

<p><b>Challenge Title</b> One experiment always leads into another</p>		
<p><b>Authors:</b> Tammy Morgan Randy Young</p>	<p><b>Content area:</b> Living Environment</p>	<p><b>Grade level:</b> 10th grade</p>
<p><b>Standards / Knowledge or Skills addressed:</b></p> <p>Activity 1 (40 min. periods)</p> <ul style="list-style-type: none"> <li>• how to identify independent and dependent variables and control groups</li> <li>• testing one variable at a time</li> </ul> <p>Activity 2</p> <ul style="list-style-type: none"> <li>• diagnosing disease</li> <li>• how to report and analyze results</li> <li>• importance of controls in forming conclusions</li> </ul> <p>Activity 3</p> <ul style="list-style-type: none"> <li>• designing experiments</li> </ul> <p>Activity 4</p> <ul style="list-style-type: none"> <li>• peer review of Rabbit Island experiment</li> </ul>		
<p><b>Investigative Question:</b> (needs to be a specific question that will guide and focus students throughout the activity)</p> <p>What makes an experiment pass a peer review</p>		
<p><b>Challenge:</b> (Defines what the students will do – ex: write a lab report, create a brochure, prepare a debate...)</p> <p>Students will pretend to be Robert Koch, a German scientist well versed in scientific methods. They will analyze Dr. Trudeau’s rabbit island experiment by doing activities 1, 2, and 3 then write a peer review article identifying strengths, weaknesses and suggestions for Dr. Trudeau.</p>		
<p><b>Context and prior knowledge:</b> Tuberculosis is a disease caused by a bacterium Understand the importance of peer review in science</p>		
<p><b>Materials:</b> (List resources needed, student handouts necessary, lab supplies...)</p>		

- Dr. E.L. Trudeau's 1886 NY Medical Journal article "Environment in its relation to the progress of bacterial invasion in tuberculosis"
- Activity 1 worksheet (Rabbit Island Experiment Description)
- Activity 2 worksheet (Rabbit Island internal results )
- Activity 3 worksheet (experimental design)
- Photos of tb infected and healthy lungs and livers (5 to represent lot 1 – inoculated and placed in dark damp unhealthy environment) (5 representing lot 2 – controls that are not inoculated) (5 for lot 3 – inoculated but kept in healthy environment – according to his paper one of these animals had TB infected tissues but the remaining 4 were healthy with no signs of the bacteria in either the lung or liver. Of the lung that was not healthy – there were lesions on the right lung but not the left and the liver of that one showed no visible signs)
- Short powerpoint introducing the bacillus includes photos of infected vs normal lungs and livers
- Pictures of healthy and sick rabbits.

**Directions for Students:**

Activity 1:

- 1) Read the introduction and methods section of the Trudeau article.
- 2) Fill out the rabbit island experimental outline worksheet

Activity 2:

- 1) watch powerpoint presentation
- 2) look at organs of the animals record observations on activity 2 worksheet

Activity 3:

- 1) design an experiment testing only one of the variables

Activity 4:

- 1) Tie it all together by writing a letter to Dr. Trudeau describing the strengths and weaknesses of his experiment. In your letter be sure to suggest further experiments that need to be done to really develop an effective cure.

## Challenge Quality Checklist

**Title:** Peer review of Trudeau's Rabbit Island Experiment

**Author(s)** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Class:** \_\_\_\_\_

Standards / Criteria	Points possible	Points Awarded
Format: Letter is typed includes a paragraph describing strengths of the rabbit island experiment, a paragraph describing weaknesses, and a paragraph describing recommendations for further study. Attached to the letter is a design matrix describing an experiment testing only one variable.	10	
Report is handed in on time	10	
Strengths (at least 2)	10	
Weaknesses (at least 2)	10	
Design matrix attached includes:	10	
Title	10	
Hypothesis	10	
Independent Variable Includes a control group	10	
Dependent variable	10	
Procedures: Describes the setup and states what will be measured and how.	10	
Controlled factors	10	
<b>Total</b>	100	

Comments: