Part 2: BIO 201 End Semester Examination

Answer all the questions.

Note that the question numbers start from 11, in continuation of part 1.

11. Suppose that a particular diploid, sexually reproducing organism is homozygous at p loci and heterozygous at q loci. All these loci assort independently. How many different types of gametes can this organism produce with respect to these loci? (2 marks) 2 points

Your answer

12. Heritability is defined as: (1 Mark) 1 point

- (●) Vg/Vp
- ( ) Ve/Vp
- ( ) Vg/Ve
- ( ) Ve/Vg

Clear selection

13. Consider a population that is very well adapted to a given environment. In such a population, heritability of traits closely related to fitness is expected to be close to zero. This means that: (2 Marks) 2 points

- [ ] These traits have no genetic basis
- [x] There is very little genetic variation for these traits
- [ ] There is no phenotypic variation in these traits
- [x] Most of the variation in these traits is environmental

14. Match the figures with the phenomenon. (2 Marks) 2 points

Fig 1

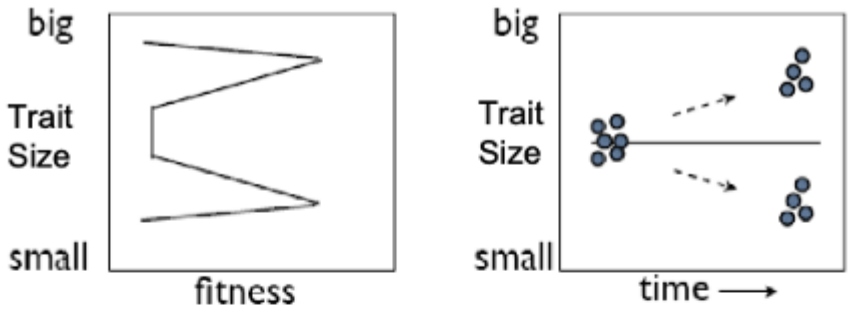


Fig 2

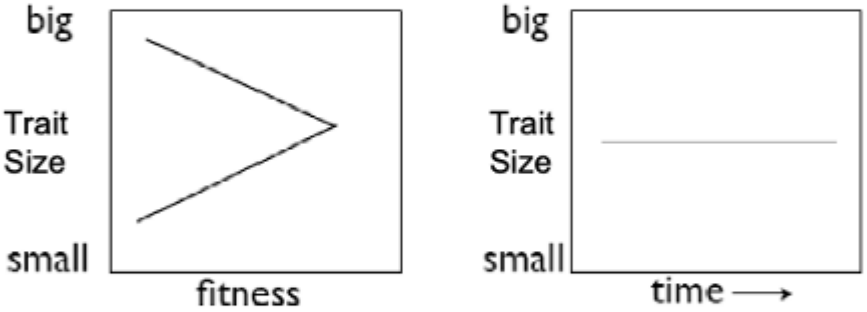
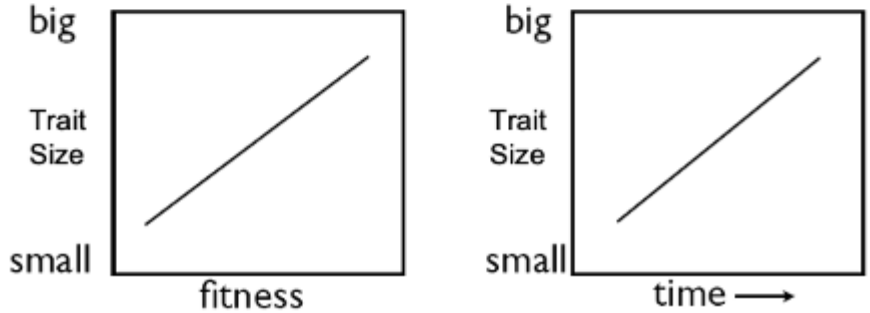


Fig 3



- ○ Figure 1 = Stabilising Selection; Figure 2 = Directional Selection; Figure 3 = Disruptive Selection
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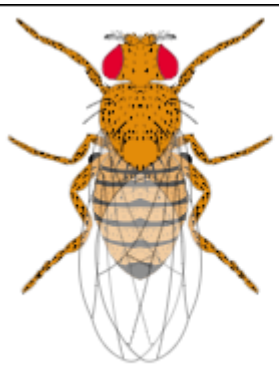
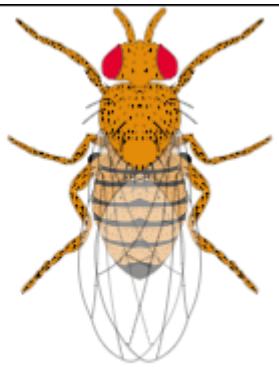
Clear selection

In Drosophila melanogaster, Aristapedia is a dominant autosomal mutation that causes the flies to have legs on their head. Aristapedia homozygotes die in the egg stage and do not reach adulthood. Suppose that you have started a population of Drosophila melanogaster with 14% of the flies that are of aristapedia phenotype and 86% of the flies that are wild type. Based on this information, answer questions 15, 16, and 17.



○ wild type (0)



◉ aristapedia (1)

15. Frequency of the recessive wild type allele (a) is: (1 Mark) 1 point

Please just write the numerical value.

0.93

16. Assume that the flies with aristapedia and wild type phenotype do not differ in relative fitness. Calculate the average fitness of the population. (2 Marks) 2 points

Please just write the numerical value.

0.88

17. The frequency of the genotypes AA, Aa, and aa in the zygote pool of the next generation are: (3 Marks) 3 points

Please specify the genotype and then write the corresponding value of frequency. For example, AA = 0.25 and so on.

AA=0.25, Aa=0.50, aa=0.25

18. The term used to describe a situation where a single locus affects more than one trait: 1 point

Please just answer in one word.

Pleiotropy

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