

Life History Strategy:

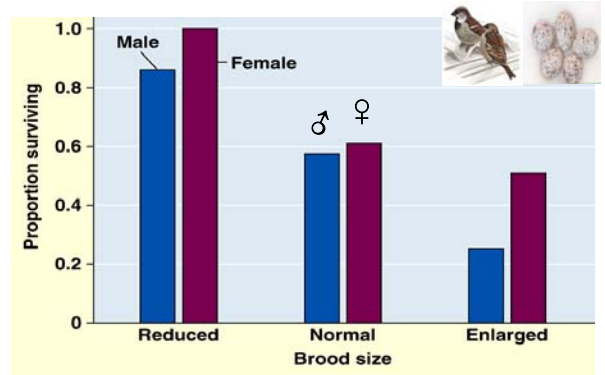
A lifetime pattern of survival, growth, and reproduction

Basic assumption of all life history theory: there is a trade-off between current and future reproduction

- can't maximize both

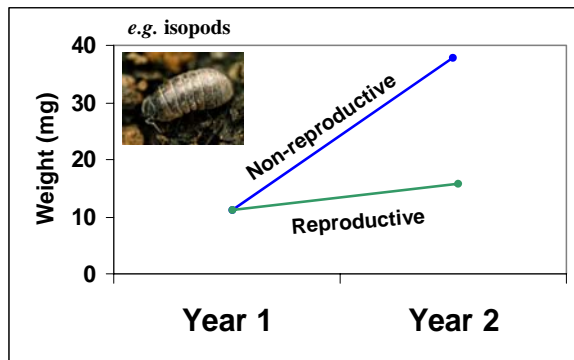
This trade-off can arise in many ways

Current reproduction often decreases survivorship e.g. clutch size manipulation experiments (Fig. 52.7)



Current reproduction often decreases growth

- resources are invested into reproduction or growth



Several Main Questions in Life History Theory

1. When should an organism start reproducing?
- early vs. late

Species have "solved" this question in very different ways



early late

Why so much variation in age of first reproduction?
Why is early reproduction much more common?

Natural selection: some genotypes within a population consistently leave more offspring than others; therefore, their frequencies increase in the population.

Fitness = relative reproductive rate

Natural selection favors genotypes with higher fitness
(= genotypes that leave more offspring)

Early vs. late reproduction: an example
Consider a population with two genotypes, A and B.

	Genotype A	Genotype B
Age class	$l_x m_x$	$l_x m_x$
1	10	0
2	----	0
3		0
4		100

$R_o = 10$ **$R_o = 100$**

Which genotype will natural selection favor?
Suppose the population starts with 10 of each genotype:

Year	# Geno A	# Geno B
1	10	10
2	100	10
3	1,000	10
4	10,000	1,000
5	100,000	1,000
6	1,000,000	1,000
7	10,000,000	100,000

So natural selection very strongly favors Genotype A

- even though it has lower R_0 (10 vs. 100)
- because it has higher realized r (2.30 vs. 1.15)

How many offspring would Genotype B have to make in Year 4 to have fitness equal to Genotype A?

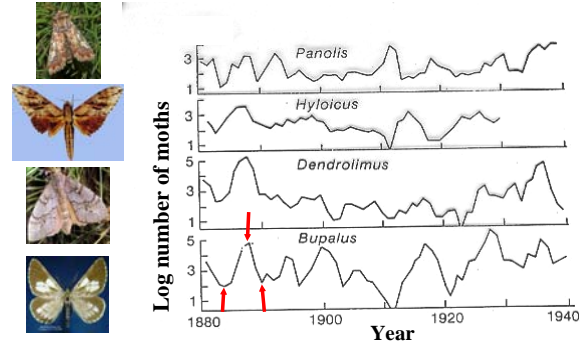
10,000

Major Conclusion:

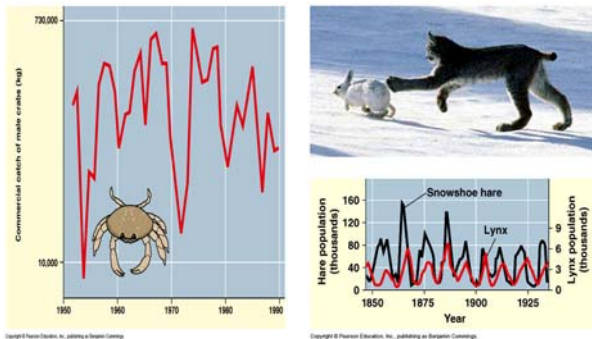
Natural selection strongly favors early reproduction in rapidly (exponentially) growing populations

Remember...

