

Chapter 15

Microbial Genomics in the Developed and Developing Nations

ABSTRACT

This chapter assessed the nature of microbes and microbial genomics in the developed and developing nations. The role of microbial agents has become extremely crucial in the commercialization of genomic science. As a result of human civilization in the twenty-first century the use of petrochemical products play monumental role in meeting the energy needs of developed, developing and the least developed nations. Inadvertently, the price we pay for management inefficiently periodically can be frightening. Therefore, we have accentuated the role of microbes and the relevance of rational sustainable development. Exponential growth in various resource converting techniques, without considering environmental degradation, has spurred the periodic unplanned ecological disasters in United States and other oil-producing nations. Unless there is concerted international, political, and scientific commitment to mitigate the spewing of greenhouse gases, there will be disastrous consequences on the environment worldwide.

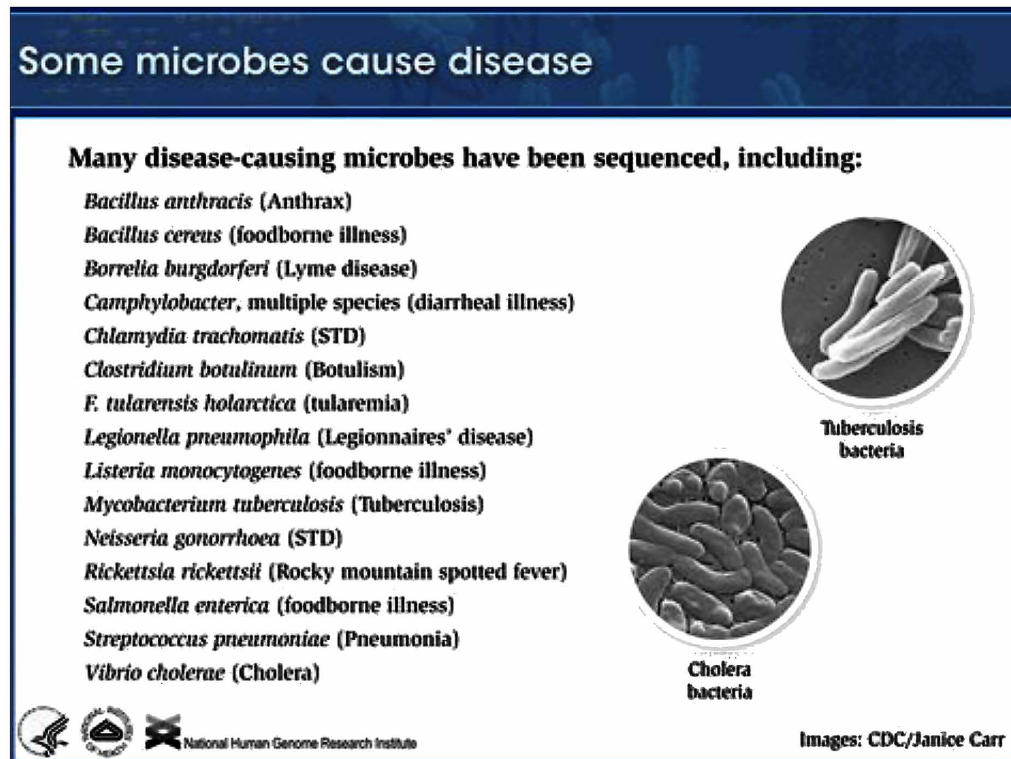
PART I: THE ROLE OF MICROBIAL AGENTS IN GENOMIC SCIENCE

Microbial Genomics in the Developed and Developing Nations: Definition

In the age of genomic science, the relevance of microbes cannot be overstated. Specifically, microbes are microscopic organisms. However, they are invisible to the naked eyes. Although many microbes are not necessarily pathogenic, yet there are large numbers of them, which are not only pathogenic but virulent to living things. The cells in our body are outnumbered in ratio of 10:1 by microbes. Besides, they represent thousands of different species which consist of bacteria, fungi, Achaea, and viruses. Synopses of microbial agents which have been sequenced are listed in Figure 1.

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Figure 1. Some microbial agents that cause diseases



From epidemiological perspectives, microbial growth and proliferation can be affected by different environmental conditions, which include nutrient availability, moisture, temperature, and the hydrogen ion concentration (P^H) and osmotic pressure and barometric pressure.

Accomplishments of the Human Genome Sequencing

Before the accomplishment of the human genome sequencing project by March 25, 2003, scientists at the office of biological and environmental research and the National Institutes of Health (NIH) had predicted the many and various benefits of a sequencing abroad spectrum of microbes because of their role in sequestration of carbon, elimination of human waste and other pertinent functions. By July 2003, over one hundred prokaryotic and eukaryotic genome had been published in the National Center for Biotechnology information (NCBI) database (United States Department of Energy, 2004). As a result of the public health consequences and financial burden associated with many of the viral agents, the following pathogenic agents of human diseases were sequenced. They include the human immunodeficiency virus (HIV), poliovirus, rabies virus, coronavirus, variola virus, and West Nile virus. Within the domain of Archaea, the agents sequenced were methsnococcus jannashii, Nanoarchaeum; in the domain of Eubacteria: the organisms sequenced included: *Bacillus anthracis*, *Clostridium tetani*, *Escherichiacoli* 0157:H7, *E. coli*, *Mycobacterium tuberculosis*, *Mycoplasma genetilium*, *Staphylococcus aureus*, *Treponema pallidum*, *Vibrio cholera*, and *Yersina pestis*; in the kingdom of Fungi, *Saccharomyces cerevisiae* and in the kingdom of Prostista: *Plasmodium falciparum*. Although advanced public health measures

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