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The Bee Line

Newsletter of the Maine State Beekeepers Association | mainebeekeepers.org

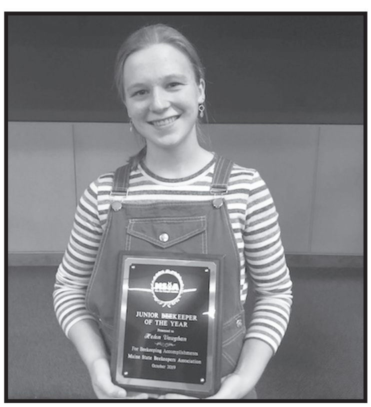
2019 MSBA Beekeeper of the Year

Betty McNally, Mike McNally and Kate Marro
Photo courtesy of Josh Botting

The 2019 MSBA Beekeeper of the Year was awarded to **Mike McNally** of Brunswick at the annual meeting in October. The consistent theme which underscored Mike's nomination was his commitment to beekeeping and his love of honey bees. Mike has been keeping bees for about 10 years and served as President of the Sagadahoc County Beekeepers Association. He is currently an At-Large Director of MSBA.

Mike is affectionately described as the "go-to guy" for both old and new SCBA members. He is generous with his time and expertise and has mentored numerous new beekeepers, as well as assisted more experienced beekeepers with an available ear and willingness to visit hives on site. Mike states "if you can help someone out, then that's great. If you have knowledge and information to help others you ought to be generous with it." Mike is a much sought after speaker and loves to talk about mushrooms and the "inter-dependency between mushrooms and honey bees." He acknowledges both Rick Cooper and Erin MacGregor-Forbes as being influential in his beekeeping experience. Mike states that he "loves experimenting with things in beekeeping and the heavy duty science part of it. I enjoy connecting the dots with all the research that is out there." When asked what he enjoys most about keeping bees he exclaims "doing splits, making queens and keeping them alive!" When asked what recommendation he would make to new beekeepers Mike responded with "listen to the older beekeepers that have been successful and have gotten bees through the winter."

2019 MSBA Junior Beekeeper of the Year



Helen Vaughan
Photo courtesy of Tom Vaughan

Helen Vaughan, a senior at Cape Elizabeth High School, was awarded the 2019 MSBA Junior Beekeeper of the Year. In the spring of last year, she was looking for a project to earn the Girl Scout Gold Award and decided to begin a bee club at her high school. With 10-15 active members, they were able to harvest honey this year. She also taught younger children about honey bees and native bees.

Currently, Helen cares for two hives at her home, in addition to two hives at the high school. When asked how she became interested in bees, she stated that she was given a Christmas gift of beekeeping classes at the Honey Exchange, which she thoroughly enjoyed. Helen delights in learning new things which help to explain what is going on in the hive. She enjoys the camaraderie amongst beekeepers and likes to learn about honey bees themselves; how they work together in the hive and the roles they play.

Helen related that the most difficult part of beekeeping is "keeping them from swarming. Out of five hives, three swarmed! This year really threw me!" When asked about how to be a good steward of bees, Helen stated it is important to care for them and not leave them to their own devices. "They are like another pet for me. When you have a pet, you know when they are healthy and when something is wrong. They take just as much care and keeping as any other animal." Helen is grateful for the influence of Phil and Meghan Gaven and her family for assisting in her beekeeping journey. She feels it is important to have young people involved as beekeepers and "start smashing the stigma that all bees want to do is sting you!"

Congratulations
Mike and Helen!

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Upcoming Board Meetings: Dec 19 & Jan 16 (7-9pm)*

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*Open to all MSBA members for discussion with voting to be done by current BOD members only. Meetings generally held at the Viles Arboretum,153 Hospital Street, Augusta or via conference call. Please contact a board member for details.

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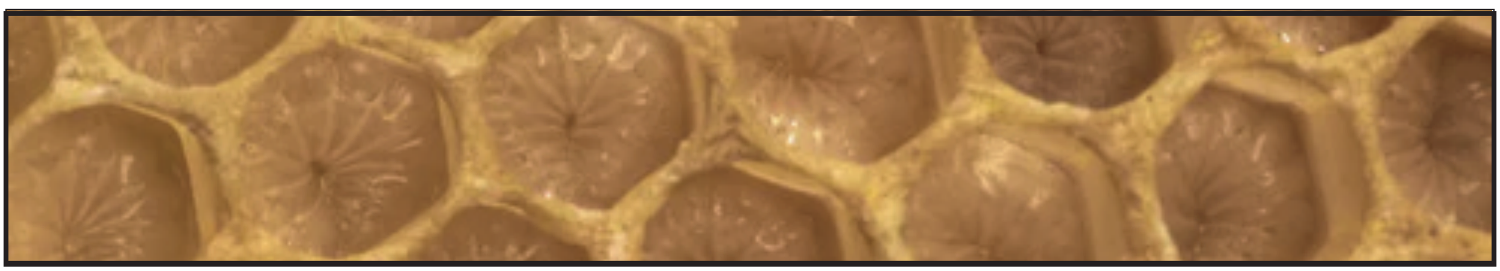

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Summary of Honey Bee Biology Presented by Dr. Jamie Ellis

by Peggy McLaughlin

It's a challenging task to keep an audience's attention after a hearty lunch and a full day of lectures, but Dr. Jamie Ellis had no problem doing so at the recent MSBA annual meeting. His afternoon talk on "Honey Bee Biology" kept the audience riveted with in-depth details, amazing video footage, and some key take-aways. Here are the highlights:

Words matter

•The words **colony** and **hive** are used interchangeably from time to time, but **colony** refers to the bees and brood themselves – anything that is alive. **Hive**, on the other hand, is the physical structure, or the house in which the colony lives. In the wild, it is called the **nest**.

