ANTIBIOTICS (lesson 3)

GRAMMAR

Task 1. For each question, complete the second sentence so that it has a similar meaning to the first sentence, using the word given in bold. Do not change the word given. You must use between three and six words, including the word given.

1. To study environmental microbes, a scientist must gather soil and water samples, and this is a crucial first step in their research.

COLLECTING _____ is a crucial first step in a scientist's research.

2. The professor said, "You must wear safety goggles in the lab at all times."

INSISTED

The professor _____ safety goggles in the lab at all times.

3. A cooling summer meant that the bacteria grew much more slowly.

RESULTED

The bacteria's slow growth _____ a cool summer.

4. We use centrifugation to separate particles from a solution.

IS

Centrifugation _____ particles from a solution.

5. Although the hypothesis was logical, the data did not support it.

DESPITE

The data did not support the hypothesis, _____ logical.

6. They were unable to sequence the genome successfully.

SUCCEED

They did not _____ the genome.

7. The doctor told me, "You really should complete the full course of antibiotics."

ADVISED

The doctor _____ the full course of antibiotics.

8. A bacteriostatic antibiotic prevents bacteria from multiplying.

PREVENTED

The multiplication of bacteria _____ a bacteriostatic antibiotic.

9. The fight against superbugs is very difficult, primarily because bacteria can transfer resistance genes to one another.

CHALLENGING

What makes the fight against superbugs so _____ that bacteria can transfer resistance genes to one another.

10. The immune system has never faced such a rapidly mutating virus before.

NEVER _____ faced such a rapidly mutating virus.

11. Innate immunity is nonspecific, but adaptive immunity targets particular pathogens.

UNLIKE _____, which is nonspecific, adaptive immunity targets particular pathogens.

12. A bacterial culture that is grown in a petri dish requires a nutrient agar.

GROWN

A bacterial culture _____ requires a nutrient agar.

13. Vaccines are highly effective because the immune system creates memory cells.

DUE

The effectiveness of vaccines is _____ the immune system's creation of memory cells.

14. To prevent resistance, you should not stop taking medication early.

AVOID

You should _____ medication early to prevent resistance.

15. "How is this microbe transmitted?" the epidemiologist asked.

HOW

The epidemiologist asked _____ transmitted.

16. The new treatment must be tested extensively before approval.

NEEDS

The new treatment _____ extensively before approval.

17. A broad-spectrum antibiotic kills harmful bacteria and also affects beneficial bacteria.

ONLY

Not _____ harmful bacteria, but it also affects beneficial bacteria.

18. The researcher paused her work because she wanted to check the temperature of the incubator.

STOPPED

The researcher _____ the temperature of the incubator.

Ex 2. Read the text below and choose the correct option for each gap.

In the autumn of 1928, microbiologist Alexander Fleming (1881–1955) **(1)** ***was examined / had examined / was examining*** several cultures of pus bacteria (staphylococci) in his lab at St. Mary's Hospital in London. The lab **(2)** ***stuffed / was stuffed / has been staffed*** with Petri dishes that had bacteria growing on agar nutrient media – a bit untidy perhaps, but sometimes genius comes from chaos.

Before his summer holidays, Fleming **(3)** ***had inoculated / inoculated / was inoculated*** some dishes with bacteria. All of them were now covered in clearly visible colonies, and in some of them, some mold **(4)** ***has grown / grew / was growing.*** The summer had been cool, which had slowed down the growth of bacteria. Over the following days Fleming grew the fungus on broths that **(5)** ***made / was made /had been made*** microbe-free by heat. He then placed various kinds of Gram-positive bacteria around the fungus, **(6)** ***included /including / being included*** chain-forming streptococci, clusters of staphylococci, and pneumococci. Sure enough, none of them could spread to the immediate neighborhood of the fungus. Gram-negative bacteria, **(7)** ***however / although / despite***, such as E. coli and Salmonella species, **(8)** ***was growing / grew / had grown*** unperturbed. Fleming identified "his" mold as a member of the *Penicillium* family, *P. notatum*, to be precise.

He began to grow the fungus in a bigger broth container. Soon the top of it **(9)** ***covered /was covered / was covering*** by a greenish mold layer, similar to a lawn. The liquid turned golden yellow after a few days, and new experiments with bacteria showed that the broth alone could slow down their growth. The fungus **(10)** ***secreted / was secreted / has secreted*** apparently something bactericidal or bacteriostatic into its environment. Fleming called it penicillin after its origin.

