

# BBKA News

The newsletter of The British Beekeepers' Association,  
incorporating **B|B|J** The British Bee Journal



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**Busy bees**

Photo by Harriet Roberts, West Sussex



#### Improving Honey Bee Health

Following the review of bee health policy a range of revisions have been proposed, as outlined by the NBU on page 187.



**Inside: The British Bee Journal**  
The BBJ launches with a focus on the Insect Pollinators Initiative.



**Are your swarming instincts as good as those of your bees?**

Continued swarm management is an important aspect of beekeeping; see page 192.





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# Chairman's Letter



Honey bee and beekeepers are all over the media again. First there is Martha Kearney's new series on the BBC. Beautifully filmed and showing both experienced and not so experienced beekeepers working together, it mirrors the work many of us do in our own associations. There is nothing as satisfying as seeing your 'apprentice' go out and become an accomplished beekeeper. And then there are a number

of cookery and science programmes coming up. Our Press Officer, Gill Maclean, tells me she receives lots of calls for information and has recently been approached for information for several upcoming new series. It seems the public still has a great appetite for understanding the role of bees as pollinators and the part we play as beekeepers in helping to maintain healthy bee colonies. We, all of us in the wider BBKA, are seen as the authoritative voice of beekeeping and for the honey bee. With some 24,000 members, a mere 0.05% of the population, we punch very much above our weight. The credit for that goes to everybody who talks to non-beekeepers about honey bees, whether that is at a local show, to a large corporate organisation seeking to improve its green credentials, a farmer who wants bees on his land, a friend or neighbour curious about our unusual pastime or the kid next door peering over the fence. We should all be proud of ourselves and the organisation to which we belong.

One of the things I am often told is that the BBKA Executive does not communicate with its members enough. We do try but the traditional methods can take some time. At the Chairmen's Day last year it was agreed that where the BBKA has a member's email address we can communicate with them directly. Currently we have 6,000+ email addresses registered on the website and send out the occasional email communication to those members plus the Area Secretaries and often the Branch/Division Secretaries too. So that we can communicate as widely as possible I would urge all members to go to [bbka.org.uk/Members/My Profile](http://bbka.org.uk/Members/My Profile) and register to receive email news and information by adding your email address in the appropriate box. This will also give you access to members only information on the BBKA website and to the discussion forum where you can give or receive advice on beekeeping or hear the latest news and views from other beekeepers.

The 2014 Chairmen's Day was held at Stoneleigh on the 26 April and was judged a successful day. Thanks to all those who made the trip. Fred Ayres has written a report which can be read on page 185.

I wish you good beekeeping for the season ahead.

**Doug Brown,**  
BBKA Chairman

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**Cover photos:** Main image: Harriet Roberts, West Sussex; Bottom left: Frank Gellatly; Centre: Dr Geraldine Wright; Right: The Forager.

# June In The Apiary

by **Wendy Maslin**, Yorkshire BKA

## Jobs for June

Perform regular colony inspections with swarm management as required  
Check for signs of disease  
Monitor food stores and feed if necessary  
Add or remove supers and extract honey  
Queen rearing may be undertaken

So much of what we do in our beekeeping, and how and when we do it, is determined by the local weather conditions. These can vary greatly from the north to the south of the country and year on year. When I look back on my beekeeping diaries I am reminded that late June of 2013 was, for us, the peak swarming time, with good weather and warm days. There were no problems with the new queens getting mated and, by the end of the year, the honey crop was good. By contrast in June of 2012 it started raining and it did not seem to stop. That year our summer months seemed dominated by bees confined to their hives with all the associated problems, most notably failure of the new queens to mate and the subsequent issues of drone-laying queens.

Bee husbandry in June can involve continued swarm management with regular routine colony inspections, adding supers to colonies, removing full supers of honey, extracting, queen rearing or bee breeding, even feeding bees to mention just some of the more common tasks.

## Please mind the gap

The June gap is one topic always talked about in beekeeping circles. This is the time when the spring flowers have finished and before the main summer nectar flow starts as the summer forage comes into bloom. If you live in an area where this is likely to be an issue then you must keep an eye on the quantity of stores in your colonies and ensure that they have sufficient food. The colonies by now will be well populated with adult bees and frames well covered with brood so the need for resources is quite high. About two frames of food should keep the bees going between inspections. If the weather closes in and you need to feed, use a light syrup 1:1 water to sugar as this most mimics nectar. Take care not to contaminate honey with sugar syrup.

## A healthy hive is a productive hive

One of the tasks not mentioned above is varroa management, which impacts significantly on bee health. Rather than try to cover a miscellany of jobs for June in the apiary, I am going to concentrate on keeping bees healthy; if we are able to do that then, all other things being equal, the sticky stuff follows whether you want it or not. Varroa remains one of the most challenging aspects of our management in terms of bee health and colony strength. So, one of the reasons for colony inspection is to check for disease. This involves looking at the adult bees and the brood. Of prime importance is developing the ability to be able to recognise what is normal; identifying anything that varies from this will then arouse a suspicion of abnormality.

One factor that can be assessed is the size of the colony. The number of frames covered by bees can be noted along with the number of frames containing brood. By recording this over time the colony build-up can be monitored and can be an indicator of colony health.

Adult bees can be affected by a variety of problems, including *Nosema apis* and *Nosema ceranae*, the mite *Acarapis woodi* and many, often exotically named viruses, as well as those with simpler names, for example Bee Paralysis Virus — the clue to the effects of viruses

is often found in the name! In the presence of varroa, colonies will already be weakened and any additional pest or disease will potentially have a more devastating effect.

Checking for disease of the brood also requires recognition of the normal appearance of both sealed and unsealed brood and bees must be removed from the frame you are examining to look at it properly and make a full inspection.

Varroa mites live on adult bees. They use their sharp mandibles to pierce the cuticle of the bee and suck the haemolymph (blood) from the bee. Varroa breed in the brood cells, the mother mite establishing a feeding station on the larva where she and her offspring can feed. So, varroa not only weakens bee larvae by feeding from them, but also enables viruses to enter directly into the haemolymph. This is one of the reasons why bees are much more susceptible to viruses in the presence of varroa. Adult varroa seen on bees are all female as the male dies when the young bee emerges from the cell.

## Maintaining healthy bees

Having identified that our bees are in good health, the question then is how do we keep our bees in good health? The simple answer is to avoid stresses and provide the bees with good nutrition and living conditions. These include:

- ❑ A good apiary site with plentiful supplies of varied pollen, and nectar flows, hopefully, throughout the year.
- ❑ Not over-populating an area with too many colonies and placing the individual colonies in such a way as to avoid drifting and robbing.
- ❑ Good accommodation means secure, dry hives, protected from damp, from prevailing winds and other pests especially mice, rats and wasps.
- ❑ Supplying fresh brood comb, often, as old comb is a reservoir for disease organisms.
- ❑ Good swarm management.
- ❑ Keeping varroa numbers under control by means of monitoring and taking prompt, appropriate action using an integrated pest management system.

Monitoring varroa can be done by counting natural mite drop through the open mesh floors or uncapping drone brood at the purple-eye stage. It is important to be aware of the varroa status of the colony and then management can be instigated if needed. I would once again direct you to the National Bee Unit website and to their excellent publication *Managing Varroa*.

Having just returned from the very enjoyable BBKA Spring Convention I was reminded that there is much we can do without the use of chemicals in the management of varroa. Such methods are documented in the National Bee Unit's Bee-Base literature. For example, techniques like queen trapping, drone brood culling and using the artificial swarm, with some adjustments, are all ways to reduce varroa numbers in the colonies. Keeping varroa levels low should greatly help in reducing the impact of viruses and other diseases within the colony. 

# BBKA Chairmen's Day

by **Dr Fred Ayres**, Chairman, Lancaster Beekeepers

This event took place on 26 April 2014 at Stoneleigh and was attended by Chairs and other representatives from around half of the associations invited. In his opening welcome, Doug Brown, Chairman of the BBKA, said the purpose of the day was to get some understanding of what associations wanted from the BBKA and to set out what the BBKA currently does. This latter topic formed the basis of a presentation by Jane Moseley, General Secretary of BBKA, which largely covered the same ground as Doug Brown's article 'The BBKA – Supporting Bees and Beekeepers since 1874', which appeared in the January 2014 issue of *BBKA News*.

Items that caught my attention particularly from this presentation were:

- There will be vacancies for four trustees at the next ADM which will have to be first-time appointments. A debate as to whether potential trustees should have particular skill sets was inconclusive.
- The Spring Convention is losing significant numbers of volunteers, mainly through age, and requires new volunteers.
- The BBKA website had 540,000 hits, up 49%, of which 360,000 were unique visitors.
- The website contains a range of presentations, including some aimed specially at schools, together with stand graphics, which can be freely downloaded.
- A new resource ARK (Apiarist's Record of Knowledge) will go live, on-line, in July. This is an on-line study programme with the option of accreditation (more on this in July *BBKA News*).

Two short presentations followed. The first was by Andrew Royce, Trustee and Chair of the Finance Committee, who said that the BBKA's finances were back on track and that five applicants for the post of Treasurer would shortly be interviewed and a new Treasurer appointed on 9 May 2014.

The second presentation, by Jane Moseley in her fund-raising role, stated that of the £150,000 she had been set to raise by 30 September 2014, £63,500 had been received and not less than £41,500 was committed to be received. Jane said that she was confident that she could raise the balance of £45,000 before the year end.

These presentations were followed by a general discussion across a diverse range of topics including Spray Liaison Officers, bee poisoning, the organisation of swarm collections, insurance, last year's ADM, the BBKA's stance on neonicotinoids and Bee Health

Month. One issue which surfaced repeatedly was the ineffective state of communications between the BBKA and associations and branches, although it appeared that much of the issue lay not so much with the BBKA not sending information out, but with association contact details not being up-to-date and information not being passed on within associations.

Next on the agenda was a short presentation on the first draft of the BBKA's Draft Strategy for 2014–2019. We were told that as this was only a basic draft, it was to be kept confidential to Association Chairs and their committees, who are asked to provide feedback by 9 May 2014. We were also told that once the initial feedback had been received a more 'fleshed out' document would be produced which, presumably, will be available to all members for comment.

The rest of the day was taken up with discussing the 'Surrey Proposition.' By way of background, the fiasco at the 2014 ADM arose because many delegates objected to being asked to approve a financial budget that had already been in operation for four months, especially when they would not have supported some of the high cost activities included. Surrey Association successfully proposed that a working party be set up to consider how associations could be more effectively involved in the governance of the BBKA. How this might be achieved was discussed at some length. The possible approach that emerged was based on around three stages:

- Each year, around August, the Trustees would produce a detailed set of objectives for the following year, supported by a detailed budget for approval by members, i.e. the objectives and budget for the year October 2014 to September 2015 would be approved in August/September 2014.
- The 2015 ADM would be asked to agree a five-year strategy plan setting out the broad objectives to be achieved and the reasons for each.
- Subsequent ADMs would then focus on monitoring the outcomes against the agreed budget.

A working party to consider how this could be implemented will be set up shortly and all associations are invited to submit names of people they feel would be effective members.

Overall, this was a useful and constructive day which provided a good opportunity for chairmen to network, exchange opinions and gain an understanding of the differing challenges facing associations, large and small.



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# Improving Honey Bee Health: Responses to the Bee Health Policy Review

by **Gay Marris, Jason Learner and Mike Brown**, National Bee Unit

## The bee health review and consultation

In 2011 on behalf of Defra and the Welsh Government (WG), the Food and Environment Research Agency (Fera) bee health policy team undertook a review of current Bee Health Policy. The review sought to decide how best to manage pests and diseases in the future so that: the optimum policies and interventions are in place; priorities for future collective action (partnership working) by government and beekeepers are clear; and we are making the best use of current public funding/resources for this programme in order to sustain a healthy honey bee population for pollination. The review, which took a year to complete, was carried out by a diverse team with representatives from Defra and WG Bee Health Policy, the National Bee Unit (NBU), hobbyist beekeeper associations (BKAs), the Bee Farmers' Association (BFA) and an independent scientist. In January last year, a range of proposed policy changes were presented for public consultation, with final responses being collated after its close in March 2013. If you would like to read more about these processes, please visit: <https://www.gov.uk/government/consultations/improving-honey-bee-health>.

## Proposed policy options

In brief, the review set out three options for future policies, the recommended and chosen option being 'to refine and build on current policies with a renewed commitment to collective action by government, beekeepers and BKAs'. A prioritisation exercise undertaken by the review team highlighted the substantial costs, e.g. colony losses, to beekeepers and pollination services that are due to endemic pests and diseases and which would result if exotics become established in the UK.

## Objectives of the revised policy

The future shifts in direction for Bee Health Policies, which will therefore guide the activities of the NBU when working in partnership with beekeepers, are covered by the following themes:



*Training beekeepers at the home apiary. Unless indicated, all photos are Courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.*

- **Enabling beekeepers and improving their self-reliance** by, for example, sharing data and analyses on pest and disease risks with beekeepers; and by planning, coordination and delivery of education and training.



*EFB, photo by Frank Gellatly.*

- **Tackling causes of problems and not just symptoms**, e.g. improving the response by government, supported by BKAs, to recurrent outbreaks of serious diseases such as European foulbrood (EFB).



*AFB infection; using a match stick to test for ropiness in the cell.*

- **Formalising and extending better regulation approaches for the control of American foulbrood (AFB) and EFB**, specifically by recognising and rewarding good practice, by reducing inspection burdens, which the NBU already has in place for some commercial and semi-commercial beekeepers. This is known as the Disease Accreditation Scheme for Honey Bees (DASH).

## Managing emerging threats

- **Broadening the focus of government's role to cover other pests and diseases**, (not just notifiable foulbroods), including re-focusing on varroa management with campaigns and training to reduce colony losses;
- **The refocus on surveillance and early detection**, and expanding management options for exotic pests, examples of which are given later on in the article.

Defra's recommended policy changes for each pest and disease under consideration are laid out, more specifically, below.

## Intended outcomes from updated policy on varroa

- To renew the commitment by government, working with beekeeping associations, to improve beekeepers' management of varroa.
- To reduce colony losses and associated costs to beekeepers.
- To ensure the effective use of authorised treatments.
- No veterinary medicines or illegal residues found in honey.



*Varroa mites on a larva.*

### Intended outcomes from updated policy on AFB and EFB

- ❑ To lower the incidence of AFB and EFB.
- ❑ To avoid losses by beekeepers and, as a result, reduce costs to them from having to replace colonies lost from disease.
- ❑ In the longer term, reduce costs to tax payers for AFB and EFB surveillance and control with opportunities to reallocate resources to other bee health priorities; increased appreciation, value and use of disease prevention (i.e., biosecurity and barrier management) by beekeepers.
- ❑ To increase appreciation by beekeepers of the importance of AFB and EFB and their role in effective control of these diseases.
- ❑ In the long term, if in-field diagnostics can be developed, particularly for

confirming the presence of the pathogen *Melissococcus plutonius* (EFB), have evidence of beekeepers using these tools and taking action to reduce risk of symptoms/outbreak.

- ❑ No outbreaks of AFB or EFB associated with the sale of bees, particularly starter and nucleus colonies.
- ❑ No outbreaks of AFB associated with honey packing plants, where AFB risks may be present due to spores in imported honey.

### Intended outcomes for updated policy on the exotic pests, Small Hive Beetle, *Tropilaelaps* and Asian hornet

- ❑ To optimise the chances of early detection.
- ❑ In the event of arrival, an effective

implementation of the contingency plan to eradicate and prevent establishment, if possible.

- ❑ To outline a clear rationale for moving from an eradication policy to a containment policy, including informing beekeepers.



Adult Small Hive Beetle.

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- ❑ If any of these pests become established, educating beekeepers on how to manage this/these pest/s effectively to minimise impacts on their colonies. This would be subject to ensuring practical advice was available to beekeepers on treatments and husbandry methods.
- ❑ If established, beekeepers manage this/these pest/s effectively to minimise impacts on their colonies.



Dorsal view of *Tropilaelaps*.

More specifically, building on current policy, government and beekeepers working together on a package of additional measures to increase the chances of early detection and eradication of exotic pests and, if unsuccessful in preventing their establishment, to provide robust advice to beekeepers on effective management. The following are examples of measures that may be taken to ensure this:

- ❑ Step up raising awareness so that beekeepers and others are able to identify and detect exotic pests leading to early notification of arrival.
- ❑ Expand network of sentinel apiaries at risk points and at other sites to increase likelihood of detecting introductions at non-risk sites.

- Expand exotic pest surveys.
- Raise beekeepers' awareness of number of incursions/ outbreaks (trigger points or thresholds) which are likely to guide decisions about moving from an eradication policy to longer term management/containment.
- Exercises to test contingency and response plans including training of beekeepers who would assist the response (disease liaison contacts).
- Develop and/or clarify additional treatment and management options for eradication and containment.
- Provide robust advice to beekeepers on how to manage this/these pest/s if it/they become established, taking into account evidence on how best to influence beekeepers' behaviour.

## The Implementation Plan

In order to realise the intended outcomes of the policy review, as outlined above, an *Implementation Plan* is being drawn up for 2014. This important document sets out the specific objectives of the review, describing how and when these will be met and clarifying how all the partners will work together. The plan will be presented and agreed at the Bee Health Advisory Forum.

The objectives of the *Implementation Plan* fall under five broad categories, namely Communications, Training, Foulbrood Detection and Control, Biosecurity and Contingency Planning, and Evidence and Analysis. The plan has yet to be finalised, however, some of the objectives have already been contributed to, others are underway and others are yet to be implemented.

One of the objectives already contributed to under the *Implementation Plan* ('the plan') is the update of the following advisory leaflets:

*Managing Varroa.*

*Foulbrood Disease of Honey Bees and Other Common Brood Disorders.*

*The Small Hive Beetle, a Serious Threat to European Apiculture.*

*Common Pests, Diseases and Disorders of the Adult Honey Bee.*

*Tropilaelaps, a Parasitic Mite of Honey Bees.*

These leaflets are available as pdfs on BeeBase at: <https://secure.fera.defra.gov.uk/beebase/index.cfm?pageid=167>.

