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CCD Finally Revealed? Israeli Acute Paralysis Virus (IAPV) linked to CCD Colonies

Its official folks! We have yet another affliction to deal with, Israeli Acute Paralysis Virus. This past year numerous entomological and infectious disease researchers have been investigating the causes of CCD and seem to have discovered the proverbial smoking gun (or at least one of them). The following are news releases about CCD with the latest information. The first section is a news release sent out by Dr. Cox-Foster which is meant for beekeepers. The next four articles were extracted from Bee Culture magazine's website (www.BeeCulture.com). They are a compilation of different articles which were released in the past few weeks from Columbia University, Penn State, and Science Magazine. Some of the information is repeated from article to article however, each has a slightly different approach which I think you will find interesting. The last is notes acquired from Apimondia's Australian conference about CCD and the possible Australian connection.

Colony Collapse Disorder and Israeli Acute Paralysis Virus

By Diana L. Cox-Foster

A recent publication in Science established a link between a new virus, Israeli Acute Paralysis virus (IAPV), and CCD colonies. Of those colonies that suffered from CCD, all had IAPV present while healthy colonies did not have IAPV. Additionally, the research found that IAPV was present in bees imported from Australia and in royal jelly from China. Operations with CCD and sampled in the study had either imported Australian bees directly or had been closely associated with colonies that had Australian bees. We also know that IAPV has been previously found in Israel, suggesting that this virus maybe more widely spread globally. No one knows where its origins are at this point in time.

Does this prove that IAPV causes CCD? No, what this article and research to date points to is that IAPV could be involved in CCD and more work is needed to prove or disprove this idea. We can conclude, however, IAPV appears to be a very good marker for CCD and its detection may aide in defining CCD.

So where did the IAPV in the U.S. come from? It is not clear at this point but certainly Australian package bees are a likely source. Additional sampling in the U.S. and Australia is needed to be certain. We have begun discussions with Animal Plant Health Inspection Service (APHIS) and Australia with our concerns about package bees. Contacts have been made in Australia for additional samples and we are seeking the help of the Apiary Inspectors of America to gather additional samples here in the U.S. Samples are needed from colonies that appear to be suffering from CCD as well as samples from colonies that were established from Australian packages this past year.

What if I have Australian package bees in my beekeeping operation, what should I do? The recommendations for dealing with CCD remain the same (see MAAREC website); 1) keep Varroa under control, 2) treat for Nosema if present, 3) do not re-use equipment from dead hives.

What else can I do now to further protect my bees from decline? We still don't know all the factors involved in CCD but there are no treatments for viruses; your best defense is a healthy well fed colony.

Are we sure if IAPV is causing CCD? No, we believe it is a marker and maybe involved in CCD but may be working in conjunction with other stressors like Varroa, pesticides, or poor nutrition.

Why would IAPV not be causing problems in Australia? At least two explanations are plausible, Australia does not have Varroa to vector and activate IAPV and it may have co-adapted to bees stock in Australia. If the virus has adapted to Australian stock then we may want to look at Australian bees as part of our breeding programs. Along this same line, a research group in Israel believes that some bees in Israel have incorporated part of the DNA of the virus into their bee DNA and this DNA incorporation is offering resistance to the colony. IAPV has been linked to some colony losses in Israel. While the DNA incorporation idea is novel and somewhat controversial, it does offer hope as a means of combating IAPV or other virus problems. We do believe that breeding bees for increased resistance to varroa and pathogens such as IAPV is an answer.

How can we maintain strong colonies? Do the things you know how to do; reduce Varroa, treat for Nosema if needed, and feed when needed. If IAPV is causing a problem with bees in the U.S. then strong colonies are our best defense

Efforts continue to try and understand the key components involved in CCD. Currently we are initiating experiments to try to determine if indeed IAPV is a causal agent in CCD. We will be exposing healthy, IAPV-free colonies to IAPV in conjunction with other pathogens, pesticides, or nutritional stress to see if we can get the colonies to develop CCD symptoms and collapse. Likewise, we are trying to determine methods that will work for treating equipment from dead out colonies. Others in the working team are asking about many other aspects, such as pesticides, etc. In collaboration with all, we hope to be able to answer many questions concerning CCD and bee health and deliver methods for mediation or prevention of the problems in bee health.

Bee Researchers close in on Colony Collapse Disorder

Across the nation, beekeepers have seen hive after hive succumb to Colony Collapse Disorder (CCD); a team of entomologists and infectious disease researchers now report a strong correlation between the occupancy of CCD and a virus, Israeli Acute Paralysis Virus (IVAP). "We have not proven a causal relationship between any infectious agent and CCD," the researchers report in today's (Sept. 6) issue of Science Express online. However, they note that the prevalence of IAPV genetic material in bees

suffering from CCD, the timing of the outbreaks and the geographical circumstances "indicate that IAPV is a significant marker for CCD."

