TOPIC: PUTTING IT ALL TOGETHER

Putting it All Together

◆ **Hardy-Weinberg** principle says that the genotype frequency of a population will equal:

Genotype Frequencies: *AA* = _____ Where p = freq. of *A* allele.

Aa = _____ q = freq. of *a* allele.

aa = _____ $p + q = 1$

Hardy-Weinberg equation: ___+_____+___= 1

◆ Reasons a population may not be in HW equilibrium: **MATING MUTANTS**? It's **NATURAL IN FLOW**ERS!

Process	Occurs when	Genetic Variation	Special Types
Non-Random Mating	Certain genotypes _____ likely to mate with each other. Affects _____ freq. but not _____ freq.	____	**Inbreeding**—creates excessive _____.
Mutations	New alleles are created by _____ changes in DNA.	____	**Point Mutations:** change to single nucleotide. **Duplications:** can create new genes. **Horizontal Gene Transfer:** introduce genes from different species.
Natural Selection	Certain alleles become more common because they increase the likelihood of survival and _____.	____	**Directional**—selects _____ end of distribution. **Stabilizing**—selects _____ of distribution. (_) **Disruptive**—selects _____ ends of distribution. (_) **Balancing**—maintains _____ alleles. • Frequency dependent & Heterozygote advantage. **Sexual**—selects ability to _____ mates. • Intersexual & Intrasexual selection.
Genetic Drift	Allele frequencies change due to _____ chance in non-infinite populations.	____	**Founder Effect**—new populations only contain alleles present in _____. **Population Bottleneck**—sudden drop in population size increases _____ of genetic drift.
Gene Flow	_____ move between populations.	____	

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PRACTICE

Which of the following statements about the assumptions of the Hardy-Weinberg equilibrium are true?

I) Non-random mating will not cause a change in allele frequency on its own.

II) Infinite population size counteracts the effects of natural selection.

III) Both deleterious and beneficial mutations will affect the Hardy-Weinberg equilibrium.

a) I & II only. b) I & III only. c) II & III only. d) I, II, & III.

PRACTICE

Which mechanisms most reliably increase genetic variation?

a) Natural selection & random mating.
b) Genetic drift & mutation.
c) Gene flow & mutation.
d) Random mating & genetic drift.

PRACTICE

Imagine that you are a researcher studying the beaks of Galapagos finches, and you measure a sudden shift in beak size in the population over a short time period. What additional information below would best indicate that the change was due to Natural Selection and not genetic drift?

a) There was a loss of genetic variation over the same time period.
b) There was a large reduction in population size, with only a few individuals surviving to create the new breeding population.
c) Allele frequency changed in the population along with the phenotypic change of beak size.
d) The shift coincided with an environmental change that had coincided with similar previous shifts in phenotype in the past.