Beetalk December 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 this wonderful 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. And to everyone of our readers. Have a great Christmas and all the best wishes for the coming year, both in health, wealth and happiness, and may your beekeeping year be a great one.

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

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Beekeeping tips —Winter work for the beekeeper.

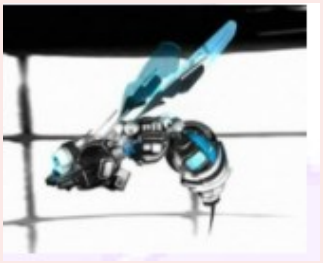
Winter gives us the opportunity to make sure all our equipment is fit for purpose. Supers and their contents may require attention. Corners of the woodwork, where the hive tool has been inserted often become compressed or worn away and wasps can enter between boxes. Additionally, when clearer boards are placed under these damaged supers they can be robbed out by bees from other hives. Small holes made by woodpeckers can usually be filled with exterior grade Polyfilla. Damaged corners need to be cut away and the woodwork replaced by good timber glued into position, with waterproof glue, and held in positionby gimp pins (Similar to those used to nail frames together). Do make sure the heads of the nails are well punched in to be level with the top of the wood so they do not obstruct insertion of the hive tool. A similar technique is required where the woodpecker has damaged the sides at the top or bottom of supers … woodpeckers find making holes between boxes is the easier way into the hive. Also where the woodwork is thinner, for example in handholds, they often make holes. Colonies usually survive such attacks by woodpeckers but the real damage is that the holes allow access to mice and rats. Once a mouse nest is built inside the hive the bees find it very difficult to co-exist and frequently it spells the demise of the colony. Super frames, especially those that have been immediately above the queen excluder, can have an excess of pollen in them and when stored for the Winter the pollen deteriorates so that it is of no use to the bees in the following season. It is best scraped out by the beekeeper, as the bees will find it nearly impossible to remove once the frame is back on the hive. Alternatively, if you over winter on a brood and a half you can make sure the frames containing pollen go back on the hive. Spare floors can be made ready for use in the Spring by scorching with a blowtorch to remove wax and to remove moth grubs that have made a hole in the woodwork. It is desirable to replace the floor on every hive early in the year even if it means replacing the mouse guard. Periodically check that hives tilt slightly forward so that water cannot collect on the floor but runs out of the entrance or through the gaps at both ends of the entrance block. Ted Hooper always maintained that it was a good idea to invert the entrance block so that the entrance was at the top of the entrance block. The idea was that dead bees could not block the entrance as they were on the floor below the entrance.

This photo, during a recent visit to Buhtan, shows a huge colony (also in close-up below) located in a precarious place for visitors entering the Dzong monastery, although the bees didn't seem to bother anyone.

The colonies hang for years before their sheer weight causes them to fall. Only then, and after the excitement has calmed down, do the monks collect-up and harvest the fallen honeycomb.

All the really old, large monastic buildings apparently have 'resident' colonies of bees.

Bionic Bees



Sometimes real science sounds more like science fiction. Just the phrase 'bionic bees' sounds like something out of an old paperback. But that is the goal of a new project from the Universities of Sheffield and Sussex. Engineers are planning on scanning the brains of bees and uploading them into flying robots, with the hope that the machines will and act like the real thing. The goal of the project is to create the first robots able to act on instinct.

Researchers hope to implant a honey bee's sense of smell and sight into the flying machines, allowing the robot to act as autonomously as an insect rather than relying on pre-programmed instructions. Possible applications for the bionic bee include search and rescue missions such as a collapsed mine, detecting chemical or gas leaks and even pollinating plants just like a real bee. Dr. James Marshall, the head of the $1.61 million study, wrote in a press release: 'The development of an artificial brain is one of the greatest challenges in Artificial Intelligence.

So far, researchers have typically studied brains such as those of rats, monkeys, and humans, but actually 'simpler' organism such as social insects have surprisingly advanced cognitive abilities.' Researchers anticipate that developing a model for scanning and uploading an animal's brain will offer insight into how a brain's cognitive systems work, potentially offering advances in understanding animal and human cognition. 'Not only will this pave the way for many future advances in autonomous flying robots', wrote Dr. Thomas Nowotny, the leader of the Sussex team, 'but we also believe the computer modelling techniques we will be using will be widely useful to other brain modelling and computational neuroscience projects.' The project, which researchers call 'Green Brain' is funded by the UK's Engineering and Physical Sciences Research Council with technical help from IBM and hardware donated by NVIDIA Corporation.

