Natural Selection

Middle School

Objectives

MSLS4-2

- Learn about genetic traits.
- Discover Natural Selection.
- Explore how physical traits that are advantageous get passed on to the next generations.

Vocabulary

- Genes
- Traits
- Genetic Variation
- Mutation
- Gene Flow
- Heredity
- Natural Selection
- Adaptation
- Extinct
- Survive
- Evolve
- Forage

There are about 8.7 million different living organisms on Earth. Of those, it is estimated that 7.7 million of them are animals!
Earth's environment is constantly changing and when a environment changes, the living organisms in it, will change too.

Why do you think animals in the future will look different?

Discuss with a partner for 30 seconds

Genetic Variation

One reason is genetic variation. Genetic variation simply means individuals within a species have different DNA. Just take a look at your classmates. Do they look exactly the same? No, they look very different from one another.

Lets back track a little. Our DNA is located inside of each of our cells and is like a unique recipe that makes up each individual. Each individual living organism has different DNA, unless they are identical twins (but that is a whole other slide deck).

Genes

Our DNA contain our genes.

Each of us has 30-40 thousand genes. And our genes express our **traits**. Traits are things like eye color, hair color, type of hair and how tall you are etc.

Different combinations of traits make individuals unique.

For example, individual tigers have different markings, various sizes claws, legs and tails. Some are slightly harrier and others might have bigger ears.

Genetic Variation

So why do we have different genes or traits in the first place?

One reason is **mutations**. Occasionally, genetic **mutations** occur and new genes are produced.

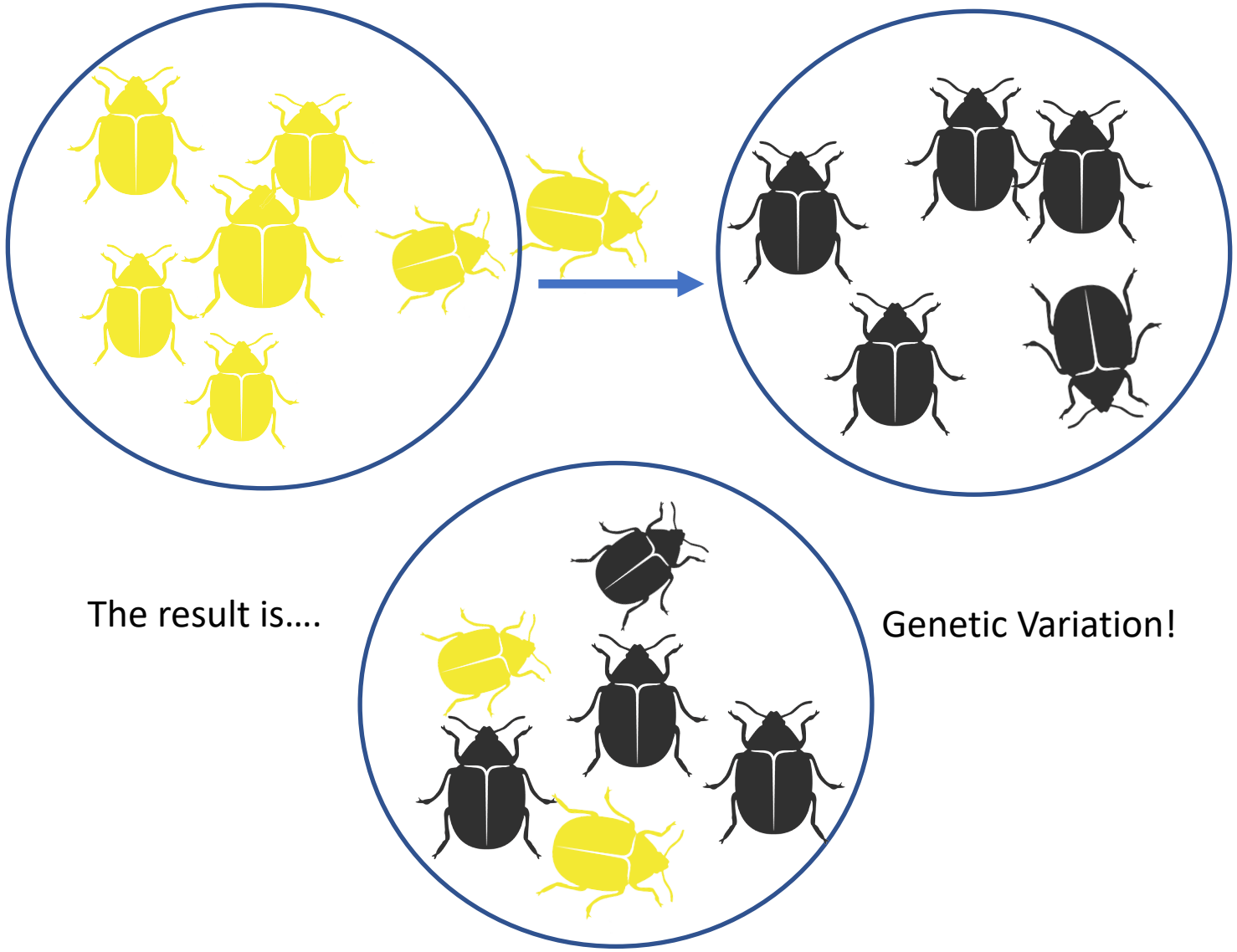
For example, a genetic mutation in tigers produced the first white tiger. These kinds of mutations, create variation (differences) with in species.

