in the sketch. However, they are not strictly necessary.

Since Richard Taylor gave me a jumbo funnel, I cut a hole to use it. Since I also need a door for that, I made one that uses a nail in one corner as a pivot and in the other corner to firmly close. If you want to get a similar funnel made at a local sheet metal shop, the outside diameter is 20"; and the length and diameter of the neck are each 3"

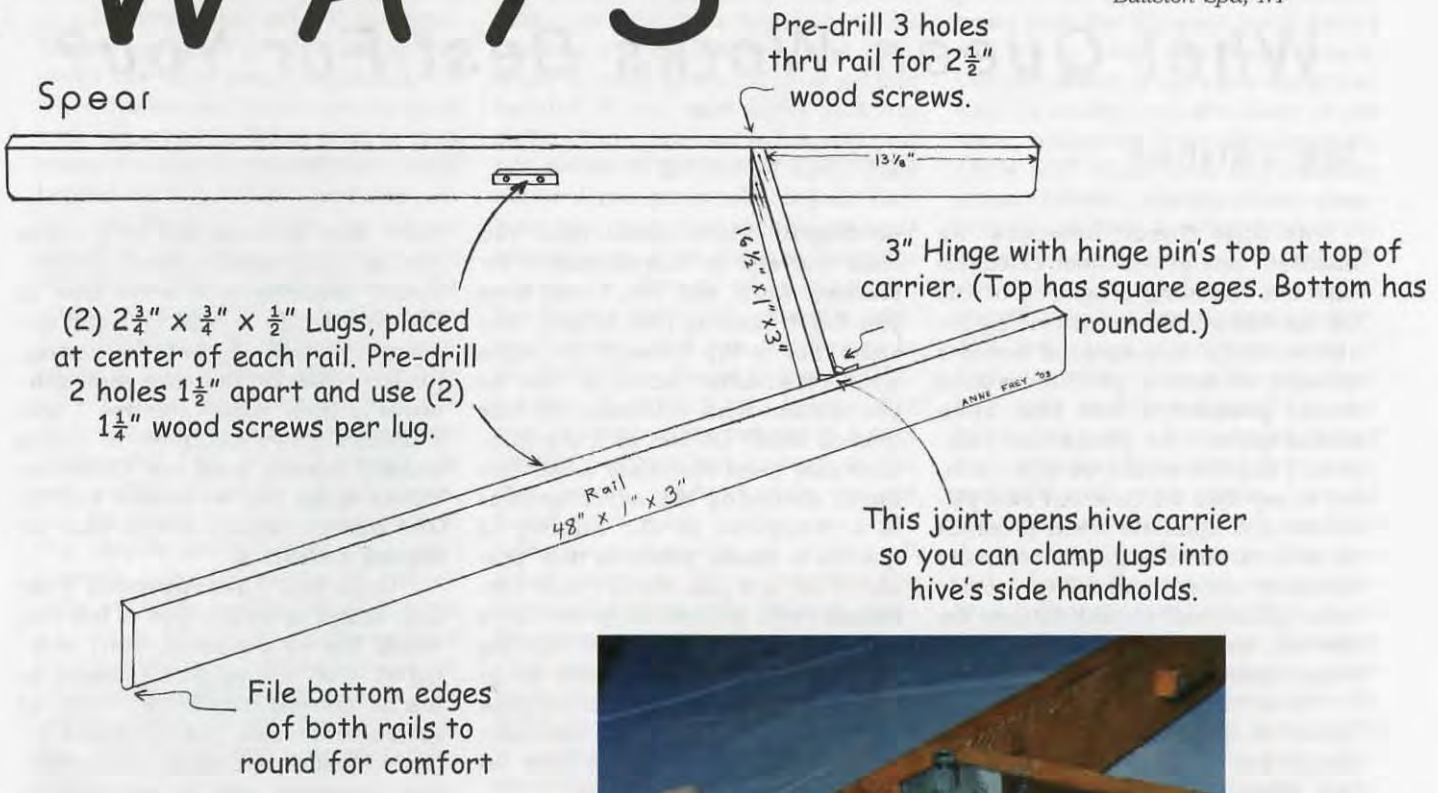
I use the box without the funnel when the swarm is either within easy reach and readily accessible. If the swarm is clustered on a vertical surface such as a fence post or is so high I have to use a stepladder, I use the funnel. It is easy to brush the bees from the vertical surface into the funnel, and the box and funnel fit easily and steadily on a stepladder tray. (I do not go higher than a stepladder will let me reach.)

With or without the funnel, this is an invaluable tool and rides constantly with me during our short swarm season. It can easily handle a 10-pound swarm without danger of overheating. It not only makes it easy to collect the swarm, but the wide opening means that the swarm can easily be shaken into their new home. Try one, you will wonder how you ever did without it.

WAYS

Hive Carrier

Design by Fred Ludewig, Ballston Spa, NY



I have always admired those who can look at a problem, and see a jig that will solve it; a talent I do not share. A beekeeping friend designed the clever two-person hive carrier shown. While similar tools can be purchased from dealers for $80-$100, this can be made from pine for around $10 and from hard maple for less than $20. Pine is plenty good enough for the weight requirements.

The secrets to this are the single hinge that lets the jig open to fit into the handholds, the lugs that carry all the weight, and the placement of the lugs. (If you equip your hives with 2" x 4" strips to lift, as many commercial beekeepers do, the lugs are not necessary. This is worth thinking about, as the lugs are the weak point of the jig.)

Those without a table saw can easily make this jig. Any lumberyard will cut the three long pieces of wood, usually without charge. A smile and a please will probably also get you the lugs, free. After the wood is cut, assembly should not take more than 10 minutes.

The leverage this provides is nothing short of amazing. I usually work with a woman who is not a weight lifter, and weighs considerably less than the 150-pound hives we routinely lift. She can get her end to about waist high by using her legs. While she is taller than I am, she cannot lift that much weight up to chest height so steps on a box to get her end up to the tailgate of my truck. That is all we need.

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EVALUATING QUEEN STOCK

What Queen Works Best For You?

Joe Latshaw

At Ohio Queen Breeders, we maintain one of the most extensive selective breeding programs in the US for the purpose of providing instrumentally inseminated breeder queens to queen producers and honey producers that rear open mated queens for production colonies. I think it would be quite honest to say that we have our own priorities and opinions when it comes to selective breeding, but company opinions aside, I will try to provide some additional considerations for the next time you get ready to order your replacement queens.

How often does change occur unless it is absolutely necessary? Remember the adage, "if it isn't broken, don't fix it"? Beekeepers seem to adhere to this basic principle with very little exception. As it stands right now in the commercial queen rearing industry, most queen producers can sell all of their product, queens, packages, etc., which means why should a queen producer spend the extra money to improve the quality of his or her stock if there is not an incentive to do so? Think about it. Would we be any different in such a situation? If you as a beekeeper are in a position to demand better queens, you must be in a position to influence the market. By this I mean you should expect a higher quality product and speak up when your expectations are not met. Additionally, expect to pay more. Yes, quality costs you money, but look at it as an investment and expect a return on your investment, especially if you have taken the time to research and find the best queen producers with the best stock. Beekeepers need to provide an incentive in order to expect better quality queens, and to a limited extent this is beginning to take shape within the industry, but beekeepers need to continually demand a higher quality product

The first thing you can do is to be diligent. Think about what you read and see in this magazine for starters. After, and yes, I said after you finish reading this article, take some time to flip through the pages and look at advertisements. How do you decide who you want to buy queens from? Do you pick the prettiest and most elaborate advertisement, assuming the advertisement is a reflection of the quality of queens a queen producer will produce? Or, are you one of those beekeepers who is lured in by the catch phrases and the new and exciting traits that are being selected for or against? Think about the purpose of an advertisement and consider what effect it is meant to have on you as a consumer.

In order to critically evaluate advertisements you must first have some selection criteria that exceeds the simple attractiveness and lure of the advertisement. Begin your search by having an idea of what type of bee works well in your area or has worked well for you in the past. Do not be swayed by advertisements that claim to have the "perfect bee" for every hot, cold, damp, or dry environment. I will ask you, is that really possible? Also keep the question in the back of your mind about where your list of potential queen producers select and evaluate their breeding stock. This becomes especially important if you live in an area with a cold extended winter. Most commercial queens and packages are produced in a warm climate, because they have an extended growing season. What does that say about the adaptability of a stock that has been raised and selected in a warm climate to your local environment? Bees seem to do a better job of adapting to a warm climate as opposed to being relocated to a cooler climate, which at the moment is the opposite of what most operations practice. How can a bee that has been bred and selected in a warm climate really excel in your environment? Regardless of what type of bee you decide is best for your operation, expect to receive young, healthy queens that are representative of their strain. Figures 1 and 2 illustrate two examples of young healthy queens from our Cordovan Italian strain that we named AUREA and our Carniolan strain that we named KARNICA.

Once you have narrowed your field based upon the type of bee you would like to purchase, start looking at what the producer claims in his or her advertisement. Some of the current catch phrase claims include disease resistant, mite resistant, hygienic, gentle, productive, hardy, Russian, SMR, and to top it all off, you may find any combination of these listed claims preceded by the words, "selected for" What does this mean? Do not get me wrong. If you have ever read one of our advertisements, you will see the same things, but for many, using the phrase "selected for" seems to imply a lack of responsibility if their queens do not exhibit the advertised traits. After all, how can a queen producer be held responsible for which drones mate with his or her pure bred queens that were raised from stock that exhibited the advertised traits? If the previous sentence did not seem sarcastic in nature, please read it again! If you receive such an excuse from a queen producer, you should be asking yourself, and then the queen producer, wait, does that mean you do not take any measures to insure an ample drone supply of desired genetic background to mate with your queens? Hold the queen producer accountable. If the advertisement is making claims about traits that have a genetic component, then you should expect to see some results.

For example, at Ohio Queen Breeders, we sell very expensive

breeder queens, however, we stand behind the quality of our breeding program and our stock. We are so confident in the improved genetics of our stock that we tell our customers to expect to see an improvement the first year, regardless of what drones are in the area to mate with the queens. What good is it to make a claim if you will not stand behind it? If a queen producer advertises hygienic stock, do not be afraid to ask what advantages you should be able to expect from the hygienic stock. Will you notice a visible decrease in brood diseases compared to your current stock? Or how about mite resistance, are the claims made by the queen producer legitimate? This is your money, do not hesitate to ask tough questions. Ask the queen producer; by purchasing the so-called mite resistant queens, can you expect to reduce your mitecide applications? Do not accept a text book answer that passes the buck onto the researcher who developed the trait or stock. The bottom line is if you see it in writing, you should see it in your colonies!

