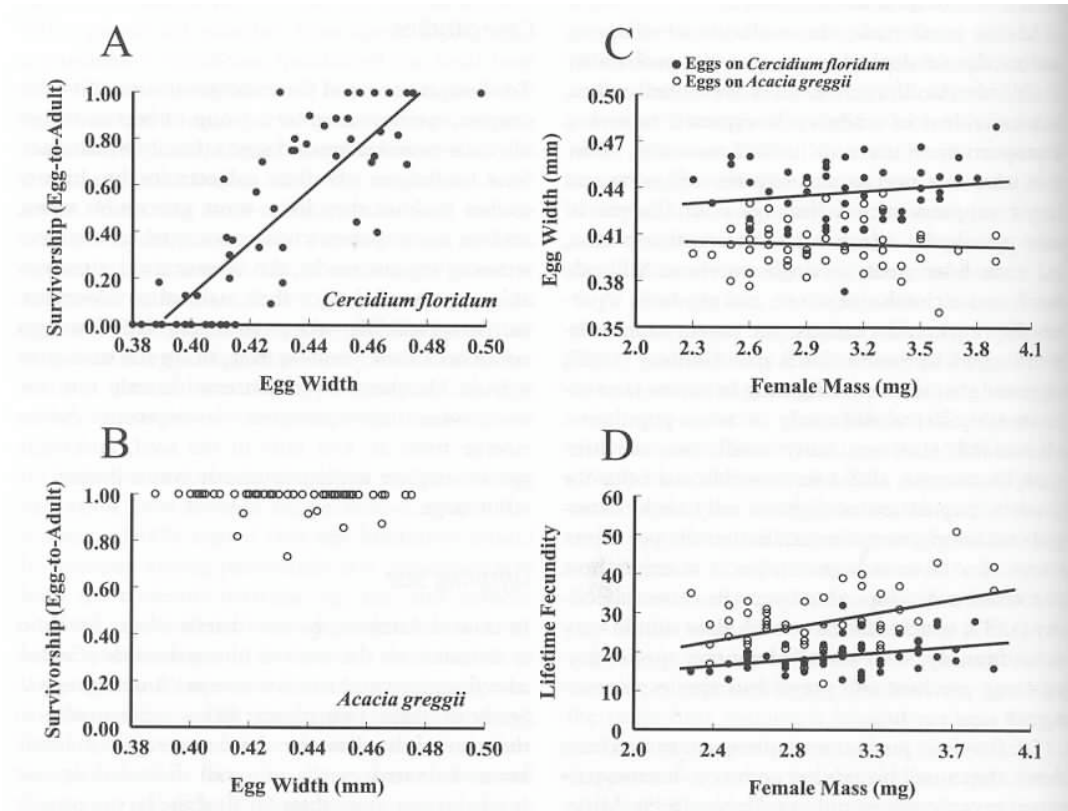


Quizlein # 2

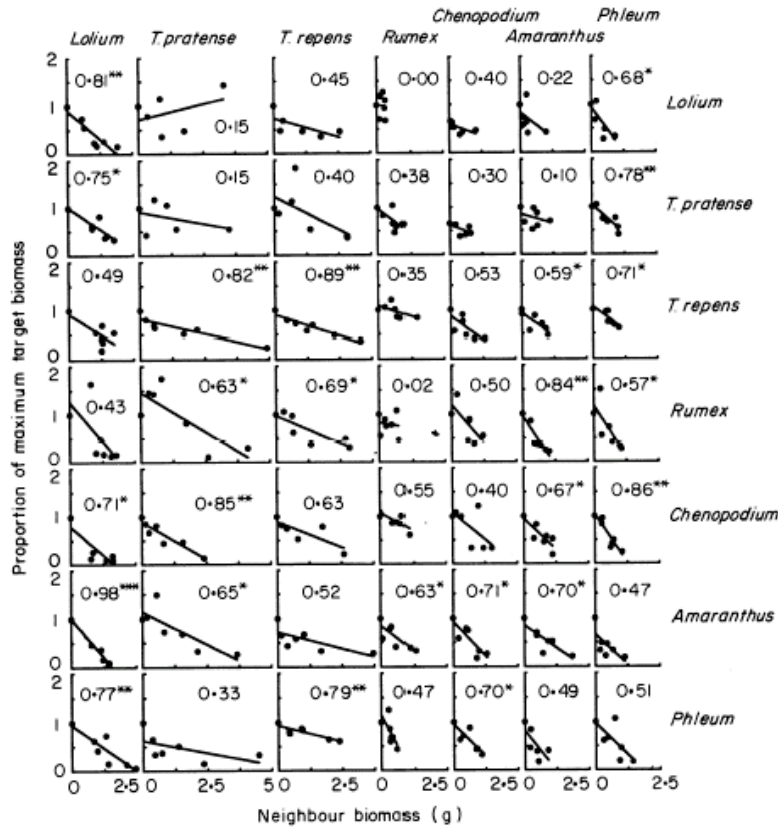
Full credit given for answers that are complete and concise.

