Apis-UK The Electronic Beekeeping Newsletter

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Hi and welcome to 2008. Again you must have wondered if Apis UK would be seeing the light of day again after an absence of around 5 months. Unfortunately, these things do happen but we will aim for them not to happen again. I've had many messages from readers asking us when we will be returning and offering good wishes and so thank you for those. Now we are back with our usual mix of science and history, hoping to keep all beekeepers and those interested in what beekeeping science can do, fully up to date. And, we speak in English, not science speak. For example, in this issue we bring you the research that will undoubtedly change the way good queen breeders measure the effectiveness of their queens. Also, we bring news of a new and very effective method of preventing the devastation caused by the Small Hive Beetle. Just as importantly, if you need to protect your elephants, we tell you how - with bees. Read on!

In our historical note which deals with the preservative properties of honey, we tell a particularly vile anecdote, and our poem of the month is by a great but comparatively little known Victorian. The recipe this month is so delicious that you just have to keep on making the things and our quote of the month will bring you food for thought rather than the stomach.

During 2007 I was able to visit Apimondia in Melbourne and a jolly good time was had by all. My thanks go particularly to the Mexican stand operatives who provided us all with copious amounts of tequila in little pottery jugs attached to neck lanyards (so that you didn't lose the pot). Also, cheers to the honey beer stand. Marvellous stuff for thirsty show goers. I was also able to visit the show stalwarts such as Thornes and NBB and it was great to see that they had travelled so far. The only sad note was news of the death of Dr Eva Crane. Now there was someone of standing who contributed so much to beekeepers' understanding of the importance of science to the industry that she literally set the ball rolling for a revolutionary change in the way we progress our knowledge. She founded IBRA and has stayed with it through all of its transformations, and it was IBRA that set me off on my beekeeping career. Other organisations/journals/laboratories have now come on the scene and IBRA's role has changed dramatically, but it was IBRA that started it all off after WWII. IBRA brought scientists and scientific knowledge together at a time when communications were difficult and the information age not even a dream. When I first read my initial 'how to keep bees' books, I thought, 'there must be more to it than this'. Ekes, Frow

chemicals, Isle of Wight disease! It was dreadful stuff. But there was more, and it was IBRA that showed me the way forward. We hope that Apis UK in its much smaller way can carry on spreading the good word about the importance of science to beekeeping.

A Beekeeper on top of The World
As I write this, I have heard of another sad death this morning – that of Sir Edmund Hillary. Who hasn't heard of this colossus who made the first successful climb to the summit of Everest? Did you know what his profession was when not on his adventures? He was a commercial beekeeper in the Auckland region of New Zealand, and kept on beekeeping until around 1970 when he retired from the industry. Arguably he was the world's best known beekeeper, even if you didn't know about the beekeeping part!

So, again, welcome to 2008 which I hope will be exciting for all of you with good beekeeping and again I remind you that we are back! If you have any notices or anything to say, write in.

The world's best known beekeeper on the NZ 5$ note

David Cramp. Editor

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The National Diploma in Beekeeping.
The Examinations Board of the National Diploma in Beekeeping would like to announce that an examination will be held in 2008.

The written papers will be held on Saturday 15th March, the same date as the BBKA exams, to be taken at a convenient location to be arranged. The practical assessment will be held on one day of the weekend of July 19th / 20th, at Easton College, Norwich, Norfolk. The Fee for the Examination will be £100.

Although the NDB Board has discussed changes in the format of the examination, these will not take place until 2009, so the format of the 2008 examination will be exactly as given in the syllabus on the Board's website, and will exactly follow the format of the past papers also available there:-
http://www.national-diploma-bees.org.uk/

The 2008 Advanced Beekeeping Course will be held at CSL York from 7th to 11th July. Details will be available shortly from Ken Basterfield, Course Tutor:
ken@basterfield.com

For further details please contact the NDB Board Secretary: Norman Carreck, New Hall, Small Dole, Henfield, West Sussex. BN5 9YJ Email: norman.carreck@btinternet.com

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A HIVE BEETLE TRAP USING BEETLE BIOLOGY

The arrival of the Small Hive Beetle is looked on with dread in those countries that haven't yet got it, but it is reassuring to know that when it does arrive there will probably be an array of methods for dealing with it developed in those countries that have got it. The trap described below uses beetle biology to be effective and could provide an answer to the problem – and it is all to do with yeast!

Peter Teal, leader of the Chemistry Research Unit at the ARS Centre for Medical, Agricultural and Veterinary Entomology in Gainesville, and his colleagues have developed an apparatus and attractant to help beekeepers protect their honey bees.

Small hive beetles release a yeast that's highly alluring to fellow beetles. When the yeast grows on pollen in the hive, it attracts more beetles and set off a cascading effect. When the population of beetles explodes, the disturbed bees leave the hive, according to Teal. This leaves beekeepers without honey or their bee colonies.