Hymenoptera

•Bees, like ants and wasps, are part of the order **hymenoptera** ("membranous wings"). All hymenoptera are **haploid-diploid** meaning offspring either receive half or two copies of a parents' genes.

She may be royalty, but…

•The queen's most complicated behavior is mating. The rest of the time she is laying eggs. Workers, by far, have more complicated behaviors and perform the vast majority of tasks. The queen's presence adds to nest **homeostasis.**

•Epigenetics ("above the gene") teaches us that the information stored in the genes of female bees is the same, but is expressed differently for workers and queens.

Queen reproductive biology

•The queen has two large ovaries connected by lateral oviducts connected to a median **oviduct** ("egg chute").

•Dr. Ellis compared the composition of the ovaries to strings of sausages. Each string, or tube, is an **ovariole** where eggs are produced. There are approximately 125 ovarioles. The lumps inside these tubes are bee eggs. At the top of the tube are the youngest eggs. As the eggs migrate down the tube they are nourished by nurse cells and grow in size. The larger eggs at the bottom of the tube are ready to be laid by the queen (oviposited).

•A new queen mates once in her life at 10-14 days old.

•Inside her body is a special organ called the **spermatheca** in which sperm is stored for the rest of her life. It is lined with special cells to keep sperm alive and healthy. A surrounding tracheal net allows oxygen to reach the sperm.

•The queen controls the flow of sperm in and out of the oviduct. She can release sperm to fertilize an egg or not.

Big, ol' drones

•Drones are half of the genetic material of the individuals in the nest.

•Drones produce semen while they are larvae and pupae. The sperm migrates from the testes to the vas deferens where it is stored for the rest of the drone's life. The testes shrivel up when the drone reaches adulthood.

•The rearing environment for drone brood is important. Clean comb and nest temperature affect sperm quality.

Where and how mating happens

•When drones are 10-12 days old and sexually mature they fly to **Drone Congregation Areas** (DCAs), about ½ - 1 mile from the hive. Drones have about 30 minutes of "fuel in the tank" per flight. Visiting a nearby DCA allows more time to wait for queens before flying home to refuel. Drones make approximately six searching flights a day.

•Ten to twenty thousand drones fly about in the DCA. The scent of a queen alerts the drones to her presence. They form a cone in the air called a **drone comet**. Mating competition begins as the queen passes through. The queen is mated 12-20 times within a few short minutes. Researchers don't know who wins or why and they don't think there is any special selection process.

•A queen also has about 30 minutes of energy per flight. She only needs to stay for five to ten minutes at a DCA, so flies to one further away. When she is finished mating, she returns to the hive never to mate again. Most queens take one flight, sometimes two. Researchers believe this is to avoid overlapping mating areas and prevent breeding with drones from the same hive. **Inbreeding** is believed to be a leading cause of **spotty brood pattern.** If a queen mates with her brothers, workers will detect and remove the brood.

•A "plug" is left behind in the queen after each mating encounter. A special structure on a drone's reproductive organs removes the plug to allow for consecutive mating. Queens with a plug are mated more successfully and successively. The plug appears to function as a target to help drones locate the queen. The more drones with which a queen mates the fitter and healthier the colony.

•Dr. Ellis showed a video clip of a queen and drone mating from the documentary, "Tales from the Hive" (NOVA, 2000).

•Once mated, the queen's lateral oviducts fill with sperm. Over the next 48 hours, her abdominal muscles push semen into the **spermatheca**. The spermatheca holds the volume of sperm from one to two drones. The remaining 90% of sperm is flushed from her body.

•All drones are represented in the spermatheca, but not equally or in the order in which they mated. Semen is eventually equally mixed. Eight to 12 families are represented in the sperm. Eggs fertilized by minority represented sperm are often selected for queens. Eventually, sperm representation in fertilization is random.

Every bee wants to be a star

•Bees, as insects, have exoskeletons and must shed their skin as they grow. Developing larvae shed their skin six times. The period between molts is called an i**nstar**.

•The youngest larvae float in a pool of brood food at the back of the cell in the shape of the letter "C". They spin around in the cell eating, and breathe through a row of holes along their sides called **spiracles**.

•Larvae grow to fill the cell. They eat so quickly the brood food is not visible.

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Presentations by Research Assistants

by Dozier Bell

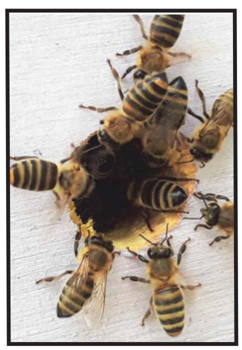
Three research assistants from the University of Maine at Orono and the College of the Atlantic gave engaging presentations of their projects to those in attendance at the annual meeting.