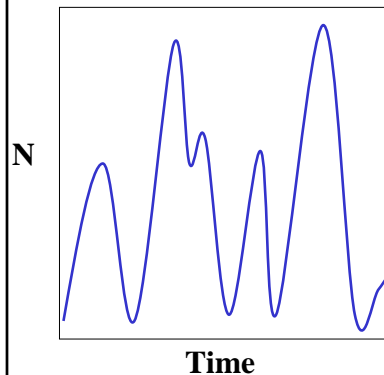
Drastic fluctuations are the rule rather than the exception

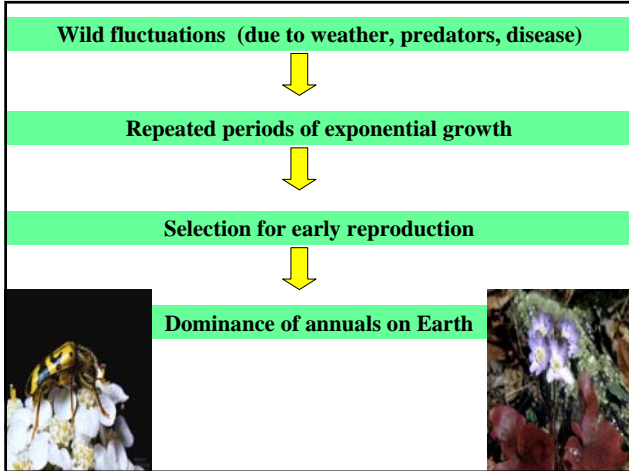


Due to drastic population fluctuations, exponential growth is very common



Most animals show “boom and bust” fluctuations



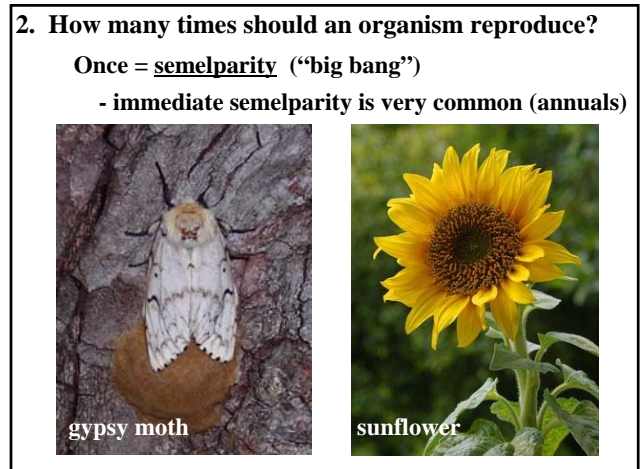


Can natural selection ever favor delayed reproduction?

- suppose resources are limited because pop is near K
- so reproduction is only 10% of former value

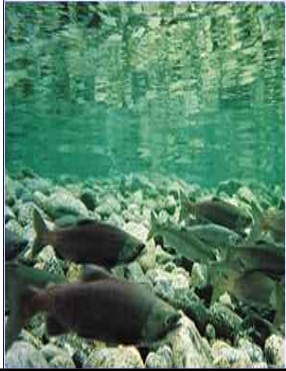
Now Genotype A has $R_0 = 1$ and realized $r = 0$
 Genotype B has $R_0 = 10$ and realized $r = 0.58$

So delayed reproduction is favored if pop is often near K



- delayed semelparity is very rare

salmon



bamboo



More than once = iteroparity



“r-selected”



“K-selected”