Many researchers are investigating CCD because domestic honeybees are vital to a variety of agricultural crops in the United States. Beekeepers truck their hives cross country to pollinate almond groves in California, field crops and forages in the Midwest, apples and blueberries in the Northeast and citrus in Florida. Unlike other diseases that have plagued bees in the past, CCD leaves a hive with a few newly hatched adults, a queen and plenty of food. Researchers suspect a pathogen because while bees will not re-colonize a CCD hive, once the hive is irradiated and therefore sterile, bees are happy to live there.

The disease was recognized in 2006, but beekeepers reported hive declines similar to CCD as early as 2004. An estimated 23 percent of all beekeeping operations in the U.S. suffered from CCD during the winter of 2006/2007. After looking at other methods of identifying the cause of the disease, the researchers decided to sequence the genetic material in bees to try to find a potential pathogen. "The genome of the honey bee had just been completed," said Diana Cox-Foster, professor of entomology, Penn State. "So it was possible to do the sequencing and then eliminate the genetic material of the bees."

W. Ian Lipkin, M.D., professor of epidemiology, neurology and pathology at Columbia University and director of the Center for Infection and Immunity at Columbia University Mailman School of Public Health, and his team prepared samples for 454 Life Science-- the company that developed the array-based pyrosequencer-- to sequence cDNA from the RNA of the bees. Researchers analyzed data using a unique set of algorithms generated at Columbia, did a large amount of viral sequence comparison, developed real time PCR assays and cloned the full length IAPV genome, among other things. The samples sequenced included bees from four geographically separated CCD suffering operations, apparently healthy bees imported from Australia, non-diseased samples from Pennsylvania and Hawaii, and samples of royal jelly imported from China. Royal jelly is secreted by bees and used to feed all larvae, but those fed only with royal jelly become queens. "We chose bees from Hawaii because at that time, those populations were free of varroa mites, a problem in all mainland hives," says Cox-Foster. "The royal jelly was not intended for bees, but for human consumption and cosmetics, but some beekeepers use it to create new queens."

The researchers grouped material for sequencing as presumed CCD positive, presumed CCD negative and royal jelly. The pooled RNA sequences were analyzed for bacteria, fungi, parasites and viruses matches. Lipkin played a key role in the search for new or reemerging pathogens, contributing unique methods. The genetic sequences, minus that of the domestic honeybee, were eventually matched against GenBank, a database of genetic sequences maintained by the U.S. National Center for Biology Information, National Institutes of Health. Ninety-six percent of the genetic material matched that previously found in bees. The bacterial sequences were those normally found in bees worldwide, analyzed by Nancy A. Moran, the Regents' professor of ecology and evolutionary biology, University of Arizona, and colleagues and Jay Evans, research entomologist, Bee Research Laboratory, U.S. Department of Agriculture, Agricultural Research Service and colleagues. "The bacteria found were the same as those found in two previous studies from two different parts of the world at two different times," says Cox-Foster. "They represent mutualistic or symbiotic relationships with the bees, similar to those of humans and the bacteria found in the human gut."

Protozoans and fungi analyzed by Liwang Cui, associate professor of entomology, and David M. Geiser, associate professor of plant pathology, Penn State respectively, were associated with both CCD and non CCD populations. "We knew before we started that we would find a boatload of viruses in the bees given our preliminary research," says Cox-Foster. "Eighteen different types are known from serology and antibody work in England."

Cox-Foster's and Lipkin's groups analyzed the viruses. They found the expected viruses, and they found one that, while identified by researchers at Hebrew University in 2004, has just now appeared in scientific

publication. This virus, IAPV, along with Kashmir bee virus (KBV), was found only in CCD populations. In the initial experiments, the researchers report that "IAPV was found in all four affected operations sampled, in two of four royal jelly samples and in the Australian sample. KBV was present in three of four CCD operations, but not in the royal jelly."

Other viruses and *Nosema* parasites had been suggested as the cause of CCD, but the researchers found that those pathogens appear in both CCD and non-CCD samples. Only KBV and IAPV correlated with CCD in the genetic survey. In a recently published study, Jeffery S. Pettis, research leader, Bee Research Laboratory, and colleagues reported that *Nosema ceranae* had been in the U.S. for at least 10 years, along with *Nosema apis*. Researchers then analyzed samples collected from 30 CCD colonies and 21 healthy colonies in the past three years for four pathogens: KBV, IAPV and *Nosema apis* and *Nosema ceranae*. They found that all samples that had IAPV had KBV, but KBV also occurred in both sick and healthy samples. "IAPV was found to increase the risk of CCD with a trend for increased CCD risk in samples positive for *Nosema apis*," the researchers said. "Neither KBV nor *N. ceranae* contributed significantly to the risk for CCD nor did they alter the influence of IAPV on CCD." However, while IAPV may be a marker for CCD, proving that any organism is the cause of CCD is somewhat more difficult. The researchers will now try to infect bee colonies with CCD. Beside general health stress from the heavy load of pathogens normally carried by bees, other suggested contributors to CCD include pesticides, drought and nutritional stress.

