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**Table of Contents**

HAS President's Welcome ........................... 4
HAS 2018 Sponsors .................................... 5
HAS 2018 Vendors .................................... 6
Keynote Speakers .................................... 7
Panel Discussions .................................... 11
Guest Lecturers and Synopses ................. 15
Honey Show ............................................. 21
Registration, Dormitory, Meals, and Parking.............................................. 32
Evening Social Events ............................... 34
Washington University Danforth Campus Map................................. 36
Conference Schedule ................................ 38

**AT A GLANCE**

| TUESDAY       |  • Registration  
|               |  3:00 pm - 7:00 pm
|               |  • Vendor Setup 
|               |  12:00pm – 7:00 pm

| WEDNESDAY     |  • Registration  
|               |  7:00 am - 6:00 pm
|               |  • Vendors Open 
|               |  8:00 am - 7:00 pm
|               |  • Conference 
|               |  8:30 am - 4:45 pm
|               |  • Honey Show Entry 
|               |  Deadline 6:00 pm
|               |  • Mexican Dinner with 
|               |  Live Music 6:00 pm - 7:30 pm
|               |  • Free Movie Night with 
|               |  popcorn and honey ice cream 7:45 pm

| THURSDAY      |  • Registration  
|               |  7:00 am - 6:00 pm
|               |  • Vendors Open 
|               |  8:00 am - 7:00 pm
|               |  • Conference 
|               |  8:30 am - 4:45 pm
|               |  • Brews and Bees at 
|               |  Anheuser-Busch Brewery, 
|               |  board shuttle at 5:00

| FRIDAY        |  • Registration  
|               |  7:00 am - noon
|               |  • Vendors Open 
|               |  8:00 am – 1:30 pm
|               |  • Conference 
|               |  8:30 am – 4:45 pm
|               |  • Zoo Bee at St. Louis Zoo, 
|               |  board shuttle at 5:00
“The bee’s life is like a magic well: the more you draw from it, the more it fills with water.” Karl Von Frisch, Nobel Prize, 1973

Welcome to Saint Louis! We are honored to host HAS 2018. Our goal for HAS is to offer beekeepers the skills and knowledge they need to keep bees healthy and enjoy the bounty of the hive. We have brought together some of the best and brightest in beekeeping, including eminent scientists, master beekeepers, extension specialists, crop producers, and businesses. I am grateful that so many of you have joined us. I am particularly thankful to the Planning Committee that worked diligently for many months to make HAS a success, and to our sponsors, vendors and hosts for their generous support. To each of them, I say thank you, and, to everyone attending, I hope you have a great HAS!

Bob Sears
President, Heartland Apicultural Society
July, 2018

HAS 2018 Planning Committee
Madonna Bogacki
Matthew Doucette
Laura Faust
Tim Fredricks
Jerry Hayes
Tim Hyde
Clayton Lee
John Pashia
Barry Richards
Ralph Samples
Bob Sears
Debbie Seib
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Marla Spivak is a MacArthur Fellow and McKnight Distinguished Professor in Entomology at the University of Minnesota. She has bred a line of honey bees, the Minnesota Hygienic line, to defend themselves against diseases and parasitic mites. Current studies include the benefits of propolis to honey bees, and the effects of agricultural landscapes and pesticides on honey bee and native bee health.

Dr. Spivak’s Keynote talk, *The Long and Optimistic View of Bee Health*, is based on the observation that “honey bee colonies can be surprisingly resilient, and beekeepers can be creative and adaptive. Rather than fixating on the many stressors facing honey bees and beekeeping, I will focus on ways honey bee colonies can help themselves, and ways beekeepers can follow the bees’ lead, turning obstacles into opportunities.”

Dennis van Engelsdorp graduated with a master’s degree in apiculture at University of Guelph, Ontario, and has since worked for the Canadian Government as a consultant to the Antigua Beekeepers Cooperative in the West Indies. He returned north to work at Cornell University as an extensionist then moved to the University of Maryland in 2012 and is now an Assistant Professor at the University of Maryland after working as the Acting State Apiarist for the Commonwealth of Pennsylvania, through a contract with Penn State University, where he also earned his PhD. He is President of the Bee Informed Partnership, Inc. He has served as the President of the Apiary Inspectors of America, is a founding member of the Colony Collapse Working Group, and a former board member of Haagen-Dazs Ice Cream Bee Board.

*Mite Management Matters*
According to the Bee Informed Partnership’s annual management and loss survey – a large number of beekeepers don’t manage their mites. Mites are incredible parasites and there is little doubt that they can cause large damage to colonies. In this talk we will make the case that that managing mites matter and what approaches one should take when managing them.
THURSDAY KEYNOTE SPEAKERS

Keith Delaplane is Professor of Entomology and Walter B. Hill Fellow at the University of Georgia and Director of the UGA Honey Bee Program. He and his staff and students are active in research on honey bee epidemiology, Varroa IPM, and polyandry - the queen's habit of mating with multiple males. Dr. Delaplane is author of A Year in the Life of an Apiary, Crop Pollination by Bees, and First Lessons in Beekeeping. He is currently writing a book, Honey Bee Social Evolution, with Johns Hopkins University Press. His Keynote speech, *Integrating Hive Management with Evolution & Ecology* will explain how understanding the ecology and natural history of honey bees as a species offers important clues to good health management for beekeepers.

Samuel Ramsey's enduring interest in entomology started 21 years ago and shows no signs of waning. A recent Ph.D. from Dr. Dennis vanEngelsdorp's lab at the University of Maryland, College Park; Ramsey maintains a focus on how insect research can benefit the public through the development of IPM strategies and STEM outreach initiatives. He graduated with a Bachelors of Science in Entomology from Cornell University in 2011 focusing his research on Predatory/Parasitic insect behavior. His current work centers on the effects of parasites on individual honey bee and colony level survivorship specifically targeting Varroa and the Tropilaelaps mites.

Dr. Ramsey's Keynote speech is titled *Varroa destructor Feeds on Hemolymph and Two Other Alternative Facts* and starts with evaluating a common observation: "Varroa destructor feeds exclusively on the hemolymph of adult and immature bees". It's considered to be such an obvious fact that it often goes without citation now in scientific papers. But there is very little if any experimental support for this universally accepted conclusion. My project, in partnership with the USDA and Project *Apis m*, has shown that Varroa are actually feeding on a very different tissue, the fat body, leading to a diverse combination of health impacts that have never been fully explained by feeding on hemolymph. With a better understanding of how this parasite impacts its host, we can develop novel forms of control and new methods to remediate the health issues common to infected colonies.
FRIDAY KEYNOTE SPEAKER

Jennifer Berry has been the Apicultural Research Professional and Lab Manager for the University of Georgia Honey Bee Program for over 18 years. Her research objectives have focused on queen breeding, keeping bees alive, the sub-lethal effects of pesticides on beneficial insects and IPM techniques for varroa and small hive beetle control. Jennifer’s extension duties include teaching bee-keeping to people from all walks of life, including those in Central and South America, to those imprisoned in Georgia’s maximum security prisons. She is also passionate about educating the public about the importance of beneficial insects and is somewhat of a regular columnist for Bee Culture magazine. On night and weekends she operates Honey Pond Farm, a honey bee venture that sells quality nucleus colonies and teaches how to raise superior queens and keep bees alive at her farm in Georgia.

Ms. Berry’s Keynote speech is Oxalic Acid Extended Release Study and Results. “Oxalic acid, found in some of our favorite veggies, front yards and hardware stores, was recently approved for use in honey bee colonies to reduce populations of Varroa destructor. Even though it is still relatively new in the US, OA has been used for decades in Europe and Canada. As of now, there are 3 approved application methods for OA, but there’s a fourth that has been gaining popularity across the country. UGA and Auburn University conducted two huge field trials to test the efficacy of an extended release formulation of food grade vegetable glycerin and oxalic acid. We will discuss the results of last year’s study along with the other three methods of using OA for varroa control.”
MODERATED PANEL DISCUSSIONS

Julie Shapiro, Senior Policy Director, Keystone Policy Center, will moderate two panel discussions of issues affecting bees, agriculture, and ecosystems.

Julie Shapiro, Senior Policy Director, Keystone Policy Center, has 15 years of experience in the environmental and natural resource field as a facilitator, mediator, and educator. She joined Keystone in 2008. Julie assists diverse public, private and NGO stakeholders in creating common understanding and forging shared solutions on topics including gene editing, sustainable agriculture and food production, pollinator health, wildlife and habitat conservation, land use planning, water quality, mine reclamation, and more. Julie has designed and facilitated stakeholder dialogues, public engagement processes, strategic planning processes and summits on national, regional, state and local scales. Julie holds a Master's degree in environmental studies from the University of Colorado at Boulder and Bachelor’s degrees in geosciences and English from Williams College. Julie facilitates the Honey Bee Health Coalition, a multi-stakeholder initiative working to improve honey bee health by addressing multiple factors including hive pests and disease, forage and nutrition, and crop pesticides.

Panel I, Thursday, 11:10 am, Anheuser-Busch Hall, Bryan Cave Moot Courtroom: What Do We Know about Bees and Pesticides, What Do We Not Know, and How Do We Know It?
There’s a lot of ‘buzz’ about bees and pesticides; what does the science say? This panel discussion will engage academic and private sector scientists in discussion of the interactions of bee health and pesticides. It will explore the current state of the science and key topics and questions for the future.

