Teaching Third Graders About Digestive Enzymes

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It all starts with a growl...
Introductory questions on nutrition and digestion

Why do we get hungry?

Why do I have to eat over and over again?

Why can't I live off of ice cream and candy?

Why does my stomach growl?

What happened to yesterday's pizza?

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Safety First: Laboratory Safety Procedure

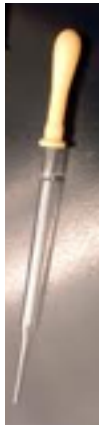
1. Laboratory protective gear: Goggles, Gloves, Lab Coat, Long Pants, Closed Shoes
2. Secure long hair, jewellery and baggy clothes
3. Never work alone in the lab
4. Never eat or drink when doing experiments
5. Always work in a well ventilated area
6. Know the experimental procedure as well as the precautions needed to handle materials

1. Experimental Procedure, Reagents and Equipment

Describe material and equipment

Mortar and Pestle

Spatula



Pasteur Pipette and Bulb

Vial for Control Sample

Vial for Experimental Sample

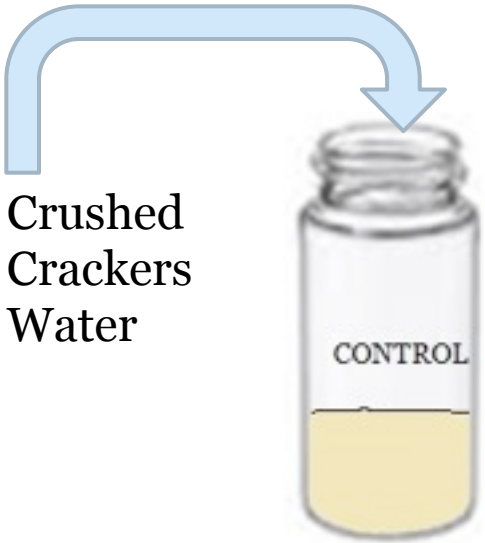
Vial with an aqueous solution of Iodine and Potassium Iodide

Crackers

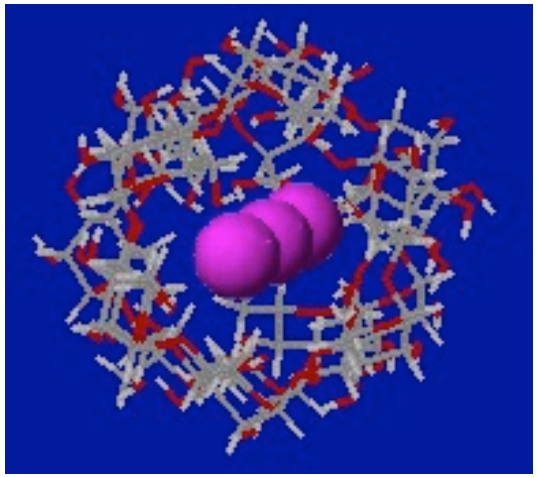
2. The Control Sample

A student crushes a cracker with the mortar and pestle, uses a spatula to transfer the crumbs into the CONTROL vial. Another student adds 10 drops of water to the vial using a Pasteur pipette then 2 drops of the yellow solution (mixture of Iodine, Potassium Iodide and water). The mixture turns DARK BLUE as the starch complexes the iodide.

1. Crushed Crackers
2. Water



3. Add 2 drops of the Yellow KI/I2 solution



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3. The Experiment

The Exp. Sample: Repeat the steps for the control substituting the 10 drops of water with a generous amount of saliva from a volunteer. The mixture turns DARK BLUE as the starch complexes the iodide but after a few minutes it becomes colorless as the starch is broken up by the DIGESTIVE ENZYME AMYLASE in the saliva.

