

# Reigate Beekeepers



## BeeNews November 2017

### Photo opportunity of the Month



### Save the Bees

In recent years 'save the bees' slogans have been appearing in many places. This month's photograph shows a fine example of street art on a wall in London. And there are many others with bees which we may feature in future editions of **BeeNews**.

But let's also focus on the message which is so important. Every day we hear more concern about our environment - recent German study findings that pollinating insects have declined by 75% over 30 years.

And the supposed Albert Einstein quote - "If the bee disappeared off the face of the Earth, man would only have four years left to live" may yet be true.

*Got an unusual, topical, or interesting bee related image that could be featured here? Please send it to the editors today!*

### Dates for your Diary

Date	Event / Description	Venue / Contact
Nov, Wed 8 <sup>th</sup>	<b>RBKA AGM and Awards</b> (19:00 for 19:30 - 21:00) Officers Reports, Committee Election, Trophies & Cert's.	<b>Woodhatch Centre.</b> Andrew Buchanan
Nov, Sat 11 <sup>th</sup>	<b>BBKA Module Exams</b> (timings notified to candidates) End of the revision, time to turn the exam paper over.	<b>Venue Notified</b> Celia Perry
Dec, Sat 2 <sup>nd</sup>	<b>SBKA AGM 2017</b> (14:00 to 17:00) AGM, followed by talk on Plants, Pollination and Bees.	<b>Trinity Sch, Croydon.</b> Julie Hogarth (Sec)
Dec, Wed 6 <sup>th</sup>	<b>Winter Season Meeting</b> (19:00 for 19:30 - 21:00) Extracting Pollen from Honey - talk by Jonah Chitolie	<b>Woodhatch Centre.</b> Andrew Buchanan
Jan, Wed 3 <sup>rd</sup>	<b>Winter Season Meeting</b> (19:00 for 19:30 - 21:00) 'Healing Properties of Honey inc Manuka' - by Geoff Blay	<b>Woodhatch Centre.</b> Andrew Buchanan
Jan, Mon 16 <sup>th</sup>	<b>Beginners Course Commences</b> (19:30 - 21:00) 10 session course presented by David Rudland	<b>Woodhatch Centre.</b> Gill Simpson
Feb, Wed 7 <sup>th</sup>	<b>Winter Season Meeting</b> (19:00 for 19:30 - 21:00) 'Nuc's and their Uses' - talk by David Rudland	<b>Woodhatch Centre.</b> Andrew Buchanan
Feb, Sat 17 <sup>th</sup>	<b>Spring Lunch</b> (12:00 - 15:00) Book in advance to enjoy a fine lunch with fine company.	<b>Grumpy Mole Brockham</b> Julie Thain
Mar, Wed 7 <sup>th</sup>	<b>Winter Season Meeting</b> (19:00 for 19:30 - 21:00) Making Hornet Traps - hands-on & talk by Andy Robinson	<b>Woodhatch Centre.</b> Andrew Buchanan
Apr, Wed 4 <sup>th</sup>	<b>1st Summer Season Meeting</b> (18:00 for 18:30 - 21:00) Tutors, Mentors & Trainees - kick off 2018's beekeeping.	<b>Henfold Copse</b> Andrew Buchanan
More dates?	<b>The Members website has the full year's Diary Dates</b>	<a href="#">Click Here</a>

Comments about and contributions for publication in **BeeNews** will be welcomed by the editors.  
**For inclusion in an edition, contributions are required by the 25th of the preceding month.**

### New (Beekeeping) Year, Setting New Sights

The 2017 beekeeping year really does now feel like it has ended. Our own Honey Show and the National Honey Show that was hard on its heels, perhaps serve to draw a line under this years activities in our apiaries. What we do from now on will all be towards the 2018 season. Whether that be colony increase, reduction, improvement, (recovery!), honey yield or queen rearing; or simply being able to enjoy the gentle buzzing of happy bees during a warm summers afternoon.

For RBKA, a significant element in the preparation for 2018 is ensuring that the administration of your division is in good hands, for which your input is essential. Some time at our AGM on the 8th November will doubtlessly touch on the past years achievements, culminating of course in the presentation of Exam certificates and Honey Show Trophies. However the main business focus will be on what we as a division aspire to be doing during 2018. And upon by whom and how those aspirations are driven forward to make them real.