May Berenbaum, Ph.D. has been on the faculty of the Department of Entomology at the University of Illinois at Urbana-Champaign since 1980, serving as head since 1992 and as Swanlund Chair of Entomology since 1996. She is known for elucidating chemical mechanisms underlying interactions between insects and their hostplants, including detoxification of natural and synthetic chemicals, and for applying ecological principles in developing sustainable management practices for natural and agricultural communities. Her research, supported primarily by NSF and USDA, has produced over 230 refereed scientific publications and 35 book chapters. A member of the National Academy of Sciences, she has chaired two National Research Council committees,
the Committee on the Future of Pesticides in U.S. Agriculture (2000) and the Committee on the Status of Pollinators in North America (2007). Devoted to teaching and fostering scientific literacy through formal and informal education, she has authored numerous magazine articles and six books about insects for the general public. She graduated summa cum laude, with a B.S. degree and honors in biology, from Yale University in 1975 and received a Ph.D. in ecology and evolutionary biology from Cornell University in 1980.

Keri Carstens
Keri Carstens is Global Regulatory Lead for Seed Applied Technologies and Biologicals for Corteva Agriscience, Agriculture Division of DowDuPont. She leads global regulatory strategy development and implementation and serves as Regulatory & Stewardship representative for the global Seed Applied Technologies and Biologicals businesses. Keri also leads outreach and communication of stewardship activities for pollinator health and best management practices for seed treatments, and serves as DowDuPont’s representative on the Honey Bee Health Coalition. Prior to her current role, she spent five years as Environmental Safety Assessment Lead for DuPont Pioneer, providing global scientific leadership in environmental risk assessment of DuPont Pioneer products, including research on environmental fate, non-target impacts, and gene flow. In addition to her work at Corteva, Keri holds adjunct graduate faculty status at Iowa State University, where she serves on graduate student program committees and lectures in Toxicology Methods and Pesticides in the Environment courses. Prior to her time at Pioneer, she was a U.S. EPA STAR Fellow studying veterinary antibiotics in agroecosystems. In 2015 Keri was awarded DuPont Working Mother of the Year and takes pride in mentoring and encouraging young people in STEM. Keri grew up on a multi-generational farm near Grinnell, Iowa, and earned her B.A. in Biology and Education from Wartburg College, and her M.S. and Ph.D. in Toxicology and Entomology from Iowa State University. She and her husband, Jeff, have three daughters and the family enjoys their small farm with pollinator habitat outside of Ames, IA.

Caydee Savinelli
Caydee Savinelli is the Pollinator and IPM Stewardship Lead at Syngenta Crop Protection, where she is responsible for developing and implementing strategies and tactics for pollinator health and stewardship, integrated pest management, insect resistance management and biodiversity conservation initiatives, and leads Syngenta’s Operation Pollinator program. Caydee also works collaboratively with organizations focused on pollinators, such as Delta F.A.R.M., The Bee & Butterfly Habitat Fund, The Honey Bee Health Coalition, Monarch Collaborative, Pollinator Partnership and Trees Forever. Caydee holds a Ph.D. in Entomology with a minor in Crop Science from North Carolina State University, a M.S. in
Entomology from The Pennsylvania State University and a B.A. in Biology from Gettysburg College.

**Marla Spivak** (see Keynote Speakers, p. 7)

**Panel II, Friday, 9:40 am, Edison Theater**

*How Technology is Shaping the Future of Pollinators, Ecology, and Agriculture.*

From new hive health products to precision agriculture, and from gene editing to artificial intelligence, emerging technologies have the potential to significantly shape the future of pollination and crop production. This panel discussion will engage leaders from academic, private and NGO sectors in discussing technology’s role in influencing outcomes for productive agriculture systems and healthy ecosystems.

**May Berenbaum** (see p. 11)

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**Robb Fraley, Ph.D**

*World Food Prize Laureate and Former Executive Vice President and Chief Technology Officer of Monsanto Company*

Dr. Robert Fraley is the former executive vice president and chief technology officer at Monsanto Company. He has been with the company for more than 35 years, most recently overseeing the company’s global research and development division which includes plant breeding, plant biotechnology, agricultural biologicals, digital agriculture and crop protection.

Often recognized as the father of agricultural biotechnology, Dr. Fraley developed the first genetically modified organisms (GMOs) in the early 1980s as a solution for farmers battling pests and weeds that threatened their yields. He has authored more than 100 publications and patent applications relating to technical advances in agricultural sciences. Some of Dr. Fraley’s most distinguished honors include being recognized as a World Food Prize Laureate in 2013, receiving the National Medal of Technology from President Clinton in 1998 and receiving the National Academy of Sciences Award for the Industrial Application of Science in 2008.
Peter H. Raven is president emeritus of the Missouri Botanical Garden and George Engelmann Professor of Botany Emeritus at Washington University. During his tenure at the Garden, the institution grew to attain the status of a global leader in botanical research and conservation. A recipient of the National Medal of Science, the highest award for scientific accomplishment in the United States, he is a member of the Board of the National Geographic Society. He is an elected member of the National Academy of Sciences (1977-) and of a number of similar academies worldwide. Among his numerous books and publications is the coauthored Biology of Plants, the most popular botany text internationally. Raven completed his undergraduate studies at the University of California, Berkeley, and earned his Ph.D. at the University of California, Los Angeles. He has held both Guggenheim and MacArthur Fellowships.
GUEST LECTURERS AND SYNOPTES

Sandra Arango-Caro, PhD is an Education Programs Facilitator in Education and Outreach at the Donald Danforth Plant Science Center. She designs and implements K-12 learning modules and professional workshops for science educators, develops public STEM events and coordinates a citizen-science project at the state level. Sandra earned her Ph.D. in Ecology and Conservation Biology from the University of Missouri - St. Louis. Her research includes studies on bird ecology, ethnobotany, forest regeneration, and soil health. Sandra has taught at local universities and overseas and mentored numerous undergraduate and graduate students. Sarango-carо@danforthcenter.org

Insect pollination: Coevolution from the Flower's Perspective

The interaction between plants and their insect pollinators has been of particular interest due to the extraordinary benefits it provides to human kind. The evolutionary biology behind this interaction is not as popular. During this presentation I will review the origins of insect pollination and present striking examples of adaption and specialization. We know flowers are a critical resource for pollinators. However, how much do we know about flower's adaptations to attract them?

Bee Squad, University of Minnesota. Inspired by Dr. Marla Spivak, the Bee Squad helps beekeepers and the community in the Twin Cities promote the conservation, health, and diversity of bee pollinators through research, education, and hands-on mentorship.

During HAS, four members of the Bee Squad will present a suite of basic beekeeping skills classes in both the classroom and the apiary. The participating Bee Squad members are:

Ana Heck learned how to keep bees in Nicaragua while apprenticing on an organic farm and working with a women's beekeeping cooperative. She joined the University of Minnesota Bee Squad in 2014, where she works in the development and management of outreach and Extension programs. Heck manages apiaries and provides hands-on and classroom training to beekeepers. She holds a Master's degree in Public Policy from the University of Minnesota.

Bridget Mendel Lee is a Beekeeper, Project Coordinator, and Grant Writer member of the University of Minnesota Bee Squad. Bridget started beekeeping in 2007 at an apiary in Southern Illinois, and has since worked with honey bees and beekeepers in Maine, California, and Greece. She joined the Bee Squad in 2014 as a beekeeper and grant writer. Bridget holds a BA from Northwestern University, and an MFA in Creative Nonfiction from the University of Minnesota. Bridget is a member of the Bee squad team that will present a range of basic beekeeping skills in the classroom and apiary throughout HAS.
Rebecca Masterman, Ph.D., University of Minnesota Bee Squad. Becky has led the UMN Bee Squad program since 2013. She graduated from the UMN Twin Cities first with a BA (major in history, minor in biology) and then obtained a Ph.D. in Entomology under the direction of Dr. Marla Spivak studying honey bee hygienic behavior and neurobiology. Rebecca leads a talented and growing Bee Squad team that provides bee outreach to beekeepers and the public in the greater Minneapolis-St. Paul area of Minnesota and beyond. As the outreach arm of the Bee Lab, the Bee Squad communicates the latest bee research to audiences that are passionate about helping bees. Bee Squad has expanded their programs to include innovative ways to not just help bees, but also help people. Now Bee Veterans, Bee Arts and projects that train others who might not have had access to beekeeping are part of the Bee Squad. Additionally, the Bee Squad has launched a national beekeeper citizen science project in an effort to fight the deadly mite pest, Varroa destructor.

Jenny Warner has been a valued member of the University of Minnesota Bee Lab, headed by Dr. Marla Spivak, since 1997. Jenny is a Team Leader and founding member of the Bee Squad. She graduated with a B.S. in Horticultural Food Production and a minor in Soil Science from the University of Minnesota, Twin Cities.

The Bee Squad classes at HAS are:

**Drama Queens**
To be a beekeeper is to worry about your queens. But the best beekeepers know enough about bee biology to know when their bees know best. This class will help you decipher when you should intervene and when you should trust your bees. You will learn how to assess your colony and queen health to discern if you need to requeen. You will also learn techniques for introducing a new queen into your colony when necessary.

**Pheromones: Understanding Colony Communication**
No, your bees are not baking banana bread! Learn how honey bees communicate through pheromones and how paying attention to hive scents like banana and lemon can make you a better, more effective beekeeper.

