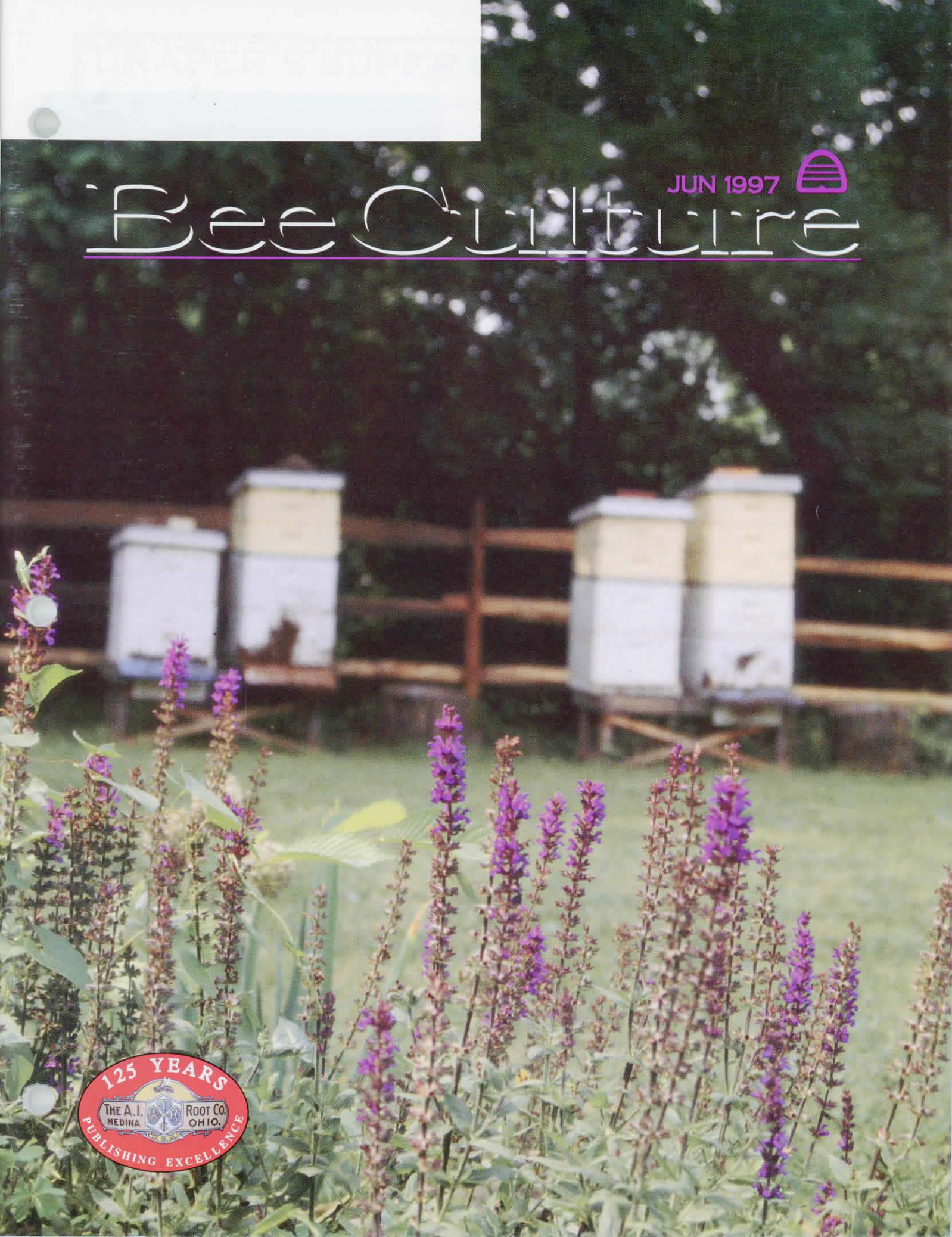

JUN 1997
Bee Culture
125 YEARS
THE A.I. ROOT CO.
MEDINA OHIO.
PUBLISHING EXCELLENCE

Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

June 1997 VOLUME 125 NUMBER 6

FEATURES

COVER
This bucolic beeyard is located on the grounds of The 577 Foundation, a 14-acre estate on the banks of the Maumee River in Perrysburg, Ohio. It is a Nature and Arts Center, fostering exploration, education, experimentation and personal enjoyment. Part of this experience are these bees, and a year-round observation hive, tended by resident beekeeper Robert Smith. The foreground flowers are used to define the space and to be enjoyed by mostly bumblebees, yet another experience.
photo by Kim Flottum

DEPARTMENTS

C.C. Miller, Pg. 56

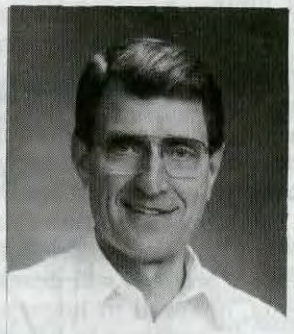
ing off. Demand has been steady, prices steady and sales outlook for the season about the same as last year.

Region 2

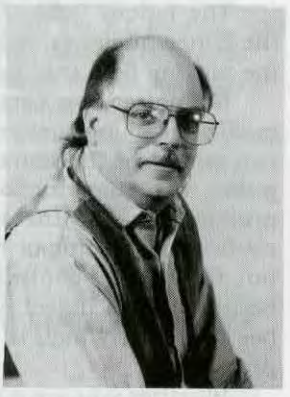
Overall prices steady, but wholesale dropping, and retail rising,

Honey Report, Pg. 12

COLUMNS



JOHN ROOT
Publisher



KIM FLOTTUM
Editor

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INNER COVER

A referendum to change the assessment procedure of the National Honey Board is slowly being hammered out and will soon be winding its way through the political morass in Washington. The outcome, barring any unforeseen obstacles will be to offer the beekeeping industry an unprecedented opportunity to determine its own future.

Fundamentally, the vote will be to assess honey *producers* one penny a pound, (already on the books), and, additionally, honey *packers* one penny a pound. These pennies will support the ongoing programs of promotion already in place, and to support production and quality control research. The packer assessment, and the allocation of funds generated for research are new, along with an additional packer seat on the Board, and the reasons for the vote.

Conventional wisdom weighs heavily in favor of the packers not actually paying that penny out of their pocket (but I may be wrong), but rather paying producers a penny less for their product. If true, producers will, at the present price of about 70¢/lb., be paying about 3.8% of their earnings to support the workings of the Honey Board. One does wonder, if that conventional wisdom is true, why packers should get an additional seat?

Superficially this looks grossly unfair to honey producers, and highly favorable to packers. That, however, is not completely true. Read on.

Two areas of research will be funded with the money collected. The first, production, will receive something in the neighborhood of a half million dollars a year. That money will be allocated by the board, with input from the industry, to solve production problems. Some will be short term, right-now problems. Like new mite controls. New equipment tests and development. Management techniques for Africanized bees, northern wintering, southern swarming, better feeds and feeding techniques, and more.

Some problems will be long term, like developing superior genetics for pest and disease resistance, maintaining a stock center that breeders can pick and choose from for their own designer bees; and some we haven't even thought of yet.

With input from the industry, and the amount of money generated there's no problem that can't be solved, and no obstacle too big to tackle. The possibilities are infinite, the potential extraordinary. Of course packer input to product research doesn't make much sense. Or importers or exporters. What do they know about better bees, anyway?

The money collected for quality control benefits everyone in the honey business, too, for it is the first step (of many) in evening the playing field that packers must play on.

No matter how careful producers are, a careless, cost-cutting, inefficient or basically dishonest packer can produce a product not worthy of the name honey. This affects all *packers* since the public tends to paint 'food' images with a broad brush. Of course a producer can do the same through inattention to details when medicating, feeding or harvesting. I'm not suggesting either occur, but the quality control research projects will develop more and better ways to detect accidents, or fraud in honey's travels from bee to bottle. Which is why producers need to be involved in this process.

Whether you are a two, or two thousand colony producer, and give away, sell in barrels, pails, cases or retail, you will benefit from these changes in the funding of the National Honey Board.

Once implemented the discoveries made will enable you to produce honey more efficiently and to be certain that others are producing, and selling, a product as good as yours. Perhaps more importantly, the people who buy honey will have even more confidence in the image and quality of honey – *our* pure and natural product.

I urge you to support these changes and the upcoming referendum (with the given caveats), and to convince those who doubt what I say here that they are in error. And, if you do not now contribute to the Honey Board, even if you are a two colony producer, begin doing so. Any contribution, small or large, will buy your ticket, and allow you to enter this brave, new, exciting world.

Kim Flottum

NHB Referendum Support

Reader Assistance

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Bee Culture

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MAILBOX

Renews Subscription

I received your April '97 issue of *Bee Culture* yesterday and I'm grateful for the envelope reminder it contained about renewal time. It caught me by surprise. If it isn't a blizzard with 40 stranded people, it's a flood with homeless ones that we have on our minds these days.

Please keep *Bee Culture* magazine coming our way. It is an excellent informational journal to have and we appreciate the work you are doing on it. Enclosed please find our check to renew our subscription.

Thanks for all you do for the beekeepers and beekeeping industry. It is no small contribution you are making.

Br. Bertrand
Assumption Abbey
Richardton, ND

Dancing Butterflies

Joe Traynor's comments (March, p 11) on the reference to dancing butterflies deserve amplification. Although there is no word for poet in Chinese, there are words for different kinds of verse. Every educated person was expected to compose poetry. I saw Hui-tsung's 12th century (c.) handscroll on exhibit at the Metropolitan Museum of Art in New York. The entire poem is:

Among the reds and blues, it is hard to put down the brush;

Only through creativity does one's merit remain behind.

Dancing butterflies are confused by fragrant pathways;

Fluttering about, they chase the evening breeze.

I read the dancing butterflies in the poem as confused by the superabundant odors carried by shifting air currents from a garden beneath them. Honey bees would likewise be overwhelmed by currents of odors from hundreds of acres of blooms, and follow one that happened by as they flew out of the hive. It would not matter they did not get back to the place visited previously, except to the researcher waiting patiently by a dish of syrup for a marked bee to return. Our bees fly to fields on the west side of a hollow, but the prevailing winds are north/south.

If the Emperor had experience with dogs, he certainly knew of their keen sense of smell. On daily walks in the woods with my dog friends, it is as if they hit a wall when the spoor of an animal crosses our path. In earlier comments (1996 p.551) I forgot Max, a yellow Labrador retriever, trained to detect American foulbrood in hives at a cost of $3,500 for training (1985 p. 500). I do like the singles bar metaphor since scents now promoted for both genders have a potential for surprising mismatches.

Toge Johansson
East Berne, NY

More on Mite Control

I would like to see more articles on things that different beekeepers are doing to control mites, i.e. using natural oils for control, etc. We as beekeepers can't wait on Congress to take care of the mites!

Also, more articles on disease resistant bees. Good articles from small beekeepers would be great.

Also I like your "Humbugs & Swindles" Dept.

Carl Nults

Editor's Note: *Reports of research results are few for publication, but I'm leery of publishing untested, unsafe, and possibly dangerous techniques, simply because somebody thinks they have a new idea. Stick with what works, and try others at the risk of your bees, and your honey. Congress is, at the moment, controlling the mites.*

Wax Works

Thanks to Stephen Pratt for quantifying the rate at which bees draw new comb (*Bee Culture* April, 1997, p. 24). However, he might want to expand his study to include the comb building done by newly hived swarms.

I use swarms to draw all my new comb. If that comb is intended for use in extracting supers, as it usually is, on the next day after hiving, I locate the queen, cage her in and place the cage in the new hive. This prevents her from raising brood in the frames intended for extracting honey. Of course, these bees must be fed and I supply sugar syrup in jars above the inner cover. A little of this syrup winds up being stored in the new comb but not very much and almost never capped. One can imagine that the bees are, somehow, anticipating a time when all this comb will be needed but they require no other stimulus to begin drawing.

The author speculates that a comb honey producer might well be advised to remove empty comb in the brood chamber but without crowding the bees. I do this for a different reason (in hopes of encouraging them to use the space provided in the extracting supers above) by replacing some of the brood chamber frames with "masonite frames" which simply are there to take up space.

Dan Hendricks
Mercer Island, WA

•

I was fascinated with your research article on comb honey (Stephen Pratt, Ap. '97). It supported my limited experience. Two years ago liquid honey was hard to sell so I tried comb honey in coastal sage in Monterey County, California. I compressed booming two stories into one super and added comb supers. They made honey, but about 50% swarmed. I had no time for swarm control.

Last year I tried comb honey again, but on Summer Star Thistle

Continued on Next Page

MAILBOX

and with new queens. I started with cells and half a deep super of bees. When the super was full a short drawn super went over an excluder (as would happen in Nebraska where some of our colonies spend the Summer). When the bees started to work in the short I shook bees out and put a comb super in its place. The comb honey was drawn decently and no swarming happened. This seems to agree with Mr. Pratt's conclusion that bee crowding is not the key element for wax production.

Mark Hohmann
Napa, CA

Blue Ridge Blues

I am writing in behalf of the "Humbugs & Swindles" Department.

I had also ordered three 3# packages of bees in 1995 and paid in advance, only to receive a letter in the Fall asking permission to send them the following year. Excuses were made, but, who does he think we are – some financial institute?

"Mr. Huck" won't get my business! I'll stick to my good 'ol standby, Hardemans.

Monroe Miller
Sears, MI

•

Your "Humbugs & Swindles" Department writers seem to all have Blue Ridge Apiaries in common. My name is on that list as were 42 others who had filed complaints with the U.S. Postal Service.

I know *Bee Culture* is not responsible for Babcock's morals but you could create the forum necessary to give your subscribers a chance at justice. Each of us alone couldn't afford to pursue him, but joined together we might make a class-action lawsuit that would attract an attorney to take the case on a contingency basis.

If *Bee Culture* would act as clearing house for complainants and used it's connections for a lawyer search it would gain reader confidence and send a message to it's advertisers.

Think about it. Smokey Dents would jump at the chance to help.

Jim Macaulay
Greensboro Bend, VT

Editor's Note: *We ran this up the legal flagpole, as it were, and the advice received was that individuals would be better served by contacting the Post Office, the Attorney General in South Carolina, or in your own state.*

•

The recent flap caused by Blue Ridge Apiaries should come as no surprise to anyone.

Both *Bee Culture* and *The American Bee Journal* have known about this man's activities for many years and I blame this latest episode on their shoulders.

I canceled my subscription to *Bee Culture* several years ago, but my wife continued the subscription in her own name – I would not.

I said at that time "You gave this man access to a very select, nationwide clientele – that is – readership with a common interest in bees and beekeeping and despite knowledge of his activities, *"you continued to take his money!"*

Despite disclaimers to the contrary I still believe both *Bee Culture* and *American Bee Journal* must take blame for these recent happenings. In February you wrote "In extreme cases, we refuse further advertising." How extreme does it have to get?

When I could not get satisfaction from Mr. Babcock, I filed a complaint with the Illinois Attorney General.

He got Mr. Babcock's attention in a hurry and I got my refund – finally. In an accompanying letter with the money Mr. Babcock said "Our letters must have crossed in the mail." What a joke!

Other beekeepers who cannot get refunds could contact the State's Attorney in their own state. It costs nothing to file a complaint.

Finally, in my opinion, Blue Ridge Apiaries (and other possible names) should be banned from advertising in any reputable beekeeping publication in the U.S.A. forever.

Douglas W. Gouldthorp
Bensenville, IL

•

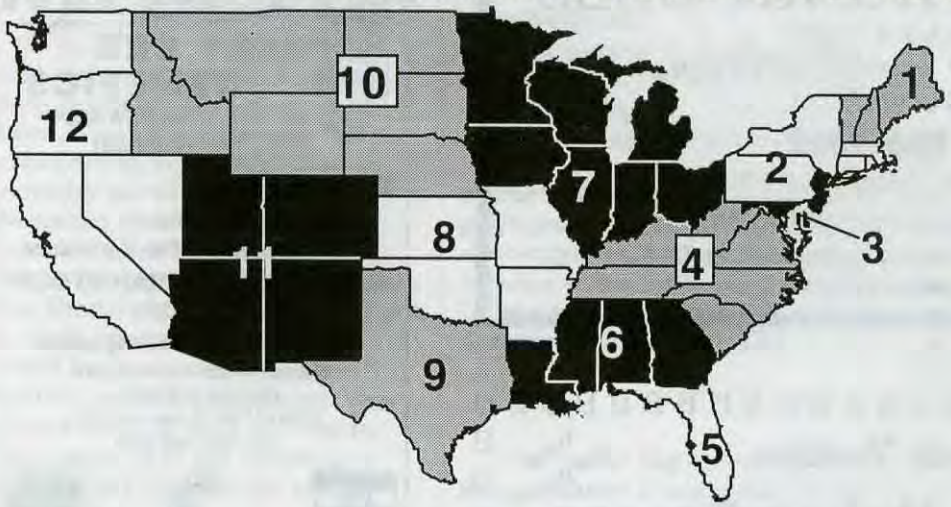
Editor's Note: *For the record, both* Bee Culture, *the* American Bee Journal *and others discontinued carrying these ads once the problem became known. Unfortunately, there is a lapse between 'ad placed' and 'service rendered,' (or not, as the case may be). Below is a response, written by A.I. Root, 105 years ago about a similar situation. Some things never change.*

•

In the June issue of our esteemed contemporary, the American Beekeeper, *the editor has seen fit to warn the beekeeping public against sending Mr. Timpe any more money. While this is a hard thing to do, we feel sure that the* Bee-keeper *has done right. It is true, friend Timpe has probably had bad luck; but my impression is, that anybody will have bad luck who receives money and puts it into his own pocket, and then writes his customers that he is too poor or too unfortunate to send it back. His fault is in not sending the money back when he found he could not send the queens. It may be claimed that others have done the same thing, and have not been published. Well, this may be true; but I think our bee-journals have been at fault, perhaps, in this very line. Mr. Timpe not only kept the money, but failed to answer letters of inquiry from those whom he had defrauded. It is true, he did send out a sort of general printed letter; but printed letters don't answer under such circumstances. I believe our bee-journals have tried to exercise charity, and have been backward about complaining; but I am impressed just now that the man who receives money for the goods he advertises, and* keeps *it, when he finds himself unable to send the goods, should be shown up promptly and without much mercy. Of course, he should have fair warning; but just as soon as he confesses that he is either unwilling or unable to borrow money and protect his reputation, just so soon should the public be warned.*

A.I. Root, 1892

JUNE – REGIONAL HONEY PRICE REPORT



Region 1

Reported prices a bit higher than last month but seem to be leveling off. Demand has been steady, prices steady and sales outlook for the season about the same as last year.

