Name: _____ Class: _____ Date: _____

Famous Examples of the Scientific Method

Introduction

The scientific method is not a new idea; it has been used by generations of scientists. This activity will introduce you to some of the most famous scientific experiments and discoveries – ones that continue to influence our lives even today! See if you can identify the different parts of the scientific method and experimental design in each.

The Strange Case of BeriBeri

In 1887 a strange nerve disease attacked the people in the Dutch East Indies. The disease was called "beriberi". Symptoms of the disease included weakness and loss of appetite, victims often died of heart failure.

Experiment #1:

Scientists thought the disease might be caused by bacteria. They injected chickens with blood from patients with the beriberi disease. The injected chickens became sick. However, so did the other group of chickens that were not injected with bacteria.

1. What was the initial hypothesis in this example?

2. A hypothesis is always based on prior knowledge, research, or observation. What do you think scientists based this hypothesis on?

3. What **independent variable** were the scientists studying in this case? What **dependent variable** were the scientists measuring?

4. What was the **experimental group** in their study? What was the **control group**?

5. Why is a control group important? What conclusion might the scientists have reached if they did not use a control group in this example?

6. Would this first experiment be considered a failure? Explain why or why not.

Science 8 Name Key

Unit: Scientific Method Period

"Famous Examples of the Scientific Method"

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The Strange Case of BeriBeri

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Experiment #1

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1. What was the initial hypothesis in this example? Beriberi believed to be a blood born pathogen. (IF injected w/ blood then sickness will occur.)
2. A hypothesis is always based on prior knowledge, research and observations. What do you think scientists based this hypothesis on?

Prior experiences w/ bacteria being transmitted by blood.

3. What is the independent variable in this case? blood w/ beriberi
4. What is the dependent variable in this case? illness (sick chickens)
5. What was the experimental group? chickens injected w/ blood
6. What was the control group? none injected chickens
7. Why is it important to have a control group?

To compare results and make sure experimental results are valid.

8. Would this first experiment be considered a failure? Explain why or why not.

No → they learned the bacteria must be transmitted by other pathways.

Experiment #2

One of the scientists studying Beriberi was named Dr. Eijkman. He realized that before the experiment, all the chicken had eaten whole grain rice, but during the experiment, the chickens were fed only polished rice. Dr. Eijkman researched this further by testing two new groups of chickens. One group was fed the polished rice, the other group was fed the

whole- grain rice. Only the polished rice chickens got the illness. As a result, he believed that the polished rice was missing a nutrient needed to prevent the disease.

1. What observation did Dr. Eijkman make during the first Beriberi experiment?
all chickens ate whole grain rice but during ate polished.
2. What is the independent variable in this case? type of rice
3. What is the dependent variable in this case? sick or not sick
4. What was the experimental group? polished rice feed chickens
5. What was the control group? whole grain rice feed chickens
6. Explain what Dr. Eijkman would need to do next in order to share his discovery with other scientists and have his conclusions be considered valid.

Publish results & retest, retest, retest

The Discovery of Penicillin

In 1928, Sir Alexander Fleming was studying Staphylococcus bacteria growing in culture dishes. He noticed that a type of mold called Penicillium was also growing in some of the dishes. A clear area existed around the mold because all the bacteria that had grown in this area died.

Experiment #3

Fleming thought that the mold must be producing a chemical that killed the bacteria. He decided to isolate this substance and test it to see if it would kill bacteria. Fleming transferred the mold to a liquid broth solution. This solution contained all the material the mold needed to grow. After the mold grew, he removed it. He then grew two identical groups of bacteria. He then took the mold infused broth and added it to the groups of bacteria. Those bacteria died. Fleming then added a liquid broth that did not contain mold to the second group of bacteria. This group survived.

1. What is the independent variable in this case? Penicillin
2. What is the dependent variable in this case? bacteria growth/death
3. What was the experimental group? Bacteria culture w/ penicillin broth
4. What was the control group? Bacteria culture w/ untreated broth.
5. When an experiment is designed, all variables between the experimental and control groups must be held constant. List three constants below.

broth, bacteria, environment, petri dishes