## DASH

One of the plan's major objectives is the Disease Accreditation Scheme for Honey Bees (DASH). The details are published on Defra's website: <https://www.gov.uk/govern>



*Vespa velutina, the Asian hornet.*

ment/consultations/improving-honey-bee-health and further information about the DASH scheme will be provided in a follow-up article in *BBKA News*.

## Sentinel Apiary Networks

Finally, underpinning research is an important element of the bee health work, and the NBU have recently secured a new grant to 'stress test' Sentinel Apiary Networks. The objective is to find out how robust the current network is, and how increasing or restructuring the Sentinel Apiary Network would increase the likelihood of the NBU detecting a pest sooner, to improve our chances of successfully eradicating any incursion.

Sentinel Apiaries are apiaries across England and Wales where beekeepers have agreed to monitor for certain exotic pests such as the Small Hive Beetle, *Tropilaelaps* mites and the Asian hornet, using traps provided by the NBU. More information about the exotic threats we face are available on BeeBase. The Asian hornet pages are full of information on *Vespa velutina*, including details of the design of traps and the Sentinel Apiaries. Additional information can be found in the exotic pest advisory leaflets and in previous articles on the publications pages of BeeBase: <https://secure.fera.defra.gov.uk/beebase/index.cfm?pageid=166>.

## Further information

If beekeepers wish to import honey bee queens or packages, they are now able to submit an import notification electronically via their BeeBase login. To do this log into BeeBase and on the left hand side of the screen, click on 'Import Notifications' from the index. Then click on 'Add New Import Notification' and submit your details. Please be aware that you will still need to notify the Animal Health Veterinary Laboratory Agency of your import. ✚

# High Varroa Populations

Many of our Bee Inspectors have reported a high population of varroa mites in colonies across England and Wales. We believe these high levels are largely due to many colonies continually rearing brood throughout the mild winter. Continuous brood rearing dramatically reduces the efficacy of winter varroa treatments such as oxalic acid, which do not kill mites sealed in brood cells.

We urge beekeepers to monitor colonies and check either the natural mite drop from a sticky insert/ open mesh floor or by uncapping drone brood. From May to August, a natural mite drop should be monitored over a week. The number of mites then counted over this week should be multiplied by thirty to give you a rough population of varroa in your colonies. A figure of one thousand mites or more is considered to be a high infestation. If uncapping drone brood, then only five varroa mites out of 100 uncapped pupae need to be found to be considered a high infestation.

Should you discover that your colonies have a high amount of varroa then a range of options are available from biotechnical methods such as drone brood removal, to authorised varroacides. Any varroacides used will be weather and temperature dependant. If you have supers on your colonies then thymol treatments should not be used due to tainting of the honey. More information is available in the National Bee Unit (NBU) leaflet *Managing Varroa*, available from <https://secure.fera.defra.gov.uk/beebase/index.cfm?pageid=167> or alternatively, a hard copy can be obtained by phoning the NBU office on 01904 462510.

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# Managing Honey Bee Parasites and Disease by Letting Them Be

by **Maryann Frazier**, Penn State University, USA

Although we think of them as European honey bees *Apis mellifera* probably originated in Africa. Their presence, for millions of years, on a continent where ecosystems range from desert to savannah to tropical rain forest, has resulted in a highly diverse population of unique subspecies well adapted to these different habitats. They have unique mechanisms that equip them to thrive, even in places that might appear unsuitable for honey bees. One such mechanism is their defensive behaviour; they are after all, the parent population of the Africanized aka 'killer' bees, now ubiquitous throughout most of South America, Central America, Mexico and much of the southern United States. In addition, they reproduce (swarm) and abscond (leave the nest) more often than their European counterparts and they are able to migrate long distances to find the nectar, pollen and water resources they need. Interestingly, these bees also appear to be better equipped to deal with the diseases and pests that plague *A. mellifera* in other parts of the world, including Europe where they are considered native. For instance, the highly contagious and deadly American foulbrood disease is not a problem in Africa and the small hive beetle, now a serious pest in parts of the USA, is present throughout much of east and southern Africa, but is rarely a problem.

of the International Centre for Insect Physiology and Ecology (icipe), in an effort to have a closer look at the African *A. mellifera* and learn more about the biology and behaviour of these bees, how they are kept and how they respond to diseases and pests. What we discovered on that trip was a great surprise to us, as well as to our Kenyan hosts; varroa mites, thought not to be present in East Africa, were present in every colony we inspected! Yet these varroa infested colonies did not appear to be collapsing from the infestation. This discovery took us and our icipe colleagues on safaris around the country to determine the range of the newly infested colonies. It is now clear that varroa is widespread throughout much of Kenya and at least the coast of Tanzania.

## Researching honey bees in Kenya

Over the past four years, our PSU/icipe team has been working in Kenya to identify the geographic distribution of the *A. mellifera* subspecies, and to characterise their varroa- and disease loads and certain behavioural characteristics, such as hygienic removal of freeze-killed brood. We also hoped to understand more completely what impact varroa mites are having on the honey bee populations and whether or not individual subspecies are responding differently to these mites and the diseases that typically accompany them. To do this, we carried out extensive sampling, colony assessments and beekeeper interviews at 24 locations across the country. The results of this work have been submitted to the journal *PLoS One* for publication.

## Status of Kenyan bees

In general, the health of the honey bee populations in Kenya appear to have declined in recent years. There are fewer hives being colonised by reproductive and migratory swarms, swarms are often small and unproductive and honey production overall is down. Colonies in areas where beekeeping has traditionally thrived due to abundant nectar and pollen resources seem



Dr Elliud Muli, beekeeping specialist at icipe, looks for varroa mites in drone brood while conducting the freeze-killed brood assay for hygienic behaviour.

to be less impacted, while those in areas with poor or limited resources seem to be suffering most. Potential factors contributing to the decline probably include, loss of foraging areas (deforestation and increased clearing of land for farming), drought and climate change, pesticide use, and of course the presence of the parasitic mite, *Varroa destructor*, and the viruses it vectors. However, without historical baseline data it is difficult to determine what factors are having the most significant impact. Nevertheless, bee populations do not appear to be devastated by the presence of this mite. Perhaps the ability of African bees to resist or tolerate diseases and pests extends to varroa mites as well.

Varroa is not new to Africa. In South Africa, the parasite was first identified in 1997 and was expected to 'severely curtail beekeeping', Allsopp 2004. But in 2006, Allsopp reports that "Varroa mite appears to have been reduced to the status of an incidental pest." He further states that *A. m.*



Maryann Frazier and Dr Muli interview beekeepers in the Aberdare Mountains. All photos courtesy of Maryann Frazier.

In 2009 a United States Department of Agriculture (USDA ) grant took several Penn State University (PSU) faculty students, an extension specialist (myself) and a beekeeper to Kenya to work with members

*scutellata* was resistant after seven years and he attributes this to hygienic removal of infested brood and lack of chemical controls used by beekeepers. It appears that honey bees in South Africa developed resistance to mites, simply by letting them be. Perhaps we are seeing a similar evolutionary process occurring in East Africa.

### Clues about varroa management from Africa?

While we wait to see what happens to the honey bee populations in Kenya/East Africa, it is hard not to ponder the question: "Why do diseases, mites and beetles continue to plague bees/beekeepers in areas of the world where beekeeping is 'modernised' and not in places where beekeeping is considered 'primitive'?" Certainly in Europe and the Americas we have successfully harnessed bees to produce large amounts of honey and provide us with pollination services



Drs Harland Patch and Diana Sammataro collecting honey bee samples for virus analysis.

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necessary to make large crop production possible. While there are many reasons for keeping European honey bees, beekeeping is driven largely by convenience and economics; bees are forced to adapt to the management schemes we have devised for them. However, in much of Africa, 'beekeeping' is driven mainly by the biology of the bees and their environment; beekeepers adapt to the ways of bees. African honey bees do not produce the honey crops European bees are capable of, yet they do seem better equipped to tolerate/resist diseases and pests. Perhaps a question we should be asking ourselves is: "Can we use our knowledge of both European and African bees to develop sustainable (healthy and profitable) strategies tailored to the unique environment of each?"

It appears that honey bee populations have the ability to fend off diseases and pests and are perhaps best able to do this when existing with minimal management. As we try to solve the many challenges facing our European honey bees, perhaps doing what we can to encourage wild populations and giving more attention to the use of resistant stock and less to chemical intervention, would benefit us and our bees.

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# Swarming Instincts

by The Forager

Swarming is a natural instinct for the honey bee; it is, after all, the method of making increase and of perpetuating the genetic make-up of the colony. For the beekeeper, the natural instinct is to ... well, I am not sure anymore what the beekeepers' natural instinct is. Traditionally, it has been the custom and practice of the beekeeper to take swarms as a means of increasing his stock or for sale to another beekeeper, but today, it seems, there are many beekeepers who do not, or will not, fulfil that traditional role.

Whether it has anything to do with the changing demographic of beekeepers I am not certain, but it is clear to me that swarms are something that many beekeepers would like to just eliminate completely from the scope of their beekeeping. I hear of beekeepers who want to breed less 'swarmy' bees, but are not prepared to invest the time and effort into learning and practising swarm management techniques and of others who will not take swarms in case they are carrying disease.



*Everybody out!*

For those in the first category, I would suggest that they try to understand a little more of the natural history of the honey bee. The problem will not go away, it is a simple fact; a honey bee colony that will not swarm, will not survive. Beekeepers need to work with their bees rather than try to stifle their natural instincts. For those beekeepers who are in the second group, I would ask: "how will we ever get on top of disease if everybody chooses to ignore it?"

I suppose that the real problem starts from beekeepers' initial education. Often beginners' courses only cursorily cover swarming; students are often told that that

is something they will not need to know about straight away and so when they come across their first swarm there is confusion and uncertainty. Certainly there are some swarms which do not make things easy for the beekeeper, settling as they sometimes do, in chimneys, roofs or very tall trees, but that is all the more reason to practise swarm management and encourage your colonies to swarm under your 'guidance'.

Among those beekeepers who are ready to help their colonies, there are many who will create artificial swarms or will carry out colony splits, but many will only start their preparations when they see signs of colonies developing queen cells. Many 'old hands' will tell you that this is probably too late as the first signs of a colony making preparations to swarm is the development of drones. At the very least, be prepared with spare brood boxes equipped with frames fitted with foundation (preferably drawn) together with a suitable number of spare floors, crown boards and roofs. Nucleus boxes can make a very useful contribution as well.

We hear so often these days about beekeepers wanting to raise their own queens and joining queen rearing courses to do so. Many of these courses, which often teach grafting skills, are not appropriate for many hobbyist beekeepers with, say, half-a-dozen colonies. Artificial swarming, on the other hand, helps the beekeeper to preserve the integrity of his or her colonies and develop the new queens that the colonies will need to give them longevity. It is also a very rewarding skill to master.

Now we come to that thorny problem of do we take swarms in areas where disease may be present and the answer is a most resounding "yes". For if we do not take such swarms and they do prove to be diseased, even today, when swarms in the wild easily succumb to varroa, such swarms left unmanaged can spread disease throughout a significant area. And this is before we even start to consider the possible social nuisance which swarms can sometimes be to non-beekeepers. I can see absolutely no logical or sensible reason for declining to take swarms just because they may be carrying disease. This argument was put forward in the early days of varroa in the UK and it did nothing to stop the



*A Swarm of Bees in May. Photos by The Forager.*

spread of varroa. Similarly, it will do nothing to stop the spread of other diseases. Beekeepers must always remember that, though they may own the hives in which the colonies are housed, the bees themselves are a part of the national stock of honey bees. They fly where they wish and are as likely to contract disease as any swarm is likely to be carrying a disease. The beekeepers' role is to manage the colonies such that disease is identified and dealt with.

Surely, the intelligent approach is to take swarms when they are there to be taken, hive them and then, if there is any cause for concern, seek a hospital/quarantine site on which they can be kept and observed until their full provenance is established. This way, the bees are not being lost, they are not a public nuisance and if they do, subsequently, prove to be infected with a notifiable disease, they can easily be treated, managed or disposed of in an appropriate manner. But, you may say, "Where am I going to find a hospital site that I can use?" This is exactly where the local association can potentially help as most associations are continually being offered sites, often more than their members can manage to populate. Some careful thought at the beginning of each season could easily lead to each association designating a suitable site in case of need.

I started this article by using the term 'swarming instincts'; you may by now realise that I feel the concerns are not about the behaviour of the bees, but rather about that of the beekeeper. If beekeeper behaviour were more instinctive, I am sure that would do much to improve the overall health and well-being of the honey bee as well as adding to the skills and knowledge of the beekeeper. ✚

# Hive Cleaning, Sterilisation and Good Practices for the Hobbyist Beekeeper

by Jason Learner, NBU

Honey bee colonies are subject to infestation or infection by a range of pests and diseases. These include viruses and bacteria, such as the microbes that cause American or European foulbrood (AFB and EFB); *Paenibacillus larvae* and *Melissococcus plutonius* respectively. Such infections can be rapidly spread by the beekeeper and by drifting or robbing of colonies by other honey bees. Good hygiene and beekeeping husbandry practices are therefore essential in reducing the impact that harmful bacteria and viruses have on colonies and the apiary. Additionally, good hygiene practices should extend to beekeeping equipment and clothing, as well as to the apiary itself. For example, as a minimum measure, using sterile disposable gloves and washing hive equipment in a solution of washing soda between each apiary visit. This article seeks to address some of the questions posed by small scale beekeepers and gives practical advice on sterilisation of equipment and hygiene practices around the apiary.



*Good husbandry practices and a clean apiary will help reduce robbing and are less likely to attract pests. Alternate the direction of your hive entrances to discourage robbing and drifting of other bees. All photos courtesy of The Food and Environment Research Agency (Fera), Crown Copyright; images supplied by the National Bee Unit at Fera.*

## What best practices should I be using when travelling from apiary to apiary?

When travelling from one apiary to the next, there are some essential tools that every beekeeper should have to help minimise the transference of infections. Disposable gloves are essential and, at the very minimum, they should be changed between each apiary in foulbrood clear zones. If, however, you receive an email notifying you that foulbrood has been found within 3km of an apiary, then gloves should be washed between each colony. You may find it useful to wear more than one layer; this will increase the thickness of the material and offer greater confidence for those beekeepers who are new to the craft, and it will allow you to pull off the top layer if necessary. In addition, it is also worth investing in a 10L bucket with a lid. In this you should prepare a washing soda solution made from 1kg of washing soda in 5L of water (i.e. use a 1:5 ratio solution). On the bucket, mark an expiry date of one month after the solution was made up. Change the solution when

this time passes or sooner if it becomes excessively discoloured. Use a stainless steel pan scourer with the solution to clean your hive tools between each colony and also your smoker (paying particular attention to the bellows). Stainless steel hive tools can

“ Good husbandry practices and a clean apiary will help reduce robbing and are less likely to attract pests. ”

be left to soak in the soda solution between apiary visits. It is also useful to have a small, sealable container for putting brace and burr comb and other scraps of wax that can be accumulated and rendered down. Discarding old bits of wax on the ground can encourage robbing by bees and by pests such as wax moths or wasps. When carrying out inspections in an apiary, leave any colonies known to be under suspicion of disease or that have been previously treated against EFB until last to avoid the risk of contaminating clothing and equipment.

## How and when do I clean gloves and bee suits?

Try to ensure that all clothing and equipment is clean and free from accumulations of honey, propolis etc. before commencing an inspection of an apiary. Bee suits should be washed regularly in accordance with the manufacturers' recommendations; a half cup of washing soda added at the start of the wash will help to remove propolis staining and wax. Leather gloves should be avoided. They harbour disease causing pathogens which can be transferred from colony to colony without the beekeeper knowing. Additionally, they make working the hive a clumsy task, especially when the gloves become hardened by propolis and age.

## How can I keep bees away from supers that are awaiting extraction while letting the odd bee escape from them?

Supers awaiting extraction should not be left exposed, even when left in a shed. These sorts of practices encourage robbing by bees that may carry and spread harmful infections to other colonies. All supers should be stacked together properly, with any holes being sealed with foam or tape. The stack should be stood in a suitable tray or on several sheets of newspaper and a crownboard to catch any honey and the top covered with a bee-tight roof. Ensure that debris and spills of wax and honey are cleaned up. On the top of the stack, the roof can be replaced with a crownboard and the porter bee escape left in to allow the odd bee to escape. It may not be possible to get all bees out of the supers and some bees may be left in. If they are still alive when you come to extracting the combs, a window can then be opened and the bees nursed out of it. Be sure to close the window after so that returning bees are not able to access the room. Should the Small Hive Beetle ever reach UK shores, it could very quickly become a serious problem in honey extraction and storage facilities, particularly where hygiene



*Proper storage of equipment can help to minimise problems with robbing and pests.*

is poor. Poor storage of supers gives the opportunity for beetle infestations to increase very rapidly, especially when kept in a protected environment. Following these precautions will greatly reduce the beetles' impact.