Region 2

Overall prices steady, but wholesale dropping, and retail rising, just a little. Demand strong in the region so far, as are prices. Outlook of this season's sales steady, with no big changes foreseen.

Region 3

Prices steady since last month, but demand is mixed. Prices seem to be heading down according to some reporters, with only average sales expected for the season.

Region 4

Wholesale prices beginning to drop, and some retail following suit. Demand, however, is steadily increasing, which should maintain prices at retail, but regional differences exist. Outlook good to average for the season.

Region 5

Bulk prices steady to up a bit. Demand only steady as are prices. Strange, with a short citrus crop. Outlook for season's sales only average.

Region 6

Bulk prices down, retail up since last month. Demand is steady to increasing, while prices expected to do the same. Outlook for this season only average, according to reporters.

Region 7

Since last month prices have been heading down, at least at the wholesale level. Retail steady, only steady. Demand, too, has slowed, probably seasonally. Outlook about the same for this season as last.

Region 8

Prices pretty much up across the board since last month, with demand still strong. Prospects for prices increasing seem good, and our reporters are optimistic about another strong year.

Region 9

Prices, demand and sales steady, and low. Outlook mixed as weather and other factors play games.

Region 10

Prices seem to be heading south, but since most reporters are wholesalers, that makes since. Retail still steady, demand strong and once things dry out, outlook good.

Region 11

Prices down just a little since last month, but demand steady. Outlook good for the season.

Region 12

Prices steady, demand steady and sales steady to increasing. A good market, it seems. Outlook very favorable for a good season.

	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																
60# Light	65.70	73.00	60.00	66.42	64.50	65.00	64.00	81.00	54.00	70.17	74.00	68.67	48.00-95.00	67.51	68.57	54.72
60# Amber	63.21	68.35	60.00	62.80	60.00	62.00	66.53	67.50	51.00	67.89	69.33	62.75	49.20-90.00	64.47	64.06	51.71
55 gal. Light	0.98	0.98	0.90	0.99	0.88	0.98	0.94	1.00	1.00	0.97	0.98	0.93	0.66-1.72	0.97	0.97	0.81
55 gal. Amber	0.91	0.96	0.87	0.93	0.80	0.88	0.92	0.94	1.00	0.95	0.94	0.91	0.66-1.62	0.93	0.91	0.77
Wholesale - Case Lots																
1/2# 24's	31.30	30.38	37.78	35.88	23.60	35.33	28.73	37.78	35.00	37.78	28.75	33.47	21.60-60.00	31.73	30.16	24.97
1# 24's	41.07	41.58	38.40	38.99	37.80	38.40	41.72	41.57	49.95	40.89	47.43	47.16	20.60-60.00	42.08	42.23	34.69
2# 12's	37.33	38.09	40.20	38.51	38.90	37.95	38.63	39.44	37.95	38.58	40.10	36.00	29.40-48.00	38.35	37.35	32.68
12 oz. Plas. 24's	34.50	36.05	38.40	35.47	30.50	33.20	35.21	33.96	38.00	34.11	43.43	29.92	16.56-50.40	35.37	36.03	29.98
5# 6's	36.54	37.74	30.02	33.13	39.38	36.20	39.93	42.00	45.00	30.02	38.95	38.73	35.00-48.00	38.55	38.90	33.91
Retail Honey Prices																
1/2#	1.82	1.91	2.83	2.17	1.25	1.77	1.61	1.77	2.96	2.83	2.35	2.00	1.20-3.00	1.85	1.78	1.70
12 oz. Plastic	2.20	2.39	2.25	2.37	2.17	2.11	1.99	2.31	2.99	2.39	2.38	2.26	1.69-3.25	2.23	2.21	1.97
1 lb. Glass	2.71	2.81	2.50	2.82	2.19	2.74	2.60	2.86	3.77	3.24	2.95	2.83	2.00-5.00	2.73	2.68	2.23
2 lb. Glass	4.58	4.73	4.50	4.82	3.94	4.74	4.01	5.57	4.75	5.78	4.38	4.59	1.99-10.75	4.60	4.42	3.81
3 lb. Glass	6.05	7.31	6.50	5.65	5.42	6.18	6.46	6.02	6.25	6.56	6.75	6.26	4.50-9.00	6.19	5.93	4.94
4 lb. Glass	7.61	6.50	7.95	7.00	7.50	6.95	8.20	7.58	7.79	9.26	7.85	14.00	6.00-14.00	7.77	7.13	5.85
5 lb. Glass	8.39	10.05	8.50	8.70	7.63	7.70	8.03	7.79	10.00	8.50	9.75	8.26	5.87-14.00	8.63	8.63	7.09
1# Cream	3.14	3.43	3.81	3.16	2.59	2.96	2.84	3.06	6.00	3.81	3.53	3.16	2.25-6.00	3.17	3.24	2.82
1# Comb	4.17	4.31	3.74	3.80	4.42	4.13	3.67	3.96	6.01	4.42	6.32	3.89	1.95-7.00	4.31	4.20	3.73
Round Plastic	3.73	4.15	3.49	3.40	4.43	4.00	3.31	3.73	4.00	4.43	5.75	3.72	2.50-7.00	3.80	3.85	3.51
Wax (Light)	2.94	3.93	2.25	2.15	2.07	3.47	2.10	2.75	4.00	3.33	3.20	3.42	1.00-6.00	2.99	2.90	2.34
Wax (Dark)	2.54	3.63	1.88	1.92	1.60	3.23	1.88	1.90	3.75	3.03	2.72	2.54	1.00-5.50	2.58	2.58	1.84
Poll. Fee/Col.	34.43	39.50	26.50	35.63	23.75	35.25	40.00	40.00	15.00	35.08	50.00	31.80	15.00-55.00	35.24	35.00	33.06

Roger Morse

Research Review

"This work, though nearly 50 years old, still holds true today."

Honey does not have an indefinite life. Time and high temperatures are its chief enemies. Honey stored at room temperature for five to 10 years is usually black and watery. Honey loses flavor at about the same rate it loses color, but some honeys lose both more rapidly than others. The factors affecting honey quality, which I review here, were carefully researched by Prof. V.G. Milum of the University of Illinois about 50 years ago.

Most liquid honey will granulate and ferment if not pasteurized before being bottled. For these reasons, liquid honey should be heated to about 160°F before packed into jars. Heating honey to this temperature for a short time (less than 30 minutes) is not harmful and not a serious factor causing the darkening of honey. However, Milum found that heating honey above 160°F is harmful insofar as color is concerned.

There are two reasons for heating honey. Heating to 160°F destroys the crystal nuclei that might otherwise lead to early granulation. Since all honeys are supersaturated sugar solutions, they all granulate eventually, though some honeys do so more rapidly than others. Our goal in heating honey is to delay granulation as much as possible. Heating honey to a temperature of 160°F also kills yeast cells that are present in all honeys and that cause fermentation as the honey granulates.

Milum processed and packed a number of differently colored honeys and held them at various temperatures for two years. Very little change in color took place when the samples were held at 59°F or below. However, since the optimum temperature for honey granulation is 57°F those honeys held at 40°F and 50°F granulated more rapidly.

Honey held for two years at temperatures between 60°F and 77°F darkened about 20 points on the Pfund Color Grader. The Pfund grader ranges from zero (water white) to 140 (dark, really black). However, it was the long-term storage temperatures above 77°F that caused the greatest damage. All of the honeys held at higher temperatures, even those with color grades as low as 30, were darker than 130 on the Pfund grader at the end of the two-year test period. This is a clear warning to beekeepers in warmer states who store their honey in metal buildings that often reach temperatures approaching 100°F on a warm Summer day. It is also an explanation of why honey packers are reluctant to buy honey more than a year old.

Honey that comes in contact with raw iron will also darken rapidly. One of the great steps forward in honey-processing, and food processing in general, is the use of stainless steel and plastic in processing equipment. It wasn't always this way, and as few as 50 years ago, bee-supply manufacturers were selling iron and galvanized-iron extractors, uncapping tables, and storage tanks.

Milum's data shows jars of honey stored in a dark place darkened more rapidly than those stored in a sunlit room. No explanation of why this occurs was given, nor am I sure what is taking place. Perhaps the light causes some bleaching.

Milum emphasizes that honey in metal containers should never be heated by direct flame or steam. Unfortunately, a few honey packers have attempted to process honey in stainless steel tanks with steam jackets. The problem is the sugars used to make jams and jellies, sucrose and glucose, are different from those in honey, which contains fructose. Fructose is a sugar that burns easily and makes up half of the sugar content of most honeys. Honey should be heated using a hot-water bath. Even dry, hot-air heat in a hot room to liquefy honey in barrels or cans may burn the honey. You should never use the electrical heating belts that may be wrapped around barrels. They do a great job of liquefying honey but are real honey color and flavor killers.

When honey granulates, it is actually only the glucose that forms crystals. The fructose in the honey remains in liquid form even though the crystallized honey is hard and firm. When the glucose crystallizes, it takes into the crystal 9.09 percent water. Normal honey contains about 18 percent water. Thus, we see that the remaining liquid fraction of the crystallized honey increases in water content as granulation proceeds. The yeast cells found in all honeys cannot grow in sugar solutions containing less than 19 percent water. As the liquid fraction increases to more than about 19 percent because of granulation, the fermentation begins. The yeasts that live in honey produce alcohol and carbon dioxide when they ferment, but they also produce flavors that are undesirable and will ruin the honey. BC

References:

Milum, V.G. *Some factors affecting the color of honey.* Journal of Economic Entomology 41: 495-505. 1948.

?DO YOU KNOW?

Behavior & Physiology

Clarence Collison

The activities of honey bees are regulated by many different factors associated with the environment in which they live and their internal physiology. Bee behavior in its simplest sense would be defined as the automatic reactions of an individual to stimuli found within or in the immediate area of the bee's body. Principle structures associated with behavior are the sense organs and glands of the individual bee. Interactions between colony members are also an important component. Individual bees may react differently to similar stimuli because sense organs may have different levels of sensitivity related to genetic composition, and glandular differences associated with age and hormone levels.

Please take a few minutes and answer the following questions to find out how well you understand honey bee behavior and physiology.

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

1. ___ The round dance informs workers that there is a food resource within close proximity of the hive.
2. ___ When a worker honey bee begins to function as a nurse bee, she begins by feeding young larvae royal jelly.
3. ___ Drifting honey bees are more likely to move from strong colonies to weaker colonies and from queenless colonies to queenright colonies.
4. ___ Nassanoff glands or scent glands are found in all honey bee castes.
5. ___ A colony preparing to abscond initiates queen rearing activities before leaving the nest site.
6. ___ Absconding colonies are more prevalent in tropical countries than in temperate countries.
7. ___ The transfer of food between two colony members is initiated when one of them either "begs" or "offers" food to the other.
8. ___ Drone honey bees perform communicative dances when they return from their flights to indicate the location of drone congregation areas.
9. ___ When there is a complete cloud cover, honey bees are unable to correctly indicate the direction of a food source when they are dancing.

Multiple Choice Questions (1 point each).

10. ___ Credited with discovering the honey bee dance language.
    A. G. M. Doolittle
    B. C. C. Miller
    C. Karl von Frisch
    D. Rev. L. L. Langstroth
    E. Moses Quinby
11. ___ The Nassanoff or scent gland is located under the base of the ___ abdominal tergite.
    A. 4th
    B. 7th
    C. 5th
    D. 8th
    E. 6th
12. ___ When there is a food source more than 100 meters from the hive, the forager does a _____ dance to recruit new foragers.
    A. Tail-Wagging or Waggle
    B. Sickle or Crescent
    C. DVAV or Joy
    D. Massage
    E. Round
13. Describe two actions that a beekeeper may take to reduce drifting between colonies. (2 points).
14. Name three situations that result in worker honey bees fanning their wings. (3 points).
15. Describe how worker behavior is altered soon after a queen is removed or lost from a colony. (2 points).
16. Explain how the profitability of food rewards are communicated through the honey bee dances. (1 point).

Listed below are several different types of communicative dances that have been observed in the honey bee colony. Please match the type of dance being performed with the information being conveyed by the dance. (5 points).

(A.) Wag-tail dance (B.) Buzzing run (C.) Shaking dance (D.) Round dance (E.) Sickle dance (F.)Jerking dance (DVAV)

17. ___ To signal nearby hive bees to clean certain parts of their body that cannot be reached by their own grooming abilities.
18. ___ Used to stir up bees when a colony is ready to issue a swarm.
19. ___ A gradual transition between a round and tail-wagging dance.
20. ___ Scout bees use this dance to induce a swarm cluster to take flight to the new nesting site.
21. ___ Purpose of the dance unknown.

ANSWERS ON PAGE 46

Our intent, when we began this review of 125 years of Gleanings In Bee Culture, *was to cover the entire series during the course of this year. Several things have convinced us that there is a more informative way to proceed. The first is the overwhelming positive response we've received to the first four articles we've done. It has been very encouraging. The second is the awesome amount of information to cover. To satisfy both, that is provide an article that is well received and at the same time faithfully and fully covers the information in each of these issues, we have decided to extend the time frame allotted to these articles, and expand the coverage of each. We trust you will continue to follow the evolution of American beekeeping with the same enthusiasm as those who preceded built our foundation.*

125 Years

1891 - 1893

One thing we want to make clear, as you read this, is that we don't 'read ahead,' enabling us to prejudge what we report, emphasizing what 'turns out' to be important, and de-emphasizing those discussions that went nowhere. So, some of what you read will, eventually turn out to be vital, while some of what appears here will end up in history's attic, saved but not used.

•

In January, 1891 there were 10,054 subscribers. The goal of 10,000 had been reached in late 1890 and maintained for the new year. The magazine kept its twice monthly publication schedule, averaging 48 pages each issue. But advertising had picked up by now, and fully a quarter of these pages were ads.

Screened photos were a regular feature also, with several in every issue. The tobacco column (quit smoking and get a free smoker [the irony here is wonderful]), and Reports Encouraging and Discouraging were renewed at the beginning of the year. Meanwhile, the Rambler (who was introduced and biographed in March, 1891) continued to travel, to visit and to write, and Manum (the commercial beekeeper from Vermont) kept writing about his visits to, or visits from commercial beekeepers.

Ernest was now pretty much in charge of the magazine, handling the mail, dealing with the regular correspondents and contributing on a regular basis. Meanwhile, C.C. Miller's trial column, Stray Straws, became a regular feature, and with that promotion, C.C. Miller became more and more 'to the point' on his commentary. He also strayed from his regular topics with greater frequency, commenting on the writings of other columnists, both in *Gleanings* and the other bee journals.

A.I., however, was getting even further afield, literally and figuratively. He began by taking a series of trips, again, and reported on these. His long trips would cover several issues, with incredible detail on what he saw, who he talked with and how it all affected him. His Ohio background had not prepared him for much of what he saw in strange places (Indians, deserts, mountains), and he explained these wonders for his readers. His gardening interests expanded, too, with an article every month entitled 'High Pressure Gardening,' intended for the commercial producer. But he didn't forsake his previous readers and kept his 'Special help For A.I. Root and His Friends Who Love To Raise Crops' columns. These, with his 'Our Homes' and 'Neighbors' columns often occupied a third to half of an issue. And, they very often crossed purposes, with the Neighbors piece this month reading like the Our Homes last month (similar content, same style), and his gardening and travel prices often similar. If you liked A.I., you liked *Gleanings*, no doubt about it.

But beekeeping was still the mainstay, and old topics were discussed and rediscussed as techniques were tried under new or varying conditions. These came up often in the 'Heads Of Grain From Different Fields' and 'General Correspondence' columns. Topics included the fixed vs. loose frames (attached at bottom), the new Hoffman self-spacing frames, punic bee behavior, bricks for colony record keeping (many schemes were advanced, most *really* complicated but some simple), pesticide applications when fruit trees were blooming, and honey plants.

New ideas constantly surfaced and were discussed also. Among these, new equipment like the Hubbard section former (making square section boxes the easy way), foulbrood and paralysis 'cures,' improvements in equipment (Root improved the Hoffman frame several times), the Benton mailing cage, and many aspects of bee biology.

Meetings, too were detailed, since an underlying suspicion of most beekeepers then (still, maybe?) was that it was cheaper to read what went on than to travel all the way to the location. This editorial attitude, however, slowly changed as E.R. became more involved in the industry and, after much preparatory work stood before a disappointingly small crowd. Nevertheless, he continued to print the highlights of the talks given and the side trips taken in his travels. ABJ, however, published extensive reports of these meetings, and E.R. often referred readers to that journal for specifics.