Timing also may be the key to pinpointing the cause. The United States began allowing importation of bees from Australia in 2004, which coincides with early reports of CCD. The same year, IAPV, described by Israeli researchers with symptoms of shivering wings, progressed paralysis and bees dying outside the hive appeared. While CCD does not seem to have the same symptoms, this may reflect a different strain of the virus, co-infection with another pathogen or the presence of other stressors. The researchers note that "the varroa mite, for example, absent in Australia, immuno-suppresses bees, making them more susceptible to infection by other organisms." Beekeepers used miticides, chemicals used to control varroa, on both CCD and healthy colonies.

Edward C. Holmes, professor of biology, Penn State, and Gustavo Palacios, Columbia University, were instrumental in determining the evolutionary relationships of the viruses found in CCD colonies compared to previously known viruses and isolates from Australia. While unquestionably it is important to identify the cause of CCD, this total genetic study of bees and their fellow travelers also may lead to a better understanding of other disease causing agents in the population and to an understanding of the beneficial organisms that reside within the bee.

Other researchers on the Penn State team include Dennis vanEngelsdorp, senior extension associate and State Apiarist for the Pennsylvania Department of Agriculture, and Abby Kalkstein, research technologist. Other researchers at Columbia University include Sean Conlan, PhenixLan Quan, Thomas Briese, Mady Hornig, Andrew Drysdale, Jeffrey Hui and Junhui Zhai. Vince Martinson, University of Arizona and Stephen K. Hutchison, Jan Fredrik Simons and Michael Eghom, at 454 Life Sciences, also contributed.

Progress made in research on mysteriously disappearing honeybees

Researchers identify virus possibly responsible for declining honeybee population using 454 Life Sciences' sequencing technology; findings published in Science implicate virus in deaths of tens of billions of bees

BRANFORD, Conn. – September 6, 2007 – 454 Life Sciences, a Roche company, today announced that researchers at Columbia University have identified a virus implicated in the deaths of 2.4 million honeybee colonies – tens of billions of bees – using the company's Genome Sequencer™ system. The

findings explain how foreign organisms living in and among the bees were identified by reading sequences of DNA isolated from the bee colonies. The study, entitled "A metagenomic survey of microbes in honey bee colony collapse disorder", appears online (ahead of print) today in the journal *Science*. Using 454 Sequencing technology, Dr. Ian Lipkin, Professor of Epidemiology at Columbia University's Mailman School of Public Health, and colleagues sequenced DNA and RNA samples that were extracted from collapsing and healthy bee colonies in search of any pathogen responsible for the collapse. The research identified five major bacterial groups, four lineages of fungi and seven types of viruses. While most of the foreign organisms were found in both the collapsed and healthy bee colonies, one virus, Israeli Acute Paralysis Virus (IAPV), was found only in the collapsed colonies. As discussed today in *Science*: "Although we have not proven a causal relationship between infection and CCD, the prevalence of viral sequences in CCD operations ... make IAPV a leading candidate." "Unbiased 454 Sequencing technology enabled us to rapidly assemble a comprehensive inventory of microflora in Colony Collapse Disorder (CCD) and non-CCD populations and provided the sequence information needed to identify candidate pathogens," stated Dr. Lipkin. "CCD is a model for investigating epidemics of unexplained infectious disease"

Bees play an integral role in the world food supply and are essential for the pollination of more than 90 fruit and vegetable crops worldwide. The economic value of these agricultural products is placed at more than \$14.6 billion in the United States alone. In CCD, honeybee colonies inexplicably lose all of their worker bees. CCD has resulted in a loss of 50% to 90% of colonies in beekeeping operations across the United States. The observation that irradiated honeycombs from affected colonies could be repopulated with healthy bees, while non-sterilized combs could not, suggested an infectious basis for CCD. Suspected pathogens were screened for association with CCD by examination of samples collected from several sites over a period of three years. "We are very pleased to see our technology applied to solve real-world problems. There were a lot of examples during the last months, from cancer research, infectious diseases research, drug discovery, marine biology, anthropology, paleontology, and many more. We are hopeful this latest research will help eliminate the threat of CCD to global agriculture" said Christopher McLeod, president of 454 Life Sciences. "The chief advantage of 454 sequencing technology is how it enables researchers to identify the organisms present in complex environments without any advance knowledge of the sample."

CCD was first reported in the fall of 2006 in the United States. Since then, CCD has been reported in Germany, Switzerland, Spain, Portugal, Italy and Greece. A recent survey of 13 states by the Apiary Inspectors of America showed that over a quarter of U.S. beekeepers have lost, on average, half of their bee colonies between September 2006 and March 2007.

Virus named as possible factor in honey bee disorder

A comparison of healthy and unhealthy bee colonies points to a virus contributing to Colony Collapse Disorder (CCD), according to a report being published by the journal *Science*, at the *Science Express* web site, on 06 September. *Science* is published by AAAS, the nonprofit science society. "Our extensive study suggests that the Israeli Acute Paralysis Virus (IAPV) may be a potential cause of Colony Collapse Disorder," said W. Ian Lipkin, director of the Center for Infection and Immunology at the Mailman School of Public Health, Columbia University. "Our next step is to ascertain whether this virus, alone or in concert with other factors such as microbes, toxins and stressors, can induce CCD in healthy bees," he added.

