# INVESTIGATORY PROJECT
# BIOLOGY

ALL INDIA SENIOR SECONDARY EXAMINATION (CBSE),
NEW DELHI, 2020-2021

## EFFECT OF ANTIBIOTICS ON MICROORGANISMS

*CLASS:11-F*

*DONE BY: Keerthana, Keerthi, Divya and Rithanya*

# BONAFIDE *certificate*

*Certified to be the project work done by*

*Master / Miss*_____

*Regd No.*_____ *of class*_____

*during the academic year*_____

*Date*_____ *Teacher-in-charge*_____

Signature of the Teacher

Signature of the Principal

*Submitted for the* _____

*in*_____

*at*_____

*Date*_____ *Internal Examiner :*

Seal

*External Examiner :*

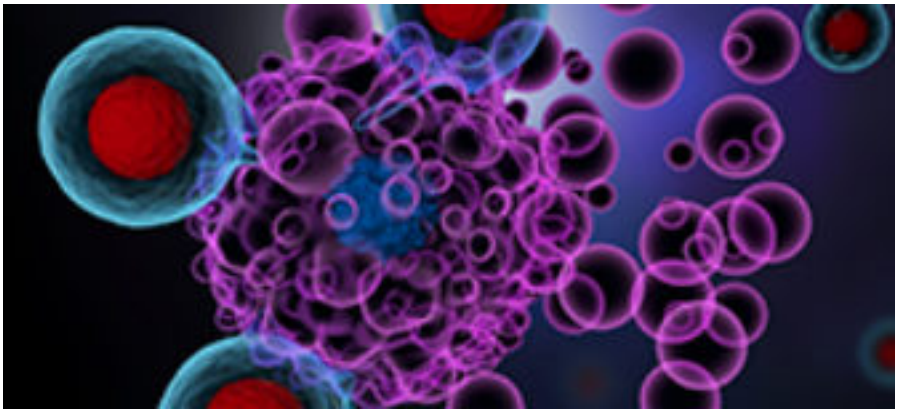
## *INDEX*



***INTRODUCTION***

Antibiotics are chemicals that kill or inhibit the growth of bacteria and are used to treat bacterial infections. They are produced in nature by soil bacteria and fungi. This gives the microbe an advantage when competing for food and water and other limited resources in a particular habitat, as the antibiotic kills off their competition.

First discovered antibiotic was penicillin it was obtained from fungi pencillium.First discovered bacterial antibiotic was streptomycin,discovered from streptomycetes griseus.Many antibiotic medicines are obtained from the bacteria.

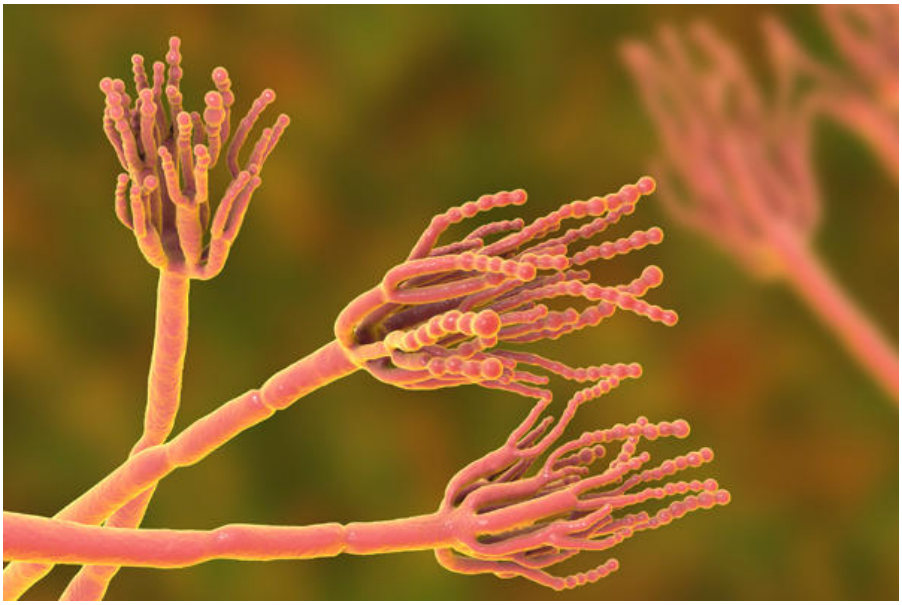


**How do antibiotics work**

Antibiotics take advantage of the difference between the structure of the bacterial cell and the host's cell.