While we are on the topic of advertised traits, it is important to provide you with a background in genetics. For example, as a queen breeder, I know how difficult it is to select for several traits simultaneously. The reason being is that much of genetic selection is based on probabilities. What is the probability of two traits occurring in the same queen? What is the probability of three traits occurring in the same queen? It is somewhat like flipping a coin. On your first toss, what is your probability of getting heads? If you said 50%, you are right. There are two sides and you are bound to get one of them. How about if you get heads on your first toss and you want heads on your second toss, then what is the probability or chance of getting two heads in a row? The odds of it happening two times in a row begins to go down, now you only have a 25% chance of getting two heads in a row. Genetic traits behave in a very similar fashion, but instead of just two choices, heads vs. tails, you are faced with many options and the odds or probability of getting all those desirable traits into one bee drastically decreases. Be very careful when you read an advertisement that combines several different lines or strains into one, such as Russian/SMR/hygienic Carniolans or Italians. It is not quite that easy to combine all of the desirable traits in to one bee over night, just to take advantage of the advertising publicity.

Another factor involved in making genetic improvements has to do with how traits are inherited. For example, a pure stock selected for hygienic behavior is crossed with a pure Russian stock. In an ideal situation, you would hope that all the desirable traits from the hygienic stock and all of the desirable traits from the Russian stock would end up in your new ideal queen. Unfortunately, it does not work that way. In reality, you are likely to get some influence from the hygienic stock and some from the Russian stock. However, the important question to ask here is what type of results should you expect to see? Often times the results of such untested crosses are unpredictable. Will you see a significant level of hygienic behavior or mite resistance from your new ideal queen? I do not know, because I have never tested such crosses, but based on my experience with other traits, I would venture to say that you will see little if any notable difference. The reason I bring this up is not to discredit the researchers that have worked with hygienic or Russian stock, but mainly to bring to your attention the claims I have seen in advertisements, which have little validity.

How about temperament? Many queen producers claim to have "gentle stock" To my knowledge, there is no certified scale to indicate without a shadow of a doubt a sting for sting comparison of stocks. Gentleness is a very subjective term and often times limited to the experience of the beekeeper making

Aurea

Leah demonstrates well-bred, gentle bees.

Karnica

Continued on Next Page

QUEENS ... Cont. From Pg. 33

such claims. Due to the subjectivity of evaluating temperament, I have included the picture in figure 3 to illustrate how gentle bees should behave. Keep in mind the photo in figure 3 is not a one time publicity stunt, it is common practice in our bee yards. Temperament of a stock is becoming increasingly important, and as the Editor pointed out in the December issue of *Bee Culture* whether we want to accept it or not, keeping bees in close proximity to people presents us with a liability. When we first started our breeding program, we selected heavily for gentle temperament, and by gentle, I mean a bee suit consisting of a pair of shorts and a smoker. At first we thought temperament was of very little economic value, but now people are beginning to demand gentle bees, because they live in town, or they supply pollination hives and the grower is afraid of being stung. Whatever the reason is, beekeepers want more docile bees, temperament is a heritable trait and can be greatly improved through genetic selection. I realize environmental conditions such as rain, humidity, or temperature influence temperament, but remember, rain or shine, we can work all of our colonies in a pair of shorts, and that is what it means to have gentle bees.

If you have made it this far, I thank you for you patience and diligence. I have explained some of the common things to be wary of, but what should you look for in a good queen and ultimately a good queen producer? Keep in mind that selecting for too many traits at one time can be difficult and in some cases detrimental to the stock. A simple approach often works best. Look for queen producers who focus on the quality of the queen and the fitness of the colony rather than the newest catch phrase. As a beekeeper your number one priority should be to focus on good healthy stock without too many bells and whistles. If a queen producer is selecting from the best of his or her stock or is working closely with a queen breeder who specializes in breeding stock, chances are that if a trait is truly desirable and beneficial, it will work its way into that particular strain over time, but never neglect the fundamentals of a good bee for a single trait. Additionally, many of us are keeping bees in more densely populated areas, which means we should be keeping docile bees to prevent any accidents. Temperament can and should be a priority, but it is often times a very subjective trait to measure. What one beekeeper considers to be gentle, another may consider to be aggressive. So let's work with the highest expectations and keep supporting those who strive to make a difference in our beekeeping industry. BC

Joe Latshaw is a grad student and queen breeder in Columbus, Ohio.

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Wax Moths

"Oh ugh! Creepy crawlies." You just opened up one of your hives and found a mess. A handful of unhappy bees, whitish-gray caterpillars wiggling around, a tangle of tough webbing and quite a few whitish cocoons. You have just been visited by ***wax moths***.

Let's get something straight from the beginning – wax moths did not kill your colony. And, by the way, wax moths, in spite of their name, do not eat very much wax. Now that we've laid these two old-beekeeper's tales to rest, let's find out just what is going on and what you can do about this annoying critter.

We actually have two wax moths that inhabit hives: *Galleria mellonella*, the Greater Wax Moth and *Achroia grisella*, the Lesser Wax Moth. There is no point in trying to decide which one you have since the destructive result is the same. Generally the Greater Wax Moth is responsible for the damage.

larva

The wax moth is a successful invader. It has many attributes, as egg, larva and adult, that contribute to this success. An understanding of wax moths can go a long way in helping us control them. In warm regions of the U.S. the wax moth can be a year-round problem, but in the colder zones the warm months of Summer and Autumn are the danger months. Not only do we need to control them within the hive but also in stored equipment.

First, a look at the adult wax moth. Although you may see much damage inside your hive and have seen larvae and pupal cocoons you will have difficulty glimpsing the adult. The adult female is quick. She runs swiftly away the second you open your hive since she dislikes light. Her swift running is an excellent behavior for entering a hive – she simply rushes past any guard bees at the entrance. She enters during the night, therefore you will normally not have a chance to see her enter.

The female moth is about an inch long but the male is much smaller. The color and markings are variable but generally the moths have light gray wings with brown or darker gray streaks. The diet of the larvae controls the size and color of the adult. Neither the adult female nor the male eat or need water so you cannot directly blame them for the damage. Life span is usually about a week but they can live longer, up to a month.

These moths have a strange but successful life. Hatching of the pupal cocoons takes place inside the hive. Both males and females leave the hive at night and fly to a nearby tree, where mating takes place. Now the female can return to the hive during the night to lay eggs. However the male stays behind on the tree and lives the rest of his short life there. Most females leave the hive about daybreak to spend the day in a tree. However, if lucky, we can sometimes see the ones who are spending the day in the dark of the hive. During the Winter adults that have hatched inside the hive stay there. Mating takes place and the females will lay eggs.

The next successful part of their life history begins with the egg. A female will lay 300-600 eggs in her lifetime. The eggs are tiny, creamy-white and are laid in cracks and crevices around the hive. You will find it difficult, if not impossible, to find them. In the warmer parts of the hive the eggs with hatch in about three to five days. But in cooler areas of the hive eggs can take up to 30 days to hatch. In this manner a large population of wax moth larvae is assured, throughout the year, in every part of the country.

Once the eggs hatch the destructive part of the wax moth's life begins. The larva is the only "eating stage" of the life cycle of wax moths. The hive is full of nourishment for the larvae so that they can grow rapidly. The larvae, tiny at first, can double in weight during their first 10 days. A fully-grown larva, after consuming a good diet, will reach a length of about 1-1.4 inches. The larvae begin their part of the life cycle creamy-white in color but as they mature you will see them as greenish-grayish-tan. They are ugly, naked and

destructive.

Now we will have a look at the nutritious diet the hive provides. Newly-hatched larvae search out honey, nectar and pollen. In this search they also consume some beeswax but a diet of nothing but beeswax is not sufficient for larval development. The comb is destroyed by the larvae chewing their way through and opening cells to obtain the honey and pollen. Since the larvae cannot sustain development on pure beeswax, you can now understand why newly-drawn comb is rarely destroyed by wax moth. The cocoons left behind by developing bees is an excellent source of protein for wax moth larvae. Now you can understand why old, dark brood comb is desirable.

The newly hatched larvae will eat their first meal then chew their way down to the midrib of the comb in order to be safe from patrolling adult honey bees. Here is another part of the success story. The tunneling destroys the wax cells of the comb. As the larvae mature you may find them on the bottom board since hive debris provides nourishment also. If their normal food is in short supply the larvae will also eat bee brood.

The larvae spin a silken thread as they wander through the comb. You may be familiar with this tough tangle over and within chewed-up comb. Sadly, adult bees trying to emerge from their own pupal cells can get caught in the threads and are unable to emerge.

After about 18 days as wax moth larvae they chew grooves in hive sidewalls and frames and spin their cocoons. Honey bees, with their weak mandibles, cannot chew out and remove the tough cocoons. Again, another step in the successful life of wax moth.

We do not normally think of larvae traveling (except for the Small Hive Beetle). But newly-hatched wax moth larvae can leave their home hive and crawl up to 150 feet to infest another hive.

Wax moth control is a universal problem, particularly in warm climates. Everyone seeks control of these critters. By far the best way of control is to keep a strong, healthy colony. With such a colony the bees have defenses to do their own control. A strong colony can supply bees to chase and harass adult wax moth, chase away larvae and basically keep the hive completely free of damage.

Pupa

When disease, a poor queen or whatever other reason causes a colony to weaken, the wax moth population increases, sometimes rapidly No longer are the adult female moths challenged at the entrance. As the adult bee population dwindles the wax moth population increases further. Even if the wax moth had not invaded the hive, the honey bee colony would have died anyway. However, since it *looks* like your bees are dying out and successful wax moths taking over, you may mistakenly think that wax moths killed the colony. Not so.

Stored comb is really a big problem. No bees to help you with defense. Brood comb is the most difficult to store safely since it is full of cocoons and debris. Comb used only for honey and stored dry has very little appeal to wax moth.

Wouldn't it be nice to have some natural enemies of wax moth? Well, they do exist but unfortunately not in sufficient numbers to control a population of wax moth enjoying good nutrition from brood comb plus the darkness inside the hive.

adults

One preparation on the market had some popularity in the past. This was Certan®, an appropriate preparation of Bt, *Bacillus thuringiensis*. This particular Bt is designed specifically for wax moth and does not harm bees. Unfortunately the method of delivery – spraying into every cell on every side of every comb – probably caused its use to decline until it was no longer profitable for the manufacturer. Certan was really only suitable for a very few hives.

Paradichlorobenzene, PDB, advertised as Para-Moth® in bee supply catalogs, is one approved chemical that can be used for wax moth control. It may not be available everywhere. It is only effective if used according to directions, including the airing out of comb before being used. PDB off a grocery store shelf is not labeled for control and cannot be used. And, it may contain fragrances harmful to the hive. Use the labeled stuff only.

Since the adult wax moth dislikes light, effective moth-free storage can be achieved by keeping stored comb exposed to light. If boxes containing drawn comb are stacked on end or in alternate directions or staggered so light enters each box, the female wax moth will not invade. Enclosed storage sheds need to be provided with light, but open sheds work just as well, depending on climate. However, staggered boxes do leave comb available to rodents.

