



Beetalk September 2018

General info and news about bees

Hello and welcome.

Beetalk is a compilation of news from across the bee keeping word.

Its not affiliated to any beekeeping group so you wont get things like the next meeting and what we are doing and such like.

We hope that the articles provided will be useful to anyone interested in the a rewarding hobby and in some way we also hope that you may gain some pleasure in reading some of the article that are included.

Also we intend to include articles that may be helpful to anyone new to the hobby.

Being based in Lancashire it would be great for any contributions from Beekeepers from the county. But as stated above, please nothing about your association or group.

Hope you enjoy.

Editor

If you have any articles that you think may be useful to have included in Beetalk.

Please e-mail them to the editor

at

birt_192@hotmail.co.uk

A new parasite or pathogen in the Honeybee?

I recently performed a routine examination of bees for Acarine, Nosema and Amoeba. During the Nosema test I noticed an unusual addition in the gut: up to six in a field of view (at x40 objective and x10 W eyepiece). It was about the size of a Himalayan Balsam pollen grain (30µm in length) but somewhat variable in form. I had not seen these before, although I had looked at thousands of samples for Nosema over many years. A few days later I looked again at the same samples and found somewhat different forms, unchanged in size but with a marked exterior surface and a more noticeable internal content. They were not moving so were either dead or dormant. I contacted the beekeeper who had submitted the samples to say what I had found regarding Acarine, Nosema and Amoeba but said I did not understand some of the content of the bees' abdomens and asked for more samples from his hives. (The original batch quite clearly showed this phenomena in one hive in particular and to a lesser extent in the others.) Two bee colonies were apparently quite healthy, whereas one had slight Nosema. The new bee samples produced two live samples of the "animal", which was much like Paramecium found in pond water. I suspect it was what is loosely called, a Protozoa and that I had seen it in its various stages of development. It was in the 1990's that I found what I suspected was chlamydomon as in a sample. I reported this in the Manchester Bee News and in my annual microscopy report at the AGM but received no feedback. From a quick look through some text books, it is said that the life cycle of some protozoa are linked with the internals of beetles, lizards etc (as is Malaria via man etc). At a recent Manchester microscopy study day we discussed the organism and I was advised by one of the medical doctors that it was similar to a pathogen found in Man; at least two different sites of infestation and different effects on human well being. Should this source of material survive in the stock the beekeeper intends to try and over winter, (he sees no reason why it should not), we should have some interesting material to work on. I am looking for a biologist or someone to help me study this further and hopefully find out if it has been noticed before in honeybees and if it is a likely problem regarding bee health, or perhaps just a chance find with no cause for concern.

Corresponding with my MP

I first wrote to my MP about 40 years ago to take issue about the import of honeybees or queens leading to the dilution of our native black stock. The reply was simply that my concerns were noted. Subsequently I learned from a family friend, who happened to try to teach me at an early age and was now my local Borough councillor that enquiries had been made about this 'crack pot', the reply was that it was a serious matter and should be taken further. I wrote again a year or two later regarding the removal of pollen from commercial honeys to disguise their Country of Origin and received a standard reply from the Minister concerned at the time. I have since written again to various MPs (change of Member, boundary changes and house move) on other bee-related matters, latterly mainly regarding the imposition of EU directives. A year ago, I wrote again to two MPs; I live on a constituency boundary and advised them that my bees forage freely over both their districts. My concern was regarding the EU Court finding in favour of a Bavarian Beekeeper and admonishing Monsanto due to the GM pollen collected by the Bavarian's bees (see M&DBKA Newsletter no. 75 Dec 2011 for further comments). This, at the time, would make us each responsible for testing our honey for GM pollen contamination at a cost running into four figures per batch. I received replies from both MPs. One letter was overwritten in a large hand "Bizarre". Three months later the secretary of one of the MP's asked for an appointment for the MP to meet me. This was arranged for September. Mid September came and so did the MP promptly, smartly dressed and immediately declared he knew nothing about beekeeping and was surprised to hear that there were hives in the locality and only a few yards away. Pleasantries were exchanged and we then discussed how legislation was now stifling beekeeping. One had only to look at a legal honey label to see what has been imposed upon us; Best Before Date, Lot No., Country of Origin, Weight in grams and with no reference to pure, guaranteed, organic etc. or misleading pictures.