CCD is a puzzling phenomenon occurring in the United States – and possibly other countries where it is not yet confirmed – in which all adult bees disappear from the hive, leaving the honey and pollen behind. Few, if any, dead bees are found around the hive.

Between 50 and 90 percent of the commercial honey bee (*Apis mellifera*) colonies in the United States have been afflicted by CCD, and the disorder is making it difficult for U.S. commercial beekeepers to pollinate crops.

Researchers including Lipkin and Diana Cox-Foster, entomology professor at Pennsylvania State University, and colleagues have taken a new approach to investigating infectious disease outbreaks. To find the cause of CCD they used a rapid genome sequencing technique called pyrosequencing to catalogue the entire variety of microorganisms that honey bees harbor. After comparing their sequences with known sequences held in public databases, they identified symbiotic and pathogenic bacteria, fungi and viruses found in both healthy and CCD-afflicted colonies. They tested samples collected over three years across the United States from normal and CCD-affected hives. They also tested royal jelly imported from China, which is fed to bee larvae to start up a new colony, as well as apparently healthy bees imported from Australia, in an attempt to locate a source for an infectious agent. After detailed statistical comparison of all the samples, the molecular signs of Israeli Acute Paralysis Virus appeared to be associated with CCD. “This research gives us a very good lead to follow, but we do not believe IAPV is acting alone,” said coauthor Jeffery S. Pettis, research leader of the Bee Research Laboratory, United States Department of Agriculture. “Other stressors to the colony are likely involved,” he said. Those stressors could be poor nutrition, pesticide exposure and parasitic mites. The next research steps include inducing CCD in healthy bees, determining the global distribution of IAPV and CCD and studying bees that appear to be resistant to CCD.

“A Metagenomic Survey of Microbes in Honey Bee Colony Collapse Disorder,” by D.L. Cox-Foster, E.C. Holmes, D.M. Geiser, D. vanEngelsdorp, A.L. Kalkstein and L. Cui at Pennsylvania State University in University Park, PA; S. Conlan, G. Palacios, PL. Quan, T. Briese, M. Hornig, A. Drysdale, J. Hui, J. Zhai and W.I. Lipkin at Columbia University in New York, NY; E.C. Holmes at Fogarty International Center, National Institutes of Health in Bethesda, MD; J.D. Evans and J.S. Pettis at U.S. Department of Agriculture (USDA) Agricultural Research Service in Beltsville, MD; N.A. Moran and V. Martinson at University of Arizona in Tucson, AZ; D. vanEngelsdorp at Pennsylvania Department of Agriculture in Harrisburg, PA; S.K. Hutchison, J.F. Simons and M. Egholm at 454 Life Sciences in Branford, CT.

The American Association for the Advancement of Science (AAAS) is the world’s largest general scientific society, and publisher of the journal *Science* (<http://www.sciencemag.org/>). AAAS was founded in 1848, and serves 262 affiliated societies and academies of science, reaching 10 million individuals. *Science* has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of 1 million. The nonprofit AAAS (<http://www.aaas.org/>) is open to all and fulfills its mission to “advance science and serve society” through initiatives in science policy; international programs; science education; and more. For the latest research news, log onto EurekaAlert!, <http://www.eurekaalert.org/>, the premier science-news Web site.

A Connection between virus and Colony Collapse Disorder in bees

A team led by scientists from the Columbia University Mailman School of Public Health, Pennsylvania State University, the USDA Agricultural Research Service, University of Arizona, and 454 Life Sciences has found a significant connection between the Israeli Acute Paralysis Virus (IAPV) and colony collapse disorder (CCD) in honey bees. The findings, an important step in addressing the disorder that is decimating bee colonies across the country, are published in the journal *Science* this week.

In colony collapse disorder, honey bee colonies inexplicably lose all of their worker bees. CCD has resulted in a loss of 50-90% of colonies in beekeeping operations across the U.S. The consortium of scientists who have been studying the role of infection in this phenomenon includes Diana Cox-Foster,

professor in the Department of Entomology at Pennsylvania State University, Ian Lipkin, director of the Center for Infection and Immunity at Columbia University Mailman School of Public Health, Jeffery Pettis, research leader of the ARS Bee Research Laboratory, and Nancy Moran, Professor at the University of Arizona, Tucson.

Ian Lipkin, MD, professor of Epidemiology, Neurology, and Pathology at Columbia, and his team at the Mailman School's Center for Infection and Immunity, together with a team at 454 Life Sciences, used revolutionary genetic technologies, to survey micro-flora of CCD hives, normal hives, and imported royal jelly. Candidate pathogens were screened for significance of association with CCD by examining samples collected by the USDA and Penn State from several sites over a period of three years. Using the 454 Life Sciences high-throughput DNA sequencing platform, and analytical methods developed at Columbia, Dr. Lipkin's team searched for footprints of viruses, bacteria, fungi, and parasites in thousands of sequences. Candidates were further characterized by more detailed sequence analysis to ascertain their specificity for CCD and relationship to known and unknown pathogens.

