



Beetalk September 2020

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

birt_192@hotmail.co.uk

THOUGHTS ON A WINTER EVENING.

Often on a dark Winter's evening it may appear that I've nodded off in front of the wood stove, but the closed eyes and occasional grunt belie the truth that I'm considering how I will approach the next year's beekeeping. As a result of this endeavour I've decided that this year I will adopt a policy of entirely changing brood comb and as well as sterilising brood boxes each year. To many a Yorkshire beekeeper this will appear to be gross extravagance.

There is indeed a cost, but then every investment has a cost. The question is whether the benefit exceeds the cost. So what is the cost? A pack of ten sheets of wired standard deep foundation costs £3.95. The time taken to frame sheets of foundation is about an hour. To draw the comb on the ten frames will require from the bees about one pound of wax equivalent to about five pounds of honey or four pounds of sugar given as syrup. So the exercise costs about £10 plus an hour's work per colony.

So what are the hoped for benefits? In broad terms it is a healthy and productive colony. My experience to date, and I admit it is limited but encouraging, is that colonies are exceptionally productive on new comb and my top three productive colonies of all time have all been on new comb. A poor colony may only produce £40 worth of honey or less. A good colony can produce over £100 worth of honey. The possible benefits can more than balance the cost, though there are numerous reasons why one colony may thrive better than another.

There are a number of possible explanations why a colony prospers on new comb. The primary one is that changing brood comb drastically reduces the reservoir of disease pathogens stored in the colony. Many of the disease pathogens that cause serious damage to the honeybee spend all or part of their life cycle in or on the brood combs. These diseases include AFB, EFB, Nosema, Wax Moth, Braula, Chalkbrood and Stonebrood.

Consider Nosema which is thought to be endemic in much of England. It weakens colonies, slows down the build-up in spring and, in serious infections, can lead to the death of a colony. The disease is spread when infected bees defecate on the combs within the hive. In normal conditions the bees will defecate outside the hive, but when the bees are confined within the hive for long periods, then the bees can soil the inside of the hive, spreading the disease to the house bees as they clean the hive.

Secondly, new comb gives the queen the opportunity to produce a dense compact brood nest in an area free from damaged comb and free from comb full of old pollen and granulated honey. Eleven frames of BS standard deep brood, fully utilised, are quite sufficient to support a colony of 80,000 bees. Do the maths if you don't believe this!

Thirdly, the transfer of the colony onto new frames requires the colony to produce wax and this, along with ample space for egg laying, inhibits the instinct to swarm, not entirely, but to a significant extent. Generally the exercise of changing comb would be carried out in April or May when the colony is well established and expanding quickly.

There are a number of management methods that achieve the end of putting the bees on new comb. The better known of these are the Shook Swarm Method, the Bailey Frame Change and, indirectly, the Snelgrove Method of swarm control. So that's what I'm trying this year. If it works out, great – if not there'll always be someone to put me right.

VARROA OR OPEN MESH FLOORS

I have been keeping bees for a couple of years and have got round to changing all my floors to the open mesh type. I have great belief in the benefits of these floors both for helping control Varroa mites and for improved ventilation all year round. There are a few things I have noticed about these floors which may be of help to other beekeepers, and some observations I have made of my bees in relation to the floors. I would be interested to know what any of you think.

The bees seem to get used to their new semi-permeable floor quite quickly, and I think that the bees pass a lot of materials through the floors (I have often observed many bees clinging to the underside). I wonder whether in the busy periods the bees pass a lot of nectar through this method (the stands my hives are on make the underneath quite easily accessible by the bees). This can only be good for the beekeeper!

A couple of practical points with regard to the bees hanging on the underside of the floors. When moving hives in the months when the bees are active it is worth remembering the bees underneath. It can be a surprise to the beekeeper to discover them when he has blocked the entrance and expects them all to be in! Also I recently put Apiguard® into my hives and a couple of them have the Thornes 'economy' Varroa floors which have no slide-out inspection tray. I therefore had to make a couple of boards to fit under my hives to seal the floors (which is recommended for maximum effectiveness of the treatment). So, before I placed the boards underneath, I brushed the adhering bees off, which would otherwise have been squashed!

A Few Useful Tips

Enemies over the winter

Supers have two enemies over the winter; mice and wax moths. The first is easy to deal with by placing a queen excluder above and below each pile of supers. Wax moths are more difficult to control since PDB (par-dichlorobenzene) was banned so what can we do now?

Three methods are available to the hobbyist:

1. Place your super or individual frames into the deep freeze (ask first to avoid divorce!) for 48 hours and immediately place each super into a sealed bin bag on removal. Stack with an excluder above and below in a cold airy place. Wax moths like dark, humid places so even stacking supers outdoors so the wind can whistle through the pile can help.
2. Spray each the face of each super frame with a solution of Certan®, a bacterial preparation which will help to control the moths.
3. Place a floor with a queen excluder on it on the ground. Onto this place a wheelie bin bag liner into which four supers can be placed. Take care not to put holes in the plastic. In the top super remove the two centreframes and place a glass container containing half a cupful of 80% acetic acid (now called Ethanoic acid Ed.) Seal the bag; place an excluder on top and leave to fumigate. This will kill wax moths in all stages of its life cycle, and also kills Nosema spores and EFB bacteria. Care must be taken, as acetic acid is corrosive to human skin, metal and concrete. Metal ends must be removed and metal runners coated with Vaseline. Its vapours are harmful so work in a well ventilated area. You can leave the supers like this all winter but must air them for a few days before use.

Now some queen introduction methods.

Dunking. Take your new queen and drop her into some lukewarm water for a few seconds. Then drop the bedraggled lady in between the frame containing brood of a well-smoked queenless colony. The colony can be made more receptive by spraying all the frame faces with water or light syrup – scented if you wish. Try a drop of vanilla extract in your mix. I have heard that in olden times a beekeeper would pop her into the mouth to cover her with saliva before being dropped in. I have not tried this but remember queens do not normally sting! **Smoking** Give four good puffs of smoke at the entrance, open the hive and then puff 6/7 good blasts down between the centre frame spaces to drive the bees down into the gap, wait a few seconds and give another 5/6 good puffs across the frame tops. Once she has vanished between the frames close up and give 5/6 puff into the entrance. Leave the hive alone for ten days.

