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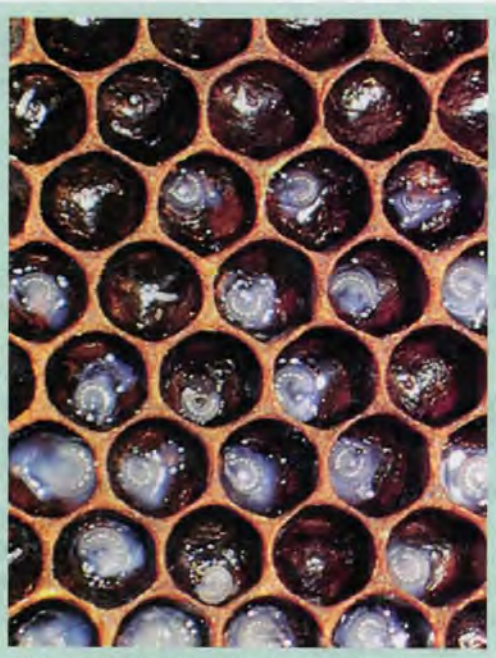
Bee Culture

THE MAGAZINE OF AMERICAN BEEKEEPING

APRIL 2007 VOLUME 135 NUMBER 4



Lots and lots of healthy larvae – that's what we all want, now that April is here.
photo by Larry Connor

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FEATURES

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Don't Forget The 2008 Bee Culture Calendar Contest – See Last Month's Issue For Details

DEPARTMENTS & COLUMNS

New For Beginners & Gardeners

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Soft cover, full color inside
8" x 10" format, 165 pages
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Editor of *Bee Culture*

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- Honey production guidelines
- Large color photos
- Making Candles, Soaps, Lotions
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Thanks Dr. Tew

Just wanted to write you a few lines to compliment your magazine which I have been a subscriber to for a number of years and plan to for many more, God willing.

I, too, as Mr. Brent Bean (re: mailbox letters 02/2007 issue) enjoy reading articles written by Dr. James Tew and usually jump to these articles first. I have also sent Dr. Tew a few e-mails with questions that I had and I know he is a very busy man but he has always answered each and every one. So hats off to Dr. Tew and I hope he plans to stay with Bee Culture for many more years.

Virgil Eskridge
Mooresville, IN

I'm A Brethern, of Sorts

Just wanted to comment on the excellent articles in last month's issue.

It seems like the "Inner Cover" (the Brethren) and the 2nd or 3rd article were written just for me. I like to consider myself a Brethren of sorts. Each season I pose this question to my beekeeping cohorts.

Why feed bees at all?

So they make it through the Winter is the resounding response. Nobody feeds the bees in the trees, yet they survive? (Natural Selection)

I consider feeding bees contradictory to what we as beekeepers should be trying to achieve. Bees which are suited to our geographical location. N.E. Ohio in my case.

Each season everyone brags how they lost only 30 to 40 percent of their bees this past Winter. I have never lost more than 20 percent and I have never fed 1 darn hive. I have been keeping bees for 20 years and currently run 50+ hives.

I feel that feeding bees enables poor genetic stock to survive and propagate.

Each time a swarm leaves me with a virgin queen back at the parent hive, I wonder who is she going to mate with.

Will she mate with drones who should not even be there in the first place? (fed to make it through Winter) Or, will she mate with the drones which I have been trying to saturate the area with?

Each season I replace my dead outs with bees of known genetic stock. New World Carniolans are my favorite. I have been using Russians and MN Hygienic also. You see, I not only use varieties of bees which are suited for my environment, but also breeds which have shown some mite resistance (another factor in poor over wintering of bees).

Now when one of these hives swarm there is a bunch of good genetic stock getting out there. Not weak bees which had to be fed just to make it through an average Ohio Winter.

How come Russian bees are resistant to mites? Because no one treated them and natural selection took over.

Well another Winter is upon us and again I have asked the question "Why feed bees?"

I get the same answer each season for 20 years now....."Talk to me next Spring when all your hives

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are dead!" It is funny, that 20 years of proof is not enough for some people.

Brian Neuman
North East Ohio

Less Invasive Beekeeping, Please

I am writing to encourage you to include more information about organic and minimally invasive beekeeping techniques, including the use of top bar hives, in your publication. Thanks!

Gerry Pearlberg
Brooklyn, NY

Likes Bee Culture, and Likes Plastic Supers

About a year ago I was asked if I wanted to handle bees for my father's Ranch. It sounded interesting, so I accepted the offer.

I started collecting information and was given a copy of your magazine. The contents of *Bee Culture* have been more than helpful. While looking through the ads, I came across the "Bees Forever Plastic Super".

To me they made sense so I order a few. When they arrived, we filled the supers and that was that. It took a total of about five hours to complete 200 hives. The bees grew strong quickly and were ready in time for sunflowers.

Being a new beekeeper I managed to do all the things expected of me in a very short time. I dropped supers from the forklift; I dropped supers from the truck; I even ran into them with a pickup, etc. The plastic did not break, while I'm sure wood would have! Another test was the California weather this year. We were hit with both extremes and the bees have done very well.

Saving time and money are important in any business. Plastic supers are crucial to achieve this in my operation. No messy paint is another plus.

Others can paint and nail, but I'd rather be fishing!!

Henry Harlan
Woodland CA

Vented Bee Hive Cover
Inventor: Norman R. DeYoung

Patent 6579147

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INNER COVER

As I scribble these notes in early March the U.S. Beekeeping Industry basks in the bright light of media attention unlike any experienced in years. This extraordinary coverage begins with the basics - News Releases by the Penn State PR machine, supported by interviews from the Bee Alert Researchers in Montana, the Pennsylvania Department Of Agriculture, and the Florida State Department of Agriculture and Consumer Service. *Colony Collapse Disorder* (CCD) has a life of its own now...and comes complete with over 40,000 hits on Google. National and international television, radio, blogs, and magazines and newpapers have joined in. Its got legs, as they say in the news business. Not Anna Nicole, but close.

Certainly the gathering of USDA, University, government and independent researchers and beekeepers at the two meetings in Florida in February gives this Disorder even more, and stronger legs on a professional and industry basis. (See Malcolm Sanford's exclusive articles for *Bee Culture* this month). And a front page story in the New York Times at the end of the month, and then the OP-ED piece a few days later got everybody who wasn't already interested, interested. I wasn't even remotely associated with this story as an information source, though I knew some things, but on a single afternoon this office received 11 emails from newspapers, and 23 phone calls from TV, newspaper and magazine reporters. But those really in the thick of this are bogged down with an extreme number of interviews and calls and not able to get real work done . . . it's one of the "Be Careful What You Wish For" scenarios. It'll come back to bite you sometimes.

So. So far these scientists have examined thousands of colonies that are going through or have recently gone through this Disorder. Colonies are discovered with no, or very few bees remaining. Often they find only a queen, a small amount of brood and a handful of workers struggling to survive, and maybe raise that brood. But sometimes . . . nothing. Nothing at all. There's food in the colony, most of the time, but interestingly almost always no small hive beetles or wax moths or robbing bees have moved in to cannibalize the remains (is there a toxin lurking within?). And this decline is rapid – from colonies at a strength appropriate to time of year and location . . . to nothing, in a matter of days, or short weeks.

Analyses show a variety of things going on, but there seems to be no common thread. From Florida to New York to the Dakotas to California, colonies are dead and dying in essentially the same way, but from seemingly different causes . . . or maybe the same cause not yet discovered.

Indeed, this malady may have a yet undiscovered denominator. Several new nasties have been found so far in the search . . . a new fungus in the bee's gut for instance, unexplained viruses and bacteria, and especially some new toxins are being found. But no matter what it is, if it is to be discovered the good people now in search of this curse will certainly master it. Even better, they are gathering and preserving samples by the score to examine later . . . and to keep and see if it comes 'round again.

Right now there is too much talent and too much need not to find the fundamental cause. There's even money . . . well, seed money if you will . . . in the equation – money from the government (and more being asked for), money from the industry, money from places unexpected. We are hopeful it is enough. But it could be more with your help . . . it could be enough to match the will and the determination of those now leading the way. You can add to the supply if interested (see Malcolm's article for information on how to participate).

But back to the story. Not surprisingly, some beekeepers had something similar last year and even some the year before, it seems. Maybe the same thing? Maybe they had a head start and it spread from there to everywhere else this year? And there's a host of things the researchers have to choose from that it could be. Which one, do you suppose is the root of this evil, the cause *celeb*?

There's the *Varroa* Complex, for starters. That's not a surprise, is it? This devil is lethal on so many levels, starting with basic damage to larvae and adults simply by the feeding activity of adult mites. Damaged adult bees don't live long, and damaged larvae grow up to be damaged adults who not only don't live long, but aren't 100% at being nurse bees either, which puts the next generation at an immediate disadvantage. And that puts the next down a notch, and the next . . . it goes on until there are no more generations left. And then there's this virus thing. Nine, at least nine, viruses visit honey bees. *Varroa* are responsible, apparently, for transferring viruses from bee to bee, and for causing silent others that have been lurking to suddenly rise and be counted. Viruses get around and can, and do strike hard and fast on several fronts. But *Varroa* is the middle man, every time.

Then there's this nutritional thing. Lousy weather last year in many places led to lousy forage, and lousy pollen. And what got stored, if anything got stored, was just as bad. Lousy food makes for fewer Winter bees, fewer Spring bees, fewer bees. Poof. No bees. Throw in the high fructose corn syrup conspiracy – that is overheated HFCS, or acid-made vs. enzyme-made . . . something, it seems, may be responsible for tankers of off-spec syrup . . . or so it is thought.

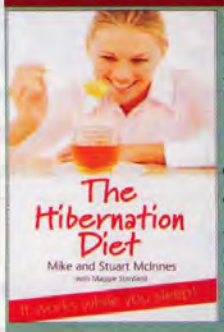
Certainly there's the catch-all Stress thing. Here's just some of the things on that list to add to all of the above:

Not enough food; pesticides outside the hive (increased use of imidacloprid as a foliar spray this year

Continued on Page 70

Death By A Thousand Cuts, Perhaps

New For Beekeepers In 2007



The Hibernation Diet *U.S Edition published by World-ClassEmprise, LLC. P.O. Box 180, Danbury, TX 77534. www.worldclassemprise.com.*

It works while you sleep! "The Hibernation Diet is entirely different from all other fad, low-calorie, and food-excluding diets. Yes, you can sleep, and lose weight all at the same time." Could the solution really lie in sleep? But not just any sleep, "recovery sleep" made possible only when you go to bed with a fully stocked liver, fueled by eating honey.

The Hibernation Diet was first published in the United Kingdom but did not include the scientific references that provide the rationale and basis for the diet. Without these the reader is left to his/her own resources to validate the truth of the book. Now, Mike and Stuart have been extremely forthcoming about sharing their research with references and additional literature that validated the principles of *The Hibernation Diet.*

All you need is a little honey and eight hours of sleep or so each night. What could be simpler? According to the authors, most who take their suggestions about "fueling" the liver before bedtime will notice positive results within two weeks. Though results will vary from person to person depending on metabolism and genetics, the reported results have included gradual but consistent weight loss of three to five pounds a month, relief from gastric reflux symptoms, improved quality of sleep, and increased energy during the day – all from eating a spoonful of honey at bedtime.

Ron Fessenden, MD, MPH, February, 2007

Bees Forever Plastic

No painting, assembly non-porous, food grade plastic. Interchangeable with all wooden supers, Works in all climates. With or without hand-hold, edges roughened so there's no slipping – beesrus@2xtreme.net

Centennial Beekeeping

Beekeepers that have hives mounted on pallets now have a new tool to assist when moving bees - an all-electric bee smoker that mounts on the forklift!

The forklift smoker functions on the same principal as the propane bee smoker that was introduced two years ago, but the forklift smoker uses the 12v. electric system of the forklift to pump a smoke fluid through a vaporizer coil that is heated by an electric element. An on-off switch controls power to the heating element, a second switch activates the fluid pump when smoke is needed and the vaporizer coil mounted near the forks dispenses smoke to the hive entrance. The propane model uses a hand-activated pump to process smoke fluid through the vaporizer coil that is heated by a propane flame. Both smokers use the same smoke fluid.

A kit is available to retro-fit forklifts already in use, and manufactures are considering including the smoker as an option on new machines.

www.newbeesmoker.com.

Sherriff

MAXPRO all-in-one suit with BODYSHIELD – A roomy coverall with integral hood and veil. Our *Comfort* suit is made from lightweight breathable hi-tech fabric. The *Body Shield* is made from quality 100% wide holed thick polyester net. Sherriff's MAXPRO range incorporates a fixed inner net liner over the shoulders and part of the torso which acts as a body shield which also extends up in to the collar and hood section giving extra protection to the head.

The thickness of the net liner holds the outer layer of the garment more than the depth of an average bee sting away from the body therefore offering the wearer a much higher level of protection.

A light weight suit weighing a lot less than its polyester cotton counterpart making it the most comfortable item of clothing for beekeeping on the market today. Made in England.

Available in White only Sizes: Medium/Large, Extra Large

Ankle Protectors as in the photo of the Maxpro suit

A pair of plasticated ankle protectors secured around the ankle with a Velcro fastening.

An elasticated strap stretches under the shoe arch to hold gaiter in place.

Can be worn with with most types of shoes or Wellington boots.

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Kencove Portable, Battery-Operated Fence Energizers, from AKO, combine a reasonable price with state of the art technologies. The power adjustment knob gives a wide range of power to control output for your specific application or to extend battery life. The battery indicator light flashes red when battery power is low; green LED indicator flashes when voltage is above 2500 volts. A lot of time and effort can be saved by adding a solar panel. These specially designed kits come with panel, mounting bracket and hardware. With German engineering and a THREE YEAR WARRANTY - these units are a very good value.

Kencove Farm Fence supplies farmers and contractors with a full line of farm fence products including high-tensile wire, woven wire, electric netting, horse fence, tools, posts, gates and much more. : sales@kencove.com

Swinger

Super Bee Rough Terrain Forklift. The new model, "1K", has a 37 hp Cummins diesel engine, planetary reduction axles, hi/lo drive and other updates. The engine develops 37 hp @ 2,800 rpm with 82 lb-ft. peak torque @ 1,600 rpm. The high torque rise 3-cylinder engine develops maximum tractive effort fast — 800 to 1,600 rpm.

The transverse mounted engine makes maintenance easy and access to the entire rear compartment is ample. The hydrostatic drive system is now an operator-select 2-speed for choice of maximum tractive effort or maximum propulsion speed. Also new are the axles with planetary reduction final drive. The planetary axles relieve driveline stress, multiply torque and place the engine operating range at usable lift and carry speeds. A redesigned and heavy-duty 2-axes articulation joint provides independent modes for articulation (steering) and frame oscillation (smooth, level operation). It also contributes to extended frame life. Other features include a straight mast with 14-degree forward tilt and a 16-degree back tilt for simple and secure handling of sensitive hives and other loads on uneven ground. Side shift travel remains at 6" with a maximum height reach up to 150". ROPS/FOPS overhead guard, ergonomic operator controls, excellent visibility and turf-protecting articulated steering are other features. The Super Bee also converts to a loader/carrier with an optional package.. Details on the new 1K Super Bee are available at **www.nmc-wollard.com.**

HoneySuperCell

The advantages of this frame are the 4.9mm i.d. cell size has been reported to contribute to significant decreases of *Varroa* mite infestation. HSC fully drawn frames are ready to go to work immediately. HSC fully drawn frames are an integral part of a High-Speed extraction system which can significantly reduce the labor and capital requirements of honey harvesting operations. HSC frames are inert and will not harbor chemical residues like wax will and are unaffected by wax moth or hive beetle.

Frames are available at **www.honeysupercell.com**

Happykeeper

Happykeeper anti-*Varroa* bottom board. Mites and waste fall through spaces between tubes that bees cannot pass between Always clean, strictly controlled environment. For more info, **Jim@happykeeperusa.com**

Radius Garden

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Unique tool functions as transplanter, digging spade, standard shovel. Advanced Ergonomic Design, extra-wide, raised forward kick, steel-reinforced shaft, large, non-slip TPE-covered "O"-shaped handle. Overall height is 42". Guaranteed for life.

NRG Ergonomic Hand Tools

Natural Radius Grip tools minimize stress and maximize power. Ultra-light aluminum-magnesium alloy blades and comfortable, curved, non-slip handle. Trowel, transplanter, weeder, and cultivator. Many innovative features. Guaranteed for life. Radius Garden, LLC, www.radiusgarden.com

Betterbee

8 Frame Equipment:

Betterbee has added a complete line of 8 frame equipment, including Beginner's Kits and Hive Increase Kits. Beekeepers often say that if you don't have a bad back when you start beekeeping, you will. Avoid the bad back and try lighter, smaller, and easier to handle equipment.

www.betterbee.com

Giant Hive Tool:

A serious hive tool for the serious beekeeper. The double hooked end makes it a snap to lift the most stubborn frames from the hive. At 14" long, it gives you all the leverage you will need to pry apart the most glued together pieces of equipment.

Embossed Glass Jars:

Beautiful glass jars with a honeycomb pattern embossed on the top and bottom. You have your choice of three different decorative caps to accent your honey.

Comb Honey Labels:

Now your comb honey can have the same professional presentation as your other products. The round label fits Ross Round sections and the bottom portion can used for custom print information (apply it to the back) and removed making a window to see the comb honey.

BrandNew Industries

The brand new BrandNew Model SPT. This series of electrically heated branding irons is the electrical equivalent of our popular Model 2100 PORTO-PRO propane heated branding torch. The new SPT series is capable of heating large size branding irons up to about 30 square inches. It has been designed for use where a flame heated branding iron is not feasible. Prices vary depending on the size of the branding iron and the wattage required. The Model SPT series is available exclusively from BrandNew Industries, Inc. 800-964-8251 or www.brandnew.net.

Deluxe Eyelet Tool

Constructed of hardwood with steel dowel pins; makes inserting eyelets in your end bars fast and easy. Place the eyelets onto the pins, lay the endbar down and hammer! You'er done!

Kelley's Frame Nailing Device

Assemble those frames in record time! Holds end bars upright and at the proper distance so top and bottom bars can be nailed or stapled quickly and without hassle. Device is fully assembled. Available in two sizes.

Walter T. Kelley Company

It's About Time

An attractive watch with honey bee design dial; Japan quartz movement, 1 ATM water resistant; silver-oxide battery (included). Heavy two-tone band with center clasp, plus a deluxe wood case. Makes a great gift. Available for ladies or men.

All Purpose Tote

Organize tools for nearly anything - sewing, crafting, home repair, gardening and, of course, beekeeping! Features exterior clip. key fob, molded handle grip, along with a handy, divided box for nuts, bolts, nails, etc. Measures 8-1/2" x 8-1/2" x 15-1/4". Made of heavy, durable nylon. (Tools not included)

www.kelleybees.com

NOD Apiary Products

NOD Apiary Products, manufacturer of Mite Away II, has developed and tested a new migratory lid design that combines the lid and rim. This allows for the application of Mite Away II and the application of any other soft treatment options, as well as for running on the hives year 'round.

When built to specifications it is sturdy, stackable,a nd will withstand the rigors of transportation. It is a singly piece of equipment that replaces and solves the problems created by having to use a separate rim.

Free plans are available from www.MiteAway.com,

Beekeeping Cards

Hand printed on recycled paper, with five designs. Bee Hive, Veil, Frame Grip, Smoker, Hive Tool. More at www.L2designcollective.com

Brushy Mountain Bee Farm

The Sideliner Uncapper has a pair of cutting cylinders that uncap as you slide the frame through them. Lay your frames on the table and crank them EASILY through the blades to reduce your uncapping time in half. Outstanding quality and innovative simplicity.

The Wee Bee Suits are available in sizes 4-6 and10-12. These suits are made with 100% US-grown cotton, sewn here in North Carolina. Tightly woven for the greatest sting resistance. Ankle zips, plus elastic in the ankles and wrists, and several pockets. The veils come with ring pull zippers and velcro at the end of the zippers. The one-piece hat-veil combo is made with a soft, ventilated hat with two layers of mesh for maximum protection.

Both screens fasten in place over the entrance and can be used to contain bees while moving hives. The **"Florida Moving Screen"** allows field bees to reenter the hive without allowing the bees in the hive to get out. The **"Moving and Robbing Screen"** has two doors at the regular entrance to easily open and close the hive. Additionally, there is an indirect entrance behind an aluminum "curtain" that confuses robber bees and protects susceptible hives.

The Queen Castle is a hive body that can be divided into into four 2-frame nucs, two 5-frame nucs, or left whole as a single 10-framer. It comes with four boards to use as individual inner covers and a special bottom board that provides an entrance to each section, one on each of the four sides, as well as just the right amount of ventilation. It holds standard 9-1/8" frames.

www.brushymountainbeefarm.com

Bill's Bee Vac was developed by Bill Owens in for his own use in his bee removal business. It's easy to climb up a ladder with this in tow. Bill has solved the two worst problems of bee vacs: overheating of the captured bees and varying the suction so as not to kill the bees he has caught. His superior design has a removable collection chamber and the vacuum motor housed in a plastic pail.

A&O Forklift

The New Hummerbee (2 Models Available)

The competitively priced XL and Turbo Models have many common features. The Turbo includes power and smoothness never before offered. Both have the cooling and power to run our fork attached mower or dirt bucket (shown here). Call us for a list of many other features. A&O Forklift – **www.hummerbee.com**

Dadant

A folding style veil with a new polyscreen material is Durable and flexible. It won't rust and will hold up for many seasons of use. Has white nylon binding.

Honey bee designed gift bags. Made from jute with a clear display window and honey bee designs. Single or triple, deigned to hold either one or three 1 lb. Queenline style or Classic jars.

Multi-function IPM screened bottom board makes hive management simple. It allows observations, choice of mite control program and ventilation all without dismantling you hives. Features include easy access from front or rear, rear smoke hold and rain guard, board placement over screen for warmth or fume type mite control, deep captivity area under screen, easy-clean plastic board. Completely assembled.