To exploit the small hive beetle's biology, Teal installed traps baited with the yeast below test hives belonging to cooperating beekeepers. The traps were separated from hives by sliding doors drilled with conical holes that allowed the beetles to enter the traps, but not to exit.

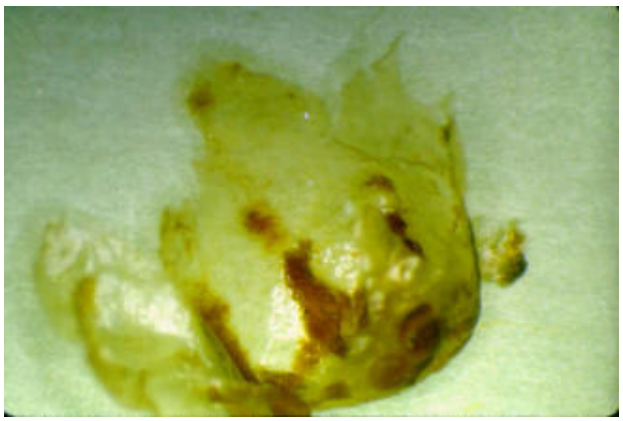
The researchers believe these traps will solve the problem for small-scale beekeepers, which make up 60 percent of the industry. These small-scale bee keepers tend their hives daily and can clean their traps frequently. For large-scale beekeepers who maintain up to several thousand hives, Teal's team hopes to develop a new trap requiring less management.

If perfected, this trap could be a boon to the bee industry in Florida, which is a common overwintering destination for commercial bee colonies. A patent for the trap was filed in March 2005. Teal hopes to apply the same principle to reduce populations of Varroa mites, another significant pest in honey bee hives.

Note:
A paper on this research recently appeared in the Proceedings of the National Academy of Sciences and this article was adapted from materials provided by US Department of Agriculture.

A NEW PRODUCT OF THE HIVE and one you probably hadn't thought about!
Are bees the new Silkworms? They produce 'High Performance Silk.'
We all know that moths and butterflies, particularly silkworms, are well known producers of silk. And we all know spiders use it for their webs. But what about bees? Surely this most advanced of social insects wouldn't be found wanting when other insects are aware of the versatility of silk? Well bees produce it too.

Australian researcher Dr Tara Sutherland and her group from CSIRO Entomology are looking at silks produced by other insects and the results of their recent work have been published in Molecular Biology and Evolution, in the paper Conservation of Essential Design Features in Coiled Coil Silks.



The bottom half of a high quality silk cocoon spun by a bee larva.

"Most people are unaware that bees and ants produce silk but they do and its molecular structure is very different to that of the large protein, sheet structure of moth and spider silk. The cocoon and nest silks we looked at consist of coiled coils - a protein structural arrangement where multiple helices wind around each other. This structure produces a light weight, very tough silk," she says.

"We had already identified the honeybee silk genes," says Dr Sutherland, "and now we have identified and sequenced the silk genes of bumblebees, bulldog ants and weaver ants, and compared these to honeybee silk genes. This let us identify the essential design elements for the assembly and function of coiled coil silks".

"To do this, we identified and compared the coiled coil proteins from cocoon and nest silks from species which span the evolutionary tree of the social Hymenoptera (bees, ants and wasps)," she says.

Bees and ants produce high-performance silk and, although the silks in all these species are produced by the larvae and by the same glands, they use them differently.

Honeybee larvae produce silk to reinforce the wax cells in which they pupate, bulldog ant larvae spin solitary cocoons for protection during pupation, bumblebee larvae spin cocoons within wax hives (the cocoons are reused to store pollen and honey), and weaver ants use their larvae as 'tools' to fasten fresh plant leaves together to form large communal nests.. These groups of insects have evolved silks that are very tough and stable in comparison to the classical sheet silks and it is probable that the evolution of this remarkable material has underpinned the success of the social

Hymenoptera. Coiled coil silks are common in aculeate social insects i.e. those that have stings but not in aculeate parasitic wasps. These social insects are higher up the evolutionary tree and the coiled coil silks appear to have evolved about 155 million years ago.

Note: The silk research is part of the joint CSIRO and Grains Research & Development Corporation (GRDC) Crop Biofactories Initiative (CBI) and this article has been adapted from materials provided by CSIRO Australia.

On the subject of silk! Tarantula feet

Incidentally, did you know that Tarantulas can produce silk from their feet? In 2006 researchers found for the first time that tarantulas can produce silk from their feet as well as their spinnerets, a discovery with profound implications for why spiders began to spin silk in the first place.

THE AMAZING HONEY TREE

A Banyan tree near Nandagudi in Hokote Taluk in the Bangalore Rural District is believed to have the 'world's largest number of beehives,' and the authorities are hoping to get official recognition for the tree as an International Heritage Site. It certainly would be something different in the list of such sites.

The tree 'houses' as many as 600 colonies and The Institute for Natural Resources Conservation, Education, Research and Training (INCERT) is making efforts to get this matchless tree get recognised as an International Heritage Site so as to create awareness about the importance of this bee colony.