My other complaints were with the illegality of now recycling glass jars, use of common chemicals for prophylactic and controls of formulation of common ingredients for cosmetic and domestic medicinal purposes. (Honey remains the best treatment for wound healing and burn dressings etc). I am pleased to say that no Party politics or similar matters were discussed and that the proposed Constituency Boundary changes were unlikely to be made in the near future. The only controversial detail where we may have disagreed on was the benefit of Himalayan Balsam to beekeepers in the North West. Without it there would undoubtedly be fewer bees and beekeepers since it yields up to 50% of our bee's harvest. I think we both benefited from the meeting. MPs are not as normally portrayed in the press and media, since that side of some their life is newsworthy but I have found them to be caring people serving their constituency and public. The afternoon ended with a quick look at some beehives, the bees working Balsam in the rain and away he went with a memento of the visit, a jar of local honey.

Questions

Why do bees have five eyes?

The two large compound eyes which are the most obvious, are for producing images, but what are those three little ones used for on the top of their heads? They are the Ocelli or Simple eyes (simple here means single lens – our eyes are also 'simple'), and are valuable for rapid response in flight control. The light falling on the ocelli (from the sun), will vary as the bee swerves in flight. These minute variations in light intensity can be used to control flight. To fly straight and true, the bees keep the ocelli in a constant orientation to the sun. Bee ocelli cannot focus to produce an image or picture, (the compound eye can, although it is a rather pixellated (fuzzy) picture, instead the ocelli are honed for the rapid detection (and onward transmission) of light intensity changes.

But let us not dismiss the bee's compound eyes as inferior – compound eyes have very fast flicker response – we humans can just about resolve images arriving at about 30 per second (conveniently the Power engineers have arranged that alternating current mains electricity cycles at 50 cycles per second so we see the light from our living room bulb as continuous).

Bees (and most other insects) can resolve images arriving at their compound eyes at up to 300 images per second.

Next time you try to swat a fly, it will see a large aerial object (your hand) arriving in pretty slow motion – it will already have processed 150 or 200 images by the time your hand arrives and of course the fly will have long departed. But to return to the bee's simple eyes or ocelli. Initial pre-war research by Parry of Cambridge showed that the bee's simple eyes have high speed connections straight into the nervous system, such that a variation in light could produce a very rapid nerve response.

Thus a variation in light stimulus can produce a rapid flight control muscle response – in the words of Gerald Kastberger (one of the pre-eminent ocelli researchers) "the ocelli help the bee to react photokinetically to photic stimuli in a much shorter time than do the compound eyes alone". Kastberger flashed lights suddenly at bees in flight. The control bees braked rapidly (cautious). The bees that had their ocelli covered, wobbled a bit but blundered on at high speed. It is interesting that the current designers of unmanned aircraft also have difficulty in keeping their craft stable in a 'three dimensional world', and they have become very interested in the workings of insect ocelli. Why three ocelli? That probably gives the optimum input of light intensity change information.

Two would give a nice stereo (3D) effect for 2D ground movers such as us but three are probably better if you are a 3D flyer. They are notably near the top of the head (more exposed to the sun), although Drone ocelli are pushed down the head to allow for their much larger compound eyes. The drone has perhaps had to sacrifice flight control a little to gain better compound eye acuity, (they always locate the queen, even though they may crash into her occasionally).

Is it a good idea to put a super at the bottom of the hive during Winter?

This is recommended practice by some experienced beekeepers however, others suggest it may cause problems. These are comments received from Dennis Chow an experienced beekeeper in Sussex.

"About ten years ago upon the advice of other beekeepers in my club I tried the system of leaving the super box under the brood box, the reverse way to a normal brood and half system. In theory this is very logical because in the Spring we always found the queen laying in the top super box. By changing it over, we should have more room for the queen to lay and consequently more bees to produce the early crop. I was totally happy with the idea and changed all my four hives at the Buchan Park to the new system, but didn't change my other three colonies at the

Handcross site. However, when I visited my bees in the Spring, I was very sad to see the three colonies at Buchan Park had died, but there was plenty of food untouched in the super box (below the brood box). Because the bees

had not died of diseases, I just couldn't understand why. I felt lucky that I had not changed the hives at the

