

Antibiotics, antibiotic resistance, and the meaning of life.

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I joined the UW Biochemistry Department in 1967 and started studying two lines of research: antibiotic mode of action with an emphasis on translation inhibitors and ribosome function, and mechanisms of resistance to antibiotics in bacterial pathogens. Ever since, my research has involved antibiotics (in one way or another). Small molecule biology is fascinating! Antibiotics represent only a minor segment of the massive structural diversity of these low-molecular-weight, biologically active compounds present in nature and made by all forms of life, having a wide variety of hormetic activities. Despite providing a profitable resource for research and pharmaceutical applications, the natural roles of this vast array of small molecules are largely unknown. Chemical ecology is as much of a mystery as microbial ecology, largely because it has not been studied properly. It is assumed that all microbes in the environment are involved in a constant arms race, simply because of the activities of a small number of microbial WMDs under laboratory conditions. This notion of aggression is enhanced by the identification of antibiotic resistance mechanisms in bacterial pathogens. In fact, resistance genes often have other roles in their natural hosts and have been hijacked to perform protective roles in various bacteria. It is suggested that antibiotic action and resistance determination may in fact be rare functions in the environment. A better understanding of all aspects of chemical ecology will likely be of benefit in terms of pharmaceutical discovery and drug applications. As for the meaning of life ...