**Gentle Beekeeping Basics**
This is an excellent class for new and intermediate beekeepers who want to become more comfortable and confident in their colony inspections. We will observe honey bee body language and communication to help us practice gentle beekeeping. Learn to perform a full hive inspection and identify all the stages of brood (eggs, larvae, pupae), presence and health of the queen, food resources (nectar, honey, pollen), and signs of diseases.

**The Ups and Downs of Varroa Management**
In this class we will review methods to sample and monitor for Varroa. We will discuss and demonstrate methods for reducing mite populations, focusing on treatment options and timelines for fall.

**Colony Autopsy: Identifying and Preventing Common Causes of Winter Loss**
Losing a honey bee colony is never easy. Identifying why your bees died can help you improve your honey bee management skills in the future. In this class you will learn to identify possible reasons for your colony's death based on the clues the bees leave behind. We will focus on how to find signs of mites and mite-vectored diseases on the dead bees and in the comb. You will also learn about what to do with leftover honey and beekeeping equipment after colony loss.
**MiteCheck: Working with Beekeepers to Manage Varroa destructor**

MiteCheck is a beekeeper citizen science project for North American beekeepers. Learn how you can help in the nationwide monitoring of this destructive pest. Join us to help fight the mite!

**MiteCheck: Hands-On Mite Monitoring Training**

Mite monitoring can be easy, fun and fast! Learn how to monitor Varroa destructor levels in your honey bee colonies. Join us in the apiary to learn some tips and tricks to take home to your apiary.

**May Berenbaum** (see Panel Discussions, p. 11)

**Fungicide Effects on Bees**

**Jennifer Berry** (See Keynote Speakers, p. 7)

**Back to the Basics on Keeping Bees Alive**

With so much attention on varroa and viruses, global warming and pesticides, tweets and collusion, some of us have forgotten about the fundamental basics on keeping our bees alive. This lecture will focus on these topics that have gone by the wayside.

**Fighting for Our Bees**

As we all know, honey bees have been threatened for decades due to the widespread use of pesticides, modernization of farming practices, and habitat loss due to human expansion. However, the most detrimental and hardest blow to *Apis mellifera* has been the new heavy weight challenger, *Varroa destructor*. We are now in round 13 and Varroa is winning. Unfortunately, mites are not going away, but let’s give our bees the best coach, the best training and the best knock punch to at least make it to the last round. This talk will delve into recent research from UGA and investigate relationships between varroa and our bees. We will also discuss plans to postpone the inevitable or more optimistically, to finally win by knocking out our opponent. Time to float like a butterfly and sting like a bee!

**Peter Berthelsen** is Partnership Coordinator for The Bee and Butterfly Habitat Fund. He has almost 30 years experience improving pollinator forage, and is widely recognized as the leading pollinator forage expert in the Midwest. He has developed the heartland region's most innovative, cost-effective, way to establish high quality habitat for honey bees.

**Bee and Butterfly Habitat Fund: A Program to Help You Plant Pollinator Habitat**

**Keys to Getting the Best Possible Pollinator Habitat**

**Dewey Caron** is Emeritus Professor of Entomology & Wildlife Ecology, University of Delaware, and Affiliate Professor, Dept Horticulture, Oregon State University. He spent 40+ years teaching, doing bee extension and bee research at Cornell (1967-70), University of MD, College Park (1970-1981) and University of DE, Newark DE (1981-2009). He spends 3-4 months each year in Bolivia, where he keeps Africanized bees and teaches beekeeping (in Spanish). The rest of the year he is in the northern hemisphere; his 5 backyard colonies in Tigard OR are docile European bees. He keeps active giving Bee Short Courses and lectures to various bee clubs and state organizations. He remains active in EAS & WAS having been President, state Director, chair of various Committees, Program coordinator, etc., but this is his first HAS return in several years.
**Bee Math**  
Interactive presentation of math “problems” in bees. Bee math answers range from 0 to 5 – sometimes with additional zeros. Can you score 10 or above?

**Bee MD**  
This lecture presents an interactive decision-tree approach to diagnosing common “issues” found in our bees such as queenlessness, diseases, what we are seeing outside the colony before entering, within supers, etc. How to tell the difference between normal and abnormal by asking the bees and noting what we see – much as your MD might do diagnose a health condition.

**HBHC Tools for Varroa Management**  
An essential “tool” to combat mites is knowing how to best monitor their population. We need ask the question How MANY not just whether our colony has mites or not. With a number we can be better equipped to help us make a more informed decision of risk of colony damage/loss from mites. I will demonstrate how the Honey Bee Health Coalition Tools for Varroa Management is an “essential” tool to help potentially reduce mite damage in our colonies.

**Keri Carstens**  
(See Panel Discussions, p. 12)

**Pollinators and Pesticides Stewardship**

**Phil Craft** served as the Kentucky State Apiarist from 1999 through 2011. He is a graduate of Oberlin College in Ohio (BA in biology), and of the University of Kentucky. Phil continues to communicate with beekeepers through his “Ask Phil” question/answer column which appears in Bee Culture magazine, and through his webpage, Philcrafthivecraft.com. He is also the U.S. technical adviser for Veto-pharma, the maker of Apivar, Varroa Easy Check, and other products. A native of the mountains of Eastern Kentucky, he now lives out in the sticks in the Bluegrass region of Kentucky near Lexington with his family, a very old dog, and some bee hives. You may send questions to Phil at phil@philcrafthivecraft.com.

**How to Detect and Correct Queen Problems**

Among the most common causes of summer colony problems are queen loss and other queen related issues. This session will focus on queenless colonies, laying workers, and infertile queens. Other topics to be covered are queen replacement, complications in shipping, and installing queens.

**Vance Crowe** is the Director of Millennial Engagement at Monsanto in Saint Louis, Missouri. Vance is a former Communications Strategist for the World Bank Group, a returned U.S. Peace Corps Volunteer stationed in Kenya, a former communications coordinator at an NPR station in Northern California and was a deckhand on an eco-tourism ship that traveled in the Western Hemisphere. Vance holds an undergraduate degree in communications and sociology from Marquette University and a Master’s Degree in Cross-Cultural Negotiations from the Seton Hall School of Diplomacy. Vance lives in Saint Louis with his wife Annie and dog Tiamat (pronounced Tie-eh-mat). Connect with Vance on twitter @VanceCrowe

**Hives, Tribes, and Networks- How Ideas Spread and Why Beekeepers Have Such a Big Impact on Culture**

In this talk, Monsanto’s Director of Millennial Engagement will talk about how new ideas start within small, highly focused networks of individuals and why some of those new ideas spread into other networks until eventually they become what a culture “knows.” Vance will then discuss why he thinks beekeepers serve as
bridges across networks and why their opinions are so impactful on what the broader public thinks about environmental sustainability.

**Keith Delaplane** (see Keynote Speakers, p. 9)

**Biology of the Individual Honey Bee**
The biology of *Apis mellifera* happens at two levels: the colony and the individuals that make it up. Each has its own patterns of birth, growth and development, and behavior. In this lecture we focus on the workers, drones, and queens.

**Biology of the Honey Bee Colony**
The honey bee colony is an example of a superorganism in which worker bees are analogous to cells in an organismal body. Just like tissues and organize specialize into different functions in the organism, workers specialize into different functions in the colony. Patterns of birth, growth, behavior and senescence are strikingly different between the two levels.

**Sharon Gibbons and Chris Gibbons** are mother and son Missouri beekeepers. Sharon has been a beekeeper since 1979. Chris joined the business in the 1990s. In recent years, Chris has taken over the physical bee work, while Sharon handles packaging. Chris manages over 600 colonies in Eastern and Central Missouri farm locations. In addition to producing seasonal varieties of honey, they produce a wide range of honey-based products including cremed honey, honey mustard, honey poppy seed Dijon salad dressing, honey-comb beeswax and molded beeswax candles. Sharon has also developed spreadable, cremed honey, flavored with powdered dried fruit in many flavors, including apple, strawberry, raspberry, apricot, peach and two nut flavors: pecan and black walnut.

**Making Cremed Honey**
Sharon and Chris will demonstrate and discuss simple ways to expand your honey sales by preparing many of their specialty flavored products.

**Grant F. C. Gillard** is a beekeeper and Presbyterian pastor in Jackson, Missouri. He keeps around 200 hives, selling honey at the farmer's markets in Cape Girardeau County. He produces nucs, loves to catch feral swarms, raises his own queens and has authored and published several books on his experiences. Grant began keeping bees on the family farm in Glenville, MN, after graduating from Iowa State University with a degree in Agriculture in 1981. While active in his local church, his local congregation convinced Grant he'd make a better pastor than farmer. He graduated from Fuller Theological Seminary in Pasadena, CA, with a Master's of Divinity degree in 1987. He later obtained a Doctor of Ministry degree from Aquinas Institute of Theology in St. Louis, MO. Since moving to Missouri in 1993, he combines his passion for beekeeping with his pastoral duties at the First Presbyterian Church of Jackson, Mo. Grant is past-president of the Missouri State Beekeepers Association, and a frequent regional and national conference speaker.

**Small Scale Queen Rearing**
A young, productive queen is the key to any colony's vitality. Two of the biggest obstacles for backyard beekeepers are the cost and the availability (or lack thereof) of good queens. This is a talk about a simple, efficient method of raising small batches of queens without huge investments in equipment or complicated schedules.
Finding a Queen That Doesn’t Want to Be Found
A queen is easy to find, until you really need to find her. This is a demonstration in the apiary about some easy tips and tricks to finding those elusive queens, and we’ll actually go looking for them!