The AGM's Agenda is provided on page 4, and you will see that item 11 provides you with the opportunity to pose 'Questions from the floor'. Do please suggest, propose or challenge 2018's objectives, as well as perhaps offer help towards their achievement.

As many members already demonstrate, you certainly do not need to be a Committee Member to make a positive difference.

Do therefore please make every effort to attend the AGM and participate in setting course for 2018 ... and beyond.

Meanwhile, our own **BeeNews** Q&A topic - 'How Do Honey Bees Reproduce?' - is reaching a climax of its own in the penultimate part of the series. Enjoy ... and be amazed.

*Richard & Graham*

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Our website is updated much more regularly than this monthly edition of **BeeNews**, so click on [Members Website](#) for lots more information and, all the latest news and activity updates.

Reigate Beekeepers  
  
MEMBERS

## REIGATE BEEKEEPERS

### DIVISION OF THE SURREY BEEKEEPERS ASSOCIATION

#### Chairman's AGM Report for the Year 2016/2017

The year under review was notable in several ways.

- Our financial condition continues to be very strong.
- Our membership has maintained a level only just below that of 2015/16.
- The number of activities has significantly increased.
- The number of members becoming involved in organising events/activities has grown.
- The honey harvest from our apiaries increased.

As usual, I start with the weather that played a significant part in the success and enjoyment of the beekeeping year. The winter was relatively mild followed by a spring, summer and autumn which, in general, with one or two spikes of cold, hot and wet weather, was really very good for plants and thus for bees. Nectar and pollen was plentiful and colonies were able to achieve high populations. In turn, in most cases, this contributed to good harvests of honey from RBKA's colonies and those of our members.

RBKA's Honey Show in October 2016, again organised by **Maggie Minter** supported by a team of enthusiastic members, was a great success. **Simon & Karen Ford** again organised the Winter Team, which spent many hours, often in the cold and wet, caring for the bees at Henfold Copse

An initiative by **Alan Berridge** resulted in a series of Pop-up Stalls to sell honey, stemming from RBKA and members, at Christmas Bazaars around our catchment area. Alan and a small but regular team were very successful in creating another opportunity to publicise our existence and in adding funds to our coffers.

Our Beginners Course, open to the public during January through March, was filled to the brim and was once again presented by **David Rudland** who has been the mentor for several years. Of some 25 attendees 12 went on to join RBKA.

The Annual Auction at the end of March was organised by **Vince Gallo**, where **Paul Cleaver** served as our Auctioneer, whilst **Bob Maurer** ran a Spring Bee Health Clinic. The whole day proved to be a great success.

During the high season, RBKA's apiaries were very well and successfully managed by **Simon & Karen Ford** (Henfold Copse), **Jack Chapman** (Mickleham), **Richard Ramsden** (Brockham and Buckland) and **Mike Hill** (Beare Green).

For the summer sessions at Henfold Copse **Mike Hill**, **Vince Gallo**, **Geoff Blay** and **Andrew Cornwall** drew up curricula aimed at training Beginners, BBKA Basic Assessment Holders and those intent on further advancing their knowledge and skills. Teams of Mentors were assigned to each colony that were in turn supported by **Mike**, **Vince**, **Bob Maurer** and **Celia Perry**. By all accounts, members thought it was the most comprehensive programme to date and that it was very informative and enjoyable. One of the new elements to the programme were the planned and the impromptu mini lectures in the Pavilion, either after the bee handling sessions or when the weather was inclement.

Throughout the summer months the Pavilion was also used as avenue by a film crew, a walking club, for exams and for courses run either by ourselves or by outside parties.

In June at Henfold Copse, on the same day as our Annual Taster Day event, the BBKA Basic Assessments were held for aspiring RBKA members – and everyone passed.

A number of Village Shows were also attended. **Mike Hill** oversaw the programme of events and, this year, was supported by a longer list of members who helped to enthuse the public. The new and more professional labels for our honey (designed by **Richard Bradfield**) were undoubtedly a helping factor in the excellent level of sales at these and other events.

The main development at Henfold was the 4th container to allow machinery and outside furniture etc., to be stored under cover and for members to gain improved access to equipment.

During August **Andrew Cornwall** organised a team of members to extract RBKA's honey harvest and **Janet Kay** followed this up by spending hours running the honey into jars, whilst **Bob Maurer** and his team ran Bee Health Clinics over a couple of Wednesday evenings.

