DNA Extraction

Week 13

Truly You have formed my inmost being –
you knit me in my mother's womb. I give you thanks
that I am fearfully, wonderfully made.
Wonderful are Your works.

Who made you?
What is DNA?
Where is DNA found?

Objective

Today students will learn that DNA is the molecule which governs everything from how they look to what happens inside their cells. They will have the opportunity to isolate DNA in a strawberry.

Gregor Mendel is known as the "Father of Genetics." He was an Augustinian friar, born in Austria. He was one of the first to understand that our genetic code is passed down from generation to generation with some genes being recessive and others dominant. This studying of genes and traits in living organisms led to the science known as genetics.

DNA, which is the acronym for **Deoxyribonucleic acid** is a molecule. All living things have DNA. It contains all the genes that give organisms their traits. It also controls everything that happens inside a cell. It uses only four different bases to record everything in a sort of code. DNA is a large molecule. The DNA in one cell if it were stretched out would be about six feet long!

Some traits that are coded in a persons DNA are hair color, skin color, eye color, height, and even whether they can curl their tongue or not!

Supplies

- **Strawberries** - 1 per student
- **Zip-top plastic bags** - 1 per student
- **Dish detergent**
- **Salt**
- **Water**
- **Plastic cups** - 1 per student plus one to mix extraction liquid in
- **Coffee filter** - 1 per student
- Cold **rubbing alcohol**
- **Straightened paperclip** - 1 per student
- **Magnifying glasses** - 1 per student
- **Butcher Paper** - 5 feet of length per student
- **Markers** for tracing student outlines

Teacher Prep

- In a plastic cup, make the extraction liquid:
- Mix ½ cup water, 1 teaspoon salt, and 2 teaspoons of dish detergent. (this will be enough for 14 students, make more if necessary)

Procedure - Part 1

- Discuss how God has created each of us uniquely:
- "Did you know you were made by God?"
- "Each of us is uniquely different and made perfectly for the plans God has for us. DNA is the way God writes down that plan within our cells."
- Discuss how monasteries in the middle ages were actively working on scientific discovery. Gregor Mendel was one of these scientists.

Procedure - Part 2

- Give each student a strawberry. Have them pull off the green leaves and place the strawberry into a zip-top bag.
- Gently squeeze and smash the bag until the strawberry is completely crushed.

- Add 2 teaspoons of the prepared extraction liquid to each student's bag. Reseal bag and gently mix using hands, avoid making soap bubbles.
- Pass out one cup and coffee filter to each student. Have students place the coffee filter on top of their cup, slightly pushed in in the center.

- Open the zip-top bag and pour the strawberry mixture into the filter. Gently squeeze the filter to get as much liquid out of the strawberry as possible.
- Discard the filter and the strawberry solids inside.
- Add same amount of rubbing alcohol as there is strawberry juice in the cup. Pour the alcohol gently down the side of the cup. **Do not stir or mix.** The DNA will separate from the rest of the strawberry mixture.

- Watch patiently for a white cloudy substance in the top clear layer above the strawberry layer. This will take 2-3 minutes.
- Use a straightened paperclip to probe and examine the DNA. It will form a clump or layer on top, but if you look closely you will see that it is composed of long strands.
- Bend the end of the paperclip into a hook to gently lift up the DNA.
- If time allows examine the DNA further with magnifying glasses.

Terms to Know

DNA

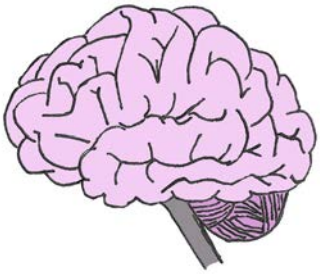
Deoxyribonucleic Acid

Gene

Recessive

Dominant

Gregor Mendel



Put on Your Thinking Cap!

Week 14

The brain is part of the nervous system along with the spinal cord. Neurons send and receive messages allowing us to move and learn.

What are three parts of the nervous system?
What function does the nervous system serve?
What are the regions of the brain called?

Objective

Today you will assemble a "Brain Hat." This is a fun take-home project which will expose students to the different functions of the lobes of the brain.