Patrick Hurley's presentation was titled "Mites, Camera, Action: A New Approach to Old Mite Treatments." Working with Lincoln Sennett of Swan's Honey, Patrick tested a new approach to varroa control using formic and oxalic acids. 72 hives were divided into three groups, with one receiving only formic acid, the second only oxalic acid, and the third group receiving formic acid followed by an application of oxalic acid twelve days later. Patrick reported that the results of the double acid treatment were positive, though not perfect, and that he would be sampling again this fall to gather more data. He hopes to be able to generate useful guidelines for this method, based on temperature and time of year.

Adele Wise of College of the Atlantic looked at labor shortages in Maine's beekeeping industry. Her project, titled "Bees Aren't the Only Workers: A Labor Needs Assessment for Beekeeping," was based on interviews and surveys with stakeholders in the Maine beekeeping industry. Wise found that only two percent of beekeepers regularly hired help; most operations are too small to justify the expense, and skilled labor is hard to find. Many relied on family members and a number of aging beekeepers had no succession plan for their apiaries. Wise created an informational resource sheet for those wishing to find and hire local, seasonal, and migrant labor, or to mentor people interested in learning the trade.

Henry Laurita, Patrick Hurley and Adele Wise. Photo courtesy of Jane Dunstan

Henry Laurita realized that while bees follow certain rules and patterns while foraging, these have not been well studied. His project, "Flowers, Food, and Foraging Patterns," used artificial "flower beds" to explore bees' preferences for particular shapes and patterns of foraging areas. Using paper disks filled with sugar water and thyme oil, with wicks as stamen, Laurita arranged the "blossoms" on table tops in uniform, random, and clumped arrays. Over two-hour periods during the day, he counted the visiting bees every 90 seconds. Laurita is still analyzing the statistics. He hopes to be able to expand the experiment to a couple of acres and then to actual plantings, with the ultimate goal of giving farmers a natural way of increasing pollination and honey production while reducing mono cropping and pesticide use.



State Of the State: Beekeeping In Maine

by Carol Cottrill

Jen Lund presented an overview of the State of the State of Beekeeping in Maine. Currently there are 1,193 beekeepers registered in Maine with 10,058 hives. There were approximately 50,030 migratory hives brought into Maine for pollination this year. Fifteen suspect samples were sent to the Beltsville Lab for testing and one tested positive for American Foulbrood. The equipment from the AFB infected hives was purchased used.

Jen presented some of the results of the 2018/2019 Maine Honey Bee Survey reported in the previous two issues of The Bee Line. The good news: most reported a good honey flow with an increase in production from prior years. The bad news: losses were about the same with queen issues topping the list for cause in the summer (followed by varroa, unknown, and environmental) and varroa the most cited cause during the winter.

A very important take-away message: monitoring for varroa. The monitoring method used appears to be directly correlated to lower losses. With overall losses for those reporting around 45%, those performing an alcohol wash to monitor for varroa reported lower losses of 38%. Other monitoring methods were not as accurate.

Maine and Massachusetts received a joint grant to provide jars to be used for performing alcohol washes and printed information on Integrated Pest Management Options for Varroa. This handout explains the steps to do an alcohol wash and has information on products/methods used to control varroa mites. These were made available during the meeting along with a card with information on the Honey Bee Health Coalition (see honeybeehealthcoalition.org/varroa) Nineteen beekeepers from Maine participated in the Sentinel Apiary Program through the Bee Informed Partnership. Information on how to participate in this program and results from this year's survey can be found at beeinformed.org/programs/sentinel.

The revised state rules for beekeeping have been approved. Changes include definitions and clarification of terms and regulations, deregulation of some pests/diseases (e.g. varroa, EFB), addition of pests not currently seen in the United States but with the potential for harm, and an increase in the registration fee.

Most of the participants at the annual meeting indicated they had heard Jen speak at a class or club meeting at some time during the past year. We are grateful to Jen for all her efforts to educate beekeepers in our state!

Oxford Hills Honey Bee Club

This is the tenth year that the Fryeburg Fair has invited us to have a booth in the Garden Center at the fair. Each year the American Honey Queen Program sends a representative (queen or princess) to speak to fairgoers about the importance of honey bees.

Oxford Hills Honey Bee Club President Chris Easton. Photo courtesy of Carol Cottrill

American Honey Queen Hannah Sjostrom from Wisconsin. Photo courtesy of Carol Cottrill

As the 2019 American Honey Queen, Hannah serves as a national spokesperson on behalf of the American Beekeeping Federation, a trade organization representing beekeepers and honey producers throughout the United States. The American Honey Queen and Princess speak and promote in venues nationwide, and, as such Queen Hannah will travel throughout the United States in 2019. Prior to being selected as the American Honey Queen, Hannah served as the 2018 Wisconsin Honey Queen. In this role, she promoted the honey industry at fairs, festivals, and farmers' markets, via media interviews and in schools.

Booth volunteers Carl and Lisa Nadeau (and our beekeeper "Applesauce") Photo courtesy of Carol Cottrill

"Wild Blueberry Pollination: Blueberry Plants and Bees… with Honey Bee Digressions" with Dr. Frank Drummond

by Jean Vose

Who he is…
Dr. Drummond is Professor Emeritus of Insect Ecology and Insect Pest Management and Blueberry Extension Pollination Specialist at the University of Maine. He is recognized for his diverse work including innovative work with alternative pollinators. The long-term impact of his studies has contributed to organic blueberry production increases and a reduction in conventional pesticide use for fruit growers.

