

How Alexander Fleming Discovered Penicillin

In 1928, bacteriologist Alexander Fleming made a chance discovery from an already discarded, contaminated Petri dish. The mold that had contaminated the experiment turned out to contain a powerful antibiotic, penicillin. However, though Fleming was credited with the discovery, it was over a decade before someone else turned penicillin into the miracle drug that has helped save millions of lives.

Dirty Petri Dishes

On a September morning in 1928, Alexander Fleming sat at his workbench at St. Mary's Hospital after having just returned from a vacation at the Dhoon (his country house) with his family. Before he had left on vacation, Fleming had piled a number of his Petri dishes to the side of the bench so that Stuart R. Craddock could use his workbench while he was away.

Back from vacation, Fleming was sorting through the long unattended stacks to determine which ones could be salvaged. Many of the dishes had been contaminated. Fleming placed each of these in an ever-growing pile in a tray of Lysol.

Looking for a Wonder Drug

Much of Fleming's work focused on the search for a "wonder drug." Though the concept of bacteria had been around since Antonie van Leeuwenhoek first described it in 1683, it wasn't until the late nineteenth century that Louis Pasteur confirmed that bacteria caused diseases. However, though they had this knowledge, no one had yet been able to find a chemical that would kill harmful bacteria but also not harm the human body.

In 1922, Fleming made an important discovery, lysozyme. While working with some bacteria, Fleming's nose leaked, dropping some mucus onto the dish. The bacteria disappeared. Fleming had discovered a natural substance found in tears and nasal mucus that helps the body fight germs. Fleming now realized the possibility of finding a substance that could kill bacteria but not adversely affect the human body.

Finding the Mold

In 1928, while sorting through his pile of dishes, Fleming's former lab assistant, D. Merlin Pryce stopped by to visit with Fleming. Fleming took this opportunity to gripe about the amount of extra work he had to do since Pryce had transferred from his lab.

To demonstrate, Fleming rummaged through the large pile of plates he had placed in the Lysol tray and pulled out several that had remained safely above the Lysol. Had there not been so many, each would have been submerged in Lysol, killing the bacteria to make the plates safe to clean and then reuse.

While picking up one particular dish to show Pryce, Fleming noticed something strange about it. While he had been away, a mold had grown on the dish. That in itself was not strange. However, this particular mold seemed to have killed the *Staphylococcus aureus* that had been growing in the dish. Fleming realized that this mold had potential.

What Was That Mold?

Fleming spent several weeks growing more mold and trying to determine the particular substance in the mold that killed the bacteria. After discussing the mold with mycologist (mold expert) C. J. La Touche who had his office below Fleming's, they determined the mold to be a *Penicillium* mold. Fleming then called the active antibacterial agent in the mold, penicillin.

But where did the mold come from? Most likely, the mold came from La Touche's room downstairs. La Touche had been collecting a large sampling of molds for John Freeman, who was researching asthma, and it is likely that some floated up to Fleming's lab.

Fleming continued to run numerous experiments to determine the effect of the mold on other harmful bacteria. Surprisingly, the mold killed a large number of them. Fleming then ran further tests and found the mold to be non-toxic.

Could this be the "wonder drug"? To Fleming, it was not. Though he saw its potential, Fleming was not a chemist and thus was unable to isolate the active antibacterial element, penicillin, and could not keep the element active long enough to be used in humans. In 1929, Fleming wrote a paper on his findings, which did not garner any scientific interest.

12 Years Later

In 1940, the second year of World War II, two scientists at Oxford University were researching promising projects in bacteriology that could possibly be

enhanced or continued with chemistry. Australian Howard Florey and German refugee Ernst Chain began working with penicillin.

Using new chemical techniques, they were able to produce a brown powder that kept its antibacterial power for longer than a few days. They experimented with the powder and found it to be safe.

Needing the new drug immediately for the war front, mass production started quickly. The availability of penicillin during World War II saved many lives that otherwise would have been lost due to bacterial infections in even minor wounds. Penicillin also treated diphtheria, gangrene, pneumonia, syphilis, and tuberculosis.

Recognition

Though Fleming discovered penicillin, it took Florey and Chain to make it a usable product. Though both Fleming and Florey were knighted in 1944 and all three of them (Fleming, Florey, and Chain) were awarded the 1945 Nobel Prize in Physiology or Medicine, Fleming is still credited for discovering penicillin.