

Introducing PollAGen: measuring insect genomes over time

Inez Januszcak

The importance of pollinating species, in particular insects, is well documented. Pollinating insects are keystone species in almost all terrestrial ecosystems and are crucial for both food production and ecosystem health. According to the UK Wildlife Trust, 85-95% of the UK's insect-pollinated crops rely on wild pollinators, which include a vast variety of groups (bees, moths, butterflies, hoverflies and beetles, to name a few). It is estimated that insects pollinate £690 million worth of crops annually, with approximately one third of the food we eat relying on insect pollination alone.

However, it is no secret that UK pollinator numbers are declining. A study by the Natural History Museum in 2022 revealed that 60% of the UK's flying insect population has declined, with invertebrates affected by rising temperatures, fragmented habitats and excessive pesticide use in agriculture.

In response, an exciting new project has just launched at the Natural History Museum in London. Funded by NERC (Natural Environment Research Council), the PollAGen project is aiming to delve into the reasons behind this decline, but from a genetic standpoint. Whilst measuring abundance is one way of tracking these changes, little is known about the evolution of certain pollinator species and how they have adapted (or if they have adapted) to these dynamic fluctuations in the UK environment.

Utilising museum specimens collected at three different time periods, and modern specimens collected across the UK, PollAGen will examine changes in diversity across species which are in decline or expanding. Museum collections offer a unique opportunity to access DNA from historic pollinator specimens as a comparison point to the species we see today. Using specimens in this way, as well as using previously published genomic data, is one way to measure the impact of a change in population size, structure and even selection pressure across the insect population.

PollAGen are subsequently looking for entomologists, recorders or hobbyists who would like to be involved in this exciting research and able to collect specimens from across the UK. There are 15 pollinator species on the list; eight bees, two wasps and five hoverflies (summarised in the table provided), all with a relatively good UK distribution and easy to identify in the field. The project will provide all equipment as well guidance around sample preservation for genetic research – the only requirement is each species cannot be collected more than twice at each site, so there is a high enough geographical distribution of specimens.

If you would like to get involved, or have any questions at all, please don't hesitate to contact PollAGen Project Coordinator Inez Januszcak at inez.januszcak@nhm.ac.uk.

PollAGen species list

	Common name	Scientific name
Bees (females only)		
	Buff-tailed bumblebee	<i>Bombus terrestris</i>
	Garden bumblebee	<i>Bombus hortorum</i>
	Common carder bee	<i>Bombus pascuorum</i>
	Red-tailed bumblebee	<i>Bombus lapidarius</i>
	Brown-banded carder bee	<i>Bombus humilis</i>
	Ruderal bumblebee	<i>Bombus ruderatus</i>
	Red mason bee	<i>Osmia bicornis</i>
	Yellow legged mining bee	<i>Andrena flavipes</i>
Wasps (females only)		
	Common wasp	<i>Vespula vulgaris</i>
	Tree wasp	<i>Dolichovespula sylvestris</i>
Hoverflies		
	Marmalade hoverfly	<i>Episyrphus balteatus</i>
	Thick-legged hoverfly	<i>Syrirta pipiens</i>
	Batman hoverfly	<i>Myathropa florea</i>
	Gossamer hoverfly	<i>Baccha elongata</i>
	Dark-saddled Leucozona	<i>Leucozona laternaria</i>

Useful links

Wildlife Trust website: <https://www.wildlifetrusts.org/about-us/what-we-do/combating-climate-change-crisis/savingbees#:~:text=What%20do%20pollinators%20do%20for,in%20the%20way%20we%20farm.>

Bugs Matter Citizen Science Survey: <https://cdn.buglife.org.uk/2022/05/Bugs-Matter-2021-National-Report.pdf>