## How can I clean honey extracting equipment and dry it without getting thousands of robbers coming to clean up?

Cleaning an extraction room can be a sticky and messy task. It is important to employ good hygiene around the extraction room and make sure tasks are done efficiently and as quickly as possible. Leaving full supers lying around for extended periods of time will attract foragers and cause robbing. They should be extracted as soon as possible after harvesting from hives and comb or wax cappings should not be left exposed. If you do have to leave the extractor with remains of honey in it, ensure that the lid of the extractor is closed and that all windows and doors to the room are shut. You may even find that the keyhole to the outside door needs blocking up to prevent bees or wasps getting in. When cleaning extraction equipment, use cold water and rinse the equipment thoroughly. Waste



*Clean extraction facilities will discourage any unwanted visitors.*

## How best to remove propolis and wax from frames and tools?

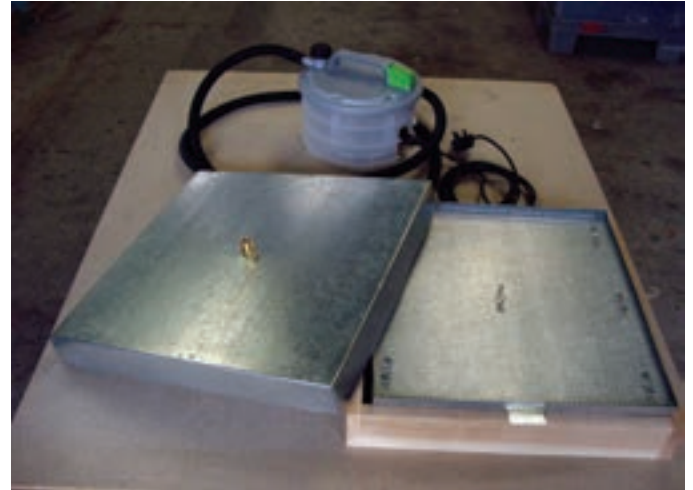
### By boiling

To sterilise frames, lay newspaper down on the working surface and then start by scraping all the frames over the paper as thoroughly as possible. Ensure that all the propolis or wax falls onto newspaper underneath so that it can then be burnt once you have finished. Prepare a mixture of soda solution (at a 1:5 ratio) in a pan large enough to hold the frames and bring the water to the boil. Next, fill a separate pan with cold water and place it nearby. Submerge your frames in the boiling soda solution for a minute or until the frame is clean of any remaining wax and propolis. Remove the frames from the soda solution and then rinse them in the pan of cold water. Leave them to dry and fit them with fresh foundation.

### By steam

Hot steam is very effective for melting wax from dirty wooden brood boxes and frames prior to their reuse. Apparatus consists of a source of steam, for example from a domestic wallpaper stripper; a plastic hose pipe, a collection tray, a modified brood box and lid. Equipment as described is available to purchase or can be home-made.

Begin by placing a box filled with dirty frames onto the purpose built collection tray, which needs to be similar in size and



*Equipment used for steam cleaning frames of propolis and wax.*

shape to a hive floor but with a small opening at one edge and cover with the lid. Attach the end of the hose pipe from the steam chamber into the top of the sealed box. As the wax softens and melts it runs down through the box and out of the opening in the tray, from where it can be collected. The stripped and cleaned wooden frames can be reused. Allow at least one hour of treatment for each box of frames. Frames can then be refitted with fresh foundation.

## How can I chemically sterilise old frames and equipment when given to me from a contact?

Old comb should never be re-used when coming from an unknown source. Instead, the comb should be cut out and burnt. The frames can then be sterilised by boiling or steaming as described above. Equipment such as polystyrene hives can be cleaned in a solution of sodium hypochlorite. This is present at a concentration of about 3% in household bleach. Immersion, for twenty minutes, in a solution of 0.5% sodium hypochlorite and water will kill AFB spores and other bacteria. Therefore, you will need to make a solution of one part of household bleach to five parts of water to get a 0.5% solution for sterilising your equipment. Be sure that you scrape all equipment of wax and propolis as thoroughly as possible because the solution needs to be in contact with all areas of the surface in order to be effective.

## What do I do if bees do not 'clean' the supers properly for dry storage?

If supers are still wet when going into late autumn and contain a lot of stores, beekeepers can place the super under the brood box over winter. The bees will then shift the honey up into the brood box as a preference. If the combs are just 'wet' with remains of honey after extraction, the super can either be placed above the crownboard for a few days in autumn (with the porter bee escape open) so that the bees clean the super; or, can be stored wet in a dry environment over winter and given to the colony in spring to clean up. ✚

# A Novice's Nightmare: Part I

by **David Morris**, Chesterfield and District BKA

My interest in bees stems from my schooldays, but it wasn't until 2011, having moved house from Greater London to Chesterfield, that I decided that I had the time and space to have a hive of bees. I joined my local beekeeping association in October of that year, putting my name down for the initial beekeeping course and, upon advice, also on the list for a swarm. Before that I had started to assemble some of the required items: first and foremost a hive. I was ready! No, I needed some frames. Now I was ready. No, I needed a suit, hive tools, a smoker, something to put the hive on, a stand. I'll build it. Now I was ready.

The course was completed, time went by, the weather was terrible, March, April, May. Where are the bees? Eventually mid-May the call came, "Do you still want bees?" "Yes please," was my reply. I was given the contact name of a member who had the swarm to dispose of. I got it, brought it home and thought I had better pop it in the hive as soon as possible; it was mid-day. The book or two that I had read said you could walk them in. Had I got the guts to do this? What if they flew away! No, I would shake them in, put the roof on quick and hope for the best. I learned later that the best time to hive bees is in the evening as there is a greater chance of them remaining. I was lucky that they stayed. 'Don't disturb them for a week', I was advised. I was itching to have a look. Isn't temptation hard to resist for a novice? A week dragged by. I had been checking to see if there was movement and bees had been going in and out, so all was well, so far. Time to carry out my first inspection. I got my suit on and all the gear, the smoker, hive tool etc. and opened up the hive. Wow they had been busy. All the frames had been drawn out with capped honey in some. Sigh of relief. The bees had decided to stay and make this their home. Where is the queen? Is there one? I had not seen her.

Next inspection. Because they seemed so placid at the first inspection, this time I would try without the use of smoke. Gently does it, removing a frame was no problem. My joy! There were eggs and larvae on four frames; there must be a queen present, but where? By this time the number of bees in the hive were growing. I put on a super to give them more room, to make as you say a brood and a half. I had better put on another super, I would like some of their honey. Oh joy, I found the queen, gently caught her and popped a drop of paint on her so I could find her next time. A month later and now ten frames of brood... hey, what are those? Queen cups, Oh heck I had better get rid of them. Done.

Today I'm going to carry out a little job in my caravan. I will open the curtain, that way I will be able to see the bees and do the job at the same time. Who cannot multi-task! I had noticed a few bees, more than normal, flying around the front of the hive but did not think much of it until I came out of the caravan. The sky was awash with bees. Retreat into the caravan quick. What has happened? You guessed it, they swarmed. That queen must have been busier than I had thought. Now what do I do? Where is the book? Answer: in the house. Where is the house? At the other end

of the garden with thousands of bees in between. Soon they settled, clustering in among the raspberries, loganberries, wisteria and trellis.

Quick dash into the house. Check the notes made from the course: ah-ha, put a box over them and they will crawl up into it. Done. Wind blew the box off. Where is the rope? In the shed. Eventually I tied the box down. Now the bees climb up into it. Oh yes, now I have got to put a cloth down onto which I will put the full box of bees. Negotiate with the lady wife for a cloth. The bees do not seem to be moving up. A bit of smoke should do the trick.

Wrong; no movement upwards. A squirt of water, that should move them. Wrong; no movement. Wait a moment, if I do manage to catch them what am I going to do with them? Fortunately, like a good Boy Scout, I was prepared with a spare brood box, floor and



stand. If you are making one, you might as well make a second, just in case! Quickly put together a second hive. Now then let me get this swarm. It still has not moved up into the box. Now what? Nothing for it but to cut the bees out. Cut, hack, chop... half the foliage and trellis gone, but I have got the bees on the box, onto a sheet, with corner of the box up to let the stragglers in.

I think I'll try walking them in. Slanting board installed, package of bees in box placed on board, cloth untied, laid out... gently lifted box and shook out the bees... go on now walk into that nice hive. No, they are not having it. Off they flew, the sky blackened with bees again. This time they settled in the adjoining hedge of our neighbour. Now what, I thought. Time to call in reinforcements.

Thankfully at the end of the course we had all been attached to a mentor. I gave him a call, explaining what had happened and what I had or had not done and said: help! My mentor, in shining armour offered to come round and sort me out. Of course, textbook fashion the swarm was collected. That is where experience shows. Yes, the collected swarm was walked into the new hive, the queen was seen; it was the one I had marked previously. Now I had two hives of bees. I had only planned on one the first year. Although 2012 was a bad year, I did manage to obtain about six jars of honey, which I was more than pleased with. So onward into next year.



Photos by David Morris.

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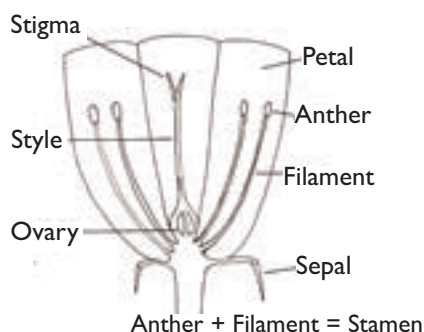
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# Flower Structure

by **Andy Willis**, New Forest BKA

I have great sympathy with many beekeepers regarding identifying flower structure. Mother nature has provided a huge variety of flower shapes, sizes, types and colours and few are the same as each other. Most books will show a 'stylised' flower to help with identifying the parts of a flower, but this can lead to confusion when comparing this with real flowers.



*Generalised structure of a flower.*

In this article I have used photographs of real flowers, hopefully familiar to most beekeepers, to help illustrate the various components of the flower structure. Cherries, apples and oilseed rape have flowers that are very similar to the stylised image, with the sepal, petals, filament, anther, style and stigma all quite easily identifiable.

In the strawberry and bramble (e.g., blackberry) flowers, things become slightly complicated as these have multiple styles, each with a stigma at their ends within the centre of an individual flower. In the poppy, the multiple styles have become fused together and reduced in size with the stigmas arranged in a star-like shape directly on the enlarged seed pod (the ovaries are hidden within this). The poppy sheds its (normally two) sepals as the lower opens. In plants like the willow and holly, the male and female parts are usually separate and found on different trees. Male willow flowers are composed entirely of filaments and the pollen-bearing anthers, while the female willow flowers are entirely composed of styles and stigmas with no filaments or anthers.

In the flowers of the female holly trees the filaments are still present, but the anthers are sterile. However, within the flower on male holly trees the ovary is sterile and the style and stigma are missing.

With the rosebay willow herb, the sepals are darkly coloured with the anthers

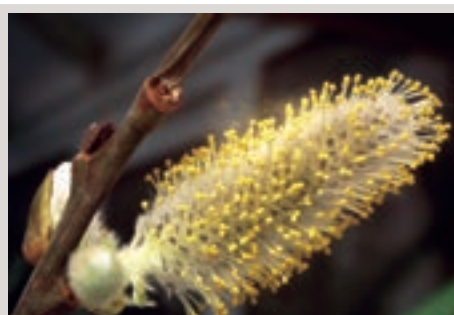


*Flowers that look like the typical stylised flower:  
Above left: Cherry blossom. Above right: Oil seed rape flowers. Left: Apple blossom.*

*All photos taken by Andy Willis.*



*Flowers with multiple stigmas and styles:  
Below left: strawberry flower. Below right: blackberry flower, showing multiple styles.*



*Above left: Multiple styles are fused with stigmas taking on a star-shaped structure centrally in the poppy flower. Above right: A male willow flower bearing only the male elements, filaments and anthers (stamen). Below left: male holly flowers and below right female holly flowers.*



Rosebay willow herb



White clover flowers



Field bean broad bean flowers



Ivy flowers



Dandelion flowers



Head of a sunflower



Tilia (lime tree) flowers



Male flowers of the sweet chestnut tree



Female flower or burr of a sweet chestnut tree



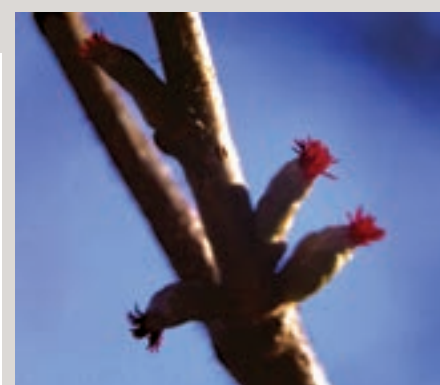
Hellebore flower showing purple nectaries



Left: Male hazel flowers.

Right: Female hazel flowers.

For both sweet chestnut and hazel the separate male and females flowers are found on the same tree.



also coloured purple/blue with pollen. In plants that are members of the pea and bean family, like white clover and field beans, the petals have been modified to totally enclose both the stamens (filaments and anthers) and the style.

Ivy flowers are arranged together in a ball-like head with the small green petals and sepals folded right back. With *Tilia* (lime) trees, the sepals are the same size as the petals, with nectar secreted on their inner facing surfaces.

Dandelions and sunflowers are composed of many small individual flowers all packed close together to make one large

'flower'. In the dandelion, each tiny flower has one enlarged petal. In the sunflower, only the outermost flowers of the disc have one enlarged petal, giving the familiar 'ray disc'.

In hellebores, the true petals are reduced into tubular nectaries (here coloured purple) and what we think of as petals are in fact enlarged sepals, which are not shed.

With plants like sweet chestnut and hazel, there are no petals and the male and female flowers are separate, but still on the same tree. The easily overlooked crimson red styles and stigma of the hazel are produced from the ends of bare buds. The

more familiar and visible male catkins shed their pollen from many anthers with very short filaments protected by a scale. The sweet chestnut male flowers are also arranged in long catkins but these have filaments with nectaries at their bases. The female flower is a small green burr with no petals or nectaries with the creamy coloured styles and stigmas protruding in a similar way to the hazel female flower.

I hope that these photographs will illustrate some of the huge diversity that nature provides in the flower kingdom and help you to reduce the confusion that often accompanies identifying flower structures, in real flowers.



## *In this issue:*

### Abstracts of presentations made at the insect pollinators initiative meeting held at the BBKA Spring Convention 2014

The Insect Pollinators Initiative (IPI) was established in 2009 following the spirited campaign by the BBKA and others to draw the attention of the Government to the challenges facing bees and the need for greater investment in research. The Biotechnology and Biological Sciences Research Council (BBSRC), the Department for Environment Food and Rural Affairs (Defra), the Natural Environment Research Council (NERC), the Scottish Government and the Wellcome Trust under the auspices of the Living With Environmental Change partnership, committed £10M to 'innovative research aimed at understanding and mitigating the biological and environmental factors that adversely affect insect pollinators'. The partners had different missions and remits, but they all shared a common agreement that there was an urgent need for novel research to provide a solid evidence base with which to inform new policies and approaches to address concerns about pressures on bees and other pollinating insects. The nine projects that were funded are now drawing to a close and the 2014 BBKA Spring Convention provided an ideal opportunity for some of the key findings to be disseminated in a special IPI session. The abstracts are presented in this volume of *The BBJ* and further results and findings will be forthcoming in the months ahead.

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IPI is funded by BBSRC, Defra, NERC, the Scottish Government and the Wellcome Trust under the auspices of the Living With Environmental Change partnership.

# Modelling Systems For Managing Bee Disease

## Researchers

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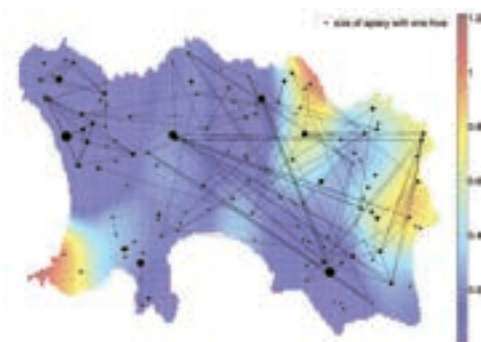


Figure 1. Map of the predicted likelihood for the location of the primary infection for the AFB disease outbreak in Jersey; red = the most likely; blue = the least likely. From: Datta et al, 2013.

## Key:

- Runs (5–9 members)
- Runs (10 or more members)
- Size of large Runs clusters
- Size of SaTScan clusters



Figure 2. Correlation between the location of AFB disease clusters (centroids) identified using two different methods (Runs test ● and SaTScan ○). Estimated cluster sizes: green polygons for SaTScan (radius = cluster size) and pink polygons for Runs test (convex hull enclosing clusters). From: Mill et al, 2014.

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Models are mathematical representations of real world processes and even quite simple models can sufficiently describe disease processes to offer useful, predictive results. This project brought together world leaders in developing disease models (Universities of Newcastle and Warwick) with microbiologists (University of Bath) and bee biologists (Fera, NBU) to help describe how damaging diseases of the honey bee develop into epidemics. The project has been incredibly productive, with four peer-reviewed publications so far, and the IPI presentation summarised the findings from these.

## Modelling American foulbrood spread in honey bees

Researchers at Warwick University and the NBU at Fera investigated the spread of the damaging bacterial brood disease through the honey bee population in Jersey.<sup>1</sup> American foulbrood (AFB) is a statutory notifiable disease caused by *Paenibacillus larvae*. We developed models to reconstruct the disease outbreak that was discovered in the summer of 2010. The model highlighted the likely source of the infection on Jersey (Figure 1) and was also able to separate spread by honey bees and spread by beekeeping practises (about 60:40). Finally, models were run to predict whether different control measures, such as following colony ownership links and having different inspection radii, could improve the chance of eradicating the disease. These methods were then used on a larger scale to look at disease control across England and Wales.

## Epidemiology of AFB

A second collaboration between Newcastle University and the NBU at Fera used the NBU database, BeeBase, which has recorded the location of notifiable honey bee disease since 1994. We used this information to look for disease clustering (i.e. an aggregation of disease in an area over time; Figure 2). You might ask why this might be important. Knowing that disease is

clustering in a particular place at a particular time helps us to target where to send bee inspectors. This could also tell us that certain places represent higher disease risks than others. For the first time, we report that clusters do exist for AFB.<sup>2</sup> The majority of disease clusters did not persist, suggesting that the control programme of burning infected colonies has led to local eradication of AFB. However, some clusters did persist in time, signifying continued or reoccurring risk in those areas. A comprehensive screen of risk pathways will be completed to understand whether any risk locations, such as restaurants or honey importers, actually align with persistent disease clusters.

