**From hermaphrodites to males and females**

**Study guide and reading assignments**

**The numbers in front of each study question correspond to slide numbers, as presented during lecture.**

***Reading assignments:***

* Required: Aryal and Ming. Papaya. Full paper: it can be downloaded, as pdf, from Canvas – in the “Files” folder.
* *Highly recommended, but not required:*
  + Eckardt\_CMS
  + Takayama and Isogai\_Self-incompatibility

2 Be able to define all terms. Why is a continuum shown – starting to the right of 0 and to the left of 100%?

3 What lines of evidence point to the ancestral state being hermaphroditic?

4 Compare and contrast pros and cons of outcrossing. What is meant by “unwanted gene flow”?

5 Explain how something as simple as floral architecture can affect the degree of outcrossing.

6,7 Compare general definitions of self-incompatibility and male sterility in the context of perfect flowers.

8 Can CRISP-Cas9 be applied to sex determination in plants with perfect flowers?

9 Reflect on the basal condition and pay close attention to the points in growth and development when different species selectively abort floral organs. What implications does timing of selective abortion have on manipulating the process to achieve self-fertility?

10, 11 Define moneoecy. How simple is it to make maize into a plant with perfect flowers? Is the example give likely to show quantitative or qualitative inheritance?

12 In natural ecosystems, what advantages are there to a plant like *Corylus* combining monoecy and self-incompatibility?

13 What challenges does self-incompatibility pose to breeding hazelnuts (filberts)? What tools do breeders/geneticists have to deal with self-incompatibility? How do farmers deal with self-incompatibility in this species?

14 What is diagnostic of an incompatible reaction in hazelnut and what does this have to do with double fertilization? Why might hazelnut breeders want to clone the “S” locus?

15 Why are producers of hybrid seed interested in male sterility?

15 What were the pros and cons of the “T” cytoplasm for hybrid seed production in maize?

16, 17 Define dioecy. How does an X, Y sex determination system ensure ~ = numbers of males and females?

18 Hops are dioecious, and female plants are desired for commercial production. Currently male and female plants cannot be distinguished during juvenile growth. What are the prospects of being able to track a single allele with a molecular marker to select seedlings based on their sex?

19 Explain how and why doubled haploids are used to produce super male asparagus.