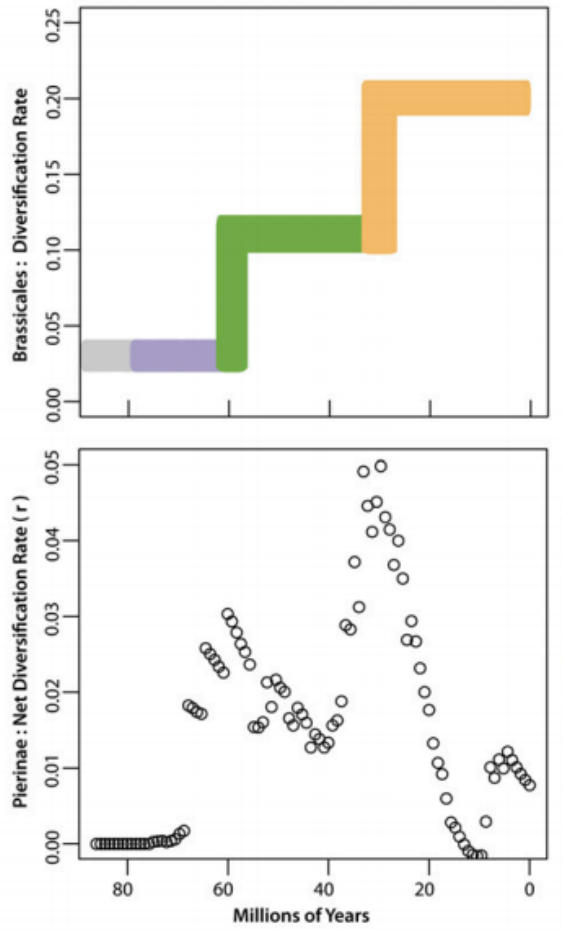
Name:

BIOL415 Quiz #2:



1) The figure above shows the diversification rate of Brassicales (plants that produce glucosinolates) and Pieridae (butterflies) (Edgar et al. 2015 PNAS).

Given what you know about this system, do you think these plants and the butterflies have co-evolutionary interations? Explain why/why not in 2–3 sentences (2 pts).

Model answer:

Yes. I think this macroevolutionary patterns (diversification rates) of both groups shows some concordance with the dispersed coevolutionary interactions. The dramatic increase of the diversification overlaps between the plants and the insects. This diversification may have been caused due to the arms-race between the chemical defense complexity of plants and evolutionary counteracts of butterflies.

2 pts: 0.5 pts for 'yes', 0.5 pts for correctly defining coevolution or using in context, and 1 pt for a logical, coherent explanation of why (i.e. chemical defense...etc).

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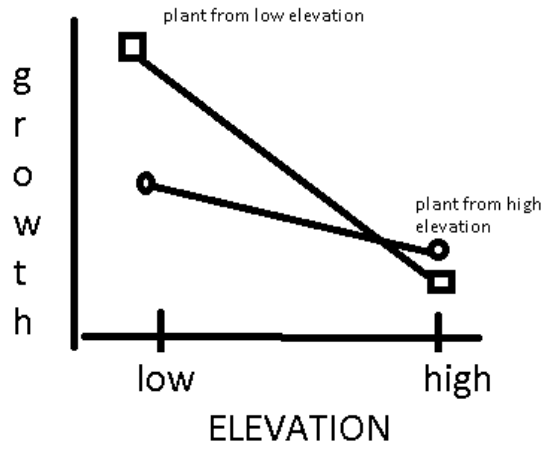
2) You do a reciprocal transplant experiment on high elevation and low elevation *Rubus spectabilis* and measure growth rate. Squares = low elevation population. Circles = high elevation population.



a) In which location does high elevation *R. spectabilis* have the highest growth rate? (1 word; 1 pt) low
b) Is there evidence of local adaptation? Why or why not? (1-2 sentences; 2 pts)

Yes (1 pt), local populations grow better than migrant populations (1 pt) (any logical explanation).

3) One major benefit of selfing is the transmission advantage. This advantage is lost when δ>0. 5? Explain why this happens (2 sentences; 2 pts)
HINT: Consider pollen and seed portions of reproductive output.

When inbreeding is greater than 0.5, the extra reproductive output of the pollen parent (from fertilizing both self and others) is canceled out by the reduction in viability in the selfed offspring.
Outcrossing:
Pollen Seed
1 + 1 = 2
Selfing:
Pollen(out) Pollen(self) Seed(self)
1 + (1* δ) + (1*δ) = 2

0.5 pts for identifying delta as inbreeding depression
0.5 pts for explaining transmission advantage or using it correctly
1 pts for explaining how inbreeding depression cancels out extra output.
Minus 0.5 pts if you incorrectly specify all inbreeding depression applying to pollen.