## Understanding pathogen diversity

This project has also been working to understand whether population diversity exists for the bacterial pathogen, *Melissococcus plutonius* which causes European Foulbrood (EFB). Such information could be very useful to help explain variations in field symptoms and also to help retrospectively understand pathogen movements. Ed Haynes, one of our PhD students, working with the University of York, was tasked with producing a method to explore pathogen diversity. For the first time, Ed produced a method that was able to distinguish 20 different types of the pathogen.<sup>3</sup> Some types were restricted to beekeepers and those they sold bees to. Other types were associated with recent imports from the continent. The project went on to use this typing scheme to discover that there are 15 different types of *M. plutonius* causing EFB across England and Wales and that certain types seem to cause more severe disease symptoms.<sup>4</sup> The implications of these, and other interesting results from the project were discussed at the IPI meeting. ■

More information, including links to the publications, can be found on the project website ([www.beedisease.co.uk](http://www.beedisease.co.uk)).

# British Pollinator Change at the Landscape Scale

## Researchers

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Strong evidence suggests that both wild and managed insect pollinators have declined in abundance and diversity (Biesmeijer *et al*, 2006; Carvalheiro *et al*, 2013). However, many of the potential drivers of these declines operate at landscape scales, making it difficult to test their effects in controlled experiments. As a result, the main causes of pollinator losses remain unclear. The Agriland project addresses this problem through two ground-breaking approaches: a) testing links between historical pollinator shifts and land-use changes, and b) selecting and sampling a widely contrasting network of field sites to independently test landscape-scale drivers of population decline.

## Historical pollinator and land-use changes

In the absence of randomised landscape-scale experiments, the strongest available evidence of the dependence of pollinators on land use comes from the 'accidental experiments' of land use change. For this part of the project, we identified 24 field sites in the UK for which significant historical records of pollinator communities are available. These sites were resurveyed for pollinators over two field seasons. In addition, the land cover of the sites and their surroundings were analysed for changes by comparing maps from the 1930s and 2000. Eighty percent of historically surveyed sites showed evidence of declines in pollinator diversity showing that pollinators are closely tied to patterns in land use. A forthcoming supporting study will aim to further assess this link by analysing the changes in land use on sites with recent evidence of pollinator shifts.

## Current land use study

In order to study the impacts of current land management practices on insect pollinators, we devised a unique site selection protocol to test the importance of the most likely landscape scale drivers of losses. These drivers are usually inter-related, but our design enabled us to decouple them in subsequent analyses. The landscape variables we studied were: 1) habitat diversity, 2) honey bee density, 3) floral resources and 4)

pesticide usage. National datasets of estimates of these variables were collated, and these were used to select 96 sites clustered in 6 regions through a series of algorithms. The sites contrast as much as possible in the four variables providing a representative picture of the current British landscape.

Over the past two summers, we have undertaken a comprehensive field campaign sampling these 96 field sites for pollinator and flower abundance and diversity. We also conducted experiments to assess the usefulness of each landscape to different groups of pollinators using solitary bee trap nests and experimental honey bee hives. In our IPI presentation we described some of the early results from these surveys, with some interesting national patterns in pollinator distribution and honey bee performance. For example, provisional results suggest that honey bees gathered more pollen from simple landscapes. This interesting observation could suggest that honey bees, with their nesting sites provided by beekeepers, are able to exploit landscapes that other pollinators might find challenging due to an absence of nesting sites.

Our field work also enabled us to 'ground-truth' the estimated values of the landscape variables we used to select our sites. This, in turn, allowed us to evaluate both our site selection protocol and the utility of the national, remotely collated datasets. Honey bee density and pesticide usage figures are still being analysed, but the estimation of habitat diversity from satellite imagery performed well against the ground-truthed data. Floral resource estimates were not as accurate, but they do provide a wide range of values to test the impact of nectar and pollen availability on pollinator populations. Finally, we provided details of our plans for a multi-factorial analysis of our huge and exciting dataset and our upcoming dissemination activities at the IPI meeting. ■

More information can be found at the project website [www.agriland.leeds.ac.uk](http://www.agriland.leeds.ac.uk)



Figure 1. The use of the British landscape has important impacts on the pollinator populations and communities. Photo by Clare Pemberton.



Figure 2. In this study, diverse (above) vs simple (figure 1) landscapes are compared across Britain. Photo by Bex Cartwright.

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# Urban Pollinators: Their Ecology and Conservation

## Researchers

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Figure 1. A perennial flower meadow brightens up Stanhope Recreation Ground in the suburbs of Leeds. Photo by Mark Goddard.



Figure 2. A bumblebee approaching a Common Poppy flower in an annual flower meadow in Armley Park, Leeds. Photo by Mark Goddard.

Pollinators supply a crucial ecological service, and finding ways to improve their lot is a major challenge. Urban environments are growing across the UK and flower-rich oases in otherwise uninviting city habitats could support large numbers of pollinators. Although urban areas are expanding,<sup>1</sup> outside urban nature reserves towns and cities provide little protection for biodiversity. Urban habitats have the potential to provide excellent conditions for pollinators, however. For example half of Germany's entire bee fauna have been found in Berlin<sup>2</sup> and 35% of British hoverfly species were sampled in a single Leicester garden.<sup>3</sup>

This project has been investigating three questions: 1) How does the insect pollinator biodiversity in urban areas compare to that of nature reserves and farmland? 2) Where are the hotspots of insect pollinator biodiversity in urban environments? 3) How can we improve insect pollinator diversity and abundance in urban areas? Brief methods and findings are described below. The project team includes academics from the Universities of Bristol, Edinburgh, Leeds, and Reading, taxonomists at the National Museums of Wales, local councils, and local Wildlife Trusts.

## 1. Comparing urban areas to farmland and nature reserves

To examine how the pollinator communities in urban areas compare to other habitats, the project team collected data in farmland, nature reserve and urban sites in and around 12 cities across the UK, from Dundee in the north to Southampton on the south coast. A dedicated team of fieldworkers recorded insects visiting flowers and the plant species on which they were feeding across the 36 sites. Results suggest that while urban areas contain fewer pollinators overall, the abundance and species richness of bees in urban areas is equivalent to or better than other habitats.

## 2. Urban pollinator hotspots

Urban habitats were sampled intensively in four cities (Bristol, Reading, Leeds and Edinburgh) over two years to quantify pollinator abundance and diversity in different urban habitats. More than 700 sites, including 400 gardens, were sampled for pollinators. Other sites sampled were allotments, gardens, parks, cemeteries, car parks, urban nature reserves and road verges. Pollinators and flowering plants were recorded along sampling walks through each habitat. The initial findings of this study were presented at the IPI meeting.

## 3. Urban flower meadows

In the third phase of the project we examined if the addition of urban flower meadows containing nectar- and pollen-rich plant species can improve conditions for pollinators in urban areas. In partnership with local councils, sixty large flower meadows were planted in areas of amenity grassland in Bristol, Reading, Leeds and Edinburgh in 2013. Three types of meadows were sown: a perennial mix, and two types of annual meadows with differing management strategies. Insect pollinators visiting meadow flowers were sampled at monthly intervals. Feedback from the public was incredibly positive and the meadows were popular with insects too. The results from this study are being collated and full analyses are yet to take place. ■

For further information about the project please see our website [www.urbanpollinators.org](http://www.urbanpollinators.org); catch up on project news on our blog at [www.urbanpollinators.blogspot.co.uk](http://www.urbanpollinators.blogspot.co.uk) or follow us on Twitter @BrisUrbPolls, @LdsUrbPolls, @ReadingUrbPolls

## Project Partners

Bristol City Council, City of Edinburgh Council, Leeds City Council, Reading Borough Council, Avon Wildlife Trust, Berks, Bucks & Oxon Wildlife Trust, Yorkshire Wildlife Trust, National Museums of Wales, Cardiff.

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3. UK National Ecosystem Assessment 2011. *The UK National Ecosystem Assessment: Synthesis of the Key Findings*. UNEP-WCMC, Cambridge.

# The Impact of Cholinergic Pesticides on Bees

## Researchers

Dr Christopher N Connolly, University of Dundee (Speaker)  
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Dr Nigel Raine, Royal Holloway University of London

Neonicotinoid pesticides have become the most widely used pesticides globally. They are widely used as systemic pesticides, coated onto seeds and taken up when they germinate. The neonicotinoids are then distributed throughout the plants, including the nectar and pollen collected by bees. It is becoming clear that the impact of the neonicotinoids seen after normal field exposure is not via acute toxicity that kills bees quickly; acute toxicity is only seen when higher doses are applied. However, given the role of the target for the neonicotinoids, sub-lethal effects are possible. The target is the nicotinic acetylcholine receptor. This is the most important site by which insects learn from their environment in order to find and maximise their food supplies. This receptor is called 'nicotinic' because it also responds to nicotine.

In humans, this is the 'reward' received from smoking. At higher levels nicotine is very damaging and can kill quickly, but such levels are never reached by accident and death from nicotine is rare. Although unlikely to be lethal, it can have serious effects on the body, especially to the developing child or, even worse, the unborn child in the womb. In insects, nicotine works poorly on the acetylcholine receptors. However, the neonicotinoids (*neo* = new, *nicotinoid* = nicotine-like) work in insects like nicotine does in man. Therefore, we can expect similar negative effects from nicotine in bees to those found in man.

Our research programme was aimed at investigating the sub-lethal effects of the neonicotinoids (and other pesticides) on bees using a range of cellular and behavioural approaches, in particular those predicted to be influenced by bee brain dysfunction. At the cellular level, we developed a technique to remove the bee brain and record its activity using highly sensitive electrical recording devices. As was expected, the neonicotinoids activated the bee nicotinic acetylcholine receptors causing an excitatory response. In fact, exposure to neonicotinoids at field-

relevant doses stimulated a hyper-excitation, much like an epileptic seizure. However, this stimulation was short-lived and the brain cells involved in bee learning became blocked (Palmer 2013). A similar response was found for organophosphates that increase the natural neurotransmitter, acetylcholine.

These findings predict that bee learning should be compromised when exposed to neonicotinoids. To explore this possibility, research was conducted on a learning model, the proboscis extension response (PER). This test is similar to that of Pavlov's dogs where a bell predicted a food offering and the dogs salivated when they heard the bell – they had learnt that food was coming. Honey bees can be trained in a similar fashion. In this case, a particular odour can be used to predict food and bees stick out their proboscis in anticipation once trained. In these learning experiments it was found that neonicotinoids decrease both the speed of learning and the number of times bees get this right.

To investigate whether this brain dysfunction and learning deficit had a negative impact on a whole colony, we investigated the impact of neonicotinoid exposure on bumblebee colony development. Using radio frequency identification tags (miniature versions of bar codes used to identify products), thousands of individual bees were monitored as they left and returned to the colony on foraging trips. This identified that colonies exposed to neonicotinoids at field-relevant doses performed as well as untreated colonies for the first 10 days. However, after 14 days clear deficits in colony strength started to show and correlated with an inability to efficiently forage and bring back pollen to feed the brood, resulting in a failure to thrive.

Together, our findings indicate that field-realistic levels of neonicotinoids have a negative impact on the learning centre of the bee brain, leading to learning deficits and colony weakness. How large an influence these effects have on the global decline in bees and other pollinators remains unclear. ■

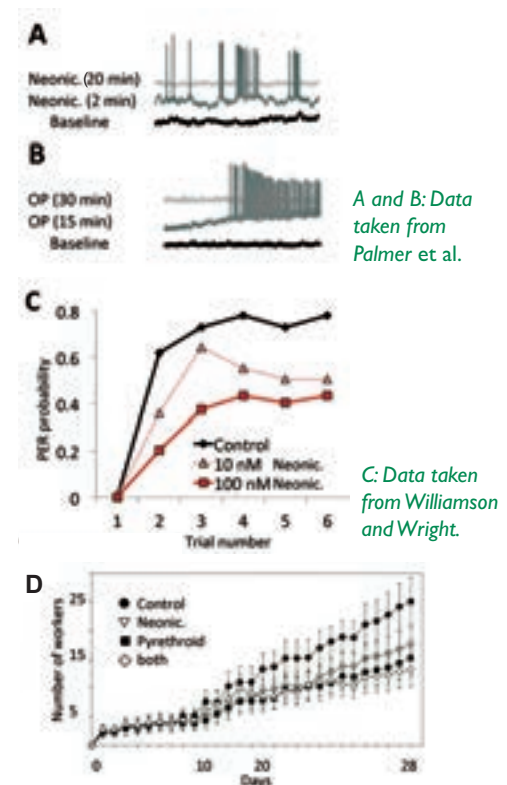


Figure 1. Impact of pesticides on bees. Honey bee brain cells are initially stimulated (shown by the upward spikes not seen in the baseline record), then blocked by exposure to (A) neonicotinoids or (B) organophosphates (OP) causing a disruption to honey bee learning using the PER as a measure of learning (C) and to bumblebee colony development as seen from worker numbers (D; Data taken from Gill).

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# DWV and *N. ceranae* in Bumblebees and Honey Bees

## Researchers

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Emerging infectious diseases (EIDs) pose a major threat to wild and managed bee populations. Honey bees (*Apis mellifera*), the main managed insect crop pollinator across the globe, suffer from a range of emerging and exotic high-impact pathogens, such as *Varroa destructor*, Deformed Wing Virus (DWV) and *Nosema ceranae*, and population maintenance requires active management by beekeepers to control them. Wild pollinators such as bumblebees (*Bombus* spp.) are in global decline, one cause of which may be pathogen spillover from managed pollinators, both commercial colonies of bumblebees and managed honey bees. Here we report on a combination of infection experiments and landscape-scale field data to show that honey bee EIDs are indeed widespread infectious agents in foraging honey bees and bumblebees in the UK. The prevalence of both DWV and the exotic parasite *Nosema ceranae* in honey bees and bumblebees are linked epidemiologically. Because honey bees have



*Bombus terrestris* — a head-on view.  
Photo by Matthias Fürst.



Bumblebees on a flowerhead.  
Photo by Mark Brown.



Bumblebee drinking — one of the experimental treatments. Photo by Matthias Fürst.

higher background levels of DWV prevalence due to the parasitic mite *V. destructor*, and sympatric bumblebees and honey bees are infected by the same DWV strains, we suggest that *Apis* may be the likely source of at least one major EID in wild pollinators. However, in the absence of definitive proof about the direction of transmission, further work is needed to understand the epidemiological dynamics of emergent diseases in the pollinator assemblage. ■

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Fürst M, McMahon D, Osborne JL, Paxton RJ, Brown MJF. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 2014; 506:364–6.

# Landscape Effects on Bumblebee Foraging and Colony Dynamics

## Researchers

The research team is led by Dr Claire Carvell, working with Dr Matt Heard and John Redhead at the NERC Centre for Ecology and Hydrology, Wallingford; Dr Seirian Sumner and post-doctoral researcher Dr Stephanie Dreier at the University of Bristol; Dr Jinliang Wang at the Institute of Zoology; and Prof. Andrew Bourke at the University of East Anglia.

Bumblebees are among the most important insect pollinators of a number of crops and wild plant species. Declines in their populations over recent decades have been caused by multiple drivers, but key among these is land-use change. Developing effective conservation measures requires an understanding of the factors that affect bumblebee populations, yet we still have a poor understanding of several critical stages in their annual colony lifecycle.

This project aimed to better understand the effects of land management and habitat structure on the foraging and colony dynamics of five bumblebee species. We studied four nationally common and widespread species (*Bombus terrestris*, *B. lapidarius*, *B. pascuorum* and *B. hortorum*) and one declining species (*B. ruderatus*). We investigated how the fine-scale spatial genetic structure (the pattern of genetic relatedness between individuals or their nests in relation to their position in the landscape) of nest-founding queens and foraging workers varied across an agricultural landscape in Buckinghamshire, UK. DNA from live wild queens and workers was sampled non-lethally and used to estimate their relatedness and identify colonies. These data were then combined with detailed models of the landscape to estimate how queen dispersal, colony locations and worker foraging distances were affected by habitat structure (Carvell *et al.*, 2012).

Queens of all species dispersed widely across the landscape and we found very low levels of fine-scale spatial genetic structure in sampled populations. This suggests that a typical agricultural landscape enhanced by agri-environment measures does not present substantial barriers to dispersal or gene flow in bumblebees. Worker foraging distances varied between species, with averages ranging from 268m to 553m. Importantly, foraging distances also varied between colonies, within species, depending on resource availability. Colonies in parts of the landscape with fewer flowers had much greater mean foraging distances, up to and exceeding 2 km,

and we estimated maximum individual foraging distances up to 2.8km. We have also conducted preliminary analyses looking at cross-generational relationships between sampled queens and workers, and at how the survival of family lineages within the study landscape is affected by surrounding habitat quality.

Our findings suggest that targeted conservation measures, such as agri-environment schemes that encourage farmers to sow wildflower mixtures alongside their crops, are likely to reduce net energy expenditure in bumblebee colonies by reducing the distance and hence cost of worker foraging trips. In turn, this is likely to enhance the survival of colonies located within overall foraging distance. Management applied at the landscape level can therefore have important positive consequences for bumblebee populations. ■



*Bombus ruderatus*, a nationally rare bumblebee species being studied by the team, on Red Clover sown in an agri-environment scheme flower mixture. Photo by Dr Claire Carvell.



Above: Researcher taking a non-lethal DNA sample from a bumblebee queen for genotyping and reconstruction of relatedness with other queens and workers in the landscape. Photo by Dr Claire Carvell.

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# Sustainable Pollination Services for UK Crops

## Researchers:

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Above right photo is of *Episyrphus balteatus* on a strawberry flower and the photo immediately above is of *Bombus hortorum* on clover.

Both photos are by Louise Truslove.