Artificial queen cells

- for virgin introduction only? Take some 9/10 mm plastic tubing and cut a 25mm length. Seal one end with a plug of wax. Run your new queen into this and seal the open end behind her with tape. This cell can then be placed between the top bars of two frames containing brood of a well smoked (see above) queenless colony.

Newspaper brood frame Shake most of the bees off a frame of capped and emerging brood - if you leave a few young nurses behind then all the better. Now wrap the whole frame in newspaper, slip your new queen in and close the paper behind her. Prick a few holes into the paper taking care not to give the queen a body piercing! Place the whole frame into the centre of your queenless stock and leave for ten days. Bits of newspaper at the entrance are a good sign.

Remember with all these methods there must be no queen cell in the colony - so check!
A recent research article in IBRA's "Journal of Apicultural Research" found that the success of queen (virgin) introduction increased as the period of queenlessness increased with the maximum success being at four to five days.

Lets look at some of the more unusual methods of getting the bees out of a super. Firstly let's start with the most violent – as far as the Bess are concerned – method, 'Blowing'. This is the method preferred by Bee Farmers as it is quick and requires just one visit.

The method is simple, place the super on its side and blow all the bees out with a leaf blower. Like everything there are 'tricks to the trade'. Which way do you blow, from the top or bottom? Intuitively you would think that you would blow through the top bars, as there is more room at the bottom for the bees to whoosh out, no it is the other way. This is because the air can enter the wide spacing between the bottom bars and be concentrated as it funnels up between the frames so forcing the bees out more effectively. The super is placed with the frames vertical about 3 metres in front of the hive with the top bar facing the entrance, and it helps to raise the super off the floor by placing it on a spare box, or a special angled frame can be made. The blower nozzle is angled slightly up and directed between each frame in turn. Starting from one side of a super, each frame is given a blast of air, blowing from the bottom bar end of the box, through the top bars. The frames can be prised apart to enable the jet of air to reach the clustering bees. Giving the blower a little 'sideward flick' to create turbulence can help to break the bees grip. The tip is not to smoke the hive first or the bees will have their heads in the cells gorging themselves with honey which makes them difficult to dislodge without decapitation! So crack open the hive and quickly remove the super(s) before applying smoke to the top of the brood box, this calms the bees and allows the crown board and roof to be replaced without the bees boiling out. The bees will be blown at up to 200 mph into a pile in front of the hive and although disorientated, irate and a little sticky, they will soon crawl back in but not if the grass is soaking wet and it is raining. So this is a method for a warm dry day and is not recommended for the home apiary unless you don't like your neighbours.

You can watch a video of the method at http://www.youtube.com/watch?v=_4DMK2oRhW0

[v=_4DMK2oRhW0](http://www.youtube.com/watch?v=_4DMK2oRhW0)



The second method is to 'stink' them out by using a fume board impregnated with a pungent but safe chemical although historically the latter was not always the case. A fume board looks like a crown board with a deeper space below it (around 2cm) to allow a fume pad or flannel lining to be fixed to its underside. A normal crown board over a shallow eke like the ones used to apply Apiguard© can be used. A liquid bee

repellent is applied to this absorptive lining and the fume board is placed on top of the honey supers (in place of the normal crown and roof). Within minutes, the bees are repelled out of the honey supers and down into the brood chamber. Instant success! The honey supers can then be safely removed and taken to a bee-proof area. It helps to have full sun on the hive to heat the board and so evaporate the chemical repellent.

What chemicals are used? Historically carbolic acid also called phenol (C_6H_5OH) and derived from coal tar was used but this is extremely corrosive and may cause dermatitis, liver & kidney damage, harmful effects on the central nervous system and heart, resulting in dysrhythmia, seizures, and coma. If that is not enough it also causes cancer.

Other chemicals used as repellents were butyric propionic anhydride or benzaldehyde which smells of almonds but these are also toxic, combustible, and may cause respiratory and liver damage. There is however, a non-toxic blend of natural oils and herb extracts such as Bee Quick which can be bought from suppliers such as Thornes, together with fume pads. It costs around £13 for 200ml and should do a few supers. Have I tried these? Yes I tried benzaldehyde as I could get some for free but it did not work that well and was too risky but it was interesting to hear the raised buzz from the hive and the bees rush away from the smell. I have seen Bee Quick used and it works but again needs a warm day.

Lots of ways of clearing bees and I will leave you to decide but my monies on the simple clearer board.

OCTOBER IN THE APIARY.

October is a peaceful month in the apiary when everything that can be done, has been done, and the beekeeper can sit back and relax for a while, without the pressures of the last few months: each colony should have sufficient food to last it over the longest of winters, and the Varroa count should be minimal. If the hive entrances are more than 8mm deep mouse guards need to be used over the entrance, but use common sense here as large amounts of valuable pollen from the ivy will probably be carried into the hives and metal mouse guards will knock much of it off the bees' legs. Wire cages to protect from the attentions of green woodpeckers must be in place if this is likely to be a problem, so still a few small jobs to do on those lovely warm October days.

Caring for equipment

There is a fly in this generally peaceful ointment: all that equipment which was pushed into the shed as the hectic period of honey harvesting and feeding took place, now needs overhauling, cleaning and tidying. All out of use brood boxes, and brood frames intended for future use, should be scraped clean of brace comb and fumigated with acetic acid (see January WB for instructions and precautions). The boxes themselves can be flamed with a blowtorch as an alternative. Comb which is going to be replaced should be cut out and the empty frames cleaned in hot washing soda solution. Do not leave old comb lying about as it will attract wax moths and these can be a real problem if they once get going. Old brood comb is best burnt and this provides another pleasant autumnal job on October evenings. Queen excluders need to be cleaned off and stacked and feeders need washing. If all the equipment is in good shape and ready for use, you can hit the ground running in the spring even if we have unseasonably warm weather early on, as we did this year. So not too much time for relaxation after all.

Handling the honey

The first year of beekeeping usually results in a few jars of honey – if you are lucky. These are eagerly awaited, some consumed with relish, others proudly given away as gifts, but as time goes on hives tend to increase and a point is reached where there is too much honey to be simply eaten by family and friends. Thoughts then turn to selling the surplus. This opens up a whole new area and careful thought has to be given to finding outlets, labelling, and processing. Probably the first fact to be taken into account is that a continuous supply is needed if a shop is being supplied and therefore a reasonable amount of honey is necessary. For example, if your outlet sells 6 jars per week, you will need over 300lb of honey to keep them going. When you consider that more will be sold during December (but probably less in January) then the amount starts to increase. Sales may be slow at first, but, if you are producing a good quality product, attractively marketed, they will grow. Can you cope with this? When a large amount of honey is produced it is usual to store it in 15lb or 30lb buckets and to process these gradually over the year. It is important, when filling these buckets, to fill them as full as possible and to ensure that the lids are very tight. This prevents the absorption of water, into the honey, from the air. Labels can be affixed to the buckets giving each a number, a date of extraction, apiary site, water content, if this is known, and any other information you wish to keep. The buckets should then be stored somewhere cool.

