NC STATE UNIVERSITY

April 2014

Wolfpack's Waggle

April 2014 Newsletter

NC State Apiculture Program

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

Issue 2, April 2014

More inside

What have we been up to?

Like everyone else, we're gearing up for a busy spring season! We didn't have very good overwintering success, in large part because we were doing research so late into the fall last year that we didn't really give the bees a chance to recover before winter. But with late mite treatments, uniting lots of hives together, and getting some last-minute sugar feed on them, we were able to get through with ~25 colonies this spring. Jennifer also installed another 25 packages in late March, mostly to build up the combs for our 100 mating nuclei that we'll be using heavily this year. The main research that we have planned is to start up our large-scale project on *in vitro* queen rearing to select for "queenliness". In doing so, we'll need to perform a lot of genetic crosses using instrumental insemination, so we'll need to raise a lot of queens and drones! We'll also be doing several other experiments on small hive beetle biocontrol, the behavior and viral infection of varroa mites, and which virgin queens win the fatal duels over their rivals!

New citizen science project—we need your help!

This new initiative, called the NCSU Swarm Collective, will be aimed at collaborating with any and all beekeepers to collect and share data. This year, the project will center around varroa mite control.

More on Page 3

Beekeeper Education & Engagement System

Developments in the BEES network

Anytime is the right time for mini-courses on honey bee biology, management, and industry to advance your knowledge and skills

The BEES network is a new online resource for beekeepers at all levels. The system is entirely internet based and aims to foster an online learning community among beekeepers. The structure of the BEES network is broken into three ascending levels of difficulty (Beginner, Advanced, and Ambassador) and three general areas of content (honey bee biology, honey bee management, and the honey bee industry).

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

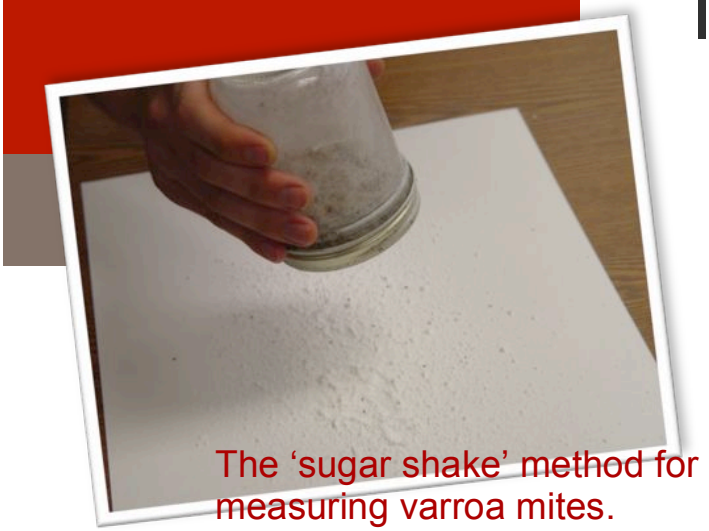
BEES 2.03.07: History of beekeeping

Lab spotlight: Holden Appler

In the Fall semester of 2012, our lab was joined by **Holden Appler** who started an independent Masters degree. Holden is co-advised by another faculty member in Entomology, Dr. Steve Frank, who is an excellent applied ecologist and IPM specialist in horticultural entomology.

One of the Frank lab's area of expertise has been in the effects of urbanization on insects. Holden's project, therefore, is a terrific overlap of our two programs: investigating the effects of urbanization on honey bees. Specifically, Holden's interest in immunology and physiology compelled him to gravitate towards how "city bees" may be different from "country bees" with respect to their ability to ward off disease. Catch him at the NCSBA summer meeting as their Ambrose Student Award winner—congratulations and great work Holden!

Introducing the NCSU "Swarm Collective"



The 'sugar shake' method for measuring varroa mites.

We're starting a new annual 'citizen science' initiative that hopes to harness the power of many to test questions that are important to beekeepers. Collectively, we can gather enough data to make some important insights into bees and beekeeping that can help improve our management practices.

