

## Discussion questions—the future of evo-devo

### Irschick et al.

Irschick et al define 'functional complexity' as "the number of moving elements within a trait complex, which together allow animals to perform ecologically relevant functional tasks, and which can evolve independently", using jaw complexity as an example. How could we define functional complexity for plants?

In describing the relationships between genes, morphology, and functional ecology, we might be dealing with some very complex morphologies. We've seen landmark analyses and PCA to describe morphospace. What other ways may we measure complex traits?

What is the relationship between morphology and function? What is the use of some body parts without meaningful function?

The Irschick paper is trying to be predictive: what is a null hypothesis for testing whether or not an evolutionary radiation is adaptive? Would it be the "empty spaces" in Figure 1, and can we think of an example?

How might integrating the study of genotype and phenotype with investigations of adaptive radiation change how we view some of the previous model systems that we have looked at?

Where would [insert favorite adaptive radiation]\* be placed along the morphological disparity-functional complexity curve in Figure 1 of Irschick et al. (2013)?

\*in the absence of alternative examples, the prior is very high that a fish example will be provided

### Parsons and Albertson

What are the limitations of the combined QTL mapping and population genomics approach proposed by Parsons and Albertson? What model systems might not benefit from their proposed research program?

What do we really learn when we show that altering the activity of a particular pathway (either through pharmacological or RNAi type approaches) alters morphology? Is it something more than we learn when we show that feeding [insert favorite metazoan here] less results in a smaller body size?

Parsons and Albertson seem to focus a lot on how we can get molecular data for complex traits. How important is it really to have the specific mutations pinned down for understanding phenotype evolution? The most important? Is anything more important? (a genuine question!)

### General

To what extent do the approaches advocated in these papers represent productive ways forward in evo-devo? Do they leave major gaps?