Speaking to The Hindu, (An Indian Journal) Dr. M.S. Reddy, Reader, Department of Zoology, Bangalore University, said that the banyan tree has been monitored by apiculturists for more than a decade, and their records show that there were approximately 625 bee colonies around November 2005. A survey conducted in October 2007 revealed the number of hives in the tree to be around 575. Dr. Reddy said: "The effort to recognise this tree as an International Heritage Site will not only help horticulture prosperity, but also play a vital role in protection of the environment and maintaining the ecological balance as bees, through pollination, help increase the biodiversity."

The banyan tree is largely surrounded by eucalyptus trees whose flowers are a major source of nectar to the bees. During the monsoon, the size of the colony reduces as the rock bees migrate due to lack of flowering in the eucalyptus trees. Dr Reddy said: "To prevent this migration, the villagers in the vicinity are being encouraged into agricultural activities like coconut plantations and floriculture which may help create

sustenance to the bee colony. This is so that the bees may thrive on them round the year and do not have to migrate in the monsoon season." Even the villagers have stopped extracting honey for the past three years after they were informed that their unskilled methods of extraction led to the decline in the number of beehives, he added.

CAN BEES PROTECT ELEPHANTS?

Elephants' fear of angry bees could help to protect them at a time when encroaching human development in former wildlife areas has compressed African elephants into ever smaller home ranges and increased levels of human-elephant conflict, a study in Current Biology, suggests that strategically placed beehives might offer a low-tech elephant deterrent and conservation measure.

The tiny Bee may be able to protect the mighty elephant.

The researchers found that a significant majority of African elephants fled immediately after hearing the sound of bees, providing "strong support" for the idea that bees, and perhaps even their buzz alone, might keep elephants at bay. By contrast, the elephants ignored a control recording of natural white-noise, the authors reported.

"We weren't surprised that they responded to the threatening sound of disturbed bees, as elephants are intelligent animals that are intimately aware of their surroundings, but we were surprised at how quickly they responded to the sounds by running away," said Lucy King of the University of Oxford. "Almost half of our study herds started to move away within 10 seconds of the bee playback." King is also affiliated with Save the Elephants, a Kenya-based organization that aims to secure a future for elephants.

Earlier studies had suggested that elephants prefer to steer clear of bees. For instance, one report showed that elephant damage to acacia trees hosting occupied or empty beehives was significantly less than in trees without hives, the researchers said.

In Zimbabwe, scientists have also seen elephants forging new trails in an effort to avoid beehives.

In the new study, the researchers tested the response of several well-known elephant families in Kenya to the digitally recorded buzz of disturbed African bees. Sixteen of the 17 families tested left their resting places under trees within 80 s of hearing the bee sound, the researchers reported, and half responded within just 10 seconds. Among elephants hearing the control sound, none had moved after 10 s, and only four families had moved after 80 s. By the end of the 4 min sound playback of bee buzz, only one elephant family had failed to move, whereas eight families hearing the control sound had not moved. This behavioral discovery suggests that bees might very well be a valuable addition to the toolbox of elephant deterrents used by farmers and conservation managers across Kenya, King said. She added that such innovative approaches are sorely needed "to avoid extreme solutions such as shooting problem animals." She cautioned that the use of beehives to shoo elephants away might prove to have limited application and that more research is needed if we are to understand its effectiveness. "But if we could use bees to reduce elephant crop raiding and tree destruction while at the same time enhancing local income through the sale of honey, this could be a significant and valuable step towards sustainable human-elephant coexistence."

Note: The researchers include Lucy E. King of the Department of Zoology, University of Oxford in Oxford and Save the Elephants in Nairobi; Iain Douglas-Hamilton of Save the Elephants in Nairobi; and Fritz Vollrath of the Department of Zoology, University of Oxford in Oxford and Save the Elephants in Nairobi. This work was supported by ESRC/NERC, The Wingate Foundation and Save the Elephants.

Reference: King et al.: "African elephants run from the sound of disturbed bees." Publishing in Current Biology 17, R832-R833, October 9, 2007. Adapted from materials provided by Cell Press.

Colony Collapse Disorder

This 'disorder' has confounded scientists for several years now. Below are a few opinions of various research groups on the causes of this mysterious business.

Scientists from Penn State University in the USA say they have found a connection between *Israeli Acute Paralysis Virus (IAPV)* and colony collapse disorder.

Researchers argued that the virus, in conjunction with other stress factors, is likely the cause of the disorder, which has resulted in a loss of 50-90 percent of North American bee colonies. It was originally discovered in Israel in 2004, the same year that Australian bees were imported in to the United States.

Colony collapse disorder has been observed in Poland, Greece, Italy, Portugal and Spain, and unverified reports have surfaced in Switzerland and Germany. Cases have also been reported in India and Brazil.