Durable plastic, hi-impact resin, maintenance free, UV inhibitor, paintable plastic, reversible wet\dry pest deterrent trays on stands, hold over 1000 pounds, removable mite screen and drawer under screen

www.dadant.com

Lazy Bee

Chef Isaac's Queen Kitchen Lazy Bee is proud to offer a new queen mating nuc. There are four individual compartments, each having it's own entrance in a pinwheel configuration. It is recommended that each quadrant of the body be painted a different color to prevent drifting. Included are 4 screened (not shown) inner covers which will support mason jar feeders or used for ventilation, 20 deep "mini-frames" with Pierco waxed foundation. Unit can be run as four 4-frame mini nucs or two 10-frame nucs, by removing dividers. Use any standard telescopic or migratory cover you provide. **www.lazybeestudio.com** or 866.LAZY.BEE

An optional "hatch-out" (modified deep) body is available which will assist in drawing out the foundation of Lazy Bee's "mini-frames" or when queen rearing season is over, to salvage unhatched brood on existing colonies. Retail: $19.95

Apis Arts offers a full line of balms and soaps containing honey and beeswax which can be customized for you to sell or give. In addition to natural oils like coconut, jojoba, sweet almond and hemp---many formulas also contain shea butter or lanolin. Other hive products such as royal jelly, pollen or propolis can be formulated to enhance your products further. Apis Arts offers full-color customization on packaging to include your logos, contact information and even UPC barcodes. Apis Arts also offers contract manufacturing and can sign a non-disclosure agreement to produce products to your specification.. View details online at **www.apisarts.com** or call toll free: 866.529.9233.

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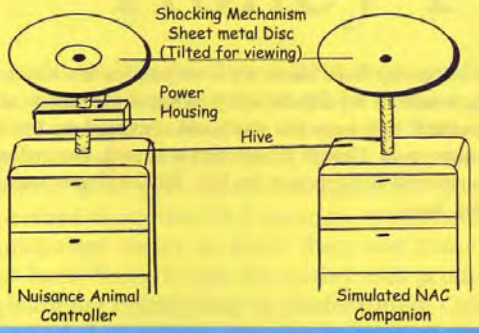
sales@maxantindustries.com

Maxant 1700 chain Uncapper.

In 2006 Maxant inaugurated the use of stainless steel chain on the cutting reels. All individual link ends have been pot welded, which amounts to over 400 spot welds per machine. Plus, all zinc plated slide and chain rods have been switched to pure stainless steel.

Dealers stock these machines for regional delivery. Maxant has improved the reliable 3100P Extractor, also. The new reel basket that holds 9 frames is entirely stainless steel and TIG welded on water cooled automatic machines.

Nuisance Animal Controller



ScaresBears. USDA and Wisconsin DNR tested and proven effective bear deterrant. Each unit custom made. Mounts on top of hive and when moved, sends shock to marauding bear. Works with two 12-volt lantern batteries. Also, simulated device, unpowered to fool bears after initial encounter. Shocked bears recognize device and flee. More information 715.398.5737 or scarebearsaway@yahoo.com.

MiteGone

Costs only $ 3-5 per year per hive, no Resistance and no contamination.

Do not unwrap the pads! Put 3 soaked half-pads in the hive in August and leave them there until April. Refill or put 2 new pads into the hive in April. Throw out the pads in May.

Treatments in late September or October are too late! The damage to winter bees is done. Your colony may collapse!

BENEFITS: Following these instructions will get rid of Tracheal and Varroa mites, Nosema, Chalkbrood, as well as the Lesser wax Moth and can potentially deter beetles.

www.mitegone.com. View the free video! Download, print, and read helpful information from our PRINT LITERATURE link including Detailed Instructions, Brochure, Treatment Selection, Other Uses of Pads, Safety, Costs, Testing.

Books

A Color Guide To Pollen Loads Of The Honey Bee. Second Edition. William D. J. Kirk. In English, French and German. IBRA. 54 pages. $25US, plus post. www.IBRA.org.UK. 18 North Road, Cardiff, CF10 3DT, UK The second revised edition of this popular book came out late last year. The book talks about pollen colors, IDing pollen, recording grain size and even propolis and spores collected by bees. The color charts are self-evident. 268 plant species found in Europe and identified and examined.

Producing Royal Jelly. R. F. van Toor. 5½" x 8½". 100 pages. Color and B & W. ISBN 139780473113698. Bassdrum Books BB, 35 Newborough Rd., Wimborne Minster, BH21 1RB, Dorset, UK. $30US, plus shipping

Forty hours per week, 30 hives for production, 15 hives for support, and 10 nucs...all using traditional queen grafting techniques – that's what it takes to harvest Royal Jelly. How much? 10 grams of Royal Jelly from 40 queen cells 72 hours after grafting. How many cellscan a colony support, times 30 and you've got your answer. It adds up, and you can charge and arm and a leg for the stuff.

That's what you'll learn from this book. Plus lots of basic bee biology. And timing. And equipment. (there's a suction device that's used that you absolutely need. Find out how and where to get it, first)

Noble Apiaries

Raising Your Own Queens! These one piece grafting frames – "Uniframe" – are made from laminated, exterior-grade, sign plywood (MDO) on our own computerized router.

Nothing else available compares in quality or durability.

The kit includes one pice frame and three cell bars.

For more information and pricing visit **QueenBeesForSale.com**

DVD Program

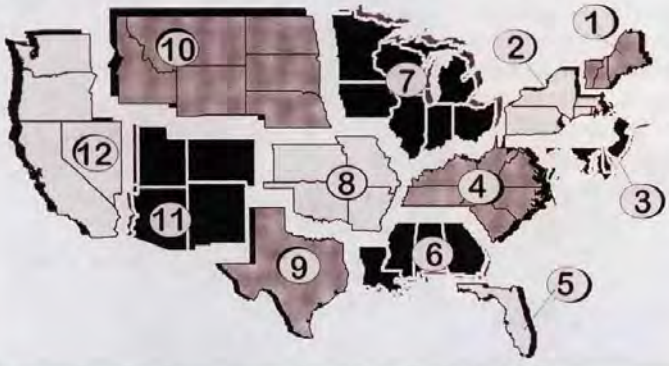
SISTER BEE is a lyrical, half hour DVD documentary about six beekeepers who encounter startling beauty and spiritual truth in their work with honey bees. Featuring stories and images from the lives of six women beekeepers, it follows the arc of the beekeeping year beginning with Spring queens and ending with the Fall honey harvest. The unique outlook and personality of each beekeeper is revealed through her thoughts and gestures as SISTER BEE advances through the beekeeper year. SISTER BEE is a highly musical film with a striking vusual style.

SISTER BEE is available from **www.SisterBee.com**

Cover Board

New Cover Board. Cover board comes with untreated edges and should be primed and sealed. Most are white, some have 1 side bright yellow. Sizes to spec width and length.. mating nucs, eight or 10 frame equipment or other sizes made to order. Also can be used for bottom board or pallet material. Material on both sides is a waterproof polyester resin which is bonded to plywood. Wax and propolis buildup same as other materials. Shipped from Ohio or Washington. Info: **flowers2honey@yahoo.com**

APRIL – REGIONAL HONEY PRICE REPORT



Most beekeepers sell honey from home. It's a natural, but the volume tends to be small. Farm markets are popular, and growing, as are higher-end retail outlets. And packers, both large and small, still command the lion's share of amount of honey sold. Though the numbers are small, they reflect the proportion of commercial beekeepers in the U.S. Wholesaling to stores seems to be increasing, too.

% of Reporters Selling at these locations				% of Their Honey Sales at these locations				Locations Honey Sold at
2004	2005	2006	2007	2004	2005	2006	2007	
68	78	69	65	40	35	33	46	Home (inside or roadside stand)
17	14	13	16	23	41	49	26	Local community - sponsored farm market (i.e. Saturday & Sunday sales)
24	21	30	37	23	14	17	32	Local Farm Market business that's seasonal (Fall only, for instance)
19	18	16	18	32	34	17	25	Local Farm Market business that's year-round
5	6	18	5	6	23	5	44	Flea Market
28	41	28	24	28	14	20	19	Health Food/Organic store
15	17	10	10	23	9	7	14	Gift Store
8	11	10	5	9	11	14	9	Specialty Outlet (salons, tourist outlets, airports)
23	29	23	15	22	16	16	25	Bakeries/Food Establishments
14	11	5	4	18	23	5	21	Local High-End Retail Outlets (gourmet stores)
26	25	36	21	24	18	19	19	Local, Small 'Mom & Pop' Retail Outlets (grocery & gas)
4	6	10	2	22	12	21	8	Local, Small, Franchise Outlets (7-11, Dairy Mart, Stop & Go)
15	25	10	9	40	31	12	32	Local Small Packer or Producer/Packer
6	10	5	5	66	68	45	60	Huge Packer, they pick up
17	25	16	12	40	35	43	34	Wholesale only to medium retail outlets (small chains) you deliver
4	6	3	3	44	29	40	47	Wholesale only to larger stores, you deliver to warehouse
3	10	10	6	5	3	15	5	Breweries/Beer or Mead makers
8	11	8	7	31	12	15	17	Internet, direct retail, mail order
17	11	25	18	19	6	28	33	Work, direct retail
5	6	8	5	27	33	17	18	Local/State Fair, with club

*Total percentage of sales does not come out to 100% because of multiple outlets.

	REPORTING REGIONS												SUMMARY		History	
	1	2	3	4	5	6	7	8	9	10	11	12	Range	Avg.	Last Month	Last Year
EXTRACTED HONEY PRICES SOLD BULK TO PACKERS OR PROCESSORS																
55 Gal. Drum, Light	1.03	1.25	1.03	1.00	0.82	1.15	1.01	1.03	0.82	0.93	0.90	1.12	0.82-1.25	1.01	1.06	0.94
55 Gal. Drum, Ambr	0.95	0.98	0.95	1.10	0.73	1.10	0.91	0.95	0.71	0.95	0.75	1.00	0.71-1.10	0.92	0.97	0.89
60# Light (retail)	103.00	120.33	120.00	103.75	110.00	102.50	102.63	105.00	120.00	107.10	105.50	119.25	102.50-120.33	109.92	119.79	102.08
60# Amber (retail)	103.00	111.67	120.00	102.25	110.00	93.33	96.43	105.00	110.00	109.21	100.50	129.00	93.33-129.00	107.53	103.86	95.16
WHOLESALE PRICES SOLD TO STORES OR DISTRIBUTORS IN CASE LOTS																
1/2# 24/case	40.75	55.98	40.80	41.30	47.84	47.84	38.75	47.84	47.84	35.76	31.00	55.20	31.00-55.98	44.24	43.82	36.76
1# 24/case	61.62	66.78	67.20	59.30	63.00	69.00	60.17	60.90	50.40	77.76	72.00	83.12	50.40-83.12	65.94	63.87	63.05
2# 12/case	61.49	62.32	61.80	54.47	58.50	51.00	55,97	66.00	51.40	57.84	49.20	73.30	49.20-73.30	58.61	58.70	54.97
12.oz. Plas. 24/cs	58.56	60.48	49.80	57.23	54.00	65.00	50.91	51.60	43.20	47.64	52.20	62.00	43.20-65.00	54.38	53.41	53.55
5# 6/case	62.48	68.99	71.25	58.57	66.39	72.00	63.54	50.00	47.00	56.43	48.75	75.50	47.00-75.50	61.74	63.19	57.74
Quarts 12/case	77.00	100.35	66.00	85.04	72.00	77.33	73.10	77.00	96.00	110.88	78.24	109.00	66.00-110.88	85.16	89.02	82.78
Pints 12/case	50.00	49.95	112.20	56.50	58.00	46.60	61.95	44.00	60.00	49.50	46.50	58.33	44.00-112.20	57.79	52.45	50.05
RETAIL SHELF PRICES																
1/2#	2.50	2.57	2.22	2.75	3.03	2.00	2.62	1.89	2.37	2.56	1.96	3.91	1.89-3.91	2.53	2.49	2.46
12 oz. Plastic	3.25	3.30	2.75	3.31	3.40	3.25	3.37	3.50	2.96	3.04	2.87	3.91	2.75-3.91	3.24	3.28	3.16
1# Glass/Plastic	3.82	3.82	3.70	4.11	4.00	3.90	3.83	4.00	3.70	3.89	3.75	5.10	3.70-5.10	3.97	3.97	3.93
2# Glass/Plastic	6.50	6.57	6.80	6.07	6.49	5.40	6.25	8.12	6.31	6.77	5.24	8.75	5.24-8.75	6.61	6.58	6.51
Pint	5.50	7.38	6.50	5.56	5.25	4.67	6.51	5.56	5.33	7.00	5.31	9.25	4.67-9.25	6.15	5.85	5.60
Quart	11.00	8.98	11.00	8.99	7.50	7.94	8.38	9.31	9.00	16.00	7.64	13.16	7.50-16.00	9.91	9.60	8.89
5# Glass/Plastic	13.50	13.66	15.65	13.40	15.00	14.50	17.50	15.00	15.00	13.73	11.33	19.50	11.33-19.50	14.81	14.28	13.89
1# Cream	4.60	5.50	4.89	4.81	6.84	4.00	5.18	4.59	6.84	5.07	6.74	5.75	4.00-6.84	5.40	5.53	4.65
1# Cut Comb	5.00	5.30	5.19	4.93	7.22	4.25	5.52	4.50	7.22	5.75	5.89	8.87	4.25-8.87	5.80	6.02	5.74
Ross Round	4.50	3.65	4.97	5.38	5.27	3.00	4.50	6.50	5.27	5.27	4.67	8.99	3.00-8.99	5.16	5.23	5.19
Wholesale Wax (Lt)	2.30	2.45	2.00	2.33	1.90	2.83	2.24	2.75	2.00	2.00	2.13	2.15	1.90-2.83	2.26	2.17	2.32
Wholesale Wax (Dk)	1.25	1.90	1.00	2.25	1.70	2.00	1.37	2.50	1.95	1.89	1.90	1.45	1.00-2.50	1.76	1.57	2.17
Pollination Fee/Col.	50.00	75.00	60.00	44.50	42.00	45.50	48.00	60.00	80.97	120.00	26.00	92.50	26.00-120.00	62.04	72.46	67.91

Honey Production – 2006

Honey production in 2006 from producers with five or more colonies totaled 154.8 million pounds, down 11.4 percent from 2005. There were 2.39 million colonies producing honey in 2006, down only one percent from 2005. Yield per colony averaged 64.7 pounds, down 11 percent from the 72.5 pounds in 2005. Colonies which produced honey in more than one State were counted in each State where the honey was produced, therefore yields per colony may be understated. Colonies were not included if honey was not harvested. Producer honey stocks were 60.5 million pounds on December 15, 2006, down 5% from a year earlier. Stocks held by producers exclude stocks held under the commodity loan program, which totaled 13.7 million pounds at year-end. That totals 74.2 million pounds of unsold honey in U.S. Producer's warehouses. That's 48% of the U.S. crop this year. 48% remains, after the shortest U.S. crop in decades.

Still, Honey Prices Up 14 Percent

Honey prices increased during 2006 to 104.2 cents, up 13.5% from 91.8 cents in 2005, but still down 3% from 106.9 cents in 2004. Prices are based on retail sales by producers and sales to private processors and cooperatives. Prices at the individual state level reflect the portions of honey sold through retail, co-op and private channels. Honey prices for each color class are derived by weighing quantities sold for each marketing channel. Honey prices for 2006 were higher than the previous year for all color class totals.

Several items bear noting for 2006 as changed from 2005. Of course a one percent drop in the number of colonies is unsettling, considering the increased demand for colonies for polliation. However, where they dropped is even more telling. Look at the Top 10 Table. These 10 states support 71% of the nation's colonies (the same as 2005, and produced 71.3% of 2006's honey (down 14.4% from 2005). The top 10 didn't change much in colony population this year, but North Dakota, California and Texas did drop a bit. Michigan was up over 10%.

71% of the nation's honey was produced in these 10 states, with more than 45% coming from the top four – North and South Dakota, California and Florida. Florida, however, was the only state of the top four that didn't have a production decrease this year. In total, the top four were down 15% compared to last year in honey production. The top 10 were down 16% overall!

Of the 154.8 million total pounds produced last year, 60.5 million pounds, or 39%, still sits in producer

Per Capita Consumption

Plusses	**Mil. Lbs.**
Production	154.8
Stocks In (+ Loans)	82.5
Imports	279.3
Total	**516.6**

Minuses	**Mil. Lbs.**
Loans	17.7
Stocks Left (+ Loans)	74.2
Exports	6.7
Import Stocks left (Est. at 20% of imports)	55.3
Total	**153.9**

To Calculate Per Capita Consumption	**Millions**
Production	516.6 lbs.
(minus) Removed	153.9 lbs.
(equals) Consumed	362.7 lbs.
(divided by) Population	299.4 people
Per Capita	1.21 lbs/person

Per capita honey consumption for 2006 is 1.21 lbs/person. This comes to 19.4 ounces. 2005 was 18.6 ounces. 2004 was 17.6 ounces. 2003 was 19.7 ounces.

Honey: Number of Colonies, Yield, Production, Stocks, Price, and Value by State and United States, 2006[1]

State	Honey Producing Colonies	Yield per Colony	Production	Stocks Dec 15[2]	Average Price per Pound[3]	Value of Production
	x 1,000	Pounds	x 1,000	Pounds	Cents	1,000 Dollars
AL	11	72	792	230	146	1,156
AZ	30	65	1,950	839	139	2,711
AR	32	76	2,432	730	105	2,554
CA	380	52	19,760	7,706	98	19,365
CO	36	75	2,700	1,458	139	3,753
FL	170	81	13,770	1,790	101	13,908
GA	63	74	4,662	746	116	5,408
HI	10	93	930	233	119	1,107
ID	95	44	4,180	2,592	86	3,595
IL	10	66	660	356	188	1,241
IN	6	54	324	107	151	489
IA	26	84	2,184	1,441	115	2,512
KS	14	55	770	246	140	1,078
KY	5	56	280	70	220	616
LA	30	90	2,700	675	89	2,403
ME	11	23	253	86	200	506
MI	72	55	3,960	2,099	128	5,069
MN	125	80	10,000	3,300	89	8,900
MS	14	98	1,372	453	105	1,441
MO	15	46	690	117	149	1,028
MT	132	79	10,428	1,981	100	10,428
NE	47	73	3,431	3,843	104	3,568
NV	9	37	333	50	355	1,182
NJ	9	36	324	152	115	373
NM	7	48	336	104	96	323
NY	60	64	3,840	2,458	138	5,299
NC	10	50	500	215	156	780
ND	350	74	25,900	7,770	90	23,310
OH	14	56	784	282	145	1,137
OR	46	48	2,208	729	111	2,451
PA	28	40	1,120	605	161	1,803
SD	225	47	10,575	10,575	82	8,672
TN	7	55	385	58	184	708
TX	82	70	5,740	976	87	4,994
UT	23	50	1,150	265	105	1,208
VT	6	56	336	144	121	407
VA	8	42	336	114	219	736
WA	49	52	2,548	1,605	119	3,032
WV	5	42	210	57	195	410
WI	64	93	5,952	2,500	114	6,785
WY	39	85	3,315	497	88	2,917
Oth Sts[4,5]	17	43	726	274	269	1,951
US[5]	**2,392**	**64.7**	**154,846**	**60,528**	**104.2**	**161,314**

[1]For producers with 5 or more colonies. Colonies which produced honey in more than one State were counted in each State.
[2]Stocks held by producers.
[3]Prices weighted by sales.
[4]CT, DE, MD, MA, NH, OK, RI, and SC not published separately to avoid disclosing data for individual operations.
[5]Due to rounding, total colonies multiplied by total yield may not exactly equal production.

warehouses, either unsold or under loan. Compare that to the 276.3 million pounds of imported honey, 15% more than in 2005, and, in fact more than any year, ever. It's amazing more isn't left in those warehouses.

Imports, or course, are nearly always preceded by the word cheap. When all the colors, varieties, kinds and styles of imported honey are totaled (276.3 million pounds), and all the money paid ($176.8 million), the average price/pound comes out right at $0.64/pound. Of course the tarriff imposed on imports from China and Argentina move these prices up about a dime or even more per pound.

The People's Republic Of China sent over 71.1 million pounds (26% of these imports), at an average value of $0.44/pound. Argentina, another big exporter, sent along 61.4 million pounds, (22% of those imports) at an average value of $0.76/pound, significantly higher than Chinese prices, certainly.

And once again there is that disparity between the price that producers are paid and the retail store shelf price. For instance, The Honey Price Table shows a 183% markup between farm gate and store shelf. That's down from the 202% markup in 2005 – somebody's making good money on this stuff it seems.

Look now at The Per Capita Consumption Table. The computation is pretty straight forward: honey in, honey out, honey left over, number of people – pounds of honey per person consumed. But that's every person. My guess is that half of the people in the U.S. never, ever eat a drop of the stuff. You know some of them, right? They do, I'd guess, eat some honey in those products that advertise honey on the label, and actually have some inside. So, to take this next step, those who actually eat honey probably eat, what, a pound and a bear a year? Close? How much honey do *you* eat in a year?

We've been tracking per capita consumption using the basic formula shown on the table for many nears now. And during all that time, consumption per person hasn't changed more than 10% up or down. It goes up an ounce or two, or down an ounce or two every year, but stays right about 17 - 19 ounces per person, per year. That little change, considering how large the numbers are is certainly rounding error every year.

This is in one way good, because as the population goes up every year, total consumption goes up every year. This year there were 300 million people eating their 1.something pounds of honey.

However, the static nature of the amount of honey consumed per person per year is troubling. Sugar, and certainly artificial sweeteners continue to show per capita increases on an annual basis. The honey industry is losing market share – as population increases, other sweetener uses increase per person, but honey...honey remains the same, year after year after year.

The troubling part of this is that this industry has, for 20 years now, put about $3 – 4 million per year into a program that, by its own Mission Statement, is designed to Maintain and Expand domestic and foreign markets of honey. After 20 years, it seems, they've only done half the job.

Two more things. The numbers in the USDA report are chronically flawed due to sampling error, moving colonies and producer's reluctance to participate. We are confident, however, that when compared to the previous year's reports, accurate trends become apparent. Prices and colony numbers, up or down here, may not be exact but they are consistent. That counts.

For more than a decade's worth of data check out usda.mannlib.cornell.edu/reports/nassr/other/zhobb/ and see for yourself how your state has done over time, compared to nearby states, and how your operation compares to others in your state. It's an enlightening experience.

