Abstract

Disease associations between honeybees and bumblebees as a threat to wild pollinators

M.A. Fürst[1]*; D.P. McMahon[2]; J.L. Osborne[3]; R.J. Paxton[4]; M.J.F. Brown[1]

[1]Royal Holloway University of London, School of Biological Sciences, Bourne Building, Egham TW20 0EX, UK

[2]Queen's University Belfast, School of Biological Sciences, 97 Lisburn Road, Belfast BT9 7BL, UK

[3]Rothamsted Research, Department of Agro-Ecology, Harpenden AL5 2JQ, UK

[4]Martin-Luther-Universität Halle-Wittenberg, Institute for Biology/General Zoology, Hoher Weg 8, 06120 Halle (Saale), Germany

Emerging infectious diseases (EIDs) pose a risk to human welfare, both directly and indirectly, by affecting managed livestock and wildlife that provide valuable resources and ecosystem services, such as the pollination of crops. Honeybees (*Apis mellifera*), the prevailing managed insect crop pollinator, suffer from a range of emerging and exotic high-impact pathogens, and population maintenance requires active management by beekeepers to control them. Wild pollinators such as bumblebees (*Bombus* spp.) are in global decline, one cause of which may be pathogen spillover from managed pollinators like honeybees or commercial colonies of bumblebees. Here we use a combination of infection experiments and landscape-scale field data to show that honeybee EIDs are indeed widespread infectious agents within the pollinator assemblage. The prevalence of deformed wing virus (DWV) and the exotic parasite *Nosema ceranae* in honeybees and bumblebees is linked; as honeybees have higher DWV prevalence, and sympatric bumblebees and honeybees are infected by the same DWV strains, *Apis* is the likely source of at least one major EID in wild pollinators. Lessons learned from vertebrates highlight the need for increased pathogen control in managed bee species to maintain wild pollinators, as declines in native pollinators may be caused by interspecies pathogen transmission originating from managed pollinators.

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* Correspondence to M.A. Fürst