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Newsletter Emailed to You

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Hello California!

Dear California beekeepers,

I am truly thrilled to be the new Assistant Extension Specialist in Apiculture here at UC Davis and I can’t wait for us to get better acquainted. I know, I know, I have some big shoes to fill, but I’m thinking I have the next 38 years to do so. My official start date was September 1, 2014 so as you can imagine I barely had the time to learn how to get from my lab at Briggs Hall to my office at the Harry H. Laidlaw Jr. Research Facility. Despite the short time I’ve been here, I’ve had the pleasure of already meeting some of CA beekeepers. But until I get to meet you all, I will share a few words about myself, starting at the very beginning.

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I am a native of Bosnia and Herzegovina, a small Eastern-European country (right above the heel of the “Italian boot” if you decide to look it up on a map). At the time I arrived to the United States I was determined to become a veterinarian, but while working on my bachelor in animal science degree at Cornell University I decided I needed a greater challenge. On the advice of my college adviser, I signed up for an entomology class and that was pretty much it – I was hooked! There, I worked under Dr. Phil Kaufman providing support for studies on management of pestiferous insects in poultry houses and dairy farms in New York State. After graduating I continued to work in a veterinary entomology lab at North Carolina State University where I obtained my Master’s degree under the supervision of Dr. Wes Watson.

While I very much enjoyed the work I was doing as an applied scientist, I realized that to get ahead I would need to gain experience in basic research as well. Enter the honey bees! Dr. Christina Grozinger was a new faculty member at the time and was (and still is!) doing some remarkable work on the genomics of chemical communication in honey bees and collaborating with Dr. David Tarpy on understanding honey bee queen post-mating changes. Upon attending one of her lab group’s meetings I was hooked once again. My doctoral degree research examined measurable behavioral (e.g., queen mating flight behavior), physiological (e.g., changes in pheromones), and molecular (gene expression) changes that happen after the queen mates and reaches the final stages of ovary activation. More specifically I studied how anesthesia with carbon dioxide (CO<sub>2</sub>) during instrumental insemination, oviduct manipulation (mimicking the act of queen and drone mating), insemination volume, and insemination substances affect these post-mating changes. A beekeeper might argue that probably the most important investigation was into how

these post-mating changes in queens affect worker behavior and physiology which could alter colony social organization and lead to changes in colony productivity and survival.

As it often is in science, we found that things are not quite so clear-cut. We confirmed that CO<sub>2</sub> causes queens to stop attempting mating flights and helps them start producing eggs. However, when we studied what happens at the gene level we found that oviduct manipulation triggered greater changes in brain gene expression, while differences in the fat body gene expression (a place where egg-yolk proteins and proteins involved in immunity are synthesized) are primarily due to insemination substance and then insemination volume. We found even more intriguing results when we looked at changes in queen pheromone profile. I always see queens as egg laying–pheromone producing machines. They produce many pheromones from many glands and that is how they regulate the social organization of the hive (*i.e.*, they use pheromones to keep the workers “in check”). We took a closer look at two glands and found that instrumental insemination triggers changes in Dufour’s gland pheromone presumably signaling queen’s mating status, while physical manipulation, insemination substance, and volume all have long lasting effects on queen mandibular pheromone profiles, signaling the queen’s mating quality. Amazingly, workers seem to be sensitive to these differences and form a greater retinue around slides smeared with mandibular gland pheromone from semen vs. saline and high vs. low volume inseminated queens. But what does all this mean in terms of colony well-being? Results of our field study revealed an effect of queen insemination volume, likely through changes in pheromone on worker behavior (retinue response, building of new queen cells) and physiology (worker pheromone production preceding egg-laying) but also

on queen and hive overwintering survival. Understanding the regulation of reproductive processes can lead to better management practices for improved colony productivity and health. We also realized how much there is still to discover about honey bees. For example, there are many more compounds in mandibular glands than just the core five components comprising queen mandibular pheromone (QMP). This potentially opens up the door for improving synthetic pheromone blends often used to stabilize the hive in the event of queen loss or even for attracting foragers to bloom.