Top Ten Producing States Each Year

2001			2002			2003			2004			2005			2006			
State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	x1000 Col	x1000 Prod lbs	State	X1000 Col.	% Chg. From 2005	X1000 Prod lbs
CA	425	27.6	ND	320	24.0	CA	480	32.1	ND	390	30.4	ND	370	33.7	ND	350	-6%	25.9
ND	280	26.9	CA	470	23.5	ND	340	29.6	SD	215	22.6	CA	400	30.0	CA	380	-5%	19.8
FL	220	22.0	FL	220	20.4	FL	210	14.9	FL	205	20.1	SD	220	17.4	FL	170	+6%	13.8
SD	235	15.3	SD	225	11.5	SD	215	14.0	CA	390	17.6	FL	160	13.8	SD	225	+2%	10.6
MT	136	13.9	MN	117	8.5	MN	120	10.0	MT	140	10.8	MN	120	8.9	MT	132	+2%	10.4
MN	135	10.9	MT	134	8.4	MT	145	9.6	MN	135	10.1	MT	130	8.7	MN	125	+4%	10.0
TX	97	7.7	TX	114	7.6	TX	140	9.4	TX	116	8.8	TX	84	6.0	WI	64	0	6.0
WI	67	5.4	WI	70	6.7	WI	74	5.7	ID	100	6.3	WI	64	5.3	TX	82	-4%	5.7
MI	76	4.6	NY	60	5.8	NY	67	4.8	WI	68	5.8	MI	65	4.4	ID	95	0	4.2
NY	53	3.7	MI	72	5.5	MI	65	4.8	MI	65	4.3	ID	95	3.5	MI	72	+11	4.0
Total	1724	138.9		1802	121.9		1856	134.7		1824	136.8		1708	131.7		1695	-1%	110.4
All Sts.	**2506**	**185.5**		**2574**	**171.7**		**2590**	**181.1**		**2599**	**181.7**		**2410**	**175.0**		**2392**	**-1%**	**154.8**
% of Tot.	**69%**	**75%**		**70%**	**71%**		**72%**	**74%**		**71%**	**75%**		**71%**	**75.3%**		**71%**		**71.3**

*Percent difference reflects retail mark up price over bulk honey price.
**2004 prices revised by USDA in 2005.

Honey Prices 1994-2006

Cents/lb.	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004**	2005	2006
All Honey	52.8	68.5	87.8	75.7	65.5	60.1	59.7	70.4	132.7	138.7	108.5	90.4	104.2
Retail Shelf	89.1	100.0	117.3	125.7	114.7	126.6	130.4	142.2	152.5	188.5	188.7	183.3	191.0
%Difference*	169%	146%	134%	166%	175%	211%	218%	202%	115%	136%	174%	202.8%	183%

Malcolm T. Sanford

NP305: The Next Half Decade At The Bee Labs

"Nutrition, stress, patents, pollination and Small Hive Beetle are on the agenda."

Most of those interested in beekeeping are familiar with the research work accomplished by what are known as the "bee labs." These entities of the USDA's. Agricultural Research Service (ARS) have played an integral role in developing much of the technology used to effectively manage honey bee colonies. Currently, there are five major centers of research: the Honey Bee Breeding, Genetics and Physiology Laboratory (Baton Rouge, LA); the Honey Bee Research Unit at the Kika de la Garza Subtropical Agricultural Center (Weslaco, TX); The Carl Hayden Bee Research Center (Tucson, AZ); the Bee Research Laboratory (Beltsville, MD); and the Pollinating Insect-Biology, Management & Systematics Research Unit (PIRU) (Logan, UT). The latter unit concentrates on alternative pollinators to the honey bee, known as "non-*Apis*" bees. In addition, to these, ARS conducts research on bees at other laboratories, including The Center for Medical, Agricultural & Veterinary Entomology (Gainesville, FL) and Insect Genetics and Biochemistry Research Unit (Fargo, ND).

Not so apparent perhaps is that the above research also contributes to what is called a "National Program" in ARS (there are 22 such programs total),[1] specifically known as NP305, or the "Crop Production National Program." NP305 has three components: Integrated Production Systems, Agroengineering; Agrochemical, and Related Technologies; and Bees and Pollination. ARS held a "Crop Production Assessment and Customer Workshop" in Stuart, FL 20-22 February, 2007 to "initiate the next five-year cycle of NP305." Expected outcomes included developing a "better understanding of crop production issues important to ARS' customers, stakeholders and partners." This workshop was organized by the two co-program leaders of NP305, Sally Schneider, and Kevin Hackett, who is the point person for the Bees and Pollination component.

The first step in developing the program for the next half decade was an assessment of the last five years by a panel of six scientists with diverse expertise, employment assignments and geographic location. The results were delivered by Ken Richards of Agriculture Canada who chaired the panel. In its "overarching comments," the panel said that in general NP305 is making key discoveries and that several of the problem areas are unique to the ARS mission and also represent the only national effort in the area. In addition, the panel said that the three components of NP305 have little in common with themselves (have more in common with other national programs); that economic analysis of much of the research was lacking and there was a significant gap in controlled environmental production systems (greenhouses, high tunnels).

For the Bees and Pollination component, the panel said that in the pest management area ARS should emphasize control measures for *Varroa* and that collaboration with both domestic and international researchers be continued. In the bee management and pollination area, the panel urged more emphasis on examining the optimum number of pollinators required to pollinate a crop (*e.g.*, updating S.E. McGregor's book on pollination of cultivated crop plants) and that cyropreservation research be continued. Finally, it concluded that ARS should focus efforts to meet pollination demands of California almond growers, capitalizing on recent developments in sequencing the honey bee genome.

The honey bee breakout group then met for several three-hour sessions in an attempt to further define specific problems that ARS could and should be working on. The group was asked to state the problem and research needs, find "actionable" items, suggest cooperation and collaboration needed in addition to infrastructural needs, and finally determine anticipated products and potential benefits. A "strawman" was created consisting of the following topics: Africanized honey bees, *Varroa* and tracheal mites, small hive beetle and wax moth, American foulbrood, European foulbrood, chalkbrood, nosema, viruses, nutritional management, pesticide stress, queen breeding, genomics, regulatory and marketing, honey production, chemical management and pollination. It was especially significant that the new "colony collapse disorder" discussed at a research workshop sponsored by the Foundation for the Preservation of Honey Bees earlier in the week was included and will appear as a specific need in the resulting document. The selected items were later prioritized and then presented to ARS employees on the final day to begin writing their vision about how they would be accomplished.

Perhaps the best way to get an idea of what the next five years have in store for the bee labs is to look at the last half decade. The accomplishment report dated August 2006 includes the following:

Varroa Mite Control: ARS was instrumental in developing chemical control using Apiguard®, which substitutes for chemicals that *Varroa* mites are becoming resistant to Apistan® and CheckMite+®. The compound 2-heptanone made by bees during comb building is a potent miticide, which also prevents robbing and inhibits wax moth predation on stored comb has been awarded a patent and it awaits commercialization. A formic acid gel was developed and still awaits a place in the market due to packaging issues, however, the technology is being exploited by NOD Apiary Products, Ltd. (Mite_Away II®).

The ARS Russian bee project is now affording U.S. beekeepers a stock that requires no management for either *Varroa* or tracheal mites

"The Honey Bee Genome is expected to open up a wide range of opportunities in understanding basic honey bee biology not possible in the past, including caste determination, defensiveness and odor reception."

USDA United States Department Of Agriculture
Agricultural Research Service

and also survives Winter well. This directly impacts U.S. pollination efforts because the stock remains stable regardless of development by others of resistance to miticides. An allied project has developed the technology to select for the SMR/VSH traits that afford *Varroa* resistance. The *Varroa* Sensitive Hygiene (VSH) trait is highly desirable and been released to the U.S. beekeeping community. Strict mating is not required to retain the trait and it can be added to any stock of honey bees, including Russian bee lines. The screened bottom board, a "low tech" approach to mite control using relatively inexpensive materials, was transferred to the bee industry, and is now sold by many distributors of bee supplies.

American Foulbrood Disease: ARS scientists undertook FDA approval of tylosin tartrate (Tylan®) as an alternative traditional Terramycin®, which is becoming less effective. This technology was also passed to Agri-Canada to support registration in that country. In addition, ARS scientists have looked at bee immunity and developed a bioassay for response using non-pathogenic bacteria.

Viruses: Rapid, accurate and sensitive methods have been developed by ARS resulting in 1) unequivocal evidence that the parasitic *Varroa* mite is a capable and effective vector of bee viruses and that uninfected mites are able to acquire virus from association with infected mites; 2) the first report of deformed wing virus (DWV) in the U.S., quantification of this virus in different bee life stages and that overt symptoms (*i.e.* deformed wings) are a function of virus levels, not just presence or absence of virus; and 3) the finding of an alternate route of transmission, directly from queen to her offspring (vertical).

Small Hive Beetle: While investigating basic biology of *Aethina tumida*, ARS scientists discovered that in the honey house, beetle eggs would not hatch below 50 percent humidity. This resulted in a practical control. In addition, investigators have developed an in-hive trapping system and lure based on a beetle-carried yeast. Both are patented and in the process of being released to the U.S. beekeeping industry.

Artificial Diet: A liquid artificial diet has been developed and is in the process of being made ready for market. All facets of the industry are expected to benefit from early spring buildup of bee populations. No totally artificial diet has ever been used by the industry previously.

Africanized Honey Bee Takeovers (Usurpation): ARS scientists have found various reasons that Africanized honey bees (AHB) replace European colonies in the wild. Such factors include: 1) use by European queens of Africanized rather than European sperm to produce a majority of AHB workers; 2) a shorter developmental period for Africanized when compared to European queens and workers preferring the former as well; 3) presence of so-called "intermorphs," queens with both worker and queen characteristics thought to play a role in usurpation; 4) European colonies going queenless are prime takeover targets for AHB swarms. Finally, a queen-specific volatile has been identified, which may play a role in queen acceptance.

Miticides in the Beehive: The growing concern in the beekeeping industry that miticides are having sublethal effects has been confirmed by ARS, especially with reference to coumaphos. Queens have especially been found to be at risk, such that recommendations currently are for beekeepers to carefully monitor residue levels in combs.

The Honey Bee Genome: ARS scientists played a key role in the honey bee being selected for genome sequencing. Identified genes are now being used to determine the causes of beneficial (*e.g.*, reproduction, queen production, and immunity) and detrimental (*e.g.*, defensive behavior) traits in honey bees. Marker-assisted-breeding (MAB) will also help in development, verification, and maintenance of stock with desirable traits as will use of systemic gene silencing (RNAi). The latter technology means that genes can be selectively switched off and is expected to be important in understanding the role of specific genes in disease and parasite

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resistance, reproduction and even the ability to pollinate certain crops.

The genome was not available to ARS scientists during the last half decade of research. Therefore, it represents a completely new tool that will be used in the next five years and so much of the work discussed at the workshop will be using this technology. It is expected to open up a wide range of opportunities in understanding basic honey bee biology not possible in the past, including caste determination, defensiveness and odor reception. In conjunction with this research on preserving both sperm and embryos through cryopreservation (freezing) will help queen producers and breeders in a number of important ways.

Some of the topics were not considered as "actionable" because ARS did not have the expertise to deal with them. The best example of this category was one mentioned in the panel's formal evaluation, the fact that S.E. McGregor's book, *Insect Pollination of Cultivated Crop Plants*," is out of date and needs revision. Unfortunately, there is little if any current research on many of the plants in that book, and for some, many new varieties have been created by plant breeders with no input about pollination requirements. It was acknowledged that bee scientists and plant breeders in ARS have not communicated well with each other in the past, resulting in the latter often ignoring the importance of pollen and nectar production when developing new varietals.

Another area where ARS has no expertise is in honey marketing issues such as detecting adulterated honey. Thus, although considered a priority item by the industry, no effort on this area is expected. Fortunately, much of that is covered by National Honey Board activities.

One topic which consumed a good deal of time was honey bee nutrition as part of general bee health. Given the research already accomplished, it is surprising how little basic practical information there is in this critical area. Program Leader Hackett suggested during the workshop that ARS scientists should consider submitting this topic for a specific "area-wide" program for which there is considerable funding available.

Chris Heinz in her report to Project Apis *m* (PA*m*), 1750 Dayton Rd., Chico, CA 95928 said the following about this opportunity:

"Bee health and nutrition was given top priority. I stressed the need for a comprehensive study of macronutrients (protein, carbohydrates (sugars) and lipids) and micronutrients while increasing available knowledge on timing and form of delivery. Discussion centered upon not just *feeding* colonies, but *stimulating* colonies to provide for earlier brood production and looking at factors including nutrition (spring vs. Fall pollen) and breeding that stimulate particular genes to produce brood earlier thereby slowing colony decline and improving population for early season pollination.

"Several months ago, Dr. Ed Knipling, ARS Administrator, allocated $76,000 to fund a comprehensive study evaluating fall feeding regimes preparing bees for almond pollination. Dr. Jeff Pettis, Research Leader, USDA-ARS Beltsville Lab, coordinated a well-orchestrated study involving all four honey bee labs. The Tucson Lab provided their diet that has been under development and also provided in-field assistance for the trials. Beltsville coordinated the study and looked at disease elements (Nosema), Weslaco's expertise studied the role of nutrition in mitigating pest pressures like *Varroa*, and Baton Rouge supplied Russian bees to allow evaluation of two different bee strains.

"Results of this study were presented and bee diet has a marked impact on bee health and the number of full frames of bees present. The Tucson diet proved to be a very successful, if not the most successful, diet available. The success of this study in providing practical, demonstrable results directly applicable to bee management and improving bee health for the early almond pollination season makes it a prime candidate for a five-year $5M Area-Wide program now being planned with USDA."

Finally, there was discussion about the importance of the patenting process in ARS research. Beekeepers have and continue to be frustrated by the length of time it takes to patent a technology and get it into the marketplace. This is considered problematic at the present time for two accomplishment areas given above, the liquid diet and small hive beetle trap and bait. ARS administrators stated that the patenting process was often a necessary step in order to get something to market that was reliable, and that publication, not patenting, was the most important consideration when evaluating scientists work.

The results of deliberations at the Florida workshop show that there will be plenty on the bee labs' plate in the next five years. The deadline for the action plan to be published on the World Wide Web is June 1, 2007. Perhaps there is too much to do considering all the problems identified. This is the reason the American Beekeeping Federation developed a plan to increase USDA-ARS research funding to $16 million, specifically requesting that six (6) specific new positions, including a honey chemist, be added to the bee labs. For more information on this initiative, contact the Federation, P.O. Box 1337, Jesup, GA 31598, ph 912-427-4233, <info@ABFnet.org>. BC

"The results of deliberations at the Florida workshop show that there will be plenty on the bee labs' plate in the next five years. The deadline for the action plan to be published on the World Wide Web is June 1, 2007."

Dr. Sanford is a former Extension Specialist in apiculture at the University of Florida.

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1. USDA-ARS Programs Web Site, accessed February 26, 2007 http://www.ars.usda.gov/research/programs.htm.

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RESEARCH REVIEWED

The Latest In Honey Bee Research

Steve Sheppard

"Field trials and tribulations of bees and mites."

A number of researchers have reported success in breeding honey bees that show some measure of resistance to diseases and parasitic mites. These findings suggest that the long term prospect of beekeeping without chemical "intervention" is favorable. In view of the fact that many migratory beekeepers involved in the 2007 almond pollination in California faced unexpected (and in some cases unexplained) bee population declines, the potential benefit from the use of selected genetic stocks of honey bees may be unprecedented. However, one of the limitations to date has been the lack of data from field trials that evaluated selected honey bee stocks in commercial production apiaries. A recent paper by Ibrahim and colleagues took an important step in that direction as they evaluated colonies selected for multiple resistance mechanisms under field conditions (Ibrahim et al., 2007).

The experiments were conducted over two years in two commercial beekeeping operations that variously operated in Minnesota, North Dakota and Texas. The beekeepers reared naturally-mated queens in Texas by grafting daughters from instrumentally inseminated queen mothers provided by the researchers. These initial queen mothers were themselves crosses derived from two lines: one that expressed high levels of hygienic behavior (HYG) and one that expressed suppression of mite reproduction (SMR). The SMR trait has recently been renamed VSH (*Varroa* sensitive hygiene), as the resistance mechanism (bees preferentially uncap and remove worker pupae infested with reproductive mites) has been better characterized. The outcome of natural matings between the daughters of the instrumentally-inseminated queen mothers and a local population of hygienic drones in Texas led to estimates that the production queens used in the first year of the experiment were 63% HYG and 37% SMR. Breeder queens for the second year were derived from this population and again crossed to local HYG drones, so the queens used in the second year were 82% HYG and 18% SMR. The HYG/SMR hybrids were compared to two other lines: Minnesota hygienic bees not crossed to SMR (HYG) and an Italian "strain" of honey bees unselected for either hygienic behavior or SMR.

In the first year, the researchers compared the three different genetic stocks in multiple apiaries in Minnesota (four apiaries with six to eight colonies per line) and North Dakota (three apiaries with eight colonies per line). In the second year, colonies were all located in a single apiary in North Dakota until June and then divided among three apiaries, each containing 10 to 14 colonies per line. The researchers evaluated the colonies for numerous criteria in this large-scale experiment. In May or June each year they evaluated the colonies for the number of frames of bees and brood, brood viability, hygienic behavior and the number of mites on adult bees. In September of each year, they evaluated colonies for honey production, the number of mites on adult bees and in worker brood and the reproductive success of mites.

The results of the measurements of colony strength and honey production showed some variation by location and by year. One consistent measure across both years was that the HYG/SMR colonies had fewer combs of worker brood in June compared to Control and HYG colonies. For most other measures of colony strength or honey production no overall trend was apparent. For example, in year one the HYG/SMR colonies produced less honey in Minnesota compared to the Control colonies, but this was not the case in North Dakota in year one or two.

Measures of hygienic behavior and mite levels showed significant differences between genetic lines. Thus, in both states and both years, the HYG/SMY and HYG colonies were significantly more hygienic (removed more freeze-killed brood) than the Control group. In June of year 1, there were no differences in mite levels on adult bees in June in either MN or ND. By September of year one in ND, both the HYG and HYG/SMR colonies had fewer mites on adult bees than the Control colonies, while in MN the HYG/SMR colonies had significantly fewer mites than either the Control or HYG colonies. In year two, again there were no differences in mites/adult bees in June, while by September; the HYG/SMR colonies had significantly fewer mites than either Control or HYG colonies. The levels of mites in brood were significantly lower in both the HYG and HYG/SMR colonies compared to the Control colonies in year one in both states. In year two, HYG/SMR colonies had significantly less mites in the brood compared to the Control colonies. Based on examination of infested brood, there were no measurable differences in mite reproductive success between the three groups.

Overall, the researchers concluded that, "HYG colonies had intermediate levels of mites on both

adult bees and in brood compared to the HYG/SMR and Control colonies, which shows that the addition of the SMR trait to the HYG lines did help lower mite levels." There is already considerable evidence that HYG bees are more resistant to both chalkbrood and American foulbrood than unselected lines of bees. This study showed that mite levels also can be reduced by the addition of the SMR trait into a HYG population, without a concomitant reduction in honey production or brood viability. Such a finding is welcome news, as it demonstrates that it is possible to combine desirable traits derived from various selection and breeding programs. As we enter a future with ever-diminishing supplies of "safe" miticides and ever-increasing reliance on selection and breeding, the ability to bring multiple genetic tools (i.e. resistance mechanisms) to bear on the mite problem will greatly enhance the likelihood of success.

One other important result pointed out by the authors was that that their study documented that it was possible to maintain the trait of hygienic behavior even under conditions of natural mating. The authors point out that the collaborating beekeepers in this experiment had reared daughters from HYG queen mothers (themselves maintained by instrumental insemination) for over six years at apiaries in southeastern Texas. After that amount of time, the local drone population contained high frequencies of genes responsible for the recessive hygienic trait and, thus, the beekeepers could successfully produce HYG queens through natural matings. This also raises another interesting point and one worthy of careful thought relative to potential other contributions to honey bee mating and stock "improvement." If we consider that this study showed how beekeepers can impact the genetics of a local drone pool...then what about stocks of bees currently being introduced into the United States from geographic regions where honey bees have had no historical exposure to mites? After 20 years of surviving "under the influence of mites," we might reasonably expect that the most highly susceptible genetic strains of bees in the U.S. have been eliminated or at least reduced in prevalence*. It may be worth noting that a significant influx of bees from mite-deprived locations (such as Australia for example) could have the unplanned genetic consequence to increase mite-susceptibility in U.S. populations, if such bees were used as a source of breeder queens or contributed significantly to drone mating pools in areas where commercial queens were being produced. BC

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Ibrahim, A., G.S. Reuter, M. Spivak. 2007. *Field trial of honey bee colonies bred for mechanisms of resistance against* Varroa destructor. Apidologie. 38: 67-76.

*One can argue that the notion that U.S. honey bee populations as a group have become less susceptible to *Varroa destructor* after 20 years of exposure is only "reasonable" in the absence of high levels of miticide use, because such a practice can allow highly mite-susceptible honey bees to persist. I suspect that within the U.S., we have bee populations that have had wide ranging histories of miticide "support." In fact, a paper by Tom Seeley in the same issue of Apidologie documents a renewed feral honey bee population living with *V. destructor* in upstate New York that itself may represent a new relationship between parasite and host. But that is a topic for another column...

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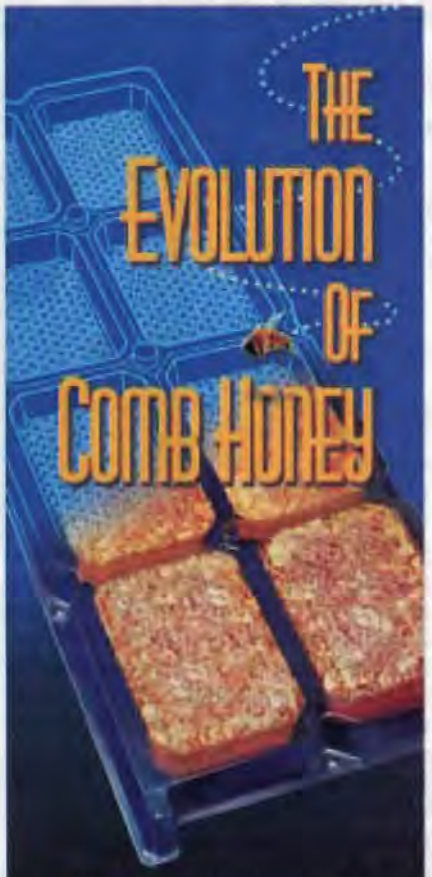

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In the first part of this series there were several instances where the phrase "our group" or something similar was mentioned. The idea for operating in a cooperative fashion has always seemed to me to be a good idea for small producers. The thought of giving up an ounce of independence, however, is completely foreign to almost everyone involved in any sort of agricultural enterprise – even when there are benefits to be gained from a cooperative effort. Being raised in a rural setting, and in a family that has depended on agriculture for their livelihood since coming to this continent, I have a great appreciation for the independence of the American farmer – and beekeeper. This being said, it has been frustrating for me to watch the loss of most small and mid-size farming operations over the past three decades. A lot of the same things can be seen happening to the beekeeping sector of agriculture as well. There are very few small to mid size beekeeping outfits that are self sustaining business ventures nowadays.

