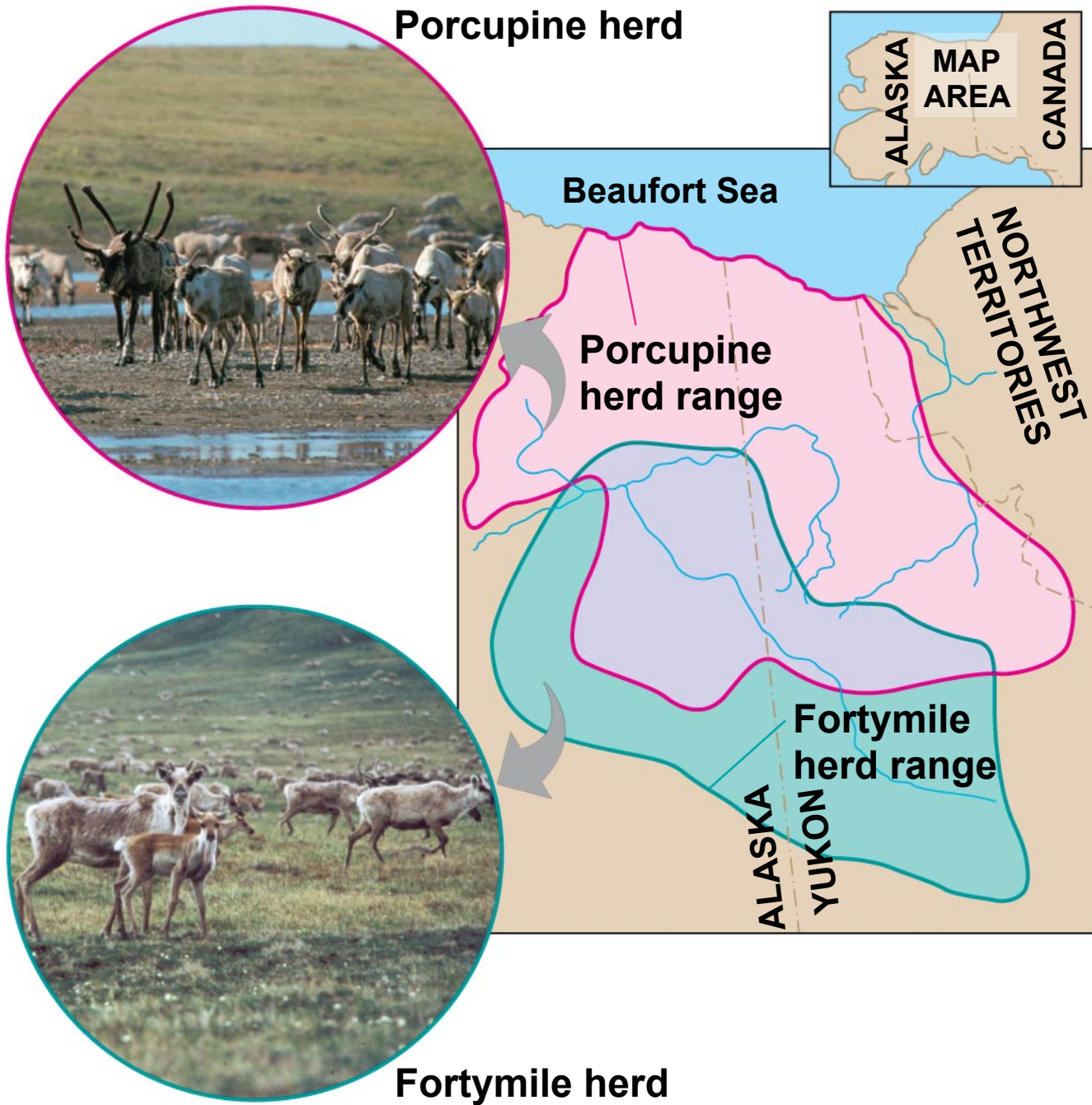




(a) Caterpillars raised on a diet of oak flowers



(b) Caterpillars raised on a diet of oak leaves



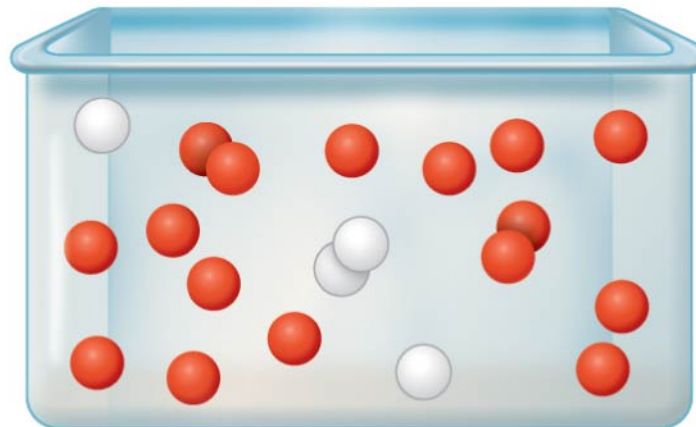
Frequencies of alleles