David Hackenburg, a beekeeper near Tampa Bay, Florida, lost nearly 2,000 of his 3,000 hives in a matter of weeks and has since been raising the issue with university researchers, bureaucrats at state agencies and elected politicians. He has told a number of media outlets that new synthetic nicotine-based pesticides known as neonicotinoids, or neonics, are the major contributing factor. Researchers told IPS that further studies will include these pesticides as possible contributing factors. Some large environmental groups, like the Sierra Club, also believe that genetically modified food production could be a contributing factor. A comprehensive British study found that genetically modified crops in conjunction with powerful chemicals were harmful to bees, butterflies and birds.

But other scientists argue that there is scant evidence that the Bacillus thuringiensis toxin produced by genetically modified crops is a factor in the mass deaths of bees.

According to Science Daily, a team of scientists from Edgewood Chemical Biological Centre and the University of California at San Francisco have identified a virus and a parasite that are likely culprits in the recent deaths.

Penn State University's Colony Collapse Working Group had drawn no clear conclusions as to what the causative factors may be until this week.

Dr. Mariano Higes, a scientist based in Guadalajara, Spain, has concluded that European honey bees suffering from colony collapse disorder fell victim to Nosema ceranae, a micro-sporidian fungus. The research team led by Higes has been investigating the issue since 2000 and ruled out any other causes. U.S. scientists have stated that although it may be a factor, it is not the only cause of the disorder.

Eric Mussen, a University of California Davis apiculture expert, believes that small variations in weather caused by climate change could affect the water, nectar and pollen the bees rely on. Mussen also argues that bees have many viruses, but it is their weakened immune systems that are making them susceptible to death. The first cases came to public view in late 2006. Since then, speculation has ranged about the causes from a diverse set of theories which range from new pesticides, genetically modified crops, agricultural products, climate change, viruses cell phones.

In the 1940s, there were an estimated 5 million managed bee colonies in North America. Now there are just over 2 million. Adverse weather conditions and hurricanes have also contributed to the heavy losses of bee colonies in recent years.

Dr. Leonard Foster, a University of British Columbia Assistant Professor of Biochemistry told IPS, "There is certainly something happening in the United States and it is difficult to say if it is due to a bacteria or fungus—it is difficult to detect with the current methods."

"It could be various factors combined, but it is difficult to verify at this time—climate change, antibiotics or the use of pesticides where bees may visit. We have various historical records that show that there are fluctuations with beehives every seven or eight years that are affected by weather conditions and crop yields. It is too early to draw conclusions yet."

ORCHID BEES AND THEIR PERFUME
(Or how flowers that produce no edible pollen or nectar get pollinated!)

Apis UK has touched previously on the subject of orchid bees and their need for perfume to attract females but now researchers in the UK have found that this isn't a general perfume but very much an individual one and the bee doesn't produce a pheromone or excretion to do this; he has to make it all himself

The research was carried out by Professor Scott Armbruster, of the University of Portsmouth, who has been studying the relationship between euglossine bees and flowers in South America and found that each bee has to blend its own perfume in order to find a mate.

Orchid bees

The professor\ explained that the female euglossine bee, also known as the orchid bee, has the job of home-building by collecting resin from dalechampia flowers to help create nests for their offspring.But because the flowers visited by these bees do not produce edible pollen or nectar, Prof Armbruster wanted to find out how they become pollinated.

He discovered that the male bee has to visit a variety of flowers, decaying wood and sap in order to make its "personal" perfume and at the same time pollinate the flowers.

Prof Armbruster said: "The males collect scents from flowers, sap and decaying wood with their front legs and store them in their hind legs until they have accumulated a complex blend.

"It is thought this creation of a perfume helps the male attract a female and helps the female choose which male to accept. The scent acts a little like sex pheromones.

"If he wants to pass his genes on to the next generation he must buzz from flower, to sap, to decaying wood to create an individual scent to attract a mate. He has to be, if you like, the bee's knees at perfume-making."

Euglossine bees are tropical relatives of honeybees and bumblebees. They have brightly-coloured, often metallic, colourings, extremely long tongues and can fly far and fast, almost certainly because the species of plants they depend upon are spread over a wide area.

Note: Orchid bees comprise the tribe Euglossini in the family Apidae, which includes honey bees and bumble bees. The largest orchid bee genus is Euglossa. Bumble bee-like species belong to the genus Eulaema. Parasitic orchid bees are in the genus Exaraete.

HOW TO RUN COMPUTER SERVERS MORE EFFICIENTLY

Use Honeybee strategies!

Honey bees manage to efficiently collect a lot of nectar with limited resources and no central command — after all, the queen bee is too busy laying eggs to oversee something as mundane as where the best nectar can be found on any given morning. According to new research from the Georgia Institute of Technology, the swarm intelligence of these amazingly organized bees can also be used to improve the efficiency of Internet servers faced with similar challenges.

