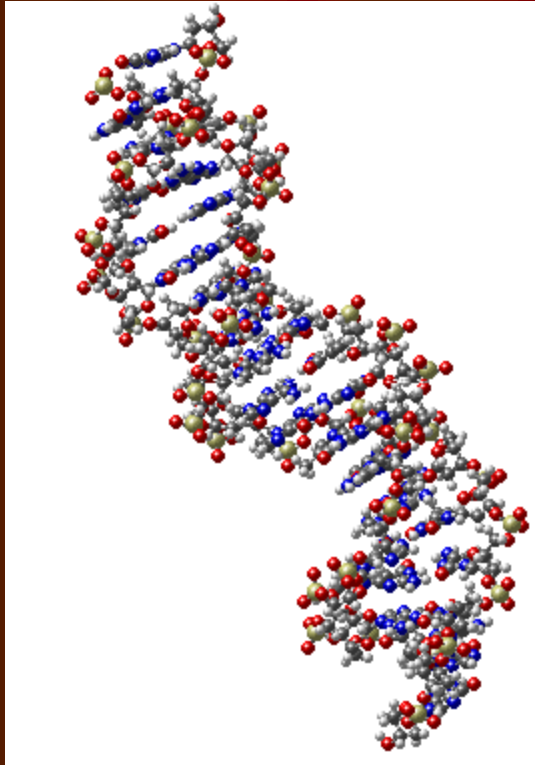


Mutations



Review

1) A huge molecule made up of amino acids (adenine, cytosine, guanine, thymine)

DNA

2) A process that produces the sex cells with half the chromosomes of a body cell

Meiosis

3) Strands of genetic material

Chromosome

4) Factors that control traits

Gene

Mutations

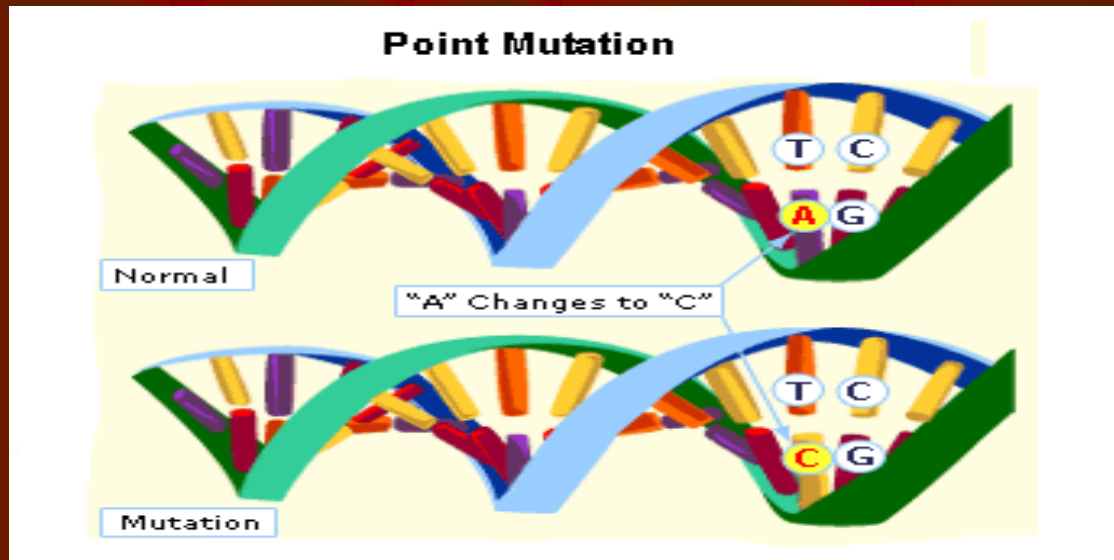
a **CHANGE** in a gene or chromosome

Mutations result in a *different phenotype* than normal → lead to genetic variation

Mutations may lead to **genetic disorders**

Types of Mutations

Point Mutations



Transfer Mutations

In these mutations, extra chromosomes (or parts of chromosomes) transfer into the sperm or egg. Some of these do not survive far beyond fertilization while others may survive and live after birth.

There are two ways in which mutations occur:

- Mutations can be **inherited**.

This means that if a parent has a mutation in his or her DNA, then the mutation is passed on to his or her children.

- Mutations can be **acquired**.

This happens when environmental agents damage DNA, or when mistakes occur when a cell copies its DNA prior to cell division.

Mutations can be...

- 1) helpful
- 2) harmful
- 3) neutral (no effect)

Depends on the environment

Hello! I am a white bison calf. I live on a farm with my mother and father, who are brown. My cousin who is also a white calf lives in the wild. Which one of us has a better chance of surviving? Why?



A Note on Being Albino

- Some forms of albinism are caused by a mutation. Other forms are actually inherited by a recessive allele on the X chromosome. Only genetic testing can tell what type of albinism has been inherited.



Albinism



Harmful Mutations

- They reduce the organism's chance for survival and reproduction
 - Any mutation leading to a disease
 - Cancer- overexposure to UV light
 - Cystic fibrosis
 - Sickle-Cell Disease
 - Hemophilia
 - Down Syndrome



Examples of Harmful Mutations



This is an albino tree frog. It has a harmful mutation because it can be easily seen among the green trees. Therefore, it has a decreased chance of surviving because predators can see it easily.



