

## The Apiary Project



In May 2011 Imperial College London introduced its first colony of honey bees to the Secret Garden. Since then, with the backing of the Estates Facilities department, the staff and student Apiarists have introduced two more hives, another British National Hive and a top-bar hive. The membership and activity of the Environmental Society Apiary has grown to support these three thriving colonies. Highlights since the start of the project have included the first honey harvest in September 2012, which took place over at the Silwood park campus, and later that year our first honey tasting event at the Imperial Fringe festival, where staff, students and visitors were able to sample the South Kensington produce.

The Imperial College Apiarists intend to use the experience gained in the last two years to engage the wider College community in the project. Over the next year there are plans to hold a series of introductory lectures to allow students and staff to gain more theoretical knowledge of honey bees and those wanting to learn more will be given the opportunity to attend local beekeeping training sessions.

Apiaries like ours which offer staff and students the chance to learn about the honey bee are a springboard for more ecologically-minded and mindful action. If we can encourage even a few people to take an interest in the plight of the honeybee, and perhaps get them started with a hive of their own, then we may be contributing to a more secure future for these vital and intriguing creatures.



**Apiarists inspecting the British National Hives, spring 2012**



**A honeybee laden with orange-coloured pollen**



**The bees start to build their comb on the frame**

## Motivation

Insect pollinators have gained increasing attention in recent years as crucial to human agriculture, natural food chains and biodiversity. Honeybees are crucial for approximately 60% of farmed foods, a keystone species for ecology and human life. There is a general consensus that insect pollinators, including honeybees are decreasing in number, a loss which threatens major key systems. In order to reverse this trend, an increase in smallholding of honeybees twinned with replanting of areas with flowering plants has been suggested as a part of a wider movement.

## Background

The Apiary Project was born out of a twofold concern for the environment- the imperative for the College to become more sustainable and a special concern for the plight of the country's bee populations. The Estates Facilities department discussed the Apiary project with the grounds maintenance contractor, Gavin Jones. With an experienced in-house beekeeper, they were able to offer advice on requirements: the potential location, the necessary resource for managing the hive and the financial investment. It was then agreed that the best way for the project to be taken forward was with the involvement of students who would be trained in honeybee husbandry and become ambassadors for the initiative.

At this stage, the Estates Facilities department got in touch with the Student Union and then with students from the Environmental society (Esoc). It was agreed that two members of Esoc would attend courses in beekeeping and once trained in the basics they would take over management of the hive. They would use their training to educate other members of the Esoc Apiary. Estates Facilities would continue to fund the initiative and receive reports on progress from the Apiarists.

## A brief history of our bees

### Spring- winter 2011

- First colony introduced. See blog: <http://beemassobs.wordpress.com/2011/06/02/welcoming-albert-and-the-carnies/>
- Two members of Esoc trained with the Wimbledon Beekeepers
- No potential for a honey harvest this year; the colony doesn't seem to be building up enough honey stores to survive the winter.
- As we cannot extract our own honey, we head over to Silwood Park campus to assist with their harvest. John Knight and John Mumford are hobbyist beekeepers and senior lecturers at Silwood. With around 7 strong hives, it makes for a hard-day's work, but gives us plenty of experience in readiness for our own future harvests (see Appendix for full Silwood Harvest story)
- We feed the bees a sugar syrup mixture during October to help them build up their honey stores.
- We treat for varroa mite with a strong smelling all-natural block of thyme extract.
- We continue to feed until it's too cold to open up the hive and then sit tight and hope for the best.

### Spring- summer 2012

- The colony has survived the winter!
- By the summer, the single colony has grown and is split into three strong honeybee colonies. Two are hived in National hives and one in a top-bar hive.
- We have our first honey harvest, yielding 25 kg of golden honey. As we do not yet have the right equipment at South Kensington, we get in touch with the Silwood apiarists and organise to transport our honey filled 'supers' to their conservatory for extraction.

### Autumn- winter 2012

- For the end of term we made it to the Imperial Fringe Festival. Here we offered a taste of our Imperial honey, as well as a collection of shop bought honeys for comparison. On our table we also had some of the beekeeping equipment and a few frames for people to have a look at. We were provided with a plasma screen which showed off some of our bee macro photography and a video of a hive inspection.