Freezing comb is very effective but time must be allowed for the comb to cool to freezing temperatures. Three days below freezing, after the cool-down period, will kill all stages of wax moth. Then the boxes with comb can be sealed in plastic bags to prevent re-infestation. Large freezer facilities may not be available to all but sharing space either within a group of beekeepers or with some facility is a possibility.

Carbon dioxide fumigation also kills wax moth larvae. Again such a facility may not be practical for many beekeepers.

Some thought has been given to the value of wax moth destruction as nature's way of eliminating American foulbrood (AFB). Certainly the consumption of cocoons and destruction of wax and comb effectively destroys infected comb. However, economically the losses from AFB are much less than the losses to wax moth.

If you can imagine it, wax moth larvae are actually deliberately raised. For what? Food for various birds, fish and other small animals. Zoos and laboratories use these protein-rich larvae which are soft-bodied as opposed to the tougher meal worms. So the wax moth, with the fast growth rate of the larvae, is a useful insect.

So as you view the mess in your hive, not all is doom and gloom. Shake the larvae into a can, get out the fishing pole and go fishing. BC

Ann Harman battles wax moth and goes fishing around her home in Flint Hill, Virginia.

James E. Tew

Bee Culture's Beeyard

Changes

From future changes to changes past.

I am presently in the beekeeping museum at The Ohio State University at Wooster. Our closed collection does not compare to large personal collections, but it's okay. The room is as quiet as a library and has the distinctive musty odor of a museum. I am using a one-of-a-kind aluminum hive as a temporary desk and I am using a 100+ year-old nucleus hive as a seat. I have my laptop, cell phone, and my digital camera on top of another antique hive nearby. Strange setup. I only come to the museum on special occasions, usually during the winter when not much else can be done in beekeeping and I have a few scraps of time.

As I wrote the companion article in this issue of *Bee Culture* on some of the changes in beekeeping, I realized that the museum was a collection of ideas and changes past. It seemed appropriate, on this cold day, to visit this quiet, pleasantly odiferous spot and review beekeeping changes that are now old news. However, in their day, they were hot, new ideas.

An early observation

Just because someone lived 100 years ago does not make him or her any less clever. Ironically, many of the items on display here would require a skilled craftsman to reproduce. True, some of the pieces are crude and homemade, but others were manufactured using technology and components long gone.

A homemade division board feeder. It would still work.

By antique standards, some of the pieces are not really all that old. In the beekeeping manufacturing industry, there is no "Research and Development" system as in other industries. Generally, a clever person comes up with an idea, manufacturers it, markets it and the beekeeping community either accepts or rejects it. Through the years, there have been many successes – and rejections.

Why store all these old pieces?

Within beekeeping industry, there is simply a lot of junk, but every now and then, something comes along that is worth saving. It is a tangible piece of our beekeeping history. In this large pile of history, there are occasionally good ideas that could be implemented again, but most of the time they were "so what" concepts. Yes, they usually worked, but other designs worked just as well. So what? I have included here some photos and comments on various extraneous pieces in our small collection.

Feeders

Everyone seems to have had an idea for a feeder design. All feeders had the same challenges – how to get syrup to the bees without them drowning and how to get the syrup to the bees conveniently. I can't show all the pieces, but some are interesting enough to get a viewing here.

The Alexander feeder, shown below, was manufactured by A.I. Root and was made from a solid piece of wood. It was designed to fit into a custom-made slot in the back of a deep bottom board. It functioned much like a drawer. Open it, fill it, and close it.

The Hive Fountain feeder was small, made of plastic, and was plumbed to a syrup reservoir can. Individual feeders were designed to fit inside a frame. This piece is obviously not of antique vintage. In fact, I used these in the late '70s to feed baby nucs. The syrup reservoir can, by gravity flow, would fill the small container in an individual feeder and all the other feeders that were in the syrup line. The foam block would float

when the compartment was filled and stop the syrup flow. The bee yard had hoses running all about, but the syrup reservoir was easy to fill. The primary problem was that it clogged easily. Hive Fountain feeders are no longer available.

Hive Designs

Being a woodworker, I always enjoy studying the hive designs that are long gone. They ranged from very simple to very complicated. Today, our hive appliances are all the same. Several years ago, I took the carcass of an American Hive, pursued the literature until I found all the dimensions and reconstructed the hive. In the photo, I show the original antique and my reproduction. I built the hive to the original specifications – knowing full well that I was offending bee space principles. The bottom was slanted in order for "moth larvae to roll out." Being made from 1" thick lumber, it was tedious, but enjoyable to build.

Many hive designs have come and gone. Most were heavy and violated the concept of bee space. Below are two such obsolete styles.

A novel smoker

I have named this device the "ice pick" smoker. I have no idea what its proper name is and have never seen it advertised. It is truly the size of a large ice pick and was designed for the beekeeper to hold in his mouth as he worked the hive. I suspect it was filled with tobacco, but I can't confirm that. I would not recommend inhaling too often. Being so small, it must have been used to work smallish colonies. Today's colonies would put you back in the car in short order with such a small smoking device.

A paper queen cage

While not particularly old (in fact, someone may still be manufacturing them), Ashurst cages were made from paper cardboard. The cage functioned much like a matchbox or a smaller box fitting into a larger box. Supposedly, queens could be introduced without having to return to remove the cage. Bees were reported to tear down the cage and remove it after the queen had been released. These were still commonly available in the '70s, but I have not seen a new one in many years.

Innovative beekeepers

Beekeepers seemingly have always been a clever lot. Gadgets and contraptions abound. Extractors, honey-serving containers, queen rearing devices, hive appliances, smokers, and comb honey equipment are examples of areas that have seen a great diversity of styles and designs. It should come as no great secret that these things are occasionally offered on eBay or are seen in antique shops. To have always been a small industry, we have certainly worked energetically to make beekeeping better. And strangely, we have normally worked nearly free. Either the design was easily copied or the concept was intuitively obvious. There's no reason for all of us to be collectors, but those who do collect bee

A complicated feeder. Did it go on the bottom or on the top?

An Alexander bottom board feeder made from a single piece of wood.

A "Hive Fountain" feeder in a baby nuc frame.

An ice pick styled smoker.

Continued on Next Page

An original American Hive (right and my reproduction (left).

paraphernalia serve to store our beekeeping history for us. When in an antique shop, if you spy something wooden, that has little doors or glass windows and strange little pieces, there is a good chance it was some long ago bee device. Buy it. Keep the prices up.

I will post more bee museum photos at: http://www2.oardc.ohio-state.edu/beelab/

Take a virtual tour. BC

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The German Circus Hive (left) and Zoar Hive (right).

A queen cage made from paper cardboard.

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Hard To Guard

European bees handle small populations of Small Hive Beetles, but don't do so well with crowds.

James D Ellis, Jr.

Last month I described what social encapsulation of Small Hive Beetle (SHB) by European honey bees is and what it accomplishes. In summary, European honey bees (and I say "European" honey bees indicating that the bees we traditionally use in the United States are of European origin) use social encapsulation to control minor infestations of small hive beetles. We now know that when SHB infiltrate honey bee colonies, they are quickly encapsulated by the bees in propolis prisons or in cracks throughout the colony. The bees guard the prisons and, through aggression and feeding behavior (trophallaxis), keep SHB encapsulated.

Social encapsulation is a complex honey bee behavior that is more like a tug-of-war match than a harmonious, well-planned strategy. SHB are less active during the day, prompting the bees to station fewer guards around prison perimeters. However, when the sun goes down, SHB come to life, eliciting a response from the bees that suppresses increased SHB activity.

Once escaped, the damage can be devastating.

At low SHB infestations, bees are able to keep most (~93%) SHB out of the central nest (combs), where they could feast like kings and multiply like rabbits. At this point, I am sure many questions are coming to your mind. "If bees use social encapsulation as successfully as you say, then why do our bees have problems with the little critters?" Or, "what causes social encapsulation to ultimately fail?" These are fair questions and a second project my colleagues and I conducted to answer those very questions, may help us understand.

Let me begin by outlining to you the second project of which I speak. If you remember, Part I of this article dealt with social encapsulation at its core. My colleagues [Professor Randall Hepburn-Rhodes University; Dr. Patti Elzen-USDA and Amanda Ellis-accomplished wife] and I conducted a very similar experiment to that of the first. We were interested in seeing what increasing SHB infestations do to the integrity of social encapsulation. In short, what do our honey bees do when more SHB are entering their colonies?

We used three observation hives, each with three deep frames of bees and a queen. We introduced 25 SHB into each hive. The hives were then watched for three consecutive days at 08:00 and 20:00. On the fourth day, we introduced 25 more SHB (for a total of 50 SHB) and observed what happened. At each SHB infestation level, we recorded guard bee and encapsulated SHB behavior. The results speak for themselves.

Firstly, we found that there were more guard bees per SHB at the higher of the two infestation levels. When SHB populations increase in a colony, so does the number of bees guarding them. At the low infestation level (25 SHB) there were 0.7 guard bees per SHB and at the higher level (50 SHB) there were 1.1 guards per SHB. So, at higher SHB populations, proportionately more bees are guarding SHB. This could negatively affect colony foraging behaviors since it is possible that more foraging age bees are guarding SHB, thus reducing foraging yields. The assumption that foraging workers are also SHB prison guards is supported by two other papers my colleagues and I currently have in review each showing that as SHB levels increase, foraging activity decreases.

Coming as no surprise, increasing SHB densities led to an increase in the number of prisons. Our data further show that the number of SHB per prison did not increase at the higher infestation level. This is

Continued on Next Page

HARD TO GUARD ... Cont. From Pg. 43

quite funny if you look at what it implies. Bees respond to increasing SHB infestations by increasing the number of prisons NOT by increasing the number of SHB in each prison. Put simply, bees do not overcrowd their prisons. Perhaps bees would make good politicians (or at least colonies would make "model" societies from which one can learn)!

Also not surprising is that the number of guard bees per prison increased at the higher infestation level (from 2.3 at the lower level to 3.3 at the higher one). Again this shows that bees respond to increasing SHB infestation levels by increasing the number of guards.

From here, we must take a look at SHB behavior. SHB activity increased both at night and at the higher infestation level. So the higher population of SHB in your colony, the more active they are. This could have terrible consequences. Growing SHB densities are bad enough, but if more of the little guys are active, the number of prison escapes could increase. We are all aware of what happens when SHB escape incarceration and gain access to the combs.

Further, more SHB were soliciting for food from guard bees at the higher infestation level. Here lies a very important point I wish to raise. Although more SHB were begging for food from guard bees, more SHB were NOT being fed. This sets the stage for problems. If trophallaxis is used by honey bees to suppress natural SHB feeding habits, then a lack of feeding increase by guard bees when SHB populations or activity are high could cause encapsulated SHB to leave prisons and move into the central honey bee nest in search of food. Such behavior may also trigger SHB reproduction.

