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The Buzz Club Newsletter

University of Sussex

Inside this issue:

In the March issue of our quarterly Buzz Club newsletter we report on some findings from our Hoverfly Lagoons and P.A.N. projects, we tell the woeful tale of the beautiful but likely-doomed Giant Golden Bumblebee, we report on findings from our continuing research into the effects of neonicotinoids on flower-visiting insects, we draw attention to a spring pollinator to look out for, and we introduce the full line up of our exciting Buzz Club projects, 2016!

This issue is edited by Dr Ellen Rotheray. Each issue will be edited by a different member of the team.

Overwintering larvae in Hoverfly Lagoons

By Dr Ellen Rotheray

Overwinter survival is important to monitor in our lagoons because it can make a huge difference to the number of hoverflies emerging in spring. Due to the artificial nature of the lagoons, it's possible that they may make larvae more vulnerable to the elements, particularly freezing, desiccation and suffocation. But larvae *are* adapted to freezing conditions. During the summer and autumn their primary goal is to grow, but triggered by seasonal elements such as daylight and temperature, regardless of size larvae will enter winter diapause, stop growing, and start to accumulate fat. This is an essential survival store and important basic survival requirement in many organisms. Once fat storage is complete, indicated by becoming completely opaque with white fat, larvae stop feeding and enter a slow-moving over-winter stasis. By emptying the stomach and becoming partially dehydrated they avoid tissue damage if encased in ice for several days! Come spring, they either utilise this fat to grow more, or if they have completed development, the fat reserve is used as an essential resource during the pupation phase when larvae morph into adults. A good indication that a larva is about to exit a lagoon to pupate in spring is it becoming completely opaque with fat.

Their means of survival was put to the test this winter when lagoons froze solid for several days. While winter may not be over yet, on 28th February I counted larvae in two of my silage, wood chip, and sawdust-filled lagoons. Larvae in sawdust lagoons have faired best so far, indicating a whopping 87% survival, with a total count of 172 larvae. Those in silage lagoons had 68% survival (total count of 77) and wood chip lagoons faired the worst with 45% survival (total count of 88).

My lagoons also experienced what was most likely a bird predator, but possibly a small mammal or fox, picking the contents out of two lagoons, leaving no detectable survivors. One of these lagoons was a test to see if we could use shallow seed trays as a container. These may be easier to forage upon for a predator, but they were also found much less productive than my alternative 15cm deep buckets.

Depth might be important to lagoon-dwelling hovers. Long-tailed larvae, or rat-tailed maggots, are so named due to their long, extendable breathing tube, which allows them to breath while feeding deep in the rot-hole, or lagoon, hidden from predators. If the water gets disturbed the larva can quickly retract its breathing tube until the coast is clear.

Long-tailed hoverfly larvae feeding submerged with their breathing tubes extended to the surface

This year we're recommending using 4 pint plastic milk bottles, cut to the handle, as an alternative lagoon receptacle. These will be easier and quicker to fill, keep topped up with water and decaying material, and to survey. Please visit the website to find out more!

The Plight of the Giant Golden Bumblebee

By Prof Dave Goulson

Right now, in Tierra del Fuego, it is the end of summer. The last few giant golden bumblebees will be going in to hibernation, preparing to sleep until the southern hemisphere spring arrives in six months or so. These are huge insects, the biggest bumblebees on the planet. I have heard them described as resembling flying mice.

Depressingly, next spring may be the last one for the giant golden bumblebee, properly known as *Bombus dahlbomii*. This wonderful creature used to be common along the southern Andes, from northern Argentina and Chile down to Tierra del Fuego. Now, it is almost gone from all of its former range, except for the island of Tierra del Fuego. Its demise is due to a foolish act by the Chilean Government. In 1998, they decided to introduce European buff-tailed bumblebees, *Bombus terrestris*, to central Chile. Presumably they thought they would boost crop pollination, and perhaps they have. Unfortunately, they paid no regard to the lessons that ought to have been learnt long before; the disasters that invasive, non-native species such as cane toad in Australia can create. The buff-tails decided they liked it in Chile, and they multiplied and spread. Within a few years they had travelled 1,000 miles, and hopped over the Andes to Argentina, which they seemed to like too. This year, they reached the straits of Magellan, and came in sight of Tierra del Fuego. Sadly, no sooner do buff-tails appear than the native golden bumblebees vanish. The Chileans didn't think to screen their buff-tailed imports for diseases, and it seems that they were carrying at least two parasites that the South American species has no resistance to. It is similar to the situation with grey and red squirrels, or signal and native crayfish in the UK.

