FEB '91

GLEANINGS IN BEE CULTURE

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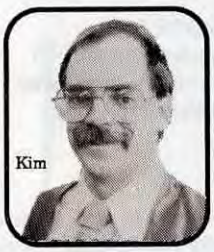

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Columns

Departments

COVER ... This seemed like the perfect time to look at queens, queen rearing, and even queen breeders. Raising your own can be tricky, but certainly possible. If you buy from a breeder, what should you know about his/her operation? And, how do you get a new queen from that little cage to laying eggs in your colony, anyway? It's all here this month, plus packages, and almonds ... and even catnip.

FEB '91

CONTENTS

(ISSN 0017-114X) Vol. 119, No. 2

117 Years Continuous Publication by the Same Organization

Features

INNER·COVER

We had intended to present some of the results of our Reader's Survey this month. In fact, they were going to fill this space, and give me a chance to rest.

But for all of Murphy's reasons, it just wasn't to be. The computer program just didn't want to cooperate – and, if you are at all familiar with those machines, there need not be any rhyme or reason for the problem. So, with luck (and maybe a swift kick to the terminal), next month we'll have the full report.

There are some teasers I'd like to drop though, and they tend to support some of my recent musings –

Our readers are getting younger, (Say, there's an advertising gimmick I've never seen!) for the most part. The average age is creeping downward, instead of going the other way, which indicates to me that if your group is looking for members, concentrate on people (primarily men, but don't limit yourself) in the 25-35 age group.

The results also show most of our readers are still in the learning curve, and favor reading basic How-to Articles – something I think we do rather well, and often.

There is also strong support for the Honey Board's activities, but most of our readers aren't participants due to the amount of honey they produce.

There's lots more information available, I'm sure, once the computer decides to cooperate, so stay tuned and, with luck (and maybe that swift kick I mentioned), we'll have something more substantial next month.

•

Five years ago this month I moved from Connecticut to Ohio to start this job. I was not a little surprised when it dawned on me not only how long it's been since I started here, but how much longer it's been since I got started in this business.

Which, I guess, deserves some explanation. My introduction to the field of agriculture came about almost completely by chance. I was working with a group of kids, and we had just finished making about a dozen jack-o-lanterns for Halloween. There was a bucket of pumpkin innards that needed to be disposed, and right on top were 50 or so seeds.

I grabbed a bunch and stuffed them in my lunch box and headed home because my shift was over. At first I intended to roast them or something. I knew, vaguely, that they were edible and that was about it.

I didn't eat them though, but somebody suggested I put them in some soil and grow my own. Why not, I thought? It can't be too hard to grow a pumpkin, right?

I bought some soil and pots, planted the seeds, and sure enough, up they came. And in two weeks they were all dead. And suddenly there was a question that I *had* to answer – I just *had to know* why, what seemed like a simple task didn't work – and six years later I got a degree in Agriculture.

And six years after that I landed here – going from pump...ns to Extension to the USDA Bee Lab in Madison back to raising pumpkins in Connecticut (along with all sorts of vegetables and fruit), and finally here.

It all goes back to that one, single moment when there was a question that just had to be answered.

Lots of people have that same experience, with plants, or numbers or honey bees. If you've been at this awhile you probably know what I mean, but if you're just starting or thinking of starting – just wait. You'll know when it happens. And you'll never forget it.

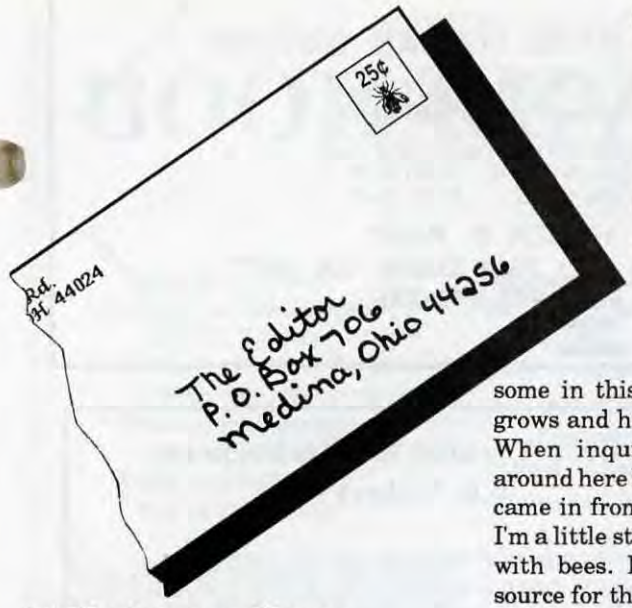
•

As the final chapter in our informal series on reducing business costs, thereby (hopefully) improving your margin, and ultimately the chance for survival, we queried several successful business people in their areas of exper-

Continued on Page 114

Some Explanations Are In Order ...

MAILBOX



■ Christmas Cheer

I have kept up with Richard Taylor's "Bee Talk" ever since he started writing for *Gleanings in Bee Culture*. I always looked forward to his next article each month. In a rating of one to ten he was a +10, but after reading the first paragraph in the Dec. 1990 issue about Christmas (or not about Christmas) I score him as a -1.

I am really disappointed in Dr. Taylor. I hope he had a nice Christmas anyway.

Floyd D. Helm
Odon, IN

■ Thanks

A short time ago I wrote for a copy of your magazine*Bee Culture*. You sent me a November, '90 issue right away, and in my book that speaks well for the A.I. Root Co.

But the real reason for this short note is to comment on the magazine's cover – "Diana, *what a beautiful job*."

I'll have to check and see if we have fireweed in Vermont.

If there is I have to put a couple of hive bodies in their midst.

Again, a job well done.

Phil Paquet
Barre, VT

■ Popular Plant

First of all, I'd like to tell you how much I enjoy *Bee Culture*. It is certainly informative, entertaining and at times inspirational. You and your staff do a fine job and I sincerely appreciate it.

In your October issue, you ran an article about Anise Hyssop that I found very interesting. I would like to plant some in this area to see how well it grows and how the bees respond to it. When inquiring about seed, folks around here look at me as though I just came in from outer space. They think I'm a little strange anyway for working with bees. If you can recommend a source for the seed, I will be grateful.

Thank you for your time and any assistance you can provide.

Please keep up the good work.

Alan R. Nestico
Darlington, SC

Editor's Note: This article has generated an immense amount of interest. Annise Hyssop seed is available from most large seed catalogs, but Park Seed, Cokesbury Rd., P.O. Box 46, Greenwood, SC 29648-0046, and Burpee Seed Co., 300 Park Ave., Warminster, PA 18974 are two that have seed available.

■ Drone Trap?

This is in response to Henry Harris' letter in the December issue regarding the use of queen excluders.

If a queen excluder is placed between boxes of brood, to be left there for an extended period of time, it is imperative to provide an upper entrance. Otherwise any drones above the excluder would be trapped, and would perish needlessly.

Steve Moeller
Odessa, MO

■ Elbow Room?

Referring to Questions and Answers, December 1990 – in his answer to Elbow Room, Richard Taylor states that most beekeepers use nine frames in the brood chamber and eight frames in the extracting supers.

My own experience as an inspector tells me that in western Massachusetts at least, most beekeepers use ten frames in the brood chamber and many, though certainly not most, use nine frames in the extracting supers. I rarely saw eight. My dealings have been largely with backyard/hobbyist beekeepers. Perhaps commercially oriented beekeepers use fewer frames.

I would be interested in knowing the number of frames used commonly in other areas.

Dr. Taylor also states that eight frames are used because they are easier to remove. More important to me is that when there are fewer frames, they are easier to uncap, since they are drawn more deeply.

Richard E. Bonney
Charlemont, MA

Editor's Note: This is an interesting question, and we should explore it more. Send me a post card and tell me: 1. Frames in Brood Chamber; 2. Frames in Honey Supers; 3. Size of Honey Supers; 4. Area of state you live in (i.e. Southern OH, Northern UT). We'll publish any results we get, and let you know who has elbow room.

■ Double Treat

This note is to point out that Professor Morse, in his article on "Beekeeping in the Empire State", published in the December *Bee Culture*, considerably underestimated the number of colonies inspected by New York State apiary inspectors from 1986 through 1989 for AFB. He included only the "systematic" inspections that are used for statistical purposes.

The apiary inspectors additionally examined a large number of colonies that they selected themselves. They also inspected migratory apiaries for certification.

Combining all kinds of samples, the New York State apiary inspectors examined between 32,435 and 48,668 colonies for AFB annually during the years 1986 through 1989. This is about double the number of inspections cited by Professor Morse.

Hugo Jamnback, Consultant
Apiary Disease Control Program,
Albany, NY

BOOK REVIEW

The Honey Bee:
A Guide For Beekeepers
by V.R. Vickery
Published by Particle Press
P.O. Box 132
Westmount, Quebec
Canada, H3Z 2T1
ISBN 0-9694759-0-X
245 pp Hardcover

Like all good manuals, no matter the subject, this book draws from the experiences of many people, from many backgrounds, all funnelled through the eyes, and words, of the author. A teacher and beekeeper by profession, Vernon Vickery was finally persuaded to put in permanent form his class notes and field experience for the benefit, and enjoyment of others.

The initial chapters are fairly basic, introducing the reader to honey bees in general, apiary equipment and some basic bee biology. The photos and drawings, all in black and white, are descriptive and appropriate. The chapter on apiary site selection is good, describing floral requirements and colony placement.

The chapters on beginning beekeeping are thorough and cover all the usual questions and topics. However, the chapter on honey processing was better than most because of the detail involved, and the layout and design of hobby – commercial sized extractor location – certainly worthwhile for anyone.

Diseases and pests were covered quite well, even the aspects of pollination. Any beginner could have much to absorb with these. The photos in the disease chapter, while good, were in black and white, which make their usefulness limited. This problem, however, is common in beekeeping books everywhere.

Next came a fairly accurate look at the "African Bee" problem, followed by fall and winter management.

Vickery discussed clustering, feeding, ventilation, wintering in buildings (well described, but not in great detail), insulation and packing (which is covered in excellent detail), and finally preparation for spring.

Beekeeping economics is discussed, along with some thoughts on commercial beekeeping.

A glossary, reference and index are followed at the very end by a series of excellent color photos showing various aspects of beekeeping.

This book would make a good teacher's guide, and student manual. It must be remembered though, that some aspects of this work are northern-latitude oriented. However, for the most part the information presented is fairly universal.

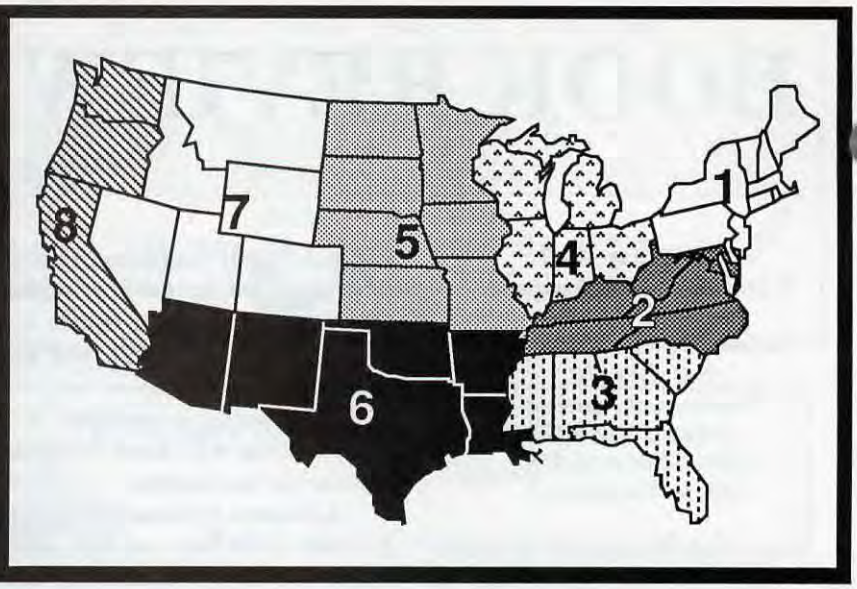
The greatest strength of this book, in my opinion, is the list of references given at the end of each chapter. They are necessarily inclined toward the academic side of apiculture, but articles from *Bee Culture, American Fruit Grower, Canadian Beekeeping* and other general interest trade journals are common. Knowledge, and information is where you find it, and this *Guide For Beekeepers* is a good place to start.

Kim Flottum

FEBRUARY
Honey Report

February 1, 1991

REPORT FEATURES SUMMARY: R=Range of all prices; A=Average prices across all regions; LM=Last month's average; and LY=prices one year ago.



	Reporting Regions								Summary		History	
	1	2	3	4	5	6	7	8	R	A	LM	LY
Extracted honey sold bulk to Packers orProcessors												
Wholesale Extracted												
60 # Wh.	42.33	40.67	39.10	32.40	41.00	41.25	42.00	43.67	31.00-52.00	41.11	38.22	39.16
60 # Am.	41.67	36.33	38.14	28.80	39.50	39.75	31.70	40.33	23.40-52.00	37.64	36.78	36.44
55 gal. Wh.	.51	.45	.51	.54	.48	.56	.53	.60	.42-.65	.53	.51	.50
55 gal. Am.	.50	.43	.43	.48	.48	.44	.50	.52	.40-.60	.48	.48	.46
Case lots — Wholesale												
1 # 24's	28.62	30.33	26.25	27.03	23.51	24.15	28.75	30.98	23.50-38.40	28.38	27.89	26.70
2 # 12's	28.30	26.17	26.00	26.26	22.25	23.60	27.50	28.20	22.20-32.10	26.43	26.26	24.60
5 # 6's	34.13	26.38	25.15	28.93	29.30	26.15	26.50	27.90	25.00-38.50	28.95	27.17	25.82
Retail Honey Prices												
1/2 #	.92	1.10	1.25	1.17	1.01	1.11	1.05	.97	.75-1.19	1.08	1.01	1.00
12 oz. Plas.	1.68	1.52	1.50	1.43	1.25	1.25	1.45	1.45	1.13-1.98	1.47	1.43	1.34
1 #	1.68	1.78	1.60	1.69	1.54	1.80	1.75	1.60	1.29-2.19	1.66	1.63	1.58
2 #	3.07	3.03	3.25	3.26	2.66	2.85	3.15	3.05	2.39-4.00	3.03	2.94	2.87
2-1/2 #	3.55	3.85	3.52	3.90	3.75	3.50	3.45	4.10	3.45-4.75	3.75	3.41	3.63
3 #	4.12	3.78	4.59	3.59	4.15	3.58	4.25	3.85	3.25-4.80	3.92	3.88	3.79
4 #	5.62	5.10	5.15	4.75	4.88	4.00	4.95	4.80	4.00-5.75	5.02	5.06	4.96
5 #	6.83	6.10	6.43	6.59	5.98	5.48	6.10	6.25	4.95-7.75	6.30	6.13	6.08
1 # Cr.	2.08	1.25	2.00	1.69	1.55	3.33	1.89	1.72	1.25-5.15	2.04	2.00	1.65
1 # Cb.	2.65	2.05	2.25	2.25	2.98	1.95	2.75	2.38	1.25-3.00	2.46	2.77	2.38
Round Plas.	2.50	1.80	2.15	2.35	2.10	1.85	2.50	1.95	1.60-2.50	2.12	2.47	2.00
Wax (Light)	1.48	1.12	1.35	1.58	1.25	.99	1.15	1.23	.97-2.00	1.27	1.34	1.08
Wax (Dark)	1.40	1.02	1.15	1.03	1.00	.92	1.05	.95	.80-2.00	1.09	1.16	.98
Poll./Col.	32.50	20.00	30.00	30.00	23.00	26.00	29.00	32.00	20.00-35.00	29.33	30.25	29.58

MARKET SHARE

Anticipated shortages this spring and summer, due to low production last season and increased forfeitures will require an increase in imported honey. Several countries have ample supplies, and the marketing program by the Honey Board will keep sales brisk. Local honey will be a scarce commodity, and should demand a premium price. Not only that, develop that 'local honey' market now and insulate yourself from more imports in the future, and surpluses, too.

Region 1

Sales steady, prices steady to increasing slowly. Depressed economy holding prices, but sales holding. Colonies in good shape in January due to warm weather. Early feeding may be necessary. Local honey supplies running low.

Region 2

Sales steady and increasing somewhat. Prices, increased over holidays a little, have stayed higher for now. Colonies in good shape due to mild weather, which means early feeding.

Region 3

Sales steady, but prices not doing much. Weather predictable, but not detrimental to colonies, which appear in good shape, generally. Mites a big concern, and, along with increasing regulations could be an even bigger problem this spring.

Region 4

Sales steady to slowing a bit. Warm weather reducing prices, and sales in most areas. Some prices increasing as supplies run low. Mites a problem as they move into area full strength. Some colonies already showing infestation weakness.

Region 5

Sales steady to increasing as weather gets colder and seasonal demand kicks in. Prices steady and showing signs of increasing in urban areas, but generally steady. Snow cover helping some, but mite infestations already showing up. Watch spring feeding

Region 6

Sales steady to increasing and prices increasing seasonally. Market steady, considering the less than dramatic AHB arrival a few months ago.

Region 7

Retail prices steady to increasing, and demand healthy. However, wholesale and commercial prices in the dumper because of ASCS ruling, forfeiture and other problems.

Region 8

Northern regions being hit hard by winter, while the south, for the most part, still hot and dry. Some rain has helped though. Prices steady pretty much all over, supplier variable. Pollination season picking up, and colony prices rising due to shortages.

RESEARCH REVIEW

DR. ROGER A. MORSE

Cornell University • Ithaca, NY 14853

"With a little experience almost any beekeeper can master queen rearing."

Dr. Nicholas Calderone, of the U.S. Department of Agriculture laboratory in Beltsville, Maryland, has demonstrated that beekeepers can select breeding stock with simple methods and equipment and thereby improve honey production. Calderone found that breeding from queens in high producing colonies, without regard for the drones with which they mated, could lead to stock improvement. Modest rewards can be seen after only a few generations of selection.

Professor Walter Rothenbuhler, recently retired from Ohio State University, had suggested this approach to bee breeding in 1980; however, until Calderone gathered data on the subject there was no proof that this was a practical approach. Rothenbuhler started his article on the subject by stating that beekeepers "have felt somewhat powerless to engage in bee breeding" because they had no control over mating. He also pointed out clearly that one could proceed twice as fast in a breeding program if they had control of both parents. However, for most beekeepers this is not possible. Control of mating in honey bees is possible only if one uses instrumental insemination or has an island many miles from the mainland or an otherwise isolated apiary.

Calderone began his studies using 33 colonies of bees. These were weighed at regular intervals from early spring until the end of the major honey flow. The queens from the three colonies with the highest weight gain were used to start a high producing line. At the same time, the queens from the colonies that gained the least weight were used to start a low producing line.

The daughter queens from these two lines were mated in an apiary some distance from the parent colonies. This is an important consideration as it prevents inbreeding. Rothenbuhler had written that inbreeding can be prevented "if the drone population is large, genetically diverse, and receives unrelated stock occasionally."

In the second season, Calderone repeated his colony weighing and again selected the best and the poorest weight gainers to continue these lines. After three seasons, statistically significant differences between the two lines were evident. The better colonies gained three times more weight than the poorer colonies during the main honey flow. What is especially interesting is that "early-winter colony weight, late-winter colony weight, early-spring colony weight, and winter weight loss, were not correlated with seasonal colony weight gain and do not appear to be useful aids to selection." It is the early-

Finding just the right location is important so breeding with closely related drones does not occur.

season weight gain that is most important and that correlates well with the total weight gain. An advantage of using only the early season weight gains is that one may rear new queens in the same season. Queens reared in the summer, after the major honey flow, can be used to grow full size colonies for testing the following spring.

Application of the information reported here is not restricted to those with a large number of colonies. Hobby beekeepers, each of whom have only a small number of colonies, may work together to select their best producing colonies for queen rearing.

There is no question that queen rearing is a special art and requires patience and a good knowledge of bee biology. However, with a little experience almost any beekeeper can master queen rearing. Existing equipment can usually be modified so that there is a minimum investment. There have been many good books and brochures on this subject of growing queens.

A bulletin by F.L.W. Ratnieks and R. Nowogrodzki that beginners will find useful is entitled *Small-scale Queen Rearing,* Information bulletin 209. It is available for $2.50 by writing Cornell University Distribution Center, 7-8 Research Park, Ithaca, NY 14850. This 12 page brochure has one full page in color with nine photographs of various aspects of grafting and growing queens.

Full details of the experiment performed by Dr. Calderone will appear in an upcoming issue of Apidologie. □

References:

Morrison, J. *Higher producing honey bees.* Agricultural Research 38(11): 23. 1990.

Rothenbuhler, W.C. *Necessary links in the chain of honey bee stock improvement.* American Bee Journal 120: 223-225, 304-305. 1980.

Tim Lawrence *Susan Cobey*

Rearing your own queens can save you money and increase your enjoyment and understanding of honey bees. It may also reduce your exposure to mites, African(ized) bees and various diseases. However, queen rearing can be an extremely frustrating, expensive endeavor and discourage your interest in beekeeping. The questions you should ask yourself are – what are your priorities and how much extra time are you willing to devote to queen rearing. This month we look at your alternatives – purchasing queens, and a few things to look for in selecting a good queen producer. If you still want to rear your own queens stay with us, we will discuss several queen rearing systems in later articles.

