Evolutionary processes

Analyzing genotype frequencies

Types of natural selection

Other evolutionary mechanisms

Mating patterns

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Outline

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Example: Human blood groups

TABLE 26.1 The MN Blood Group of Humans: Observed and Expected Genotype Frequencies

The expected genotype frequencies are calculated from the observed allele frequencies, using the Hardy–Weinberg principle.

		Genotype Frequencies			Allele Frequencies	
Population and Location	**Data Type**	***MM***	***MN***	***NN***	***M***	***N***
Inuit (Greenland)	Observed	0.835	0.156	0.009	0.913	0.087
	Expected	0.834	0.159	0.008		
Native Americans (U.S.)	Observed	0.600	0.351	0.049	0.776	0.224
	Expected	0.602	0.348	0.050		
Caucasians (U.S.)	Observed	0.292	0.494	0.213	0.540	0.460
	Expected	0.290	0.497	0.212		
Aborigines (Australia)	Observed	0.025	0.304	0.672	0.176	0.824
	Expected	0.031	0.290	0.679		
Ainu (Japan)	Observed Step 1	0.179	0.502	0.319 Step 2		
	Expected Step 4				Step 3	

DATA: W. C. Boyd. 1950. Boston: Little, Brown and Company.

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TABLE 26.2 ***HLA* Genes of Humans: Observed and Expected Genotypes**

The expected numbers of homozygous and heterozygous genotypes are calculated from observed allele frequencies, according to the Hardy–Weinberg principle.

Gene	Data Type	Genotype Counts ($n = 122$)	
		Homozygotes	Heterozygotes
HLA-A	Observed	38	84
	Expected	48	74
HLA-B	Observed	21	101
	Expected	30	92

DATA: Markow, T., P. H. Hedrick, K. Zuerlein, et al. 1993. *Journal of Human Genetics* 53: 943–952, Table 3.

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(b) For example, directional selection caused average body size to increase in a cliff swallow population.

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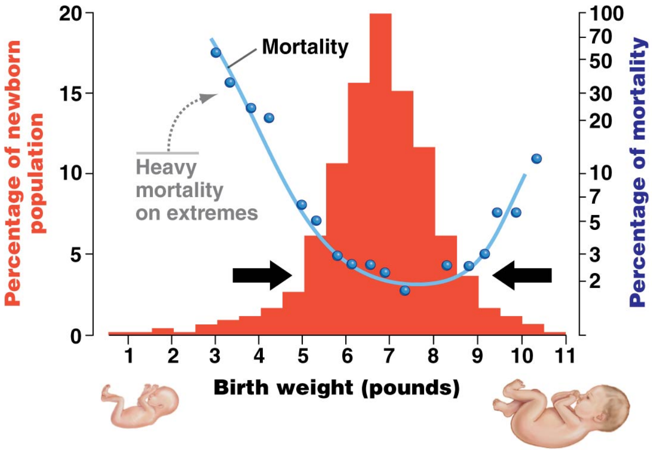
(b) For example, very small and very large babies are the most likely to die, leaving a narrower distribution of birthweights.



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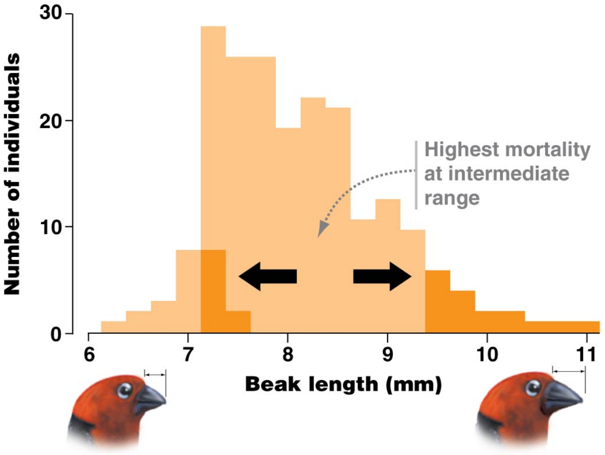
Seedcrackers

Disruptive selection

(b) For example, only juvenile black-bellied seedcrackers that had short or extremely long beaks survived long enough to breed.



Outline

Analyzing genotype frequencies

Types of natural selection
- Directional selection
- Stabilizing selection
- Disruptive selection

