NC STATE UNIVERSITY

October 2018

Wolfpack's Waggle

October 2018 Newsletter

NC State Apiculture Program

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

Issue 4, October 2018

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What have we been up to?

With our summer research finally behind us, we are now busily analyzing our results, processing collected samples, and otherwise making sense of it all. Daiana has been busy writing up several previous studies as well as generating new samples on a project that is investigating the ovary development of *in vitro* queens. Brad and Nissa are cranking up the pheromonal analyses from a group project this summer on queen introductions, and Lauren is analyzing the behavioral dataset from the same observations. Joe has been working on larval exposures to different pesticides, and together with Carson is also testing the effects of mite treatments on adult bees. James wrapped up his season's research early so that he could attend both the IUSSI conference in Brazil and the EAS conference in VA, where his research was well received. Hannah has wrapped up her third and final season collecting bees in the pollinator communities all across the state and will have a wealth of data to analyze about their composition and health. Erin has been burning the candle on both ends processing samples for the BIP research project as well as the clinic, and Jennifer is quickly getting all of the colonies ready for winter through feeding and mite control.

2018 veterinarian conference on honey bees

The first-ever conference of the Honey Bee Veterinary Consortium (HBVC) was held at the NCSU vet school this fall, which we hope will be the first of many to come in an effort to bring vets into the beekeeping community.

More on Page 3

Honey Bee Queen & Disease Clinic

Better Data, Better Bees

Quality Assurance

Morphometric Analyses: multiple measures of queen or drone, body and reproductive tract (rearing quality)

Quality Report: a "grade" report of a queen or drone's reproductive quality for your quick interpretation

Semen Quality: total sperm count, and sperm viability in queens (mating success), or drones (mating potential)

Genotyping Analyses: full assessment of paternity for up to 48 workers and an estimate of queen mating frequency

Troubleshooting

Pathogen Screening: identification of presence and relative levels of ABPV, BQCV, DWV(A&B), IAPV, LSV, Trypanosomes, and both *Nosema* species

Mitotyping for Africanization: genetic analyses of maternal ancestry as African or European using population genetic techniques and markers

Your Bees, Your Data: any results or interpretations from our work is held in the strictest confidentiality and anonymity

Customized Experimentation

This highly-tailored collaboration involves custom experimental design, analyses, and interpretation. This unique partnership between science and industry has been utilized to:

- Test the impact of various agrochemicals
- Assess the effects of banking on queen quality measures
- Evaluate novel management practices' improvements in queen mating quality
- Observe the effects of shipping on queen health and sperm quality

Contact us for more information & pricing

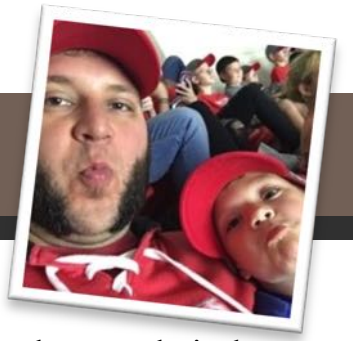
Queen & Disease Clinic Pricing (five sample minimum, bulk pricing available)

Strong Research Foundations
Established as a natural extension service leveraging basic and field honey bee research at NCSU, the clinic has worked to improve colony health for over 10 years.

Analysis	Pricing (per sample)	Samples Tested: Queens	Drones	Colonies
Reproductive Quality	$24.00	✓	✓	
Standard Pathogen Screen	$55.00	✓	✓	✓
Apiary Pathogen Screen	$220.00*	*up to 10 colonies, pooled		
Mitotyping (Africanization)	$35.00	✓	✓	✓
Genotyping (Mating Number)	$320.00			✓

Custom Disease Screening
Additional and custom pathogen targets available upon request

Lab spotlight: Brad Metz



For the last several years, **Dr. Brad Metz** has been a postdoctoral researcher in our lab, and he has quickly become a unifying force for many of the research projects in the program.

Brad received his PhD from Texas A&M University studying chemical ecology and brood pheromone in honey bees. He therefore has introduced a new element into our analyses that had otherwise been absent, and it has greatly benefited several projects in the lab.

Brad is also spearheading the queen analyses in our clinic, where he has significantly advanced our analytical processing and logistics. He is also conducting research on quantifying drone reproductive quality, which will enable us to offer a similar service for drones much like we do for queens.

First ever conference of the Honey Bee Veterinary Consortium at NC State University

North Carolina, through NCSU's vet school, is leading the national need to bring beekeepers and vets together through a new consortium.

New EPA rules have forced beekeepers and veterinarians to have to work together for obtaining antibiotics. That doesn't mean this new relationship has to stop there.