The End of Season Supper, superbly managed by **Janice Whitehead** who, owing to a last minute problem at the proposed venue, was faced with re-organising the event at very short notice. Needless to say no one needed to worry, everything went smoothly. The food, the beer and the atmosphere were excellent, and everyone thoroughly enjoyed the evening.

Most of the above relates to special or annual events. However, throughout the entire year there are members who continually run projects, such as the production of the Monthly Newsletter and maintenance of our Websites by **Richard Bradfield** and **Graham Pooley**. Looking after House and Grounds at Henfold Copse; **Sue Hickson**, **Coral Lloyd** (both responsible for the delicious homemade Anzac Biscuits) and **Sue Moore**, ably assisted by others, have provided the service from the kitchen, whilst **Maggie Bourne** and others have regularly cleaned the Pavilion and **Pete Moore** has kept the grass under control. In addition, several enthusiastic members undertook many small projects.

I have mentioned some members who have lead projects but I also acknowledge all those who have added their support, without whom many projects would not have been completed, but who are too many to list. Everyone who 'gets involved' deserves a huge vote of congratulations and thanks. In addition, to the members who have not yet become so involved but who regularly come to our training sessions and events we really do appreciate your support as well.

To the members of the Committee, who have 'worked their socks off' this year, for their enthusiasm, commitment and excellent level of attainment, my special thanks.

It is the many levels of support from members that produces the high standard of the projects and activities we initiate and makes RBKA the success it is and the envy of many.

**Andrew Buchanan** 1st November 2017

## **ANNUAL GENERAL MEETING AGENDA**

### **Wednesday 8th November 2017**

1. Welcome and address
2. Apologies for absence
3. Minutes of the AGM held on Wednesday 9th November 2016
4. Matters arising from the minutes
5. Chairman's report - circulated
6. Treasurer's report - available at the meeting
7. Other Officers' reports - circulated
8. Nomination and Election of President, Officers and Committee Members  
**President - Mr Mike Hill**  
**Chairman - Mr Andrew Buchanan**  
**Honorary Secretary - Mrs Gill Simpson**  
**Honorary Treasurer - Mr Vince Gallo**  
**Committee Members - Mr Geoff Blay, Mr Richard Bradfield, Mr Simon Ford, Mrs Sue Hickson, Mr Mike Hill, Mr Bob Maurer**
9. Nomination and Election of Representatives to Surrey Beekeepers Association  
**Trustee to Surrey BKA - Mr Andrew Buchanan**  
**Representative to Surrey BKA - Ms Celia Perry**  
**Representative to Surrey Show Committee - Mr Bob Maurer**
10. Nomination and Appointment of Honorary Auditor - **Mr Mike Bensley**
11. Questions from the Floor
12. Raffle in Aid of Bees Abroad
13. Presentation of Awards from the Honey Show and Examination Certificates
14. Any other business
15. Date of next AGM - Wednesday 7th November 2018

All reports submitted, with the exception of the Treasurer's Report, will be available on the RBKA Members website. A limited number of all reports will be available at the AGM.

### Reigate Beekeepers' 2017 Honey Show - Results & Report Summaries

#### From Show Manager **Richard Bradfield**:

I am indebted to the great number of members who turned up Friday evening and/or during Saturday to just get stuck in to whatever needed doing. In addition to **Celia's** practiced hand at organising the Show Class Entries and Judging, I am grateful to those taking up the leads on the various stalls, displays and demonstrations: **Julie Thain** (Tombola), **Karen Thomas** (Plants), **Vince Gallo** (Swarms), **Nigel Sones** (Skep Making), **Graham Pooley** (Wax Posters), **Sue Hickson** (Catering), **Cyril Humphries** (Extraction), **Maggie Minter** (Mead Tasting), **Richard Woodhouse** (Honey Sales), **Anne Slade** (Bee related Sales), and **Pauline Sparks** (Queen Bees Pantry).

Importantly, I am also very grateful to the many that either already knew better than I did what had to be done or saw where the gaps were ... and filled them.

As in recent years, we had relied heavily on the voluntary displaying of modest posters and

flyers just a few weeks or even only days ahead of the event. So we are all indebted to **Janet Jones** for parading up and down Reigate High Street on the day handing out flyers to drum up visitors to useful effect.