Did you know ?

Bee Facts

Bees see all colours except the colour red. That and their sense of smell help them find the flowers they need to collect pollen. Not only is pollen a food source for bees, but some of the pollen is dropped in flight, resulting in cross pollination. The relationship between the plant and the insect is called symbiosis.

Winter Considerations

The following articles discuss two important considerations during the Winter weather

(1) Why you should avoid opening a hive in Winter ,

In Winter if a colony has no brood, and is not opened, it will consume less than 300 g of honey per week. However if it is opened, this jumps to around 700 g. When there is brood, and the workers need to keep the brood at 33°C then around 1 Kg will be consumedeach week. If you then open the hive to check on that brood, consumption rises to 1.5 Kg. If there was 40 lb (18 Kg) of honey to start, they should survive the Winter. In practice the colony is probably totally reliant on stores from the start of November, and the queen will start laying in mid February; but it is mid April before there is any nectar coming in. So 15 weeks at 300 g + 8 weeks at 1 Kg = 12.5 Kg. Based on this calculation the 18 Kg should happily allow for a couple of peeks in demand for stores. Well maybe not, because unless the temperature stays below 10°C for all 23 weeks, the bees will disturb themselves on warm days, breaking the cluster, losing heat and need more stores to keep the core temperature of their cluster above 20°C. So avoid opening hives if at all possible, and only open them when it is essential, such as the application of oxalic acid, choose a warmer day and close the hive as soon as you can. Check the hive for stores by 'hefting' and feed as necessary with solid food placed right on top of the frames where the bees are located, until there is a steady reliable flow of pollen and nectar going into the hive.

(2) The Importance of Hive Ventilation.

Optimum Winter conditions for bees are we know a constant cold temperature and dry conditions. Bees die from damp not from cold. This problem has been recognised for years. Back in 1932 Wedmore writing in A Manual of Beekeeping said: "If some British beekeepers suffering from Winter losses could be persuaded to try and kill their bees one Winter by excessive ventilation they would be surprised at the number of colonies they would save thereby". It is quite easy to calculate that for every kg of honey consumed by bees they release 680 g of water and 1,173 g of carbon dioxide due to respiration. Most of the energy released is used in Winter to maintain core temperatures in the hive. It is also well known that warm air holds more moisture than cold, and as it cools the moisture condenses back to water. Warm air is less dense than cold air and carbon dioxide is much denser than air. All of which means air saturated with water vapour and with a high carbon dioxide level needs to be removed from the hive. So how do we achieve good ventilation? There are two main ways to do it.

Top ventilation

This can be achieved by leaving one of the feed holes open, or by propping open the crown board with matchsticks or similar. The bees will form a protective mantle round the brood, which traps air rather like feathers on a bird and retains heat in the cluster. The bees may consume more food to make up any heat lost through the top of the brood box.

Floor ventilation

The use of open mesh floors for varroa represents an opportunity to change the way hives are ventilated. This is not new and mesh floor ventilation was described by Wedmore. An open mesh floor replaces a small entrance for fresh air with a very large one. It is then possible to manage without top ventilation. Insulation over the crown board ensures the wood stays warm and water vapour doesn't condense there and drip on the bees. There is no scientific data as to which system is better in terms of survival and even energy usage, but the open mesh floor with insulation may lose less heat because a bubble of warm air will form at the top of the hive.

Recipe (16) Lamb Cutlets with Honey

1 dessertspoon ***Honey***
4 Lamb Cutlets
4 fluid ounces Stock
1 dessertspoon Flour
A little Cooking Oil
Juice of half a Lemon

Brush the cutlets with the oil and place under a hot grill to brown on both sides.

Reduce the heat and grill until the outlets are cooked. Set aside and keep warm.

Using a dessertspoon of fat from the grill pan, stir in the flour and cook over a low heat until brown.

Then blend in the lemon juice honey and stock. Cook over brisk heat for about 3 minutes stirring all the time.

Pour the sauce over the outlets and serve.

Recipe (6) Toddy with a Kick!

2 tablespoons ***Honey***
1 fluid ounce Whisky (or to taste!)
2 to 3 tablespoons of Lemon Juice
1 tablespoon Ginger Wine
Boiling Water
(Serves one)

Put the honey, lemon juice and ginger wine into a heatproof glass and three-quarter fill with boiling water.