Most of us in the NC beekeeping community probably don't realize it, but there was a fairly significant regulatory change that went into effect on January 1, 2017. Most in the national apiculture industry, however, have been keenly aware of this transition. I say that because most part-time or hobbyist beekeepers—like most of us—do not use antibiotics in their beehives, whereas most full-time or commercial beekeepers do when needed. The rule that went into effect was imposed by the FDA to regulate animal use of antibiotics that are also prescribed for human consumption. Since that time, **any beekeeper who wishes to purchase and apply antibiotics are required to have a licensed veterinarian physically inspect their colonies and write a prescription for its use**.

The two diseases where antibiotics are needed are the two foulbroods, European (EFB) and American (AFB). These are both bacterial infections that kill developing larvae and are problematic or devastating, respectively. EFB is usually considered a "stress" disease induced by nutritional depravation, something that the beekeepers (and the bees) can overcome if those other stressors are removed. AFB, however, is horribly noxious because the bacteria are spore-forming, which can be spread like wildfire. Traditionally, beekeepers have had the antibiotic oxytetracycline (Terramycin®) available to treat both of these infections, although experts have long been reluctant of its use because (a) it doesn't eradicate foulbrood just prevents its further growth and (b) prophylactic use can select for antibiotic resistance. Indeed, AFB has become resistant to oxytetracycline (although not in North Carolina), which prompted a second antibiotic (tylosin, sold as Tylan®) to be registered for AFB infections. These are the two main products that beekeepers now need a prescription in order to buy and use.

In response to this new way of doing things, the veterinary community has responded by forming a new network—the Honey Bee Veterinary Consortium—aimed at facilitating the implementation of these new regulations. North Carolina has led this charge, with many key members at the NC State University College of Veterinary Medicine. The first ever conference of this group convened on September 29-30th with nearly 200 attendees from all across the nation, including speakers such as Don Hopkins, Randy Oliver (CA), Nicolas Vidal-Naquet (France), and Michael Murphy (FDA). The new logistics are somewhat complicated, and below are some important links with additional information, but let me quickly summarize what I've learned about how you can properly order antibiotics if you so wish. There are two processes that willing veterinarians can use: (1) they can write a **prescription** for either of the two antibiotics if fed to the bees in

NC State's College of Veterinary Medicine hosted the first conference of vets and beekeepers to address bee health.

Veterinary conference (Continued)

syrup, or (2) they can execute a **Veterinary Feed Directive (VFD)** *for tetracycline only* if fed to the bees in patties or sugar dusting. The distinction between these two options are not quite as important to the beekeeper, but *both require an in-hive inspection* to diagnose the problem and verify that antibiotics are a viable solution. Our terrific team of NCDA&CS Apiary Inspectors can be consulted on these visits, but they cannot write the prescriptions on behalf of a veterinarian. In order to locate a knowledgeable and willing veterinarian in your area, please visit: https://www.hbvc.org.

All of the above recommendations are provided if you *wish* to use antibiotics, but it does not address whether or not you *should* use antibiotics. As initially mentioned, most beekeepers in NC neither need nor should they use antibiotics and instead should rely on quarantine or culling. As always, your local inspector is going to be your best resource for advice and instruction on the proper course of action for beekeeping your bees healthy. However, I hope as a state beekeeping community that we will also **embrace this new influx of animal-health experts** that have been thrust upon us because of these regulatory changes. There is a large number of excellent, well-trained and knowledgeable veterinarians out there, and I believe that they have a lot to offer us as beekeepers about how to best manage animal systems. Most, however, have not have much training about bees but rather mammalian systems, so they need our help to get up to speed on the differences of mammalian husbandry and honey bee husbandry. As such, they are going to rely on us to fill those knowledge gaps and assist them in this process, and I am confident that the NCSBA will respond positively since it can only help our community keep our bees healthy.

NC State Apiculture Program

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Hannan Levenson, MS Student (Entomology and Evolution & Ecology)
Lauren Rusert, MS Student (Entomology)

Undergraduate Researchers
Carson Noel, Olivia Loyack, Nissa Coit (UNC), Ashley Rua, Will Fowler, Tess Wiegmann (artist-in-residence), Zachary Everson, Gaven Bell (high school intern), Austin Acree, Emily Johnson (media intern)

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.

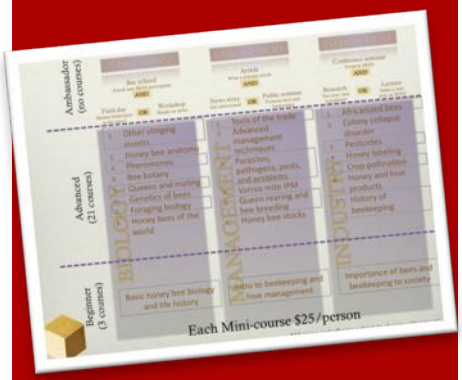
Make a gift-in-kind – The Apiculture program is always seeking creative solutions to its material needs. If you have surplus equipment or other non-monetary assets to give (e.g., gently used honey extractors, microscopes, even vehicles), please consider donating them to the program. You will receive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

Check out our new website!