His passion…
In his own words, "ever since I was eight or nine years old, I have loved insects. For me, my job at the University of Maine is a dream come true. I enjoy studying insects both in the lab and outside in the field and I also have great fun teaching undergraduate students, the general public, farmers and beekeepers about insect biology, ecology, and management."

Dr. Drummond began his presentation with a background on blueberries in our state. Wild blueberries are the fourth most important agricultural crop in Maine and blueberry production is dependent upon bee pollination. The wild blueberry story starts 12,000 years ago when receding glaciers left barren gravel plains that were colonized by heath plants able to tolerate poor soils. The wild blueberry community is comprised of five species associated with an additional eight other heath plant species, making up a rich plant community in Maine. They have a common flower type, a bell-shaped monoecious flower (has both male and female), nectaries at the base of the corolla, and pollen produced in poricidal anthers (hollow tubes with holes that only release pollen when vigorously shaken).

Wild blueberry is one of the few "native traditional" crops grown in the U.S. These plants are natural understory plants in the northeastern forests. Native Americans burned forest areas to clear the land for wild game forage and in so doing also created vast areas of wild blueberry. When there is a forest canopy, the plants do not produce flowers, only leaves. European settlers learned from the Native Americans that if the forest is cleared, the wild blueberry plants flourish and continual removal of trees through burning will maintain a crop. Maine's largest acreage of wild blueberry was during the Civil War years (1860s) at more than 250,000 acres. These berries were shipped on the new trains that came into Maine.

Individual plants of sweet lowbush blueberry, the predominant wild blueberry, are called clones and these plants range in average growth of about 30 square yards. Clones do not grow into each other; they stop growing when they touch. This has interesting implications for pollination.

Dr. Drummond then moved into bees and pollination. Because many of the plants bloom at similar times, maybe separated by a few weeks, there is a lot of cross pollination between them, depending upon the year and how much overlap there is in bloom among the species. He talked about cross pollination he has done and observed in the wild and some do not produce great blueberry yields.

Bees and Blueberries
The plants have flowers that are difficult for many bees to extract pollen from because of the poricidal (tubular) anthers that contain the pollen. Many species of our native bees have behavioral activities that enable them to extract pollen. Bumble bees grab onto the flower petals with their feet and vibrate their wing muscles at 440 Hz, shaking out the pollen, similar to a salt or pepper shaker. Many sand bees buzz (vibrate) the flowers. Osmia bees and some sweat bees climb inside the flower and drum the anthers with their front legs to release pollen. He then described some of his studies on the differences of pollen depositions by bumble bees, Osmia bees, Andrenid bees, and honey bees. The honey bee deposits the least amount. Therefore, a single flower visit by a honey bee will probably not result in a fruit, three to four visits will be needed. Whereas a single visit by a native bee will likely result in a fruit.

BUT honey bees are important pollinators…why?
1. when flowers are visited by a native bee first, pollen is deposited all over the flower so that when a honey bee visits, it picks up more pollen than usual depositing up to twice as much pollen on the next flower.
2. strength is in numbers; thus, even though honey bees are not efficient pollen vectors as an individual, they are very effective because they can be brought to fields in the hundreds of thousands.
3. by following different bee species during their flower visitation in blueberry fields, it was found that of all the bees, honey bees' foraging movements resulted in more visits between clones than within clones.

This is important for pollination because pollination results in fruit set (flower becoming a fruit). Fruit set explains 25-60% of the variation in yield. This means that pollination, while very important to yield, is not the only factor that determines yield. In the past 30 years Dr. Drummond documented the many factors that affect yield ranging from weather, crop management such as fertilization, disease, insect pests, weeds, heath plant species composition in a field, and genetic makeup of sweet low blueberry plants within a field. He then described the factors leading to fruit set including bee preferences for plants, pollen needs vs. self-pollination, early bloomers vs. late bloomers, and the timing of honey bee colonies placement.

In conclusion, honey bees are important pollinators of Maine wild blueberries, but they should be thought of as supplements to our native bees that are associated with wild blueberry (about 120 species of bees). In addition, the bee density (number per unit area of blueberry bloom), behavior and movement of bees along with the heath plant species diversity in fields, and the genetic makeup of sweet low blueberry clones determine the fruit set achieved in wild blueberry fields. Fruit set is a driver of yield, but other factors such as crop management, weather and pests play a role in the final harvestable crop.

Dr. Drummond then briefly discussed the question "How does climate change affect wild blueberry pollination and yield?"
Fall blooming of wild blueberry: his hypothesis is that the warm fall temperatures cause some clones to break their dormancy and start development of flower bloom, partially resulting in a low percentage of buds that break. Time will tell if this becomes a serious situation. The number of good pollination days for bees has decreased by about 50% starting in 1990 and is mostly due to more rainy weather during the latter half of May and the first half of June.

Dr. Drummond left us with this thought "What effect more wet springs will have on native bees and their reproductive potential is unknown, but it is a concern."