Handcross site and these bees were fine. After thinking about the problem for a while, I came up with a theory that by changing the brood and half system to the reverse way this may have caused cold temperature problems in the hive. During the cold days the bees had clustered as normal in the brood box (on top), and the super box at the

bottom got very cold which caused the stores to solidify, so the bees were unable to use these stores. Whereas in the normal way, the bees cluster in the brood box at the bottom and their heat rises to keep the super box of stores warm and fluid so that the bees are able to use these stores. Then when the bees have finished all the stores in the bottom brood box they move up to the super box in the Spring. However, I discovered that no one had lost any bees because of changing over the system in a WBC hive. Was this because a WBC hive is double walled and

consequently unlike the National hive provides better insulation to keep the stores in the super box at the bottom sufficiently warm I wonder ? For me it was a very bad experience and I decided to keep my brood and half system the normal way. Since then I have never lost a single hive in any hard Winter."

Perhaps the lessons are that it is beneficial to place a super box beneath the brood box during Winter because this provides improved insulation from the cold floor. But any stores are better placed above the brood box so that they do not cool and prevent the bees from using them. With the predictions of a very cold Winter to come this year it may be wise to consider the temperatures within our hives, and ensure that we have an appropriate set up of stores and insulation, both from the cold floor and at the roof to prevent heat loss.

Perhaps the optimum set up is; insulation above the crown board to prevent heat loss, a super with stores

Beekeeping Donkey



I thought you might like this story from Treehuger:

Manuel Juraci is one of 120 beekeepers in Itatira, Ceará who produce massive quantities of honey each year. This is an excellent trade for one of the world's poorest regions, though it's difficult to get ahead.

But Juraci has a special tool that makes him one of the most competitive of all beekeepers: a donkey. Outfitted in a custom suit designed by Juraci that keeps him safe from bee stings,

Boneco the trusted donkey transports the honey that Juraci collects down to the marketplace.

This team work ensures a greater carrying capacity than other beekeepers can have, and the Association of Honey Producers is keen to commission more donkey beekeeping suits from their designer.

And that might help, but Juraci insists that the secret behind their success can't be attributed to the suit. It's the donkey's friendship and loyalty that matters the most.



Shooting bees (with a camera!)

I've kept bees for over thirty years, and realised as we entered the age of digital photography that the camera can be an important aid, particularly in assessing the health of a colony. It was always a bit awkward, wearing a veil, holding a frame of bees in one hand, and my camera in the other. With deep brood frames it was almost impossible.

Mark Fairhurst is a local photographer, who asked me if he could use my bees to further develop his skills, as he started to acquire better camera equipment. I had a spare suit and veil, and a couple of years ago he took his first shots. The quality was good enough to inspect bees on each frame, making it far easier to identify any abnormalities than trying to do this at the hive. The proportion of workers with wing deformities can give a fairly accurate estimate of the degree of infestation by varroa mites, if present in a colony; the drone population can also be assessed. Mark contacted me early this season, eager to try out a new macro lens he'd bought for his camera. The day before, I'd collected and housed a 'wild' honey bee swarm that had left a hollow tree in the cemetery at

Chatteris. It was bothering passersby. Having been a registered swarm collector for several years, I'm always suspicious that I've captured a failing queen, so I was eager to study my new colony. They were so docile compared

to a more aggressive swarm I'd collected from close to the entrance to Soham Church a week earlier. I sometimes take ages trying to find the queen in a colony, especially if it has similar markings to her workers. We found the Chatteris queen after only a minute or

two (see
Picture.).



The health of the brood can also be assessed, and the laying ability of the queen (see picture, top left, overleaf) I'm not an expert in bee genetics, but all swarmed colonies that I've observed seem to have a mixture of yellow Italian and black North European sub-species, and others which I assume are hybrids of the two. They are reputed to have different qualities; Italian better at house-keeping, European at defending the hive, for example. I've been attempting to look for photographic evidence of these traits, which could also provide clues as to why my Chatteris bees are less aggressive than my Church swarm. Here are some preliminary findings about the defensive nature of black bees...



Three black guard bees at the entrance to my Chatteris colony, a common sight (pictured above). The benefit of them hanging upside down seems to favour returning foragers, who can fly straight in without being hindered.