Processing honey

Virtually all British honeys granulate, some quickly, others more slowly, so an essential for processing honey is some kind of warming cabinet. Some beekeepers have adapted old fridges or freezers by putting in electric light bulbs, but low-energy bulbs will not work, so this idea is rapidly becoming redundant. Increasingly people are using small tubular heaters in purpose made, insulated 'boxes' and, with a thermostat installed, these do a very good job. (It is essential that a qualified electrician inspects such equipment.) A warming cabinet can be bought from the suppliers but, whether bought or self-built the warmer must be capable of heating a 30lb bucket of honey (or 2) up to a temperature of 50°C. At such a temperature a 30lb bucket of liquid honey will be converted to liquid in about 24 hours. The time will depend on the honey, and oilseed rape honey will probably take the full time, other types a bit less. It helps to stir the honey occasionally as it softens. Some beekeepers will throw up their hands in horror at mention of such a high temperature, but it is necessary to ensure that all the crystals are melted, otherwise the liquid honey will start to granulate very quickly and have a very short shelf life. Once the honey is clear it can be filtered through a straining cloth, if this has not been done at the point of extraction, and then bottled.

To be sure of keeping an attractive product on the shelf even longer, water-bathing the bottled honey, with the lids on, for 1 hour at 60°C will be effective. It should be cooled as quickly as possible. The problem with heating honey is that the hydroxymethylfurfuraldehyde (HMF) content increases and it is illegal to sell honey with an HMF content higher than 40mg per kilogram of honey. We are not able to measure this, so we aim to keep heating to a minimum, but it is important to remember that two factors are at work to increase HMF: temperature and time, so a high temperature for a short time will have the same effect as a moderate temperature for a long time.

Having described how to produce good quality liquid honey, next month I will look at set honey and some of the regulations that govern the sale of honey.

Readying your hives for winter.

Now is the time to prepare your colonies against the perils out there, as well as making sure they survive the winter. So what's left to do? – Put on Apiguard, or other similar varroa treatment, to kill the dreaded varroa if you have not already done so. Best time is August.

Ensure entrances are small (one to two inches max) until the wasp menace is past, then fit mouse guards. Once varroa treatment is finished, feed colonies (mid-September at the latest) using a thick sugar syrup (2lb sugar to a pint of water). To get sugar to rapidly dissolve, trickle the sugar into hot water stirring all the time – do not pour the water onto the sugar. For my hives, I aim for a hive weight (without roof) of 26 to 28 kg for single brood and 35 to 37 kg for brood and a half. Or you can just feed until the bees do not take any more syrup.

Finally, ensure that your hives are ready to stand what the winter will throw at them. They should be firm on their bases – no rocking – level or very slightly tipped forward, to let condensation run out if on solid floors. If they have light roofs then a brick on the top or a strap round the hive to stop the roof blowing off is a good safety measure.

Also, for those members whose hives are out in the countryside, check them from time to time to see if they are okay and inspect to see if the local woodpecker has found them! Signs of woodpecker damage are holes pecked/bored into the hive. If you find such damage then wrap the hive in wire netting to deter the bird.

If you want advice on feeding or any other beekeeping matters then call your advisor – that's what they are there

An Alien Beehemoth?

Anyone hunting for crop circles who happened to check out the fields near Wistow could be forgiven for thinking that the aliens had surpassed themselves this summer when an image of a giant honeybee, complete with skep, materialised in a corn field. Sadly, those seeking an extra-terrestrial or mystical origin for this amazing formation would be disappointed to learn that the picture was cut by humble agricultural machinery and not by cosmic ray beams from a passing UFO nor energy seeping from a nearby ley-line. It is however a wonderful piece of art, though I have to admit that if I were called to deal with a bee this size, I'd probably want to be packing a piece a little more heavyweight than a smoker and a hive tool.



Did You Know?

"Unlike honey bees, stingless bees transport large amounts of honey, pollen, and cerumen* from the mother hive to future nest sites before swarming (Kerr and Laidlaw 1956). Nogueira-Neto (1954, cited in Michener 1974) demon-strated this transfer of food stores by coloring honey in the mother nest and observing the appearance of the dye in the honey pots of the daughter colony. Relocation of these resources apparently increases the probability that daughter colonies will succeed."

*Note: Stingless bees construct their nests with cerumen, a mixture of wax that the bees secrete and sticky resins collected from trees.

"Worker bees construct the combs of cerumen, a mixture of wax and plant resin. Most species of tropical stingless bees build inner walls of thin, paper-like cerumen that contain a number of tiny holes as passageways inside the nest. Some species construct long entrance halls. Remodeling of the nests goes on continually. Used cells are rebuilt; walls are moved and the locations of entrances."

Seven Golden Rules to Avoid Being Stung.

1. Keep only docile bees that are easy to handle
2. Avoid cold, wet, thundery and windy days, especially for manipulations.
3. Be sure that there is ample food, readily accessible for the bees to gorge upon before opening a stock
4. Avoid being over-hot and bearing unpleasant odours about your body.
5. Adopt the minimum personal protection necessary to ensure freedom from worry without hampering operations.
6. Handle the combs of bees with firm, gentle movements, avoiding erratic or sudden gestures.
7. Tackle the bees with understanding and confidence. Do not keep the hive open for any longer than is necessary, decide beforehand what is to be done, then do not delay further, but get on with the good work.
To this I would add an eighth.
8. Wear a clean bee suit, and if gloves are worn wash them regularly to remove bee venom.

Bee Stings

Have you been stung recently? Have you noticed any differences in response compared with the last time you were stung? This article is the first of two articles, written by Dr John Gower who has researched the subject of bee stings to help us understand why we might get stung, how a sting is inflicted, how the chemicals in bee venom affect us when we are stung and how this changes with subsequent exposures.

Although I have a medical degree I am writing about a subject in which I have no expertise. My knowledge has been gleaned from listening to experts and reading relevant articles. Some references are listed at the end for those who would like to read more about this subject.