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Smith P *et al.* UK National Ecosystem Assessment, Chapter 14: Regulating Services. UNEP-WCMC, Cambridge, 2011.

Crop pollination is a vital ecosystem service and essential for maintaining agricultural and horticultural productivity. Pollination services are provided by wild pollinators such as bumblebees, hoverflies and butterflies and managed bee species, including the honey bee, and this service is worth more than £630M per year (Smith *et al.*, 2011). The Sustainable Pollination Services for UK Crops project set out to (i) identify which insect pollinators are contributing to UK crop production, and (ii) test whether crop yield and quality are limited by a lack of insect pollination. Based on this information the project went on to (iii) predict the future abundance and distribution of UK pollinated crops and their insect pollinators and identify potential pollination deficits, and (iv) test different pollinator management strategies to mitigate against deficits.

Using field surveys and experimental manipulations we have shown that a number of pollinator taxa including honey bees, bumblebees and solitary bees can be effective pollinators of some of the UK's most widespread flowering crops, including oilseed rape and field beans. The abundance of these pollinators in the field, however, dictates their contribution to crop production so management to improve pollination should be targeted to specific crops (Garratt *et al.*, 2014a). Insect pollinators, including honey bees, are also really important for the production of top-fruits, including apples. This has been valued at £37M to Cox and Gala production alone, but current sub-optimal pollination (i.e. deficits) indicates that yield and quality could be increased by up to £5.5M with appropriate management in some varieties (Garratt *et al.*, 2014b).

In order to address any crop pollination deficits that might exist, as part of this project we have been testing potential management strategies using managed pollinators as well as local farm management to increase the abundance and diversity of wild crop pollinators.



By mapping the distribution of wild pollinators and honey bee hives across the UK, areas potentially receiving sub-optimal pollination, or those particularly vulnerable to pollinator decline, have been identified. This can enable crop pollinator management strategies to be targeted to areas with the most need (Polce *et al.*, 2013). Furthermore, using future climate models, we have shown that changing weather patterns could affect where in the UK it is best to grow certain crops. We have found some mismatches between where a crop is grown and where the pollinators are found. More specifically we have shown that, due to climate change, pollinators may persist in areas currently used for fruit production, but that these areas might provide sub-optimal climatic conditions for orchard species currently grown (Polce *et al.*, 2014.)

Our research has highlighted the value of insect pollination to both the yield and quality of several UK crops. It has also emphasised that crop pollination is provided by many different insect species and different crops often rely on different species, but a diversity of pollinators is important for stable pollination in different landscapes and environmental conditions. We have identified examples of crop pollination deficits and shown that crop pollination services may become more unstable in the future, particularly in the face of a changing climate. Therefore, it is fundamentally important that we identify effective strategies, making use of both wild and managed pollinators, to ensure robust and effective UK crop pollination into the future. ■

For further details on our project please visit our website. [www.crop-pollination.co.uk](http://www.crop-pollination.co.uk)

# Can Bees Meet Their Nutritional Needs in The Current UK Landscape?

## Researchers

Geraldine A Wright, Susan W Nicolson,  
Sharoni Shafir, Philip C Stevenson, Anne Borland,  
Stephen J Simpson

An important, but often overlooked, reason that bee populations are in decline is likely to be that they cannot obtain adequate nutrition. Land management in the UK has undergone a dramatic transformation in the past 100 years, as land has been consolidated into larger farms that farm monocultural crops. More than 39 crops in the UK alone depend upon insect pollinators for fruit and seed production. In natural habitats, a colony of 'generalist' bees, such as honey bees, will visit the flowers of potentially hundreds of different plant species to find food. Nutritional balance becomes extremely important in monoculture situations: honey bee colonies used for pollination services have little or no choice of food and limited access to natural vegetation. Ironically, while crops like oilseed rape may provide vast expanses of pollen and nectar when they are in flower we do not know if these floral resources provide adequate nutrition for bees. In fact, species like honey bees may be obliged to forage for pollen and nectar from a variety of plants to obtain adequate nutrition, but the nutritional basis for this has not been established.

Using a sophisticated modelling approach that has been developed to study nutrition in many other animals, we have experimentally determined the ratio of protein and carbohydrates that adult worker honey bees and bumblebees need. Cohorts of worker bees were fed a series of diets varying in their protein-to-carbohydrate (P:C) ratio to determine their optimal intake of these nutrients. We found that foraging worker honey bees require a diet that is high in carbohydrates and low in essential amino acids (P:C, 1:250), whereas younger, within-colony honey bee workers require a dietary P:C ratio of 1:50–1:75. Foraging bumblebees, on the other hand, have an intake target P:C ratio near to 1:180. In both species, diets high in protein reduce bee survival. We have also examined how changes in environmental conditions, exposure to pesticides, or consumption of toxins affect the worker bee's



nutritional needs. Exposure to the neonicotinoid pesticides (imidacloprid and clothianidin) causes forager bees to need a higher intake of protein, whereas exposure to thiamethoxam causes them to need more carbohydrate. We have also examined how nutritional balance influences learning and memory in foraging bees. Certain amino acids are reinforcing, whereas others are repulsive to bees. We are currently completing studies examining how nutritional imbalance affects colony-level foraging and communication. In addition, we have analysed the nectar and pollen of over 300 UK plant species for their carbohydrates and their free (not bound to proteins) and protein-bound amino acids. The analysis is still ongoing, but a summary of the results was presented at the IPI meeting.

Two important conclusions from our results are that exposure to industrial chemicals or plant toxins causes stress that changes nutrient balancing in favour of dietary protein. However, protein cannot be consumed in large amounts by foraging workers, or it will cause premature death. To enhance colony survival, it is important to provide bees with separate sources of protein and carbohydrates, so that bees can independently regulate their intake of these food sources without compromising their survival.

Bee with floral pollen basket.  
Photo by Geraldine Wright.

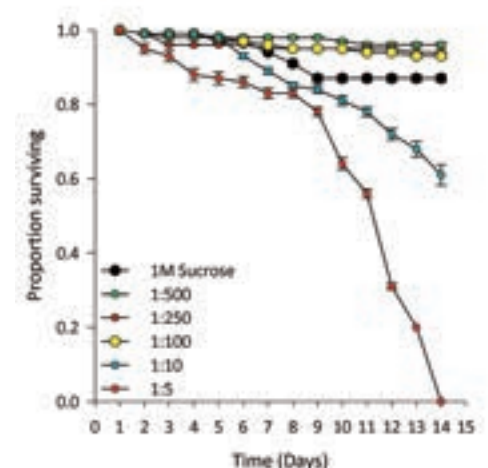


Figure. Diets high in essential amino acid compromise honey bee worker survival. Groups of twenty newly-emerged adult workers were housed in boxes and fed ad libitum with a diet composed of 1.0M sucrose and the 10 essential amino acids, the latter amounts being given in a varying ratio to carbohydrates (e.g. as in legend, amino acids: carbohydrate 1:5). From Paoli et al in review.

# Identification of a Virulent Hybrid Form of DWV

## Researchers

Eugene V. Ryabov,<sup>1</sup> Graham R. Wood<sup>2</sup>, Jessica M. Fannon,<sup>1</sup> Jonathan D. Moore<sup>2</sup>, James C. Bull,<sup>1</sup> Dave Chandler<sup>3</sup>, Andrew Mead,<sup>1</sup> Nigel Burroughs<sup>2</sup> and David J. Evans (Speaker)<sup>1</sup>

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Figure 1. Recently emerged honey bee with the classic symptoms of DWV infection. Photo by David Evans.



Figure 2. Honey bee larvae raised on an artificial diet in an incubator in the laboratory. Larvae raised under such controlled conditions can be inoculated with viruses and their responses to this studied. Photo courtesy of the University of Warwick publicity department.

Deformed wing virus (DWV) is probably familiar to most beekeepers (see figure 1). The characteristic symptoms of atrophied wings and stunted abdominal development are accompanied with reduced foraging ability, learning defects and, critically for overwintering losses, markedly reduced longevity of workers. In the absence of varroa, DWV is transmitted vertically from the queen and horizontally by mouth during feeding of larvae by nurse bees. The presence of varroa is associated with increased signs of viral diseases in honey bees, in particular DWV, and recent studies have demonstrated a strong correlation between high varroa and high DWV levels with elevated overwintering colony losses. In addition to directly delivering virus to the haemolymph of developing pupae, it has been suggested that varroa suppresses the immune response of pupae, increasing their susceptibility to virus infection.

Our IPI-funded studies have focused on the three-way interaction of honey bees, varroa and DWV. We have taken historically varroa-naïve larvae (sourced from Colonsay) and exposed them (via frame-transfer to a mite-infested colony) to varroa. We have subsequently characterised the virus population and the changes in gene expression in the host honey bee. In contrast to previous studies we have conducted our analysis on individual age-matched pupae (all at the purple-eyed stage) wherever possible, rather than on pooled samples. In our studies we stratified exposed pupae according to varroa association and viral load, resulting in four discrete experimental groups: C (controls, taken from the varroa-naïve colony), NV (no varroa), VL and VH (respectively, varroa-associated pupae with low and high levels of virus).

We have demonstrated that a single type of recombinant (hybrid) DWV accumulates in VH group pupae. This virus is characterised as having part of the genome derived from DWV and part from the closely related VDV-I (Varroa destructor virus type I). We have previously demonstrated the presence

of this type of hybrid virus in studies of varroa-infested colonies.<sup>1</sup> The striking thing about the virus population in varroa-associated VH pupae is that it is essentially clonal, with little or no variation in the virus genome. In parallel analysis of recently emerged nurse bees with overt DWV symptoms we can demonstrate that the very same hybrid virus predominates. In striking contrast, the C, NV and VL groups exhibit 1,000–10,000 times lower virus levels and contain a wide diversity of DWV-like virus types, that include a range of different hybrid genomes, together with DWV and VDV-I. We have also analysed the virus population in mites associated with pupae in the VL and VH groups. In both cases the mites contain a highly diverse virus population.

By directly inoculating pupae *in vitro* (using a syringe) we can recapitulate the amplification of the same hybrid virulent DWV-like virus. This strongly suggests that varroa acts as a simple mechanical vector, and that the particular recombinant virus amplified has a growth advantage when directly inoculated into haemolymph. This marked elevation in virus levels and restriction in virus diversity is similar to the changes seen in landscape-scale in studies by Stephen Martin in Hawaii.<sup>2</sup> However, in contrast to these, the changes seen in individual pupae in our studies occur within six days of virus transmission. We propose that landscape-scale changes reflect the cumulative outcome of interactions that occur at the level of individual pupae within the colony.

The identification of a single type of virulent hybrid DWV virus will, a) allow the development of diagnostic assays for the particular variant of DWV relevant to honey bee health, b) enable antiviral therapies to be developed, targeted against the pathogenic virus and c) allow a better understanding of the molecular basis of DWV pathogenesis. These studies will be the focus of our research over the next three to five years. ■

## References

1. Moore J *et al.* Recombinants between Deformed wing virus and Varroa destructor virus-1 may prevail in Varroa destructor-infested honeybee colonies. *J Gen Virol* 2011; 92: 156–61.
2. Martin SJ *et al.* Global honey bee viral landscape altered by a parasitic mite. *Sci* 2012; 336: 1304–6.

# Adopt a Beehive



by **Nicky Smith**, Adopt a Beehive, Twelve PR

In May *BBKA News* we introduced the BBKA's new fund-raising scheme, Friends of the Honey Bee. Some readers may have wondered what has happened to Adopt a Beehive, so this article is to let you know that 'Adopt' is still going strong, and to explain how and why we now have the two schemes.

Adopt a Beehive was set up in 2009 in response to an enormous increase in public interest in the plight of the honey bee, and the number of people who wanted to do something to help, without actually taking up beekeeping.

## How does it work?

By choosing to 'adopt' a beehive from one of ten regions across the UK, supporters can follow in the life of their beehive and beekeeper through three seasonal updates and the members' newsletter, *Hive Talk*. In this way the scheme meets two of the BBKA's charitable missions:

- ❑ To promote and further the craft of beekeeping.
- ❑ To advance the education of the public in the importance of bees in the environment.

All the beekeepers who take part in the scheme are volunteers, and offer a rich variety of beekeeping experience, helping to increase supporters' understanding of what good beekeeping involves. We know that many 'Adopters' go on to become beekeepers themselves having followed as 'armchair beekeepers' for a year, so it is clearly making a positive case for our craft.

## Fund-raising with a purpose

Adopt is sponsored by Burt's Bees, which covers the cost of the work involved in running the scheme for the BBKA, carried out by Twelve PR who helped to set it up. Each 'Adopter' is given a 'welcome' box of bee-related materials and then sent the beekeeper updates and the *Hive Talk* newsletter three times per year, by post. Migrating to the far cheaper email route is taking some time to introduce as most people still prefer the paper, postal option. So far more than 10,000 people have supported the scheme, many renewing every year, and we hope that when direct debit becomes a payment option we will have even more continuous supporters.

Each Adopt sold now returns around £15 revenue to the BBKA; income which has been used to provide seed-funding for a range of applied education and research projects over the years

including 'Course in a Case' teaching materials; Ron Hoskins' 'Swindon Honey Bee Conservation Group' and PhD students at Sussex and Keele Universities.

## Charitable competition

Since Adopt was set up, many other charities have entered 'the bee space,' often campaigning aggressively on single issues such as pesticides or the loss of wild meadow land. Many have set up their own 'help the bee' fund-raising campaigns. Adopt costs £30 per annum plus £4.99 post and packaging, and is a relatively 'generous' supporter scheme in comparison to others which have been set up recently. With a wide range of educational content as part of the package, including the *Pocket Guide to the Honey Bee*, the beekeeper updates and *Hive Talk*, it allows us to explain the many different issues facing honey bees, focussing especially on the craft of beekeeping and good husbandry.



Top: The 'welcome' pack for Adopt a Beehive supporters.

Bottom: Front page of the new 'Adopt a Beehive' leaflet available from the BBKA head office.

In order to offer a product which is less expensive to buy, which also focuses on particular issues, but which still helps to educate and fund-raise, the BBKA decided to set up a new scheme, Friends of the Honey Bee. It focuses on two issues: varroa mite and the loss of forage.

Having the two schemes operating together allows us to offer more choice, with Friends of the Honey Bee costing £20 per annum and Adopt £34.99, and both schemes returning fifty per cent for good causes. In theory having the two schemes will increase the pool of people who are able to support projects which are specifically honey bee and BBKA related.

## The craft of beekeeping

We hope you can help us to promote both 'Adopt a Beehive' and 'Friends of the Honey Bee'. Leaflets for both are available from the BBKA office. Adopt has a



lively Facebook community of 5,000 people and is regularly featured in magazines and even occasionally on TV. Some of you may have seen Barnaby Shaw, one of our London 'Adopt' beekeepers, on ITV's 'Good Morning' breakfast show recently, or spotted Mary Berry on the BBC learning about beekeeping with Jules, one of our Adopt beekeepers from the Midlands.

An enduring joy and delight from working with beekeepers is witnessing the kindness and care which they show towards their fellow human beings, as well as their honey bees. Training others; giving talks; mentoring 'newbies'; saving swarms, all beekeepers seem to give generously of their time and are at pains to describe the issues that honey bees, in common with all pollinators, face.

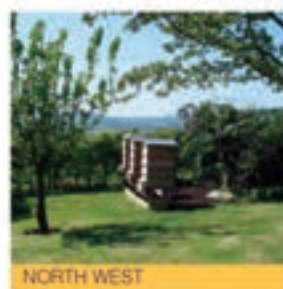
These two fund-raising schemes are, we hope, an extension of your voice and a positive way to help protect honey bees and the craft of beekeeping for future generations. For more information visit [adoptabeehive.co.uk](http://adoptabeehive.co.uk); Facebook/Adoptabeehive or call 0845 6807 038 ✚



Above: Barnaby Shaw, an Adopt beekeeper from London, on ITV's Good Morning breakfast show.  
Top right: Mary Berry learning about beekeeping with Jules Moore, an Adopt beekeeper from the Midlands.



Below, right: a selection of Adopt beekeepers' apiaries from across the country.



NORTH WEST



NORTH EAST



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NORTHERN IRELAND



EAST



SOUTH WEST



SOUTH EAST



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Adopt a Beehive is the only charitable scheme in the UK especially for the honey bee. The British Beekeepers' Association, registered charity no. 212025.

Official BBKA fundraising campaign. All profits go towards applied research & education projects to help save the honey bee.

# Nucleus Colonies In My Apiary

by Michael Palmer, Vermont, USA

*"Almost every emergency of management can be met forthwith by putting something into or taking something out of a nucleus, while nuclei themselves seldom present emergencies."*

*E.B. Wedmore, A Manual of Beekeeping.*

## The beginnings of a new plan

I used to buy bees, lots and lots of bees; singles from South Carolina, nuclei from Florida and frames of brood from New York. I used to buy queens, lots and lots of queens; queens from Georgia, queens from Texas and queens from California. Every year it was the same. Pick up the pieces of my apiary in the spring, send a big check to southern queen breeders, split up my best colonies, and hope I made enough of a honey crop to pay the bills. Some years I did, some years I did not.

In 1982, an apiary management job became available with a New York state orchard located on the west side of Lake Champlain. Chazy Orchards, advertised as the largest contiguous McIntosh orchard in the world, managed something like 800 acres of trees. Whether or not it was the largest then or is today I do not know, but I can say it was huge to me. The new job added 500 additional colonies to my workload. Colonies more or less dumped in my lap with the instructions, 'fix it'. The orchard's apiary had crashed over the years from mismanagement and American foulbrood (AFB). What had been a successful apiary of more than 800 colonies had dwindled to 150 by 1980. The orchard was able to hire a former Vermont bee inspector for a couple years and he did a great job of cleaning up the disease and starting the build-up of colony numbers to near pollination requirements.

