

Wolfpack's Waggle

January 2015 Newsletter

NC State Apiculture Program

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

Issue 1, January 2015



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What have we been up to?

The beginning of a new year always brings reflection about the previous. We've had another successful year, with six peer-reviewed publications and 21 presentations at scientific meetings. We have 10 active grants totaling \$1.4M, and we have more people in the program than ever. This past year saw the addition of several new postdocs in the lab, both of whom have been stellar additions to our group so far. Holden Appler graduated this past year with his MS degree, and we eagerly anticipate the publication of his two (and possibly four) manuscripts on the effects of urbanization on honey bee immunology and disease. On the extension side, collectively we delivered ~30 presentations and workshops to various beekeeper groups for ~6,000 individual contacts, and we were covered by 12 media stories on our work. New courses on our BEES network continue to be on hold until the migration to the DELTA server is finalized (see page 2), but we hope it will once again gain some traction. Overall, 2014 was a great year, and we hope the same for 2015!

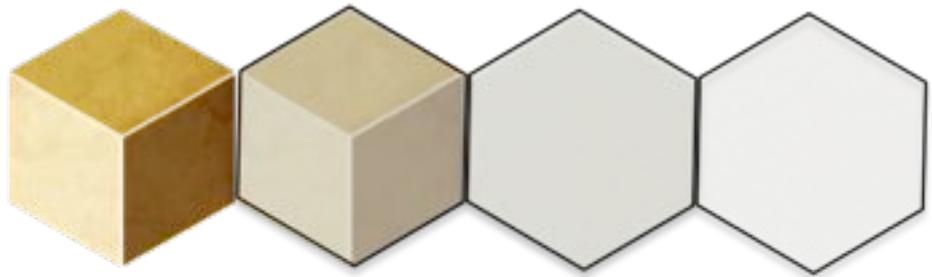


Quantifying the quality of CA commercial queens

We have been blessed, for the second year in a row, to have received a generous grant from the CA State Beekeepers to help put the Queen & Disease Clinic into practice.

More on Page 3

Beekeeper Education & Engagement System



New developments in the BEES network

The extension server for the college is discontinuing. However, these online beekeeping mini-courses will now be offered through DELTA!

The **BEES** network is moving! What was once hosted on the Extension server of the College of Agriculture and Life Sciences (CALs) has now migrated to the Distance Education server. While it is a pity that budget cutbacks continue to impact extension delivery, it is comforting that we will be able to continue these courses for the time being. It's initial roll-out has been a bit rocky but we hope to work out the kinks soon.

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)

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

Sign up today @:

<http://go.ncsu.edu/BEES>

Lab spotlight: Jennifer Keller

What can we say about Jennifer that will adequately do her justice? She's our rock. Our constant. Our savior?

Jennifer is the University's Apiculture Technician, the "chief beekeeper" for the NC State Apiculture Program. Far more than simply

someone who manages our live bees, Jennifer is an integral and invaluable member of our overall research, extension, and teaching programs.

But perhaps most impressive about Jennifer's service is her discreet, personal impacts that are

difficult to categorize or be easily measured. Simply put, the Apiculture Program would not be what it is today without Jennifer Keller, and all of the recognition and reputation that our efforts have received is in large part attributed to her tireless efforts.



CA Beekeepers support Queen & Disease Clinic for second year

We have been blessed, for the second year in a row, to have received a generous grant from the CA State Beekeepers to help put the Queen & Disease Clinic into practice.



We can measure queen quality very accurately and quickly

There can be no question that queen longevity has decreased substantially over the last few decades. Historically, queens would remain viable egg layers for 2-3 years, whereas today beekeepers routinely requeen twice a year or more. Determining the factors that result in low-quality queens is therefore of fundamental importance for improving colony productivity and survival.

One of the major suspects behind premature queen failure is the decreased viability of queen sperm. Queens mate early in their lifetimes with an average of 14 drones, storing a proportion of each male's sperm in her spermatheca. Only live sperm can actively migrate into the spermatheca, thus sterile drones do not (in fact cannot) contribute to queen insemination. However, because the storage conditions of sperm in the spermatheca is metabolically taxing, "fragile" sperm can be subject to dying after storage, leading to decreasing sperm viability within a queen over time. When a queen can no longer effectively fertilize eggs, colony productivity is clearly negatively

affected. Studies have also shown that the rearing environment of queens greatly affects their reproductive quality. This establishes the obvious need to measure queen reproductive quality in general and sperm viability in particular in order to diagnose queen failures.

We were extremely fortunate to have been funded last year by a grant from the CA State Beekeepers' Association to establish our new [Queen & Disease Clinic](#). This effort was greatly facilitated by [Project Apis m](#), who enabled us to purchase a Vision CBA Analysis System[®] (Nexcelom Bioscience, Lawrence MA) for high-throughput processing of sperm samples. This device uses high sensitivity fluorescence and brightfield cell counting of dead and living sperm simultaneously, and it has facilitated our development of a high-throughput and repeatable analysis of the queens.

