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Discovery of New Antibiotic & Drug Agents
A Proposal for Modern Day Drug Discoverers

Abstract

Bacterial cells produce anti-cancer and antibiotic drugs, as well as other potential medications and medicinal preparations. Microorganisms produce antibiotics with varying chemical natures and structures as well as therapeutic uses. Many new drugs are prepared through genetic manipulation of existing bacterial codes. Many experts in the industry of drug research believe that only ten percent of the total microbial population (naturally occurring) of the earth has been isolated and characterized.

Background

Due to the ever-increasing resistance of pathogenic bacteria to our current arsenal of antibiotics, a great need exists for the isolation and discovery of new antibiotics and other drug agents. If microorganisms have been traditionally used as a source of antibiotic and other drugs, the search should intensify for the isolation of existing bacterial cells or fungal cells that may produce beneficial drugs or medications. This approach is contrary to the current method of genetically altering existing bacterial species or other microbial agents. Table 1 lists some antibiotics currently produced on a commercial scale.

Table 1
Examples of Antibiotic Sources

Antibiotic	Microbial Source
Amphomycin	*Streptomyces canus*
Avoparcin	*S. candidus*
Erythromycin	*S. erythreus*
Monensin	*S. cinnamonensis*
Penicillin G	*P. chrysogenum*
Pimaricin	*S. natalensis*
Streptomycin	*S. griseus*
Tylosin	*S. fradiae*
Vancomycin	*S. orientalis*

In a particular environment, competition may be shifted toward a specific type of bacteria due to changes in the availability of growth requirements as well as changes resulting in the alteration of physical or chemical conditions within the subsurface environment. The addition or natural presence of a carbon source becomes a major element affecting the bacterial diversity in an ecosystem.

In the mid 1990s, scientists began exploring caves searching for new strains of bacteria potentially capable of producing cancer drugs. Subterranean environments are low in nutrients. The established microbial populations are constantly striving (competition) to prevent their neighbors from flourishing at their expense (utilizing the low level of nutrients available). Thus, the bacterial cells may produce antigrowth enzymes (cancer drugs). A need exists for new and effective drugs.

The isolation of new drug and drug agents may be obtained using alkane enrichment. Hazardous waste sites produce enormous stresses on established microbial populations. Most chemicals, such as chlorinated solvents, cannot readily be used by bacteria as food sources. In a highly stressed environment, the surviving bacteria must strive to compete for available food sources while enduring the toxic assaults. It is these bacterial populations that may produce antigrowth factors more quickly and readily than in other environments.

Bacterial and fungal organisms isolated from soil and/or groundwater at, for example, a hazardous waste site would undergo alkane enrichment (butane) for a period of several weeks or months in order to select for the most robust organisms. Butane enrichment would allow the isolated organisms to flourish at the expense of a highly soluble food substrate. It would be these organisms that would be potential drug sources.

References

Bernard Atkinson and Ferda Mavituna, 1991. *Biochemical Engineering and Biotechnology Handbook*, Second Edition, , Stockton Press.

One or more U.S. Patents Pending.