NC STATE UNIVERSITY

April 2017

Wolfpack's Waggle

April 2017 Newsletter

NC State Apiculture Program

Dedicated to the dissemination of information and understanding of honey bee biology and management

Issue 2, April 2017

More inside

What have we been up to?

It's been a busy spring thus far, and things are only just beginning! Joe has started his project by raising queens, Hannah is off to Peru then across the state at the Ag Experiment Stations, and James received a whopping 1,500 old replacement queens from Ray Oliverez in CA for his project. Esmaeil had a nice review paper accepted on the interaction of queens and disease for a special issue on bee health, and Hongmei has been busy in the lab and field with her egg-injection project. Looking ahead to this summer, both Claire and Sarah will be continuing to help with their projects, we will be joined by three high school interns (one working with Erin and two working with Hongmei), and we will have another two undergrads joining the program (one as part of the Bee MORE program studying the interface between bees and microbes). With 35 new or ongoing research projects, we will definitely be staying busy!

New major grant on queen quality

We have recently secured a $1M grant from the USDA Food Security Challenge Area for Pollinators (FSCAP) to conduct research and extension on why honey bee queens are experiencing so many problems.

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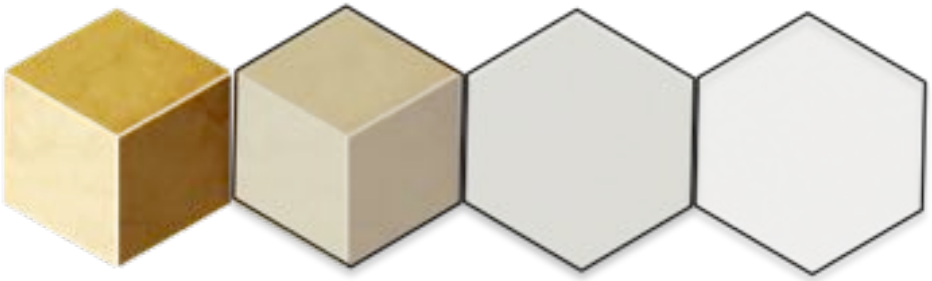
Beekeeper Education & Engagement System



New developments in the BEES network

Course enrollment predictably lower with increased overhead costs

The BEES network has officially moved has moved to DELTA as of January 1, 2016, and is now including a 43% overhead on each person for each course. While we have been on hold in developing new material for the network, we continue to have steady traffic in the various courses particularly at the introductory levels.

Beginner level

BEES 1.01: Basic honey bee biology and life history (1.66 hours)

BEES 1.02: Introduction to beekeeping and hive management (1.95 hours)

BEES 1.03: Importance of bees and beekeeping to society (1.71 hours)

Sign up today @:

http://go.ncsu.edu/BEES

Advanced level

BEES 2.01.02: Honey bee anatomy

BEES 2.01.05: Queens and mating

BEES 2.01.07: Foraging biology

BEES 2.02.03: Pathogens, parasites, pests, and problems

BEES 2.02.04: Varroa mite IPM

BEES 2.02.05: Queen rearing and bee breeding

BEES 2.03.01: Africanized bees

BEES 2.03.07: History of beekeeping

Lab spotlight: Erin McDermott

Victoria Blanchard, who goes by Viki, is a visiting undergraduate researcher from the University of Exeter in southwest England. She is doing the equivalent of her junior year abroad, having received a competitive grant to travel here for the academic year.

Viki has been working in James Cresswell's lab at Exeter, who is a notable bumble bee researcher in the UK. Her independent project here has been to compare the immune system responses to cold stresses among honey bees, bumble bees, and solitary bees.

Viki's independence and drive have been nothing short of exceptional, and we will all miss her collegiality and dedication when she leaves in June. She is very well poised to continue her research into graduate school.

Reduced queen longevity has been a consistent problem for beekeepers in recent years. Understanding what factors affect sperm viability will help us mitigate this important problem. Photo by K. Lorenzen.