Nest Defence

A honey bee nest is a valuable food resource for many predators, such as ants, wasps, moths, birds and mammals, including man. In natural (wild) colonies, the primary defence is to site the nest in a cavity with solid walls in a high position with a small entrance, which is easy to defend. Besides being in hollow trees, they are often found in chimneys, cavity walls and roof spaces.

The second line of defence for the nest is the bees themselves. Guard bees are recruited from house bees when they are about three weeks old at the time they are due to become foragers. The sting, its poison and the pheromones that alert and recruit other workers to nest defence mature with time. Bees are programmed to defend the nest at the expense of their own lives. This is the mark of a true social insect. Their existence is subservient to the needs of the whole community. Drones, fertile male bees, do not have a sting.

Guard bees at the nest entrance perceive a threat when an animal approaches too closely; the cues include nervous or erratic movements, rocking or vibration of the nest, threat to an individual bee or carbon dioxide from mammalian breath. Alerted bees may rear up with wings spread and mandibles open.

They may partially extend the sting, which will release the alarm pheromone, isopentyl acetate, which is volatile and has a distinctive smell.(1)

Alerted bees may leave the nest searching for a predator. They go for movement, (e.g. blinking eyelids), dark colours, odours such as sweat and breath. When fully kitted out in protective clothing, including Wellingtons and rubber gloves, hot smelly areas are to be found on the legs, just where the trousers tuck into the top of the boots and at the wrists above the glove cuff. Also at these sites the clothing is constricted, so stings may penetrate to the underlying skin more easily.

A bee may not sting the predator immediately, but harass it by buzzing, headbutting or burrowing into hair, which it may pull or bite before going on to sting. Once stinging begins, the pheromones released will attract other bees to the fray and to the site of the sting. Venom will dry on the protective clothing regularly worn by the beekeeper and this may have two effects. The first being to elicit the sting response on the next occasion one is tending the bees. Secondly, inhalation of venom dust by the family of the beekeeper may sensitise them to the venom, even though they have not been stung.

The Sting

The sting apparatus is a marvellous structure with many parts.(2) Once programmed to sting by the bee's nervous system, it will keep going even when detached from the bee. The venom is elaborated in two long secretory tubules and collected in the venom sac, where it is stored ready to replenish the bulb of the sting from where it is pumped down the venom canal into the victim. The sting itself is made up of three parts, a stylet with grooves in which slide two barbed lancets, the three together forming a tube: the venom canal. Within the bulb each lancet has a valve shaped like a scoop. Muscles acting on the plates attached to the upper end of the lancets protract and retract the two lancets in reciprocal fashion. As a lancet is advanced, the valve opens, forcing venom down the canal. The barbs anchor the lancet in the dense skin of mammals. As one lancet retracts, the other lancet advances, driving the sting ever further into the victim. The valve on the retracting lancet closes as it is re-positioned ready for its next advance. Once the sting is firmly anchored, the bee can only escape by tearing itself free. This leaves the abdominal cavity open to leak haemolymph. The bee does not die immediately, but is still able to fly and join its nest mates, harassing the enemy. A lingering death follows. The dose of venom delivered by the bee is sufficient to kill another invading insect, such as a wasp, directly. To kill a human not sensitised to the venom, requires hundreds, if not thousands, of stings.

The Venom

Venom is a clear, acidic liquid, which tastes bitter and smells of ripe bananas.(3) It is a watery solution containing a complex mixture of substances. The main active components are the enzymes Phospholipase A2 (about 12% of the dry weight), hyaluronidase (3%), acid phosphatase (1%) and peptides mellitin (50%) and much smaller amounts of mast cell degranulating peptide (MCDP), the neurotoxin apamine and histamine. This mixture has the potential to elicit a pronounced allergic response. The main components contributing to this effect are the enzymes and mellitin.

Mellitin is the main toxin of bee venom. It destroys both blood cells and tissue cells by drilling holes through the cell wall.(3) It is an allergen - that is, 'an antigen or foreign substance that induces an allergic response when it enters the body'. Mast cells are found in skin and mucosal surfaces (i.e. in the lining of gut, airways and lungs) and around blood vessels. They contain packets of histamine in the form of granules. Histamine is released when the allergen is encountered. MCDP causes 'degranulation' so the histamine can escape from the cell. It is this massive release of histamine from all the mast cells that causes the symptoms of acute anaphylaxis. Phospholipase A2 digests cell membranes and works with mellitin to destroy cells. It causes release of inflammatory lipids and prostaglandins and is the major allergen in venom. It also causes abnormal blood clotting. Hyaluronidase dissolves the ground substance in connective tissue, allowing venom to spread through the tissues. It also allows serum to leak from damaged capillaries, causing the swelling (oedema) seen after the sting.

What is Allergy?

Allergy can be defined in several ways, but originally it was coined from the Greek meaning 'other energy' to describe 'an altered capacity of the body to react to a foreign substance'. Alternatively, it is a 'disease following an immune response to an otherwise harmless antigen', or even better, an 'excessive immune reaction against antigens that most people tolerate'.

When an individual is stung for the first time, they are non-allergic. They experience a local reaction. Pain felt first, is fiery, stinging and intense. There is immediate redness (erythema) and often a small area (up to 1cm. diameter) raised and pale, of oedema, the so-called weal and flare.(4) The pale area is where the leaky capillaries have allowed liquid to fill the tissue spaces, which have been squeezed, so blood only flows in the inflamed area. This first experience produces only trivial effects (apart from the child's noisy reaction)!

On a second exposure the central weal subsides, but surrounding swelling increases slowly over several hours. Gross swelling is most likely where skin is loosely attached to underlying structures, such as the head and neck. If a hand is stung the swelling may affect the whole limb. In a dependent part this can lead to blistering and sometimes secondary infection.(4) Such oedema is not dangerous unless it affects the airway. Stings on an eyebrow may cause sufficient swelling to close an eye for two or three days. Any swelling also subsides slowly. The itching, which accompanies the swelling is caused by the histamine, which has been released.

The Wound

The sting has inflicted a wound and the injected poison kills cells close to its point of entry. The sting is best removed by scraping it out – squeezing should not be done because this will force poison from the venom sac into the wound. The sooner the sting is removed the better, as pumping venom goes on for over a minute. At the site of entry a small hole or blood spot may be seen with a magnifying glass. This is surrounded by a purple mark, which over the course of a few days dries, goes black and eventually a small scab will separate leaving a pink scar which fades to white over a few months. These permanent scars are usually so small they go unnoticed.

