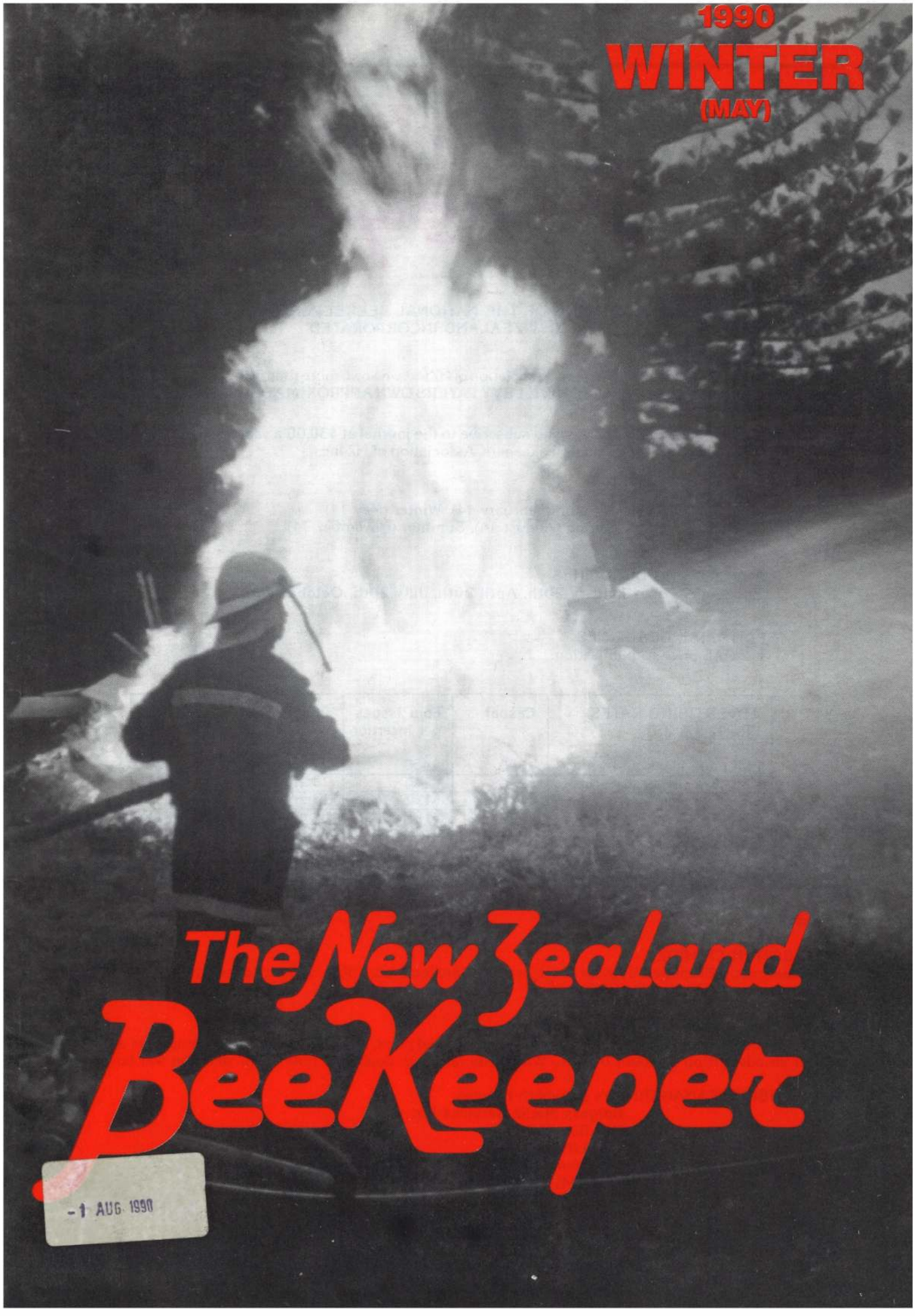

1990
WINTER
(MAY)

The New Zealand BeeKeeper

The New Zealand BeeKeeper

OFFICIAL PUBLICATION OF THE NATIONAL BEEKEEPERS' ASSOCIATION OF NEW ZEALAND INCORPORATED

CIRCULATION, 1,550. . .
To Members of The National Beekeepers' Association of NZ Inc. who own more than 50 hives each and so are legally subject to the annual hive levy. **THESE HIVE-LEVY PAYERS OWN APPROXIMATELY 87% OF ALL BEEHIVES IN NEW ZEALAND.**

To Beekeepers with less than 50 hives who subscribe to the journal at $30.00 a year (incl. GST) which also includes membership of the National Beekeepers' Association of NZ Inc.

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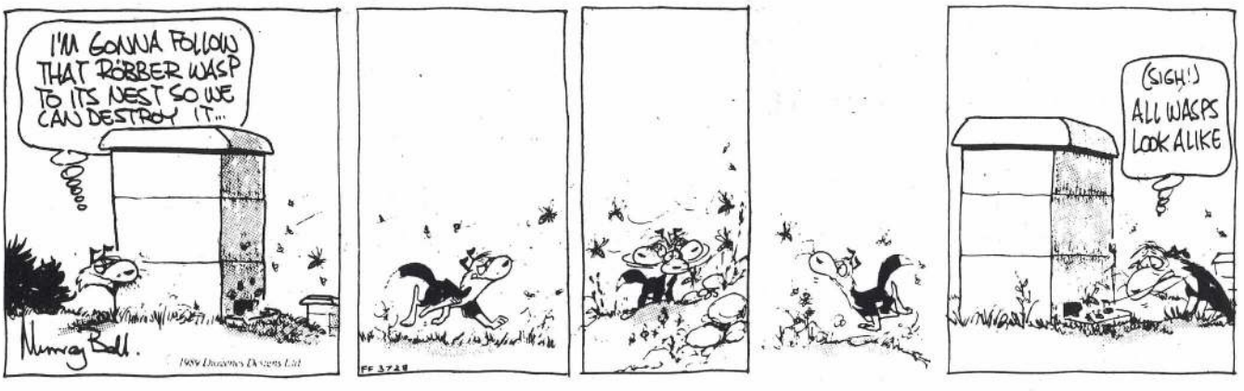

FRONT COVER: Diseased hives go up in flames (see page 16)

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ATTITUDES CAN KILL

By Walter Reid

The attitude of the individual towards work plays a large part in the success or demise of the activity concerned. By observing the players in the beekeeping industry one may wonder why some of these people are still in the industry, if their entrenched attitude is anything to go by. Whilst it is one thing to decry the prices offered for their product, a subject they have no hesitation in promulgating ad nauseum, suggestions that they look constructively at their operation do not have any apparent effect. In fact one might as well talk to the proverbial brick wall, which over the years must have absorbed many varied topics.

Being subjected to a history lesson on the woes of the industry may relieve the tensions within the presenter, but is hardly productive in establishing a constructive policy to get the beekeeping industry off its collective butt and formulate a plan which looks towards the future. The Industry Plan currently being promoted by the NZ Beekeepers' Association does go a long way toward establishing a constructive and coherrent approach toward the future of the industry - or does it?

Any plan, project, scheme, call it what you may, is only as effective as the support behind it. Whilst the national council may have sweated blood in the production of the industry plan, it will come to naught if the lack of cohesion existing within the industry is allowed to continue unabated. Those who join the National Beekeepers' Association hopefully do so with more on their mind than the thought of belonging to "The Club". That individualism is rampant among members is not hard to detect: just start talking to a few of them. The fact is that these people are allowing their individualism to cloud their thinking and could bring about the demise of the very industry their lip service is said to protect.

In any group the submergence of the "Rights" of the individual may initially be necessary in order to establish and preserve the principal they aim for as a collective. No, this is not politics, merely a fact of life. Nothing an individual can do is likely to be as effective as the concerted actions of a cohesive group. To achieve clout one must have strength, to achieve strength one must have numbers, to achieve numbers one must have cohesion in thought, deed and action.

The Industry Plan is therefore only as good as the support it receives. The future for this plan is not bright if the membership does not bring its collective muscle to bear in support of the ideals contained within the document. Your choice is simple, as a member. Support the plan or reject the Plan. But remember, once committing yourself to support the document, your total dedication is necessary for its survival. Submersion of your own individualism may be called for, in the short term, total abandonment of your entrenched ideas may be necessary if progress toward the future is to be made.

Divided we fall; this can only come true if your loyalty to your association is submerged or second in place to your tendency to go out and "do your own thing". This does not pre-suppose that we will not always have individualism amongst members, but in doing your own thing, bear in mind the ideals of your association. Using the Industry Plan as a guideline may not be as limiting as you may think.

Thinking is possibly the one factor we are all guilty of in our activities within the beekeeping industry, or rather the lack of thinking of the results we engender in going off on our own. The larger the producer, the larger the impact, is not necessarily true, as a small producer is just as capable of undermining the industry as the larger one.

"They", the unknown out there who seek to profit from the weakness of others are constantly on the lookout for the individual to pick off, to use to their advantage against the rest of the fraternity.

So there it is, you sink or swim according to your actions. If you want a cohesive beekeeping industry, something you will be proud to belong to, then get in and support your organisation and the Industry Plan. Failure to do so will leave you without any form of positive thinking. Come to think of it, will my random thoughts come to anything if they are promulgated?

Award Now Open To Beekeepers

The Lincoln College Foundation Annual Farmers' Award is now open to beekeepers.

Established in 1978, at the time of the Lincoln centenary, the objective of the Foundation is to encourage people who can contribute to the development of New Zealand's land-based industries. Applications from those without access to other sources of funds are particularly welcome.

A capital sum of $500,000 has been established by donations and contributions and the interest is available for awards. Over 100 awards have been made to a variety of recipients: farmers, scientists, advisers, foresters, staff of commercial firms, agricultural contractors, and fisheries' scientists.

The Trustees have extended the scope of the Foundation and its awards by fostering a competition among farmers. Final judging is held in conjunction with events organised by the Lincoln University Farmers' Committee, and the competition is designed to develop relationships further between the Foundation, farmers, and the University.

The competition is restricted to the South Island in the belief that the North Island is already covered by similar events.

Neil Gow, the co-ordinating judge for the Trustees says: "There are plenty of farmers out there who are managing high-performance animal enterprises who will slot very neatly into this year's category. I know from past judging that they are around and that is why the Trustees chose the non-traditional animal enterprise for this year. We must seek them out and get them to share their entrepreneurial skills with the wider farming community."

The prospectus and application forms are available from all local MAF offices, Farm Management Consultants, Federated Farmers and Young Farmers Regional Secretaries, and also from the Foundation itself, C/o Education Unit, P.O. Box 84, Lincoln University Post Office.

LETTERS

Dear Sir,

I am a beekeeper and bees are my life-work. I graduated from 2 Institutes, y compris the Institute of Apiculture and more than 20 years I work with bees, so I have enough of experience. I have myself a large apiary.

I dream of visit your beautiful country and to work at a large apiary or at a bee farm this season (June 1990-April 1991).

It will be very interesting for me to see your advanced methods, as is saying in action and to show my style of work.

I would like to work all one's heart in new conditions for a bee farmer and for me.

Don't you know a man or woman who are in difficulties for an experienced beekeeper? They will be to may depend on me in all. I can promise exactly the main thing — I'll do one's best for the augmentation of honey crop and extension of apiary. Please propose them to write me and to send the invitation.

I am an easy and equable man, because it is such my character.

I think I'd better receive the invitation from your Association in addition. Is it possible? Or it will be better to advertise in your magazine on my behalf. I shall compensate all expenses on one's arrival in your country.

If I receive this invitation for a period of 1 year by then I have time to August to finish all my affairs, it is possible more early.

So, all will depend from the invitation. As for me, dear friend, I'll do my best for your pleasure.

What do think about it? Can it be done?

I shall be very grateful for your help.

I shall be happy to receive your answer.

Eugene Plastinin
56 Flat,
23 Pervomayskay Street,
T. Nova Kakhovro,
Kherson Region,
USSR

Would anyone care to write to Mr Plastinin? Editor

Dear Sir,

I am writing re my concern for the illegal entry of honey SAMPLES into N.Z. I have been very impressed with the customs efforts and seizures related to honey but I have recently wondered if there could be a loophole in the checks re small honey sackets.

A neighbour recently returned from U.S.A. has proudly presented me with 6-8 varieties of U.S.A. honey sackets. I felt like hitting the roof but instead calmly asked a few questions. They do remember seeing honey on the list as a banned item, but felt that so small a sample could not be significant — it's "only a taste"! These people are very conscientious and law abiding and would never have knowingly done something dangerous to the honey industry.

I am worried that other NZers must have a similar attitude and that alot of honey sackets could be ending up at the "tip" for some anxious N.Z. honeybees to taste test!

I am wondering about two possible solutions:

1) that the customers sheets **specify** honey **sackets** or samples

2) that overseas airlines flying to N.Z. be contacted to see if honey sackets are being served as part of an in-flight meal.

I will be interested in hearing your thoughts on this matter. Although a small amount of honey, it could be disastrous (I received honey samples from four states). I am just thankful that it was me that received the treasured gifts as I was able to destroy them "well and truly!"

Merle Moffit

A copy of this letter has been sent to the A.Q.S. Editor

Dear Sir,

I was somewhat dismayed to read the Autumn 1990 'Comment' column. New Zealand queen breeders have long been under pressure to supply select tested queens at Woolworths' prices. We are expected by a few beekeepers to be able to supply quantities of queens at a moment's notice and at whatever time of the year suits the beekeeper concerned. Speaking for myself and probably most commercial queen breeders, I endeavour to supply beekeepers on the dates required with the best possible quality queens at the price. If any beekeepers want other than run of the mill quality then they should discuss it with their queen breeder but be prepared to pay extra. For instance, no less than a further three weeks and 30% more queens are required to be able to supply guaranteed pure mated queens. From the beekeepers point of view however, I feel it would be more economical for him to buy the 30% extra at run of the mill price, make up some nucs and test the queens himself. One thing easily forgotten is that whilst you may be enjoying glorious weather, your breeder may be suffering atrocious conditions and having to work in them seven days a week and field 'phone calls seven nights a week. It beats truck driving for growing ulcers. All this for a return which compares favourably with the dole except that the working conditions are somewhat different apart from the seven day week.

Finally failures arise usually from no more than 2½% of queen output, but if buyers have a genuine complaint and cannot achieve satisfaction then they do have recourse to the NZQBPA (provided the breeder is a member). A beekeeper of 30 years standing has not learned a hell of a lot in that time if he allows a poor queen to stay in hive, looses it in a swarm and then waits for it to return. If he chooses to do this I would suggest that he gets a book on practical beekeeping and a chair alongside his hive and does some careful reading otherwise he will be standing for a further 30 years.

Don Gibbons
Waipu

P.S. Commercial Queen Breeding is very competitive these days and for this reason alone I don't believe queen quality as a whole has deteriorated. This situation gives buyers the opportunity to try other queen breeders if they are not satisfied with their current one.
Don G.

Dear Sir,

I was recently reading a copy of your magazine (Winter '88).

I found the magazine to be very informative and interesting.

I am writing to enquire about subscriptions to your magazine.

Could you please send me information on how to go about this?

I thank you in anticipation.

John van der Hulst
Waikeria

Dear Sir,

I am a commercial beekeeper operating about 300 stocks based in Oxfordshire, and am more into pollination than into honey, except heather honey in which I specialise.

I have a son, Daniel who will be 18 years old in June of this year when he takes his A level exams. Provided his grades are high enough he will be taking a "gap" year before going to University in 1991 in the summer. He has always expressed an interest in New Zealand.