A bee dance-inspired communications system developed by Georgia Tech helps Internet servers that would normally be devoted solely to one task move between tasks as needed, reducing the chances that a Web site could be overwhelmed with requests and lock out potential users and customers. Compared with the way server banks are commonly run, the honeybee method typically improves service by 4 percent to 25 percent in tests based on real Internet traffic. The research was published in the journal *Bioinspiration and Biomimetics.*

After studying the efficiency of honeybees, Craig Tovey, a professor in the H. Milton Stewart School of Industrial and Systems Engineering at Georgia Tech, realized through conversations with Sunil Nakrani, a computer science colleague visiting from the University of Oxford in the UK, that bees and servers had strikingly similar barriers to efficiency.

"I studied bees for years, waiting for the right application," Tovey said. "When you work with biomimetics (the study of how biological principles can be applied to design and engineering), you have to look for a close analogy between two systems — never a superficial one. And this definitely fit the bill."

The more Tovey and Nakrani discussed bees and servers, the surer they became that somehow the bees' strategies for allocating limited resources in an unpredictable and constantly changing environment could be applied to Internet servers.

Honeybees have a limited number of workers at any given time to fly out to flowers, collect nectar, return to the hive and repeat until the nectar source is depleted. Sometimes, there's an abundance of nectar to be collected; at other times nectar is scarce. The bees' environment is constantly changing — some flower patches occasionally yield much better nectar than others, the seasons shift and rainy days make nectar collection difficult. So how do the bees manage to keep a steady flow of nectar coming into the hive?

Internet servers, which provide the computing power necessary to run Web sites, typically have a set number of servers devoted to a certain Web site or client. When users access a Web site, the servers provide computing power until all the requests to access and use the site have been fulfilled. Sometimes there are a lot of requests to access a site (for instance, a clothing company's retail site after a particularly effective television ad during a popular sporting event) and sometimes there are very few. Predicting demand for Web sites, including whether a user will access a video clip or initiate a purchase, is extremely difficult in a fickle Internet landscape, and servers are frequently overloaded and later become completely inactive at random.

Bees tackle their resource allocation problem (i.e. a limited number of bees and unpredictable demand on their time and desired location) with a seamless system driven by "dances." Here's how it works: The scout bees leave the hive in search of nectar.

Can Bee Strategy be used for more efficient servers?

Once they've found a promising spot, they return to the hive "dance floor" and perform a dance. The direction of the dance tells the waiting forager bees which direction to fly, the number of waggle turns conveys the distance to the flower patch; and the length conveys the sweetness of the nectar.

Following the dance, the foragers fly out to collect the nectar detailed in the dance. As long as there's still nectar to be found, the bees that return continue the dance. Other forager bees continue to fly toward the source until the dancing slowly tapers off or a new bee returns with a more appealing dance routine.

While this may not sound like a model of efficiency, it's actually optimal for the unpredictable nectar world the bees inhabit, Tovey said. The system allows the bees to seamlessly shift from one nectar source to a more promising nectar source based on up-to-the-minute conditions. All this without a clear leader or central command to slow the decision making process. "But the bees aren't performing a computation or strategy, *they ARE the computation,"* Tovey added.

Internet servers, on the other hand, are theoretically optimized for "normal" conditions, which are frequently challenged by fickle human nature. By assigning certain servers to a certain Web site, Internet hosts are establishing a system that works well under normal conditions and poorly under conditions that strain demand. When demand for one site swells, many servers sit idly by as the assigned servers reach capacity and begin shifting potential users to a lengthening queue that tries their patience and turns away potential customers.

Tovey and Nakrani set to work translating the bee strategy for these idle Internet servers. They developed a virtual "dance floor" for a network of servers. When one server receives a user request for a certain Web site, an internal advertisement (standing in a little less colorfully for the dance) is placed on the dance floor to attract any available servers. The ad's duration depends on the demand on the site and how much revenue its users may generate. The longer an ad remains on the dance floor, the more power available servers devote to serving the Web site requests advertised.

OPTIMISING QUEEN BEE ACCEPTANCE AND LONGEVITY
Adapted from materials provided by Georgia Institute of Technology USA
This excellent piece of research could alter the way commercial beekeepers buy their queens and also the way that breeders and queen rearers select for breeding.

The research
Research by scientists in the Department of Entomology and W.M. Keck Centre for Behavioural Biology at North Carolina State University has found that the number of times a honey bee queen mates is a key factor in determining how attractive the queen is to the worker bees of a hive.

As most beekeepers will know, a honey bee queen mates early in her life, usually with multiple partners, the drones of another bee colony. The scientists found that the number of partners appears to be a key factor in making the queen attractive to the worker bees of a colony -- the more partners, the more attractive the queen is and the longer her reign is likely to be.

Can we better ensure her acceptance?

Pheromones altered by the number of matings
The scientists also conducted experiments that suggest that the number of times a queen mates is a factor in altering the composition of a pheromone, or chemical signal, the queen produces. It is the composition of this pheromone that appears to attract the worker bees of a hive.