There are numerous queen producers throughout the United States that produce high quality queens early in the year and in very large numbers. A quick glance through this journal will give you a wide range of producers to select from. Don't forget to look in the classified ads where some smaller producers advertise. Most of the beekeepers in this industry are very hard working, honest and dependable. They are professionals, very good at what they do and diligently work to provide you with the best product available.

There are many things to consider when selecting a queen producer. What race of bee will do well in your area and fit your management system? Different races of bees have different production and survival strategies and will require different management techniques. Also keep in mind that producing good queens is expensive, very labor intensive and that *price should not* be your major consideration.

To obtain queens reared under optimal conditions, grafted from proven selected stock and mated in an area with an adequate supply of selected drones requires attention to detail during every step of the process. The old cliche "you get what you pay for" applies here. Cheap queens requires a producer to cut costs somewhere and this will be passed on to you as poor queen performance. Asking a few questions of a queen producer will give you a good indication of the quality to expect. This will allow you to weed out the few producers to avoid.

> "Price should *not* be a major consideration when purchasing queens."

Nutrition is number one. Remember, every fertilized egg has the potential to become either a queen or worker bee dependent upon the diet it receives. Queen larvae require a plentiful diet of royal jelly for proper development. The worker larvae chosen to be grafted into queen cell cups must be very young, preferably less than 24 hours. A queen produced from older larva will develop into an intercaste of inferior quality. The swarm box, or cell builder colonies, must be strong and have an abundance of young, well fed nurse bees. Copious amounts of royal jelly are essential to the developing queen larvae. These colonies also must have a continuous supply of pollen and sugar syrup.

The number of queen cells given to a cell builder is important. Queen producers routinely graft 30 to 80 cells per cell builder. Fewer queen cells given to each cell builder increases the likelihood the cells will receive a more plentiful diet. Depending upon the queen rearing system used, and these will vary widely between producers, cell builders given more than 45 cells *may* be of inferior quality.

Virgin queens require a numerous and diverse source of drones. Queens multiple mate with as many as 20 drones. A mating yard with hundreds, and sometimes thousands of mating nuclei must be supplied with a large number of drone mother colonies. These should be colonies of selected

stock placed to surround the mating yard. With literally thousands of queens taking their mating flight on the first clear warm day, ten's of thousands of mature drones must be available to ensure well mated queens. Inquire how your producer ensures proper matings.

Weather and seasonal changes are the biggest threat to being able to obtain good matings. Early spring rain and cold will inhibit the ability of queens to take mating flights and will slow the maturity of drones. A cold snap can even cause the bees to kick out mature drones and remove developing drone brood. If you insist on early queens – watch the weather and work with your producer to be flexible during this time. It is better to receive late queens than to replace poorly mated queens and loose a crop. Late summer and fall queens sometimes can be a problem too. Optimal nutritional conditions are more difficult to maintain and the supply of drones begins to dwindle. These queens may have a tendency to be smaller and poorly mated.

Good producers will allow their queens to lay for several days before shipment. This is especially important during the first round of early spring and during late summer, when conditions are questionable. This allows the producer to weed out most poorly preforming queens and promotes good ovarian development of queens before shipment. New, well mated queens often will fill all available cells with eggs in a nucleus in a single day and this is what your producer is looking for.

You probably will notice genetic variability among the queens you purchase from your queen producer. This diversity is natural, especially with the multiple mating system of the honey bee. Most producers make efforts to saturate mating areas with drones from selected colonies. Their success will vary depending upon the geographic locations and colony numbers. As you, the consumer, demand better quality and consistency in your queens, the producers will devote more effort to their breeding stock.

When ordering queens, ask a few questions of the producer. You want a large, healthy and productive queen to lead your colony, and there are no shortcuts to raising one of these.

Breeder stock from which your production queens are reared may be selected from the producer's own colonies or from commercially available breeder stock. Producers have been able to select from within their own stock with good results. Though, difficulty in finding and maintaining isolated mating areas makes naturally mated breeder queens often variable and unreliable. Controlled matings through the use of instrumental insemination (I.I.) will speed the process of selection, stock improvement, and establish consistency of queen performance. I.I. breeder queens are being used with increasing popularity because of this. This technique allows the breeder to eliminate random matings which dilute the selection process. Honey bees respond well to selection, so it's important to ask your producer what criteria is used in their breeding program.

Your queen producer is anxious to provide you with quality queens on time, because their reputation is built upon this. Your producer is aware that it is often a friend's recommendation that is the best advertisement. Producers make every effort to ship quality queens, however, occasional duds will slip through the process. If this happens, chances are your producer wants to know. Within reason a good producer will stand behind their product, but do not expect them to replace queens lost during improper introduction. If you don't like the quality of queens you purchase or the service you receive, exercise your own selection pressure – and buy from someone else. □

A Scientist

Looking For An Experiment

JIM ANDERSON • DEREK ANDERSON
217 Rooks Drive
Slidell, LA 70458

I remember the day when my eight year old son Derek came to me and said that he could really use some help. It was an overcast morning in November of 1989, with a cold north wind blowing, and I was enjoying a cup of hot, freshly brewed coffee and watching the bee hive through the frosted living room window. Since the mood of the weather had rubbed off on my enthusiasm, I was especially glad for the diversion from my thoughts of repairing automobiles and all of the other things I had been putting off doing.

I told him that I would be glad to assist him if I was able to, and then asked what it was he needed. Since it was November, I was not surprised to learn that it was "Science Fair" time again in school, an annual ritual here in Louisiana, and my son needed a good idea for a science fair project. He seemed to be having some difficulty coming up with one that would be acceptable.

The guidelines were well understood. First, the experiment had to be simple enough for a second grader to do. Second, it had to teach the student something about the scientific method. Finally, the project should not require a large outlay of money, nor should it require a lot of expensive equipment. It did, however, require an exhibit to be made for demonstration of the work completed.

Derek and I spent some time reviewing these suggestions so that he would be able to choose a project that would be appropriate. As a result, Derek "scaled down" his ideas to things like developing a new kind of fish that was easy to catch, while I had projects in mind like what makes a balloon fly when it is blown up and then released. In the end, it was Derek, however, who came up with the perfect idea.

We had been watching the hive of honey bees during the "decision making" process, when he asked, "Dad, can the bees tell the difference between sweet nectar and really sweet nectar?" I refrained from answering him directly, and to stimulate his interest, I asked, "What do you think?" After some apparently "deep" thought, he replied that he believed they could. I then asked him how he would prove that to me, and the discussions that followed led to the experiment that he eventually decided to do.

After selecting the general idea, Derek encountered his first major obstacle – he had to get his teacher to approve the

This is how the two sugar solutions were set up

experiment. This was no easy task, as the teacher had some misgivings about an eight year old coming into close contact with "bees", even if it was for the purpose of education. She eventually relented and gave him her approval when he assured her that he would be working with his dad, "who is a NASA scientist and (therefore?) knows what he is doing."

After gaining approval from his teacher (and the awe struck admiration of a lot of students in his class who seemed to think that he was placing his very life in danger), he set out in earnest to conduct his experiment. The purpose of the experiment he chose was "To find out if honey bees can tell the difference between sugar water of different sweetnesses."

Derek's hypothesis (or "guess" as he used to call it before becoming a scientist) was that, if the bees were given two dishes containing different solutions of sugar water, "Honey bees will be able to tell which dish has the sweetest sugar water in it, and will go to that one more that the other."

As the Saturday test date drew near, Derek located two shallow plastic dishes at the local market (microwave dinners), and then convinced me to "empty" them for him, a task that we shared with some enthusiasm. A pair of large concrete blocks were to serve as "tables" for the dishes. At "T-minus three days and counting", two quarts of 2:1 sugar solution were painstakingly prepared "just right" for use as "nectar" (he did this in what was once a clean kitchen.) Finally, he made up a data collection form on which he could record all of the data that he was going to gather.

On Friday afternoon when he got home from school, Derek got busy and set out the concrete blocks (he conned a certain large type beekeeper to move them for him, since he didn't "want to drop one and disturb the hive"), directing the positioning so that each one was about six feet from the hive entrance and six feet from each other. He carefully placed the plastic dishes on the blocks, made sure each one was level, and filled them each with "just the right amount" of sugar solution. He did this so that the bees would learn the locations of the "nectar" before the experiment began. Every detail was reviewed several times to make sure that everything was set.

And so, EARLY (4:30) Saturday morning, Derek woke me up (as worried as he had been earlier that day, he somehow managed to sleep soundly through the night, which is more than I can say for "a NASA scientist who knows what he is doing.") "Is it time to get started?" he wondered. He wasn't sure, since the sun hadn't come up, so he couldn't see if the bees were out yet. Luckily, sunrise greeted us with only partly cloudy skies and no threat of rain, which greatly added to the confidence of the budding scientist.

Since he conducted the experiment on January 15th, the temperature at sunrise was in the 40's, a little too cold for the bees to be out and about. Derek reasoned that since the bees could now see where they were going, they should be out. And since there were no bees flying, things all of a sudden took a turn for the worse, and the prospects for a fine day weren't looking good in the eyes of one eight year old. Nonetheless undaunted by all of this, at about 8:00, when the temperature had reached 50°, he went out and refilled the dishes so that there would be a plentiful supply of 2:1 "nectar" in each dish. He returned to the house with the bad news that there were still no bees flying. Then the l–o–n–g one hour wait began.

Almost as if the bees didn't want to disappoint the young scientist-to-be, at precisely 9:00 a.m. the first "girl", as we call them, appeared at the hive entrance and "made a bee line" for dish "A" The fact that the temperature had reached 55° was recorded by Derek, but the significance of that was unknown to him at the time. The initial forager was followed by an ever increasing number of her sisters, and in no time at all the normal numbers of bees were on the wing. A smile from ear to ear greeted me when I asked Derek how it was going.

" Dad, can bees tell the difference between *sweet*, and really sweet nectar?"

And so, between 9:00 in the morning and 2:00 in the afternoon, Derek went out to the "study site" (dishes) every 10 minutes to make a count of the number of honey bees at each dish. I know it was 10 minutes EXACTLY since he insisted that he learn how to set the timer on the microwave the night before (beep – beep – beep), and practiced it enough to nearly cause us to vacate the house. He meticulously recorded the information he gathered on HIS form, and made notes of other things that were going on around him like "cloudy" or "sunny" etc.

At 12:00 noon (beep – beep – beep), he made the count as usual, but then replaced the sugar water in dish "B" with a solution of 1:1 sugar water (half as sweet as that in dish "A"). This had been planned in advance, so he was following the design he had put together for the experiment. He returned to the house, and resumed data collection at 12:10 (beep – beep – beep).

After all of the "fun" was over, Derek really wasn't sure what should be done next. So I showed him how to make a simple graph of the data. This meant that I had to explain about "axis", "scale", "co-ordinates", what lines going "up" meant, as well as what lines going "down" indicated, and a lot

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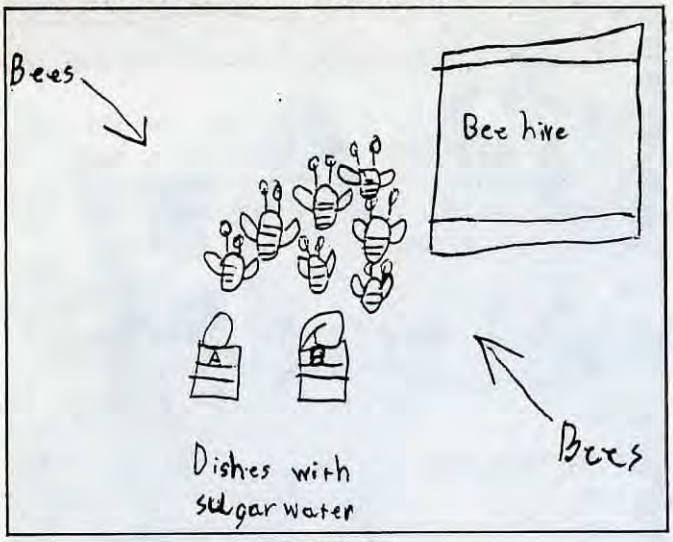
SCIENTIST ... Continued from page 81



The 'plan'

of other things he had never heard about.

The *real* learning began immediately after Derek had connected the "dots" on the graph. As can be seen, the results were outstanding, so good in fact that I wonder to this day if he hadn't explained to the bees what he wanted them to do, so there would be no mistakes made!

After we had talked about the graph, it was quite evident to Derek that the honey bees can tell the difference between solutions of differing sweetnesses, and that they prefer the more concentrated solutions. The conclusions he reached were: 1) The bees begin to fly when the temperature is near 55°; 2) The same number of bees will go to two different places to get sugar water if they are the same sweetness; 3) Bees can tell which sugar water is the sweetest, and more bees will go to the sweetest water, and 4) Bees will go to the next sweetest water when the sweetest water is gone.

But now consider what was really learned. Deciding what to do, forming a hypothesis, designing an experiment to test the hypothesis, planning the execution of the experiment, considering alternatives, planning for problems prior to their occurrence, data collection, recording and analysis, interpretation of graphs, forming conclusions, expressing ideas and concepts in writing, and a good dose of raising self esteem from a job well done. Not bad for a second grade fair experiment.

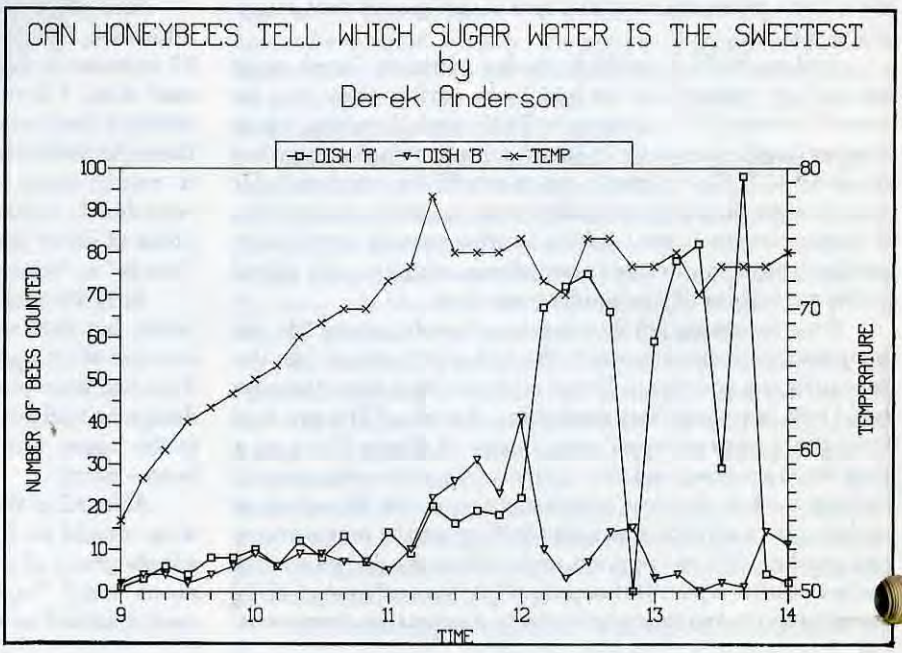
But many others benefitted from his project. He had to explain the whole thing to his class, and so about 30 other children were exposed to the "gentle" side of honey bees. And since he placed first in his class, he also went on to explain the whole thing over again to the judges at the county level competition, where he placed first in his age group.

This all points out that there are many ways that we as beekeepers and parents can educate our youngsters in the fascinating ways of the honey bee, all of which require that we get involved with young people. The experiment that Derek did is but one example of this, and of course, like so many scientific investigations, this one generated many more questions than it answered, each one worthy of additional study. But that isn't all bad, for the questions raised can be put to good use in future projects for Derek if he still wants to include honey bees in his science projects.

I have already begun to get ready for this possibility by putting some of these "questions" together in a sort of booklet I call "A SCIENCE EXPERIMENT BEE-FITTING CONSIDERATION" If and when I get enough ideas to make it worthwhile, I plan to type them up, have them printed and bound, and make them available to schools, beekeeping associations, and interested beekeepers alike at my cost plus actual shipping. But I am rapidly running out of ideas.

And this is where you fit in. If you would like to contribute to our youngsters through this project, I encourage you to send me your ideas. Include such things as a description of the "problem", equipment required to do it (bees are involved of course), and what age group it would be appropriate for. You might even have several "levels of difficulty" that would make it a good project for several age groups. Of course, be sure to include your name and address so that you can receive recognition for your contribution. And when the first set is ready, I'll announce it in *Bee Culture*, so keep your eyes open.

Perhaps the most important thing that came out of Derek's science project however, was the chance for me to work with my son and feel the bond between he and I grow through our mutual admiration of one of God's little miracles. If for no other reason than this, I will always be grateful that there are honey bees in the world. For you see, every time I notice a honey bee, I can't help but think of another very special little miracle who has grown some since that cold November day, but is every bit as inquisitive about "the girls" now as he was then. And who knows. Someday he may even pass along the knowledge he gained to another "scientist looking for an experiment." □



The 'Result'

START RIGHT

DEWEY CARON

Look, learn, observe, experiment, ask questions – and most of all enjoy. Bees can provide hours of pleasure and enjoyment – and *you* can move at the pace you want. This is a singular activity, not a team sport.

If, by the time you read this, you have not made up your mind to start a honey bee colony then I encourage you to read on. To readers who have become beekeepers – to both groups – welcome! Keeping a colony of honey bees is a joy, a challenge and a marvelous learning experience.

Why do people become beekeepers? I have found the reasons to be as varied as the individuals themselves. The opportunity to produce honey or pollinate fruits or vegetables are two popular reasons. People start bees as a challenge, for a hobby, to learn more about bees or to have fun. Sometimes individuals inherit or "find" bees. Or, in the case of a swarm, the bees "find" them.

To be a beekeeper you don't need land nor a lot of money. You won't begin today, learn all you need to know in a month or year and then be bored. Beekeeping is an excellent hobby – it can also be profitable.

All kinds of people become beekeepers. One hundred years ago farmers were beekeepers and some are today. Some individuals are fulltime beekeepers, managing several hundred to a thousand or more honey bee colonies. Full time beekeepers often move and live with their colonies a long way from home for part of the year. However the majority of the estimated 200,000 beekeepers in the U.S. are suburbanites. Beekeepers live in towns and cities large and small and have jobs in factories or in offices. Professional people like doctors or lawyers are beekeepers. Individuals who own their own businesses are beekeepers. Others are already employed in government, education or in countless other occupations. Whatever their job or wherever they live, the common factor is an interest in learning about and improving their mastery over honey bees.

When To Start

You can start a bee colony any time of the year. Usually spring is the best time to start because the bees have the coming season to become established. Also, you have better weather and conditions to learn and experience their ways. In the warmer southern states bee colonies are active nearly 12 months of the year. In the north the active season is shorter. The bees respond to these varying conditions.

What To Expect

Honey bees are a living organism. Their social life is complex. We understand a considerable amount of their biology but not everything. Beekeeping is both a science – the biology of the bee – and an art. Experience is as good a teacher as what experts have written about bees. Everything you have or will read or your interpretation of what they say won't always be correct.

Skillful, perceptive individuals are better beekeepers. Experience helps, as does understanding and assimilating what others write or say. As a beekeeper, you are managing the population of a complex, intricate social organism. With experience and patience, you can expect to pay back your financial investment or even make extra income. The level of commitment you make will provide ample rewards – if it is but a few

Bees in winter. As the snow melts and weather warms in spring beekeepers need to prepare their hives for starting new colonies.

Personal bee equipment – a veil, hive tool (right hand), smoker (at right on ground) and a hive of bees is all you need to get started.

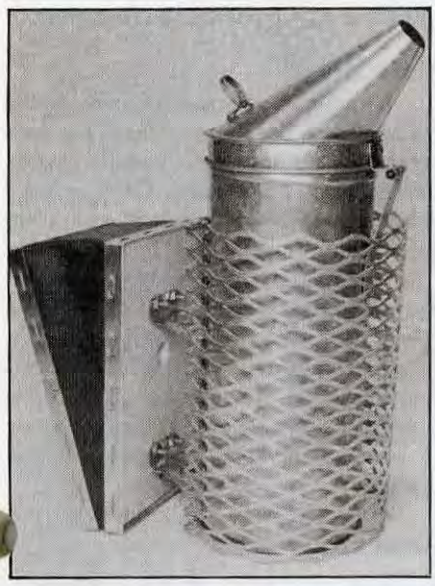
hours or if it is more extensive.

To become a beekeeper you require three basic components. You need:

1. Some equipment – for you and the bees
2. The bees
3. A commitment in time and interest.

Personal Equipment

You need to purchase a few items of personal protection. Beekeepers should have a bee veil and, for many, gloves, coveralls and boots or sturdy shoes. To examine a colony you will also need a bee smoker and a hive tool.