Genetic Variation

Gene flow or migration also creates genetic variation. Gene flow is when individuals from one population move their genetic material to another.

For example, a group of yellow beetles from a grassland travels to the woods and joins up with a group of black beetles of the same species.

The result is new population with yellow and black beetles.



The result is….

Genetic Variation!

Genetic Variation

And finally, reproduction creates genetic variation. Offspring are a combination of genes from each parent.

This is why sometimes we look like our parents and other times we look like a mash up of them.

Heredity

So how does genetic variation result in organisms looking different in the future?

Once you have genetic variation, parents will pass on their traits to their offspring. This is called heredity.

For example, if a mom and dad have blue eyes, it is likely that their baby will have blue eyes. Mom (parent) and dad (parent) will pass on that blue eyed gene (trait) to their baby (off spring).

Heredity is the reason why baby animals look like their parents.

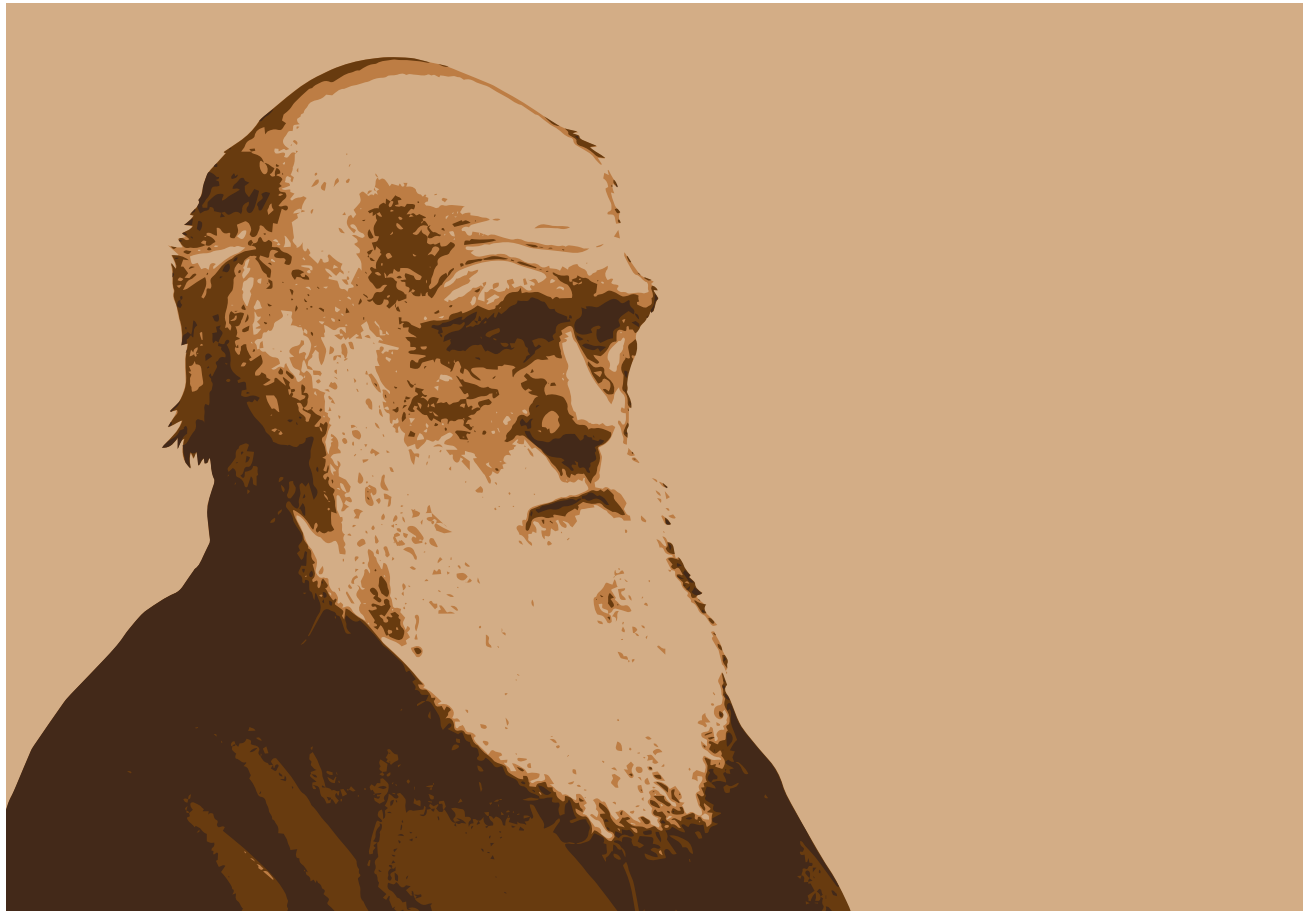
So now that we know about genetic variation and heredity, lets learn about how certain traits get selected.