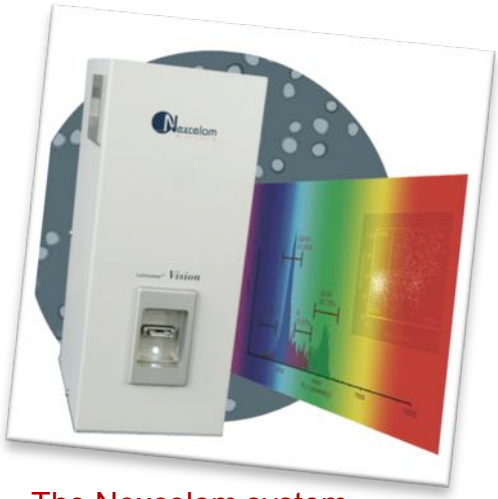
Improving colony health by increasing the reproductive quality of honey bee queens

Our new 3-year, $1M grant from USDA-AFRI may prove to be a real game-changer when it comes to understanding why good queens go bad.

Survey results from beekeeping operations in the U.S. have consistently shown that one of the primary perceived problem for beekeepers is 'poor queens.' While this factor encompasses many different symptoms, most of these reports document premature supersedure (queen replacement), inconsistent brood patterns, early drone laying (indicative of sperm depletion), and failed requeening as indicative of low queen quality. Determining the factors that result in low-quality queens is therefore of fundamental importance for improving colony productivity and fitness.

These issues directly address the USDA program area priority on the 'development and evaluation of strategies to reduce declines of pollinators in agroecosystems and/or surrounding landscapes caused by one or more factors such as habitat changes or loss, nutritional imbalances, pathogens, pests, pesticides, toxins, genetic factors.' In doing so, this addresses Section I—Priority Action 4 in the White House Pollinator Research Action Plan released by President Obama in 2015.

This new grant from the USDA-AFRI program for pollinator health is in collaboration with Dr. Jeff Pettis, formerly the Research Leader at the USDA-ARS Beltsville lab and now at the University of Bern in Switzerland, who is a leading authority on apiculture and queen biology. Jeff has done some recent work on how the chilling of queens during shipping can significantly decrease the viability of stored sperm, which may lead to problems downstream. We will also be collaborating with Dr. Marla Spivak and her PhD student Katie Lee (University of Minnesota) on some real-world testing of failing queens in commercial operations.



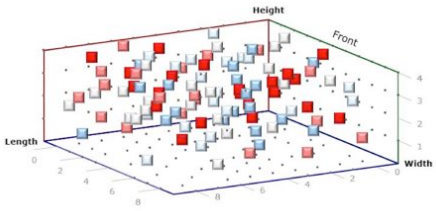
The Nexcelom system automatically measures sperm viability and stored sperm counts in queens.

Our objectives are to: (1) Establish temperature thresholds that affect sperm viability in queens; (2) Measure temperature fluctuations of queen shipments in (a)

New USDA grant (Continued)

packages and (b) battery boxes; (3) Quantify pathogen loads and pesticide residues in queen bees; (4) Solicit stakeholder participation to test problems with queens; (5) Improve information acquisition through the Queen & Disease Clinic as a resource for queen producers and beekeepers nationwide; and (6) Develop best-management practices (BMPs) to mitigate identified threats to queen bees.

We have already made some nice progress on this project. For example, James Withrow has measured temperature fluctuations experienced by bees during package transport. Interestingly, queens in packages on the outside of the shipment were not chilled more often than those sheltered on the inside, yet the rate of queen failure after establishment was still over 20%. We hope to expand on this work to determine how temperature, disease, nutrition, and management practices all interact to result in queen- and colony failure so that we might avoid just it.



James' studies have shown large variation in the temperature profiles experienced by queens during package shipment, but temperature had little effect on queen survival in the colony.

NC State Apiculture Program

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Support the NC State Apiculture Program!

The Apiculture Science fund-raising efforts operate under the auspices of the North Carolina Agricultural Foundation, Inc. a 501(c)3 organization. You will receive an official receipt for your donation.

Make a gift toward emerging needs – Consider supporting the program with a gift that would go toward the current area of greatest importance. Flexible funding enables the Apiculture Program to address critical needs as they emerge, often enhancing the program beyond what would be possible through restricted grant funding. Funding of any amount, from $10 to $10,000, will be extremely helpful.

Make a gift-in-kind – The Apiculture program is always seeking creative solutions to its material needs. If you have surplus equipment or other non-monetary assets to give (e.g., gently used honey extractors, microscopes, even vehicles), please consider donating them to the program. You will receive credit for the monetary value of the gift and the gratitude of our faculty and students.