### Spring- summer 2013

- Currently, 85 staff and students are subscribed to the Apiarist mailing list, with around 15 active beekeepers
- All three hives seem to have made it through the winter!
- Very bad weather means that we are unable to inspect our hives. The very late advent of spring is not good for our bees as they have little opportunity to leave the hive and gather food.
- April: Sadly one of our colonies did not make it through the bad weather
- June: one of our colonies has swarmed. We decide to artificially swarm those remaining, by splitting the 11 frame National into two nucleus hives (smaller, 5-6 frames).
- August 2013: we have two colonies of honeybees being populated by queen bees we have reared and allowed to be naturally mated. Further to this we have one colony of British black honeybees, thought to extinct a decade ago but now being sought after for their natural adaptation to the British Isles and for their resistance to disease



**A close-up of our bees as they emerge from the hive**

**Two 'nucleus' hives and an empty National hive. We artificially swarmed the bees in summer 2013 to create two colonies from our existing colony.**



**A 'smoker' which is used to calm the bees when inspecting. The smoke makes the bees cluster in the hive and gorge themselves on honey**



**A bee resting on a raspberry plant in the Secret Garden**

**There is plenty of forage for the bees in and around the Environmental Society Garden**

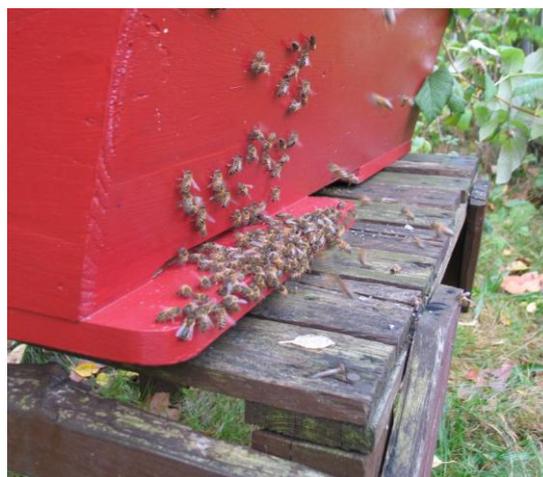
## Inspecting

As soon as the temperature climbs above 15C, we start inspecting our hives. These initial spring inspections are chiefly concerned with checking the levels of honey stores which the bees have retained over winter, and feeding the bees artificially with fondant or sugar syrup as necessary, to prevent starvation. The inspections are carried out quickly to minimise the heat loss from the hives, which are at their minimal population.

As we move into early summer we start weekly inspections. Here we are chiefly concerned with monitoring for signs of disease (for which we can treat or must report to our local bee inspector), and to ensure that the queen is healthy and building up her brood as expected.



Our two National Hives during summer



Our Top bar hive on a busy day in summer

As we move into full summer the inspection focus shifts to managing the expansion of the colony, trying to anticipate if and when the hive will swarm. Swarming is the natural means of reproduction of honey bee colonies.

A new honey bee colony is formed when the queen bee leaves the colony with a large group of worker bees, a process called **swarming**. In the *prime swarm*, about 60% of the worker bees leave the original hive location with the old queen. This swarm can contain thousands to tens of thousands of bees. Swarming is mainly a spring phenomenon, usually within a two- or three-week period depending on the locale, but occasional swarms can happen throughout the producing season.

It is considered good practice in beekeeping to reduce swarming as much as possible. Swarming often results in the loss of the more vigorous division and the remaining colony may be so depleted that it is unproductive for the season (so less honey for us!) If we have had a successful year, honey is harvested in late summer, and the focus of inspections shifts back to disease monitoring and feeding actions, as the colony reduces in size and hunkers down for the winter.

Finally in late Autumn the hives are reduced to the smallest volume possible (so they are easy for the bees to keep warm), sealed in with the maximum food stores, and protected against woodpeckers and door mice for over wintering.