IAPV, an unclassified dicistrovirus not previously reported in the U.S. that is transmitted by the varroa mite, and Kasmir bee virus were only found in CCD hives. The researchers report that IAPV was found in all four affected operations sampled, in two of four royal jelly samples, and in the Australian sample. KBV was present in three of four CCD operations, but not in the royal jelly. One organism was significantly correlated with CCD: finding IAPV in a bee sample correctly distinguished CCD from non-CCD status 96.1 percent of the time. "This is a powerful new strategy for looking at outbreaks of infectious disease and finding cause. Dr. Cox-Foster recruited us into this project, making a persuasive case for applying our state-of-the-art methods for differential diagnosis of infectious disease in humans, to this challenge in agricultural epidemiology," said Dr. Lipkin. "The profound synergy within the group—bringing entomology, microbiology, and bioinformatics together—enabled us to work toward a solution to this extraordinarily complex problem."

This is the first report of IAPV in the United States. IAPV was first described in 2004 in Israel where infected bees presented with shivering wings, progressed to paralysis and then died just outside the hive. Importation to the U.S. of bees from Australia began in 2004, coinciding with early reports of unusual colony declines. IAPV was found in non-CCD hives in some cases, which could reflect strain variation, co-infection, or the presence of other stressors, such as pesticides or poor nutrition. The varroa mite, for example, absent in Australia, immuno-suppresses bees making them more susceptible to infection by other organisms, including viruses. Other stressors may include chemical pesticides used on plants pollinated by bees and in hives to control pests. "Our results indicate that IAPV is a significant marker for CCD. This discovery may be helpful in identifying hives at risk for disease. The next step is to ascertain whether IAPV, alone or in concert with other factors, can induce CCD in healthy bees," added Dr. Lipkin.

Bees play an integral role in the world food supply, and are essential for the pollination of over 90 fruit and vegetable crops worldwide, with the economic value of these agricultural products placed at more than \$14.6 billion in the U.S. In addition to agricultural crops, honey bees also pollinate many native plants within the ecosystem. Recently, the increased deaths in bee colonies due to CCD seriously threaten the ability of the bee industry to meet the pollination needs of fruit and vegetable producers in the U.S.

Comments about CCD at Apimondia's Australian conference

CATCH THE BUZZ message sponsored by Bee Culture, The Magazine of American Beekeeping.
www.BeeCulture.com

The killer is a mite called Varroa destructor that attaches itself to bees and feeds off their blood. Australia's leading bee expert, Dr Denis Anderson, principal research scientist at CSIRO entomology,

says Australia is the only major honey-producing country free of the mite, but with New Zealand succumbing to varroa in 2000, it's only a matter of time before it arrives here. The threatened honey industry employs about 2000 commercial apiarists and turns over \$100m a year, but Anderson says the far more costly impact would be its effect on agricultural crops. "A lot of our pollination is reliant on feral bees. It will wipe out all the feral bee population, and then the hive colonies will be reduced." Apples, pears, melons and root vegetables such as onions all rely to some extent on bees for pollination, but the \$150m-a-year almond industry is expected to suffer most, because almonds are 100% reliant on bees for pollination.

Despite the inevitability of the incursion, Australia isn't ready for varroa, Anderson says. "At the CSIRO we did an economic analysis of how much money Australia should spend to try and keep varroa out of the country for the next 30 years. That analysis showed we could put in \$25m to \$50m every year for the next 30 years and we'd still be in the black. That's the sort of effect varroa will have. We should be putting in funds to do this." In July, federal agriculture minister Peter McGauran announced that the bee industry would receive \$390,000 to develop a plan to deal with the challenges facing the industry. At present, only about \$500,000 a year is spent on bee research, but Anderson says scientists urgently need more research dollars.

There is another threat on the horizon for the honey bee. In the past year, apiarists across 36 US states have reported the mysterious disappearance of up to 70% of their bees. The disaster has been dubbed colony collapse disorder (CCD), but no one knows exactly what it is or how to stop it. Dr Jeff Pettis, research entomologist at the US Bee Research Laboratory and a speaker at this week's 40th international Apimondia bee-keeping congress in Melbourne, says "there are a number of factors coming together to cause the colony losses, the prime suspects being varroa, pesticide exposure and things like poor nutrition. If you couple these factors with a pathogen [virus] it could explain what we're seeing."

Anderson dismisses a report published in the American Journal of Science last week that claims CCD is caused by the Israeli acute paralysis bee virus, imported into the country on the back of Australian bees. "The methodology underpinning the study is fundamentally flawed. The way the samples were collected gives me cause for serious doubt."

The typical response to varroa has been to fight it with chemicals. Pettis sees this as a short-term fix, because the mites keep developing resistance to the poisons. "We're running out of things to try in the chemical arsenal. My advice is, think resistant bees."

