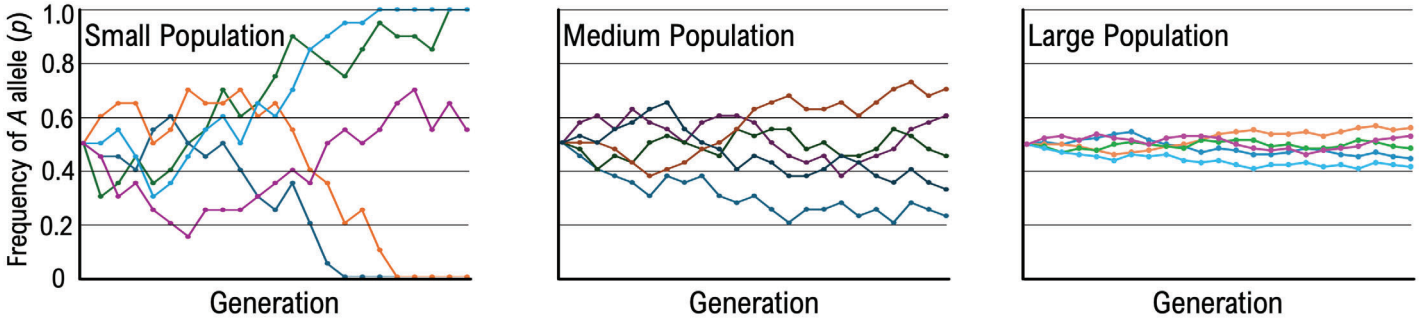
TOPIC: GENETIC DRIFT

Genetic Drift

Effect on allele frequency: _____, reduces genetic variation as alleles are lost.

◆ **Genetic drift:** change in allele frequency due to _____.

- Occurs because population size is not _____.
- More pronounced in _____ populations.



◆ Greatest effect on _____ alleles.

- Can ___ frequency of deleterious alleles in small populations.

EXAMPLE

The table below gives the allele frequencies for the *M* allele in four different populations of sunflowers over 30 years. Other than infinite population size, assume all other conditions of the Hardy-Weinberg principle are met. Based on these data, which population do you expect to be the smallest?

Population	Frequency in 1990	Frequency in 2020
A	$M = 0.6$	$M = 0.55$
B	$M = 0.7$	$M = 0.68$
C	$M = 0.5$	$M = 1$
D	$M = 0.4$	$M = 0.4$

Smallest Population: _____

Why? _____

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PRACTICE

Genetic drift will have the greatest impact on which type of alleles?

a) Advantageous alleles.

b) Neutral alleles.

c) Deleterious alleles.

d) Genetic drift impacts all alleles equally; it is population size that determines the strength of genetic drift.

PRACTICE

Which of the following statements about genetic drift are true?

I) Genetic drift is most pronounced in large populations.

II) Genetic drift can reduce genetic variation.

III) Genetic drift is due to chance events, not differences in fitness.

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

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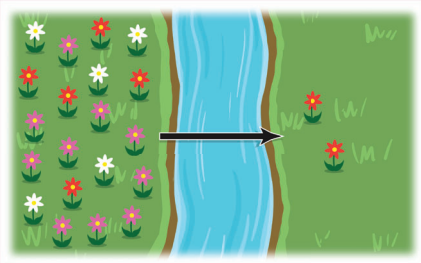
Special Cases of Genetic Drift

◆ __ particular situations can result in accelerated genetic drift.

◆ **Founder Effect:** a small _____ of a population forms a new population.

- New population has allele frequencies matching the _____.



$p = 0.5$
$q = 0.5$

$p = 1.0$
$q = 0$

◆ **Population Bottleneck:** sudden change to the _____ reduces population size that later rebounds.

- Genetic drift is accelerated even though population size is the _____ in end.

$p = 0.5$
$q = 0.5$

FIRE!

$p = 0.18$
$q = 0.82$

EXAMPLE

Western snowy plovers are shorebirds that live along the American West Coast. After a flood, a particular population of western snowy plovers went from 437 to 26. Western snowy plovers are known for having large black spots on their faces, but the population that survived the flood happened to have relatively small facial spots. Assuming that face spot size is a heritable trait, answer the following questions:

What changes (if any) do you expect in the offspring of Western snowy plovers that survived compared to the original population?

_____

What special case of genetic drift describes this scenario?

_____

What are two ways genetic diversity could be increased in this population in the future?

_____

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PRACTICE

True or False: if false, choose the answer that best corrects the statement.

The founder effect and population bottlenecks will generally decrease genetic variation in a population even if the population eventually returns to a large population size.

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a) True.
b) False; the founder effect and population bottlenecks will only decrease the genetic variability if there is no natural selection.
c) False; the founder effect and population bottlenecks will only reduce genetic variation if the population size remains small.
d) False; population bottlenecks will decrease genetic variability, but the founder effect will introduce new genetic variation.

PRACTICE

Humans first evolved in sub-Saharan Africa. Populations of modern humans likely migrated from Africa, populating the rest of the world within the last 100,000 years. A general trend observed in the human population is that the farther a native population is from Africa, the less genetic diversity in that population. What could explain this trend?

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a) Exchange of alleles through gene flow.
b) Loss of alleles through a population bottleneck.
c) Balancing selection and heterozygote advantage.
d) Loss of genetic diversity through repeated founder effects.