The new **Swarm Collective** is an idea that we have had for quite a long time. Back in 2005, we conducted the New Beekeeper Cost-sharing Program, funded by the Golden LEAF foundation. In doing so, we provided 250 first-time beekeepers with pairs of hives, one headed by an 'Italian' queen and one headed by a 'Russian' queen. Because the Russians have been bred to be more tolerant of varroa mites, we took the opportunity to ask all beekeepers to measure their mite levels at the end of the summer and compare the two stocks. We did indeed show that the Russian bees had significantly fewer mites (although their queens were not accepted as frequently), and we published the results in the *American Bee Journal*.

The sharing of information among beekeepers is also very much inspired by our ongoing participation in the Bee Informed Partnership. For example, the annual management survey compares the winter losses of beekeepers that use different mite-control products, showing significant differences in the efficacy of various treatments. The only measurement of the this survey, however, is colony survival and not mite levels themselves.

To launch our new initiative, we aim to merge and expand these two ideas of collecting, analyzing, then sharing information from beekeepers for beekeepers. This year, rather than just compare the mite levels in two different stocks of bees, we will be measuring mite levels for **any and all mite-control strategies**. These can include genetic stocks, mechanical techniques (e.g., screened bottom boards, drone-brood removal, sugar dusting), "softer" biopesticides (e.g., ApiLife VAR®, formic acid), to the "harder" synthetic acaricides (e.g., Apivar®, Apistan®, Checkmite+®). More information about mites and treatment options can be found in our Beekeeping Note 2.03.

So obviously, **WE NEED YOUR HELP**! Beekeepers who would like to participate in this project need only have a minimum of 2 hives (but more is always welcomed!). For each colony pair, you will need to keep one as a 'negative control' where you don't use any measures for mite control (i.e., leave it alone to see how high the mite levels would go if you do nothing). For the second hive in a pair, you will want to implement whichever control measure you wish to compare. Otherwise, *both hives should be as similar to each other as possible*.

Then, before taking any action for mites in the 'treatment' hive, you will need to monitor both hives in each pair for varroa using two standard techniques. First, measure the entire

Monitoring mites using a 'sticky board' is something all beekeepers should do anyway, so why not share those data so we can learn from each other?!

NCSU Swarm Collective (Continued)

'mite load' of each colony by inserting separate sticky boards into each hive for 72 hours. Second, after removing each sticky board, measure the 'mite intensity' of both colonies using three separate sugar shakes and taking the average number of mites per 100 adult bees.

These two mite measurements should be taken twice before varroa treatment (once in July, and once in early August), then twice again after varroa treatment (once in late August and once in September). These are standard measurements that all beekeepers should be doing anyway!

After you have all of the mite counts, send them into us and we'll analyze the data. More detailed instructions and a printable data sheet can be found on our website:

NCSU 2014 Swarm Collective

Together, we can see what works and what doesn't!

	Sticky board (72 hr)		Sugar shake (3)	
	Control	Treatment	Control	Treatment
July	#	#	#	#
August (pre)	#	#	#	#
August (post)	#	#	#	#
September	#	#	#	#

The experimental design for the 2014 Swarm Collective: measure pairs of colonies, one control (no action taken) vs. one treatment (your choice of mite control). Measure each using a sticky board and 3 sugar shakes—once in July, twice in August (once before and once after the "treatment"), and once in September. Then, send us your data and we'll analyze! This will give help determine what practices lower mite levels more effectively.

NC State Apiculture Program

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Holden Appler, MS Student (co-advisor, Steve Frank)

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http://entomology.ncsu.edu/apiculture

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.

Photo by Alex Wild

Queen & Disease Clinic now open!

We're extremely excited to offer a new fee-based service to the beekeeping community. Send us your queens—good or bad—and we will be able to accurately quantify their sperm viability and sperm counts within a matter of days. We can also analyze entire colonies for virus levels, Nosema, and Africanization using genetic techniques.

LINK

Next Apiculture webinar June 19th

We are delighted to be hosted by the Mecklenburg County Beekeepers Association for our next live online webinar about bees and beekeeping. The topic for June 19th will be "The NCSU Swarm Collective: taking part in a citizen science beekeeping project," where we will be discussing the new initiative outlined on Page 3. Just let us know if you wish to join as a club or as an individual!