Yellow workers seem to be more cautious about entering their hive, and are more likely to be seen licking the hive entrance on their return, black bees go in 'all guns blazing' – or, perhaps, 'all stings blazing'! (see above). Look at the picture below of the response to this potential intruder, that was quickly disposed of minutes later. The bee on the left with antennae raised is yellow. Two black bees emitting warning pheromone, the black one to their right was the first to attack, although the final 'stinging bundle' included both. As well as providing an opportunity to study bee behaviour, I also use Mark's photographs to check the sources of pollen at different times of the season. There are more accurate ways of doing this, using microscopy, but colour charts are available to download. The worker above is depositing horse chestnut pollen.

Finally Mark has aspects of entomology. His bumble-bee interested. One of my favourites (below) shows the extended proboscis of a Humming-bird rescue!



now built up a library of mology. His bumble-bee interested. One of my favourites (below) shows the extended proboscis of a Humming-bird rescue!



high quality JPGs, covering all collection is extensive, if favourites (below) shows the me of a North Sea helicopter



Island beekeeping on Fiji

John Lewis, President of the Fijian Beekeepers' Association,

It's fair to say that beekeeping on Fiji isn't quite like beekeeping in Cambridge. For starters, there's the distance. "My hives are about four hours' drive away", says John, "and I visit them about once every month." The reason is because even the most robust of bees can't make good enough honey where John lives, on the eastern side of Viti Levu, the largest of the more than 330 islands which make up the archipelago of Fiji. "It's just too wet!" says John, and the honey that the bees produce locally proves it, being capped at around 22% water.

This isn't enough to stop fermentation in the comb or jar, and so the majority of the island's beekeeping is done on the drier west side, around 80 miles away, and over a mountain range.

John's one of about 900 beekeepers on Fiji, and has around 40 of the 9,000 hives on Fiji, putting him "just on the small side of a commercial beekeeper". The theory's the same as with our beekeeping – it's the same species, after all – but the practice is, of course, different. "We only use Langstroths," says John, "because that's what was brought over by European colonists when they brought honeybees to Fiji in the 1800s. Another big difference is that we don't use supers or queen excluders – just brood boxes stacked one on top of the other. Most of my hives have at least three deeps on them, and that's usually just about enough." The colonists are also responsible for the vicious temperament of the Fijian bee, which is descended from the German black bee. John seems wistful when we talk about how we tend to our hives. "I can only dream of the light protection that people have here! I always, always get stung when opening a hive, and sometimes if there's a mishap, I can be stung 80 or 90 times. We've heard tell that the Fijian government research program has some more docile bees, though, so we're trying to breed those characteristics into our bees. We can but hope!" When your hives are so far away, honey extraction can be interesting. John's come up with a novel extraction room – he takes a tent with him, puts newspaper down on the floor, and extracts in the field. Once he's finished, he simply tidies up and throws the newspaper away – no mess! It seems a few other beekeepers are catching on, too. When extracting from hives without queen excluders, he simply inspects each frame and avoids any with eggs or larvae.

Island honey tends to be dark and thick. "The variation in the honey shown here is amazing – from almost white right the way down to black. We just don't get that – our honey's always dark, and it's very rare to have it crystallize, too. If you tried to sell the lighter honey in Fiji, people wouldn't buy it – they'd think you were trying to sell them sugar water!" The rewards aren't quite so great as over here, either; John sells his honey for around \$15 (£3.50) per kg, which is around £1.60 per jar. However, Fiji is close to the equator, and doesn't really have a 'summer' and a 'winter'. Instead, there are relatively uniform day lengths, and the temperature in the 'cool season' averages around 22°C. It means the Fijians can continue harvesting all year round, and starving colonies are much less of a problem. Diseases are, of course, an issue. Nosema and various viruses are as prevalent as in the UK, and wax moth is a continual problem, particularly in apiaries away from home which aren't checked so frequently.

However, there's one parasite which hasn't yet made its way to Fiji: "No Varroa!" says John, happily. "Not yet, anyway. It's reached islands a few hundred miles away from us, so it's a case of if, not when, but we're enjoying it while it lasts." Being on a tropical island can bring problems from other quarters, though. "The worst problem is cane toads", says John, ruefully. "They just sit at the entrance to the hive, picking off the bees as they come out." "A bit like blue tits here, then?" I ask. "Well, yes, but a cane toad is about 15cm long and weighs 2–3lbs, so it can get through a few more bees than a blue tit!". To try to combat this, all Fijian hives are kept at least 18 inches off the ground, so the cane toads can't sit so close to the entrance. It was excellent to get to meet and talk to a beekeeper with such a different experience – if you're on holiday anywhere, do try to find a local beekeeper and let us know of any interesting facts you may glean. I've already volunteered my services to the Committee for a return exchange to Fiji, though – expenses paid, of course...