They can prevent the bacterial cells from multiplying so that the bacterial population remains the same, allowing the host's defense mechanism to fight the infection or kill the bacteria, for

example stopping the mechanism responsible for building their cell walls.



3D illustration showing spores conidia and conidiophore.

An antibiotic can also be classified according to the range of pathogens against which it is effective. Penicillin G will destroy only a few species of bacteria and is known as a narrow spectrum antibiotic. Tetracycline is effective against a wide range of organisms and is known as a broad spectrum antibiotic.

**Antibiotic resistance**

Bacteria are termed drug-resistant when they are no longer inhibited by an antibiotic to which they were previously sensitive. The emergence and spread of antibacterial-resistant bacteria has continued to grow due to both the over-use and misuse of antibiotics.

Treating a patient with antibiotics causes the microbes to adapt or die; this is known as 'selective pressure'. If a strain of a bacterial species acquires resistance to an antibiotic, it will survive the treatment. As the bacterial cell with acquired resistance multiplies, this resistance is passed on to its offspring. In ideal conditions some bacterial cells can divide every 20 minutes; therefore after only 8 hours in excess of 16 million bacterial cells carrying resistance to that antibiotic could exist.

**How is resistance spread?**

Antibiotic resistance can either be inherent or acquired. Some bacteria are naturally resistant to some antibiotics due to their physiological characteristics. This is inherent resistance. Acquired resistance occurs when a bacterium that was originally sensitive to an antibiotic develops resistance. For example resistance genes can be transferred from one plasmid to another plasmid or chromosome, or resistance can occur due to a random spontaneous chromosomal mutation.

***EXPERIMENT***

**AIM:**

To study the effects of antibiotics on microorganisms

**MATERIALS REQUIRED:**

Potato, agar, dextrose, beef, peptone, NaCl, sodium bicarbonate, distilled water, five different types of antibiotics (such as penicillin, streptomycin, aureomycin, terramycin and chloromycetin), syringe, oven sterilized petri dishes, flasks, beakers. Pipettes, garden soil, glass marker pen etc.

**PROCEDURE:**

**A. Preparation of culture medium**

1. Potato Dextrose Agar (PDA) Medium. Take 200 g of peeled potato chips. Boil them with 500 ml of water in a beaker for 15 minutes. Squeeze the potato pulp thus obtained through a muslin cloth and keep it in a flask. Take 20 g of agar in a beaker and warm it with 500 ml of water. Mix both the solutions of potato and agar and add 20 g dextrose to it. Thus one liter of PDA medium is prepared.
   Autoclave the medium at 15 pounds pressure for 15 minutes
2. Meat extract Agar medium. Weigh 3g beef extract, 1o g peptone, 5 g NaCl and mix these in 1 liter of distilled water. Heat the mixture to 65°C stirring until the materials are completely dissolved. Filter the mixture through filter paper and adjust the pH to 7.2 to 7.6 by adding a bit of sodium bicarbonate. Now, add 20 g agar to the broth and autoclave the medium at 15 pounds pressure for 15 minutes.

**B. Effect of antibiotics on soil microorganisms**

1. Take 2g of soil and dissolve it in 10 ml of water in a beaker. Let the soil particle settle down
2. Take 6 oven sterilized petri dishes and pour 1 ml of soil suspension in each of the plates. Now pour 1 ml of the five antibiotics separately in five petri dishes with the help of a syringe, and mark them with a marker pen. Leave the sixth petri dish without antibiotics to serve as control.
3. Pour PDA or meat extract agar in each of the petri dishes and mix the suspension by rotating the petri dishes. Leave the petri dishes undisturbed at a warm place for a week.

***OBSERVATION***

Colonies of microorganisms appear on the culture medium, count the colonies in each of petri dish and present your observations in the following table:

| Sno | Antibiotics | No of colonies |
|---|---|---|
| 1 | penicillin | nil |
| 2 | streptomycin | 2-3 |
| 3 | terramycin | nil |
| 4 | chloromycetin | 2-3 |
| 5 | control | 30-40 |

## *CONCLUSION*

Penicillin and Terramycin were the most effective antibiotics against microorganism in soil.

## *BIBLIOGRAPHY*

https://www.1000sciencefairprojects.com/Biology/aids-and-hiv.php

https://www.amr.gov.au/resources/infographic-how-antibiotic-resistance-can-spread

https://www.healthline.com/health/how-do-antibiotics-work

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4790345/

https://www.sciencedirect.com/science/article/pii/S1550413119303122