Stir to dissolve the honey, add the whisky and drink whilst hot.

Having warmed yourself - make some more toddies and share with friends.

Recipe (17) Honey Mulled Wine

3 tablespoons ***Honey***
1 litre of Red Wine
1 Orange
1 Red Skinned Apple, cored, quartered then sliced
2 tablespoons Brandy
10 Cloves
0.5 teaspoon Cinnamon

Stud the orange with cloves and cut into slices. Put into a large, heavy based pan and add all the ingredients except the apple and brandy.

Heat gently until hot but not boiling.

Stir in the apple and brandy.

Serve in heatproof glasses whilst hot.

‘MIND THE GAP’

A gap of less than 4 mm... is too small for any but deformed worker bees to pass through. Any spaces, cracks or crevices of this or smaller dimension will be filled with propolis or sometimes a mixture of wax & propolis and on yet other occasions pollen may be mixed in with the filling (I suspect that this is for reasons of porosity or possibly the transmission of light, but I am not certain).

A gap of 4.3 mm is a standard European spacing for wires in a Queen Excluder.

A gap of 5 mm if used between the wires of a square mesh will make an excellent pollen stripper as the workers can get through but a significant portion of pollen will be stripped from their legs.

A gap of 5.2 - 5.4 mm is a spacing that can be used to exclude or differentiate Drones as Workers and Queens will pass but Drones cannot.

A gap of 6 mm Is the smallest gap that bees will leave between adjacent comb surfaces (outside of the usual clustering area) the bees can defend this more easily and they can work individually within this dimension. The smaller gap around the periphery of the nest, also renders the nest less susceptible to draughts, and may help in maintaining humidity.

A gap of 7 mm not used by the bees themselves but some people regard it as a valid bee space to use in some parts of beekeeping equipment. If this spacing occurs between the side faces of frame topbars they are the least likely to suffer from accretions of wax. Frames spaced at 35 mm pitch (normal Hoffmann spacing) that have topbars 28 mm in width give rise to this 7 mm gap.

A gap of 8 mm is a popular bee space among those that design their own equipment as it falls midway between the 1/4" and 3/8" figures so often quoted in old books. I used to be keen on this dimension myself but I have come to regard it as 'neither one thing or the other' and now I favour 9 mm or in some circumstances 6 mm.

A gap of 9 mm is the usual space the bees will leave between adjacent areas of capped brood this allows two layers of bees to work back to back, usually in an oval pattern in the centre of a frame.

A gap of more than 9 mm and we are into brace comb territory!

A gap of 10 mm is practical from a design point of view. With the B.S. Brood frame at 215 mm (some are 216) mm and the Shallow Frame at 140 mm The boxes are then 225 mm and 150 mm respectively this gives 1 mm above the frames and 9 mm below (or the reverse if you are like me, top bee space oriented). This may seem large but it only is this way with fresh equipment. The grain in the frame side bars is vertical and practically no shrinkage will occur in this direction. The box sides however are grain oriented horizontal and the shrinkage will occur in the vertical height of the box. So in use the space is often much less than the initial 10 mm.

In all things there are exceptions, when it comes to the gap between the frame bottom bars in the bottom box and the floor surface underneath it, this is usually 28 mm or 31 mm in UK hives, but it does not suffer brace or burr comb unduly, as the bees consider it a similar situation to a wild nest in a cave.

With thanks to the Dave Cushman web site.

The editor gathering honey from Thailand's wild bees

Extensive histone post-translational modification in honey bees

Researchers Mark J. Dickman, Robert Kucharski, Ryszard Maleszka, & Paul J. Hurd say they have unlocked the genetic secrets of honey bees' high sensitivity to environmental change.

Scientists from the UK and Australia think their findings could help show links between nutrition, environment and the insects' development. It could, they suggest, offer an insight into problems like Colony Collapse Disorder, a mysterious cause of mass bee deaths globally. The findings appear in Insect Biochemistry and Molecular Biology.

The change is suggested to be the result of a "histone code" - a process that sees genetic changes made to proteins called histones within cells' nuclei. Rather than "genetic" changes that are locked into DNA, these are known as "epigenetic" changes. The report marks the first time such effects had been recorded in honey bees.

"The development of different bees from the same DNA in the larvae is one of the clearest examples of epigenetics in action - mechanisms that go beyond the basic DNA sequence," said co-author Mark Dickman from the University of Sheffield. "From our knowledge of how the histone code works with in other organisms, we think the marks on the histone proteins might act as one of the switches that control how the larvae develop."