1. Crushed Crackers
2. Saliva

3. Add 2 drops of the Yellow KI/I2 solution

4. Wait 5 minutes

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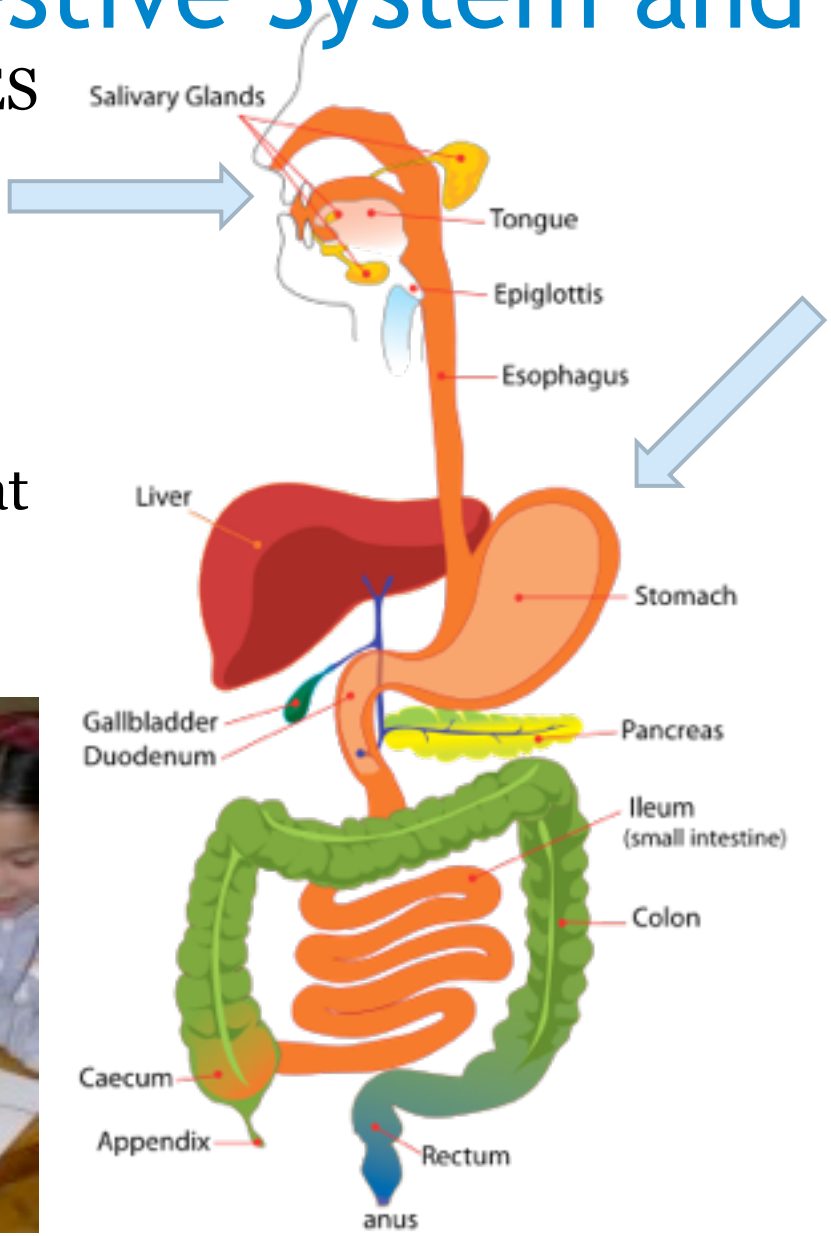
What Happened?

AMYLASE is an ENZYME that breaks down POLYSACCHARIDES into DISACCHARIDES (maltose). The students realized that chewing makes our meals easier to swallow but that the ENZYME CATALYST brakes the CHEMICAL BONDS

The Digestive System and Enzymes

CARBOHYDRATES (like starch) are broken down into SUGARS in the mouth by the digestive enzyme AMYLASE and that gives us our ENERGY



PROTEINES are broken down into AMINO ACIDS in the stomach by the digestive enzyme PEPSIN and that is used to build our MUSCLES