What's killing our honey bees? A lecture by Dr. Jamie Ellis

by Joy Auclair

Before beginning his presentation, Dr. Ellis took the time to establish his credentials. Knowing that a room full of beekeepers will give more credence to information being passed on by a fellow beekeeper, as opposed to an academic, he pointed out that he has been keeping bees for over 30 years, starting at the age of eight at his rural Georgia home. In addition to investing time in practical beekeeping, Dr. Ellis pursued his curiosity about bees through academics and has been fortunate enough to marry his love of bees with his passion for science. So, his credibility comes from experience, the intensive academic study required to earn a PhD, and the drive necessary to head a facility (HBREL) that is conducting about 30 different, ongoing honey bee research projects.

Dr. Ellis started with a bit of history to remind us that we are working with the descendants of the Western honey bee, the only one of nine species of honey bees to occur outside of Asia. The Western honey bee (Apis mellifera) developed variations at different locations in Europe, the Mid-East and Africa, which led to the subspecies (or races) that we recognize and use (ex: Italians - Apis mellifera ligustica; Carniolans - Apis mellifera carnica; etc.). Honey bees aren't native to North America; they were brought over by early colonists in the 1600s. Over the centuries, additional honey bees were brought over from Europe, but that stopped in the early 1900s when the U.S. Congress passed the HoneybeeAct in an effort to stop the diseases spreading through Europe from reaching the U.S. Following this brief history, we were shown a graph of honey bee colony loss trends created for the Department of Agriculture, which started keeping statistics on the number of honey producing colonies in the U.S. in 1939. The number of colonies peaked in the mid 1940s (@ 6 million), dropped precipitously through about 2008 (@ 2.5 million), and has started to rise since then. We don't actually know what caused this drop because we have only been looking for correlating factors since around 2006. Dr. Ellis hypothesized that the significant decline in the number of colonies in the last half of the 20th century was related to economics, not stress factors. The net loss of colonies from the 1940s to the 1980s averaged about 1% per year, probably due to a steady decrease in the price paid for honey and pollination services. Starting in the 1980s, which is when Varroa mites started to spread, the rate of decrease slows because we start to more intensely manage our colonies. It wasn't until 2006, though, that honey bee colony losses came to national and international attention. That was the year a beekeeper from Pennsylvania brought his colonies to Florida to overwinter and experienced the loss of a majority of his bees. He started pushing for answers, attributing this loss to a unique set of factors that later became known as Colony Collapse Disorder (CCD).

When CCD made national news, people became alarmed because of a perceived threat to their food supply. Bees supply us with a number of products such as propolis from tree sap resin, the pollen they collect to feed more bees and the honey they make from nectar to fuel the colony. However, their greatest value is in their pollination services. Although we would not starve if bees were not around, many of the fruits and vegetables we consider necessary for a varied diet would be scarce. Ten to 20% of the food we eat results from the use of managed honey bees, which not only help increase fruit set, but increase its quality as well. To make that possible, commercial bee colonies are moved around the country, mostly along the coasts where we cultivate crops of berries, fruits, alfalfa and nuts. It also means that over two thirds of commercial colonies are overwintered in the South, so that they will be strong enough to go to California for the early almond bloom. The colony losses in Florida in 2006 is what precipitated the intensive search for their causes and cures over the last 13 years.

Dr. Jamie Ellis addressing attendees.
Photo courtesy of Dan Dolan

What are the top stressors causing colony loss? It depends on who you ask. For example, commercial beekeepers will list different stressors than hobbyists. Everyone will include "bad weather", which does kill bees, but over which we have no control. All beekeepers will also have losses associated with Varroa mites, which seem to have arrived in this country in the late 70s (the transportation routes used to move pollinator colonies are how the mites, and their associated diseases, got spread). Varroa destructor comes from Asia, where the native honey bee hosts have developed defenses; Western honey bees have none. These mites feed on brood and pass on viruses which shorten a bee's lifespan and make it useless (think deformed wings) to the colony. THEY ARE KILLING YOUR BEES! But unlike dealing with the weather, you do have some control. While you may hesitate to use miticides because the treatments you use to kill the mites may harm your bees, they are not as harmful as the mites, which are responsible for nine out of ten of your colony losses. Data shows that those who sample for mites, then apply a treatment and sample again to be sure it worked, have the fewest colony losses. There are resources on the internet you can turn to for help. Dr. Ellis highly recommended the Tools for Varroa Management Guide and videos found on the Honey Bee Health Coalition's website.

Another issue in beekeeping is queen quality. Unfortunately there is no good, predictive way to judge the quality of your queen; you make that judgement at the end of a season when you can see the strength and productiveness of the colony. Queens are being bred for specific qualities, such as Varroa resistance and productivity, but many beekeepers hesitate to invest in them because they are afraid it will be a waste of money; they will be short lived, or their traits won't carry through successive generations. We can't forget the drones, whose genetics also influence the traits of your brood. Since queens mate with multiple drones, all the traits she was bred for will quickly dissipate if the drones do not also carry them.

Poor nutrition will also put stress on a colony. Bees need a variety of pollen and nectar to maintain strong, healthy brood and workers. If you are a commercial beekeeper providing pollination services, you are forcing your bees to use the resources of one generally poor quality crop. If they are not getting what they need you can try substitutes like sugar or pollen patties. Studies show that sugar will benefit a growing or challenged colony, but the presence of the chemicals used in commercial brands of pollen substitute has not been found to increase in colony brood. So, while the patties may disappear because of their sugar content, they are not being used for brood production. It seems bees need a variety of natural pollen sources to stay healthy.

