Genetics of Cloning

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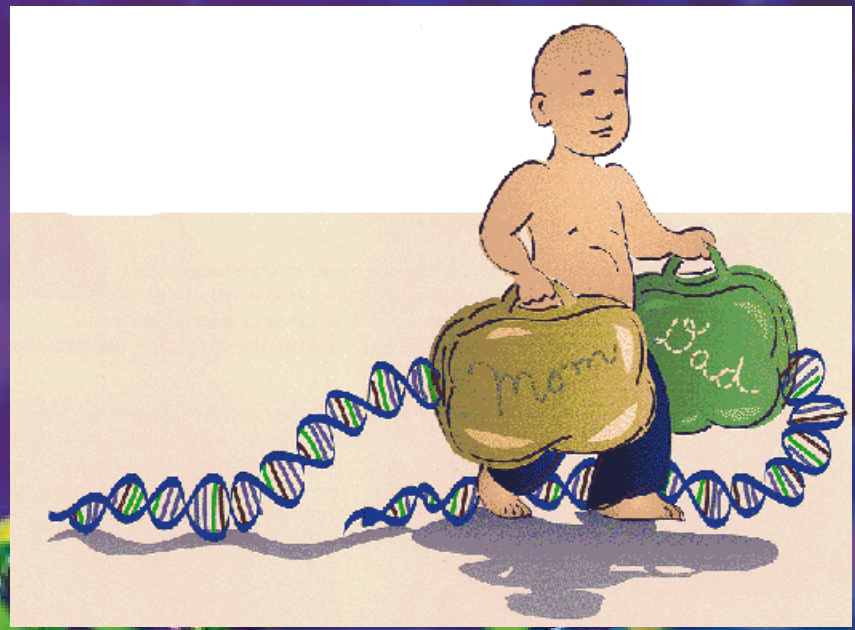
Chromosomes

- X-Shaped coils
- Contains DNA
- The total number of chromosomes is 46 because there are 23 pairs.
- Half of your chromosomes come from mom and the other half from dad.



What are Genes?

- Sections of DNA that control traits such as eye color, hair color, and height.
- Its what makes you, you!

What is Cloning?

- Cloning is the creation of an organism that is an exact genetic copy of another.
- That means that every single bit of DNA is the same between the two.
- What do we call two people who have the same DNA?
- TWINS!!!

How is cloning done?

- Dolly the Sheep was cloned in 1997 but cloning was going on long before that.
- The first animal (a tadpole) was cloned in 1952.
- There are two ways to clone:
  - Artificial Embryo Twinning
  - Somatic Cell Nuclear Transfer

Dolly and her birth mother

Artificial Embryo Twinning

- This is similar to how twins are made.
- An egg normally divides on its own, but researchers can separate the egg into two parts.
- If we put the cells in two different petri dishes, they will continue to divide and develop into clones.
- Artificial Embryo Twinning Video

Somatic Cell Nuclear Transfer

- Let's break this term down:
  - Somatic cell: Cells that have two complete sets of chromosomes (46). These are the cells that make up your body.
  - Nucleus: The nucleus is the brain of the cell (It tells the cell what to do)
  - Transfer: Moving something from one place to another
- SO…It's like taking the brain from one cell and putting it into another (a donor cell).
- SCNT Video 1 Video 2

Therapeutic Cloning

- Therapeutic cloning (used in the medical field) is a form of somatic cell nuclear transfer.
- It can be used to grow organs for a person who needs a transplant (like a new heart or kidney).
- It is done by using stem cells.
- Stem cells are early forms of cells and some of them can become any kind of cell! (Like cells that haven't figured out what they want to be when they grow up)

Why clone?

- Medicine
- Research (discovering cures for diseases)
- Stem Cells
- Bringing back endangered or extinct species (Jurassic Park!)
- Cloning Humans!
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What are the Risks?

- High failure rate
  - For every 1000 tries for somatic cell nuclear transfer, there are between 970 and 999 failures!
- Cloned organisms may not survive because their systems may not be working correctly. Dolly the Sheep only lived for six years!
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Give it a Try!

LET'S MAKE A CLONE

http://gslc.genetics.utah.edu/units/cloning/clickandclone/