Today, the giant golden bumblebees thrive only in Tierra del Fuego, but the buff-tails will probably cross the narrow sea very soon and that may be the end of them. However, there is a glimmer of hope. Chilean scientists José Montalva has been organising his own citizen science project, asking the public to record sightings of giant golden bumblebees or buff-tails. They have had hundreds of records this year, mostly of buff-tails, but there have been a few sightings of giant golden bumblebees on the mainland. These may be the last few that haven't yet caught the disease, or possibly ones with some resistance. Perhaps they can form the foundation for a recovery.

The depressing thing about this tale is that it was entirely avoidable. I did once hear a suggestion that we should introduce giant golden bumblebees to the Falklands (where there are no bumblebees), to provide them with a refuge. Perhaps a bee could help build political bridges between Argentina and the UK? On the other hand, there may be other insects in the Falklands that would be harmed by the introduced bumblebees – it is probably too risky to try. Let's hope then, that the giant golden bumblebee can orchestrate its own recovery. But let's also learn a lesson once and for all – that moving species around the world is a dumb idea!

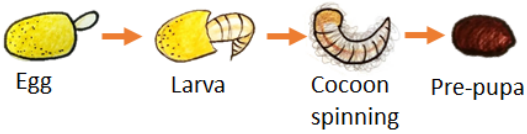
Neonicotinoids and mason bees

By Dr Beth Nicholls

Human-driven changes to the natural environment, such as habitat loss or pesticide exposure have been implicated in bee declines, but the majority of research investigating these factors has focused on just two species; honeybees and bumblebees. Here at Buzz Club HQ we have been investigating whether a less well studied bee species, the red mason bee (*Osmia bicornis)*, is affected by exposure to neonicotinoid pesticides during development. *O.bicornis* emerge from hibernation in April, and frequently choose to make their nests in 'bee hotels' that many of you may have in your gardens or allotments. Analysis of some of these nests, kindly donated by volunteers from across the UK, suggests that even in urban areas, mason bees may be exposed to agro-chemicals

Osmia bicornis

such as neonicotinoids. To investigate the effect of such chemicals on their development and survival we used special observation nests which had clear lids so we could observe the development of young bees all the way from egg to adult (see below). We spiked the pollen that the larvae (young bees) ate with varying concentrations of the neonicotinoid Clothianidin, and then recorded the time it took for them to reach the different developmental stages outlined below, as well as how the bees' weight changed over time. So far the results suggest that neonicotinoid exposure does not affect development time, and we will know in a month or so whether survival over winter and the behaviour of the emerging adult bees has been affected- watch this space for more updates!



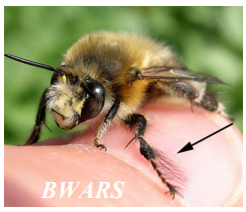
Developmental stages: after eating all the pollen, the larva spins a cocoon inside which it transforms (pupates) into the adult form.

Special observation nests. Here you can see an egg that has been laid on a lump of pollen collected by a female bee.

Pollinator Corner: The Hairy-Footed Flower Bee

By Dr Rob Fowler

This time of the year, a range of pollinators will begin to emerge once the temperature starts to rise. One fascinating bee you're most likely to see first is the Hairy-Footed Flower bee, aptly named due to the males having long hairs on the end of their legs (or tarsi). The males use these long hairs to help 'waft' their pheromones to attract females. The males and females have very different colouration, which is unusual in bee species. The males are much brighter, with pale hairs on their abdomen and thorax and a very yellow face. Females are completely black, apart from their hind legs which have long red hairs especially suited to carrying pollen back to their nests for their young. This species have a long tongue (or proboscis) which allows them to collect nectar from Lungwort, Comfreys and Deadnettles. They are commonly seen in parks and gardens between March and May often in large aggregations, and nest in old walls and sometimes in the ground. They are commonly seen quickly darting between patches of flowers, and the males tend to chase off other bees trying to encroach on their territory. If you manage to see one, please let us know on our twitter feed @The_Buzz_Club they are a clear sign that spring is approaching!



Male Hairy-Footed Flower Bee (note: long hairs on its tarsi).

Air Bee n' Bee: bringing research into schools

One of the main reasons we started The Buzz Club was to encourage and give everyone the opportunity to learn more about pollinators and what they can do to help conserve them. One way which we are trying to do this is by involving school children in our projects. Although implementing this is still in the early stages, the Buzz Club have teamed up with Brighton and Hove Environmental Education to trial our bee hotel project in several schools in and around Brighton. We are asking pupils to make their own bee hotels and then record when and how many bees nest in them. Although this project is very simple, it can give us important information on solitary bee emergence times and their success at producing offspring. If successful this year, we hope to offer it to more schools next year. We also hope to provide schools with resources in order to enable them to teach pupils important information about pollinators. This project is also available for all Buzz Club members to participate in. For more information visit out website.