Guard bee behaviors also changed dramatically at higher SHB densities. Guard bee aggression towards SHB increased at the higher density (more guard bees were biting at encapsulated SHB). This indicates that bees attempt to contain SHB by being more aggressive toward the pests.

The final guard bee behavior is where the bees bite the area around SHB prisons. Although this behavior is poorly understood, it significantly decreased at the higher SHB infestation level. I believe this to be an indication of a bee behavioral shift to a more active state of SHB prison guarding. When SHB populations are low, more guard bees are "working" the prisons walls but when SHB populations increase (as well as their overall activity), guard bees become active guards. At this point, bees guard prisons much like they do at the colony entrance, with their front two legs in the air, "jumping" at anything that comes their way.

The last parameter we looked at proved to be the "tell-all" parameter. I say this because of what I have told you so far concerning the behavioral shifts in both bees and SHB at the higher infestation level culminate into what I am about to share with you. At the low SHB infestation level 22%, 0%, 32%, 41%, and 5% of all SHB were distributed in the top, bottom, front, back and rest (among the combs) of the hive respectively. These percentages remained nearly the same at the higher infestation level except for at one location. At the high SHB infestation, 25% of all SHB were found among the combs. So, the number of SHB infiltrating the colony cluster increased from 5 to 25% at the higher infestation level. This shows that as SHB populations increase, more SHB are gaining access to the combs. This can have devastating effects on colony health. If more SHB are reaching the combs, then it is highly likely that they are beginning to feed on honey, pollen, and bee brood resulting in what we recognize as SHB-associated problems.

Therefore, what we have is an increasing number of SHB causing dynamic changes in social encapsulation behaviors of European honey bees. These behavioral changes lead to increased numbers of SHB entering the combs. Although we did not observe any negative effects of SHB in any of the three colonies (they were not reproducing) it is conceivable that had we added more SHB, the observation hives likely would not have been able to contain the infestations.

In summary, as SHB density increases in a colony, an arms race of sorts begins. Bees and SHB alike are each trying to move ahead of the other, to gain the upper hand. Bees do what they feel is necessary to control SHB. Namely, they increase the number of guards and become more aggressive. However, the bees fail to feed SHB more when SHB are obviously soliciting for food more. This failure by the bees likely sends SHB into the combs where they are harder to guard. SHB, in return, increase activity at the higher infestation level. Perhaps at low infestations, social encapsulation works quite well for European bees, but as SHB populations increase, SHB gain the upper hand.

We are only just beginning to understand the complex interactions between European honeybees and SHB. More studies will soon take place to further identify weak points in European honey bee defensive efforts toward SHB. Regardless, it is truly remarkable that European honey bees even possess social encapsulation abilities. This suggests that African and European honey bees may be even more alike than once thought. Social encapsulation behavior by both subspecies is a must-see in any observation hive.

In conclusion there is some hope for our fight against SHB. Because our bees use social encapsulation implies that they, at least at some level, possess the ability to contain SHB on their own. I believe that the ability of our bees to contain SHB may be selectable in breeding programs. That said, we are still quite a way from identifying what bee behaviors would be most useful at suppressing SHB. In spite of this, the findings from this research are a step in the right direction. In the meantime, it is imperative that we study SHB as much as possible. Who knows what remains to be found? The answer to controlling SHB may be just around the corner. BC

Acknowledgements

I would like to thank my colleagues, Professor Randall Hepburn, Dr. Patti Elzen, and Amanda Ellis, for their assistance on this project. The USDA and Georgia Beekeepers Association funded the research reported in this article.

INNER ... Cont. From Pg. 8

adults. Honey production was also higher for sunny colonies, and, it was drier at harvest.

A round-table of Russian users had lots to say. Bob Brachman from New York reported they were gentle when pure, not when they weren't, good Tracheal mite resistance, strong hygienic behavior, and they produced lots of supercedure cells, that were made, chewed down, remade...

Bob Coy from Arkansas reported they were gentle when worked and they had smaller clusters than Italians in the Spring. He requeens once every three years or so with cells, and has lots of Russian drones in his yards. A once/year mite treatment of all his bees has resulted in about 50% loss in his Italians, and less than 3% for the Russians.

Charlie Harper, from Louisiana reported significantly higher losses to his Italians than Russians. He requeens with cells from a pure breeder, but still doesn't have enough Russian drones to get pure matings.

Steve Bernard, who produces pure Russian breeder queens for queen producers to use, also gave a report. Like the researchers, he stresses it takes several years for a producer to get enough Russian drones in an operation to produce nearly pure Russian production queens.

He also tests all of the lines to come from Russia and has kept some, and discarded some after small, then large trials. The best need less help from beekeepers, relative to pest control treatments, need less honey for overwintering, don't use much propolis, are gentle, good honey producers, and resistant to both mites. Those discarded didn't start laying after introduction for as long as 20 days, raised lots and lots of supercedure cells and weren't as gentle as one would like.

Take home message from all this? Russian bees show resistance to both mites, pure Russians that is. Producers need a minimum of two, better three years to get enough drones in their operations to insure good Russian x Russian mating at the production level. Finally, they are different from Carniolans, so expect that. And, of course, if you don't support this program, producers won't raise them and then where will we be?

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THE NATIONAL MEETINGS. Highlights and musings: Dr. Mark Feldlaufer, Beltsville commented that honey had risen way above FDA's radar due to the chloramphenicol contamination of Chinese honey. During his talk, somebody came in and reported that the U.K. had found U.S. honey, imported, to contain traces of streptomycin and sulphathiazole. This, so far, has not been confirmed, and attempts to contact the parties concerned have been unsuccessful. In any event, more people are looking at more honey for more things. Be aware.

Small hive beetle egg hatch is humidity dependant, according to Jeff Pettis. When the RH is less than 50%, egg hatch is less than 50%; when RH reaches 90+%, hatch is over 85%. Take home message – keep honey super storage areas dry, dry, dry. Use a dehumidifer, AC and keep pollen and brood *out* of supers.

Can honey bee larva be resistant to AFB infections? Apparently so, according to Jay Evans, from Beltsville. Some larva can turn on a response to an infection at the critical time and not succumb to the disease. Can this be exploited? Inherited? That, too, is apparently so. Stay tuned.

What are the effects of GMO pollen on a honey bee colony? Brood? Queens? Foraging? Tucson scientist Gordon Wardell is trying to find out. Also, is there a liquid diet that meets all the requirements for a bee? Imagine how much easier life would be if there was! One's just, or almost just around the corner according to Wardell.

Do different honey bee races emit different pheromones, or greater or lesser amounts of the same chemicals? Yes, according to Gloria DeGrandi-Hoffman from Tucson. This in turn may be leading to communication problems in queen acceptance, shown by European/African colonies, and, perhaps, U.S./Russian queen problems.

Don't want to use a whole frame for drone comb, but want to trap *Varroa* easily? Here's how. Cut out the bottom third just below the wire if using wax, or cut a large hole if using plastic). The bees will fill it with drone comb when replacing. Knock it out when capped (don't forget!) and replace. Repeat.

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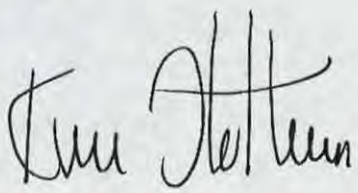
The article on Poplars and Bees has stirred a too-long, too-quiet pot. Beekeepers, almost everywhere, still suffer the sting of pesticide abuse by some in the agricultural community Labels have been changed, in many cases weakened to protect and enhance crop protection, while allowing, at best, questionable spray practices.

New chemicals have arrived that are imparting still unknown problems, and more are on the horizon. State Departments of Agriculture favor, often, the biggest wheels, who dominate the financial scene. Who wins in a label dispute? Guess.

Work with sprayers if possible. Let them know locations. Also, let them know you're watching to make sure it gets done right, with a video camera if necessary. Be prepared to help on occasion – move or cover or whatever. But don't cave in. Defend yourself, using the law.

Mostly, those that abuse labels are either in a world of hurt with their crop and desparate to save it; or, they don't have any vested interest in building or maintaining a relationship with a nearby beekeeper.

And you will lose. Some will never win, some will start to win when the noise gets loud. But, it's time that we do more, again, to protect honey bees. Begin now. How? Document. Document. Document. Lose bees? Take samples. Freeze 'em and call your county extension agent. No help, move up stream. Keep calling until somebody tells you to quit or threatens you, and document that. And let *us* know. We've got to start somewhere.



James E Tew

Changeable Beekeeping

"I can see two hives outside. They're probably dead."

Getting older

In spite of all I can do, I seem to be aging. My wife says I think about it too much. But how can I not think about it when I arise each morning and shave my Dad's face – the face that's in my mirror (Just kidding, Dad). I suspect that my frame of mind colors my thinking as a writer for these pages. In articles past, I and innumerable other writers have told beekeepers how to keep themselves busy during Winter months in order to make the arrival of Spring more productive.

I would write something like, *"Winter is a perfect time to repair equipment, read bee literature, and attend meetings."* So far as it goes, that sentence is true, but all the truth is that after a short time, I become sick of repairing busted up equipment and my interest in reading bee things, which I will probably forget before Spring, wanes to the point of boredom. And meetings? Though there are some big ones, actually there are only three or four meetings during winter months – certainly not enough to fill the entire Winter season. So here I sit, in hard Winter, making and changing plans for my upcoming Spring season. Tired of doing all my Winter beekeeping chores.

From where I sit

Like something from a pastoral painting, I can see my two of my hives as I write this piece for you. My urge is to photograph the hives and write something wintry in this piece. Honestly, those photogenic hives are probably already dead. After years of "abnormal" Winters, my bees and I are finally experiencing a "normal" Winter – cold and colder. At this point, it's not a record-breaking season, but it has been down to 0°F several times and the prediction is for more cold until Spring. My beekeeper friends and I will definitely have some winterkills this Spring.

What should I do to help my freezing hives?

In long-term cold weather – like I am experiencing now – there is little I can do to help my hives. I left plenty of stores on last fall, but some of the clusters were small. There is a chance they could have survived a mild Winter, but not this one. Knowing now that this Winter season will be cold, I should have combined those smaller units – but I didn't know that last fall. I gave it my best guess and I missed, hence the winterkills.

Animal *owners* vs. animal *guardians*

A few states have changed the designation of animal owners to animal guardians. In the changing philosophy, animal owners (guardians?) have increased responsibility for the health and well being of their animal charges. Though this would be a significant change, I really have no qualm with the new paradigm.