p = frequency of C^R allele ● = 0.8

q = frequency of C^W allele ○ = 0.2



Alleles in the population



Gametes produced

Each egg:



80%
chance



20%
chance

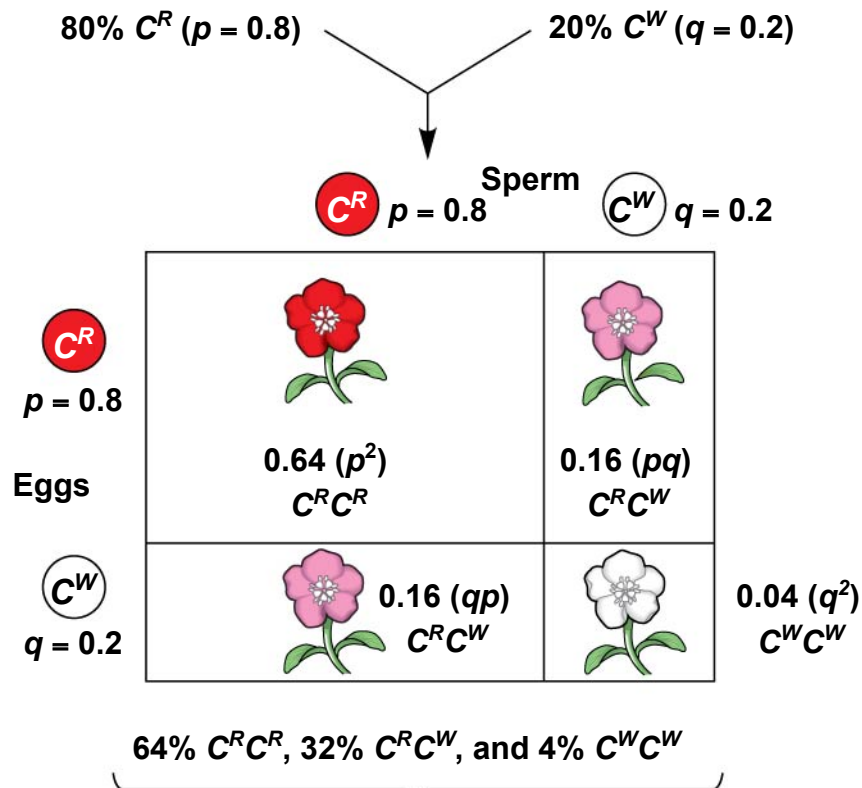
Each sperm:



