



# BIOLOGY COLLOQUIUM

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Hosted by Dr Kathy Su Feng-Yi

## How to build a bigger bee: the regulation of body size and caste in bees



### By Julia Bowsher

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Body size is an important phenotypic trait that correlates with performance and fitness. For determinate growing insects, body size variation is determined by growth rate and the mechanisms that stop growth at the end of the juvenile stage. Larval insects are generally hypothesized to initiate metamorphosis once they attain a critical weight. However, we demonstrate that starvation cues metamorphosis in the solitary bee *O. lignaria* and that a critical weight does not exist in this species. Larvae initiated pupation <24 hours after food was absent. Removing food at different larval masses produced a 10-fold difference in mass between smallest and largest adults. We also investigate whether juvenile hormone signaling and ecdysone are involved in the mechanistic basis of this response. Our experiments on honey bee larval growth suggest that metamorphosis may be regulated in the same way in honey bees. Using in vitro rearing and a factorial experimental design, we demonstrate that food quantity is a regulator of caste in honey bees. We discuss the implications of body size variation for insect species that are provided with a fixed quantity of provisions, including many bees which have economic value as pollinators.