Down Syndrome



Dwarfism



Sickle Cell Anemia

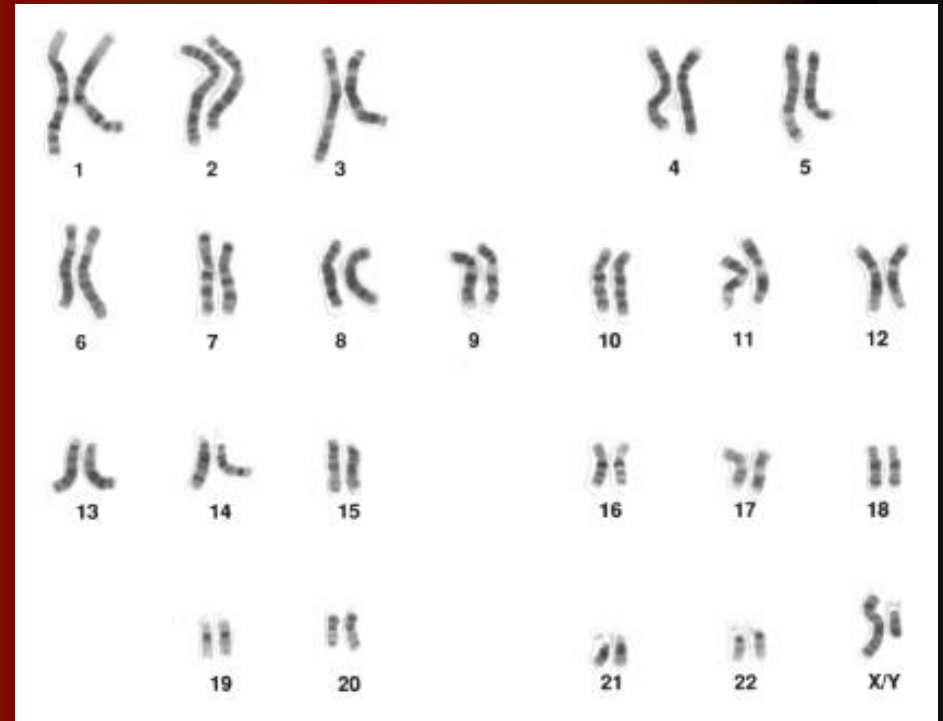
Cystic Fibrosis



Down Syndrome



Down Syndrome



Normal

Helpful Mutations

- Improve the organisms chance for survival and reproduction

Scorpion with an extra stinger

This extra stinger gives the scorpion an advantage over its prey (How?) and predators (How?). It has an increased chance of survival.



Examples of Helpful Mutations



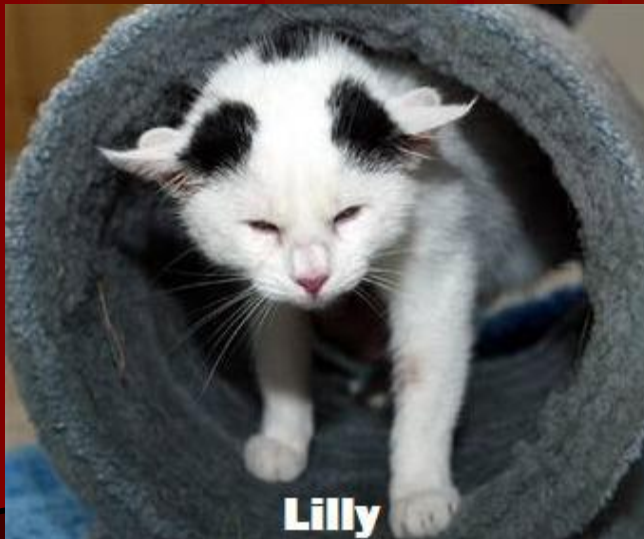
Poison Dart Tree Frog.

Poison dart frogs are normally bright blue, red or yellow in color. What advantage does this mutation give to this poison dart frog?

Neutral Mutations

- These mutations **do not show any advantages or disadvantages** to an organism.
- In fact, many organisms may have mutated genes and not know it because it does not show through on its phenotype and does not affect the structure or function of the gene in the cell at all.

Examples of Neutral Mutations



Lilly



Gizmo

14 10

What do you think?

Is the mutation shown, helpful, harmful or neutral? Why?



Keys to know about Mutations

- Most are minor
- Some are harmful
- Some are lethal
- Some are helpful

Can I get a mutation from someone who has it?

- No! Mutations are not communicable. That is, you can not get the mutation by contact with someone who has it.
 - Mutations occur within your own cells.
 - you can inherit a mutated allele from your parents during fertilization

Are there cures for mutations?

- Depending upon the type of mutation that has occurred, treatment may be possible.
- Cancer is a disease caused by mutations and is treatable through radiation and chemotherapy;
- there is no definite cure for cancer as of current dates
- Another disease caused by mutated cells is Sickle Cell Anemia which has treatment methods being used currently, but still no cure.

