



How intra-colony differences in bumble bee learning ability influences their foraging choices

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In many social insect groups there is appreciable variation in learning ability among closely related individuals, including between foraging workers within the same bumble bee colony. This level of variation is not expected; foraging is a complex task requiring individuals to learn about and choose between flower species, which differ in available nectar and pollen resources and the signals advertising these rewards. It is expected that individuals or colonies with higher learning capacities will perform better when faced with complex foraging decisions. Indeed, it has been demonstrated that enhanced visual-based learning can result in increased nectar collection by bumble bee colonies. However, learning ability may influence foraging in other ways that are important to colony health and productivity. Learning ability may alter the number and variety of flowers a forager visits, consequently altering the diversity of floral resources collected. Using bumble bees, we investigated how variation in learning performance among foraging individuals influences their foraging choices (i.e. the types and morphology of flowers visited). We assessed individual learning performance (visual or olfactory) in the lab and then monitored the foraging behaviour of the same individuals in the field, using radio frequency identification (RFID) tagging and visual observations. These data allow us to determine whether individuals that perform better in associative learning tasks visit a greater diversity flowers and/or flowers with more complex handling mechanisms, thus providing further insights into the evolutionary consequences of intra-specific variation in learning abilities within social insect colonies.