

LEAD-IN

The title of this unit and the image it is accompanied by present a war-like scenario. Antibiotics, antiviral drugs and other treatments are personified, portrayed as soldiers determined to fight with all their might against the enemy, i.e., pathogens. **But what do pathogens include? Which types of pathogens do antibiotics and antiviral drugs target?**

The term *pathogen* derives from the Greek words **pathos** (*suffering*) and **gheno** (*breed*), and means causing suffering, particularly through illnesses and infections. **Pathogens** are microorganisms that are capable of causing infections that may develop into a disease. While pathogens are germs, not all germs are necessarily pathogens. For instance, not all bacteria are pathogenic.

This unit focuses on antibiotics and antiviral drugs. Let's review some basic facts about bacteria and viruses that these drugs are designed to combat.

Activity 1: Fill in the following table using facts from the previous unit and your background knowledge. You may return to the table and add more information as you progress through the unit.

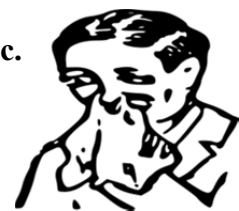


	Viruses	Bacteria
Structure	Non-cel-----; consist of ----- or -----	Single- ----- with a complex c----- s-----
Reproduction	Require a h----- c----- to replicate	Reproduce through b----- f-----
Infections and diseases they cause		
Possible treatment	Treated with a-----	Treated with a-----

Activity 2: What do you think the medication shown in the picture above is used for? Viral infections, bacterial infections, or both? (Hint: it contains penicillin).

Activity 3: Imagine that the warning below is directed to the public. Choose the correct word in each highlighted pair.

WARNING! Antibiotics do not treat **viral** / **bacterial** infections such as colds or flu. Misuse can lead to dangerous antibiotic resistance. Only take them when prescribed for **viral** / **bacterial** infections.



Pronounced as

- **Petri** (dish): **pe** as in **pen** in British English / as in **pit** in American English
- **Penicillin**: **pen** as in **pen**, **i** as in **a**bout, the primary stress on **ci**.
- **Antibiotics** : **An** as in **cat** // **ti** as in **tin** in British English, often as in **tie** in American English

Did you know?

Penicillin comes from the Latin word *penicillus*, i.e., “a little brush”, because mold cells look like tiny brushes under a microscope.

READING 1

Activity 1: Before you read the text, use your prior knowledge to decide whether the following statements are true, partly true, or false. Then, scan the text to check your answers. Correct the false or partly true statements, starting with: No. It was X **who** / **that**...// It was in 19...**that** X happened.



1. Howard Florey, Ernst Boris Chain, and Norman Heatley discovered penicillin.
2. Penicillin was discovered in 1930.
3. The substance secreted by mold has antiviral properties.
4. Antiviral medications were urgently needed to treat sepsis during World War II.
5. Fleming was awarded the Nobel Prize in Physiology or Medicine in 1945.
6. The Egyptian recognized the antimicrobial properties of mold.

Activity 2: While reading, cross out the word that does not fit in each highlighted pair.

THE HISTORY OF PENICILLIN IN A NUTSHELL

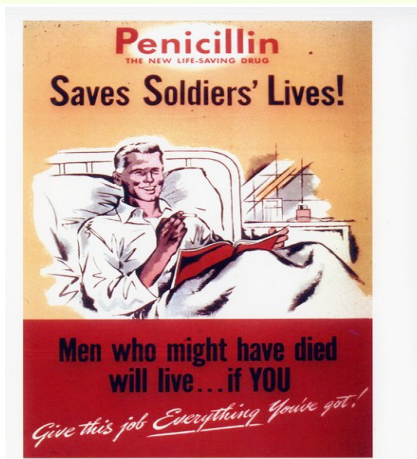
For centuries, bacterial infections claimed countless lives, as medicine lacked effective ways to control them. However, in 1928 Alexander Fleming made an observation that led to one of the most significant discoveries in medical history, which was destined to save lives that might otherwise be lost to bacterial diseases. After returning from a trip, Fleming noticed that a culture



Culture plate of penicillium mould (or mold)

Fleming noticed that a culture

plate he had ¹inoculated with staphylococci was spoiled / contaminated with a fungus. Remarkably, the bacteria surrounding the mold had been destroyed and the area was clear, while those farther from the mold were dotted / stuffed with colonies. Fleming assumed that the mold was secreting a substance that killed the bacteria, and later identified it as belonging to the genus *Penicillium notatum*, recognizing the presence of a naturally occurring antibacterial agent that would later become known as penicillin.