Other 1891 highlights included information on the West Cell protector (a spring-like device to protect queen cells) while in a hive; the incorporation of the NABA; the economics of handling 'colonies' instead of 'frames'; Manum getting married and dropping out of sight for a bit; selling bees, venom and royal jelly; and the many new bee journals that started up that year – five in all.

The subscriptin price remained at $1.00 for 24, 48 page issues in 1892, and subscriptions remained at about 10,000. A new column started that year, called 'Ladies Conversazione Department,' focusing on the feminine side of the business with mostly women contributors. It seemed immediately successful.

A.I. was pretty much out of the picture as far as running things was concerned. He turned the apiary and magazine over to E.R. and the supply business over to J.T. Calvert (A.I.'s son-in-law). A.I. stuck to the gardening and seed side of the business. And his travels and his health

Continued on Next Page

125 YEARS ... Cont. From Pg. 17

dominated his life for most of the year.

The improved Hoffman frame was becoming very popular as more and more beekeepers tried, and liked it. The Root Company was making 5,000 per day, by the way. Bakers were turning more and more to sugar as it was considerably cheaper than 18¢ honey. Pesticides applied during bloom were killing thousands of colonies across the country, and Medina had 2,000 people living peacefully. It has 22,000 today, less peacefully.

Grading comb honey became a much discussed issue and several methods were advanced. None worked for everybody. The Novice extractor changed its gearing from direct drive-on-top to a side-mounted handle making it easier to use. Reversible extractors were being explored and radial models, too, were examined.

The government wanted to tax honey, but it wasn't a very popular idea (!), and the Department of Agriculture hosted the annual meeting of the NABA meeting in D.C. And Canada wanted out of the NABA.

In March Manum returned from his honeymoon and began writing again, and his new wife was becoming a beekeeper. A.I. bought an Edison phonograph to dictate into, and, to play music with for the girls in the office. It made life even easier. It ran on storage batteries (more about these later), for 70 hours per battery.

Swarm catchers, or self hivers, were fairly new and were discussed. Basically they funneled a swarm directly into an adjoining box. Some models let the queen in, some kept her confined in a small area so she could be found and replaced. Wonderful and despicable were the two extremes expressed in articles.

Paint for hives was discussed. White wash didn't work, but there were some that were excellent. Cut-rate paints were rampant, and basically fraudulent brands were widespread.

A million sections a month were rolling out of Root's factory, and the debate about sealed (very sealed) covers and no ventilation vs. loose covers and lots of ventilation during wintering continued. The vote was still split.

About mid-year the Federal Chemist in charge of checking food purity analyzed a large sample of honey from around the U.S. and announced that Ohio's Muth was guilty of adulteration. The uproar was loud, long and can still be heard. More later.

Meanwhile electric embedding was beginning, and the Root Company started, using batteries. Soon, they were selling batteries, containers and instructions for using them. Kellogg (of yet-to-be-cereal-fame) denounced honey as unhealthy, and ABJ was sold to G.W. York as Newman became too ill to continue as Editor.

During the Summer Langstroth wrote again, stating that "If money is to come from honey, manipulation must be reduced to a minimum." Truer words never spoken, and still true today.

The Rambler, traveling out west visited Santa Cruz Island where some queen breeders were working, along with 3-400 sheep herders, and an appropriate number of sheep. And thick top bars were the rage – no more burr comb and they were selling fast.

In August, a reader asked why A.I. hadn't written a book on beekeeping in the South? "No," said A.I., "there wasn't a large enough audience, and besides, any intelligent reader could modify his techniques to fit their conditions." Hmmm . . .

By Fall a new disease was being discussed. Larva were coffee colored, somewhat shriveled, not ropey, no (or very little) smell, and it "goes away." Any guesses?

By the end of 1892, L.L. began a several-part autobiography, A.I. was singing the praises of bicycles, *Apis dorsata* was headed for the U.S., and the Root Company had an *exclusive* on tinned wire in the U.S.

1893 opened with yet more changes, most subtle but still going in the same direction. Stray Straws was getting longer and branching out in more directions, but Miller still "got to the point." He was elected President of the NABA anyway.

In February, L.L. wrote his Eureka beespace part of his autobiography. It went from the simple top bar to beespace on the top, sides and bottom of the frames. And the rest as they say, is history.

Root started offering extracting frames for section supers and recommended phonographs in offices because they don't get married or sick. The new Editor of ABJ did a profile of E.R., who that year started the "Trade Notes" column featuring new equipment, or improvements. 'What' was featured was decided by the Editorial 'We' – usually E.R.

The 'new' Crane smoker came out with an improved valve, so ashes didn't get sucked into the bellows, and the nozzle was lined with asbestos. OSHA wouldn't approve today.

Peppermint oil was used to treat dysentery by some that year (didn't work for that, either), and the typesetter at *Gleanings* started reviewing the real old beebooks each month. In June, wax was selling for 21¢, or 24¢ in trade. The Root Company was selling imported queens for $5.00 each, and the G.B. Lewis Company in Wisconsin reported selling 10-12 *million* sections a year. Remarkable.

In a Summer issue a nearly updated hive tool was shown. It had a curved scraper end, but the other end tapered to a screwdriver-like device. Almost there.

J.H. Larabee, late of the Federal Bee Lab in D.C. and now in Michigan, gave an extensive report on research concerning bee breeding, wax secretion, honey plants and feeding.

A beekeeper named McIntyre produced an eight-frame, water powered, fully reversible extractor that ran at 190 RPM. And in California, the Rambler described a parallel radial extractor almost identical to the one on the market today, except it was hand powered.

Long discussions were published on whether bee space should be at the top, or the bottom of a super, how thick top bars and rabbets affected that, and the 'V' shape of the underside of the top bar.

Arguments for all of these took place, but in the end what the manufacturers could produce easily, efficiently and inexpensively won out. Miller endorsed the new frames and spacing, and at the end of the year A.J. Cook retired from Michigan and moved to California.

And 1893 closed, quietly and without fanfare.

Mark Winston

A Fine Experiment

"I am excited about the opportunity to work in a granting environment in which beekeepers and researchers can operate in partnership."

I recently had the honor to participate in an unusual experiment. Why unusual? This experiment had nothing and everything to do with research. The "nothing" part was because we had no intention of generating new data or information from the experiment. The "everything" part was because the experiment did involve research, but instead of doing research, we experimented with raising money to do research.

Our experimental design was simple: Create a Canadian Bee Research Fund, supported entirely by beekeeper donations, and governed by beekeepers. What is unique about this fund is that government is not involved, and that the beekeeping community has taken full responsibility for raising the money and making decisions on who and what projects get funded.

The rationale behind creating this new type of beekeeper-driven granting agency was simple: Federal and provincial governments in Canada have been cutting their deficits, and budget cuts over the last few years have hit bee research hard. Agriculture Canada, for example, has cut its honey bee research by 80 percent, from five full-time research scientists and their technicians to one scientist and one technician. Research on other bee species also has virtually disappeared from Agriculture Canada laboratories, with at least three individuals being transferred out of alternative bee research, and only one scientist remaining, whose responsibilities include only a small component of pollination research. Universities also have been hit hard. The University of Guelph, for instance, which amazingly used to have its own department of apiculture, has reduced its official honey bee faculty to only one professor, and no longer has a focused teaching program in apiculture.

These facts were apparent at the January 1996 annual meeting of the Canadian Honey Council, which is the major beekeeper organization in Canada. In my memory, which admittedly is not as good as it used to be, this was the single most depressing meeting I've ever attended. The beekeepers, researchers, and extension personnel at this meeting were reeling from these budget cuts. Furthermore, we all had spent years fighting with the federal government to retain positions and grant funds, to no avail. We were tired, worn out, and discouraged. We were not, however, ready to give up, but it was apparent that beating the dead horse of government funding simply was not going to improve the situation.

Ironically, it was government that showed us the way out, because in the early 1990s, Agriculture Canada had provided a one-time, last-chance $2 million grant to beekeepers in order to placate their growing concerns with the degenerating role government was playing in the beekeeping community. $300,000 of these funds was used to support research across Canada, but in this case, decisions about funding were left in the hands of the Canadian Honey Council rather than with any government agency. The council set up a committee of beekeepers and researchers to make funding decisions, and this committee was a real breath of fresh air in a stagnating funding environment. For the first time, beekeepers got to decide which projects to support and what research was important to them. Even better, the committee held back a portion of each grant until each researcher appeared before the council's annual meeting to communicate their findings and wrote a beekeeper-friendly article for their newsletter that explained their results in readable form.

These projects were important for two reasons. First, the research conducted with the approval and supervision of the Canadian Honey Council has made a significant difference to Canadian beekeepers. For example, projects testing various application methods for formic acid, and comparing formic acid to Apistan, have resulted in clear recommendations about when and how to use these products most effectively. Another project on airborne fungi within indoor wintering buildings alerted our beekeepers to potential health concerns while working inside these facilities. A set of projects testing the performance of various lines of tracheal mite-resistant bees under commercial beekeeping conditions gave our beekeepers excellent data indicating which lines of bees perform best under the different conditions found in various parts of Canada. Work on viruses provided us with the first comprehensive survey of what is present in our colonies, and research on borage polli-

Continued on Next Page

"It likely will take a few years for the CBRF to receive enough money to make a significant contribution to Canadian research, but once in place, it will be the major player on the apicultural granting scene."

EXPERIMENT ... Cont. From Pg. 21

nation has helped to open up a new crop for beekeepers to put their colonies on for Summer honey production.

The success of these projects in generating useful research led to the second important result from these projects: Beekeepers realized the advantages of weaning themselves away from government funding and taking control of their own research agenda. Although the January 1996 Honey Council meeting was a real "bummer," as we would have said in days of longer hair, a new initiative has arisen out of the ashes of government withdrawal from bee research. The phoenix that is resurrecting and re-inventing our research community is the Canadian Bee Research Fund (CBRF).

The CBRF has been set up as a charitable organization, able to issue tax receipts to donors. Our goals are to raise $1 million over the next 10 years and to provide annual research grants out of the interest generated by the fund. The fund is administered by the Canadian Honey Council, and is directed to issue grants based on research priorities set by the Canadian beekeeping community. Furthermore, grant applications that provide matching funding to other grants are preferred, which doubles or even triples the value of each research dollar the fund provides. It likely will take a few years for the CBRF to receive enough money to make a significant contribution to Canadian research, but once in place, it will be the major player on the apicultural granting scene.

The fact that Canadian beekeepers will control the fund is one experiment, since there are very few, if any, granting agencies worldwide that provide that level of influence to beekeeping groups. The second "experiment" is that this fund is fueled only by donations; there is no levy or other assessment required of our beekeepers. In other words, beekeepers need to be convinced that the CBRF provides them with good research value for their contributions, or else they simply won't donate.

We tested the willingness of Canadian beekeepers to support the CBRF at the January 1997 Canadian Honey Council meeting. This gathering was like night and day compared to the previous year. Honey prices were up, the CBRF was formed, and it was time for beekeepers to roll up their sleeves and get the job done. We suggested to the beekeepers attending that a minimum of 25 cents per hive would be a reasonable annual contribution to start the fund off, and to my amazement they came through with a clear message of support. We raised about $12,000 in just a few minutes, which worked out to an average of about 50 cents per hive from the beekeepers present in the room. These funds, taken together with money raised in an auction and with donations from groups like the Canadian Association of Professional Apiculturists, put the fund at about $20,000 by the end of the meeting. If we can keep to a pace of even 25 cents per hive each year from the 600,00 to 700,000 colonies in Canada, we should have no trouble meeting our goal for the CBRF.

We are creating a new paradigm in Canada for how bee research is funded, and although government withdrawal has induced considerable short-term disruption in our research community, the long-term prospects for Canadian bee research are promising. Best of all, the CBRF provides a vehicle for beekeepers to make their own decisions about what research they wish to support and who they want to do it. This model has considerable implications for how research is conducted in Canada, because researchers must answer directly to beekeepers for the work we propose and conduct. If we can't convince beekeepers that a project is useful, it won't get funded. If we conduct a project in a way that does not satisfy the directors of the CBRF, they won't fund us again.

To me, this is a welcome shift in how research is funded, and I am excited about the opportunity to work in a granting environment in which beekeepers and researchers can operate in partnership. I have great faith in the ability of Canadian beekeepers to fund a broad spectrum of basic and applied research, and to make wise decisions about where their research dollars should go. I also believe that Canadian researchers will grow through the experience of having to justify their work in terms that beekeepers can relate to.

If you wish to make a contribution to the CBRF, you can send your check to: Canadian Bee Research Fund, c/o Canadian Honey Council, P.O. Box 1566, Nipawin, Saskatchewan, SOE 1EO, Canada. All contributions will be gratefully acknowledged with a tax receipt. Beyond that, you will have the satisfaction of taking part in a very fine experiment. BC

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

New National BEEKEEPING EXHIBIT

Dewey Caron

The Beltsville Research Center of the U.S. Department of Agriculture has recently prepared an attractive display to highlight bee research within the USDA. It will be used to educate the visitors to the Beltsville Agricultural research station on the outskirts of Washington, D.C.

The exhibit includes a three-frame observation hive and a folding display panel containing information about honey bees. The exhibit was funded by donations from Friends of Agricultural Research at Beltsville. The Eastern Apicultural Society contributed to the display along with the Apiary Inspectors of America (AIA), American Association of Professional Apiculturists (AAPA), and state and local bee associations in DE, MD, PA, and MA. Don Nyce, on behalf of the CT Beekeepers Association, donated a hand-crafted observation hive.

The panel display contains four sections. One is headlined "Why Bee Research." The text answers the question by discussing bee diversity (720,000 species), pollination value (more than $20 billion annually), and raising and management of bees (hobbyist and commercial). Photos of Gloria deGrandi-Hoffman holding a frame, a honey bee forager on an apple blossom, a bumble bee on a red flower, and a piece of beeswax comb with a half-dozen workers are interspersed with large-type text material.

Facing this panel is a second, entitled "To Be A Better Honey Bee." Photos show Steve Sheppard with laboratory instruments and Tom Rinderer conducting a FABIS measurement of Africanized bee forewings projected onto a screen. The three adult bee colony members are also featured. Some of the text discusses Africanized bees.

A third panel features pollen bees. Suzanne Batra is shown collecting wild bees with a sweep net, and there is a non-Apis bee on a dandelion bloom as well as the cell of a hornfaced bee. Pollination is discussed in a few lines of text.

The final panel informs readers that "Bees Need Doctors Too." Dr. Shimanuki and Dave Knox are shown inspecting a hive. Tracheal mites inside tracheae, *Varroa* on a worker, and chalkbrood disease are shown. The text indicates the Beltsville Bee Lab conducts annual diagnosis of nearly 2,000 samples of bee diseases. In all, there are 14 photos in the panels. The bees anchor one of the corners of the building. The observation hive is connected to the outside via clear plastic tunnels that allow visitors to see worker bees as they exit and enter their hive. The hive rotates 360° so the bees, queen, honey, and hive activities are easily visible. The hive has three standard and one shallow frame.

Honey bees are included in another display panel highlighting beneficial and harmful insects. Honey bees are included as both. A photo of a honey bee on a fruit bloom is included with lady beetles and two weed-eating beetles as beneficial. Africanized honey bees share the billing with fruit flies, screwworm maggots and the Asian cockroach as harmful insects. A miniature swarm trap and a cut-away of a hornet nest visually attract viewers to this panel.

The Log Lodge, which houses the bee display, is an interesting site itself. It was built as a recreation center by the CCC (Civilian Conservation Corps) between 1934 and 1937. The CCC was one of the first U.S. government work-sponsored programs enacted to ease unemployment of the Depression era. Some three to four million men worked for the CCC. After the CCC was terminated at the end of World War II, the Log Lodge was transferred to the USDA. The Lodge is modeled after lodges built in Yellowstone National Park. All the lumber came from the site, which at the time was rural. Today the 7,000-acre research station is encircled by towns and housing developments.

In addition to the observation hive and panels on honey bees, the Log Lodge Visitor Center features an excellent teacher resource corner, information on various aspects of agriculture, including beekeeping, and other displays of interest. The Lodge is part of tours of the research station, a popular visitors' destination in the nation's capital.

Donations from a number of groups/organizations have enabled the USDA, Bee Research Lab at Beltsville to prepare this excellent exhibit. Additional funds are needed to help pay for the display and prepare an information sheet about honey bees to provide a walk-away pamphlet for visitors. Individuals and bee associations wishing to support this display should communicate with Friends of Agricultural Research, FAR B, P.O. Box 1061, Beltsville, MD 20704-1061. BC

Dewey Caron is professor of entomology, and chairman of the Dept. at the University of DE. He is also chairman of the Board of the Eastern Apicultural Society.

50 Years of Beekeeping

Roger Hoopingarner reflects on a career of bees, and beekeepers in Michigan.

One of the first bee books that I read was Dr. C.C. Miller's account of his 50 years of beekeeping (*50 Years Among The Bees*). I was a young Boy Scout at the time and had become interested in beekeeping through a very dedicated scout leader. I found Miller's book fascinating, and it probably had an influence on my decision to go into apiculture as a profession. Most beekeepers should be familiar with his name since we use his inventions of the hive-top feeder and the Miller queen introduction cage, among others. As I approach 50 years in this business, (1997 being my 50th year) it was natural for me to think of the title of this article. I decided to put together some thoughts on what changes I have seen in the beekeeping industry during that time period. I would like to start with some people that have influenced me and the beekeeping industry.

A.J. Cook was one of the early leaders in Michigan's, (and America's), beekeeping history. He was a professor of zoology and physiology at Michigan Agriculture College (one of the earlier names for Michigan State University). Cook was quite famous during his tenure at MAC (1867-1893) and the author of the book *Manual of the Apiary* that had some 20 editions. He started a line of apiculturists at the college/university that continues to the present. My most immediate predecessors in that line, Russ Kelty and Dr. E.C. (Bert) Martin, also had a great effect on Michigan beekeeping as well as on me.