As a USDA-NIFA-AFRI post-doctoral fellow at Penn State, I conducted further investigations into which specific seminal fluid components are involved in regulating which specific changes in mated queens. Knowledge of the fine details of reproductive processes can be harnessed to improve queen quality, to extend their longevity and productivity and therefore the productivity of the entire colony. Since Christina Schulte and colleagues at Heinrich Heine University in Germany recently were able to insert a foreign gene into a honey bee queen, which was then transmitted to drone eggs, this line of research might be here sooner than we hoped. This indeed is very, very exciting! During my stint as a postdoc, I also conducted a survey in order to better understand what might be some of the societal obstacles to developing successful local queen breeding programs, which is of great interest to many beekeepers particularly in areas of the US with very cold winters. For an excellent update on current efforts towards creating and maintaining survivor honey bee stocks you should check out the *American Bee Journal* article by M.E.A. McNeil (October 2014 edition). Our efforts to support the PA beekeepers in creating a breeding program also resulted in a development of a Queen Rearing Workshop which, held for four years with great success.

Which brings me to a brief overview of my plans for our UC Davis apiculture program.

I have to start off by saying that I am very fortunate to have a wonderful team to work with – Billy Synk and Bernardo Niño (staff research associates) and Cameron Jasper (PhD student). You can learn more about us on our website <http://elninobeelab.ucdavis.edu/> and on our Facebook page, <https://www.facebook.com/elninolab>.

Our research program is dynamic and will be shaped by the contemporary needs of the industry. We will continue our research on queen mating and reproduction, especially considering the importance of Northern California beekeepers for the queen rearing and bee breeding enterprises. The program will expand to include studies crucial for supporting honey bee health. Current collaborative work includes examination of the effects of Israeli Acute Paralysis Virus (IAPV), Deformed Wing Virus (DWV) and Nosema gene expression regulation and longevity in workers. Understanding molecular mechanisms that underlie individual's responses to specific honey bee pathogens can help inform the implementation of appropriate beekeeping practices. In the near future we plan to contribute to the general understanding of synergistic effects of pesticides on honey bee health and collaborate on research evaluating alternative *Varroa* mite control. We want to work together with the beekeepers across the state of California conducting applied research leading to practical solutions.

Our extension and outreach program will provide something for everyone. First and foremost, we view ourselves as the liaison between the beekeepers and other relevant growers and the scientific community. For example, we know that not all of you are able to attend many great (cont. page 6)

**California State Beekeepers Association**  
**125<sup>th</sup> Annual Convention**  
**2014 Convention Program-“Celebrating Beekeepers”**  
**Hyatt, 24500 Town Center Drive, Valencia, CA 91355**  
**November 17-21, 2014**

Convention Sponsors:

Platinum: Mann-Lake Ltd.

Gold: Barkman Honey; Dadant & Sons; Beekeeping Insurance Services; Pierco Beekeeping Equipment

Silver: A&O Forklift; Dave Smith Motors

Bronze: Shastina Millwork; Cowan Mfg.

**Monday, November 17, 2014**

3:00 pm	Board of Directors Meeting	<b>Canyon Country</b>
7:00 pm	President’s Reception	<b>Topiary Garden</b>