Honey Bees: Genetic Labeling Decides Blue Blood

Helmholtz Association of German Research Centres

It is hard to believe that they belong to the same species: The large, long-lived queen bee is busy producing offspring throughout her lifetime. The much smaller worker bees, on the other hand, gather food, take care of the beehive, look after and feed the brood – but they are infertile.

“The honey bee is an extreme example of different larval development,” Professor Frank Lyko explains. Lyko, a scientist at DKFZ, studies how genes are regulated by chemical labeling with methyl groups. This type of regulation is part of what are called epigenetic regulation mechanisms – chemical alterations in the genetic material which do not change the sequence of DNA building blocks. This regulation mechanism enables the cell to adapt to changing environmental conditions.

Why are cancer researchers interested in bees? *“Cancer cells and healthy cells have identical genomes, but they behave very differently. To a large extent this is due to differences in the methylation of genes. Queen bees and worker bees also share the same genome, despite all differences in appearance. Here, too, methyl labels could be responsible for different larval development,”* says Lyko.

In a beehive, it is the food alone which determines the future of the off-spring: If the larvae are fed pollen, they develop into worker bees. If they are to grow into queen bees, their only food is royal jelly, which is rich in fat and protein.

Australian researchers have recently imitated the effects of this power food by turning off the enzyme that labels DNA with methyl groups in bee larvae. These larvae all turned into queens – completely without any royal jelly. This was a clear indication that it is methyl labels that determine the larvae’s fate by influencing the activity of particular genes. In their current work, Lyko and his team have investigated which genes turn a bee into a queen. While previous epigenetic investigations concentrated on the methyl labeling of individual genes, the Heidelberg researchers, jointly with bee experts from Australia, have been the first to compare methylation of the whole genomes of queens and workers. *“The bee with its small genome has served as a model for us to test the method. By now, we are able to perform such investigations also in the human genome,”* Frank Lyko explains.

Other than the richly methylated human genome, the bee genome carries considerably less methyl labels. In more than 550 genes the investigators found clear differences between worker bees and queen bees. These genes have often remained largely unchanged in the course of evolution, which is an indication for researchers that they fulfill important tasks of the cell. Moreover, Lyko’s team identified a previously unknown mechanism by which gene methylation might influence character production. In bees, methyl labels are frequently found at so-called splice sites of genes where the blueprint for protein production is cut.

If these recognition sites are made unrecognizable by chemical labels, the cell may possibly produce an altered protein with a different function. *“So far, the theory has been that methyl labels block gene activity at the gene switches and thus produce diverging characteristics,”* Frank Lyko says. *“But now we have found evidence to suggest that the mechanism discovered in bees may also play a role in cancer cells.”* This would mean that epigenetic factors in cancer not only turn genes on or off, but may also be responsible for production of proteins of a completely different kind.

The underrated Drone.

Drones are male bees. They take 24 days to develop from an unfertilised egg. They are raised in the spring and continue in the hive all summer. They live a life of idleness, waited on by their sisters. In the autumn they are unceremoniously turfed out of the hive to perish. Their only purpose in life is to mate with a virgin queen, whereupon they die, albeit in ecstasy. They are large, have big eyes, no sting

and are allowed to enter any hive. This, in a nutshell, sums up the information about drones to be found in many bee books. Oh, and they are very useful for practicing various procedures on, such as marking and clipping. The same books will have chapters to say about the multi-tasking workers and as much about the highly specialised queen; the poor old drones get a paragraph or two. But in their way they are just as important as the queen after all they provide half of the workers genetic

make up. Most drone information is to be found in more specialised books on anatomy, biology etc, and in reports of research carried out into mating behaviour. I have tried to put together from many sources a summary of all the relevant drone data I could find. It is fascinating!

The Nursery

In very early spring the queen recommences laying after the winter break. Her eggs are parthenogenetic, i.e. they will hatch without first being fertilised. However, a fertilised egg can produce either a sterile female worker bee or, if fed correctly, a queen bee. Unfertilised eggs result only in male bees. Only worker eggs are laid at first. As the colony grows in strength, drone eggs will appear, some six to eight weeks before any swarming will occur. This ensures that there is an abundance of mature drones when the first virgin queens appear. This production of the male element before the female is called protandry, although the term is more usually used with reference to hermaphroditic species and plants. Drones are substantially larger than worker bees and need a bigger cell, both in width and length, to mature in. The workers build these



cells mainly on the periphery of the brood nest - it is surmised that drone larvae prefer slightly cooler temperatures. Also, if there is a sudden cold snap, and the cluster has to contract, causing chilled brood, drones are more expendable than workers. In a crisis, the first to be ditched are the older drone larvae. Some say that the queen is shepherded to these cells when the workers 'think' it is time to start raising drones. It is believed that she measures the diameter of each cell with her forelegs and so knows whether to lay a fertilised or unfertilised egg.

The life cycle of the drone is well catalogued. As a larva, he needs substantially more food than a worker does, and there appear to be differences in the composition of this brood food, drone food having more diverse proteins. The older larva is also fed a food with a different ratio of carbohydrates, vitamins and minerals to that given to a young larva. When ready to pupate, his cell is capped with a domed cover, giving him even more room. He takes twenty-four days to mature before hatching, compared to the twenty-one needed by workers. (It is this extra three days pupation that makes drone brood so attractive to varroa mites-they can usually produce another generation in that time.)

Jack the Lad

Once hatched, our drone then does no work in the hive, having no specialised parts to perform must help with temperature control. He is fed by his sisters at first, on a mixture of brood food, pollen and honey. Sperm production does not seem to be affected by the amount of protein given, though longevity and mating ability may be. An older drone will then



help himself from open honey cells, to power his mating and orientation flights. (A resting drone requires 1-3 mg sugar per hour, a flying drone needs 14mg/hr, rather more than a worker.) Once he is old enough to fly he will take orientation flights, but cannot do any foraging, as his tongue is short and he has only a slender honey stomach and no pollen baskets.

