

P121

Correlates of rarity and fitness in UK bumblebees.

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As rare species tend to exist in more isolated, scattered populations than common species, theory predicts that they may experience reduced gene flow and population size, and as a result be vulnerable to the combined effects of drift and inbreeding. The subsequent reduction in genetic diversity may cause increased susceptibility to disease and parasitism. In recent years, many native UK bumblebee species have suffered significant population declines and reductions in range due to changing land use and habitat loss, with three species becoming extinct. Given their key role as pollinators, particularly in temperate ecosystems, it is vital to understand the possible effects that such declines may have on future population viability. This project aims to assess whether there is evidence of population structuring and reduced genetic diversity in a declining bumblebee species (*Bombus monticola*) when compared with an abundant and stable species (*B. pratorum*). The possible implications for fitness are assessed by measuring two components of the innate immune response; phenoloxidase (PO), an enzyme which plays a crucial role in melanisation, the process responsible for rapidly neutralising pathogens, and antimicrobial peptides (AMPs) which circulate in the haemolymph and provide a long-term antibacterial response. These results are compared with quantification of the parasite load to give an indication of overall fitness. The implications of the results for practical conservation applications are then discussed.