FORENSIC SCIENCE: THE CASE OF THE MISSING DIAMOND-MAKER

Setting up your initial “Crime Scene”:

- Take a jar that is of some significance to the class. Leave it at the center, visible, before the last time you see the students.

- The following morning, leave the jar empty for all to see. Surround a small area with forensics tape and feature the jar in the center. Set up some pieces that could be used as ‘evidence’ to try to figure out what happened:
  1. A note within the taped area
  2. A pretty pencil/pen
  3. A mitten left behind
  4. Empty wrappers

- Then ask students to identify what can be used around as evidence and how? As students call the items, place the evidence numbers on the different pieces of evidence. Challenge them to think about other places where they should look for evidence (door knob, light switch, garbage bin, footprints, etc.).
THE CASE OF THE MISSING DIAMOND-MAKER

Forensic Science
Cornell Institute for Biology Teachers, 2015 Version
WHAT IS FORENSIC SCIENCE?

- Forensic Science is the study of objects related to a crime.
  - The objects are called evidence.
- Forensic Scientists collect objects from the crime scene and analyze the evidence in a forensics (or crime) lab.
WHAT TYPES OF THINGS MIGHT BE CONSIDERED “EVIDENCE”?

Evidence you can sense:
- Smells
- Sounds
- Broken or misplaced items
WHAT TYPES OF THINGS MIGHT BE CONSIDERED “EVIDENCE”?

- Hair
- Blood
- Saliva
- Fiber or fabrics
- Fingerprints, footprints, lip-prints
- Handwriting
- Glass fragments
- Teeth impressions
- Dust, dirt or powders
HOW MIGHT A FORENSIC SCIENTIST ANALYZE THE EVIDENCE?

- pH tests
- Blood typing
- Chromatography
- DNA analyses
- Teeth impression analyses
THE CASE OF THE MISSING DIAMOND-MAKER
WHAT WE KNOW

- Dr. Suzy Squeeze’s Diamond-Maker machine that turns coal into perfect diamonds in less than an hour was stolen from her lab at Rags-to-Riches, the company where she works.
- The thief left behind a number of clues…

…it is your job as the Forensic Scientist to find out WHO did it!
THE SUSPECTS

- Dr. Edwin Evil – Scientist
- Randy Raggman – Night duty security guard
- Sandra Dee – High school student
- Malcolm Meddlesome – Dr. Squeeze’s boyfriend
- Maria Maestra – The director of Rags-to-Riches Labs
Dr. Evil

Dr. Evil works in the same lab as Dr. Squeeze.

They have a long-standing rivalry.

Dr. Evil has been avoiding Dr. Squeeze ever since she became a celebrity for inventing the Diamond-Maker.

As usual, he was working in the lab the night of the robbery.
Randy Raggman

Randy works as a night security guard at Rags-to-Riches Labs. He was working the night of the robbery. He checked in on the Diamond-Maker during his rounds where he stopped in the lab to snack on a powdered jelly donut.
Sandra Dee

- Sandra Dee is a high school student volunteer in Dr. Suzy Squeeze’s lab.
- She is a big fan of Dr. Squeeze and is often seen working in the evening.
- No one saw her the day of the robbery, but she has her own key.
- She says she had a date that night.
Malcolm Meddlesome

Malcolm is Dr. Suzy Squeeze’s boyfriend.

He works as a computer technician in the lab.

He carries keys to all lab rooms so that he can work on the computers when the scientists aren’t around.

He says he was playing basketball at the time of the robbery.
Maria is the director of Rags-to-Riches Labs. She keeps a close eye on her staff and is quick to take credit for the company’s successes. She is a good scientist and likes to be in the spotlight. She says she was at the movies during the robbery.
THE EVIDENCE

The following things were left behind at the scene of the crime:

- Fingerprints
- Spilled powder
- Lingering perfumes
- Clothing fibers
- Spilled liquid
- Pen markings
Let’s examine the evidence from each station…
## FINGERPRINTING

<table>
<thead>
<tr>
<th>Fingerprint #1 belongs to:</th>
<th>Dr. Suzy Squeeze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingerprint #2 belongs to:</td>
<td>Malcolm</td>
</tr>
<tr>
<td>Fingerprint #3 belongs to:</td>
<td>Dr. Evil</td>
</tr>
</tbody>
</table>

How can we explain these findings?
CHROMATOGRAPHY

<table>
<thead>
<tr>
<th>Pen A belongs to:</th>
<th>Dr. Evil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pen B belongs to:</td>
<td>Sandra</td>
</tr>
<tr>
<td>Pen C belongs to:</td>
<td>Malcolm</td>
</tr>
<tr>
<td>Pen D belongs to:</td>
<td>Randy</td>
</tr>
</tbody>
</table>

Whose pen was used to write the note? Malcolm

How important do you think this piece of evidence is? Why?
FIBER ANALYSIS

<table>
<thead>
<tr>
<th>Fiber Color(s) and Pattern(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
</tr>
<tr>
<td>Randy</td>
</tr>
<tr>
<td>Sandra</td>
</tr>
<tr>
<td>Malcolm</td>
</tr>
<tr>
<td>Dr. Evil</td>
</tr>
<tr>
<td>Dr. Suzy Squeeze</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evidence #1</th>
<th>Dr. Evil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence #2</td>
<td>Dr. Suzy Squeeze</td>
</tr>
</tbody>
</table>

Anything surprising about these findings?
SMELLS

What we know:

- Paper towel found in the trash had strong smell
- Perfume/cologne samples were collected from Sandra, Dr. Evil, Randy, & Malcolm

Evidence smell belongs to:
Sandra

Did you find a possible explanation for this particular finding?
SPILLED LIQUID

<table>
<thead>
<tr>
<th>Drink</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Evil</td>
<td>Alka Seltzer</td>
</tr>
<tr>
<td>Malcolm</td>
<td>Gatorade</td>
</tr>
<tr>
<td>Maria</td>
<td>Water</td>
</tr>
<tr>
<td>Sandra</td>
<td>Orange Juice</td>
</tr>
</tbody>
</table>

Whose drink was found at the crime scene? Malcolm

Did you find a possible explanation for this particular finding?
# SPILLED POWDER

<table>
<thead>
<tr>
<th></th>
<th>Appearance Under Magnification</th>
<th>Texture</th>
<th>Reaction to Water</th>
<th>Reaction to Vinegar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evidence</strong></td>
<td>White fine powder</td>
<td>Silky, sticks to fingers</td>
<td>None, dissolves</td>
<td>None, dissolves</td>
</tr>
<tr>
<td>Powdered Sugar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baking Soda</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baking Powder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the mystery powder? **Powdered Sugar**

Who do you think spilled the powder in the lab? **Randy**

Why do you think so?
### SUMMARY OF ALL THE EVIDENCE FOUND

<table>
<thead>
<tr>
<th>Suspect</th>
<th>Fingerprint</th>
<th>Chromatography</th>
<th>Fibers</th>
<th>Smells</th>
<th>Drink</th>
<th>Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malcolm</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Randy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Sandra Dee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Dr. Evil</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Maria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Suzy Squeeze</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Malcolm was hoping to impress his girlfriend, Dr. Suzy Squeeze, by making her a diamond ring.

After basketball practice, he snuck into the lab and “borrowed” the machine with the intention of returning it later that night.

Unfortunately, it was discovered missing by Randy before he could return it.

In the process he spilled his drink and left his prints on the glass cabinet.