You are not likely to find a drone sitting on a flower! Although he can make an intimidating buzz when aroused, the drone has no sting and cannot defend the hive. Virtually all the glands and external adaptations of the worker bee are absent or vestigial in the drone. However, his specialised parts needed to perform his prime function of mating, are highly developed. His eyes have 7- 8000 facets, compared to the 4-7000 of the worker. His sense of smell is greatly enhanced by the 30,000 antennal plate organs, carrying odour and other receptors. (worker bee has 3000). He has very strong wing and abdominal muscles and impressive reproductive organs.

Haploid/Diploid

Queens can lay fertilised or unfertilised eggs. Fertilised eggs contain two sets of chromosomes, one from the queen and one from the drone whose sperm fertilises the egg. These eggs are called diploid and hatch into females.

Only their subsequent nutrition determines whether they become workers or queens. Unfertilised eggs have only one set of chromosomes, from the queen, and are called haploid. These eggs hatch into perfect males, or drones. A drone has no father, but he does have a grandfather.

(I have omitted a paragraph here on diploid drones, owing to lack of space but the larvae are invariably eaten by the workers. - Ed.)

The laying of diploid drones seems to be more common if inbreeding has taken place i.e. the queen has mated with a closely related male (s). A sibling mated queen can produce up to 50% diploid drones. (Woyke) It can be so prevalent that many cells lie empty, causing a pepper-pot appearance on the comb.

The Man-about-Town

A drone takes about a fortnight from hatching to become sexually mature. From then, in an average life of four weeks (Winston), he will fly out every day, usually in the afternoon, between 2pm and 6pm, when it is warm enough, at least 16°C, and preferably much warmer. He flies to a gathering of drones in the sky, known as a 'drone congregation area' (see below), there to await the arrival of virgin queens. If 'lucky', he will mate with a virgin, dying as a result. If unlucky in love, he will return to his own, or a different colony, where he will be easily accepted. In an apiary of several hives you can test this by marking some drones and seeing where they turn up. They definitely seem to prefer hives with plenty of food or virgin queens in them. (It is quite rare to find drones in small observation hives) A hive with a virgin queen in it acts like a magnet to drones - even a small nuc may have a whole frame of them. Once the queen has mated they mostly vanish. Presumably this must, in pre-varroa days, have happened in the wild, even though colonies would have been much more widely separated than in domestic apiaries. It ensures that genetically diverse drones are on the spot when a virgin leaves to mate.

Although a lot of research has been carried out into drone behaviour in DCAs, no one has yet satisfactorily explained why the DCAs occur in certain places, and even more mystifying, why they persist in the same places year after year. (The DCA referred to by Gilbert White is still in use today.) Virtually all drones die in the previous autumn, so how do the new drones know where to go? Light distribution and the contour of the horizon seem to play a part in choosing a site

(Pechhacker 1994) and Zmarlicki and Morse determined that most DCAs seem to be located over an open area of land of about a hectare, protected from strong winds. Obstructions such as high buildings and tall trees are avoided, but not all open spaces are used.

The flyways connecting the DCAs tend to follow lines of trees or hedges, etc. There may be several DCAs adjacent to each other. One study showed that a 10 sq k. area next to an commercial apiary contained at least 26 DCAs and 18km of flyways. Based on radar images a DCA was defined as an area approx. 100m in diameter, where the drones fly at a mean

height of 25m - it depends on wind velocity. The stronger the wind, the lower the drones fly. Many drones seem to stay faithful to one DCA, but may visit another in the same general direction. Two to three km seems to be an average distance for a drone to fly, but they have been known to travel up to six km. For a queen rearer wanting pure matings from a

mating apiary, it seems that this is the minimum distance there must be from any other hives, or else a physical barrier of 500m or more must be present. The parentage of a sample of drones was tested in Germany in 1998, and the conclusion reached was that all the colonies in the area seemed to send roughly the same proportion of delegates to the meeting, thus minimizing the chances of inbreeding. (C. Collinson, *Bee Culture*, Sep. 2008) Because mating takes place in flight, it is difficult to observe. Modern technology such as radar, combined with the technique of tethering a virgin queen to a moving line, has shown drones detecting a virgin forming a long comet-shaped tail behind her. Recent studies have shown that the drones find the virgin primarily by smell. One of the components of queen substance, called 9-ODA, attracts drones during mating flights. (Apis UK, July 2008). However, it has also been noticed that drones will momentarily chase anything that moves, butterflies, dragonflies or a thrown stone, so presumably eyesight plays a part as well. Drones have to be very fit and well developed to mate with a queen. In addition to the excellent flying power needed to catch the queen, they must have ample supplies of spermatazoa, as only a fraction of each ejaculate will

migrate to the queen's spermatheca. (Woyke and Jasinski, 1973) In a series of studies made by Duay et al, in 2002, it was shown that the effects of parasitism by *Varroa destructor* in the larval stage, could seriously affect the drones ability to mate. A significant reduction in drone body weight resulted from invasion by only one female varroa mite, and two or more mites reduced drone life expectancy so much that sexual maturity was seldom reached. Varroa parasitism by only one mite hardly affected flying power but sperm production was reduced by 24%. In those drones that survived, two female mites invasion resulted in greatly reduced flying power and a sperm reduction of 45%. Other interesting facts to emerge are (a) Drones like it hot. Flying to a DCA and gathering enough drones to form a comet only occurs at 18°C or above. (b) They are very good time keepers, generally flying between 2pm and 6pm. This varies according to the weather. (c) Drones returning to the apiary outside these times were not interested in a queen.

(d) Maximum flight height in flyways is 21m, but in DCAs it can reach 50m. (e) Drones can make several trips to a DCA in an afternoon, returning to the hive to refuel when necessary. Each mating flight lasts about 30 mins. (f) The number of drones in a DCA can vary enormously, from hundreds to thousands. (g) Usually, 7 to 11 drones will mate with a queen. About 90 million sperm will be deposited in her oviducts, and a mixture of about 7 million of them will be stored in her spermatheca.

MATING

The actual process of mating has now been documented quite thoroughly. A drone mounts a queen and inserts his endophallus and ejaculates his semen. During ejaculation he falls backwards and his endophallus is torn from his body, remaining in the queen. Any subsequent males mating with the queen dislodge the previous drones endophallus and leave their own in its place. The drones die quickly with their abdomens ruptured in this fashion. The queen returns to her hive still carrying the endophallus of the last male mate with her. Beekeepers call this the 'mating sign' It will be removed by the nurse bees. The process is described very clearly in 'The Biology of the Honeybee' by Mark Winston.