A Leaf-cutter Bee bringing a leaf plate back to the nest

Great bee hotels already made by a Buzz Club member

Pollinator Abundance Network 2015 Results

The second year of our Pollinator Abundance Network (P.A.N.) project was undertaken between June and September in 2015. Over this time, we recorded a total of 205 bees (32 species), 32 solitary wasps, 48 hoverflies, 37 butterflies & moths and over 2000 other flies. These values are lower than those recorded in 2014, mainly due to fewer participants in the study. However, we recorded 6 bees per participant in 2015 compared to 5 in 2014. For hoverflies and wasps, the average number was equal between years, with just over 1 individual caught per garden. Interestingly, we recorded half the number of flies in 2015 than we did in 2014 per garden, which could be due to a wetter summer in 2015.

With data from these two years alone, it is difficult to interpret a change in abundance of insect populations. Long term data are needed to be able to determine if and why insect numbers are changing. There are some questions we plan to ask using this data, however, including why certain gardens are better than others and how the surrounding landscape affects pollinator populations, and we can add the species we've identified to national records.

Importantly, we need to keep going! If you are keen to help out again, or know anyone else who would like to join, please visit our website and sign-up to P.A.N. 2016.

Thank you to everyone who took part in 2015's project. Although some of you may have caught only a few insects, these are valuable records. If you would like more information on what species you recorded in your garden or allotment, please email the Buzz Club: buzzclub.uk@gmail.com

The Buzz Club Projects 2016

We have a range of exciting projects open for Buzz Club members, perfect for all ages, schools, garden groups, and anyone else who is keen! Along with several already-existing projects being brought into the fold, the Buzz Club has a range of 'citizen science' projects currently underway or planned for members. Have a look and see if there are activities that you would like to get involved with. We can also provide multiple kits for schools or larger groups that would like to take part.

Pollinator Abundance Network

P.A.N. is a nationwide project that aims to measure the abundance of pollinators, by sampling using pan traps (colourful bowls with soapy water that attract flying insects). Having a record of what species are caught in these traps, and from where, will allow us to find out which pollinators are declining most and fastest. Until we know this, we cannot target efforts to conserve them, but you can help by taking part!

Hoverfly Lagoons

Hoverflies are some of our often-overlooked pollinators, and much less is understood about their needs and behaviours than of bees. We hope to change that! The Hoverfly Lagoon project aims to create suitable habitat for hoverfly larvae in gardens by creating a 'lagoon' out of a bucket, or other container, packed with organic matter and water. This will provide a habitat for their larvae which we can study and record. Find out what species are making a home in your garden, and help attract more.

All About Alliums

Many of our favourite crop plants are members of the Allium genus, including leeks, onions and chives, and their ornamental relatives provide spectacular bursts of colour in summer borders. Many insects are attracted to the big, bright flower heads. We hope to make use of this, by recording how well the flowers get pollinated over a summer, which should give us an idea of how healthy the pollinator community is nearby.

Sow Wild! (SOLD OUT!)

Bees and other pollinators depend on flower-rich habitats which provide them with vital pollen and nectar. Planting wildflower patches in farmland is known to increase numbers of bumblebees, but we don't know how well this approach works in urban environments. Our 'Sow Wild' project aims to find out.

Air Bee n' Bee

Solitary bees (which do not form social nests) are important and often overlooked pollinators. You can help provide homes for these visitors with 'bee hotels', homemade or bought. We hope to monitor how successful these are.

Bees n' Beans

Looking at insect pollinator levels in gardens and allotments (and any other space), using the successful pollination of broad beans as a measure for bumblebee presence. This is a sister project to the Buzz Club, run as part of other research. It will be moving under the Buzz Club banner completely in 2017.

Tweets!

@The_Buzz_Club Awesome Insect Hotel spotted at Longleat Center Parcs

@The_Buzz_Club Hoverfly Lagoons created at a school

Please continue to send any photos to us at The Buzz Club buzzclub.uk@gmail.com or tweet us @The_Buzz_Club and we will add our favorite ones to the newsletter

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We are a group of scientists and non-scientists, adults and children, working together to find out more about bees and other pollinators. The Buzz Club's goal is to ensure that we look after our wild bees and other insects, giving them a future. We can only do this if we understand more about them; why are some disappearing, how many are left, and where are they? How fast are they declining? What can we best do to help them? Together, we undertake fun nationwide surveys and experiments.

Visit our website

www.thebuzzclub.uk

Help us study and save pollinators!