

# Wolfpack's Waggle

January 2017 Newsletter

NC State Apiculture Program

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

Issue 1, January 2017



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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 10 peer-reviewed publications and 23 presentations at scientific meetings, both record highs for our program. We had 17 active grants totaling \$2.2M, and we have 15 people in the program. We have been joined by a new Ph.D. student, Joe Milone, from Elon University, and we're extremely happy for Margarita for becoming the Extension Apiculturist at Penn State this past summer. Our Clinic Technician Deniz Chen has also unfortunately left the lab, and his molecular expertise will be sorely missed. On the extension side, collectively we delivered ~15 presentations and workshops to various beekeeper groups for ~4,300 individual contacts, and we were covered by five media stories on our work. Our BEES network continues to hold its own after the migration to the DELTA server (see page 2), but we hope it will once again proliferate with new courses and opportunities. Overall, 2016 was a great year, and we hope the same for 2017!

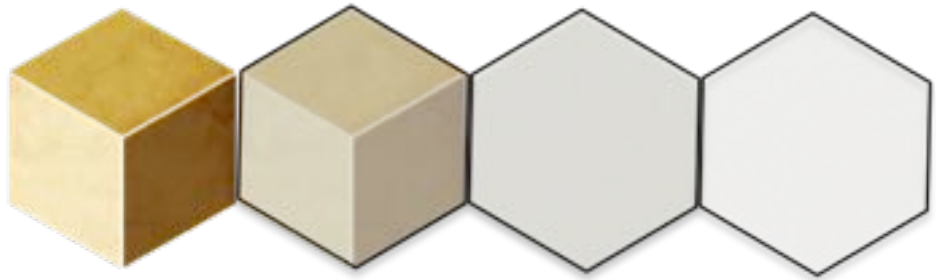


## Two graduating graduate students

We're proud of both James Withrow (left) and Carl Giuffre (right) for recently defending their theses and graduating with an MS and Ph.D., respectively.

More on Page 3

# Beekeeper Education & Engagement System



## New developments in the BEES network

While enrollment is down, we hope logistics are streamlined and will start to develop new content

The **BEES** network has moved! 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 we will be able to continue these courses for the time being, to recover costs DELTA is now including a 43% overhead on each person for each course. We are monitoring traffic to see if we will continue these offerings.

### 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: Joe Milone

We're pleased to have recruited Joe Milone to our program. While initially entering as an MS student, Joe has been able to secure a Ph.D. fellowship to pursue his doctoral work.

Joe is a graduate from Elon University, where he did some undergraduate work

on bees. This led him to a stint with Smithers-Vinscent, where he really cut his chops with bees and apiculture.

Joe's research interests are investigating how the "exposome" of the honey bee nest affects bees and particularly queens. This is



important and timely work that will help provide insights into how different pesticides may be interacting to result in subtle effects on bee health.

Welcome aboard, Joe, we look forward to great things!

# Two graduating students from the NC State Apiculture Program

One Masters student (**James Withrow**) and one Doctoral student (**Carl Giuffre**) have both successfully defended their respective theses. James will continue on with us as a Ph.D. student, while Carl is moving onto greener pastures.



A figure from Carl's second chapter, investigating how varroa mite behavior may be influenced by virus infection

Within the past month, two of our graduate students have successfully defended their degrees. The first, **James Withrow**, completed his Masters degree while studying aspects of queens from two very different perspectives. His first thesis chapter investigated an invisible and very curious phenomenon that we're only just beginning to understand. We all know that honey bee queens mate with multiple males, and therefore there are many subfamilies within colonies. As James has conclusively shown, the distribution of these subfamilies among the workers are dramatically different from those among the queens. Indeed, many queens that are raised during emergency queen rearing derive from subfamilies that are rarely if ever seen among the workers. These "royal patriline" suggest that there may be something special genetically with these queens, so there may be some hidden decisions going on over queen rearing that we didn't know about before. James' second thesis chapter was much more familiar to beekeepers, where he measured the temperature profiles of queens during shipment of

packages. At issue here is that overheating of queens and packages can result in mortality, but queens that get too chilled can also lose sperm viability and thus become poor egg layers. James tested how variable the temperatures can be during package transport and how that temperature exposure affected queen longevity, which teaches us all that we need to be much more careful about temperature when we install packages.

