



Regulation of individual differences in the waggle dance activity of honey bee foragers

Author(s): Ebi Antony George, Axel Brockmann , Ebi Antony George

Institution(s): National Centre for Biological Sciences, Bangalore, India ; National Centre for Biological Sciences, Bangalore, India ; National Centre for Biological Sciences, Bangalore, India

Division of labour is a hallmark of eusocial insects like honey bees. Different worker groups are involved in different tasks at the same time, in accordance with the colony need. However, each individual worker must independently integrate multiple cues and signals and do the appropriate behaviour, because there is no centralised organisation. Hence, there are multiple lines of communication between various worker groups, to ensure that tasks like foraging occur an efficient manner. Honey bee foragers use the waggle dance behaviour to recruit nest mates to profitable food sources. The waggle dance contains information about the navigational as well as the reward value of the food source. Importantly, it incorporates information about the colony food stores as well as the food influx into the colony. Although the waggle dance itself is well characterised, very little is known about individual differences in the waggle dance activity as well as the social factors that might be involved in its regulation. On observing individual foragers over consecutive days, we found consistent inter-individual differences in dance activity under constant food reward and environmental conditions. We then manipulated foraging group compositions by either removing some foragers or allowing recruits into the foraging group. Removing foragers led to an increase in the dance activity of some of the remaining foragers. Allowing recruits into the foraging group led to an immediate and drastic reduction in the dance activity of all foragers. Currently, we are using an agent-based modelling approach to understand the importance of different parameters in regulating individual variation in dance activity. Our work reveals a fine scale division of labour within honey bee foraging groups. It also reinforces the importance of the social environment in task performance in eusocial insects and highlights the role of social communication in maintaining consistent individual behavioural patterns.