Why do you think this pangolin has an armored body? (Discuss for 30 seconds)

Natural Selection

The pangolin inherited its armored body trait from its ancestors. But why?

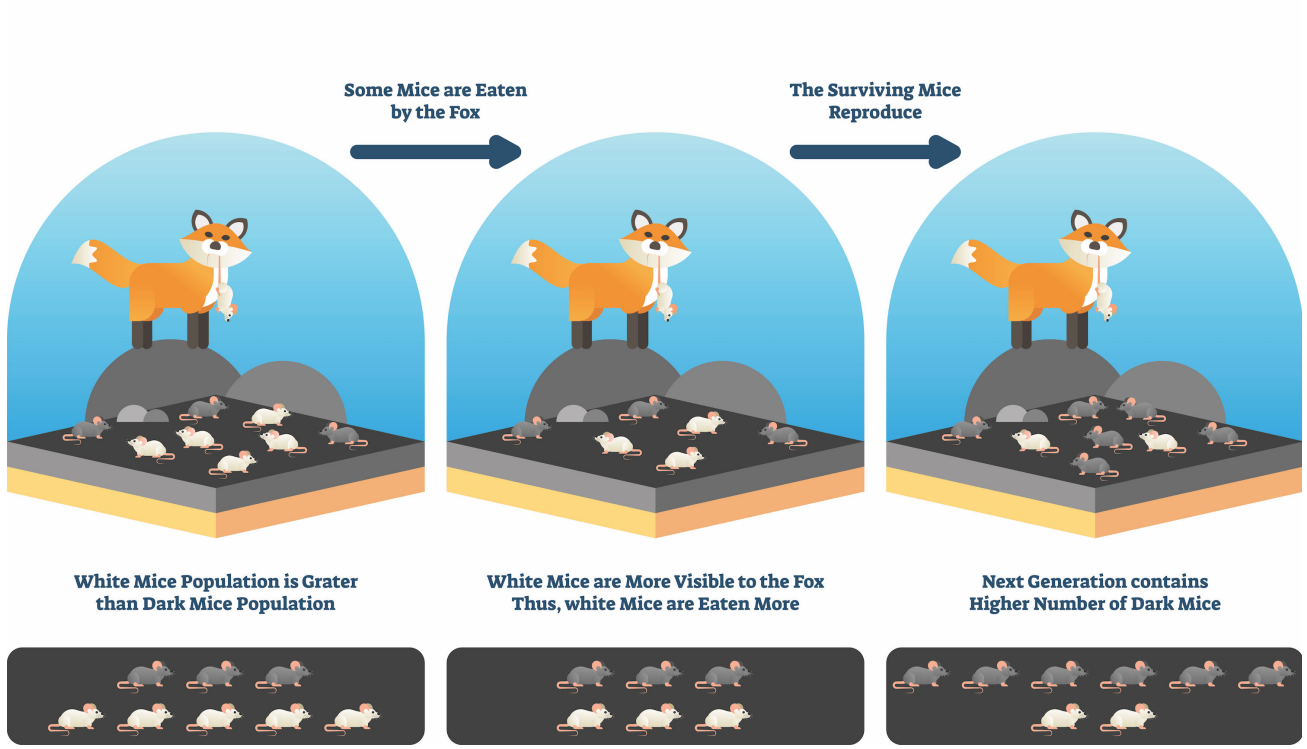
The Scientist Charles Darwin's theory of natural selection states that the "strongest survive". This means when change occurs, the organisms with the best traits suited for the environment will survive.