Behind the scenes; our team of 'roadies' **Mike Welch, Phil Elwell** and **Vince Gallo** efficiently collected, delivered and finally returned all the staging equipment; 'gatekeeper' **Adam McLaren** managed the flow of members vehicles needing to be unloaded; and **Simon Ford** pressed all the right keys in the right order to produce winners certificates and deliver the results summarised below and provided in full on the website.

In thanking again all of the forty or more members who pitched in to help with this 2017 event, notice is served that planning for 2018 is already underway. Meanwhile, do please read my fuller report on the Members website, view the pictures and send me YOUR feedback.

**Richard**

[Click here for photos and Full results](#)

#### 2017 Honey Show Trophy Winners

**Blue Ribbon** awarded to **Chris Peers** for 'Best in Show' Class 15, A Group of Bee Products

**Reigate Cup** awarded to **Andrew Boagey** for 'Most Points in Show'

**Tanner Cup** awarded to **Chris Peers** for 1st place Class 1/2, Light or Medium Honey

**W-J Cup** awarded to **Celia Perry** for 1st place Class 4, Crystallised or Soft Set Honey

**Novice Trophy** awarded to **Keith Mackie** for 1st place Class 5, Novices Honey

**J.M.B. Cup** awarded to **Andrew Boagey** for 1st place Class 6, Two Containers of Cut Comb

**Redhill Cup** awarded to **Maggie Minter** for 1st place Class 20/21, Mead

**Bramshaw Cup** awarded to **Vince Gallo** for 1st place Class 10, A Comb for Extraction

**Geoff Lewis Plate** awarded to **Gill Simpson** for 1st place Class 12, A Honey Cake

**Lockett Bowl** awarded to **Chris Peers** for 1st place Class 15, A Group of Bee Products

#### From Entries Secretary **Celia Perry**:

Thank you to all the exhibitors who took the time and trouble to prepare and present their entries at the Honey Show, to all who helped and to Mary Wynn who acted as Judge's Steward.

There were too many entries for the judge to write individual comments about each one, although she did write quite a few.

An overall comment she made was that many of the entries in the clear honey classes hadn't been warmed enough and there were signs of granulation in many of the exhibits.

On the cut comb class, the comment was that the exhibits hadn't been drained well enough; there should be no honey in the container.

Details of the trophy winners are above and all results are published on the Members website.

## National Honey Show 2017 - Reigate Beekeepers Helping and Winning

Reigate's 'Super Six' achieved notable placings in 7 Open and 11 Surrey Classes, with **Andrew Boagey** (below left), **Chris Peers** (below right) and **Tim Burke** also winning an impressive collection of silverware presented by the High Commissioner for the Republic of Trinidad and Tobago, His Excellency Orvill London.



### Surrey Trophy Winners

**Egerton Smythe Cup** - **Chris Peers**  
**Lawrence Cup** - **Andrew Boagey**  
**Hood Chalice** - **Andrew Boagey**  
**Coronation Cup** - **Andrew Boagey**  
**W-J 1968 Cup** - **Tim Burke**

### Placings

#### Open to the World

Class 3: Three Jars of Honey (Gift).  
 VHC - **Chris Peers**

#### Open to the British Isles

Class 25: Two Jars Light Honey.  
 3rd - **Andrew Boagey**

Class 32: Six Jars Honey Produced by a Branch Apiary.  
 HC - **Reigate Beekeepers**

#### Open to the World

Class 63: Methaglin or Hippocras Dry or Sweet.  
 2nd - **Meriel Spalding**  
 VHC - **Tim Burke**

Class 65: Cyser  
 1st - **Tim Burke**  
 2nd - **Meriel Spalding**

Class 80: Display of Home-produced Products.  
 2nd - **Maggie Minter**

Class 94: Skep Class.  
 1st - **Nigel Sones**

Thanks are due once again to **Andrew Boagey** for his preparation of RBKA's entry of Mickleham Apiary honey that achieved a Highly Commended in its British Isles Open Class.

