

## **Development time and individual size**

### **Results and Discussion**

Development time for each sex was influenced by an interaction term, although this reflected the magnitude rather than direction of the differences: both males and females took longer to develop when reared in smaller containers (table S1), but only females took longer to develop with larger numbers of larvae (table S1). The pupal weight of males and females were greater when they were reared with fewer larvae, but only the weight of males was affected by the size of the container (table S1 & S2).

While development time may be one of several factors determining pupal weight, it is not clear how the different treatments might influence development time. Insect larval development can be hindered when individuals are reared in high densities [1-3]. The onset of pupation can be inhibited by interference by other individuals, which is likely to be greater in higher densities. The slower development time of females in the treatment with smaller container and 50 larvae is consistent with this view. We find no evidence that larvae experienced greater competition for food when reared with more individuals, despite being fed *ad libitum*: individuals reared in smaller containers became heavier than those reared in large containers. Body size and developmental time can be determined by the same underlying factors, leading to the assumption that these traits should be strongly linked [4]. However, there is no *a priori* logic for including developmental time as a covariate in our models. While the treatments influence developmental time, this is likely to be a mechanism determining the variation in the size of organs, and does not necessarily confound the interpretation of our results. Indeed, models that include development time may be difficult to interpret: do we expect more or less investment for a given development time? Thus, while we want to measure the treatment effects on organ size, independent of body size, we don't want to evaluate these effects independent of developmental time.

### **References**

- [1] Brent, C.S. 2010 Stage-specific effects of population density on the development and fertility of the western tarnished plant bugs, *Lygus hesperus*. *Journal of Insect Science* **10**, 49. (doi:10.1673/031.010.4901.).
- [2] Gu, H. & Danthanarayana, W. 1992 Influence of larval rearing conditions on the body size and flight capacity of *Epiphyas postvittana* moths. *Australian Journal of Zoology* **40**, 573-581. (doi:10.1071/ZO9920573).
- [3] McNamara, K.B., Elgar, M.A. & Jones, T.M. 2009 Adult responses to larval population size in the Almond moth, *Cadra cautella*. *Ethology* **116**, 39-46. (doi:10.1111/j.1439-0310.2009.01714.x).
- [4] Nijhout, H.F., Roff, D.A. & Davidowitz, G. 2010 Conflicting processes in the evolution of body size and development time. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* **365**, 567-575. (doi:10.1098/rstb.2009.0249).