Nancy Gilliard is the “other” Gillard in Gillard Family Honey. While Grant works the “hive into honey,” Nancy then takes it from “honey into money.” She is also, like Grant, an ordained Presbyterian Pastor serving a small congregation in Perryville, MO.

Tales from the Farmers Market and Other Sagas of a Beekeeper’s Spouse
Nancy’s talk will look at the lighter side of being a beekeeper’s spouse, along with some helpful tips for succeeding at the farmers market.

Krispn Given is Apiculture Specialist at Purdue University's Department of Entomology in West Lafayette Indiana. His responsibilities include maintaining 120 research colonies, running the Purdue honey bee breeding program, teaching queen rearing and instrumental insemination, and managing the honey bee laboratory and extension activities. His research is focused on selecting for behavioral resistance to varroa destructor. Krispn helped develop the new “mite-biter” bee strain with Dr. Greg Hunt. This strain demonstrates an ability to groom themselves free of varroa mites and bite them. Krispn also recently developed innovative instrumental insemination devices and equipment available through http://apisengineering.com/content/

Selecting for Behavioral Resistance to Varroa Destructor
This talk will give an overview of a successful breeding paradigm and how we select for certain social immunity traits like mite-biting. Will also explain the protocols we have used at Purdue the last 22 years in the current breeding program along with Instrumental insemination techniques used to ramp-up selection etc.

Mike Goblirsch earned his Ph.D. from the Department of Entomology at the University of Minnesota. The focus of his dissertation was to understand the role of the fungal pathogen, Nosema ceranae, in honey bee health. As a counterpart to his research with Nosema ceranae, he developed a cell line from honey bee embryonic tissues that will serve as a tool to further understanding of intracellular microbes that have a negative impact on honey bee health, including the many bee viruses. Mike is a hobby beekeeper and enjoys working with and especially learning from other beekeepers. He is currently a postdoctoral research associate in the laboratory of Marla Spivak. Mike will collaborate with Tom Webster in teaching the pest, pathology, and anatomy lab classes at HAS.

Dr. Matthew Grieshop is the Organic Pest Management Specialist faculty member of the Michigan State University Department of Entomology, where he is an Associate Professor. His responsibilities include research (50%), extension (30%), and teaching (20%) in the areas of organic agriculture and pest management. Although he is housed in entomology, he also has a strong interest in the management of weeds and pathogens The overall goal of his research and extension efforts are to develop, refine, and deliver pest management technologies that minimize off farm inputs while preserving farm economic sustainability.
The Past, Present and Future (?) of US Organic Agriculture.
Over the past fifty years organic agriculture has evolved from a fringe movement to a multibillion dollar industry. In this talk, we'll discuss the history of the US organic movement, the regulatory structure of USDA NOP, and some of the past, present, and future controversies that define this dynamic social movement.

Organic Insect Pest Management: Challenges and Opportunities
Insect pests are a ubiquitous part of farming and their management can have broad impacts on agroecosystems. We'll discuss: How do organic growers manage insect pests? What types of insecticides and fungicides are utilized in organic pest management? How might organic insect pest management techniques impact native and managed pollinators?

Jeff Harris, PhD is an Asst. Extension/Research Professor in the department of Biochemistry, Molecular Biology, Entomology and Plant Pathology at Mississippi State University. Prior to joining the Mississippi State faculty, he spent 15 years with the USDA, ARS Honey Bee Breeding Lab in Baton Rouge, La. He was one of the leaders in the development of the Varroa Sensitive Hygienic (VSH) line of bees that displays resistance to Varroa destructor. Jeff holds Masters and Doctorate degrees in insect Physiology and Entomology from Louisiana State University.

Progress with Breeding and Biology of VSH Bees

Bridging the Pesticide Divide Between Growers and Beekeepers

Tammy Horn-Potter After becoming smitten with honey bees while helping her grandfather in 1997, Tammy Horn Potter wrote Bees in America: How the Honey Bee Shaped a Nation (2005) and Beeconomy: What Women and Bees teach us about Local Trade and Global Markets (2012), both published by University Press of Kentucky. She started Coal Country Beeworks in 2008, working with surface mine companies to establish more pollinator habitat in Eastern KY for six years. In 2014, Tammy became the KY State Apiarist. In this role, she works with the nonprofit Green Forests Work to implement a NRCS Conservation grant reforesting surface mine areas with nectar/pollen producing trees, coordinating several USDA-APHIS Honey Bee Health Survey grants, and starting a queen production association in KY. She was the 2014 President of EAS, and when that role ended, was asked to represent EAS on the Honey Bee Health Coalition. In this capacity, she has worked on varroa mite management manuscripts and videos, best management practices guides, and other educational varia that the Honey Bee Health Coalition produces.

Martin Marklin was first introduced to beeswax candles when, at the age of eight while serving at his local parish in St. Louis, he noticed the unique inlaid-wax decorations on the 5 foot Easter Candle. He resurrected this technique in his parents’ basement and started Marklin Candle Design in 1985. Today, the company transforms tens of thousands of pounds of beeswax annually for thousands of churches in all fifty states. Additionally, Marklin has fashioned one-of-a-kind candles for three Popes and the Prime-Minister of Ireland. In their 50,000 square foot facility, Martin and his wife Christine pioneer innovative techniques in beeswax candle production and dip some of the largest candles in the US. (over 72" long and weighing 50 lbs each). Martin started keeping bees in 2009 and now manages over 150 hives.
Mind your Beeswax: The “Other” Gift of the Bee
The amount of beeswax typically harvested from a colony is a fraction of the honey that bees can produce. In fact, rarely if ever does one take up beekeeping with the primarily intent of harvesting wax. And yet, this “by product” accounts for a multi-billion dollar industry worldwide, with uses in candles and candy, pills and polishes, creams and caplets. Come and learn how this precious commodity is rendered into a valuable resource for items we use and consume daily, as well as how to turn your own beeswax into more than just lip balm.

Candle Making Fit for the Pope
Traditionally candles used for Catholic worship needed to be made of beeswax. While this is no longer a requirement, tens of thousands of churches in the US today are willing to pay more for beeswax than paraffin candles. Why then, does beeswax remains the queen of the natural waxes for candle making? Come and explore the challenges—and pitfalls—of making a beautiful, well-burning beeswax candle that even the Pope would prefer.

James D Masucci (Jim). BS in Biology from MIT in 1986. PhD in Molecular Biology from the University of Wisconsin – Madison in 1992. Post Doctoral Fellowship at the University of Michigan. Joined Monsanto in 1997. Spent the last 6 years in the Chemistry organization developing the topically applied RNAi technology we call BioDirect. I was originally a hobbyist beekeeper and used that experience to transition to the Bee Health Team at Monsanto in 2014 where I lead the field trial efforts to develop our BioDirect Varroa control product. In this role I have had the pleasure to work with some of the best commercial beekeepers in North America.

Progress Toward Biological Varroa Control
I will talk about our field trials for BioDirect, our varroa control product. I will talk about the effectiveness of a commercial treatment we are using as our positive control, how mite populations recover from this treatment, and the rate at which this treatment fails. I will introduce our new RNAi-based varroa control product and discuss how it works, what makes it a novel control product, and how it might fit into a varroa control management system.

Michael C. Misko, MD, FAAFP, FAEP, CPE, FACHE Dr. Mike Misko has been a practicing physician for over 30 years. Having grown up in St. Louis (Go Cardinals! Go Blues!), he completed his medical school at the University of Missouri – Kansas City School of Medicine in 1984. Upon completion of his residency in Family Medicine at Eglin Air Force Base, Florida, he continued to serve in the US Air Force for another 4 ½ years. He then practiced full-time family medicine in Holden, MO for 8 years. Dr. Misko then transitioned to Emergency Medicine, completing an emergency medicine fellowship while working full-time at Western Missouri Medical Center in Warrensburg, MO. During his tenure at WMMC, he served as the Chief of Emergency Medicine and the Medical Director of the Emergency Department. Along with others, Dr. Misko helped establish Johnson County EMS and served as its Medical Director for 10 years. He subsequently served as the Vice President of Medical Staff Services / Chief Medical Officer at WMMC for 5 years. Following this, Dr. Misko became the system Chief Medical Officer for Citizens Memorial Healthcare in Bolivar, MO, where he served for 3 years. Since August 2016, Dr. Misko serves as the Regional President of Physician & Ambulatory Services for SSM Health’s Mid-Missouri and NW Regions. His wife, Cathy Misko, has been an avid beekeeper for over 3 decades. Mike serves as honey connoisseur and chief apiary grounds keeper at their “Dancing Bees Ranch” near Centerview, MO.

Medical Issues in the Apiary: How to Prevent, Recognize, and Address
Whether you are a novice or experienced, young or old, healthy or have chronic medical conditions and on medications, there are a number of potential medical issues that you might encounter working in the bee
yard. Even if you don’t experience them, family, friends, or visitors might. Although the spectrum of possible reactions to bee stings (and their appropriate medical management) will be covered, we will go beyond this to discuss heat-related illnesses, various injuries (and how to prevent them), rashes, bites from other critters, precautions if you take certain medications, and what to have in your emergency bee sting kit. We will cover what can be handled on site and what should provoke a call to 911 or a visit to the Emergency Department. Packed with practical advice that you can apply as you care for the bees.