A honey bee colony consists of a single queen and several thousand sterile worker bees. Throughout most of her life, the queen's job is to lay eggs. However, early in a queen's life, she makes several mating flights. On these flights, she mates -- in midair -- with anywhere from one to more than 40 drones. The average number of drones with which a queen mates is 12. The queen stores the semen from her mating flights for the remainder of her life, two to three years for a long-lived queen.

However, some queens are not so long-lived. They are rejected by the workers of the hive. The research sheds light on this rejection mechanism. Because queens mate early in their lives and store semen, it stands to reason that queens that have mated multiple times and accumulate more semen might be more valuable to a colony. But the researchers have not studied the impact of the number of times a queen mates on her physiology until now.

To determine the effect mating has on honey bee queens, the scientists artificially inseminated queens. It's difficult to determine the number of times a queen mates under natural conditions. Some queens were inseminated with the semen from one drone, others with the semen from 10 drones. The scientists then put the queens in hives and observed them.

More attention paid to multiple mated queens
They found that worker bees paid more attention to the multiply inseminated queens. Worker bees demonstrate what is known as a "retinue response" to their queen; they lick her and rub their antennae on her. The retinue response to the multiply inseminated queens was more pronounced.
This indicated that the workers can tell how many drones the queen has mated with.

Like many animals, honey bees use pheromones to communicate. When they analyzed pheromone produced in the mandibular gland of honey bee queens, they found that pheromone composition changes dramatically after queens mate and that the number of times the queen mates appears to be a key factor in determining the extent of pheromone alteration.

The research team added that when worker bees were exposed to pheromone from queens inseminated with semen from one drone and queens inseminated with semen from multiple drones, the workers showed a preference for the pheromone from the multiply inseminated queens.

Also, an analysis of the mandibular gland pheromone found differences in the chemical profile of pheromone from once-inseminated and multiply inseminated queens. The scientists also found differences in the two types of queens in brain-expression levels of a behaviourally relevant gene. The results clearly demonstrate that insemination quantity alters queen physiology, queen pheromone profiles and queen-worker interactions.

Implications for breeders and buyers
The research could have implications for bee breeding and for beekeepers. The research suggests that queens that mate with multiple partners are superior, so breeders may want to select for this behaviour.

A test for this?
At the same time, beekeepers usually buy mated queens when they re-queen their hives. The scientists believe that it should be possible to devise a test to determine if a queen has mated few or many times. Such a test would help beekeepers determine the quality of the queens they buy.

Does Predator Pressure Maintain Bees' Social Life?
This interesting research from Flinders University in Australia illustrates a few differences in sociality amongst social insects.

The complex organisation of some insect societies is thought to have developed to such a level that these animals can no longer survive on their own. New research suggests that rather than organisational, genetic, or biological complexity defining a 'point of no return' for social living, pressures of predation create advantages to not living alone.

The ancient systems of sociality in bees, wasps, termites, and ants seem to have become an obligatory way of life for these organisms as there are almost no examples of species reverting to solitary lifestyles. "This has prompted the notion of a 'point of no return' whereby evolutionary changes in behaviour, genetics, and shape in adaptation to a social lifestyle prohibit the insects from living without their society -- a queen bee losing her workers would be like a human being losing a vital organ," explains Luke Chenoweth of Flinders University, Australia.

Most social insects have developed a system in which there is a division of labour between castes of related individuals. Reproductive queens rely on sterile workers, usually their daughters, to feed them and nurture their young, but in a few examples of social bees all females in a colony retain the ability to breed but some do not, a phenomenon known as totipotency. Chenoweth and colleagues investigated Halterapis nigrinervis, an African species thought to provide a rare example of a bee with totipotent social ancestors that has reverted to a solitary lifestyle. By investigating this species the researchers hoped to reveal the factors that allow or prevent reversion to a solitary lifestyle.

Has bee sociality reached the point of no return?

The researchers collected nests from various habitats. Surprisingly they found that over half contained multiple females and those containing multiple females were more likely to have bee larvae in them. "The results mean that H. nigrinervis is social and that there are consequently no known losses of sociality in this group of bees." As these bees lack the social and behavioural complexity of honeybees and many other social insects, the fact that they do not seem to live solitarily in any circumstances suggests that ecological pressures rather than biological factors maintain sociality.

The researchers hypothesise that sociality in H. nigrinervis is maintained by predation: multiple females not only offer greater protection to the brood in the nest but also should an adult fall foul of predators, nest-mates will raise their young. While many social insects might retain the potential to raise young alone, the benefits of protection against predation result in sociality being maintained.

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THE TRIALS OF CHAD
Chad returns here with his own teacherly! Way and offers advice on the advisability of choosing teaching as a profession.

Teaching is a sensible job that pays monthly despite inclement weather. Beekeeping is not like teaching. I am having serious doubts about the wisdom of choosing bee-farming as an occupation. It seems to be absorbing a great deal of money but not giving me much back. If it would just stop raining for two weeks I'd be quids-in but I'm being tested at the moment; I've not been broken yet despite the Grand Overseer's best efforts.