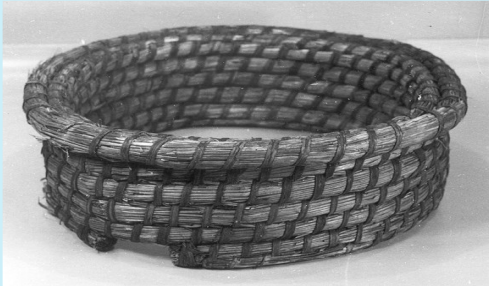
John Lewis (mid)

HOW to use an Eke!

The word is derived from the old English eacan which is related to Old Norse auka to increase or in Latin *augere*, and means to eke out a living or to increase. In beekeeping it refers to a short box, ring of straw or just a plain wooden frame used to extend a brood box, super or skep. Its use provides the flexibility to perform management techniques without the need for having a spare full-sized box which save on costs and as all beekeepers know the ever shrinking storage space!

Figure 1 shows an Eke, or sometimes called an "Imps" that was placed below a traditional skep to provide extra room as a colony increased in size. Notice the entrance notch. Similar rings or caps were placed on top to act as supers see figure

2. Both of these collection of Bee-



are held in keeping Arte-



the IBRA facts.

Today an Eke is used either above or below a box of bees.

How can I make & use one? To make a simple eke just take 4 pieces of 50 by 20 mm timber cut to length to fit the size of your hives external dimensions and fix them into a simple square. I feel that one 50 mm in height is about right for the various jobs I will outline. Today most timber is tannalized and I have never found this to be a problem but I do allow it to weather a little so any surface chemicals are dissipated. To fix them, drill pilot holes to prevent splitting and fix with a nail and screw in each corner. I use a screw because a nail will become loose and pull out with time. To prevent twisting I use the extra nail – no reason for another screw!

How can they be used?

□ For winter feeding – at this time of year candy is placed on top of hives that are short of food or just as insurance. In figure 4 you can see a simple plastic bag of baker's fondant which has a hole cut in it below so when placed over the feeder hole the bees can enter and consume the candy (fondant). The Eke provides the extra room to allow the roof to be fitted on. In extreme cases of food shortage the bag of fondant can be placed directly on top of the brood frames above the clustered bees with an eke around it to lift the crown board up. This is needed because if the weather is very cold the bees cannot break the cluster to move up through the feeder hole; some people place insulation around the candy block to help maintain warmth – this will also stop the candy becoming rock hard! You can even buy Ekes for polystyrene nucs like the Apidea ones.

- ◆ Autumn feeding – if you use a rapid or contact feeder an eke can be placed around it to provide the space to allow the roof to be replaced. A super can be used but I never have enough!

◆

Uniting a colony – you put your newspaper on the bottom colony, hold it in place with an excluder and pierce the holes but when you come to drop the second box on it wobbles! Why? The bees have built brace combs on the bottom bars! Now no problem on a nice day with gentle bees but if you are uniting evil little £%**! The last thing you want to have to do is tilt the box, smoke the bees off and cut off the offending bits. The answer is to use an eke which you can remove later once things have calmed down.

◆ Treating with thymol

Varroa treatments like

Apiguard – research has shown that at least a 25mm (1 inch) should be provided around each tray of treatment to allow firstly the bees to make contact with it and secondly to allow the evaporation and circulation of the fumes through the hive. If this is not possible the efficacy is reduced through a slower dissipation of the active ingredients. So place an eke around the treatment and replace the crown board, seal the feeder hole up, put the mesh floor slide in and reduce the entrance; do all this and you will get quick (if temperature right) and effective circulation of the fumes.

◆ Clearing supers –

- ◆ sometimes there are so many bees in a colony that adding an eke under your clearer board (Canadian, porter or ...) will allow the bees to leave and have somewhere to cluster.
- ◆ Hot weather – if you have large colonies placing an eke under the roof above the crown board or even below the brood box on top of the floor will give extra space and aid ventilation.

Demaree swarm control –

Dealing with wet comb bits –

Good apiary hygiene dictates that pieces of comb cleaned off the tops of frame and the like should not be left around to start robbing or worst still spread disease. Buckets are fine but then any sticky bits have to be washed or they will go mouldy so why not let the bees clean them and retain the honey. To do this place an eke under the roof and place the comb pieces inside before placing the WELL fitting roof back on.

