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name of the list and your first and last names followed on the next line by hyphens.

A snail mail (US Postal Service) subscription still is available for \$15 a year. Send your payment (preferably a check made payable to the **Regents of UC**) to me at the address at the end of this newsletter. Be sure your name and address are easy to determine.

Final Move?

It seems like just yesterday, but I moved my office out of the Bee Biology Facility, back to Briggs Hall on the main campus, the week of March 17th.

If you wish to have this newsletter sent directly to your e-mail address, when it is published, please follow the instructions below.

The move was necessitated so that one or more new Pollination Biologists will have room to conduct their research and house their graduate students.

Send an e-mail addressed to **listproc@ucdavis.edu**. Leave the Subject line empty. In the body of your message put in the following: sub ucdavisbeenews <your first name (without these “brackets” around it)> <your last name>. On the next line, insert two hyphens, not underscores (underlines). If I were subscribing, it would be:
sub ucdavisbeenews Eric Mussen
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Yes, you read it correctly, one or more Pollination Biologists. Under the impending fiscal limitations to the University, we were lucky to be able continue our recruitment for the position. Beginning with the departmental faculty and our new Entomology Department Chair, Dr. Lynn Kimsey, and assisted vigorously by the Dean and Associate Dean, we were able to convince the campus Provost and Vice-provost that we really needed two individuals to adequately perform all the expectations of that position.

The hyphens are there to tell the subscription software on the server not to be confused by any following information that occurs, such as a “signature frame” (or signature block, as I call it).

If you wish to be removed from the list, then you do the same thing, but instead of **sub**, you use **unsub** or **signoff**, then the

A specialist in non-*Apis* bees was desired to fill a teaching and research gap in the Sustainable Agriculture program. An

Apis oriented individual was needed to return a research presence to the honey bee program, as well.

Before new individuals come aboard, there are negotiations to be worked out between the potential hires and the campus administration. Hopefully, in a few months, we will know for sure who is coming and when.

Meanwhile, I still have not emptied all my boxes of stuff that I brought to Briggs from Bee Biology. I am moving into less space, and I already had more things than my former office could hold (as some of you have seen).

My telephone number remains unchanged, as does my e-mail address. However, my FAX reverts back to the Entomology Department FAX: (530) 752-1537. Being on campus has some distinct advantages, but I will miss the close interactions with Sue Cobey, Robbin Thorp, Kim Fondrk, and Katharina Ullmann.

When it Rains, it Pours

My selection by the California State Beekeepers' Association as Beekeeper of the Year, last November, was the beginning of a series of awards bestowed upon me over the last few months. (I guess they must think the end is near!) The most recent was being selected for the Pacific Branch, Entomological Society of America, Extension Entomologist Award. That selection enters me into this year's national competition among Extension Entomologists. Our departmental award winning publicity person, Kathy Garvey, has been having a lot of fun with these accolades. You can read all about them on the Entomology Department Web page: entomology.ucdavis.edu/home.cfm.

Annual Honey Production

According to the NASS (National Agricultural Statistics Service), 2007 honey production may be the lowest on record for the country. At only 148 million pounds, it is a far cry from the 235 million of 1987 and 230 million of 1993. Is it the number of colonies diminishing (26% decline since 1987) or diminishing yield per colony (70 pound average, down to 59 pounds; a 16% reduction)?

As usual, North Dakota (31.1 million pounds of honey), California (13.6), South Dakota (13.3), and Florida (11.3), made up the top four producing states.

The February 29, 2008, report has a couple graphics in it that are reproduced in the April edition of Bee Culture magazine. While some find the loss of colonies since the 1980's to be alarming, it is interesting to note that colony numbers had remained fairly steady, at about 2.6 million, from 1995 to 2004. Then the number dropped by about 200,000. That is the first year when we saw what now is called CCD. Beekeepers from North Dakota asked me and USDA researchers to look at some colonies that had been in real good shape just weeks earlier and now were basically empty of bees. Since there had been severe drought in the area, I felt that malnutrition was the cause. I am sure malnutrition didn't help, but there was more there than we suspected. A few samples were taken to the USDA ARS lab at Beltsville for examination, but nothing out of the ordinary was detected.

When similar losses were observed two and three years later, the level of interest sky rocketed and remains very high at this moment.

"Pattern" to CCD?

On three separate occasions I have heard observations of the “spread” of CCD through apiaries. The first was a San Joaquin Valley (CA) beekeeper who told me that he sees the disease sweep from west to east, through his apiaries, at the end of summer. The second was a report, through Jerry Bromenshenk, that a beekeeper attempting to produce organic honey in Montana has 600 colonies spread around an area far from anything and anybody. A visiting beekeeper places an apiary near the center of that beekeeping area and stays only long enough to take advantage of the honey flow, then leaves. After the visiting hives are gone, CCD starts in the apiaries nearest where the visitor was located and spreads out from the center to the more peripheral locations.

