To our children:

Sarah Walker Scheld,
Bruce Alexander Craig and Lisa Ellen Craig Castiglia, and
Andrew and Mitchell Hughes
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FOREWORD

It is becoming as predictable as New Year’s Day: the annual appearance of yet another new human pathogen of public health significance. Sometimes it sneaks up on us with a case here and a case there, as with hantavirus. Sometimes it hits us suddenly and shakes us to the core, insisting on recognition, as with the 1976 outbreak of Legionnaires’ disease. And sometimes it does both, as with AIDS. After AIDS was first recognized as a few cases in 1981, we soon found that hundreds of thousands of Americans were already producing billions of viruses a day. But it was not limited to this country. It was quickly realized that the virus was present in all parts of the world, first at relatively low levels and then with an explosion that shook the very structure of countries and global organizations, including the United Nations.

As organisms struggle daily to find an advantage that improves their chances of immortality, the world tinkers in an uncoordinated fashion with relatively small adjustments. The results are new variations of our antibiotics giving only a short-term advantage. Antimalarial drugs give us hope for another decade of protection. Vaccines are for longer-term or even ultimate protection but are limited to a small percentage of the pathogens inflicting humans. But always we worry about the worst-case scenarios such as human engineering of agents to be used in warfare or terrorism or agents with the destructive power of human immunodeficiency virus that are spread as easily as influenza virus.

What is a logical response? It is finally dawning on us that it must be a response that includes every tool the world can assemble, from a coordinated global surveillance system that ties all current surveillance networks with new systems to fill gaps, to rapid analytical capabilities and a coherent global response capacity. This is not something that can continue to be done on an ad hoc basis, muddling through each new threat.

Will Durant once voiced doubts that the world would ever provide an example of coordination short of a threat of an alien invasion. In recent decades we have seen examples of threats that have served as surrogates for an alien invasion, surrogates because they leave many feeling vulnerable, providing partial examples of what the world might be capable of organizing. Work on reducing the threat of nuclear weapons, the smallpox eradication effort, current efforts to eradicate polio, and efforts to avert global warming come to mind. It is time to see emerging infections as true surrogates for an alien invasion. The response must involve every lesson and tool of the infectious disease community. But it will also require political leadership and the support of national governments, global agencies, social scientists, corporations, nongovernmental organizations, and indeed every segment of society. The AIDS pandemic has finally resulted in the mobilization of the global
community in the interest of global health. This new interest must now be used to provide a generic response to all emerging infections. Our response must be so complete that leaders in 100 years will judge our actions to be exactly what was needed.

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PREFACE

As a result of improvements in sanitation and overall living conditions during the early part of the 20th century and the subsequent introduction of many vaccines and antibiotics, tremendous progress has been made in the prevention and control of infectious diseases. Globally, smallpox has been eradicated and target dates have been established for the eradication of poliomyelitis and dracunculiasis. Impressive progress toward eradication of both of these diseases has been made, but major challenges remain. In the United States, the annual incidence of several vaccine-preventable diseases is at an all-time low.

In spite of these successes, infectious diseases remain the leading cause of death worldwide. The World Health Organization (WHO) estimated that approximately 14 million (25%) of the 56 million deaths that occurred worldwide in 1999 were caused by microbial agents. In the United States, infectious diseases are the third leading cause of death.

The Institute of Medicine (IOM) published a report entitled "Emerging Infections: Microbial Threats to Health in the United States" in the fall of 1992. This report, developed under the leadership of Joshua Lederberg and Robert Shope, identified the important factors that contribute to disease emergence and reemergence. These factors include changes in human demographics and behaviors, advances in technology and industry, economic development and changes in land use, increases in travel and commerce, microbial adaptation and change, and deterioration in the public health system at the local, state, national, and global levels.

Recognizing the intense interest and scientific and public health importance of new and emerging infectious diseases, the program committee of the Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) and the officers of the Infectious Diseases Society of America (IDSA) organized joint sessions during ICAAC and the IDSA annual meeting beginning in 1995. These joint sessions on new and emerging pathogens were immensely popular, attracting audiences in excess of 4,000, and were planned carefully to span the gamut among new and emerging bacteria, viruses, fungi, and parasites with appropriate discussions on national and international strategies for control.

The chapters in Emerging Infections 5 were derived primarily from presentations given at the sessions on new and emerging infections at the 2000 ICAAC and are updated and fully referenced for this volume. These chapters focus on a variety of diseases that pose major clinical and public health challenges today; some have been recognized for a century or more, while others have been identified during the past 25 years. Some are important problems in the United States, while others cause disease primarily in other parts of the world. The epidemiology of each has been influenced by one or more of the factors identified in the IOM report. Because
of the nature of the “global village” in which we live, we cannot afford to be ignorant or complacent about any of them.

Experiences with these diseases should alert physicians, microbiologists, researchers, public health officials, policy makers, and the public to the critical importance of ensuring the availability of the capacity to detect, respond to, and control these infections. The ability to address these emerging and reemerging microbial threats requires adequate surveillance and response capacity, ongoing research and training programs, strengthened prevention and control programs, and rebuilding of the public health system at the local, state, national, and international levels. The challenges that these diseases will continue to pose demand a multidisciplinary approach and a supply of trained clinicians, microbiologists, pathologists, biomedical researchers, rodent and vector biologists, ecologists, behavioral scientists, and public health officials. The challenges also require funds to support the people and facilities needed to meet them. This is especially true in the developing world because poverty and malnutrition make populations especially susceptible to emerging and reemerging infections.

Future challenges are difficult to predict but certainly include more problems with antimicrobial-resistant infections, the threat of another influenza pandemic, and the increasingly complex challenges of food-borne disease resulting from the globalization of the food supply. The global human immunodeficiency virus epidemic will continue to put large numbers of people at risk for currently recognized and new opportunistic infections. The roles of hepatitis B and C viruses in chronic liver disease and hepatocellular carcinoma, human papillomavirus in cervical cancer, and Helicobacter pylori infection in peptic ulcer disease and gastric cancer are now well established. Additional chronic diseases will certainly be found to have an infectious etiology, providing important new opportunities for disease prevention in the future. Food safety and blood safety will continue to be priorities and to pose challenges. Recent events provide a grim reminder of the threat of bioterrorism, further emphasizing the need to strengthen infectious disease surveillance and response capacity. Two chapters in this volume provide a public health perspective on this issue.

Based on the continued importance of new and emerging infectious diseases as defined by the 1992 IOM report, symposia on these topics are planned for future ICAACs. We plan production of an annual volume on new and emerging infections based on the presentations at each year’s ICAAC. This volume, the fifth in the series, should serve as a valuable source of current information for persons responsible for coping with infectious diseases in the new millennium.

W. Michael Scheld
William A. Craig
James M. Hughes
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