



The Mind Prepared

This editorial occasioned by the death of Sir Alexander Fleming appeared in the London Times on 12 March 1955 and is reprinted here with permission.

EVEN before his death the name of Sir Alexander Fleming had been entered with those of Jenner, Pasteur and Lister in the proud roll of men who have been "eternis'd for some wondrous cure." The story of the discovery and development of penicillin is already a classic of science: how one day in the laboratories of St. Mary's Hospital "a stray mold spore implanted itself on a microbial culture where it was not wanted"; how Fleming digressed from his research into the staphylococcus to observe the action of the mold, to cultivate it and to explore its antibacterial properties; how the problem of extracting a concentration sufficient for clinical purposes was taken up again 10 years later at Oxford and solved; how its first clinical success was at the time of Germany's heaviest aerial bombardment of Britain; how its large-scale commercial manufacture was undertaken in the United States, and how it became available in quantity in the latter part of the war.

However closely the methodology of science is studied no prescription will be found for discovery. It is not made by rule of thumb. The story of penicillin well illustrates two complementary phases of scientific

research. There was the concentrated attack by Sir Howard Florey and his associates at Oxford on a single predefined problem—the extraction of a pure and stable form of penicillin. But this was preceded by the almost accidental discovery of the properties of this mold by Fleming when he was engaged on other work. It was a long chance that a spore of that particular mold should float into St. Mary's laboratory and settle on a culture plate. When laden with honors toward the end of his life, he used to emphasize this element of chance at the expense of his own contribution. But, as Pasteur truly noted, in the field of observation chance favors only the mind that is prepared. Instead of passing it over as a spoiled plate, Fleming seized upon it, studied it, and justly appreciated the novelty of its effects.

Fleming used to draw another moral from the tale: that it illustrated the value of freedom to pursue research. He was able to relax his attention to the project in hand in order to pursue an unexpected and unexplained phenomenon which was a by-product of it. It might have been a blind alley—it almost was; but it is from the freedom and readiness of scientists to explore blind alleys that discovery often comes. Genius is the prime mover; and genius brooks no direction.

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