**Carl Giuffre** is a Ph.D. student in our Biomath program whose research is highly integrative by every definition. Carl's research has three main projects, threaded together by the technical process of using imaging technology to automate information acquisition. His first chapter addresses the behavioral and social grooming behavior of honey bee workers, an important mechanism for disease resistance. He has developed an entire video-capture system and bioassay to automatically calculate the rate and degree of grooming, which will help future research into

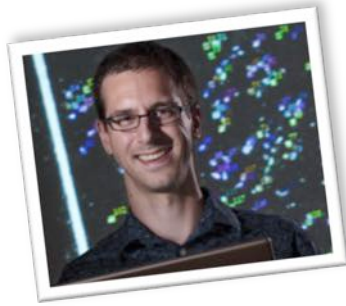
collecting such data in a high-throughput process. His second chapter investigates the interaction between the varroa mite and the viruses that they vector to cause bees to get sick. Using video tracking technology that he developed, he has robustly quantified the behavior of individual mites and correlated those behaviors with the incidence and prevalence of viral infection. Finally, his third chapter focuses on developing an automated process of assigning pollen sources by color recognition. Bees collect pollen from



James at our bee lab on Lake Wheeler conducting some of his field research on queen rearing and "royal patriline."

## Graduating students (Continued)

an assortment of flowering plants, and understanding their ever-changing floral resources is important for proper bee management. Carl's exciting new procedure may someday enable beekeepers to take a simple picture of collected pollen on their smart phone and immediately identify the floral sources from which it derives!



Carl has three main chapters to his thesis, each of which is a novel approach to applying mathematics and computer imaging to bees and bee health.

While Carl will be moving on (hopefully to a mathematics teaching position), fortunately for us James has decided to remain in our program for a Ph.D. degree, so we look forward to his continued work on queens. In both cases, we're very proud of their accomplishments and congratulate them on their degrees.

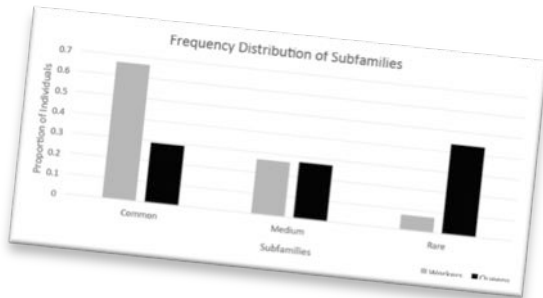


Figure from James' first chapter, conclusively demonstrating that a high percentage of queens are raised from very rare genotypes in the colony.

### NC State Apiculture Program

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Parry Kietzman, Postdoctoral researcher

Esmail Amiri, Postdoctoral researcher (UNC-G, with Olav Rueppell)

Carl Giuffre, PhD Student (Biomathematics)

James Withrow, Ph.D Student (Entomology)

Joe Milone, Ph.D Student (Entomology)

#### Research assistants

Erin McDermott  
Hannah Levenson

#### Undergraduate Researchers

Claire Collins (media intern),  
Christopher Juberg, Victoria Blanchard (UK exchange student),  
Stephanie Roth, Sarah Hassan

## 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**

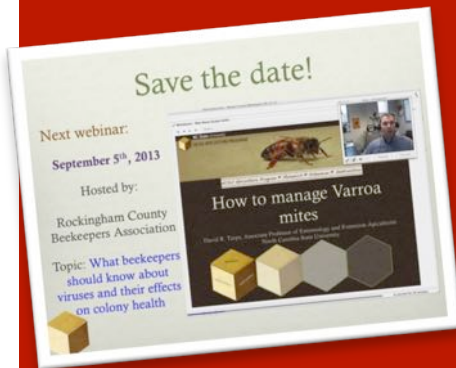
**Make an estate gift** – If you are interested in planning an estate gift to benefit Apiculture, please let us know! We can provide you with the tools you and your attorney will need to ensure that your wishes are fulfilled. Please click the link above for more information.



