

As always, these are the important points of each lecture and we will use these to craft multiple choice questions. A good way to study would be to try to craft multiple choice questions yourself. If you think you have a good one, submit it to chris.simon@uconn.edu and I might use it on the exam!

Lecture 24 - Allochronic, Parapatric and Sympatric Speciation Secondary Contact and Hybridization.

1. Know how the *Magicicada* Decim Group case study provides evidence for allochronic speciation, reproductive character displacement, and reinforcement.
2. Why did Martin and Simon (1988, 1990) not search for the contact zone between mtDNA lineage A and B in *Magicicada* 13-yr cicada Brood XIX?
3. What geographic evidence did that find that suggested that the new 13-year cicadas came from 17-year cicadas? How did they know that the new 13-year cicadas were recently derived from 17-year cicadas?
4. Why did Simon et al. 2000 predict that mating would be random? What did they find? What explanation did Marshall and Cooley's data suggest?
5. Why did Marshall and Cooley test female song preferences?
6. Why was it important to survey outside the zone of the contact zone between the new 13-year cicadas (*M. neotreddecim*) and the older 13-year cicadas (*M. septendecim*)?
7. How is crowd sourcing being used to provide evidence for life cycle switching (early and late populations)?
8. Given a hybrid zone between two parental populations, what do you predict would be the fate of an allele? Would it move from one parent through the hybrid zone to the other parent or not, if it were _____
 - a) selectively advantageous? b) selectively neutral? c) selectively disadvantageous?
9. Define parapatric speciation.
10. How might environmental differences on either side of an ecotone be important? Use the term "genetic hitchhiking" in your answer.
11. Explain how Dobzhansky Muller interactions could be important in parapatric speciation.
12. Is there evidence to suggest that speciation can happen in the presence of gene flow? Was this idea controversial in the past?

13. Are reproductive traits more or less likely to be affected by gene flow across contact zones?
14. Is divergence with gene flow expected to be faster or slower than divergence without gene flow?
15. Know the consequences of contact between chipmunk species that are closely related versus those that are distantly related (i.e., diverged farther back in time).
16. Define sympatric speciation. What conditions does it require? What examples did we look at in class?
17. Why is current day overlap not evidence for sympatric speciation?

Lecture 25. Hybridization, speciation, host races, chromosomal speciation.

1. If two species come into secondary contact but their reproductive prezygotic signals do not differ much at all from each other, what do you predict would be the outcome?
2. If two species come into secondary contact and their reproductive prezygotic signals differ just enough from each other, what do you predict would be the outcome?
3. Decreased fitness of hybrids compared to non-hybrids in a contact zone would be expected to lead to selection for what?
4. Individuals that engage in courtship with individuals coming from the opposite side of a contact zone can have lowered fitness without even completing mating. Why?
5. What kind of selection occurs in the case of reproductive character displacement (or any kind of character displacement for that matter)?
6. Define host-race speciation and give an example.
7. How did gradual allochronic change assist in the evolution of host races of true fruit flies of the genus *Rhagoletis*? Mention hawthorn, apple and cherry in your answer.
8. Why do some people want to call this "micro-allopatric" speciation? Why is this different from allopatric speciation as classically defined?
9. Briefly describe host races of *Enchenopa* tree hoppers.

10. Synthesis question: What example did we see in a previous lecture of chromosomal mutations like inversions reducing fertility of the individuals carrying them if crosses were made between different populations (producing transversion heterozygotes)?
11. You've seen this question before: Why is chromosomal speciation (other than polyploidy) expected only in organisms that exist in small populations?
12. The tree frog *Hyla versicolor* is believed to have evolved from *Hyla chrysoscelis* by what mechanism?
13. What is very unusual about the species *H. versicolor*? Under each of these species concepts (biological, or phylogenetic), would *H. versicolor* be one species, three species, or not a species? How would you view *H. chrysoscelis*?
14. What is parallel speciation? What examples did we discuss? Why is parallel speciation distressing to proponents of the phylogenetic species concept?
15. Why did the lizard (*Plestiotodon skiltonianus* and *P. gilberti*) example of parallel speciation fall apart upon further examination? What kind of data was the first hypothesis based on? What kind of data was the second hypothesis based on?
16. Hybrid species are often not very fit at first but over generations individuals become more fit. What is the explanation for this? In what two examples did we see this?
17. In the case of the hybrid sunflower, *H. anomalus*, when Rieseberg et al. created three artificial lines in the laboratory by hybridizing the parents and then breeding the hybrid offspring, how did these lines compare to the wild hybrids? Why was this interesting?
18. What do we mean by "co-adapted allele complexes" and why are they important?

Bonus. More questions from lecture 23 to help study for the final.

1. Know the difference between vicariance and dispersal.
2. If a barrier arises in the middle of a population how would the consequences of that barrier be different from a barrier that arises near the edge (periphery) of a species distribution?
3. Know how the species diversity of vertebrates compares to the species diversity of different holometabolous insect groups.
4. What does holometabolous mean in the context of insects? If you didn't get this down in your notes when I told you, Google it!

5. What are the problems with massive, rapid surveys of biodiversity?
6. Eldridge and Birmingham produced evidence from mtDNA genetic distance measures for six Gulf coastal plain freshwater fish species that [what typed of] speciation event took place prior to the Pleistocene? How do you imagine that these differences that we see today were maintained throughout the Pleistocene?