He has helped me over the past five or six years, particularly in the moving of bees which is an endless chore for me with pollination. He is well aware of what and how a bee farm is, and how it is managed, though he has never expressed a desire to keep bees on his own account. Being away at school for most of the year I have not encouraged him to run his own bees.

I wonder if it would be in any way possible for him to work on a bee farm

starting mid-September this year. He obviously has to earn money to pay for his keep and so would expect whatever wage a student would get. He is string and a willing worker. He is studying Maths, Chemistry and Physics for his A levels, and has a keen interest and knowledge of computers and electronics. He has a clean driving license.

Could you possibly advise me as to the feasibility of him working, and perhaps through your good offices you could let me have some addresses of likely employers.

I hope this is not too much trouble for you. I hope to be in New Zealand in November and December this year — fishing, not beekeeping.

Julian Johnston
10 High Street
Bampton, Oxfordshire
England

P.S. Should the opportunity occur I would welcome a New Zealand boy/girl next year.

Dear Sir,

I was interested to read John Hogg's article on comb honey in the halfcomb in the February issue, particularly the comparison with producing round comb. I have tried both and would like to relate some of my experiences.

I have now had nine seasons producing round comb. When the halfcomb packaging came on the market I experimented with a few supers for two years and then decided to give it up and only produce round comb. My reasons were:

1. I found round comb easier to manipulate in the hives and get each round properly filled. I have averaged 9% not filled enough to be sold, being partially capped over and not easily able to be placed in a strong hive for finishing. Indications were that this figure would be exceeded with halfcomb.

2. With halfcomb there was a tendency for comb building on the bottom of some box surfaces. This caused a wave effect on the surface of the capping of the comb in the box beneath, in order to maintain the correct bee space. These boxes were underweight because the extra comb was on the bottom of the next box and was wasted. This fault was also experienced by another beekeeper in the district who tried a larger number of supers. Possibly this is a peculiarity to Marlborough conditions. With the round comb I have not experienced these problems.

3. As round comb retailed at a lower price, the turnover in local shops was greater. Shoppers did not seem to take into account the difference in net weight in favour of the halfcomb.

4. The top corners of the square plastic containers broke fairly easily whereas the round containers were more robust.

Thoughts for the future:

Although plastic containers are convenient and attractive, they are fairly costly and I feel that the time will come soon when they are not environmentally acceptable, particularly in export markets such as the Common Market. If anybody could come up with a reasonably robust material of a biodegradable nature which retains the present design advantages of either the round or halfcomb, prospects for the future would be brighter.

Tony Inglis
Blenheim

Dear Sir,

I write because there is a matter where I need your special help. I am working at the well-known Commercial Apiarist's School in 3100 Celle, North Germany, as a Beekeeper Supervisor. So I know most of the German trained beekeepers, the good ones and the lazy workers.

So here I have a good one: She is 21 years of age, her name and address is:

Simone Treutler
Eieckhof 5
3012 Langenhagen
West Germany
Phone 511-752302

She wishes to work one year or season, in New Zealand for more experience in commercial beekeeping. She can start September '90. She can work in a queen-breeding business or also in honey production. If I had any doubts that she could not cope with any type of beekeeping, I would not offer that person to you. I have two beekeeper-fellows who worked in NZ when we had winter here. I know New Zealand Beekeeping requires hard work, but you also have a good reputation. That of course matters a lot, and keeps my conscience clean, recommend a woman so far away.

It takes three years to become educated as a professional beekeeper in Germany, and I believe to say it sure meets Australian awards.

So if an employer can be found on your side, who has no trained beekeeper-worker with the required skills locally available, then it should work out.

If you may know an employer, please let me know the address, or write to Simone Treutler directly. I would appreciate hearing from you soon because all this bureaucratic work takes a long time. It has to go through the New Zealand Embassy.

If you ever have a person who wants to work in Germany for more beekeeping experience, then let me know.

Wulf-Ingo Lau
Bienenzuchtberater
Wehlstr. 4a - 3100 CELLE
Telefon 0 51 41-60 54
West Germany

Dear Sir,

Just in case it slips through without other comment, I feel obliged to correct a letter to the Editor in the Autumn 1990 issue.

B. King of Blenheim makes the bold statement that 'NZ's national honey consumption is one teaspoon per human per YEAR.' What utter rubbish! I am disappointed that you as the Editor did not print a comment of your own at the time.

Only by immediately challenging such outrageously erroneous statements can we as beekeepers ever expect to keep them from masquerading as truth. Let's look at the numbers.

NZ's annual honey crop in round numbers is 10,000 tonnes. That's 10,000,000 kg of honey per year. Of that, we consume about ⅔ — that is 6,600,000 kg or so. With a population of about 3,000,000 that works out at of about two kg per person per year.

B. King's claim of one teaspoon per human per year is categorically distanced from truth and reality. I note that his letter carries on with an equally faulty grasp of marketing and public relations.

Now that his letter has been published and circulated through the *NZ Beekeeper* all around the world, how is my letter ever going to catch up? I sadly feel that, to paraphrase, truth delayed is truth denied, and the damage of such a letter will have already been done.

Nick Wallingford
Tauranga

The word 'teaspoon' in the letter referred to describes not only honey consumption but the amount of advertising needed to increase that consumption. Therefore, its use is clearly emotive and not intended to be taken literally. Whether or not B. King has a grasp of marketing and public relations is beside the point. The 'Letters' section exists for readers to express their views, whether they be right or wrong. That is what B. King has done and which indeed you have. However, since accuracy appears to be demanded in this case, it should be noted that the latest figures from the Statistics Dept. show New Zealand's population to be approx. 3.4 million, not 3 million, and according to the NBA's Annual Report, Dec. 1989, the honey crop for the year 1988/89 was 5,752 tonnes. Editor

BEEKEEPING IN WONDERLAND

By Reg Clarke

"The time has come," the Walrus said,
"To talk of many things:
Of breeding schemes, and feed
regimes, and pollen cakes
and queens."
(with apologies to Lewis Carroll)

Many of you will recently have seen David Yanke's revised proposal for a closed-population breeding scheme. It has been circulated widely to branches and interested persons; if not copies are available from David, or your Branch Secretary. This has to be the best chance we are ever likely to get to improve the genetic side of our queen breeding.

The scheme follows well-tried principles. First a base population of select, genetically varied stock is being established. After careful evaluation, the best 25 queens will be selected as breeders. Daughter queens will be mated by instrumental insemination with pooled, homogemised semen. The second generation thus carries forward the genes of the 25 selected mother queens, with each new queen having an identical male contribution from all 25 families. Each autumn, these daughter queens are introduced to the base hives, and the same evaluation and selection process is repeated. This makes possible rapid progress: concentrating the good qualities and eliminating the bad, while maintaining the gene pool and alleles. With open mating, only very slow process, if any, can be made, and there is greater risk of reducing the gene pool by inbreeding.

The cost to participating breeders will be about $600 each year. In return, they receive a share of the surviving one-year-old breeder queens, and one inseminated daughter from the best breeding line of the current season's stock. Small-scale queen producers may be put off by the cost, modest as it is for the potential benefits. If so, why not pool resources locally to share the benefits and costs? The foundation stock is already being assembled, but there may still be a few vacancies.

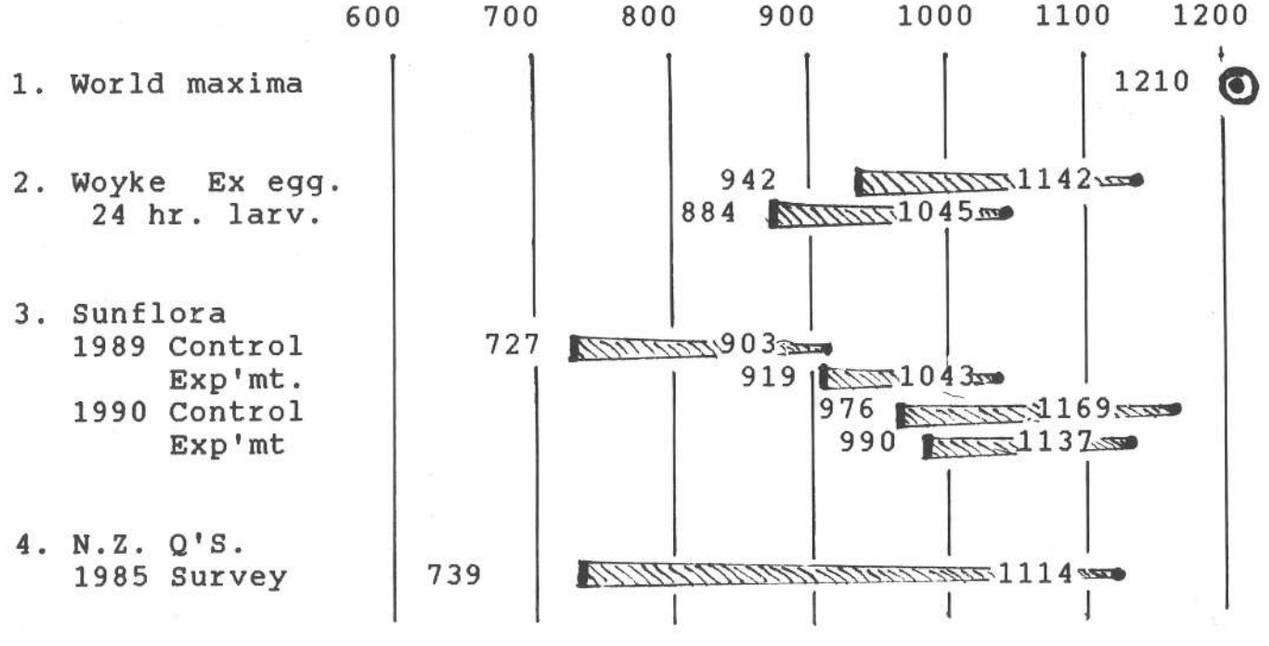
David has shown a lot of ingenuity in bringing down the cost to something our small industry can afford. And I know from my own experience of his inseminated stock that he has the required skills. The Aussies now have several such schemes running, each backed by the resources of their Agriculture Ministry or Training Colleges. The West Australian scheme is claimed to produce an annual increase of 10% extra honey crop. The Queensland Agricultural College scheme is producing queens that are 30% heavier than the best I can raise.

Once upon a time, we lived in a financial version of Alice's "Wonderland" when generous Government subsidies were lavished about. Though to be sure, beekeeping saw little of it. Now the tale is of "User pays" and "Market Forces," and sounds more like "Cinderella" than "Alice in Wonderland." The economics of beekeeping are critically dependent on the quality of our queens, and to make progress we have to use modern technology. There will be no Government hand-out nor even a handsome fairytale prince to help us. The choice seems starkly clear to me; we either give this scheme our full support, or we continue with our present methods and become a quaint working museum of antiquated apiculture.

Feed Regimes and Pollen Cakes

Recently, the Bay of Plenty Branch held a successful and well supported

SUNFLORA QUEEN DATA
COMPARATIVE REPRODUCTIVE INDEX VALUES



Field Day, covering various aspects of bee nutrition and feeding methods. For me, it was a welcome opportunity to share with those present the results of some of my studies in this field. And as always there was much to be learned. Bay of Plenty beekeepers are well aware of the importance of good nutrition for fast colony build-up, and regular feeding with pollen substitute seems to be normal practice in pollen deficient areas. (See Buzzwords No. 12 for recipe). There was also a readiness to think beyond protein and sugar, to mineral and vitamin needs and the possible effect of soil mineral deficiencies. These are matters which livestock farmers long ago came to grips with, and which the beekeeping industry is only just beginning to think about. Here again, the Australian industry is well ahead of us. The protein values of each pollen species are widely understood, as is the need to maintain or restore bee-body protein levels. Beekeepers migrate with their hives to pollen rich areas for build-up and restoration periods before and after intense nectar flows on pollen deficient species. We need similar detailed knowledge of the protein and mineral values of our own pollen sources. That is something I would like to contribute to but I cannot see how it could be financed. Any ideas, anyone?

Queens

As I write, queens are still being examined for the first ever Queen Quality Competition. Support has been disappointing, but is just sufficient. Next year, it will be possible to include spring-produced queens, which may encourage more to enter. Results will be published in the next edition of the "Beekeeper." My guess is that the best queens will score about 1100 points. What is more important than the score or the winner's name, is the potential to increase the standard each year, learning from each other as we progress. And then to apply that knowledge to increasing the standard of our production queens. I am old enough to remember the time when no athlete could run a mile in under four minutes. Why not? Because no-one believed it could be done. Once that psychological barrier was breached, many runners did it. It will be the same with 1200 point queens: at present beyond our reach but commonplace within five years.

Results of my experimental programme have been a little disappointing this year. The experimental queens were only marginally better than the controls in some important respects. (See diagram). With so many variables, it is not easy to decide the reason for ovariole numbers and spermatheca volumes being below expectations. There have been dietary changes between the 1989 and 1990 experiments and some of these may have had an adverse effect. Environmental conditions in January were very difficult, with severe drought, blistering heat, and pollen shortage. And with the control queens setting a very high standard, perhaps it is getting more difficult to advance as physiological limits are approached.

The queen mother used throughout the trial work this year was a single drone insemination supplied by David Yanke; all daughter queens are true sisters, and more even in quality than with multiple drone mating. There were a number of significant gains in the experimental batches. These include a 25% increase in larval growth rate, with slightly increased royal jelly supply of 10% greater glucose content. There was also a 10% increase in the ratio of queens cells put out to queens harvested, and a 17% increase in queens over 260mg. The extra feed cost is only 4%; of the value of the extra queens. I plan to produce a fully detailed report on

this season's work during the winter, and will advise when it is available in "Buzzwords."

Notes:

1. The Reproductive Index = ovarioles + (spermatheca volume x 270) + (sperm in millions x 40). This gives near equal weighting to each of the three values.
2. Mean values are plotted at the left side of the symbol; maxima at the right. Minima ignored for simplicity.
3. World Maxima. Hypothetical value, composed of ovariole count from Brazil (Casagrande 1984), spermatheca volume from Woyke's paper, and the sperm count from Dr. Szabo's data. (J.Apic.Res. 25(4), 1986.
4. Woyke. Data from Dr. J Woyke's paper. J. of Apic Res. 10(1), 1971.
5. Insufficient data exists to plot values for any other country's commercial queens. The available evidence suggests values similar to those plotted for N.Z. queens from data published by C. Van Eaton. (N.Z. Beekeeper, No 192, 1986)

LAND PLAN

A Scottish scientist has warned that Europe's so-called surplus farmland problem is unlikely to be solved by an expansion in either forests or nature conservation.

Professor Kenneth Thomson of the North of Scotland College of Agriculture predicts that Europe is more likely to experience a "minor expansion of lightly used grazing land devoted to low-yield livestock" as the most obvious solution to the problem. However, he admits that such a solution does not quite coincide with the recent calls for more uniform and high quality meat production.

In an article, "World Agricultural Prospects and the macro-economic Environment", Professor Thomson gives a gloomy assessment of the state of farming in the developing world.

"The current outlook for agriculture in many developing countries cannot be said to be particularly bright. Their economies overall are growing only slowly, and populations are still rising at a pace which offsets much of the growth in food output," he states.

"Many of these countries depend heavily upon exports of tropical products for which demand in the developed world is stagnant, and supply persistently tends to outstrip consumption. Failure to increase foreign exchange earnings is bound to continue to depress economic growth, and to dampen effective demand for imports of agricultural and other products from the developed world, except on highly concessional terms."

The agricultural review in which the professor's piece appears, also includes articles ranging from an examination of 1992 and the advent of the European single market, an economic analysis of less intensive grassland farming and a review of farm forestry, to an assessment of Britain's animal feed industry. It is available from SAC Economics Publications, 42 South Oswald Road, Edinburgh EH9 2HH, Scotland. Price £5.

