NC SCIFEST
PRESENTED BY BIOGEN FOUNDATION

DUKE ENERGY SCIENCE NIGHT

Build a Cell

Big idea

Get familiar with the basic parts of a cell by making a simple model.

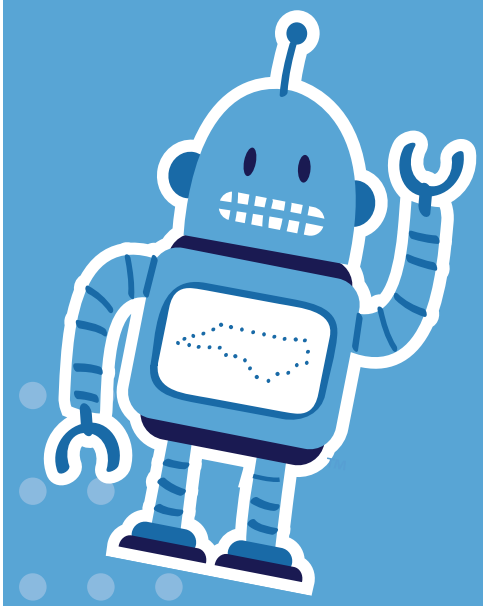
You will need

WHAT WE GAVE YOU:

- pipe cleaners
- plastic capsules
- plastic bags
- Build a Cell instruction sheet

STUFF YOU PROVIDE:

- scissors
- permanent markers
- pencils



Set it up

Each of the 12-inch pipe cleaners needs to be cut in half prior to the event. Place the Build a Cell instruction sheet on the table along with the 6-inch pipe cleaners, plastic capsules, and plastic bags.

It's showtime!

As families approach, invite them to make a simple model of a cell. Remind them that cells are the basic building blocks of all living things and that there are 50 trillion cells in their bodies! Explain that each cell is made up of three basic parts:

- the cell membrane is the outer lining of the cell and will be represented by the plastic bag.
- the nucleus is like the "brain" or "boss" of the cell because it has all the instructions for the cell to do its job. It will be represented by the plastic capsule
- the cell's instructions are located in DNA which is found in genes that are linked together in structures called chromosomes. This is the genetic material for a cell and will be represented by the pipe cleaners. Chromosomes come in pairs - one from the biological mother and one from the biological father.

Give each student one plastic bag, one plastic capsule, and six 6-inch pipe cleaners to make their cell model. Have them use a permanent marker to write "cell membrane" on the plastic bag and "nucleus" on the plastic capsule.

Remind them that chromosomes come in pairs, so they should work with their pipe cleaners in pairs. They will notice that the pipe cleaners are longer than the capsules. Point out that in the cells in their body, the genetic material is in a special shape or form to fit into the nucleus - a spiral shape called a helix. The students will need to twist their pairs of pipe cleaners into spirals and press them down so that they fit into the nucleus. (This can be done by twisting the pipe cleaners around a pencil or a finger.)

Continued ›

SCIENCE FOR ALL • CIENCIA PARA TODOS •

DUKE ENERGY SCIENCE NIGHT

Build a Cell

Why is this science?

Cells are the basic building blocks of all living things. We're all made up of cells: we have about 50 trillion cells in our bodies, and each has over 20,000 genes inside! A cell is so tiny that you can only see it by using a strong microscope. Each cell is made up of three basic parts:

- The cell membrane is the outer lining of the cell. It is represented by the plastic bag in our model.
- The nucleus is like the "brain" or "boss" of the cell. It holds all the instructions for the cell to do its job. It is represented by the plastic capsule in our model.
- The cell's instructions are located in DNA which is found in genes that are linked together in long structures called chromosomes. This is the genetic material for a cell and is represented by the pipe cleaners in our model.

All living things get their genes from their parents. The chromosomes containing the genes come in matching sets of two (or pairs) and there are hundreds, sometimes thousands, of genes in just one chromosome. In humans, a cell contains 23 pairs of chromosomes inside its nucleus. One chromosome in each pair comes from the mother and one chromosome in each pair comes from the father. This is how people inherit traits, or characteristics, from their parents.

Different animals and plants have different numbers of chromosomes: Our cell model has 3 pairs of chromosomes, which is how many a mosquito has! Carrots have 9 pairs, giraffes have 31 pairs, and a kind of fern plant called "adder's tongue" has more chromosomes than any other living thing - 630 pairs!

Chromosomes are so tiny they are not visible in the cell's nuclues - not even under a microscope! Even though they are so small, in order to fit into the nucleus, the genetic material is in a special shape or form - a spiral shape called a helix.

North Carolina connection

Did you know that scientists can change or "genetically engineer" the instructions in the DNA of a plant cell? New instructions in the cell's genetic material can help plants like farm crops resist frosts, droughts, insects, diseases and other things that can prevent them from growing well. Other instructions can help to increase the yield (the amount grown) or the nutritional value of the crop. Many universities and companies throughout North Carolina are involved in this important research because agriculture is an important industry for our state. Today, most of the field corn, soybeans, and cotton grown in NC are genetically engineered.

N&C SCIFEST

PROUDLY PRODUCED BY

MOREHEAD PLANETARIUM+ SCIENCE CENTER

DUKE ENERGY SCIENCE NIGHT

Build a Cell

Supplies

- 1 plastic bag
- 1 plastic capsule
- 6 pipe cleaners

Note

Different animals and plants have different numbers of chromosomes:

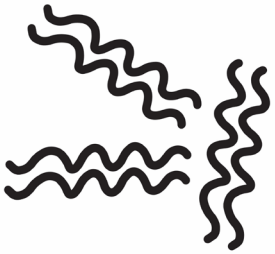
- Humans have 23 pairs
- Carrots have 9 pairs
- Mosquitos have 3 pairs
- Giraffes have 31 pairs
- Adder's Tongue ferns have 630 pairs!

? What type of cell did we make?

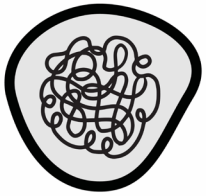
What to do

1. The plastic bag will represent the outer lining of the cell. Use a marker to label it "cell membrane".
2. The plastic capsule will represent the brain or boss of the cell. Use a marker to label it "nucleus". The nucleus of a cell holds all the instructions for the cell to do its job.
3. The pipe cleaners will represent the chromosomes of the cell. The cell's instructions are located in DNA which is found in genes that are linked together in long structures called chromosomes. This is the genetic material for the cell.
4. Arrange the pipe cleaners in pairs on the table. Chromosomes come in sets of two, one from the biological mother and one from the biological father. This is how traits or characteristics are passed on.
5. Twist the chromosome pairs in a spiral around your finger or a pencil. In order to fit into the nucleus, the genetic material is in a special shape or form - a spiral shape called a helix.
6. Place the chromosomes inside the nucleus.
7. Place the nucleus inside the cell membrane.

Chromosomes



Nucleus



Cell Membrane