Then there are pesticides which kill bees every year in every state. Toxicological projects will show which pesticides are harmful to bees, but their toxicity is demonstrated in studies done using excessive amounts of the pesticide. When evaluating the stress your colony may experience from pesticides it is more important to consider risk: how toxic is the pesticide and how much exposure your bees are getting. Even if the pesticide is toxic to your bees, if you limit their exposure to it, you will limit the risk that they will die from it. If you are using pesticides yourself, follow the label instructions which tell you how to apply the chemical with the lowest risk of unintended consequences (this includes the miticides you use in your hives). In Maine, you have the right to know when pesticides are being applied, but you also have the responsibility to request that notification and get on a registry. Bees will fly three to five miles from their hive to find resources, so you have to consider what is going on in the 30 – 80 square miles that surround your colonies. Being informed is the key to avoiding problems.

The bottom line is that we are losing our bees due to a combination of factors and beekeeping has certainly become more challenging, but economics is also playing a role in the loss trend numbers we see. So while it is true that we are losing bee colonies at a rate of about 40% per year, net colony numbers are currently increasing at a rate of about 1% per year because of economics and education. It is currently profitable to be a beekeeper, and beekeepers are putting in the time and resources needed to educate themselves to keep their colonies going.

Bissell Brothers Brewing donates $1,000 to MSBA

Some of the members the Cumberland and Sagadahoc County chapters who stopped by Bissell Brothers Brewing for a tour and taste of their small-batch honey ale on October 25th were (L-R): Stephen Mace, Karen Mace, Dan Dolan, Sandy Dolan, Jacky Hildreth, Bonnie Hildreth, Scott Withers, BBB brewer Patrick McAnany, Kelly Withers, Greg Withers, Jay Baxter, Jane Baxter, Judith Stanton, Michael Stanton. Photo courtesy of Bissell Brothers Brewing

MSBA has been awarded $1,000 through Portland-based Bissell Brothers Brewing "You Earned It" program. Employees are encouraged to connect to the greater community by periodically producing a small-batch beer, which is sold in the taproom for a limited time. Proceeds get donated to a charity of the brewer's choice; in this case BBB team member Seth Vigue, who made an ale using local honey from Portland beekeeper Chris Dennehy, chose MSBA as the recipient. Several local MSBA members got a complimentary tasting and tour at Bissell Brothers to kick off the new beer. Thank you BBB for supporting the Maine State Beekeepers Association!

EAS 2020 Orono, Maine, August 3-7, 2020

EAS MAINE
2020
The Art & Science of Beekeeping

The EAS conference in Maine next August will feature several fun evening activities including an open mic "Story Concert." Please read below on how to participate.

If you're a beekeeper, we know you have at least one really good story. And we want to hear it!

Whether it's a story about processing your first harvest on the back porch so as not to mess up the kitchen, the fiasco of installing your first package, the time the bees taught you to slow down and listen, or what you went through to catch that swarm, you have a story. And we want to work with you to help you tell it. It can be funny, poignant, informative, or a lesson learned about yourself. After our judges choose those who will tell, we'll contact you and begin the process of helping you craft your work.

Please send your *intent* to tell a story to: beejourney2010@gmail.com. From there you will be instructed to send your *actual story* to a third party. Then from there your story will receive a number. No names will be on the stories themselves when the judges receive them in an effort to be impartial in our choosing.

Please try to craft your story with the intent that in the telling it will be no longer than five minutes. This is not an easy thing to do, so write your story out (about two pages double spaced maximum) and we'll help you trim it down to the finest points. Remember, a story has a beginning, a middle, and an ending with something salient happening within. In the end, someone has typically changed (for the better or worse).

Know that you'll be telling your story live.

There will be no notes or props. You'll be speaking into a microphone to a live audience of beekeepers who can certainly sympathize with your travels in the bee world. If you'd like an example of how this looks, google, Moth Radio Hour Episodes, and click on some of the stories there.

Here are some guidelines to keep in mind:

The Four "F's"
1. Your story should be **Factual** – a true story as best you can remember it.

2. **First person** – your story should be about YOU, not someone you know or something you heard about.

3. **Free of notes** – you'll tell this from your memory, as if relaying it to a friend or at a party.

4. **Five minutes** – We'll help you hone down your story but it should, in the end, be no longer than five minutes.

YOU CAN DO THIS! AND IT'S GOING TO BE A LOT OF FUN! SO SEND IN YOUR INTENT TO TELL:

beejourney2010@gmail.com

Deadline is March 1, 2020.

EAS 2020 Honey Show

EAS 2020 Honey Show Chairman Chris Rogers displayed some of the many honey show categories from cut comb to arts and crafts to candles and mead at the MSBA annual meeting.

Chris has set a challenge of 100 entrants for next year's honey show. EAS will hold its annual Short Course and Conference at the University of Maine in Orono next August 3 – 7, 2020.

Chris Rogers, EAS Honey Show Chairman
Photo courtesy of Peggy McClaughlin

For more information about honey show categories and tips & tricks for preparing items for the show bench, please visit easternapiculture.org.