We wish to follow up on our previous work and test factors of queen quality that beekeepers themselves find important. In doing so, we wish to enter into numerous collaborative

arrangements with participating beekeepers to empirically test for factors that they strongly suspect might be behind the problems that they are experiencing with queens. In doing so, we will implement proper controls for comparison as a means to provide sufficient support to bolster or refute their initial diagnoses in the field. Our experience has shown that this approach better optimizes the use of the [Queen & Disease Clinic](#).



Our new Nexcelom machine automatically measures sperm viability and counts stored sperm in both queens and drones.



Tarpy lab in the news

Our CALS administration put together a really nice video to showcase at the recent "Innovation in Action" multimedia presentation at the NC Agriculture and Biotechnology Summit. The session was very well received, although nobody in the program was able to attend because it was held during the ESA conference.

[LINK](#)



Next Apiculture webinar January 15th, 2015

We are delighted to be hosted by the Chatham County Beekeepers Association for our next live online webinar about bees and beekeeping. The topic is "[What aspiring beekeepers really need to know: discussions among beekeepers.](#)" Just let us know if you wish to join as a club or as an individual!

[LINK](#)

Random notes

Best wishes, Mark!

It is bittersweet that we bid adieu to Mark Jandricic, who joined us just over a year ago and has been spearheading our Queen & Disease Clinic (as well as helping out in the lab on many, many things). He and his wife are moving back to Ontario, where she landed a rare, ideal position in her field. While he has some trepidations about moving back to Canada in January, we are all very happy for him and thank him earnestly for everything he's done over this last year. Thanks again, Mark!

Welcome aboard!

We have over 20 people in the lab now, in no small part because of the great crew of undergraduate researchers. Our two newest undergrads are Omar Halawani and Hannah Thigpen. Omar will be helping out Mike Simone-Finstrom on the "queen genomics" project, measuring queen quality traits using the high-throughput methods we've developed. Hannah is our first 'Media Intern' for the program, a position we hope to maintain indefinitely. Her skills and background as a design major will serve her—and us—very well.

Congratulations!

Our undergrad researchers have continued our perfect streak on

submissions to the undergraduate research grant program; Jennifer, Ravi, and Gabriella ALL received funding for their research grants, each for \$750! Jennifer's grant will determine if genetic diversity predicts stronger immune response in bees. Ravi's grant will enable him to continue his work on measuring oxidative stress in migratory vs. stationary bees. Gabriella's project will be to explore the disease ecology of native bees in the Raleigh area. Congratulations again, and great job to each of you!

2014 Swarm Collective

This past summer, we launched a new trial citizen science research project for beekeepers everywhere. In doing so, we asked beekeepers to send us their mite counts before and after their mite-control treatment so that we can calculate their relative efficacy in reducing varroa levels.

The original hope was that we would amass enough data from a sufficient number of beekeepers that we'd be able to truly compare the efficacy of different mite-control strategies. However, we only received data from a total of 6 beekeepers, so we're unable to draw any conclusions other than one important one: controlling for mites, either with or without chemicals, helps tremendously!

Thanks to those who participated this year, and we'll see if this initiative continues in 2015.

Teacher's corner: Courses at NC State

We're teaching two courses this Spring 2015 semester at NC State. ENT 401, "Honey bee biology and management", which is a distance education (DE) course despite it having three weekend field days for hands-on beekeeping activities, is already over capacity and at an all-time high enrollment. ENT 601/801, "Social behavior of insects," is a graduate-level course being co-instructed with Hongmei Li-Byarlay and John Meyer, and it is also at an all-time high enrollment of 14 MS and PhD students. Should be a busy but fun spring semester!

<http://go.ncsu.edu/honeybees>



Tarpy's back page

The more things change, the more they stay the same...

When I started this position 12 years ago, it was in conjunction with some very serious (and sometimes even heated) discussions between the NC State Beekeepers and our administration at NC State University. At issue was the role that the NC State Apiculturist played within the association. Historically, extension specialists were central to the running their respective clientele groups (including beekeepers), but over the last few decades there has been a concerted effort to make clear the boundaries between NC State and such private groups (see the official policy [here](#)). As a result of the negotiations during my hire, I was granted the unique privilege of being the only extension specialist in the College of Agriculture & Life Science to be allowed voting rights on the board of their clientele group (in this case, the NCSBA).

As things have evolved in the NCSBA over the past few years, as well as within Cooperative Extension and particularly our Apiculture Program, that special role has waned. This was particularly precipitated by the budget cuts that prompted NC State to cede the Master Beekeeper Program entirely to the NCSBA, which was one of the main functions that our program provided on behalf the association. As such, members of the NCSBA board have recently revised their Constitution and By-Laws, and my position title will be changed and I will no longer have special voting privileges on the board of directors.

This change, while very subtle and will likely go unnoticed by most, means that I will no longer be "wearing an NCSBA hat" while performing any extension or other duties. While this brings my position into alignment with NC State policy and provides much better clarity of purpose, it is still somewhat regrettable that we will not be as involved in the NCSBA. Separate pillars, however, make for a stronger foundation, and along with the NCDA&CS, North Carolina will continue to have the best three-legged stool in the country supporting the state's beekeeping community.

Sincerely, David