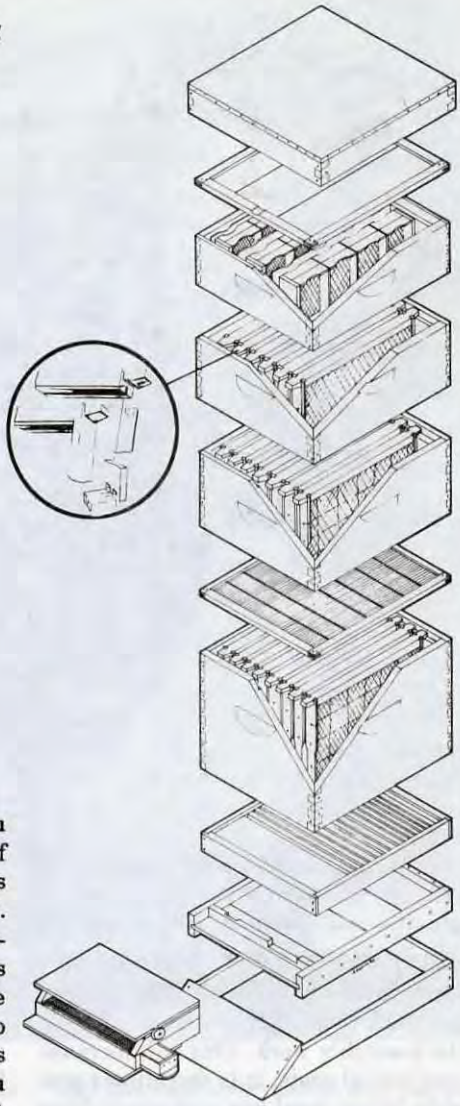
Smokers come in a variety of shapes and sizes. Get as large a smoker as you can because small models tend to go out at all the wrong times.

All the equipment you need you can purchase. You can buy a pair of coveralls that includes a veil or allows easy attachment/removal of the veil. More economically you can use coveralls that are used for work or chores around the house. Veils can be simple affairs like used army surplus mosquito nets or more elaborate, sturdy veils with special helmets. Spend what you feel is appropriate – you should expect to pay more for the best quality.

The hive tool and smoker are the two specialty items you will need to examine an established bee colony. A sturdy hive tool and quality smoker is your best purchase. Once again the price range varies. You should expect to pay $23-35 for the two.

The Hive . .

The home for honey bees is termed the hive. A hive consists of a series of boxes, called hive bodies, each of which hold frames. A bottom board that includes the beehive entrance, and inner and outer covers complete the basic hive. Other items can be added. To start you should concentrate on the basics, adding other items as experience and knowledge dictate.



Beehive equipment is usually purchased new. It is shipped knocked down and you will have to assemble your basic hive. It is possible to have hive

Some like to use gloves, which can be anything from heavy duty models like these, to light weight rubber gloves.

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Capturing a swarm is an excellent means of starting.

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equipment custom assembled for you but you will need to find someone to do the assembly work. This will increase your initial costs. It is sometimes possible to buy used bee equipment from beekeepers with extra equipment to sell, from individuals going out of bees, etc. Buying used equipment requires some skill, and beginners are encouraged to buy new equipment and assemble it themselves. In this manner you will learn to better understand hive basics. Explore used equipment when better equipped to make intelligent decisions.

As when using any set of instructions, some hive items are more difficult to assemble than others. Individuals familiar with basic carpentry tools will find the assembly easier. If something is not clear, query your supplier. Although some parts won't seem to make sense and everyone agrees that a hive could be designed differently, you should first assemble, use and understand the basic hive *before* designing your own.

Types of Supers

One decision you need to make is the type of honey you wish to harvest. (This presumes you wish to produce honey – not all beekeepers want to do so.) The decision is are you going to produce liquid (extracted) honey or harvest honey in the comb? (There is a combination form called chunk honey that is a piece of comb honey surrounded by liquid in a wide mouth jar.)

What are the differences? Extracted honey is easiest to produce, handle and use, but you need specialized (and expensive) equipment to extract the honey from the beeswax combs. Honey in the comb is more difficult to produce, you have less harvest and it doesn't store well but your costs are less. The good news is that you don't need to make this decision the first year since the bees need most of the honey for their own survival the first year.

Hive tools also are available in several sizes and shapes. This is the most commonly used model. It has a scraping edge, a prying end a rail remover.

The Bees

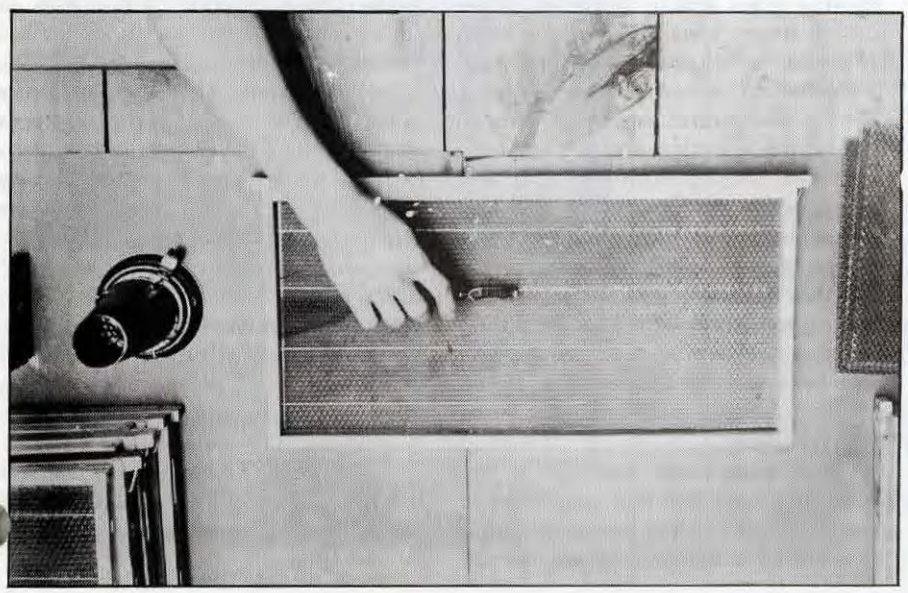
Obviously you need a source of bees to become a beekeeper. There are several possible sources of bees to start a beekeeping adventure. Getting bees from a tree hollow or side of a building into a hive is *not* a good option. Under the right conditions, transferring a colony of bees into a hive is a source of free bees. However, it can be an adventure that becomes a nightmare for the inexperienced. It is far wiser to let wild (feral) colonies be, and either purchase a package of bees or capture a bee swarm.

Package bees are ordered in advance. They are reasonably priced

A single-colony apiary in the backyard.

(about $25.00), gentle and their arrival date established. You assemble your equipment and are ready and waiting for their arrival. The bees are shipped by U.S. mail and delivered to your door (in some communities you may have to go to the post office). You merely have to transfer the bees from package to your hive and you are a beekeeper. Specific directions for care of the package bees and a suitable transfer technique are included on the package, and elsewhere in this issue. Basic beekeeping information has such information and you can prepare for bee arrival by studying such sources.

One thing you may need to do is learn to wire frames.



Alternately, you can capture a honey bee swarm. Swarms are gentle and free. Most are relatively easy to capture and place into a hive if they have recently arrived, are at a convenient height from the ground and close to where you live or work. As with anything, swarm capture sometimes does not go as planned – in which case you have to try again.

Yet another source of bees is to buy an established colony. In this case you get both bees and hive. Prices are usually reasonable ($50 to $100) and sometimes a real bargain. Your only task is to move the colony to your apiary location. This is done at night after closing the bees inside and securing the hive with screening material, masking tape and staples. Two disadvantages for the neophyte in purchasing an established colony are that you might get too strong a colony for your experience level, or

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Getting help. Take a beekeeping course (Dr. Caron with Univ. of Delaware students) or a beekeeping short course.

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you might be buying someone else's problem.

If you hear of bee colonies (bee equipment) for sale and are considering a purchase, ask some basic questions. Why are they selling the colony? Are the bees gentle? Is equipment standard stuff? Will the seller help you get started? The biggest challenge faced by the beginner is in accurately evaluating what one is buying and determining if the price is reasonable.

Where To Put Them?

An apiary, the term for a beehive location site, can vary a great deal. The bees will do well virtually anywhere. It is important to consider your own needs and especially the neighbors when choosing an apiary site.

The bees need a hollow cavity, flowering plants, sunshine, temperatures above 65°F and a source of water. They build their own storage areas out of beeswax (cells) and use propolis (which they gather from plants) to reduce drafts and help sanitize the interior of the cavity. As a beekeeper, you supply the cavity (the hive). You can supplement the nectar and pollen they normally obtain from flowering plants if the bees don't get an adequate amount. This is hardly ever necessary but may be done. Such management can be combined with another activity as when you feed a drug, for example, or to equalize colonies low on food reserves.

Beekeepers should locate bees at their convenience. Colonies can be kept on roofs, behind garages, inside structures, on balconies or virtually anywhere. It is usually better and more convenient to keep bees at ground level. The apiary site may be on rural property quite remote to the home or office of the beekeeper, in a surrounding countryside site or in the yard where you live. The closer the better.

If the site you choose has neighbors close by, you should do several things to help avoid problems in the future. Conceal the hives behind buildings, shrubs or fences especially to keep neighbor kids and pets from wandering into the bee's flight path. And I recommend you talk it out with your own family and neighbors.

The colonies are usually placed on a hive stand – one per colony or several colonies on one stand. You can buy an individual hive stand or construct a stand from materials you might have. Mowing grass around the bees can result in angry bees and bee stings so attention to this detail will help avoid problems in the months ahead.

An additional consideration in apiary site selection are any relevant laws and zoning ordinances. A few communities do have laws that ban beekeeping. More have zoning regulations that might lead to an interpretation that beekeeping is not permitted. Unless you know of a specific ruling banning beekeeping assume you can keep bees at your convenience. If you run into zoning problems you have appeal rights.

And what about liability? If you select an apiary site with neighbors in mind, prepare for your bee colonies and do ordinary management you should not be concerned about liability. If there is a likelihood of people about the site, fence in the bees and make the apiary site difficult for someone to accidently wander into bee flight patterns.

More Information

You are going to need additional information to become a successful beekeeper. There are many good books and videos on bees and beekeeping. Many states have free or low cost extension publications on various aspects of beekeeping. You should subscribe to a bee journal. Many individuals have read a description and then become a beekeeper solely on what they have read.

Some individuals learn best through other means. Experience is one of the best teachers for lots of activities including bees. Get to know a beekeeper in your neighborhood who is willing to take time to tell and show you how he/she keeps bees. Join a local and/or state beekeeping association and attend their meetings. Experts and beekeepers large and small will tell how they keep bees at such meetings. Also find a beekeeping short course convenient to your home and attend – be sure to ask lots of questions.

Your key to success will be how you understand bee biology. We haven't really domesticated the honey bee – we as beekeepers adapt to the honey bee rather than change it to our ways. The more you understand bee biology the better you will be able to have the bees work for you. We can do almost anything with the bees – they are pretty flexible. Some of the equipment we impose on them and some of the management we perform to try to "help" them really is not of service. Look, learn, observe, experiment, ask questions and most of all enjoy. The bees will provide hours of pleasure and enjoyment and even some rewards. □

Next time – Once you have the bees in a hive in your apiary what do you do next? Handling bees to avoid bee stings next time.

HARD START!

HARRY SUSSMAN

As I look back, I can't help but be surprised at myself. You see, I am an average, easy going, sensible, but inquisitive fellow, always eager to learn something new, even at my age, (I qualified as a Senior Citizen a few years ago.) I would never dream of doing anything the hard way, like going down a ladder into a well to bring up a bucket of water, or draining the lake to catch a fish. But that's exactly the way I got started in beekeeping. Here is how it happened.

A good friend of mine, Cliff Holman, kept several colonies on his property in a little town called Poquonock Bridge, about five miles from my home in Waterford, Connecticut. The first time he gave me a jar of honey, I just enjoyed it and told him how delicious it was. But after the second or third time, I became curious and wanted to know more about his beekeeping. He was delighted, and invited me over, opened a hive, showed me the queen, the brood in various stages of development, and told me fascinating stories about the activities and mysteries of bees.

I was hooked. I was determined to get some bees of my own, not so much for the honey, but to observe their fascinating activities. I told Cliff about it and he was so pleased about my interest that his immediate reply was "I have a hive of bees I'll be glad to give you to start you off"

With that he took me over to where "the hive" of bees was. Strictly speaking, I guess, it was a hive of bees. Not a conventional one, but a working hive of bees.

It seems that the year before, Cliff had a large swarm. Not having an empty hive at the time, he put them in an orange crate. What I looked at now was a very large colony, tremendously active, the entire crate full of bees, with an excess covering the outside.

"What do I do now, Cliff?" I asked.

"Why don't you go to Cady's in Old Mystic and buy a hive, and we'll put the bees in it", he said.

Which I did. I assembled the hive, painted it, and a couple of days later brought it over to Cliff's to get my bees.

It wasn't easy. Under Cliff's direction we made an opening in the top of the crate, placed my hive on top and pounded on the orange crate. The only thing that happened was that the bees became very angry. They swooped down on my veil, they dived on my gloves, and attacked my ankles.

Then we tried something else. We put the orange crate on top of my hive and pounded on it. Same thing.

"Why don't we put some honey in my hive?" I suggested.

"Good idea," said Cliff.

We did, and some bees went in. We waited. The bees ate the honey and went back to the orange crate.

Finally Cliff gave up and left the whole thing to me.

I thought about it that night and decided there was only one thing to do.

The next morning I got ready. I took the new foundation out of the frames and put it away. I took my hive, gloves, boots, bee veil, a spool of wire, diagonal cutting pliers and a large kitchen knife. After arriving at my orange crate "beehive" I put on my gloves, veil and boots and got to work. I cut large pieces of honey comb out of the crate, covered with bees, and started wiring them into the frames of my hive.

The bees were furious, and I did not know enough to use smoke yet. They came at me like dive bombers. I didn't know enough to get scared, so I continued working, after a few minutes an amazing thing happened. The bees became absolutely quiet. No angry buzzing, no divebombing! They were completely submissive, allowing me to complete my work without the slightest resistance. I got the impression they actually tried to help me. I found the queen on one chunk of comb and I knew I had it made.

> "... after a few minutes, an amazing thing happened."

I took the hive home and watched it for several days. I noticed the bees were carrying out white fluffy stuff, dropping it in front of the hive, but other than that everything looked normal. They were bringing in pollen and nectar and behaving normally. When I opened the hive several days later I found out what the white fluffy stuff was. I had wired the combs with cotton-covered copper wire and the bees had stripped all of the cotton off and removed it from the hive.

I had a great time watching those bees. I opened the hive two or three times a week, inspected the combs, watched the queen work and brought all my friends over to watch. Everything looked fine.

But then came the next spring – disaster! When the weather warmed up in April I expected to see the bees flying. They weren't.

I opened the hive. What a sickening sight! Thousands of dead bees and a family of field mice – papa, mama and five tiny little ones.

I found out I had neglected to do two things: put in the entrance reducer which restricted the entrance, and make sure the bees had enough food. My bees had starved to death. I had started the hive in June, which, apparently, was too late to allow them to develop and gather enough honey for the winter.

It was already too late to order bees by then, but that whole season I read books, talked beekeepers in the area and ordered a package of bees to be delivered early the *next spring*.

This time everything went fine. The bees accepted the queen, the colony developed rapidly and I even got some surplus honey, about half a super.

Since then I have learned a lot. I have five hives, a number my area can support without any problems. I use double brood chambers to make sure my bees don't run out of food, and I restrict the entrance in the fall to make sure mice don't get in. In contrast with my first catastrophe, everybody is happy now. The bees seem to be happy, I am happy watching them, and best of all my friends are happy when they get our honey. □

PACKAGED FOR SUCCESS

JEFFREY L. OTT

It's February. The weather doesn't make you want to do much. Actually, you probably feel there's nothing much to do. You have some new hives you could knock together, or you could clean up and repair some of last summer's honey supers. But, the easy chair looks better and has a stronger appeal. February beekeeping in the North leaves you with little to do except reading, dreaming and planning for the coming season.

To many beekeepers, planning for the coming season includes deciding how many packaged bees to buy. They do this not only to start new hives, but to replace colonies that may have died during the winter. Where do these packages come from? What does it take to prepare thousands and thousands of these for shipment beginning in April? How are all of these packages delivered? What does the Post Office think about 'packaged bees'? If you're like most beekeepers this time of year, as you rock slowly in your chair, these thoughts enter and leave your mind as quickly as honey bees from a hive during a strong nectar flow.

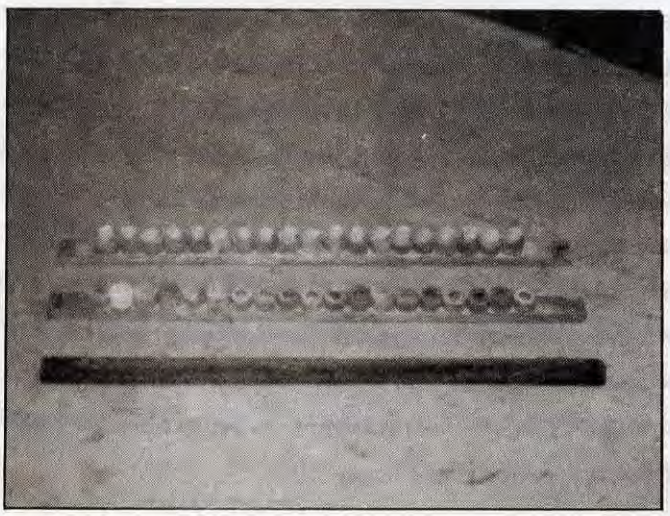
Package bee producers from the southern states and California have been supplying Northern beekeepers with bees for many years. Weather conditions in these areas provide an almost year-around nectar and pollen source for the bees. This gives the package bee producers a four-month jump on colony increases and queen production.

Basically, packaged bees consist of honey bees that have been placed in a box or "package" and shipped to the beekeeper. These packages vary in size, depending on how many bees there are in an order. A package that measures 10" x 5" x 14" will easily hold two pounds of worker bees (about 8,000), a queen in a small cage and a small feeder can of sugar water. Generally, the package has black screening across both sides to provide plenty of fresh air for the bees while in transit.

Daryl Wenner, of Wenner Honey Farms in Glenn, California, and Reg Wilbanks, of the Wilbanks Apiaries, in Claxton Georgia, are two of the many bee breeders and packagers in the United States today. Their operations are typical of what is required to fill the many orders they receive each year. Hurt by the 1987 closing of the Canadian border to bee importations from the United States, these and many other breeders are now concentrating on producing bees for commercial and hobby beekeepers in the United States.

The season for the package bee producer already began in late December or January. About this time of year producers begin to feed colonies sugar syrup and pollen substitutes. In California, producers, like Daryl Wenner move their

First steps in preparing the cell holders.



Grafting includes moving larva from a frame to a 'prepared' cell cup

colonies to almond orchards about the first of February. Besides the income from pollination fees, the almonds provide a natural floral source for the bees to build on, which helps build the colony's population. Southern producers like Reg Wilbanks need to feed their colonies into March.

The process of grafting queens begins around the middle of February, but depends heavily on the local weather conditions. Grafting is the manual process of transferring one-day old larvae into specially prepared wax or plastic queen cups using a small tool called a 'grafting spoon' The nurse bees in the incubator hives then build up these cups, and in 10 days the finished product will be the familiar 'peanut-like' sealed queen cell. This enables the breeder to have queens ready for packages at the beginning of April.

The queen breeder will have special 'queen mothers', who may be artificially inseminated queens, bred for specific qualities. From these special queens, a breeder will select the larvae that will be raised into the queens he will sell. Once the breeder has started raising queens for the season, the process

Continued on Next Page

Reg Wilbanks holds a healthy frame.

Making package boxes, or cages

BEFORE

Before You Order
There are several points to consider before ordering package bees.

How many pounds of bees ...
There are no fast rules. Ask experienced beekeepers in your area. However, beekeepers often buy a two or three pound package for each hive they plan to start.

From whom should I order ...
Most breeders are reputable and provide a reliable service. Ask beekeepers in your area what kind of success they've experienced. Breeders in every state have had to battle Varroa and Tracheal mites. This is costly and the breeders have had to pass the cost onto us. Ask about mites. The bees should have been inspected. They should say they've been certified "Apparently mite free." Some breeders ship bees and/or queens with an Apistan™ strip for a nominal charge. Ask about preshipment treatments.

When should I order ...
Package producers want you to order early. Generally, they request a minimum deposit which helps them plan for the season. Don't wait too long, some packers stop taking orders for packages early in the season.

When should they arrive ...
Check with experienced area beekeepers. The general rule is to try to have the bees arrive about the same time as pollen becomes readily available. In the North, this is about fruit bloom or dandelion time.

Anything else ...
Yes. Join an area beekeeping club. There are beekeepers that are overflowing with knowledge, so let some land on you. You may go together on orders with other beekeepers to get a quantity discount. You and others may plan a trip and pick up a truckload of bees for yourselves. This can be a very worthwhile experience! Bee clubs are valuable resources, to keep in touch with the industry to get the latest information on what is going on.

On the right a 'queen mover' goes through a colony before a 'shaker' behind him fills packages from the colony.