### Surrey Members Classes

Class 221: Two Jars Light Honey.  
 1st - **Andrew Boagey**

Class 222: Two Jars Medium Honey.  
 VHC - **Andrew Boagey**

Class 225: Two Jars of Liquid Honey, any one colour.  
 1st - **Chris Peers**

Class 226: Three Matched Pairs of Jars of Honey.  
 1st - **Andrew Boagey**

Class 227: Two Containers Cut Comb, (free from Ling).  
 1st - **Andrew Boagey**  
 2nd - **Chris Peers**

Class 228: One Frame of Honey suitable for extracting.  
 1st - **Andrew Boagey**

Class 229: One piece of beeswax.  
 1st - **Andrew Boagey**

Class 230: 8 of 16 pieces of moulded beeswax.  
 2nd - **Andrew Boagey**

Class 231: One Bottle Mead.  
 3rd - **Tim Burke**

Class 232: One Jar Light of Medium Honey (Gift).  
 2nd - **Andrew Boagey**

Class 234: One Jar Naturally Crystallised Honey (Gift).  
 3rd - **Andrew Boagey**

**Meriel & Tim**, members of both Reigate and Croydon divisions, used their place points in Croydon's annual battle with Wimbledon for the Douglas Cup ... which Croydon won this year.

Reigate members were in evidence throughout the 3 days of the show, attending Lectures, Workshops or browsing the Trade Halls.

Yet more were also helping as NHS Stewards, Lecturer Chauffeurs, manning Surrey BKA's Information Stand in the foyer or on BeeCraft's B'Kids stand in the Trade Hall. Well done to **Geoff Blay, Richard Bradfield, Janet Jones, Chris Peers, Anna Slade, Susan Tilley, Richard Woodhouse & Mary Wynn** ... and anyone omitted from the list ... for their time.

The **2018 NHS** will be at Sandown Race Course in **25th, 26th & 27th October**.



### Surrey Beekeepers' AGM

Saturday 2nd December 2017 at 2pm  
Trinity School, Croydon

Followed by  
3.00pm Refreshments  
3.30pm Talk "How to improve our green spaces for bees and other pollinators" by Karin Alton  
4.45pm Meeting ends

## SPRING LUNCH

**Saturday 17th  
February 2017**  
12:15 for 1.00pm  
at  
**The Grumpy Mole  
Brockham Green**



Join fellow members and friends of RBKA for a great meal together whilst maybe reflecting upon this summer's beekeeping, and even daring to contemplate what 2018 may bring.

Menu options and booking forms with menu selection, will be available by December on the Members website and will accompany the December and January *BeeNews*.

**Put the date in your diary NOW.**



### Extracting Pollen from Honey

... a presentation  
by guest speaker

**Jonah Chitolie at the Woodhatch  
Centre, Wednesday 6th December  
7:00pm for 7:30 start.**

## Reigate Beekeepers' Division

**REMINDER  
about the  
2017 Annual General Meeting  
of the  
Reigate Beekeepers' Association  
to be held on  
Wednesday, 8th November  
commencing at 7:30pm  
in the Woodhatch Centre.**



The Agenda is in the AGM News section of this edition of *BeeNews*, and is also posted on the website.

All members are encouraged to attend the meeting which will be followed by the

### **Awarding of Exam Certificates**

together with

### **Trophies and Prizes from the Reigate Beekeepers' 2017 Honey Show.**

Venue:  
The Woodhatch Centre, Whitebeam Drive,  
Reigate RH2 7LS



## 2017/18

### Membership

If you have not yet renewed, please do so now.



If you don't think you have had a Renewal Request email, please check your Spam folders.

If it's not there, or in error you have perhaps deleted the request, email the Membership Secretary [sue.hickson@btinternet.com](mailto:sue.hickson@btinternet.com)

If you believe you have renewed, no need to double check as specific reminders will be sent to individuals who have not renewed by the time of the AGM.

### How Do Honey Bees Reproduce ? (Part 4 - Mating and Sperm Storage)

We continue our series this month with a look at the mechanics of mating; plus some aspects of the role of pheromones; and the many and significant changes to the queen when she is no longer a virgin queen but becomes a mated queen and has to store the drone's sperm.

#### The Queen Advertises her Mating Desire

Within colonies and outside mating areas, drone bees appear unaware of virgin queens. However, within a drone congregation area (DCA), the presence of a queen requiring mating is advertised by chemical and visual means:

1. As the queen flies, queen mandibular pheromone (QMP) is dispersed into the air. In particular, the 9-ODA component declares her presence but not her precise location due to her fast twisting flight and the turbulence caused by the following comet of drones. Drones can detect 9-ODA more than 400 m upwind. (Look out for more about queen pheromones in the January edition of [BeeNews](#).)
2. From the first mating episode onwards, the queen carries a highly visible white mating sign in her vagina. Drone bees have very large eyes that are highly sensitive to movement, such as might arise when a virgin queen enters a DCA. By flying below her, they can view her against the bright background of the sky for maximum contrast. They are also able to identify small objects the size of a mating sign from 30 cm away in their upper anterior visual field, which is precisely where a mating queen bee flies in relation to the chasing comet of drones.