Although antibacterial properties of mold had been recognized for centuries (e.g., in Egypt) and prior / subsequent researchers had made similar observations, it was Fleming's determination and dedication that specifically / ultimately led to this breakthrough. After his initial discovery, Fleming spent 12 years trying to convince / persuade chemists to undertake / underscore the task of purifying penicillin, but eventually he gave up in 1940.

By a fortunate coincidence, that same year, a team at Oxford led by Howard Florey, Ernst Boris Chain, and Norman Heatley successfully purified penicillin for clinical use. This enabled its mass production at a time when it was entirely / urgently

needed to treat bacterial infections (e.g., sepsis and pneumonia), which were common among wounded soldiers during World War II. In 1945, Fleming, along with Florey and Chain, was awarded the Nobel Prize in Physiology or Medicine in recognition of their invaluable contribution to humanity.

Activity 3: Now, answer the following questions.

1. Was the discovery of penicillin a result of serendipity (*accident*), or of targeted research?
2. Was it the first time that the antibacterial properties of mold were acknowledged?
3. What did Fleming observe that led to the breakthrough?
4. Did Fleming produce penicillin himself?
5. What was penicillin used for during World War II?
6. How was the contribution of Fleming and his colleagues to science acknowledged and rewarded?
7. Is the following information stated in the text? "Fleming cautioned that bacteria could become resistant to penicillin if it was misused".

Activity 4: Write the words from the text above that correspond to the explanations below.

1. Scattered throughout an area -----
2. Infected -----
3. Produce or release a liquid -----
4. Pioneering discovery -----
5. Introduce an organism into a medium (in a laboratory setting) -----
6. Remove impurities or contaminants from something -----
7. It was meant to / going to -----
8. He took on the task of -----

¹ **Inoculate:** Introduce a microorganism into a culture, or a vaccine into the body. From Latin *inoculare*: to graft a bud (eye) of one plant into another.

Activity 5: Match the following words with their synonyms in the second row.

- Remarkably, breakthrough, invaluable, determination, prior, underscore, culture plate.
- Major discovery, resolve, notably, previous, Petri dish, emphasize, priceless.

Activity 6: Fill in the gaps with words or phrases from the text above, in the correct form. One word is used twice.

1. The sequencing of the human genome set the ----- for targeted therapies.
2. The leaf was ----- with fungal spores.
3. The ----- wound required immediate treatment to prevent the spread of bacteria.
4. The vaccine was developed to ----- the population against the emerging virus.
5. To test the antibiotic, scientists decided to ----- the sample with bacteria.



Watching and Listening 1

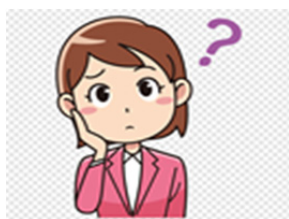
Watch the first 3 minutes of the video at <https://www.youtube.com/watch?v=yDrI8q98YpU> and answer the questions:

1. Why are antibiotics important?
2. What would the world be like without antibiotics?
3. What is the scientist saying about the percentage of dead soldiers dying from infections?



In pairs, write interview-style questions and answers between Fleming and an interviewer. The interviewer could ask questions such as “What inspired your work?” and “What was your reaction when you realized the potential of penicillin? Use your imagination.

Words Easily Confused 1



Drug — Medicine — Medication

In the following sentences observe the similarities and differences between the highlighted terms and the way they are used. Then, do the activity that follows.

1. Traditional herbal **medicines** have been used for centuries to treat various ailments.
2. The nurse reminded the old lady to take her **medication** as prescribed.
3. Marijuana used to be a **drug** popular with teens. / The doctor prescribed a new **drug**.
4. She has been on this **medication** for years.

Now fill in the blanks with the terms: *medication*, *medicine*, and *drug*.

1. M----- and ----- refer to medicinal substances used for therapeutic purposes. In other words, their purpose is to cure or prevent symptoms or diseases. These terms are used in general contexts. -----, however, is a broader term and may include either medical or illegal substances depending on the context.
2. ----- is used in formal contexts and puts emphasis on the pharmaceutical product used to treat a specific condition.