Sexual Selection

http://www.modelbasedbiology.com

Natural Selection Model

- Individuals with advantageous traits that are better suited to their environment survive and reproduce. These offspring resemble their parents with the advantageous trait and continue to pass on the trait to future generations.
  - “Survival of the Fittest”

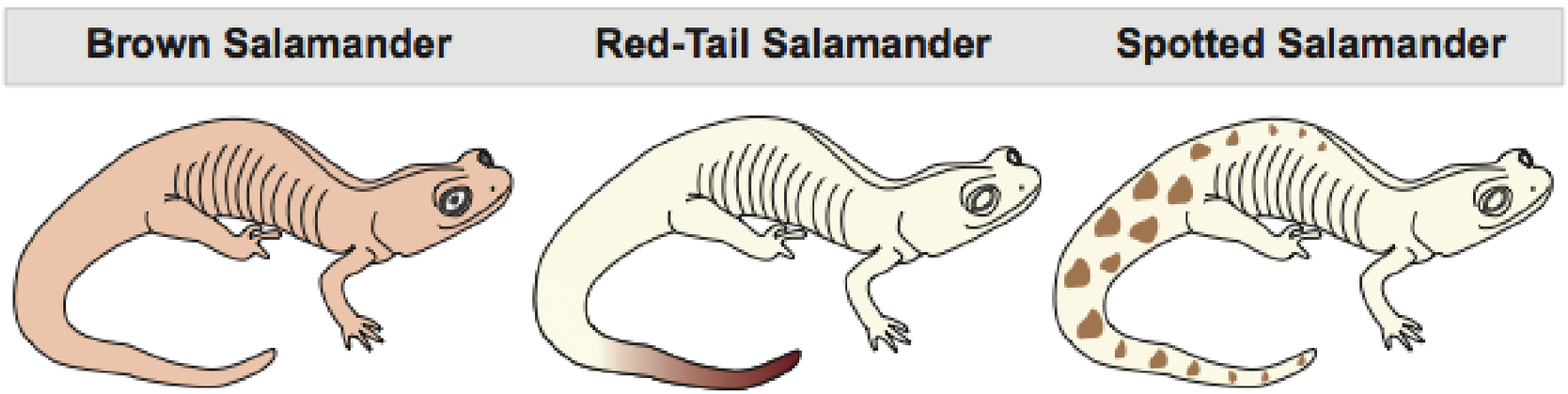
- What does it mean to be “fit”?
  - Your thoughts
  - Partner thoughts

What does it mean to be “fit”?