Many, many years ago, my Grandfather owned a dog that he called Uche (o͞o chee). Uche got in with a bad dog crowd and developed the terrible habit of going to the neighbor's farm where he took part in attacking and killing young hogs, called shoats. Expectedly, the neighbor took a very, very dim view of this bad dog behavior. I have a faint memory of the neighbor, with a bloody dead hog having its ears essentially chewed off, piled in a wheelbarrow. The neighbor was demanding to know what my Granddad was going to do about his derelict dog. In short order, my Grandfather gave his dog of many years a last meal and shot him dead. In the evolving scheme of animal guardianship, I don't know what the proper protocol would be today.

For 15 years, I was responsible for BJ, a 90 pound chocolate Labrador Retriever. He was a difficult animal to control, but I did my best. He was always an outside dog. I had a proper doghouse for him and supplied him with fresh straw bedding about once per week. I gave him high quality food as recommended by his vet. I kept a heater in his water dish and kept his water fresh. When the temperature dropped to about 10°, I would bring him into my woodshop where he seemed miserable. About once per week, I now see a TV news story about negligent dog owners leaving their dogs outside on frigid nights. Usually, these dogs are truly abused and need attention, but I can't help wondering if BJ was still alive would I be in trouble if a neighbor phoned the authorities charging me with leaving him outside in Winter weather? I don't know. Things change.

Why am I putting you through all this?

Farm animals, raised for slaughter, presently have fewer "rights" than animals kept as pets. Where

Continued on Next Page

"Am I to become a honey bee guardian?"

do bees fall? I haven't read a single word about bees in regards to this subject, but since I am responsible for several hives, am I to become a "beehive guardian?" Will some future inspector show up during hard Winter and give me a failing grade on Winter colony management? Honestly, I don't think we are anywhere near that, but my, my, how things can change.

Another reason for putting you through all this

A couple of years ago, I was trying to respond to a vegan question concerning some forgotten aspect of beekeeping. A vegan is (pronounced VEE-gun) is someone who avoids using or consuming animal products. While vegetarians avoid flesh foods, vegans also avoid dairy and eggs, as well as fur, leather, wool, down, and cosmetics or chemical products tested on animals[1]. As I searched the web, I was surprised to find my name in conjunction with a vegan web page entitled, Why honey is not vegan[2]. In that page, I was chided for instructing beekeepers on ways to remove and extract honey, as follows:

Yes, sometimes they (bees) make more than they can eat, but do the beekeepers only take the extra? No, according to James E. Tew, an Extension Specialist in Apiculture at Ohio State University in Wooster, "Commercial beekeepers frequently extract [steal] all fall-season honey and then feed colonies either sugar syrup or corn syrup in quantities great enough to provide all the winter food the bees would need" (Tew). (Everyone steals most of the spring-season honey.) Theft of all of the fall-season honey is merely the most blatant form of exploitation. Bees are also often fed in the fall in preparation for winter and in the spring and early summer to ensure the hive gets off to a good start.

Please note that my term, "extract" was changed by the vegan page author to the word, "steal." From that point on, "steal" and "theft" was used in the page to describe beekeeper honey harvesting procedures.

I want to be crystal clear

I want to be crystal clear at this point. I know very little about vegans or about the trend in animal guardianship. Other than what I have read in the popular press (ergo, my Winter reading), I am uninformed on both subjects. I used the posted vegan philosophy to demonstrate that there are people who have opinions that vary greatly from beekeepers' opinions. When this stance is considered in conjunction with the animal guardianship vs. animal ownership subject, I hope my discussion shows that most things change – sooner or later. While we are presently beehive owners, will we be beehive guardians in the future? In the future, will I be able to casually say that I suffered winterkills without offending future legal statutes? Who knows?

Change is not always bad

Change is not necessarily bad, but neither is it necessarily good. Change is not always predicted. It just happens – sometimes slowly – sometimes quickly.

Varroa establishment.

Varroa's arrival and establishment seemed to happen overnight. We were warned for years that this new problem pest was on the way, but there was nothing we could do. After *Varroa* arrived, our bees died in vast numbers. Beekeepers left beekeeping in significant numbers. Big changes. At this time, beekeeping is the same in many ways, but different in many ways.

Chemical control of *Varroa*

Pre-*Varroa*, we hated pesticides. They were the bane of beekeeping. After *Varroa*, we embraced pesticides. We desperately needed these specialized chemicals to keep our beekeeping practices as near to normal as possible. After we grew more confident in their use, we began to change. Another change even if it has been a slow one.

Non-chemical control of *Varroa*

I don't think anyone ever really loved using chemicals within the hive, but there were not many other options. Now we are moving away from straight chemical control to Integrated Pest Control (IPM) procedures. Succinctly stated, IPM practices require that you try everything non-chemical before advancing to chemical use. This is a good change.

Varroa colony kills

Varroa made colony kills common in a macabre way. Pre-*Varroa* hives could be expected to live indefinitely – barring pesticide kills or bacterial invasions. Now, I probably have two dead hives in my backyard that may or may not have died from *Varroa* infestations. No big deal, even commonplace. The new procedure is simply to start them up again next Spring from splits or buy packages yet another change from the old days.

And plastic

I have referred to this change before. My, how we did resist the plastic invasion of our beekeeping practices, but now look at a new supply catalog. As much as possible, everything is made from plastic. The list would be entirely too long to present here. The change – plastic is now a vital component of beekeeping. Few of us even think about its use anymore.

You changed

You, the beekeeper, changed. Though you have many of the characteristics of beekeepers past, you are different. You don't keep as

[1] What is a vegan? http://www.vegan.org/about_vegan.html

[2] Why honey is not vegan. http://www.vegetus.org/honey/honey.htm

many hives and more of them are in urban/suburban settings. Beekeeping is not nearly as agriculturally related as it was just a few decades ago just as you are not nearly as agriculturally related as you were just a few decades ago. Yep, you changed (and are changing).

It's not sacred

Most things sacred to beekeeping are actually not that special at all. We now use chemicals, we use plastic, we tolerate dead colonies, and we keep bees in town where we constantly compromise with our neighbors. Things we thought we could never do we routinely do. Is it really so far fetched that we will one day be bee guardians rather than beekeepers? Maybe, maybe not. I don't know. Either way, we will survive. It would be just another change. BC

Dr. James E. Tew, State Specialist, Beekeeping, The Ohio State University, Wooster, OH 44691, 330.263.3684, Tew.1@osu.edu; www2.oardc.ohio-state.edu/agnic/bee/; www2.oardc.ohio-state.edu/beelab/

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Richard Taylor

Bee Talk

"One of Dr. Seeley's most challenging, and difficult, tasks was to somehow find out what kind of nesting box would be *minimally* acceptable to a swarm."

I've been describing, in the last two talks, the behavior of swarming bees and how they locate new nesting sites. This whole complex process seems loaded with mystery, with questions that challenge the researcher and even seem unfathomable. It is as though some unseen guiding hand were at work. It was once thought, quite naturally, that the queen, earlier considered to be the king, ruled the whole process. Maeterlinck attributed it all to what he called "the spirit of the hive," which of course explains nothing. Allen Latham, the Connecticut beekeeper famous for his beekeeping skill and sagacity, thought that there must be some perhaps small group of control bees in the hive, in charge of everything. There was, as it has turned out, a glimmer of truth in this, but the fuller account awaited recent, painstaking and laborious research, and Tom Seeley has been at the forefront of this.

Swarming bees present questions, and part of the skill of a researcher is to formulate the questions that need to be answered and then use ingenuity to devise ways to answer them experimentally. This is the approach of the ethologist, to take the questions from nature herself, rather than just cooking them up in one's head.

I have explained some of the remarkable behavior involved in swarming – how a single bee can measure the volume of the hollow in a tree, how the swarm receives the signal to take off, how it is guided straight to its new nesting site, which the vast majority of bees in the swarm have not visited, by what criteria the bees determine that a given hollow will be suitable as a nest site, and so on. The manner in which scout bees convey the distance and direction of potential sites has been well known since the discoveries of Karl von Frisch; namely, they do this by means of the famous figure-eight dance, in the same manner that they communicate the distance and direction of nectar and pollen sources.

What is perhaps the most challenging question of all remained to be addressed, however; namely, whether, among various potential sites that the scout bees have discovered, some of them better than others, the bees are able to select the *best* of these, and if so, *how*. The natural supposition would be that the scout bees go around and check them all out, compare them, then return to the swarm to announce which is the best. But that is not how it happens at all.

Before proceeding to that great question, we need to have a look at some of the experimental equipment that Dr. Seeley and his helpers used.

First, they designed five identical boxes, of all which, without modification, would serve as excellent nesting boxes, based on the information already at hand. Each box was such, however, that a partition could be inserted so as to reduce the volume accessible to the bees. The entrances could also be reduced in identical ways and in set amounts. Thus, the bees could be offered boxes of different volume and entrance size, one of them being just right as a nesting site, and the remaining four inferior but still acceptable.

Swarms would be needed, of course, but this was no problem. You can create a swarm just by finding the queen in a hive, caging her, then shaking and brushing bees from the combs. These then cluster around the queen, suspended conveniently on a nearby post. With the release of the queen this cluster becomes, for all practical purposes, a natural swarm. To get identical swarms, important for experimental purposes, one simply weighs them.

An alternative supply of swarms is, of course, package bees, readily available.

In order to keep his experiments free from extraneous influences Dr. Seeley carried them out on an island off the coast of Maine, where there were no trees, apiaries or feral colonies.

Video equipment was also used, enabling the researchers to film, sometimes over hours, individual marked bees. This was valuable in getting very precise and accurate measurements of the various dances bees used to communicate. For example, they were able to measure the vigor of such dances, by counting the number of "waggles" per minute that a dancing bee exhibits during the middle part of the dance.

One of Dr. Seeley's most challenging, and difficult, tasks was to somehow find out what kind of nesting box would be *minimally* acceptable to a swarm, in terms of volume and entrance size. Knowing this, he would then be able to offer a swarm an array of these, together with just one *optimally* acceptable one, to see whether the bees would know enough to choose that one in preference to all the others, and if so, how they would make such a determination. The inferior boxes, it is important to stress, would have to be acceptable to the bees, but only barely so. If less than acceptable then the swarm would have no choice but to select the highly desirable nesting box, whereas, on the other hand, if more than minimally acceptable, then there would be less reason for them to select the desirable box in preference to these, and we would not have any clear indication that an actual choice had been made.

The way Dr. Seeley dealt with this difficult step was to devise a two-hive experiment. That is, having found, without much difficulty, that a box with a 40 liter volume and an entrance of 15 square centimeters was highly acceptable to the bees, he set up another identical box at the same distance from the swarm and facing in the same direction. Then, by systematically varying the volumes and entrance sizes of the two boxes, and having his helpers count the numbers of scout bees at each box at set times, he finally determined that a box with a volume of only 15 liters and an entrance of only 15 square centimeters was acceptable to the bees, but only *barely* so. If either measurement was significantly reduced then the bees lost all interest in that box, to the point that no scout bees visited it at all, but, given no other choice, they would accept the inferior site of 15 liters volume and 15 square centimeters entrance.