#### Function of the Mating Sign

A mating sign weighs about 15 mg and represents about 10% the drone weight. It serves as a physical join and a fluid seal during the mating process. Furthermore, it is a highly potent visual stimulus for the next drone to hone in on. It serves no role in the prevention of sperm leakage from the queen's genital tract: the vaginal valve does that.

Neither does it interfere with subsequent mating. And each subsequent mating drone leaves their own mating sign.



Photograph showing the 'mating sign'

#### The Mechanics of Mating

Of the thousands of drones in a DCA, perhaps a hundred fly in a comet below and behind the queen. One of these catches up with her, flies above her and touches her abdomen with his thorax. Then, whilst flying at the same speed as her, he grabs her abdomen from above with his front two pairs of legs and from below with his hind legs. Whilst temporarily flying for both of them, he curves his abdomen underneath the queen so that its tip inserts into her sting chamber, which she has opened. With the tip of his abdomen snugly in the sting chamber, the drone contracts his abdominal muscles in one large movement. This pushes almost all of his hemolymph into the membranous endophallus which immediately unfolds and expands inside the queen bee's genital tract.



The queen's sting chamber soon reaches maximal distension which necessitates the rapidly-enlarging endophallus to extend deeply into the genital canal. At this point, the drone becomes paralysed, falls backwards and the conjoined bees start to lose height. The

endophallus is half-everted but, due to the perfect seal in the queen's genital tract, the drone stays in place. At the very tip of the endophallus, a thin tube called a cervix extends beyond the queen's vaginal valve.

Sperm passes along the cervix of the endophallus to be deposited in the median oviduct of the queen bee. The queen contracts her sting chamber at this point. Not only does this ensure the complete transfer of the drone's sperm into the queen's oviduct system, it also fully releases the drone's endophallus, resulting in him peeling away from it and falling to the ground whilst the queen regains flying height.

The drone dies within about an hour of mating. The entire mating process takes about two seconds per drone and the queen can easily mate with the necessary number of drones in a well populated DCA in under five minutes.

Each successive drone enters the sting chamber below the mating sign left by the previous one. Then, by virtue of the hairy patch at the base of his endophallus, each drone automatically pulls out the mating sign from the previous drone as he replaces it with his own. The mating sign of the previous drone falls away with him at the end of the mating act.

All drones stop chasing the queen the moment she leaves the DCA.

## **Post-Mating Changes in the Queen**

### **(1) Charging of the Spermatheca**

Immediately after the mating flight, the lateral and median oviducts are grossly distended by about 70-100 million sperm, of which over 90% will be discarded and just 5-7 million will be stored in the spermatheca.

Each drone's sperm remains largely bundled together but positioned somewhat randomly within the oviduct system.

Many different muscles, collectively called the bursa copulatrix, surround the queen's genital tract and act as a 'sperm press'. With each contraction, a small amount of sperm is ejected from the median oviduct into the vagina. At the same time, a small pulse of sperm passes up the spermathecal duct and into the spermatheca.

It takes about 24 hours for the oviducts to empty and the spermatheca to fill. This filling method confers no advantage to the sperm from any particular drone, irrespective of their place in the mating sequence.

### **(2) Neurophysiological Changes**

Mating induces permanent large-scale behavioural, physiological and anatomical change in the queen bee, all of which is genetically-driven. Studies have shown massive alteration in gene expression, most notably in the ovaries, fat bodies and brain. Changes in the ovaries and mandibular glands are almost immediate but those involving neurological alterations take longer.

### **(3) Behavioural Changes**

Whereas a virgin queen hunts down and fights rivals; is attracted to light; and is driven to perform mating flights, the successfully mated queen is photophobic; gives up flight; surrounds herself with workers; and avoids fighting with other queens.

Her visual perception genes become down-regulated. Upon giving up flight, she is less dependent upon carbohydrate metabolic pathways for energy production and these are regulated differently.

### **(4) Ovarian Development and Egg Laying**

After successful mating, her fat bodies synthesise larger amounts of vitellogenin and this stimulates ovarian development. Her ovaries and their ovarioles increase in size. In order to synthesise eggs, fatty acid metabolic pathways and macromolecule biosynthesis pathways are up-regulated. Vitellogenin is also incorporated into the maturing eggs, which she starts laying two to three days after mating.