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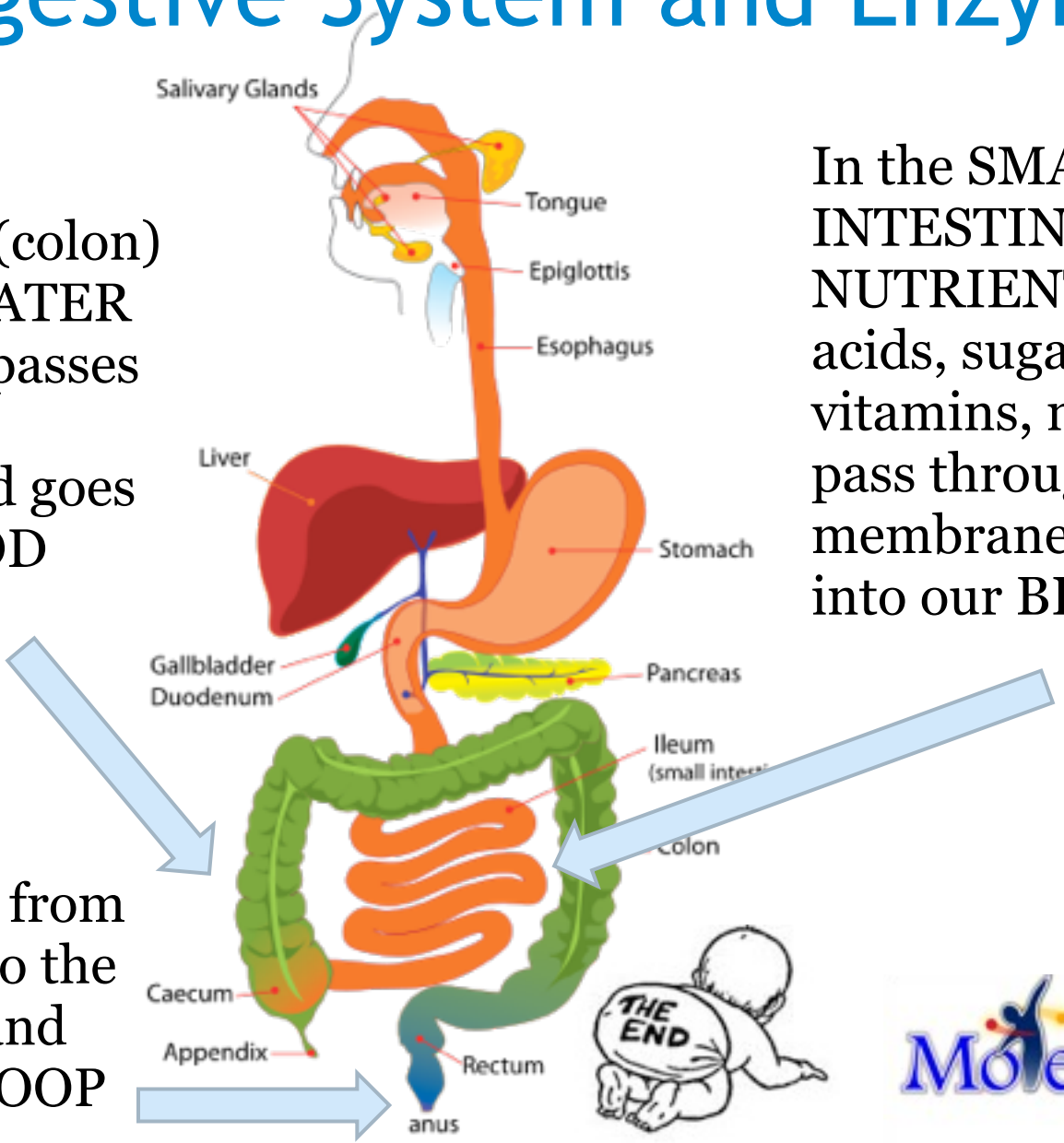
The Digestive System and Enzymes

In the LARGE INTESTINES (colon) most of the WATER that we drink passes through the membrane and goes into our BLOOD



In the SMALL INTESTINES the NUTRIENTS (amino acids, sugars, vitamins, minerals) pass through the membrane and go into our BLOOD

WASTE passes from the BLOOD into the INTESTINES and comes out as POOP

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Is your Favourite Meal Right for YOU?

Food packaging was distributed to each student and the NUTRITIONAL FACTS were studied to determine which foods provided the best source of CARBOHYDRATES and PROTEINES.

The students were asked to draw their favourite meal and categorised them into the four food groups. The students taped their pictures on boards labelled GRAINS, FRUIT AND VEGETABLES, MEAT and DAIRY.

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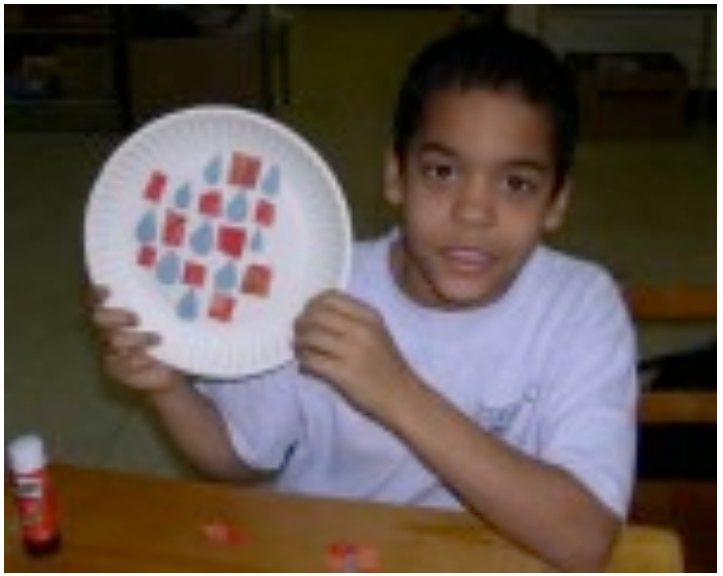
Favourite Meal Mosaics

The students took back their drawings, determined if they contained more carbohydrates or proteins then they cut them up into triangles and squares for CARBS and PROTEINS, respectively.



Pre-cut water drops and paper plates were distributed and the students made MOSAICS of a perfectly HEALTHY, BALANCED meal to take home to their parents.

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Summary

- The importance of laboratory safety was introduced
- A Starch/Iodine experiment was performed to demonstrate the chemical reaction between saliva and carbohydrates
- A discussion on the process of digestion, digestive enzymes and the conversion of polymers into sugars and amino acids
- Mosaics of healthy balanced meals were prepared based on the student's new knowledge of carbohydrates and proteins.

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Acknowledgments

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