A new phylogeny study sheds light on the relationship between different species of bumble bees throughout the world. This information helps narrow the search for which bumble bee species, important to agricultural crop pollination, are on the decline in the United States.

Bumble bees are among the most important wild bees in the United States. These insects are increasingly used in the managed pollination of greenhouse crops, such as tomatoes and peppers. Despite their elevated importance to agriculture, bumble bee populations are on the decline in Western Europe and North America. Five bumble bee species in the United States are currently on the Xerces Society Red List of threatened insects. The timely work of entomology professor Sydney Cameron and her colleagues at the University of Illinois and the Natural History Museum in London contributes important insight into this critical agricultural problem.

Large-Scale DNA Analysis of Bumble Bees: Worldwide Phylogeny Points to Commonality in the Decline of North American Species

Sydney Cameron, University of Illinois, Urbana-Champaign

**Figure 1. Images of bumble bees from the long-tongued group: a) \textit{B. (Megabombus) supremus}; b) \textit{B. (Diversobombus) trifasciatus}; and the short-tongued group c) \textit{B. (Melanobombus) keriensis}.**

Photograph Credit - Paul Williams, Natural History Museum, London.
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Photograph Credit - James Whitfield, University of Illinois, Urbana-Champaign.

The reasons for the decline remain unclear and may vary regionally. Species in this subgenus include the most important pollinators for managed agriculture, specifically B. occidentalis in the United States and B. terrestris in Europe. Bombus occidentalis and another species B. franklini have all but disappeared in the United States. In addition, the range of their close relatives has been radically reduced compared to a decade ago. The bumble bee phylogenetic tree also reveals that two species, B. impatiens and B. vosnesenskii, within another subgenus, Pyrobombus, are undergoing range expansion in the United States. These species are distantly related to the species from the subgenus Bombus s.s., currently in decline.

Most bumble bees in the United States belong to the shorter-tongued group. From the phylogeny study, the researchers determined that out of the 47 bumble bee species in the United States, five of the declining species belong to the subgenus Bombus sensu stricto.

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IMPACT

The information gained from this novel and comprehensive phylogenetic tree may allow scientists to resolve the causes leading to the decline of subgenus Bombus s.s., and the increased range expansion in different bumble bees groups. Ultimately, the knowledge gained from understanding bumble bee relationships may assist scientists in working with other bumble bee groups to aid future agricultural applications.


Figure 1. Bumble bee field work on the Tibetan Plateau in the Sichuan basin of southwestern China.