Natural Selection

Natural selection can be summed up in 4 points.

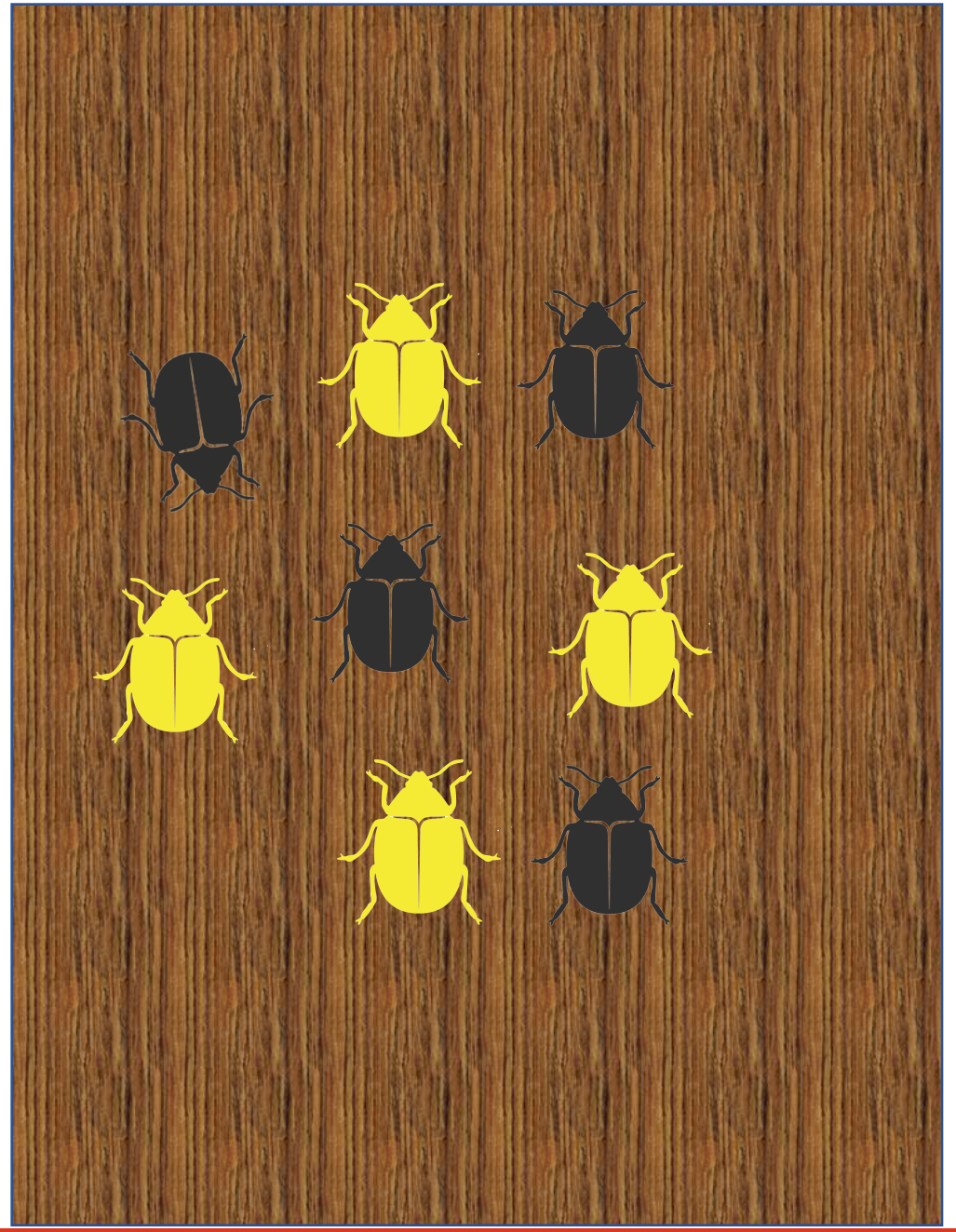
1) There is variation in traits.
2) Individuals best adapted to an environment are more likely to survive.
3) There is heredity.
4) Organisms evolve (change) over time.