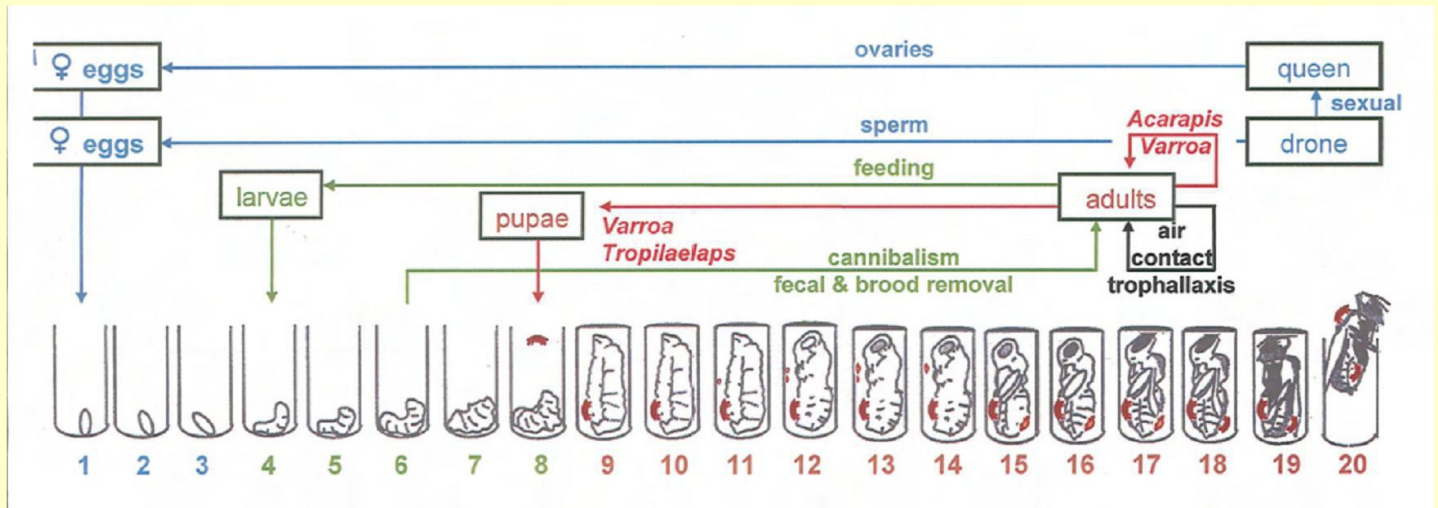
My tip is to have an eke for each hive which can be placed under the roof ready for instant use.

Caution

Ekes are great but make sure they fit well and do not leave them on for too long, especially if there is a flow on, otherwise you will find them gummed up with wild brace comb. Water balsm has caused me problems here because if there is a good flow from it the bees will fill the eke containing the apiguard tray with lovely white and clear thymol flavoured honey!



Viruses In Bees - What do they do and what can we do about it?



Bees, like all living things, have a wide range of viral diseases. Most have been known since the 1970s and were, at that time, relatively harmless. Epidemics were transient and rarely at the expense of the colonies. This peaceful co-existence has been disturbed during the past 30 years, mainly due to *Varroa*, but also due to changes in farming and beekeeping practices. Here we examine the relationship between bees and their viruses, how it can derail, and how we can reduce this risk.

All kinds of differences

Viruses can only survive through transfer to new hosts (or "hostesses", in this case). This does not necessarily have to cause disease. Illness or death of the host without transfer is, from the virus' perspective, effectively suicide. Disease only benefits a virus if it enhances the chance of transmission (such as sneezing with colds).

Figure 1 describes the various transmission routes available for bee viruses. These can be broadly divided into: • oral faecal (through food and faeces, green) • sexual (blue) • contact (black) • through a parasite vector (red).

We do not have the space to include the Table which showed, for each virus, the confirmed transmission routes, associations with other parasites, developmental stages infected or diseased, seasonal incidences.]

Faecal, oral and contact transmission is relatively inefficient: high virus concentrations are required to cause infection. Transmission via mites by contrast is very efficient and generates very high virus titres in the affected bees. Such bees then become also much more infectious through the other transmission routes. This mutual reinforcement of different transmission routes increases the likelihood of an epidemic. Since adult bees are central to most transmission routes, due to their many interactions and mobility, their health is essential to reduce the impact of such epidemic transmission loops.

