

OR191

Historical biogeography predicts social complexity in the small carpenter bees

Sandra Rehan

The small carpenter bees, genus *Ceratina*, offer important insights into the early stages of sociality. *Ceratina* provide a unique opportunity to study the evolution and maintenance of social complexity in a group benefitting from detailed behavioural studies and a well-established phylogeny. Small carpenter bees are globally-distributed (excepting Antarctica) and comprise a single genus *Ceratina* with 21 subgenera, most of which are endemic to continents. Species range from solitary to eusocial; solitary species are typically found in temperate environments and social groups are recurrent in tropical regions. Unequal rates of forward and backward dispersal are one mechanism that will produce regional differences in biotic composition. Any such differences will affect how ecosystems are assembled and it is important to understand the implications of niche composition on social evolution. Using sequence data from three genes and 99 species, and ancestral distributions the historical biogeography of this genus is inferred using Bayesian and maximum likelihood approaches. These data show that *Ceratina* had an African origin in the early Eocene followed by rapid radiations around the globe. Once a continent was occupied there have been no back dispersals. These results are similar to studies on two other major bee groups indicating that back dispersals are very rare. It is unlikely that physical barriers can explain these patterns. However, they might be explained by assembly rules such as niche pre-emption or reduced opportunities for escaping into enemy-free space. At a continental level it is likely that the composition of bee faunas is more strongly influenced by very early dispersal events rather than later physical barriers to dispersal. These data highlight the importance of molecular phylogeny and historical biogeography for understanding the relative roles of phylogenetic inertia and regional ecology on the evolution of social phenotypes.