When I took over, the bees were in decent shape, but unproductive. There had not been a honey crop in years and the previous beekeeper, while dealing appropriately with the AFB, nearly bankrupted the apiary, costing \$55 per colony for his management when the orchard could rent colonies of bees for \$22. How many times the owner of the orchard threatened to burn the whole lot I cannot remember, but it seemed like all the time. While working for an angry man is never much fun, I have a thick skin and persisted with my management. The second year I worked for Chazy Orchards, the bees made almost five tons of honey. The angry man almost smiled. The following year we made ten tons of nice light honey, and management costs fell to less than rental prices.

After working for the orchard for several years, I was ready to expand my own apiary. I felt I could do better with my own bees, and in 1986 I gave my notice: sell me your bees or I am off to work for myself. The grumpy old man resisted, but his son saw the wisdom in my offer and the orchard agreed to sell me the bees and all the related equipment. At the time, I thought I had it made. I now owned an apiary of more than 800 colonies, I pollinated the orchard with 600 three-story colonies; all done by hand ... no forklift, using the 'arm strong' method! This took three trucks with three guys each, three nights to move in ... and the same to move out again. However, if everything worked out as I hoped, the

possibility of making many tons of honey seemed entirely possible. Looking back, I now realise the folly of my new path. The best-laid plans often go astray and I found that to be true.

Beekeeping is just like all other agricultural endeavors. It is a tough way to make a living and it seems that every year something goes wrong. How many times have you said 'it will all be better next year'? Next year your bees will winter successfully, or they will make a big honey crop because you will do this or that or something else. This is the great hope of every farmer everywhere, no matter what they grow or where they farm. Next year will be the year. So I approached my beekeeping with an eye to the future and the belief that next year will be the year.

Over the years that followed, I did the best job I could. I followed the best management practices recommended by beekeeping experts and educators. My honey crops averaged eighteen to twenty tons per year and my winter losses averaged ten or fifteen percent. For a few years, in the late eighties, my apiary did me well. Then along came *Acarapis woodii* (acarine). Winter mortality skyrocketed; losses of thirty to fifty percent became normal. Two years after the arrival of acarine, I discovered *Varroa destructor* on my bees. On seeing that first mite, I closed the hive, sat down under an ancient sugar maple, to think about what I had just seen. I knew this was the end of an era and of beekeeping as I had known it. I felt a bit like that maple tree that held my back. She had stood on that spot for hundreds of years, watching the passing of the old ways, one by one. She and I were witnessing the passing of another.

The 1990s was a tough time to be a beekeeper. Winter losses were high and spring clusters were small. As an apple pollinator with a contract to fulfill, I found it difficult to maintain the required number of suitable colonies to pollinate the orchard. Some years, with numbers way down and very few colonies strong enough for spring splits, I resorted to buying bees. That is where the singles from South Carolina, the nuclei from Florida, and the frames of brood from New York came in. It was mandatory that I fulfill my pollination contract. I had no choice but to buy in replacement bees and pay for them with my pollination check and it went like that for several years. Buy replacement bees in the spring, spending what money I had, and hope a decent honey crop would come my way. You all know how fickle the honey crop can be, so this was not a good plan. I felt as if I was slowly losing my apiary. There really had to be a better way.

In 1999, I visited Kirk Webster, another Vermont beekeeper, just before apple bloom. We drove out to one of his apiaries where he showed me some of his over-wintering nucleus colonies. These nuclei were wintering on top of production hives and there were bee beards hanging from the entrances of the nucleus boxes. Understand I was a struggling beekeeper trying to keep my bees alive and fulfill my pollination contract. This particular spring was late and it was all I could do to put together 600 good colonies for the orchard and Webster had over-wintered nuclei that were so populous they were bearding, two weeks before apple bloom.

That really got me thinking. My management meant splitting up all the strong colonies I had to keep my numbers up, and spending the money I made on apple pollination to buy bees and queens to help restock my apiaries, and Webster had nuclei wintering in his apiaries with bee beards, two weeks before bloom. After seeing those nuclei with bearding bees hanging out their little entrances, in the middle of April, I was convinced. It was time for a management change.

I never imagined at the time how nucleus colonies would become the keystone of my apiary. It was not until years later that I realised the full potential of having nuclei wintering in my apiaries. All the bee work I do now, as the owner/manager of a large apiary, is centered on the production, wintering and use of nucleus colonies with locally reared queens.

### Maintaining honey producing apiaries

For the first few years I wintered nucleus colonies, I thought of them as stocks for replacing winter losses and as stocks for making increase. Dead colonies were cleaned up and new equipment was readied. Nucleus colonies that had successfully wintered were transferred to the empty equipment and apiaries were filled after the long winter. Nucleus colonies were perfect for both uses and often built up faster than many of the over-wintered production colonies. In fact, they absolutely exploded on the dandelion flow when hived on drawn comb.



Four over-wintered nuclei at Dandelion bloom. All photos by Michael Palmer.

In a commercial honey-producing apiary, the beekeeper must keep colony numbers up and every colony as strong as possible. While increased numbers may seem beneficial to the honey producer, quantity should never trump quality. Weak colonies do not produce. With that thought in mind, I began managing weak spring colonies differently. Formerly I had boosted slow colonies with frames of emerging brood from the best colonies. It was a good plan. The weak colony got a shot of young bees and the strong colonies got some needed swarm control. But, did that swarm control come at the cost of a reduced honey crop? With my short beekeeping season, I would have to say yes. And did boosting weak colonies with brood do anything to correct the problem? I had to ask myself why were they weak. Was it the fault of the queen? I believed most likely so and re-queened them later in the season. But why wait? Why not just do it right off when the problem was first discovered. Rather than give a weak colony valuable brood resources only to discover a failing queen later in the summer, why not just kill that old queen and give the colony an over-wintered nucleus? Doing so immediately boosts that weakling early in the season and re-queens it at the same time. It takes a

struggling colony with an inferior queen and only three or four frames of brood and turns it into strong colony with a tested queen and eight or nine frames of brood. The results can be startling.

As I said, in the beginning nucleus colonies were future production colonies to be used in my apiary. I made them up before the middle of July, using brood and bees from hives that were not strong enough to make a honey crop. The little colonies would build up, filling their four-frame cavities. When August arrived, with hot and humid 90°F weather, it was all I could do to keep them in their boxes. The only solution seemed to be to remove frames of brood and bees, replace them with comb or foundation, and start more nuclei. That worked to some extent, but nucleus colonies made up after the beginning of August do not winter well here in Vermont. So what to do? I chose to add that excess brood to struggling production colonies. This turned out to be a good use of resources. Imagine placing a deep body of brood on the floor of a colony having difficulty growing enough of a population to survive the coming winter. The results were quick and lasting. The larger cluster created by adding combs of emerging brood not only boosted the colony population in the short term, but the increased cluster size lasted through the winter and, come spring, those colonies were among the strongest in the apiary. It was as if I had dropped a bomb on each colony and I jokingly referred to them as 'Bee Bombs' in *Bee Culture* magazine. Drop the bomb and the population explodes.

While harvesting brood from strong nucleus colonies slowed swarming, it did not help much with absconding. Try as I might, too many of these summer nuclei would abscond with the arrival of our August weather. Days with 90°F temperatures and 90% humidity levels were just too much for these miniature colonies. They could not maintain a suitable temperature within their cavity and objected by, what I thought at the time was swarming. This proved to be wrong. The clusters were leaving the hive with no queen cells left behind. Oddly, the 'swarm' would fly fast away from the area, never clustering temporarily as traditional swarms do. Upon inspecting the swarmed-out colony, there would be a good brood pattern, a handful of very young bees, and a few older field bees that must have been out foraging when the bees left. It took me a couple summers to understand what was happening, and



The brood factory apiary wrapped for winter.

when I realised that the bees were actually absconding and not swarming, the solution became obvious: add another story above. This gave the bees needed expansion room, but more importantly a cavity size where they could better control the temperature of their brood nest.

## Brood factories

In the spring, after the nucleus colonies had been transferred to the production yards, I always had some too weak to be of much use. Because my season is so short, these colonies never really built up in time to be productive. Trying to use what resources they held to benefit my apiary, I combined the weakest, allowing them to grow until strong enough, and sacrificed them for making nucs. While this worked okay, it was far from perfect. Some years, for whatever reasons, they did not build up properly. This left me without enough brood and bees to make the planned increase, and forced me to sacrifice production colonies to make my nucs. Breaking up honey producers worked to provide me with the necessary resources for the work, but resulted in a decrease in the number of colonies in my apiary. As a commercial honey producer, this was unacceptable.

One night while falling asleep, the thought came to me. Why not allow good over-wintered nuclei to build up, use them as my brood/bee resource for making up the new nucleus colonies and leave the production colonies alone. In the spring, I could expand them onto additional combs, and then harvest combs of brood and bees. What a game changer. The plan worked so well I decided to see how far I could take it.



*A nice apiary of nucleus colonies in late summer.*

In the spring 2011, I set up fifty nice over-wintered, four over four, two-story nucleus colonies in double nucleus boxes. Each nucleus was given a nucleus super with four additional combs, making a total of twelve combs each. Beginning in early May, I began removing sealed brood with adhering bees to strengthen my cell building colonies. Every four days, starting with the first nucleus, I



*Brood factory ready for harvest.*

removed two or three frames of brood from each nucleus until the day's brood requirement was filled. Four days later, I repeated the process, harvesting brood from the nuclei next in line. My intention was to remove enough brood from each to fill my needs, but not enough to significantly weaken the colonies. I needed them to be strong enough to fill combs of brood quickly, but not so strong they would swarm before I returned for another harvest. From May 9 until June 19 I harvested 245 combs of brood to set up my 35 cell builders,

each receiving seven combs of sealed brood and two of honey. Then, after the last cell builders had been set up, I switched the focus of my brood harvest to making the summer's nucleus



*Supering-up summer-made nucleus colonies.*

colonies. Those fifty nuclei gave me enough additional combs of brood and bees to establish 330 more nucleus colonies. Think of it! More than 900 combs of brood and bees harvested from only fifty over-wintered nucs.

*“ I never thought I would look at individual colonies in my apiary as being disposable ... I no longer feel the need to preserve every colony, or to give every queen just one more chance to prove herself. With a supply of nucleus colonies ... unproductive colonies and poorly performing queens become completely disposable. My bees benefit, my apiaries benefit and I benefit as well. ”*

Wintering nucleus colonies changed my beekeeping career for ever. Back when I used to pollinate and keep bees using my old management, an average honey crop from 800 hives was something like twenty tons. I know that may sound like a lot of honey, but it is only a fifty pound average. When I started wintering my own nucs and raising my own queens, I had all these nucleus colonies in the springtime and I did not have to split my bees to replace my losses. I did not have to buy any more bees and queens. I did not have to pollinate apples anymore! After only a few years of the new management plan, my average honey crop rose to 40 tons instead of 20, with a big crop being 50 plus tons instead of 30. And that is the difference. My bees are healthier and more productive. I have the resource in my nucleus colonies to build up my honey producers so they have a chance to make a good crop. My bees are stronger going into winter and stronger coming out of winter, and for those that do not make it? Well, I guess Wedmore had it right. That is what nuclei are for.

I never thought I would look at individual colonies in my apiary as being disposable. They were all 'sacred cows' to be preserved, come what may. I no longer feel the need to preserve every colony, or to give every queen just one more chance to prove herself. With a supply of nucleus colonies on the other side of the apiary, or down the road in an out-apiary, I can afford to be ruthless. Unproductive colonies and poorly performing queens become completely disposable. My bees benefit, my apiaries benefit and I benefit as well. And the same process benefits the bees when working on a much smaller scale.

While beekeeping is still agriculture and every year does not reward me with a big profit, I am having so much fun playing with my bees I doubt I will ever retire. ✚

# Patterson's Page

by Roger Patterson, Wisborough Green BKA. [roger-patterson@btconnect.com](mailto:roger-patterson@btconnect.com)

Although our country is quite small, the climatic and forage conditions vary considerably, meaning that bees need to adapt to suit the conditions they live in. It is generally accepted that honey bees followed the retreating ice into Britain after the last ice age, until the closing of the channel land bridge, after which they evolved in isolation for around 8,000 years. They survived successfully under varying conditions that included changes in land use by assarting (woodland clearance) and farming. There were quite wide variations in the climate too, including the 'Medieval Warm Period' and the 'Little Ice Age', the latter lasting several hundred years, until the mid 19th century. These climatic events are subject to varied opinions among the experts; all agree there were warmer and colder periods, but there is disagreement on temperatures and dates.

Intensive farming in fairly modern times has affected managed bees, one example being the introduction of oil seed rape (OSR) to Britain as a major crop in the 1970s. Beekeepers have often had to deal with widely varying amounts of forage and their timing from one year to the next. Farmers will grow whatever gives them a profit and this may favour huge acreages of OSR one year, meaning colony build-up needs to be early, followed by little or none the next year when for optimal colony performance its build-up should be later. As well as different colony management we also need adaptable bees to deal with these rapid changes.

“ This fluctuating environment is created by man, but we are dealing with insects that have evolved to suit natural situations to which they would not normally need to respond so quickly or variably. ”

Worldwide there are around 20,000 known species of bees of which the Western honey bee, *Apis mellifera*, constitutes just one. The *Apis* ancestor of *A. mellifera* found its way to Africa from where its offspring spread in several directions before becoming isolated by distance and natural barriers such as desert, mountains, water and ice, and further evolved into more than twenty different recognised sub-species (or races).

Let us look at three common sub-

species of the Western honey bee and see how they may have evolved to suit the conditions in which they have found themselves.

Italians — *Apis mellifera ligustica* (*A.m.l*) evolved in the Mediterranean region where the climate is predictable with long, warm summers and short winters. This climate suits a very prolific bee that builds into huge colonies. As winters are short and still fairly warm, the queens probably lay throughout the year. It has been stated that Italians need 2½ times the amount of food to sustain a colony during the year than *A.m.m* does and from my own observations I would not disagree with that. Queens are short-lived, probably because of the large number of eggs they lay. It is said that Italians are unable to retain as much waste material in their bodies in winter as other races, probably because they would normally have more opportunities for cleansing flights. This may be the reason why they are particularly susceptible to nosema. They are light coloured, presumably to help reflect excessive heat from the Mediterranean sun.

Carniolans — *Apis mellifera carnica* (*A.m.c*) originated in a mountainous region in Eastern Europe where the winters are long and cold and the summers short and warm. This is very different from *A.m.l*, although I am told the two are closely related. Carniolans winter in small clusters, but build up rapidly in the spring to take advantage of the short foraging season. Even in countries where they are the bee of choice they have the reputation of being very swarmy, presumably as a counter to fairly heavy winter losses. Serious users of carniolans tell me they consume half the amount of stores during the winter compared to Italians.

Dark North European Honey Bee — *Apis mellifera mellifera* (*A.m.m*) cover a huge natural range north of the Alps, from the Atlantic seaboard to the Urals and as far north as bees will survive; as one account states, '... where the rivers are frozen for six months'. Winters throughout their home territories are typically cold or damp, summers can be unpredictable, varying from cool to warm. This produced a bee that is very adaptable, less prolific and frugal. *A.m.m* winters in tight clusters with queens going off lay for several weeks. It is

said their workers are longer-lived than those of other races, Italians in particular. Their bodies are dark, presumably to absorb warmth and insulated by the longest body hair of all the sub-species. *A.m.m* appear to be the only race capable of apiary vicinity mating, which happens when the weather is too cool for drone assemblies to form.

“ COLOSS study conducted at sixteen locations throughout Europe showed that at every location, survival of the local indigenous bee was superior to that of all others. This is confirmation of what bees have evolved and striven towards for so long. ”

Stock that is imported into an area that does not suit them often needs more care and attention than those that are better suited. They soon show their weaknesses and need 'mollycoddling'; that has unfortunately become part of modern beekeeping. Natural selection would probably quickly deal with them, but they are kept alive by what is effectively life support. There is no doubt in my mind that bees today are not as tough as the bees were when I started beekeeping, which I believe is partly because of continued imports and treating for disease without replacing queens that head diseased colonies.

Even though there may be few pure native bees left in some areas of Britain, it is possible to derive bees with most of the characteristics of natives, by culling and simple selective breeding of the mongrels that many beekeepers have. It is often said that mongrels cannot be improved, but they can and many people throughout the country are successfully doing so.

The recording of the qualities you want in your bees will help in selecting the colonies from which to choose queen cells or in selecting which queens to keep when uniting. Producing queens from locally adapted colonies is a very simple matter that is often seen as being complicated, but it can often be an extension of what is already being done.

Why do we need to import queens that have not naturally evolved to live here when with a little effort we can produce our own? 

# Bees in Need

by **Robert Clare**, Colchester, Essex BKA

It was the end of March this year, I was trimming a hedge in my garden at Copford, Essex. My neighbour, Roy 'Hunna' Sainty, who is a veteran beekeeper, appeared at the other side of the hedge; he told me about a sycamore tree that was going to be felled in a local garden. This tree had a colony of bees in it; we both agreed that we would like to try and save the bees. We decided to go and take a look to see if it would be possible to rescue the colony.

The nest was in a hole, which had been a bird's nest and it was twelve feet high up in the tree! Luckily the householder, Jill, was very keen that the bees should be rescued if possible. I arranged for her to contact me when the tree surgeon would be present, so that we could discuss with him how we could save the bees.

A few days later Jill rang, and Hunna and I went to meet her and the tree surgeon. When we arrived the felling of the tree had already begun. Andy, the tree surgeon, said it would about an hour before he would reach the place where the bees were. It was an early morning in March, the weather was quite cold, the bees were not very active and there was not much flying, so I decided to block the entrance to the nest with my car wash sponge (top image)! I hoped this would keep the bees captive.