“Histone post-translational modifications (PTMs) play a key role in regulating a variety of cellular processes including the establishment, maintenance and reversal of transcriptional programmes in eukaryotes. However, little is known about such modifications in the economically and ecologically important insect pollinator, the honey bee (Apis mellifera). Using mass spectrometry approaches, we show that histone H3.1, H3.3 and H4 of the honey bee are extensively modified by lysine acetylation and lysine methylation. We analysed histones isolated from queen ovaries and 96-h-old larvae, in toto we quantified 23 specific modification states on 23 distinct peptides. In addition, we have identified and characterised patterns of histone PTMs that reside on the same peptide, generating detailed combinatorial information. Overall, we observed similar profiles of histone PTMs in both samples, with combinatorial patterns of lysine methylations on H3K27 and H3K36 more frequently identified in histones extracted from queen ovaries than from larvae. To our knowledge, this comprehensive dataset represents the first identification and quantitation of histone PTMs in this eusocial insect and emerging epigenetic model”.

http://www.sciencedirect.com/science/article/pii/S096517481200166X

I AM allergic to bee stings By Andy Sivell

Andy Sivell is a journalist, copy writer and magazine publisher. He got his first colony and took up beekeeping in 2010. He maintains a blog, Diary of a Nervous Beekeeper, which can be found at www.beekeepingadvice.co.uk

I

n July 2010 I took up beekeeping. Exactly two years later I was stung for the first time. A week later I was stung for only the second time, and a week after that the third. Then things got a little weird. Not until a whole eight hours had passed following the third sting did I experience a reaction. Of course, the first two stings hadn't gone unnoticed: both hurt and there was some localised swelling. But the third sting was different. A half day after being stung in the foot, and not inconvenienced to the extent even of having to give up mowing the lawn or push around a wheelbarrow (dammit), my head suddenly registered that something was wrong. I had difficulty breathing. I wheezed my way through a sleepless night and by morning discovered that my right pedal extremity had been replaced by a hairy pink inflat□able. I'd had what appeared to be an allergic reaction.

Perhaps more alarmingly, barely 24 hours later I'd also received a clear instruction from my doctor to give up beekeeping. My subsequent plea for advice on whether or not I should continue generated a record number of comments from fellow beekeepers. All were positive. The overwhelming majority advised me not to give up.

Many included accounts of readers' own, similar reactions to bee stings. Some included detailed information about medication, and a few suggested novel remedies, such as placing a copper coin on the sting, or heating the affected area with a hair dryer. For a while I did nothing. Nor did I go anywhere near the bees.

Then I did what most people in receipt of an unwelcome medical opinion do: I went and got a second medical opinion. It echoed much of the advice I'd already received via this blog: carry on but be sensible, upgrade my bee suit, always have someone check overalls for stray bees before disrobing, and have medication on stand-by. The one area in which my two doctors were in complete agreement, however, was that I should attend an allergy clinic for further tests.

Now, as it happens, one of the leading allergy clinics in the country is just up the road from me in Cambridge. So early last month I presented myself at the reception desk of the catchily titled 'Clinic 2a' at Addenbrooke's Hospital.

I was welcomed by a succession of nurses, all of whom had apparently been schooled by call centre staff. Each one introduced themselves by their first name, which I immediately forgot, and regularly punctuated their sentences with mine, presumably lest I forget that too. None could resist cheerily informing me that every customer that morning had been a beekeeper.

Eventually I was introduced to a slightly more senior-looking nurse, whose name I again forgot, but whose step-by-step description of what I was about to experience left an indelible impression.

Taking my right forearm she wrote the numbers one to ten down it in biro, before pricking the skin surface next to each number with increasing dosages of, first bee, then wasp venom.

I was then invited to wait in the office next door for 20 minutes, to see whether there was any reaction. 'Seeing whether there was any reaction' involved one of the first nurses coming back and measuring the inflammation around each pin prick with what looked like one of those plastic widgets hardware stores sell to gauge the size of wood screws.

I could tell that she was disappointed.

Clearly I wasn't inflaming well. She disappeared and came back with more bee venom, before adding an elev□enth dot. Twenty minutes later I was ready to gnaw my arm off. The sensation took fully 24 hours to subside. Clearly we'd established that I'm not very quick on the uptake.