The queens of the swarms used for this crucial experiment were kept caged, so that the bees, having lifted off, always returned to their queen, and no swarm actually took over either box. The degree of interest in either box, from zero to great, was determined by counting the bees visiting them. If a box was degraded to the point that no bees visited it, then they clearly had no interest in it.

Now came the great experiment, the question being whether, given a choice among several possible nesting sites, all of them acceptable but only one of them really desirable, the bees will choose the best one, and, if so, how they would do this. These experiments were carried out with great care, using five different but similar swarms on different days and over a considerable period of time, as much as two years apart in some cases.

The procedure was to offer a swarm five nesting boxes, four of them the same and of minimal acceptability in terms of volume and entrance size, and the fifth a highly desirable one. Different but similar swarms were used each time, and the distance of the boxes, direction of entrances, and so on, were all the same. The positions of the boxes were shifted about from one trial to another, in order to eliminate location as a factor in the selection.

It was found that, every time, the bees danced, more or less vigorously, for all of the sites, as they were discovered (except in one of the five trials one of the inferior sites attracted no interest at all). Sometimes the bees were slow in discovering the really good box, so they danced, with varying degrees of excitement, for the others. In time all of the boxes were found (except in the one trial when apparently only four were found), and scouts could be seen advertising all of them. Their degree of interest in a particular box was indicated by the vigor of the dances and, over time, by the number of dancers favoring one box or another. Sometimes a box attracted very little interest, and sometimes one of the inferior boxes had a considerable number of bees advertising it. In time, however, all, or virtually all, of the dancers, which had grown to a great number, were dancing for the best box. They had made a choice, and, what is important, they had made the *best* choice. Soon thereafter the swarm received, from the "pipers," the signal to warm up, and soon after that, the signal from the "buzz runners" to break up, and the swarm forthwith lifted off and took off for the chosen site.

That was the result in four of the five trials. In the other the bees settled, somehow, for one of the inferior sites. And this leads to the conclusion that, given options, a swarm of bees will *usually* choose the best site over those less suitable.

Finally, it should be noted that this choice is made, not by scouts going from one potential site to another and making comparisons, but by the fact that the best site attracts an increasing number of scouts until, by sheer numbers and the vigor of the dances, this site prevails over the others. The first bees drawn to the winning site gradually tire and drop out, but in the meantime they have conveyed their enthusiasm to other scouts, so that, in time, the best site wins out simply by inducing an ever increasing number of scouts to come check it out. BC

Richard Taylor is a lifelong beekeeper and philosopher living in the Finger Lakes region of New York.

?DO YOU KNOW?

Spring Things

Clarence Collison
Mississippi State University

Early Spring is a very difficult time of the year for the honey bee colony because of unstable weather patterns in many parts of the U.S. During this time the colony food stores must be carefully monitored. As fresh pollen and nectar become available, they serve as strong stimuli for brood production. As a result, the size of the brood area may increase faster than stores are replenished. Colonies often run a tight line between available food and starvation, since weather often inhibits flight activity for extended periods of time. Stress diseases (European foulbrood, sacbrood, and chalkbrood) plus tracheal mites and nosema disease are also most prevalent in the Spring and further complicate the problem. As a result, many colonies that survived the Winter are often lost during the Spring, when the rate of brood rearing is rapidly increasing.

Take a few minutes and answer the following questions to determine how well you understand bee diseases, mites, the stressful conditions that colonies face in the Spring, and what management decisions the beekeeper faces.

The first nine questions are true and false. Place a T in front of the statement if entirely true and an F if any part of the statement is incorrect. Each question is worth 1 point, unless otherwise indicated.

1. ____ Leaving Checkmite+ and Apistan Strips® in hives longer than the label indicates and reusing strips a second time will contribute to the development of mite resistance.
2. ____ A foundress female *Varroa* mite when she enters a brood cell produces only one male offspring.
3. ____ Two biotypes of *Varroa destructor* are found in the United States.
4. ____ A brood cell containing two or more foundress *Varroa* mites will produce fewer offspring/female mite than when a cell contains only one foundress female.
5. ____ Larvae with European foulbrood usually die whey they are 4-5 days old.
6. ____ Only young female *Varroa* mites can mate.
7. ____ Male *Varroa* mites feed on hemolymph from pupal honey bees within the brood cell.
8. ____ Crystallized honey stores consumed during the winter increases the incidence of dysentery.
9. ____ Bees cannot survive without honey.

(Multiple Choice Questions, 1 point each)

10. ____ Considered to be the most serious health threat to apiculture.
    A. American Foulbrood
    B. Tracheal Mites
    C. *Varroa* Mites
    D. European Foulbrood
    E. Sacbrood Disease
11. ____ The scientific name for the small hive beetle is:
    A. *Braula coeca*
    B. *Aethina tumida*
    C. *Achroia grisella*
    D. *Galleria mellonella*
    E. *Ascospheara apis*
12. ____ The bee louse belongs to the family:
    A. Apidae
    B. Braulidae
    C. Hippoboscidae
    D. Syrphidae
    E. Bombyliidae
13. ____ The latest continent in which the small hive beetle has been discovered is:
    A. South America
    B. North America
    C. Africa
    D. Asia
    E. Australia
14. ____ When ____ or more *Varroa* mites enter a single brood cell, there is a high probability that the bee developing in that cell, if it survives at all, will emerge with wing damage.
    A. Five
    B. Two
    C. Six
    D. Four
    E. Three
15. Explain the differences between a pollen supplement and a pollen substitute. (2 points)
16. Name three components normally used in the making of sugar candy that is used for feeding colonies found short of food stores. (3 points)
17. In addition to American foulbrood, name 2 bee diseases in which spores are produced. (2 points)
18. Where are the eggs laid by female tracheal and *Varroa* mites? (2 points)
19. Name two ways in which nosema disease affects adult worker bees. (2 points)

ANSWERS ON PAGE 54

?Do You Know? Answers

1. **True** Leaving either Apistan® or Checkmite+ strips in the hive longer than the label calls for will select for mite resistance, as it exposes the mites to a form of "sub-lethal dosing", which results in mite survival. The length of time that the strips can be legally left in the hive, is based on the acaricide release rate profile from these polymer strips. When these strips are reused, they again provide only a sub-lethal dose of the toxicant.
2. **True** The first egg laid by a female *Varroa* mite is unfertilized and develops into a male. It is laid in the top part of the cell near the entrance. All subsequent eggs are fertilized and develop into females. They are laid in the base of the cell near the bee fecal area.
3. **True** Biotypes have been proposed for *Varroa* mites from different regions of the world, as there is some variation in characters and in the damage that the mites cause to the bees. We have two biotypes in the United States; Korean and Japan/Thailand haplotypes of *Varroa destructor*.
4. **True** When *Apis mellifera* brood cells are entered by more than one female *Varroa* mite, competition between offspring at the feeding site increases offspring mortality, especially of the younger stages. Also the mother mites in heavily infested cells show a decrease in the number of eggs laid per mite, resulting in fewer offspring.
5. **True** European foulbrood generally kills larvae 4-5 days old while they are still coiled in the bottom of the brood cells.
6. **True** Male *Varroa* mites are produced from unfertilized eggs (as in bees) and females from fertilized eggs. Females that produce only males in one reproductive cycle, continue to do so in subsequent cycles, indicating that only young females can mate, and that without sperm, only unfertilized eggs are produced. Soon after mating is completed the sperm transport system in the female degenerates thereby preventing any future mating.
7. **True** As we have indicated in previous exams, the male *Varroa* mite chelicerae, are not suited for feeding as they are in female mites. Instead of being pointed as they are in the females, they are highly modified and have an open hollow tip that is used to transfer sperm packets from the genital opening of the male to the genital opening of the female. While numerous literature sources indicate that male mites are unable to feed, it has been shown that male mites are able to feed on bee pupae at the feeding site prepared by and kept open by the mother mite and her daughters.
8. **True** When honey crystallizes, glucose separates from the liquid phase as crystals, while the other sugars remain in solution. As crystallization proceeds, the moisture content of the liquid phase increases. When this happens in the comb during the Winter, the bees suck the fluid from between the crystals, thus obtaining considerably more water in their diet than normal. Excess water in the diet is the primary cause of dysentery. Once the water has been removed from between the crystals by the bees, the remaining stores are very dry and are often impossible for the bees to use until Spring.
9. **True** Bees cannot survive without honey or a carbohydrate source. Colonies with inadequate stores die, and the deceased workers can usually be found, each with nearly its entire body, head first in a cell. Often hundreds of such workers are found in contiguous cells. Starvation is frequently found toward the end of the winter or early spring but can occur at any time of the year.
10. C) *Varroa* Mites
11. B) *Aethina tumida*
12. B) Braulidae
13. E) Australia
14. A) Five
15. A pollen supplement is a protein source such as soybean flour, powdered skim milk, brewer's yeast or a mixture of these with some pollen added to it. The natural pollen attracts the bees so that they will make use of the protein source. A pollen substitute is a protein source containing all the essential nutrients for bees but no pollen.
16. White Sugar, Water, Glucose or White Corn Syrup, Cream of Tartar, Honey (some recipes call for it but is not recommended because of potential disease transmission), and vinegar.
17. Chalkbrood, Nosema, Stonebrood
18. Female tracheal mites lay their eggs in the adult honey bee's tracheae.
    Female *Varroa* mites lay their eggs in recently capped brood cells (drone or worker).
19. Nosema infection affects individual honey bee workers in many ways:
    Life span is reduced
    Ability of infected nurse bees to feed brood is reduced
    Rapid aging of the honey bee
    Some lose the ability to fly
    Become dysenteric earlier than uninfected individuals

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

Clarence Collison is a Professor of Entomology and Head of the Department of Entomology and Plant Pathology at Mississippi State University, Mississippi State, MS.

GLEANINGS

MARCH, 2003 • ALL THE NEWS THAT FITS

USDA 2003 Budget Proposal

Ag Secretary Ann Veneman has released details of the Bush Administration's proposed FY 2004 budget for USDA programs and services, which includes record spending for farm conservation measures, food safety protections, and nutrition and food assistance programs. The $74 billion request is 2% higher than the previous year and $5.4 billion higher (or 8% growth) since FY2001. In a detailed briefing on USDA's budget proposal, the Secretary said the FY2004 budget supports the goals outlined in the Administration's policy book, *Food & Agriculture Policy: Taking Stock for a New Century*, and the Department's 5-year strategic plan. Key aspects of the budget include the following:

Safeguarding America's homeland & Protecting the Food Supply: The budget seeks record support for USDA's Food Safety Inspection System meat and poultry food safety programs as well as increases to strengthen agricultural protection systems.

Continued Implementation & Administration of the 2002 Farm Bill: The budget supports the continued implementation of the 2002 Farm Bill, which includes providing historic increases for conservation funding and protecting natural resources.