Library Notes

By John Heineman

We have recently purchased a copy of: "BEEKEEPING IN THE YEAR 2000" being the proceedings of the second Australian and International Beekeeping Congress held at Surfers' Paradise in Queensland from 21-26 July 1988. Compiled and edited by John W. Rhodes of the Department of Primary Industries, Queensland, it is a record of all that went on and of the papers presented at the Congress. Much of the material was of course contributed by Australian speakers connected with the beekeeping industry but some came from a number of well-known researchers and experts from elsewhere, including a few New Zealanders.

Papers covered a variety of subjects under headings s.a. bee biology, bee pathology, apicultural science, pollination, melliferous flora, technology and equipment, apitherapy, beekeeping economy and marketing. A wide field indeed.

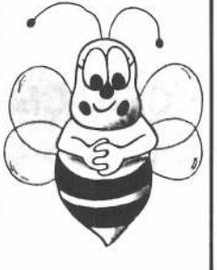
These papers contain a terrific lot of information and will be of good value to anyone studying particular subjects and for general reference. The book is illustrated with many b/w photos and diagrams. It has a well set out index, list of participants, etc.

It did not come cheaply at A$ 40 plus postage, but should prove to be a justified library investment. It is available from several Australian Bee equipment manufacturers.

At long last all but one of the books lost in the house fire at Levin some years ago have been replaced and are available again to borrowers. "Curative Properties of Honey and Bee Venom" by N. Yoirish is out of print and not available from several second-hand dealers which have been approached. However Mr Don Stedman from Pine Bush (I'gill) lent us his copy which we have photocopied and put into a ring binder so that the gap has been filled in the meantime.

The following papers should be noted in your catalogue copy:

— MAF. PRIMARY PRODUCTS ACT, PROPOSED LEGISLATION 1989.
— M. Reid. DISEASES OF HONEY BEES IN NEW ZEALAND. 1988, 3p., NZ.
— P. Reid. WASP PARASITE, interview, DSIR 1988, NZ.
— J. Longworth. SPIDER MITE (gorse), interview, DSIR, 1988, NZ.
— B. Stringer. THE OTHER DOWN UNDER, interview with Gavin White. Gleanings 1987.
— G.W. Gaisford. PROPOLIS OINTMENT AND TINCTURE. 1985, lp., NZ.
— N.Z. Herald, Photocopy of advertisement J.S. Brockland, Ohaupo 10-11-1885 and report visit to Karl Bros. Apiary.



Determining the Importance of the Bee Mite in Honey Bees

By Ron Van Toor

In 1987 the opportunity for New Zealand beekeepers to export honey bees to Canada was put at risk by impending restrictions due to the bee mite, *Mellitiphis alvearius.* In a project partly funded by the NBA, we determined using an immuno assay technique that the mite was not parasitic on bees. We also demonstrated that mites contaminating bee packages could be killed using an acaricide, with no apparent effect on bees.

Observations

The mite is commonly seen in bee hives throughout this country. The brown female adult, at 0.7mm diameter being the largest of the development stages (Figure 1) is often seen scurrying over bees and disturbed frames. Colonies of all stages, including white nymphs (Figure 1) and the brown adult males under half the size of a female adult can be found between the top bars and hive mat.

Preliminary observations from confining adult mites with a variety of possible diets showed that they were attracted to bee cadavers, propolis and pollen, rather than wax, bee larvae or eggs. Microscopic examination of the mouth parts verified that morphologically the mite could feed on eggs of arthropods or pollen granules.

These observations strongly indicated that the mites scavenge pollen. However they did not exclude the possibility that the mites could also be parasitic on bees. Since there was no evidence of mites feeding on the external parts of bees, we presumed that if the mites were parasitic, they would be feeding on tissues inside the bee. We wanted to prove that the gut contents of the mite were not derived from bees, but instead came from other food sources in the hive. Since bee protein retains its native antigenic configuration within the digestive tract of feeding mites, even after partial digestion, it is detectable by immunological methods.

Immunoblot Technique

The highly sensitive immuno-dot blot technique was employed by Dr Bruce Gibbins, an immunologist at the University of Otago, to detect any bee haemolymph (bee blood) and or pollen in the mite gut. Decanted extracts of washed bee haemolymph, whole bee, bee mite, two-spotted mite (a mite known to be nonparasitic on bees) and pollen were arranged in dots of graduating concentrations onto a special membrane (Figure 2).

Rabbit anti-bee haemolymph and anti-pollen antibodies were prepared by injecting a rabbit with either bee haemolymph or pollen respectively. After three weeks the haemolymph and pollen antisera produced by the rabbits were extracted. These solutions con-

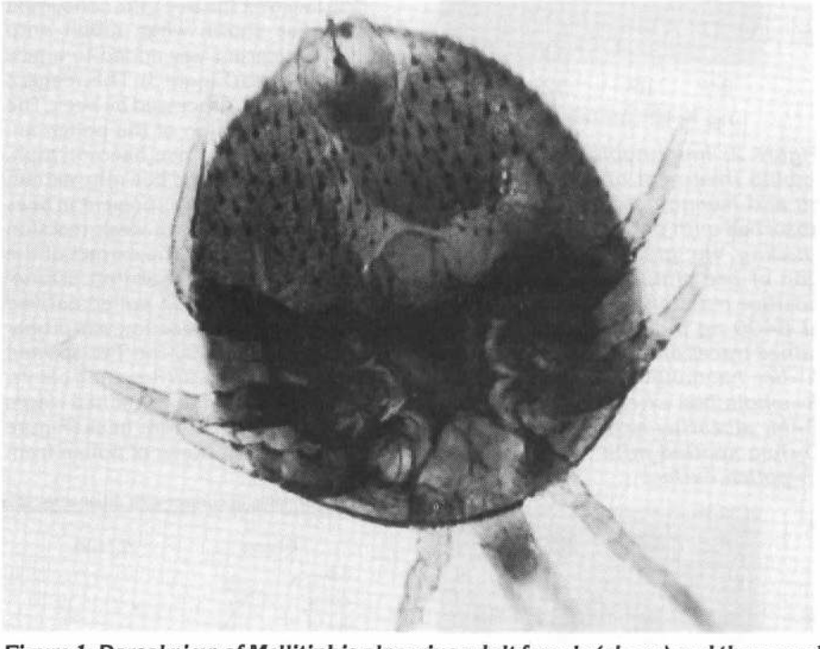
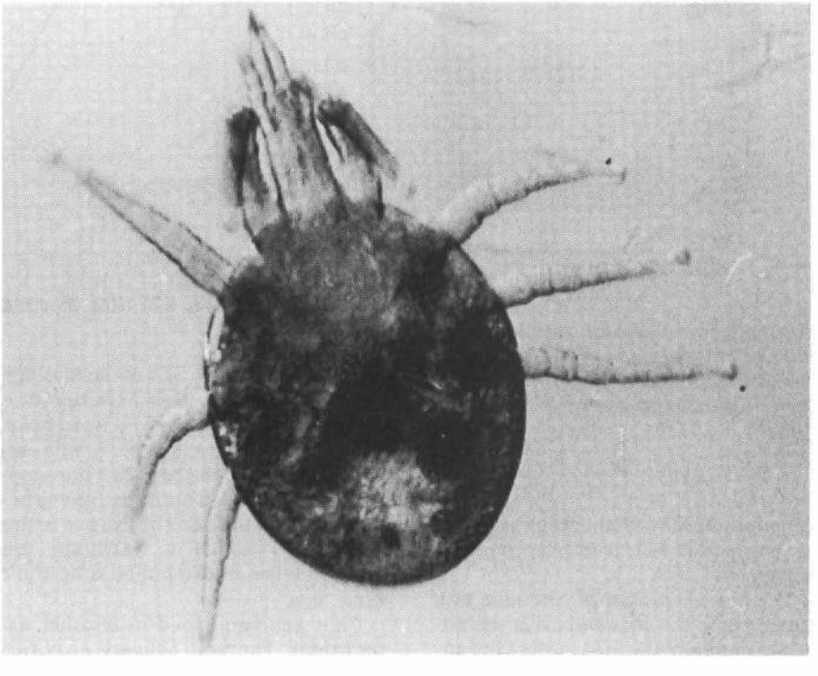


Figure 1: Dorsal view of Mellitiphis alvearius adult female (above) and the nymph stage (below). Magnification 40 times.



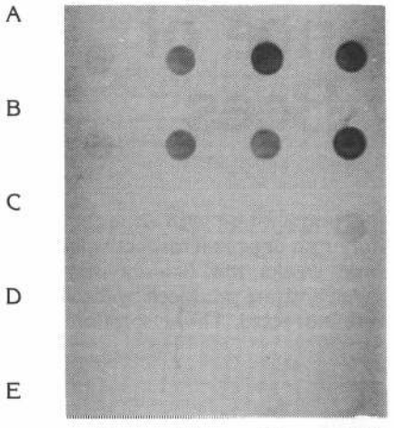


Figure 2: Immunoblot reaction following treatment of blots with rabbit anti-haemolymph antiserum pre-absorbed with pollen. The darker the shading, the greater the concentration of bee protein in the dots. The positive reaction on M. alvearius (C) at 6400 ng indicates the mite contained traces of bee derived proteins.
A=bee haemolymph
B=whole bee extract
C=M. alvearius extract
D=Two spotted mite
E=pollen extract

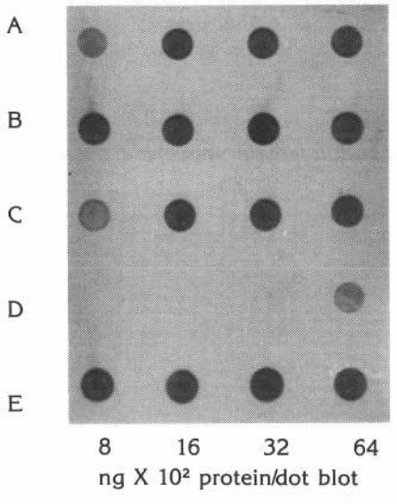


Figure 3: Immunoblot reaction following treatment of blots with rabbit antipollen antiserum showing that the bee mite ingests pollen.

tained antigens which 'stuck' specifically to protein derived from bees or pollen.

The bee haemolymph antisera, was applied onto the dots and a dye was added to highlight the areas where the antibee antibodies in the antisera had bound to bee protein in the dots (Figure 2).

Results indicated that, as expected, the anti-haemolymph antiserum reacted with all concentrations of dots of bee haemolymph and whole bee extract. However the weak reaction with *M. alvearius*, which was not due to a shared cross reactivity among insect haemolymph since no detectable reaction occurred with the two-spotted mite dot blots, showed that the bee mite contained bee proteins internally.

The fact that the bee mite consumed pollen was shown when rabbit anti-pollen antiserum was added to a new set of dot blots (Figure 3). This reagent detected pollen processed by bees. The very strong reaction of the pollen antiserum to dots of bee haemolymph, whole bee extract and bee mite extract showed that pollen was present in bees and the bee mites. The weak reaction which occurred with the extract of the two-spotted mite suggesting erroneously that it contained pollen derived from bees, but the reaction was probably brought about by the Two-spotted mite's association with flowering plants.

Since the bee mite contained traces of proteins derived from bees (Figure 2C) and large amounts of pollen from the bee hive (Figure 3C), these findings indicated that the pollen in the bee mite contained proteins derived from bees. This may have been due to the mite eating pollen which the bees had previously digested, the bee derived proteins being those regurgitated by the bee in the saliva and honey to facilitate the manipulation of the pollen onto their hind legs.

This was confirmed in another experiment. Thoracic salivary enzymes

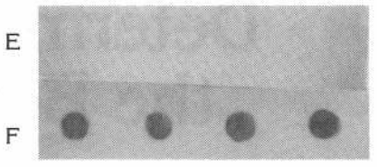


Figure 4: Immunoblot reaction of rabbit anti-haemolymph antiserum after pollen and salivary antigen contaminants had been removed on dot blots of M. alvearius (E) and bee salivary extract (F).

extracted from bees were added to the bee haemolymph antisera to absorb out any of these materials. The enzyme absorbed bee antisera was then applied to the dot blots of the extracts of **M. alvearius** and bee saliva (Figure 4). The positive reactions to bee saliva (4, F) indicated that the bee derived proteins were the salivary enzymes. The weak reaction from the non enzyme-absorbed haemolymph on the **M. alvearius** extracts (2, C) was eliminated using the absorbed reagent.

These experiments showed that the bee mite contained pollen internally and bee proteins in the bee mite were derived from bee digestive enzymes associated with the pollen. We concluded that the bee mite was commensal in the beehive scavenging on processed pollen and is not parasitic on bees.

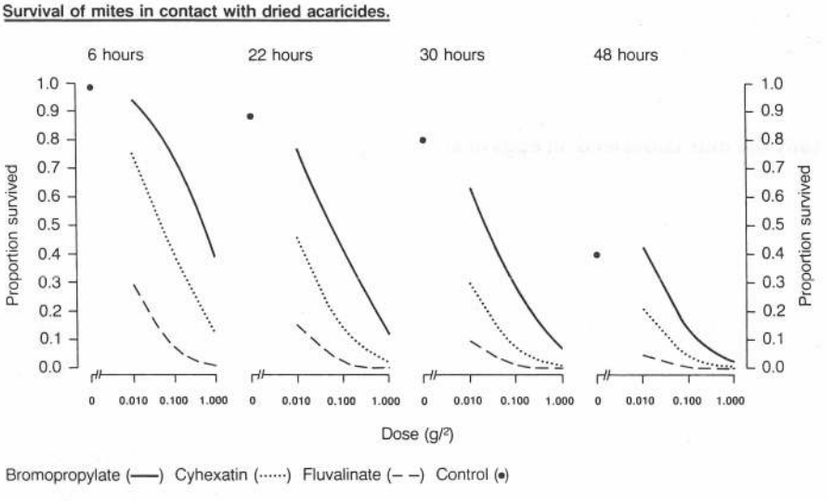


Figure 5: Survival of mites in contact with dried acaricides

Mite Control

Since the Canadian authorities may request that all mites be dead on arrival, we investigated the use of acaricides for killing mites contaminating export bee

packages. In a set of bioassays, the contact toxicity of cyhexatin, bromopropylate and fluvalinate were evaluated on nymph and adult mites in containers representing that of cardboard tube bee packages.

The acaricides were smeared onto cardboard disks which were dried and placed into petri dishes. The mites were incubated at 28°C and 85% relative humidity and observed at various intervals for up to 48 hours.

Both cyhexatin and fluvalinate gave the required 99-100% mortality (adjusted for mortality in the control) of mites after 22 hours (Figure 5). Fluvalinate was effective at a rate of 0.1 g/m². Bromopropylate did not give the desired degree of control after 30 hours.

To evaluate the contact acaricidal toxicity to bees, 10 bees each were held in 78 mm x 24 mm diameter polypropylate tubes. The sugar gel was the same as that used in export bee packages. The acaricides were smeared onto the inside face of the cardboard insert. Bees were incubated at 28°C. Because of the variations in humidity experienced by the bees on their flight to Canada, the bees were held at either 40%, 65% or 85% relative humidity. After four days survival of bees at the three humidities in the control group and that of bromopropylate and fluvalinate was acceptable (Figure 6). Cyhexatin however caused high mortalities at rates above 0.1 g/m².

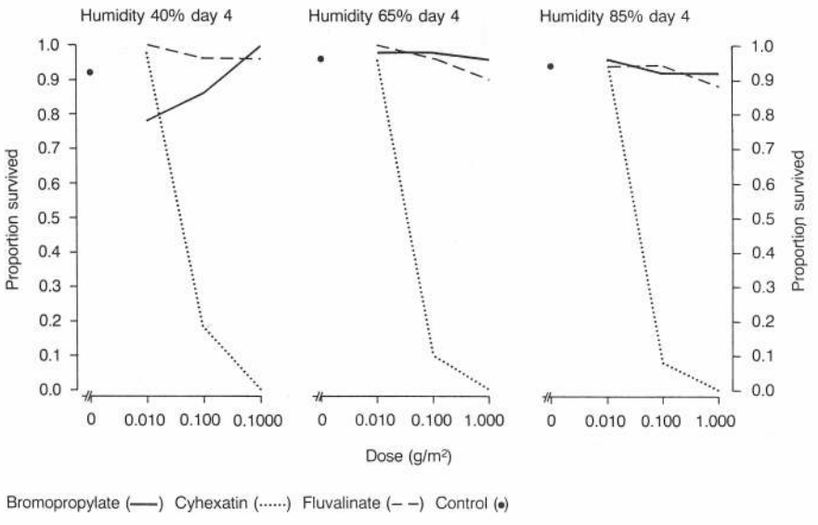
This study was continued for nine days, the maximum duration for the bees to be in transit before being transferred to the hives in Canada.

After seven days survival of bees was poor at 40% relative humidity, but was assisted for some unexplained reason by bromopropulate and fluvalinate. At the other two humidities, fluvalinate at 0.1 mg ai/m² did not affect survival comparative to the control but the higher rate did. Bromoproylate demonstrated no ill effects on bees at all rates provided relative humidity was above 65%.

However fluvalinate at 0.1 kg/m² was the only effective treatment to adequately control mites and also exhibit no toxicity to bees when they were confined to the packages. Costing three cents for the material to cover the inside of the cardboard tubes used in export, fluvalinate has the potential to be a viable compound for control of the bee mite in bee packages. If countries importing bees from New Zealand require the bee mite to be dead on arrival, then fluvalinate warrants further study on actual packages.

Our work has demonstrated that the mite is not parasitic of bees and that if necessary the bee mite can be successfully controlled in bee packages using fluvalinate acaricide.

Survival of bees after four days.



Survival of bees after seven days.

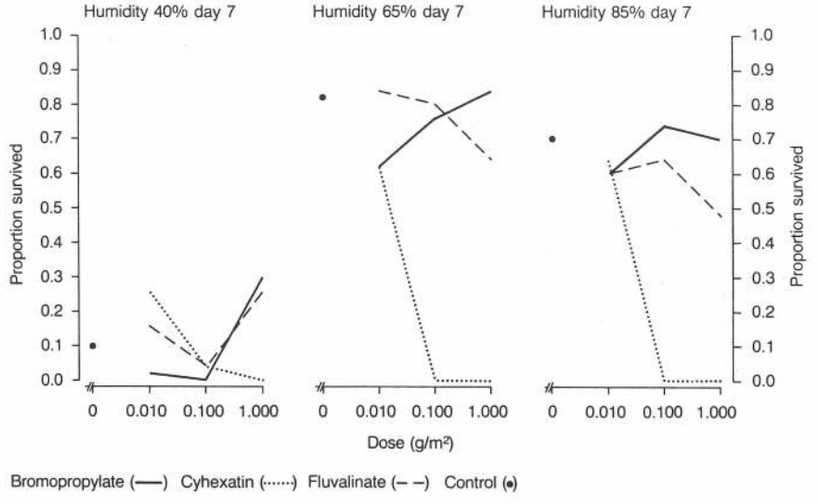


Figure 6: Survival of bees in contact with dried acaracides after 4 and 7 days.

ACKNOWLEDGEMENTS

I gratefully acknowledge Mr John Foote for access to his bee colonies during the course of this study and Mr Ivan Dickinson who supplied hives for the source of mites, and the New Zealand National Beekeepers' Association for a grant-in-aid for this study.

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Gibins, B. L. and van Toor, R. F., 1990. Investigation of the parasitic status of bee mite **Mellitiphis alvearius** (Berlese) on honey bees **Apis mellifera. Journal of Apicultural Research:** (in press.).

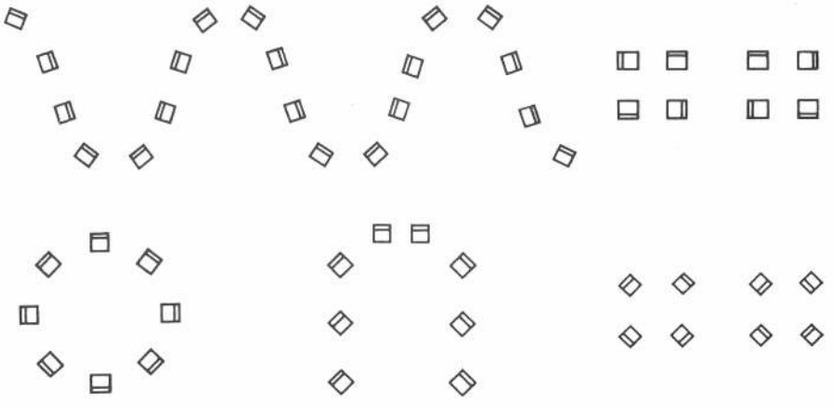
van Toor, R. F., 1989. Evaluation of acaricides for **Mellitiphis alvearius** (Berlese) mite in export bee packages. Proc 42nd Weed and Pest Control Conference: 269-273.

Drifting Behaviour in Colonies on Pallets

By Andrew Matheson

Honey bees often leave one colony and join another. This "drifting" of bees causes problems which have been known to beekeepers for over 30 years.

A number of people, including Vince Cook in New Zealand and Cam Jay in Manitoba, carried out experiments to show what effects drifting causes, and how to minimise this problem.



Layouts which can be used to minimize drifting.

Drifting can have pretty serious consequences. Because drifting takes place in definite patterns, colony populations in an apiary can become very imbalanced - some hives burst at the seams while others really struggle along.

Apart from creating a lot more work for the beekeeper, in equalizing hives and preventing swarming, this effect reduces overall honey production (by up to 21% in some of Jay's studies).

Drifting increases the risk of disease spread, both directly by bees returning to the wrong colonies and indirectly through transfer of frames between hives.

Units used for mating queens should always be arranged to minimise drift; including honey-producing hives where requeening is done with cells. The effort put into raising and placing cells is totally wasted if queens return from their mating flight to the wrong hive.

What to do about drifting is also well known and very simple, though not all beekeepers have yet got the message. The three key actions are:

- Arrange hives in low-drift layouts (see illustration).
- Use a variety of colours when painting boxes, so that hives end up looking less monotonous to bees.
- Use landmarks in the apiary where practicable, especially in mating yards. These visual cues can be natural features such as bushes, or marker boards.

How has the drifting question changed, now that more and more hives are being put on pallets? A recent paper by Cam Jay and Don Dixon of Manitoba, Canada, gives us some of the answers.

These two scientists looked at five commonly-used arrangements for hives on pallets, and determined the number of bees drifting between hives in the same group and the overall effect on honey production.

The results are quite straightforward. Layouts A-D (see diagram) all produce about the same, relatively-low level of drifting, but arrangement E caused up to six times as much drifting.

The honey production for each pallet, though, was not significantly different for any of the five layouts. This means that beekeepers can choose whichever suits their style of operation and equipment.

Although there was more drifting with layout E, it was fairly random and no hive built up at the expense of another. This disposition of hives still increases the risk of disease transfer and failed queen replacement.

But here's a surprising result - there was no significant difference between individual colonies within a pallet. Most beekeepers reckon that the direction an entrance is facing will affect honey production, and that those "on the hind tit" (like A1 and A4 in the diagram) also lose bees to the front hives. Jay and Dixon say that this observation needs further testing on a larger scale.

That's drifting within a pallet - what about drifting between pallets? We don't know very much about how close pallets can be placed without causing drift, and which method of arranging groups of pallets is best.

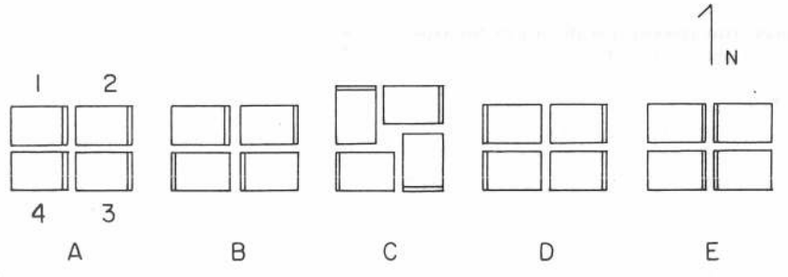


Diagram showing the layout arrangement (treatment) of groups of 4 hives on pallets. Individual layouts were spaced 2.4-3.0 m apart within an apiary.

We can surmise, though, that the rules about drifting between hives also apply here, and that pallets should be placed in an irregular layout. A variety of hive colours would also help.

By following a few simple guidelines on drifting, beekeepers can increase honey crops and make big savings in management time, disease incidence and queen loss.

Reference

Jay, S C; Dixon, D. 1988. Drifting behaviour and honey production of honey bee colonies maintained on pallets. Journal of Apicultural Research 27(4): 213-218.

NATIONAL BEEKEEPERS' ASSOCIATION 1990 CONFERENCE AND MAF SEMINAR

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Friday 06	Cultural Village tour with lunch, visit to local beekeepers. Tonight features a tour of the local night life.
Saturday 07	A Circle Island Tour. Early evening you will attend the Manager's Cocktail Party.
Sunday 08	A day of rest in Rarotonga — a Church Tour to hear the famous Cook Island singing is included in the cost. Afternoon Specialty Meetings. Evening Barbecue and Buffet Dinner.
Monday 09	Morning: Official opening of Conference. Afternoon: Seminar. This evening features a Buffet Dinner with live entertainment including a local dance group.
Tuesday 10	Annual General Meeting and Conference. Conference Dinner this evening.
Wednesday 11	Conference continues.
Thursday 12	Early morning transfer to your Air New Zealand flight.
Friday 13	Arrive in Auckland with connections on to Christchurch for those that require it.

COST PER PERSON:

Twin	$1249	Triple	$1199.00
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COST INCLUDES:

Economy Class airfare — Christchurch/Rarotonga/Christchurch or Auckland/Rarotonga/Auckland Return transfers to/from Rarotonga Airport, Lei greeting, 7 nights accommodation Edgewater Hotel including 7 continental breakfasts. Barbecue dinner, Buffet dinner with live entertainment, Conference dinner, Welcome Cocktail Party. Day tours as specified in itinerary.

NOT INCLUDED:

Airport tax, meals other than above, Adult registration fee $15. Items of a personal nature such as beverages and room service.

The NBA Waikato Branch cordially invites you to attend the 88th Annual NBA Conference. This conference already has 250 people attending. It appears that it is going to be the biggest conference ever held and it is certainly the first overseas conference. Come and join in this exciting occasion.

For further information please phone Glen Beattie, Thomas Cook, or Conference Organiser, Russell Berry, Phone (073) 461-111, Fax No. (073) 480-777, or MAF Seminar organiser Murray Reid, Phone: (071) 385-841. Fax No. (071) 385-846.

Poverty Bay

The honey harvest this year has confirmed our previous predictions of an average year's production for a change. In the past we have had a succession of droughts and bad weather at crucial times during the flow. This year things held on a little longer especially in the lower country around Gisborne. This is reflected by the excellent growing season other types of farming have enjoyed this year.

In late February a number of branch members got together with MAF staff and with the aid of a local volunteer fire brigade conducted a 'burnathon' of over 35 AFB infected hives. These hives, placed on a kiwifruit property, had been inspected by MAF in December and found to be infected. The owner had been told to burn the infected hives, but had done nothing apart from attempting to close the entrances of the infected hives with paper. They stayed like that until burnt in February.

It cannot be stressed too often that the responsibilities, both moral and legally, to destroy diseased hives rests with the beekeeper who owns them. The 'take-all-freedom-and-no-responsibility' of thinking cannot be condoned or allowed to continue through either ignorance or design.

Some 35 more hives owned by other beekeepers also had to be destroyed after becoming infected from being near this apiary during kiwifruit pollination. It is also likely that feral hives have been infected to cause an ongoing disease problem in this area. Unfortunately this is a story that has been too often repeated around the country.

While we generally agree that the industry should fund part of its disease control, we are concerned that MAF's decreased activity, because of a money and manpower shortage, can only contribute to increasing disease in the future. This fact alone has heightened our awareness of collective responsibility where disease control is concerned. Consequently we propose to hold a 'diseaseathon' this spring. It will be open to all beekeepers.

Barry Foster

Above: The girding of loins.

Right: Infected hives with their entrances stuffed with paper.

Below: The big burn.

Auckland

This honey season has been a vast improvement on our last. The barberry and buttercup had a good flow early on for the build up for kiwifruit pollination. Willow was the poorest for sometime. The weather during spring queen rearing and mating was good. The hives

came out of the kiwifruit in very good order and went right into production.

Beekeepers in some districts got a very good per hive result. The summer has been just great, carrying through till right now. Autumn queen rearing has been first class for mating. Some members would like to know if registration fees for honey houses in other branches have as great a variation as in this branch.

The odd hive still shows disease. The next job for some members will be the inspection of the apiaries around the district.

Dave Young

Nelson

Most beekeepers have reported that crop weights are down despite what appeared to be a warmer spring and summer. In some areas the wasps will have taken what the bees might have gathered, although it does appear that the wasps were late gaining strength and, in some areas, their numbers have actually diminished. Inquiries reveal that few nests have been destroyed and there has not been enough rain to drown others.

Our branch had its weekend at St Arnaud from late Friday afternoon, February 16 to February 18. The speakers on various topics were good value, although perhaps the most important was Ted Roberts, the only AAO left in New Zealand. It is up to everyone in the beekeeping world to keep the MAF on the job of keeping unwanted diseases from products and by-products of the beehive from entering the country.

Last but not least we had our AGM and those elected to office are a mixture of old and new blood, so we look forward to the future with a bright outlook.

Ron Stratford

Bay of Plenty

After last season, this not-so-bad one was something of a relief. Pollination, in general, went off well with good weather and mostly consistent payments.

As for the honey crop, the Bay of Plenty produced from one to 2.5 tonnes per 100 hives. Some bush sites near Tawari produced up to three tonnes per hundred. Rotorua had some surprising results, from sites that produced nothing to one which produced 10 tonnes per 100.

Generally speaking, most hives should have enough stores for the winter with a small surplus for more fortunate beekeepers.

The Bay of Plenty held its annual field day at Karl Christopherson's place. it was guested by Reg. Clarke of Blenheim, who spoke about queen nutrition and quality. Chelsea Sugar sponsored the day and sent a representative to talk about the Company, sugar prices, etc. Bay Mille Products also sent a representative. That Company processes liquid sugar into litre containers. This product is used as an aid to sugar feeding in orchards.

Norm Findlay from Hamilton had a nice little display on the back of his ute. He offered for sale a range of beekeeping accessories from bee brushes to a stainless-steel wax and honey separator.

Several beekeepers displayed pumps for feeding sugar syrup. A hot swim and a BBQ ended a good day.

Thank you to all who helped make the day a success, and thanks in particular to Chelsea Sugar.

Well, I hope you have all had a reasonable season and, if you do not have large maintenance programmes planned for the winter, enjoy the break between seasons.

Karl Christophersen

Westland

At a most successful Wild Foods Festival, recently held at Hokitika, a small band of branch members manned a stall which promoted extracted and comb honey common to Westland. A little mead also got into the act as did other promotional materials. Comments were favourable and those who participated considered it a very worthwhile exercise, one they would involve themselves in again.

During general discussion at the branch's AGM, Thursday April 5, topics ranged from the metal frames displayed by Mr Jack Davies of Wanaka, to biological honey production, to the wasp situation this year, and the condition of the hives for winter.

The metal frame concept was interesting and members will be watching its development.

With the bulk of Westland's honey gathered from our forested mountainsides, it was generally agreed that the formulation of rules for biological honey production must be watched closely. Those members already applying for recognition under this heading spoke of the problems encountered but they were nonetheless keen to pursue the idea to hopefully a satisfactory conclusion.

The wasp situation on the West Coast this year has been unusual. While few wasps are encountered in the open country-side, the very opposite is the case in the forests, particularly beech-honeydew areas. One comment was that wasps, crawling on the trunks of beech trees, had not been seen in such large numbers before, literally hundreds, and maybe even thousands. The trees appear to have been almost stripped of loose bark in the wasps effort to locate the dew insect. Absolutely no hope of bees finding a drop of dew this autumn, which has had a detrimental affect on winter stores. With an early cessation of the main honey flow, and very little pickings to be had since then, brood production declined more rapidly than usual, leaving the hives low in population and light on feed, necessitating more syrup feeding this autumn. It was agreed a dry winter would be a boon, otherwise with hives in poor condition we could have high winter losses.

Sandy Richardson

Southern North Island

(Southwestern Districts)

In my last report written mid-January, I mentioned that we were on the verge of a good crop — if rains came. For some parts of our district they did, giving excellent yields of three-four tonnes/100, especially around Wanganui.

It has been a late crop, the latest in 19 years, but not everyone benefitted. The diversity of land type and climate through the length of our district meant some areas had little more than winter stores.

Our honey promotion tent at the Levin Horticultural Field Days in February was again most successful. Trading was brisk. It was another image builder for a most versatile grocery item. We look forward to a set of standards for the correct labelling of 'organic honey'.

Some of our beekeepers are not happy with the quality of purchased queen bees. The variation in yield from hive to hive is too great.

If Ted Roberts is not quite as accessible for advice we understand it is because of his extra duties as Executive Officer. The affairs of our industry at National level are at a critical stage, and various pieces of legislation now coming forward will affect us. Already some of our members are involved in meetings with Federated Farmers, in an attempt to build a new land user group to include beekeepers.

At our April A.G.M. Merv Farrington stepped down as secretary after six years of faithful service. Sue Walker (Palmerston North) was elected as our new secretary. Chris Bromell (Manaia) continues as chairman.

John Brandon

Northland

We had a good flow from manuka but most other flowers were dried out in the seemingly endless summer.

Our field day at Malcolm Haines's was as entertaining as expected and included a vast feed. Malcolm's latest is a field of sorghum which yields an early bite for cows and then a crop of sugar for the beekeeper. (Chelsea beware!). We saw huge poplar trunks ready for the chainsaw mill, poplar planks for hives, poplar storeys dunked in copper sulphate followed by paraffin wax dip, metal bending for feeders, feeder tanks for farm trikes. Derek Betesworth spoke on MAF disease prevention, Dr Sanderson on queens and half moon disorder, George Nichols on electronics in beekeeping.

George Nichols

Hawkes Bay

A very good spell of autumn has helped members in what has been only a fair to average season, although the extractors, both hobbyist and commercial, have spun a little more than they have for the last three years.

While there was no apparent reason for it, the poor attendance at our 1990 Annual General Meeting was noticeable and unfortunate as it was a very enjoyable and fruitful evening. In his report our President made special mention of the successful branch meetings we have had during the past year, the equally successful inspection day last November and the much talked about extraction day and bar-be-que tea so many of us enjoyed on February 17.

It was with some considerable dismay that we discovered at election time that our President, John Dobson, was standing down. John has guided our branch over difficult years: bad weather, poor honey crops, high expenses and so on. Yet he can look back on a job well done, and we have all appreciated his efforts.

To Bob Wetherspoon, our new President, we extend a big welcome and feel sure his stay in the 'big sea' will be a long and happy one.

Gordon Sutton

Otago

With the honey harvest pretty well behind us it appears that few in our part of the province will face the problem of having to spend extra cash. Takings vary from very little to below average with a few better patches.

We have had some rain lately but conditions are still extremely dry in most districts and farmers are faced with consequent problems. The ground needs a real good soaking before next season. If that does not happen, the outlook will be grim indeed.

Our AGM took place last night (April 6). It started with two speakers from MAF telling us about their activities in the beekeeping industry, discussing mutual interests, and problems.

The Branch's executive was re-elected for another year. Activities during the past year have been very much concentrated round the planning and the hosting of the Conference in Dunedin which no doubt went very well. Financially the Branch is out of pocket and we advise future conference organisers not to budget too tightly for a seminar and also keep a strict eye on photocopying done for special meetings etc. It is annoying not to know afterwards for certain to whom extra costs should be allocated.

It is planned to hold the Otago - Southland Beekeepers' Convention again this year on Monday the June 4 (Queen's Birthday), the last day of the Otago A & P winter show. Beekeepers

are urged to support the show's honey section so that it will stay alive.

We intend to hold a WASPATHON in the very near future covering an area near Port Chalmers where the wasps are causing big problems. This is to be a PR activity. Some losses of colonies thanks to wasps attacks were reported.

It seems only three Otago Branch members will make it to the forthcoming Conference at Rarotonga.

John Heineman

MELT AND MIX CHRISTMAS CAKE

1.5 kg packet mixed fruit
½ cup sherry, rum or brandy
1 green apple
1 tbsp honey
1 cup brown sugar firmly packed
4 large eggs lightly beaten
250 grm butter melted
1½ cups plain flour
½ cup self raising flour
1 tsp mixed spice
2 tbsp sherry, rum or brandy extra

•Place mixed fruit in large basin, add sherry, grated apple, honey, sugar and eggs, mix well with wooden spoon to break up any large clumps of fruit. Add cooled melted butter, sifted flours and spice. Mix thoroughly. Cook in 9" (23cm) round tin. Bake in a slow oven 2½ hours.

DON GIBBONS' VIEW

Pssst! Want to know how to win the queen-breeding competition? You do? Then read on.

Carefully select your time of year; the time of the year with thousands of drones about, mild and settled weather, perhaps even with a light flow on. Make up a swarmbox with perhaps 1.5 kilos of bees shaken right across the brood nest. This swarm box should have two frames of mainly unsealed honey, one on each outside, then two good frames of fresh pollen (not native). Gorse, broom, willow, buttercup or clover mixes are ideal. These go between the two honey frames with a space between for a frame of eight or 10 queen cells. Keep the swarm box in a cool, dark, airy place for about four hours with a syrup feeder, jar or tin, feeding from the top centre. The syrup should be moderately thin with fumidol and two percent pollen added.

After the four hours, put your newly-grafted 12-hour larvae into that space in the centre of the swarm box. Twenty-four hours later remove the larvae, taking care not to disturb the jelly more than necessary, and transfer fresh 12-hour larvae into their place. Replace in the swarm box and leave for 24 hours.

The next step is to prepare a strong finisher with no eggs or young larvae but plenty of unsealed honey and fresh pollen and transfer the 24-hour cells into it. Feed it with fumidol and pollen syrup. On the 10th day after grafting you should have eight to 10 cells ready to be placed into mating nucs. Standard four-frame nucs are good. Use two frames of honey and pollen with two frames of emerging brood. Set the nucs up in an area where there are heaps of black drones: Italians are gentlemen alongside these rapists! In three weeks you will have queens that look like Russian weight lifters. In all probability they will be useless to head your own colonies but they will have all the attributes required to win the queen-breeding competition.

I say this is because I consider that the queen-breeding competition as outlined to be completely useless. The suggestion that the award-winner will hold an advantage on the commercial scene I believe to be misleading. It is like saying that if I produce the biggest, most beautiful aeroplane I will corner the world market even if it cannot fly.

I applaud the basic idea of a queen competition, but it must be run on the basis of what the queens will do rather than the number of beauty competitions they will win. Gavin McKenzie has the experience and the ability to incorporate the practical tests with the training of his pupils at Telford. Ivan Dickinson and John Heineman, would make good judges.

THE WAY IT GOES

From John Heineman

Two things happened last spring (1989) which I should like to relate for they illustrate very well some of the points previously discussed under 'Beginners Notes'.

I received an invitation from the Dunedin Beekeepers' Club to attend one of their monthly meetings. This happened to be their October get together on a fairly cold and showery Saturday afternoon. The venue was a lovely old mansion near the golf course and on a large section with a mature garden full of flowering trees, shrubs and plants. The bottom end, really the head of a large gully, was taken up by an old orchard. Here the club's demonstration hive has found a place. A good possy it is, one would not think to be in the middle of a fair sized city.

A feature of Dunedin is it's townbelt: a strip of native bush wisely set aside by city fathers to be preserved. Where most of the surrounding area has little to offer in the way of early bee pasture, hives in the vicinity of the town belt usually build up well early in the season.

After some bee talk it was decided to make use of a dry spell and open up the hive. The person looking after it had already explained that the colony was so strong that she had found it prudent to give it an extra super and some sheets of foundation so as to avoid swarming.

There was the hive four f.d. supers high. Top box heavy with honey, mostly left over winter stores as the colony had been wintered in three supers. Next came the super recently given. More honey, some combs with old stores raised from the brood nest also some fresh honey gathered lately. Three combs with sealed brood, not together but seperated by three sheets of foundation already partly built out. On one of the brood combs two queen cells. Before it could be stopped they were destroyed accompanied by the words: "that's what we did not want." The deed was done and all I could say was not to be so rash before the full story was known.

Next step, removal of the excluder. Then box no. three that is to say the top super of the broodnest. Here we found honey and pollen combs on both sides followed by combs with mostly sealed brood and again three sheets of foundation in the centre of the box, partly built out. This foundation again split the broodnest. No eggs or young larvae were to be found on any of these brood combs. Down to box four the bottom super. In the centre a single sheet of foundation. On one side three combs with brood, mainly sealed and again no eggs or larvae but with a nice large queen cell in the middle of one of the combs. This time it was carefully set aside. On the other side of the sheet of foundation more brood combs now with brood in all stages. So after all there was a laying queen. And we did find her on the very last, outside comb. A good looking girl, less than a year old.

Questions arising: if the colony was queen right and the queen was not old and worn out why the three queen cells? Why should a colony which was given extra room and foundation to work on still attempt to swarm?

In the first place those queen cells were not swarm cells but supersedure cells. Swarm cells would be seen at the bottom edges of the combs and likely in greater numbers. These cells were more in the middle of the combs.

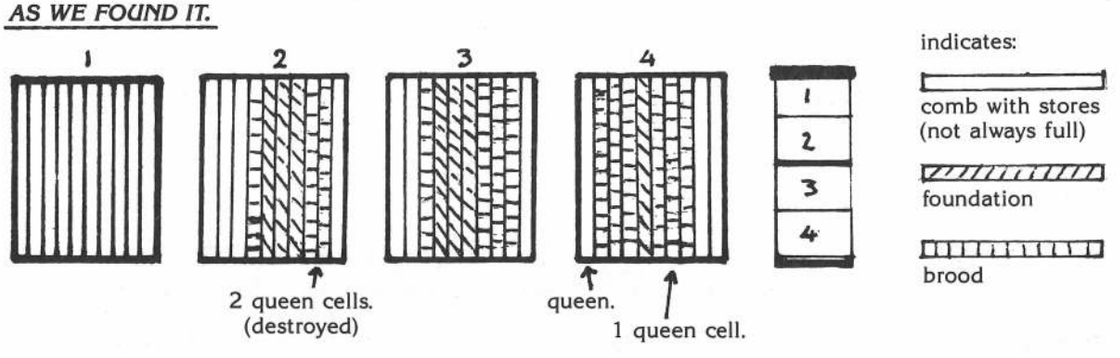
It was correct to give the hive some sheets of foundation to help prevent it swarming but by inserting them in the way it was done the coherence of the broodnest was very drastically disturbed, resulting in a number of seperate clusters and with the queen more or less isolated in one half of the bottom super. Those seperate clusters started to feel queenless and consequently took their emergency measures. Thanks to the strength of the colony and the relative mild weather no chilling of the brood had occured. That too could have easily happened.

The next step was to re-assemble and re-arrange the hive. The bottom super holding the queen lost its sheet of foundation as did the comb with the queen cell. The brood combs were placed together in the centre and a couple of decent brood combs inserted into the empty spaces at the sides of the super. The queen was carefully left on the comb. She was on and alongside a comb she had been laying in. (4)

Followed the second brood chamber (3). We moved the combs with brood to the centre, then two sheets of foundation to one side and one sheet on the other side. Good quality combs with stores of honey and pollen filled the remaining spaces. Then the queen excluder was put back on top of two brood boxes.

Next was the super which had been above the excluder (2). The three sheets of foundation were removed, and the comb with the queen cell from the bottom brood box placed in the centre with the brood combs already in the super flanking it on both sides. The remaining spaces were filled up with reasonably good brood combs, all partly filled with stores.

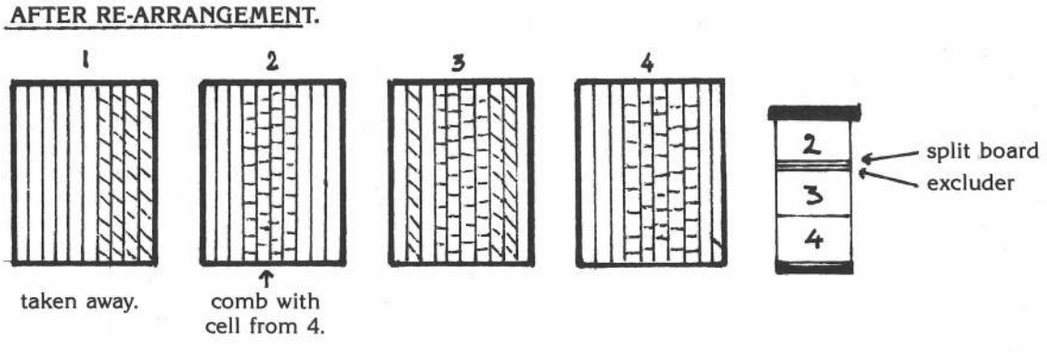
There was now a more than adequate supply of both pollen and honey under as well as above the excluder. The idea was of course to make good use of that queen cell by making a nuclei colony on top. However we did not immediately



put in a split board above the excluder as we judged it better to let the colony sort itself out for a while as by now the bees had become fairly excited.

We were still left with the top box (1), now containing the four sheets of foundation we had removed and the rest of the combs with left over winter stores. Not much sense in placing this back on top, it would just be a nuisance when next inspecting the hive, lifting it down and up again. So it went back to the house for temporary storage and to be used at a later date. The combs with old stores could at this time be swapped for combs holding new season's honey fit for extracting. The bees clinging to the combs were of course first brushed off with a twig from a nearby tree.

On went the crown board and lid and we went inside for a cup of tea and, a post mortem.



The split board was placed between parent colony and nuc some time later, after the hive had quietened down. Good bees to work with no doubt, considering the weather and the big upheavel. Nobody got stung except me on the hand and that was of no consequence. It panned out to be a good demonstration showing the dangers of splitting the broodnest. Lots of things could have gone wrong for that colony.

The Club Secretary told me in early December that the cell duly hatched, the resulting virgin queen was mated and both mother and daughter colonies were booming.

Next chapter is about a farmer-beekeeper here in our district. He has kept a limited number of hives for a few years and it must be said that he takes his bee keeping seriously. We do his extracting for him and in turn he gives us a hand from time to time.