Hunna and I returned about an hour later. We did not know how big the nest was or how deep in the tree it was. The decision was made to take out a big chunk of the trunk by cutting under the hole/entrance and hopefully miss cutting into the nest. Luckily this procedure was successful! Andy then carefully manoeuvred the piece of the trunk, containing the nest, on to the bucket of his tractor and secured it.

He then drove the quarter mile to a field belonging to Hunna, at the rear of my house. We placed the tree trunk on a suitable spot in his apiary. We had decided that this was the only practical solution at this time. We



*The 'rescue'. Photos by Robert Clare.*

stood back and let Andy remove the car sponge which had been blocking the hole... and waited to see what happened! The bees seemed fine and quite calm, they slowly wandered out of the nest to see what was happening.

I left the colony alone for a few days, to give the bees time to settle down and also to wait for the outside temperature to rise. I then decided to extract the colony and put it into a hive. I rang Andy, the tree surgeon and he came back, I gave him my bee suit and he then started to slowly remove slices of the tree trunk until he reached the nest.

We found a small colony packed into the cavity, with three combs of brood and the rest of stores. I carefully lifted the combs out and placed them in a brood box with 3/8 inch wood spacers in between to create the bee space. I filled the remaining space with frames of fresh foundation; unfortunately I did not have drawn comb available. I fed 2:1 syrup in a rapid feeder.

I left the bees alone for a few weeks to really settle in, just keeping a visual check and also monitoring for varroa. It is now several weeks since our 'rescue' and all seems well with the bees, they are out and about and returning to their 'new' home laden with pollen. The comb is now transferred to frames and foundation frames have been added. The queen is laying and all seems well.

I was concerned about the distance from the original site, just about quarter mile, (the rule of moving bees three feet or three miles was in my mind). The move does not seem to have affected the bees in this case.

## Acknowledgements

My thanks to Jill, Andy and Hunna as I now have my third hive. ✚

# International Meeting of Young Beekeepers 2014

by **Serena Watts**, Newbury BKA

After accompanying our team on a successful trip to Munster, Germany, in 2013 for the International Meeting of Young Beekeepers (IMYB), it is with great pleasure that I am to accompany/ chaperone this year's team to the IMYB in Poland.

With only a month to go before our departure we have just returned from our training day at BBKA headquarters in Stoneleigh. Margaret Murdin and Pete Sutcliffe, both BBKA trustees, organised this event and a big thank you must go to Geoff Galliver, from Fleet BKA, who attended to aid the training of our team. After some theory work we were delighted that the sun shone and we were able to open hives and gain some practical training and top tips.

Back in March we held a selection day to select our team. Applicants need to be between 12 and 16 years old and, ideally, to have achieved their Basic Beekeeping



*This year's entrants for the IMYB; from left to right are Serena Watts, chaperone; Rebecca, Dominic and Daniel. Photo taken by Geoff Galliver.*

Certificate in order to qualify for entry. Having achieved fourth place overall in the competition last year we feel the BBKA Basic Qualification suitably equips our team for the competitive part of the International Meeting of Young Beekeepers. The beekeeping competition only makes up part

of the experience where young people from 20 to 25 countries meet together with a common interest — beekeeping.

The 2014 team is made up of: Dominic, age 14, our team leader from Chalfont BKA, Daniel, age 15 from Vale and Downland BKA and Rebecca, age 12 from Sutton Coldfield BKA. Well done and thank you to these associations for having nurtured these young beekeeping stars!

Wherever we are placed in the 2014 competition these young people are heading for an amazing opportunity because they have a passion for bees. They are the future of this fascinating hobby. How fortunate we are that someone had the fantastic idea of creating this International Meeting for Young Beekeepers, now in its fifth year. It would be amazing if we, in England, could host this three-day event sometime in the future. ✚

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# A Long and Bumpy Road

by John Whitaker, Yorkshire BKA

It has been a long and bumpy road, taking ten years and 23 days. At current rates, it has cost me £665 in fees paid to BBKA. To that should be added at least £300 for books, £100 for B&B and hundreds of miles of travel costs. I can be thankful that my wife is unlikely to read this. As for the time commitment I have no idea, hundreds of hours, maybe thousands.

The journey started on 23 May 2003 when I took my Basic Assessment and then ten years later, on 17 June 2013, I took the Advanced Husbandry Assessment at Stoneleigh, and just a few days later received notification that I had passed and therefore was a Master Beekeeper. It would not be an overstatement to say that I was mightily relieved and quietly pleased with myself.

There had been no big plan. In 2000, after being a member for eight years, I agreed to be secretary of our local village-based beekeepers' association; a position I still hold after thirteen years. It did not seem like a big commitment. We only had fifteen members and met in the local village hall each month during the winter, though not in January and February as the weather was considered too inclement for our elderly members to venture out. We had no apiary and no training programme for new members. Our main claim to fame was the quality of the cakes and scones served with tea and coffee at the end of our meetings. As secretary of a local association I began to attend the Yorkshire BKA county AGMs and in 2002, somehow, I ended up being voted in as treasurer of YBKA. I am reasonably sure 90% of those that voted for me had no idea who I was; I could very well have been just released from prison.

At this time there was an increasing interest, nationwide, in beekeeping and our little village association was somewhat embarrassed to find that our membership was increasing. So, following protracted consideration, it was decided that we should broaden our activities from eating cakes. One of our members, a beekeeper of long standing, offered to run a course and I felt that maybe I could contribute, though first I should do my basic. So on 23 May 2003 I turned up at the car park of the Brown Cow in Leeds and followed the assessor to the apiary at Temple Newsom where the assessment was held. The assessor, by the way, was Dave Barrett and

he continues to do basic assessments ten years on.

Having successfully got over that hurdle, I then thought that I could try the modules. This was a bigger commitment. At that time, as far as I knew there was no-one else in Yorkshire BKA doing them, though I subsequently found that there were two others ploughing this lonely furrow. There were no tutorials and no study groups. But there were the BBKA correspondence courses and these I followed over the next four years. The tutors turned out to be well known luminaries of BBKA, including a future chairman. So I took Module 1 in March 2005, Modules 2 and 3 in March 2006, Modules 5 and 6 in March 2007 and finally modules 7 and 8 in March 2008. Modules 1 and 2 were straight-forward and it was largely a matter of organising what I had been told and learnt from my own experience over the previous ten years. Module 5 on honey bee anatomy I found both interesting and difficult, my brain apparently incapable of retaining the names of the bee mouth parts for longer than six hours. Modules 6 and 7 on the behaviour and breeding of bees opened up new ways of thinking about my bees. At that time Yorkshire BKA did not organise a venue for sitting the examination and so I sat my examinations at the Harlow Carr Gardens in Harrogate, where the Harrogate and Ripon BKA had for many years taken its members through the module system; a scheme guided by the commendable John Annett.

I was now becoming hooked on the BBKA examination system and having reached the end of the theory track I needed to switch my efforts to the practical husbandry side. A bit of book learning comes easily enough, but I was not so confident with my practical skills. In 2008 I applied to do the General Husbandry Assessment. I could not have chosen a worse time. During the winter of 2007/2008 I, along with the many beekeepers, lost quite a lot of bees and I had no honey. In addition I failed to prepare, mainly because I had no idea what was required. Needless to say I failed. This came as a hard lesson. Having strolled through life for sixty years without displaying any brilliance but never actually failing at anything of this kind that I had attempted, it was a salutary lesson. But, once I had

allowed myself time to reflect, I could not help but agree with the comments that were made on my performance.

By now YBKA were starting to place much more emphasis on beekeeper education. Wendy Maslin had taken over the duties of the education officer. The committee suggested, in 2009, that we should run a course to prepare candidates for the General Husbandry Assessment. This was ideal for me and when a subsidy for the course was considered, the committee were pleasantly surprised to find that the treasurer was more willing than usual to loosen the purse strings. As our membership increased there was an increasing demand for basic assessors and we simply did not have sufficient in the county. It was essential that we encouraged more Yorkshire members to take the General Husbandry Assessment and so make more basic assessors available.

The course was well attended and very successful. In June 2009 I took the General Husbandry again. As I had failed on the previous occasion a pair of assessors were with me this time. This time I passed. I had put in the work and practised my skills. Even in my unbiased opinion I had improved and would have been bitterly disappointed if it had been otherwise. Also it was pleasing that the seven other candidates from YBKA had passed and Yorkshire was, at last, becoming replete in beekeepers qualified as basic assessors.

There was one further step to take, the Advanced Husbandry Assessment, and at first it seemed to me to be a step too far. For a couple of years I increased my number of bees, was heavily involved in basic assessing and worked with my own area association establishing two apiaries and setting up training courses. In addition my children got married and I then needed to get used to the new status of granddad.

But having got so far I needed to give it a try, and finally applied in 2012 to do the Advanced Husbandry Assessment. The day was a nightmare. I had chosen my B&B badly. It was noisy and I hardly slept the night before. The weather was foul for the manipulation section. But more significantly I was aware that there were areas of my preparation that were totally inadequate and this whittled away at my confidence. By the

afternoon sessions I was totally exhausted, felt very old and quite frankly had ceased to think clearly. It was a depressing three-hour drive back to Yorkshire. So I had another failure and a cruel, I am sure not intentionally so, letter setting out my deficiencies, with which, and this was even more depressing, I largely concurred. The only consolation was that I was not alone in failing. Only about a quarter of candidates passed that year. One of my friends had taken and failed the Advanced Assessment a couple of years before and he is one of the best beekeepers I know. Everything he does is disciplined and immaculate.

But by winter I was determined that I would have another, and final, attempt during the following year, 2013. Several hundreds of my bees were sacrificed as I practised my acarine dissection. I trespassed on local expertise to hone my

skills and very grateful I was for the time given to me. This time I knew I was better prepared and that took the tension out of the day. And so, eventually, I passed this final test and reached the end of the road. Parallel to my progress, Yorkshire BKA was changing. In 2004 there were only three Basic Assessments taken, whereas in 2013 there were 87. In 2004 there was just one module passed and in 2013 there were fourteen. Education was becoming a priority. In the last few years YBKA has frequently run courses for candidates wanting to take the Basic, General Husbandry and Advanced Husbandry Assessments and it runs tutorials for members wanting to take the modules. In addition there have been courses for honey judging and mead making.

There are a few final points I want to make. First, I really do appreciate the time

given by all the assessors that have crossed my path during this process. Now when I do Basic Assessments I do not consider that I am giving anything, simply paying back.

I am sure that there are talented individuals who can sail through this process in isolation. I am not one of them. I needed the support, both moral and expertise, from fellow members of my local association and YBKA. I believe that beekeeping really needs a reservoir of expertise spread throughout the country. Yorkshire, by prioritising education, is now seeing more qualified beekeepers coming through, not just myself but others as well. It is a virtuous circle. The more qualified beekeepers there are in the county the easier it is to run the courses that aim to raise the standard of beekeeping in the county.

And then there is the question of whether, at a personal level, it was worth it, the cost and the time. I love my beekeeping and being a beekeeper has become an important part of my identity. Going through the examination system, I am convinced, has made me a better and more complete beekeeper and this has added to the enjoyment the craft gives me. The fact that it has been such a bumpy and difficult road adds to the satisfaction of completing the journey. If there is any element of pride, it is in having the determination to persevere. I do not fool myself that the qualification has made me anything special. There are many beekeepers in Yorkshire to whom I will continue to defer for their knowledge and experience.



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## Master Beekeeper

If you have been inspired by John's article or are just curious, you can find information about the route to Master Beekeeper on the BBKA website. Log on to [www.bbka.org.uk](http://www.bbka.org.uk) and click on Learn and then Examinations and Assessments. From there you can find contact details for your local Exam Secretary, information about each qualification, (including the syllabus) details of how to apply for an exam and the application form.

Whether you want to take an exam or not the syllabi are a useful checklist to guide your learning about beekeeping and the booklist is pretty useful too. Alternatively you can phone the BBKA office on 02476 696679 and talk to Sarah.

**Val Francis,**  
BBKA Exam Board Secretary

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# Letters from Kenya

by **Arthur Mc Laughlin**, Bristol BKA

During this month I have been working hard but also getting to do some sightseeing! I spent a challenging four days climbing Mount Kenya, which at 5199m, is Africa's second highest mountain after Kilimanjaro and I had a very enjoyable time seeing all of the good views. I went with Harrun, from the Cera Rights office, to the Mount Kenya Wildlife Conservancy and Animal Orphanage (co-founded by Hollywood star William Holden) to see the animals which are rescued, raised and released into the wild. I have also been on a wildlife safari outside Nanyuki and saw elephants, zebra, rhino and chimpanzees. I paid a reduced rate as I was classed as a 'resident' rather than a 'tourist'. Kenya is an amazing country with many fantastic places which more people should see and protect.

As well as sightseeing I have visited lots of beekeepers in the area around Laikipia. I



travelled to the Maasai area of Nadungoro. We travelled three people on one motorbike, and two of us had to get off and walk when it started raining and was too slippery. It was a very impressive place, a large flat area pock-marked with farm houses. The beekeepers told me that the natural woodland flowers all year round so it reduces the chances of the bees absconding as there will always be bee forage. I met the chief of the area and he showed us

his bee hives. They were log hives hung high in trees to keep them out of the reach of honey badgers and elephants whose footprints we could see all around the area.

I visited a beekeeping group in Chepsigot primary school, which has a special class for visually impaired children. The teachers allow the students to manage the club, even having a student chairman and visually impaired children in the beekeeping group. The club is encouraging parents to take up beekeeping and the children to continue when they leave school. We took along school equipment which was given to Bees Abroad by an English school.

More news next month,

Arthur





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# Readers' Questions Answered

**Q:** I have just examined a colony of bees and they have clearly swarmed. I cannot find a queen and there are several queen cells, one of which has hatched. I do not want to leave it to send out caste swarms so what should I do?

**A:** It is quite common to see colonies like this during the swarming season, particularly when beekeepers have not examined their colonies or colonies have been headed by clipped queens and a queen cell missed prior to going on a two-week holiday!

If you were to remove all the queen cells you could land up with a queenless colony and if you closed up and let them get on with it the colony could throw several caste swarms, which you do not want, and in any case would destroy any future crop yields in the current season. The conditions described leave you with two possible situations. Firstly, that a prime swarm has emerged from the hive and a virgin queen is present in the colony who may or may not have stung the other queen cells to kill the contained queens. Secondly, that a prime swarm has emanated from the hive, a virgin queen hatched, left with a caste swarm leaving developed queen cells behind.

The first question to be answered is: 'Is a virgin queen present in the colony?' Finding virgin queens is rather different to finding established queens in that the latter are often seen moving sedately

around the frames looking as if they own the place and have a distinctly larger abdomen, whereas virgins rush around like hyperactive children and though they have a smaller abdomen it is distinctly triangular in shape. With experience they are comparatively easy to find but when you only have a few colonies this skill can take many years to develop.

If you can see a virgin queen heading the colony you can assume it is safe to remove or kill all the queen cells. However the chances are that you will not see the virgin so what then is the best course of action? As you cannot be sure whether a virgin is present or not you should examine the remaining queen cells carefully and look for cells that have a distinctive darkish brown ring around the base of the cell. You may even see one in which the virgin queen is cutting the ring to get out. A gentle opening action with the tip of a hive tool against the edge of the brown line will lift the lid and hopefully a virgin queen will walk out of the cell. If this does not happen then the contents may dead, void or you could even be looking at a cell that has hatched and the lid put back into place by the workers. If so try another. When you have seen the virgin queen hatch you should destroy or harvest all the other cells. In this way you ensure that there can be no more than two virgin queens and if there are two then they either fight it out to select the new colony mother or only one caste swarm will emanate.✚

by **Pinguin Imperium**

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## What is: EARS?

by **Wally Thrale**, EARS Funding Coordinator

EARS stands for 'Eastern Associations' Research Studentship'. Each year the associations in the Eastern Region are invited by their RBI to a beekeeping seminar. Normally representatives of the NBU are present to give talks and presentations. About six years ago, a chance remark was made by Dr Giles Budge stating that a fairly small amount of money (£4,000 per annum) is all that is needed to apply for funding to initiate a research project, normally from the Biotechnology and Biological Sciences Research Council (BBSRC). This figure is obviously far too much for an individual association to commit to. However, various association delegates held an impromptu meeting after the seminar and thought that this figure could be achieved if several associations chipped in an amount that they could afford. The great news about this is that for each £1 beekeepers contribute, we receive £6 in funding, raising the total to around £100,000 over four years. Great value!

Within a few weeks most of the associations agreed to commit a sum of money for four years and the £4,000 figure

was comfortably reached.

As well as associations contributing, there were generous donations from the Morley Foundation and the Bee Farmers' Association (BFA). With this funding in place, an application was made to BBSRC for a varroa-related project. Dr Steve Martin at Sheffield was in charge of the research and he recruited Ricarda Kather as the student. David Bancalari from BFA coordinated the application, which was eventually successful. Four years later several research papers had been produced and we now have an understanding of how varroa manages to acquire colony odour thereby enabling it to infiltrate a colony without arousing bees' suspicions. You can read about this in May 2014 BBKA News.

Another project is due to start this autumn with Dr Alan Bowman at Aberdeen University. Again it is varroa-related and it is known as EARS 2. The project will try to identify how varroa alters deformed wing virus (DWV) to make it more virulent when varroa is the transmission agent. Before the arrival of varroa to Europe and

the UK the virus existed in colonies without overly impacting the well-being of a colony. However, in the presence of varroa the virus is somehow changed and then often greatly impacts on colony health.

Aberdeen were successful with another application, so two projects will run from October. The other project is sponsored by Scottish Beekeepers' Association who are using the EARS model. So beekeepers are now initiating research that may provide us with better control methods in the future.