Frustratingly, most of my apiaries are surrounded by masses of blooming clover and bramble but the bees can't get out to forage. Organic dairy farms grow huge acreages of clover and vetch to get enough nitrogen into their systems. Father-in-law came up with the names of three organic farmers in the area who were more than happy to let me put some hives on their land. Maybe next year they will be more fruitful.

The last four Mondays have seen me travelling to the New Forest to buy colonies of bees and ferry them back to the farm in my van and trailer. It's an interesting two hour journey travelling with eight leaky hives in an enclosed space. If bee stings are good for arthritis, I'm never going to get an arthritic joint in my life. The elderly bee farmer who was selling the hives kept discovering hives that he had forgotten about and phoning me to come and collect more.

Each time I went it rained. Taking supers off strong colonies in the rain is not a job for the faint-hearted. Let me tell you, these are no Alan Stonell string-vest bees. To add to my problems the hives were all situated in an over-grown garden under trees on a terrace up some very steep steps. I imagine their position had put off all other potentially interested parties. Still, I like a challenge, actually that's a lie, my life choices until now have always followed the path of least resistance.

Some of the hives I have bought are Smith hives. I mainly run Nationals with a few Commercials but these new colonies are strong enough for me to be interested in them, the frames will transfer to my national hives and I can gradually wean the bees onto national frames. I bought a Dana Api-melter last week too. Had I known that the honey crop was going to be so poor I would have waited until next year. The api-melter is basically a tank which has heating elements both above and below. You put cappings and extracted honey into the tank and turn on the heaters. The honey sinks and is kept at 30-40 degrees whereas the wax melts and floats being heated from above at 70-80°C. You can then drain off the two liquids separately.

In the past I have been very fortunate to receive the odd nuc from John Chamberlain. These arrived in small nuc boxes, five frames of bees, well established and at the point when they could be transferred to a larger hive. I was therefore of the opinion that all nucs when purchased would arrive in this fashion, how wrong I was. Two people in the locality had asked me if they could get bees for their gardens, not being happy to sell them any of mine and having seen an advert in the national beekeeping press, I bought two nucs from this supposedly reputable company. I'm not sure

whether it is slander or libel so I ain't gonna mention the company's name, but if you buy me enough drinks I'll tell you. The nucs arrived, five frames in each. However they looked like they'd been made up the day before, they were hardly established, the queen hadn't even been introduced into the colony, still trapped inside the queen cage, presumably having been imported the day before from some far flung country. Because of this when I inspected the first nuc I discovered that the bees had released the queen only to sting her to death. Great use of £100 I thought. The company then sent a replacement queen which was accepted but did not start laying for another three weeks. The second nuc had accepted the queen but despite the advert saying the nucs had laying queens, this queen was alive but not laying. Great use of another £100. In future buy all your nucs from John and ignore bold claims in the national press. I was really pleased to see the complaint from Chris Slade in the last BeeLines magazine berating the poor temperament of Buckfast bees. Our forums (***fora*** screams Mrs Elliot my Latin teacher) shouldn't be shy of naming and shaming poor service or products wherever we come across them, unless like me, you can't afford a law suit.

As a side-line to my bee-farming I also pose as a private beekeeper for a few households in the area. People who haven't the time to bee-keep themselves but who like the idea of eating honey from their own gardens, employ me to tend hives for them. I called around recently to one such garden with the intention of taking off the spring honey. It was a hot day (imagine that) and the lady of the house met me and we walked towards the hive chatting. On nearing the hive we were buzzed and I suggested she retired inside while I went about my work. Some minutes later, with super in hand I was walking back through the garden seeing to my horror that the lady had not gone inside, rather, was milling around with her husband, secretary and five dogs. It not being my place to instruct any action of my employers I suggested again that they all got inside as the bees were a little hot and cross. Then the first dog got stung. Instead of going inside and sorting out the dog, there was a tremendous rushing around and flapping which led to the second dog and the secretary being stung. At this point I told everyone to get inside in my most teacherly fashion. Having stowed the super in my van I joined them all in the conservatory, retrieved the bee from the secretary's hair and pulled the sting out of the first dog. We then stood about drinking elderflower cordial and sampling the honey. That's when the lady of the house spotted the second dog, wide eyed in the corner, rocking on its haunches, panting heavily. You can spot anaphylaxis in a Jack Russell a mile off. There was then a nasty hour when I didn't know if the dog was going to survive in time to be treated by a vet. That was in fact a very long hour. The community I live in is quite tight and killing someone's dog would have ostracised me, my heirs and successors for generations. I'm glad to say that Polly the dog is still with us. These days I phone an hour before I turn up, so the dogs and secretaries can be shut away during my visits.

Preparing a super in the apiary by gently passing air between the combs

And finally, I wrote the following poem whilst collecting hives from the New Forest. It was pouring down, there were intermittent thunderclaps, I was sodden and the bees were thick all over me, the pear-drops smell of the alarm pheromone was stifling, I was being stung mercilessly, torn at by brambles, stumbling around half-blind with sweat and rain dripping in my eyes. Whilst heaving these Smith hives through a jungle

of bushes and down precipitous steps I came up with this rhyme. I memorised it by chanting it through clenched teeth as I struggled on.