Michigan at one time was a hotbed of beekeeping activity. The reason for this may have been that the state had the enviable position of having the highest honey yields per colony of any state. Honey yields of 200 to 250 pounds per colony were common. In the 1880s and the 1890s Michigan was a major queen-producing state as well. There were two beekeeping magazines that were published from the state. Early was the *Bee-Keeper's Review* and later the *Michigan Beekeeper*. Beekeeping supply houses were also developed, with A.G. Woodman of Grand Rapids being the most famous. The company purchased the hot-blast smoker patent of Bingham (of Abronia, Michigan) and made it the instrument that we use so commonly today.

"It's been an interesting trip."

Honey Bees Through 50 Years

When I look back on the bees that were common in my youth, there have been some major changes. While most beekeepers had "Italian" bees in the late 1940s, there were still some remnants of the original imported German "brown" bees, as they were called. They were probably descendants of the European *Apis mellifera mellifera,* and they were fierce! But even the Italian bees that were in most hives were nowhere near as gentle as most of the stock that beekeepers have today. We have made great strides in breeding gentleness into our honey bees.

There have been changes in the color of our bees during the last 50 years. We selected our bees to be very light Italians up until the mid-1980s. Then with the advent of the tracheal mites, the shift was back to the darker strains since they seemed to have some resistance to the mites. I think the trend is continuing with the *Varroa* mites, though the factors of resistance to *Varroa* may not be as closely linked to the darker color as they are with the tracheal mites.

We also saw the rise of the hybrid bees from the early 1950s. First came the Starline Hybrids, and the Midnight strain soon followed. When these hybrids were first released, they were a dominant force in the queen-rearing business. Their influence has diminished, but I think that the lessons gained from the selection and breeding of these hybrids have carried over into the

stocks of other queen breeders.

Diseases and Pests

The use of the antibiotic sulfathiazole for the control of American foulbrood was very new when I started keeping bees. However, sulfa's acceptance was almost universal, as up until then, the only cure was burning the equipment. Unfortunately, burning diseased equipment continued for many, many years after this known control was introduced. I do not know the dollar figure of the equipment that was lost because of the burning policy, but it was substantial. The biggest loss, either because of antibiotics, or because of the burning policy, may have been that we stopped looking for disease resistant stock. The beekeeping community should be thankful that Dr. Walter Rothenbuhler did not stop looking for disease-resistance, and found the easily selected trait for hygienic behavior.

In the mid-1950s Terramycin became available for the control of both American and European foulbrood diseases, and then completely replaced sulfa as the antibiotic of choice once sulfa lost its EPA registration. Beekeeping has been favored by the fact that the disease organisms did not become resistant to Terramycin. There have been a few cases of at least mild resistance to Terramycin developed in the AFB bacteria, *Bacillus larvae,* but it's still a good product.

European foulbrood has gone through a few cycles in America. It was a fairly common disease early in the century, and then was essentially eliminated by the change of stock from the German brown bees to the Italian strain. By the 1930s EFB was almost a forgotten disease. Then in the early to mid-1950s, the disease returned. I do not think anyone knows if the bacteria mutated so that our strains of bees no longer were able to suppress the disease, or if the bees themselves had lost their resistance, though the former hypothesis seems the more likely.

Chalkbrood disease came to the United States and Canada sometime in the early 1970s. Since this fungal disease is spread by wind-borne spores, it traveled across the country in a very short time. There were (are) times when beekeepers thought chalkbrood was the worst disease problem since there was no chemical agent for its control. While efforts continue to find a control, I think that the most sensible answer has to be genetic resistance to the fungus. Since chalkbrood spores are wind-borne it is constantly being introduced into the colonies. Maybe we can find an antibiotic that we would be able to use continuously within the hive, but I suspect not. There has been some recent progress made in selecting strains of bees that are resistant to chalkbrood.

"Honey bees have taught me a fair amount of humility. Just when you think you know the answer, they change the rules!"

By more recent events, the problems of AFB, EFB, or chalkbrood were almost nothing. Fortunately, I missed by a few years the major problem of control of AFB. By the time I started keeping bees, sulfa was commonly recommended. At its worst, American foulbrood may have killed 20 to 25 percent of the colonies. A great loss, but nothing to compare with the losses caused by tracheal and *Varroa* mites today.

Tracheal mites surged onto the scene in 1985, and by 1988 were killing colonies by the thousands. This epidemic continued until 1992 or 1993 and then dramatically abated. Reasons for the collapse of the high populations of tracheal mites are not completely known, but appears to be some biotic factor that has lessened the mite's virulence. Can we hope the same will be true of *Varroa?* Evidence from other countries would indicate that there will be a reduction in the problem from *Varroa.* How much of a reduction, or when it will occur, is not completely clear. However, any change for the better would be welcomed.

Changes Over 50 Years

When I started beekeeping, there were probably more commercial beekeepers than there are today. The size and mix of beekeeping operations have changed as well. The commercial beekeepers that have survived and exist today have all become larger, on average.

Most commercial beekeepers that I knew in the early 1950s sold a much larger proportion of their honey through direct retail than they do today. Thus, there has been a noticeable shift from intensive beekeeping to extensive. Most beekeepers produced at least some comb honey in the 1940s and 1950s when I first started. Comb honey production never totally died; it's just that it was produced by only a few beekeepers. Then along came the invention of round plastic sections by a Michigan physician. These round sections brought a renewed interest into comb honey production since the bees seemed more ready to put honey into them. In my opinion, the newer half-comb cassettes should bring an even greater proportion of beekeepers back to the comb-honey fold. With the half-comb cassettes, the production of comb honey is much easier, and the bees seem to like them even more than the round sections. It is a curious event that the half-comb cassettes were also invented by a Michigan beekeeper, John Hogg.

Along with the change from relatively small commercial beekeepers to larger operations came the inevitable switch from 60-pound honey cans to barrels; no longer will young men develop their arm muscles lifting the cans in a honey packing plant, much as I did as a teen-ager. Along with the shift to barrels came the additional mechanization of barrel loaders and pallet lifters.

One of the major changes that has occurred in beekeeping during the last 50 years has been the development of pollination as a commercial (even the only) business. Pollination as a business has been fostered by two things. The first is the development of good front-end

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HOOPINGARNER ... Cont. From Pg. 25

loaders that could lift a pallet of four colonies and be able to place it properly into an orchard in the middle of the night. A good pollination business demands a rapid response in moving colonies of bees – pallet loaders allowed that to happen. The second factor is that orchards began to concentrate into fewer and fewer varieties and growers begin to increase the physical size of each orchard. This meant that natural pollen transfer by native bees or wild colonies was not sufficient, and that honey bee colonies needed to be rented.

What The Bees Have Taught Me In 50 Years

Honey bees have taught me a fair amount of humility. Just when you think you know the answer, they change the rules! The longer I work with them, the more respect I have for them. They also seem to be marvelously adaptive. I am sure that they will even work out of the current *Varroa* problem if we give them time. Generally we don't want to give them all the time they need, and so we do a lot of selective breeding ourselves.

I also have a great deal of respect for beekeepers. Not only are they nice people, but they are very adaptive, too. They have had to be just to stay in the business. Every time I go into a different beekeeper's apiary, I am sure I learn something new.

It has been an interesting trip from a young Boy Scout who had a colony of bees that exited the hive via a window in his parents' garage. I still feel a great debt to the Boy Scout organization for getting me started in my profession. However, I was more than a little disturbed to learn that they recently had dropped the beekeeping merit badge. When I retire from MSU on June 30, 1997 I can look back at a fair number of changes in bees and beekeeping. I just hope I can keep learning from the bees for many more years. BC

Dr. Roger Hoopingarner retires from his position as Extension Specialist in Apiculture, Michigan State University, this month. We wish him all the best in his leisure activities, although we understand he has no plans in that direction.

Congratulations, Roger, on a lifetime of service to honey bees, beekeeping, and beekeepers... everywhere.

John Root
Kim Flottum
and all the Staff of Bee Culture

Germany's Honey Market

John Parker

Germany is a major world player when it comes to buying and reselling honey.

Germany is the world's leading importer of honey, and is also a major exporter. Most of the exports consist of honey in attractive consumer-ready containers to many traders in other European Union (EU) countries. German honey imports and exports reached a peak in 1995, and tended to stabilize during 1996. However, import sources became more diversified in 1996. A sharp reduction in Mexican deliveries caused German importers to seek new suppliers.

However, increased imports from other sources were not sufficient to prevent a decline in total German imports in 1996, following the 1995 peak of 90,049 tons valued at $112 million, but German honey trade may rebound slightly in 1997. Duty-free trade among the 15 countries of the European Union means that German firms have more customers for imported and blended honey than ever before. This means that it is profitable to import bulk honey from suppliers like China and Argentina. Much of this honey is processed and blended in Germany and placed in attractive jars, cans, and unique containers for export to the rest of Europe and even the Mideast.

When American consumers faced higher prices for honey in 1995 because of smaller imports, German consumers enjoyed relatively stable prices. This was because a surprising 62 percent increase in domestic honey output was combined with larger imports.

World Prices and Import Demand

Higher prices for imported honey in 1995 and early 1996 did not do much to dampen strong demand from both German consumers and the traders who specialize in blending and packaging honey for distribution. Rising income has allowed more consumers to increase honey purchases. The yearning for a shift to healthier food is evident today in Germany, particularly among the young. This means greater demand for fruits, vegetables, and honey. As a result German honey consumption increased about 16,839 tons in 1995 to an estimated 109,026 tons, vs. 92,813 tons in 1994. For many shoppers in the eastern area of Germany, the abundance of honey was welcome. Prior to demolition of the Berlin Wall in 1989, the supply of honey there was inadequate. Now, all Germans have the same access to consumer goods throughout the country. The market is one of the most efficient in the world. Blending and preparation of honey for attractive consumer-ready jars, bottles, and containers in consumer-friendly sizes are carefully managed to provide high-quality honey.

When honey supplies were flush from the larger-than-expected domestic output and prices were good in 1995, a number of shoppers increased purchases for storage. They were concerned that rising world honey prices would make one of their favorite foods more expensive in 1996. Because of the large 1995 domestic harvest, prices for German honey exports remained steady when world prices rose.

GERMAN HONEY SUPPLY AND DISTRIBUTION, 1992-96

Year	Output	Imports	Exports	Supply	Estimated Consumption
		metric tons			
1992	24599	89230	12259	101570	101570
1993	23319	80522	13800	90041	90041
1994	22233	82872	14292	90813	92813
1995	36685	90049	15708	111026	109026
1996	25000	85000	14000	96000	96000

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GERMANY ... Cont. From Pg. 27

Domestic Output Bolstered 1995 Sales

A great boost for consumption in 1995 came from the 65 percent rise in domestic honey production. It reached 36,685 tons, compared with 22,223 tons in 1994. The bumper harvest in 1995 resulted from favorable weather conditions – beautiful Autumn weather extended the season. German agriculture has also become more efficient recently. Through increased multiple cropping, more nectar-producing crops are grown for a longer part of the year for bees to forage on.

German bees are healthy, and there is a concern that great care must be taken to make sure they stay that way. In 1995, there were 101,749 beekeepers in Germany, a slight decline from 1994. Also, the number of colonies declined slightly to 1,046,732. Yet, those in operation were more efficient.

Imports Peaked In 1995

Imports of honey into Germany increased eight percent in 1995 to 90,049 tons. This was slightly above the 89,230 tons imported in 1992. Because of smaller supplies from China, total German honey imports may have declined slightly in 1996. The import value was up in 1996 because of higher prices. The average price for honey imported by Germany rose from $1,243 in 1995 to $1,409 per ton January through May 1996. During this period, the price for honey from Argentina increased nearly a fourth to $1,245 per ton, while China's price was about a tenth higher to $1,116 per ton. These are the two major suppliers of bulk honey imports.

Diversification

Problems in obtaining expected supplies of honey from some traditional sources caused German traders to seek increased deliveries from a wider range of suppliers and new sources in the last several years. In the first five months of 1996, German imports of honey from Romania and Turkey were already greater than imports for all of 1995 from those sources. During this period, imports from Spain, Cuba, and Australia were at a higher pace than during 1995.

Argentina was the leading source of German honey imports in 1995, providing 22,541 tons, this being about a third of total Argentine honey exports. Imports from Argentina were at a lower pace in early 1996, and total deliveries in all 1996 may have been only about half the 1995 level. In early 1996, arrivals from Mexico, which was the third major source, were about a third below the 1995 rate, 15,442 tons. 1995 deliveries were about a fourth below the peak of 19,855 tons imported from Mexico in 1994. Between 1994 and 1996, Mexico appears to have reduced shipments to Germany (and elsewhere) more than any other major honey supplier.

Imports from China dropped sharply to only 11,679 tons in 1994, but rebounded to 18,534 tons in 1995. This was because China sought alternative markets while dealing with the U.S. anti-dumping complaint, which resulted in an agreement in

IMPORTS AND EXPORTS OF HONEY DURING 1994, 1995 AND JAN-MAY 1996
By Quantity For 1994, Quantity And Value For 1995 And Jan-May 1996

	1994	1995	1995 Value	1996 Jan-May	1996 Jan-May Value	1995 Average Price	1996 Jan-May Average Price
IMPORTS	metric ton	metric ton	x $1000	metric ton	x $1000	$/ton	$/ton
Argentina	22541	26915	27576	6705	8349	1025	1245
Mexico	19855	15442	19248	4645	6071	1246	1307
China	11679	18534	18408	11835	13213	993	1116
Australia	2320	1443	1543	719	847	1069	1178
Canada	1658	2674	3736	702	1048	1397	1493
USA	323	289	418	157	266	1446	1694
Hungary	3823	5296	8255	2664	4692	1559	1761
France	1730	2996	5725	1336	2862	1911	2142
Spain	1253	758	2182	648	1573	2879	2427
Turkey	941	1323	3300	2172	4630	2494	2132
Czech Rep.	1761	2444	4353	1165	2061	1781	1769
El Salvado	1691	1289	1748	625	1070	1356	1712
Cuba	2316	1403	1171	701	802	835	1144
Russia	772	113	106	0	0	938	NA
Chile	0	1569	1739	563	761	1108	1352
Uruguay	3741	2556	2768	945	1167	1083	1235
Other	6468	5005	9612	3133	5132	1920	1638
Total	**82872**	**90049**	**111888**	**38715**	**54544**	**1243**	**1409**
EXPORTS							
Netherland	5024	4576	11007	1517	3797	2405	2503
France	2284	2073	3903	947	2101	1883	2219
Italy	1419	1446	3435	409	1033	2376	2526
Saudi Arabia	1056	805	2852	186	618	3543	3323
Denmark	1020	764	1329	350	655	1740	1871
Belgium	744	725	1791	260	676	2470	2600
UK	716	951	1820	670	1516	1914	2263
Spain	*	651	1293	632	1142	1986	1807
Switzerland	549	488	1246	198	525	2553	2652
Yemen	216	50	112	0	0	2240	NA
Russia	191	66	249	39	147	3773	3769
Austria	*	1496	2678	1351	2635	1790	1950
Finland	*	177	327	133	281	1847	2113
Other	1073	1440	4114	436	3797	2857	8709
Total	**14292**	**15708**	**36156**	**7128**	**16510**	**2302**	**2316**

* Included in other NA - Not applicable
Sources: Foreign Trade of Germany and FAS/USDA, Bonn

August 1995 on controlling U.S. imports. Despite a smaller honey harvest in China and new government intervention activities for honey trade by agencies in Beijing, German imports from China were at a higher pace in early 1996. Since the problems with the United States on dumping honey in the mid-1990s, apparently China has shifted honey exports more to other markets, particularly Germany and Japan. German traders appreciate honey from China for their blending operations. The average export price for packaged honey derived mostly from imported bulk supplies is about double the cost of imported honey.

Some of the smaller suppliers of bulk honey for processing are Uruguay, Hungary, Romania, and Cuba. While China had the lowest price for honey delivered to Germany among significant suppliers from January to June 1996, the price of $1,144 per ton for honey from Cuba and $1,178 for arrivals from Australia were not far behind. Some of the more expensive sources of German honey imports in the last two years were Spain, France, and Turkey. The average price for imports from Spain reached $2,879 per ton in 1995, but dropped to $2,427 during the first five months of 1996. American honey delivered to Germany had an average price of $1,446 per ton in 1995 and $1,694 from January through June. For honey in consumer-ready containers, the price for U.S. honey is considered reasonable.

Some previously significant suppliers have stopped most commercial honey deliveries to Germany. Usually this is because that country found a good market at home, and sometimes because the country had shifted from a net export to a net import position. An example of this can be found in the German honey trade with Russia. German honey imports from Russia dropped from 772 tons in 1994 to only 113 tons in 1995 and completly stopped in early 1996. From January through May 1996, Germany also stopped imports of honey from Moldova and Bulgaria, other former Soviet Union countries.

The same good weather which enhanced German 1995 honey output was also beneficial for honey output in the Czech Republic, which increased deliveries to Germany nearly a third in 1995 and remained near that pace in early 1996. The average price of $1,781 per ton for German imports of Czech honey in 1995 indicates that a considerable part of the purchases may be packaged in consumer-ready containers. Slovakia delivered 801 tons of honey to Germany in 1995. Czech Republic, Slovakia, Hungary, and Romania are considered good suppliers to fill any gaps left by declining deliveries from Latin America.

"Problems in obtaining expected supplies of honey from some traditional sources caused German traders to seek increased deliveries from a wider range of suppliers and new sources in the last several years."

