



## Murder and a Meal Lab Activity

### The Case

A murder has occurred right here in our peaceful little town of Corona, Ca. As top-notch biology students at Centennial High School you have been asked to assist in the investigation of this most unfortunate incident. Central to identifying the individual who committed this crime is establishing where the victim was the day of the crime so that detectives can question the individuals with whom the victim came into contact. An autopsy was performed on the victim has revealed that the victim ate just prior to the time of death. Upon questioning the victim's friends and family, detectives working the case have learned that the victim enjoyed eating at the following places.



### **JERSEY'S PIZZA**

The victim would never eat thin crust pizza from anywhere else! The victim would typically order a pizza with sausage, pepperoni, and bacon.

*What macromolecules would you expect to find in the stomach contents of the victim if the victims final "pie" was eaten here?*

**HYPOTHESIS:** \_\_\_\_\_



### **BUFFALO WILD WINGS**

The victim would hang out here to watch sporting events while feasting on Blazin' wings and celery.

*What macromolecules would you expect to find in the stomach contents of the victim if the victims final meal was eaten here?*

**HYPOTHESIS:** \_\_\_\_\_



### **MACARONI GRILL**

The victim loved to go here for a night of bread, olive oil, and pasta.

Less by Camron J. Stanley 2008

Name\_\_\_\_\_ Hour\_\_\_\_\_ Date\_\_\_\_\_

*What macromolecules would you expect to find in the stomach contents of the victim if the victims final meal was eaten here?*

**HYPOTHESIS:** \_\_\_\_\_

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How will you solve the crime? The forensic pathologist has removed the contents of the victim's stomach for you to analyze in order to determine where the victim had his last meal.

Name\_\_\_\_\_ Hour\_\_\_\_\_ Date\_\_\_\_\_

## Procedur

e

Before analyzing the stomach contents of the deceased, you must determine the procedure to be used to test for each organic macromolecule. Using information given in class, write out the procedure for testing for each of the following macromolecules. For each macromolecule you must (1) describe the procedure (in enough detail so that others can repeat your work) you will follow to perform each test in the space below, (2) describe how a positive result for the macromolecule will look and record this information in Table 1, and (3) describe how a negative result for the presence of the macromolecule will look and record this information in Table 1.

**NOTE: Before you may begin your investigation, you must obtain approval from your teacher.**

**Describe the procedure you will follow to test each of the following organic compounds. Use the handout at the lab station to help you.**

### Lipid Test



### Protein Test

### Carbohydrate—Glucose Test

### Carbohydrate—Starch Test

Name\_\_\_\_\_ Hour\_\_\_\_\_ Date\_\_\_\_\_

Teacher Approval \_\_\_\_\_ Date\_\_\_\_\_

Name\_\_\_\_\_ Hour\_\_\_\_\_ Date\_\_\_\_\_

**Table 1. Positive and Negative Results, using Known Samples, for the Presence of Organic Macromolecules**

Macromolecule	Chemical Test Used	Positive Test Result	Negative Test Result (water)
Lipids (Cooking Oil)		Circle #2	Circle #1
Proteins (Albumin - Egg White Powder)		Bubble #2	Bubble #1
Carbohydrates— Glucose (Syrup)		Test Tube #2	Test Tube #1
Carbohydrates— Starch (Cracker)		Bubble #5	Bubble #4

**Table 2.**\_\_\_\_\_

Test for Lipids	Test for Proteins –	Test for Glucose	Test for Starch
Observations: Circle #3	Observations: Bubble #3	Observations: Test Tube 3	Observations: Bubble #6
Present? _____	Present? _____	Present? _____	Present? _____
Not Present? _____	Not Present? _____	Not Present? _____	Not Present? _____

### Lab Analysis

- 1) Write a descriptive title for Table 2 above, and fill in the table with your data results.
- 2) Report your findings in discussion format. Open the discussion with a statement regarding which restaurant the victim visited for his last meal (**1 point**). Provide a logical explanation, using data from the tests on the stomach contents, that explains how you reached that conclusion (**4 points**). The discussion should explain the results of the investigation in regard

to the scientific concepts that are being applied in the investigation. In this case, the scientific concept being applied are *macromolecules* and the specific chemical tests used to determine their presence (**5 points**).

## Macromolecule Tests

**\*\* Caution:** The reagents you will be using the following procedures may be corrosive, poisonous and/or irritants; they may damage clothing. Avoid skin and eye contact. If contact occurs, notify your instructor.

**Safety precautions:** goggles, gloves, glassware, disposal of materials, chemical spills

### Procedure:

**Day 1: Testing of Known Substances (indicated by a \*)**

**Day 2: Testing the Unknown Sample from the Victim's Stomach (indicated by a #)**

#### 1. Protein test:

- \*Place 1-2 drops of the albumin (Protein) solution into the bubble labeled 2 on your dimple tray. Add 1-2 drops of Biuret solution.
- \*Place 1-2 drops of the water into the bubble number 1 in your dimple tray. Add 1-2 drops of Biuret solution.
- #Place 2 drops of the of Stomach contents into bubble 3 of your dimple tray. Add 1-2 drops of Biuret solution.
- Record Observations in detail!

#### 2. Glucose test: (3 test tubes)

- \*Place 10 drops of the water into your test tube #1. Add 5 drops of Benedict's
- \*Place 10 drops of the glucose solution into your test tube #2. Add 5 drops of Benedict's solution.
- #Place 20 drops of the water and a scoop of stomach contents into your test tube #3. Add 10 drops of Benedict's solution.
- \* + #Place the tubes in the hot water bath for five minutes. Use test tube clamps to hold hot test tubes.
- Record Observations in detail!

### 3. Starch test:

- \*Place 1-2 drops of the water into bubble 4 of your dimple tray. Add 1 drop of iodine solution.
- \*Place 1-2 drops of the starch solution into bubble 5 of your dimple tray. Add 1 drop of iodine solution.
- #Place 1-2 drops of stomach contents into bubble 6 of your dimple tray. Add 1 drop of iodine solution.
- Record Observations in detail!

### 4. Lipid test:

- **Draw three separate circles on a piece of brown paper (about 2 inch diameter each). Label them #1, #2, #3.**
- \*Place 1 drop of water onto circle 1.
- \*Place 1 drop of the vegetable oil circle 2.
- #Place 1 drop of stomach contents onto circle 3.
- Record Observations in detail!

Name\_\_\_\_\_ Hour\_\_\_\_\_ Date\_\_\_\_\_

**To make the vomit, blend the following materials:**

Corn (not sweetened)

Beans Potato

Noodles

Vegetable oil

Red food coloring

\*\* I don't recommend using the food coloring if you are going to use "Sudan III" to test for lipids. You can use it, however, if you use the "brown bag test" for lipids.

Test your mixture before hand. It should only have starches and lipids.

I put the contents in a beaker and made the kids "handle" it. They loved and hated it!

The ultimate goal is to show that the last meal was "Macaroni Grill".

**Need more information? Visit these sites for ideas ...**

**Food Chemistry**

[http://www.sciencecompany.com/sci-exper/food\\_chemistry.htm](http://www.sciencecompany.com/sci-exper/food_chemistry.htm)

**Testing for Lipids, Proteins, & Carbohydrates**

<http://seplessons.ucsf.edu/node/362>

**Food Chemistry Testing**

<http://www.scribd.com/doc/3371524/Food-Chemistry-Testing-SUGAR-STARCH-ETC>

**Einstein Project – Food Chemistry**

<http://www.einsteinproject.org/einstein/for+educators/unit+offerings/food+chemistry/default.asp>