All's not well in the Apiary

You might have stung me, but I'm still alive,

You're gonna have problems when you're back in your hive.

You shouldn't have done it, logic prevails,

You're not gonna last long without your entrails.

When I crunch down the crown-board I feel little remorse,

I just think of your sisters attacking in force.

I bee-keep for money, I don't do it for love,

I'm reminded of this; you left your guts on my glove.

What chance did you stand against my veiled garb?

Such wanton aggression, equipped with your barb.

Evolution, adaptation, it's just one of those things,

Better born a wasp they have multiple stings.

Fly off and die with your bad tempered genes,

I'll retire to my anti-histamines.

You left only a blemish the size of a comma,

I've got no respect for a suicide bomber.

Oh yeah, and another thing that really narked me; the idea was to buy these bees from the New Forest and take them to some borage fields near Marlborough. The resultant honey crop would pay for the bees that I'd just bought. It was all arranged with the farmer who told me he'd ring in three weeks to give me the green light. After four weeks I phoned him only to be told that he had ploughed up the borage crop because it hadn't taken well...

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THE GRILLED HONEY-CAPER SHRIMP
This recipe is both different and delicious. Try and use a good 'Fino' sherry such as Tio pepe or a good Manzanilla. (Not the herbal tea).

Ingredients
1 pound large shrimps, peeled and de veined (if required).
1/2 cup honey
3 tablespoons capers
2 tablespoons pickling liquid from the jar of capers
2 tablespoons dry sherry
Zest of 1 lemon
Juice of 1/2 lemon
2 teaspoons sea salt
1 1/2 cups extra virgin olive oil
Capers (for garnish)
Lemon wedges (for garnish)

Put the shrimps aside in a glass baking dish or bowl.

In a food processor, puree all remaining ingredients except the olive oil and garnishes to make marinade. While the motor is running, add the olive oil in a slow, steady stream. Toss the shrimps in the marinade and refrigerate for 1 hour.

Grill the shrimps over medium-hot coals on the BBQ or a hot plate for about 2 minutes per side.

Serve 3-4 hot shrimps per person as a tapa, dressing each plate with capers and lemon wedges.

Serves 4 as an appetizer

POEM OF THE MONTH Back to top
This month's poem comes from a truly remarkable man who distinguished himself in the spheres of diplomacy and languages.

Bees by Sir John Bowring 1792 - 1872

What well appointed Commonwealths! Where each
Adds to the stock of happiness for all;
Wisdom's own forums! Whose professors teach
Eloquent lessons in their vaulted hall!
Galleries of art! And schools of industry!
Stories of rich fragrance! Orchestra of song!
What marvellous seats of hidden alchymy!
How oft, when wandering far and erring long,
Man might learn truth and virtue from the BEE!

Sir John Bowring was born in Exeter of an old Puritan family. In early life he came under the influence of Jeremy Bentham, and later became his friend. He did not, however, share Bentham's contempt for *belles lettres*. He was a diligent student of literature and foreign languages, especially those of Eastern Europe.

Bowring ranked with Giuseppe Caspar Mezzofanti and Hans Conon von der Gabelentz among the world's greatest hyperpolyglots — his talent enabling him at last to say that he knew 200 languages, and could speak 100. The first fruits of his study of foreign literature appeared in *Specimens of the Russian Poets* (1821–1823). These were followed by *Batavian Anthology* (1824), *Ancient Poetry and Romances of Spain* (1824), *Specimens of the Polish Poets*, and *Serbian Popular Poetry*, both in 1827.

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Honey as a Preservative.
Honey is of course a well known preservative and the ancients knew this as well and was used by the Babylonians, Greeks and Spartans for preserving the bodies of their great soldiers who died in battle far from home. The famous and wicked King Herod kept the body of Mariamne his wife in honey for seven years after her death because he loved her so much – even in death. The fact that it was him that executed her in the first place says a lot about Herod!

The Egyptians provided their dead with jars of honey to eat in the after life and some of them survived until found by Egyptologists exploring the great tombs in the 1800s – 1900s. The honey was fine.

The Egyptologist E. A. Wallis Budge at his desk in the British Museum

One incident however shows us the true power of honey to preserve and is taken from a story told by E A Wallis Budge an Egyptologist (1857 – 1934) who became curator of the British Museum. A local man had told Budge that:

'Once when he and several others were exploring the graves and seeking for treasure near the pyramids, they came across a sealed jar, and having opened it and found that it contained honey, they began to eat it. Someone in the party noticed that a hair in the honey turned round one of the fingers of the man who was dipping bread into the honey and as they drew it out, the body of a small child appeard with all its limbs complete and in a good state of preservation. It was said to be well dressed and had upon it numerous ornaments'.

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Which well known beekeeper based his life on his own quote below:

Be Determined. Aim High