Our group of beekeepers began as a group of two. Both Gerald and I saw the necessity of hiring outside labor if we built our own little empires as stand-alone businesses. After a lot of thought and discussion on the subject of cooperatives, the conclusion was reached that a true cooperative was not the best fit for our situation. The idea was batted around for a year or so, until it was decided to combine our resources and play it by ear. Over the past four years three additional members have been added, with a fourth who is more a "collaborator" than a "cooperator." Each person in our group has their own strengths and weaknesses, and a set of rough guidelines have been put in place to take advantage of each person's abilities. In fact, the term "collaborators" may better apply to our group, as we have no "set-in-stone" obligations toward the group that must be met.

Over the past 15 years I have developed a good working relationship with several commercial beekeepers. These are not only people that raise queens, but also true commercial operators that depend on the bees for their entire living each year. Some of them are pollinators, some large honey producers, some are queen breeders. It is intriguing to get "inside" one of these bee businesses and observe the level of cooperation the large operators have with one another. There is a lot of sharing of resources among these folks. This is where the idea was formed to operate in a cooperative way, without being an actual "co-op."

By pooling our bees larger pollination contracts can be serviced; and by pooling our needs, quantity discounts can be taken advantage of. There are eight different tasks delegated to different persons or teams of persons: equipment manufacture/maintenance; queen production; honey harvesting/packing; feeding; moving bees for both pollination and to take advantage of honeyflows; making nucs and splits; hive inspection/evaluation; and purchasing/marketing. None of these tasks are more important than others, because all must be taken care of for the operation to run smoothly. For the major jobs, such as harvesting honey, moving bees, and making nucs, it is "all hands on deck." The other jobs are handled by one and sometimes two persons. All equipment and hives are owned individually, but used cooperatively. When honey is harvested it is packed in buckets and divided in proportion to the number of hives the person has. Most (but not all) individuals in our group market honey under their own label. There is also a lot of sharing of the workload when possible. Hoyt Adams usually assembles most of the wooden equipment, but in the Winter, when there is not a lot going on in the beeyard, he gets help – he might claim hindrance – with the assembly from some of us that are suffering from cabin fever. If the bees that are on pollination contracts need feeding, but the bees in the queen rearing hives also need to have feed put on them, David West is not expected to do all of the feeding. The person in charge of the queen yard will handle the feeding there. So even within our specific areas of responsibility there is a blurring of the lines between the jobs we perform.

Most of us had built a customer base long before beginning to work together, and we each brought that base to the group when we came together. Because of this conglomerate customer base, and because of our success in exploiting a sometimes overlooked avenue for marketing – making distributors out of loyal customers - the majority of our honey is sold at retail from our homes. We have, in effect, dozens of distributors of our honey. None are high volume, but all are active in moving some of the product. Our true marketing "executives" (I get a real laugh from seeing the word "executive" used in reference to any of the individuals in our group) are Hoyt Adams, Myrna Burchett, and Valerie Williams for honey products, David West for pollination, and Gerald Burchett and me for live bee sales. I act as the primary purchasing agent for the group, with backup from Richard Broyles. Richard, with assistance from Gerald and from me, is involved primarily with rearing queens. The one person in our group I have yet to mention is

also one of the most important, Paul Lacefield. Paul owns 16 hives, which he leaves at the disposal of the group to use for pollination, queen rearing, or honey production, whichever is most needed. The attributes Paul brings to the group are not so much associated with bees – as in having a vast knowledge of a particular area of beekeeping – but instead, are the willingness to put in a hard day's labor in the beeyard, of being ready and able to come home from his public job and extract and bottle honey into the wee hours of the morning. I have never seen a beekeeping operation that would not benefit from having a helper like Paul. It is really a time saver to have a laborer that is willing to act as "go-fer" when making splits or supering hives, and this is where Paul excels.

Hoyt Adams

The jobs that were formerly thought of as drudgery are now no longer dreaded nearly as much. When there is sufficient labor, tough jobs become exercises in teamwork . . . and almost fun. This year there will be around 500 hives managed by our "loose fitting" co-op.

Tax liability is on an individual basis. We operate on a pay-as-you-go system, using money to keep score. When lumber for hive bodies is purchased, the individual beekeeper pays for, and gets a receipt for, the number of supers needed. Consequently, when honey is divided among members, then sold under their label, it is their responsibility to report the income.

There are good, and bad, points to everything I suppose. The good points to our way of business are – more efficient use of time and labor, economy of scale purchasing, being better able to control the overall quality of all inputs to the business (queens in particular), marketing a more consistent product, and the camaraderie that is built within groups that work together for a common goal. The bad points are – the necessity of giving up a bit of independence for the group to work, the difficulty, sometimes, of dealing with the various work schedules of the members that hold public jobs, dealing with the stress that comes from being haunted by the nagging fear we might not be holding up our end of the bargain.

The last sentence in the preceding paragraph should give some insight into what really makes this system work for us. We conduct our activities relating to our bee business by a set of principles which we do not waver from. It is my belief that in order for a small co-op to work well as a business model, the right personalities must be involved. Not with just half or two-thirds of the members having the perfect personality, but all of the members. If only one member of our group developed a "me first" attitude, the entire group could collapse. It is also a must in a small group such as this that the members genuinely like each other. I am convinced that we are not unique to the world of beekeeping. That the success and enjoyment we have found in our work can be repeated anywhere the proper personalities are put together. The set of principles we use as guidelines for our group are summed up in the first two. (1)Before committing oneself and one's bees to the group, be determined to give more of yourself in labor and time than you could ever be compensated for. (2)Trust the other members implicitly to do their work to the best of their ability, and expect them to request help if they cannot complete the task before them.

All of us realize we are not going to retire in the Bahamas from the bee business. Our individual enterprises do however operate in the black, (if our personal business budget is not blown on toys and trinkets). There is a peace of mind in knowing if a queen is needed, one will be there for us; if some supers are needed, they will be there for the taking; if there are several dead hives this Spring, they will be full of bees by Summer; if the need is for strong backs for the honey harvest, they are ready to go to work. If there are a lot of dead bees, or some unknown problem, an answer will be found, if possible. This way each beekeeper, even if they have a hobbyist-sized number of hives, is not required to have The Hive and The Honeybee, and ABC and XYZ... committed to memory.

Here in western KY "porch time" is a premium product. By working together to achieve a common goal the amount of "porch time" for all of us has increased greatly . . . and that makes life much more enjoyable. BC

Kent Williams

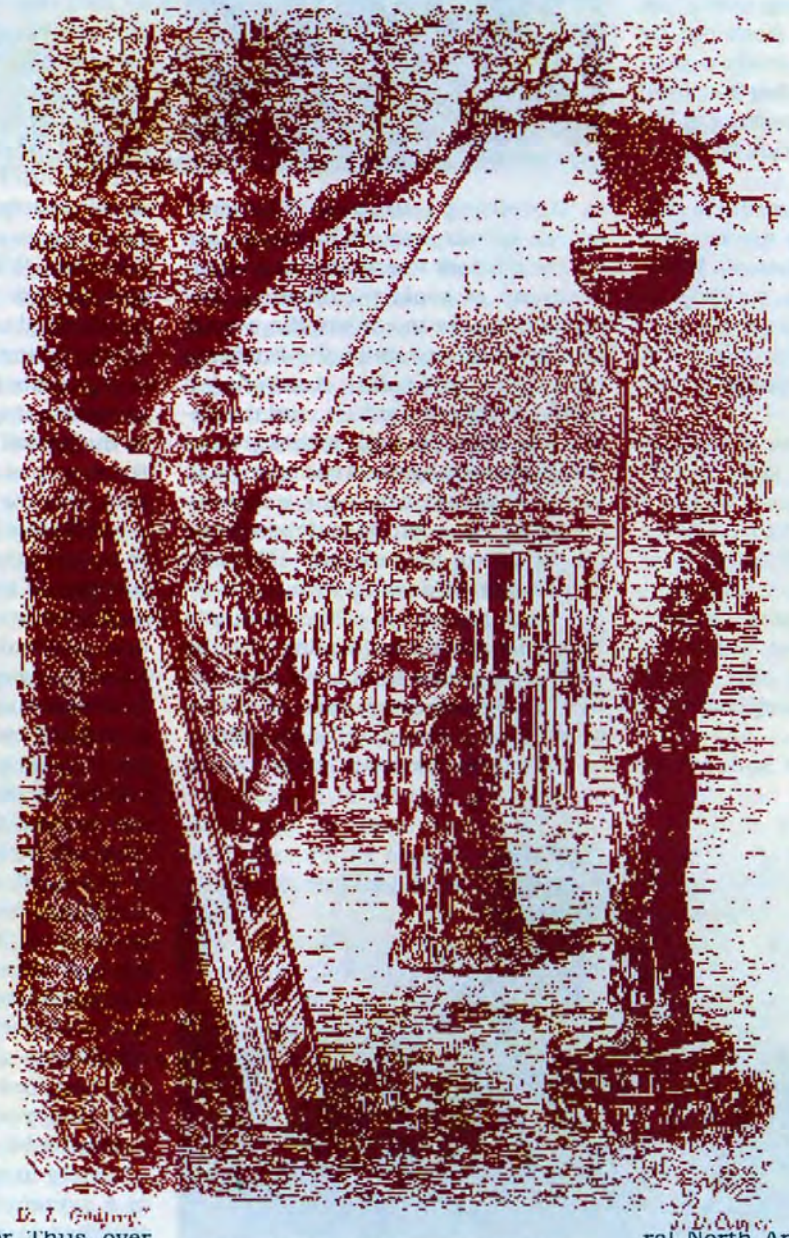
Kent Williams keeps bees in several places, but lives near Murray, Kentucky.

TANGING

The Biology Of Swarms & Making Noise

Al Avitabile

In a letter to *Bee Culture* in the July, 2006 issue, a writer recounts how honey bee swarms can be induced to terminate their flights and cluster by tapping, in this case, on the wooden handles of hoes. As far back as 2041 years ago, the Roman poet, Virgil, also a beekeeper, wrote in his Fourth Geogoric that by striking cymbals, an in-flight swarm will terminate its flight and form a stable cluster or return to its hive. Much later, laws were enacted in Europe that enabled beekeepers to claim their swarms should they cluster at a neighboring property, providing that at the onset of swarming, the beekeeper notified the neighbors by making noise, thus establishing that the flying swarm belonged to the pursuing beekeeper. Naturally the connection between the swarm clustering and the production of noise, again, reinforced the belief that noise was the agent responsible for causing the swarm to cluster. Thus, over the course of many centuries and continuing to the present time, there persists the idea that swarms will alight if one creates noise that travels aloft as sound waves. It is believed that these waves are somehow detected by flying bees and their effect results in the settling down of swarms.



From Modern bee-keeping, *originally published by the BBKA in 1880. Still available from The International Beekeeping Research Association. www.IBRA.org.uk*

Others with similar claims have indicated that they, too, have been successful in terminating swarm flight by creating noise upon spying a swarm on the wing. This process of noise-making to retrieve swarms is known as 'tanging' the bees. The purpose of getting swarms to terminate their flight is to capture them before they have fully escaped from the beekeeper's apiary.

The literature on bees and beekeeping not only describes the various gadgets for tanging, but also contains illustrations showing individuals tanging, and the subsequent alighting of the swarms. Over the passage of time, tanging instruments have also evolved, many reflecting the innovations of industrial progress of the time; from cymbals used by Virgil, to ringing bells, to tin or iron cooking pans with accompanying metal spoons (in rural North America, metal pans and spoons were commonly employed, both being readily accessible in open kitchens), to dust pans and spoons, to shotguns, to the watchman's rattle, and even to the horns of motorized vehicles. In 1977, while attending

a beekeepers' meeting in Canada, a beekeeper recounted his method of tanging bees. Upon arriving at one of his out apiaries in his pickup truck, if he happened to spy a swarm, he would honk the truck's horn and the swarm would alight.

In reviewing the anatomy of swarm behavior, the following events usually unfold: The queen(s), workers and drones emerge from their hive in what has been described as a somewhat chaotic fashion and take wing. The queen(s) and/or some workers alight on a nearby object, such as a tree branch. Workers expose their Nasonov glands and release a pheromone which attracts more bees and the queen if she did not settle out first. Over time, this aggregate of bees grows larger and larger, resulting in a stable swarm cluster. This sequence from exiting the hive to the formation of a swarm cluster often occurs within the vicinity of the beeyard, whether or not someone is banging on a pan or employing other sound-making devices. After the cluster is settled, scout bees leave the cluster and search for a cavity, usually of sufficient volume for the bees to construct ample comb in order to accommodate brood and stores of honey and pollen.

Therefore, after exiting the hive, an apparent prerequisite to searching for a homesite requires bees in most cases to curtail their flight and form a stable cluster while scouts search for an adequate homesite. This being the case, the production of noise as the bees are flying around after exiting the hive, is not the reason why the swarm ceases flight and clusters. In fact, the two events – the clustering of the bees and the production of noise, gets linked only because the swarm was going to alight *in spite of the noise.*

Now if the swarm fails to alight in response to a noise, the proponents of tanging might offer the following rationale: the noise-making started too early, or too late, or was too loud, or not loud enough. In fact, one advocate of tanging describes a set of conditions which must be met for tanging to work. Keyes suggests that one should discontinue tanging once the bees begin to cluster, and tanging should only commence when the queen has exited, otherwise, the noise might alarm her and she will remain in the hive. One can imagine having to position someone near the hive in order to signal the tanger when the queen has exited! Here again, proponents insist that should the tanging fail, it is not because the tanging doesn't work, but certain conditions need to be in place for tanging to be effective.

Also, one needs to ponder as to what evolutionary advantage it would be to a swarm to abort flight when it detects sound vibrations. Were vibrations possibly emitted by some pursuing predator that once evoked danger? What kind of predator was it, that by emitting noise, would compel a swarm to seek protection by settling out? Or was it some meteorological phenomenon like thunder, often a prelude to rain that might be the factor that induces swarms to abort flight?

If there were some credibility in connecting noise-making to swarm settling, would not some enterprising inventor by now have produced an apparatus that would be placed in apiaries during the swarm season? Such an apparatus would have the effect of containing swarm flights out of the general vicinity of beeyards, thus providing beekeepers with the opportunity of retrieving their bees.

Finally, if noise does cause bees to terminate flight, one should be able to go to the beeyard at anytime of the year, make noise, and see if bees flying in and out of their hives abort flight and initiate temporary mini-cluster formation.

In conclusion, we submit that there is no connection between tanging and swarm clustering. The phrase that describes this fallacy of linking two separate events together is *post-hoc, ergo propter hoc* (after this, therefore, because of this). The swarm discontinues its flight and clusters (*post hoc*) as a consequence of the production of sound (*ergo propter hoc*). BC

Al Avitabile is a Professor of Biology, retired, and co-author of The Beekeeper's Handbook.

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BEE'S FOREVER PLASTICS

You *Can* Do This At Home

Producing ROYAL JELLY

David Cramp

The magic!

To the general public, royal jelly is probably thought of as the most mysterious, rare and valuable of products of the honey bee. Roal Dahl's well known story in his 'Tales of the Unexpected' series about the father who fed his child exclusively on royal jelly eventually turning him into a bee (or at least a yellow & black striped hairy baby who buzzed) was almost believable, and so mysterious is this substance in the public's eye, it can perform miracles such as these. In fact in their minds, it is so full of nutrients, vitamins; special, almost magical properties that they are prepared to pay a huge price for even tiny amounts of it. You will often find that many people also know that a queen can live four or more years whereas a worker lasts at most four to six months. It is mainly the spectacular fertility and long life-span of the queen, exclusively fed on royal jelly, that has suggestively led people to believe that royal jelly produces similar effects in humans. Anything that is perceived to prolong life is eagerly seized upon – and highly paid for. If those bee farmers who collect and sell the valuable *clinically proven* antibiotic manuka honey from New Zealand could obtain the same price per kilo for their honey as those who produce the *unproven* royal jelly, they would be rich men and women indeed.

The reality

Unfortunately (or fortunately perhaps), eating royal jelly, or rubbing it into the skin will not make anyone younger or live for a thousand years. But if you can use it to supplement and support other diets, activities or medicines, it may have synergistic effects which cannot be explained by a list of compounds and their individual effects. The subject of royal jelly, its reported benefits in animal and human health and its use in apitherapy would require much more space than the scope of this article allows. But this can be easily researched on the web and both Apimondia **www.apimondia.org** and the American Apitherapy Society **www.apitherapy.org** have very informative sites for further advice. Although there is a body of research on royal jelly, scientific investigation into its health-promoting properties in humans has effectively been limited to its ability to lower blood cholesterol levels. But there is also plenty of circumstantial evidence that leads us to believe that royal jelly might be highly beneficial to mankind in other ways. What we do know is that it contains the eight essential amino acids, the full vitamin B complex, acetylcholine (a powerful neurostimulant), testosterone, insulin like peptides and an antibiotic component. However, whatever is claimed for royal jelly, it is clear that more thorough research is required and some rigorous clinical studies carried out before the definitive therapeutic benefits of this royal bee food are known. In the meantime, all we can truly say about the substance is that it is a viscous white liquid produced by worker bees as a food and that it contains a range of useful vitamins and minerals (as do a lot of food products), and that it won't do you any harm (unless you are allergic to any of the ingredients). If anyone knows of extensive clinical trials on the subject, please let me know.

Discarding larvae prior to harvest.

What function does it have in the colony? Why is it produced by bees?

The answer basically is that it is all about queen production, an issue so vital to the propagation of the bee species that in fact all bees other than the drones (who don't have a father) are destined to become queens. At first!

Did you know that? That there are two types of bee at the start? A drone and a queen. Later, a third is formed. A worker. It is a bit more complex than that but still, one of the questions often asked by new and not so new beekeepers is: How is a queen formed? And they should be asking, 'how is a worker bee formed?' because it is worth repeating that all female larvae are actually destined to be queens. Nurse bees interfere with the destiny of the vast majority of these potential queens by limiting their royal-jelly diet thereby turning them into sterile female workers instead. It is simply this lack of royal jelly at a certain stage in their development that creates workers. The rest of them stay as queens because the continued feeding of royal jelly stimulates the correct hormone production to fully develop their egg-producing organs. Recent research in Brazil has looked at when and how these organs develop for queens or don't develop for workers. The research found that all female larvae start off with the same reproductive equipment (and are otherwise genetically the same, too). The pertinent parts are the egg-producing ovarioles, long skinny subdivisions of the ovaries. To start with, larval workers and queens have the same number of ovarioles.

For the first 2.5 to three days, the situation persists. Worker and queen larvae mature in different cells but that makes little difference in their development. The important thing is that both get 100% royal jelly. So, they stay the same and are all on their way to queen-hood. But, on about day 2.5, nurse bees stop giving larval **workers** 100% royal-jelly food and give them a mixture of jelly, pollen, and honey instead. Those destined to become workers now get much less jelly than the queens and over the next 2.5 days, the number of 'worker' ovarioles dwindles.

Nurses continue to give larval queens only royal jelly and so by day five, workers and queens differ vastly in ovariole count. Then, both worker and queen larvae spin cocoons and pupate (undergo several changes to emerge as adult bees). Workers continue to reabsorb their ovarioles into their bodies through pupation. As emerging adults, workers have only about 10, whereas queens have over 100. With so few egg-producing ovarioles left, the larval workers largely lose the ability to reproduce.

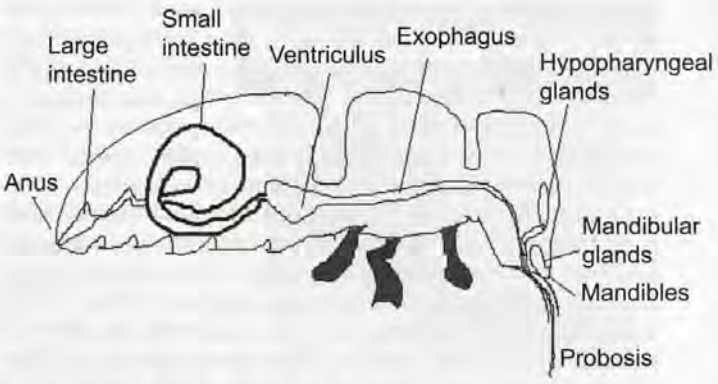
Royal jelly is a milky-white cream, strongly acid, rich in protein, sugars, vitamins, RNA, DNA, and fatty acids. How this jelly creates queens is connected with the production of an insect hormone. Royal jelly does its work through its effect on 'juvenile hormone'. This amazing hormone can, for example, keep caterpillars in the larval stage and prevent them from developing into adults. It puts them into an 'eternal youth' state and keeps them there.

It is likely that lots of royal jelly changes juvenile hormone levels in maturing larvae so that females fully develop their egg-producing organs. The jelly seems to influence hormone level so that workers (who don't get enough of jelly) fall into an 'eternal youth' state but queens (who get plenty) don't and therefore mature.

Where and how is Royal Jelly Produced in the colony?

The nurse bees are the royal jelly-producers and feeders as a normal part of all worker bee development. These nurse bees are young workers, usually around three to six days old. At this age, the worker bee has well developed glands that produce this brood food. The hypopharyngeal and mandibular glands from which the main components of royal jelly are formed, are located in the head of worker bees. (See Diagram).

Royal Jelly extractor.



Royal Jelly Production by Beekeepers

The main requirements for production are: a good site; hives bursting with bees; an effective disease monitoring plan; a good and well planned feeding regime including pattie food, and finally a workable and dedicated routine. Most beekeepers already have this set up and a change from honey production to jelly production can be easily accomplished. You just need to acquire the knowledge necessary to effectively produce royal jelly.

The production of royal jelly is not actually difficult and requires nothing in the way of expensive machinery, but it does require a sound knowledge and understanding of colony/hive dynamics that many of us overlook. As far as equipment is concerned, possibly the most expensive item of equipment would be the electric suction device designed to remove the jelly from the cells when required but manual ones can be purchased cheaply. (In many Asian countries, they remove the jelly with tiny wooden spoons at an incredible rate).