The tricky part of mutations

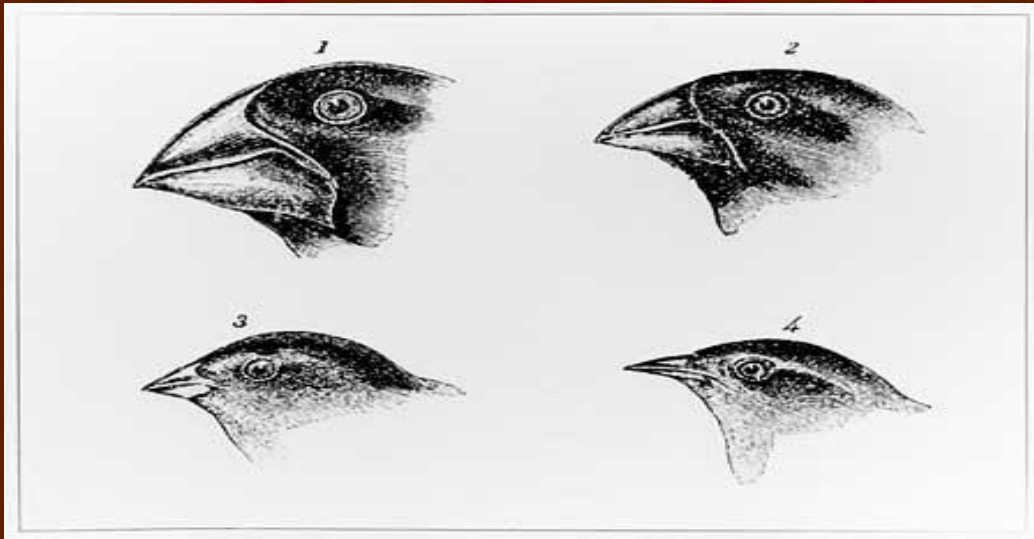
- Often mutations are confused with adaptations

Remember...mutations are a **CHANGE** in a gene or chromosome, which result in a *different phenotype* than the normal

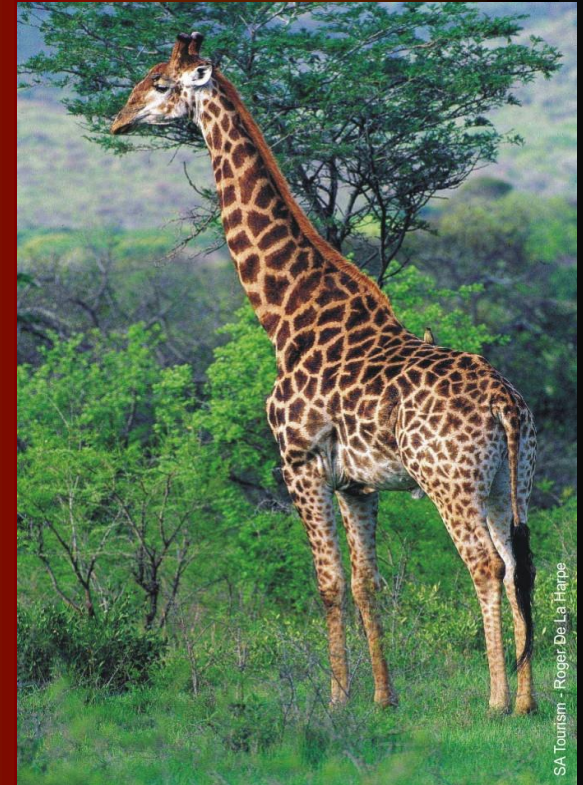
Adaptations

are a trait that helps an organism survive and reproduce

Examples of adaptations

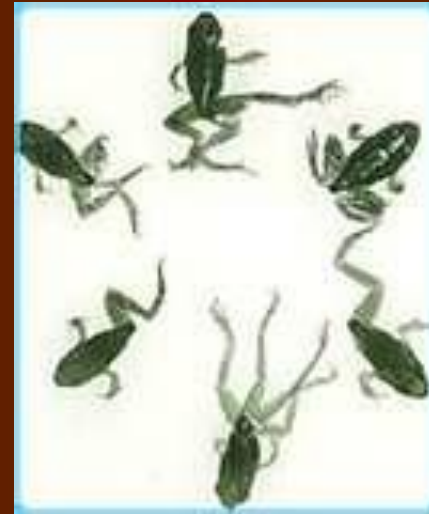


Hello, we are all Galapagos Island finches. We all have different sized beaks depending on what we eat!



What is the adaptation giraffes have made over time? How did this adaptation help them survive?

Environmental Mutations



These mutations were all caused by a chemical called dioxin. The frogs were born in ponds and streams around Lake Michigan in the early 1980s. Shortly after, it was discovered that members of a Native American tribe had an 80% cancer rate among male members.

HANDOUT 10

1. Neutral

2. Harmful

3. Helpful

4. Harmful

5. During protein synthesis, the cell uses information from a gene to make specific proteins.

6. The order of nitrogen bases (A, T, C, G) along a gene forms the genetic code.

7. Transfer RNA

8. Messenger RNA



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