The third, similar observation was sent to my e-mail as “Catch the Buzz.” This is a free, very current update of many things “bee” that you can receive (have to subscribe) simply by going to www.beeculture.com and clicking on the “Catch the Buzz” Right Here button. In this recent e-mail an unnamed CCD researcher is describing what happens in an apiary as CCD progresses. Among all the other description, this sentence caught my eye: “In large holding yards, CCD starts at one end and rolls through to the other end like a wave.”

Of all the things that may be involved in driving colonies toward colony collapse, the best one that would fit this “disorder spread” criteria would be a pathogen causing an epidemic. Pesticides, malnutrition, toxic food, etc. are not likely to affect the colonies in a “sweeping” or “rolling” fashion. That sounds like a contagion moving through the colonies by drifting bees. Remember, also, that when losses start occurring, that is not when the contagion is sweeping through. That happened weeks earlier, when all the bees looked healthy.

There are studies being conducted, right now, in which colony samples of bees, brood, and food are being taken from hives every so often and held for future analysis as soon as the monitored colonies start to show signs of CCD. I hope that a specific change is noted, and not just a multitude of changes that lead to the mess that we find at the end of the process.

Colony Collapse Still Around

Stories of collapsing colonies are still coming in. As in the previous year, they started in late summer and continued right through almond bloom. Involved beekeepers varied from some who never had problems before to others who were hit hard two years in a row.

As in previous years, samples taken after the collapse don’t tell us too much, because whatever happened occurred earlier. What we see is empty hives with no sample bees left to take.

Something that quite a number of beekeepers have noticed is that *Nosema* infections are much higher than they anticipated. When I arrived fresh from the University of Minnesota, I really emphasized the necessity of controlling nosema disease, especially if a beekeeper was going to sell queens and bulk bees to other beekeepers. That made quite an impact, especially on our Bee Breeders. Sales of fumagillin rocketed up in California.

Our Bee Breeders have been using fumagillin for decades to control *Nosema apis* with very good results. They had their treatment schedules worked out and samples sent to me for spore counts were nearly always ND (not detected).

This year, Dr. Marla Spivak and her crew began a project, with the assistance of Sue Cobey, to help the Bee Breeders select breeder queens whose workers demonstrated elevated hygienic behavior. Marla was pleasantly surprised to observe how well that trait already is established in many of the stocks.

During those visits to the beekeeping outfits, samples also were taken of worker bees and analyzed for *Nosema* spores. A few years ago, ND was the norm. This year, ND was a rare exception. Most colonies had levels of infection that required treatment, according to the old guidelines. Some counts were as high as we see in laboratory studies of caged bees.

How did this happen? Did our old friend, *Nosema apis*, become resistant to the fumagillin? I doubt it. The few studies that have been conducted over time showed no problem of that sort.

Perhaps this isn't *Nosema apis*. It is likely to be *Nosema ceranae*, according to verbal reports of the CCD researchers. The European studies suggest that *N. ceranae* is susceptible to fumagillin, but they use it at dosages up to four times stronger than we use for *Nosema apis*.

The Bee Breeders are not the only ones to see increased *Nosema* infections this year. Other California beekeepers are reporting high spore counts. Some are reporting globs of bee feces on the fronts of hives and on the ground in front of the colonies. Last fall, Randy Oliver was taking some samples from his colonies. He found that returning foragers, captured around noon and especially if they were writhing around on the ground, had elevated levels of spores. However, workers taken from the brood nest (nurse bees?) did not have demonstrable spores.

This follows the pattern that Dr. Higes presented at our MegaMeeting in Sacramento a few months ago. He stated that the nurse bees would appear to be uninfected during the spring and summer, but as late summer and fall approached, the bees inside the hive would start to build up spore levels, as well as the foragers. When nearly all the "house bees" were infected, the adult population would abandon the hive. Is this what we call CCD?

As our beekeepers try to resolve this nosema disease problem, they have to consider three important factors. The first is that worker honey bees infected with *Nosema ceranae* apparently will not take feed, either syrup or patty. Thus, the bees have to have the medicated syrup applied onto their bodies to force them to clean themselves off and take their medicine. Since you can only apply a small amount of syrup per treatment, the researchers in Spain suggest four treatments at one week intervals.

The second difference between treating *Nosema apis* and *N. ceranae* concerns the dosage of the medication. Without saying much about experimental trials, the Spanish have decided that the dosage should be about 2.5-3.0 times higher than that used for *N. apis*. Thus, they would mix the 95 gram bottle into 40 gallons of syrup, instead of into 100-120 gallons.