80%
chance



20%
chance

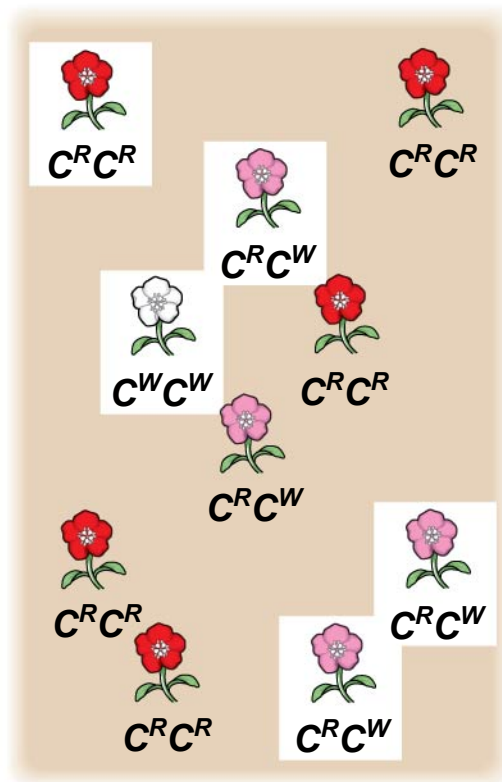


Gametes of this generation:

$$\begin{aligned}
 &64\% C^R \text{ (from } C^R C^R \text{ plants)} + 16\% C^R \text{ (from } C^R C^W \text{ plants)} = 80\% C^R = 0.8 = p \\
 &4\% C^W \text{ (from } C^W C^W \text{ plants)} + 16\% C^W \text{ (from } C^R C^W \text{ plants)} = 20\% C^W = 0.2 = q
 \end{aligned}$$

With random mating, these gametes will result in the same mix of genotypes in the next generation:

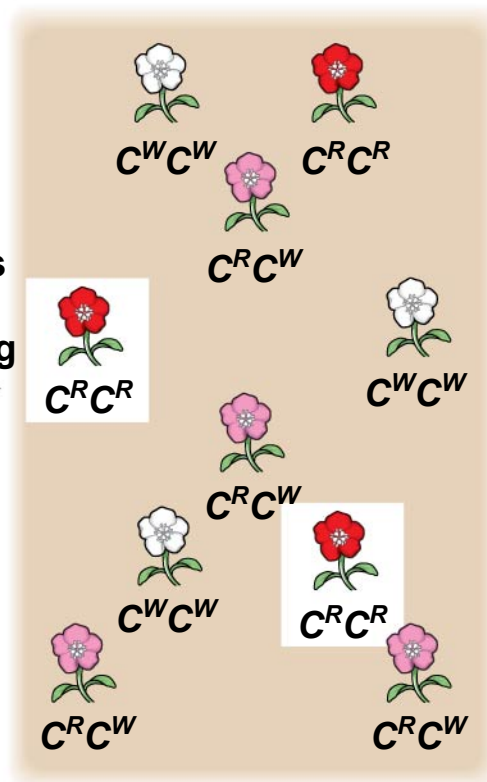
64% $C^R C^R$, 32% $C^R C^W$, and 4% $C^W C^W$ plants



