



# 43 ALEXANDER FLEMING

1881 - 1955

Alexander Fleming, the discoverer of penicillin, was born in 1881, in Lochfield, Scotland. After graduating from the medical school of St. Mary's Hospital in London, Fleming engaged in immunological research. Later, as an army doctor in World War I, he studied wound infections, and he noticed that many antiseptics injured the body cells even more than they injured the microbes. He realized that what was needed was some substance that, while it would harm bacteria, would not be harmful to human cells.

After the war, Fleming returned to St. Mary's Hospital. In 1922, while doing research there, he discovered a substance

which he called lysozyme. Lysozyme, which is produced by the human body, and which is a component of both mucus and tears, is not harmful to human cells. It destroys certain microbes, but unfortunately, not those that are particularly harmful to man. The discovery, therefore, although interesting, was not of major importance.

It was in 1928 that Fleming made his great discovery. One of his laboratory cultures of staphylococcus bacteria was exposed to the air and became contaminated by a mold. Fleming noticed that in the region of the culture just surrounding the mold, the bacteria had been dissolved. He correctly inferred that the mold was producing some substance which was toxic to the staphylococcus bacteria. He was soon able to show that the same substance inhibited the growth of many other types of harmful bacteria. The substance—which he named *penicillin* after the mold (*penicillium notatum*) that produced it—was not toxic to either human beings or animals.

Fleming's results were published in 1929, but they did not at first attract much notice. Fleming had suggested that penicillin could have important medical use. However, he himself was unable to develop a technique for purifying penicillin, and for more than ten years the marvelous drug remained unused.

Finally, in the later 1930s, two British medical researchers, Howard Walter Florey and Ernst Boris Chain, came across Fleming's article. They repeated his work and verified his results. They then purified penicillin, and tested the substance on laboratory animals. In 1941, they tested penicillin on sick human beings. Their tests clearly showed that the new drug was astoundingly potent.

With the encouragement of the British and American governments, pharmaceutical companies now entered the field, and rather quickly developed methods for producing large quantities of penicillin. At first, penicillin was reserved only for the use of war casualties, but by 1944, it was available for the treatment of civilians in Britain and America. When the war ended, in 1945, the use of penicillin spread all over the world.

The discovery of penicillin greatly stimulated the search for other antibiotics, and that research has resulted in the discovery of many other "miracle drugs." Nevertheless, penicillin remains the most widely used antibiotic.

One reason for its continued supremacy is that penicillin is effective against a very large variety of harmful microorganisms. The drug is useful in the treatment of syphilis, gonorrhoea, scarlet fever, and diphtheria, as well as some forms of arthritis, bronchitis, meningitis, blood poisoning, boils, bone infections, pneumonia, gangrene, and various other ailments.

Another advantage of penicillin is the wide margin of safety in its use. Doses of 50,000 units of penicillin are effective against some infections; but injections of 100 *million* units of penicillin a day have been given without ill effects. Although a small percentage of people are allergic to penicillin, for most persons the drug provides an ideal combination of potency and safety.

Since penicillin has already saved many millions of lives and will surely save many more in the future, few persons would dispute the importance of Fleming's discovery. His exact placement on a list such as this would depend, of course, upon how much credit one feels should be allocated to Florey and Chain. I feel that the bulk of the credit should go to Fleming, who made the essential discovery. Without him, it might have been many years before penicillin was ever discovered. Once he had published his results, however, it was inevitable that sooner or later improved techniques of production and purification would be devised.

Fleming was happily married and had one child. In 1945, he was awarded a Nobel Prize for his discovery, sharing the award with Florey and Chain. Fleming died in 1955.