Early last spring he was making a quick round of his hives to see how stores were lasting. At the first yard the picture was no good at all: the hives were very light. So he decided that some hurried feeding was the thing to do. This was done without prior inspection for disease, also at this second site.

A week or so went by before he found the time to do the first thorough spring inspection. What he found at the first site was depressing indeed. Nearly all the hives were in poor condition not only but showed signs of disease. He was certain it was B.L. (American Brood disease, Bacillus larvae). Convinced of this and knowing his obligations under the Apiaries Act he poured petrol into the infected hives, bundled them up and took them to a nearby old shack which he wanted to clean up anyway. The hives were placed inside the delapidated building together with rubbish, more petrol was poured around. Our friend took, what he judged to be a safe distance, lit a torch and bowled it into the shack. What followed was just not funny for the whole affair exploded with a terrific woosh, scattering bits and pieces right around, very close to and past him. He was dazed but very lucky indeed not to be seriously hurt. But that is not the end of the story.

Off to the second lot of hives he had given an emergency feed. He found the same thing. This time however he was not so quick of the mark and came to us for consultation. He could not understand where such an outbreak of B.L. could come from so suddenly as the area had been free of disease for a number of seasons. It was of great concern to us too being such close neighbours.

Combs with brood were examined and yes, at first sight, one got a shock as it looked like the real thing and a bad plaster of it. However the well-proven test with a matchstick did not show any ropiness, no matter how many cells were tested. No dead grubs showing the characteristics of B.L. could be found but many could be pulled out of the cells appearing as a greyish bag. When the skin of the bag was broken a watery fluid came out. Typical of sac brood. Naturally this was a big load off our friends mind and ours too!

However, it was an outbreak of sac as bad as we have ever seen. What was the cause? We know that sac brood is stress related. It can also be blamed on the queen, as replacement of a queen will usually cure the ailment.

Admittedly stores at both sites had been extremely low, and that probably for a while so that is where the stress factor came in. But I do not think that sac would have shown up in such extreme quantity as was the case.

The queens at both sites were relatively young, having been introduced during the previous season. A phone call to the queen breeder who supplied the queens was made. He stated categorically that all colonies involved in his queen breeding operation did not show any signs of sac brood.

The colonies at the second site have been requeened since and all signs of sac have disappeared. Some other reasons have been considered but had to be dismissed. So it leaves us with a bit of a riddle.

Our friend is of course happy that after all he did not have B.L. infected colonies, but not so happy when thinking about the killed bees and the burned gear. Besides if it had been B.L. the equipment s.a. supers, roofs, bottom board and the excluders could have been sterilized in our parafin wax trough (we were treating boxes at that time anyway) especially as it all was of good quality.

Well it just shows that it always pays to make very sure of the facts when diagnozing bee diseases and also to remember the danger of petrol fumes.

Here you have my two stories. May we learn from mistakes made by others and so save ourselves a lot of worry and concern and above all a lot of dollars.

The funny thing however is that the same mistakes are made over and over again. Our parents made them, we did and our children still do.

BEE PREPARED

By Sara Solovitch
Courtesy 'West' Magazine

Our van shakes and shudders down the steep, rocky canyon of Cerro Gordo, along a nearly five-mile dirt path never intended for anything but feet. To our left looms the shadow of a forest, one of the last deciduous forests left in Latin America. The van's wheels scrape the carcass of a cow, stripped of all its flesh and sprawled against the path. As the van lurches to a stop, Chip Taylor, the scientist in the front seat, warns us to stay far from the horny acacia tree and its symbiotic red ant. But the bites of the fierce acacia ants are like babies' teeth compared to what awaits us just 100 yards away.

Killer bees.

Once fodder for bad jokes, supermarket tabloids and Grade B horror movies, the so-called killer bees are now practically buzzing at America's doorstep. They ar the descendants of African bees that escaped in 1957 from a scientific research project in Rio Carlo, Brazil — or so the official story goes. Most biologists question that version of events, but virtually no one disputes the fact that this is yet another case of science gone awry.

There are now an estimated 200 million swarms of the bees in Central and South America, moving steadily northward at 300 miles a year. In 1986, they arrived in Mexico and migrated north so quickly that by October of last year they had broken through the "biological barrier" erected by the Mexican and U.S. governments. Now roughly 350 miles south of Texas, the bees are projected to land in Brownsville next March. There is no way to stop them; no scientist worth his petri dish contends otherwise. Even the once-optimistic U.S. Department of Agriculture has given up all talk of stopping the bees. Taylor has been telling them all along that they didn't have a chance.

"The bees must feel right at home in this kind of place," mutters Glenn Hall, a bee geneticist from the University of Florida and a colleague of Taylor's, as he zips himself into a protective suit more fitting an asbestos worker than a scientist. "It's just like Africa."

Moments later, as Hall, Taylor and a small band of American journalists thread their way among the 45 colonies of the apiary, the air turns thick with frenzied, angry bees on the attack. There are hundreds, no, *thousands* of them, and the noise is deafening. it has been described as the roar of a small plane engine, and that's accurate — with one important codicil. The plane is flying at ear level.

Though just yards apart, the scientists are shouting to make themselves heard over the buzzing. Bees are attacking the photographer's camera lens in such thick numbers that he is unable to focus. When I sweep my hands through the air, I feel bees bumping up against my heavy leather-and-canvas gloves. Bees are bombarding my eyes, nose, mouth. Hours later, after we have left the apiary several miles behind and I am finally able to remove my veil, I count more than 200 stingers in the seams. But for now, there is no relief from the bees, the noise and the tropical heat.

Taylor is hunched over an opened hive box, scanning a frame for the queen bee. "This is a modest attack, a six on a scale of 10," he says, looking up from behind a black cloud of bees. Just then, José Antonio Guterrez Martinez, a University of Mexico graduate student, locates the queen in Box 43. It is unmarked by the scientists, therefore a new queen, the hive's fourth in a year. Incredibly, Guterrez begins to remove one glove. He needs some dexterity to paint a dab of orange model paint on the queen's back. But he hardly has the glove off before 20 bees have plunged their stingers in. "It's quite bad, Chip," he moans, doubling over in pain. "Get him out of here," Taylor yells over the buzz.

It was only a year ago, shortly before the arrival of the African bees in northern Mexico, that Taylor distributed 180 colonies of gentle European bees throughout six apiaries along the eastern coast of Mexico, from sea level at Veracruz to an altitude of 5,250 feet slightly north of Jalapa. His intent was to record the change in behavior and genetics as African bees infiltrated the region. The rapidity of that change has been "genetically incredible," according to Taylor and Hall. Today, the bees in the Cerro Gordo apiary show all the behavior — including the frenzied temperament — endemic to African bees.

Even among European honeybees, there are numerous strains. The most popular among U.S. beekeepers is the Italian, identified by the Dusky-brown-to-bright-yellow band on its abdomen. Considered by many to be the prettiest of all bees, it is an excellent honey producer and as predictable as any bee ever gets. Sue Hubbell, author of the recently published *A Book of Bees*, characterizes it as having an "exuberant, sunny Mediterranean disposition." Hubbell writes that another strain, the Caucasian, is "a bit conservative." By that, she means that the bees hold back on honey production and reproduction until the weather is stable.

Then there are the African bees, whose aggressive qualities are thought to have evolved as a response to tropical predators, including man. In Africa, killer bees are managed for honey but considered too dangerous to farmworkers to be used to pollinate crops.

Of course, no self-respecting scientist would be caught using the "K" word. So what, then, should one call these "little bastards," as even the most proper entomologist has been known to call them? Are they, as USDA scientists say, hybrid or "Africanized," after 30 years of crossbreeding with their more docile European cousins? Or are they, as Chip Taylor contends, almost "pure African," genetically indistinguishable from any strain in South Africa, their native home?

Certainly, enough deaths have been reported to justify the name "killer." Though its individual sting is no worse than that of a European bee, an African bee is far more aggressive in defending nests and territory, attacking longer and in greater numbers. Unprovoked, the Africans do not sting. But it doesn't take much to provoke them. In a 1980 experiment, scientists dangled a black flag in front of European and African bee hives. The African bees responded nearly five times faster than the Europeans and inflicted on the flag 85 stings in 30 seconds, compared with 10 by the European bees. More to the point, conservative estimates attribute 750 to 1,000 deaths in Latin America to African bee attacks during the last 30 years. Many of the victims had been stung thousands of times.

There is no evidence to suggest that all the years of interbreeding have tempered the bees' nasty disposition in the slightest. And there is evidence that Africanized bees do not survive in the wild — which is why Taylor's work has become so important. It seems that the Africanized bees swarm out of apiaries like the one in Cerro Gordo only to go off and die, while the pure African bees continue to head our way. This scenario, Taylor's theory, throws a monkey

wrench into the USDA's $6 million cooperative program with the Mexican government, which has been trying to slow the bees' northward migration by intercepting them with colonies of gentler European bees — the biological barricade. The idea is that the African genes will be diluted. But now even the Mexican government has apparently decided that this is wishful thinking, and is practicing a policy of learning to live with the killer bees.

In his usual low-key manner, Taylor, an entomologist at the University of Kansas at Lawrence, predicts what will happen once the bees take up residence in the United States: 'There aren't going to be a lot of incidents, but the incidents there are will be spectacular."

In one such incident last March, a Minnesota man drowned during an attack by a swarm of African bees in a lake off the Panama Canal. Gary Hauser, an athletics director at a U.S. Defense Department school in Panama City, was fishing with two companions when their boat was suddenly swarming with bees. The men tried to swim to shore, but the bees kept stinging them on their faces, backs and arms. Hauser, a 42-year-old in top physical condition, never made it. A Defense Department spokesman said the stings were so numerous that the man swelled up and couldn't breathe.

Scientists project that once African bees become established in the United States, they could account for up to 100 deaths a year, compared with the 40 now reported.

There have already been several occasions in which African bees landed in this country. The most notable occurred in 1985, when a swarm of African bees was carried to a small farming community near Bakersfield on some oil-drilling equipment apparently brought by a Venezuelan tanker. By the time the bees were finally discovered in a burrow near Los Hills, they had been in California for six months and emitted a dozen swarms. It cost the state $1 million to track down and eradicate all the swarms, under the eaves of houses, in hollow trees. The original discovery was purely by chance. The driver of a bulldozer apparently set off enough of a vibration with his machine to disturb the ensconced bees. As he watched in horror, the swarm attacked a rabbit and then his glassed-in, air-conditioned cab, covering it so completely that he couldn't see out. Afraid people would brand him a loony, the driver held off reporting his find until after several days' nagging by his wife.

Even worse than the threat to humans is the one to agriculture. No single insect directly benefits mankind as much as *Apis mellifera,* the honeybee, which provides U.S. beekeepers with $200 million annually in honey production and is responsible for pollinating $20 billion worth of fruit trees and other cash crops each year, from the almond trees of California to the blueberry bushes of New Jersey. Every spring, commercial beekeepers load huge flatbed trucks with hundreds of pallets jam-packed with honeybees and transport them thousands of miles to add to the pollinating forces of the native bees. How is one to do that with African bees, which take insult at the slightest vibration?

Sitting in the 132-year-old main square of Veracruz, surrounded by balloon vendors and strolling musicians, Taylor is drinking beer and making small talk, recommending souvenir choices, such as the pure vanilla extract for which this region is famous. Hundreds of birds are swooping over the port city's buildings into the almond trees of the Plaza de la

Constitucion. Taylor, always the biologist, analyzes their flight path. And then he sees the bees. Attracted to the ever-present pheromone, or artificial bee scent, in his pocket, a couple of them are starting to buzz around the table.

"See how fast they zigzag," Taylor says. "They're hard to follow with your eyes, they move so fast. That's one of the things that's really been oppressive about all this. You go to a place that's never seen African bees before and suddenly they're everywhere."

With his ruddy face, salt-and-pepper beard, and safari vest slung over a gray T-shirt dominated by a huge anatomical diagram of a honeybee, Taylor, 51, looks like a jungle explorer. He definitely has a flair for the dramatic. For his undergraduate course on honeybee biology, he organizes an annual feast to which every student is required to bring an edible bee product. His own regular contribution is drone larvae, sauteed with a little garlic.

Taylor enjoys publicity and knows how to use it. Last year he gave 60 telephone interviews to newspaper and magazine reporters, spending an average of an hour with each. Sometimes, he seems attracted to TV cameras the way African bees are drawn to the tiny neglected cracks between our skin and the bee suits. In several television appearances, he deplored public ignorance of the problem, each time using the same anecdote: "Most people have never heard of African bees and when they hear the term 'killer bees,' I'm afraid they think of the *Saturday Night Live* sequence with John Belushi coming out and screaming, 'Your pollen or your wife!' " It's a good line and it works every time.

Taylor's research and projections on the migration of Afridan bees are the most widely cited in the field. For years, he has set forth the theory that the migrating bees are almost pure African. Now he says he has proof: genetic studies by Deborah Smith at the University of Michigan and Glenn Hall at the University of Florida in Gainesville. "Our data has completely blown away their whole program here in Mexico. They're operating on the premise that these two races are compatible, that all genetic combinations form in apiaries and all survive in the wild.

"It turns out there's good evidence that the bees that become Africanized don't survive significantly in the wild."

Tracing the migrating bees' mitochondrial DNA, passed only from mother to offspring, researchers Smith and Hall found an unbroken line all the way back to Africa. To scientists, the implications of this discovery were immediate and revelatory. It meant that while the African bees have crossbred with more than 500,000 colonies of European bees in the course of their 30-year migration, they have remained almost genetically unaltered. Though African drones continue to mate with European queens, their offspring are not part of the migrating force. The bees headed our way are not Africanized; they are African.

"So in a genetic sense," says Taylor, somewhat reluctantly, "it really is a killer bee. It is displacing the European honey-bee."

Pure science is not the only factor behind Taylor's problems with the USDA. He accuses Thomas E. Rinderer, research leader of the government laboratory in Baton Rouge, La., of operating an ineffectual program that is "very high on style and low on substance."

"Tom's basically a nice guy but sucked into a power trip with these bees. I have a lot of sympathy for Tom. I imagine myself in his position. It's a no-win position. It's bigger than he is, bigger than his lab, bigger than the USDA. He doesn't realize that, and that's why I blame him. He should have adopted a management style that would have spread the glorious blame."

Despite his contributions to an understanding of the biology of the African bee, Taylor has been without any financial support since last September. "There's just no money for science in this country," he says. "This is one of the biggest biological phenomena of the 20th century and I can't get funding." For years now, he has operated on a shoestring and estimates that he has already invested up to $30,000 of his own money on research. Now, he is preparing to pull out of the field altogether.

The killer bee issue has been political from the very beginning. Warwick Kerr, the Brazilian scientist responsible for bringing African bees to the New World, was a prominent liberal spokesman and humanitarian during one of the most oppressive military regimes in that country. His admirers — and there are many — contend that the junta sought to discredit him with the accusation that he had sabotaged Brazil by intentionally releasing the bees. In fact, Kerr, who studied genetics at Columbia University, was trying to create a new breed for Brazil's northern tropics, where bees had never thrived.

Most accounts tell of a hapless scientist whose experimental bees escaped when a visiting researcher opened the wrong gate. A more likely scenario might read like this:

Kerr, a good scientist but a poor ecologist, propagated hundreds of queens from his 26 original African colonies, then sent them to friends and acquaintances with isolated apiaries in the Brazilian tropics. The male offspring of those queens would of necessity be pure African. Whether the resulting explosion of African hives was by design, accident or miscalculation no one wants to say, as almost every scientist in the United States who knows Kerr is extremely fond of the man.