PACKAGED ... Cont' from page 93

cannot be stopped. The queen's development is as meticulous as clock work and a day cannot be missed for any reason. Otherwise, it is possible to lose all of the queens before they are placed into the mating yards.

Mating yards are special locations that a breeder sets up with hundreds of queen mating nucs. Queen nucs are small four or five frame colonies virgin queens are placed in.

It takes all of March to prepare and make the 10,000 or so queen mating nucs. Careful records must be kept and shortly before a queen is ready to emerge the cell is moved from the incubator hives out to the mating yards and placed into a mating nuc. Here the queen emerges and stays during the time she makes her multiple mating flights. Her total time in the mating yard is about two weeks. This insures that the queens sent with the packages or sold separately are mated, healthy and productive layers.

Beginning about April first, packages are prepared to be shipped north. The key to the business, according to Reg Wilbanks, is organization. This is evident in the method he uses for packaging the bees.

He starts by getting his trucks to the bee yards. On these trucks he carries air compressors, pneumatic staplers, the canned sugar syrup and the queens to be installed in the packages. To avoid taking the resident queen from a "bee donor" colony and also to insure that enough bees remain to help build the colony back to population, 'queen movers' work ahead of the packers. The movers go through the colony, find and remove the queen. They only place her back into the hive with enough bees so the colony will be able to rebuild quickly. The queen movers then leave frames of excess bees leaning against the hive. Right behind the movers come the 'shakers' Their job is to shake the bees from the frames left leaning into a huge funnel and into the packages.

This is a critical job, for the bees need to be shaken enough so they fall off the frame, but not so they are jostled too much. The theory is these bees, having just gorged themselves with honey, will rupture their honey stomachs if they are shaken too much – they look fine, but will soon die. For this reason the shakers don't wear gloves, which makes them more sensitive to the treatment they give the bees.

Even though the bees are packaged and sold by weight, the shakers package mostly by sight. Experienced shakers can properly package the right number of bees. There is always a scale available on the truck, but it is not used often. Don't let this worry you though, these experienced shakers always put more bees in the package than you ordered. They over-compensate for the bees heavy with honey, and those that may die in transit.

After the bees have been packaged, the sugar syrup can and the queen are added. Once everything is in place, the lid is stapled down. The package is then placed on the truck.

The packages are then taken back to the warehouse where they are labeled and placed into the 'cool room' The temperature in the 'cool room' is kept between 60°-65°F to keep the bees in a cluster.

If you think this is labor intensive work, you are right! During this time, Wilbank's Apiaries employs 10 to 12 people, seven days a week, between 12 and 18 hours a day!

The bees are shipped to the customer the day they are packaged. Some are shipped crated together with other packages, when going to the same destination. Others are shipped individually, generally to hobbyist beekeepers via Parcel Post. One would think that shipping thousands of packages out each year the Post Office would be hesitant to handle the bees, but the relationship between the packers and the Post Office is very good. In fact, the Postal Centers who handle the bees sent by Daryl and Reg speak highly of the package bee business.

The bees are picked up from the packers by a mail contractor, such as Johnson Star Route, and loaded on trucks with plenty of room between the packages so air circulates freely. They then usually go to a Postal Regional Center. The major worry when shipping bees is high temperatures. If the temperature reaches 100°F, the bees are not sent, which is why most packers do not ship bees during the summer months.

From the Regional Center the bees are shipped to their final destinations, again via Parcel Post. Ordinarily, bees can be safely transported up to 650 miles within five days. Shipments of this time and distance insure the bees' viability upon their arrival at the beekeeper's home.

Even though Post Offices in the South and in California may see bees every day from April to June, your local Post Office may not get them very often. It is a good idea to notify the Postmaster several days before the bees' expected arrival that the package is on its way. Let him know you would like to be called as soon as they arrive. This way he can let his people know that this unique package is on its way and you don't have to wait while your bees tour half the county. Then if you have your equipment ready and set, you can sit back and read your latest bee journal, knowing the Post Office will call as soon as your bees arrive.

The wind may be blowing and the snow may be falling just outside your window, but there are many people right now working hard to give you the best possible start to this year's season. Through the efforts of the producer and the Post Office, your bees will arrive healthy and ready to bring you a season of golden pleasure - packaged for success!

INSTALLATION

There are as many different ways to hive a package of bees as there are package bees to hive. Choose a technique that sounds best for you and your experience or one that the other beekeepers in the area use. You'll find that honey bees are pretty forgiving.

Before the bees arrive have all of your equipment assembled, painted and ready to use. If the hive has been freshly painted let it air out for a couple of days. Have all of your equipment in the place it will stay and ready to use. You'll avoid a lot of last-minute panic and unplanned rushing around.

Your bees have bounced around in the package for several days and they'll be ready for a place to call home. It is best to hive them as soon as possible. However, if you cannot hive the package immediately, store the bees in a cool, dark, dry place, such as a garage or basement. Feed the bees with a 1:1 sugar:warm-water mix, using a misting sprayer and applying directly to the screen. Be careful you do not use a spray bottle that previously contained poisons or cleansers. If they are agitated, this feeding will help to quiet them.

It is best to hive the bees later in the afternoon. This will keep flying to a minimum and by morning, the bees will have settled into the new hive. Before you start, feed the bees once again. One way to install a package starts by removing the hive cover, inner cover and several frames from one side of the hive. If you wear a bee suit, veil and gloves put them on at this time. Experienced beekeepers will tell you protective clothing isn't needed while installing packages, the theory being that the bees are disoriented enough and they won't sting. Do so at your own risk, at least initially. However, if you want to learn to work bees without wearing gloves, this is an ideal time to start.

Next, spray the bees with sugar water again, and give them a moment to lap some up. Tap the package on the ground just hard enough to dislodge the bees from the top of the package. With your hive tool, remove the cover of the package. You will see the can that contains the sugar syrup the bees used for food during the trip, and next to that the metal tab that holds the queen cage. Pull up the can far enough so you can remove the queen cage, and set the lid back over the opening of the package. Inspect the queen and make sure she is alive and apparently healthy.

At one end of the cage remove the cork covering the white candy. Sometimes a cork is not used and just the metal tab covers the candy. Swing this out of the way. Use a frame nail and pierce a small hole through the candy. Be careful not to go so far as to lance the Queen. Place the queen cage down between two frames, hanging by the metal tab or wire. Position the cage so the candy is facing up, and the cage screening is 90 degrees to the frame. Push the frames together to help support the cage. Make sure the screen side is not covered by comb material. The bees *must* have access to the queen.

Then, remove the cover on the package. Carefully remove the syrup can and set it aside. Pick up the package and to gently shake the bees into the hive, making sure to dump some directly onto the queen cage. Shake the remaining bees into the space left open from the missing frames. You won't get every bee out of the package, so set it down in front of the hive. Gently replace the frames you removed earlier. Do not force the frames down into place. You will squash many of the new bees. Rather, let the frames slowly settle in place on their own as the bees move out of the way.

Slowly put the hive back together, being careful not to smash any bees in

Continued on Next Page

Gently shake the bees down to the bottom and spray with sugar syrup.

Remove cover. Note feeder can, and tab holding queen cage.

INSTALLATION ... Cont. from 95

the process. You should feed the bees sugar water to help them draw out the comb if the hive has all or mostly new foundation. Make sure to install an entrance reducer. This will keep the entrance down to the size the small colony can protect.

Things from this point will happen pretty much on their own. Check the queen cage in three days to make sure the queen has been released. If she is still in her cage, release her. In either case, remove the empty queen cage.

These are the basic points of hiving your new package of bees, but there are many variations. However, if you stick to the basics (as described here or any of the many other publications on the subject), you'll find success. Experiment and find a system that works best for you and your location. □

Lift up feeder can enough to remove queen cage. Replace feeder can.

Poke small hole through candy in queen cage. Don't injure queen.

Install queen cage between two frames, making sure she has perfect exposure to bees. Remove feeder can from package, and dump a handful of bees on top of queen cage

Dump remaining bees into hive. Try & leave dead bees in package. When done, place package in front of colony so remaining bees can find 'home'.

Carefully replace frames.

Feed a light sugar syrup for three to four weeks, or until a strong honey flow starts.

FIGHTING FOULBROOD

BENJAMIN A. UNDERWOOD

Vigilance, and an ability to recognize the disease are essential to detecting AFB

The beekeeping industry in the U.S. has been plagued recently by tracheal mites (*Acarapis woodi*) and varroa mites (*Varroa jacobsoni*) and is faced with the imminent arrival of Africanized honey bees from Mexico. These several problems are serious enough to warrant the attention of all beekeepers, but therein lies a further complication of an insidious nature. Publicity surrounding mites and Africanized bees directs attention and limited financial resources away from that traditional scourge of beekeeping, American foulbrood (AFB).

Recent disturbing incidents involving the destruction of several hundred colonies in Florida prompt this reminder that, despite the amount of publicity directed toward other problems, AFB has not diminished in importance and may even be on the increase. Commercial beekeepers should be well aware of the seriousness of AFB and they probably do not need reminding; they comprise only a small fraction of the total number of beekeepers in the U.S., however. Most beekeepers are hobbyists, who keep a few colonies for their own pleasure, or sideliners, who keep up to several hundred colonies and depend on income from their bees to supplement other sources.

Beekeeping has a high rate of turnover among its practitioners; perhaps as many as 10% of all beekeepers give up each year, while an approximately equal (though lately, a lesser) number of people take up the hobby for the first time. Beginners bombarded with information about mites naturally focus attention on the parasites and may be unaware of the importance of AFB. Procedures for preventing, detecting, and eliminating mites are completely different from those needed against AFB. Furthermore, state apiary inspection programs, which were originally established to combat AFB, have been strained by the burden of mite problems. Budgetary considerations dictate that only a fraction of colonies be examined by state inspectors each year. Thus, much of the responsibility for controlling AFB lies with the *individual beekeeper.*

This article is directed at hobbyists and sideliners and is intended as an overview of the AFB problem. Numerous books and journal articles, a few of which are cited in the bibliography, can provide additional information about various aspects of the disease and the interested reader is invited to explore the literature further.

THE DISEASE American foulbrood is caused by the bacterium *Bacillus larvae,* which has two distinct life stages: a multiplying, rod-like stage and a non-reproductive spore stage. From the beekeeper's point of view, the more important stage, because it is the one that makes AFB such a serious problem, is the spore. Spores of *B. larvae* are resistant to heat, desiccation, and treatment with medications or other chemicals and may persist and remain infective indefinitely (at least 35-50 years).

An AFB infection begins when a young larva (less than 3 days old) ingests spores of *B. larvae.* Contaminated equipment, honey from a colony infected with AFB, or even a beekeeper's gloves or hive tool might be the source of those spores. Once the spores reach the favorable environment of the young larva's gut, they germinate, transforming into the rod-like stage and multiplying rapidly. Eventually the immature bee is killed, with death occurring *after* the cell is capped (i. e., when the brood is in the late larval or early pupal stage). Within a few days, the bacterial rods in the corpse transform into spores and so become infective to other larvae within the colony.

Since only one or a few spores are needed to cause an infection in a young larva and a single dead pupa may contain billions of spores, the disease can spread very rapidly. Dead brood that is not removed by adult bees turns into a semi-liquid brown mass, which eventually dries to a hard, flat scale. AFB scales adhere tightly to the lower cell wall and are difficult or impossible for the bees to remove.

As indicated, the disease may spread rapidly within a colony; it may also spread between colonies. Workers from an AFB-infected colony may drift (move accidently) into nearby colonies within an apiary. Drifters may carry spores on or within (spores are harmless to adult bees) their bodies and so infect other colonies. Colonies weakened or killed by AFB may contain contaminated honey and be attractive to robber bees. Robbers can spread AFB not only within an apiary, but also to colonies several miles away.

DIAGNOSIS OF AFB IN THE APIARY Vigilance on the part of the beekeeper and an ability to recognize the disease are essential to detecting an AFB infection and minimizing the damage if one occurs. It is especially important that beginning beekeepers make frequent (at least monthly) inspections of the brood nests of their colonies. Some will argue that this could increase the chances of being stung or that frequent inspections might reduce honey production. Anyone afraid of being stung should not be keeping bees and any losses due to

Benjamin Underwood recently published an article about his research on the world's largest bee, the Cliff Bee in Népal. The article appeared in Natural History.

disturbances will be more than compensated by increased knowledge of the inner workings of the hive.

Every beekeeper should be familiar with the appearance of a good brood pattern and of healthy brood. Brood pattern refers to the arrangement of eggs, larvae, and pupae within the brood nest. A good queen will walk slowly over combs and place an egg in nearly every available cell. Usually eggs are laid in a pattern of concentric circles; this is especially noticeable in early spring, when both colony population and the brood nest are expanding rapidly. If the colony is healthy, nearly 100% of larvae will be reared to adulthood. The result will be brood combs with nearly every cell occupied and adjacent cells containing brood of similar age - a "good" or "solid" brood pattern. Close inspection will reveal that healthy larvae have a glossy, pearly white appearance and are curled into a tight "C" shape in the bases of the cells. Older brood cells have uniform light to dark brown cappings, which are slightly domed (bulging outward).

Any deviation from a good brood pattern or from a normal appearance of cells within that pattern should be cause for concern. A poor or spotty brood pattern, one with many empty cells or with brood of mixed ages in adjacent cells, is not necessarily indicative of AFB. A failing queen or any one of several other diseases could also cause an abnormal brood pattern. The key to diagnosis of AFB is close examination of individual brood cells.

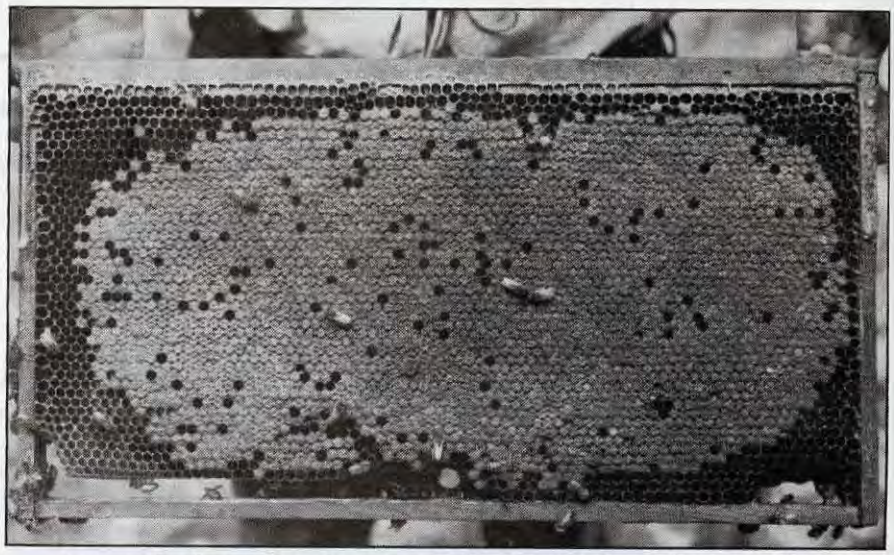
Brood cells are often more easily examined if most of the adult bees are shaken from them. Contents of individual cells are best revealed in strong sunlight; the examination process is similar to searching for eggs in dark comb. Stand with the sun over your shoulder and, holding the brood frame by the top bar, tilt the comb so that the light plays into the cells.

Any brood cells with capping that are discolored (darkened), sunken, or perforated demand special attention. If brood within a capped cell has died, workers may begin to uncap it. Sometimes cells are completely uncapped, but their contents may not be removed; other times, cappings are merely perforated. Use a corner of a hive tool for complete removal of perforated cappings in order to examine all contents.

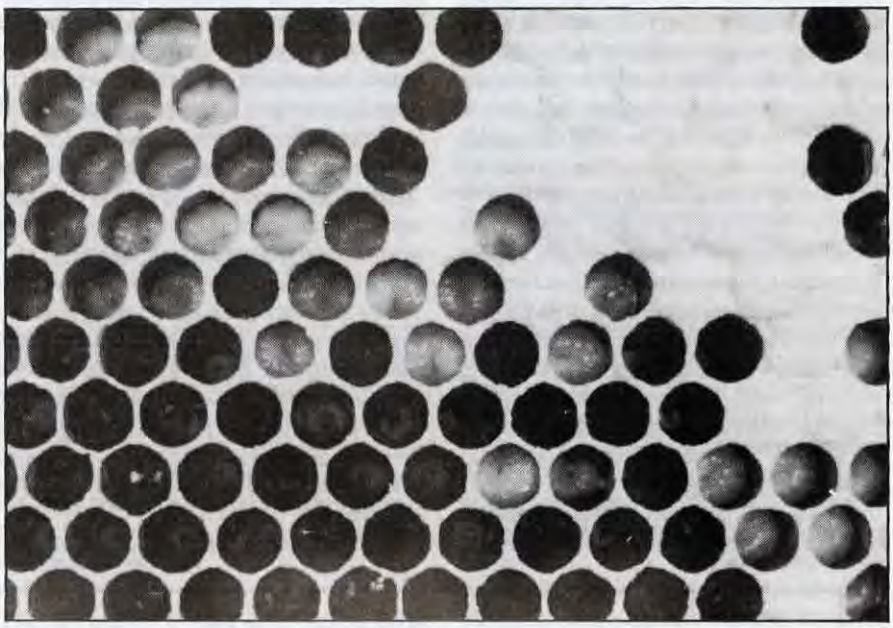
After an immature bee has died from an AFB infection, its corpse begins to decay and it may give off a foul (hence the name foulbrood) odor. Since brood that has died for any reason will begin to smell within a short time, odor alone is *not* diagnostic of AFB. Larvae that have died of AFB lie stretched out flat along the lower cell wall. This is in contrast to larvae that have died of European foulbrood (EFB), the disease most easily confused with AFB. European foulbrood usually kills larvae *before* the cell is capped; corpses often appear twisted in the cell, rather than flat. Finding a few twisted corpses should not lead you to conclude the colony has no AFB, however; mixed infections of AFB and EFB are not unknown, and may be common in some years.

Shortly after the death of a larva from AFB, the corpse will have a runny texture, but within a few days, it may become ropey. Ropiness is characteristic of AFB (EFB-killed larvae do not become ropey) and may be tested for by inserting a toothpick or other thin sliver of wood into the corpse. The decaying mass is stirred and then the toothpick is withdrawn slowly. If a thin thread of material can be drawn out to a length of an inch or more (it usually snaps back after being drawn too far), AFB is indicated. (A common comparison is rubber cement). You may need to test a number of dead larvae before one is found in the stage of decay that exhibits a ropey texture. Of course, dead brood that has dried to the point that it has begun to form a hard scale cannot be used for the stretch test.

Continued on Page 101



An example of a good brood pattern, nearly symmetrical and almost completely filled.



Close-Up. Note pearly white C-shaped larva in cell bottoms.

WHO SUFFERS?

R. MUNGARI
H. JAMNBACK

American Foulbrood (AFB) is a, usually, fatal disease of honey bee larvae produced by spore-forming bacteria. It is such an important pathogen that most states have established apiary disease control programs to reduce AFB rates.

Information on the incidence of this disease obtained from state apiary disease control programs normally consists of the percentage of colonies infested, the percentage of apiaries infested and the total number of each inspected, without any indication of the confidence limits of the AFB rates. Additionally, the methods of selecting apiaries and colonies for inspection are not specified.

In 1986, New York State (NYS) established a procedure for systematically inspecting apiaries. It was recognized that beekeepers with easily accessible yards, with good (or bad) histories of AFB, with good (or bad) relationships with the apiary inspector and with large (or small) numbers of hives might be inspected disproportionately depending on the biases or prejudices of the inspectors and/or their supervisors.

Unless all, or almost all of the colonies in the state are inspected, an unbiased method of selecting colonies for inspection is needed. While random sampling of apiaries on a statewide basis would have had statistical merit, it was not feasible for the state, because of its size, and the distribution of its 11,000 apiaries and 120,000 colonies relative to that our 18 seasonal apiary inspectors.