Streptococci, staphylococci, anthrax, diphtheria, glandular fever, and tetanus could all **(11)** ***stop / be stopped / have stopped*** in their tracks by penicillin. Little did Fleming know what a breakthrough this meant and that it would save the lives of millions. Although further experiments showed that penicillin **(12)** ***has attacked / attacked / was attacking*** only bacteria, but not rabbits, Fleming never tried **(13)** ***obtaining / to obtain / obtain*** pure penicillin to treat bacterial pathogens in lab animals.

Hardly anybody noticed his article in the *British Journal of Experimental Pathology*, and even in 1940, Fleming wrote that it was not worthwhile to produce penicillin in the future. It seems that his main interest was in the selective effect on various bacterial species, as it helped to classify the species. By that time, however, other scientists **(14)** ***became / has become / had become*** aware of its bacteria-inhibiting properties.

In 1938 Ernst Boris Chain (1906–1979) in Oxford became interested **(15)** ***on /in / of*** the fungus. The outbreak of the Second World War **(16)** ***has lead / leaded / led*** to a surge in demand for medication to treat bacterially infected wounds in soldiers. Under the supervision of the Australian researcher Howard Florey (1898–

1998), he and his colleague Norman Heatley (1911–2004) worked frantically, **(17)** ***to separate / separating / separated*** penicillin from other compounds in the nutrient broth and purifying it. On March 25, 1940 the yellow powder was tested on mice that **(18)** ***infected / was infected / had been infected*** with pathogenic bacteria. The mice **(19)** ***recovered / had recovered / were recovered*** within a very short time, which was sensational. The UK and USA governments began to support the efforts to produce sufficient amounts of penicillin, but they kept the project top secret because of its military relevance. In 1990, Heatley **(20)** ***was not awarded / didn't award / hasn't been awarded*** the Nobel Prize, but something far rarer – the first honorary doctorate in Oxford University's 800-year history!

In the summer of 1941, when Germany **(21)** ***expected / was expecting / was expected*** to attack Great Britain, rumor has it that Florey and his colleagues had decided to destroy their lab completely, should the enemy land on British shores. The only exception was the miraculous penicillin fungus which the researchers rubbed into their clothes **(22)** ***due to / in order to / for to*** be able to start new cultures everywhere.

1941 was the year that saw penicillin tried out on a patient for the first time. He had life-threatening staphylococcal and streptococcal infection. The patient, who first seemed to recover, died a month later, as the amount of available penicillin was insufficient, although it **(23)** ***recycled /has been recycled/ was recycled*** from the patient's urine, **(24)** ***bringing / brought / was brought*** to the lab every day by Florey's wife. Florey and Chain had to produce larger quantities of penicillin before they could cure their first patients.

In July 1941, Howard Florey and Norman Heatley began a collaboration with the USDA in Peoria, Illinois, and soon companies such as Merck, Squibb, Lilly and Pfizer joined in, only a few months before the United States entered the war. When Heatley and Florey arrived in the United States in 1941, the amount of penicillin they had been able to produce was nothing to shout **(25)** ***at / on / about*** – 4 units/ml. The problem with Fleming's *Penicillium* strain was that it would only grow on the surface of its nutrient (surface culture). So, the search, which also **(26)** ***has involved / involved / involving*** the US Army, began for a more productive strain that could be grown in a submerged culture.

At the end of November 1941, Andrew J. Moyer (1899–1959), expert in nutrition of molds, cooperated with Norman Heatley and succeeded **(27)** ***on / with / in*** multiplying the output 10-fold by using corn steep liquor as a nutrient. US universities such as Stanford, Minnesota and the Carnegie Institution in Cold Spring Harbor, NY joined in, and by the end of 1942, 17 US companies **(28)** ***involving / involved / were involved*** in the penicillin project.

On March 1, 1944, the first industrial plant with submerged cultures was opened in Brooklyn, NY. The production went up from 210 million units in 1943 to 1663 billion units in 1944 and 6.8 trillion units in 1945. In 1943 it was possible to treat 1500 military personnel, and only one year later, countless wounded in the D-day landings **(29)** ***were saved / were being saved / had been saved*** by penicillin. Fleming, Florey, and Chain **(30)** ***awarded / were awarded / has been awarded*** the Nobel Prize in 1945. By the way, until this day, the British regret that, for ethical

reasons, they asked Florey **(31)** ***not to file / to not file / do not file*** for a patent on penicillin.