Natural Selection

1) Just like we learned earlier, there is variation in traits.

Let’s take a look at the population of beetles that live on in a wooded area. They have variation in color, black and yellow.

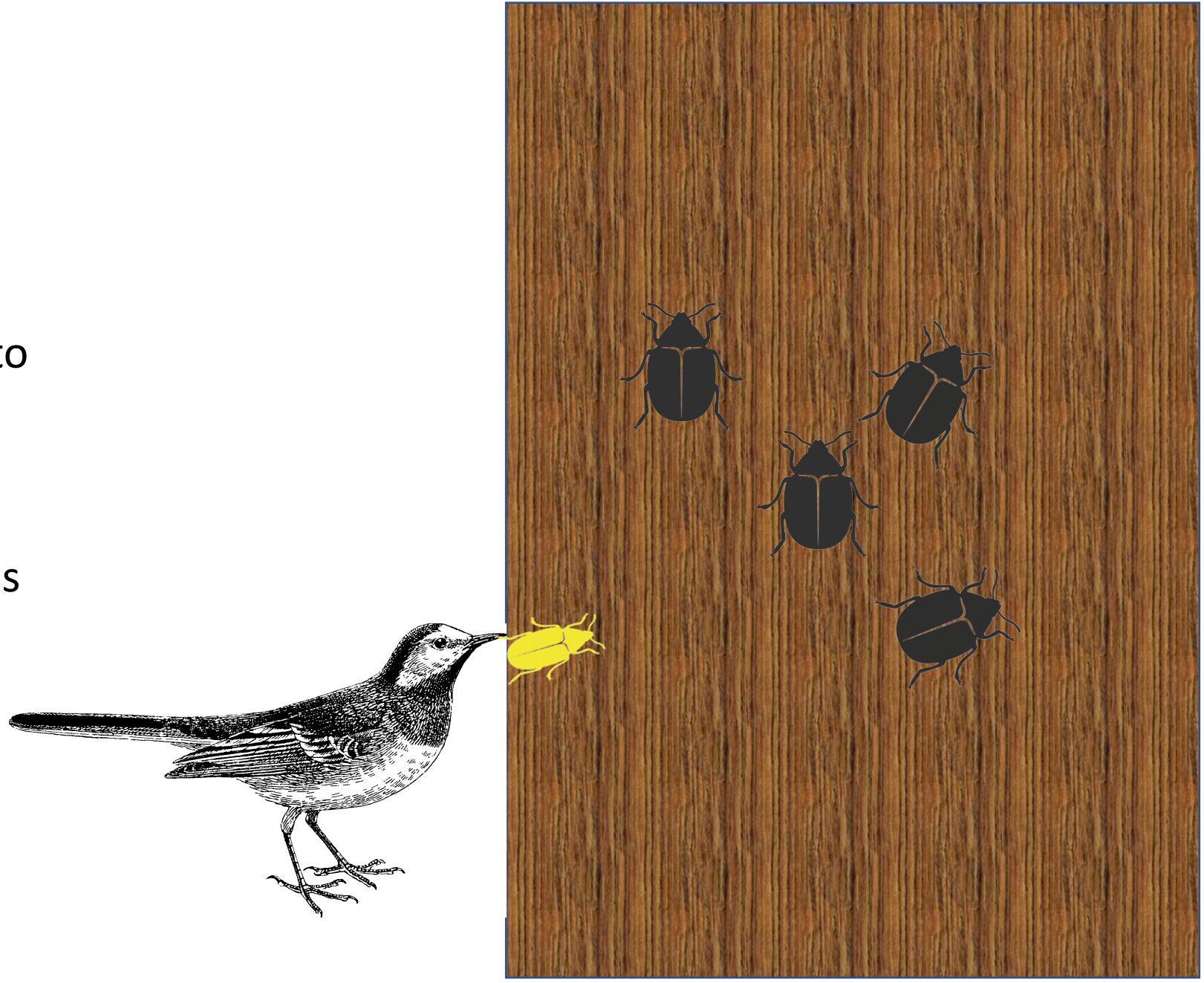


Natural Selection

2) Individuals best adapted to the environment are more likely to survive.

A bird arrived on the scene, and ate all the yellow beetles because they stood out.

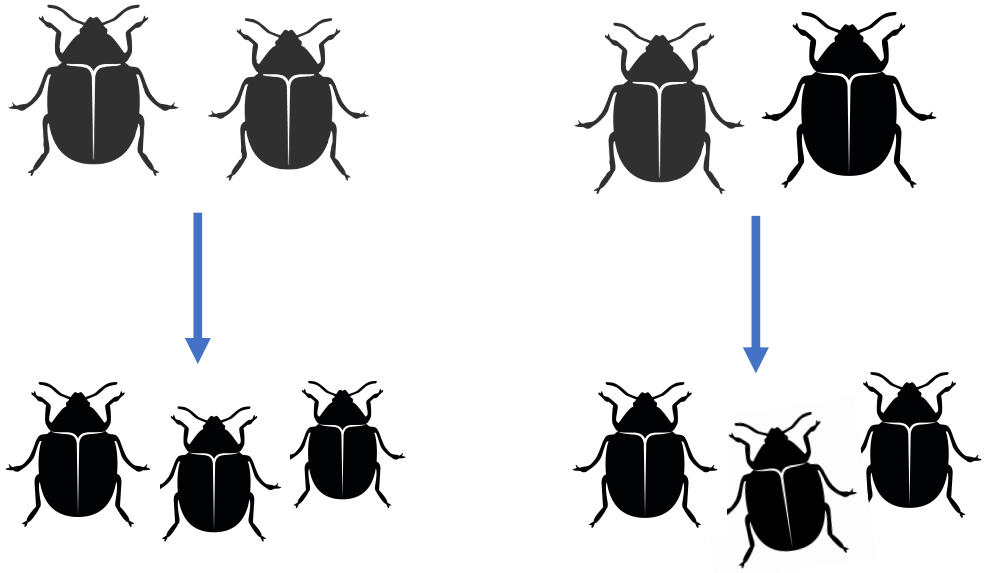
What trait helped the other beetles survive?



Natural Selection

3) There is heredity. The traits that help an organism survive will be passed from parent to off spring.

The remaining black beetles will reproduce, passing on their black color trait.



Natural Selection

4) The result is evolution.

The result, is a population of black beetles. The yellow beetles did not survive.

The beetles **evolved** to become all black! Their color is an **adaptation**.

