Urban pollinators – Preliminary results from research on insect pollinators in Brisbane, Australia, and Malmö, Sweden.

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City bees and rural hoverflies

Backyards with more flowers had more native bee individuals and more bee species. The number of bees found was not affected by human population density, so backyards in denser built suburbs can also benefit bees, as long as there is an abundance of flowering plants. In contrast, we found fewer hoverflies in densely populated suburbs, and it did not help to have more flowers locally to boost the numbers. We believe this is because hoverfly larvae require other types of habitat and food than bee larvae do. Bees only eat pollen and nectar, while hoverfly larvae for example feed on decomposing vegetation and aphids. In more densely populated suburbs, backyards are often smaller and the green spaces more intensively managed, leaving less hoverfly habitat. Despite the long distance and difference in biome, we found similar results for bees and hoverflies in the Swedish part of this study.

The list

Below is a table of the specimens caught and identified to species. Bees were identified by Dr. Tobias Smith and hoverflies by Susan Wright at the Queensland Museum. For me, the stars of the show were the glimmering Bluebanded bees (*Amegilla*) and their nest parasites the Neon cuckoo bees (*Thyreus)*, together with the cute and furry Teddy bear bees (another *Amegilla* species). The hoverfly community was highly dominated by one species, *Simosyrphus grandicornis*. An equal number of pollinators were only observed, not caught. They were identified as either bees or hoverflies and are therefore not included in the list below. To learn more about the species you can for example search for them on the Atlas of Living Australia website (https://www.ala.org.au/), or have a look at Bee Aware Brisbane's site (https://www.beeawarebrisbane.org/).

Table over the bees and hoverflies caught in backyards of Brisbane, November 2017.

Native wild bees (*scientific name*)	Ind.	Hoverflies	Ind.
Stingless bee (*Tetragonula* sp.)	40	*Simosyrphus grandicornis*	59
Bluebanded bee (*Amegilla cingulata*)	29	*Villa* sp. #1 (Bombylidae)	6
Leafcutter bee (*Megachile* (Eutricharaea))	21	*Sphaerophoria macrogaster*	3
Bluebanded bee (*Amegilla pulchra*)	14	*Syritta orientalis*	3
Sweat bee (*Lasioglossum convexum*)	8	*Episyrphus viridaureus*	2
Halictid bee (*Lipotriches flavoviridus)*	5	*Ischiodon scutellaris*	1
Leafcutter bee (*Megachile apicata*)	4	*Melangyna* (Austrosyrphus) sp.	1
Teddy bear bee (*Amegilla bombiformis*)	3	*Mesembrius hilaris*	1
Homalictus bee *(Homalictus* sp.*)*	3	*Paragus* (Pandasypthalmus) *politus*	1
Neon cuckoo bee *(Thyreus nitidulus)*	2	*Eristalinus* (Lathyrophthalmus) *aurulans*	1
Masked bee *(Amphylaeus nubilosellus)*	1	*Eumerus aurifrons*	1
Reed bee *(Braunsapis protuberans)*	1	*Eupeodes* (Macrosyrphus) *confrater*	1
Masked bee (*Hylaeus nubilosus*)	1	*Villa* sp. #2 (Bombylidae)	1
Sweat bee *(Lasioglossum bicingulatum)*	1		
Sweat bee *(Lasioglossum gilesi)*	1		
Leafcutter bee *(Megachile aurifrons)*	1		
Leafcutter bee *(Megachile mystaceana)*	1		

Bees and hoverflies respond differently to urbanisation

We analysed our samples of bees and hoverflies to find out what factors that drive the abundance and species richness of these pollinators. The factors we evaluated were the abundance of flowers growing in each backyard, and how green and densely populated the neighbourhood was. We found that the more flowers and the higher the number of flowering plant species, the more species of bees and the higher the number of bee individuals in backyards. In contrast, hoverflies were not affected by flowers. Instead, hoverflies increased in abundance when the neighbourhood was greener (a higher surrounding vegetation cover), and less densely populated.

In the Swedish part of this study, we compared urban and rural backyards with respect to native bee and hoverfly species. Quite surprisingly, we found that the number of bee species was higher in urban backyards than in rural ones. In contrast, the number of hoverfly species was clearly lower in urban than in rural sites. We also found that for bees, urban and rural backyards contained different sets of species, and therefore complement each other with regard to bee regional biodiversity. For hoverflies, the urban species were only a small subset of the rural species pool, pointing to the low quality of urban habitats for hoverflies.

A Neon cuckoo bee (Thyreus nitidulus).
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Is hoverfly habitat lacking in urban areas?

We believe that the reason that hoverflies are more sensitive to urbanisation is the habitat requirements of their larvae. Bee larvae are only fed pollen and nectar, which their mothers (or sisters for social bee species) collect and store in the nest. Therefore, many bee species can manage quite well as long as there are flowering plants when they are active and appropriate habitat for nesting. Hoverfly larvae, on the other hand live in habitats like dead and decaying wood and puddles of water, and feed on things like aphids and dead plant matter. Such habitats are likely more common in rural and peri-urban areas compared to in more urbanised suburbs. Even though hoverflies need flowers as adults, the larval stage could be the limiting factor when it comes to surviving in the city.

Bluebanded bee (Amegilla) on an eggplant flower.
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More flowers and less tidy backyards

Our preliminary results, together with other research from around the globe, show that there is a general need for more flowering habitat and more variation in urban vegetation to benefit a variety of insect pollinators. Some research shows that we should actually work less hard with garden and park maintenance in order to benefit biodiversity. In a recent study on butterflies in urban parks in Malmö, Sweden, we found more butterfly species in parks with more native vegetation and less intensive management. This means that exchanging parts of frequently cut amenity grass and ornamental exotic flowers for native grasses, herbs and shrubs, would benefit urban butterfly diversity. This is not only important for biodiversity *per se*, but also for our possibility to experience nature and species in our everyday life, close to where we live and work.

The next steps

This project continues throughout 2019 and we will continue to analyse and interpret our data. The goal is to better understand how the amount, spatial distribution, design and management of urban green spaces effect pollinator biodiversity and pollination. The results will be published both in scientific journals and in popular science reports.

Lund, Sweden.
January 2019

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