

## Review # 2 - BIL 160 Evolution & Biodiversity - Fall 2023

The most important component of our last seven lectures has been our discussions of evolutionary forces. To show your understanding, first indicate which of the following four forces affect genetic diversity as follows:

Mutation

Genetic Drift

Migration

Selection

Which of the above-named forces always remove genetic diversity?

Which of the above-named forces always add genetic diversity?

Which forces (if any and possibly more than one) may add or remove genetic diversity?

Which "force" I talked about not on the list above that generates novel combinations of alleles, is not generally regarded in the same category of the other evolutionary forces?

Hint---one word will suffice.

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Be prepared to define the following on the test:

Heterozygosity

Allele

Haplotype

Fitness

Population Size

While we did not discuss Hardy-Weinberg equilibrium in detail, which of the following do you believe would apply to a situation involving a population at genetic equilibrium?

Very large & random mating

Free of mutation

Free of migration

Without selection

All of the above

With regards to equilibrium, which of the following balance with mutation to create a type of equilibrium?

Genetic drift

Natural selection

All of the above

None of the above

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Explain the difference between a bottleneck and a founder event?

Identify the factors that might influence effective population size?

Random mating

Age structure

Sex ratio

Reproductive output

Mate preference

Which do you imagine to have the larger  $N_e$ , a sea lion colony or the bacteria in the sea lion colony?

Why is Tay Sachs disease probably so prevalent in some populations?

Why might Cystic fibrosis be so prevalent relevant to the background mutation rate?

Why could a genetic disorder like depression be so common in the human population, ~10% commonly are affected? Which evolutionary force might be responsible for increasing the frequency of the genes underlying depression, to this level and why? What does that mean about depression as a creative or destructive force? Are there other examples of 'diseases' with both deleterious and beneficial characteristics, or just limited to mental health disorders?

Which types of selection increase genetic diversity, and which types of selection generally decrease genetic diversity?

What are the tenets of Natural Selection as described by Darwin?

**What is a selective sweep?**

Process by which a favorable mutation becomes fixed in a population.

Process by which a favorable mutation originates in a population.

Process by which a favorable mutation is eliminated from a population.

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Which concept describes genetic hitchhiking?

What effect does a selective sweep have on heterozygosity?

For relative fitness, if  $W_{AA} = W_{Aa} = W_{aa}$ , there is:

Selection against the A allele

Selection against the a allele

Equivalent or no selection

How do direction selection, balancing selection, and purifying selection affect genetic diversity differently? How would you detect influence of one versus the other?

Neutral Theory has been characterized as the "Survival of the Luckiest". What is the neutral theory? Who first developed the theory, and how was it modified to accommodate "weak selection"? 15 pts

Some questions, about the Evolution of Beauty may also be on the test, so be prepared