The third interesting factor is the formulation of the fumagillin that now is available to us. Fumagilin-B[®] is imported into the United States from a Canadian company, Medivet. The product is not "registered" as such, but the FDA has worked out a type of memorandum of understanding so that the product can be imported and used in the U.S.

The numbers on the label differ from those on the label of the old Fumidil-B[®], but the mixing instructions are the same for *Nosema apis*. However, since it is not likely that we have *Nosema apis* in our bees anymore, you should pay attention to the instructions for use against *Nosema ceranae*.

The Medivet label divides its instructions into fall and spring uses. Fall isn't difficult, because they are the same instructions as for the old Fumidil-B in the fall. It is the spring use that demands careful study.

The instructions say to feed "at a rate of 30 mg fumagillin activity per colony, 4 times at 1 week intervals." For our purposes, the next set of instructions is better. "Dissolve 454 g Fumagilin-B (one large bottle) in 40 US gallons of sugar syrup and feed each colony 1 pint (treats 320 colonies). Repeat 3 times at 1 week intervals." Schedule to complete treatment at least 4 weeks before adding honey supers."

Yes, this means that the dosage is about 2.5 times stronger than we used to use for *Nosema apis*. Yes, this means many additional visits to the bee yards. And, if you notice that the bees in the colony just are not taking up medicated syrup, you may have to pour it on the bees. That is the procedure used by the Spanish researchers. Spraying the applications on the bees is being tested, currently, by Medivet.

There are a few other Medivet suggests that bear repeating. Make sure the fumagillin is well blended into the syrup. This formulation blends into syrup much more readily than the old Fumidil-B – do not get the syrup very hot or the fumagillin will be inactivated. Check to see if the bees are taking the syrup. *Nosema ceranae*-infected bees often stop feeding, all together.

Vanilla, Not Citrus

I imagine that most of you are aware of the advertising program that Häagen Dazs ice cream has begun. They are spreading the word that the fruits in 40 of their products come from honey bee pollination. So does the cream (indirectly – from alfalfa and clover) that makes their premium ice creams so irresistible.

The company likes to spruce up its containers with various pictures depicting what is inside. Some California beekeepers were dismayed when they thought that they noticed a citrus blossom on the cartons.

Actually, that is a vanilla bean flower. The flowers actually look extremely similar. Citrus has five elongated petals flared around a cylindrical interior of fused anther filaments and an internal pistil. The vanilla flower (an orchid) has three sepals and two petals, which all look like elongated petals. A third petal is modified into a trumpet-like cylinder surrounding the anthers and stigma. Vanilla flower parts are greenish, with yellow in the center, while citrus is white. It would be very easy to confuse them on an ice cream carton.

New Honey Board Creations

Have you ever owned a Michelangelo, De Vinci, or Van Gogh? You can, now – on mugs, mini-posters, small posters, sweatshirts, long and short sleeved t-shirts, tote bags, women's v-neck shirts, Jr. Spaghetti tanks, or BBQ aprons. Of course, you will have the National Honey Bear logo in the design. Prices vary from around \$5-21.

Purchases can be made only online from CafePress. The Web site you will visit will be: www.cafepress.com/buy/

honey+board. If that doesn't work, go to www.cafepress.com and put **honey board** into the second search window.

Pollination Contract

Project *Apis m* (PAm) recently developed a very nice Web page that includes information about the organization, the research they are funding, an open-ended call for proposals for funding, and a "Sample Almond Pollination Agreement." That last document can be down loaded and modified to suit your individual operation and grower contacts.

One of the first things that is important is that the strength of the colony, in frames of bees, is to be determined "at the time of delivery." A blank space is left for denoting how long it can be, after delivery, that strength inspections are conducted.

Rental fee payments are listed as installments – 1. execution of agreement, 2. delivery of colonies, and 3. completion of pollination. In this case, payments not made on time incur a 10% annual interest charge.

If colonies have to be moved for bee-toxic pesticide applications or irrigation purposes, there is a \$4 per colony charge for removal and replacement.

A couple of really important clauses, late in the contract state: "Grower acknowledges that the beekeeper makes no warranty that the number of colonies set forth above will be sufficient to achieve full pollination of grower's orchard and that pollination is dependent on weather conditions, colony loss due to disease, pests or acts of nature and other matters beyond the beekeeper's control, for which the beekeeper shall have no responsibility. In no event shall the beekeeper

be responsible for failure or reduction of growers' crop."

PAm's url is: www.projectapism.org. Look under Current News & Events for the Sample Contract.