The Down-and-Out

Once the mating season is over, the 'raison d'être' of the drones is gone. Only in queenless or very well provisioned colonies will some be allowed to overwinter in the hive. There is no sentimentality in nature, and drones with no function to perform are simply a drain on valuable resources, ie honey stores. In the autumn they are refused entry to the hive, or have their wings bitten and are forcibly ejected, to die of cold and starvation.

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'Pheromones of the Social bees' by John Free.
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Getting ready for the winter months,

Unless you have been holding on for a late flow, by now your colonies should be in a condition to survive the winter. The two key issues are varroa control and stores, but there are other precautions, which come under the heading of hive or apiary security.

Are the colonies queen right?

You need a nice warm day to check the hives to ensure that the queen is at home and is well. A queen-less colony can mislead you into thinking all is well by showing signs of activity well into the New Year. Even after a colony is dead there will usually be robbing activity, bees going in and out, which at a casual glance could be mis-read as a live colony. Be suspicious of bees that have been slow in taking feed. Looking at the entrance and seeing pollen going in is not necessarily a reliable indication that all is well, a drone laying queen or laying workers produce brood that requires feeding. You need to look in the hive and make sure that normal worker brood is present.

Hive and apiary security.

Stock proofing. If you have an out-apiary make sure that livestock cannot get to your hives and damage them. Or even be damaged; remember earlier this year when horses and a dog were stung to death by angry bees? Wood pecker attacks can kill a colony. Once the birds have learned that there is food inside, they will knock large holes in the hive box to get at the bees. Chicken wire is effective as a preventative, as are strips of plastic cut from compost bags or similar. Fix the latter at the top and let the flaps flap. (*I have also heard that a toy rubber snake on the roof is effective against woodpeckers, but do not know anyone locally who has had woodpecker problems. Ed.*) Mice can also be a problem in winter. I have not used a mouse guard in fifteen years, I do not like them. With up to 60 holes to defend, no bee colony would choose such an item. Also when fitted they can form a step and make it difficult for the bees to throw out hive debris, particularly dead bees. A wooden entrance block of giving a gap of 100mm wide and no more than 9mm high will serve well; and it does not have the horrible sharp edges of a zinc mouse guard.

Over hanging trees.

Dripping water all winter, trim back the branches; or large limbs that may come down in a winter wind. They need taking down for safety.

Roof Security.

A swirl of wind can lift off a hive roof, especially a shallow one. A brick or rock will usually be enough. If you are in a windy area; add more bricks.

Sound hive boxes and roofs.

The very best boxes and roofs are needed. No bad joints or splits. This box has to take the colony through the worst weather that the winter can throw at it and it needs to be sound. Damp kills bees, not cold. Bees can survive below minus temperatures, but they do not survive damp and wet.

Solid floors.

If you do have solid floors, make sure that the hive has a slight tilt towards the front otherwise if rain water collects the bees may end up with a swimming pool in the basement. Open mesh floors do not have this problem and they also help air to circulate. Use open mesh floors if you have them.

Snow.

Snow blocking the entrance can suffocate a colony. In countries with regular large snow falls, bee keepers often provide a small emergency entrance somewhere near the top of the hive. Such precautions are unlikely in most areas of Britain, but just remember to check your hives after a heavy snow fall. Go onto BeeBase www.nationalbeeunit.com and read the pamphlet 'Preparing honey bee colonies for winter' for more detail.

ARE YOU REGISTERED ON BEEBASE ? IF NOT REGISTER NOW.



Home-made honey could fight superbugs.

University researchers and the National Botanic Garden of Wales are appealing for help in building up a DNA profile of the nation's honey. They hope to use the information to identify plants which could fight antibiotic-resistant bacteria such as the 'superbug' MRSA. The honey project could also help fight the diseases currently attacking Britain's bees.

Honeys have long been known to have antibacterial properties and are used in wound dressings today.

Different honeys act against different microbes depending on the chemicals in the plants visited by bees.

Now the Welsh School of Pharmacy and the National Botanic Garden of Wales with support from the Society for Applied Microbiology is asking honey-makers across the country to send them samples, along with a list of plants near their beehives. A screening test developed at Cardiff will test for activity against two of the most common hospital acquired infections antibiotic-resistant bacteria MRSA and *Clostridium difficile*.

The National Botanic Garden of Wales will identify the plants which contributed to the most powerful honeys, using a DNA profiling process being developed as an application of their Barcode Wales project, that has DNA barcoded the flowering plants of Wales. The team will then investigate the plants found in honey for the potential to develop new drugs. The Botanic Garden has 14 beehives and an inhouse bee keeper, Lynda Christie, who will provide key expertise in support of this project.

The joint University and Garden team will also be looking for honeys which help bees resist pests and bugs. In particular, they will test for resistance to the Varroa mite, which has caused a rapid decline in the UK bee population, and the bacterium *Paenibacillus larvae*, responsible for American Foulbrood, which is one of the most destructive of all bee diseases. Bee pollination is worth an estimated £100m to British agriculture every year, and it is vital to halt the fall in bee numbers.

Professor Les Baillie of the Welsh School of Pharmacy said: "A lot of drug development involves expensive laboratory screening of a huge variety of plant products, often without success. We're hoping to cut out the middle man and let the bees do a lot of the hard work, guiding to us those plants which work. We're hoping the public can provide us with as much home-made honey as possible – they could supply the vital breakthrough in fighting these bacteria." Dr Natasha de Vere, National Botanic Garden of Wales, said: "We have nearly completed our Barcode Wales project to DNA barcode each of the 1143 flowering plants in Wales and are excited to be developing our first applications that use this fantastic resource. We can see which honeys have the best results against infectious diseases that affect humans and bees and use DNA barcoding to identify the plants making the honey.

Controlling Varroa before winter sets in.

August is the month when varroa counts can become very high and the traditional time to treat for it. The aim is to have your bees largely clear of varroa by September when the queen will be laying eggs that will become healthy overwintering bees. It doesn't matter if you still have Apiguards on at this time.

You have, of course, been monitoring your natural mite drops and been pleasantly surprised to find them low, at less than 2/day, during April, May and June. They have been getting worryingly higher in some colonies in July and in these, more susceptible colonies, things can really go pear-shaped in August with counts over 5-10 a day. Such colonies will almost certainly die out before next summer if not treated adequately.

Oxalic acid treatment in December (more in the November Apiarist) is a very effective treatment but too late to save moderately or badly affected colonies.

