Biology-Miss Hardy By
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Experiment to investigate the effect of different antibiotics on the bacteria *Bacillus subtilis*:

Aim:

To see which antibiotic (Chloramphenicol, Erythromycin, Fusidic Acid, Oxacillin, Novobiocin, Penicillin, Streptomyan and Tetracycline) reacting with the *Bacillus subtilis* has the largest zone of inhibition in mm ($^{+}$/- 0.5mm) and so which has the biggest effect on the bacteria.

Introduction:

Gram -positive bacteria are bacteria that are dark blue or violet when gram staining. Gram-positive organisms are able to keep the crystal violet stain because of a high amount of peptidoglycan in the cell wall. This makes up about 90% of the thick, more than 20 layers of peptidoglycan together. Gram-positive organisms normally do not have the outer membrane, whereas Gram-negative organisms do.
Gram-positive bacteria include many well -known genera like Streptococcus and Bacillus. Most pathogenic bacteria in humans are Gram-positive organisms and these are used to manufacture antibiotics.
Bacillus subtilis, also known as the hay bacillus or grass bacillus is a Gram- positive bacterium, which is mostly found in soil. *Bacillus subtilis* is not a human pathogen and it can contaminate food but rarely causes food poisoning. *Bacillus subtilis* spores can survive the extreme heat during cooking and *Bacillus subtilis* is responsible for causing a sticky, stringy consistency in spoiled bread dough.
Antibiotics are among the most frequently prescribed medications in modern medicine. They cure disease by killing or injuring bacteria. The first antibiotic was penicillin, discovered accidentally from a mold culture. *Penecillium* fungus produces penicillin to kill bacteria. Today, over 100 different antibiotics are available to cure minor discomforts as well as life-threatening infections.
Antibiotics are produced by microorganisms to kill or control the growth of other organisms. Inappropriate antibacterial treatment and overuse of antibiotics have contributed to the emergence of antibacterial-resistant bacteria. It is important to know that antibiotics only treat bacterial infections, not viral (e.g. common cold) or fungal infections.

Variables:

-Independent variable:
The different antibiotics, which are placed in the Petri dishes with the *Bacillus subtilis.*
C-Chloramphenicol, 25ug
E- Erythromycin, 5ug
FE-Fluidic Acid, 10ug
OX-Oxacillin, 5ug
NO- Novobiocin, 5ug,
PG- Penecillin G, 1 unit
S- Streptomyan, 10 ug
T- Tetracyline, 25ug

-Dependent variable:
The zone of inhibition (of killed bacteria) in mm ($^{+}$/- 0.5mm). Measured with a ruler.

Results:

The following is a table to show how large the zone of inhibition for each antibiotic is in mm. The Petri dishes were left for 24 hours at a temperature of 30°C. ($^{+}$/-0.5°C).

Different antibiotics	**Zone of inhibition/ mm ($^{+}$/- 0.5mm)**					
	Repeat 1	Repeat 2	Repeat 3	Repeat 4	Repeat 5	Average
P1	14.0	13.0	14.0	13.0	13.0	13.4
P1.5	13.0	14.0	15.0	13.0	16.0	14.2
P2	16.0	15.0	16.0	14.0	13.0	14.8
P5	16.0	17.0	16.0	15.0	16.0	16
P10	17.0	18.0	17.0	18.0	17.0	17.4
C	21.0	22.0	18.0	21.0	24.0	21.2
E	19.0	22.0	16.0	20.0	19.0	19.2
FC	22.0	22.0	22.0	22.0	22.0	22.0
OX	18.0	25.0	22.0	24.0	24.0	22.6
NO	16.0	16.0	15.0	14.0	15.0	15.2
PG	14.0	15.0	12.0	14.0	13.0	13.6
S	11.0	13.0	11.0	11.0	11.0	11.4
T	13.0	21.0	18.0	19.0	20.0	18.2

Conclusion+ Evaluation:

As seen in my result table the antibiotics Chloramphenicol, Erythromycin, Fusidic Acid and Oxacillin show the biggest effect on the bacteria. The zone of inhibition for these antibiotics is the largest. The different types of penicillin show very similar results in all five repeats and P1 has the smallest zone of inhibition, whereas P10 has the largest. Overall the table shows that Oxacillin has the largest average zone of inhibition with 22.6 mm. Looking at the table carefully the size of the zone of inhibition increases steadily from an average of 13.4mm until it reaches Oxacillin at an average of 22.6mm and then it decreases again. Only Tetracycline has a higher size of the zone of inhibition again. This shows that different antibiotics have differently strong effects on the same bacteria. Therefore it must be considered well which antibiotics to take against which infection.