Unprecedented Funding for a Food & Nutrition Safety Net: The budget reflects the Administration's continued commitment to the nutrition safety net by including $42.9 billion for domestic food assistance programs, a $1.7 billion increase over 2003.

Expanding Ag Trade & Supporting International Food Assistance Programs: The budget continues a commitment to export promotion and foreign market development efforts by proposing $6.2 billion in spending.

Increasing Housing Opportunities & Investment in Rural America: The Administration proposes $11.9 billion for rural development programs.

FDA SEIZES ADULTERATED HONEY

At the request of the Food & Drug Administration (FDA), U.S. Marshals seized adulterated imported bulk and finished product honey from Hoyts Honey Farm, Inc. in Baytown, Texas.

U.S. Marshals seized 266 drums of honey (each containing 639 pounds of bulk honey) and five totes (each containing a net weight of 3,000 pounds) after FDA tested and confirmed the presence of an unapproved food additive, chloramphenicol. In accordance with the Federal Food, Drug and Cosmetic Act, food products that contain chloramphenicol, an antibiotic, are adulterated and are not permitted to be sold in or imported into this country.

This seizure is the third enforcement action against similarly contaminated honey in six months. The first such seizure occurred in August 2002 in LA. The second seizure occurred in January 2003 when U.S. Marshals served a warrant on T.W. Burleson and Son, Inc. in Waxahachie, TX. The continued monitoring of food production and distribution at many levels has enabled FDA to detect this adulterated honey since the agency learned of the presence of chloramphenicol in imported honey.

Chloramphenicol is a broad-spectrum antibiotic drug used to treat life-threatening infections in humans, usually when other alternatives are not available. The use of this antibiotic is limited because of its potentially life-threatening side effect, idiosyncratic aplastic anemia. For the very small number of the population susceptible to this side effect, exposure to chloramphenicol could be life threatening Because of the current uncertainty regarding the dose-response relationship between

Contributed on Next Page

Regulations.gov
WEBSITE OFFERS IMPROVED ACCESS

A new website launched in January will provide ready access to proposed new federal regulations that are open for public comment.

The Office of Management and Budget (OMB) and the U.S. Environmental Protection Agency (EPA) announced the creation of Regulations.gov, a site designed to allow citizens and small businesses to access and comment on hundreds of rules from all federal agencies.

The EPA was selected by the OMB to be the lead agency on the initiative, which will improve access to proposed regulations that impact people's lives.

"E-Rulemaking will allow citizens to participate actively by enabling them to be involved in federal rulemaking on their own terms at a location and time of their choice," said EPA deputy administrator Linda Fisher. "This initiative will help assure the public that they have a role in making regulatory decisions and that it can be done in a more timely and efficient manner."

The initiative is part of the Bush administration's E-government agenda, aimed at cutting costs and streamlining interactions between citizens, businesses and government.

The new website is available at: http://www.regulations.gov

MARYLAND APPROVES BLACK BEAR HUNT

For the first time in 50 years, the state of Maryland has approved a hunting season for black bears.

Despite receiving more than 500 comments from Maryland citizens who oppose bear hunting by a five to one majority, the Maryland Black Bear Task Force voted six to four to recommend a new bear hunting season.

"The Task Force has thumbed its nose at Maryland citizens – more than 80 percent of whom voiced their opposition to a bear hunting season," said Michael Markarian, president of The Fund for Animals. "We hope that Governor Ehrlich and the Department of Natural Resources will respect the will of the people and continue the 50 year tradition of black bear protection in Maryland."

Maryland's black bear population, estimated at 266 to 437 bears, has come back from the brink of extinction. Because of the state's growing human population, encounters and conflicts between humans and bears have become more common.

According to the task force website, "The Task Force feels that black bears are a valuable natural resource, that efforts should be used to conserve black bear habitat, but bear populations should be maintained at levels compatible with land use and property concerns."

The task force voted to approve "fair and sportsmanlike" bear hunting, barring the use of bait and dogs, and banning spring hunting. Funds raised from the sale of bear hunt permits will be used to fund bear management programs and to compensate property owners for damage caused by bears.

The Fund for Animals says that there are better ways to manage the state's bear population and reduce conflict with humans. The group says the task force was provided with scientific data on black bears but has not produced a comprehensive analysis of black bear

Continued on Next Page

BEAR ... Cont. From Pg. 57

habitat needs or the impact that a hunt would have on the bear population and non-target species.

"There was never any information suggesting that hunting bears would reduce bear/human conflicts," said Markarian. "In fact, hunting bears for sport would likely make problems worse."

The Fund for Animals suggested expanding public education efforts on implementing nonlethal methods to humanely prevent or resolve human/bear conflicts in the state.

TURKISH JOURNAL

MELLIFERA is the first scientific beekeeping journal in Turkey. It is printed in two language (Turkish & English). The journal has been found eligible for screening by the ULAKBIM National Indices and "APICULTURAL ABSTRACTS" of Ulrich's International Periodicals, BIOSIS and EBSCO. Subscription form, instruction to authors and other information can be found at www.tkv-dft.org/publications/index.htm or write to mellifera@ktg.com.tr

FDA ... Cont. From Pg. 57

chloramphenicol ingestion and aplastic anemia, it is not possible to define a safe level for the presence of this antibiotic in food products.

The agency will continue to detain or seize any honey imports that contain chloramphenicol to ensure that this product is not released for human or animal consumption in the United States.

In response, Bruce Boynton, CEO of the National Honey Board said The NHB supports the Food & Drug Administration's system for testing and monitoring honey. The seizure in TX of imported honey contaminated with traces of chloramphenicol clearly demonstrates that the systems in place are working and effective.

The NHB strongly condemns any practice in the U.S. or abroad that jeopardizes the purity of honey and the reputation of the honey industry and its members. The board strongly supports all efforts to maintain a safe and wholesome supply of honey to consumers.

Based in Longmont, CO, the NHB is an industry-funded research, consumer information and promotion board whose mission is to advance the use and application of honey and honey products throughout the world.

Made Possible By The National Honey Board

ARCHIVAL OF HONEY EXPERT'S PAPERS

The National Honey Board, in recognition of the unique and outstanding contributions made by Dr. Jonathan W. White to the honey industry during his 60-year career, recently provided funds for preparation of his collected works for public use. As of January, 2003, The Penn State University Archives, Special Collections Library, has made The Jonathan W. White Papers available to the public. Dr. Jonathan White, internationally recognized authority on the analysis and composition of honey, passed away on September 2, 2001.

"Dr. White's research has influenced all aspects of the honey industry," said Gene Brandi, chairman of the National Honey Board. "His research was incredibly valuable, and he was a loyal friend to many. We are pleased to be a part of protecting this body of knowledge and making it available for future opportunities."

During his career, Dr. White made numerous contributions to the body of knowledge on honey. For example, he identified four new sugars and the principle acid in honey, developed new methods of separation and identification, improved the methods for measuring honey adulteration, characterized honey's antibiotic principle, and demonstrated the nature of various honey enzymes. He also completed much technical work on new processes and products.

A native of Pennsylvania, Dr. White attended Penn State University for his undergraduate degree and received graduate degrees in Agricultural Chemistry from Purdue University. Dr. White worked for the United States Department of Agriculture from 1942 to 1978, at its Eastern Regional Research Laboratory in Wyndmoor, Pennsylvania, where he conducted the majority of his honey research. After White left the USDA, he worked as an independent analyst and consultant on honey, first as president of Honeytech, Inc., and in 1987, for Honeydata Corporation.

Dr. White had more than 140 professional publications and 6 patents to his credit. He also collected relevant research publications dating to the late 1890s. The complete collection contains eight series: Apiculture, Beeswax, Biological and Medical Research, Chemistry of Honey, Codex Alimentarius, Food and Food industry, Publications, and Personal. The Jonathan W. White papers were donated to the University Archives by Dr. White and his daughter, Dr. Barbara Pennypacker.

For information about the archive, contact Special Collections at 814.865.7931, or Jackie R. Esposito, University Archivist, at jxe2@psu.edu. The contents of the collection can be viewed at www.libraries.psu.edu/crsweb/speccol/FindingAids/white.html.

AUSTRALIAN SITUATION ROUNDUP

An illegal New Zealand immigrant may just be the bees' knees for Australian fruit and vegetable growers.

The federal government is being asked to consider allowing bumblebees to be introduced on the mainland after Horticulture Australia said it found few effects on native plant species in Tasmania since bumblebees breached Australia's biosecurity barriers and arrived in the island state in 1992 from New Zealand.

The Australian Hydroponic and Greenhouse Assn. has asked for Horticulture Australia to look at the feasibility of their mainland use for pollination of hothouse crops such as strawberries, tomatoes and capsicum.

Association president Graeme Smith said in the northern hemisphere hothouse growers have found bumblebees cost around 1% of production but deliver a 28% improvement in yield. "They will work in much harder conditions than humans ever will," he said.

The three-year study in Tasmania found some weeds such as the tree lupin produced more viable seed as a result of the bumblebees while others had fewer seeds.

Tasmanians said bumblebees increased production in rhododendrons, bean crops and blueberries but reduced broad bean crops by robbing nectar.

"Our initial impression of the report is that it is not the concern some conservationists would have us believe," Smith was quoted as telling local reporters. "Generally speaking, it looks quite positive."

The Victoria government has listed bumblebees as a potential threat under the state's Flora and Fauna Guarantee Act but it is facing another problem – a shortage of bees.

Almond growers in the state's north – as well as growers in south western New South Wales – say they are facing a shortage of bees to pollinate their crop.

The crop now has 8,000 hives with 240 million bees carrying out pollination but by 2007 some 646 million bees in 21,545 hives will be needed to service the rapidly expanding crop area.

This growth will have to be on top of programs to replace the millions of bees lost to the continuing nine-month drought that has hit 70% of Australia and 99.96% of New South Wales. It has also devastated large areas of Victoria and Queensland.

Grain and horticultural growers are expecting a yield reduction up to 10% next season because of loss of bees in the worst national drought in 100 years.

The effect of the drought comes on top of bee losses from wide-ranging bushfires in New South Wales – which produces half of Australia's honey – over the last 12 months and the discovery of the small hive beetle in NSW and Queensland.

NSW Agriculture apiculture technical officer Bruce White said it's estimated that the usual stock of 268,000 hives in the state has fallen by 25% and could drop further this Winter.

While hives have been dying out, he said nobody has quit beekeeping but are working other jobs until conditions turn around.

It has asked for a A$10 million aid package from the federal government but has had no response from Canberra.

NSW honey production has fallen by 50% with more than half the state's beekeepers being forced to feed their bees sugar syrup and pollen supplements since February last year.

