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The discovery of penicillin

Before the age of modern medicine, there were medical practices that may sound extremely absurd to us now. From mercury, one of the most toxic metals, being used as an antiseptic, to using cocaine as a remedy for toothaches, medical practices as such were very common (Nguyen 2016). One of such practice was using a mold to treat wounds which can be dated back to the ancient Egyptians (Peña-Perez 2005). While the former examples caused obvious side effects to the human body, the latter actually seemed to work. However, this was not formally discovered until 3,000 years after the ancient Egypt era by a bacteriologist by accident. Alexander Fleming, a Scottish bacteriologist who was working on wounds and their resistance to infection after the first world war in 1928 accidentally left a petri dish full of staphylococcus. When he came back from a vacation, he was welcomed with the sight of mold that grew because the petri dish appeared to have infiltrated and stifled all of the staphs around it. This was the beginning of the story of the discovery of penicillin—one of the world's earliest antibiotics and a catalyst that marked the era of modern medicine. The goal of this paper is to further explore how penicillin was discovered and why this discovery was so important.

Though it was found that the ancient Egyptians used a form of antibiotic (mold) to treat wounds in the traditional ‘rubbing bread mold into wound way’, the downfall of the ancient Egypt empire also resulted in the loss of their practices like mummification, their religion, and more. It was only discovered again 3,000 years later in 1928 by Alexandar Flemming. When he

noticed that the mold called *Penicillium notatum* was preventing the staphylococci around it from growing, he tried multiple times to draw a proper, scientific conclusion but failed to do so. While the story goes that it was Flemming who concluded the whole study of using penicillin to combat bacterial diseases, the truth is that Fleming had neither laboratory resources nor the chemistry background to make the next giant steps of isolating the active ingredient of the penicillium mold juice, purifying it, figuring out which germs it was effective against, and how to use it (Dr. Market 2013).

There were several dangerous bacteria, including streptococcus, meningococcus, and the diphtheria bacillus, that Fleming discovered his mold juice could kill. Stuart Craddock and Frederick Ridley were entrusted with isolating the pure penicillin from the shape juice by Mr. Ridley. Regrettably, it ended up being incredibly temperamental, and they could plan simple answers to work with. He announced his outcomes in the British Journal of Comparative Pathology in June 1929, briefly mentioning penicillin's therapeutic advantages. Its primary use had been to isolate penicillin-intolerant bacteria from those that are responsive to the antibiotic. If nothing else, this kept bacteriologists interested in penicillin for the time being (Li 2019). Attempts to purify penicillin by others, such as Professor Harold Raistrick of Biochemistry at the London School of Hygiene and Tropical Medicine, failed.

So how did penicillin make its way into modern medicine as we see it today? It was not until another 10 years later in 1942 that penicillin was rediscovered by Howard Florey, Ernst Chain, and their colleagues at the Sir William Dunn School of Pathology at Oxford University who turned penicillin from a laboratory curiosity into a life-saving drug with the help of Fleming's papers on his initial discovery of penicillin.

This advent of antibiotics with the discovery of penicillin is widely regarded as one of the most outstanding and important achievements in modern medicine. Though it was in the United Kingdom that it was discovered, World War II forced the United States to take the lead in developing a considerable quantity of the drug. Florey, an Australian pathologist and a pharmacist, recognized that large-scale production of penicillin was probably out of the question in Britain, where the chemical industry was fully absorbed in the war effort. With the support of the Rockefeller Foundation, Florey and his colleague Norman Heatley traveled to the United States in the summer of 1941 and turned what had previously only been available to a select few into a widely used medicine (Pathak 2020).

The medical landscape was forever altered when penicillin was discovered. Previously deadly illnesses, including bacterial meningitis, bacterial endocarditis, and pneumococcal pneumonia, were now readily treatable because of their invention (Pathak et al., 2020). One of the most often prescribed antibiotics today is penicillin, which has been called the first "wonder medicine." By stimulating other enzymes and inhibiting those involved in the construction of bacterial cell walls, it can tear down these protective barriers.

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