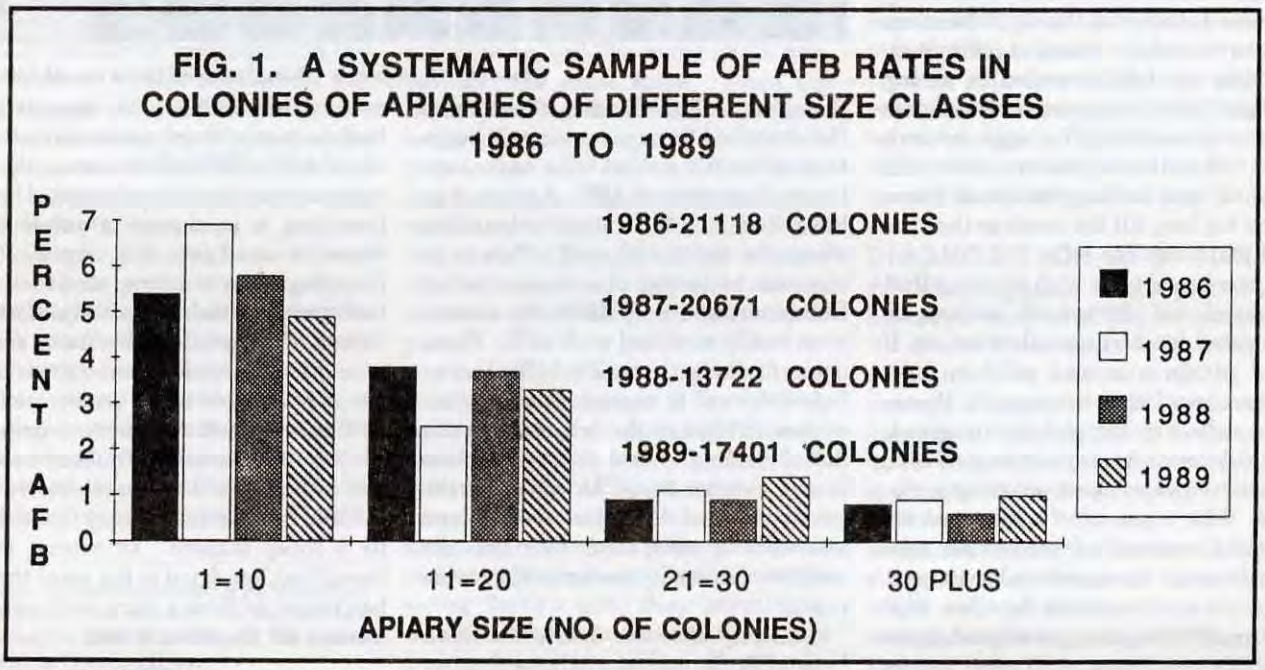
As a compromise, every fourth apiary in the state registry was selected for inspection in a given year and the records derived from these inspections (called the systematic sample) were used for statistical analysis. All colonies in the selected apiaries were inspected for AFB. Because the apiaries are listed in the state register by county and township, the numbers inspected were directly proportional to the number of apiaries in each township and were random (that is, without apiary inspector or supervisor bias) as to apiary size, time since last inspection, history of disease, ease of access etc. Because some beekeepers went out-of-business, moved or could not be located and because of the increased workload due to tracheal and varroa mites, a majority, but not all of the selected apiaries, were inspected.

With these systematically collected records, it was possible to determine the AFB rates and confidence limits for different beekeeper groups – hobby, sideline and commercial beekeepers. It was also possible to evaluate year-to-year differences on a state-wide basis. This method of sampling and analysis is not more expensive than other methods and will, in the long term, result in savings because high-risk groups of beekeepers can be detected and targeted for increased monitoring and control.

The statistical procedure used, "an evaluation of the significance of the difference between two percentages " (Swaroop, 1966) was selected because it uses the data traditionally collected by apiary inspectors (the number of colonies and apiaries inspected and the AFB rates for each).

Using this procedure, the state-wide AFB rates in colonies of apiaries of all sizes taken together were as follows:

1986–2.1% -21,118
1987–2.6% -20,671
1988–2.3%-13,722
1989–2.2% -17,401



These year-to-year differences were small, indicating that AFB rates in colonies in the state neither increased nor decreased appreciably during this period.

There were, however, significant differences for all four years between colonies in apiaries of different sizes. These differences, which were consistent for all four years, are shown in the first chart.

Hobbyists (defined as having one to ten colonies per apiary) had AFB rates of about 6.0%, sideline beekeepers (11-20 colonies per apiary) had AFB rates of about 3.0% and commercial beekeepers (21 or more colonies per apiary) had rates of about 1.0%. This systematic sample made up about half of the total number of colonies inspected.

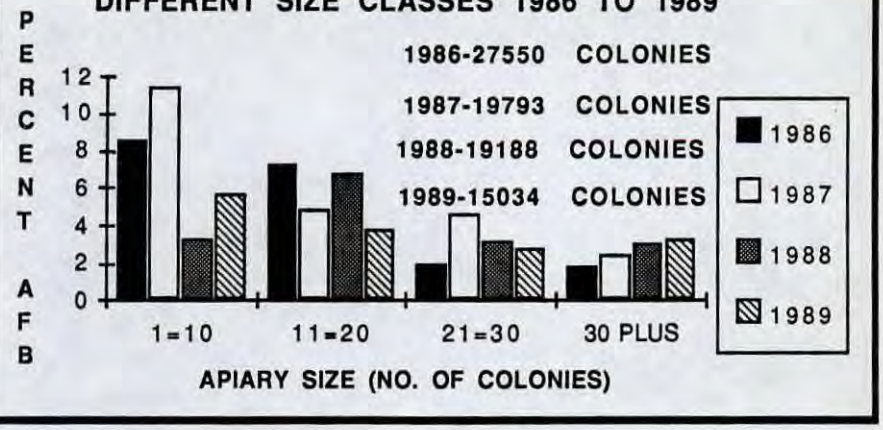
In contrast, the AFB rates in the "non-systematic collection" carried out in apiaries selected by the inspectors and apiaries of migratory beekeepers, requiring certification for interstate movement, were much less consistent from year to year as can be seen in the second chart, the AFB rate varied much more from year to year (about 8.0% among hobbyists in 1987, compared to 1988).

From this we conclude that it is essential to specify the group or groups inspected and to sample these groups systematically.

Commercial beekeepers are, on average, more knowledgeable about AFB, and their lower rates may reflect the widespread use of oxytetracycline (Terramycin®) to prevent and control AFB. Returns on a 1989 apiary questionnaire sent to NYS beekeepers with five or more bee yards (we considered these to be mostly commercial beekeepers) indicated that 95% used Terramycin® to prevent AFB.

While we have not surveyed the use of Terramycin® by hobbyist beekeepers, it appears that few are familiar with the use of antibiotics, or with the appearance of AFB for that matter. As a result, they are at higher risk and require increased attention from apiary inspectors. □

FIG. 2. A NON-SYSTEMATIC SAMPLE OF AFB RATES IN COLONIES OF APIARIES OF DIFFERENT SIZE CLASSES 1986 TO 1989



References:

Swaroop, S. 1966. *Statistical methods in Malaria Eradication*. World Hlth. Org. Monog. Serv. 51: 164 pp.

FIGHTING ... Cont. from Page 99

The test for ropiness may not even be necessary if the comb contains pupae killed by AFB. Cells uncapped by workers or by the beekeeper may reveal dead pupae with their tongues extended *upward*. A pupal tongue extending from a dried scale is the unmistakable diagnostic feature of AFB.

If you have had little experience with diseases you may be unwilling or unable to make an AFB diagnosis. Nearly every state has an Apiary inspection program established for the purpose of controlling AFB. Any beekeeper with an undiagnosed disease problem should seek assistance from an inspector. In a few cases, even an experienced inspector may have difficulty making positive identification of AFB in the apiary. Perhaps the disease is in its incipient stages and there is little dead brood in the colony. In instances where no pupal tongue can be detected, an inspector may be reluctant to diagnose a colony without calling for a laboratory test

There are a number of laboratory techniques available for positive identification of AFB in properly preserved brood samples. In most states, you or an inspector can send a sample to the head office of the apiary inspection program. A piece of comb containing diseased brood should be cut from the frame (a sample about two square inches should be sufficient), wrapped in paper (never plastic, which might encourage mold formation, making diagnosis impossible), and sent in a sturdy cardboard box.

TREATMENT Once a diagnosis of AFB has been made in one of your colonies act promptly to remedy the situation. Remember that AFB is highly infectious and that other colonies, both within the apiary and for miles around, are at risk. A hive tool used in inspecting an AFB colony must be thoroughly cleaned (with alcohol or steel wool) before being employed in another colony. Gloves are almost impossible to decontaminate, which is why many experienced beekeepers prefer not to wear them at all.

Every beekeeper should be aware of relevant state laws regarding the treatment of AFB-infected colonies and contaminated equipment. Most states quarantine AFB colonies, allowing neither their sale nor movement without a permit. Some states allow treatment with oxytetracyclene hydrochloride (OTC, sold under the trade name Terramycin®), the only drug currently registered in the U.S. for use in controlling AFB. Terramycin® is effective in killing the rod stage of *B. larvae*, but it does not destroy the spores. Consequently, colonies treated with OTC may be subject to reinfection once the treatment course is completed. For that reason, some states do not allow treatment of AFB-diseased colonies, but instead demand that they be destroyed by burning.

Burning a colony of bees can be a traumatic experience for any beekeeper, but following a few simple procedures may insure that the whole process does not have to be repeated with another colony in a few weeks or months. Assuming that the disease has been diagnosed before the death of the colony, the first task is to kill the remaining adult bees. Any of a number of commercially available insecticides formulated for use against bees may be employed. These are usually sold as wasp and hornet sprays, but the labels will list bees among the target insects; instructions for use will also be found on the labels.

Whatever method is chosen, *every* colony member must be killed. No bee should be allowed to escape and per-

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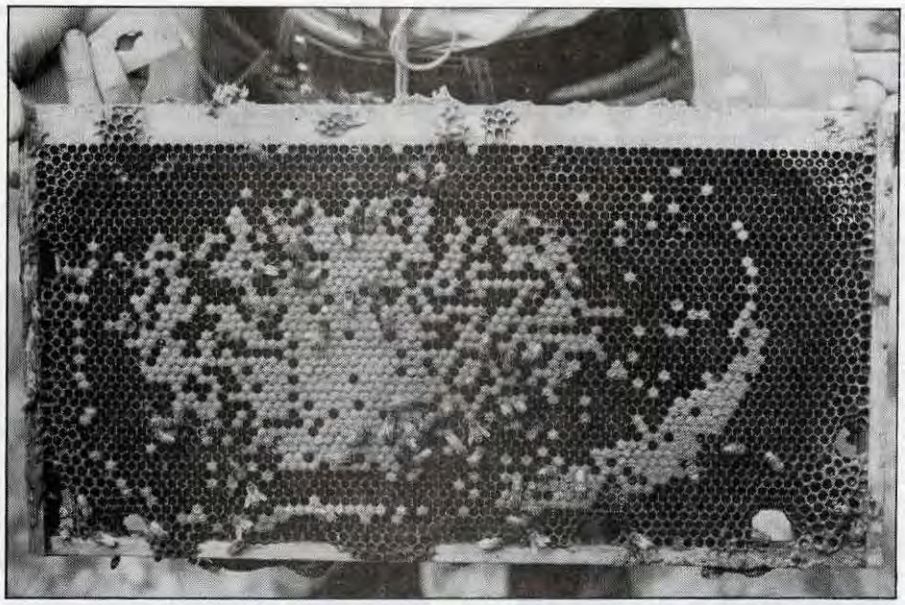
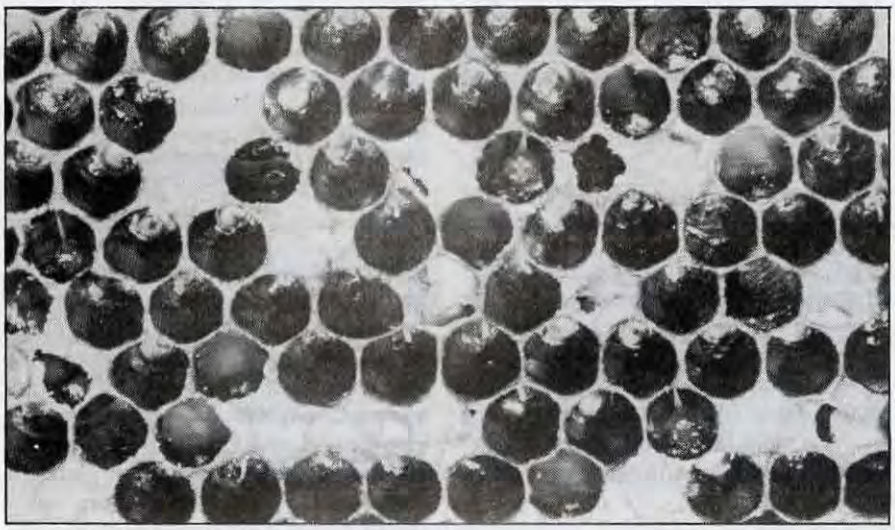
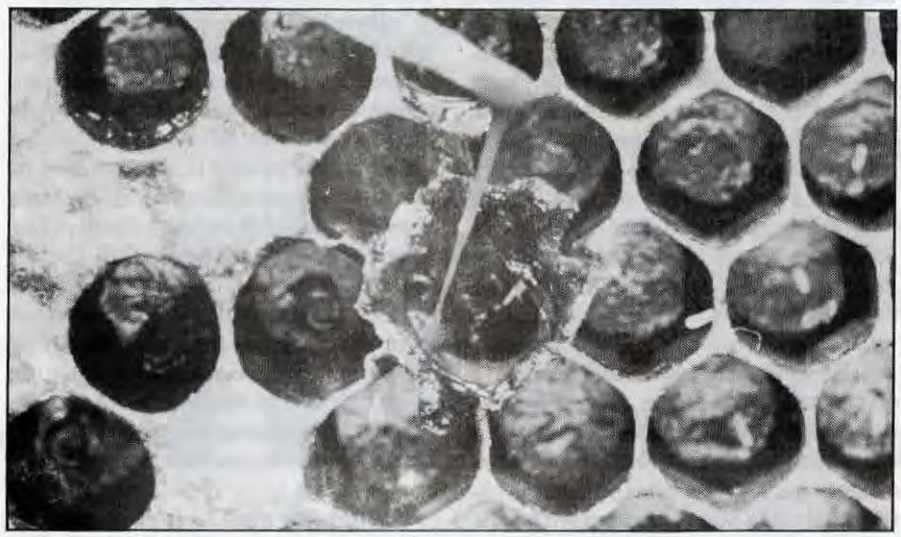


A poor brood pattern, especialy in the center of the frame – 'spotty'.



Close-up. Note especially the cells with dead larva with their tongues sticking up.



Using a small stick, twirl the end in a cell you suspect died of AFB, and withdraw slowly. If you get this type of reaction – a 'ropey' characteristic – you can be sure you have problems.

FIGHTING ... Cont. from page 101

haps spread the disease by drifting into another hive. Destroy the colony at a time when there is no flight activity: after dark or perhaps early in the morning if the weather is cool. After spraying the bees, seal the hive so that none escape. It may take some time for all of the bees to die; meanwhile, prepare the fire pit.

In all steps of the burning process, remember that AFB is highly contagious and assume that spores will persist indefinitely if not burned. Care must be taken to insure that no honey, bits of wax, or dead bees are left on the ground outside the fire pit.

The pit should be situated away from buildings in an area that is unlikely to be disturbed (do not dig it in the garden!). Dig a hole at least two feet deep and large enough to accommodate the charred remains of all combs from the colony or colonies to be destroyed. A pit two feet wide and three feet long should be sufficient for one to several colonies. Pile dirt from the hole around its edges to act as a firebreak. Place two poles about three inches in diameter and long enough to span the hole about a foot apart over the pit; these will be used to suspend frames and other hive parts within the flames of the fire.

Begin by burning the empty combs and those with the least amount of brood and honey (too much honey at once might smother the fire). Place several frames across the poles; the wax will melt quickly and add to the intensity of the fire. As flames begin to lick through those combs already on the poles, continue to toss more frames on top of them. Hive bodies, covers, and bottom boards may be salvaged, but inner covers and wood-bound queen excluders are probably not worth saving and should be added to the fire. If the colony being destroyed was populous, there will be a large mass of dead bees. These must be burned, but add them gradually, rather than in a large heap that might smother the flames.

If all has gone well, the poles used to support the hive parts will have burned through and collapsed into the pit. As the last of the wax and wood is consumed, test to see if the burn has been complete. Testing the burn is, in the words of New York State bee inspector Paul Cappy, "something like testing to see if a cake is done." Insert the blade of a long-handled shovel into the coals at the base of the pit and withdraw it. If it comes out dry, the fire is "done." More

likely, however, there will still be small pools of honey or melted wax and the shovel will emerge wet. If so, stir the coals (here the cake analogy breaks down!) and perhaps splash on some kerosene or diesel fuel (never gasoline) to enhance the fire. Continue burning until everything has been consumed and the coals are dry, then fill in the pit.

Bottom boards, covers, and hive bodies may be salvaged by thoroughly scorching their inner surfaces; this can be done while the frames are being burned. Those hive parts that are to be salvaged must be scraped free of propolis and burr comb. Though they would melt during the scorching process, deposits of either could act as insulation and protect the wood (and possibly *B. larvae* spores) beneath them. Add the scrapings to the fire in the pit.

One of the easiest methods of scorching hive bodies is to create a chimney fire. Stack them on the bottom board with the first hive body right side up and subsequent ones upside down. This arrangement allows the fire to lick into the rabbets where the frames rest and destroy any spores that may be lurking there. Splash a little kerosene down the corners of the stack and light it by dropping in a small wad of burning paper. Let the fire burn a few seconds, then insert a shovel into the entrance and pry up slightly on the stack. This feeds air in at the bottom and flames will shoot out the top of the chimney. Continue the fire only long enough (usually not more than about 30 seconds) to scorch the insides of the hive bodies without actually burning them. Then, either cap the chimney with the cover to smother the fire or topple the stack to put out the flames. Neither the bottom board nor the cover will be properly scorched in the process, but these can be placed across the poles of the fire pit for a few seconds.

Some states allow ethylene oxide (ETO) sterilization of AFB-contaminated equipment in fumigation chambers. ETO fumigation can be used to salvage frames and combs as well as other hive parts. But some studies indicate that combs containing honey are not effectively sterilized by ETO fumigation. Viable spores remaining in honey may lead to a recurrence of AFB after the combs are reused. For this reason, some beekeepers in states that allow ETO fumigation may still prefer to burn their combs. Feeding Terramycin® to bees established in fumigated

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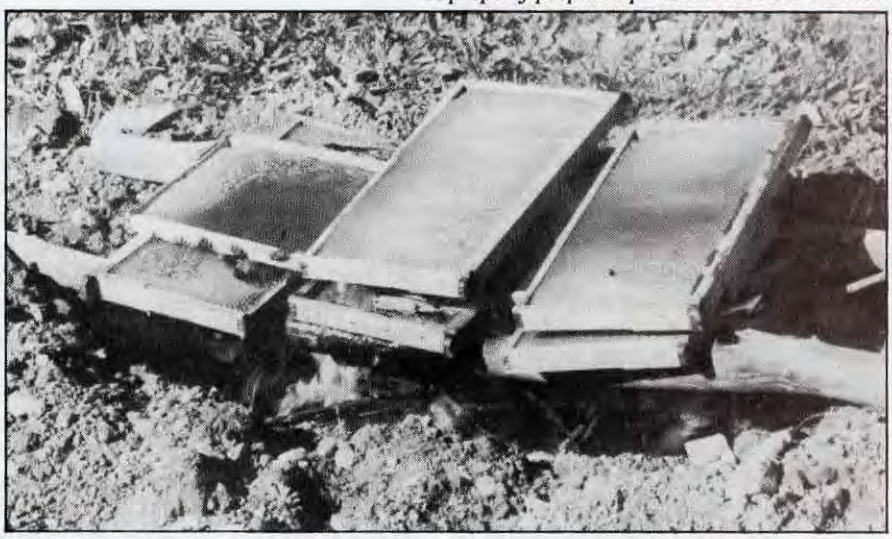
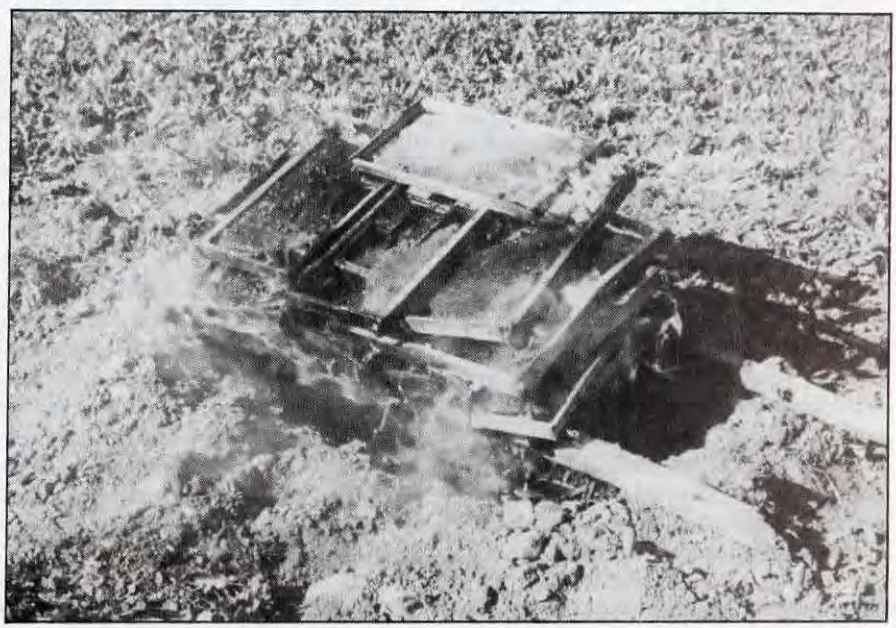
A properly prepared pit. Bees have been killed.



Frames are stacked on poles above pit ...



... and burned until 'done'.

FIGHTING ... Cont. from page 103
equipment improves the chances of avoiding recurrence of disease.