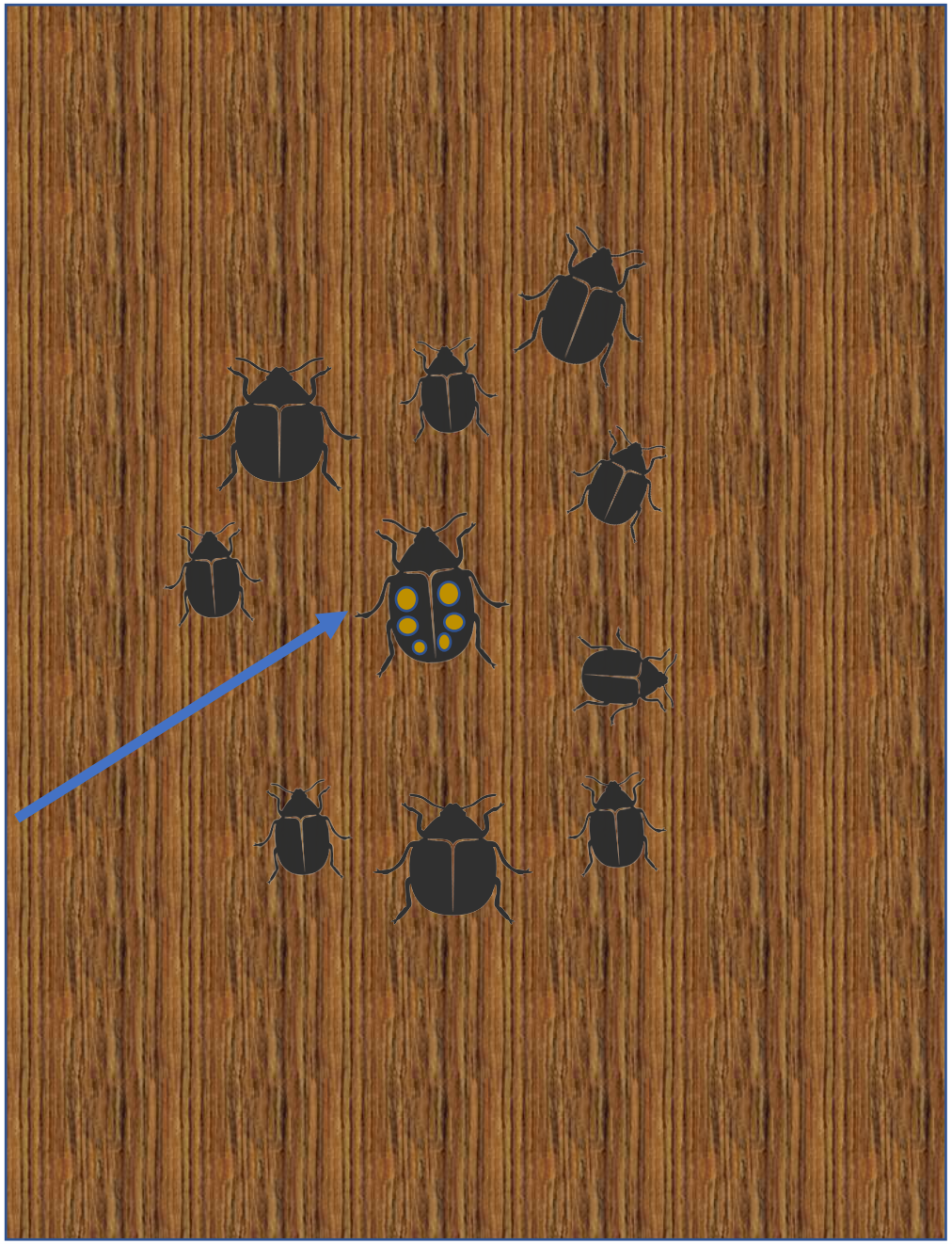
Genetic Mutation Review

10 generations later…

A genetic mutation arrived. A beetle appears with brown dots.

Will this new trait survive?

Only time will tell.



Adaptation

Natural selections leads to adaptation.

Adaptation is a process that helps an organism become better suited to their environment. Adaptations can be anatomical or behavioral.

For example, some snakes have adapted to have venom.

Adaptation

The existence of adaptations is proof that organisms change (evolve) over time.

Evolution

Evolution is a gradual change in the characteristics of a population of animals or plants over successive generations.

Meaning, all living things that exist today come from earlier types. The differences between them are a result of changes that happen over many years.

Now thinking about the challenge…

How will the creature your choose evolve in the future? What traits will it keep and what possible mutations will lead to new adaptations?

Optional Activity: Natural Selection Simulation

Participate in a foraging (collecting food) natural selection simulation. Will you have the strongest traits? Will you survive? Please refer to the Natural Selection Lesson Plan for details.