Class ideas

Warm-up

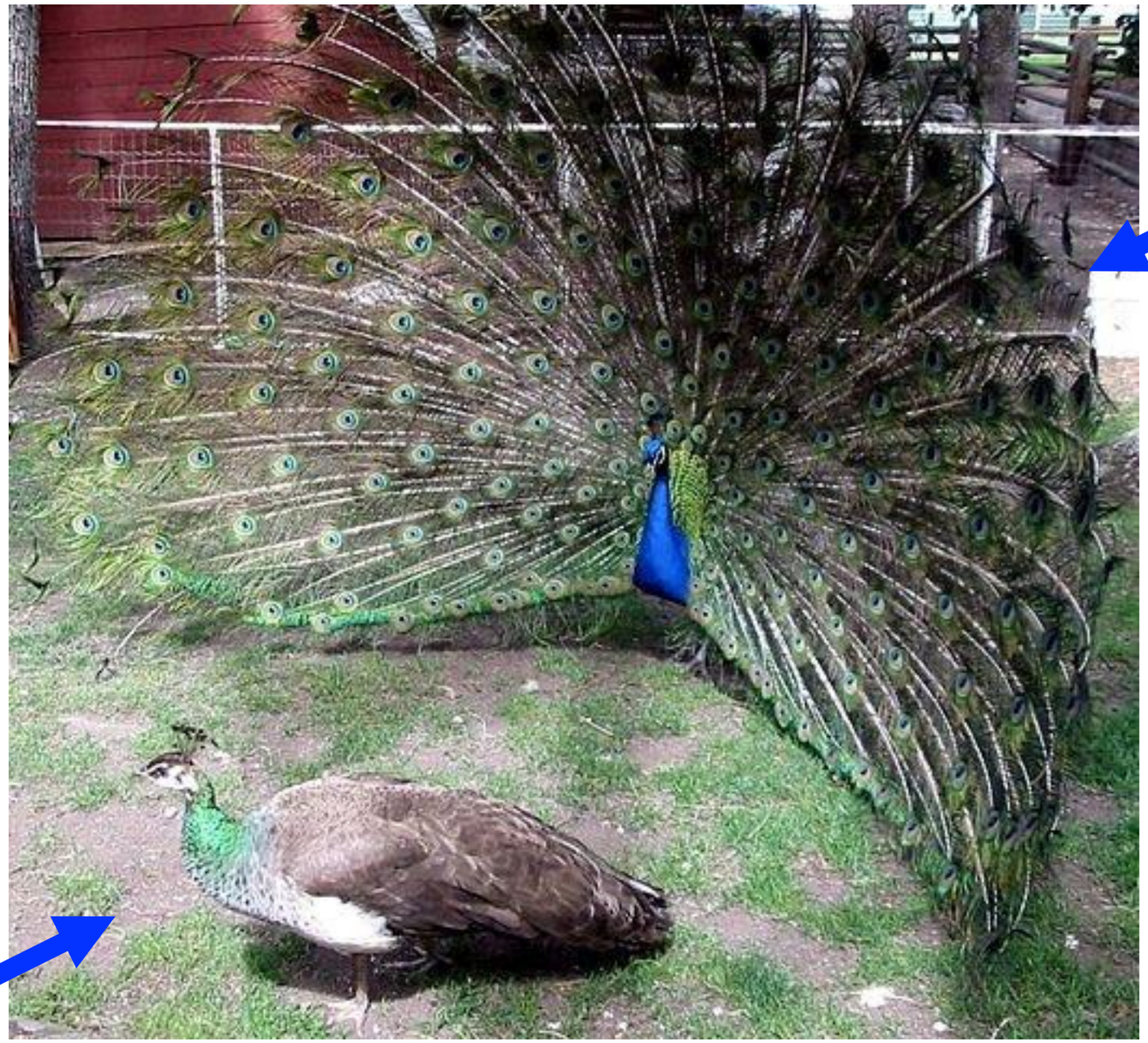
Imagine a cave that is inhabited by three different species of salamanders, brown, red-tail and spotted. Based on the data below, which species of salamander is the “fittest”? Put your ideas and explanation into Box C of your doodle.



Eye development	Small, developed	Very small, undeveloped	Very small, undeveloped
Vision	Good	Blurry	Blurry
Sense of smell	Poor	Extremely developed	Poor
# Eggs laid	100	67	65
# Young survived	1	7	3
Comments	The brown salamander is very agile and fast.	The red tail salamander sleeps underwater.	The spotted salamander can survive many days without food.

Peacocks

P



Male

Female

https://commons.wikimedia.org/w/index.php?curid=861511

Hercules beetles *(Dynastes hercules lichyi)*

P

Udo Schmidt (CC by SA 2.0)

https://askentomologists.com/2015/05/30/bug-boy-girl/

What do you notice about the differences in the sexes of these organisms? Box D

- The males have traits that draw attention to them or make it more difficult to escape predators.
- How does that fit in with our Natural Selection model?

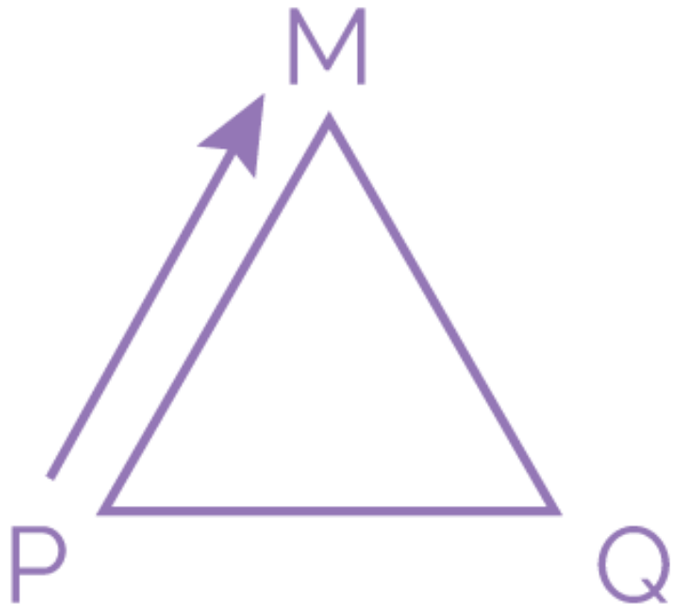
Ring-necked pheasants

P

https://commons.wikimedia.org/w/index.php?curid=105796

Let’s learn investigate this more using the ring-necked pheasants.

https://commons.wikimedia.org/w/index.php?curid=8653034



We provide two data sets:

- Pheasants and their relatives
- Pheasants courtship

- Analyze the data sets and summarize your findings on Box E of your doodle.
- Share it with the rest of the group.
- With this new information, does it help you answer our question (Box F):

How males survive when so easily spotted?