### **(5) Pheromone Recognition**

Whilst a virgin, she is able to detect the pheromones of rival queens within the nest and identify drone congregation areas. Post-mating, there is down regulation of her odorant receptors and odorant binding proteins.

### **(6) Pheromone Production**

After mating, her pheromone profile alters to indicate her reproductive status to the hive. This promotes colony cohesion, attracts her retinue and inhibits queen replacement activities. Synthesis of a wider range of

pheromones at higher quantities requires up-regulation of fatty acid metabolic pathways.

### **(7) Structural and Chemical Changes in the Brain**

After mating, the Kenyon cells of the mushroom bodies in the queen's brain (used to process and store chemosensory information) decrease by 30%, while the neuropil of the mushroom bodies increases by 25–50%. Levels of dopamine and N-acetyldopamine also decrease following mating.

### **(8) Immunocompetence**

After mating, there is up-regulation of a wide range of immune genes. It seems likely that these were not activated at an earlier stage to conserve total energy expenditure during her mating flights. The pheromone vitellogenin also has important immune-priming properties.



### **Initiation of Egg Laying**

Worker bees live for an average of six weeks during queen mating season. As a very rough-and-ready rule of thumb, for every day that a colony lacks an egg-laying queen it will lose approximately 1-in-42 of its baseline worker bee population three weeks later. This will continue on a daily basis for as long as the deficit of a fertile queen persisted. Therefore, rapid queen replacement is important for colony well-being and survival.

Queen bees start laying eggs about 2-3 days after successful mating and the egg laying rate gradually picks up over subsequent days. With an early and successful mating flight, a new queen bee can be laying eggs 12-15 days after emerging from her pupal cell.

The trigger for initiating egg-laying is not the completion of a mating flight; the presence of

sperm in the genital tract; or any aspect of the mating sign. Instead, it is the repeated stretching of the bursa copulatrix by the endophallic pressure of a sequence of mating drones.

An egg-laying queen is fed large amounts of royal jelly, perhaps twice her own body weight on a daily basis at peak season. This is used in egg production, pheromone manufacture and repair/maintenance of the queen.



Photograph showing the semen (including sperm) which can be collected from drones and used for artificial insemination of a queen - click <https://www.youtube.com/watch?v=cRYm3GrzRkU> for an interesting video about the process

### **Maintaining Sperm Viability**

Although the quality of stored sperm decreases as the queen bee ages, some queen bees have remain fertile for up to five years.

The spermatheca maintains the viability of stored sperm, allowing complete detachment of mating and egg laying activities. It is surrounded by an extensive tracheal net that ensures a high level of oxygenation. It is also supplied with nutrients and chemicals from a huge gland. Spermathecal contents are alkaline and have a high potassium level.

### **Mixing of Sperm from Different Drones**

In the early weeks and months post-mating, the sperm from each drone remains relatively bundled and poorly mixed within the spermatheca and the different patriline from the various drones that mated with the queen are variably and disproportionately represented within the worker bee population in a constantly changing pattern. However, by about a year, the sperm has become better mixed and the representation of each patriline becomes more consistent within the worker bee colony.

*The final part will be in next month's edition of **Beenews** when we will consider mating problems.*

*adapted from an article courtesy of John Chambers, Warwickshire BKA*

### Understanding How Bees Keep Warm in Winter

*Apis mellifera* worker bees begin assuming a clustering configuration in the centre of the nest as ambient temperatures start dropping. Individuals remain active at the core of the cluster, keeping space between themselves, whereas bees at the cluster's edge pack together tightly. Bees enter empty cells head-first, thereby maintaining the contiguous state of the cluster in spite of the interspersing combs. The cluster tightens and expands as temperatures drop and rise.

#### Early Models of Bee/Cluster Behaviour

Research by Phillips & Demuth in 1914 showed that the temperatures at the centre of the cluster begin increasing as ambient air temperatures begin decreasing. This formed the basis for an early model of honey bee winter thermoregulation - that core bees respond to decreasing ambient temperatures by shivering to actively generate heat and warm the cluster.

This model assumed the existence of an information conduit through which core bees learned of ambient temperature. It also assumed an altruistic response on the part of the core bees to expend the energy needed to generate heat for the welfare of nest mates.