Anderson says that given time and money, researchers could isolate the specific chemical signal produced by the honey bee that attracts the mite, and locate the gene that produces the signal. This would enable scientists to develop a mite-resistant strain of bees. "If we want to arrive at this within a five- to 10-year period, we'd probably need to put in about \$3m on just that project every year," says Anderson.

At the conference, Pettis says, the message will be research over reaction. "It costs a lot more to fix a problem than prevent a problem." Apimondia sponsors a week long Conference every other year, with the current meeting in Melbourne, Australia.

Georgia Beekeeper's Association Fall Bee Meeting **October 12th - 13th**

The Georgia Beekeepers Association will hold their annual fall meeting at the Cowetta County Fair Grounds in Newnan Georgia. Registration will begin at 8:00am on both days. All members are

encouraged to pre-register, which will save you \$5 on your registration. The Board of Directors Meeting will be held at the same location on Thursday evening, October 11th.

Speakers will include:

Dr. Jerry Bromenshenk, research professor at the University of Montana and coordinator of the CCD work group. He will be discussing the latest on CCD. Dr. Keith Delaplane, professor of Entomology at UGA will be giving an update on honeybee research. Jennifer Berry, researcher at UGA will be presenting a program, "Small Cell Research". Virginia Webb, will discuss developing batch codes for honey and the record keeping involved with the new regulations. Bill Owens, will give a presentation on "Managing a Chemical Free Operation". Kelly E. Ryan, a Latin teacher (and beekeeper) will be presenting a program titled "Bees in Ancient Mythology".

The address to the Fair Grounds is: 275 Pine Road, Newnan, Georgia 30263.

If you would like to save money on the registration, download a registration form by going to www.gabeekeeping.com and clicking on Upcoming Events. Then mail the form to Evelyn Williams, 528 Bridge Avenue, Forest Park, Georgia 30297. If you have any questions you can call her at (404) 366-6404 or e-mail at ehoneyman2@aol.com.

Hotel accommodations can be made at the Comfort Inn (770-502-8688) or La Quinta Inn both located in Newnan at exit 37 off of I-85. The rate is \$64.95 + Tax for a double room (non-smoking) at both hotels. Cut off time for reservations are September 26th. There are only 35 rooms reserved and if you book with a credit card you will have until Oct. 8th to cancel. Hope to see you there!

Eva Crane, English Expert on World's Bees, Dies at 95

By Douglas Martin

Published: September 16, 2007

New York Times

Eva Crane, who earned a doctorate in nuclear physics and then abandoned the field to devote herself to expanding and spreading knowledge about bees as a researcher, historian, archivist, editor and author, died on Sept. 6 in Slough, England.

She was 95, 57 years shy of the reputed life span of the 17th-century English farmer Thomas Parr who, she suggested in one of her books, owed his longevity to eating honey that she said he produced as a beekeeper. The International Bee Research Association, which she founded in 1949, announced her death.

For more than a half-century Dr. Crane worked in more than 60 countries to learn more and more about honeybees, sometimes traveling by dugout canoe or dog sled to document the human use of bees from prehistoric times to the present. She found that ancient Babylonians used honey to preserve corpses, that bees were effectively used as military weapons by the Viet Cong, and that beekeepers in a remote corner of Pakistan use the same kind of hives found in excavations of ancient Greece.

The usefulness of her findings was apparent in 2001 when an official of the [United States Department of Agriculture](#) in Louisiana read about Russian bees in one of her books. They had developed a resistance to mites, which had been devastating local bees, The Sunday Advocate of Baton Rouge reported. The agency imported some Russian bees, and the Louisiana bees were soon mite-resistant.

Dr. Crane wrote some of the most important books on bees and apiculture, including "The World History of Beekeeping and Honey Hunting" (1999). In a review in The Guardian, the author Paul Theroux, himself a beekeeper, called the book a masterwork "for its enormous scope and exhaustiveness, for being an up-to-date treasure house of apiaristic facts."

In an obituary published Friday, the British newspaper The Independent said Dr. Crane published more than 180 papers, articles and books. It noted that she wrote most of them when she was in her 70s and 80s, after stepping down in 1984 from the day-to-day running of the association.

The Times of London in 1999 called her the “queen bee among bee experts.” Ethel Eva Widdowson was born in London on June 12, 1912. Her older sister, Elsie Widdowson, who never retired either, helped revolutionize the field of nutrition, showing similar energy chasing seals on ice floes to study their eating habits.

Elsie died in 2000. The bee association did not list any survivors for Dr. Crane. Both sisters attended Sydenham, a girls’ school known for having dedicated women as teachers, The Independent reported in 2000. Eva moved on to King’s College London, where she was one of only two women then studying mathematics at the University of London, of which King’s College is a part. She completed her degree in two years, then earned master’s degree in quantum mechanics and a doctorate in nuclear physics. She took a post lecturing on nuclear physics at Sheffield University in 1941. The next year she married James Crane, a stockbroker serving in the Royal Navy Volunteer Reserve. He died in 1978.