Generation 1

p (frequency of C^R) = 0.7
 q (frequency of C^W) = 0.3

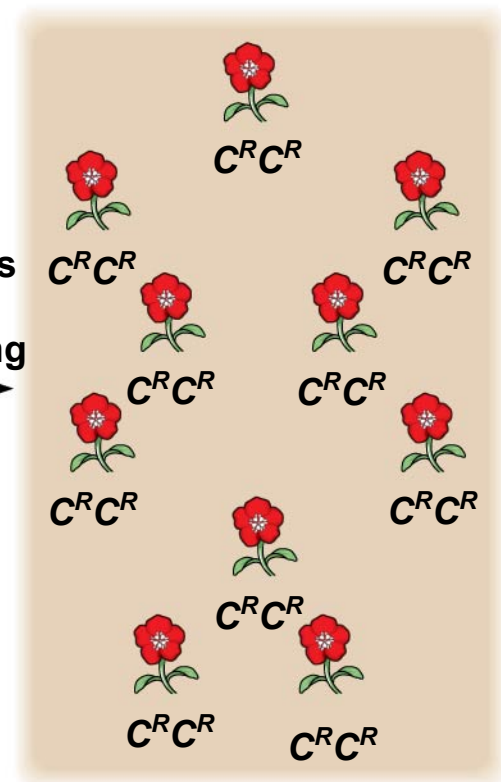
5 plants
leave
offspring
→



Generation 2

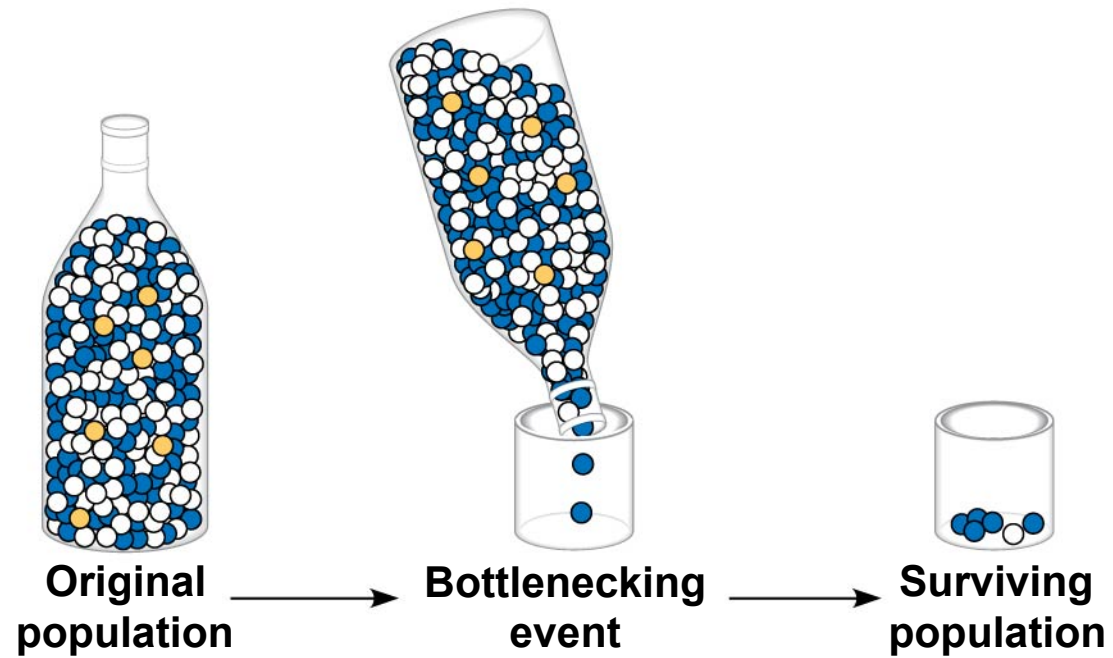
$p = 0.5$
 $q = 0.5$

2 plants
leave
offspring
→



Generation 3

$p = 1.0$
 $q = 0.0$



(a) By chance, blue marbles are overrepresented in the surviving population.



(b) Florida panther (*Puma concolor coryi*)