How colonies collapse through virus infection

Typical of an epidemic virus infection is the progressive shrinking ('dwindling') of a colony, due to excessive larval or adult mortality that cannot be replaced fast enough. However, a shrinking colony itself does not automatically point to an infectious (viral) disease. It can occur naturally after a long break in brood rearing (i.e. winter) when the old adult population dies faster than it is replaced. Any factor affecting the health of these old bees during this time can tip a colony into collapse. Virus infections may accelerate this process (they are opportunistic pathogens, after all), but not necessarily as the primary cause. This time window depends also on the size and health of the winter cluster (produced during the previous autumn) and the early spring foraging opportunities. Since spring foraging consists mostly of shrubs, trees and weeds, it is therefore partly influenced by the homogenisation of the farming landscape and practice.

Virus disease management

So, what can be done to minimize the potential for epidemic virus transmission? The main source of infection is the bees themselves. Through the worldwide trade in bees and bee products, most bee pathogens now have a world wide distribution. However, the prevalence of disease can vary sharply between countries, due to different beekeeping or farming practices, as well as geographic and climatic differences. There are two components to (virus) disease

Management:

- minimising the risk of transmission
- reducing the virus load in colonies.

These categories overlap to some degree, since the risk of transmission increases with higher virus loads.

Reduce the risk of transmission

This focuses largely on separating infected material from non infected material. This applies mostly to the bees themselves (queens, sperm, packages, colonies, apiaries) and to lesser degree to equipment (hives, frames, hive tools, extraction equipment, etc.). The key tools here are good organization and quarantine.

Apiary management

The most practical unit for transmission risk management is the apiary, usually consisting of 5-20 colonies. Placing apiaries several kilometres apart (i.e. out of most of the practical flight range), provides a natural quarantine that should be supported by minimizing the exchange of bees and material between apiaries. Partitioning the local foraging between multiple smaller apiaries is, from a disease management perspective, preferable to fewer larger apiaries.

Know your enemies

Routine inspections and thorough knowledge of disease symptoms are essential for identifying problems early on. Colonies that develop slower than expected in spring or fail to accumulate honey in summer are suspect, as are frames with 'spotty' brood, which can arise from bees removing diseased brood. Symptoms can be confirmed by sending a sample to a diagnostic laboratory or with the field ready ID kits that are currently being developed. Diseased colonies should be quarantined and protected with entrance reducers to prevent robbing by healthy colonies.

Sexual transmission

Sexual vertical transmission, from drones to virgin queens and to her progeny, is a popular transmission route with viruses, because it allows the virus to spread over long distances and between colonies, efficiently infecting entire colonies through the queen. This risk can be limited by checking the semen or drone colonies, or the initial progeny of newly mated queens, for diseases [if you have the means].

Healthy beekeepers associations

Perhaps a slightly unexpected, but key factor to transmission risk management is a well supported local beekeeper association. After all, the health of your colonies depends partly on that of your neighbours' colonies. Active associations promote education and cooperation, benefiting the health of everyone's bees.

Reduce the disease load

This focuses on general colony health and disrupting the key within colony transmission routes.

Preventive management

Since viruses are opportunists that flourish during times of stress, the first remedy is to keep your bees happy, healthy and stress free. This boils down to the usual Good Beekeeping advice such as abundant season-long foraging, minimal disturbance, protection from the elements, a productive queen, adequate ventilation and room for growth. Like other types of preventive care, such as exercising, flossing your teeth and changing the car oil, it is the sort of 'common sense' advice we all know in theory but do not always implement equally well. However, as with most 'common sense' advice, it also gives the greatest long term health benefit, for the least cost. Take care of the bees and the bees will take care of you. Since honey bees thrive in a diverse (floral) environment, the intensification of farming landscapes and practices has put greater pressure on apiary selection or periodic relocation to ensure adequate forage and protection throughout the year. One major current research topic is therefore how this landscape can be modified to benefit both farming and bees.