## Check out our new website!

In conjunction with our department merger, we decided to update and move our program's website, which is now located at <http://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. Be sure to update your bookmarks!



## Webinar series on hiatus

We have not had an apiculture webinar in recent months, but we have not forgotten about them and hope to resume them if there is sufficient demand and traffic from the county chapters.

[LINK](#)

## Random notes

### Welcome aboard!

In addition to **Joe Milone** (page 2), we're also pleased to have several new undergraduate students join our program.

**Stephanie Roth** is an Entomology Minor who will be helping Jennifer out at the bee lab several times a week, learning the ins and outs of beekeeping (and what better way to do it!). **Sarah Hassan** took ENT 203 last semester and developed a fascination for bees, so she will be helping Joe with his lab and field work this semester and hopefully longer. Welcome!

Part of James' upcoming field project is to be testing old queens, and he's going to need a lot of them (hundreds). As such, we just simply don't have the number of colonies to accommodate, so we would be very appreciative of anyone who has extra or old queens that they won't be needing this spring. If you do, please let us know!

### ...and sadly missed.

With the end of our grant funding from the National Honey Board, which effectively provided the support for the technician position for the Queen & Disease Clinic, unfortunately Deniz Chen is no longer with our program. For nearly 2 years, Deniz was instrumental in developing new techniques and bringing an amazing depth of molecular expertise to our program. Please accept our heartfelt thanks from all of us!

### **Looking for old queens**

Do you have any overwintering colonies? Are you planning to buy some newly mated queens to replace your old ones? If so, we'd be happy to take them off your hands!

## Teacher's corner: Courses at NC State

We will not be teaching any courses this Spring 2017 semester at NC State. This past fall semester, our ENT 203 course, "An introduction to the honey bee and beekeeping", regained traction and was once again at maximum enrollment of 180 students. It was a terrific set of students, some of my favorite in the last 10 years. We will take this spring and summer to gear up for yet another successful semester this fall!

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



## Tarpy's back page

It's the end of an era—that is, the NC State Apiculture Program's involvement in the Bee Informed Partnership (BIP). Earlier this month was the official end date of the original, multi-million dollar grant that started it all. This was the first ever \$1M per year extension-only grant that the USDA had funded, which speaks to its importance and impact.

Going on 6 years later, the BIP is going strong and expanding in ever-larger directions, thanks to Dr. Dennis vanEngelsdorp and the excellent team that he's assembled at the University of Maryland. The annual surveys have been the real key to success of the BIP and serve as an important barometer of mortality in the managed honey bee population. The second main reason behind the success of the BIP was the in-field technology transfer teams, or tech teams, that have proliferated across the country. These hard-working crews have been instrumental in working with the commercial beekeepers that support them in their region, and in doing so they have been able to take samples from their hives to measure them for various health-related issues.

Our role in the BIP has always been fairly small, where we received a small fraction of the total samples from the tech teams for virus analysis. Nonetheless, we have processed nearly 3,000 colony samples for virus profile, which is a *huge* dataset in of itself. Since the tech teams have so much other data on these colonies (including, but not limited to, varroa levels, nosema, frames of brood, and other factors), we are now in the process of determining how all of these variables are inter-correlated with each other so that we can see how viruses actually contribute to making bees sick.

While the "extension" phase of the BIP is now continuing on without us (as a non-profit entity), we are still involved in the "research" phase of the BIP to start empirically testing the best-management practices revealed by the extension project. We look forward to our continue involvement in that capacity.

Sincerely, David