The human brain is part of the nervous system. Signals from all over the body travel up the spinal chord to the brain for processing and understanding. We think, move our bodies, use our senses, create, and organize data all using different parts of our brain. Our **brain** is divided into sections called lobes. Scientists have studied the brain to determine the functions of each lobe.

Cerebellum - This portion of the brain helps coordinate movement.

Frontal Lobe - Front part of the brain; involved in planning, organizing, problem solving, selective attention, personality and a variety of "higher cognitive functions" including behavior and emotions.

Occipital Lobe - Region toward the back of the brain which processes visual information.

Parietal Lobes -
Right - Visual and spatial processing.
Left - Understanding spoken and/or written language. The parietal lobes contain the primary sensory cortex which controls sensation (touch, pressure).

Temporal Lobe - One on each side of the brain located at about the level of the ears. These lobes allow a person to tell one smell or sound from another. They also help sort new information and are believed to be responsible for short-term memory.

Supplies

- **Brain hat printout** on **cardstock** - (in appendix) (total of 2 sheets cardstock per student)
- **Brain Lobe Labels** and **action/emotion labels** - (in appendix)
- **Clear tape**
- **Colored pencils**
- **Glue stick**

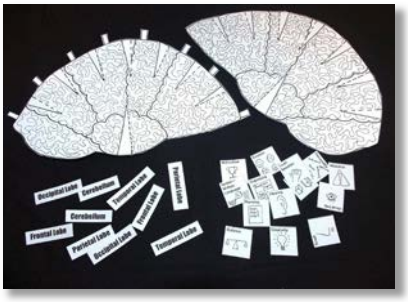
Teacher Prep

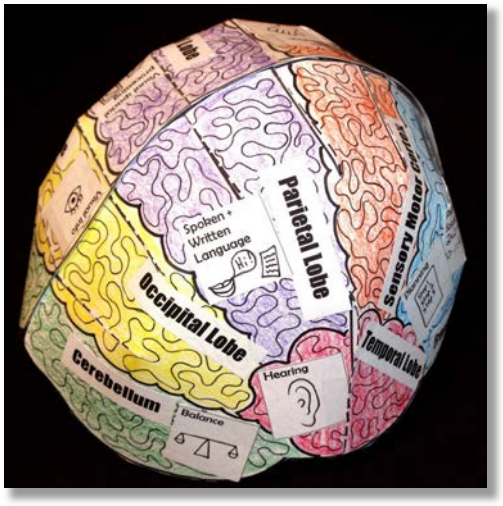
Working with scissors is valuable practice; however, if your youngest class cannot cut effectively you may cut out their brain hats for them. They can do the coloring and labeling themselves.

Procedure

- "Do you know that your brain has different regions or *lobes*?"
- "How many lobes do you think your brain has?" (many)
- "What are some things you use your brain for?" (seeing, feeling, creating, deciding…)
- "Why is it so important that we wear helmets when riding bikes or doing dangerous activities?" (if a part of the brain gets damaged, we may not be able to do that activity anymore. The brain is amazing, though. With hard work, sometimes parts of the brain can be trained to take over for the damaged parts.)

- Pass out the Brain Hat printouts.
- Pass out colored pencils.
- Have students locate the frontal lobe.
- Color it blue.
- Add the correct label and functions with a glue stick.
- Have students locate the temporal lobe.
- Color it red.
- Add the correct label and functions with a glue stick.
- Continue until all lobes are colored (each a different color) and labeled.
- Cut out the brain hat halves following the outermost solid line.
  (Do not cut off the tabs on the right half.)
- Cut only the dotted lines in the wedge shapes. Leave the solid lines uncut.
- Pull the dotted line over to the solid line.
- Fasten with tape. (overlapping the small white triangle)
- Assemble the brain hat from the two brain halves by taping the tabs of the right brain to the inside of the left brain.





Put on your brain hats and have a brain hat fashion show!

Terms to Know

Nervous System

Brain

Spinal Cord

Neurons

Frontal Lobe

Cerebellum

Occipital Lobe

Parietal Lobes

Temporal Lobe