**Tuesday, November 18, 2014**

**Grand Ballroom**

8:00 am	Registration & Exhibits Open	
8:30 am	Opening Ceremonies	
9:00 am	<b>Sponsor Recognition</b>	Bill Lewis
9:05 am	Reports from Standing Committees	
9:45 am	Platinum Advisors Report	Holly Fraumeni
10:00 am	Break	
10:30 am	American Honey Producers Report	Randy Verhoek, President
10:40 am	American Beekeeping Federation Report	Gene Brandi, Vice President
10:50 am	National Honey Board Report	Brent Barkman, Board Member
11:00 am	“Almond Odyssey”	Kim Flottum/Kodua Galieti
12:00 pm	Lunch on your own	
1:15 pm	Presentation by Mann-Lake Platinum Sponsor	
1:25 pm	“Bee Forage Support System”	Laurie Adams Davies Ex. Director Pollinator Partnership, NAPPC
2:00 pm	Pam Partnerships: “Bees are Social and so are We”	Christi Heintz, Ex. Director PAM
2:30 pm	“Blue Orchard Bees”	Dr. Gordy Wardell
3:00 pm	Break	
3:15 pm	“Successful Over Wintering Indoors”	Eric Olsen
4:00 pm	Panel Discussion-“Bridging the Gap Between the Beekeeping Industry and the Urban Beekeeper”	Zac Browning Ruth Askren Sarah Red-Laird
5:00 pm	Exhibits Close	

**Tuesday, November 18, 2014 Concurrent Sessions**

**Valencia Room**

1:30 pm	“Educating the Educators”	Sarah Red-Laird
2:00 pm	“Fundraising for Bees”	Chelsea & Rob McFarland HoneyLove.org
2:30 pm	“Honey Bee Pests, Diseases, & Treatments- Following the Label”	Randy Oliver Scientificbeekeeping.com
3:00 pm	Break	
3:15 pm	“Urban Beekeeping, Beginner to Advanced”	Kim Flottum
4:00 pm	Mead Making-‘Homebrew Express’	Garret Miller
5:00 pm	Exhibits Close	
<b>7:00 pm</b>	<b>Welcome/Exhibitor’s Reception in Exhibits Areas – Exhibits Open</b>	

**Wednesday, November 19, 2014**

**Valencia Room**

8:00 am	Registration & Exhibits Open	
8:00 am	Presentation by Dadant Gold Sponsor	
8:10 am	Panel- “Land Trusts Working with Beekeepers”	Darla Guenzler, CCLT John Miller

9:15 am	“Forage Habitat Partnerships in the Dakotas”	Justin Wages, Placer Land Trust
10:00 am	Break	Pete Berthelsen, Pheasants Forever
10:30 am	“Ongoing WSU Research on Honey Bee Germplasm: Dr. Walter S. Sheppard Cryogenics, Breeding, Distribution & Field Trials”	
11:15 am	“The Browning Honey Story”	Zac Browning

**Wednesday, November 19, 2014**                      **Concurrent Session**                      **Canyon Country**

7:00 am	Sioux Honey Association Breakfast	Chris Wile
	<b>Invitation Only</b>	<b>Grand Ballroom</b>
8:00 am	“Paperwork Made Easy- Pesticide Use Reports”	Larry Lima
8:30 am	“Honey Wheel” and “CA Master Beekeeper Program-Planning Update”	Amina Harris, UC Davis
9:15 am	“On the Radar- Hot Topics”	Kim Flottum
10:30 am	Break	
10:30 am	“No Treatment Beekeeping in Arizona”	Les Crowder
11:15 am	“The Effects of Bee Safe Insecticides”	Dr. Reed Johnson

**Wednesday, November 19, 2014**                      **Grand Ballroom**

<b>12:00pm</b>	<b>*Research Lunch - “A Survivor Population Of European Honey Bees Living in the Wild in NY State”</b>	<b>Dr. Thomas Seeley</b>
2:00 pm	Auction – Fundraising for Research	
6:00 pm	Research Committee Meeting chaired by Alan Henninger	<b>Canyon Country</b>
6:00 pm	Resolutions Committee Meeting Chaired by Roger Everett	<b>Newhall Room</b>
8:00 pm	Movie Night	<b>Valencia Room</b>