Disrupting transmission

The other major tool for reducing virus loads in colonies is disrupting transmission within the colony. For this it is important to know the preferred transmission routes of the different viruses. For example, chronic bee paralysis virus is primarily transmitted through close contact. It is therefore often associated with overcrowding and aggression, for example due to over expansion, inclement weather or insufficient forage. Resolving the causes of overcrowding disrupts the transmission and slows or reverses the epidemic. Sacbrood virus is a larval disease of Spring and rapid colony expansion, when there is much brood for the adult bees to attend and infected larvae may escape detection and removal. It usually clears up by itself when the adult population catches up, but it can look disconcertingly like American foulbrood (AFB), so it is useful to have a few AFB test kits around to make sure. Black queen cell virus (BQCV) is associated with *Nosema apis*, a disease of adult bees that normally peaks in late spring. It can be a problem in commercial queen rearing operations where breeder colonies are kept broodless for extended periods. The nurse bees tend to be older in such colonies, and therefore more likely to be infected with *Nosema*, and thus also BQCV, which is transmitted to the queen larvae through the royal jelly. Control of both *Nosema* and the age of the nurse bees should avoid most problems. Bee virus Y is also closely associated with *Nosema* and Bee virus X with *Malphigamoeba* disease, all of which are spread by dysentery. Preventing the accumulation of faeces inside the hive should alleviate these diseases. Bee Virus X and Bee Virus Y share many features with the recently described Lake Sinai Virus 1 and 2 and could therefore be the same viruses. *Critical treatment timing* Deformed wing virus (including genetic variants Kakugo virus and Varroa destructor virus 1), acute bee paralysis virus (including the closely related Kashmir bee virus and Israeli acute paralysis virus) and slow bee paralysis virus are actively transmitted by *Varroa* and most likely also by *Tropilaelaps* mites. Controlling the mite population is the key to managing these virus diseases. The most damaging mite mediated virus transmission is to developing pupae when the mite is reproducing. Such pupae produce damaged, non functional and short lived bees that accelerate dwindling and winter collapse. **Autumn**

Varroa treatment should therefore be at least 6 weeks (one bee generation) before brood rearing has finished: 1 week to remove the mites on adult bees, 2 weeks to clear the mites from the brood and 3 weeks to purge, from the adult population, those bees derived from mite infested pupae with high virus titres and reduced survival.

And the frames?

Although traces of viruses can be found in hive boxes and combs, especially in stored pollen, it is unclear how contagious this material, given the inefficient oral transmission of most viruses. Frames covered in faeces or diseased brood represent a much more serious risk and should be replaced. Regular comb replacement also helps avoid the accumulation of bacterial pathogens and pesticides.

Antiviral medicines

Conventional wisdom states that there is no cure for virus diseases but that is no longer true. The developments in molecular biology have yielded an ever growing range of antiviral products, particularly in the medical and veterinary fields, where the cost of treatment can be justified. Honey bee virology has belatedly caught up and there are now clinical trials of antiviral drugs for honey bee (virus) diseases, based on RNAi technology with very encouraging initial results. How cost effective such treatments will be depends on disease severity, application rates and how the virus evolves in response to the treatment.

Probiotics

Another recent development is the discovery that the bees' natural bacterial microflora is actively involved in suppressing bacterial disease. This microflora is shared between bees as part of their social immunity. Although it is not yet known whether this microflora also specifically protects against viruses, it is clearly a generic health benefit for individual bees and colonies. Researchers in Sweden are trying to improve this probiotic health benefit and minimize the damage done to it by the antibiotic treatments used in beekeeping.

Genetics

Honey bee breeding is becoming increasingly sophisticated, using highly developed pedigree analyses and molecular mapping techniques to identify the genes influencing important traits such as hygienic behaviour, foulbrood resistance and *Varroa* reproduction. This is currently also being done for resistance to virus infection. Furthermore, genetic diversity within a colony is in, and of itself, highly beneficial to colony health. This is achieved naturally through the multiple mating by the queen. The genetic aspect of bee health management therefore consists of reconciling the different genetic benefits of selective breeding and mating diversity.

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*Below is our simple advice on honey labelling.
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- 1. The Word "HONEY" is required.*
- 2. The weight must be on the label - we will ensure it is the legal size and format.*
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- 4. You can specify the type of honey. For example, Heather, Borage. The honey must be at least 75% of that particular type.*
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- 6. If you are selling the honey through a third party, you must have a lot number.*
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- 8. New for 2003 You must have a country of origin on the jar. For example - Produce of England, Product of Scotland, Harvested in Wales. Adding the country to the end of your address is not acceptable.*

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