

## **EMERGING INFECTIOUS DISEASES IN THE 21<sup>st</sup> CENTURY**

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The 20<sup>th</sup> century was notable for, among other things, dramatic increases in our knowledge of infectious diseases, their etiologies, pathogenesis, diagnosis, and, especially over the last half of the century, their treatment and prevention. Accordingly some experts optimistically predicted that infectious diseases, long a scourge of mankind, would soon be conquered and no longer present a serious threat to health. Instead, with changing patterns of human behavior, population growth, migration and rapid travel (globalization), increases in the numbers of vulnerable individuals (immunosuppression, aggressive therapies, longer survival of susceptible groups) and changing ecosystems, new, previously unknown or long quiescent infections began to emerge or re-emerge. Despite improved public health practices and the development of effective antimicrobial agents, over thirty new infectious diseases appeared during the last three decades, including HIV/AIDS, Legionnaires' disease (*Pneumophila*), bovine and human spongiform encephalopathy, and viral hemorrhagic fevers (Ebola and Marburg) among others. Microbial adaptability has resulted in new antibiotic-resistant bacteria, and continuing mutations of the influenza virus (avian strains) present the possibility of a worldwide outbreak resembling the 1918 pandemic. West Nile Virus (WNV) infections, long endemic in Africa, West Asia, Europe and the Middle East, appeared for the first time in North America in 1999 and moved rapidly across the continent becoming the most prevalent form of arthropod-borne viral encephalitis. At almost the same time in 1999 WNV re-emerged as a problem in Eastern Europe (Romania and the Volgograd Region of Russia). A previously unknown pulmonary disease (Severe Acute Respiratory Syndrome, "SARS") appeared in China in November 2002 and spread rapidly over a few months to over two dozen countries in Asia, North America, South America and Europe with almost 9000 identified cases. A massive worldwide co-operative effort led to rapid identification and genetic mapping of the causative agent, a previously unknown strain of coronavirus (SARS-CoV). The epidemic was effectively contained by late 2003, and except for a small laboratory outbreak in China in 2004, has not recurred. Bioterrorism, the deliberate spread of infectious agents to civilian populations, continues to present a threat, as dramatically demonstrated in 2001 by 22 cases of inhalational anthrax from microorganisms sent through the mail system in the United States, apparently the result of domestic bioterrorism. In the context of the topic of emerging and re-emerging infections, several of the above mentioned examples will be reviewed.