**Thursday, November 20, 2014**                      **Valencia Room**

7:00a	Project Apis m “Board Meeting”	<b>Newhall Room</b>
8:00 a	Exhibits Open	
8:30 a	CSBA ANNUAL BUSINESS MEETING	
10:00 a	Exhibitors Break	
10:30 a	Presentation by Gold Level Sponsor	
10:40 a	“Bee Informed Partnership- Update”	Dr. Dennis vanEngelsdorp
11:00 a	“Research Projects”	Randy Oliver
Noon	Lunch Break	
<b>Noon</b>	<b>Ladies Auxiliary Lunch</b>	<b>Topiary Garden</b>
1:15 p	“CA Extension Apiculturist-Passing the Torch”	Dr. Eric Mussen Dr. Elina Lastro Nino
1:45 p	“Understanding Factors Affecting Queen Health”	Dr. Jeffery Pettis
2:15 p	“Sperm Viability in Queens & Factors of Diminished Drone & Queen Reproductive Quality”	Dr. David Tarpy
2:45 p	“VSH based Resistance”	Dr. Jeffrey Harris
3:00 p	Exhibits Close	
3:30 p	Panel – “Keeping Bees Safe in Almonds-Panel”	Bob Curtis, Almond Board of CA Randy Oliver, Beekeeper Jeff Rasmussen, CAPCA Ryan Cosyns, Almond Grower/Beekeeper
5:00p	Program Ends	

**Thursday, November 20, 2014**                      **Concurrent Sessions**                      **Canyon Country**

10:30 a	“Honeybee Democracy”	Dr. Thomas Seeley
11:20 a	“Panel - TED Experience”	Dr. Dennis vanEngelsdorp John Miller Sarah Red-Laird
Noon	Lunch Break	
1:15 p	“Suitability of Various Pollen Substitutes”	Dr. Kirk Anderson

2:00p	“Taking Advantage of Honey Bee Broodless Periods to Enhance the Effectiveness of Mite Treatments”	Dr. Brandon Hopkins-WSU
2:45p	“Utility of Honey Bee Genetic Diversity as a Resource for US Queen Breeding”	Megan Taylor-WSU PhD student
3:00p	Exhibits Close	
3:30 p	“The Bee Hive as a Honey Factory”	Dr. Thomas Seeley
4:15p	TBD	
4:15p	CA Apiary Board Meeting	<b>Newhall Room</b>
5:00p	Program Ends	
<b>6:00 p</b>	<b>Social Hour/Silent Auction</b>	<b>Convention Foyer</b>
<b>6:45 p</b>	<b>Silent Auction Ends</b>	
<b>7:00 p</b>	<b>*Annual Banquet, Awards and Auction</b>	<b>Grand Ballroom</b>

**Friday, November 21, 2014**

**Canyon Country**

8:00 a CSBA Board of Directors Breakfast Meeting chaired by Brad Pankratz

\* Ticketed Meals

conferences related to beekeeping so we will attend for you. Either through our Newsletter or when you invite us to come and talk to your beekeeping group, we will get you up to speed on all of the current honey bee research happening across the country. We also ask you to share with us your concerns and ideas so we can use that information to plan future research efforts. Furthermore, serving on various advisory boards will allow us to guide decision making and legislation based on the most up-to-date scientific information.

Our group is already busy developing curricula for various clientele groups ranging from school children to seasoned beekeepers. Youth programs will be tailored for specific age-groups. We are also debuting a hands-on Queen Rearing Techniques class in the spring 2015 and will expand our offerings in the upcoming years. Although there is no replacement for practical instruction, we are aware that we live in a very large state so we will work towards developing web-based educational tools tailored to California groups. And make sure you look for us at public events such as California State Fair and California Agriculture Day.

Busy, busy bees we are and we are very excited about working together with the

beekeepers, growers, CE advisors and other members of the University of California community. California truly is a great place to “bee” and we hope to be calling it a home for many, many years to come.

ABC’s BMP (by Eric Mussen, Extension Apiculturist Emeritus)

For decades the Almond Board of California has been keeping an eye on honey bee health, and funding research on honey bees. The almond growers and beekeepers have developed a mutualistic relationship in which both watch out for the other. Also, both groups are aware that honey bee colonies have to thrive for 12 months of the year, and more than 90 other commodities, in California alone, are dependent upon honey bee pollination. Recently, unanticipated problems with colony damage following exposure to pesticides – especially to products that previously seemed benign to honey bees – has prompted the Almond Board to action.