Canadian Queen Cell Imports

Authorities have decided how to try to deal with the loss of honey bees from Prince Edward Island, without importing adult bees and possible accompanying predators and parasites. Commercial beekeepers or others providing specific pollination services to crop producers (especially blueberries) may apply for an importation grant. The grant will pay up to 80% of the costs (up to \$10 per cell, and limited in number to 2/3 of their colony count) to import "capped queen cells."

There is a bit of red tape involved, like having the application work submitted by May 15th each year; having the queens come from pre-approved originating apiaries (didn't specifically state Canadian apiaries); special traits of imported stock and how well they actually did during the year; periodic progress reports on the bees and how they wintered; provide access to hives by government inspectors; etc.

The program will be continued, for one or more years, if these infusions of new stocks breathe new life into the PEI honey bee industry. If you wish to learn more about the program, contact Chris Jordan, program Manager, PEI Dept Ag, PO Box 16600, 440 University Avenue, Charlottetown, PE, Canada C1A 7N3. Phone: 866-734-3276 or 902-569-7638. FAX: 902-368-5729. I found the info at: www.gov.pe.ca/af/agweb/index.php3?number=1021775&lang=E. There are no blank spaces between any of these letters, punctuation marks, or numbers.

New Honey Bee Text

Dr. Peter Kevan at the University of Guelph, in Canada, determined that previously written honey bee texts were a bit “dated” in their information and presentation. Thus, his new book, *Bees: Biology and Management*, is described as follows: “This book is not only about ‘How to Keep Bees’ but why bees are kept, what it is about them that makes them amenable to management and domestication: their anatomy, physiology, behavior, diversity, ecology, and value to science, agriculture and the natural world. The main base of the information presented in this book comes from the European races of the Western honeybee, *Apis mellifera*, but other bees are far from forgotten.”

The text of the 345 page book is divided into 11 sections (called Chapters), then subdivided into a total of 51 fairly short and well illustrated sub-chapters.

The beginning information is devoted to basic bee biology and behavior: castes and anatomy of honey bees; colony structure; division of labor and changes in tasks with age. This is followed by metamorphosis and development; genetic caste determination; nutrition; hormonal control of development; and age-dependent behavior.

Then the seasonal cycle is discussed, as it relates to a region that has a really cold winter. As the season progresses, information is provided on mating strategies and genetics; colony reproduction; swarming; superseding; absconding; laying workers; and colony migration.

This is followed by honey bee communication; navigation; thermo-regulation; the nervous system; and sensory systems.

The next portion is on beekeeping, from its inception to the present. Included are descriptions of diseases, predators and pests. The final portion of the text deals with products of the hive and use of honey bees in crop pollination.

If you wish to learn more, go to: **www.volumesdirect.com** where a copy can be ordered for \$48.70.

Bee Schools

April 29-May 1 – Advanced Workshop on Instrumental Insemination Technique. Taught by Susan Cobey at the UC Davis Bee Biology Facility. \$400. Call Sue at 530-754-9390 to see if openings still exist.

May 3 – Intermediate Beekeeping Class, hosted by the Sacramento Area Beekeepers’ Association. Taught by UC Davis Extension Apiculturist Eric Mussen. Class will be held at the Sacramento County Cooperative Extension auditorium, 4145 Branch Center Road (1 block west of Bradshaw on Keifer Boulevard) from 8:00 AM to 5:00 PM with a break for lunch. Bring a veil, if weather permits colony inspection. The cost is \$35 per participant (\$30 for SABA members). For registration, call (916) 451-2337 or e-mail: info@sacramentobeekeeping.com.

May 24 – Beekeeping Basics, One Day Event (11:00 AM to 1:00 PM). The session will be hosted by Ron Hoyle [909-234-6339] and Jerry McCarter [909-982-6592] at 2535 Vista Drive, Upland, CA. The course will cover 1. how to properly assemble equipment, 2. basic hive inspection and management techniques; and 3. harvesting and processing honey. The course is free to members of the sponsoring

Beekeepers' Association of Southern California (BASC). Non-members will be charged \$8.00 and will become members of BASC. Bee suits, veils, hats and gloves are suggested. To secure a reservation, please call Mark Hoppe at 562-841-9754 or Mark Allen at: 562-505-2768. You also may register at: www.basbbees.org.

May 29 – Beginning Beekeeping Class. Hosted by the San Francisco Beekeepers' Association and taught by Randy Oliver. The class will begin at 9:00 AM and adjourn at 4:00 PM. For more information on the class and its location, check the Association website: www.sfbee.org or call 415-826-1250.

Oaks (near Sacramento). The class is scheduled from 9:00 AM to 5:00 PM. Please call 916-961-8727 for more information and to register.

Sincerely,

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June 21 – “Natural Beekeeping” class is being offered at Steiner College, in Fair