Other evolutionary mechanisms
- Genetic drift
- Gene flow
- Mutation

Mating patterns
- Inbreeding
- Sexual selection

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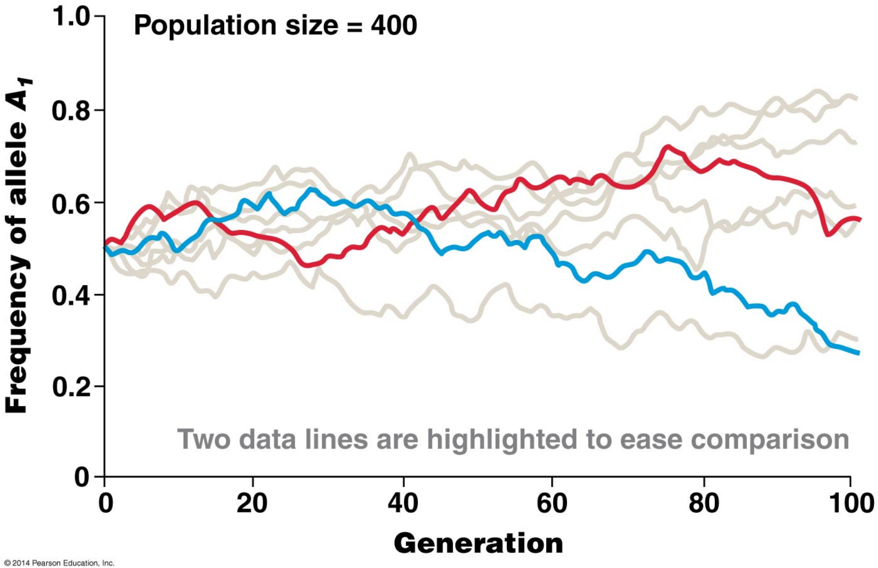

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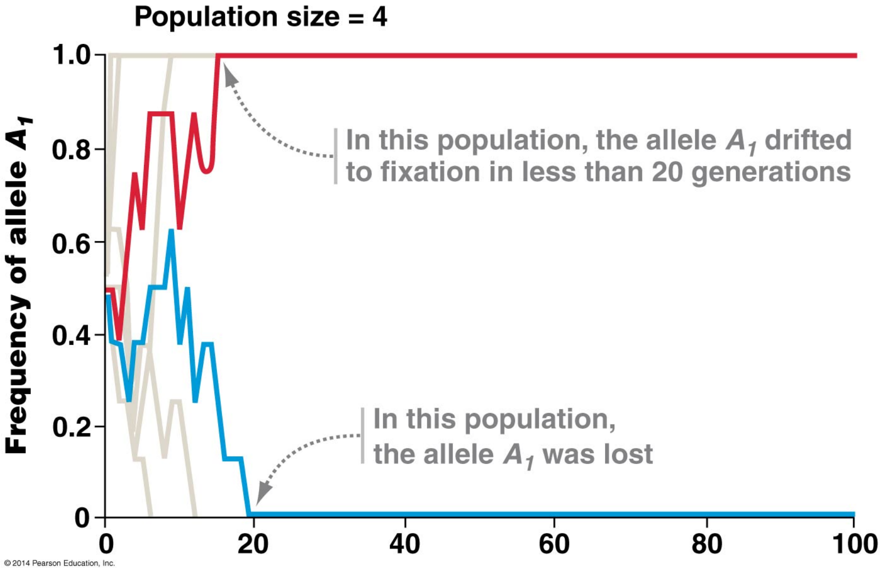

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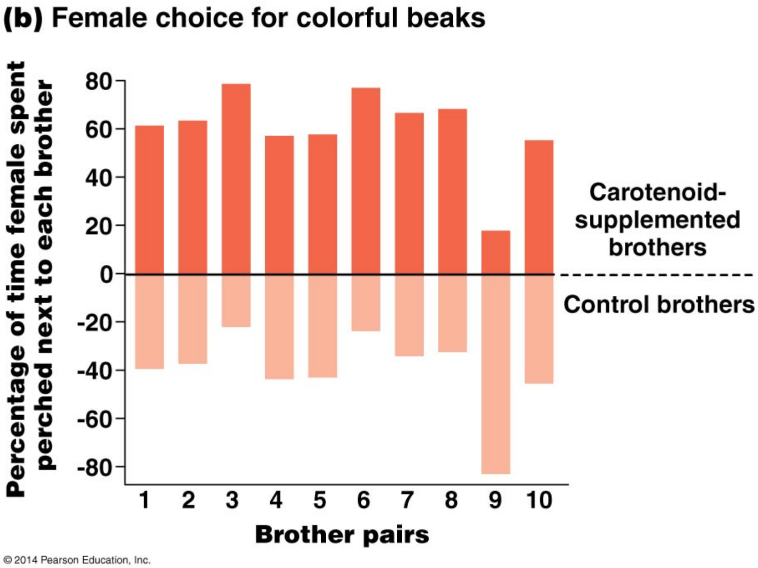

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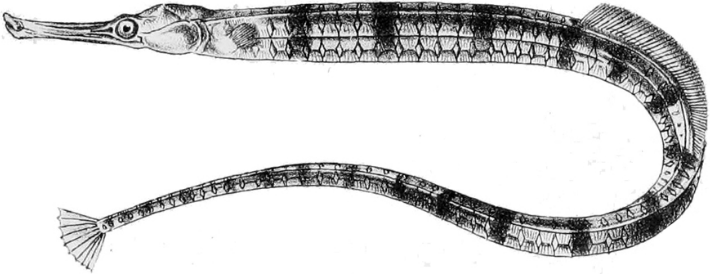

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