German imports of Hungarian honey increased sharply to 5,296 tons in 1995 and were at a slightly higher pace in early 1996. The average price for honey from Hungary was $1,559 per ton in 1995 and about a ninth higher in early 1996. During January through May 1996, Romania had already delivered 1,588 tons of honey to Germany, compared with 1,393 tons for all 1995. Romania's price of $823 per ton was the lowest for any source of honey imports entering Germany from January through May 1996. Some Romanian exporters were glad to sell more honey to Germany following their larger 1995 harvest.

Suppliers of honey from within the European Union are not that important for German importers. France provided 2,996 tons in 1995, up from 1,730 tons in 1994. Prices for French honey delivered to Germany averaged $2,142 per ton in the first five months of 1996, when the pace was near that of 1995. Spanish deliveries of honey to Germany were down more than a third in 1995, but the pace picked up in early 1996 when the drought was broken and production rebounded.

Favorable Export Prospects

Germany has developed an interesting and extensive business for honey exports. The average export price remained steady at $2,316 per ton in the first five months of 1996, which was about 43 percent above the average import price. Most of the honey exports go to other European Union markets, and new EU members like Austria and Finland increased purchases recently. The leading destination for German honey exports in 1995 was the Netherlands, buying 4,576 tons, or nearly a third of the total German honey exports of 15,708 tons.

German honey exports remained stable at 7,128 tons in the first five months of 1996. During this period, the leading export markets were the Netherlands, Austria, and France. These three countries accounted for about half the exports in early 1996. The fourth major market in early 1996 was the United Kingdom, followed by Spain. Shipments to Spain in January through May 1996 were 632 tons compared with 651 tons in all 1995.

Saudi Arabia has traditionally been the leading market for German honey exports beyond the duty-free trade area of the European Union. German honey exports to Saudi Arabia declined from 1,056 tons in 1994 to 805 tons in 1995. The pace of shipments to Saudi Arabia dropped by about half in the first five months of 1996. Small deliveries to Kuwait and the United Arab Emirates continued in early 1996, but shipments to Yemen, Pakistan, Japan, and Hong Kong stopped. Yemen had been a market for 216 tons of German honey in 1994, but deliveries declined to only 50 tons in 1995.

Neighboring Switzerland surpassed Saudi Arabia to become the

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leading market for German honey exports beyond the EU borders. Shipments to Switzerland declined from 549 tons in 1994 to 488 tons in 1995. Another decline appeared likely for 1996, when January through May shipments were 198 tons. Yet, the rate of decline for shipments to Switzerland was slight compared to that for exports to Saudi Arabia. Increased direct shipments of honey from Asia and Latin America to Saudi Arabia may have contributed to smaller shipments to buyers for the supermarkets.

German shipments of honey to Jordan in January through May 1996 were 75 tons, the same as for all 1995. This indicated a good gain in shipments to Jordan for 1996. German honey exports to Kuwait were also at a higher pace in early 1996.

Exports to Russia reached 66 tons in 1995. Deliveries of 39 tons in the first five months of 1996 indicated good gains for sales of honey to the Russians. Some of the 133 tons of German honey exported to Finland in the first five months of 1996 may have been for sale to Russians visiting duty-free shops or for the transit trade. Belarus was a market for 38 tons of German honey in early 1996, nearly as much as Russian purchases. In the future, Belarus may become a good new supplier of honey in bulk containers for German traders lacking usual arrivals from Latin America. BC

John Parker is a retired government statistician, and has studied the world honey market for Bee Culture.

PLASTIC FRAMES & FOUNDATION

Richard Bonney

The advantages of using plastic in your hives are increasing – from quality to ease of use to cost.

Plastic hive parts are not for everyone, at least not yet. The majority of beekeepers use the old standbys for their frames – wood and beeswax. Plastic is becoming more popular though, and at least part of the appeal is in the reduced labor in preparing frames for use, and the longevity of the frames and comb in the hive. No doubt more and more beekeepers will be turning to plastic as time passes.

The information in this article is based on acquiring, inspecting, and installing into frames when appropriate, ten pieces of each product mentioned. The intent was to work with deep equipment but in one instance deeps were not available. No attempt has been made to evaluate these products either in the context of use in the hive, or the bees acceptance of them. Such an evaluation will be the substance of a future article, using the very equipment discussed here.

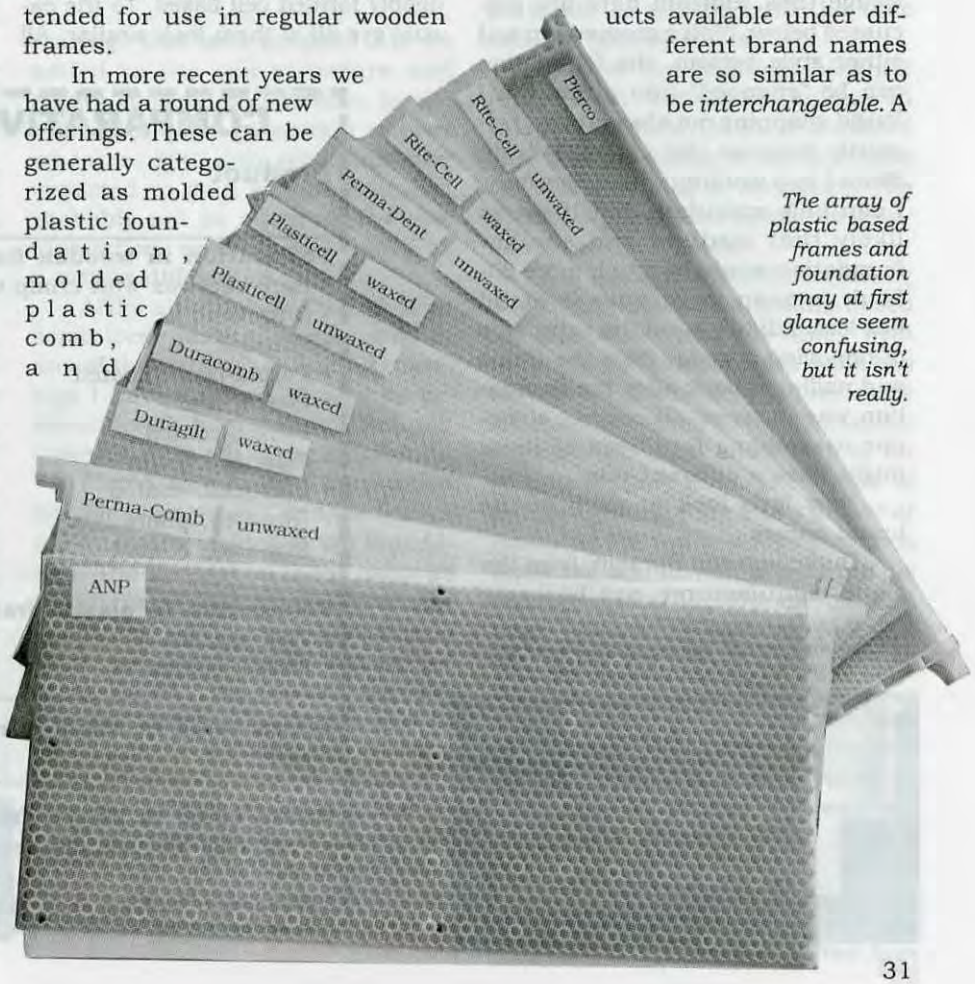
Plastic is not a new material in the hive. Plastic bottoms, covers, frames, hive bodies and supers all have been available in years past. Most of these plastic parts have had low acceptance by beekeepers for several reasons, among them tradition, aesthetics, quality, and expense.

In addition to plastic, other materials have been tried, particularly in frame and comb reinforcement. Wire was an early introduction, and of course it is still with us as cross wiring in frames and crimp wiring in foundation, but along the way other materials have come and gone, including paper, nylon thread, and aluminum.

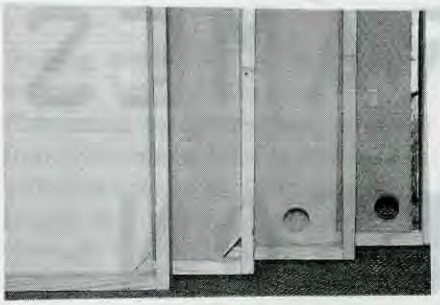
In addition to wire, the only survivor of the earlier offerings are plastic based foundations currently available as Duragilt and Duracomb. Both of these are standard beeswax foundation bonded to a base of smooth plastic, and both are intended for use in regular wooden frames.

In more recent years we have had a round of new offerings. These can be generally categorized as molded plastic foundation, molded plastic comb, and plastic frames with integrally molded comb or foundation. Most of these newer products are available in two options – thinly wax-coated, and uncoated. The different combinations give us at least thirteen different frame and foundation products incorporating plastic.

That number is deceptive, however. Several of the products available under different brand names are so similar as to be *interchangeable.* A



The array of plastic based frames and foundation may at first glance seem confusing, but it isn't really.



In some products the communications hole is precut. In others it is optional. You may break it out or not as you choose.

casual examination shows no significant differences – same appearance, same feel, same approximate weight. No doubt the producers of each will argue the merits of the individual products, but will the bees recognize a difference?

I don't know, but let's have a closer look at the various offerings. Looking first at the foundation, all of them are intended for use with regular wooden frames. Although all will work with either grooved or wedge top bars and grooved or two-piece bottom bars. My preference after assembling a few of each is for wedge tops. Bottom bars are discussed below. With a grooved top and either style bottom, the foundation can be "snapped" into place, but I found snapping not always easy, primarily because the plastic is stiff. Since I was working with deeps only, I can only speculate, but it seems likely that medium and shallow foundation would be much more difficult to snap in because it would flex less. I didn't mind the extra step of removing a wedge from the frame and nailing it back after the foundation was in place. Of course, someone assembling hundreds of these might have a different view.

Now let's look at each of the brand names.

Duracomb and Duragilt, from the same manufacturer, are basically the same product, beeswax foundation bonded to a core of smooth, thin plastic. The two products differ in that Duragilt is bound at each end with a narrow strip of metal. It needs no further reinforcement or support in the frame if used with a grooved bottom bar. The metal strip keeps the foundation from bending and the weight of the foundation rests on the bottom bar. Duracomb, too, works with a grooved bottom bar, and further, with support pins to prevent bending. For both of these products, even though they look like conventional foundation, neither is intended for use with cross wire reinforcement.

Both Duracomb and Duragilt have a feature not found in other beeswax foundation, a round "communication" hole, 5/8" in diameter in each lower corner of the foundation. These are intended as an easy passageway for the bees from one side of the comb to the other.

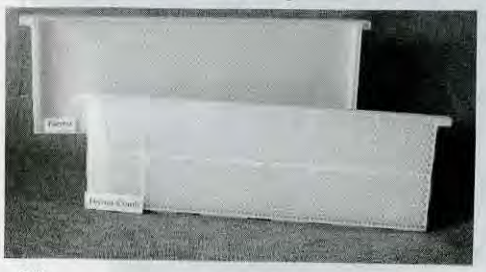
Plasticell, Rite-Cell, Perma-dent, and Pierco – these are the formed plastic foundations with no integral frame. They are all thicker than regular wax foundation, the extra thickness coming from the more deeply formed cell bases. To the casual eye all of them look similar. All are available with a beeswax coating. All but Perma-Dent are also available plain, without the wax coating.

Either style of bottom bar, grooved or two-piece, may be used with these products. The foundation is molded with a thin edge about a quarter inch wide, top and bottom. These edges rest in the grooves. If the bottom bar is two-piece, a couple of nails through the bars is good insurance to keep the sheets from slipping through.

Plasticell, Rite-Cell, and Perma-Dent each have recognized that some beekeepers (I don't know about the bees) like the idea of a communication hole in the comb. Each of these is perforated in the lower corners so that a triangular opening three-quarter inch on a side may be broken out if the beekeeper desires. In fact, Perma-Dent does not leave the breaking out option to the beekeeper. It is delivered with the triangles already removed.

ANP Comb, when ready to be used, is fully drawn plastic comb that mounts in wooden frames supplied by the beekeeper. However, the comb comes in three parts that must be assembled and pinned together with the included plastic pins before

These frames are complete and ready to put in the hive when they are received.



COMPARATIVE WEIGHTS

Product	Weight per ten, w/frame
Foundation in wooden frames*	
• Pure beeswax with crimp wire	6 lb -4 oz
• Duracomb	5 lb - 10 oz
• Duragilt	5 lb - 15 oz
• Perma-Dent, coated	6 lb - 14 oz
• Pierco, plain	6 lb - 9 oz
• Pierco, coated	7 lb - 8 oz
* Plasticell, plain	6 lb - 14 oz
• Plasticell, coated	7 lb - 8 oz
• Rite-Cell, plain	8 lb - 2 oz
• Rite-Cell, coated	9 lb - 1 oz
Foundation in plastic frames	
• Pierco, plain	5 lb - 15 oz
• Pierco, coated	6 lb - 9 oz
Drawn comb in wooden frames*	
• ANP	15 lb - 10 oz
Drawn comb in plastic frames	
• Perma-Comb (medium depth)	11 lb - 4 oz

** Wooden frames are provided by the purchaser.*

COMPARATIVE PRICES

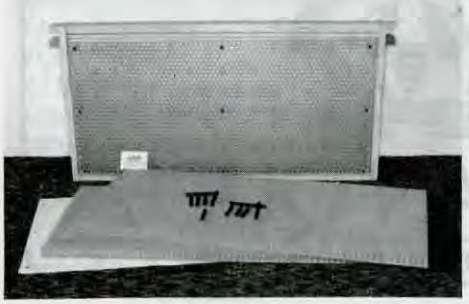
Type	Product Name	Sizes Available	Price range, deep, per ten*
Traditional crimp wired foundation	Various	shal, med, deep	$7.50 - $9.95
Wax foundation on plastic sheet	Duracomb	med, deep	$9.59
	Duragilt	shal, med, deep	$9.00 - $10.29
Formed plastic foundation			
Unwaxed	Plasticell	deep	$9.50 - $11.00
	Rite-Cell	med, deep	$7.00
	Pierco	med, deep	$7.60
Waxed	Plasticell	deep	$10.90
	Rite-Cell	med, deep	$7.60
	Perma-Dent	deep	$7.50
	Pierco	med, deep	$7.40 - $8.50
Plastic comb, unwaxed	ANP	deep	$25.00
Plastic frames			
With integral plastic foundation			
Unwaxed	Pierco	med, deep	$16.00
Waxed	Pierco	med, deep	$18.00 - $27.50
With integral plastic comb			
Unwaxed	Perma-Comb	med, deep	(med) $37.50

** Where a range of prices is shown indicates that the product was found in more than one catalog at different prices. Other prices may be available, and quantity pricing is possible. Check with your supplier.*

installation can be completed.

Weight becomes a factor with ANP comb. Plastic weighs more than beeswax, and an assembled ANP comb in a deep wooden frame is about twice the weight of a deep frame containing drawn but empty beeswax comb in a wooden frame – about 25 ounces to 12 ounces. This is an additional eight pounds for a hive body with ten frames. Of course, this is for new ANP and relatively new beeswax comb. We know the beeswax will increase in weight over time as the comb is used for brood rearing. Wax and propolis will be added to the cell structure and empty cocoons will remain in the cells after each generation of bees emerges. ANP can reasonably be expected to gain weight also, but probably not as much as the wax foundation, so there will always be a weight differential.

ANP comb requires a little work. The completed frame in the background is ready to use. The parts in the foreground – two sections of comb, one mid-rib, and nine pins – must be assembled into a frame.



ANP, although available from some local dealers, is not listed in any of the national or regional catalogs I have checked. It may be ordered directly from the manufacturer, however, from ads in the magazines.

Pierco frames and foundation are one piece plastic, and the frames are integrally molded to the foundation. The foundation is the same as the Pierco product which is available separately, discussed above, and these, too, are available wax Coated or uncoated. This product requires no preparation. The frames can be taken from their box as delivered and dropped directly into hive bodies.

Perma-Comb is also an integrally molded frame, but in this instance, with drawn comb. This product also may be placed directly in a hive upon delivery.

As with Pierco, Perma-Comb could not be located in any national or regional catalog. Furthermore, although magazine ads in recent months mention deep, medium, and shallow sizes, I was able to obtain only the medium depth from the manufacturer.

WEIGHT

Weight of frames and foundation is not a large factor when dealing with hives, but in the different products here there is some variation. The table shows weights for ten frames of each product. These weights should be viewed as approximate, and are offered primarily for comparison. The weight of old fashioned wooden frames and crimp wired foundation is shown also, but keep in mind that these can vary from one manufacturer to another, also.

ASSEMBLY AND LABOR

For someone with more than one or two hives, assembling hive parts can be an onerous chore. Frames and foundation are the most time consuming part of this activity. Here, with plastic, we have an opportunity to reduce both the time and the labor involved.

Most of the products here are foundation, intended for use in wooden frames. In each instance save one, no wiring or support pins are recommended or necessary. The rigidity of the plastic holds the foundation in the frames.

The labor involved in installing any of the plastic or plastic-based foundation is about the same. With the exception of Duracomb, each has only to be secured in a previously assembled wooden frame. Duracomb requires the extra small step of inserting support pins. The choice of snapping foundation into a groove or removing the frame wedge and then replacing and fastening it with nails or staples after the foundation is in place adds some variability. If you are able to snap, a little time is saved.

No labor at all is involved with the plastic frames from Pierco and Perma-Comb. They come ready to use, and of course, no wooden frames are involved.