Dorothy Morgan Dorothy is an innovative queen breeder, based in South Central Kentucky. She is President of the Kentucky Queen Bee Breeders’ Association, a board member of Heartland Honey Bee Breeders Co-op, an instrumental inseminator, and a founding member of Sustainable Genetics Technology Network. Dorothy is currently working with Dwight Wells of Ohio on distributing the Purdue Bee Lab stock with the rest of the region and beyond. They are working on a system that will allow beekeepers to transport 48 hour-old queen cells within a 10 hour window from finisher to nuc/hive.

Polystyrene Hives
Dorothy will explain how she runs her breeding operation with 6 frame polystyrene hives. She will demonstrate how to assemble, paint, repair, and set up a hive stand. She will also share her top feeder/moisture quilt and will show how to make a shim all with polystyrene.

Dr. Ray Nabors was the University of Missouri Apiculture Specialist at the Fisher Delta Research Center in Portageville Missouri from 1990 to 2000. He estimates he has instructed over 3,500 Missourians in the art of keeping bees (beginning beekeepers). He is an engaging speaker, known for combining a sophisticated, scientific orientation and agricultural background with homespun humor and sound instruction in honey bee hive management. Dr. Nabors has been keeping bees since 1976 and has an apiary in the “Southeast Missouri Lowlands” where he produces comb honey. He has authored two University of Missouri Extension Guides on beekeeping, and has been a contributor to American Bee Journal and Bee Culture. He is active in beekeeping education through the Missouri Department of Agriculture and The Missouri State Beekeepers Association. He earned a B.S. in Water and Soil Conservation from the University of Tennessee, Martin, a Specialist Degree in Agriculture Biology from Arkansas State University, and a PhD from the University of Missouri.

Rediscovering Comb Honey
Ray will explore the advantages to small scale beekeepers of producing comb honey. He will focus on the management techniques he has developed over decades of producing the finest comb honey from cotton in the Missouri Delta. He will present methods that work with the bees’ natural behaviors, and not against them.

Bees and Pesticides in the Missouri Bootheel
Dr. Nabors will discuss the complex economic and biological relationships and interactions of transportation, beekeeping, and agricultural chemical use in Southeast Missouri.

William Palmer East Troy Honey Co, East Troy, Wisconsin, started beekeeping in 1996 with one hive to pollinate his fruit trees. By 2002 he had 120 hives and was pollinating several area crops including apples, squash, and pumpkins, and producing basswood honey. In the beginning years he took his honey to several markets and started selling to a few health food stores. By 2010 the workload of 120 hives, a full-time job and selling honey was reaching the limit. At that point William decided to focus on packing and selling honey which he has successfully taken into Woodman’s Grocery and the Meijer stores in Southeast-
ern Wisconsin, along with additional health foods stores and seasonal markets. He has been active in the Wisconsin Honey Producers Association and several local beekeeping groups.

**Growing Into Small Scale Pollination and Honey Production, Including Bottling and Labeling**

Let’s talk about how you begin your honey business including bottling choices, labels, and how to be efficient in your bottling and labeling. We’ll touch on pollination and when you need to buy honey, how do you select the honey you want to represent your company.

**Frederick P. Proni**

Freddy is an EAS Certified Master Beekeeper, the North American Area Manager for Veto-pharma, and Second Vice-President of the North Carolina State Beekeepers Association (NCSBA). He is a former full-time beekeeper, with an extensive background in business, who has thirty years combined experience in honey production, commercial honey brokering/packaging, and queen rearing. In addition to managing the Proni Honey Bee Company, Freddy lectures about the business aspects of beekeeping, teaches bee schools and is actively engaged with the Farm Bureau and other agriculture and honey bee related organizations.

**Passion to Profession for the Stationary Beekeeper**

Often we either dream of increasing our operation or circumstances dictate our unexpected growth leaving us in a quarry of questions reminiscent of a forager’s first orientation flight. This discussion focuses on growth considerations for the stationary beekeeper from equipment requirements, husbandry skills, standardization, pollination possibilities and efficiency practices. Together we will explore growth strategies allowing you to grow, slow or fast, while addressing how the practices of the backyard initiative changes dramatically as does the financial “honey money” bottom line.

**Kathleen Prough**

is Indiana Chief Apiary Inspector with the Indiana Department of Natural Resources. She inspects all hives starting with beekeepers that have one hive to the commercial beekeepers with thousands of hives. Kathleen has seen most everything that can happen to a hive. She is a board advisor to The Beekeepers of Indiana. kprough@dnr.in.gov

**Using Chemical Control Products for Varroa**

*What Are You Seeing? Pollen, Nectar, Eggs, Larva, Disease*

**Samuel Ramsey** (see Keynote Speakers, p. 9)

**Varroa Anatomy: Why it Matters to Your Bees**

*Varroa* are well-adapted to being parasites of honey bees. Some of their most fascinating adaptations are difficult to see with the naked eye but with the help of the USDA Bee Lab and the Electron Microscopy Unit, you can see the mites from the bee’s perspective and learn why they’re so adept at being so destructive.

**Tropilaelaps Mites: A Fate Worse Than Varroa**

*Tropilaelaps* mites are spreading across the globe at a rate very similar to that of Varroa in the 1960’s, roughly 20 years before they arrived in the US. If they continue to spread this way, it’s possible that they could be here just as quickly. These mites are much more destructive than *Varroa* with faster population growth, greater mobility, and no pesticides currently labelled for their treatment. There’s a lot to learn about them. This presentation details what we already know and what we still need to figure out.
Stephanie Regagnon is the President & CEO of FieldWatch, Inc., a non-profit company promoting stewardship and collaboration in agriculture. She has dedicated her career to the agriculture and renewable energy industries in Washington, DC, and St. Louis, MO for close to 20 years. Stephanie resides in St. Louis with her family.

Growing Good Neighbors: Stewardship & Collaboration in Agriculture

FieldWatch, Inc® is a non-profit company that promotes communication between producers of specialty crops, beekeepers and pesticide applicators in support of ongoing stewardship activities in 19 states and 1 Canadian province. DriftWatch™ and Bee-Check™ are programs of FieldWatch and are free, voluntary mapping tools used to promote awareness and collaboration on the ground. Our collaboration tool was originally designed by the Purdue University Agricultural and Biological Engineering Department with input and support from Purdue University Cooperative Extension. Our platforms feature an easy-to-use Google Maps™ interface that clearly shows pesticide applicators the locations of registered areas so they can utilize the data as they plan and prepare for their applications. During this presentation you will learn more about how to use our stewardship platform, including information about our new apps that allow beekeepers to map and move their hives with ease as well as how to expand our platform into your area. For more information please visit: www.fieldwatch.com.

Caydee Savinelli (see Panel Discussions, p. 12)

Pollinators and Pesticides Stewardship

Pesticides such as insecticides, herbicides and fungicides play an important role in controlling insects, mites, weeds and plant diseases on farms and in urban landscapes. Before a pesticide is registered, many regulatory studies are required. In the case of honey bees, there is a tiered approach which consists of both laboratory studies on adult and larval honey bees and field studies which evaluate effects on the honey bee colony. This approach and how the studies are conducted will be discussed. Additionally, insect pollinators and pesticide product stewardship will be discussed. Proper pesticide use starts with reading and following the product label. The use of Integrated Pest Management and good stewardship practices will help to reduce the potential exposure or harm to insect pollinators.

Mike Seib has been keeping bees for over 49 years since he was 10 years old. He expanded from just a few hives to 150 in 2016. He co-owns Seib's Hoosier Honey and has mentored countless beekeepers in and around the Morgan County area. Mike was instrumental in setting up the Indianapolis International Airport Community Apiary, which began operations in the spring of 2015, a couple of miles from the runways. Mike rears queens and is part of the Indiana Queen Breeders Association. Mike is currently the President of the White Lick Beekeepers Association and has been a Board member of the Indiana Beekeepers’ Association since 2010. He now serves on the board for The Beekeepers of Indiana.

Three Step Process for Controlling Varroa

Using a screen bottom board, a drone frame and powder sugar; hobby beekeepers can control their Varroa mites using a natural process. This session will share what tools are needed, walk through the process and allow attendees to try it themselves.

How to Light a Smoker and Keep it Lit

Every beekeeper from beginner to advance struggles with keeping their smoker lit. Mike will go through multiple types of fuel to use, how to pack it so the smoker will last while going through your hives.
Gregory Sekulic leads the Canadian Canola Council’s pollinator protection programs that promote biodiversity in canola cropping systems. Gregory has been an agronomy specialist with the Canola Council of Canada since spring 2011. Prior to that, Gregory spent 10 years in the Edmonton area as a field agronomist, working with top producers in the black soil zone. Gregory obtained his BSc in Agriculture, Crop Science, from the U of A in 2001. Throughout his career, Gregory has been an advocate for soil and water conservation, as well as sustainable agricultural production with a special interest in beneficial insect ecology.

Canola Story: Benefits to Beekeepers
Canola and Bees are a great Canadian success story. As acres of Canola have tripled from seven million acres in 1997 to 22 million in 2017, we have seen honey bee colonies nearly double, from 350,000 to over 700,000. A mutually beneficial relationship, the presence of bees placed near canola fields can lead to increased yield, increased crop quality, and shortened maturity. Canola pollen provides fantastic nutrition for honeybees, along with abundant nectar to produce large quantities of high quality honey. Canola farmers and beekeepers work together to their shared success.

Julie Shapiro, (see Panel Discussions, p. 11)

Honey Bee Health Coalition - How Stakeholders from Across Agriculture are Collaborating on Bee Health
This presentation will share the latest from the Honey Bee Health Coalition, a diverse partnership of beekeepers, crop producers, businesses, NGOs, researchers, and agencies working together to improve honey bee health. The Coalition’s multi-factor approach includes initiatives on hive pests and disease, forage and nutrition, and crop pesticides. The presentation will highlight work across these areas as well as Coalition tools and resources for beekeepers.