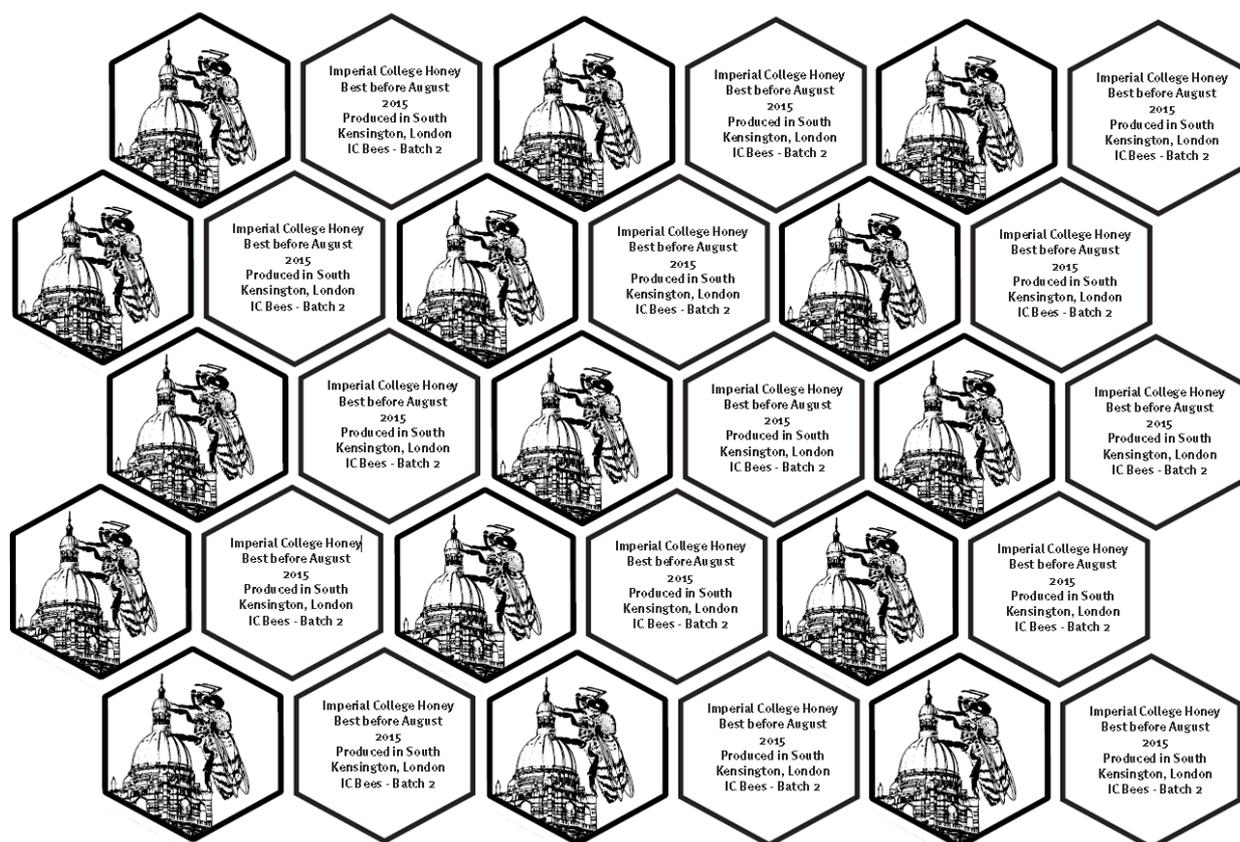
All inspections are recorded in a logbook, so that the Apiarists can track the health of the colony and note concerns or manipulations.

## The honey harvest

Last year, honey harvests suffered nationwide due to the bad summer and were typically down by around 50%. It was with this in mind that we transported our honey-filled-supers to Silwood Park to use their centrifuge honey extractor. During the extraction process the honey is forced out of the uncapped wax cells, runs down the walls of the extractor and pools at the bottom. A tap or honey pump allows for the removal of honey from the extractor. Honey must be removed in time and always stay below the rotating frames as otherwise it prevents extractor from spinning with sufficient speed.

We were pleasantly surprised by our harvest of around 25kg of delicious honey, helped by the efficient equipment which by spinning the honey out of the comb, leaves the comb intact and ready for re-use. That means that the bees have to spend far less time and energy on building new comb next year and can instead concentrate on honey storage!

The 25kg was decanted into recycled jars and labelled and distributed between members and stakeholders within College. We created a logo for the labels of our first batch last year and have done the same in preparation for this year's harvest.