A group recently gathered to discuss the problems and to develop what appear to be the most important aspects of controlling pest problems, without damaging honey bee colonies that might have foragers working in

the area. These suggestions became Best Management Practices (BMP).

The underlying basis for this approach is COMMUNICATION. If everyone from the beekeeper, the broker, the grower, the pest control advisor, and the applicator were in on the decisions, then most problems could be avoided. The need for pest control should be based on monitoring the pest level and deciding when a treatment threshold will be met. Then, the choices of treatment materials and timing of the applications become very important.

In almonds, and a number of other crops, timing can be critical. In cases where pesticides cause significant problems to the colonies, foraging bees have collected nectar and pollens from contaminated blossoms. The contaminated food is brought back to the hive and is consumed immediately or mixed into the food stores. Stored pollens undergo a sort of fermentation process and the “pickled” pollens (“bee bread”) can remain moist and nutritious for months. They will be consumed when the bees are rearing brood and fresh pollens are no longer being collected.

If the stored pollens are contaminated with pesticides damaging to honey bees, especially to developing bee brood, then brood is lost and colony size reduced well into fall and through the winter. The colonies may not be strong enough to use for pollination in February. More information on that subject is supplied in a subsequent article.

With almonds and a number of other crops, honey bees forage for pollen only for a portion of the day. Usually, this is morning through early afternoon. Then all the pollen is gone for the day and the bees go elsewhere. Applications of short residual products that do not contaminate pollens or pollen-collecting bees will do least harm to

the colony, although bee-toxic materials will kill nectar foragers that are in the blossoms all day. Recently, the problem has been tank-mixed concoctions of fungicides, insect growth regulators, sometimes fertilizers, and the newer adjuvants, that advertise as being penetrants. Adjuvants, and inert ingredients in formulations, are not listed by active ingredient on the labels, and some of them are quite toxic to honey bees.

The total guidelines package is available for downloading on the web from ABC. Since it is voluminous, they condensed the important facts down to a double-sided page for beekeepers and growers, and a single sheet for PCAs and applicators.

The hope is that by bringing this information to all individuals involved in making these types of decisions, honey bees will less often become involved with pesticides that cause economically severe damage to honey bee colonies. We have to protect our pollinators in order to continue to produce our crops.

Nearest Relatives (by Eric Mussen, Extension Apiculturist Emeritus)

This might seem to make little difference to beekeepers, but one of the goals of taxonomists is to try to determine the closeness or distance of relationships among groups of insects. The Order Hymenoptera includes all those stinging things and their relatives. But, which groups are more closely related to others? The overarching question was, “Why do we have social groups of wasps and bees and what were their precursors?”

Three entomologists at UC Davis, Drs. Brian Johnson, Joanna Chiu and Phil Ward and their staffs joined Ernest Lee from the Sackler Institute for Comparative

Genomics to dissect the insects molecularly and came up with the following suggestions.

Apparently, the most basic group includes the cuckoo wasps and their relatives. They are parasites that don't build their own nests, but parasitize those that do. The next major split separates the vespid wasps (paper wasps, hornets, yellowjackets, and potter wasps) from the rest of the wasps, ants, and "speciform wasps" and bees. Yes, I had to ask what speciform wasps are. That group includes the mud daubers.

Finally, the ants and bees turned out, in this way of looking at things, to be really close relatives. Usually taxonomists place vespid wasps and ants a lot closer together. And I thought that honey bees are nothing more than hairy yellowjackets. Shave a honey bee sometime and see if it doesn't

look a whole lot like a yellowjacket with blunted mandibles and squished legs.

If this piqued your interest, the paper can be located at:  
<http://dx.doi.org/10.1016/j.cub.2013.08.050>.

Sincerely,

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