The commercial and the small scale production of royal jelly require a methodical approach, good organization and precise timing. Constant attendance is essential as one day off at the wrong time can eliminate two days of production. In the same way as with intensive queen rearing, a good feeding regime of very populous beehives must be instituted and carefully worked out and followed, and a set of procedures must be adhered to. Remember that in any intensive feeding regime, EFB can be a hidden problem. The parasitic nature of the bacteria can be masked by the over feeding so keep an eye out for this. By knowing the procedures and carrying out the methods correctly, especially when feeding, the production of royal jelly can be increased by up to 30% indicating that knowledge and technique are vital components of the production regime. The beekeeper is far more tied to a routine when producing jelly than when producing honey and any beekeeper deciding to take up this course should be prepared to adopt these procedures. But by doing this, it can be a very lucrative sideline or even a main occupation.

The beekeeper must be able to devote much more time than is commonly required for the production of other bee products. For a semi hobbyist 30 hive jelly producing outfit, a beekeeper should be able to work a 40 hour week with two days on and 1 day off. He or she will be looking after 30 jelly producing hives, 15 back up hives and 10 nucs. Obviously the hours are only worked in the season of about three months duration and each hive should be able to produce 10 grams of jelly every three days and with 30 producing hives a beekeeper should be

able to produce around 700 grams per week over a three month period. Using modern split plug lay cage systems available, an extra 20 hives could be operated working no more hours, because of time saved by not having to graft. This would then increase production to 1-1.2Kg per week with no extra effort. Look up the amount that people are willing to pay for 10 grams of royal jelly in your area or in the export arena, multiply by a hundred and then multiply the result by 12 (three months production), and you can then work out roughly what you can make in gross earnings. And if you can produce organic royal jelly, then those earnings will increase dramatically especially in the export market. This latter point is I believe important. Much of the world's supply of royal jelly comes from Asia, especially China, and production is large and difficult to compete with, but the trade in organic royal jelly which is very much in demand is small and it is here that the 'boutique' producer can make money. The organic product market is vast and booming and it is certainly worth checking out.

Post harvest storage

Having produced the jelly, storage of the product before sale and then packing the product are vital concerns of the beekeeper. There are several methods available and in fact none are too difficult for the average beekeeper to manage. Royal jelly can be sold in its fresh state, unprocessed except for being frozen or cooled, mixed with other products, or freeze-dried for further use in other preparations.

The fresh production and sale can be handled by most beekeepers since no special technology is required. In its unprocessed form it can also be included directly in many food and dietary supplements as well as medicine-like products or cosmetics.

For larger industrial-scale use, royal jelly is preferred in its freeze-dried form, because of easier handling and storing. Freeze-dried royal jelly can be included in the same products as the fresh form. (Many users however claim that freeze drying destroys some of the beneficial properties of royal jelly and there is evidence that if you feed it back to larvae after reconstitution, it doesn't work).

For storage purposes and subsequent definitions of freshness, international standards apply but to keep the substance fresh for one year, storage in a domestic freezer for one year at -10°C is recommended and in the fridge at -4°c for four months is indicated. Freeze drying of the product, does require a large amount of capital expenditure but would only be viable for large operators. Some producers include a 3% mix in with honey. This provides a tastier alternative when taking royal jelly especially for children, and the honey preserves the royal jelly but what effect does the honey have on the chemistry of the royal jelly? One further point is that if you are producing royal jelly as a food as opposed to cosmetic use, most countries have rigorous food production standards to comply with and you should take this into account in any planning. Some compliance costs can be high.

Composition of royal jelly per 100 g fresh material.

Component (units)	Average
Moisture (g)	66.8
pH 3.8	
Total carbohydrates (g)	11.6
Glucose (g)	4.6
Fructose (g)	4.5
Sucrose (g)	1.1
Trisaccharides (g)	0.3
Total protein (g)	12.3
Free amino acids (g) [isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine]	0.25
Lipids (g)	5.1
10-hydroxy-2-decenoic acid (g)	2.5
10-hydroxydecenoic acid (g)	1.2
Ash (g)	1.0
Potassium (mg)	491
Sodium (mg)	37
Magnesium (mg)	30
Calcium (mg)	26
Zinc (mg)	2.7
Vitamin B complex	
B1 Thiamine (mg)	0.4
B2 Riboflavin (mg)	1.4
B3 Niacin (mg)	4.3
B5 Pantothenic acid (mg)	13.2
B6 Pyridoxine (mg)	0.5
B7 Mesoinositol (mg)	10.0
B8 Biotin (mg)	0.2
B9 Folic acid (mcg)	30
Minor components	
Benzoic acid (mg)	1.0
Acetylcholine (mg)	10
Testosterone (mg)	22
Insulin	Trace

Abridged from Lakin (1993).

Royal jelly chemistry

For those interested the table below lists constituents that are present in significant amounts, or are considered to be of potential significance. About 3% of dried royal jelly remains unidentified, its properties unknown. Royal jelly contains two-thirds water, with the remainder rich in sugars, protein and lipids. It contains a large range of the vitamin B complex, although it lacks vitamins A, C and E. 10-hydroxy-2-decenoic acid and a protein, royalisin, are unique to royal jelly. Both are known to have antibacterial activity, with the former also having antifungal activity. Royalisin kills bacteria because of its ability to disintegrate bacterial membranes. The antibiotic components have properties similar to gramicidin and penicillin and so it can readily be seen that royal jelly does have potential which future research will no doubt uncover.

The Future

Royal jelly just might be the miracle product that many make it out to be, but we need proper, rigorous, clinical trials to tell us this. Despite this, people are still very much in awe of royal jelly and are still prepared to pay a lot of money for it, and this is where you come in. I believe that the high interest in royal jelly is not a fad and that the future stares us in the face. The use of natural alternatives to modern drugs is a rapidly rising phenomenon in Europe, especially, and such other countries as Japan – and the requirement for royal jelly is rising accordingly. Ally this with the onset of more research on the subject which I've no doubt will occur and

the production of more concrete information and results, and the future for the royal jelly producer cannot be more certain.

Conclusion

This article doesn't pretend to describe all of the properties and uses of royal jelly or instruct beekeepers how to produce or make a profit from it. It does, however, offer some food for thought for those interested in a fascinating, different and potentially profitable hobby or sideline. Whether you have one hive or a thousand or more, royal jelly production could be of interest to you. Why not try it? It could open up a whole new world of beekeeping for you. BC

There is an excellent book on the subject, Producing Royal Jelly *by Ron van Toor. It is a fully illustrated guide that shows both commercial and hobby beekeepers how to produce Royal jelly from one hive or a thousand. ISBN: 0-473-11177-2. Published by Bassdrum Books Ltd. (NZ). www.bassdrumbooks.com*

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Hello Friends,

April is national poetry month. To celebrate, send us your bee poems and we'll send you a prize!

Bee B. Queen

Poem for a prize?

What's Buzzing?

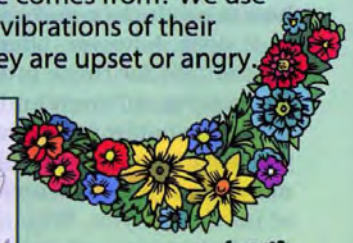
Do you ever wonder where the buzz of a bee comes from? We use our voice to make sounds. The bees use the vibrations of their wings. They make different sounds when they are upset or angry.

The Bee

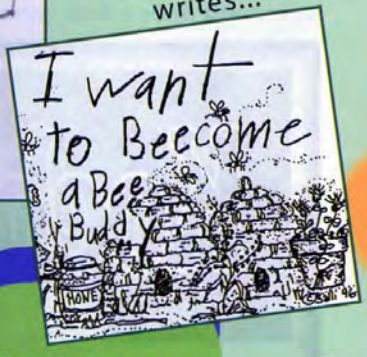
A bee is such a little thing,
But it can surely sting!
Better not bother it,
Or you will have a fit!
Beeingly,
A Bee Buddie, Judith

Judith, age 9 from Mill Creek, PA

Queen Bee by Ricky, age 10 from Portsmouth, Ohio.



Elena, age 8 from Centerville, MN writes...



Tongue Twister

Flying friends find flowers for food.

Spring Dance Fever

Honey bees use sound and odors along with dances to tell the other bees where to find flowers. The nectar and pollen in the flowers are food for the bees.

Follow the Dots Dance

Connect the dots to follow the dance of the bees.

Round Dance

If the flowers are close to the hive, the bees do the round dance. With short quick steps they run in circles to both the left and right.

Waggle Dance

If the waggle dance. The dance will tell the bees what direction and how far to fly to find food. While moving in a straight line the bee wiggles her body, especially her abdomen. She turns right, circles, comes around again, then turns left to make what is almost a figure eight.

1973, Frisch w Prize for t social anim espec explana "dance la be

www.beeculture.com

uzz sometime.

... Bee kid's corner

Produced by Kim Lehman -www.beeladyprograms.com
April 2007

The Buzz About Bees

In English, we imitate the sound of the bees by saying "Bzzzz". What about bee sounds in other languages? Try these!

Hebrew: ***zum zum zum...*** Japanese: ***bunbun...***

Arabic (Algeria): ***bezzz...***

Afrikaans: ***zoem-zoem...***

German: ***summ summ...***

Korean: ***boong-boongs (wing-wing)...***

Bengali: ***bhonbhon...***

Italian and Croatian: ***zzzzzz...***

Russian: ***zhzhzh...*** Turkish ***vzzzz vzz...***

Esperanto: ***...***

Window garden art by Ryanna and Ruby from Austin, TX.

Window Garden

Create an indoor garden with these easy-to-make window decorations.

You will need:
- Clear plastic vinyl (use old shower curtains or buy at a fabric store)
- Permanent markers
- Scissors

Instructions:
- Cut the vinyl into smaller pieces.
- Color bees, flowers, butterflies and anything else you want in your garden.
- Place on windows with the non-colored side against the glass. If the pieces do not stick to the glass, dampen with a wet paper towel.

(Answers: Across - 3. supers, 4. smoker, 5. veil Down- 1. queen, 2. frames, 4. suit)

Beekeeping crossword puzzle

Across

Down

In Karl von ...on a Nobel ...the study of ...nal behavior, ...ially the ...tion of the ...nguage" of ...ees.

Send all questions, photos and artwork to: beebuddies@hotmail.com or mail to the above address.

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Send two self addressed stamped envelopes and the following information to: Bee Buddies, PO Box 2743, Austin, TX 78768. We will send you a membership card, a prize and a birthday surprise!

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Age: _____ Birthday: _____

E-mail (optional) _____

COLONY COLLAPSE DISORDER (CCD)

Malcolm Sanford

Like so many things there's good and bad news about the phenomenon originally called "Fall dwindle disease," now renamed "colony collapse disorder," or CCD. The bad news is that it appears to be a continuing situation with little short-term solution in the offing. The good news is that it has caught the attention of the press, and is responsible for an increased attention about honey bees and their pollination potential.

In an effort to understand the conditions currently faced by the industry with reference to CCD, The Foundation for the Preservation of Honey Bees sponsored a workshop on the disorder in conjunction with the USDA Agricultural Research Service's review of National Program 305, which kicks off a new five-year work cycle. The bee labs are an integral part of NP305. Though not formally linked, the fact that these two events occurred back-to-back at the same location (Suart, Florida) appears to be fortunate. Industry leaders and USDA researchers were able to compare notes, and the disorder made the formal list of things that NP 305, and thus the labs, will be working on for the next half decade.

A Pennsylvania/Florida beekeeper, David Hackenberg, is being noted by press releases as most affected by the phenomenon (Fall dwindle), and in this role has now been quoted all over the globe, as the story continues to take on a "life of its own." Dr. Jerry Bromenshenk of Bee Alert Technology, Inc. and faculty member at the University of Montana, laid out the reason for the name in a posting to the Bee-L Discussion list, February 16, 2007:

"CCD was a name carefully chosen to not imply anything more than we know. The initial Fall Dwindling Disease terminology had three problems – our surveys indicate that the problem was not confined to the Fall, nor was it a dwindle in terms of taking several weeks of months to play out, and it may or may not be a disease. CCD means Colony (the effects are at the colony level), Collapse (sudden, rapid reduction of population sizes – a couple of weeks, maybe even a couple of days), and Disorder (since it may or may not be a disease). CCD may be something new – the nosema seen in Spain, the neonictotinics (imidacloprid) used in France, a new virus, a fungus, the result of throwing everything but the kitchen sink into a hive, etc., or it may be something old – a variation of mites and PMS (parasitic mite syndrome), whatever went through colonies in Louisiana and Texas in the 60s, etc."[1]

The Foundation for the Preservation of Honey Bees is a 501 (c) 3 entity with the mission "to preserve and protect honey bees to ensure a quality food supply and environment."[2] Under its objectives are several pertaining to beekeeping, the reason that it organized the workshop. Thus, it assembled in Florida a diverse array of industry leaders, including representatives of the Apiary Inspectors of America, American Beekeeping Federation, American Honey Producers Association, land-grant colleges (Pennsylvania State University, North Carolina State University), American Association of Professional Apiculturists, Eastern Apicultural Society, and USDA's Agricultural Research Service (Beltsville, MD and other bee laboratories).

Several affected beekeepers at the meeting, including Mr. Hackenberg, described a variety of symptoms characteristic of CCD, but others reported they were not experiencing more than "normal" colony loss. However, a few of those not affected have observed colonies of colleagues collapse quickly for no apparent reason and remain nervous. One operation lost 800 of its 1400 hives and another saw 400 colonies reduced to 10 in short order. Enough beekeepers have been affected, therefore, that the disorder has resulted in its own research group. The CCD Working Group consists of a number of researchers who have agreed to share information, establish standardized sampling procedures, and develop other agreements with respect to citing, publishing and reporting their research. So far, the Group has defined the symptoms of CCD as follows:

1. In collapsed colonies, complete absence of adult bees with no or little build up of dead bees inside or in front of hives; capped brood present; honey and bee bread is not robbed by bees and attack by wax moth and small hive beetle is noticeably delayed.

2. In actively collapsing colonies, not enough workforce to maintain brood present; only young adult bees and queen present, cluster reluctant to consume provided sugar (carbohydrate) or protein supplement.

Reports from the Working Group at the workshop consisted of discussions about the historical context of this kind of phenomenon (disappearing disease), relationship to other diseases and pests, sampling, virus and pathogen screening and comb testing. At least one "organic" beekeeper with new equipment has reported the disorder, leaving in doubt concerns that pesticides employed by beekeepers for mite and beetle control are a cause. Affected colonies also appeared to have passed on the disorder when stacked on healthy hives, suggesting that it might be communicable. Although the workshop produced no concrete recommendations for bee managers at the present time, it was strongly hinted that prudent ones not mix affected equipment or hives with healthy ones until more is known and carefully consider a preven-

tative feeding program of fumagillin for nosema control.

Perhaps the person who has seen the most colonies with CCD is Dr. Bromenshenk, quoted elsewhere in this article, beginning with the Midwest in the Spring of 2006. He reported it appeared to have spread from there to the Southeast and then Central states last Summer, and now is reported in the far West. About 24 states in total have been affected. A major concern was the status of honey bee colonies in California almond groves. Another is that there is simply not enough information for the Working Group to go by in investigating the situation. To this end Dr. Bromenshenk's company, Bee Alert Technology, Inc., has mounted a World Wide Web survey to collect data on the disorder.[3] Beekeepers are urged to cooperate in this survey. The specific information they provide will remain confidential and will become an important addition to the studies.

Funding remains an issue. The Florida State Beekeepers Association ($6,000), Tampa Bay Beekeepers Association ($1,000), Eastern Apicultural Society ($5,000), and The National Honey Board ($58,000) have all committed to support this research. A range of estimates determined at the workshop indicated this course of study might require up to $500,000. A final concern is the large number of requests from the press. Again, the publicity could be a good thing, but beekeepers are urged not to provide "off the cuff" remarks to reporters. One strategy is to steer reporters away from the topic and focus on the exciting life of the honey bee and its historical value to humanity. There is concern that often the topic of safety of honey in human nutrition comes up when CCD is discussed. Any questions about honey quality should be directed to the National Honey Board.[4] Updates about CCD will continue to be posted at the Mid-Atlantic Apiculture Research and Education Consortium (MAAREC) Web site.[5] BC

Dr. Sanford is a former Extension Specialist in apiculture at the University of Florida.

References:
1. Bee-L Discussion List Archive, accessed February 23, 2007 http://listserv.albany.edu:8080/cgi-bin/wa?A2=ind0702c&L=bee-l&T=0&P=4806.
2. Foundation for the Preservation of Honey Bees, Inc. Web Site, accessed February 23, 2007 http://www.honeybeepreservation.org/
3. Bee Alert Technology, Inc Web Site, accessed February 23, 2007.http://beealert.blackfoot.net/~beealert/surveys/index.php
4. National Honey Board Web Site, accessed February 23, 2007 http://honey.com/.
5. Mid-Atlantic Apiculture Research and Extension Consortitum Web Site, accessed February 23, 2007 http://maarec.cas.psu.edu/index.html.

If your organization is interested in helping fund these studies, you can make donations to:

1) Project Apis M.
1750 Dayton Road
Chico, CA 95928
Att: CCD Working Group

or

2) Bee Alert Technologies
1620 Roger Street, Suite #1
Missoula, MT 95802

or

3) Maryann Frazier
Att: CCD Working Group
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NAKED COMBS EMPTY SPACES

We are the hedgerow hive on the north. April is kind . . . and cruel.

Larry Connor

Day 1

The long awaited day of equal dark and light came and went almost a brood cycle ago, and ever since we have had rapid shifts of uncollectible abundance and near starvation. The combs are not as empty as they were, but we are still surrounded by the vast cavernous spaces devoid of honey, pollen, or young ones. The smell of the empty comb fills our minds and drives us to work harder than any of us have ever worked.

The frame of honey the human put on the edge of the nest is empty, and has been for some time. If she were to visit us today, something she has not done since the honey was added, she would find us confined to just to two of the combs she calls frames. Our numbers have dwindled dramatically, and our full effort is going toward the young ones, eating as much honey as we can to make our little cluster warm so the young ones are warm and healthy. We have expanded the brood nest outside the point where we are able to protect it on cold days and even colder nights. Until we are able to spend the night without going into cluster we will be constantly risking the loss of the young ones in cells outside the zone of tight clustering. We must take that chance, and if we loose some of the young ones we must remove the dead remains from the cells so that the queen can replace the dead with the new.

Our loss of hive mates has been great. Old foragers from the previous season died long ago during the middle of Winter, and even those who never raised brood until the days began to lengthen now fall from the cluster or fail to return from a foraging trip. We finally have a substantial center of emergence of the young ones, there the newest members of the hive are stimulated to clean and polish their own cells and feed on the precious pollen the foragers bring to the brood nest. Then they will feed the young ones the rich food they secrete. Many of us still try to do this, but our bodies are tired and we are weak; the food we consumed long ago has already been given to the production of the bees that are now emerging. Instead we guard the hive, carry out the dead members that remain at the bottom of the nest, and forage for food and fresh water.

While the supply of food in the flowers is abundant, our smallness limits us because we cannot gather it all while it is present. In other seasons we had many more of us at this time of the year. Those bees covered all the brood combs and were able to collect any food they could find in the neighborhood and beyond. But not us, we are on only a portion of two combs, and we work, struggle as we can, to expand the nest size with increasing new members.

In our need for food, some have collected dust from the food put out for animals and birds. Others have sampled sweet wood cut by humans into fine particles. When these bees arrive at the hive we too are excited, but the nurse bees are not able to make food from these items, and become sick from feeding from it. They must fly many times to keep themselves healthy.

There was pollen abundance from the elm trees, but during the days the elms were showing their inconspicuous flowers it was cold and rainy. We could only bring a small amount into the hive before we could no longer fly.

There is nectar and pollen of the maples of the swamps and wetlands. The bright orange maple flowers attract us, so impressive against the bright blue sky, but the cool winds blow hard and all day, and the only foragers with returning loads of food from maple were the few that found trees in protected locations. In the areas around the human dwelling we collect flowers exotic and abundant with pollen. The crocuses they planted all around the colonies are attractive and provide all the signals that they are offering food for us, and they bloom as soon as the temperature allows. Sometimes we will battle for food from these short-lived flowers.

So much abundance, yet there are so few of us to collect it on the few days it is not cold, or snowy, or rainy. Or windy, blasting from different directions, at times bring in warmth and other times bringing in the cold. Some work from the east, driving in fog to restrict our flights for long times of the day. We know these things have happened before and we must take every matter into balance so we are able to keep the young ones growing and more of us emerge and the colony grows in size.

Day 2

It is no longer quiet in the colony, the long quiet period of Winter inactivity of the cluster and the spell that hangs over us has finally been broken. There are the soft sounds of honey being eaten by the nurse bees, and even a few bees work to ripen the precious drops of nectar the field bees collected the previous day. They work carefully, taking a small amount of nectar from their insides and expose it to the warm of the air in the hive by holding it to the warm, open air. The nectar becomes thicker as they repeat this process, hour after hour, and then they place the half-nectar half-honey into cells where it is available for the nurse bees to consume to make food for the young ones. This energy food will not be sealed over, but kept for the feeding of the new ones that we see increasing as the conditions improve.

Our nurse bees need pollen, and prefer the fresh Spring pollen to the old, stale bee-bread from last season. The pollen foragers return to the hive

Those that have perished lie on the floor, awaiting warmer weather so we can move them away.

Our queen lays eggs, but not so many as she can.

New Pollen! How we love new pollen!

with pollen on their back legs and find cells in or around the brood nest and remove the pollen with a sharp kick with the legs. They leave the pellets in the cell, and the house bees process the pollen and make it into brood food. When there is a shortage of pollen the nurse bees feed on the pellets themselves. But the house bees prefer they wait until they have added contents from their stomachs and process the pollen into food the nurse bees should be eating. The pollen pellets are softened by chewing and following the addition of honey, the house bees push the pollen into the corners of the cell with their heads. Our heads are the same angle as the angle of the cell, so we use the tool ideal to push the pollen into cells so we can increase the storage of the growth food in the cells.

