



## Alexander Fleming

### The Discovery of Penicillin: September 1928

Fleming was a well-known microbiologist, but was not the tidiest of workers. He had left a Petri dish open on his bench. It was already loaded with staphylococci, bacteria that cause boils, carbuncles, abscesses, pneumonia and septicaemia. Spores of a fungal mould (*Penicillium notatum*) floated in through an open window and settled on a plate. A little time later it was covered but for some unknown reason not put into the incubator. Fleming promptly went off on holiday leaving it on the bench. On his return Fleming found the plate and noticed that the bacteria had not grown as they would have under normal summer conditions even outside the incubator and so, Fleming deduced, they had been inhibited or killed. Later he showed that the substance had been produced by that mould and so called it penicillin. The first antibiotic had been discovered.

That open window also generated a story. Some years later Fleming, now a famous man, was shown some new laboratories in the USA. They were, by the standards of the day, impressive with fixed windows and air conditioning. "Ah", Fleming is alleged to have remarked, "you realise that I would never have made my discovery in these conditions, they are too clean"!

It is almost standard for other scientists to try to repeat interesting or important work such as that carried out by Fleming. All attempts failed: dropping spores of *Penicillium* on to an agar plate teeming with staphylococcal bacteria did not produce the expected effect; the bacteria were unaffected. Only years later was the puzzle solved, by Fleming's research assistant Ronald Hare. He found that the key to the puzzle was temperature: *Penicillium* grows best at 20°C, staphylococcal bacteria at 35°C.

On the fateful day when the plate was contaminated, there followed an exceptionally cool period lasting nine days. Thus the *Penicillium* grew well, the staphylococcal bacteria hardly at all. Then the temperature rose and the bacteria started growing. But by now there was sufficient penicillin present to destroy the bacteria. When Fleming returned he was confronted by the extraordinary condition of the agar plate. Had he not forgotten to put the plate in the incubator, had he not gone on holiday, had the weather not turned and turned again, had a different mould landed on the plate, this "miracle" would not have happened when it did.