More to the point, we'd apparently also put beyond doubt that I was allergic to bee venom. The nurses were all delighted. As a reward, I was going to finally meet a doctor.

The specialist who saw me was a dead ringer for a former girlfriend, which was a little unsettling as she looked like the girl I dated 20 years ago, whereas I now look like a balding guy in his late forties. It didn't help that when it came to taking the inevitable blood sample my needle phobia meant that she insisted on holding my hand. That just felt plain wrong.

The existence of my allergy seemed to interest her far less than the time it took my head to register an assault upon my extremities. I had, since being referred, incurred a fourth bee sting on my big toe.

That time I had removed the stinger using a credit card and taken the prescribed Fexofenadine Hydrochloride (antihistamine) and Prednisolone (steroid), all within five minutes.

The subsequent absence of any reaction at all had been as much of a surprise as a relief.

Twenty four hours later I couldn't even locate the puncture wound.

When I relayed this to my doctor she seemed almost put out, and promptly instructed me to delay taking any form of medication next time, "just to see" whether in my case delayed reactions were the norm. (They are. A fifth sting saw my hand inflate like a pink washing-up glove after 12 hours).

Notwithstanding the unlikelihood of my keeling over on the spot when next assaulted by Apis iratus, I was judged a suitable candidate for 'desensitisation' therapy. Next summer I'm to report to Addenbrooke's Clinic 2a every week for an 11-week course of treatment. Still, with all those other beekeepers around I shall be in good company

Beekeeping Tips: Inspection of colonies

As taught by Clive de Bruyn and Ted Hooper, when we had professionals teaching us at Writtle College, there are five things to be considered each time we open a hive for inspection of the colony.

These are:

1. Has the colony sufficient room?
2. Are there eggs and is the queen present and laying a good brood pattern?
3. Are there sufficient stores?
4. Is the colony building up normally in the Spring; and are there any queen cells? Is there any disease and mite damage present?

No.1: Using the National hive as a model (Scale up for larger sizes). During the months from October to March colonies should have the full use of a deep brood chamber and a super (known as one and a half), without a queen excluder. In October each colony should have had somewhere around 20 kg of stores comprising sugar and honey. At the first inspection, in early March, you may find the queen has been laying eggs in the shallow, as the brood nest tends to expand upwards, because of the warmth, rather then sideways. In the brood chamber you will find outside deep frames full of pollen and sealed stores (some granulated). To make room for the queen to lay eggs, in these unlaid deep frames with honey and pollen, scratch the honey cappings with your hive tool as that encourages them to move this honey into the shallow frames, or to use it. Insert the queen excluder between the boxes; making sure the queen is in the deep box. (For further help see Bee Tips no. 13). Replacing with drawn empty frames can reduce the number of frames, full of pollen. Some of these can be used in other colonies that are short of pollen.

No.2: A good brood pattern is one where the inner part is hatching or hatched or even re-laid and the remainder is solid sealed brood. There should be few empty cells amongst the sealed area and if there is this may be due to a failing queen not laying a viable egg. Around the outside of the sealed area will be found many cells containing a single egg in each. The sealed area should be flat ... raised cappings would indicate unfertilised eggs and drones within, indicating the failure of the queen to fertilise each egg. That is to say, a failing queen.

No.3 A Standard deep (DN4) full of sealed stores on both sides will weigh roughly 2 kg. From this the weight of other areas of stores may be estimated, and the total stores assessed. It is a good idea to lift one side of the hive so that in future you know what weight corresponds to these known stores. Stores should be adequate to last until the next inspection and this depends on the weather, the size of the colony and the type of honeybee. Experience is the main guide and 3 kg of stores for a ten days inspection routine is a useful starting point.

No.4 Any colony building up slower than others in the apiary is suspect. Look for disease and call the bee inspector, or your mentor, if there's anything suspicious. If it is a small colony (less than five seams between frames) then a hatching brood frame may be moved from a stronger colony, after shaking the bees off, to boost it.

No. 5 Disease can be a problem and slowness to build colony size may be attributable to nosema. Symptoms are defecation on the comb if very bad. Firstly, defecation may show on the front outside wall of the brood chamber where yellow streaks are the giveaway signs.