For the third time in 3 years, we have completely revamped our website, which is still located at https://ncsuapiculture.net. With a cleaner look and streamlined content, we hope this new look will be easier to navigate and enable us to include regular blog posts.



BEES network

Our online courses in the Beekeeper Education & Engagement System (BEES) are still up and running, although we have been continually delayed in creating new content. Enroll today at: go.ncsu.edu/BEES

Random notes

New publications

Giacomini, J. J., J. Leslie, D. R. Tarpy, E. C. Palmer-Young, R. E. Irwin, and L. S. Adler. (2018). Medicinal value of sunflower pollen against bee pathogens. *Scientific Reports*, **8**: 14394.

Presentations

The first field day for the NC Pollinator Conservation Alliance (NCPCA) was held this past September 8th at the Piedmont Research Station in Salisbury, NC (picture below). Attendees included several NCSU researchers, including **Hannah Levenson**, Elsa Youngsteadt, and Becky Irwin, who conducted several hands-on exercises on how to sample for pollinators in flowering habitat. The event was well received and hope to repeat in coming years.

In addition to the HBVC Conference (page 3), David provided several live online presentations to the Illinois Queen Initiative, which generated very good discussion and interest on our research and Queen & Disease Clinic.

Welcome aboard!

We are pleased to have **Gaven Bell**, **Austin Acree**, and **Emily Johnson** join our lab in recent weeks. Gaven is a senior in high school at the NC School of Science and Mathematics (NCSSM) in Durham. She contacted us about an internship because of her interests in Entomology and genetics, and twice a week she is helping Lauren on her projects analyzing the genetic diversity within and among honey bee colonies in Hawaii. Austin is also assisting Lauren in those same efforts after gaining an interest in honey bee research while taking ENT 203 this semester. Emily is a Marketing major, also in ENT 203 this semester, and is excited to join our team as our latest media intern to spearhead our social media accounts and promotional materials. Welcome to all of you!

…and sadly missed

Both **Dan Charbonneau** and **Claire Collins** have regrettably moved on from the program. Dan was a postdoc in our group but primarily housed up in Philadelphia at the University of Pennsylvania in Tim Linksvayer's group. Our collaboration was on the division of labor among nurse bees, and how their individual choices about which larvae to rear as queens were manifest as a collective decision-making process at the colony level. Dan has accepted another postdoc position at Arizona State University working on lazy ants, the system in which he worked during his doctoral studies. Claire was our long-time media intern in the program and helped out numerous research projects for almost 3 years, but regrettably our funding has run out on those grants and Claire is busy with other projects during her senior year. Best of luck to you both!

Congratulations!

Hannah Levenson was awarded the Outstanding MS Student Award from the NC Entomological Society for her work on pollinator communities across the state.

Teacher's corner:
Courses at NC State

This fall semester, "An introduction to the honey bee and beekeeping" (ENT 203) has 180 students. Both Joe Milone and Lauren Rusert are TAing the course for the second time, and more importantly they are spearheading a brand new "break out" section for a subset of the students. For one extra credit, 9 of the students are meeting with Lauren and Joe once a week to have a hands-on beekeeping experience. This is giving the students an opportunity to learn beekeeping but also affords Joe and Lauren the opportunity to develop their own teaching skills. Needless to say, it's a win-win opportunity!

http://go.ncsu.edu/honeybees

Tarpy's back page

North Carolina has been hit hard this fall with more than its fair share of tropical storms. First hurricane Florence dealt significant wind damage and heavy rains especially to the southeastern regions of the state, then tropical storm Matthew brought additional rainfall through the central Piedmont several weeks later. In the wake of all major rain and flooding events, public health officials become concerned about mosquito-borne diseases (and rightly so) since increased water levels can cause their populations to explode. Abatement programs have therefore been ongoing since the storms have subsided, and these efforts are often in direct conflict with honey bee health, as what is effective at killing adult mosquitos are usually pretty effective at killing honey bees as well.

Unlike previous years with Fran and Floyd, *the state is no longer handling spray programs*; *spraying is initiated and coordinated by counties and municipalities*. Beekeepers in those areas should immediately identify themselves to the county EOC (Emergency Management) and find out if they are in/near a proposed spray block and get details from their local government. We have provided several news feeds and articles through Cooperative Extension and the Entomology Extension Portal that addresses many of these issues, provides helpful suggestions, and lists dates and contact information:

https://entomology.ces.ncsu.edu/2018/09/how-to-protect-your-beehives-from-mosquito-spraying-following-a-hurricane/
https://entomology.ces.ncsu.edu/2018/09/bee-kind-if-you-spray-for-mosquitoes/
https://entomology.ces.ncsu.edu/2017/09/protective-measures-of-beehives-during-hurricanes-2/

With a little forethought, cooperation, and common sense, mosquito abatement programs do not have to be significantly problematic for our honey bees.

Sincerely, David

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A&T State University
COOPERATIVE EXTENSION
Empowering People · Providing Solutions