1. The beetle *Stator limbatus* lays its eggs on seeds of two different plant species. *C. floridus* seeds have thicker coverings than *A. greggii* seeds. Use the data shown below to argue that the mother beetles exhibit *adaptive plasticity* in egg size. (10 pts.)



2. Using selected examples from the figure below (taken from Goldberg and Landa's paper), explain how these data indicate

- (a) a difference among species in *competitive effect* (5 pts.)
- (b) a difference among species in *competitive response* (5 pts.)



(c) Why did their evaluation of competition differ from the above when they used *neighbor density* on the X-axis? (6 pts.)

3. In 3-4 sentences, explain the meaning and relationships among the following terms: phenotype, genotype, alleles, loci, dominance, epistasis, and pleiotropy. (10 pts.)

4. I have crossed two true-breeding strains of goldenrods that differ in two phenotypic characters: (1) Stem hairiness (hairy or smooth) and (2) floral color (yellow or white). The F1 generation were all hairy and yellow. Counts of F2 progeny show the following distribution of phenotypes:

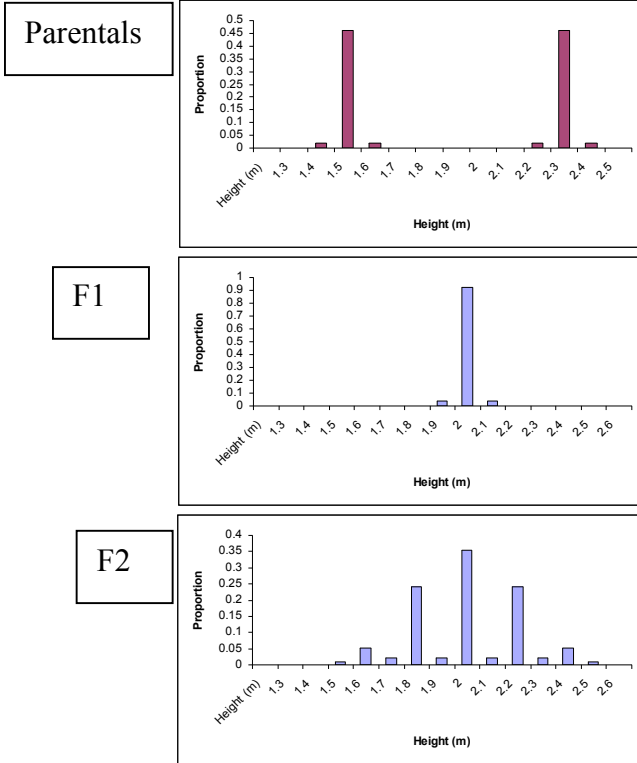
Hairy and yellow – 238  
 Hairy and white – 62  
 Smooth and yellow – 65  
 Smooth and white – 35

d.f.	critical $\chi^2$
1	3.84
2	5.99
3	7.81
4	9.49

(a) Test whether these phenotypic proportions conform to Mendelian rules of inheritance. (10 pts.)

(b) Propose the most likely biological explanation for the results. (6 pts.)

5. The data below give the phenotypic distributions of two parental strains of corn that differ in height, the F1 generations from a cross of the two, and the F2 generation. From these data, estimate the number of loci that interact additively to produce this difference in height between the strains. Explain your reasoning. (12 pts.)



6. A local entomologist has discovered a *phenotypic polymorphism* in the length of elytra (the hardened wing-covers) of native tiger beetles. In one population, she estimated that 75% of individuals had long elytra while 25% had short elytra. Assuming this phenotypic variation is completely caused by genetic variation (two alleles at one locus), describe *all possible genotypic proportions* in this population. (12 pts.)

7. Assume selection is acting on genotypes formed by two alleles at single locus. On each of the axes below, draw two curves that illustrate approximate relationships between indicated variables when (1) the heterozygote has highest fitness (use a solid line) and (2) when it has the lowest fitness (use a dashed line). Assume the two homozygotes have equal fitness. (12 pts.)

8. The two students studying variation in floral display size in *Solidago rigida* have followed up their initial study (which showed that large displays attract more butterflies) by showing that display size has a significant positive relationship with seed number. Assuming that this result is typical of all years, what else would they need to demonstrate to show that natural selection should lead to an increase in floral display size in this population? Describe how they would best do this. (12 pts.)

Bio 252 – Spring 2004  
Put your name and box # on the back page

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BOX NUMBER \_\_\_\_\_