Class: 12th

Subject: English

Lesson 13: SIR ALEXANDER FLEMING

Author: Patrick Pringle

❖ Exercise Short Questions:

1. What are antiseptics and what is meant by the antiseptic method?

Answer: Antiseptics are substances that destroy germs or microbes. The antiseptic method, introduced by Joseph Lister, involved using

chemicals like carbolic acid to kill germs on surgical instruments, on the patient's skin, and in the air, to prevent infections during surgery.

2. What was the chief defect of the antiseptic method?

Answer: The main defect was that chemical antiseptics harmed the body's white blood cells (leucocytes) more than the germs. Sometimes they even encouraged germs to grow, making treatment less effective.

3. What role do the white cells in human blood play?

Answer: White blood cells (leucocytes) are the body's natural defense against germs. When germs enter the body, leucocytes attack and destroy them, fighting infections like soldiers in battle.

4. Give an account of the early life of Alexander Fleming.

Answer: Fleming was born on 6 August 1881, near Darvel, Ayrshire. He came from a family connected with medicine. After attending Darvel School and Kilmarnock Academy, he studied at Regent Street Polytechnic in London. Initially, he worked as a clerk but later pursued medicine at St. Mary's Hospital due to encouragement from his brother Thomas.

5. Describe how Fleming discovered penicillin.

Answer: In 1928, while experimenting with staphylococcus cultures, a mould spore accidentally landed on a plate and killed the surrounding bacteria. Fleming investigated further, grew the mould in meat broth,

filtered the liquid, and found it contained a natural antibacterial substance, which he named penicillin.

6. In what ways is penicillin better than chemical antiseptics?

Answer: Penicillin is stronger than chemical antiseptics like carbolic acid, kills germs effectively, and is harmless to leucocytes. Unlike chemical antiseptics, it aids the body's natural defense without damaging it.

7. What do you know of the Oxford team?

Answer: The Oxford team, led by Professor (Sir) Howard Florey and Dr. E. B. Chain, included chemists and bacteriologists. They had the equipment Fleming lacked and worked to produce a practical, concentrated form of penicillin for medical use.

8. How did the Oxford team make penicillin more effective?

Answer: They developed methods to concentrate and mass-produce penicillin, making it stable and suitable for treating human patients. By 1943, it reached the Eighth Army in Egypt, saving countless lives during the war.

9. Write a note on penicillin as a wonder drug.

Answer: Penicillin was hailed as a wonder drug because it effectively killed germs without harming leucocytes. It revolutionized the treatment of infected wounds, saved millions of lives, and became the foundation for the modern development of antibiotics.

10. Was Fleming proud of his discovery?

Answer: Fleming was modest and did not claim credit for inventing penicillin. He considered it a natural substance created by Nature and believed he had only discovered it by chance.

11. Why could penicillin not have been discovered in modern American research laboratories?

Answer: Because the air in sterile, air-conditioned laboratories was too pure for the accidental mould spores to land on culture plates, which was essential for its discovery.

12. Fleming's achievement paved the way for other discoveries in the medical field. What are they?

Answer: Fleming's discovery of penicillin led to the development of antibiotics and stimulated research into other drugs derived from moulds and fungi, such as streptomycin, greatly advancing medical science.

❖ Important Short Questions:

1. Who discovered germs and what are they?

Ans: Louis Pasteur discovered germs, which are tiny living organisms (microbes) that cause disease.

2. Who applied the germ theory to surgery?

Ans: Joseph Lister applied Pasteur's discovery to surgery.

3. What are antiseptics?

Ans: Antiseptics are substances, like carbolic acid, that destroy germs.

4. What is meant by the antiseptic method?

Ans: The antiseptic method is using chemicals to kill germs on surgical instruments, patients' skin, and in the operating-theatre air to prevent infection.

5. How did Lister use carbolic acid during surgery?

Ans: He sterilized instruments, cleaned the patient's skin and his hands, and sprayed carbolic acid in the air to kill germs.

6. What was the main aim of Lister's antiseptic method?

Ans: To prevent germs from entering the body and causing disease.

7. What was the chief defect of the antiseptic method?

Ans: Chemical antiseptics harmed white blood cells (leucocytes) more than germs and sometimes helped germs grow.

8. Why couldn't chemical antiseptics be used to cure diseases inside the body?

Ans: Because the dose required to kill germs would also destroy the body's cells, including leucocytes.

9. What are leucocytes and what is their function?

Ans: Leucocytes, or white blood cells, are the body's natural defense. They attack and destroy germs that enter the body.