Pheasants an their relatives

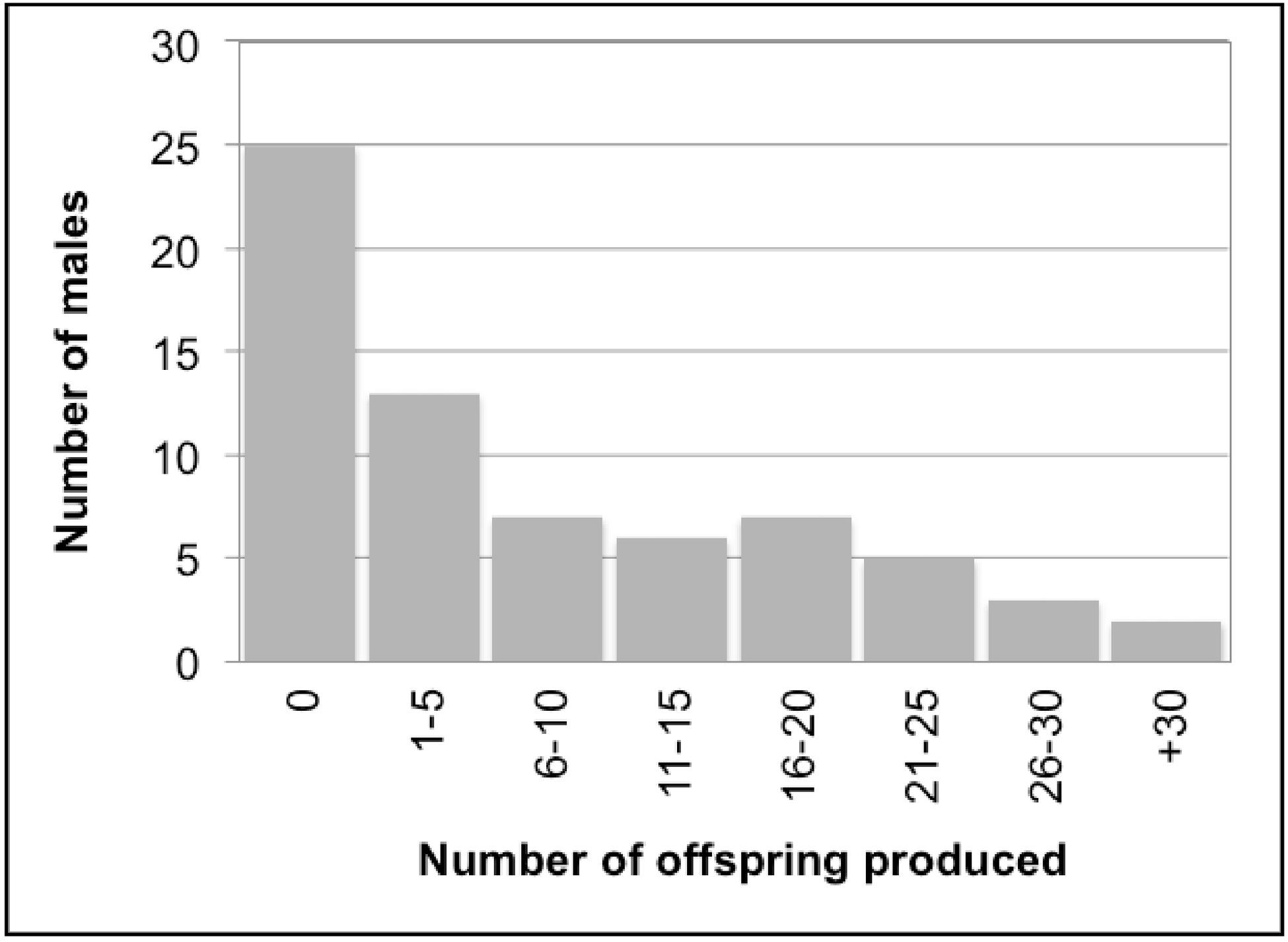
Female and male **Gray Partridge** - *Perdix perdix.* By Paul Higgins.