We are looking forward to our second honey harvest, late this summer. The Silwood Apiary will not be harvesting this year as their hives did not come through the winter very well. So we are organising an alternative means of extracting this year's batch. There are a few different options for extracting.



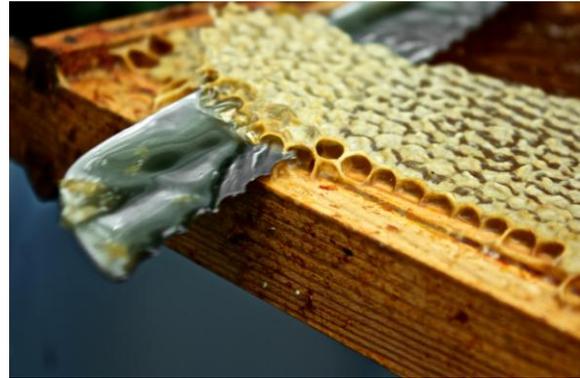
A frame from the British National hive with a wax 'foundation', reinforced with wire. The bees are just beginning to 'draw out' the comb using the foundation as a guide



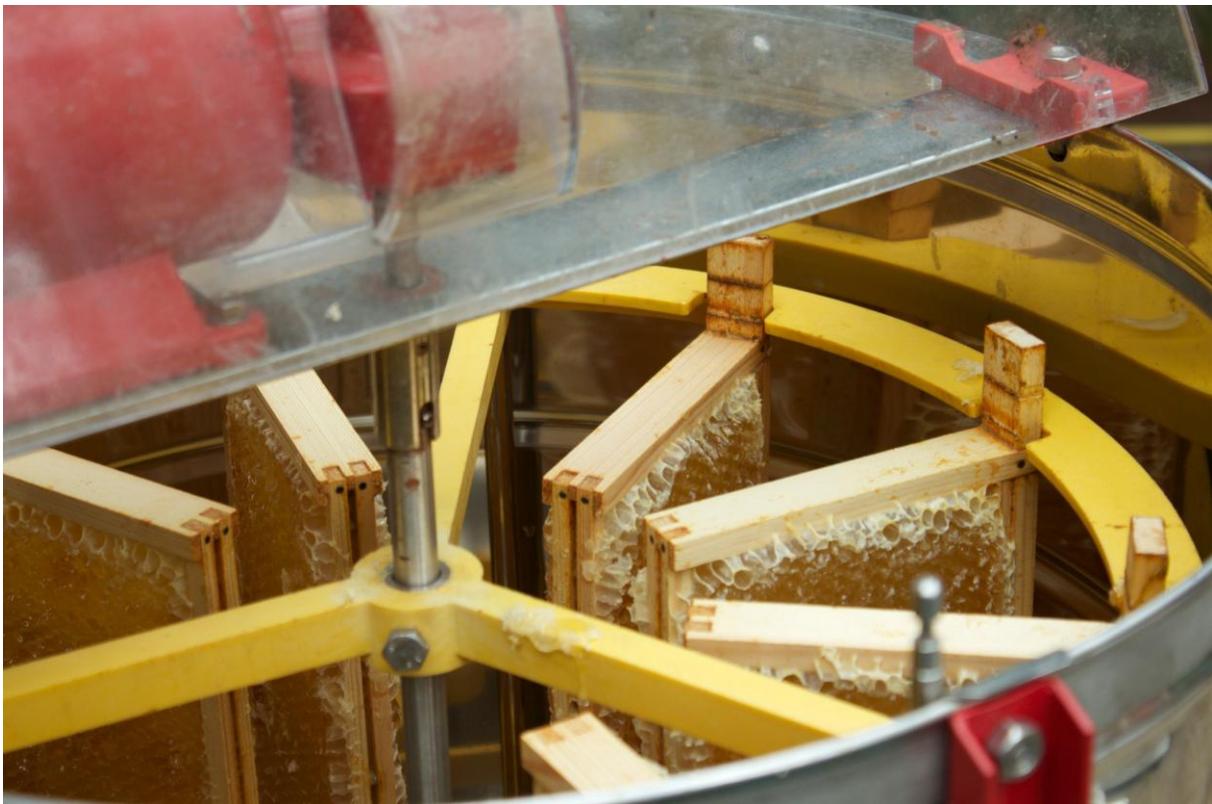
The 'top-bar' hive. The bees build their comb down from the wooden slats.