A recurring theme that emerges from EARS is 'ownership'. Ricarda gave many talks to the contributing associations during her research, which were greatly appreciated. We, in these associations, felt that we were doing something to help ourselves. There is no reason why other regions or like-minded associations should not do the same. Just imagine, if four or five projects were to run concurrently, we might have a solution to the varroa problem. Now, that really would be something! ✚

# On The Bookshelf: At the Hive Entrance

by **Dr Stephen Palmer**, FRGS FLS, Master Beekeeper, Aberdeenshire

*At the Hive Entrance* by H Storch (Translated from German to English by F Celis); 1985  
European Apicultural Editions B-1040 Brussels, 1 rue de l'escadron, 0032 2734 1185  
Reprint also sold by Northern Bee Books: £12.50 post paid (see Classified directory)

I was given this small book, a mere 67 pages long, in 1985. It is one of the few books on bees and beekeeping that I have consulted every year since. Packed into this slender volume is much common sense, applied apicultural science and practice. There are few beekeeping books that can truly claim to be unique, but this book certainly deserves that accolade.

The book has two central principles: firstly it aims to teach beekeepers 'how to know what happens inside the hive by observation on the outside'; secondly that we greatly disturb the bees by constantly opening the hive: 'A healthy colony must have peace if it is to perform its productive role'. The author makes a strong case for beekeepers taking sufficient time to carefully observe the activity at the hive entrance before even considering whether to open the hive or not. He states:

*'All year round it is through this little opening that the life of the colony pulses. Here it breathes and rejects all that it will not tolerate in its domain. Here it transmits its meaningful message for the person who can understand it. Here the colony's behaviour informs the beekeeper of its problems and state of health, and lets him know whether it needs his help.'*

The book has a deceptively simple format; the chapters work through the beekeeping year, commencing with the winter period. The observations are tabulated on the left hand side of the page and the accompanying explanation is on the right hand side of the page. This book is translated from German and occasionally the English is a little stilted, but the short and direct explanations that comment on individual observations can only be described as nuggets of pure gold. There are a few black and white photographs to illustrate some of the major points that the book seeks to make

Observation at the hive entrance does not mean simply what is seen; the author also encourages the use of smell and hearing. For example, if the beekeeper observes during the winter a badly soiled entrance which gives off heat and spreads an odour resembling that of fresh bread, the colony may well have dysentery. During cleansing flights if bees are seen with the so-called 'K-Wing' there are strong grounds for presuming that acarine is present, or if the hive entrance and the area in front of the hive is spread with light yellow liquid faeces there is the probability of the bees having an acute case of Nosema disease and the colony is slowly dying out.

In the spring if a large amount of condensation is seen at the entrance and the flying bees are bringing pollen into the hive, then the bees are nursing large areas of brood and the queen is laying. As the author states: *'This can serve as a barometer for egg laying and yield of the colony'*. If two hives within the apiary show great activity but there is no fighting, robbing may be at a high level; often one colony is the robber and the other robbed.

Month by month, as the season progresses, there are many small and detailed observations made by the author, each of which is given a simple and helpful explanation. I particularly like two comments made in the July chapter: *'All the colonies fly as if in the main nectar flow, but yet the bees that return do not seem to be laden ... the lime is flowering. It excites the bees, even when it gives no honey – which is the norm'* or *'A July storm is about to burst ... tens of thousands of bees return to the big colonies so as not to be caught in the storm. However, this return lasts much longer than if the storm had burst at the same hour one month earlier. Why? The sources of nectar begin to dry up and so as not to return with their crops empty, many of the bees fly further afield ... such long*



*distance flights do not supply much nectar for a large part is consumed as fuel during the return flight'*. There are many comments such as these which are far too numerous to reproduce for this review, but they all reward careful consideration and they encourage the beekeeper to look for similar activity at the entrances of their own hives.

The author also points out that during the winter the colony writes its own history on the bottom board of its hive. He encourages the use of a bottom board cover that can be removed in the early spring; this cover board complements the observations made at the hive entrance. Beekeepers that use ventilated floors as part of their varroa control programme can use the removable white board to great effect to monitor the general activity level and health of the colony.

If you have not read this book, then make a resolution to do so. The observations discussed in this book will help the beekeeper enormously in learning to recognise, understand and interpret the different situations presented by the apiary. The beekeeper will only be worthy of the title the day a look at the hive entrance or beneath the frames tells him with certainty the internal situation of the colony. This book is a plea for patience in beekeeping; just stop, look and listen, before you lift the roof of the colony. You will learn much and harm the bees less. ✚

# News in Brief

## Predictive BEEHAVE Model Simulates Life in a Hive

Scientists have created a virtual bee hive that enables you to quickly look at changes in a hive due to environmental and human factors that would usually take many years to witness. It features:

- ❑ A new computer model to help scientists, beekeepers and regulators understand multiple environmental effects on honey bee colonies.
- ❑ Images of bees, hives and a clip of the virtual hive in action.

The BEEHAVE model was created to investigate the losses of honey bee colonies that have been reported in recent years and to identify the best course of action for improving honey bee health.

A team of scientists, led by Professor Juliet Osborne from the Environment and Sustainability Institute, University of Exeter, and previously at Rothamsted Research, developed BEEHAVE, which simulates the life of a colony including the queen's egg laying, brood care by nurse bees and foragers collecting nectar and pollen in a

realistic landscape. Professor Osborne said: "It is a real challenge to understand which factors are most important in affecting bee colony growth and survival. This is the first opportunity to simulate the effects of several factors together, such as food availability, mite infestation and disease, over realistic time-scales."

The model is able to predict colony development and honey production under different environmental conditions and beekeeping practices. To build the simulation, the scientists brought together existing honey bee research and data, then developed a new model that integrated processes occurring inside and outside the hive. The first results of the model show that colonies infested with varroa can be much more vulnerable to food shortages. Effects within the first year can be subtle and might be missed by beekeepers during routine management. However, the model shows that these effects build up over subsequent years leading to eventual failure of the colony, if not given an effective varroa treatment. BEEHAVE can also be used to

investigate potential consequences of pesticide applications. For example, the BEEHAVE model can simulate the impact of increased loss of foragers. The results show that colonies may be more resilient to this forager loss than previously thought in the short-term, but effects may accumulate over years, especially when colonies are also limited by food supply. Simulations also show that good food sources close to the hive will make a real difference to the colony and that lack of forage over extended periods leaves colonies vulnerable to other environmental factors. Addressing forage availability is critical to maintaining healthy hives and colonies over the long term.

Juliet Osborne added that BEEHAVE: "has a user-friendly interface and a fully accessible manual so it can be explored and used by a large variety of interested people". BEEHAVE is freely available at [www.beehave-model.net](http://www.beehave-model.net). The project was funded by an Industrial Partnership Award from BBSRC with co-funding from Syngenta.

BBSRC Press Office

## Monsanto 'Silence' Varroa Genes

Monsanto, the biotechnology company in America, is developing what could become the next powerful weapon in the war against the varroa mite — one that harnesses a Nobel Prize-winning discovery to kill insects and pathogens by disabling their genes. It was announced by DEFRA on 22nd December 2010 that researchers from Aberdeen University had worked out how to 'silence' natural functions in the mites' genes to make them self-destruct.

Dr Alan Bowman from the University of Aberdeen said at the time (see <http://www.abdn.ac.uk/news/3912/>): "Introducing harmless genetic material encourages the mites' own immune response to prevent their genes from expressing natural functions. This could make them self-destruct. The beauty of this approach is that it is really specific and targets the mites without harming the bees or, indeed, any other animal." Dr Giles Budge from National Bee Unit, Fera said: "This cutting-edge treatment is environmentally-friendly and poses no threat to the bees. With appropriate support from industry and a rigorous approval process, chemical-free medicines could be available in five to ten years." The then Environment Minister, Lord Henley, said: "This excellent work by UK scientists will keep our hives healthy and bees buzzing."

Monsanto are now developing the RNA information, which can be accessed at <http://www.nytimes.com/2014/01/28/business/energy-environment/genetic-weapon-against-insects-raises-hope-and-fear-in-farming.html>

by Laurie Wiseman, Suffolk BKA

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# Bee Diseases Insurance Ltd (BDI)



by **Martin Smith**, BDI President

BDI held its AGM on the Friday morning of the BBKA Spring Convention, which contributed to a high turnout of member associations. It was good to see member associations taking an interest in 'their' insurance company.

One of the challenges of a recent review of BDI's activities was to ensure it remains relevant to modern beekeeping. Two recent announcements illustrate how the organisation is moving forward.

## eReturn

One of the most significant changes has been the introduction of eReturn, enabling local associations to upload membership details and generate electronic receipts for their members. Feedback from membership secretaries and treasurers has been very favourable with many commenting on the ease of use of the system, the professionalism of the receipts they can now generate and most importantly the savings in postage, as the receipts can be emailed to members automatically.

## Local training grants of £100 available to all member associations

In order to encourage all local groups to undertake training in the keeping of healthy bees, BDI are offering each member association a fixed grant of £100 towards an event linked to this topic. The focus is hands-on practical training e.g. recognising healthy or diseased brood, training in simple dissection, or simple techniques

of how to collect a sample of bees. BDI is keen that this training is done at a local level, where most beekeepers gain experience and confidence in handling bees

BDI hopes that by offering these grants, local associations will be encouraged to undertake healthy bee days. In offering these grants BDI recognises that the best way that a healthy bee population can be sustained is by increasing beekeeper knowledge and training. In this respect we support the work of the beekeeping examination systems to improve beekeeper knowledge and the work of the regional and seasonal bee inspectors in disseminating good practice.

## PhD student funding

BDI has started in recent years to seed fund PhD students undertaking research projects in the field of bee diseases.

Full details of recent projects and how to claim a £100 grant can be found at the BDI website [www.beediseasesinsurance.co.uk](http://www.beediseasesinsurance.co.uk)

As a result of these activities, the BDI is able to offer both cost effective insurance against losses incurred through destruction of equipment to notifiable diseases, our core business and also use a proportion of the subscriptions and premiums received to work towards a sustainable and healthy honey bee population in this country. ✚

## Diary of Events

**5–7 June.** South of England Honey Show, Haywards Heath, Sussex; 9am–6pm daily. To enter your exhibits contact: P Sparkes tel: 01293 862063 or [sparkes-l@tiscali.co.uk](mailto:sparkes-l@tiscali.co.uk)

**5–7 June.** Royal Cornwall Show, Wadebridge. Schedules: Sheila Sleeman 01872 863842.

**6 June.** Beautiful British Bees, a Painting and Sketching Day with Cath Hodsman at Painswick, Gloucestershire. Details: [cathhodsman@talktalk.net](mailto:cathhodsman@talktalk.net).

**14–26 June.** Bees for Development Bee Safari to Turkey.

**1 July.** Bee Garden Party, grounds of Lambeth Palace, host: Martha Kearny. 6.00–8.30 pm. In support of Bees Abroad and Bees for Development. Wine, food and music. Tickets: [www.beeaid.org.uk](http://www.beeaid.org.uk)

**27 July–August.** Gormanston Annual Beekeeping Course. Details: Michael Gleeson [mglee@eircom.net](mailto:mglee@eircom.net)

**September 5–7.** Midlands and South West Counties Convention. Hosts: Worcestershire BKA at Pershore College of Horticulture. Practical activities, lectures, tours. Info: <http://www.mswcc.org.uk/>

**26–28 September.** BIBBA 50th Anniversary Conference plus SICAMM Biennial Conference, Llangollen, North Wales. Trisha Marlow 07812 518822; [bibba.uk@gmail.com](mailto:bibba.uk@gmail.com) or [www.bibba.com](http://www.bibba.com)

**30 October–1 November.** National Honey Show, St George's College, Weybridge.

**26 October.** Dorset BKA Convention. Stratton Village Hall, Stratton, Dorset, DT2 9WG. Keynote speaker: Prof. Robert Pickard.

**10–23 Nov.** Bees for Development Bee Safari to Vietnam.

**17–19 April 2015.** BBKA Spring Convention. Harper Adams University, Newport, Shropshire.

## Your Letters



### Bumblebee Behaviour Near a Mating Nuc

I expect there are many of you who, like me, collect swarms every year and probably some who get called out to swarms that turn out to be bumblebee nests. For the second year running I have found the bumblebee in question to be *Bombus hypnorum*, the 'Tree Bumblebee' and what has confronted me on arrival has been a swirling cloud of drone bees outside the nest entrance. I believe they are awaiting the emergence of virgin queens to mate with them and that this behaviour is characteristic of this species; so nothing strange about that you might say. However, imagine my surprise when I set up a honey bee mating nucleus in my garden, with one queen cell in it, to find a similar cloud of *B. Hypnorum* circling continuously in front of the nucleus box for nearly a week. After that the bumblebees disappeared. The honey bee queen cell hatched, but I have no idea what happened to the virgin queen. I never saw her.

As an interesting bit of bumblebee behaviour I passed this information to Clive Hill, who had asked for such in a previous edition of *BBKA News*. The thought was in my mind that if they can detect an emerging honey bee queen what are the chances they would chase her on her mating flight and attempt to mate with her? Could this account for the poor rate of successfully mated queens I have seen in my apiary for the last five or so years?

Your Letters are continued on p216

## NORTHERN BEE BOOKS

At the Hive Entrance



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# Your Letters

Continued from p214

I thought no more of this until I was half way through Professor Dave Goulson's excellent book *A Sting in the Tale* when I came across two further interesting facts, which made me think again:

- Honey bee workers can be made to cooperate with queen bumblebees to raise bumblebee eggs, and
- escaped western bumblebees have been found to mate with native bumblebee queens in Japan, although their progeny has not been viable.

Now, call me neurotic if you like, but is there something 'hormonal' going on here and could there be potential for easier 'interference' among the various bee species than we thought? Is the mating behaviour of *B. hypnorum* drones more likely to result in interference with honey bee virgin queens? Does the arrival of *B. hypnorum* in this country coincide with a noticeable drop in honey bee queen fertility (it seems to, for me). If there is a connection will it get worse, or better, as the numbers of *B. hypnorum* nests increase? I realise one incident does not prove anything, but it does make me think! Has anyone else seen similar bumblebee behaviour?

**Bill Sievwright,**  
South Chilterns BKA

## In Response

This is a fascinating observation, but I do not think anyone should panic just yet. The natural ranges of *B. hypnorum* and honey bees overlap enormously through most of Europe, so if *B. hypnorum* harass honey bee virgin queens on a regular basis then this should be well documented from the continent, but to my knowledge it is not. There should be strong selection pressure on *B. hypnorum* males not to waste their time chasing females of the wrong species and generally species that naturally co-occur have evolved measures to prevent this; usually a distinct pheromone.

This said I have no convincing explanation for what you observed. Could a *B. hypnorum* queen have snuck into the nucleus box? Could there have been a *B. hypnorum* nest very close by that you did not notice? Neither seems at all likely I admit! It will be fascinating to see if there are further similar records of *B. hypnorum* doing this sort of thing. If so, then it might be time to start worrying!

**Prof Dave Goulson,**  
University of Sussex

## Why not stop 'queen rearing', and call this bee breeding instead?

Beekeepers who have heard my talks will know how much I hate the term 'queen rearing'; it leads to all sorts of complicated thoughts. My talks are all about keeping things simple and good old-fashioned, basic beekeeping. If we start to think about 'bee breeding' then the subject is far simpler in my view. We do not just breed queens; we need to think about how they have the best opportunity to get mated. Simply, that equates to having lots of good drones available.

There are hundreds of books on queen rearing and for most beekeepers the subject is just too complex and confusing; all sorts of names for equipment, gizmos and techniques. Rearing queens is

actually extremely simple; the bees have done this for many years and they do it very well without our constant tinkering. Having a good supply of drones from the best colonies available and removing colonies from the area that are not selected for breeding is important. Creating an area for queen mating is a task that individuals or groups of neighbouring beekeepers can do together quite easily.

With the increase of comb replacement, we are actually reducing the ability for colonies to raise drones. Look at the old combs; in the lower corners there are often groups of ten to twenty drone cells that can easily work out at around fifty per frame. So, assuming a brood nest of eight frames that will be four hundred drones that will not be raised if the combs are replaced. This, together with forking out drones to check varroa levels, with each fork containing around forty drones! There is no wonder we get poor queen mating. Please do not think I am against varroa checks or comb replacement; far from it, but we need to think of replacing what we are removing. Also, all beekeepers are excellent in queen rearing, if you think about our late spring and summer inspections, we are spending 90% of our beekeeping time actually trying to stop queen rearing, by our swarm management.

The philosophy used in our beekeeping is 'never destroy a good queen or a good queen cell.' For every decent queen cell there is an opportunity to develop a new colony, not just raise a queen. We operate with up to one hundred hives at peak season and all new colonies are raised from the best 20% of these colonies, based on simple record keeping. That means raising at least fifty new colonies per year. Key to the success is to place at least one drawn drone comb at the side of the brood nest when the colony is about five to six frames of brood in the spring. These only need to be in a number of selected good quality colonies for these to be the drone colonies. Then any queen cell is set up in a nucleus and brought to the area for mating. If the neighbouring beekeepers do the same then the chance of decent mating is improved dramatically.

Why not have a local working group to build on these principles and ensure the native or local bees are developed to suit all? Keep an eye open for the bee improvement sessions that BIBBA are arranging around the country; these sessions are to take forward simple concepts and I think it is about time some practical, no nonsense ideas were promoted. So, bee breeding ... it is easy.

**Tony Jefferson,**  
Yorkshire BKA and BIBBA member

## BBKA Insurance

BBKA member insurance provides cover for your beekeeping activities. It provides you with cover of up to £10m third party public liability and £10m product insurance cover, if not made on a joint claim. The BBKA policy covers all aspects of your beekeeping activities for non-commercial gain including swarm collection (but excluding bumblebees and other species), events, talks, pure hive products and any other beekeeping activities. Officer insurance also applies to those who hold a position within an Area Association. As with most insurance policies, an excess is payable on each claim — in this case it is currently £500 but the BBKA is actively seeking ways of reducing this sum. Full policy information can be found at BBKA members area — [www.bbka.org.uk](http://www.bbka.org.uk)

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