This production drop has resulted in prices paid to apiarists

Continued on Next Page

POSITIONS AVAILABLE AT CORNELL

Postdoctoral Research Position
Description: The Cornell University Apiary Research and Extension Program is seeking an outstanding individual with a commitment to excellence in research to serve as Postdoctoral Researcher in support of a honey bee breeding program for mite resistance.
Qualification: A PhD in Animal Science, Entomology or related field, 5 years full-time beekeeping experience (including the ability to recognize all major honey bee pests, parasites, pathogens and predators), outstanding organizational skills and general lab-experience required, experience with microsatellites desired.
Compensation: Starting salary is $32,000 annually plus benefits.

Program Apiarist
We are also seeking an outstanding individual to serve as Program Apiarist in support of a honey bee breeding program, who will assist in all aspects of the seasonal management of 200+ colonies, conduct bioassays for the identification of desirable traits in honey bees, and assist in queen rearing activities.
Qualification: A BS in an agricultural or related field (MS preferred), 5 years full-time beekeeping experience, outstanding organizational skills and general lab-experience required.
Compensation: Starting salary is $34,000 plus benefits.

Extension Support Specialist in Apiculture
We are also looking for an outstanding individual to fill the position of Extension Support Specialist in Apiculture. Duties include participation in development and delivery of the CU Master Beekeeper Program, web page development/management, library research, database design and management, publication layout, office management, and management of client communications.
Qualifications: Outstanding writing, editing and organizational skills, 3+ years experience with all aspects of honey bee management, and a BS (MS preferred) in entomology, agriculture or related field required.
Compensation: Starting salary is $34,000 annually plus benefits.

To apply: Contact Prof. N. W. Calderone, CU Apiary Research and Extension Program, Dept. of Ent., Comstock Hall, Cornell Univ., Ithaca, NY 14853. Review of applications began February 15, 2003 with a desired starting date of April 15.

AMERICAN ASSOCIATION OF PROFESSIONAL APICULTURISTS

Heather Mattila

Each year the AAPA presents an award to recognize and promote outstanding research by students in the field of apiculture. The award was presented to Heather Mattila of the University of Guelph, at the joint conference with the Canadian Association for Professional Apiculture at Niagara Falls in December. Also presented at the same time was the AAPA Student Paper Award to Janisse Bailey, also of the University of Guelph.

Janisse Bailey

AUSTRALIA ... Cont. from Pg. 58

fortunate enough to get yellow box honey jumping to about A$4.73 a kilogram from A$1.82 a kilogram in the last 18 months.

About 80% of the NSW's honey crop comes from native flora and has been hit first by fires and then by the drought. Flowers have been few and far between not only with native flora but also on important source crops such as canola which has been near wiped out by the drought.

There are fears that bees that do survive through to Spring will be too weak to pollinate crops.

Beekeepers say colonies will take at least 12 months to begin breeding after the drought breaks but hope a good Spring this year with a forecast huge canola crop will see numbers rebuild sooner.

Australia's largest packer Capilano Honey has been forced to import honey for the first time in its 50-year history after its receivals dropped to a record low of 9,000 tons from the 17,500 tons it usually gets. It is importing some 5,000 tons of eucalyptus-based honey from Argentina to blend with its export product.

But there are signs the crisis may slowly be turning around.

The rough barked native apple tree, Angophora floribunda, has flowered in New South Wales – something it traditionally does during the tailend of a drought.

This has encouraged some beekeepers to begin putting queen bees into hives using the native apple tree as a food source.

–Alan Harman

Stewart Ward

New South Wales beekeeper Stewart Ward doesn't know what beekeeping is like under normal weather conditions on the state's south coast.

He moved to Long Beach, three hours south of Sydney, 18 months ago – just as the worst drought in a century began creeping into the area and the iron bark and spotted gum trees stopped flowering.

As a result he has not collected commercial quantities of honey since his move from the NSW tablelands.

Instead, he is leaving the little honey his bees collect from the eucalyptus that covers the coast in the hives so they can feed.

Even so, the drought is taking its toll on his bees and he had seen the size of his apiary drop from 100 hives to 85 since Christmas.

With no honey income he has gone back to his former trade as a bricklayer and is fortunate the resort area is in the middle of a building boom.

Water is not a problem for his bees on the drought-stricken coast because there are a number of creeks as well as farm troughs and a number of dams that are filled from bores.

Ward said the expected end of the drought in the Dall will not mean an immediate return to normal honey gathering.

The iron bark and spotted gum eucalyptus trees in the area will take three to seven years to resume flowering.

But he has no plans to quit.

"I've been told the season after I quit will see the best honey flow ever," he said with a wry smile.

OKLAHOMA BEEKEEPERS

Oklahoma Beekeeper of the Year , Everett Taylor or Orlando, OK.

Oklahoma Young Beekeeper of the Year, Levi Harges of Skitook, OK.

Kelley 2003

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Glenn Apiaries 11
GzBz Honey Farm 16
Hardeman Apiaries ..... Ins. Back
Harrell & Sons 14
Hawaiian Queen 22
Heitkam's Honey Bees 13
Homan-McMasters 55
Honey Land Farms 49
Indian Summer Honey Farm ... 34
Jester Bee Company 14
Koehnen, C.F. & Sons 29
Kurkoski Apiaries 26
Lamb's Queens 7,16
Miksa Honey Farm 26
Pendell Apiaries 62
Rossman Apiaries 7,26
Sasseville Apiaries 26
Shuman's Apiaries ..... Inside Fr.
Spell Bee Company 55
Strachan Apiaries 34
Taber's Queens 26
Tollett Apiaries 16
Weaver, B. Apiaries 52
Wilbanks Apiaries 6
Wooten's Golden Queens 11
York Bee Co. ..... Inside Back

Associations/Education

American Honey Producers 55
American Beekeeping Federation 4

Equipment

CC Pollen 4
Cowen Mfg. 42
Country Flower Top Entrance 22
Dakota Gunness 16
Golden Bee Products 22
Humble Abodes Woodenware 9
MDA Nuc Boxes 7
Perma Comb 62
Pierco Frames 52
Propolis Traps 7

Related Items

Bee Cool Ventilators 14
Better Way Wax Melter 26
BL Plastic Containers 25
Burke's Record Keeping 11
Fisher's Honey Sticks ..... Ins. Fr.
GloryBee Foods 6
Golden Heritage Foods 9
Honey B Healthy 9
Observation Hive 11
R. M. Farms 51
Tuttle Apiaries 49

Suppliers

B&B Honey Farm 1,49
BetterBee 3,36,37
Browning Cut Stock 25
Brushy Mountain 1
Dadant 35
D&G Containers 42
Draper's Pollen 55
Kelley, Walter 63
Mann Lake Supply ..... Bk Cover
Maxant Industries 4,22
Mid-Con 4,16
Precision Plastics Pkging 11
Root 46,56
Ross Rounds 14
Rossman Apiaries 7,26
Ruhl Bee Supply 14
Sherriff, B.J. 3
Simpson's Bee Supply 55

Beekeepers are getting older. According to the U.S. census bureau, the average age of beekeepers will be 105.2 years by 2010. If this trend doesn't reverse, adult care facilities will have to include bee yards with wheelchair accessibility next to the shuffleboard court.

We must encourage young people to enter the beekeeping profession. Beekeepers need to spend more time with young people and less time with other older beekeepers. We need to relate to youth and make beekeeping relevant to them. This is easier than you might think.

First, remember that teens have a 28 second attention span. Articles written for teens should be short and include lots of pictures. A.I. Root should consider teaming up with Marvel Comics to publish beekeeping books.

Second, use language young people can understand. Publishers of beekeeping literature should follow the lead of major Bible publishers and put out a new modern translation every two weeks or so. Imagine opening a recent issue of *Bee Culture* and reading an article written in the archaic, formal style of a middle aged writer. To a teenager the text would read something like this –

"And it shall come to pass that thou must replaceth the queen. Verily, verily I tell thee, whenst thou introduceth thine queen into the hive, let thou not be hasty..."

You wouldn't wade through this ponderous prose if you were a fourteen year old.

Third, young people need a reason to keep bees. You won't entice them with the promise of meager financial gain, the hard sweaty work or the stings. Modern kids are used to passive entertainment – sitting in front of a television or playing computer games. Some boys are motivated by the possibility of attracting the opposite sex. Why else would they run up and down a muddy field with a football? Hot babes.

I am devoting the rest of my life to promoting beekeeping among young people. I studied my teenage daughter's speech patterns and tacked a list of common terms on my bulletin board, practicing them in front of a mirror – Wassup, dude, sweet, like, like, like, and like. "Like" is used frequently with so many like, subtle variations, I'm like, "Wooooe!" I could master Mandarin or Sanskrit more easily.

Speaking "teen" requires not only using the right word but the appropriate inflection. It can be confusing. For example, my 14-year-old daughter Ariele and I walk down a sidewalk near the high school. She pretends I am a casual acquaintance. We see a car with florescent lights flashing underneath. I try a new phrase.

"Woe, dude!"

"No, dad." Ariele quickens her stride, increasing the distance between us.

"What do you mean no? That's exactly how you said it yesterday when you saw the hot air balloon shaped like a gorilla."

Someday when she rolls her eyes, they are going to stick that way. "It's not 'dude', it's 'dude' Hear the difference?" (If you can't see the difference in print, you wouldn't hear it either.) Now an observer would think we were two strangers who happened to be walking in the same direction. I try some variations:

"Dude!"

"No."

"Dude..."

"No."

"Duude?"

"No!"

"If you keep doing that, they're going to stick that way."

"Whatever!"

Now she behaves like I am stalking her. A police cruiser trolls past, twice.

After years of study, I now connect with teenagers and can make beekeeping relevant to the younger generation. Pull off your kid's earphones, unplug the television for approximately 28 seconds and see if they can read the next section –

A Swarm in May – Dude!

So like me and my old man were cruising in the Buick when I'm like, "Woe, stop Dad! A swarm! Dude! This baby's about as big as a basketball. The old man is really like, freaked when I get my swarm catching stuff out of the trunk. He's wanted me to do this beekeeping stuff for years. That's when I see this hot babe sitting on a nearby porch.

I'm like, "Hey! These your bees?" She comes over to look.

She's like, "Euuuw! What are you like, doing?"

I'm like, "I'm going to catch them in this box."

"Don't they like, sting?"

"Hey, you just have to have a totally gentle touch." So I like shake the branch and the whole mess drops in. I close it up. The rest of the bees cluster around the outside. I toss the box into the trunk (I wouldn't do that if I was like driving across the country or something. They need to like ventilate or they'd croak).

I'm like, "See ya in school?"

"Yeah, later dawg!"

Guys who do bees can't help it. Sweet babes just cluster around them like they're covered with queen pheromone. That's something I learned from my old man.

I tried this story on my daughter.

"You're weird." She rolled her eyes and stalked out of the room.

I showed one of my sons. He looked thoughtful.

"So, Dad, let's go like, check out the hives. I've got 28 seconds before I have to do my homework."

Kids'NBees

Peter Sieling

BOTTOM BOARD