David Shenefield manages 3,000 honey bee colonies from his home in LaFontaine, Indiana. Before entering the bee industry, he worked for the highway department, a printing company, and as a motor pool Sargent in the army. In 1977, he joined his dad, Don, in the bee business. Dave served as the president of the Indiana State Beekeepers Association, the Indiana Beekeepers Association and was the first President of the combined associations, The Beekeepers of Indiana. He has served on the National Honey Board for region 7, Chair of Honeybee Committee for Indiana Farm Bureau, is currently President of Indiana Queen Breeders, and Indiana representative for Heartland Honeybee Breeders Association. David is instructing the queen-rearing classes.

Marla Spivak (see Keynote Speakers, p. 8)

Propolis and Bee Health
We have known since biblical times about the benefits of propolis for human health. It turns out that honey bees take the trouble to collect these sticky, medicinal resins to benefit their own health, too. A propolis lining within the nest cavity helps bees’ immune systems, and helps them fight off disease. We are currently exploring how all beekeepers can encourage colonies to construct a propolis envelope within traditional Langstroth hives.
Joy Stinger is a self-taught graphic designer, who has worked at a number of well known St. Louis design firms, and started her own graphic design company in 1981. Joy “took up beekeeping” as a hobby when she was fifty years old, and soon turned it into a small business. In addition to selling honey, Stinger (and that is her real name!) makes and sells candles and decorative beeswax ornaments, which she sells at craft fairs and farmers’ markets. Joy has given numerous workshops on candle making, to share her knowledge and experience with others.

**Making Candles and Decorative Ornaments of Beeswax**

Joy Stinger will share and demonstrate her personal approach to home-based beeswax candle making and ornament decoration. She will cover topics such as: 1) quality of beeswax to use; 2) what kind of molds to use and how to prepare them; 3) how to set a candle wick to keep it straight; 4) how to melt and pour beeswax; 6) how to unmold candles and ornaments; and 5) techniques she uses to paint beeswax ornaments.

Dr. Kirsten S. Traynor In 2006-2007, Kirsten received a German Chancellor Fellowship & drove over 50,000 miles throughout Western Europe to study the differences between European & American beekeeping. She reported her findings through 50+ published articles in bee journals. Fascinated with the social complexity of a honey bee hive, she earned her PhD in biology from Arizona State University with Dr. Robert Page. While a grad student, she spent almost a year in Avignon, France in the lab of Dr. Yves Le Conte as a Fulbright Fellow. She investigated how pesticides impact honey bee health as a postdoc with Dr. Dennis vanEngelsdorp and was appointed editor of American Bee Journal. She is the author of Two Million Blossoms: Discovering the Medicinal Benefits of Honey and Simple, Smart Beekeeping. She also manages a boutique organic apiary producing top quality nucs and Maryland reared queens. Using the biology of the bee against the biology of the varroa mite, she keeps her colonies healthy without synthetic chemicals.

**Two Million Blossoms: The Medicinal Benefits of Honey**

Long before the advent of antibiotics, our ancestors used honey to treat myriad health issues. While doctors have known that honey inhibits bacterial growth since the early 1930s, it was only in the 1970s that its antibacterial nature was revealed to be due to an enzyme bees add during the nectar ripening process. Superbugs continue to evolve resistance to modern antibiotics, making normal wounds difficult to heal. In search for effective alternatives, doctors are rediscovering the benefits of honey.

**How do Germans Keep Their Winter Losses Below 5%**

Commercial beekeepers in Europe often manage only 200 to 500 hives, yet make a comfortable living. I worked at the Professional Bee Institute in Celle, Germany, learning how to manage hives. The institute loses just 4% of their colonies annually. Discover how they intensely manage their hives to keep them healthy and productive.

**Halting the Unstoppable Swarm**

Good swarm management is one of the hardest things to learn. Despite a beekeeper’s best efforts, some colonies just insist on getting ready to go. Learn how to stop the unstoppable swarm and turn all that natural energy of the bees into beautiful, new comb.
Tim Tucker has been keeping bees since 1991 when he was given two hives of bees by a friend who was a beekeeper who was helping in removing bees from buildings with him when Tim was running an exterminating company at the time. In 1996, after selling his pest control business he moved to his farm in Niotaze, Kansas and began keeping bees full time. Running as many as 800 hives at the peak in 2006, he began delivering honey to retailers, mostly health food stores in Kansas. Currently we are delivering honey to over 50 stores in Kansas, Missouri and Oklahoma. Tim served as President of the Kansas Honey Producers and the American Beekeeping Federation where he was a board member for 12 years. He also has served as a trustee of the Foundation for the Preservation of Honey Bees

Making and Marketing a Wider Variety of Honey Products
Tim will discuss the many products that he has been marketing to the public for over 20 years and will include the many honey products that can help expand your honey business with products that will bring premium pricing for your honey.

Nuc Production and Transportation Using a Six-Frame System
This talk will cover the use of 6 frame boxes that I have been using for almost 15 years to make our nucs up in Texas and transport back to Kansas in the early spring. It has been the most efficient way we have found to make up and transport our nucs.

Dennis van Engelsdorp (see Keynote Speakers, p. 8)

Beekeeping Practices that Work
As the saying goes “for every 5 beekeepers there are 7 opinions and 6 are right”. And while that may be true – there is little doubt that some practices are better than others. But beekeeping is very local – so practices that are best in one region maybe very different than in another. In this talk we will explore the Bee informed management survey data explorer, to show beekeepers how they can find relevant information for which practices are best for their operation.

Drivers of Colony Losses, What the Data Actually Shows
Many different factors have been implicated in honey bee colony losses. Here we will review the top three – Parasites and pathogens, Pesticides, and Poor nutrition. Looking over the data from the US we will try to hone in on which factors are most likely causing losses in your operation and what you can do about it.

Thomas C. Webster, PhD is an Associate Professor in the College of Agriculture, Food Science & Sustainable Systems at Kentucky State University, where he specializes in honey bee diseases and beekeeping. His research has included studies of pesticide poisoning and he now focuses on Nosema ceranae and wintering problems. He teaches Apiculture and Pollination Biology, holds educational events for beekeepers, and teaches a Master Beekeeping Program in Kentucky. He is a founder of HAS. Webster completed his undergraduate degree in Biology at Oberlin College, and earned his PhD at the University of California, Davis.

Dissections and Examinations of Bees for Tracheal Mites and Nosema disease
Mike Goblirsch and I will demonstrate the methods for examining bees for tracheal mites and nosema disease, using low and high power microscopes. We will also discuss the biology of these organisms and how they affect honey bees. Beekeepers are welcome to bring their own bees for examination. If possible, bees should be taken live from their hives, and kept in alcohol until this presentation.

Honey Bee Anatomy: The Inside Story
The internal organs of the honey bee have much to do with successful beekeeping. Mike Goblirsch and I will
show how worker bee anatomy has much to do with the tasks and experiences of the individual bees: nurse bees, wax producers, guard bees, forager bees.

Dwight Wells started keeping bees in 1954 at age 14 as a Penn State 4H Project. He is a queen and nuc producer. He has been active as a director and member of beekeeping organizations in both Pennsylvania and Ohio. His current projects include evaluating Purdue Honey Bee Stock, catching swarms with Swarm Traps and evaluating Feral Colonies for Chewing Behavior. In 2018 he started a project to distribute 48 Hour Queen Cells, mature queen cells or unmated queens to beekeepers.

**Traveling with 48-Hour Queen Cells**

Quick, easy low-cost process to transport excellent Honey Bee Genetics into distant and local regions. Introduce the 48-hour queen cells into a Mating Nuc, the queens then mate with local drones the first year but will produce Drones the second year that will mate with local queens. A quick method to introduce and improve honey bee genetics (Beekeeping Success) within several square miles of a given region.

Five over Five Cell Starter/Cell Finisher Systems

Five over Five Cell Starter - Finisher Systems will be described With a Static Demo in the Bee Yard using five frame Nuc equipment. The Why and How to create a system with proper brood and nutrition resources, location of frames of brood and resources with the amount of proper support bees in the Nuc System. How to manage the Cell Starter - Finisher, and the advantages of using this type of system to produce 20 to 25 large healthy queens for a small Beekeeping operation.

James T. Wilkes, PhD is a beekeeper, professor, farmer, and entrepreneur. He is Professor of Computer Science at Appalachian State University teaching and working on honey bee projects including the Bee Informed Partnership. He owns Faith Mountain Farm, a family farm that includes a sideline beekeeping operation. James is founder and CEO of Hive Tracks, serving technology needs of beekeepers worldwide.

**Hive Tracks: Keeping Track of Your Hives**

We are living in fascinating times in which our personal and business lives are being transformed by digital technology. This talk surveys the brief history of technology development in beekeeping over the past ten years through the lens of experience with Hive Tracks. Then we survey the current state of software and hardware solutions available to beekeepers outlining the various factors to consider when choosing technology solutions like cost, reliability, and ease of use. Finally, looking at real world examples from hobby, sideliners, and commercial perspectives, we will examine the immediate value gained by individual beekeepers and the long term potential value to the beekeeping community.