Male and female **California Quail**. By Jim Sedgwick.

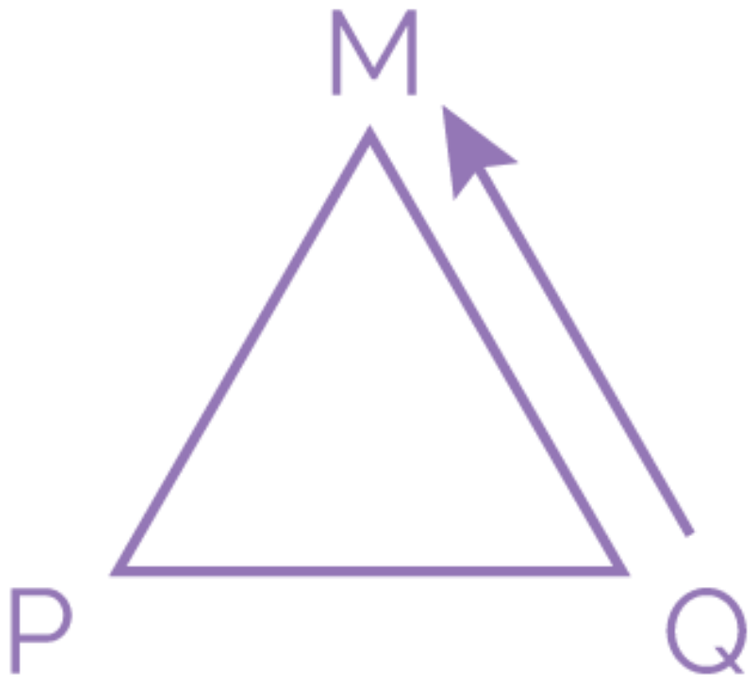
Male and female **Ring-necked Pheasants**. By ChrisO.

Male and female **Greater Sage-grouse**. By Bill Schiess.

Reproductive productivity of male pheasants in a population



Initial model ideas



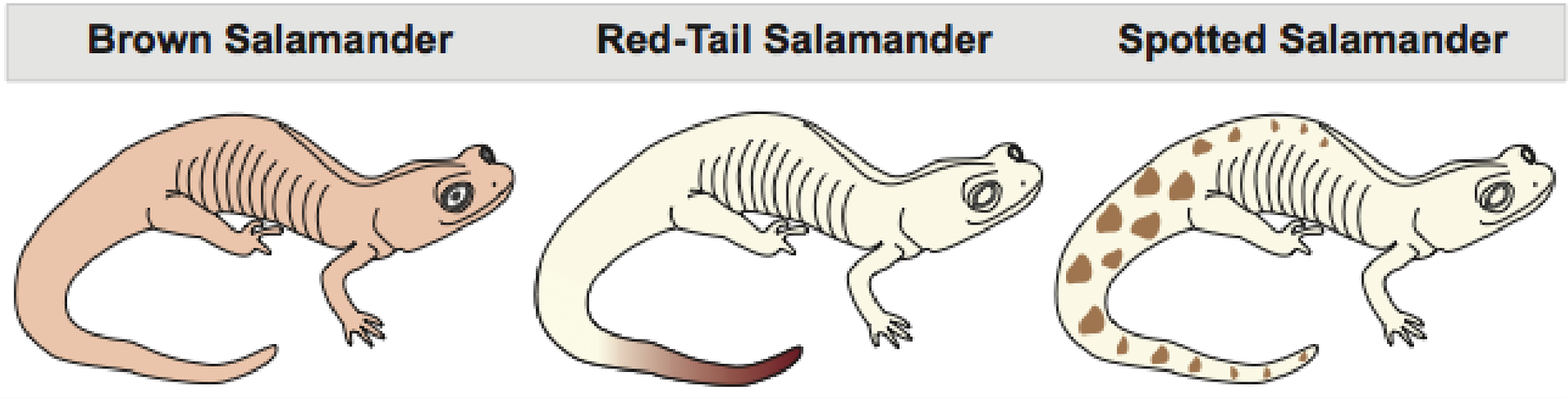
Your driving question:

Do you have any ideas how males survive when so easily spotted?