'Green Brain' project to create an autonomous flying robot with a honey bee brain Press release from Sheffield University

Scientists at the Universities of Sheffield and Sussex are embarking on an ambitious project to produce the first accurate computer models of a honey bee brain in a bid to advance our understanding of Artificial Intelligence (AI), and how animals think. Theteam will build models of the systems in the brain that govern a honey bee's vision and sense of smell. Using this information, the researchers aim to create the first flying robot able to sense and act as autonomously as a bee, rather than just carry out a pre-programmed set of instructions. If successful, this project will meet one of the major challenges of modern science: building a robot brain that can perform complex tasks as well as the brain of an animal. Tasks the robot will be expected to perform, for example, will include finding the source of particular odours or gases in the same way that a bee can identify particular flowers. It is anticipated that the artificial brain could eventually be used in applications such as search and rescue missions, or even mechanical pollination of crops. Dr James Marshall, leading the £1 million Engineering and Physical Sciences Research Council (EPSRC) funded project in Sheffield, said: "The development of an artificial brain is one of the greatest challenges in Artificial Intelligence. So far, researchers have typically studied brains such as those of rats, monkeys, and humans, but actually 'simpler' organisms such as social insects have surprisingly advanced cognitive abilities." Called 'Green Brain,' and partially supported with hardware donated by NVIDIA Corporation, the project invites comparison with the IBM-sponsored Blue Brain initiative, which is developing brain modelling technologies using supercomputers with the ultimate goal of producing an accurate model of a human brain. The hardware provided by NVIDIA is based on high-performance processors called 'GPU accelerators' that generate the 3D graphics on home PCs and games consoles and power some of the world's highest-performance super computers. These accelerators provide a very efficient way of performing the massive calculations needed to simulate a brain using a standard desktop PC – rather than on a large, expensive supercomputing cluster. "Using NVIDIA's massively parallel GPU accelerators for brain models is an important goal of the project as they allow us to build faster models than ever before," explained Dr Thomas Nowotny, the leader of the Sussex team. "We expect that in many areas of science this technology will eventually replace the classic supercomputers we use today." Green Brain's researchers anticipate that developing a model of a honey bee brain will offer a more accessible method of driving forward our knowledge of how a brain's cognitive systems work, leading to advances in understanding animal and human cognition. "Because the honey bee brain is smaller and more accessible than any vertebrate brain, we hope to eventually be able to produce an accurate and complete model that we can test within a flying robot," said Dr Marshall. "Not only will this pave the way for many future advances in autonomous flying robots, but we also believe the computer modelling techniques we will be using will be widely useful to other brain modelling and computational neuroscience projects," added Dr Nowotny. Alongside this, the research is expected to provide a greater understanding of the honey bee itself. Because of their role as pollinators, honey bees are vital to many ecosystems, yet their declining population in recent years has given scientists cause for concern. Green Brain's modelling could help scientists to understand why honey bee numbers are dwindling and also contribute to the development of artificial pollinators, such as those being researched by the National Science Foundation-funded Robobees project, led by Harvard University. The article can be found at http://www.shef.ac.uk/news/nr/green-brain-honey-bee-model-sheffield-university1.212235

BEEKEEPING TEMPERATURES.

I have divided this article into four sections - Important honey related temperatures, Hive temperatures/bee temperatures, Ambient/nectar flow temperatures and Wax melting temperatures.

Important honey related temperatures.

When producing honey, it is likely that at some point in order to process it, you will have to warm it. I discovered this in my second beekeeping year (1993), when my honey granulated in the comb and later when I started to show honey. The majority of British honeys will sooner or later granulate (crystallise). Unfortunately some honeys granulate faster than others, (high glucose to fructose ratio) some granulate with a course texture and can separate leaving the honey unattractive. Granulation occurs due to the fact that honey is a supersaturated solution of more sugars than can normally remain in solution. Such solutions are more or less unstable and, in time, will return to the stable saturated condition. In order to break down the sugar crystals, it is necessary to warm the honey but at first I found it difficult to determine what temperatures to warm my honey to and, there were few devices available to heat and control the temperature accurately. There are now many warming devices around, from home made warming cabinets (sometimes old fridges or freezers with light bulbs in) to efficient and expensive Apimelters. Note that many warming equipment manufactures now offer recommended warming temperatures.

One other thing I found when studying honey warming temperatures was, sometimes the suggested settings were in Fahrenheit and some in Centigrade. I find that people tend to prefer one or the other so I have tried to give both here. It is important to note that water heats approximately 6 to 8 times faster than air and it is necessary to make sure that any containers immersed in water are watertight and that the container (usually plastic) will withstand the set temperatures.

Fermentation of honey and temperature.

