



Science Van

## DIGESTION

### “Enzyme action, pH power”

Grades 3-5: 2 ½ hours

Students will explore the gastrointestinal track. They will investigate how the stomach and small intestine break down food into units that can be used by the body.

#### CSE Educators will need...

- 1 long table
- Access to water
- Students wearing name tags with **BOLD** first name
- Students working with a partner

#### Teachers can prepare students by...

- Reviewing the parts of the digestive track
- Reading grade-appropriate books about digestion or healthy food
- Making a vocabulary list using any of the underlined words below

#### Please be advised...

- Students will be handling a pig's stomach and intestines. Vinyl gloves and goggles are provided.
- Chemicals used: cabbage juice, baking soda, vinegar, sugar, cornstarch, tincture of iodine

#### Teacher Background:

Students often hear “you are what you eat” without understanding what the phrase means. There are three types of food that we all need for energy and building our bodies.

Proteins, which are made of amino acids, are needed for building our bones, muscle, skin, organs, etc. There are 20 amino acids, although 9 are termed “essential” because our bodies cannot make them alone—we need to eat food that contains these amino acids!

Carbohydrates are made of glucose molecules (a simple sugar). Starch is a more complex carbohydrate that is made up of many simple sugars put together. We get our carbohydrates from plants and they are needed for generating energy for our body.

Lipids, or fats, are made from fatty acids and are also used for energy. They are important structural parts of cells.

Other things we need in our diet include vitamins, minerals, and fiber. Fiber, also from plants, is indigestible by humans, although it is necessary for us to function. It helps to push the rest of our food through the gastrointestinal track (digestive track).

The huge molecules of proteins, carbohydrates, and lipids are too large to pass through the lining of the intestines to become absorbed into our body. So, digestion in the mouth, stomach, and small intestine breaks these down into their building blocks so they can leave the intestines and be transported to each cell in our body. Undigested food and wastes move through the large intestine, where water and minerals are absorbed and recycled by the body.

### Session Description:

This session assumes that students have some familiarity with the general structure of the gastrointestinal (GI) track. Students will begin with a brief review of the parts of the GI track. They will look at a real pig stomach and intestine to see where digestion takes place. Students will discover where proteins, carbohydrates, and lipids are broken down in the GI track and discuss what helps to break down these foods—enzymes! They will conduct an investigation in a “test-tube stomach” to see how pH regulates where different enzymes work. They will have discover what happens when acids and bases mix in the stomach! Students will conduct a second experiment to understand how the small intestine must break down starch into simpler parts that can pass through the intestine wall. The lab closes with a look at the digestive tracks of other organisms. The class will determine whose GI track is whose based on form and function.

### Session Outline:

- A brief walk through the digestive track.....Twists and turns
- A Pig Intestine.....How many meters?
- Proteins, Carbohydrates, and Lipids.....Dietary needs
- Enzymes.....Our biological scissors
- Test tube stomachs.....pH, Acids and Bases
- Small intestine Wonder.....What passes through?
- Who track is this?.....Why are the GI tracks so different?

### Wisconsin Model Academic Standards

This session focuses on the following performance standards, but may touch on other standards not listed:

#### Science

- A.4.5 Decide what changes are occurring over time
- C.4.2 Questioning, planning, observing, predicting
- C.4.4 Use simple science equipment
- C.4.5 Use data to develop explanations

- C.8.3 Design and conduct investigations that provide data
- C.8.4 Use inferences to decide possible results and use observations to check inferences
- C.8.6 State what they learned from investigations relating inferences to knowledge and data
- D.8.1 Observe and describe chemical properties of substances
- F.8.1 Understand structure and function of organs, tissues...
- F.8.2 Show how organisms have adapted structures to match their functions

#### Math

- A.4.1 Use reasoning abilities
  - A.4.3 Connect math learning with other subjects
  - D.4.3 Read and interpret measuring instruments
  - D.4.4 Determine measurements directly
- 
- A.8.1 Use reasoning abilities
  - D.8.3 Determine measurement directly using standard units
  - D.8.4 Determine measurements indirectly