Irradiation of beekeeping equipment with gamma rays is a relatively new technology, but one that has been used commercially in Australia. Gamma radiation is used to sterilize medical equipment and has been approved for use on certain foodstuffs in the U. S. While radiation holds some promise as an alternative to burning, at present few radiation facilities will treat beekeeping equipment. Economic considerations probably dictate that gamma irradiation will not be practical for small-scale U. S. beekeepers in the near future.

PREVENTION Given the devastating effects of AFB and the limited options for its control, beekeepers would do well to put considerable effort into preventing the disease. One of the classic ways in which an AFB infection starts is through the use of contaminated equipment. Perhaps a would-be beekeeper's or novice beekeeper's relative or friend has some old hive bodies and other equipment in storage. These had belonged to someone else in the distant past, but the bees had died of an unknown cause. If the hive bodies have been around for any length of time, they probably contain no combs, these having been consumed by wax moths. Without combs, there is no way to check for telltale signs (scales) of AFB. The used equipment is a tempting, inexpensive (perhaps even free) alternative to costly new hive parts for beginning or supplementing the new hobby. Beginners are advised *never* to buy or accept donations of unoccupied used beekeeping equipment. If purchasing active colonies, always have them examined by a competent beekeeper, preferably a state inspector.

Commercial beekeepers are aware of the serious threat posed by AFB and many routinely feed OTC as a preventative. Remember that not all states approve of feeding bees to control an infection once it has begun, but there are no prohibitions against feeding OTC to prevent the disease from occurring. OTC is sold in powdered form and is usually fed to bees mixed with powdered sugar. The drug must be used at a time of year when there is no chance that it will contaminate honey that will eventually be used for human consumption. In most parts of the country, this means that OTC should be fed in very early spring or after the honey harvest in fall. If fed mixed with powdered sugar, OTC is sprinkled on the top bars of frames around the periphery of the brood nest, not directly into brood cells (see package instructions for particulars of dosage and manner of use). Workers will soon clean up the powder and the drug will be incorporated into larval food.

Powdered sugar treatments must be repeated every week or so (per label instructions) and are not always completely effective. Research studies have shown that extender patties (OTC mixed with sugar and an edible oil) may be a more effective means of administering OTC than powered sugar. Some beekeepers have been using this method, even though it is not in accordance with label instructions and may be illegal. Approval for a change in the label must come from the Environmental Protection Agency, but no action will be taken until that agency receives a formal request for such a change. The use of extender patties cannot be recommended until the label is changed

Many beekeepers are bothered by the idea of feeding any kind of drug to their bees. For them, any risk, no matter how slight, of contaminating honey is too great. Breeding strains of honey bees resistant to AFB offers some hope of making the feeding of drugs unnecessary. Resistance, as it is currently understood, is linked to "hygienic behavior" of workers. In resistant colonies, workers rapidly uncap cells of dead brood and remove the corpses from the nest. Recall that neither the spores nor rods of *B. larvae* are harmful to adult bees and that only the spore stage is infective to larvae. If dead brood is removed from the nest before rods inside the corpses transform into spores, the source of spread of AFB within the colony can be eliminated or greatly reduced.

Perhaps ironically, Africanized honey bees may harbor valuable traits of disease resistance. The incidence of AFB in Africanized colonies in Central and South America is apparently very low and the disease is rare or unknown in many parts of sub-Saharan Africa. Whether this is due to unusually hygienic behavior on the part of the workers or actual resistance to infection by the larvae is unknown.

DO NOT TAKE THIS LIGHTLY While other problems grab the spotlight and a large share of state inspection budgets, AFB remains an ongoing threat to beekeeping. In order to insure that AFB remains at relatively low levels, individual beekeepers must take much of the responsibility for disease prevention and detection. It is especially important that beginners make frequent inspections of the brood nests of their colonies. Options for treating AFB infections are limited; in some states burning is the only legal method of dealing with diseased colonies. If burning is undertaken, it must be done quickly and thoroughly, in such a manner that the possibility of spreading the disease is minimized. Prevention of the disease is to be preferred over treating it. Beekeepers with minimal disease experience should avoid incorporating used equipment of uncertain history in their operations. Perhaps the greatest promise for relief lies in developing disease-resistant strains of honey bees; these may include stock of African or mixed African origin. □

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THE GREAT CALIFORNIA ALMOND CHASE

MICHAEL BURGETT

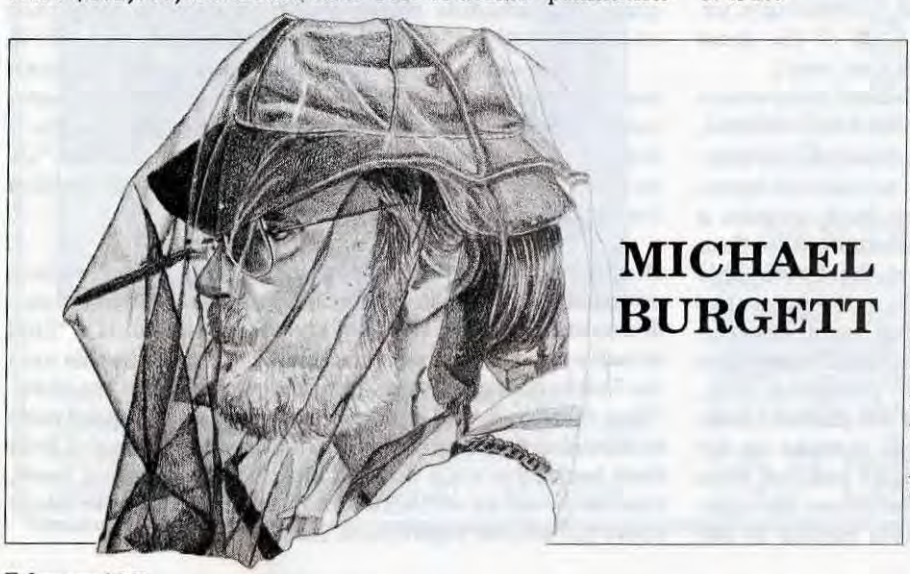
While the primary purpose of this column is to familiarize the uninitiated with the beekeeping conditions in the Pacific Northwest (PNW), I must make a geographical detour to discuss a situation with our enormous neighbor to the south that exerts a tremendous influence on commercial beekeeping in our region. Living next to California is somewhat like sleeping with an elephant, it isn't the snoring that bothers you so much, as the concern he might roll over (the same has been said of the relationship between Canada and the U.S.). As a purist logician would accuse me of the fallacy of *false analogy*, we still need to recognize the immense interdependence that has developed between beekeepers in the PNW and the present day agricultural situation in California. The best illustration of this is seen in the annual pollination of almonds (*Prunus amygdalus* Batsch).

Almond production in the U.S. is almost exclusively confined to California. The most common commercial almond cultivars (varieties) are self-incompatible, meaning pollen from almond cultivar "B" is required to effect the successful pollination of cultivar "A" Almond orchards are normally interplanted with two rows of the main production variety for each row of the pollen variety. A profitable almond crop depends upon the cross-pollination of practically all flowers. The grower wants the heaviest possible set, because there is no fruit (nut)-thinning problem with almonds (McGregor 1976).

The production area is large; extending from Bakersfield at the southern end of what is called the Great Central Valley, to Chico almost 400 miles to the north. The bearing acreage in 1989 was 408,000, representing farm sales worth some $471,000,000. Based on a "rule-of-thumb" pollination recommendation that would average almost two colonies per acre during peak bloom, this single, vast, monoculture would be expected to consume the pollinating energy of some 700,000 colonies every spring. Obviously, even in a state with the largest beekeeping population in the U.S., servicing a commodity this size requires the importation of out-of-state colonies, and such is the case.

The bloom period depends upon the variety, the latitude and the particular micro-climatic conditions of a given orchard. Flowering takes place from late January to late March, with the major bloom period being mid-February to mid-March. For those of us in the north it is a winter bloomer (spring bloomer for the Californians). This creates a rather unique option for PNW beekeepers. Why let your colonies sit around in cold, damp, sometimes snowy apiaries in Washington, Oregon and Idaho during a non-production period, (while both you and the bees wait for the spring) when you can truck them to a warm southern climate and set them in the middle of a magnificent nectar and pollen flow? And on top of this, there is a "fat" pollination rental fee to sweeten things even further.

This is an inducement too great to pass up for several hundred PNW beekeepers (which amounts to virtually 100% of all commercial beekeepers in the PNW). Could this be one of those ultimate "free lunches" so infrequent in the beekeeping world? Let's examine the situation in a bit more detail and perhaps we will know if the thought given by that famous wag anonymous (anonymous to me at least), "there is no such thing as a free lunch," is true.



First, a discussion of that "fat" pollination rental fee. According to my best source, the extension apiculturist at the University of California at Davis, a two-tier fee system exists: In 1989 it was $26 per colony north of Sacramento and $30-32 per colony south of Sacramento. The recommended average number of colonies per acre is also split according to your location north or south of Sacramento: two colonies north and 1.5 colonies south. By and large, the differences reflect the generally better weather conditions between the two areas during the bloom period. The per acre pollination

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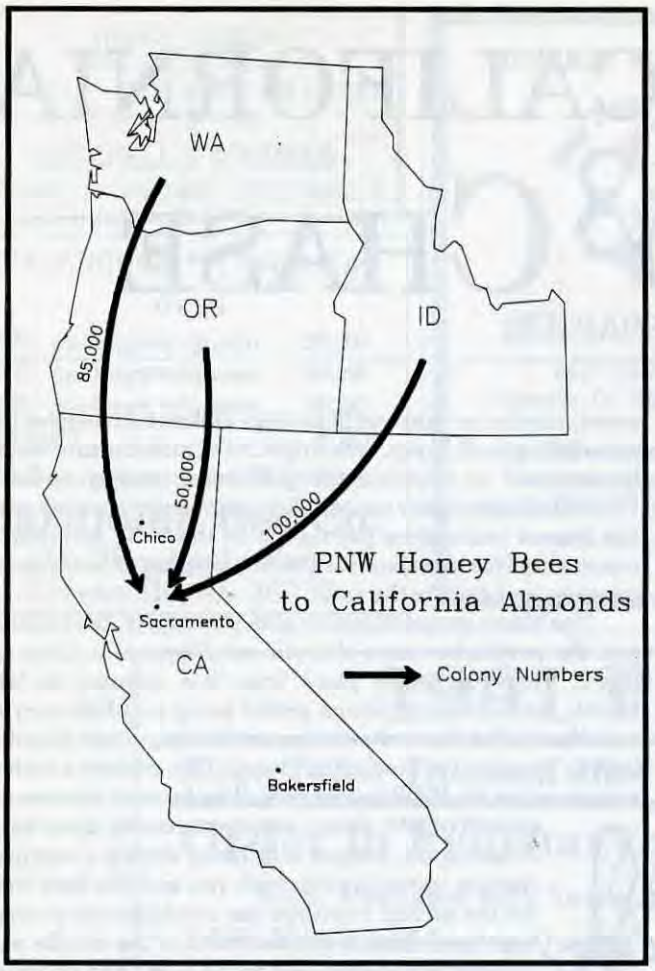

ALMOND CHASE ...Cont. from page 107

cost to the grower is $56 in the north and $45-48 in the south. Not surprisingly, the growers who consistently have the best nut production are those in the south who rent from three-five colonies per acre; unfortunately, they are a small minority of almond growers. [As a slight aside, we can for practical purposes and as food for thought, calculate an average pollination rental of $28.50 per colony, times the hypothetical 700,000 colonies required, to give an almond rental income for the beekeepers involved of $19,950,000! Interestingly, using 1989 data, this represents 4.2% of the gross farm sales of the nut crop for that year].

While a pollination fee is a pleasant inducement to PNW beekeepers for the long-haul to California, the knowledge that they are shortening the winter for their bees is of equal, if not greater, value to the commercial operations. The California "adventure" offers their colonies a nectar and pollen flow at least two-three months earlier than the natural floral conditions in most of the PNW. This normally gives colonies a boost in growth, to the point that many colonies are split prior to returning north. Because much of the almond growing area geographically coincides with the world's largest honey bee queen production area, queens are readily available at the end of the almond bloom period. Colony divisions at this time will 1) make up for winter mortality (which has been hopefully reduced even further by migrating south); 2) provide healthier, stronger colonies for the early tree fruit pollination rentals in the PNW; and, 3) allow you to make any anticipated operational increase. (Most Northwest beekeepers who make this trek hope to return with more colonies than they took south).

The recent contribution of PNW colonies to the successful pollination of California almonds involves some 200 beekeepers moving an estimated 235,000 colonies out of the tri-state region into all areas of almond production in California. For some, this involves a round-trip migration in excess of 2,000 miles. The colony contribution by state is approximately as follows; Idaho 100,000, Washington 85,000, Oregon 50,000 colonies. While the almond acreage has been increasing over the past decade, the actual number of colonies from the PNW has been slightly reduced. For the past few years, this is at least partially attributable to the doubling of normal winter mortality caused by the ever increasing infestation of the tracheal mite, *Acarapis woodi* (Burgett and Stringer 1989, Stringer and Burgett, 1990). To add a touch more gloom, the future growth of the *Varroa jacobsoni* infestation has the potential to further reduce the number of available colonies for pollination.

As discussed in my last column, the state of Idaho is dominated by commercial beekeeping, and nearly all colonies are migrated to California in January and February. Washington sends approximately 68% of their registered hives, while Oregon exports approximately 66% of its resident bees.

While a few PNW beekeepers will take their colonies south as early as October to spend the entire winter in California, most make the migratory passage throughout the month of January and into early February. (This longitudinal movement of honey bees possesses some wonderful parallels to waterfowl migrations along the Pacific flyway). For western Washington and Oregon beekeepers, the beginning of the new calendar year sees Interstate Highway 5 replete with 18-wheelers with their stacked hives heading south. As nearly all Washington bees pass through Oregon, the routes of choice are I-5 on the westside of the Cascade Mountains and Highway 97 on the eastside. That few "bee spills" do occur is testament to the trucking skills of commercial beekeepers, but we do see the occasional accident which was the primary motivation for Oregon's recent daytime netting law concerning colony movement. The returning trip north is made throughout March and for some as late as early April. In most years this schedule allows the beekeepers to take their colonies directly into tree fruit pollination back in the PNW.

What are the beekeeper's costs in this massive interstate movement of colonies? Each participating PNW beekeeper needs to carefully balance expenses against the benefits of almond pollination. For the sake of brevity I offer the "abstracted" average debits involved with the knowledge that the list is incomplete and refutable.

Health Inspection Certification The arrival of the tracheal mite and the *Varroa* mite has changed the regulatory aspect dramatically during the past six years – to call it a "fluid situation" would perhaps understate the case. In this area the California agricultural regulators have called the shots. What it has meant to a commercial beekeeper is added costs in obtaining the required health inspection certification from their respective state apiarist. For Oregon in recent years, this has meant an additional charge of 25-50 cents per colony above the annual registration fee.

Trucking Fees Many commercial beekeepers will hire this service through professional trucking firms. Most beekeepers additionally involve their own truck inventory. Costs vary, and obviously for a northern Idaho beekeeper it would be greater than a southern Oregon beekeeper and it is also dependent upon how far south into California your bees are going. For Oregon the per hive cost has been $4 6 for the roundtrip. With the recent "Gulf" crisis bringing about fluctuations in diesel fuel costs, most commercial truckers will now require the beekeeper to pay all fuel charges over a dollar a gallon minimum.

California Assessment All resident California beekeepers and all out-of-state beekeepers, have in the past paid an annual assessment of 15 cents per hive. Often a separate disease inspection fee, depending upon the particular county where you are pollinating, is levied, too. This will add another 10-15 cents per colony. This assessment is likely to undergo a dramatic change in the very near future.

Colony Management Costs The variability in this arena is enormous and can involve many potential inputs by the individual beekeeper. The case of minimal management is seen where PNW colonies arrive in California almond orchards, normally banded on pallets, and leave California four - eight weeks later with the bands unbroken. The opposite end of this spectrum is the beekeeper who arrives with his or her bees and spends the entire pollination period in a variety of activities designed to produce a qualitative and quantitative improvement in the operation. This involves assessing colony strength for almond pollination requirements (six frames of bees with brood), requeening, feeding, producing divides, and disease abatement, to name the most important. Increased operation expenses involve the cost of queens, syrup, labor, vehicle expenses, room and board while living far from home.

Options There are options for beekeepers in keeping some of these costs down. For example, trading brood and bulk bees in exchange for queens, or the outright sale of brood and bees to queen and package producers. This particular cost reduction avenue has been lessened due to the suspicion of mite-infested material. Labor costs in placing colonies in the orchards can be reduced by allowing the grower to perform this task with her or her forklift with a corresponding reduction in the pollination fee (usually a discount of $1.00 2.00 per hive).

The opinion of the great majority of PNW beekeepers involved in California almond pollination is that while it may not necessarily be an excess profit producing venture, it is well worth the effort. As a person who has been not infrequently termed an ivory tower apiculturist, I would fully agree with this appraisal of the *Great California Almond Chase*, but for more regionalistic, selfish reasons.

The California experience results in colonies of PNW honey bees that are in better condition to service the large pollination requirement of PNW agriculture that annually follows the almond bloom in California. In my next offering I will begin to discuss just how large that pollination requirement is and how very important our regional beekeeping industry is to the vitality of the larger agricultural base. □

Acknowledgements: My thanks to Dr. Eric Mussen, University of California, Davis for his valuable assistance in educating me in the apicultural economics and politics of almond pollination and to numerous PNW beekeepers for their shared thoughts concerning the Great California Almond Chase.

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BEGINNINGS

Whether you're over 60, or under 20, there are some things about bees and beekeeping you should know before you ever buy a bee.

For several years now I have been a member of that distinguished fraternity, the Geriatric Set. Chronological age doesn't have anything to do with i tthough, but rather it's how the bones and muscles behave and what you can do with them. Actually, I passed my 67th birthday a few months ago, but I got my first bees when I was 17 and did my first commercial beekeeping in 1941 – which is very long ago.

Working with bees for all these years, in many different places, has given me a perspective other than if I had stayed in just one place. Even when I was in the Navy during the war in 1943-45, I stopped and visited with beekeepers all over the U.S.

The reason for this nostalgia is to assure you that I have had a world of experience working with bees and that I can speak with GREAT AUTHORITY. (You know the definition of a GREAT AUTHORITY – He's a SOB from out of town).

There is a major problem facing older men, and a lot of women, who get interested in bees, and that is their inability to do a lot of hard, physical work. What does that have to do with bees? Lots. Bee work is hard work, requiring brawn as well as skill; muscle as well as interest; and stamina as well as desire.

So, last summer you went with a friend who had bees and you saw how interesting they were. Then your friend took you to a bee meeting where you met a bunch of like-minded folks and you began to get the 'bug' But then you remembered how heavy those boxes were and you figured you better not spend any money on this venture. But you already have spent money – going with friends to meetings and to their apiary, and time is money. The editor of this magazine tells me there are *at least* 100 new subscribers a month, so you may be one of those, spending money on this magazine.

STEVE TABER

Now read this very carefully – ***more than likely you can keep bees.*** If you are not confined to a wheel chair or walker, and like to get out in the fresh air and see a bit of nature in the raw – then you can do it.

There is one great over-riding concern to always keep in mind: Plan how much you want to do, how much money you want to spend, and, perhaps with your doctor, just how much physical work, spelled WORK, you are capable of doing without hurting yourself.

Take me for example. My knees are bad, and traditionally much bee work is done kneeling on the ground. Today I have to limit the length of time I am down on my knees to just a few minutes or they begin to hurt. Then I have a disc problem in my lower back caused by improper lifting and posture. My back problem limits me to lifting no greater than fifty pounds and I prefer not to do that very often. I try to limit my lifting to 30 pounds or less.

Next, my eyes. A few years back I was nearly blind with cataracts in both eyes. I couldn't raise queens because I couldn't see the larvae, and that's tough! I tried a magnifying lens with a light attached and some other magnifying devices and was able to do a little grafting. However now I have had both eyes operated on and I see as well as I did when I was 20.

You, too, need to do a physical inventory – what can you do and how long can you do it. And remember, you will be a bit older next year, and the year after that. Unless you have some correctable physical problem, as I did with my eyes, you may want to scale down your beekeeping ambitions.

There are two more things you have to consider before actually getting any bees of your own – where to keep them and what kind of equipment to buy. If you happen to own a patch of land in the country, or a friend does, your problem is solved. I know several hobby beekeepers who bought an acre or two where they would keep their bees, have picnics, and even build a small barn to keep their equipment in.

There are lots of advantages to owning the parcel of land where you keep your bees. Frequently a spouse has little interest in bees, but may be interested in reading, bird watching, wildflowers or other joys of nature. Before getting your bees fix this place for whatever your spouse likes to do, all the while telling your loved one that this spot, the one over there, is going to be for your bees.