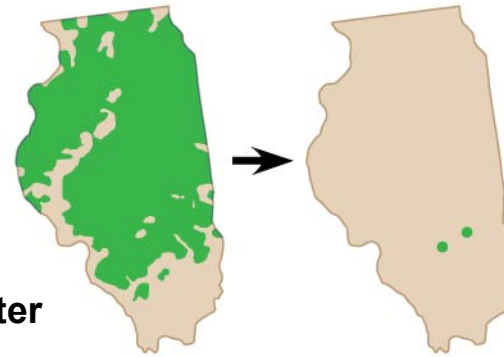


Greater prairie chicken

 Range of greater prairie chicken

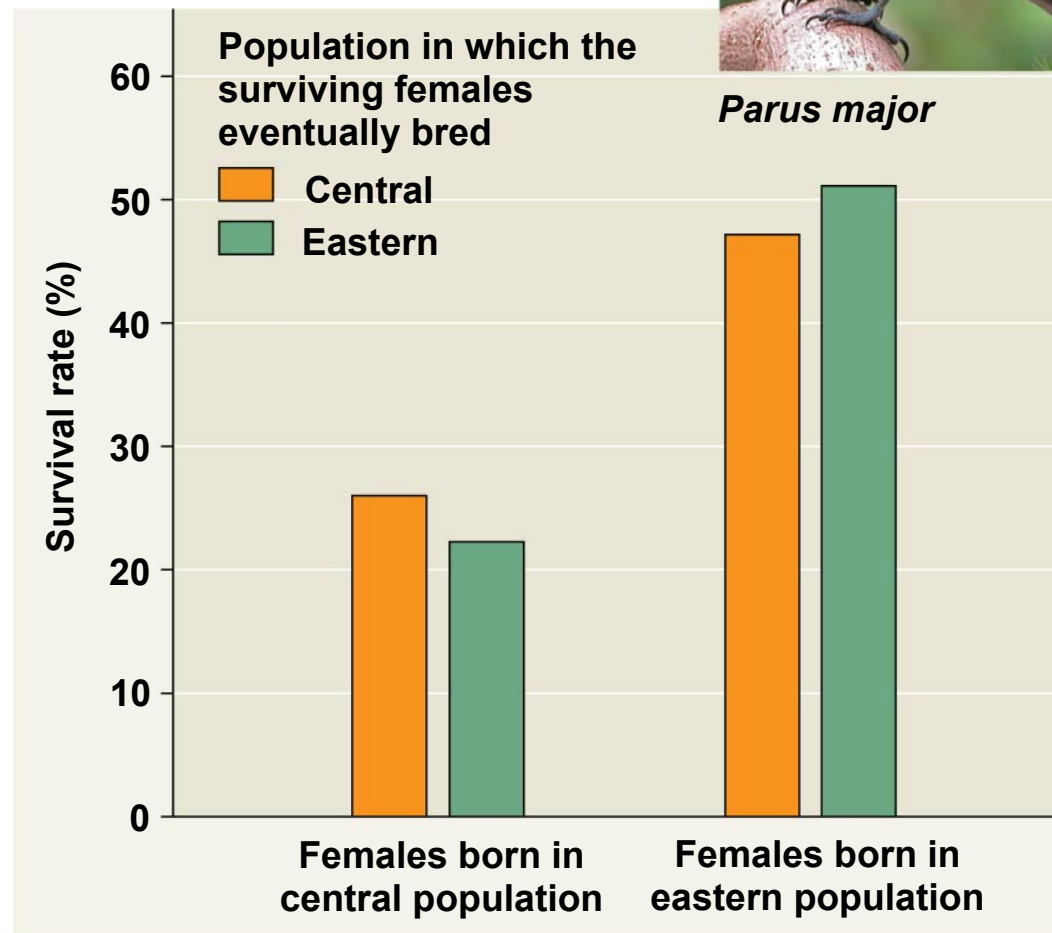
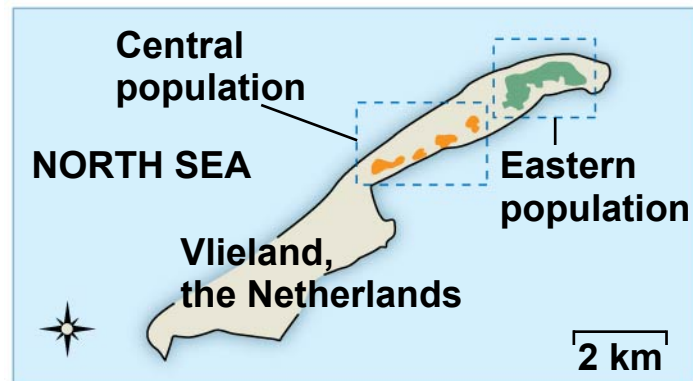
(a)