Kent Williams has 30 years of experience keeping bees on a farm in Wingo, Kentucky. He produces honey, provides pollination services, raises and sells queens and nucs, and holds a well-attended annual bee school. He is a past president of EAS and the Kentucky State Beekeepers Association, and an EAS Master Beekeeper. Kent's extensive experience along with a droll sense of humor combine to make his talks and demonstrations both useful and entertaining.

**Basic Hive Inspection/Reading Frames**

Demonstration of how to inspect a colony thoroughly while being time-efficient; understanding what you are seeing on particular frames while inspecting; how to deal with potential problems you might find.
**Making Nucs**
Demonstration of different methods for making a nucleus hive, and discussion on the reasons you might choose different methods.

**Michael Wilson** is a part-time beekeeper in East Tennessee where he also works for the Bee Informed Partnership as a database programmer and data scientist. Michael has kept honey bees since 1999 and has raised queens annually since 2006 at Rosecomb Apiaries. Michael keeps around 200 colonies primarily for honey production for local markets. Developing locally adapted stock has been an important part of his beekeeping to head productive colonies. Availability of quality genetics and the logistics of having queens on hand when needed are two of the primary motivations behind his queen rearing. There is that, and it's fun too. When not in the bee yard, Michael is working with the Bee Informed Partnership (since 2011) to collect, organize, and analyze data from thousands of beekeepers to inform management decisions. If you've been to research.beeinformed.org or received any database reports from BIP's sampling programs, then you've seen some of the work he supports.

**Queen and Drone Biology**
In order to raise good queens, understanding the biology of queen and drone development is important. We will overview the development timeline and biology of queens and drones applied to the needs of raising queens. Numerous problems can occur in the overall health of honey bee colonies when queens are not developed properly or when the health of drones mating with queens is compromised. This talk will give a basic understanding of these issues to help beekeepers raise good queens. We will also overview the process to setup a queen cell builder which will be demonstrated in the apiary for the queen rearing course, with a brief description of setting up mating nucs. The process used in raising queens should be tailored to the biological needs for healthy queens.
HONEY SHOW

• Entries for the Honey Show will be accepted at the Registration Desk (see Registration section for Registration Desk hours).

• All entries must be hand delivered.

• The deadline to enter is Wednesday, July 11 at 6:00 pm. Judging will take place Thursday morning, July 12.

• Honey show entries will be displayed once the judging process is complete. Awards will be presented during the Brews & Bees Event at Anheuser-Busch Brewery that evening.
REGISTRATION, DORMITORY, MEALS, AND PARKING

**Registration**
The Registration and Information Desk is located in Anheuser-Busch Hall, and is open during the following hours:

- Tuesday 3:00 pm - 7:00 pm
- Wednesday 7:00 am - 6:00 pm
- Thursday 7:00 am - 6:00 pm
- Friday 7:00 am - 12 pm

**Dormitory**
HAS attendees staying in the dorm should check-in at the Registration desk. Dorm check-in times are:

- Tuesday 3:00 pm - 7:00 pm
- Wednesday 7:00 am – 10:00 am / 4:00 am - 7:00 pm
- Thursday 7:00 am – 10:00 am / 4:00 pm - 7:00 pm
- Friday 7:00 am – 10:00 am

Guests may check-in outside of the time frames noted above by calling the Washington University PD at (314) 935-5555. An HAS Staff Member will be notified for check-in.

Guests must vacate rooms no later than 11:00 am on the date of check-out. Each guest is charged a $200.00 fee and denied access to the room if not checked-out by 11:00 am.

Client will be charged for linens missing at the time of check-out.

Free parking for attendees staying in the dorms is available in Shepley Drive Parking Garage (top floor only) and Wallace Drive Parking Garage.

**Dorm Office Hours:**
Monday-Friday 9:00 am – 12:00 am
Saturday-Sunday 12:00 pm – 12:00 am

There is a $5.00 charge for lockouts and replacement key cards requested during regular office hours and a $25.00 charge for lockouts and replacement key cards needed outside of the regular office hours. Guests should call the the Washington University PD at (314) 935-5555 for assistance.

Rooms include WI-FI. There is one phone per building for local calls.

**Meals**
Meals will be served in Danforth University Center, called The Duc (pronounced “duck”). Breaks will be served in Anheuser-Busch Hall, Crowder Courtyard.

Attendees may use cash, credit card or meal card purchased at the time of registration to dine on campus.

If you purchased a meal card and exceed the allocated amount, you may pay using
cash or check at the dining hall. If you have an excess amount left on your card, it will become a donation to Heartland Apicultural Society.

See the Registration/Information Desk if you have a food allergy that was NOT noted on your registration. If you did note a food allergy when registering, mention it to Catering Staff and they will assist in delivering your specially prepared meal.

The following meal options are located at The Duc:

**Delicioso**: 7:00 am-7:30 pm
Breakfast - Monday through Friday - Eggs, Bacon, Sausage, Breakfast Burritos, French toast, Fruit, Granola, Cereal and Yogurt (Lunch) Burritos, Tacos, Quesadillas

**Cafe' Bergson**: 8:00 am-1:00 pm
Pastries & Bagels, (Lunch)-Salads & Wraps

**Wash U Wok**: 11:00 am-2:00 pm
Stir Fry, Crab Rangoon, Egg Roll, Pot Stickers

**Trattoria Verde**: 11:00 am-7:30pm
Pizza, Chili, Soup, Salads

**1853 Diner**: 11:00 am-2:00 pm / 5:00 pm-7:30pm
Burgers & Fries, Chicken Sandwich & Chicken Tenders

**Other On Campus Meal Options**:  
Subway (Outside Edison Theater): 7am-10pm

Starbucks (Bauer Hall): 7:45-8pm

**Parking**

Hourly rate Visitor Parking is available on campus in Millbrook Parking Garage and Snow Way Parking Garage. The maximum full day charge is $9.

Free parking is available in Shepley Drive Parking Garage and Wallace Drive Parking Garage only for attendees staying in the dormitory.
EVENING EVENTS

HAS is excited to offer you the opportunity to enjoy popular St. Louis attractions while networking amongst your peers!

Dinner, Music, and a Movie – Wednesday, July 11

Join us for a Mexican-themed dinner with live music. This event is on-campus. The dinner is followed by a movie night with free popcorn and honey ice cream.
Dinner Location: South Forty, College Hall
When: 6:00 pm – 7:30 pm

Movie Location: Edison Theater in Mallinckrodt Center
When: 7:45 pm

Brews & Bees at the Brewery – Thursday, July 12

Home to the world-renowned Clydesdales, Anheuser Busch Brewery welcomes HAS for a fun evening out! Attendees have the unique experience of touring the historic Brewhouse along with the Beechwood Aging Cellars. You’ll also want to make your way to the Outdoor Biergarten for networking, brews and the Bier Bundle Buffet. Twenty-one and over will enjoy a free AB beverage in the Biergarten. Cash bar available.

Transportation is provided. The shuttle will depart at 5:00 pm. from Simon Hall. The return shuttle will depart Anheuser Busch at 9:00 pm.

Zoo Bees – Friday, July 13

Consistently ranked as one of the top 5 zoos in the country, the St. Louis Zoo will not disappoint! HAS attendees will enjoy live music, riding the zoo train and a special tour of the insectarium. An Italian-fare buffet will be available at the River Camp (see map for location once inside the Zoo). Cash bar available.

Transportation is provided. The shuttle will depart at 5:00 pm from Simon Hall and drop guests at the South entrance of the Zoo.

The return shuttle will depart the Zoo at 9:00 pm. Attendees will load the shuttle at the South Entrance.

NOTE: Zoo parking is $15 per vehicle. There is free street parking but on a first come, first served basis.
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Indiana’s most complete and largest beekeeping store.
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www.bastinhoneybeefarm.com
Wednesday, July 11th, 2018 | Vendor area 8 am - 7 pm – Anheuser-Busch Hall, Crowder Courtyard

**GENERAL SESSION:** Edison Theater

8:30 am - Conference Opens - Welcome, Opening Comments | Bob Sears - HAS President
8:45 - 9:35 am - The Long and Optimistic View of Honey Bee Health | Marla Spivak, PhD, University of Minnesota
9:40 am - 10:30 am - Mite Management Matters | Dennis vanEngelsdorp, PhD, University of Maryland

**10:30 - 11:10**

BREAK | Anheuser-Busch Hall, Crowder Courtyard

**Breakout Sessions in Anheuser-Bush Hall, Seigle Hall, and McMillan Café**

| 11:10 - 12:00 | MiteCheck | Anheuser-Busch 203 - Morris | Anheuser-Busch 204 - Jordan Foundation | Anheuser-Busch 305 - Cullenbine | Anheuser-Busch 306 - Zorensky | Anheuser-Busch 316 - Bryan Cave Most Courtroom | Seigle 301 | Queen Rearing McMillan Café | Queen Rearing Apiary | Apiary 1 | Apiary 2 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 11:10 - 12:00  | MiteCheck       | Bee Math        | An Interactive  | Bees and the Basics on Keeping Bees Alive | Small Scale Queen Rearing | Medicinal Benefits of Honey | Dissections and Examinations for Tracheal Mites and Nosema: Bringing Your Own Bee Samples | Selecting for Behavioral Resistance to Varroa Destructor | Using Chemical Products for Varroa Control | Basic Hive Inspection - Reading Frames |
| 12:00 - 1:30   | LUNCH | Danforth University Center (DUC) |

| 1:30 - 2:20 | Apiary 1 | Apiary 2 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 12:00 - 1:30   | LUNCH | Danforth University Center (DUC) |

| 2:35 - 3:25 | Apiary 1 | Apiary 2 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 3:25 - 3:50   | MiteCheck | Bee Squad Ana Heck, Bridget Mendel Lee, Jenny Warner |