- We could squeeze the honey from the comb and pass it through a sieve. Unfortunately this would mean destroying the honey comb and giving the bees a big building job for the next season. This option is however suited to our top-bar hive as the comb is completely natural, with no wire foundation or guide as there is on the National frames.
- The other option is to contact a local beekeeping association and see if we can borrow their equipment.
- Alternatively we could purchase a honey extractor ourselves, to be kept at South Kensington so that our honey can be extracted on site. This would involve significant investment

## Honey extraction



The honey-filled 'supers' are transported to a bee-free area. The frames are then 'uncapped' using a knife.



The honey extractor at Silwood Park which spins the honey from the comb using a centrifugal force



The honey is passed through a sieve before being jarred.

## Other developments

In the Secret Garden, it would be possible to house one more honeybee colony long term, bringing the total number of hives to four. Since generally in the spring honeybee colonies split into multiple colonies, in future we will have to look into securing new locations for further hives or expanding the boundary of the existing Environmental Society garden.

That said, the survival of honey bee colonies is dependent on a number of factors: most significantly good weather and the careful management of diseases to which the bees are susceptible. As such, although we anticipate (and hope for) growth in the Apiary, set-backs are unfortunately to be expected. (The beekeepers at Silwood Park for example lost the majority of their colonies over last winter 2012-13). Beekeeping must accommodate the downs as well as rejoice in the ups! If our Apiary continues to expand then ultimately we would like to offer those involved in the project the chance to house a colony at home.

## The bee blog

The Apiary has been keeping a record of inspections on the 'Bee Mass Observation' blog <http://beemassobs.wordpress.com/>

## The Apiarist mailing list

All announcements on beekeeping activities are made on the mailing list, to subscribe: <https://mailman.ic.ac.uk/mailman/listinfo/icu-esoc-apiarists>



## Appendix

News stories on the College website:

**June 2011**

### **Creating a Buzz on Campus**

**A group of visitors created quite a buzz at Imperial this week, when the South Kensington campus took delivery of its first beehive, and nearly 3,000 new housemates.**

Located in the Environmental Society Garden behind Ethos, a nucleus colony of Carniolan bees, including a Queen, drones and workers, were introduced to the hive, having been carefully driven from Gloucester to South Kensington. "Moving in Day" was overseen by bee-enthusiasts Bill Davidson and Anthony Mason, from Gavin Jones, the company that maintains the College grounds.

Describing how the bees will go about settling in to their new surroundings, Bill said: "The Queen will control the colony and will start egg laying in about a week, with a continual succession of eggs, grubs and hatching going on to take the nucleus to a full-sized colony. Throughout this the worker bees will be gathering pollen and nectar, with all the workers being replaced on a continuous 6 week-cycle."

Bill will continue to have a hands-on role whilst students Stefan Piatek and Reuben Gibbons from the Imperial College Environmental Society get to grips with the new arrivals and attend a bee-keeping course over the summer.

Bees are the most important pollinating insects for food production, and have an estimated yearly worth of about £200 million to British agriculture. In recent years, UK populations have declined by around a third, with possible causes including climate change, use of pesticides and disease.

Daniella McManamon, Project Assistant in Facilities and Property Management (now Estates Facilities) which is funding the bee-keeping project, explained that it is part of the College's wider Step Change campaign to promote green initiatives and reduce Imperial's carbon footprint:

"A lot of Step Change initiatives are large-scale projects that operate at a College level, and we were looking at ways for students to get more involved. Keeping bees allows us to combat a pressing environmental problem and raise awareness of wider green issues at the same time. We hope this sparks off other sustainability ideas for staff and students."

The first batch of South Kensington Imperial honey should be ready for taste-testing next summer.



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## August 2011

### The Silwood Honey Harvest

Last Thursday the South Kensington beekeepers travelled to Silwood Park to help with the annual honey harvest. It took 12 people and a day of hard work to extract and jar the honey.