Sugar tolerant yeasts reacting with glucose and/or fructose produce alcohol and CO^2, which along with water cause fermentation. Wild yeasts are brought in by the bees in nectar from flowers and the soil. In order for honey to ferment, the water content of the honey needs to rise a few % from the ripe honey amount of 17 or 18% to 19 or 20% (21% maximum allowed for sale, except for Heather which is 23%). This rise takes place quicker in granulated honey as the fluid (water) surrounding the crystal dilutes the honey. Therefore honeys that ferment tend to have a high glucose to fructose ratio (i.e. Granulate fast – e.g. rape seed honey) and have or need to develop a high water content. The yeasts are only active between 50°f/10°c and 85°f/29°c. So we can see that storing honey below or above these temperatures reduces fermentation. It is therefore best to store your honey at low temperature, as storing honey at high temperatures for long periods increases the HMF (Hydroxymethylfurfuraldehyde) level. HMF is a substance produced by the degradation of sugars in the presence of acids, this occurs with ageing of honey and is accelerated by heating (legal maximum 40 mg/kg). Heat and age also affect the diastase in honey, by lowering this protein enzyme that breaks down starch.

Granulation and temperature.

I have explained above why honey granulates, but granulation occurs faster or slower dependant upon temperature. The optimum temperature for granulation is 57°f/14°c. Crystal growth is greatly reduced, as with fermentation, by storing your honey above or below this temperature and most honeys will not granulate if stored above 65f/18c or below 50f/10c. Again as with fermentation, it is best to store your honey at the low temperature to avoid damage to your honey.

Important honey heating temperatures.

-1°c/30°f - No crystal growth after two years with seed added.

10°c/50°f - Crystallisation greatly reduced.

11°c/52°f - No yeast growth. Best to store at this temperature or below.

14°c/57°f - Granulation most rapid

24°c/75°f - Prepare base/seed honey for creaming.

27°c/80°f - Prepare combs of blossom honey for extraction. Honey unlikely to ferment above this temperature.

32°c/90°f- Prepare combs of Heather honey for extraction

35°c to 43°c/95°f to 110°f - Normal honey processing temperature for filtering and bottling. Do not leave at this temperature for longer than necessary. Temperature depends on type/viscosity of honey and grade/fineness of filter/s.

41°c/107°f - Wax combs with honey in will collapse at around this temperature.

49°c/120°f - Re-liquefy solid rape. This is the maximum temperature that beekeepers, without suitable cooling equipment should heat honey. Cool your honey down from this temperature as fast as possible.

Please note the temperature below should only be used if you have the correct heating and cooling facilities. i.e heat exchanger for rapid heating (flash heating) and cooling. Mainly used by large honey processers.

71°c/160°f for 4 to 5 minutes maximum then filter and cool rapidly to **24°c/75°f** or below (Suggested by the American Mr E.J Dyce of creamed/soft set honey fame). Yeasts are killed and honey will not ferment. Granulation will be prevented for approximately 12 months. Honey starts to darken at this temperature and taste/flavour and chemistry affected. (Pasteurisation) **75°c/167°f** – full damage to honey flavour, colour and chemistry.

To sum up -

Beekeepers that look after their honey by quick extraction of well sealed combs will not be affected by excessive levels of water, HMF or diastase destruction. Remember to heat your honey for as little time as possible and at as lower temperature as possible to achieve the desired result. Use a quality

RESPONDING TO INFORMATION RECEIVED

We now look at life inside the hive and to a consideration of some of the ways in which the colony uses cues from the hive toadjust its activity. Of course pheromones, dances and vibrations are also involved with these systems. We will look at a three examples.