#### Recent Model of Bee/Cluster Behaviour

The early model has now been replaced with a more parsimonious one that takes into account nothing more than the actions of individual bees as they respond to temperature conditions in their immediate vicinity (Heinrich, 1993).

In the Autumn, as temperatures drop, bees do what any of us would do, they move closer together to share body heat.

Young bees cannot shiver to generate heat, and they naturally have a low cold tolerance, so these individuals move by choice towards the centre where it is warmer. Older bees, in contrast, have a higher cold tolerance and are able to shiver their flight muscles, so these individuals end up in the middle layers and outer mantle.

As temperatures continue dropping, all bees both young and old respond by clustering tighter together. The mature bees shiver to keep warm and it is their heat not the young

bees in the middle that are responsible for warming the whole cluster.

Eventually, the problem at the core is no longer excess cold but excess heat, and the young bees respond by moving away from the centre, opening channels in the process that allow the exchange of inner air that warms the mantle of bees and outer air that cools the interior bees.

It is this excess heat in the middle of the cluster that tricked earlier investigators into thinking that core bees were the altruistic heat-generators for the cluster.

#### Critical Temperatures

There are two temperatures that regulate much of the behaviour by the bees: 35°C (95°F) and 15°C (59°F).

Young bees naturally prefer temperatures nearer 35°C and move further in or out of the cluster to find it. The lower number, 15°C, is the minimum temperature at which an individual bee can shiver its flight muscles and generate heat.

It is possible for older, cold-tolerant bees at the surface of the cluster to fall below this threshold and enter a 'cold coma'. These hardy individuals can survive this state for several hours, passively relying on the shivering and contracting bees beneath them to stay above lethal hypothermia, waiting until their bodies exceed 15°C again to resume shivering. They constitute living insulation. But things take a critical turn if these bees are subjected to sustained temperatures below -2°C (28°F) (Free & Spencer-Booth, 1960).

A deadly cascade of events may then ensue if that lower ambient limit is realised and if bees deeper in the cluster cannot keep the surface warm enough. Surface bees begin dying from hypothermia and dropping off the cluster, imperilling the rest of the cluster with the loss of living insulation. If this cascade persists it spells certain doom for the cluster and, sadly, this outcome seems common as many first year colonies in temperate regions struggle to survive their first year.

*adapted from an article in Bee World courtesy of Ipswich & East Suffolk BKA*

## Hive Insulation for the Winter

With the forecasts that we may be facing a severe cold Winter, and if you don't have poly hives you may be considering insulating your wooden hives.

There are two main approaches:-

1. Apply polystyrene insulation to the outside of your hive.



This link will take you to the BBKA shop that supplies purpose made kits to fit National hives for £35.

<https://www.bbka.org.uk/shop/product/bee-hive-insulation/>

2. The so-called 'wrapped hive' which is sometimes used in the USA. A layer of black roofing felt or similar material is wrapped around the hive to take advantage of solar gain on sunny days. It doesn't do much to

prevent heat loss unlike insulation. However, on a sunny day it can raise the temperature inside the hive a few degrees. And it does provide other protection. But beware it may increase humidity within the hive which can be a serious problem.



[Click](#) for typical USA wrapping kits available on eBay for around £8.50.

Remember the most important place to insulate your hive is the roof, and this can be done simply by inserting a layer of building insulation.

See also the article in the November 2013 edition of **BeeNews** about making your own complete insulation kit, sides and roof for around £20.

## Horticultural News

### November Forage

#### Trees

- Prunus x subhirtella 'Autumnalis' the Higan or Rosebud cherry

#### Shrubs and Climbers

- Colletia cruciata – photo below



- Fatsia japonica
- Fuchsias are still flowering well
- Mahonia japonica, Bealii and Lindsayae 'Cantab'
- Solanum jasminoides Alba (the white potato vine) is just coming into flower
- Viburnums Bodnantense Charles Lamont, Dawn and Deben

#### Perennials

- Aster pringlei Monte Casino
- Dahlias, those still in flower will continue to flower until the first frosts get them
- Nepetas, several varieties
- Kaffir lily (Schizostylis) – photo below



#### Annuals and Biennials

- Marigolds (calendulas)

#### Herbs

- Borage plants will continue to flower until the first frosts
- Prostrate rosemary

#### Wild flowers

- Ivy

*courtesy of Ann Jones Farnham BKA*