LINK

Random notes

New publications

Tarpy, D. R. and S. S. Schneider. (2014). Mechanisms of social evolution: linking adaptive function with proximate mechanisms. *Apidologie*, DOI: 10.1007/s13592-014-0282-5. [SPECIAL ISSUE ON MECHANISMS OF SOCIAL BEHAVIOR]

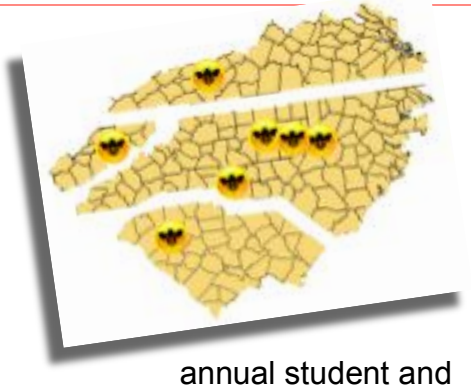
Steinhauer, N., K. Rennich, M. E. Wilson, D. M. Caron, E. J. Lengerich, J. Pettis, R. Rose, J. A. Skinner, D. R. Tarpy, J. T. Wilkes, and D. vanEngelsdorp. (2014). A national survey of managed honey bee 2012-2013 annual colony losses in the USA: results from the Bee Informed Partnership. *Journal of Apicultural Research*, **53**: 1-18.

Presentations

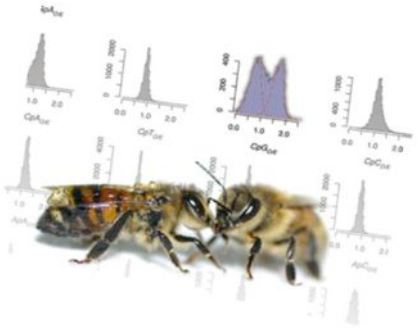
Ming Huang, Mike Simon-Finstrom, and David Tarpy were on papers at the ABRC Symposium during the American Honey Producers Assn. meeting in San Antonio, TX in January. David also presented invited seminars at the Durham Technical College and Arizona State University.

Southern Appalachian Honeybee Research Consortium

We were privileged to have recently hosted the 10th annual student and postdoc symposium for our growing group of academic labs studying honey bees. The SAHRC originally started in 2004 as the NC Honey Bee Research Consortium (NCHBRC), but the group has since expanded beyond those state boarders to become a regional affiliation.



Our goal is to continue the current momentum of the SAHRC and foster additional connections with other research efforts in the region that focus on honey bee genetics, behavior, and ecology. This year, we are joined by colleagues from the Army Research Laboratory (Mimi Strand), Clemson University (Jennifer Tsuruda), and Elon University (Steve Moore), which is in addition to the founding members from Wake Forest, UNCG, UNCG, and NCSU and more recently several labs from VA Tech.



Picture from M. Goodisman

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

We did not offer any courses during the Spring 2014 semester, but enrollment is now open for ENT 203 "An Introduction to the Honey Bee and Beekeeping" for the Fall 2014 semester. Aimed at non-science majors, we not only cover the interesting aspects of honey bee biology and beekeeping, we also delve into honey bees in art and literature, mythology and religion, even politics and warfare! Enrollment is capped at 180 student with a wait-list of 20, and it's filling up fast!

Next semester: ENT 203

http://go.ncsu.edu/honeybees

Tarpy's back page

For the past 10 years, we have been privileged to be affiliated with a very rewarding group of North Carolina research labs studying honey bees. The objective of the **Southern Appalachian Honeybee Research Consortium (SAHRC)** has been to promote scientific research and training focused on the honey bee, *Apis mellifera*, as a model organism for biological systems and biomedical applications.

At the core of the group lies multiple integrative approaches aimed at understanding biological processes and phenomena across all levels of biological organization (genes, cells, organisms, and societies), and associated labs address fundamental problems in the modern life sciences with innovative research collaborations.

A second, equally important mission of the consortium is to provide multi-disciplinary academic training to all interested students through exchange of laboratory members, research visits, and the organization of an annual student research conference. Students have the opportunity to receive training in behavioral ecology, neurophysiology, molecular and cellular biology, functional genomics, statistical analysis, and mathematical modeling, thereby providing them with the fundamental knowledge necessary for pursuing careers in a wide variety of fields.

This loose but strong collection of honey bee collaborators has been one of the most rewarding experiences during my tenure at NC State, and I look forward to continuing our integrated research projects and symposia for a long time to come.

Sincerely, David

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A&T State University
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Empowering People · Providing Solutions