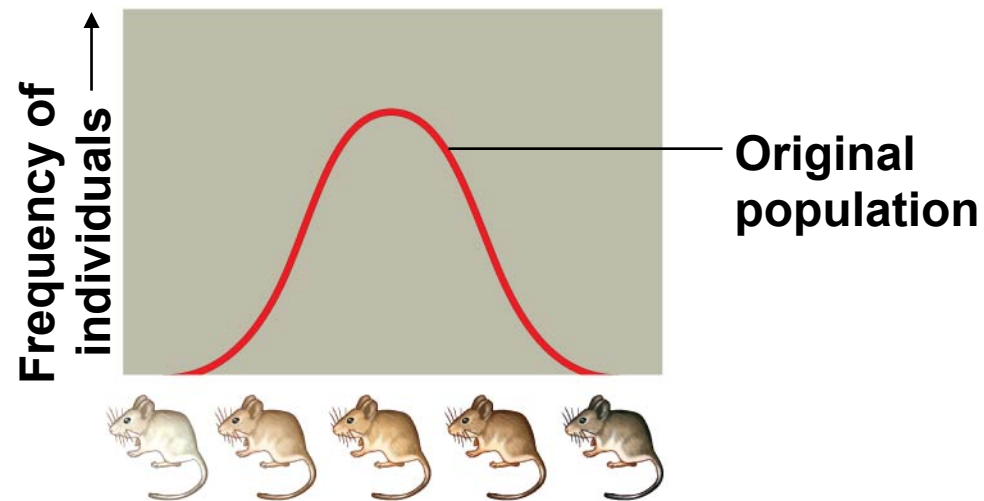
Pre-bottleneck (Illinois, 1820) Post-bottleneck (Illinois, 1993)



Location	Population size	Number of alleles per locus	Percentage of eggs hatched
Illinois 1930–1960s 1993	1,000–25,000 <50	5.2 3.7	93 <50
Kansas, 1998 (no bottleneck)	750,000	5.8	99
Nebraska, 1998 (no bottleneck)	75,000–200,000	5.8	96

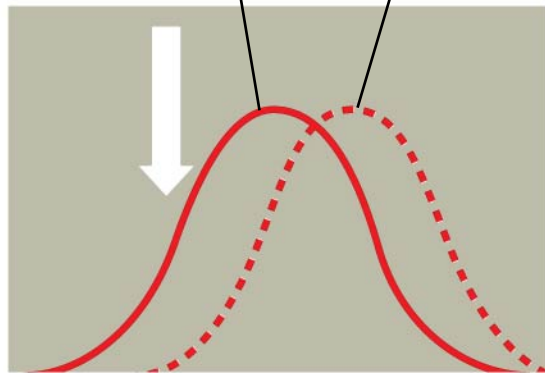
(b)



