

Review of 'Sensory plasticity in a socially plastic bee' by Boulton and Field

This manuscript describes an innovative study addressing a central questions in social behavior and evolutionary biology, and it merits further consideration. The writing is generally clear and well-organized, and the morphological analyses are detailed and seem to be appropriate. Below, I list some concerns which, if addressed, could strengthen the paper considerably.

- 1 The authors focus largely on the north-south geographical dimension, whereas the animals are most probably responding to some cumulative thermal parameter, not latitude per se. Certainly the climate in Cornwall differs markedly from the southeast corner of Britain, and, in general, places farther west (e.g. Belfast) will differ from the eastern coast of Britain. Can thermal measures (meteorological records) for the sites and year in question be provided and then evaluated in the context of the main hypothesis ?
- 2 I question whether the sample sizes in the statistics are considered correctly. Many would consider that there are only three independent samples – North Scotland, Belfast, and Cornwall, with individuals within these sites being rather non-independent. For example, they may be rather closely related genetically, in addition to developing in the same exact locality. This restriction would not necessarily invalidate the study, as field data like these are hard to come by, but it should be discussed.
- 3 At a much broader evolutionary level, there is an inherent chicken vs egg issue here. The correlation between social behavior in Hymenoptera and sensory apparatus is clear, but one often wishes to know, or at least speculate on, the sequence in which the two characters evolved. That is, were species and populations with enhanced sensory apparatus – which may have originated for various reasons – more likely to evolve sociality ? Or, were species and populations with incipient sociality – owing to climate and or resources, for examples – more likely to evolve more sophisticated sensory receptors ?
- 4 My final point is an ethical one, which I hope can be addressed in a satisfactory way : The transplantation experiment, from North Scotland to the southeast corner of Britain, is innovative and provided valuable results. But one wonders whether any of the transplanted bees, of either generation, escaped and led to admixture with the local population, thereby confounding population genetic matters for future scientists ?