



# **Streptomyces in Nature and Medicine: The Antibiotic Makers**

*David A. Hopwood*

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This is an insiders account of 50 years of genetic studies of the soil-inhabiting microbes that produce most of the antibiotics used to treat infections, as well as anti-cancer, anti-parasitic and immunosuppressant drugs. The book begins by describing how these microbes the actinomycetes were discovered in the latter part of the nineteenth century, but remained a Cinderella group until, in the 1940s, they shot to prominence with the discovery of streptomycin, the first effective treatment for tuberculosis and only the second antibiotic, after penicillin, to become a medical marvel. There followed a massive effort over several decades to find further treatments for infectious diseases and cancer, tempered by the rise of antibiotic resistance consequent on antibiotic misuse and over-use. The book goes on to describe the discovery of gene exchange in the actinomycetes in the context of the rise of microbial genetics in the mid-20th century, leading to determination of the complete DNA sequence of a model member of the group at the turn of the millennium. There follow chapters in which the intricate molecular machinery that adapts the organisms metabolism and development to life in the soil, including antibiotic production, is illuminated by the DNA blueprint. Then come an up-to-the minute account of the use of genetic engineering to make novel, hybrid, antibiotics, and a topical description of techniques to learn the roles of the thousands of genes in a genome sequence, throwing a powerful light on the biology of the organisms and their harnessing for increasing antibiotic productivity. In the final chapter we return to the mycobacteria that cause tuberculosis and leprosy, the first actinomycetes to be discovered, and how methodology, in part derived from the study of the streptomycetes, is being applied to understand and control these still deadly pathogens.

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