As the bees approach the Texas border, the scientific infighting grows increasingly political and petty. Perhaps it is best exemplified by the division between Stephen Taber, a retired USDA researcher who did the first U.S.-based studies on African bees, and Rinderer, his former boss and nemesis, whom Taber angrily dismisses as "a very bad beekeeper."

As pilot of the USDA program in Mexico, Rinderer argues that the migrating bee will wreak havoc on U.S. agriculture. A terrible honey producer, it will devastate the multi-million-dollar honey and beekeeping industry in this country, his theory runs. Its introduction into any kind of commercial setting could prove disastrous, he says.

But there is strong indication that African bees have already been deliberately introduced into the United States by commercial beekeepers.

Taber is part of a small but vocal minority of bee scientists who are spreading a far different word on the African bees than anything the USDA is putting out. According to this splinter group, African bees are hardier, more resistant to parasites that are already decimating colonies of European bees in Florida, California and 17 other states. In fact, they say, these much maligned insects are no worse than the 4 million colonies of European honeybees now peacefully buzzing away in America's fields and back yards.

When Bill Clarke, a retired bee extension specialist at Penn State University, visited Costa Rica in September, he says that he worked the "killer bees" wearing the same minimal protective gear — a veil and gloves — that he uses in his own yard back home in Pennsylvania.

"These bees have a lot of benefits to U.S. beekeepers," says Taber, who now breeds artificially inseminated queen bees in Vacaville. "It's an excellent honey producer and the U.S. Department of Agriculture says it's not. It's also a very good pollinator; the USDA says it's not. I quit the USDA because there were so many stupid idiots employed there.

"The Africanized bee is the most mythologized insect that I know of,"

Rinderer counters. "A lot has to do with them being superbees, and when you look at them they're not. But somehow these concepts get into the common lore and get repeated. I'm sort of enamored by the scientific way, myself. How other people come to their conclusions, I don't understand. Fortunately, I don't have to defend it."

But he is in the hot seat when it comes to defending the USDA's much-criticized program of genetic dilution in Mexico. Theoretically, he says, it should work. Whether it actually has he doesn't know.

"The mathematics of the concept work," says Rinderer. (Translation: a computer analysis supports his position.) "I don't know if they've done the program in Mexico as it was recommended. And one of my thoughts — should somebody say it doesn't work — is that I don't know if their experience is a completely valid perspective about the concept itself . . . But the general tone is one of optimism for that sort of a program."

In other words, the USDA will continue doing the same thing once the bees arrive in Texas that it has been doing in Mexico.

Echoes Elba Quintero, U.S. director of the cooperative program: "In theory, on computer, it probably works. But when you get those ideas into situations that don't take into account things like food availability . . . well, we looked into it and entertained the idea, but when we saw it was impossible we began looking into other methods."

In Mexico, there are no screaming newspaper headlines about "killer bees." They're just plain old "African bees." And in all of Mexico, only five people, all older men, have died in bee attacks. Compare that number, defies a media-weary Quintero, with the far greater numbers of human deaths from scorpion and snake bites.

Mexico's better fortune than Brazil, where the African bees acquired the name "killer" with good reason, may be due to the Mexican people's long-standing familiarity with bees. In some parts of the country, notably the Yucatań, it is the rare family that does not keep at least one backyard hive. Along with China, Mexico is the world's leading exporter of honey, shipping out 60,000 tons a year.

And then there's the fact that when the African bees first move into an area, they are not very defensive. New swarms have one priority, according to Taylor, and that is to survive. To do so, they must build up and stabilize their nests, cutting back on their defensive behavior.

But now many of Mexico's beekeepers are noticing a change — and becoming increasingly critical of their government's efforts at controlling the African bees. In Veracruz, agronomist Roberto Trijo started worrying about his bees in February. "Things are getting very bad," he said through an interprefer a month later. "Yesterday, we went to the hives and couldn't even harvest the honey. The stinging was so bad my workers couldn't endure it." Trijo was making plans to burn four of his hives.

As Elba Quintero says with a philosophical shrug. "If they're going to be around, you might as well try to live with them. There is no way we are going to stop them. We have slowed them down as long as possible, so the scientists will have the chance to study them. But the bees are coming."

EXPORTING

The NBA has, with the assistance of its members, established an export liaison group. This group will assist members who:

a) may be considering exporting

or

b) wish to discuss an exporting matter with someone else in the industry.

The following members will be pleased to provide information for members new and inexperienced in the export of honey.

ORGANISATION	CONTACT PERSON	TELEPHONE NO.	FAX NO.
Airborn Honey	Peter Bray	(03) 243569	(03) 243236
Arataki Honey	Percy Berry	(070) 775790	(070) 775076
Ceracell Products	Stephen Mahon		(09) 2740368
Kintail Honey	Dudley Ward James Ward	(0653) 48301 (0728) 58038	(0653) 49209
N.Z. Honey Producers Co-Op	Kevin Ecroyd	(056) 48882	(056) 84859
Southern Honey Exports	Allen McCaw	(03417) 7198	(03417) 7198
Waitemata Honey	Neil Stuckey	(09) 4038491	(09) 4038556

WASPS — FOR THAT REAL BUZZ

From Ham Maxwell

As a beekeeper interested in all aspects of the industry, the subject of wasps has been of considerable interest: not only from the damage they do to the hives, but also to the damage they do to the image of beekeeping. How often have you received a call to get rid of bees, only to find on arrival that they are wasps?

In our area, the public at large seems unable or unwilling to distinguish between bees and wasps. Should someone be stung, it is invariably a bee, one of yours to boot if the victim is a neighbour. Education is the key, and this is where talks to primary school children can assist. When I attended a local school recently, the children had prepared pictures of bees in their gardens. Every one was black and yellow! During the talk I showed them the difference in colouring between bees and wasps. Two weeks later I received a large 'thank you' note for the talk. The exciting part was the pictures sent with the note. All the bees were now black and brown.

Living as I do in a suburb, and having a local authority hostile to bee keeping, it was bitter sweet to receive a call from civic chambers asking if I would remove some wasps from a letter box nearby. That they were removed at no cost to the authorities was brought home by blunt statements to the council officers concerned. I doubt that it made any difference. They still regard any insect that stings as a menace, to be wiped out as rapidly as possible. Anything for a quiet life!

Now, what about the public? The mass of people go about their daily lives in a cacoon and explode when anything threatens the tranquility of their existence. From calls received, one gains the impression of a sky darkened with hordes of invading insects. Immediate attention is demanded, irrespective of the time of day and your social calendar. The scene of the disaster usually discloses a typical vista of wasps quietly going about their business, with about twenty or so movements each minute. But young Johnny was stung on the back lawn, and only then was the presence of "large" numbers of wasps noticed. It is usually a more difficult job to get the parents to confine the youngsters inside the dwelling out of the way, than it is to wipe out the nest.

I have met some interesting situations. For example: A dear old lady in her seventies arrived home from shopping to find the flat full of wasps. In her absence they had finally finished chewing their way through the ceiling panel and had emerged in her lounge. Naturally they were a bit disturbed to find no way out, so told her about it with a sting right between the eyes. My arrival saw a distraught old lady being comforted by a neighbour, the lounge full of wasps, and no one willing to enter. Some swift work with the insecticide spray and the vacuum cleaner soon tidied up the flat before the son of the owner arrived. Between us we removed the panel from the soffiet and uncovered a nest of mammoth proportions and of many seasons duration. That the elderly lady had recovered from the ordeal was evident when she disputed payment, because the local council had been paid the rate demand the week previous, and it was their job to protect the public. The son quietly paid the fee.

I was called to remove a nest in the ground on a hillside. Next day the owner phoned to complain that the job was not effective; wasps were still evident in the garden. Back at the site I uncovered three more nests in other parts of the garden. They were duly dispatched at no further cost to the owner. After all, what's the use of giving a guarantee if you are not prepared to back it up? All was quiet for a week. Then another phone call reported that the wasps were just as thick as ever, and that I was to come over, now, and do the job properly. Sure enough, the wasps were there, not in ravening hordes, but there nevertheless. Searching the property uncovered four more nests, all located around the boundaries which bordered on to bush. They also were killed off, again at no further cost to the owner. It was at this point that I was told they were going out, and time would not permit the offering of the usual cup of coffee one receives at the end of this type of job. That's gratitude for you.

A most unusual place to find wasps was under the bonnet of a vintage car being restored to its pristine beauty. Comfortable, secure, they nested inside a large roll of felt in the engine compartment. The vehicle's owner wanted to put the engine back in place, but the wasps had other ideas. After my suiting up and loading up the high pressure spray unit, the car owner changed his mind. Thanks for coming, but his wife had found the fly-spray and he would do the job himself. Never mind that I had come over thirty kilometers from home in the early evening. We eventually agreed that payment would be made, so **I MIGHT AS WELL GET ON WITH THE JOB.** So the job was done, the wasps killed out, and the owner able to put the motor back in the vehicle. At that point I was offered a beer. Very nice on a hot summer evening. As we sipped our drinks, a small voice started to tell me that he was glad he had not done the job himself. As soon as I had started to spray, he saw me disappear under a cloud of wasps, and he now realised just what would have happened if he had done the job himself, with no protection to his face or body. Have another beer!

A call from a social service group resulted in my attending an elderly gentleman's residence, where a rotting shed at the rear of the property housed a wasp nest of considerable size. Being a coward at heart, I duly sprayed them, and waited for the insecticide to do its job before trying to remove the nest. In the interim I chatted to the elderly gent, and found we had both been teachers in previous years. Time passed, the wasps grew less active, and finally I decided to remove the nest. At this point the elderly gent started to gasp and splutter, then told me not to mind him, he was having a mild coronary, nothing to worry about, it happened often, particularly when he was excited or disturbed.

So I removed the nest then returned to the house to find the elderly gent sprawled in his seat. At that point I nearly had a coronary myself. He rallied however, and took a tablet, so I sat with him for some time before a neighbour arrived and persuaded him to go into the house to rest. Whilst I knew what to do about the wasps, I was ill prepared to cope with the frailties of my human counterparts.

Whilst not a pet lover, I realise that some people prefer the company of their pet to that of other humans. As a result the pet is treated as a human being, and gains an importance in status the owner does not necessarily accord to other humans. So when a call came that a pet was fretting and fractious when put in the backyard cage, I placed no great significance on urgency. That was until the phone went again an hour later. Would I please give the call top priority? I duly appeared at the site, to find a worried owner and a snarling, fractious pet whimpering loudly as we approached the backyard

cage. No wonder! Inside the kennel was the biggest wasp nest of the season. How it was undetected for so long can only be explained by the tendency of the owner to allow the pet the free run of the house. The backyard kennel was rarely used, but they had planned to be away for the greater part of the day, and were unable to take the dog with them. Being a pampered pet has its drawbacks.

The fact that I charge for the service does not rest easy with some members of the public. Many seem to think the local council will pick up the tab, or that the government should be responsible. After all, isn't that what rates and taxes are paid for? That so many of our brethren have been conditioned into the "cradle to grave" mentality in their reliance on the state is a disturbing feature. In the case of rented premises, the landlord is responsible, so his (her) approval should be obtained before commencing the job. Several times I have met with delays in payment, and this last season started with the first three jobs all being "deferred" payments. The result is that now arrangements regarding payment are discussed before beginning the job. Only once have I walked away when neither the landlord or the tenant would agree to pay. The landlord had to go himself and was badly stung in the process. He was stung again when my fee had to be paid. Not too badly, however, considering that my rate is half that of the local commercial pest exterminators.

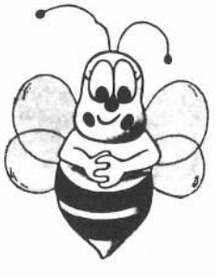
People's reaction to crisis varies from absolute panic to absolute resignation. One client has had wasp nests in the chimney for the last three seasons. Despite my telling, he still has not got around to sealing up the cracks in the chimney structure. I even offered to seal it up if he provided the materials, as I was up the ladder anyway. That chimney is still unsealed as far as I know.

Street theatre plays a large part of the service one operates. To arrive at a premises, zip through the job in moments, a model of efficiency, and then power off to the next job is not what the majority of customers want. Firstly they want a sympathetic ear listening to their tale of woe and calamity. Next they want reassurance that their problems can be overcome, preferably at the least cost to their purses. Then, hopefully, you can get on with the job. Rigging up is all part of the play, with the metamorphosis of changing from normal human form to that of a creature from outer space as one dons protective gear. Very often the neighbours are intensely interested in seeing what is going on, particularly when the nest is in a chimney or under the roof, and accessible only from the outside of the dwelling. On one occasion when I came down the ladder with a sack full of wasp nest the audience clapped. I bowed in appreciation.

Pesky children who insist on seeing what is happening are more of a nuisance than the wasps one is endeavouring to get rid of. At times I have wished my high pressure spray gun was filled with something that would freeze errant brats in their stride. At least the wasps are reasonably predictable in their behaviour. It really is no satisfaction to see a child stung by a wasp, a situation easily avoided had the child obeyed the instructions given to stay indoors and watch through the window. One has to be careful in exercising control in front of parents, particularly when it is apparent that the parent has no control over the child. What is amazing is these kids are not yet of school age! One mother got upset when I asked her to stop the child climbing the ladder behind me. She seemed to have no idea of the danger her child could be in once the wasps emerged to protect their nest, or that if I decided to beat a hasty retreat her loved one ran the risk of being trampled as I came down the ladder.

Access to nests can sometimes be a problem. People are reluctant to let one tear holes in the walls of the house, be it inside or outside. On one recent job a very agitated mother insisted that the nest be removed. She finally gave permission to open up the gib board wall of a bedroom. Now this nest was deep down, under the top plate of the wall, level with the top of the window. Carefully sizing up the location, a few bangs with a hammer opened up the wall, and there was the nest. Limiting the hole to allow my hand access was I thought, prudent. Not so the husband who arrived home shortly after the job was completed. He had recently finished redecorating the room, and was not at all pleased with my efforts. The fact that I was not responsible for restoring the wall was a further cause of discontent. Easing my way out of the premises I made a firm resolve to never again open up a wall. Repercussions came two months later. The insurance company declined to restore the wall, and would I please furnish a statement as to why the wall was damaged in the first place! This was done, with emphasis placed on the insistence of the lady householder that the nest be removed, and that restoration of the wall was not to be my responsibility. To date no reactions — my fingers are still crossed.

Is supplying such a service to the public at large worth the hassles? In financial terms it is not worth the money, and now I know why the commercial companies charge the rates they do. What started many seasons ago as a service from our bee club has slowly developed into a chore whilst the membership absorbed the cost. Many members refuse outright to attend wasp calls. Others do so reluctantly. Yet if we, as beekeepers, fail to eradicate the wasp, are we doing beekeeping a disservice? With expenses of running a vehicle, the provisioning cost of gear and insecticides, and ignoring the possibility of insurance cover, it is unreasonable to expect our members to keep providing such a service without some recompense. As soon as money is accepted, the tax man wants his share and don't forget GST. For some provisional tax may loom over the horizon. All this may call for the services of an accountant, and accountants do not come cheap. While their advice may recover money from the tax man, my experience shows that I then transfer



the best part over to the accountant. The balance left in hand would hardly cover chicken dinners as a shout for the family. Now don't get me wrong, this is not degenerating into an anti-government campaign, but if you are considering offering your services to the public, think carefully. With all the enthusiasm one has at the start of a new venture, and the real BUZZ that results from doing something worthwhile, it may well end up with you being the one STUNG.

Bug box for field specimens

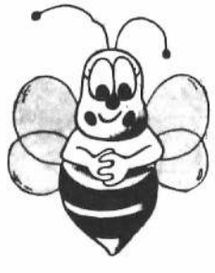
Studying specimen insects and flowers in the field has been made easier using a device developed in Britain.