10. Explain the fight between leucocytes and germs.

Ans: When germs enter the body, leucocytes rush to attack them. The battle ends with the death of the germs or the death of the patient.

11. When and where was Alexander Fleming born?

Ans: He was born on 6 August 1881 on a farm near Darvel, Ayrshire.

12. Describe Fleming's family background related to medicine.

Ans: Fleming came from a family connected to medicine; his brothers became opticians and oculists, and one sister married a doctor.

13. Where did Fleming study after Darvel School?

Ans: He studied at Kilmarnock Academy and then at Regent Street Polytechnic in London.

14. Why did Fleming initially work as a clerk?

Ans: There was not enough money for him to study a profession, so he worked as a clerk in Leaden-hall Street.

15. How did Fleming get encouraged to study medicine?

Ans: His brother Thomas, a qualified doctor, encouraged him to pursue medicine.

16. Which hospital did Fleming choose for his medical studies and why?

Ans: He chose St. Mary's Hospital in London because he had played water-polo against their team.

17. What problem did Fleming face during the First World War?

Ans: Most wounds were already infected, and surgeons struggled to kill germs without harming leucocytes.

18. Who worked with Fleming at Boulogne to tackle wound infection?

Ans: Sir Almroth Wright worked with Fleming at Boulogne.

19. What did Wright and Fleming discover about chemical antiseptics?

Ans: They found that chemical antiseptics harmed leucocytes more than germs and sometimes helped germs grow.

20. What natural antiseptic did Fleming discover in 1922?

Ans: Fleming discovered lysozyme in his nasal secretions.

21. What is lysozyme and why was it important?

Ans: Lysozyme is a natural antiseptic harmless to leucocytes. Its discovery was important as it led to the idea of penicillin.

22. When did Fleming become Professor of Bacteriology?

Ans: He became Professor of Bacteriology in 1928.

23. How did Fleming accidentally discover penicillin?

Ans: A mould spore landed on a staphylococcus culture plate, killing the surrounding bacteria.

24. How did Fleming test penicillin's effect on bacteria?

Ans: He grew the mould in meat broth, filtered the liquid, and found it destroyed bacteria like staphylococci.

25. How did Fleming produce penicillin free from the mould?

Ans: He plated the mould on meat broth, filtered the broth after growth, and tested its anti-bacterial properties.

26. What were the advantages of penicillin over chemical antiseptics?

Ans: It was stronger than carbolic acid, killed germs effectively, and was harmless to leucocytes.

27. Why couldn't Fleming concentrate penicillin for practical use?

Ans: He lacked the chemical training and equipment needed to stabilize and concentrate it.

28. How did penicillin affect leucocytes?

Ans: Penicillin did not harm leucocytes and allowed them to fight germs naturally.

29. Did the discovery of penicillin bring Fleming immediate fame?

Ans: No, he remained largely unknown until the medical profession recognized his work.

30. What was Fleming's attitude towards the fame he received?

Ans: He was modest, attributing penicillin to Nature, and preferred to continue his research.

31. Who headed the Oxford team to concentrate penicillin?

Ans: Professor (Sir) Howard Florey and Dr. E. B. Chain**.**

32. What advantage did the Oxford team have over Fleming?

Ans: They had trained chemists, bacteriologists, and equipment for large-scale production.

33. When were the first human cases treated with penicillin?

Ans: In 1941.

34. How was penicillin mass-produced for use in the war?

Ans: The Oxford team developed methods of concentration and production, and Americans helped scale it for mass use.

35. When did penicillin reach the Eighth Army in Egypt?

Ans: In 1943.

36. When was Fleming knighted and awarded the Nobel Prize?

Ans: He was knighted in 1944 and received the Nobel Prize in Medicine in 1945.

37. Why did Fleming insist penicillin was not a man-made invention?

Ans: He believed Nature had been producing it for thousands of years; he only discovered it by chance.

38. Why could penicillin not have been discovered in modern American laboratories?

Ans: The sterile air prevented accidental mould contamination, which was essential for the discovery.

39. How did Fleming's discovery of penicillin pave the way for other antibiotics?

Ans: It inspired research into antibiotics from moulds and fungi, leading to drugs like streptomycin.

40. Name one important antibiotic discovered after penicillin and its significance.

Ans: Streptomycin, which became important in treating bacterial infections and expanded antibiotic research.

Note:

This chapter is designed to provide a solid foundation of knowledge, with the goal of deepening understanding and encouraging further exploration of the subject. The content has been carefully selected to support effective learning and inspire students to engage with the topic more deeply.

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Purpose: To contribute to education by offering insightful, valuable content that enhances learning and understanding.

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