ENERGETIC EFFICIENCY OF FORAGING MEDIATES BEE NICHE PARTITIONING

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Introduction to Our Research

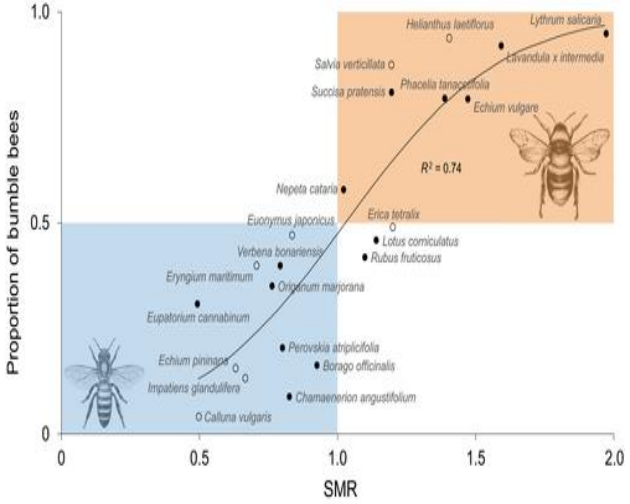
- identifying key factors influencing species distribution and assembly.
- Key Factors we look at include forager tongue length, body mass, wing length, and memory performance
- The energy expenditure (cost) of foraging bees can be quantified as it is proportional to body mass
- Nectar is a challenging resource to collect

Materials + Methods

- Bumble bees (*Bombus* spp.) and honeybees (*Apis mellifera*) are both generalist foragers
- We tested the energetic trade-off hypothesis by gathering data on the flower-visiting rates and body mass of bumble bees and honeybees foraging for nectar across 22 plant species
- speed:mass ratio (SMR) of the two genera on each plant species. This measure includes both energy acquisition (*S*; speed of flower visitation), and costs (*M*; body mass, including load weight)

Discussion

- Our primary finding strongly supports the prediction of the energy trade-off hypothesis, which predicts that bumble bees and honeybees will predominate on plant species where they have the greatest net energetic benefit
- Bumble bees outnumbered honeybees on flower species on which their speed:mass ratio (SMR) was greater than that of honeybees and vice versa. In addition, on some plant species neither bee genus had a large SMR advantage, and the



Results

- Bumble bees and honeybees comprised 96% of all flower visitors recorded and collected virtually all (99%) of the nectar from our 22 study plants
- The detailed energy budgets seen in Fig. 2 show that bumble bees (b) had a significantly greater energetic efficiency (*E*), on average 3.9 times that of honeybees (h), on those plant species on which they predominated
- Tellingly, the speed:mass (SMR_b/SMR_h) and the energy efficiency (E_b/E_h) ratios were significantly positively correlated