If you live on a small lot in the city your beekeeping location may be a problem, but that, too can be solved. First,

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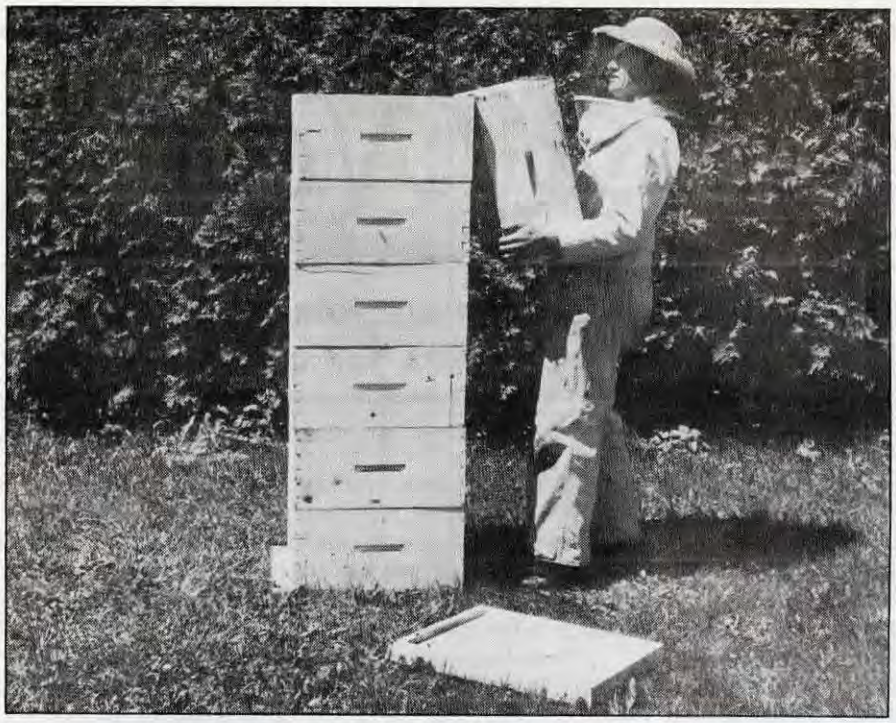

Lifting heavy supers can be the biggest drawback to becoming a beekeeper.

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find out if it is permissible to keep bees within the city limits. Does your city have a bee ordinance, and what are the restrictions?

San Francisco is a tight city with little unused land, and the lots are small. But one of my friends has about 30 hives of bees in the city limits, most are well hidden from the eyes of the public. Become used to the fact that no one loves bees but a beekeeper. Louis DuBuy, the San Francisco beekeeper, is older than me by 10 or 15 years and he works, and I mean HE WORKS, at public relations, by picking up stray swarms for free any time the city calls him. In return, city employees have helped by showing him small, unused plots of city land next to big highways, where he can put bee hives in the brush, unseen to all who pass by.

My argument with city officials and town councils who want to ban keeping bees in city limits goes like this: (Your) ban is self defeating. City limits are an ecological niche supporting "X" number of bee colonies for each square mile. These bees will be in your city, either in a beekeeper's hives and managed, or wild, living in trees, abandoned buildings, walls of old houses and other unpleasant places. *It is better to have managed bees in your city than unmanaged ones.*

Second, there are many people in the city who have small gardens and fruit trees that require bees for pollination. In a city like Vacaville, California where I used to live, I estimate at least 10 colonies per square mile of city. Of course every city will be different, but more than likely you will be able to find wild bees living in the city if you hunt for them to prove there are already bees in your city.

Your next consideration is the type of equipment to keep your bees in. There has been more nonsense spoken and written about the type of hive – its shape, size and so on – than any other beekeeping subject. The absolute truth of the matter is virtually no experimentation has been done to find out what THE BEES PREFER. A scientist named Tom Seeley is the only one I know of who has shown any interest in the subject.

The so-called Standard Langstroth deep hive which holds eight or 10 frames is not suitable for people like me, limited in the weight they can pick up. One of these 10 frame boxes full of bees, combs, honey and wood will weigh close to 80 pounds. The eight frame unit is mostly for people who pollinate and should not be considered by most hobby beekeepers. My personal preference is called by various names as "modified Dadant shallow", "Illinois", "extra deep shallow" and so on. The boxes are 6-5/8" deep and when full they weigh just about 50 pounds. Or you may want to consider using a smaller box, available from most bee supply manufacturers, usually called a "shallow" These are 5-3/4" deep and weigh about 40 pounds when full. Whatever size you decide to use, get all your equipment the same size, don't be talked into buying deep boxes for the bottom and a shallow on top, use three shallows and the combs will all be interchangeable.

In the beginning, start with at least two hives and no more than 10. If you start with only one, anything that can go wrong will, of course. With two you can use one to help the other, by swapping combs of honey or frames of young brood and so on.

Let's look at my budget, and you can use it as an example for yours. Bees

Little things, like mowing your lawn, can present challenges for you and your neighbors.

are very important to me – I HAVE to have them – and I want them near me on my lot, and I want no complaints from neighbors, so I spend money on the land I keep my bees on. To insure my rights to keep bees I recently bought this house with nine surrounding acres, which gives me enough to keep as many bees as I want where I live.

My logic (and my budget constraints) were, first, a place for me to live, second a place for the bees. I have succeeded wonderfully on both counts. The place is big enough, nine acres, to put a lot of bees out and to hide most of them. At the moment I am a half mile from my nearest neighbor, but as so often happens, next week I could have a supermarket next door. Heaven forbid, but it could happen and you should always prepare for the worst.

There is one more aspect you must consider before you get bees, and that's finding a place to work and store your bee stuff. Many would-be beekeepers start their new hobby working in the kitchen and finish it there a few months later when their spouse threatens DIVORCE, or, it's "either me or the bees, make a choice"

There are two solutions: If you don't have an appropriate garage or basement, consider renting one of the storage lockers that's probably in your community, to store and assemble bee equipment. After a few years you will accumulate nails of assorted sizes, scraps of wood, hammers, smoker fuel, smokers, coveralls, dirty bee gloves, bee veils, queen excluders and on and on and on. Unused bee boxes and frames, boxes of wax foundation, remains of experiments on the bees that didn't work and junk given you be ex-beekeepers and friends that "might be useful"

I will tell you now not to expect your bees to make any honey and to be surprised when they do. It is a great joy for beginning beekeepers to open their hives and see honey everywhere, and I mean everywhere. It will be all over your hands, clothes, shoes, smokers, hive tools , the seat of the family car – watch it, that's an alarm bell. Again you can hear the screech – *DIVORCE.* At some early stage of the new hobby, begin taking along an old towel and a gallon of water to wash and clean-up with. One of the very best aspects of keeping bees is that honey is easy to clean up with water.

The most interesting aspect of bees and beekeeping is being able to watch and wonder at the biology of this creature.

Remember also to scrape the stuff off the bottom of your shoes – honey, beeswax and propolis all seem to accumulate there. Every, and I mean every, beekeeper at some time goes into the kitchen and takes a strainer, a pot, a mixer, a large metal spoon or something. Now, right at the beginning of your new career, adopt the following procedure, immediately after using the snatched utensil – buy a replacement for the kitchen. Don't return anything to the kitchen you have used with your bees. This is because you will need the same thing again, and you will leave a scrap, ever so small, of beeswax on it – and then there's hell to pay for taking it in the first place.

The last item, which is very positive in regards to your spouse, is for you to approach your better half with the intellectual side of beekeeping – let's call it apiculture. Get some books and magazines that are "intellectual" These will have nothing to do with beekeeping, per-se. Books written by authors such as K. von Frish, M. Lindaur, E.O. Wilson and Tom Seely. Magazines such as Journal of Apiculture *Research*, and *Apidologie.* And attend the beekeeper meetings bringing your spouse along. Go to local, state, regional and, if you can afford it, one of the international meetings. They are great and you will meet people from all over the world just like yourself. The next one will be in 1991 in Yugoslavia, watch for announcements. Don't isolate yourself with a bunch of jargon of beekeepers use like frames, supers, hive bodies, smokers etc. Bring your spouse into your hobby in a way they will just have to get interested in.

All I can say now is good luck, and have fun. Remember that all the bee books and bee magazines in the world will not a beekeeper make. Now it's you and the bees. But when you are with the bees, try to remember *some* of the nonsenseyou have read in the books and magazines to see what is and is not true. This editor, and I, will be interested in your comments to share with others in your shoes. □

INNER ... Cont. from Page 68
tise on how they were making do.

Though some are barely related to the business of bees or beekeeping, their advice is worthy of note, for you may be able to apply the principles involved, if not the exact techniques.

No matter how good a beekeeper you are, if you can't manage the money you make – you won't stay in business long. So let's take a look at some financial decisions you can make that will help your bottom line.

• To reduce capitol from being tied up in vehicles consider leasing. This reduces initial cost, insurance, repairs, etc. Consider renting buildings too, or look for a co-purchaser who needs the facilities at different times of the year than you.

• Investigate paying for some expenses by bartering non-cash assets or services for assets or services you need.

• To reduce advertising expenses, share ad space costs with your retail customers or with someone with a compatible product.

• Consider raising your insurance deductibles, thus reducing your premiums.

• Sell unnecessary assets you have lying around, you seldom use, or are outdated.

• Can you save money by paying in cash, or by paying invoices in 10 days or less. Find out if any vendors work this way, and use their policies for your advantage.

• Hire part time help instead of full time workers, reducing many benefit costs, and keeping off season expenses down.

• Improve your Accounts Receivable Collections. A customer with a debt over 90 days old is costing you money.

• Reduce your inventories of seldom used, or seasonably used materials. Carrying 20 pallets of glass for two years ties up more money than you saved by buying a large quantity in the first place.

• Can some of your suppliers wait 90 days or 120 days for payment? You can keep using your money for that period to your benefit.

• Make sure you are getting the best quality for the lowest price by getting quotes from several vendors.

• Make sure your venders know your schedule so they can be prepared to meet demand without having to stretch their capabilities.

• If shipping is a big part of your business, make your packages as heavy as allowed – UPS goes to 70#, RPS to 100#. This saves boxes, packing and packaging time.

• Use common sense when using your facilities – keep utility use to a minimum, insulate, keep vehicles tuned, tires inflated and all equipment maintained.

Like we said at the beginning of this, whether this is a media recession or a real one, the cost of doing business is increasing and margins are not keeping pace. To keep your head above water, keep your belt tight and use your head. You can succeed with hard work, good luck and most importantly – smart business.

Kim Flottum

BEE TALK

RICHARD TAYLOR

Box 352, Interlaken, NY 14847

"The careful selection of stock, and rearing queens from that stock, is absolutely essential to producing quality comb honey."

I'm a comb honey beekeeper. I don't even own an extractor. Selling all my extracting equipment and converting exclusively to comb honey many years ago was, I think, one of the wisest things I ever did.

I therefore considered myself lucky last summer when I got a chance to hear Mr. Eugene Killion describe, with lots of illustrative slides, his method of producing comb honey. Mr. Killion is retired from commercial comb honey production now, but he is without doubt the greatest comb honey beekeeper who ever lived and it will be a long time before anyone matches his achievements. Of course he would give the credit to his father, Mr. Carl E. Killion, from whom he learned the craft and with whom he worked in life-long partnership, but it was nevertheless the son who carried forth and improved upon what his father had done. Beekeepers are apt to think of C.C. Miller as the greatest of comb honey beekeepers, but in fact Dr. Miller made rather few innovations in this craft and gained his fame primarily through his writings and the warmth of his personality. In any event, the Killions, in 1951, exceeded what had until then been considered the world's record of comb honey production, held by Dr. Miller. They sometimes got eight supers of square sections from individual colonies, and on at least one occasion got eleven. You get some idea of the magnitude of their comb honey operation when you consider that they had over a thousand colonies in their many far-flung apiaries. Working essentially by themselves, with the help of their families, these two men not only produced and marketed their prodigious crops, but made all their own equipment, excepting only the square wooden sections and the foundation. Eventually they moved on to the round plastic sections, but since these were not invented until the mid-fifties, most of their crops over the years were in square wooden sections.

I shall describe here, in outline, the Killion system of management, as there is much to be learned from it. A more detailed account is given in their book, *Honey in the Comb*, the latest edition of which was published in 1981.

Winters were spent cleaning and repainting supers and preparing the thousands of supers that would be needed for the season. This was, prior to the advent of round sections, a daunting task, as each section box received two pieces of foundation, one at the top and one at the bottom, and all boxes required a coating of paraffin, top and bottom.

The bees were wintered in two and sometimes three brood chambers, and when brood rearing began to expand in the spring all the hives were reversed at intervals of about one week, to get the maximum amount of brood in both stories. As the colonies gained in strength the hives were equalized by exchanging some of the combs of brood from the strongest colonies with empty combs from the weaker ones.

The critical manipulation of the colonies, which was at the heart of the entire system of management, came as the weather became warm and the swarming period was approaching. At this time each colony was dealt with as follows.

The queen was removed and clipped, and the colony reduced to a single story on the parent stand with the clipped queen in that single brood chamber. That single brood chamber also was arranged to contain an abundance of brood. The first comb honey super was then added. The brood chamber that was removed was set to one side and most of the bees in it shaken off the combs, one comb at a time, in front of the part of the hive containing the queen and remaining on the original stand. The stories thus removed, and depleted of most of their bees, were stacked three or four deep off to one side, with new bottom board and covers, given a queen or queen cell and left to rebuild their populations. By fall, these tall colonies, not used for comb honey

Continued on Next Page

Gene Killion

BEETALK ... Cont. from page 115

production, were jammed full of honey and ready to be redistributed to the hives to serve as food chambers through the coming winter.

Meanwhile, the bees were thus crowded down to a single story, being heavily congested, would begin building queen cells at once, in preparation for swarming. So the next step was to go through every colony, about three days after it had been reduced to a single story, and destroy the queen and all queen cells, not overlooking a single one. Four days later this operation was repeated. Then, on the eighth day–that is, when the colony has been queenless for at least eight days – it was given a new queen or a good queen cell. Having been queenless for eight days, the hive now contained no young brood from which the bees could try to raise new queens. From that point on the management consisted mostly of adding and harvesting supers.

This is a highly labor-intensive system of management. Anyone who has gone through even a small apiary destroying queen cells can get an idea of the prodigious labor involved in treating many apiaries this way, day after day. But it is important to look now at the result of this system. The colony at the beginning of the honey flow is overwhelmingly populous with an enormous force of foraging bees, devoid of young brood, and headed by a vigorous young queen. The honey begins to go into the supers with great speed, which is precisely the way to get comb honey of the highest quality. When fall comes, and all the comb supers have been harvested, the additional brood chamber for each colony is returned to it, now filled with honey, as the tall non-producing colonies that were created by stacking these extra stories together are broken up again.

To the foregoing account it should now be added that the Killions raised all their own queens, this role eventually falling primarily to the son. Meticulous records were kept, and the choice of breeder queens was made very carefully, having an eye to overall production and to the quality of the comb honey. Breeder queens were taken only from colonies that excelled in these and all other respects. Mr. Killion considers queen rearing and the careful selection of stock to be absolutely essential to the production of quality comb honey.

This is, as noted, but an outline of Mr. Killion's methods. I hope I have presented them correctly. When I heard him describe all this I was quite overwhelmed by the magnitude of his work and his achievements, and he confessed that, in looking back, he sometimes wondered how he managed sometimes to work so hard. □

(Comments and questions are welcomed. Use Interlaken address above, and enclose a stamped envelope for response.)

CATNIP

B.A. STRINGER

"If there is any plant that I would cultivate especially for honey, it would be catnip. I find nothing to surpass it." So wrote Mr. Moses Quinby in 1865, in his revision of *Mysteries of Beekeeping Explained*. In this popular book, first published in 1853, Mr. Quinby set forth his methods and observations gained from 23 years keeping bees. He noted that the bees visit the catnip flowers at all hours and in nearly all kinds of weather. The profusion of flowers exceeded even borage, which had been recommended as worthy of cultivation. "In a few instances," he commented, "I have known the catnip to bloom for twelve weeks, yielding honey during the whole time."

In the 1901 *ABC of Bee Culture* Mr. A.I. Root wrote that Mr. Quinby's comments were very likely "not far from right". However, the problem was that "we have never yet had any definite report from a sufficient field of it to test it alone, either in quality or quantity of the honey, and we remain almost as much in the dark in regard to it as we were at the time he made the statement, many years ago."

Mr. Root mentioned that several beekeepers had cultivated small patches of catnip which apparently yielded more honey than plants in the wild state. Bees were found on the flowers almost constantly over a period of several months. "Yet no-one, I believe, is prepared to say positively that it would pay to cultivate it for this purpose," he concluded.

Catnip, *Nepeta cataria*, is native to Europe and western Asia. Sometimes called Catmint, it was brought to this country by early settlers who used it as a medicinal herb. Although the plant has escaped from cultivation and become naturalized, its spread is not weedy or invasive. The common Catnip is one of about 150 species of *Nepeta*, several of which are attractive to bees. The plant flowers over a long period from the end of June onwards.

While interest in Catnip continued through the late 1800's it was not until 1902 that reports of large honey crops from the plant were published. Dr. J.L. Gandy, of Humboldt, Nebraska, wrote an article for *Gleanings in Bee Culture* magazine describing his success with bees, and attributing great honey crops to catnip. Dr. Gandy, a physician who engaged in a variety of endeavors including beekeeping, had opportunity to accumulate large tracts of land. He leased much of the acreage to tenants, with a clause in the lease requiring the tenants to sow a certain amount of catnip. Considerable interest was generated by his story of an average of 400 pounds of honey per colony. Editors of the bee magazines visited Dr. Gandy to observe his artificial pasturage for bees. They found that, for many miles around Humboldt, the roadsides had been planted with catnip.

After investigation, both magazine editors concluded that Dr. Gandy's huge honey crops were the result of "large hives and normal forage, rather than from the catnip which he had planted" While much was said about the doctor's farming interests and accomplishments, as the man was definitely a focus of attention at the time, his honey crops could not be attributed to catnip.

Catnip and its close relatives were among plants tested at the *American Bee Journal* Honey Plant Test Gardens in the 1940's. Mr. Frank Pellett grew five species of *Nepeta*, hoping to span a long period of time with the bloom of these plants for the bees. The succession of bloom, from mid-May until frost, included *Nepeta mussinii* (Catmint), *Nepeta nuda, N. macrantha, N. cataria* (Catnip), and *N. glechoma* (Ground Ivy or Gill-over-the-ground). This last has been reclassified botanically and is now known as *Glechoma hederacea*. All of the plants were very attractive to bees and apparently produced nectar and some pollen.

In the 1901 *ABC of Bee Culture*, Mr. Root stated that Gill-over-the-ground, where plentiful, "has furnished so much honey that it has been extracted in considerable quantities." The honey was described as dark and a little strong, but improved with ripening. He placed great value on it "to keep the bees uninterruptedly rearing brood, until clover and locust" However, the plant can become a weed, and he was hesitant to send out seed.

Catnip continues to be of interest to beekeepers because of its attraction to bees, regardless of its nectar production. □

GLEANINGS GLOBE

FEBRUARY, 1991 ALL THE NEWS THAT FITS

Fewer To Count Every Year

FARM CENSUS FINISHED

What states and counties have the most farms? Which have the most farms with sales over $100,000? Which produce the most corn, wheat, strawberries, and watermelons? Which have the most cattle and hogs and sell the most chickens? And what counties sell the most valuable crops?

A report from the Commerce Department's Census Bureau has the answers, based on findings of the 1987 Census of Agriculture. The report ranks leading states and 100 leading counties in 71 categories and 50 leading counties in 12 categories.

It shows that California led in agricultural sales with $14 billion and that Texas, Iowa, Nebraska, and Kansas were next. It reports that the top counties were Fresno, CA ($1.7 billion), Kern, CA ($1.1 billion), and Tulare, California ($1 billion).

The census report also shows the proportion each state or county represents of the U.S. total for specific products. For example, 14% of the U.S. cattle and calf inventory was in Texas, while the top five states represented 35% of the inventory.

Copies of the report, 1987 Census of Agriculture, Volume 2, Subject Series, Part 3, *Ranking of States and Counties*, AC87-S-3 (GPO Stock No. 003-024-06859-1), may be obtained for $7.00 each prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. For more information on the agriculture census, call the division's information office at 800-523-3215.

See The Alamo, Too, in Feb!

HONEY BOARD MEETS IN SAN ANTONIO

The National Honey Board will hold its winter meeting at the Sheraton Gunter Hotel in San Antonio, Feb. 21-23.

Dwight Stoller, chairperson of the National Honey Board, invites all beekeepers and other industry members to attend.

To save time and meeting expenses, the winter meeting will have a condensed meeting format. The meetings will begin with a presentation period, followed by committee meetings and the Board meeting.

The agenda will include evaluations of the National Honey Board's 1990 programs and updates on the 1991 programs. For a complete agenda or other meeting details, contact Tina Tindall at the National Honey Board office.

NC Group Keeps Their Date!

CALENDAR READY!

In 1980 the NC State Beekeepers Association began publishing a beekeeping calendar and this has become an annual tradition. The 1991 calendar has been distributed to the NCSBA and a small number of additional copies are available for sale to non-members.