**3:25 - 3:50**

BREAK | Anheuser-Busch Hall, Crowder Courtyard

| 4:00 - 4:45 | Apiary 1 | Apiary 2 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 4:00 - 4:45   | Drivers of Colony Losses, What the Data Actually Shows | How to Detect and Correct Queen Problems | Hive Tracks, Keeping Track of Your Hives | Medical Issues in the Apiary: How to Prevent, Recognize & Address Varroa Part 2 | Rediscovering Comb Honey | Dissections and Examinations for Tracheal Mites and Nosema: Bringing Your Own Bee Samples | Preparing the “Open Flight” Starter Finisher System (Requires Special Registration) | MiteCheck | Basic Hive Inspection - Reading Frames |
| 5:00 - 6:00   | MiteCheck | Bee Squad Ana Heck, Bridget Mendel Lee, Jenny Warner |

**6:00 - 7:15**

Mexican Dinner | College Hall

**7:45**

MOVIE: Ulee's Gold | Edison Theater
### Thursday, July 12th, 2018 | Vendor area 8 am - 7 pm – Anheuser-Busch Hall, Crowder Courtyard

**GENERAL SESSION:** Edison Theater  
8:30 am - Conference Opens - Welcome, Opening Comments | Bob Sears - HAS President  
8:45 - 9:35 am - Integrating Hive Management with Evolution and Ecology | Keith S. Delaplane, PhD, University of Georgia  
9:40 am - 10:30 am - Varroa Feeds on Hemolymph and Two Other Alternative Facts | Samuel Ramsey, PhD, University of Maryland

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>10:30</td>
<td><strong>BREAKEANHEUSER-BUSCH HALL, CROWDER COURTYARD</strong></td>
<td>Anheuser-Busch Hall</td>
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<tr>
<td>11:10</td>
<td><strong>Breakout Sessions in Anheuser-Busch Hall, Seigle Hall, and McMillan Café</strong></td>
<td>Seigle Hall</td>
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<tr>
<td>11:10</td>
<td>Mind Your Beeswax: The &quot;Other&quot; Gift of the Bee</td>
<td>Anheuser-Busch 204 - Jordan Foundation</td>
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<td>11:10</td>
<td>Progress with Breeding and Biology of VSH Bees</td>
<td>Anheuser-Busch 305 - Cullinane</td>
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<td>11:10</td>
<td>Fighting for Our Bees</td>
<td>Anheuser-Busch 306 - Zorensky</td>
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<td>11:10</td>
<td>Past, Present and Future of US Organic Agriculture</td>
<td>Anheuser-Busch 319 - Trial Courtroom</td>
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<td>11:10</td>
<td>Carolina Story: Benefits to Beekeepers</td>
<td>Carolina Story: Benefits to Beekeepers</td>
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<td>11:10</td>
<td>Panel Discussion: What Do We Know About Bees and Pesticides, What Do We Not Know and How Do We Know It</td>
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<td>Making Wax Candles and Ornaments</td>
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<td>Beekeeping Basics</td>
<td>Beekeeping Basics</td>
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<td>Making Nucs</td>
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<td>12:00</td>
<td>**LUNCH</td>
<td>Danforth University Center (DUC)**</td>
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<tr>
<td>1:30</td>
<td>Pheromon: Understanding Colony Communication Part I</td>
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<td>1:30</td>
<td>Bee Squad Ana Heck, Bridget Mendel Lee, Jenny Warner</td>
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<td>1:30</td>
<td>Kathleen Prough</td>
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<td>Dewey Caron</td>
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<td>Kirstan Traynor</td>
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<td>Sandra Arango-Caro</td>
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<td>Mike Goblirsch</td>
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<td>Dorothy Morgan</td>
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<td>Mike Seib</td>
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<td>2:35</td>
<td>Hives, Tribes and Networks-How Ideas Spread and Why Beekeepers Have Such a Big Impact on Culture</td>
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<td>Bee &amp; Butterfly Habitat Fund: A Program to Help You Plant Pollinator Habitat</td>
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<td>Bridging the Pesticide Divide Between Growers and Beekeepers</td>
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<td>Honey Bee Health Coalition - How Stakeholders from Across Agriculture are Collaborating on Bee Health</td>
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<td>Fungicide Effects on Bees</td>
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<td>2:35</td>
<td>Feeding Honey Bees</td>
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<td>2:35</td>
<td>Queen Rearing Grafting (Requires Special Registration)</td>
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<td>2:35</td>
<td>Preparing Grafting Frames, Then Start to Graft (Requires Special Registration)</td>
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<td>2:35</td>
<td>Mite Sampling Demonstration</td>
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<td>2:35</td>
<td>Phenomones: Understanding Colony Communication Part II</td>
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<td>2:35</td>
<td>Bee Squad Ana Heck, Bridget Mendel Lee, Jenny Warner</td>
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<td>2:35</td>
<td>Tammy Horn-Potter</td>
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<td>3:30</td>
<td>**BREAK</td>
<td>Anheuser-Busch Hall, Crowder Courtyard**</td>
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<td>4:00</td>
<td>Pollinators and Pesticides Stewardship</td>
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<td>Nuc Production and Transportation Using a 6-Frame System</td>
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<td>4:00</td>
<td>APHIS National Honey Bee Survey-Missouri Preliminary Results</td>
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<td>4:00</td>
<td>Insect Pollination: Co-Evolution from the Flower's Perspective</td>
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<td>4:00</td>
<td>Bees and Pesticides in the Missouri Broodroom</td>
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<td>4:00</td>
<td>Different methods of Checking for Varroa Mites</td>
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<td>4:00</td>
<td>Continue Grafting and Discussion (Requires Special Registration)</td>
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<td>4:00</td>
<td>The Ups and Downs of Varroa Management</td>
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<td>4:00</td>
<td>Finding a Queen That Doesn't Want to be Found</td>
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<td>Mike Goblirsch</td>
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<td>Mike Wilson, Krispn Given and Dave Shenefield</td>
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<td>Bee Squad Ana Heck, Bridget Mendel Lee, Jenny Warner</td>
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<td>4:00</td>
<td>Grant Gillard</td>
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<td>6:00</td>
<td><strong>Brews and Bees</strong>                                           <strong>Anheuser - Busch</strong></td>
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<tr>
<td>Time</td>
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<tr>
<td>8:30 am</td>
<td>Conference Opens - Welcome</td>
<td>Bob Sears, HAS President</td>
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<tr>
<td>8:45 - 9:35 am</td>
<td>Oxalic Acid Extended Release Study and Results</td>
<td>Jennifer Berry, University of Georgia</td>
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<tr>
<td>9:40 am - 10:30 am</td>
<td>Panel Discussion: How Technology is Shaping the Future of Pollinators, Ecology, and Agriculture</td>
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<td>10:30 - 11:10</td>
<td>Anheuser-Busch 201 - Morris</td>
<td>Jane Richardson, University of Illinois</td>
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<td>11:10 - 12:00</td>
<td>Candlemaking Fit for the Pope</td>
<td>Elizabeth Green, The Beekeeper</td>
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<td>12:00 - 1:30</td>
<td>Drama Queens Part I</td>
<td>Susan Dyer, The Beekeeper</td>
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<td>1:30 - 2:20</td>
<td>Organic Insect Pest Management: Opportunities</td>
<td>Daniel Schneid, The Beekeeper</td>
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<td>5:15 - 6:00</td>
<td>Traveling with 48-hour Queen Cells</td>
<td>David L. Anderson, The Beekeeper</td>
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<td>6:00</td>
<td>St. Louis Zoo</td>
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**Breakout Sessions in Anheuser-Busch Hall, Seigle Hall, and McMillan Café**

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<thead>
<tr>
<th>Time</th>
<th>Session Description</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>11:10 - 12:00</td>
<td>Breakout Sessions: Science-Based Risk Management of Bees</td>
<td>John L. Schaffer, The Beekeeper</td>
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<tr>
<td>12:00 - 1:30</td>
<td>Breakout Sessions: Science-Based Risk Management of Bees</td>
<td>John L. Schaffer, The Beekeeper</td>
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<td>John L. Schaffer, The Beekeeper</td>
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</table>
The Lyson mini-line offers the best features of automatic line in a unit sized and priced for sideline beekeepers!

Price: $23,995

Lyson 4 Frame Tangential Extractor

Holds 4 medium or two deep frames. Adjustable legs with a steel gear crank. The perfect entry level model at great price.

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RESULTS IN BEST OVERWINTER SURVIVAL WHEN USING A NATURAL PRODUCT FOR 3 YEARS
NATIONAL MANAGEMENT SURVEY
BEE INFORMED PARTNERSHIP 2015

WINTER LOSSES ACCORDING TO THE TREATMENT

In addition, beekeepers who reported treating with ApiLife Var lost 31.9% fewer colonies than those who reported NOT treating with any varroa mite control product.

On the same survey, Apiguard loss reduction was only 23.1%.

Bee Informed Partnership 2015 survey

MORE THAN THYMOL: Synergy of 4 essential oils to ensure a better control release of thymol in-hive

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NATURAL INGREDIENTS  UP TO 94% EFFICACY*  NO VARROA RESISTANCE DEMONSTRATED

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Available from:

MANN LAKE
WE KNOW BEES
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The product was not tested this year.