

Appendix B - CULTURING BACTERIA STUDENT LAB GUIDE
(Days 2 and 4)

SHSM Science CLA - Lab Investigation: Why Use Soap?		SBI3C
<p><u>Text Reference:</u> Nelson Science 11 Grade 11 Biology – College Level Culturing Bacteria Activity 2.5 - text p113, 114</p> <p><u>Purpose/Question:</u> Why use soap?</p> <p><u>Description:</u> Students will be culturing bacteria from their hands before washing, after washing with water, after washing with soap and water, after washing with alcohol-based hand sanitizer and after wearing gloves for 30 minutes. Students will compare the amount of relative growth of bacteria between samples.</p> <p><u>Introduction:</u> Use the references listed to answer the following questions in paragraph format: (students will complete the introduction on Day 3)</p> <ol style="list-style-type: none"> 1. What is hand-washing for hygiene? 2. What is medical hand hygiene and what is its purpose? 3. Give a brief description of the substances used and their effectiveness. 4. Read through the techniques, Medical Use and Hand Antiseptics sections for further understanding of the lab protocol for observation and analysis on Day 5. http://en.wikipedia.org/wiki/Hand_washing 5. What is soap and how does it work? http://www.globalhandwashing.org/faq.htm 		<p><u>Materials</u> gloves, wax pencil, blood or nutrient agar growth medium in disposable petri plates, tape/parafilm, soap, alcohol, paper towels, hand lens/dissecting microscope incubator autoclave or bleach solution (see teacher’s notes)</p>
Opportunities		Assessment
Minds On...	<p><u>Think-Pair-Share</u></p> <p>Formulate a hypothesis. Your hypothesis should be clearly worded and indicate your understanding of the purpose of this activity.</p>	Students work in pairs and make an initial prediction of results providing their reasoning.
Action!	<p><u>In Pairs:</u> (Day 2)</p> <p><u>Method:</u></p> <ol style="list-style-type: none"> 1. See text p113-114. Substitute the following for culture sources in text: <p><u>PLATE 1</u> Quadrant 1: Control Quadrant 2: Unwashed hand Quadrant 3: Hand washed with water only Quadrant 4: Hand washed with soap & water. (<u>Use procedure on Handout.</u>)</p>	Students work through lab procedure in pairs. One student could inoculate plate 1 and their partner could inoculate plate 2.

	<p><u>PLATE 2</u></p> <p>Quadrant 1: Control</p> <p>Quadrant 2: Unwashed hand</p> <p>Quadrant 3: Hand cleaned with alcohol-based hand sanitizer. (<u>Use procedure on Handout.</u>)</p> <p>Quadrant 4: Outside of a rubber glove worn by a student in the class for at least 30 minutes</p> <ol style="list-style-type: none"> Students will inoculate petri plates by gently touching (so as not to indent or tear agar) their finger tips in the desired quadrant. Students must thoroughly wash their hands after inoculating petri plates. Follow procedure in the text for incubating and analyzing plates. <p>Observations: (Day 4) Students will complete observations after 48 hours incubation.</p> <ol style="list-style-type: none"> See text. Follow steps 6, 7 & 8 on p. 114. 	<p>Students will sketch appearance of plates and design a table to record descriptions of colonies.</p>
<p>Consolidate Debrief</p>	<p>Conclusion:</p> <ol style="list-style-type: none"> How effective was your hand-washing technique? How do you know? Explain your results, referring to the growth in each quadrant of your plates. How effective was the alcohol-based hand sanitizer in killing microorganisms? How do you know? Explain your results, referring to the growth in each quadrant of your plates. Is wearing rubber gloves an effective method of preventing the transmission of disease? Explain your answer. Using your findings from the lab and research from other sources, answer the question at the beginning of the activity: “Why use soap?” See references below. What conditions reduce the effectiveness of alcohol-based hand sanitizers? Why? <p>References: http://www.globalhandwashing.org/ http://en.wikipedia.org/wiki/Hand_washing http://www.ccohs.ca/oshanswers/diseases/washing_hands.html</p>	<p>Students will complete research in computer lab on days 5 and 6.</p>
<p><u>Further Classroom Consolidation</u></p> <ul style="list-style-type: none"> Students count the bacterial colonies present for each quadrant and chart the findings for the entire class to make comparisons between the various samples. Students can undertake a data analysis to quantify the effectiveness of each method (water, soap + water, alcohol-based sanitizer, etc.). <p>Complete activity for submission and evaluation according to the Evaluation Rubric.</p>		

Culturing Bacteria Activity Evaluation Rubric

Criteria	Level 1 (50 – 59%)	Level 2 (60 – 69%)	Level 3 (70 – 79%)	Level 4 (80 – 100%)
Inquiry proposal	- both the question and the hypothesis are clear	- both the question and the hypothesis are clear and indicate some understanding of the purpose of the activity	- both the question and the hypothesis are based on sound science principles and indicate some understanding of the purpose of the activity	- both the question and the hypothesis are based on sound science principles and indicate a clear understanding of the purpose of the activity
	- hypothesis is somewhat developed and shows a connection to the purpose of the activity	- hypothesis is well written with some spelling and grammar errors	- hypothesis is well written and complete, with few spelling and grammar errors	- hypothesis is well written and complete, with no spelling or grammar errors
	- introduction covers background information with minimal inquiry and detail	- introduction covers background information with some inquiry and detail	- introduction covers background information with considerable inquiry and detail	- introduction covers background information with thorough inquiry and detail
Observations (6 a & 7b)	(7a) Entries are somewhat complete; some items are drawn and labelled	Entries are mostly complete and neat; some items are drawn and labelled	Entries are complete, mostly accurate and neat; most items are drawn and labelled with care	Entries are complete, accurate and neat; all items are drawn and labelled with care
	(7b) Table of observations somewhat organized; minimal description of observed results	Table of observations mostly organized and neat; some description of observed results	Table of observations well-organized and neat; describes observed results with considerable detail	Table of observations well-organized and neat; thoroughly describes observed results in detail
Results and analysis	- analysis indicates a basic understanding of the results	- analysis indicates a fairly clear understanding of the results and some of their implications	- analysis is thorough and indicates a fairly clear understanding of the results and their implications	- analysis is thorough and indicates a clear understanding of the results and their implications
	- some research connecting the results to the real world is evident;	- some connections to the real world are shown;	- several connections to the real world are clearly shown;	- connections to the real world are clear;
	- work is rarely written in precise language	- some work is written in precise language	- most work is written in precise language with few spelling or grammar errors	- work is written in precise language with no spelling or grammar errors

Note: A student whose achievement is below level 1 (50%) has not met the expectations for this assignment or activity.