As we expand our comb filled with the young ones we consume the pollen in the cells and either eat or move the old honey stored in the cells. We were working on an area of last year's clover pollen in a few cells of the comb and we are stimulated by this unexpected taste and odor so early in the season. Too quickly every trace of the pollen is gone, and the cells are polished and the queen is laying eggs into them. As the young ones emerge we are able to expand our nest just a little bit more, day-by-day, hour-by-hour. There are days when no young ones emerge. Not one. We remember a brood cycle ago when we had such cold weather that we could not expand the nest, and the queen had been on light rations.

Now the queen is producing eggs at a high rate, although not as high as she could, or as high as we want if we were a larger colony. We rely on the power of the numbers, growing each day, our numbers building in all stages, more young ones, more newly emerged bees. The queen is groomed and fed many times each hour as she rests from laying eggs. She will not put an egg into the cells until they are cleaned of the previous material housed there. It may have been a young one that has just emerged from the cell, or it may be one of the precious cells where the clover pollen was stored. All traces must be eaten, the cell brought to a polish, and coated with the secretions of our tongues that attract the queen to put eggs there. She can do no cleaning herself. She is unable.

Day 3

Wet snow covers the crocuses and clings to the maple flowers. It is icy and barren and we are unable to leave the hive. Now the sky is clear and bright, but the wind blows cold. It has been cold all night, and we sense it will remain so for some time. The young ones that have emerged know to join us in the cluster and to care for the brood in the center. We have abandoned the small young ones on the edge of the nest. Some may make it because they are resistant to the cold for short periods of time, but the larger young ones are less so, and may not last.

There is little we can do but remain quiet and listen to the sound of the nurse bees and the young ones during feeding. We move slowly, since we are needed to generate heat but cannot consume too much or we will waste our supply.

Day 4

The human opened the hive today while it was too cold. We were in a tight cluster when she pulled out combs and looked at us and showed them to other humans. The queen was threatened as they sought to find her. Such foolish ways! The human should know that the queen is in the hive if the young ones are there in the comb, especially the very tiny ones. Perhaps this human cannot see the tiny young ones. Some of our guard bees were flying in her face, and several stung her on her hands. Then she stopped exposing the combs to the cold air and

returned them to their place. She put some combs back in the wrong order, and we now have a frame of honey that separates the two combs containing young. We now face the huge task of moving honey and pollen from our brood area. Did she divide our tiny cluster like this on purpose?

But then! She put the board on top of the hive that has the hole, and over that she placed a large container of sugar in water. It is still hot, and the heat will last for hours and help us with the rearrangement of the comb that was misplaced. Bees that had been inactive are now processing the sugar water in the container, sucking out the sweetness as quickly as they are able. If there were more of us we could empty the container in a few days, but we are still so few that it will take a week or more. But if the weather warms, we will be able to concentrate on collecting the pollen from the flowers. Soon many new plants will offer their flowers. About one and a half brood cycles after the day of equal light and dark we can expect many flowers to appear. The first of the dandelions will be found, and there will be flowers in the human's gardens. Maybe some of the first tree fruit will flower, the apricots and the cherries, and we will be able to gather the food efficiently and put it into good use producing the young ones. In a brood cycle we will have thousands of new bees and will be able to cover many combs in the human's hive. Then, and only then, will we consider the making the first of the males to be produced in the comb. Until now we have been a family of one mother and many sisters.

We are the hedgerow hive on the north. Our queen is from a swarm cell from the middle colony, and gave for us by the human to grow into a new hive. There are 18 fathers in our family, and we are blessed by this great diversity. We need the skills these fathers offer if we are to grow and prosper and do what we need to do, what all bee families need to do – we must swarm. We must replace the colony that we came from, for the middle colony died when the cold and snow returned. They died with their heads in the cells, their young ones eaten for survival. They were weaker than we were. It is our nature to swarm and occupy their nest. BC

The bright Maple flowers are finally here.

When not thinking about what, if anything, bees think about, Dr. Larry Connor is thinking about sex, Bee Sex that is, his next book due out whenever he finishes it. Feel welcome to interfere his thoughts and writing by sending email at ebeebooks@aol.com.

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WATCH OUT FOR THESE KILLER BEES IN YOUR BEEYARD

Dick Marron

An old TV ad said, "Don't mess with mother nature." I think it had something to do with butter or margarine. Anyone remember it? No matter, but you may know that she can be that thing that rhymes with rich. And, like any woman, she can be smooth on the surface but capable of surprising rants. We speak of the sea as a "she" and we refer to a ship as "she." These two "shes" conspired together against me once. I crossed the ocean in a troopship on the North-Atlantic in winter. It must have taken them a week to hose the vomit out of the bilge. Consider: One week, five thousand guys and one long storm.

Later I experienced a storm on the water from a small sailboat. In another year I saw what a "whiteout" was like. You had to be there! Picture a blizzard with a 60 mph wind. I set myself on fire once messing with an old one-cylinder engine. (Fire is nature, right?)And I've been in a cloud of robbing bees in a thousand-hive apiary. I also played with some AHB type bees. When you confront a force of nature it is a truly humbling experience.

So, I'm no chicken. BUT... I'm going to be a lot more careful where I step when I visit the south. There exists something down there that rocks me. African Honey Bees move over! *The yellowjackets are coming!* Giant nests of these less than friendly creatures are being found in Alabama, Georgia and South Carolina. Have you heard about this? These nests contain multiple queens and from 100,000 to 250,000 workers. The largest, found in South Carolina, may have had a hundred queens. They are the size of a small car (the nests, not the queens) or can occupy a 30 foot long cavity. Now, this qualifies as a force of nature. There's a picture of a nest in a '55 Chevy and they filled it.

Silly me. Being from the north, I thought all yellowjackets were underground. Not so, they make these open-air paper nests too. (Up here in CT, that's more likely to be a hornet's nest). Actually there are two kinds of yellowjackets and a couple of black and white models. Up to now the yellow fellows normally put together a colony of about 3,000. You could fit them in a basketball. One queen was sufficient. It seems that several things may be happening.

1. Workers, which normally die in the Winter, are living into the next season.
2. Queens, normally solitary, have learned to cooperate and tolerate fertile sisters in the nest.
3. Mother Nature is angry about something.

The "something" may be global warming. We can all be sure Mom Nature glares a little when she thinks about that. Alabama was 6° warmer than normal last Winter. The thought is that the mild winter has changed the behavior of this species. (I didn't know Alabama had any other kind of Winters). If I remember right, these predators are meat-seekers for brood food, but crave carbohydrates

for adult food. I've seen them swarm a deer carcass in Montana where they are called "meat bees." They have a lot of them there.

OK, now I have it. The lonely queen that survived the Winter hidden in debris lays a few eggs and starts a new colony. The larvae, as with honey bees, require protein. Unlike our bees they are meat eaters. Pollen won't do it. The caterpillars and other insects take a hit here. These hunting adults actually require carbs (Nectar, old coke cans) for their own fuel. When brood rearing slows in the Fall the emphasis is on sweets and they show up uninvited at our picnics, looking for lunch.

A simple change like queens suddenly tolerating each other, and we have what amounts to a new species. Beekeepers will know that this could be a small change in the molecules that make up a queens pheromone. Perhaps only one extra electron in the formula and the well ordered universe of the species is altered.

The media tends to hype this sort of thing to make a good story. I'm doing it too. I asked lead researcher Dr Charles Ray* just how unusual all this was. He was kind enough to reply:

"I am still trying to provide a definite link to the warm Winter we had and the sudden appearance of these perennial nests."

A previous researcher has written that perennial nests are common in the Glades area of south Florida. I talked to one professional wasp collector in South Florida and he also indicated perennial nests are relatively common there. They have occasionally been found in southern California and some other western states. Perennial nests are also found in Hawaii, New Zealand, Australia, and some countries around the Mediterranean. Again most of these in areas with mild Winters. In Alabama they are infrequent, or at least they have been. The Alabama Cooperative Extension Service representative in Covington County (borders Florida) indicated he sees one every two or three years. He is sure they saw at least 25 this past year in Covington county and he thinks the total number was more like 50.

"I have records of at least 80 nests and I am sure there were many more. We saw them as far north as Talladega, Alabama (Talladega is near Birmingham). We also had a tropical scale insect overwinter out-of-doors in two of our southern counties, something we had never recorded before."

Looking at newspaper reports, there seems to be sporadic reports but nothing like this past year. In summary, the number and northern extent of these nests is what was extraordinary.

A neighbor like this near your apiary could certainly do some damage. When they got tired of eating your bees they could just finish off with a honey dessert. The almond growers are probably wondering how these guys would work as pollinators. While they do visit flowers they don't pollinate much, mostly because they have no fuzz to hold the pollen. Beekeeping as we know it could be changing. Imagine what would happen if Mother Nature really got mad?

A nest the size I'm talking about could probably take down a horse.

I have to stop writing now. I'm starting to scare myself again! BC

Dr. Clarence H.Collison, Head of the dept of Entomology and Plant Pathology at MS State University, consulted with me on the bad habits of Yellowjackets. You'll know him as the guy in Bee Culture *magazine with all the tough questions. Thanks Clarence.*

**Dr Charles Ray, Research Fellow, Entomology and Plant Pathology, Auburn University; was kind enough to grant one more interview to me after the many others he gave to reporters. He is the taker of .pictures. Thanks Charles.*

Dick Marron is a retired psychologist, living in a beeyard in Connecticut.

A FRESH LOOK AT MANAGEMENT STYLE

James E. Tew

As of March my tally of Winter-killed colonies is still unknown, but it will be high. I can't even blame Colony Collapse Disorder (CCD) as the culprit. My colonies starved due to the complete absence of a nectar flow last Spring and Fall. The cost of replacement bees will be high, and they will probably be difficult to get. If ever management of my surviving colonies was important, it will be this Spring season.

Putting everything back on the table

We routinely discuss the important contributions that our bees make to agriculture and the environment – and they are valid, serious contributions. Interestingly though, much of that discussion is made by people who keep bees strictly for enjoyment, having no hope of financial gain for having kept bees. Ergo, beekeeping should be enjoyable and rewarding for all of us. Well, is it?

Over the years in our efforts to make beekeeping productive and pleasant, some management schemes have been employed but then have passed from favor. Others linger. I want to put all possible management factors back on beekeeping's Management Table for discussion. Plus I want to add some concepts that have not routinely been on the table before. Here's some thoughts.

Events happening to our colonies in the Spring will affect them during the following Winter. Should we reconsider Winter-packing our colonies? Are any of you wintering your bees indoors? Is corn syrup still the darling feed of beekeepingdom or is it causing more harm than we want to admit. Can we still split, requeen, drug, and relocate bees thousands of miles away and still expect those colonies to automatically thrive – just because there are food sources available? How about nutrition – primarily trace elements and minerals. Any chance that bees are not always getting a balanced diet even though they are foraging on abundant floral sources? Should I be giving my bees a multi-complex vitamin supplement? Should I be prepared to feed supplemental pollen and sugar throughout the warm months? Will that contaminate my honey? Winter feeding is nigh impossible. Should I use chemicals more or use them less? How long can I reuse my combs?

Clearly, when all possible management schemes are considered, it fills a big discussion table.

"Beekeeper" management

All of us have varying beekeeper abilities and skills. I suggest that successful beehive management is a combination of experience, luck, and "feel." The contributions of experience and luck are obvious, but the "feel" characteristic is vague, but none-the-less real. Maybe" feel" (or intuition) is nothing more than specialized experience. When have you moved enough bees and brood to make a successful split? When it *feels* right. When does a colony have enough food stores to survive the upcoming Winter? When it *feels* right. That queen you just released on the comb – is she going to be okay? I *feel* like she will be. Like many other pursuits, beekeeping is begun as a craft and grows to become something akin to an art. Experience and good luck are critical components of a management system. The intuition component is last to show up and it comes along slowly and deliberately.

Just a few decades ago, a beekeeper could have considerably more colonies than he or she could manage. We all know the beehives close to home got more management than those in more distant yards, but in general all colonies were okay. Not today. Neglected colonies will soon be dead colonies. How many colonies should you have? I can't answer that for you, but I know what my number is. I can honestly work about 24-26 colonies per day. I know fulltime beekeepers can work hundreds per day, but that is not my life. I work bees alone. I load the truck with equipment. Smokers, fuel, matches, hive tools, mite strips, wash water, empty buckets, cell phones – I alone, load it all. I fuel the truck up. I drive. I open the gate – and then I close it. I jockey the truck into the yard and I light the smoker – then the bee suit is put on. Before I ever open the first hive I could justify a rest break. Then heavy hives are broken apart and decisions are made. Robbing, drifting, crushed bees, aching back, are all challenges. After a short lunch, it's back to the beehives. By 3:00, I stumble more and am clearly tired. The quality of my late afternoon management probably does not equal the quality of my morning hive management. Then load it all up, leave the yard and put it away. This discussion is dragging on. Then, for whatever reason, I can't come out the next day. My schedule drags on. I can't get back out for several days. Then when I can go out, it rains. I'll do it later. Clearly, the last colonies to be managed get short shrift. Ultimately, I could probably effectively manage about 40 hives – not the 80 I went into Winter with. As beekeepers you need to match your abilities with your skill level and your personal schedule to derive the number of hives you can manage properly.

Colony stress

Stress management is in vogue – both in our lives and in our beehives. Food availability, water availability, diseases, pests, high and low

Is this yard good for the bees or for the beekeeper?

seasonal temperatures, opened hives, nearness of hives to one another, moving hives to new locations, and time-honored pesticide exposures, are all common colony stressors. Whatever you do to manage your colonies should be more helpful than hurtful. Bees are NOT happy to have you invade their hive – even if they are calm. Should we really have as many as 30 to 40 colonies in one yard? Drifting and robbing are normal colony behaviors – right? Maybe not. Identical white colonies, sitting in neat rows, containing 20 perfect frames are our contrivances. Such high numbers of bee nests, stationed so closely, on abnormally straight combs, are not found in nature. How much stress is unintentionally caused by our efforts to make beekeeping more efficient for humans by putting bee colonies in aberrant situations? Sorry, but I don't know, but I do know this – nothing can much more abnormal for beehives than being loaded onto the back of truck under an flight-restricting net and moved hundreds of miles.

But my stress reduction list is submitted for use in an ideal world. Obviously, we can't get away from all stress and neither can our bees. As beekeepers, we should encourage good stress (e.g. a strong colony in a strong nectar flow) and help colonies deal with bad stress (e.g. a weak colony in a weak nectar flow.) Some are wondering where I am going with this thought. Consider the real value of your management tasks, perform them, get out of the colony, and then leave the colony alone. Every management task, in one way or the other, is stressful for the colony. I doubt that bees are ever happy to have us visit.

Quality time in the hive

Therefore, our time spent actually in the hive should be quality time. We know what we need to do and we should be prepared to do it. We should not just be tinkering and bumping around with the hive open and bees disrupted. Are we a bit like space shuttle pilots who train for ten years to take a three-day flight? I suspect we as beekeepers should spend the majority of our time reading, talking, and thinking about our bee management rather than actually delving into the hives, just to, *"check things out."*

Management preparation

I suggest you prepare yourself in the following areas: (1) Disease and pest recognition, (2) Queen management, (3) Seasonal cycles (both bee and plant) and, (4) Biology (both bee and plant). Having a background in these common areas will imbue you with the ability to make informed and prompt decisions, thereby eliminating another hive-opening event the next day. The primary decisions you will be making will pertain to: (1) Hive space, (2) Disease recognition and management, (3) need for supplemental feedstuffs, (4) the performance of your queen and what her future should be, and (4) the condition of your equipment. Maintaining your equipment and your yard will allow you to be more prompt and efficient when opening the hives.

Traditional Winter management schemes of reversing inner covers, providing for an upper entrance, reducing entrances, and checking for stores, are still obvious tasks needing to be done in the Fall and then undone in the Spring. Reversing the brood chambers in order to encourage your (ideally one-year old) queen to build a brood nest in both deeps is also still common sense beehive management. This procedure is a major way to discourage swarming.

Swarm prevention – a personal change

Bluntly, to prevent swarming, keep young queens in your colonies and provide extra space before it is needed. If you see swarm cells, and sooner or later you will see some, make splits and hope for the best. Splitting a swarm-inclined colony may only lead to two swarms rather than one. Put swarm boxes out. That's a good use for old, retired equipment. Lastly, try to hive the swarms that issue. But here's the change – I don't think I will spend a minute specifically opening a colony to, *"tear down queen cells."* I can't say that I have ever truly stopped a single swarm from leaving by traumatizing a colony by destroying swarm cells. It is much, much better to attempt to stop swarming before it ever starts.

Drone management – a personal change

I was taught to destroy drone cells and to replace frames with high levels of drone cells. My current feeling is to stop harassing drones. A strong colony wants them, yea even needs them. We smash up drones, leaving the mayhem in the colony and on the ground around the colony. In the bright light of stress management, I don't see how that was ever really helpful.

Crushed bees – a personal change

When you open a hive, inevitably some bees get crushed. Think about it. There are no emergency gurneys on which nurse bees can rush to save or remove crushed bees. To clear up the mess, house bees can only eat the smashed worker remains or cover them in wax and propolis. How much of a stressor are crushed workers and drones? I don't know, but I don't *feel* good about it any more. Disease pathogens, as well as hormonal and phenomenal messages are released.

Said the bees, *"Oh, thank you for giving us more space, installing mite strips, leaving a caged queen, and killing five hundred of our comrades."* Clearly some bees are going to be killed in a hive opening event. It can't be helped. Clearly, we should be careful.

Traditional Winter/Spring Management Chores

1. Combine weak colonies
2. Equalize strong and less strong colonies
3. Provide space, including brood chamber reversal
4. Monitor/evaluate queen performance
5. Monitor mite populations and contagious diseases
6. Remove damaged or worn equipment, frames, and combs
7. Maintain the yard
8. Make splits, if needed
9. Position swarm traps and prepare for swarm acquisition
10. If needed, make changes in hive stands before supering
11. Freely feed pollen supplement and clean sugar syrup
12. Provide a dependable water supply

Propolis – a personal change

Were not propolis a good thing, bees would not diligently collect it. From my perspective, it's sticky and messy, and jams up my hives. From the bees' perspective, it is a pathogen preventative, a putrefaction remedy, an entrance masker, and a generalized antibiotic. It even keeps seeds from germinating inside the hive. We, the beekeepers, should stop badmouthing propolis. It's a good thing.

Chemicals – no change

Beekeepers are not good at using chemicals. The best chemical is only a short-term fix. We should use them, correctly, when we must, and then search for other ways to be helpful to the colony rather than dosing for life. I, too, have had colonies killed by mites. I, too, will readily use chemicals; therefore, I am not preaching. But ultimately, we don't really know what any chemical really does to the morale and health of the colony. I know I don't want to live in a peppermint oil vapor. We only know that, short-term, something that looks good occurs – like controlled mites, suppressed foulbrood, or whacked wax moths. These results seem good. Are they?

Non-invasive management

Sit by the front of your hive and watch for pollen and nectar collectors. Are there chalk brood mummies in front of the hive? Any signs of raccoons or skunks? Those guys stress your hives and indicate that your hive stands need improvement. Does bee flight look good on a warm day? Smeared fecal matter on the hive tells you there has been some kind of digestive problem in the colony. Any drones? Are they healthy and active or undersized and lethargic? See any crawling bees with twisted wings? That's a bad sign and a strong indicator of excessive *Varroa* populations. Clearly, you can tell a lot about the comings/goings of the colony without ripping into it. Plus, you don't smell like smoke and you don't get stung. Though I have never recommended this in a spring management discussion, if you really want to frequently look at your bees, get an observation hive.

My fresh approach to Spring management?

In my perfect world, hives are kept as far apart as possible, in a maintained yard – even having been painted with various contrasting paint colors. Queens are a year old and housed in hives that sit on stands that prevent night marauders from readily reaching the entrance. The hives are rarely opened, but when they are, carefully selected management tasks are performed quickly and efficiently. Wax combs are only a few years old. Space for future growth is provided long before it is needed. Chemicals are used judiciously. In this ideal world, diseases and pests are kept to a minimum. But most importantly, and by and large, the colonies are simply left alone. There is only so much I can do and be truly helpful. As much as I want to be involved in their lives, I must let bees do their own thing. BC

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Robbing behavior may be common, but is very stressful.

Ann Harman

How To Make – GOOD COMBS

Straight, clean combs are fundamental to good beekeeping.

Bees and beekeepers have several things in common but perhaps the most important is the desire for good drawn comb. Bees need it for storage of their food supply – pollen and nectar, and for egg-laying by the queen. Beekeepers also need it for a number of reasons: for honey to be stored and harvested, to make sure the queen has a place to lay eggs, to give package bees a good start in life, and to let a nuc grow into a full colony.

Let's face it – bees know how to construct good comb. It is up to us, the beekeepers, to provide them with the proper situations so that they can make good comb. Good comb could be defined as straight, without sags and waves; complete, filling the frame from top to bottom and side to side; and with the appropriate amount and placement of drone and worker cells.

At the risk of giving bees human traits, beekeepers need to realize that bees need a reason to construct comb. If they do not need comb, what is the point in diverting workers to construct comb when, perhaps, they should be busy with other hive tasks.

Then what are the bees' reasons? Probably the most compelling is the need for comb to store incoming nectar during a nectar flow. Storage of food gives the bees a chance to stay alive during the winter. The temperate climate bees are genetically programmed to store their food. Drought does not enter into their long-range planning. Next in importance is the need to provide cells for egg laying so that young bees will be replacing the old worker bees that are dying. A swarm of bees needs a home – meaning comb. Since the only "furniture" the swarm brought with them on their journey to a new home is honey, it is essential for comb to be built immediately. That honey they brought with them is their food to keep them alive and to give them the necessary nourishment to produce wax for comb.

Bees can and do make use of less-than-perfect comb. For them wavy comb does not matter as long as it fits into the cavity that is their home. For the beekeeper wavy comb means it is difficult to inspect the brood chamber (and it should be inspected!). In a honey super wavy comb makes it difficult to uncap either by hand or with an uncapper. Furthermore wavy comb does not fit very well into an extractor.

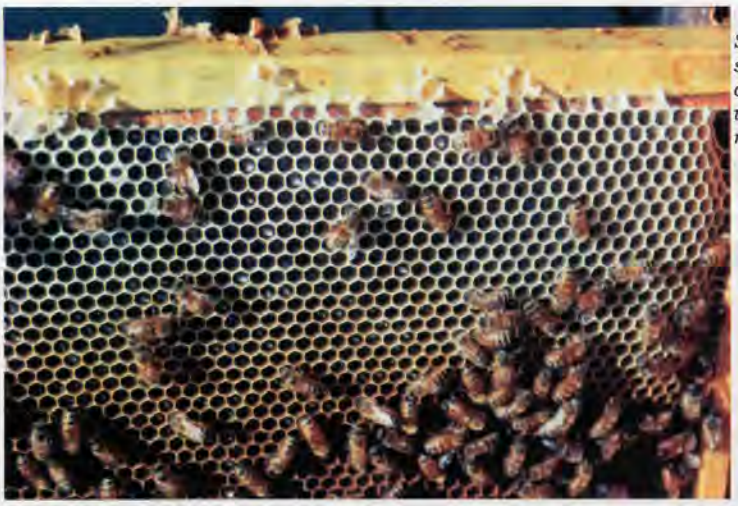
Unfortunately the bee cannot look into the future and see that comb that does not fill the frame means less honey storage and less room for brood. The beekeeper who uses comb with chunks missing and many holes may wonder why the colony does not thrive or why pieces of comb seem to break away from the frame during extraction.

Bees with a good queen can regulate the number of drones produced during the Spring and Summer. Bees know how many are suitable and may well ignore an abundance of drone cells built into damaged comb. Bees do make repairs to comb with drone-sized cells that unfortunately are not always put to good use.

Comb renewal on a three-year cycle is becoming more popular in the United States. This renewal has been the norm in Great Britain and Europe and there is considered essential for healthy bees. A program of comb renewal means that the beekeeper must provide the colonies with one-third of the comb in the brood chambers every year. Knowing the right conditions for producing good comb means that only high quality comb will be in the brood chambers all the time. If honey supers are used only for honey and not for brood, then renewal of comb is not important unless the comb is damaged during harvesting.

We can take a look at the foundations we are providing the bees. Wax foundation is still used by many beekeepers and serves very well if properly prepared. Crimp-wired wax foundation that is also wired horizontally will give the strength needed for straight comb. Without horizontal wires the beekeeper runs the chance that the foundation can bend or sag before it is drawn. This foundation is

Good comb starts with the right foundation.



Straight, strong and clean comb is what the bees need.

relatively easy to replace on a three-year cycle.

The plastic foundation and plastic frame-foundation combination as offered by many equipment manufacturers is straight and will produce straight comb if given the proper spacing. It also has the advantage that during handling there is no chance you will put your thumb through it and it will remain intact in the extractor. Replacement of comb means simply scraping off the old wax and giving the foundation back to the bees. The plastic fully-drawn foundation is, of course, straight but makes brood comb renewal on a three-year cycle rather costly.

Now let's se how we can get the bees to draw good comb on the foundation we have provided. Remember, I said the bees have to have a reason to draw comb. You have just captured a Spring swarm. Even if you have some drawn comb in storage, keep it there and give this swarm foundation. TEN frames of foundation! (Eight frames if you keep bees in eight-frame equipment.) You are regulating the spaces available and basically forcing the bees to draw straight comb.

These swarm bees will probably start constructing their nest in the center of the brood box. Now it is up to you to keep track of their work. You will want to bring frames from the sides closer to the center to have the bees draw comb equally on all the 10 (or eight) frames. Do not break the brood sphere with foundation.

What about one of those tiny mid-Summer or late-Summer swarms? Unless the swarm is large that late swarm will probably not do a satisfactory job of drawing good comb. You could try in a nuc box and provide plenty of 1:1 sugar syrup if there is a dearth of nectar flowers. But if that swarm is not producing good comb then perhaps it is better to combine them with another colony.

Every beekeeper should know when the main nectar flow occurs. (If you do not – you need to find out.) Now here is a reason bees need to construct comb – a nectar flow. You can certainly feed the bees with 1:1 sugar syrup to imitate a nectar flow. But if the bees are collecting only enough nectar for survival or are in a drought they may not draw out comb very well. Respect the bees and their sense of when to do something useful.

It makes no difference to the bees what size box you wish to use. If you use deeps for the brood chambers you can have the bees draw good comb by pretending a deep with 10 frames of foundation is a honey super. Then you will have 10 frames with good comb for use in your brood chambers for comb renewal.

The main thing to keep in mind is **draw comb with 10 (eight) frames on a strong nectar flow.**

You also need to have the correct size frame for the size of box. Now this may sound silly to an experienced beekeeper but I have seen just about every combination of boxes and frames you can imagine – with very interesting results. None have produced good comb.

Some beekeepers wish to produce comb honey of various kinds. Many beginning beekeepers without access to an extractor make cut-comb honey. Today we also have a choice of making round sections or using the plastic sections that do not require foundation.

The correct foundation for cut-comb is either the one designated "cut-comb" in the equipment catalogs or the one called "thin" or "thin surplus." For round sections you should use the thin surplus.

These thin foundations are difficult to handle, particularly when brittle in cold weather or when soft in very hot weather. For best appearance when drawn and filled with honey the foundation must be handled gently, avoiding cells being squished by fingers or cracked when cold.

Since you cannot be feeding sugar syrup to your bees when placing the honey supers on, you really have to be alert to nectar flows. If you put the supers on in anticipation of a nectar flow you may find that the bees simply chew up the thin foundation, probably to use it elsewhere in the hive.

Good comb for good comb sections needs to be drawn by a strong colony of bees during a good nectar flow. Remember? The bees need a reason to draw comb and an abundance of incoming nectar is a reason. If, for any reason – particularly bed weather ruining nectar plants – the nectar flow slows considerably or stops, that foundation will not get drawn. You might have to change your plans for comb honey.

Many times beekeepers are forced to combine drawn comb and foundation in a box. Think for a minute – if you alternate drawn comb with foundation you may not get good comb either on the foundation or on the frames with already drawn comb. If your alternate comb and foundation in a honey super the bees may continue to enlarge the comb already there and therefore make the comb on the foundation very thin and almost impossible to uncap.

Put the drawn comb to the outside of the hive body. Put the foundation together in the center. You may have to inspect from time to time to see if you need to move partially drawn ones to the center.

The bees need nourishment – honey – to produce wax. They work very hard constructing the comb. But good comb does take some work and attention on the beekeeper's part. A little bit of inspection and fussing around with positioning frames is worth it. Don't let your bees down. A hive full of good comb is one of the signs of a good beekeeper. BC

Planting Trees For Bees

Connie Krochmal

Planting Trees For Bees Is An Investment In Their Future

Spring has long been a time for tree planting. That may explain why Arbor Day occurs at this time of year. There are good reasons for this custom. Planting early allows trees to get established during mild weather before the onset of Summer. In addition, bareroot trees can only be shipped during the cooler months of the year.

For those beekeepers planning to plant trees, here are some basic guidelines on tree selection, planting procedures, and post-planting care.

Trees are sold in three ways with the planting procedure being slightly different for each kind. In addition to bareroot trees, there are also balled and burlapped (B & B), and container-grown ones. I prefer the bareroot when there is a choice. Though the plants are often smaller, they tend to become established easier.

When it comes to selecting container-grown trees, larger ones aren't necessarily worth the extra cost. My experience has been that smaller plants grow faster, quickly catching up with the others.

Selecting Your Bee Trees

Select your bee trees carefully. Choose ones that are hardy and suited to your growing conditions. Evaluate the amount of sun or shade, soil type, drainage, and typical soil moisture levels of the intended garden spot.

Match the trees to the amount of space you have available. Know the mature size of the plants you have chosen, and plan accordingly.

Also, consider proximity to utility lines, water and sewer pipes, septic fields, fences, and property lines.

The Best Times for Planting

Without exception, early Spring is the preferred planting time. This is especially true for trees that are sold bareroot.

As an alternative, most trees can be planted during the Fall as well.

Though it's true that container-grown trees can conceivably be planted during the Summer, this is a stressful time for the plant. The higher temperatures make it harder for the roots to become established. Those planted during the Summer will need frequent waterings.

If you live in an area with cold Winters, plant as early in the Fall as possible – at least six to eight weeks before the ground normally freezes. This allows the tree's roots to begin growing before the onset of Winter.

Proper Planting Depth

Planting too deeply kills trees. This is never a good idea. In most situations, just follow the directions given below for the kind of tree you've purchased. However, if your soil is very poorly drained or heavy clay, it is best to plant the tree slightly aboveground. In such situations, keep the top fourth of the root ball or root system above the soil surface. In essence, you'll be making a small berm around the tree by heaping soil up to the top of the root ball/root system. If you need extra soil for this, buy a bag of good quality top soil.

Planting bareroot trees

Bareroot plants are exactly that. They're shipped with no soil around the roots. Damp shredded paper, excelsior, or sawdust protect the roots during shipment.

Unpack the plants as soon as the box arrives. Sprinkle water on the roots and on any packing materials in the box so the roots remain moist.

Plant as soon as possible. Until you get the tree planted, store it in a cool, frost-free, unheated space. If you have to postpone planting for more than a few days, remove the tree from the box and store it outdoors in a protected, shady spot with a thick layer of mulch completely covering the roots. Water well to keep the roots moist.

Handle bareroot trees by the trunk and not by the roots. Before you plant the tree, soak it in a shallow bucket or pan of cold water. Add enough water to cover the roots. Let it soak for several hours but no longer than 10 to 12 hours. Leave the tree in the water while you prepare the planting hole.

Measure the depth and width of the tree's root system to determine what size hole you will need. Locate the crown or root flare of the plant. This will be the place at which the upper roots and trunk meet. There will be a clear change in the color and appearance of the trunk at that point.

Dig the hole the same depth as the root system, which extends from the tips of the roots almost up to the crown. The hole should be twice as wide as the root spread. This procedure loosens the soil, allowing the tree's roots to expand outwards. In the case of grafted trees, the depth should be slightly different. These need planted so the graft union will be several inches *above* the soil surface.

Remove the tree from the water. Prune any broken, twisted, or discolored roots. Place the tree upright in the hole. The crown should be about half an inch above the soil surface. The soil will settle slightly as you fill the hole, leaving the crown at the correct depth.

Hold the tree upright with one hand, and use the other hand to firmly place soil under and around the plant's roots. Backfill with the soil you removed when you dug the hole. Generally, no amendments are needed unless you have very poor soil. In that case, buy a bag of top-quality topsoil.

Fill the hole about halfway. At that point, add some water to settle the backfill soil into place around the roots. This will remove air pockets. Then, continue filling with additional backfill until it reaches slightly above the crown of the plant. This will

settle when you water. When you've finished filling the hole, mulch the tree (see details below). Then, water carefully.

Planting B & B Trees

Keep the B & B tree well watered until you get it planted. Lift the plant by the root ball and not by the trunk. Dig the hole the same depth as the root ball. You want the top of the root ball level with the soil surface. Make the hole at least twice as wide as the root ball.

As you dig, avoid making the sides of the hole absolutely smooth. Actually, it's a good idea to keep this slightly rough to make it more inviting to root growth.

Remove any rope, string, or wire from the burlap. Natural, untreated burlap can be left in place when you plant. However, other types should be removed since they won't readily decompose. Sometimes, B & B trees will have wire cages, which should also be removed.

Set the tree upright in the hole so that the top of the root ball is just slightly above the soil surface. This allows the soil to settle to the proper level when the tree is initially watered. Fold or cut the top portion of untreated burlap back from the root ball so that the roots will come in contact with the surrounding garden soil.

Fill the hole as discussed above under bareroot trees. Then, apply mulch around the tree, which is explained later. Water one more time.

Planting container-grown trees

Keep the tree watered until you're ready to plant. Don't allow the potting soil to become dry. When you handle container-grown trees, hold them by the root ball to avoid damaging the trunk.

Dig the hole as you would for a B & B tree. In other words, it should be the same depth as the root ball and at least twice as wide as the container. To check the depth, you will need to remove the tree from the pot. Make sure that you roughen the sides of the hole as you dig.

Sometimes, it can be hard to remove a tree from a container. If so, try knocking one side of the pot against a hard surface, such as a nearby rock. For larger containers, hit the sides and bottom of the pot with a large piece of wood. This should loosen the roots enough so that you can pull the tree out of the pot.

Usually, you want to disturb the root system of container-grown trees as little as possible though there are a few exceptions. If the roots are matted tightly together, these need loosened. Using your fingers, gently tease some of the roots outward or downward from the surface of the root ball.

Check to see whether any of the roots are encircling the root ball. To prevent these from eventually girdling the tree, untangle and prune them so they're the same length as the rest of the root ball.

Set the tree upright in the hole so that the top of the root ball is just slightly higher than the surrounding soil surface. This allows the soil to settle around the root ball without burying it too deeply.

The next step is filling the hole, which is explained under bareroot trees above. Then, apply mulch as directed below, and water again.

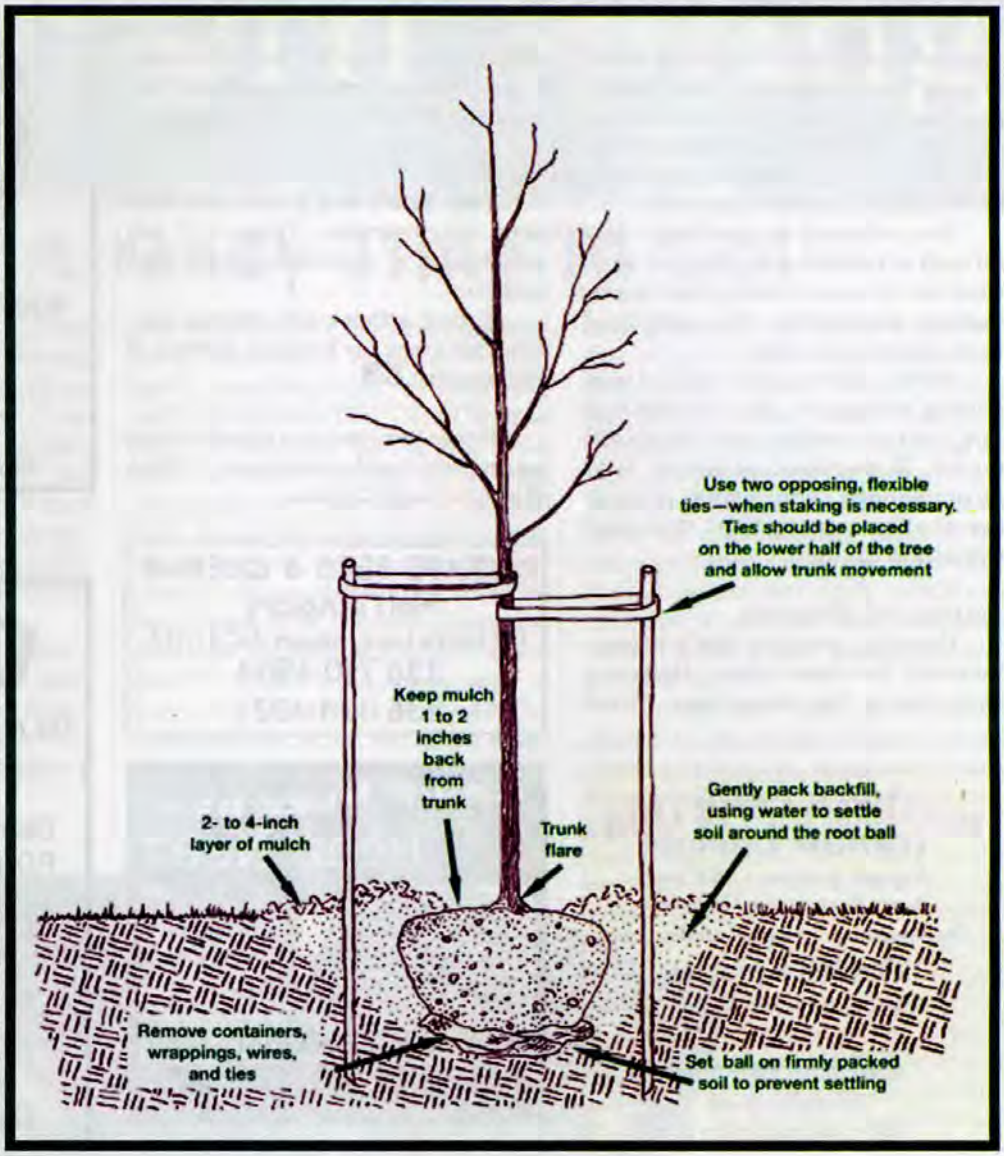
Post-Planting Tree Care

This will involve a number of steps that are explained below.

Mulching

Mulch conserves soil moisture, and minimizes weeds. This should be done right after you plant.

In most areas of the country, organic mulches work well. Typically, this will be bark mulch or wood chips. Grass clippings, straw, marsh hay, compost, or similar materials can



serve the same purpose. Apply a two to three-inch layer. Avoid going overboard as this can harm plants. I've seen commercial landscapes where a foot or more of bark mulch has been heaped around trees and shrubs.

Use the mulch to create a large circle about 1½ to two feet wide around the tree. This will help protect the plant from mower and trimmer damage. Keep mulch several inches away from the tree. If it is allowed to rest against the trunk, this might encourage rot.

Watering

Once the mulch is in place, now it's time to water your newly planted tree one more time. Water thoroughly so the root system or root ball, mulch, and the surrounding soil adjacent to the roots are moistened. Use a garden hose as sprinklers don't work very well for this. Set the hose beside the tree, and turn the water pressure to a slow trickle.

Many plants die for lack of water during the first year. Water newly planted trees on a *regular basis* as needed until they are established. This is especially critical if you live in areas where Summers are hot.

You will need to water any time an inch of rainfall doesn't occur each week to 10 days. During heat waves and very hot weather, this might need to be done more often.

Water thoroughly each time, adding enough to get the root ball and the surrounding soil completely moist. Superficial watering isn't recommended. That would encourage shallow root systems that can't withstand drought.

Staking and Wrapping

Usually, staking isn't recommended for most trees. However, there are a few exceptions. These include dwarf fruit trees, very tall ones, and weak-trunked trees, such as weeping flowering cherries. Stakes should be temporary, and removed within six months to a year. When staking, use a soft tie, such as rubber, to avoid damaging the bark. Tie it loosely so that the tree can sway slightly in the wind.

Wrapping is unnecessary unless you're protecting your new tree from deer or rodent damage, or sunscald during the Winter months.

Pruning

For most trees, heavy pruning is unnecessary at planting time. Limit pruning to broken or crossing limbs and damaged branches. The exception would be for very large fruit trees, which sometimes need pruned for training purposes.

Fertilizing Your New Tree

Newly planted trees don't need fertilizer. In fact, formulas high in nitrogen can burn the roots. Instead, begin a regular fertilizer program during the spring of the following year.

Weeding

Keep weeds and grass away from your new bee tree. These will rob your plant of needed nutrient and moisture.

Future articles will address specific bee trees for various regions of the country. BC

Connie Krochmal is an award winning garden writer and a beekeeper in Black Mountain, South Carolina.

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Southern Spring

Jennifer Berry

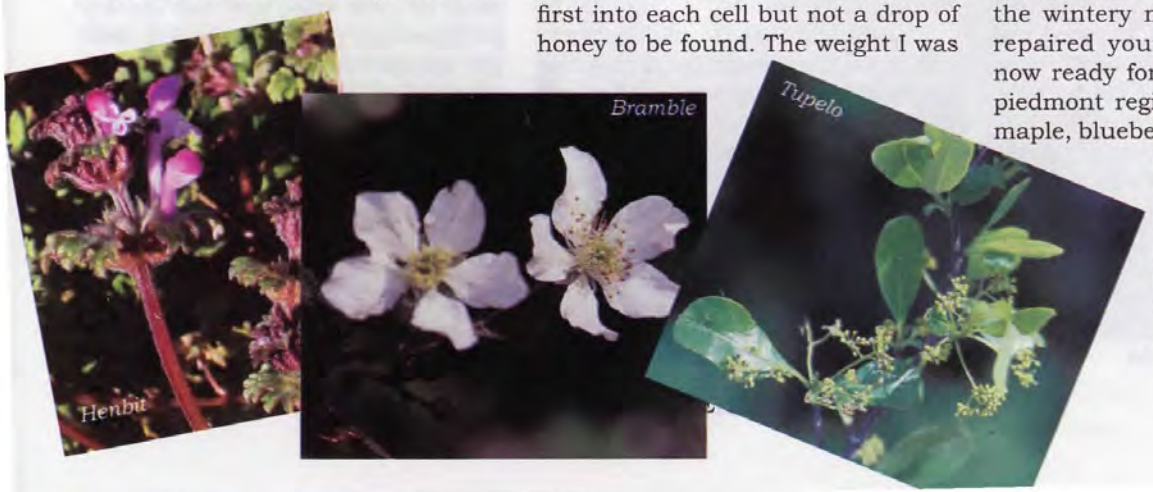
Privet

It's Already Time To Go!

By now most of the U.S. should be experiencing some sort of nectar flow. Bees should be scurrying about rewarding us with the riches of nature. Our lazy days inside, sipping on hot toddies in front of the fire, are long gone. Now is the time we shed that extra weight and feel our superman strength return as we begin lifting those 100 pound supers. Backs beware, spring time is here!

Before we jump into what's blooming, let me reiterate once more about starvation. Last month I talked about lifting colonies from the rear in order to check honey stores if cold temperatures restricted opening them. However, I recently remembered something from my beginning beekeeping years that I want to pass along. It was early Spring and I was out on a cold morning lifting colonies to determine if they were in need of food. All the colonies felt heavy plus the nectar flow was just around the corner; I was confident they would be fine. A week later I noticed numerous dead bees scattered out in front of one colony. I opened the colony only to find a box full of dead bees, and I do mean packed to the top. Plus, every frame had a single bee tucked head first into each cell but not a drop of honey to be found. The weight I was feeling was not the honey stores but the weight of the bees themselves. The colony started rearing brood earlier than usual, hence the colony population exploded, consuming all stores before the nectar flow arrived. Just be aware of this so you don't make the same mistake. With all the other problems facing us, starvation should be the last thing to kill our colonies. If you are concerned your colony doesn't have enough stores, just feed them.

So far this year, the season seems to be three to four weeks ahead of schedule. Hopefully during the wintery months you built and repaired your equipment and are now ready for the flow. Here in the piedmont region of Georgia the red maple, blueberry, henbit and redbud blossoms are on the decline. These blooms provide more pollen than nectar, which kick start colonies into heavy brood rearing. Any day now we are



anticipating a strong nectar flow with blackberry (bramble), tulip poplar, privet, and clover. Years past, our Spring nectar flows easily produced two to three supers per colony. The only problem being, it's our only nectar flow. We may see a trickle of goldenrod in early Autumn but we can never rely on it. Therefore, our bees must collect all the honey needed for our table as well as theirs in roughly four to six weeks. This honey is usually light amber with a fruity flavor. It does tend to crystallize quickly due to its high glucose content but is still a crowd pleaser.