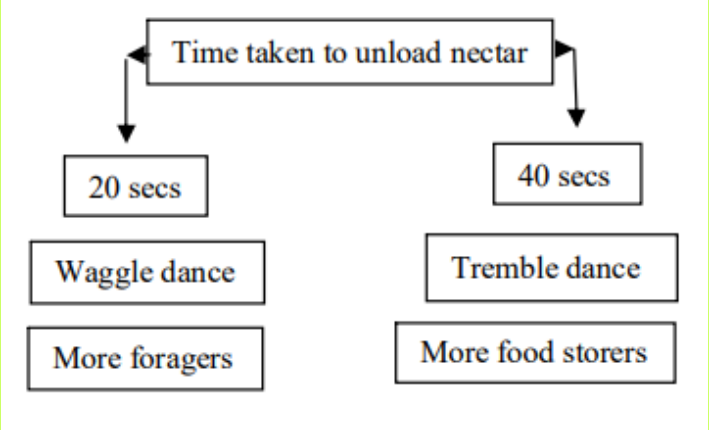
Rearing drones

During the summer colonies have drones present. They start rearing the first drones early in the year and, from then onwards, drones and drone comb are generally present until late summer. Although the numbers of drones reared depends to a large extent on colony size and resource availability, where large numbers of drones are lost from the colony, more will be reared. This can happen, for example, when sacrificial drone brood is used for Varroa control, but is also a natural process. It is not clear whether the control is ultimately pheromonal, but it probably is. Information on drone pheromones is meagre to say the least.

Food processing

Foragers bringing nectar into the hive do not unload it into cells, but give it to other house bees, called receiver bees. The speed at which unloading occurs influences the subsequent behaviour of the foragers: if their nectar load is accepted readily (20 seconds or less) by a few receiver bees, they will often go and dance to indicate to other foragers where the forage is. They may recruit other bees, which are resting, to observe waggle dances by vibrating them in a dorsoventral abdominal vibrating dance (DVAV dance). If, however, they are kept waiting to unload, (40 seconds or more) and have a long search for receivers, they will conclude that there is too much food coming into the hive for the food processors to handle and will not dance to recruit other workers to forage. They may instead move into the hive to attempt to recruit more receiver bees.

This they do by performing a tremble dance. The bee runs about the comb on the hind two pairs of legs, holding its front pair of legs up, at the same time causing its whole body to twitch and tremble. This results in the recruitment of more bees to honey storing and processing duties. As a secondary effect, if the trembling bee encounters a bee performing the wagtail dance it head butts it, and briefly pipes, and this seems to be a stop signal. The dancing bee stops doing the waggle dance, does not therefore recruit more foragers and usually flies out of the hive. In this way the balance between returning foragers and receiver bees is restored. We can show this in a simple diagram:



Food processing is of overwhelming importance to a colony if it is to survive the winter and this very sophisticated system ensures that the whole process works as efficiently as possible.

Comb building

As we all know, bees will only draw new comb when they need it. That is why, when we provide our bees with new foundation, following a Bailey comb change or shook swarm, we need to feed them with weak syrup (1lb of sugar to 1 pint of water) unless they are on a very strong nectar flow. In the natural state a swarm begins to build comb very rapidly. This is essential as the queen has to have somewhere to lay so that the embryo colony can develop.

The bees in the swarm will have brought food with them, which they can convert into wax, and many of the bees will be the right age for wax production. Once the initial comb building has taken place, wax production slows, and thereafter comb will only be built as it is needed: to accommodate the eggs that the queen is laying and the nectar stores that the foragers are bringing in. If they have existing space they will not produce more.

How do they know? Do the patrolling bees, which walk around the hive apparently aimlessly, have a function here? If so, how do they communicate the needs to the wax-building bees? Is it another effect of slow receiver bees? After all if they take time to find a cell to put the nectar in that may be an indication that more space is needed. Is the brood nest full? Is the queen having to look around to find a cell to lay in? How is this translated into a need for more comb?

So many questions! And the more you think about the marvellous organisation in a bee colony, the more questions arise. That is the fascination, and the frustration, of looking at colony organisation.

At some point a question about the intelligence of bees arises. At one time it was thought that everything a bee did was down to innate instinct. We now know that bees can work things out, remember and, to some extent, think. (There was a suggestion that they can recognise human faces – that may be good or bad, I have not decided yet!) How far this goes we do not know, but I suspect that there is still much more to learn about the marvellous but tiny brains that our bees possess.

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UK Honey Labelling Regulations

Below is our simple advice on honey labelling. For more detailed information - go to the website of the Food Standards Agency. www.food.gov.uk

1. The Word "HONEY" is required.

2. The weight must be on the label - we will ensure it is the legal size and format.

3. You can specify the area where the honey is produced. For example, Lincolnshire, Forest of Dean, Scottish Borders.

4. You can specify the type of honey. For example, Heather, Borage. The honey must be at least 75% of that particular type.

5. If you are selling the honey, you must have your name and address on the label. It does not need to be complete but you should be able to be found from the information.

6. If you are selling the honey through a third party, you must have a lot number.

7. New for 2003 You must have a best before date on the jar. We suggest 2-5 years from now.

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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