In the process of honey extraction the 'supers' - the part of the hive which contains only honey- have to be removed from the rest of the hive and transported to a bee-free area. The bees can smell the honey from a great distance and given the opportunity they would come to reclaim it! That is not something you want as their defensive strategy- the sting- is an effective one, and one that a few of us at Silwood unfortunately fell victim to this time. When dealing with bees and effectively stealing their stores it's something you've got to be prepared for, and the product of the harvest is certainly worth the risk!

Each super contains about seven frames, each heavy with honey. With a kitchen knife, the wax caps are sliced from each frame revealing the rich and sticky filled comb beneath. Each 'capped' frame is then placed in a motorised extractor which spins the honey out from the frames until it flows from a tap at the bottom of the machine, through a sieve and into large tubs. The golden contents of the tubs are then poured into jars and boxed for distribution to a lucky few. The honey isn't sold but contributions to the ongoing maintenance of the hive are always welcome!

There are currently seven active hives at Silwood, but that number varies each year with some colonies failing to survive the winter and others swarming. Last winter only one strong colony came through the winter but with the attention of Silwood beekeepers new swarms were introduced to the other empty hives and there began to thrive.

The honey produced at Silwood has a strong flowery taste, so much more intense than many you can buy in a shop.

The success of the hives is down to the efforts of John Mumford and Jon Knight who have been maintaining and developing the hives over the years. Their success is something that students based at South Kensington are hoping to replicate, albeit on a smaller scale, when they are able to harvest the honey from the new South Kensington colony next summer.

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## Frequently asked questions from the London Beekeeper's Association website

<http://www.lbka.org.uk/beekeeping.html>

### How do beehives work?

Until 1880, European beekeepers generally kept bees in skeps (baskets), in which bees would build honeycomb, raise their young and store honey. These are impossible to inspect in detail to check for disease,

so little "beekeeping" was involved, except at harvest time when the bees would be driven away and the nest destroyed.

Langstroth's removable-frame hive improved the situation significantly, because it allowed beekeepers to temporarily take apart colony for inspection and put it together again without too much disruption to the bees. Honey can be harvested by removing boxes of frames from the hive. The hive design also ensures that larvae are not raised in the part of the hive in which honey is stored.

Most beekeepers in the UK use the National hive, which - along with most hive designs - is designed on this principle. As the season progresses, supers (boxes of frames for honey) are added to the top of the hive as bees fill them with honey. If the bees have made more honey than they need to survive the winter, some of these can be harvested during the season or (usually) at the end.

## **What pests and diseases affect bees?**

There are many pests and diseases that affect bees.

The most widespread problem for the Western Honey bee is the Varroa mite. While they don't actually kill bees themselves, they spread diseases such as "deformed wing virus" which can kill the entire colony. Accidentally introduced from Asia, they are now endemic in our colonies. Unlike the Asian Honey Bee, the Western Honey Bee (that European beekeepers keep) cannot deal with these easily and most colonies will die without intervention. Beekeepers use a combination of colony management techniques and treatment to control these mites.

Regional (government-employed) Bee Inspectors help ensure that serious diseases such as American Foul Brood and European Foul Brood are kept under control and beekeepers need to look out for tell-tale signs and remain vigilant.

## **How do I capture bees to test for disease?**

Sometimes, the surest way to test for disease is to collect a sample of bees for analysis, by studying them under a microscope or doing a laboratory test. Try and take the sample as soon as possible before you test them.

The easiest way to capture them is to hold an open polythene bag in front of the entrance and capture the bees that are flying in. You can also use a matchbox to collect a sample by scraping it across a frame of bees. You'll probably need about 30 bees, but make sure you don't get the queen! You'll need to kill them by placing the bag in a fridge overnight.

## **Do bees make enough honey for us to harvest?**

The amount of honey that a colony make depends on the health of the colony, the space they have and the weather. Healthy colonies, with a productive queen, with plenty of space and in a good year, weather-wise, usually makes more honey than they need for the winter. If a beekeeper wants a honey crop, he/she has to make a judgement about how much honey to take. Some beekeepers choose to take a significant portion of honey and feed the bees sugar at the end of the season and throughout the winter. Beekeepers need to monitor food supplies in the hive, particularly in spring where colonies are at highest risk of starvation, and feed where necessary.