MAKE A DONATION

Make an estate gift – If you are interested in planning an estate gift to benefit Apiculture, please let us know! We can provide you with the tools you and your attorney will need to ensure that your wishes are fulfilled. Please click the link above for more information.

SAHRC 2017

Last month, 9 of us traveled to UNCG to attend the 13th annual student symposium of the Southern Appalachian Honeybee Research Consortium. James, Joe, Chris, Hannah, Viki, and even Steve Renya (from Marce Lorenzen's lab) all presented their work and did a fantastic job. Every year, this grass-roots gathering of NC State, UNCG, UNCC, Wake Forest, VT, East TN State, and Clemson honey bee programs just gets better and better!

Tarpy lab participates in march for science

We had numerous lab members independently participate in the Earth Day march in support of science. Erin and Hannah (above right) traveled up to DC, Hongmei took part in the contingent that contracted a bus with the Keck Center, and James, Joe , and Viki (above left) drove separately.

Random notes

Congratulations!

Hongmei Li-Byarlay was recently given an offer to join the faculty at Central State University in OH, and she will be starting her own research program there starting

August 1st. Hongmei has been an NRC fellow here at NC State for 3 years, where her main area of research has been on investigating the effects of oxidative stress on honey bee health. These types of faculty positions and opportunities are very rare in our profession, so we couldn't be happier for and more proud of Hongmei, and we wish her nothing but success in her new appointment!

Welcome aboard!

The newest member of our lab is Dr. **Brad Metz**, who is a postdoctoral researcher hired to spearhead our Queen & Disease Clinic and conduct research on issues related to reproduction. Brad got his PhD from Texas A&M University with Dr. Tanya Pankiw and has extensive backgrounds in apiculture, teaching and curriculum development, and outreach with beekeepers. We look forward to working with him further as he gets up to speed!

…and sadly missed

It is bittersweet that we say goodbye to **Parry Keitzman**, who was a postdoc in our lab for the last year or so. Fortunately for Parry, she secured a very nice position working for a non-profit pollination project that is helping to reclaim strip mine operations in WV for pollinator-friendly habitat. She and her husband are also expecting their first child in July, so we couldn't be happier for them!

Sue Cobey visits the lab

We were fortunate to be able to have **Sue Cobey** in town this spring to help us troubleshoot some problems we've been having with our instrumental insemination operation. While we have successfully employed II for years in our research, lately I've lost my touch to be able to perform it reliably. Sue also helped to train Jen, James, and Joe in the technique, so hopefully we'll have a full suite of insemination experts in the lab fairly soon!

Teacher's corner: **Courses at NC State**

We are not teaching any courses this Spring 2017 semester at NC State, since our distance-education course on 'Honey bee biology and management' is currently on hiatus. We have already reached maximum capacity for our fall offering of ENT 203 course, "An introduction to the honey bee and beekeeping," which reached 180 students in record time during the open enrollment period. We hope this is a continuing sign of the course's popularity and future potential for increased enrollment or even multiple sections.

http://go.ncsu.edu/honeybees

Tarpy's back page

When I first started at NC State in 2003, my very first NCSBA meeting was in Elkon, NC. There, I was cornered by a highly-vocal old-timer who proceeded to tell me bee story after bee story. My eyes lit up when he told me that he had the oldest queen insemination device in the state of North Carolina. When I asked him what and where it was, he pulled out an old sling shot and told me to put a drone in it and fire it at a queen. That was my introduction to **Bill Shepard**, and I will never forget how big a laugh we had at that.

Bill Shepard in 1957 performing a 4H demonstration about beekeeping. There will never be another beekeeper like him, and he will be universally missed.

With such a protracted history of beekeeping in the state, pretty much everyone has a similar story to tell about Bill particularly among those who knew him best. It will be hard to imagine an NCSBA, NCDA, or NC beekeeping community without his lively spirit, joie de vivre, and boundless optimism, but I rest assured knowing that we all now have a patron saint of beekeeping who is actively looking over us.

It was among Bill's final wishes to help raise money for our research and extension program. It is among the most humbling and appreciative acts of kindness that I have ever experienced, and I will forever be grateful to him, his family, and those who found it fitting to support our program in his name. Bill, you will be missed and always appreciated.

Sincerely, David

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