PRICE

The prices shown in the table

Continued on Next Page

PLASTIC ... Cont. From Pg. 33

are for quantities of ten, and do not reflect shipping charges. As with most hive parts, a price break is available when buying in larger quantities, often a significant break. Several of the products are apparently single source, which gives no opportunity for comparison shopping. Other products are listed in two or more catalogs and the prices do vary. Shipping charges, of course, will affect each individual situation. If possible, purchase from the nearest dealer, or check on freight delivery for reduced rates.

With the exception of one, all of the products described here can be expected to result in standard cells. The one exception is ANP comb, a particular feature of which is the non-standard cell shape. The individual cells are tapered, narrower at the top, wider at the bottom. This shape is said by the manufacturer to inhibit the development of *Varroa* mites. The claim is disputed by some beekeepers, and I am not aware of any scientific evidence for or against.

Beekeepers have strong opinions for and against most of the products reported here. We will be installing these frames and foundation in hives these spring and will observe them in the coming months. Perhaps you would like to pick one and try it, too. Then you can add your voice to the discussion. BC

Richard Bonney is an Extension Educator for the State of Massachusetts. He is a regular contributor to these pages.

WATER-WATER ANYWHERE

James E. Tew

Bees need water for the same reasons we do – to drink, to give to their young, and to cool their home.

In our laboratory bee yard a couple of months ago, just after winter had begun to break, there were several thousand bees actively collecting water from last season's closely-cut lawn. The scene had a look of grazing cattle, but with a herd of microlivestock - grazing bees. The water they were collecting was not evident, only the dampness from rainfall during the previous two days – nowhere was there standing water. It would have been impossible to have walked across that area without killing foraging bees with each step. Bees need water to cool their hives and to feed developing bees. They are adept at finding it.

It has been postulated that bees sense water by perceiving a humidity change as they approach a body of water. Exactly what makes a "body" of water - a fifty acre freshwater lake or an animal watering trough? Both. Though both types of water sources will be readily worked, bees that don't have access to large bodies of water will find much smaller water sources. I don't know how they do it. On hot summer months, I have noticed bees working sources so small that the total quantity of water would not fill a tea spoon. I can't imagine how they found it.

I once had a dog named BJ that was forced to compete all summer with water-foraging honey bees. It was sadly funny. He constantly had honey bees robbing his water dish and yellowjackets and rabbits robbing his food dish. Yet, my 100+ pound Chocolate Lab was no match for any of these foraging marauders and he clearly knew it. Also sadly ironic was the fact that there was nothing that I could do either. I tried moving the water and food dishes inside his house, but the robbers found it faster than the dog.

Down By The Pool

From this, a second common situation now arises. If I could not keep foragers away from a two gallon water dish, how could I give a homeowner advice about keeping bees away from full-sized outdoor swimming pool? "How do I keep my honey bees away from my neighbor's swimming pool?" is ranked high in my list of Tew's Top Ten Troublesome Questions (a.k.a. Tew's TTTQs). Until the arrival of the infamous duo of predaceous mites that have destroyed most of the feral honey bee population, I could (somewhat) honestly have said that I was not sure that they were bees from my hives. Nowadays, the chances are excellent that it is our bees around our neighbor's swimming pool. I suppose my current best advice is to put in a pool of your own - only closer to your hives (That is intended to be a jocular recommendation). Water sources as large as a swimming pool: (1) Have both odor and taste, (2) are easily visible, (3) don't dry up, and (4) would be large enough to establish a "humidity field". If you were a thirsty bee, why look any further?

And just when you think things can't get any worse - they do. When your bees visit your neighbor's pool, they will train themselves to specific watering sites at the pool that are frequently on or around the pool ladders. They make good places from which to hold on while drinking. Human swimmers frequently take a dim view of drinking bees. Since people are not in the pool all day, water is not splashed about all the time - but it is always in the pool. If you are something as small as a honey bee and can only have two or three memories at any given time, would you not train yourself to go to where water is always found (e.g. Surrounding the pool ladder) or to go where water is only occasionally found (e.g. splashed onto the pool deck)? There really is not much a beekeeper can do. Provide a dependable water source, provide it near the hive, ***and never, never let it dry up***. It may very well be that you may have to move your colonies.

Continued on Next Page

"Because of the loss of most feral bees, it's a good bet now, that those bees by the neighbor's pool *are* your bees."

Down By the Pit

Another of "Tew's TTT Questions" is one along the following lines and frequently occurs during a non-beekeeper discussion, "Dr. Tew, I've seen honey bees drinking water (or whatever) from the cement pad of my beef cattle's holding pen. Won't this nasty water get into the honey?" This framework of questioning immediately results in shudders and wrinkled noses around the room and is definitely not honey's best hour.

The fact is that bees do not always look for the cleanest sources of water. They readily collect from manure pits, stagnant pools or other questionable water sources having nitrogenous byproducts or trace minerals they need. Obviously, the physical size of many undesirable water sources, combined with the smell and taste, would make such a site much easier for a water forager to find when compared to a drum or some other manageable container of clean water. Consequently, bees probably have more difficulty locating and collecting from a small, clean water supply. If you watch water foragers while they collect from a clean source, they expose their Nasanov gland (the scent gland) in order to help other bees find the same source. As honey producers, our saving grace is that honey has a novel system for safeguarding against such nastiness by producing hydrogen peroxide within honey. Also, honey has a very low moisture content which desiccates microscopic invaders. Consequently, honey is, by its nature, a very clean product. But.... be assured that the audience will not soon forget that the question was asked. You may want to consider moving colonies that are collecting from suspicious sources. But you never really know where all the other water collecting sites are. I would not make this a high priority.

Even something as simple as a pet waterer works if kept full.

Why Bees Drink

Thirsty bees forage for water for many of the same reasons that we need water. They need it for themselves, for their developing young, and to cool the hive during hot weather. The hive reception procedure is interesting. Water foragers probably make the decision to collect water individually. Maybe an individual bees is hot and simply went out for a drink. Regardless, if water foragers are eagerly met by house bees at the hive entrance and the water is quickly unloaded, they are stimulated to make more water foraging trips. If these tanker bees are unloaded within 60 seconds, they take off on another flight for more water. Anything longer than 60 seconds discourages water collection and unloading times longer than 180 seconds will outright stop water collection (Winston, 1987). Controlling the internal hive temperature is critical for the colony's development of immature bees. In hot weather, bees collect water and put it in indentations in burr comb along the top bars and within cells near brood. Fanning bees evaporate the water thereby cooling and humidifying the hive. So much water will spill out when a frame is moved during times of active water collection, that it may appear a nectar flow is in progress.

Bees given the task of holding water until needed have been dubbed reservoir bees (Park, 1923) in the beekeeping literature. They stand quietly near the brood areas and dispense water as needed. They serve a particularly important function for providing water during hot nights when foraging is not possible. Nurseries are kept in the range of 94-96°F. As the temperature increases to 96°F and above in the brood area, the demand for water increases. Initially, nurse bees deposit the contents of their crops in a thin film into or near brood cells. This has been called "tongue-lashing" (Winston, 1987). If these procedures still do not bring rising temperatures under control, nurse bees and house bees begin to eagerly search throughout the hive for bees having crop contents of dilute nectar or, even better, plain water. That would leave foragers having good, sugar-laden nectar loads standing idle while bees with lesser sugar contents or water are suddenly in demand. Communications within the hive swing toward using the foraging force to collect water. Finally, temperatures drop, and attention again shifts to either pollen or nectar collecting bees.

Frequently, during these periods, the majority of the adult bee population will completely move out of the hive - a sight frequently seen in parts of the southeastern and southwestern U.S. During these times, bees will mass around the entrance of the hive giving the few remaining bees inside the colony more space to evaporate water and cool the bee nursery. Additionally, by removing so much body mass, internal hive temperatures will drop. For many parts of the U.S., 96°F and higher is not an uncommon temperature. The need for water collection is daily or even hourly.

Unemployed bees are nearly always hanging outside the hive. It is an excellent idea to provide bees water *within* the hive during hot weather. Common boardman feed-

ers, pail feeders, division board feeders or even animal waterers like those used to water chickens are excellent ways to get water to the bees. In hot climates, staggering supers in order to allow for upper level ventilation makes evaporation more efficient and helps keep the colony cooler. Beekeepers have occasionally pointed out that so many extra openings may incite robbing of weaker colonies - a point that I can't deny, but weak colonies are at risk anyway.

It has been my observation that hot bees are not friendly bees. Many beekeepers have special stories of moving colonies at night with hot bees hanging from the front. Hot bees are defensive bees and would be alert for robbing.

It should also be known that bees are not always collecting water because the hive is hot. Nearly as commonly, bees are collecting water because they need it to dilute honey in order to feed it to developing bees. Bees can also use metabolic water (water produced as a physiological byproduct). During cold months, water for brood can be collected from melting frost or ice within the colony, usually on the cover or inner cover.

Bees need water all year. If you don't provide it for them, they will find it somewhere. In fact, they will find it somewhere even if you do provide it for them. Let a facet drip, provide an internal water supply, keep a bird bath filled nearby, install a fish pond, or buy a plastic child's swimming pool, but by all means, keep your water sources wet. Once they dry out, like children developing bad habits, bees will move to other sources. Bees are going to drink - one way or the other.

Honey Bee Water Facts

1. Time for a bee to load up - 1 minute
2. Normal time for the water run - 3 minutes or less (67%), 10 minutes or less (92%).
3. Rest period between trips - 2-3 minutes
4. Water trips per day - 50 (100 max)
5. Average water load - 0.2 grams
6. It will take 800 bees working all day to collect 1 quart of water.
7. Daily water use per colony - around 1/2 pint - 2 1/2 pints (From Park, 1928) BC

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How To Handle LAYING WORKERS

Frank Fox

If you've ever had more than 10 hives, or if you've enjoyed beekeeping for at least 10 years, the chances are pretty good that you've experienced the challenge of trying to salvage a colony of laying workers. Difficult to overcome? Yes, but rarely impossible ... if you try one or more of the following methods. First, let's look at how this problem starts.

> There are several ways to deal with a laying worker colony. None are perfect. But you shouldn't have let it get this far anyway.

In simple terms, the hive was queenless for at least a week. And it was more than likely your fault. You're probably denying it, reasoning that you couldn't help it if the queen flew the coop, was somehow killed, was superseded with a lousy replacement, etc., etc. And I'll bet that when you were a kid, the dog ate your homework on more than one occasion.

I'll agree with your arguments. Up to a point. You're right when you say that you can't control what happens to the queen, but that's all the water your argument will hold. The rest of the blame lies squarely on your shoulders. After all, wasn't it you who decided to pack up the car and take the kiddies to visit your favorite uncle Elmo in Bettendorf, Iowa, for a couple of weeks? And didn't you decide it was just too hot last week to visit that apiary of yours that was "out in the country"? But it wasn't too hot the last time you paid it a visit. The trouble is, that was back in early April. And admit it, didn't you ever once accidentally include the queen in an ether roll? Or crush her when you were in a hurry to close up that last hive of the day and carelessly pushed a couple of frames together? Well, now it's payback time.

I plead guilty to at least two counts of the aforementioned crimes. But my uncle's name is not Elmo; it was changed to protect the innocent (He really *is* my favorite uncle). And when I finally got around to checking my hives some length of time after committing these cardinal sins, I found one with the classic symptoms of laying workers. All the bees were running about nervously and buzzing loudly. There was lots of capped drone brood in cells that appeared to be worker-sized. Several eggs laid haphazardly in one cell. An inconsistent laying pattern. And, as I learned the hard way, a very unhappy colony. And they let me know it. Their distinct nervous hum, and agitated behavior took me by surprise, and the planned-for schedule went, ah, up in smoke.

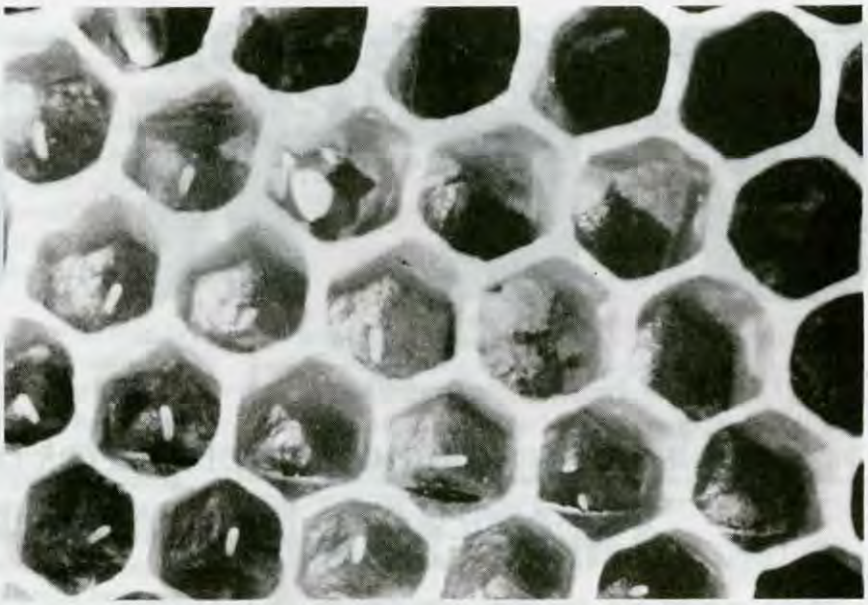
Several days later I returned with a new queen and high hopes. The hopes lasted exactly one week. That's how long it took me to discover that, after introducing a new

queen and her court, the same symptoms I described earlier were still present. There was no sign of the new queen. I had heard all the stories of laying worker hives; that the only solution, unless you were in the business of raising drones, was to somehow commit hive euthanasia.

Since that dismal failure, I've learned a few things about laying workers. The first is that the successful reintroduction of a queen in the time-honored, conventional manner is practically a guaranteed failure. I guess once some of the workers get a taste of what it's like to be "Queen For A Day," they don't want to give up the title. So they do what any other monarch would do; they kill the successor to the throne!

At this point, most folks are likely to throw in the towel and snuff the hive. But hold on. There's more than one way to skin a cat. And more than one way to get a colony back on course. A commercial operator I know advocates reversing the supers, moving around individual frames within the hive bodies, putting some of the lower ones in the upper, moving others from the left side to the right, moving the entire hive a few feet away from the original site, and, finishing with a theatrical flourish, giving the top and sides of the hive a good thumping, all the while smoking the bees quite thoroughly (I feel compelled to mention that it's a good idea to wear full battle garb while completing this piece of business).

Then, and only then, does he introduce a new queen in the normal fashion. With the bees thoroughly cowed by this experience, it's no wonder they will, according to said beekeeper, accept the new queen at least half the time. What about the other half? One strike and you're out in his league. He has no more time to devote to the problem. The hive is sealed, along with the fate of the offending colony.



This is what cells should look like – one egg in each – more than one and you've got problems.

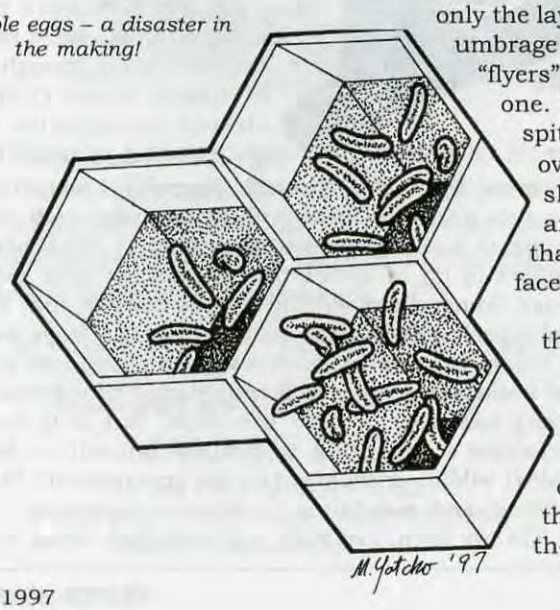
Another beekeeper recommends taking the frames about 100 feet or more away from the hive and shaking off the bees, then returning the frames, sans bees, to the hive. The theory is that the laying workers, now equipped with developed ovaries, will be too heavy to fly, so only the nonoffending workers will make it back to the hive. Apparently, it's only the laying workers that take umbrage with a new queen. The "flyers" should readily accept one. I guess a queen, despite her fully developed ovaries, can fly because she's bigger, stronger, and has larger wings than her workers. Let's face it, she's a *real queen*!

Still others advocate the use of a queen excluder above the bottomboard, or a sliver of one placed on the entrance opening itself. Again, the developed ovaries of the laying workers are what does 'em in.

Finally, if all these methods fail, the bees themselves can be salvaged, even if the hive cannot be kept intact. Simply spray each frame of bees with sugar water to the point of saturation, then shake them into other hives. I mean, *really douse 'em.* Try to limit the number of frames per new hive to about three or so. This helps to avoid any attempts by the laying hive to take control of the new colony. The sugar water is the "passport" for the transferees. The colony will be too busy grooming the new residents to fight with them. By the time the cleaning is done, everyone's old friends.

No matter which method you choose to try, chances are good that you'll be able to put the rags, poison, and blowtorches away. There may be a better way to handle laying workers. Remember, queens may come and hives may go, but there's only one Uncle Elmo. And it's been a long time since your last visit, hasn't it? BC

Multiple eggs – a disaster in the making!



Frank Fox is a sideline beekeeper and freelance writer from Nashville, Tennessee.

Some Thoughts On BEARS

Roger Morse

This isn't about fences or platforms or hunting, but the politics of wildlife and beekeeping.

Bears and bees are not compatible under any circumstances that I have ever seen. Bears cannot resist attacking honey bee colonies though what they want to eat – bees, brood, or honey – has never been clear to me. I am even more confused by bear habits and desires this year as a result of having one of my Florida apiaries attacked last October.

