Vibrio cholerae and Cholera
MOLECULAR TO GLOBAL PERSPECTIVES
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Introduction

From the time the cholera proclamation was issued, the local garrison shot a cannon from the fortress every quarter hour, day and night, in accordance with the local superstition that gun powder purified the atmosphere.

—Gabriel Garcia Marquez

This quotation from the novel *Love in the Time of Cholera* nicely reflects the prevailing misperceptions concerning the cause, transmission, and prevention of cholera at the end of the 19th century. The cholera of Garcia Marquez’s novel was an often irreversible illness that more frequently affected the poor but was feared by all because treatment was inadequate and illness more often than not led to death. Although science was beginning to understand the cause of cholera and how the organism was transmitted, fear and superstition were understandable and common in the public’s and government’s response to the disease.

In the century since this novel’s setting, we have learned much about the bacterium and the disease. In this book, this information is examined in comprehensive and integrated discussions by some of the field’s preeminent microbiologic, clinical, and epidemiologic experts. The amount of knowledge that has accumulated in the last several decades is most impressive. Microbiologists have developed isolation techniques, refined the taxonomy and subtyping of the vibrios, and determined the importance and biochemistry of cholera toxin as well as the potential of a series of traditional and recombinant cholera vaccines. Clinicians have better understood the pathogenic process and established the importance of rehydration therapy as the cornerstone of treatment. Epidemiologists have defined the who, what, where, and when of disease, as well as, in the tradition of John Snow, the why, by examining the mechanisms and vehicles of transmission and the risk factors of affected persons. These data have provided the public health community with the scientific basis for developing control and prevention strategies. Nevertheless, the advances in microbiology and clinical treatment and the implementation of appropriate control measures have not led to the effective control of cholera worldwide.

In fact, cholera has remained a persistent problem for the developing and, occasionally, the developed world. The seventh pandemic had seen the spread of cholera since the 1970s throughout southeast Asia and into Africa. Although conditions in South and Central America were conducive to the transmission of cholera, except for a few cases associated with the U.S. Gulf Coast, the Western Hemisphere had remained unaffected. In January 1991, all this suddenly changed with the emergence of cholera in Peru and its subsequent spread to many countries in the hemisphere. With hundreds of thousands of cases, cholera had emerged in a few months as one of the hemisphere’s most important public health problems. As is often the case when cholera affects a new area, microbiologists, clinicians, and public health officials were frequently unprepared. Delayed or inadequate diagnosis coupled with often inappropriate treatment led to unnecessary morbidity and mortality. This occurred not only in developing countries but also among travelers who became ill after returning to developed countries that had not seen cases of cholera for almost a century. Thus, the information included in this book has become important for clinicians, researchers, clinical microbiologists, and public health officials worldwide.

Cholera has had additional surprises. In many parts of the world, strains of *Vibrio cholerae* have become resistant to multiple
antimicrobial agents, affecting both treatment and chemoprophylaxis. Perhaps the greatest surprise, however, has been the emergence in the last year of a previously unrecognized strain of epidemic *V. cholerae*, serotype O139, in India and Bangladesh. Although at the time this book was published a number of studies were under way to explain the emergence of this new strain, preliminary data suggested an evolution from epidemic *V. cholerae* O1.

The more we learn about the organism and the disease, the more we are confronted by new scientific and public health dilemmas. This greatly compounds the difficulties that already impede the general prevention and control of this disease. Barring tremendous expenditures to improve sanitation and hygiene in large parts of the world or the rapid development of an effective vaccine, it is likely that cholera will hold additional surprises and remain an important public health problem. The scientific information provided by this book is critical to confronting this challenge and defining responses that are more effective than the firing of cannons.

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