



Variation in learning shapes foraging behavior in Honey Bees

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Individual variation in behavior can result from variation in learning capacity. In complex societies, this variation may play a role in establishing important divisions of labor. However, the connection between learning behavior and the important downstream effects in task performance or social behavior is often difficult to make. Some learning behaviors are easy to define in a tightly controlled lab situation but may be difficult to explore in the field. Conversely, natural stimuli in nature may be difficult to replicate in the lab. Here, we provide the first link between a latent inhibition (LI), a learning behavior that is well-defined in the lab, to differences in foraging behaviors in honey bee workers. LI is the ability to learn to ignore unrewarding stimuli. Interestingly some honey bees exhibit strong LI and readily ignore unrewarding odors, while some honey bees have weak LI, learning unrewarding odors and novel odors readily. We show that scout bees have significantly higher LI than recruit bees. Further, scouts exhibit higher concentrations of tyramine in their brains compared to recruits. Individuals that exhibit strong LI show differential gene expression in their brains than weak LI individuals. These differences in learning behaviors may in fact play a major role in division of labor in social insect colonies. Therefore, understanding the genetic and physiological basis of individual level behavior allows us to further explore how variation in leads to collective outcomes.