One of their wedding presents was a box containing a swarm of bees, which the giver thought might be useful in supplementing their meager wartime sugar ration. Dr. Crane soon became fascinated with the hive, subscribed to a bee magazine and joined a local bee club, The Independent reported.

She became secretary of the research committee of the British Beekeepers Association. In 1949, she founded the Bee Research Association, which adopted its present name in 1976. For 20 years beginning in 1962, Dr. Crane edited the association’s Journal of Apicultural Research, as well as editing Bee World from 1949 until 1984. (The two merged in 2006.)

The meticulousness of Dr. Crane’s research showed in her examination of ancient rock images involving bees and honey. She studied 152 sites in 17 countries from a register of rock art she established herself for her book “The Rock Art of Honey Hunters” (2001). Her goal was to show how ancient ways of cultivating bees persisted in still-used, but disappearing, methods. She called her generation the last that would be “able to see the world’s rich variety of traditional beekeeping.”

Dr. Crane also offered advice on how to use honey as a cosmetic. She advised dissolving two tablespoons of honey in two tablespoons of water, then adding six more tablespoons of water to concoct an excellent facial cleanser.

Honeybees in Hollywood!

Barry B. Benson (played by Jerry Seinfeld) makes his acting debut in the upcoming comedy, Bee Movie. Barry, a recent college graduate becomes bored with his job of making honey day in and day out at Honex. One day he is allowed to venture out of the hive where he discovers a new and exciting world; one which he must explore. Soon Barry meets a quirky florist named Vanessa (played by Renee Zelwegger) and breaks the cardinal rule of the beehive; he speaks to her. They quickly become friends and Vanessa takes him on a tour of the human experience. Soon he discovers that honey is sold in grocery stores. This upsets him to such a degree he decides he must sue the human race for stealing honey. And so the story goes.

Created by Jerry Seinfeld, Bee Movie will be in theatres November 2, 2007. To see clips, trailers and more go to www.beemovie.com

Management Calendar: September - November in Georgia

Georgia has finally been blessed with cooler temperatures, and yes RAIN. Our state has experienced the driest and hottest spring and summer ever recorded. We are not out of the woods yet, but with the cooler temperatures and at least a slight chance of rain, life is looking better. Now, before the temperatures dip too far down, we need to prepare our colonies for winter. If all goes according to plan, strong colonies going into the winter will be your best honey producers in the spring. To achieve this goal you will need a healthy, robust queen, a parasite and disease-free colony, plenty of properly placed pollen and honey stores and a good location for honey and windbreaks.

When evaluating your colonies it is a good idea to have a notebook handy, especially if you have several colonies. Below is a sample of a simple data sheet. You may want to tailor one that's more suitable for your operation.

Colony #	Queen Condition	Honey/Pollen Stores and Position	Condition of Brood and Bees	Condition of Equipment
1				
2				
3				
4				
5				

Here is a quick overview of winter preparation, starting with the queen. Check her brood pattern. Is it a solid pattern or spotty? How old is she? Has she started decreasing her egg laying capabilities? If your queen is failing it is a good idea to either replace her now or combine that colony with another. Trying to over-winter a weak colony with a poor queen is no picnic. Plus, more than likely, that colony will be a worthless honey producer in the spring.

Next, check to see if there are enough stores of pollen and honey for the colony to survive the winter months. Here at the lab we leave one full medium super or two full shallows on each colony. If the colony is robust we leave two medium supers or one full deep. It is better to leave too much honey than not enough. With cold temperatures keeping us inside our homes and out of the apiary, we tend to forget about the bees. This can have disastrous consequences. I know I sound like a broken record but starvation is the easiest thing to avoid. With all the other problems facing us (mites, beetles, diseases, pesticides, IAPV), at least starvation is one we can avoid. If needed feed a heavy 2:1 sugar solution (2 parts sugar to 1 part water) in whatever feeding contraption you may have. Be careful not to spill any syrup around the colony you are feeding. With little to no nectar available robbing can quickly ensue. Also, don't forget about pollen. Make sure there are solid frames of pollen in and around the brood area. If your colony is low on pollen make up pollen patties and feed directly on top of the brood chamber.

Don't forget to check colony mite populations. Very important! This is the time of year mite populations are at their highest. If they go into the winter with tons of mites, they'll unlikely survive. There are a variety of treatments available if the populations have reached the economic threshold. Take care of those mites today.

Examine the brood area for disease. Look for symptoms of AFB, EFB, chalkbrood and sacbrood. EFB, chalkbrood and sacbrood are more prominent in the spring but can occur in the fall. You want to see healthy, white larva in the cells. Also look for depressed cappings or ones with holes. Open these and inspect the pupae. Anything slightly off colored may be a sign of trouble (unless the pupa is in its later stage of development). If you see symptoms of EFB treat with Terramycin. If you see symptoms of AFB

you need to remove the infected frames, burn them and treat with Terramycin. In bad cases, you will need to destroy the entire colony. There are no treatments available for chalkbrood or sacbrood. Chalkbrood can be easily prevented by providing ventilation in and around a colony. Poor air circulation creates the perfect damp conditions necessary for fungal growth. If your colonies are in a low spot, move them. Low lying spots in fields accumulate moisture which in turn collects in your colonies. Also, clear any brush or debris from around the entrance of the colony. This blocks air flow into and out of the colony which in turn causes moisture to build up. The direction colonies face is also important. You need to protect them from prevailing winds. Tree lines and fences work great.