My first bear experience was in the Hudson Valley of New York when a bear (or bears) attacked and totally destroyed a 60-colony apiary of mine that was about a mile from the Hudson River and eight miles from the mountains where the bears lived. I did not save a single colony. That was in 1948. The interesting thing is that I had kept bees in that apiary for six years without any bear problems. After that experience, my father continued to use that apiary for 40 years without another bear attack. The site is east of the heavily used New York State Thruway that runs between the apiary and the Catskill Mountains that are the bears' home territory. Perhaps the highway deterred the bears, but other beekeepers have told me that a highway does not slow bear movement.

There was an interesting aspect to the bears' treatment of the bees in that Hudson Valley apiary that I have since seen elsewhere and had other beekeepers tell me about. The bear(s) carried many of the supers to a little knoll about 50 feet from the apiary, where it (they) apparently fed. I am told by beekeepers more experienced with bears than I that they do so to have a place where they can watch for competitors and people. Also, we know that guard bees in a colony carried a short distance fly back to the site where the colony was located, presumably thinking that is the site they should defend. In fact, a trick we use when we want to open a colony in front of a group of people is to smoke the entrance, carry it 50 feet, and make the examination at the new site. The colony is returned to its original location when the examination is finished, but in the interim, the guard bees are back at the old site and are not a nuisance. I wonder if beekeepers learned that trick watching bears?

My Florida experience last year was different and a mystery. Four of the five colonies in the apiary were attacked and fed upon. The equipment was scattered over an area about 100 feet in diameter. However, the bear(s) did not touch one colony that remained prosperous and healthy! Why would the bear(s) not destroy all of the colonies as they had in my apiary in New York state?

What do bears want to eat? One surviving colony, as well as two colonies on another site several miles away, had stored about 80 pounds of honey each since I left them eight months earlier. Amongst the scattered supers was one upside-down half depth with four frames full of honey undisturbed that the bear(s) had not consumed. Do bears prefer brood or perhaps bees to eat? The bears had eaten much brood as witnessed by the fact that the bottom center of several combs that had obviously been a brood nest were eaten, including, I think, some wire.

I have never thought well of bears since they destroyed my colonies years ago. However, I think I may be among a minority of people. Recently, I learned there is a new society of bear enthusiasts who seek to protect bears and even expand their habitat. What are beekeepers to do in states that encourage bear populations? Some of my wildlife friends tell me that it is a beekeeper's obligation to build an electric fence around an apiary to keep the bears away. I've been told by several beekeepers that a well-constructed bear fence, with strong batteries, will do the trick. But is it really a beekeeper's obligation to protect himself or herself against wildlife *encouraged* by the government? Buying, building, and maintaining a fence is expensive.

On my farm, I've built a 12-foot-high fence around

my garden to keep the deer from eating my carrots and beans. Four years ago, an owl killed, and didn't eat, six of my eight turkeys each weighing about seven pounds at the time. I've since covered my chicken run with wire so that the owls cannot fly into the chicken yard and kill my chickens and turkeys. I had no other choice. My little farm is overrun with wildlife. No one I've talked to in the New York State Department of Environmental Conservation seems the least bit concerned over my problems with wildlife.

Some places compensate beekeepers who lose bees to bears. In New York, there is no compensation, but beekeepers are allowed to shoot a bear that is "worrying" bees without obtaining a permit. That sounds simple enough, but bears are wary, and sitting in an apiary waiting for a bear to come is time-consuming.

To my mind, there is a larger question to examine. My loss of colonies last year in Florida is not critical to my livelihood, but it does interfere with my research. But what about the farmer who loses crops because of wildlife? In the Northeastern states, we are seeing wildlife populations increase and farming decrease. Deer and bears have been a problem for many years, but more recently I have heard complaints about turkeys that have fed heavily on cultivated crops. Wildlife is fun to see and watch, but there is another side of the coin. Wildlife feeding can be destructive and makes it more costly or even impossible to farm in some areas. We have nearly a thousand roadside farm stands in New York state that depend on locally grown fruit and vegetables that can be adversely affected by wildlife. Will they be able to survive among the wildlife? Will you? BC

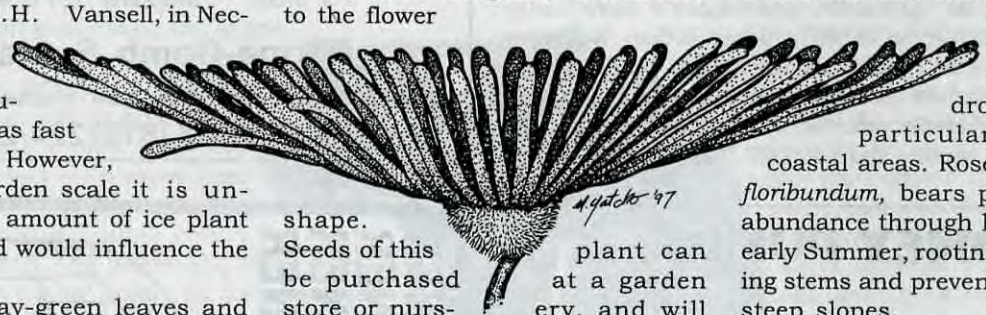
ICE PLANTS

B.A. Stringer

In a section of your garden with lots of sun but poor soil, consider planting some ice plants to attract bees. Most ice plants are perennial but many are treated as annuals, as few besides the *Delosperma* genus are truly Winter hardy. They are low-maintenance plants which require little water once established, and are good for areas which are hot and dry in Summer. Bees visit the blossoms eagerly for both nectar and pollen during the bloom. Honey from a Southern California species was described by G.H. Vansell, in Nectar and Pollen Plants of California, as granulating "almost as fast as it is made." However, on a home garden scale it is unlikely that the amount of ice plant nectar collected would influence the honey crop.

Fleshy, gray-green leaves and bright flat, daisylike flowers make ice plants interesting specimens for dry banks or sunny walls. Once classified botanically as a species of *Mesembryanthemum* ("midday-flowers") or Fig-Marigolds, the genus was originally a 'catchall,' where all the known species bloomed at noon. They have recently been split out into several different genera, all with tongue-twisting names. The only true *Mesembryanthemum* remaining after the others were reclassified to other genera is an annual plant native to South Africa, *M. crystallinum*. Its creeping stems and succulent leaves cover and protect steep banks, and are particularly useful in coastal areas. Bees collect both nectar and pollen from the large, starry, pink or white flowers which are open only in sunshine. A Summer annual, this ice plant needs little or no water once established. The edible foliage is covered with tiny, glistening dots that shine like crystals of ice in the sun.

Another easily grown annual ice plant is the Livingstone Daisy, *Dorotheanthus bellidiformis*, which is quick to bloom when sown in warm soil. Its daisylike flowers are up to two inches across, in shades of pink, red, orange, white, and yellow with orange centers. The plants will flower from midsummer until early Autumn, opening in sun and closing in shade. The botanical name *Dorotheanthus* means "gift of the gods flower," followed by the descriptive *bellidiformis* "daisylike," a reference to the flower shape. Seeds of this plant can be purchased at a garden store or nursery, and will begin to bloom about two months after sowing. For optimum bee forage, it is best to plant Livingstone Daisies in full sun, where they will be open for the longest time.



You may also wish to consider the perennial ice plants: The trailing *Lampranthus* and *Malephora* species which are often used in highway landscaping and as erosion control, the hardy mat-forming *Delosperma* species and the sparkling *Drosanthemums*. *Lampranthus* bears big, brilliant flowers on a succulent, small shrub with torpedo-shaped or three-sided leaves. Of particular note is the Trailing Ice Plant, *L. spectabilis*, which becomes a dense carpet of pink, rose, red, or purple flowers in mid-Spring. *Malephora crocea* is the hardiest of the trailing ice plants, resistant to heat, wind, car exhaust fumes, fire, and drought. The red-yellow flowers are present throughout the year, with a peak of bloom in Spring. For truly hardy ice plants, select the *Delosperma* species. The ankle-high *D. cooperi* blooms purple all Summer and takes a low temperature of 0°F if mulched. Its cast-iron cousin, *D. nubigenum*, grows in a spreading mat only one inch high, its leaves reddening in Fall and greening up again in Spring, even after temperatures of minus 25°F. Golden flowers cover the plant in Spring, making it a very attractive rock garden specimen. Glistening leaves and typical daisylike flowers are features of the *Drosanthemum* ice plant species. Once established, they survive drought, and are particularly good in coastal areas. Rosea Ice Plant, *D. floribundum*, bears pink flowers in abundance through late Spring and early Summer, rooting along its trailing stems and preventing erosion on steep slopes.

The succulent ice plants and the cactuslike Living Stones (*Lithops* species) together belong to the plant family Aizoaceae. This unusual name is derived from Greek words meaning "always alive," a tribute to the plants' ability to survive in very dry conditions. Because of their succulent, fleshy-leafed nature, and as they produce little dry matter, ice plants are somewhat fire-retardant, and may be used in landscaping for this purpose. Despite their arid living conditions, several provide large quantities of nectar and some pollen, attracting honey bees to the flowers throughout the bloom.

If your garden has very dry areas, or if you are planting to conserve water, consider the many types of ice plants which could meet your gardening needs and also provide a little nectar and pollen for bees. BC

B.A. Stringer grows bees, and bee plants near her home in Blodgett, Oregon.

Richard Taylor

Bee Talk

"If there are bait hives near your apiary, then any swarms that come out are very apt to take them over."

Let's talk about swarms. It's a little late to talk about swarm control, and besides, I touched on that last time. By the time any readers see this article, they probably will have seen some swarms, more than likely from their own hives. So let's talk about what to do with them.

First off, I want to say that it is a lot easier to catch swarms than most beekeepers realize, and even to catch them when you do not see them. I'm talking here about bait hives. If there are bait hives near your apiary, then any swarms that come out are very apt to take them over. In fact, with bait hives out there, you can to some extent put your mind to rest about losing swarms. But it is important to set the bait hives up right.

Many years ago, when I knew a lot less about wintering bees than I do now, I had three colonies in one of my yards die of Winter starvation. Such a hive is a soggy, bad-smelling mess, with lots of dead bees, many of them stuck in the cells of the combs. So I cleaned the dead bees out of these hives as best I could, scraping with my hive tool and so on, then set each of them on top of other hives to get them up off the ground and air them out. When I returned to that yard a week or two later, all three of those hives were occupied by bees, and they had done a pretty good job of cleaning out the remaining mess and starting new colonies, with fresh brood and so on. Swarms had taken them over! Obviously, I had, without intending to, set up three bait hives, and thus effortlessly recovered three swarms. It was a good lesson for me.

The first requirement for a successful bait hive is that it be up off the ground. Bees almost never nest near the ground in nature, and it has been shown that swarms have a strong tendency to take over bait hives that are six to 10 feet off the ground. Putting your bait hives 10 or more feet up creates a big problem in getting them back down, however, so my recommendation is to have them more like six feet up. This will usually require nailing some sort of frame or scaffold to the side of a tree, which is a bit of work, but certainly worth it. If you set out about three bait hives for every dozen or so colonies in your apiary, then it is quite unlikely that more than a very few, if any, swarms will be lost. Once a bait hive has been taken over, then the colony can be transferred to a hive and the bait hive used again, of course.Some have suggested that you should have some exposed honey in the bait hive, as an attractant, but this is not such a good idea. It attracts forager bees, rather than scouts. An old, dark comb or two (or more) is what you want as an attractant.

Bait hives should have old, dark combs in them, not just foundation, as these combs are almost certain to be discovered by the scout bees that swarms send out. The bait hive needs only to be discovered by one such scout bee, and she'll certainly find it if it is right nearby, up off the ground, and contains at least a couple of dark combs.

A regular standard-size deep super works just fine as a bait hive. You don't have to buy those special pot-shaped devices that are sold as bait hives, but you can. And you also do not need to use any pheromone as an attractant. An old dark comb or two works just as well. Remember, you do not need to attract a *swarm*. You need only to attract one *scout bee*, which is very easy, and if this scout considers this bait hive to be a promising nesting site, then she will bring more scout bees and then, eventually – usually within a day or two – they will lead the swarm to it. So what is crucial here is that this first scout bee finds the bait hive suitable. And that means, more than anything else, that it is situated up off the ground.

Very early in the morning is the best time to remove an occupied bait hive, so that you do not leave a lot of bees behind. But if this is difficult, then you can lower the bait hive closer to the ground, leave it there for a few days, so that the flying bees will relocate to it, and then cart it away on some cool evening, when the bees are not flying. Or, you can pick a rainy day to move the hive.

Of course you can sometimes pick up stray swarms with bait hives, especially if they are set out far from your apiary. These bees are more than likely to have come from someone else's apiary, and I have heard warnings that this is a good way to pick up American foulbrood. Well, I can only say, that in my lifetime of beekeeping, and considering the hundreds of stray swarms I have hived, I have never found a single one to have foulbrood. If that is a

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BEE TALK ... Con. From Pg. 43

concern to you, however, then there is an easy solution. Just hive the swarm on foundation instead of on drawn combs. The bees will use their stored honey to build comb, and you will get no foulbrood. Don't let anyone tell you that this is not safe. It is 100 percent safe – or as close as anything can be to 100 percent.

And that suggests another worthwhile point: There is no better way to get foundation drawn than hiving a swarm on it. If you put full-depth frames of foundation into an established colony, the bees are likely to chew it up rather badly before starting to draw it out. Swarms do not do this. They draw it out fast, and beautifully.

Suppose you do not want any more colonies. What are you going to do with a swarm? The temptation, of course, is to combine it somehow with one of your established colonies. This is not an easy thing to do. If you simply dump the swarm in front of such a colony, warfare breaks out. The incoming swarm is simply viewed by the occupants of that hive as an invading force, and the fighting does not stop until the ground is covered with dead bees. What you can do is shake all or most of the bees from the combs of the established colony and then, as they begin marching back into the hive, dump the swarm right on top of them. This usually prevents fights, although the incoming queen is certain to be balled; that is, murdered. But such a procedure does not really accomplish much, because the internal organization of the colony is disrupted, and the bees are to some extent demoralized. Another thing you can do, of course, is hive the swarm, then unite it with an established colony by just putting it on top, with newspaper between. But then you end up with a very tall hive, which may be okay if what you are producing is extracted honey.

Should you feed a newly hived swarm with sugar syrup to give it a boost? There is certainly no need to, and if it was hived on drawn combs, feeding is pointless. But if it was hived on foundation, then there is no harm in feeding it for maybe a week or so, as this will hasten the process of getting the foundation drawn out.

Now I've got to mention one really neat thing you can do with a swarm, *provided* it is from your own apiary *and* you know which hive it came from. About the only way you can be sure of that is to have the swarm emerge when you happen to be there. What you should do, then, is move the hive that threw the swarm to another spot in the same apiary, and hive that swarm at the stand that was thus made vacant; that is, at the very spot where the parent hive was. The result is that the swarm, now hived, is joined by all the foraging bees from the moved hive, and the result is a spectacular honey crop. You can sometimes get a couple hundred pounds of honey from a single brief honey flow by doing that. The hive that threw the swarm is not likely to swarm again because it has lost all its foragers, but it will build up again fairly fast and give you a decent honey crop. And the new colony, on the original stand, is not likely to swarm either, because it has already swarmed, and those bees want to throw all their energy into building up their new colony.

If you arrive at your apiary and find a swarm hanging there, then there is a way of determining which hive it came from, though it does not always work. You can shake a few of the bees in a paper bag with a bit of flour in it, release them, then see which hive these flour-covered bees fly back to. This does not work if the swarm has been hanging there for a day or two. So another thing you can do is shake the bees into an empty hive body, put a queen excluder over the top, and then smoke them heavily. Some of the bees will fly out and back to their hive, where you will find them fanning their wings at the entrance. But the queen will not be with them, of course, because of the queen excluder.

The procedure just described, of hiving a swarm at the stand of the colony that produced it, is called "padgening." It is a useful word, though hardly any beekeepers have ever heard it.

The thing to bear in mind about swarms is that, once hived, they are the hardest working bees in the apiary. It is worth taking advantage of all that energy in any way you can. It seems to be mitigated somewhat if you try to combine the swarm with another colony, so you do not get the spectacular honey crop you might have expected by such combining, but it is not reduced in the least by padgening.

Swarming is, second only to bee diseases, probably the biggest source of frustration to beekeepers, but dealing with swarms is also one of the most challenging aspects of the craft. BC

Richard Taylor is a philosopher and lifelong beekeeper who lives in the Finger lakes region of New York.

Questions?

Strong vs. Weak

Q **If you take combs of sealed brood and bees from a strong colony and give them to a weak colony, will not the bees from the different hives fight?**

Fillmore Emerson
Foresthill, CA

A Normally they do not, because the older bees on the combs being moved tend to go back to the hive they came from, leaving mostly younger bees on the combs and, while there is often some resistance to these on the part of the bees in the colony being strengthened, it is usually not serious.

Filling Brood Chambers

Q **I give my bees plenty of room by adding supers so they won't swarm when the honey flow starts, and I keep adding supers. The problem is that in the Fall they don't have enough honey in the two brood chambers. How do I get the bees to fill the brood chambers for Winter?**

Mary Luchs
Johnsonburg, PA

A Bees, when storing honey, begin at the top and work down, establishing brood nest underneath the honey, so by adding supers you induce them to move their colony and brood nest up. This helps in controlling swarms, but it is not the best way. An improvement would be to move frames of brood down to the bottom story, exchanging these for broodless combs. This would not only force the bees to keep their brood nest, and some of the honey, down below, but would encourage an open brood nest, that is, a brood nest with empty combs for the queen to lay in, which greatly discourages swarming.