Classic Apiguard is a pretty effective treatment, at this time of year and involves putting on one opened tray above the brood box, using an eke, and replacing it with a fresh one two weeks later and leaving that on for another three weeks.

The entrance should be reduced and varroa tray inserted to retain the Thymol vapour in the hive. Don't be put off by the reference to temperatures of 15C in the instructions. Apiguard works well in Aug/Sept. The great problem is that the bees are probably still bringing in honey from Balsam or Heather in August and Apiguard cannot be used with supers on as it taints the honey. It really does folks, 'cos I have done it!

So what can you do? If a colony is only lightly infested with mite counts of less than 1/day in August, you could chance it and wait until December and treat with Oxalic acid. If more heavily infested, you could set a date, say mid August, hope for 3 days of bad weather so that the bees can ripen up any new honey, put the clearer boards on and remove the supers and treat with Apiguard as above.

You should then monitor mite drops in November to decide which colonies to treat with Oxalic acid, say any colony dropping 1/day or more. A common treatment policy emerging is to de-bulk mites with Apiguard in Aug-Sept. and finish them off with Oxalic acid in December. Do monitor mite counts 2 days after putting on Apiguard to see how many phoretic mites you had and then read the trays weekly and tot up the grand total at the end of treatment. In a highly susceptible colony this could be thousands!

If a colony is really badly infested with counts of 10/day or more, Apiguard will not be sufficient. You could try: **Two Stage Sealed Brood Culling**, (for more experienced beekeepers). You won't find this in the books because I invented it! (Roar of audience applause!) It is an extension of the shook swarm principle, the second stage finessing out the phoretic mites. It sounds pretty radical, which it is, but I have used it. I

It is very effective and the bees get over it very well, particularly if you feed them afterwards (or there is a good honey flow). The supers can be left on. You might say that brood in August is a waste of time anyway, as bees raised then are too young to produce surplus honey and too old to overwinter. Although a cohort of nurse bees will be removed, the older bees are perfectly capable of raising the broodlaid after the process is complete, despite what it says in the books.

On the first visit the aim is to remove all the sealed brood, containing as it does the majority of mites in the colony. This might mean taking out 8 frames of brood and destroying them. It is important to leave 1 or 2 frames of unsealed brood to trap the phoretic mites still on the bees. You will almost certainly find that frames of unsealed brood will have some sealed brood in them so this should be excised or decapitated with a Stanley knife or similar. Replace the combs with clean drawn comb or foundation. 10 days later remove the 1 or 2 combs of brood you left behind which will now be sealed and containing the rest of the mites. You can leave any new unsealed brood as you will have removed virtually every mite from the hive. This is a remarkably effective method of de-miting a hive.

The bees now have to replace their brood nest and draw out a load of foundation so it is important to feed them sugar syrup through September. 10 litres would not be too much but examine the brood box regularly to see how they are doing. As always, keep an eye out for strong colonies that just don't seem to get much varroa, you may have a resistant strain of bee to breed from. If they really don't get much varroa and are dropping less than 2 per week, don't treat them but keep monitoring them. They can always be treated in December or next spring if it gets out of hand. Conversely, if a colony keeps on having high mite counts or needs any radical treatment, mark them down for re-queening before they start producing drones next year.

Varroa is the 'Elephant in the Room' of beekeeping and the only way forward is to find resistant bees and breed from them.

BEE KEEPERS' QUARTERLY.

The Bee Keepers' Quarterly published by Northern Bee Books is a somewhat weightier magazine than BeeCraft.

It carries articles on research; articles from bee keepers from around the world, (the editor lives and keeps bees in Messinia in Greece); articles on bee health; bee keeping development; the bee keeping season and much more besides.

Recent features have included colony losses; making a 'Langstroth' top bar hive; overwintering; new technology; Travellers' Tales and articles 'for the workshop', and there always a number of book reviews.

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Did You Know?



—The Emerald Cockroach Wasp or Jewel Wasp (*Ampulex compressa*), mainly found in tropical regions, has a metallic blue-green body, with the thighs of the second and third pair of legs red. The female is about 22 mm long. The male is smaller and lacks a stinger.

—Female wasps of this species sting a cockroach twice. A 2003 study using radioactive labeling demonstrated that the wasp stings precisely into specific ganglia of the cockroach. It delivers an initial sting to a thoracic ganglion and injects venom to mildly and reversibly paralyze the front legs of its victim. This facilitates the second venomous sting at a carefully chosen spot in the cockroach's head ganglia (brain), in the section that controls the escape reflex. As a result of this sting, the cockroach will first groom extensively, and then become sluggish and fail to show normal escape responses. In 2007 it was reported that the venom of the wasp blocks receptors for the neurotransmitter octopamine.

—The wasp proceeds to chew off half of each of the cockroach's antennae. Researchers believe that the wasp chews off the antenna to replenish fluids or possibly to regulate the amount of venom because too much could kill and too little would let the victim recover before the larva has grown. The wasp, which is too small to carry the cockroach, then leads the victim to the wasp's burrow, by pulling one of the cockroach's antennae in a manner similar to a leash. Once they reach the burrow, the wasp lays a white egg, about 2 mm long, on the cockroach's abdomen. It then exits and proceeds to fill in the burrow entrance with pebbles, more to keep other predators out than to keep the cockroach in.

—With its escape reflex disabled, the stung cockroach will simply rest in the burrow as the wasp's egg hatches after about three days. The hatched larva lives and feeds for 4–5 days on the cockroach, then chews its way into its abdomen and proceeds to live as an endoparasitoid. Over a period of eight days, the wasp larva consumes the cockroach's internal organs in an order which guarantees that the cockroach will stay alive, at least until the larva enters the pupal stage and forms a cocoon inside the cockroach's body. Eventually the fully grown wasp emerges from the cockroach's body to begin its adult life. Development is faster in the warm season.

—Adults live for several months. Mating takes about one minute, and only one mating is necessary for a female wasp to successfully parasitize several dozen cockroaches.

—While a number of venomous animals paralyze prey as live food for their young, *A. compressa* is different in that it initially leaves the cockroach mobile and modifies its behavior in a unique way. Several other species of the genus *Ampulex* show a similar behavior of preying on cockroaches. The wasp's predation appears only to affect the cockroach's escape responses. Research has shown that while a stung cockroach exhibits drastically reduced survival instincts (such as swimming, or avoiding pain) for approximately 72 hours, motor abilities like flight or flipping over are unimpaired.!

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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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