Describe the effects of the various antibiotic drugs you used. Were they all equally effective at controlling bacterial growth? How do you know?

The three antibiotic drugs used in this experiment were Penicillin, Amoxicillin, and Erythromycin. Penicillin works by disrupting the structure of bacterial cell walls. Amoxicillin works in a similar way but affects a different range of bacteria. Erythromycin works by preventing bacteria from producing proteins that are essential to them. Each drug preformed differently depending on the bacteria.

When introduced to Staphylococcus Aureus, Erythromycin excelled, resulting in a zone of inhibition measuring 25mm. Amoxicillin placed second with an inhibition zone of 12mm and penicillin proved the least effective with an inhibition zone of 10mm. When introduced to Hemophilias Influenza however, Penicillin excelled producing an inhibition zone of 29mm. Amoxicillin was a close second at 27mm. Erythromycin proved least effective producing an inhibition zone of 16mm.

Finally, when introduced to Streptococcus Pneumoniae, Amoxicillin proved the most effective with an inhibition zone of 35mm. Penicillin was a close second with an inhibition zone of 33mm. Least effective was Erythromycin with an inhibition zone of 14mm.

When the various antibiotic drugs were introduced to the bacteria, they produced a variety of different results. By measuring the bacterial growth around each different antimicrobial agent, we can asses the effectiveness of each agent against the different type of bacteria. The differences in the measured sizes of inhibition zones indicate that there are differences in which bacteria they are most effective against.

<table>
<thead>
<tr>
<th>Bacterial Species</th>
<th>Sterile Filter Paper</th>
<th>Anti Bacterial Soap</th>
<th>Household Bleach</th>
<th>Household Disinfectant</th>
<th>Penicillin</th>
<th>Amoxicillin</th>
<th>Erythromycin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemophilias Influenzae</td>
<td>4</td>
<td>17</td>
<td>31</td>
<td>21</td>
<td>29</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>Staphylococcus Aureus</td>
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<td>14</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Streptococcus Pneumoniae</td>
<td>4</td>
<td>15</td>
<td>29</td>
<td>22</td>
<td>33</td>
<td>35</td>
<td>14</td>
</tr>
</tbody>
</table>

Describe the effects of the various chemical disinfectants you used. Were they all equally effective at controlling bacterial growth? Would you use them to halt the growth of bacteria in your home or on your body?

The three chemical disinfectants used in this experiment were Anti-bacterial soap, Bleach, and Household Disinfectant. These chemicals are designed to create a hostile...
environment which will kill the bacteria and prevent growth. In each experiment, the chemical agents had a similar effect regardless of the specific bacteria. Bleach proved the most effective, household disinfectant a close second, with anti-bacterial soap proving the least effective in each experiment. These agents could prove useful in the home to disinfect surfaces, but improper use could eventually lead to bacterial resistance.

Despite the effectiveness of these chemical agents, considerations must be made before using them on humans. These chemicals, while effective against bacteria, could also prove damaging to human cells and would cause adverse conditions for us as well. This is why, for example, you would not prescribe bleach for a hemophilies infection.

Compare the effectiveness of the different antibiotic drugs and chemical disinfectants. Which seems to be better at controlling bacterial growth? Why do you think this is so?

Household bleach proved in each experiment that it was generally effective against all of the tested strains of bacteria, producing an inhibition zone of nearly 30mm each time. This is likely due to the fact that it creates a hostile environment for the bacteria. Penicillin and Amoxicillin were the most effective of the antibiotic medication, and generally were as effective as each other. In each experiment they created zones of inhibition similar to each other. This is likely due to the fact that they work in a similar way but affect a slightly different range of bacteria.

If you were a doctor treating a patient infected with Staphylococcus aureus, a bacterium that causes mild to moderate skin infections, which antibiotic would you prescribe? Why?

If treating a patient infected with staphylococcus aureus I would prescribe the antibiotic Erythromycin as it is the antibiotic medication which proved the most effective in creating zones of inhibition against the bacteria in my experiment.

Can you think of any limitations of this technique of testing the effectiveness of antimicrobial agents? If a real person were involved, what other tests might give you more confidence in your results?

This experiment has certain limitations, one of them being that the antibiotics and bacteria are only reacting to each other in a highly controlled environment, and we may see different reactions in real world application. Also, we do not observe how a human is reacting to the drug being administered. When prescribing this medication, other logistics such as a patient having an allergic, or otherwise adverse reaction to the antibiotic would also need to be considered. If a human were to be involved as a test subject, we would be able to observe the infections being destroyed by antibiotics visibly, in the form of patient recovery, for example the skin infections caused by staphylococcus aureus healing.