Andrew Dewey with Maine Bee Wellness.
Photo courtesy of Jane Dunstan

Continued from page 3

Honey Bee Biology...

Eventually, the larva stands up in the cell and becomes a prepupa. The cell is capped by workers.
•The pre-pupa sheds its skin and becomes a pupa.
•The adult bee grows wings and hair inside the skin of a pupa. When done, it emerges from the skin, then emerges from the cell.
•Dr. Ellis showed a video clip from National Geographic of the developmental stages of honey bees, in particular, showing the process of shedding skin.

Busy as bees

•As workers age, they engage in different, somewhat predictable behaviors. This is called **temporal polyethism**.
•There is a huge variation in ages for the standard tasks workers perform. Some workers skip behaviors and others spend either a lot or very little time on behaviors.
Here's the rapid review starting with **inside tasks**:
1) Stage one cell cleaning – polishing.
2) Capping brood. It takes twenty minutes to six hours to cap a cell.
3) Feeding larvae. Workers develop special glands before they produce brood food. One cell may be visited 5000x while open, but is usually only provisioned with food 1000-2000x.
4) Queen attendants
5) Nectar receivers, depositors, or processors. (Management tip: It doesn't matter whether you bottom or top super because it's not the forager who deposits nectar in the cells. The receiver bees make the deposit. They also add enzymes to the nectar and begin the evaporation process.)
6) House cleaning bees, undertakers. These bees display hygienic behavior.
7) Pollen handlers. After pollen foragers rake their loads into a cell, pollen manipulators pack it in.
8) Comb builders. Bees secrete and manipulate wax for comb construction.
9) Stage two cell cleaning – rebuilding and preparing cells for use.
Workers then migrate from nest tasks to entrance and beyond tasks.
10) Ventilation. This is the first time worker bees leave the nest.
11) Nest guards can be spotted at the entrance by their characteristic stance. As Dr. Ellis described, their front two legs are in the air, mandibles open, and they display an attitude of "bring it on."
And finally, workers migrate to outside tasks.
12) Orientation flights
13) Foraging flights – the job bees will die doing if they make it this far.
Other behaviors include robbing, dancing, food exchange, and stinging. Most honey bees just stand around doing nothing. Eighty or ninety percent of their lives, bees are just resting.

Let's get to the point

•The three parts of a honey bee stinger are a rigid **style** that forms the backbone of the stinger and two moveable **lancets**.
•Every contraction during a sting sends the lancet on the style past the neighboring lancet and propels the stinger further into your skin.

Everything that can reproduce wants to really, really bad

•The goal of a honey bee colony is to maximize its reproductive potential; to make one colony into two. Everything the colony does all year is for the purpose of reproducing, which is why **swarming** is so hard to stop. It is the colony's most basic instinct.
•Dr. Ellis compared a honey bee colony to an apple tree, an analogy taught to him by Dr. Tom Seeley. Apple trees reproduce by seed, but also by the pollen they share with other apple trees.
•Honey bee colonies reproduce when they swarm, but also spread their genetics through drones that mate with queens from other colonies.
•The **colony** is a principle unit of selection. The pressure is for the colony to survive, not the individual bee.

Two marvelous behaviors that set honey bees apart from others

•**Thermoregulation**. Bees keep their nest temperature within certain boundaries when ambient temperatures are different. Of the nine known honey bee species, eight are found in tropical climates. Apis mellifera, however, can live in different climates such as Europe, the Middle East and Africa. This is a wider range than any other species on the planet not moved by man.
•**Communication**. Bees communicate through pheromones and a complex dance language. Dance languages can include "dialects."

Why we need to understand honey bee biology

•Everything the bees do, from brood rearing to foraging to swarming, is about colony reproduction.
•If we know what our bees are trying to do, we can maximize their goals with our management practices.

What to add to your beekeeping reference library

•*Honey Bee Biology* by Mark Winston. Although published in the 1980s, it is still the most comprehensive book on honey bee biology. A must read for all beekeepers.

One last thing…

•What about washboarding? This unique back-and-forth sweeping behavior is still a mystery, according to Dr. Ellis. Some people think the bees are scent marking their colonies…but we just don't know.

Annual meeting attendee perusing the raffle items. Photo courtesy of Jane Dunstan

Photos from 2019 Annual Meeting....

Several of our Sagadahoc worker bees. From left to right, Karen Mace, Moe Dubreuil, Carroll Smith, John Fortin and Mike McNally. Photo courtesy of Dan Dolan

Members visiting vendors and perusing raffle items. Photo courtesy of Julie Rice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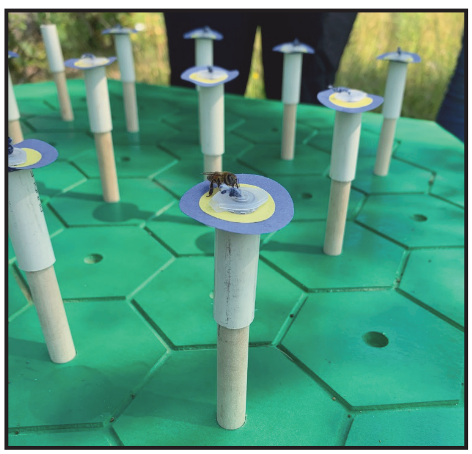
Foraging Preference and What It Could Mean For Agriculture

by Henry Laurita

Scientists have studied foraging and pollination for hundreds of years. Traditionally, however, there has been limited communication between these scientists and farmers. A deeper understanding of foraging behavior could go a long way in promoting healthier agriculture; both by fostering appreciation for its intricacy and recognizing the potential for using behavior in new, innovative ways. Making practical use of these findings is vital, particularly now, as we must seek alternative, integrated and ecologically minded solutions for the problems in our food systems.

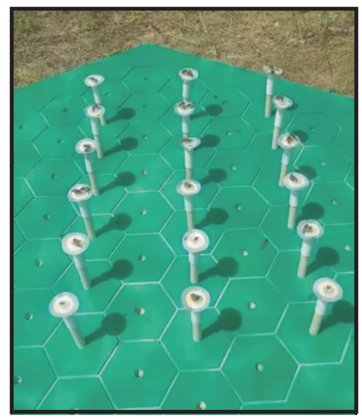
Foraging is a complex behavior molded over millions of years by the co-evolution of bees and plants. There is a long history of experiment and observation showing bees follow certain 'rules' while they are foraging. Aristotle observed that individual bees remain constant to specific types of flowers, and it was later found that bees are more likely to switch to a new species if visits become unrewarding. Bees will spend more time on individual flowers if they occur in denser patches and will visit more neighboring flowers than they do in sparser patches. Also, bees will tend to move down a line of plants if the spacing within the row is less than the spacing between rows. These are just a handful of experiments that all demonstrate an important point: foraging behavior changes in response to the arrangement of plants.

I spent this summer working at the University of Maine with the Sustainable Food Systems Research Collaborative investigating honey bees' preference for certain shapes of flower layouts. I wondered if, by laying out gardens or fields in arrays that exploit behavior rules, one may be able to encourage more pollination, more thorough foraging, or achieve other mutually beneficial outcomes. Plants already manipulate foraging through conditions like spacing, density and patterning. These tools could be further used by farmers in selecting species and their arrangement within crop fields. To this end I tested preference between uniform, clumped and randomized arrays. I made my arrays out of artificial flowers and placed two at a time in front of my beehive. Bees had to make a choice on which shape they wanted to forage, and I recorded the number of bees on each array over the course of about two hours (the time it usually took them to collect all the nectar). I set out my flower arrays early in the morning and gently scented the nectar with thyme oil so scout bees would be drawn to them and recruit their sisters.



Closeup of a foraging bee. Nectar was wicked from a small reservoir by cotton string, which bees licked.
Photo courtesy of Henry Laurita

I am in the preliminary stages of data analysis, but my early results suggest that bees preferred foraging on the randomized array, followed by the clumped array, and were least drawn to the uniform layout. My arrays were small (18 flowers each), and more tests are needed, but my early findings are interesting. Expanding or scaling up the experiment could prove useful to farmers. Consider this test on the scale of pollinator-dependent crops in a field. If I could lay out a garden in multiple areas of clumped, uniform and random patterns, the bees could forage over the course of a season. After the harvest, I could weigh the crop mass of each zone and see if one shape was more productive. Aggregate fruits like strawberries yield more mass the more they are visited by bees, and importantly, more marketable fruit. If I could demonstrate crop yield increases like this, farmers could potentially increase pollination services by planting particular arrays of crops.



Uniform shapes used in the trial.
Photo courtesy of Henry Laurita

Randomized shapes used in the trial.
Photo courtesy of Henry Laurita

These findings are preliminary, but their applications are exciting. Perhaps the randomized array was preferred because it best approximates the natural condition: the arrangement of flowers bees have historically evolutionarily foraged. Perhaps, also, there is a parallel and a lesson in the uniform layout. The bees in my study appeared to find the uniform array undesirable, yet row cropping characterizes most of our agriculture. What if the increased yield of a randomized field could offset the cost of more laborious harvesting? This may only make sense on smaller scales but Maine's farming and beekeeping populations are ideally suited. Since 1988, the number of organic farms in Maine has increased by 800%. The majority of these are classified as homesteading operations. Roughly 95% of Maine beekeepers are small scale or hobbyist (fewer than 30 hives). The overlap and pairing of these two groups represent a significant agricultural force. I think it could be a positive ecological and environmental force as well. Crop fields doubling as naturally encouraged habitats could mean more productive organic fields and more productive, healthier hives.

MSBA

Maine State Beekeepers Association

THE BEE LINE | Newsletter of the MSBA

Jane Dunstan, Editor
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Newcastle, Maine 04553

mainebeekeepers.org

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Join the Maine State Beekeepers Association today — via the MSBA website or this snail mail form!

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☐ 5-Year Individual	$ 68.00
☐ 5-Year Family	$ 100.00
☐ Lifetime Individual	$ 180.00
☐ Lifetime Family	$ 270.00
☐ Extra Gift Contribution	$______
Total Payment	$______

*Membership is per calendar year (**not** pro-rated) and includes a subscription to *The Bee Line*, the MSBA's newsletter. **Current membership is a pre-requisite for attending the MSBA Annual Meeting.**

Current Age	# of Years Beekeeping	Most # of Hives	Current # of Hives

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HONEYBEES NEED YOU!

This is a ☐ new / ☐ renewing membership (check one). How did you find out about the MSBA? ______________