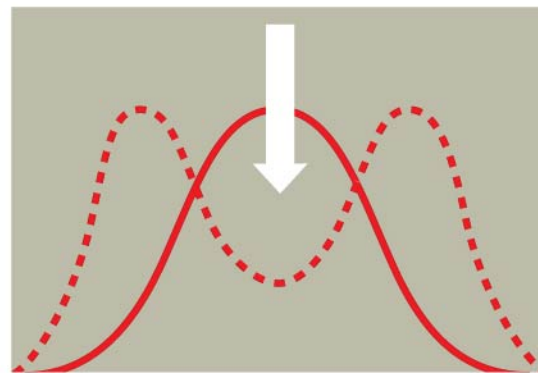


Original population

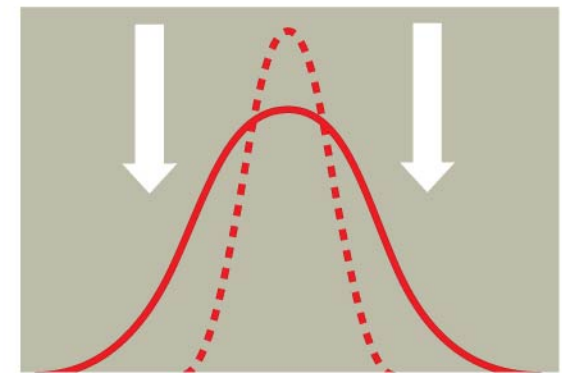
Evolved population



(a) Directional selection

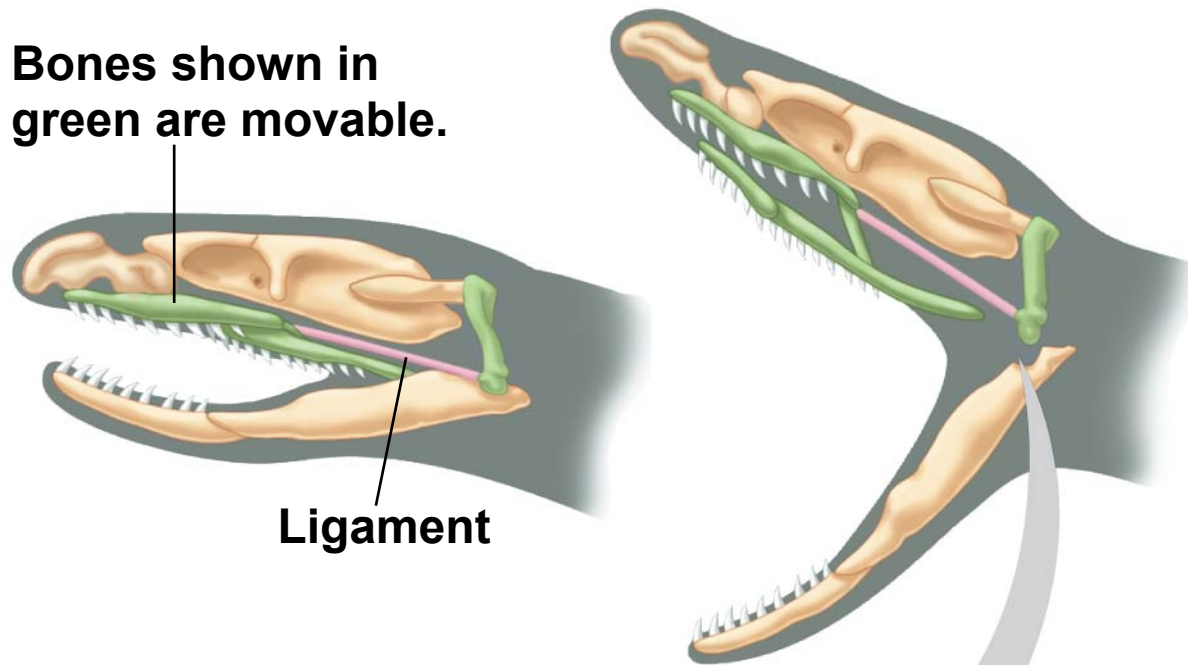


(b) Disruptive selection



(c) Stabilizing selection

Bones shown in green are movable.



Ligament





Experiment

Recording of SC
male's call



SC male gray
tree frog



Female gray
tree frog

Recording of LC
male's call



LC male gray
tree frog

SC sperm × Eggs × LC sperm

Offspring of
SC father

Offspring of
LC father

Survival and growth of these half-sibling offspring compared

Results

Offspring Performance	1995	1996
Larval survival	LC better	NSD
Larval growth	NSD	LC better
Time to metamorphosis	LC better (shorter)	LC better (shorter)
NSD = no significant difference; LC better = offspring of LC males superior to offspring of SC males.		