The NC Beekeeping Calendar serves two purposes. First, and foremost, it is a very attractive and professional wall calendar measuring 11 by 17 inches when fully opened. The calendar pages have ample room for writing notes, recording appointments, and other day to day activities which need recording. But, in addition, it serves the special needs of the beekeeper and anyone interested in bees. Each page of the calendar contains a wealth of information of special interest to beekeepers throughout the United States with special emphasis on the mideastern states around North Carolina.

Information on the blooming dates of nectar and pollen sources; recipes for cooking with honey; and information on selected topics such as a tribute to Moses Quinby, Classic Bee Patents, and bee poems are all found in the calendar. In addition, it contains the meeting dates for many of the national and regional beekeeping organizations.

Non-members of the NCSBA who are interested obtaining one of the 1991 beekeeping calendars may purchase a calendar through one of the following methods:

Direct Calendar Purchase – Individual copies of the calendar sell for $5.00/copy with the price dropping to $4.00/copy for purchase of 10 or more calendars mailed to the same address, or:

Calendar Purchase Through NCSBA Membership – Individuals who submit 1991 dues of $8.00 will receive a free 1991 calendar plus a free 1992 calendar when published. NCSBA dues also include additional benefits such as quarterly newsletters and other NCSBA publications. Checks should be made out to the NCSBA and marked 1991 dues. Mail checks to the NC State Beekeepers Association, 1403 Varsity Drive, Raleigh, NC 27606.

SEND YOUR NEWS TO THE GLOBE

Mixing The Old With The New

EAS MEETS IN NC in '91

Man's recorded association with the honey bee dates back thousands of years. However, his relationship with this marvelous insect in North America is more recent in history and Wyatt Magnum, of Raleigh, NC is one person who is trying to preserve the record of this tradition.

Honey bees are not native to the New World. Based on the best known record, honey bees first came to America by ship from England to the Virginia colony in 1621. It is possibly from this point (and a few later introductions) that bees and beekeeping eventually reached the other colonies.

Colonial beekeeping differed greatly from the practices of today. Hives were kept in almost any convenient vessel, though European tradition favored use of an inverted basket called a skep. Beekeepers would catch wild swarms to increase hive numbers and harvesting honey often meant sacrificing all the bees from several of the hives and cutting out the honeycomb completely. The honey was eaten either in the comb, wax and all, or squeezed and allowed to drain out of the combs so the wax could be used for other purposes.

In the early 1880's, beekeepers began to try new designs for hives in an attempt to make the bees easier to manage and the honey easier to harvest. Beehive boxes came in many sizes and shapes. Some looked like furniture, some had drawers that pulled out, some had removable glass boxes for the bees to fill with honeycomb. Then in 1852, Rev. L.L. Langstroth of Philadelphia, PA, patented his removable frame hive. Bees would build honeycomb in a wooden frame structure and the frames could be removed, examined, and replaced without damage to the hive. The superior design of this hive, which is the precursor of the modern hive used today, caught on and spread quickly across the country.

Having honeycomb in frames that could be removed without destruction prompted many changes in beekeeping. Honey could now be extracted from the honeycomb and the comb could be reused by the bees. Hives did not have to be destroyed to collect the golden liquid. Different management techniques developed.

Although new products came on the market, many beekeepers resisted the change, perhaps because of finances, or just a desire to keep bees in the tradition of their parents. Old style plank hives and bee gums can still be found is use today if you know where to look.

One man who knows where to look is Wyatt Mangum. Wyatt lives in Raleigh, NC and works at NC State University. He has been keeping bees since he was 11 years old, more than 20 years, now. It wasn't until four years ago, however, that his quest to preserve our disappearing beekeeping heritage began. Wyatt travels around the country searching for beekeeping items and equipment which tell the story of the development of beekeeping in his state and America.

Wyatt's collection fills two rooms and the entire basement of his small house. On a visit, one can see the evolution of the smoker. There are more than 30 different styles and designs covering over 100 years of development. There are many rare old hive styles which never survived the modern, post-Langstroth era. Some use glass honey boxes, some open from the side and some have hinged frames which swing out. There are also boxes used to hunt wild bees, extractors used to remove the honey from frames of every shape and size, swarm catchers, and much more.

One of Wyatt's greatest finds was the equipment of a complete beekeeping operation from the 1880's. It came from an old farm in the Smokey Mountains. When Wyatt found it, old beekeeping magazines from 1884 were still strewn on the floor, though a bit mouse worn. It has all been cleaned up and is ready to operate as it did 110 years ago.

Preserving our beekeeping history is a challenge Wyatt loves, but he is in a race against time. Many old beekeeping items are deteriorating beyond salvage due to neglect or exposure to the weather. Some objects are no longer recognized for their original beekeeping use and are hence being misplaced or discarded. It is important that these items be preserved as part of our heritage. We are fortunate that someone is interested and has worked hard to assemble the best collection of beekeeping artifacts in the South and, perhaps, the country.

The Mangum Museum is open for all to see by appointment at no charge. If the weather is nice, Wyatt might light up an 80-year old smoker and take you outside to examine the bees in a reconstructed Quinby standing frame hive.

Those interested in viewing the Mangum Museum or with questions or information about pieces, may contact Wyatt Mangum at Box 7626, Raleigh, NC 27695-7626.

For those of you who don't have plans to travel to Raleigh in the near future, your second best opportunity to view Wyatt's collection is to attend the Eastern Apiculture Society convention in New Bern, NC on July 24-26, 1991. As a special favor to the NC Beekeepers Association (which is hosting the 1991 EAS), Wyatt has agreed to exhibit a significant portion of his beekeeping collection at the 1991 convention. In addition to viewing the collection, participants at the convention will also have opportunity to talk to Wyatt and learn about the history of the various items on display. Watch this journal for future information on the upcoming EAS convention.

New Zealand Takes The Lead

IBRA SELECTS NEW DIRECTOR

At the IBRA Annual General Meeting at Pershore College of Horticulture, held on September 1, 1989, the Chairman, Prof. Tecwyn Jones, introduced to members present the Association's new Director Designate, Mr. Andrew Matheson, from New Zealand. Mr. Matheson, whose qualifications include an MSc, a Diploma in Business Administration and a National Diploma in Apiculture (NZ), is at present Apicultural Consultant with the Ministry of Agriculture and Fisheries in Tauranga, New Zealand. He has been a member of IBRA since 1984, and for many of those years has been our Regional Representative in New Zealand; first for the South Island, and then in 1987 for the North Island, when he took over from Trevor Bryant after moving to Tauranga.

The Chairman referred to the difficult task which IBRA's selection committee had in choosing the new Director from the large number of highly qualified candidates who had applied for the post from the UK and overseas. Prof. Jones stated that, subject to completion of the requisite formalities, Andrew Matheson would hope to take up his appointment in the near future. Meanwhile, David Francis will continue as Director until Mr. Matheson assumes the post in Cardiff.

Sticker Sale!

HONEY BOARD'S LOGO-TO-GO

By popular demand, the National Honey Board is offering stickers featuring the honey bear logo.

The gold foil stickers are 1-1/2" in diameter. The logo withthe message "Honey I Love You" is printed in black. The stickers can be used on lapels or printed promotional materials. The stickers may not be used on product containers.

Stickers are packaged 1,000 per roll. Each roll is shrink wrapped. The minimum order for stickers is one roll. ($9.00/roll for one-roll minimum order. $8.00/roll for 2-4 rolls. $7.00/roll for orders of 5+ rolls.)

Advance orders have already been taken — these will go fast! To receive your stickers, send a check with your order to the National Honey Board office.

Proceeding West

THE GYPSY MOTH

Although the gypsy moth does not compete with bees for food or habitat, it may eventually become a threat to beekeepers because of a chemical used to eradicate the moth in its pupae stage.

Imported to Massachusetts in 1869 to improve a strain of silk worms, it escaped and began travelling through the New England states slowly by ballooning (being carried by the wind on its silk). When people began to travel, and wood products were marketed to the midwest, the gypsy moth went along for the ride.

Those residents in the East have seen the destructive path the moth leaves, while munching on foliage. It has become a threat not only to homeowners with trees, but an economic disaster to wood-lot owners. The moths most desired dinners include: Alder, Apple, Aspen, Basswood, River Birch, Boxelder, Hawthorn, Larch, Mountain Ash, Oak, Sweetgum and Willow.

The State of Ohio, Extension Service, has been tracing the moth in this midwestern state since 1971, when it recorded trapping two moths. In 1989, the trapping program netted 289,454, indicating that the moth is gaining a good foothold outside the eastern states.

Before the dangers of DDT were realized, it was used as a control measure. Currently, entomologists are looking at Integrated Pest Control. Part of that control includes the use of Dimilin, an insect growth regulator that arrests the development of the insect and prevents its outer skeleton from hardening.

Dr. David Shetlar, Ohio State Extension Entomologist, explained that Dimilin also affects other insect relatives such as spiders and has a residual life of 20 to 30 days on vegetation.

When asked how Dimilin can affect honey bees, Shetlar replied that should the honey bee pick up the Dimilin on its feet, and carry it back to the hive, larvae development would be arrested.

He also added that Gypsy Moth and honey bees are not often found in the same area, and that all known beekeepers in a spray area are told in advance when the spraying will be done so that they can take precautions with their hives.

Rather than causing a panic about what methods will be used on the Gypsy Moth as it proceeds west, state extension services and forestry divisions are asking the general public to get to know the gypsy moth in all its stages and be able to control it in their own woodlots and yards, by crushing the eggs, pupae, larvae and adult females, or dropping them into a can of fuel oil or kerosene.

OBITUARIES

Charles A. Divelbiss

Charles Divelbiss passed away in October, 1990. He was an active educator all his life, serving as teacher and principal in Mansfield, OH. He also was an energetic beekeeping instructor, giving programs to both children and adults, featuring the benefits of bees, beekeeping and pollination. His energy and enthusiasm was rewarded by the Eastern Apicultural Society when they named the 'Educator of The Year' award after him. Both his family and the beekeeping community will miss him.

Francis Oliver Holmes

Dr. Francis Oliver Holmes died Oct. 12, 1990, near his home in Henniker, NH. Long a contributor to *Bee Culture*, he was also internationally recognized for his research and publications on plant viruses. His discoveries in that field included concentrating viruses for identification, developing plant varieties resistant to viruses, and diagnosing a fatal disease of coconuts in the Philippines. He was recently voted "citizen of the year", in his home town due to his many contributions to the town's activities. Contributions to *Bee Culture* were entertaining and informative, and always provided insight into the plant-bee relationship he studied.

Loys O. Milam

Loys Milam passed away Aug. 7, 1990 in Moore, TX. A third generation beekeeper, Milam worked closely with the Sioux Honey Co-op. He was a director of a five state area for 12 years. He started keeping bees while helping his father, but his grandfather was also a beekeeper. A surviving son and grandson also are in the business. He also served as a director for the Texas Beekeepers Association, and the American Beekeeping Fed.

John Westfahl

John Westfahl died Aug. 21, 1990 in Milwaukee, WI. He had lived in Clintonville, WI since 1954 and has run as many as 500 colonies. He was also involved in logging and trapping. He was active with the Waupaca County Beekeepers Association, and the WI Honey Producers. His beekeeping operation is being taken over by son Bruce.

Jerome Berry

Jerome 'Jerry' Berry died Oct. 10, 1990. He lived in Oklee, MN. He went into the beekeeping business in 1952 and worked with the Sioux Honey Association since. He was a member of the American Beekeeping Fed.

Elizabeth Bass-Mellert

Elizabeth Bass-Mellert passed away Oct. 15, 1990 in Medina, OH. She was active in the Medina County Beekeepers Association, involved in the queen program and local fair. Her husband, Delos Mellert is also active in the group, and was a life-long employee of the A.I. Root Company's Beekeeping Operation.

Hans. H. Schumacher

Hans Schumacher died Nov. 23, 1990. His career in the honey business spanned nearly 55 years. He founded the B-Z-B Honey Co., located in Alhambra, CA, in 1931 and ran it until his retirement in 1970. He wholesaled honey domestically and internationally, the latter primarily to central European food brokers. Even after his retirement, he occasionally wholesaled honey to maintain his honey business contacts. He promoted honey throughout his entire career, through local advertisements, articles in national honey and beekeeping publications, etc.

During WWII he travelled to Washington, DC, representing honey interests on a governmental agricultural board.

You might be interested to know that he was once featured in *Strange As It Seems* for his ability to determine both the type of honey and its geographical source simply by tasting a honey sample.

INDIAN BEE JOURNAL. All India Beekeepers' Association, 1325 Sadashiv Peth, Pune 411030, India. The only bee journal of India published in English, issued quarterly. For individuals US $7.00; institutions, companies US $10.00 or equivalent.

THE BEEKEEPERS QUARTERLY. From the publishers of the BEEKEEPERS ANNUAL. $8.00/year. The A. I. Root Co., Sub-Agents. P. O. Box 706, Medina, OH 44258.

IRISH BEEKEEPING. Read *An Beachaire* (The Irish Beekeeper) Published monthly. Subscription $12.00/year, post free. Mr. Seamns Reddy, 8 Tower View Park, Kildare.

AMERICAN PIGEON JOURNAL. Breeding & promoting pigeons for pleasure & profit. U.S.: 1 yr. $15; 2 yrs. $28. Foreign (payable US funds): 1 yr. $18.00; 2 yrs. $34.00. First class and air mail rates upon request. Free copy on request. P.O. Box 278, Warrenton, MO 63383.

THE AUSTRALASIAN BEEKEEPER. Published monthly by Pender Beekeeping Supplies Pty. Ltd. Send request to: The Australasian Beekeeper, PMB 19, Maitland NSW 2320, Australia. Subscription $US 27.00 per annum, Surface Mail (in advance). Payment by Bank Draft. Sample copy free on request.

RARE BREEDS JOURNAL. Bi-monthly journal about exotic, minor and rare breeds of domesticated animals and their owners. $18.00 (U.S.)/year, $24.00 Foreign; $2.50 for sample copy. Rare Breeds Journal, Dept. Bee, HCR 1, Box 45, Hebron, ND 58638 (701) 878-4970.

JUST STARTING? Start right with *The New Starting Right With Bees*, from Root.

CANADIAN BEEKEEPING. The news media of the Canadian Honey Industry. Send $15.00 for one year subscription to: CANADIAN BEEKEEPING, Box 128, Orono, Ontario, Canada LOB 1MO.

DO YOU KNOW HOW MUCH INFORMATION is packed in the *ABC & XYZ of Bee Culture*?

CORNUCOPIA. Quarterly newsletter for developmental beekeepers. Articles on low technology beekeeping, honey trees for agroforestry and marketing bee products. Rates $10/year to IAAD, D. Sammataro editor, 7011 Spieth Rd., Medina, OH 44256. (216) 722-2021.

BRITISH BEE JOURNAL. Monthly, single copies 33p plus postage. $15.00/yr. U.S. Annual subscription post paid. Sub-agent: The A. I. Root. Co., P. O. Box 706, Medina, OH 44258, U.S.A.

Bee interested. For beekeeping information read the AMERICAN BEE JOURNAL. New editorial emphasis on practical down-to-earth material, including question and answer section. For more information or free sample copy, write to: AMERICAN BEE JOURNAL, Hamilton, Illinois 62341.

THE AUSTRALIAN BEE JOURNAL. Monthly, Sea Mail $27.50 (Aus.), Air Mail $40.70 (Aus.). Write to: Ms. J. Peterson, P. O. Box 365, Emerald, Victoria, 3782, Australia. Sample $3.00 (Aus.) on request.

THE SPEEDY BEE. Monthly newspaper. $12.50 per year (12 issues) in U. S., Canada and Mexico add $2.50 postage. $20.00 per year all other countries mailed first class. Write for Airmail rates anywhere. Free sample. The Speedy Bee, P. O. Box 998, Jesup, GA 31545.

THE NEW ZEALAND BEEKEEPER. Quarterly magazine by the National Beekeeper's Association of New Zealand. Write for rates and indicate whether airmail or surface mail. N Z BEEKEEPER, P. O. Box 4048, Wellington, New Zealand.

THE ANGORA QUARTERLY. A useful publication on the rearing and marketing of Angora Goats and Rabbits. $16 - 1 year, $20 foreign (surface); $5 sample. The Angora Quarterly, P. O. Box 322, Interlochen, MI 49643.

TRAP POLLEN THIS YEAR. ADD INCOME AND SKILL TO YOUR BEEKEEPING.

device, will be used to tip colonies apart at any location within the stack in order to quickly examine a particular spot within a colony.

I think there will be major strides in the transport of bees, as well. This will come in part because of the uniformity of equipment, but also through better stock and management. Beekeepers will have to be tuned into moving bees efficiently for pollination as well as moving bees to changing nectar resources. I see apiary sites being standardized with a beekeeping operation. Thus one apiary could be moved interchangeably with another. This will facilitate moving for pollination.

Pollination will become an integral part of all commercial and semi-commercial beekeeping operations. This will come in part because the beekeepers will have become better managers of their bees, but also in part because of the economic necessity of tapping that financial resource. I see beekeepers becoming good pollination managers through increased knowledge of plants, and honey plants, that are needed to increase yields. Pollination management will become as much a part of beekeeping as any other aspect. I see this as one of the most critical developments in the future of beekeeping.

I haven't said much about our current problems with mites and what will be in the future, except when I covered breeding aspects. I think that in five years the tracheal mite problem will be so minor as to only be mentioned in passing. Resistant strains of bees will take care of that problem. It will take more time for the development of resistance to varroa. Yet that will come too. It may be that the ultimate resistance will have to wait until we can transpose the genes from *Apis cerana*. The African bee "problem" will pass very quickly. The active participation of beekeepers breeding their own bees will begin to be shown as they select the best traits from this bees.

I expect the honey bee to evolve through selection to take care of the problems it now faces. I have great confidence that the bee can do just that, maybe with a little help from us it can happen faster. I may not have as much confidence in the ability of beekeepers to evolve quite as easily. Some evolution MUST take place in the next 25 years or else the species *Homo beekeeperensis* will indeed be threatened. □

Display Index

I see the next 25 years as the period when bee breeding finally becomes a management tool of the beekeeper. This change will not be brought about by the bee breeder so much as by beekeepers themselves. They will take an active hand in determining the genetic stock within their hives. It will not be cosmetic characters such as color that will be important, but things like disease and mite resistance. Beekeepers will be more and more obliged to keep their bees in less than ideal habitats, and thus will have to design their bees to exploit the particular habitat where the apiary is located. We will design bees to reach maximum populations for the unique mix of flowers at each apiary site. The bees will be super gentle in order to co-exist with the nearby neighbors.

I believe that beekeepers will also be greatly aided in their search for a better strain of bees by commercial and scientific bee breeders. The next 25 years will see the transporting of genes from one organism to another as a common genetic tool. The varroa mite resistance of *Apis cerana,* will be incorporated into the European honey bee, *Apis mellifera*. Other characteristics will be identified, isolated and then added to the gene pool of our bees.

The loss of bee habitat will be dramatic in the next few years. We just have to look at the projected growth of the human population to understand that more houses and streets will result. In order to survive, beekeepers will be much more active in planting bee forage for their apiaries. The high-yielding honey plants that are being selected by Dr. George Ayers at Michigan State University will be planted in more and more small un-used spaces. In conjunction with these types of honey plants I see more farms being used for more than one crop per year. The first such plantings are now being tested, such as spring canola to be followed with a second crop. These plantings will be necessary for U.S. farms to stay competitive and the production of second crops, along with a third (honey), will help the farm make a profit.

I see beekeeping management being much more precisely timed. Fuel for transportation will become much more costly in the future. We will not have the luxury of multiple trips to out-apiaries. Each trip will have to cover management of the colony for as long as a month or more. Strains of bees will have to be selected that survive under such conditions. Low burr comb production and low swarming will be an absolute necessity. (These traits can be added to those required under breeding that I mentioned previously.)

Computer tracking of weather should be more on-line in a few years and this will aid in our beekeeping management. We should be able to know when honey flows start and stop with far better precision while sitting in our offices. In 25 years all kinds of sensors will be placed within each apiary, and sample colonies, and these sensors will allow us to transmit information on a colony's condition, via radio signals, to satellites and down to our computer terminals. This should allow us to respond immediately to problems that occur, but at the same time allow us to not visit apiaries just to gather information on the colony's condition.

The next 25 years will have some major changes in the way we market our honey. While honey is a world commodity now, most beekeepers are not in tune with that concept. Price supports will be gone in two or three years. A world-market price will be forced upon beekeepers by the common markets and GATT agreements. Movement to a common price for honey is well underway. Beekeepers will become active traders in such markets. They will also be active promoters of honey into local markets. This will be a survival mechanism for most beekeepers as they become marketers and also direct marketers of their honey.

I see a mini-boom in new kinds of beekeeping equipment in the next few years. In order for U.S. beekeepers to stay competitive in world markets they will have to become much more efficient. The new equipment will be in all areas; honey handling, beehives, transportation of bees, and apiary manipulation. Beehives will become simpler and more ergonomic. For example, one cost-effective hive body size such as 7.5 in. depth. Telescoping covers and inner covers will be replaced by a migratory-type cover. Beekeepers will have to be much more conscious of capital costs in order to stay competitive. Some kind of cheap banding, or efficient locking

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Through My Crystal Ball, Lightly

ROGER HOOPINGARNER

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