

The Micro-bee project: Assessing the presence of *Arsenophonus* bacterial symbionts in UK solitary bees

We have recently learnt that insect biology and ecology is commonly dependent on microbial symbiotic partners. Study of particular ‘model’ systems such as *Drosophila* and aphids have shown microbial partners may be transmitted from mother to daughter during reproduction. Most importantly, the symbionts commonly allow insects to utilize particular food sources and occupy ecological niches. They may also defend their host against attack by natural enemies, such as parasitic wasps and pathogenic fungi, and thus constitute an important part of the insects defence system. However, for the vast majority of insects, and indeed microbes, we know little about their impact in natural populations.

The purpose of this project is to understand if and how the bacterium *Arsenophonus* affects solitary bee species in the UK. Research in our group has detected *Arsenophonus* in 50% of managed UK honey bee colonies, and we are currently working to elucidate its effect on bee health. However, the presence and impact of this microbe in wild bees remains unknown. A study on German bee fauna found a similar symbiont in three species of solitary *Colletes* bee, but not in any other genera. In my project, I aim to:

- a) Establish which UK bee species carry *Arsenophonus*. This involves obtaining specimens of diverse members of the UK bee fauna and using molecular screens to test for *Arsenophonus*.
- b) Determine the effect of *Arsenophonus* infection on bee hosts.

The first stage of the project is a survey. To this end, we are seeking help sourcing bee material for testing. Below are some FAQs

What species do we want? Whilst we have a particular interest in *Colletes* bees, we are interested in all UK bee species.

How many do we want? Ideally, we would want 20-25 individuals of a particular species, with records of date/place of collection. However any specimens would be welcome, even a single bee.

Any material you do not want? The test for *Arsenophonus* is destructive –material is preserved in ethanol and then DNA prepared for a molecular screen. Thus, we will not be seeking any endangered species. We also wish to minimize the impact of removal on the population – this can be through taking a limited fraction (<10%), or taking individuals towards the end of their flying season.

How do I collect? Unfortunately, material from water traps, or from insects killed using ethylacetate, do not have well preserved DNA. Thus, we prefer collections made through net catches and then placed direct into ethanol tubes. Malaise trap catches into ethanol are also useful to us. Fridge/ice may be used to anaesthetise specimens after collection without interfering with DNA preservation.

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What will you provide to help me? We will send you sealed tubes containing ethanol to preserve material, and cover postage costs. We can also provide a letter explaining the project and its motives for wardens if you wish to get permission to collect in an SSSI/Nature reserve.

Will there be any feedback from your project? Studies such as ours can only progress with expert volunteers, and we are very grateful for your support. We will send you a report explaining what is found in terms of Arsenophonus infection in your species and more widely in the UK bee survey at the end of the project.

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