- Write your ideas to answer this question on your doodle section F.

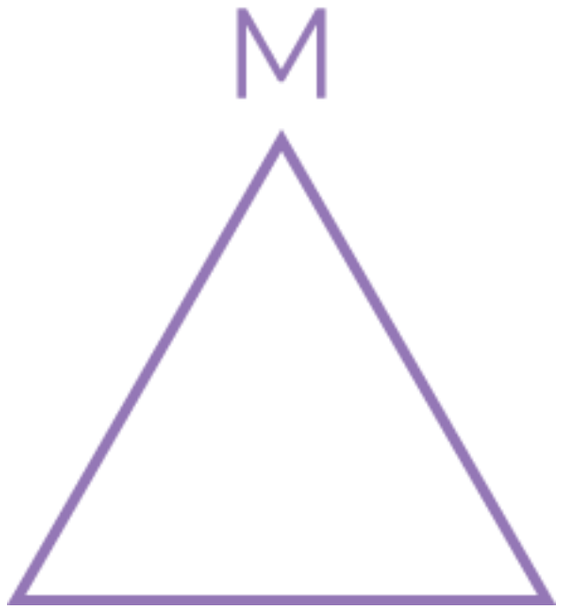
Warm-up

Imagine a cave that is inhabited by three different species of salamanders, brown, red-tail and spotted. Based on the data below, which species of salamander is the “fittest”



Eye development	Small, developed	Very small, undeveloped	Very small, undeveloped
Vision	Good	Blurry	Blurry
Sense of smell	Poor	Extremely developed	Poor
# Eggs laid	100	67	65
# Young survived	1	7	3
Comments	The brown salamander is very agile and fast.	The red tail salamander sleeps underwater.	The spotted salamander can survive many days without food.

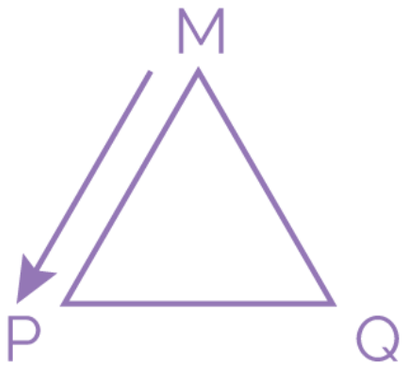
Model revison



How does the new evidence fit our Natural Selection model?

- Do you want to make any changes?
- How can we explain the presence of traits that clearly give the organism a disadvantage for survival?
- Write your new model ideas on you doodle part G.

The sneaky cricket



Read the story of the sneaky cricket and answer the questions provided.

Silent night: adaptive disappearance of a sexual signal in a parasitized population of field crickets

Marlene Zuk, John T Rotenberry, Robin M Tinghitella

Published 22 December 2006. DOI: 10.1098/rsbl.2006.0539

Abstract Sexual signals are often critical for mate attraction and reproduction, although their conspicuousness exposes them to parasites and predators. We document the near-disappearance of song, the sexual signal of crickets, and its replacement with a novel silent morph, in a population subject to strong natural selection by a deadly acoustically orienting parasitoid fly. On the Hawaiian Island of Kauai, more than 90% of male field crickets (*Teleogryllus oceanicus*) shifted in less than 20 generations from a normal-wing morphology to a mutated wing that renders males unable to call (flatwing). Flatwing morphology protects male crickets from the parasitoid, which uses song to find hosts, but poses obstacles for mate attraction, since females also use the males' song to locate mates. Field experiments support the hypothesis that flatwings overcome the difficulty of attracting females without song by acting as 'satellites' to the few remaining callers, showing enhanced phonotaxis to the calling song that increases female encounter rate. Thus, variation in behaviour facilitated establishment of an otherwise maladaptive morphological mutation.

Summary

- This is a “special case” of natural selection called Sexual Selection.
- Sexual Selection acts on an organism's ability to successfully mate and produce offspring, not just survival.
  - This leads to the persistence of traits that are actually disadvantageous in terms of survival.
  - The traits increase the probability that they will mate successfully, meaning they will continue to be found in future generations.

Summary

- Sexual selection deals with specific traits that attract mates.

- It’s all about survival of the species not the individual.

- These advantageous traits are all about sustaining the species so they will be found in future generations.