So, when should I super, you ask? The time is now. How should I super, you say? That's a good question and still under considerable debate. There are several ways, depending on which beekeeper you talk to. You have bottom- versus top-, all at once versus "as needed" basis. To keep confusion to a minimum let me state how we do things here at the lab. We try to super colonies as they need it. When a super is about half full, we add another. However, apiaries too far away to check on a weekly basis are supered two to three at a time per colony. I'd rather give them too much space than not enough. Crowded conditions during a nectar flow will force bees to fill up the brood nest with honey restricting the queen, triggering swarming. However, with the addition of our latest pest, the small hive beetle, one must be careful. Additional room allows space for the beetles to hide. They can't rear young in empty supers if there's no food available, but they can congregate there. If you are in an area prone to beetle troubles, you may want to be careful about giving your bees too much space. And don't put old nasty supers with dark comb on your colonies. Get rid of that old junk! If you don't know how old a frame is, then it is probably too old and needs to be removed. A steady Spring nectar flow is the best time for bees to construct new comb. Here at the lab we have disposed of hundreds of old frames: too many to count. We also decided not to melt the wax from these old combs. Who knows what contaminants may be lingering in the wax? A good yearly practice is to replace two frames each year in the brood chamber, marking them with the year. Therefore, none of your frames is ever over five years old.

By April our southern cohorts have already begun supering for the Tupelo flow. The Tupelo Gum tree produces large amounts of nectar in a few short weeks. The nectar output is so strong the bees go "honey crazy." Honey produced from Tupelo is considered a delicacy because of its light, amber color and exquisite flavor. Due to its low glucose concentration it doesn't crystallize as quickly as other light colored honeys, thereby making it a desirable honey, especially for northern markets. However, production of Tupelo on a commercial scale is not easy. It takes experienced beekeeping skills and a keen knowledge of regional nectar flows. There are numerous challenges facing Tupelo producers. Here are just a few: First, Tupelo locations are difficult to find and traverse since most are situated in swampy, river areas. Some beekeepers keep their colonies on barges and float them up and down the river in search of the Tupelo trees. Just prior to the nectar flow, all honey stores must be removed to insure only pure Tupelo nectar is being placed in the cells. And finally, supers must be removed before other floral sources bloom in order for the Tupelo honey not to be contaminated. Because of the difficulty producing Tupelo and its desirability, it can bring top dollar at the market. However, don't plan on heading south any time soon in search of your very own, private patch of Tupelo. These prized locations are fiercely guarded and passed down from generation to generation.

The coastal regions of Georgia will soon be gearing up for the Gallberry flow, one of the largest flows in the country. Gallberry is another light, amber honey which tends not to granulate. It is produced from an evergreen shrub in the sandy soil along the coast. It is a major honey crop for beekeepers from coastal Texas to Virginia.

Each year, swarm management and prevention seems to come earlier due to our mild, and warmer Winters. Normally strong colonies in the Piedmont regions of Georgia are swarming the first of April with the peak of the season hitting in May. This year swarms are a full month early. Our stronger colonies were producing drones as early as January. If there ever was a time to expand your operation, this is it. Colonies are loaded

early with bees. Dividing colonies or making splits is best done just prior to a strong nectar flow, which is now. Hopefully, you anticipated how many splits you would be making last year and ordered the proper number of queens. If there are no queens available, and your hives are busting at the seams, why not raise your own queens? However, realize, you will not have emerging brood from this new colony for at least 44 days. The queen has to complete her development (16 days), orientate (three to five days), make her mating flights (two to four days), commence egg laying (two to three days) and then it's still 21 days before the first round of brood will emerge. But at least you have a new colony with your very own queen. We will explore the actual rearing process in the next issue.

An additional thought. As a beekeeper and a researcher I live with a notebook strapped to my side. Every yard is named, every colony is numbered and even sides of frames may be labeled. Taking notes has become a habit and one I recommend to all beekeepers. It helps you keep track of your colonies' needs, problems or successes. After working several colonies, one tends to forget which colony needed the new queen and which one was out of food. All those white boxes begin to look the same. But if you have your trusted notebook by your side, you can quickly jot down any problems you encounter. Another reason to take notes is you'll be amazed at how much you learn about your bees. For instance, as your colonies are coming out of the Winter and your assessing their condition, why are some weaker or stronger than others? Why did one die and not the next one? If you took notes during your Fall preparation, the answers may be there.

Have a grand Spring! See ya'll! BC

The Capped Honey Reserve

Walt **Wright**

The submittal is a general discussion of an obvious feature of the honey bee hive internal content. When opening the hive from the top, capped honey and bees are the first evidence that a functional colony resides there. Accumulation of that capped honey is the basic reason that most beekeepers provide the residence in the first place.

Maintenance of the overhead capped honey reserve is critical to colony survival. Unavailable field forage and Winter are examples. Long term storage of both pollen and honey provides the flexibility to adapt to local forage patterns.

The first-year colony, operating in the establishment mode, starts very early in the establishment process building their capped honey reserve. When they first occupy the empty cavity, getting comb built, rearing replacement bees, and feeding the colony has top priority. But when those priority tasks are well underway, some incoming nectar is diverted to start building the reserve honey. Soon there will be a trail off of field nectar into the mid Summer doldrums – through which they will have to depend on the reserve.

Rearing brood is a heavy drain on nectar/honey. Adult bees become inactive and consume less stores.

The fully established colony with honey reserve has three levels of protection of the reserve. The first is limiting adult bee activity during a dearth.

The second is cannibalism of drone brood.

The third is to stop brood rearing.

The above odds and ends have been described to give you some insight into the significance the colony attaches to the capped honey reserve. The significance of maintaining the reserve during the swarm prep period seems to have been overlooked by the beekeeping community. Following is the role of the reserve in the reproductive process of the honey bee, and how the colony insures survival rations while generating the reproductive swarm.

During the early build up in late Winter the colony builds brood volume to the amount of capped honey reserve that it considers appropriate. Each colony makes an independent judgment of how much reserve to leave unopened, but they are surprisingly consistent in their judgment. When wintered in a deep and a shallow (plenty in my mild, short Winter) nearly all will leave all the honey in the shallow at the top unopened. It should be noted here that my bees live in an exceptionally swarm-prone area. Early and continuous (overlapping) sources support their build up and swarm prep needs. They have the luxury of protecting their reserve in the early season at whatever level they choose.

When wintered in a double deep with the cluster in the lower and a full deep of honey at the top, they typically expand the brood volume into half of the upper deep. The expansion dome of brood may reach nearly to the top bars at its peak, but the colony generally leaves a band of capped honey across the top of the expansion dome.

The significant point of the above observations is that swarm preparations start when brood nest expansion reaches the limit of *minimum honey reserve*. It works both ways. The colony that reaches the limit starts swarm preps, but the weaker colony that doesn't reach the limit doesn't. Starting swarm preps does not necessarily mean the colony will swarm. They must complete swarm preps and start swarm queen cells before the seasonal cut off timing.

In the swarm prep period maintenance of the reserve is crucial to parent colony survival. In late Winter the season change often comes with late freezes or extended periods of non-flying weather – either of which restricts forage availability. That's the period that the colony is building population with maximum brood volume to support division by the reproductive swarm. Mother Nature takes care of her own. The colony instinctively protects the reserve during swarm preps. If field nectar can be collected, the colony feeds on incoming. If not available, they can

Honey-bound condition – Colonies are honey-bound when a band of honey above the brood deters the queen from moving upward. The band of honey need only be half an inch wide to prevent the queen from moving upwards into an empty comb. Colonies that are honey bound usually have congested brood nests and swarm readily. Using extra deep frames, deeper than normal Langstroth frames, may give rise to this problem. The best way to break a honey-bound condition is to remove one or two such frames from the center of the brood nest and to place them in a super above it.

Does this layer of honey help, or hurt swarm prep?

dip into the reserve – that's what it's there for. In short, maintaining the reserve is quite deliberate and necessary. I sometimes use the word "sacred" with respect to the reserve during the swarm prep period.

Concluding that the reserve initiated swarm preps, I too was skeptical. Was it possible that thousands of beekeepers had overlooked an obvious factor in the swarm process? It seemed like a point of vulnerability in the swarm process that could be exploited. My first test of the preliminary conclusion was to increase overhead honey for wintering. It takes time to consume overhead honey for brood nest expansion and reproductive cut off was hypothesized at that time. Increasing overhead honey was done in two steps – double deeps and 2½ stories. For each step up in overhead honey, swarming was reduced. That seemed to validate the conclusion. Then the search was on for some other way to disrupt the swarm game plan by attacking the reserve. You know the rest of the story – whether you believe it or not. You are left with this question: Why should I be labeled a crackpot for reporting the obvious?

The boxed-in extraction from ABC and XYZ of Bee Culture is the only entry in the popular literature that I could find that treated the reserve from the standpoint of swarming. The author of that passage had swarm prevention in the palm of his hand and let it slip through his fingers.

I didn't invent the reserve. It's been an integrated part of the bee's survival format for eons. Even the word used for it may not be original – could have read it somewhere. If that is the case, you can bet that it wasn't used in a description of the swarm process. BC

Walt Wright studies swarms, near his home in Elkton, Tennessee.

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? DO YOU KNOW ?

Communication

Clarence **Collison**
Mississippi State University

Honey bees are social insects living in an extremely complex society and exhibit the highest degree of social behavior. A prerequisite of all social communities is the ability to communicate with each other. The social structure of the colony is based on the principles of division of labor, kin recognition and specialized reproductive castes. Numerous forms of communication are used within the colony to integrate their various social activities. Honey bees efficiently regulate brood nest temperature and humidity, eliminate polluted air, remove foreign objects, wastes and dead bodies and control parasites and pathogens that attack them and their food.

Please take a few minutes and answer the following questions to see how familiar you are with these topics.

Level 1 Beekeeping

1. ___ Nurse bees can distinguish between caste and ages of larvae. (True or False)
2. ___ Drone larvae are more attractive to *Varroa* mites than worker larvae. (True or False)
3. ___ The retinue of attendants that form around a queen first occurs:
   A. within the first 24 hours after a virgin queen emerges from her queen cell.
   B. when the queen returns from her mating flight.
   C. after the queen begins to lay eggs.
   D. just before the queen is ready to take her mating flight.
   E. when the queen is three years old.
4. ___ A pheromone may consist of a single compound or a mixture of compounds that is produced and secreted by an exocrine gland. (True or False)
5. What is the difference between a releaser and primer pheromone? (2 points)
6. ___ All exocrine glands produce pheromones. (True or False)
7. ___ Virgin queens exhibit a 24 hour cycle in the production of 9-oxo-2-decenoic acid. (True or False)
8. ___ The Koschevnikov gland has greater development in worker honey bees in comparison to queens. (True or False)
9. ___ Queens and workers both begin producing venom at the time of adult emergence. (True or False)
10. ___ Tergal glands are well developed in both queens and workers. (True or False)
11. ___ Name two situations when you will observe a flying frenzy around the hive entrance. (2 points)

Advanced Beekeeping

12. ___ Fat bodies are important food storage reservoirs and are also important sites of intermediary metabolism. (True or False)
13. Due to unknown stimuli, the _____ spore germinates in the ventriculus, ejecting a polar filament into an epithelial cell.
    A. Chalkbrood B. Nosema C. American foulbrood
    D. Powdery scale disease E. Stonebrood
14. The following 10 aliphatic esters: A) ethyl linoleate B) ethyl linolenate C) ethyl oleate D) ethyl palmitate E) ethyl stearate F) methyl linoleate G) methyl linolenate H) methyl oleate I) methyl palmitate J) methyl stearate are associated with the _____ pheromone.

    A. foot-print B. egg-marking C. tergal
    D. queen cell E) brood
15. ___ In artificial queen rearing, which one of the above aliphatic esters was associated with increased acceptance of wax queen cells?
16. ___ In artificial queen rearing, which one of the above aliphatic esters was associated with enhanced amounts of royal jelly deposited in the wax queen cups?
17. ___ Which of the above aliphatic esters was associated with increased weight of the larvae in the wax queen cups during artifical queen rearing?
18. ___ Which three of the above aliphatic esters are used by *Varroa* mites as chemical cues to find its host?
19. ___ *Nosema apis* kills *Apis mellifera* faster than *Nosema ceranae*. (True or False)

Please match the following:
A. Allomone B. Semiochemical C. Kairomone

20. ___ Any chemical involved in communications among organisms.
21. ___ An interspecific chemical messenger that benefits the releaser but not the receiver.
22. ___ An interspecific messenger substance that benefits the receiver but not the releaser.

ANSWERS ON NEXT PAGE

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?Do You Know? Answers

1. True Larval and pupal bees produce several pheromones that significantly affect the behavior of worker nurse bees. The feeding behavior of nurse bees in relation to the amount and jelly composition varies with the age and caste of the larvae. Nurse bees can distinguish between young and old larvae, as well as between the different larval castes.
2. **True** Drone and worker larvae, isolated from their colony, are attractive to female *Varroa* mites. The drone larvae are more attractive than worker larvae and the fifth instar larvae are the most attractive of all the stages. At the time of capping the amount of kariomonal esters is 5.6 times higher in drone brood than in worker brood.
3. D) just before the queen is ready to take her mating flight.
4. **True** A pheromone may consist of a single chemical compound or a mixture of compounds that is produced and secreted by an exocrine gland.
5. A releaser pheromone triggers an almost immediate behavioral response in receiving individuals. These pheromones are referred to as chemical releasers of behavior. Primer pheromones in comparison "prime" the receiver individual to exhibit an altered behavioral activity at some future time, not an immediate response. Primer pheromones physiologically alter reproductive and endocrine (hormonal) systems so that eventually the receiver animal exhibits new behaviors when exposed to certain stimuli.
6. **True** Not all compounds produced in exocrine glands function as chemical messengers (pheromones) and in many cases no function can be assigned to specific compounds.
7. **True** Virgin queens exhibit a 24 hour cycle in the production of 9-oxo-2-decenoic acid, synthesizing most of this compound during the late morning and afternoon, the period during which mating flights occur.
8. **False** The Koschevnikov gland, consists of a tiny cluster of cells in the sting chamber. This exocrine organ is not as well developed in workers as in queens and is reported to have different functions for each caste, although its precise roles still remain to be determined.
9. **False** Queens, but not workers, produce functional venom at the time of adult emergence. Since virgin queens may frequently kill their sisters by stinging shortly after they emerge in the brood nest, the immediate availability of toxin venom is obviously essential.
10. **False** The tergal glands, which are located on abdominal tergites four to six, are very well developed in young queens but not in workers.
11. Robbing
    Colony issuing a swarm
    Approaching thunder storm, field bees sense it and quickly return to the hive
12. **True** Fat bodies have important functions as food storage reservoirs (lipid, glycogen, protein) and have high concentrations of mitochondria and enzymes which are responsible for breaking down fat stores into fatty acids, converting amino acids into other amino acids, converting glucose into trehalose and synthesizing uric acid. Fat bodies also contain RNA (ribonucleic acid) which synthesizes protein for the blood and egg development in fertile queens. In addition to food storage, they are important sites for intermediary metabolism.
13. B) Nosema
14. E) brood
15. J) methyl stearate
16. F) methyl linoleate
17. I) methyl palmitate
18. I) methyl palmitate, G) methyl linolenate, D) ethyl palmitate
19. **False** Nosema disease, common in the United States, is caused by *Nosema apis*. This disease rarely causes major losses in infected colonies. However, if left untreated, it can cause queen supersedure, Winter kills, reduced honey yields and dwindling populations. Until recently, *Apis cerana* has been the natural host for *Nosema ceranae*. Now it has been found in *Apis mellifera* and seems to be highly pathogenic to its new host. Western honey bees die within eight days after exposure to *Nosema ceranae* which is faster than bees exposed to *Nosema apis*.
20. B) Semiochemical
21. A) Allomone
22. C) Kairomone

There were a possible 13 points in each level this month. Check below to determine how well you did. If you scored less than six points, do not be discouraged. Keep reading and studying- you will do better in the future.

Number Of Points Correct
13-11 Excellent
10-8 Good
7-6 Fair

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

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INNER ... Cont. From Pg. 10

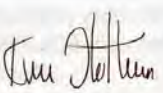
has some thinking that's the culprit); two, three or more years of drought; tracheal mites; too late *Varroa* treatments; pesticides inside the hive (from outside, and those added by beekeepers); contaminated comb; everyday pests, predators and diseases; queen problems; genetically modified crops; moving colonies, moving them again, and again, and again; that new Nosema disease (that's a scary situation considering how lethal they say it is, and how fast it can kill a colony); and everything else we do to bees that bees shouldn't be subjected to. This is without doubt a litany of woes without precedent.

But let's not forget the ordinary, the mundane . . . that normal 20% or so loss we have every year. The left side of the curve drops off predictably and that amounts to nearly a half-million colonies right there. The weak, the sick and the queenless always don't make it.

CCD may be a new, exotic, imported, insidious horrible pest of some kind, or a brand new pesticide we haven't been exposed to before. Or maybe one that's always been here. It even may be the Disappearing Disease of old or simply African absconding behavior. But, I'll tell you what I think after talking to those in the middle of this, the researchers, the scientists, the beekeepers who have had to pick up thousands of empty boxes (there are, by the way, lots of beekeepers who haven't seen this, and don't know what I'm talking about . . . Recall the Brethren?). No, I don't think it is any of these. Nope. Rather, I think it's *all* of these. I believe they'll find that exotic bug, that newest virus, that lethal disease or toxin from hell . . . but frankly, even when they do I don't think it's the only thing they'll find.

What this is . . . well, what I think this is, is *The* classic case of Death By A Thousand Cuts. One tiny thing after another after another after another, until it's simply one thing too many, and the bees rise up and scream to everyone and anyone who will listen – ENOUGH! WE HAVE HAD ENOUGH OF YOUR CRAP!

After all, they're only bugs in a box. What can you expect?



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Around here, most bears respect an electric fence most of the time. But with 85 Colorado bee yards, Paul occasionally has a "problem bear" out there somewhere – a bear with a taste for honey and larvae, who'll rip down the stoutest, hottest solar-electric fence to get some.

Colorado bear numbers have been on the rise ever since the 1992 passage of a controversial referendum banning the traditional Spring bear hunting season. Hunters felt betrayed. The enviros figured they won one. Nobody ever thought about the beekeeper.

Paul's wife Nanci runs a wildlife rehabilitation center. She loves nothing more than rescuing scrawny orphaned bear cubs, fattening them up through the Fall, and singing them lullabies until they dream white winter dreams. Along about February she sedates the little darlings and gets the Division of Wildlife boys to help her haul them to cozy little dens that she knows about. She does this every Winter, and she claims she's never lost a bear. Without Nanci's help, virtually all of these little critters would have succumbed to the cold law of natural selection.

So you can see why Paul sometimes has bear problems.

Paul is the president of the Colorado Beekeepers' Association, and we've had our meeting at his and Nanci's place the past two Summers. You couldn't ask for a sweeter, shadier spot to spit watermelon seeds and talk about *apis mellifera*. Nanci happily offers attendees a tour of her wildlife center, which is right there.

Not all beekeepers approve of tolerating bears, let alone rescuing them, however, so you do see some hoary heads shake in disbelief.

Personally, I find it charming beyond charming that a man and a woman might pursue disparate dreams and yet find common ground. We should all be so lucky.

Paul claims that bruins have to learn about the banquet of delicacies within a bee hive. Initially a bear might merely be curious. That's why the first time one visits an apiary, you might only see tracks. He might knock a cover off. The second visit he might tip over a hive. It's maybe the third or fourth time that he discovers the delights of raking honey and brood into a gluttonous maw.

You never expect to see bears in the Winter, but in December the ski patrol was doing avalanche control work on Aspen Mountain. Art and I taped a five-pound cast primer explosive onto a bamboo pole that we stuck into the snow, so that the charge was suspended in mid-air. This is called an "air blast," and the idea is to send shock waves into the snow and precipitate avalanches. Air blasts are loud. Art and I retreated a safe distance, cupped our hands over our ears, and waited.

The detonation reverberated through Rayburn's and the Cone Dumps. Unfortunately, and unbeknownst to us, the charge went off right next to a bear den. A bear came flying out and headed 75 yards down the hill before she stopped. We were just below a ridge. Other avalanche control teams were spread out across the hillside. As the other teams' bombs went off, our bear stood on her hind legs and clawed the air. She stayed in a clump of trees adjacent to the open slope below us, which is where we had planned to go next.

I was more than happy to change plans, however. Artie concurred. "No way I'm going down there," he said.

To go back up would mean a steep slog on skis in deep snow. Our route to the left was closed off by trees and cliffs. To the right would take us just below the bear den and directly above the bear, but after that we could make a long traverse across the hill. I was anxious to move.

I said to Artie, "Let's get out of here," and headed to the right.

Just as I set out, another patroller called out on the patrol radio, "There's another bear!" I looked uphill in time to see a cub wiggling his ears and looking down at me from the opening of his den 20 feet above. I could just see his head. The little darling was making high-pitched grunts that sounded a lot like "Mama, Mama!"

At this point, I was directly between the enraged mother bear and her frantic cub. Snow conditions were not ideal. In September we had a heavy snow that knocked over fully-leafed aspen trees. Now I was skiing over rocks and downed trees in deep snow. I'm not saying I panicked, and I'm not saying I didn't. I moved with haste and was careful not to fall.

We got out OK. I took some ribbing over the radio, to the tune of "Colby, where's a pail of honey when you need one?" But we all lived to hoist another locker room beer.

The den was in a place that's hard to get to, but J.T. and I went back later and fenced it off to keep out skiers and remind patrollers, so that maybe our furry friends could slumber yet.

I told Nanci about the bears and the bomb. She laughed and said, "I read something about that in the paper."

When I teased her about being part of the "bear problem," she said, "I'm not responsible for any bad bears. My bears are all ear-tagged, and they've never bothered bees."

I said, "How would you know?"

She said, "Well, the rancher always knows about the bear that's around, and those bears never have ear tags. Those problem bears are big old bears. My bears are cubs."

I said, "So your bears never get old and raise hell?"

"Nope," she said. "My bears never cause trouble."

Ed Colby

Bears