Bent Comb

Q **I use wired foundation with four pins in the end bars to keep it straight in the brood combs, but I still find some of the combs bent or warped so that they no longer fit if moved, with some of them coming in contact with the adjacent combs. I should think this would be quite hard on both brood and bees. If a comb is moved and the proper spacing thus lost, will the bees rework it to make it fit properly, with bee space, or will they just build bridge combs?**

Russell Lambert
London, KY

A It is very important that combs be built straight so they can be moved about. Often foundation that is perfectly straight will start to bend after it is put in the hive, resulting in combs that are warped. In my opinion, all frames should have at least two horizontal wires in the middle, and I, in fact, always have three, wiring all but the top. The vertical crimp wires that are already embedded in the foundation do not keep it from bowing or warping, nor do the pins in the end bars. It is also important, when getting brood foundation drawn out, to use all 10 frames. You can then reduce these to nine drawn combs later, for easier manipulation, and the combs, if horizontally wired, will be nice and straight. If, however, I come across an irregular comb in one of my hives, I do not discard it. The bees will make do with it, by reworking it to some extent, but it is still a defective comb.

A Few Good Queens

Q **What's a good way to raise just a few good queens?**

Pat Morris
Newfield, NY

A A friend of mine, who is a very good beekeeper, does it by just removing the queen from a very strong colony. He found that the best queen cells were always constructed at the bottoms of the combs in the upper story and always got damaged when he pried the upper story off. So now, when he removes the queen, he raises the second story up about an inch with a wooden frame of that depth which is inserted between the two stories. This is an excellent way to get a few top-quality queen cells, but it must be done with a very strong colony, for otherwise you can get runt queens.

Old Hive - New Home

Q **This Spring I tried a few of the commercial pressed-fiber swarm traps, using the commercial attractant in some and using lemon grass oil in others, and using old comb in all of them – without any success. On the other hand, I set some discarded old equipment about 150 feet from my hives in one yard, using for each a bottomboard, two supers, old and useless comb, and rotting hive covers. Thinking wax moths had probably taken over by now (early September), I checked them a few days ago, and lo and behold, two out of the three have strong colonies in them. I have had this experience before with equipment stored outside. Have you had similar experiences? Might this be more useful than the commercial pressed-fiber swarm traps?**

James Tipton
Glade Park, CO

A Yes, others have had the same experience. Swarms are strongly attracted to old derelict hives, even those whose combs have been riddled by wax worms. I have seen them occupy supers stacked outside that contained paradichlorobenzene, supers stacked inside a building to which they found entrance, and supers stacked in deep shade. They are apparently more attracted to a stack of supers than to a single hive body.

Questions are eagerly solicited. Send them to Dr. Richard Taylor, Box 352, Interlaken, New York 14847 (not Medina) and enclose a stamped envelope for direct response.

Answers!

Richard Taylor

?Do You Know? Answers

1. **True** The round dance is the simplest dance associated with locating food resources and does not communicate precise direction or distance. It merely indicates the presence of food in the vicinity of the hive. Newly recruited foraging bees that respond to the round dance appear to "search" in all directions from the hive.
2. **False** When a worker bee is 4 to 6 days old it begins to function as a nurse bee. At first it feeds the older larvae a mixture of pollen and honey which is called progressive feeding. Then the worker's brood food glands become functional in 2 to 3 days and the nurse bee begins to feed the young larvae royal jelly by mass feeding.
3. **False** Drifting honey bees are more likely to drift from a weak to a strong colony or from a queenless to a queenright colony, than vice versa.
4. **False** The Nassanoff or scent glands produce a powerful and characteristic odor associated with worker bees. This gland is undeveloped in the queen and in drones.
5. **False** When a colony absconds, the entire colony moves to a new location in response to unsatisfactory conditions in the nest or environment. This behavior is not associated with queen rearing, as it is when a colony is preparing to swarm.
6. **True** Absconding is extremely common among the various species of honey bees found in tropical countries, whereas, it is rare among *Apis mellifera* colonies in temperate countries.
7. **True** Exchange of food between colony members is a form of communication that is important in the maintenance of the social structure. The transfer of food between two members starts when one of them either "begs" or "offers" food to the other.
8. **False** Even though drones have definite congregation areas that are virtually unchanged from year to year, we do not fully understand what guides the drones in the choice of these areas or even if the location of these areas is communicated to younger drones. Drones may produce an odor that helps guide new drones to a congregation area, or it may be purely geographical.
9. **False** Even with a complete cloud cover the bees can indicate the solar angle of the food source correctly during the wagtail dance on the vertical comb surface. The forager's internal clock enables them to know the time of day and the position of the sun. Bees are also able to perceive ultraviolet radiation from the sun through a complete cloud cover.
10. C) Karl von Frisch
11. B) 7th
12. A) Tail-Wagging or Waggle
13. •Hives should be randomly located in the bee yard rather than having colonies in straight rows.
    •Not having the hives painted the same color or providing different patterns (orientation landmarks) at the hive entrance.
    •Increasing the distance between colonies.
    •Orienting hive entrances in different directions.
14. •When worker honey bees become disorientated and expose their Nassanoff or scent glands.
    •Temperature in the hive becomes to high.
    •As the carbon dioxide level increases in the hive.
    •Cells of unripened honey are present.
15. Worker honey bees quickly respond to the loss of their queen by becoming nervous, aggressive, with increased walking throughout the colony. A "roaring" sound can be heard upon opening queenless colonies due to increased scenting behavior. They begin the construction of queen cups in the colony followed by emergency queen rearing, generally beginning queen cell construction over cells containing larvae or eggs, almost always on the face of a comb, rather than on bottom bars.
16. The quality of the food resource is communicated to potential foragers by dancing honey bees by the liveliness and vigor of the dance as well as duration. The more attractive food sources elicit more vigorous and long-lasting dances.
17. C) Shaking dance
18. B) Buzzing run
19. E) Sickle dance
20. B) Buzzing run
21. F) Jerking dance, (DVAV= dorso-ventral abdominal vibration)

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

Gleanings

JUNE, 1997 • ALL THE NEWS THAT FITS

WESLACO BEE LAB REORGANIZED

The USDA announced in May the Weslaco Research Center had been restructured to reduce overhead costs, administration duplication and support personnel, so they could increase the number of scientists. The USDA's number of scientists has been reduced in recent years due to retirement and RIFs, and many were not replaced. This is a move in the other direction.

Originally, the Weslaco unit was comprised of six divisions: Conservation & Product Research, Crop Insect Research, Remote Sensing Research, Biocontrol, Honey Bees and Crop Quality. The reorganization reduces these to three units. These are: Integrated Farming and Natural Resources Research, which includes the original Conservation and Product Research, Crop Insect and Remote Sensing.

The second new unit is Beneficial Insects, which now consists of Biocontrol and Honey Bees. The third is still Crop Quality.

The Bee Lab, which has been without an official Research Leader (Dr. Bill Wilson has been acting RL), will not have that position filled. Dr. Wilson will take the new position of Lead Scientist. Some former lab leaders had their positions changed to Lead Scientist, which has disrupted, to some degree their status, and position.

A chemist position, held by Raul Rivera, was lost at the bee lab, and Rivera was transferred to administration. A Temporary Scientist position, held by Dr. Frank Eishen will be closed, however, a new scientist position will be opening soon to fill this gap.

This new position puts the Lab in a much stronger position, according to one USDA official. Because they are now a part of a much larger unit the opportunity to single out honey bees has been greatly reduced. The trade, however, is that there has been some identity loss, now that they are under the Beneficial Insects umbrella.

Overall, according to the USDA spokesman, the Bee Lab is in a stronger position, but still critically short of funds for additional projects. Industry support is still needed, and, in the long run, will be the key to continued activities at Weslaco.

AGRI-FACTS

- It takes a total of five cow hides to make the leather interior for just one Lexus GS300.
  – *AlphaGraphics*

- Each year, by February 10, people have earned enough money to pay their food bill for the entire year. By May 10, people have earned enough money to pay their tax bill for the entire year.
  – *Paul Harvey*

- More soybeans are grown in the United States than anywhere else in the world. In 1994, about 380,000 U.S. soybean farmers harvested a record 2.6 billion bushels of soybeans.
  – *American Soybean Association*

- Wisconsin farmers grow about 1,100 acres of strawberries each year. That's enough for 12 million jars of jam. Incidentally, each strawberry has about 400 seeds.
  – *Wisconsin Agribusiness Foundation*

CANADA'S IMPORTS

Chinese exports of honey to Canada have gone from nothing three years ago to 12 million pounds and Canadian honey producers want to know just where the honey is ending up.

The flood of Chinese honey into Canada began after the U.S. Beekeeping Association proved in 1994 China was dumping its honey in the U.S. The subsequent restrictions sent the U.S. looking for a new source for 17 million pounds of honey and it turned to Canada.

The demand sent prices soaring as much as 50%. Canadian packers and traders then began buying Chinese honey to fill industrial needs.

Labels for honey sold in Canada must state if it is blended with foreign product but it is almost impossible to find such a product.

"The packers are telling us that they're not doing it, we've never been able to find that they're doing it, and they also have their reputations to protect," an Agriculture Canada spokesman said.

It's claimed the Chinese honey is used by Canadian industrial markets as an ingredient in baking, cereals and sauces, but northern honey producers fear the lower grade Chinese honey is being blended with the local product and then re-exported as Canadian.

Canadian Honey Council president Wink Howland said the country's honey is known worldwide for its consistent high quality and if Chinese honey is being blended with Canadian it could damage Canada's reputation – especially in the U.S. where much of the honey is sold.

"It is the biggest concern facing beekeeping in Canada today," Howland told the Saskatoon-based *The Western Producer* farming newspaper.

Chinese honey often has a bad aftertaste and packers there are known to add corn syrup to their product.

The council is seeking market reassurance by asking the Canadian government to require importers to pay for increased inspections of imported honey and to order an audit of the use of the imported product.

"Even though we have 40 times as much honey being imported into Canada, the level of inspection is the same as was in existence in 1993," Howland told *The Western Producer.*

by Alan Harman

ULEE'S GOLD

Starring Peter Fonda, Patricia Richardson and a cast of millions.

No killer bees. No screaming damsels. No bodies covered with a fuzzy, menacing horde. Just a family, coping with things families have to cope with. Well, not every family, but some, and maybe more than we'd like to admit.

Ulee's Gold was shot on location in north and central Florida, and is the story of Ulysses Jackson (Peter Fonda), a solitary beekeeper working in the tupelo marshes of the Florida Panhandle. Wishing only to work his bees and live withdrawn from past ties, Ulee is a war veteran devastated by his wife's death and the collapse of his family. With his son, Jimmy (Tom Wood), in jail and his daughter-in-law, Helen (Christine Dunford), run off now for almost two years, Ulee has had to become caretaker for his two granddaughters, Penny (Vanessa Zima) and Casey (Jessie Biel) Jackson.

The trio lives an ordered, if somewhat narrow life until a call from Jimmy changes everything. Helen is in trouble, and only Ulee can fetch her home. Ulee must travel to Orlando to retrieve Helen from two of Jimmy's former partners in crime, Eddie Flowers (Steven Flynn) and Ferris Dooley (Dewey Weber). The duo turns out to have their own reasons for getting Ulee to Orlando. Old robbery money is involved, and the two will haunt the Jackson family to the end.

Help comes from surprising places – a new neighbor (Patricia Richardson), an old friend from the past (Kenneth Campbell), and the thoughts and insights of a child. Torn from his isolating routine, Ulee must draw on old strengths and craftiness to save his family, and ultimately, himself.

Ulee's Gold was shot on location in north and central Florida. Most of the crew have worked together in the past, some having taken central positions in all of Director Nunez's films. Selected as the Festival Centerpiece premiere for the 1997 Sundance Film Festival, it stars Peter Fonda as Ulee Jackson and Patricia Richardson as his sympathetic neighbor Connie Hope.

Actor/director Peter Fonda refers to the role of Ulee Jackson as "The best character I've ever read. It's the kind of role you pay money to do – a complex character, full of possibilities and the script was full of moments that were very deep, very pure and very simple." He describes the story as a journey that deals with issues of family, loss, love and responsibility.

The reserved, distant beekeeper is a familiar persona to Fonda. His father, actor Henry Fonda, kept bees, and the similarities between Henry Fonda and Ulee Jackson, Peter notes, don't end at the apiary. "I've found a lot of Ulee in my father. He kept a couple of hives and I can see him hop-footing it across the lawn, thinking he had a bee up his pant leg. As I began to develop Ulee, I used a lot of the way my father was to us as kids, the way he was to us as a family."

Best known for her starring role on the hit comedy series "Home Improvement," Patricia Richardson found the part of Connie Hope to be a welcome departure. Connie lives across the street from her landlord, Ulee Jackson, and, according to Richardson, is as emotionally disconnected as Ulee at the start of the story. It was this enigmatic remoteness, among other things, that attracted Richardson to the character.

The desperate crisis that afflicts the Jackson family draws Connie Hope into their closed world. According to Richardson, "Ulee is sort of beset by these women in the movie. He is trying to raise his son's daughters, he's got this volatile daughter-in-law to deal with and this nurse who suddenly comes into his life. These women, in their own ways, force him to cope, to come back to life."

In the course of the production, a special bond grew between the crew and beekeepers, especially with Warren Johnson and the Lenier family on whose land much of the film was shot. Ulee Jackson was made beekeeper of the year by the Florida Beekeeper's Association. Peter Fonda proudly accepted the award for Ulee.

Ulee's Gold opens June 13 on both coasts, June 20 or 27 in most places, and June 27 in smaller markets. Watch for it in your local papers. And when you do, watch for *Bee Culture* magazine on screen. But be quick!

"Fonda's performance is easily the finest of his career."
People Magazine

"Another Winner."
New York Times

"4 Stars"
Box Office Magazine

Display Index

One among the very few who make beekeeping their sole business is Dr. C.C. Miller, of Marengo, IL. He was born June 19, 1881, at Ligonier, Pennsylvania. With a spirit of independence, and a good deal of self-denial sometimes bordering upon hardship, young Miller worked his way through school, graduating at Union College, Schenectady, New York, at the age of 22. Unlike many boys who go through college self-supported, running into debt at the end of their course, our young friend graduated with a surplus of some seventy odd dollars over and above his current expenses at school; but, as we shall presently see, it was at the expense of an otherwise strong constitution. He did not know then, as he does now, the importance of observing the laws of health. Instead of taking rest he immediately took a course in medicine, graduating from the university of Michigan at the age of 25. After settling down to practice, poor health, he says, coupled with a nervous anxiety as to his fitness for the position, drove him from the field in a year. He then clerked, traveled, and taught. He had a natural talent for music, which by hard study he so developed that he is now one of the finest musicians in the country. If you will refer to the preface to Root's Curriculum for the Piano (a work, by the way, which is possessed or known in almost every household where music is appreciated), you will see that this same Dr. Miller rendered "much and important aid" to the author in his work. In this he wrote much of the fingering; and before the Curriculum was given to the printers for the last time, Mr. Root submitted the revised proofs to the doctor for final correction.

His musical compositions are simple and delightful and you would be surprised to learn that one or two of the songs which are somewhat known were composed by Dr. Miller. Speaking of two songs composed by friend M., especially to be sung at a beekeepers' convention, Dr. George F. Root, than whom no one now living is better able to judge, said, "They are characteristic and good." Dr. Miller also spent about a year as music agent, helping to get up the first Cincinnati Musical Festival in 1873, under Theodore Thomas. Dr. M. is a fine singer, and delights all who hear him. Upon hearing and knowing of his almost exceptional talents for music, we are unavoidably led to wonder why he should now devote his attention solely to beekeeping; and this wonder is increased when we learn that he has had salaries offered by music publishing houses which would dazzle the eyes of most of us. But he says he prefers God's pure air, good health, and a good appetite, accompanied with a smaller income among the bees, to a larger salary indoors with attendant poor health.

As has been the case with a good many others, the doctor's first acquaintance with bees was through his wife, who, in 1861, secured a runaway swarm in a sugar-barrel. A natural hobbyist, he at once became interested in bees. As he studied and worked with them he gradually grew into a beekeeper, against the advice and wishes of his friends. In 1878 he made beekeeping his sole business. He now keeps from 200 to 400 colonies, in four outapiaries. All the colonies are run for comb honey, and his annual products run up into the tons. He is intensely practical, and an enthusiast on all that pertains to his chosen pursuit. Though somewhat conservative as to the practicability of "new things," he is ever ready to cast aside the old and adopt the new, providing it has real merit. Although he claims no originality, either of ideas or of invention, he has nevertheless given to the beekeeping world, not a few useful hints, and has likewise improved devices or inventions otherwise impracticable.

As a writer he is conversational, terse, and right to the point. Not infrequently his style betrays here and there glimmerings of fun, which he seems, in consequence of his jolly good nature, unable to suppress. His "Year Among the Bees," his large correspondence for the bee journals, and his biographical sketches preceding this, as also his writings elsewhere in this work, are all characteristic of his style.

Of him as a man, a personal friend, and a Christian brother, it affords me great pleasure to speak. Physically he is rather under the medium height, thickset, and of an exceptionally pleasant face. To know him intimately, and to feel his intense friendship, is to know a near kinsman indeed. There are few more devoted Christians than Dr. C.C. Miller. He has always been active in Christian work, and is now superintendent of the Sunday school of the church which he attends regularly as might readily be imagined. He uses his voice and his talents for music to the glory of God, in a way which would seem sure to bring conviction to the unconverted. I have heard him sing for Christ, and I know whereof I speak. May he live long to benefit beekeepers, and to glorify Christ!

As it would hardly be appropriate for the doctor to write his own sketch, he has requested me to do so. I will therefore sign myself as below.

Ernest Root, 1891

C.C. Miller