

Paper for Tuesday 3 February 2009

Bowman, J., Smyth, D. R. and Meyerowitz, E. 1991 (*Development*) Genetic interactions among floral homeotic genes of Arabidopsis

Questions for Thought

As you read this paper, do not be intimidated by its length, information amount or obscure anatomical details. Focus on the methods used (allelic series, mutant combinations) and the logic applied to arrive at a predictive model for further experiments. Table 6 is a useful summary of all their data and will be the basis of our discussion.

As before, **write down questions** you have about the logic or rationale for each experiment, the method employed, and the conclusions drawn. Come up with at least three questions. Turn in your questions as homework at the beginning of class. During class we will discuss your questions along with the QfT below. We will emphasize the questions in bold; the other questions are meant to help you think about each issue.

1) Before reading this paper: unlike animal cells, plant cell cannot move and their identity is largely determined by position. **What biological mechanisms may allow adjacent cells to acquire different cell fates?** Think mechanistically.

2) **What is the major scientific question the authors aim to address?** What was known before this study was published?

3) The authors extend previous work by adding additional alleles. **Why is this a worthwhile approach?** What can you learn from testing different alleles? Think mechanistically and remember the concept of modularity.

4) **What do the single mutant phenotypes imply about the functions of the four genes in flower patterning?** What organs require Agamous function? *Apetala2*? *Pistillata* and *Apetala3*?

5.) What are transheterozygotes? What questions can you address with transheterozygotes? In case you have two lethal alleles resulting in a viable transheterozygote – what is a likely explanation?

6. The authors are using different temperatures for some of their phenotypic analyses. Why? Phenotypes and their severity are changing. What could this imply? Think mechanistically.

5) Remember what you learned about epistasis analysis. **How do they choose the alleles for their double and triple mutant analysis?** What are potential pitfalls? Which mutant combinations hold the most information?

6. What results allows them to conclude that AP2 and AG interact with each other? What kind of interaction seems most likely from the results?

7. Turn to Table 6 and Fig. 9 and think about their how their results allow them to arrive at the ABC model. **What results can the model explain and which aspects are not represented?** What predictions can the model make for expression patterns and protein interactions?

8. **If this model holds true how can it explain different flowers in different evolutionary lineages?** Think of how the Arabidopsis flowers (crucifer) differs morphologically from many other flowers.