The Bug Box, from the Comenius Company, comprises a clear Perspex cube with a lens in the lid and a ventilation hole in the bottom. It comes with a plastics magnifying glass and is intended for use by education authorities, museums, conservation and wildlife trusts and at tourist venues.

The box packs well and gives good focusing from all sides and base. It can also be used for viewing inanimate objects (geological and stamp collection specimens), and the ventilation hole in the base can be covered for viewing objects in water.

The 40mm cube, which opens into two equal sections, is available in a variety of packages. The individual starter kit comprises the box, hand magnifier and a set of observation notes and a chart. It is also available as two boxes and magnifiers and 24 identification flash cards and blanks.

A group study kit comprises five boxes, magnifiers and teacher notes for photocopying. A display pack contains 32 Bug Boxes. A yellow waterproof bag is available with a draw string long enough to fit on the shoulder or to tie to the belt, and is big enough to hold several Bug Boxes, lenses and notebook.



George Arnold, Still Beekeeping at 103

(Courtesy American Bee Journal)

He goes dove hunting, he goes deep sea fishing, he cooks when he wants to and he takes care of his beeyards. Who is he? He is George Arnold of Pearsall, Frio County, Texas and he is 103 years old. The oldest beekeeper in Texas, in the United States, and as far as we know, the oldest in the world.

George was born 35 miles from Mountain View, AR on Aug. 29, 1886 and his family moved to Texas when he was a young boy. He moved to Pearsall after he married and his first child was born.

He got his first hive of bees in 1905 when he was 19 years old. He traded a wheel barrow for the hive. He was told the bees would swarm and that it would be about 10:00 a.m. when they did. So he watched them for days and finally they did swarm and never came back! George's next bee venture was on a larger scale. This time he used his credit and bought 90 hives for $9.00 each. That year he made enough honey to pay his entire debt off. He sold his crop to a man in San Antonio in gallon buckets with the comb in the honey for 5c a pound. He fell in love with the honey business and that interest has lasted a lifetime.

George said times were much harder then. They made their own bee veils from oval brass strips with mosquito netting stretched over them. Frames were made from discarded onion boxes. His wife would cut the foundation into one inch strips. When their daughter was ready to enter college, George went to the bank and mortgaged the home and was to pay $15.00 per month. He and his wife planned to sell eggs, milk and honey to make the payments. Well eggs sold for 5c a dozen and the hens and cows just couldn't produce enough to make the payments. So, George went back to the bank and got his payments lowered to $10.00 per month. And, he killed most of their table meat, but had to be careful with the shells as they were 45c a box.

George has been in the bee business for 84 years. At one time he went into the cattle business which he financed with bee money. The cattle were a failure. He also sold bee supplies for a number of years and helped many beekeepers get their start in the business. Now at age 103 he still drives his truck to the bee yards and cares for approximately 300 hives. About a year ago he had to stop driving his pick-up truck to San Antonio (70 miles one way) because the traffic was a little too much for him.

Memories are numerous and he has a few keepsakes. He treasures a clock given to his Dad prior to the Civil War, his Beretta that he uses for hunting and a picture of his wife and the memories of their full and happy life together. George lives alone now; but his daughter and two sons are nearby. He feels that the honey bee has been his best friend and has provided him with all his necessities and financial security. And, he gives all the credit to Jesus Christ who he feels enriched his life with all these blessings.

PEANUT BRITTLE

2 cups sugar
1 cup honey
1 cup water
2 cups salted peanuts
1 tablespoon butter

• Put sugar, honey, water in sauce pan. Stir until sugar is dissolved. Cook to 300° F. Remove from fire. Add butter and peanuts. Stir just enough to mix thoroughly. Pour into very thin sheets on a well-greased platter. Cool. Break into pieces to serve.

EARTHQUAKE

By Charles Simon
(Courtesy Gleanings on Bee Culture)

Tuesday, Oct. 17, 1989, 5:04 p.m., Santa Cruz, California.

I had just finished finding a number of strong, winter-ready colonies for people, some who had been waiting for over a year. I am not a bee dealer, but good beehives are hard to find, so I gave these people a choice — either get on the list and wait until I "ran across" the right something, or look elsewhere. Several had chosen to wait and I finally had something for them. I headed home to both take a shower and let the waiters know that I would deliver tomorrow. I had to wait for sunset before I could pick up the bees, anyway. I whispered a little prayer that nothing go wrong, please. Of course, I meant something along the line of flat tires or a blown fan belt.

So, at 5:04 p.m. and counting, I was naked as a honey bee and ready to jump in the shower. To locate me a little more precisely — my apartment is three blocks from the downtown mall in Santa Cruz, CA one of the hardest-hit spots. My main apiary is situated in Nicene-Marks State Park, the actual epicenter of that which the locals refer to as "the pretty big one".

At 5:04 it happened. "This is is." I thought. Nothing can survive such a cruel shaking. I danced and ducked as all of my possessions were flung about with satanic intensity. The edge of one of my paintings fell and hit my foot, splitting it open. I crouched next to the drersser, and the fishbowl came flying off, missing my head by a beespace. And then my honey crop came too. Both gallon and quart jars were flying about and crashing on everything and topping them all off with honey and broken glass. It was the longest fifteen seconds in this beekeeper's history. Then it stopped.

I put on my pants and jumped over and around the incredible rubble of my things and made it out the door.

People were screaming "evacuate the neighborhood", because the gas main was broken and it was feared the whole block was going to explode. I could hear the gas hissing and smelled it as I ran to the empty field near the high school. In only minutes I was sitting in the middle of a field along with hundreds of other people. I was a refugee, cut off completely from my life and loved ones and only a few blocks from home. I was no longer a beekeeper or anything else. I was shirtless and barefoot, and it was getting dark and cold.

It may sound like I'm making this up, and I wish I were. But I was there, in the middle of it. I'll pass the details by: the homelessness, the shelters, the salvation army, the red cross, the police, the army, and the hordes of people in shock all wandering aimlessly around the ruins of their town.

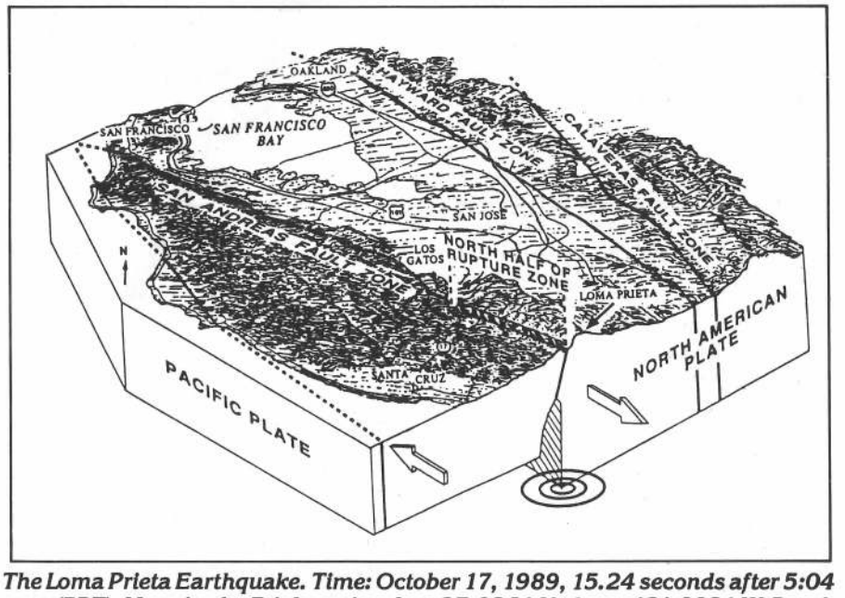
I was able to return to my apartment in a few days to address the mess, but many were not so fortunate. Scores of houses and buildings have been condemned, leveled to piles of rubble and already removed.

But, life goes on. The people, myself included, are still in shock. It is hard to go on sometimes. Taking care of business seems futile, silly and petty. The town is now a maze of cyclone fencing. There are familiar, everyday places you can't go to now, even to see the extent of the damage. The traffic jam has become endemic as major arteries are blocked in critical places. This small, seacoast town now has rush-hour gridlock. Heavy equipment is everywhere — bulldozers, earthmovers, trucks, the army, camouflaged vehicles, cranes and wrecking balls. And all during the three thousand or so aftershocks, (seventy plus registered 4.0 or better on the Richter scale), we wait for the "big one" that will put an end to all this terror.

I called Ormond Aebi, the local third-generation beekeeper and holder (along with his father, the late Harry Aebi) of the official world's record of the maximum honey production from a single hive with a single queen in one season (Guiness Book of Records holder for 10 years at 404 lbs.). Though his record was finally broken, he is still the Champ. He was okay and his hives, which I was also worried about being as how they are on high stands, had not been overturned. He had some referrals for me to attend to — people with earthquake-related api-problems.

There was a woman in Watsonville, a community hit even harder than Santa Cruz, who reported that her home was being attacked by bees. Was she sure they were bees? Yes, she was sure, and since she was terrified, could I come over as soon as possible?

I found several hundred bees relating mostly to an area of wall directly to the left and two-thirds of the way up the front door. They had the lazy back and forth flight of robbers and scouts, apparently from a colony that had been disrupted and were possibly tuned into a colony that had been in the wall there at one time. Or perhaps they were



The Loma Prieta Earthquake. Time: October 17, 1989, 15.24 seconds after 5:04 p.m. (PDT). Magnitude: 7.1. Location: Lat. 37.036 ° N., long. 121.883 ° W. Depth 11.5 miles, 9 miles northeast of Santa Cruz, 60 miles south-southeast of San Francisco.

descendents of that colony and just remembered. I told her that in my opinion if left alone, the bees would disperse on their own; but she should call if she saw more bees developing rather than less. She hasn't called.

When phone service was finally restored I received a call from a man whose chimney had collapsed with a feral colony inside, scattering combs and bees all over the street which, needless to say, was prohibiting access to the premises. I went over and cleaned up the mess, securing the area for civilian occupation again.

Then there was the man whose hives had toppled and given him a good stinging while he was setting the situation to rights. As he was allergic to venom, he was of a mind to give up and asked me if I could come and remove them. It was an ordeal to find the place, what with roadblocks and detours and unfamiliar territory (as familiar territory wasn't even familiar anymore). One picks one's way carefully, driving on tiptoes, so to speak. You can't take it for granted that the road will be there around the bend anymore. And when I finally got there, he told me he'd given the bees to somebody else, apologizing profusely. "no matter". I said, and I meant it. I was lucky to be alive.

Then came a call from a local police department — a full-blown, free-hanging, primary-seeming swarm at the end of October. Luckily, I had plenty of comb to hive it on and, with feeding, it stood a good chance of surviving, possibly thriving. This atypical, out-of-season, traditionally undesirable swarm was no doubt forced to abscond from a broken home.

At one location, a hive which had been standing on a fourteen inch high stand on a terrace cut into a mountainside had been catapulted ten yards and landed upside down without top or bottom. Amazingly, the bees were O.K., adjusting quite well to life upside down — bringing monumental loads of pollen directly into the open top (which used to be the bottom) because the entire bottom (which used to be the top) was flush with, and slightly buried in, the ground. It needed to be turned over and to have its top and bottom replaced.

I wore protective gear but used no smoke. Nor had I tied the tops of my high-top Reboks, my preferred footgear for beework (normally worn with tops untied and pants tucked in), usually adequate protection — and comfortable to boot.

It was an emergency, you see, and I suppose I was still in shock. Not only did I turn the hive (composed of four medium-depth supers and full of honey and heavy) over, but I also poured several hundred bees into the lovely funnels formed by the tops of both shoes. Oh yes, I guess I should confess — no socks, this being California. The bees gave my ankles a thorough stinging and crawled up under my suit, stinging me in various other tender places. The upside is I like getting stung.

Ormond reports that his bees began evacuating their hives ten days before the quake. Hundreds of them flew to the ground (his hives are on twelve inch stands) directly in front of the hives and proceeded to march directly east about fifteen yards. There they grouped in lumps, each representing and maintaining colony integrity. Every day the numbers increased and every evening Ormond scooped them up and returned them to their colonies. When the quake occurred there were swarm-sized clusters out on the ground — emergency swarms apparently in case their hives were destroyed. Oddly, the bees I was with during this period exhibited no atypical behavior of any sort, but they were in hives on the ground — not on stands. Perhaps it was because bees on stands experienced an amplification of vibrations that they behaved in this manner.

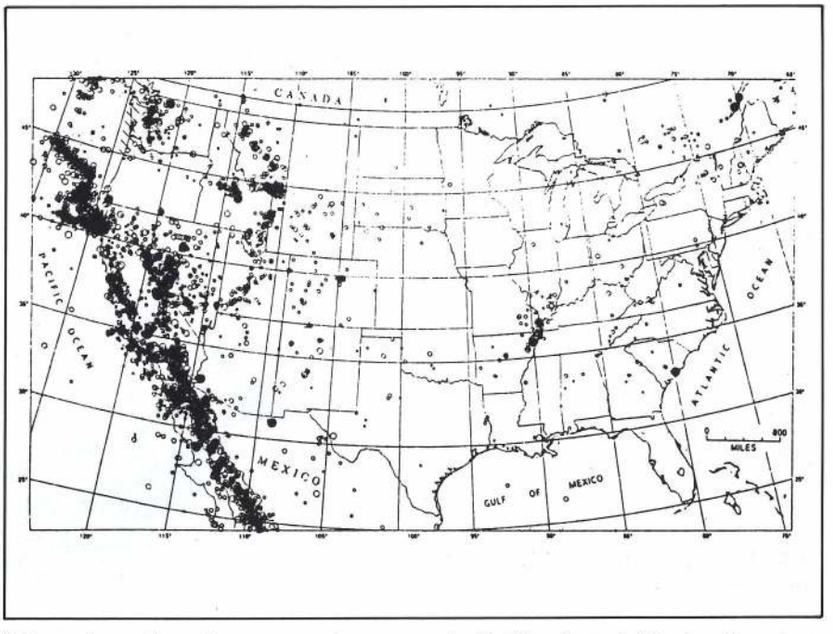
Despite the fact that Ormond's hives did not fall, he was thrown to the ground in front of them and spent the entire quake praying they wouldn't topple (and especially not on him). I have concluded that when beekeeping in earthquake country it might be best to forego stands.

SWEET-SOUR CABBAGE

4 cups shredded cabbage
½ cup diced bacon
3 tablespoons flour
¼ cup honey
¼ cup vinegar
½ cup water
1 teaspoon onion, chopped

• Cook shredded cabbage in boiling salted water until tender. Drain. Dice bacon. Cook until well done. Remove bacon and place on cabbage. Blend bacon fat with flour. Add honey, vinegar, water, and chopped onion. Cook until thickened. Pour over cabbage and bacon. Season to taste. Heat thoroughly. Serve hot.

Note: This same recipe may be used with cooked potatoes instead of cabbage.



Although earthquakes are most common in California and Alaska, they have shaken all States. Earthquakes as large or larger than the Loma Prieta event have occurred in Alaska, California, Hawaii, Idaho, Missouri/Tennessee, Montana, Nevada, South Carolina, Washington and in Quebec, just north of Maine. Also, prehistorical evidence indicates that events of this size have occurred in Oregon, Washington and Utah. This map shows the locations of all historical earthquakes of magnitude 5.5 or larger (largest circles) and all earthquakes of 5 to 5.4 (smaller circles) since 1925, all recorded earthquakes of 4 to 4.9 since 1962 (still smaller circles) and all recorded earthquakes of 3.5 to 3.9 since 1975 (smallest circles). Clearly, earthquakes are a nationwide problem.

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Brede Valley Bee Farm
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