How does your equipment look? Are there holes, cracks, and gaps? These are welcome signs for critters and cold winter winds. How about your combs, are they black and brittle? Frames older than five years should be disposed of. Who knows what kinds of contaminants are sequestered in that old, black comb. Are the lids and bottom boards sturdy and water tight? These are all important elements in keeping your colonies healthy and strong. Don't wait till the last leaves fall from the trees; get those hives winter ready today.



Goldenrod is here!





Bees working Sumac



Kudzu blossoms remind me of grape gum. Very nice!

Just a few notes about nectar flows. The sourwood flow came in better than expected, despite the lack of rain. Sumac has finished blooming with Kudzu and Aster waning. Next on the list is the goldenrod flow. The blooms have just begun to open. Once it begins, you will notice a funky odor in your colonies. Some beekeepers will extract this honey and then let it sit for several weeks to a month. Apparently the honey mellows and has a wonderful butterscotch flavor. I just can't get past the smell. Certain areas of the state can make a substantial amount of honey from this nectar flow, but do not count on it. If your colonies are in need of food, feed them. Here in the Piedmont region we only make a marginal amount of goldenrod honey. Nothing near what the colonies need to over-winter. Once the goldenrod is over that's pretty much it until the spring. Enjoy this beautiful weather. The south surely deserves it.

Electronic Delivery of *Georgia Bee Letter*

If you would like to receive *Georgia Bee Letter* via email, send me your address at jbee@uga.edu. Please put in a reference in the subject line that you are requesting the GBL. If you have sent me your address and not received *GBL*, please send it again. We sometimes experience computer viruses on campus. Also, notify me if there are changes to your club meeting times or contact persons.

How to Get Georgia Bee Letter

GBL can be received electronically by emailing your request to jbee@uga.edu

Regular Meetings

Bartow Beekeepers Association	7:00 pm, second Tuesday	Agriculture Services Building, Cartersville (320 West Cherokee Ave)
Chattahoochee Beekeepers Association	7:00 pm bimonthly, second Monday	Oxbow Meadows Nature Center, Columbus
Cherokee Beekeepers Club	7:00 pm third Thursday	Cherokee County Justice Building, Canton
Coastal Area Beekeepers Association	7:00 pm second Monday	Southbridge Tennis Complex, Savannah
Coweta Beekeepers Association	7:00 pm second Monday	Coweta Fairgrounds Conference Center
East Central Georgia Bee Club	7:00 pm fourth Monday, (bi-monthly)	Burke Co. Office Park Complex
Eastern Piedmont Beekeepers Association	7:30 pm first Monday	Bishop Community Center, Bishop
Forsyth Beekeepers Club	6:30 pm third Monday	Forsyth County Library, Cumming
Heart of Georgia Beekeepers Association	7:00 pm second Monday	GA Farm Bureau, 1620 Bass Rd., Macon
Metro Atlanta Beekeepers Association	7:00 pm second Wednesday	Atlanta Botanical Garden, Atlanta
Mountain Beekeepers Association	7:00 pm first Tuesday	Mountain Regional Library, Young Harris
Northeast Mountain Beekeepers Association	7:00 pm second Thursday	Northeast Georgia Regional Library, Clarksville
Northwest Georgia Beekeepers Association	7:00 pm second Monday, Jan - June & Sept	Walker County Agric. Center, Rock Spring
Southeast Georgia Beekeepers Association	7:00 pm fourth Tuesday, Aug-March	Wacona School Building, Waycross
Southwest Georgia Beekeepers Association	7:30 pm last Tuesday, even months	Swords Apiaries, Moultrie
Tara Beekeepers Assn (Clayton Co. area)	7:30 pm third Monday	Reynolds Nature Preservation

Beekeeping Subscriptions

<i>American Bee Journal</i> , Hamilton, Illinois 62341	(217) 847-3324
<i>Bee Culture</i> , 623 W. Liberty Street, Medina, Ohio 44256	(330) 725-6677
<i>The Speedy Bee</i> , P.O. Box 998, Jesup, Georgia 31598-0998	(912) 427-4018

Resource People for Georgia Beekeeping

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Chattahoochee Valley Beekeepers Assoc. Jim Harris, President 34333 Pontiac Drive Columbus, GA 31907 (706) 563-4186 hhonybee@bellsouth.net	Metro Atlanta Beekeepers Martha Kiefer, President (770) 668-0981	Town County Coordinator Robert Brewer Georgia Master Beekeeper Coordinator PO Box 369 Hiawassee, GA 30546 (706) 896-2024 RBrewer@uga.edu
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