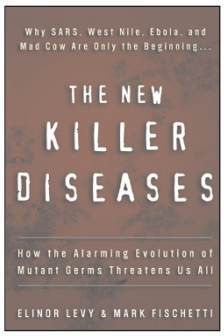
Emerging infectious diseases



The New Killer Diseases: How the Alarming Evolution of Mutant Germs Threatens Us All

by Elinor Levy and Mark Fischetti

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Reviewed by Neal Nathanson

This short book is a popular account of emerging and re-emerging infectious diseases, a theme that has evoked much attention in the media, as well as in the scientific and infectious disease communities. Jointly written by a scientist and a journalist, it is directed at the general reader and attempts to strike a middle ground between an account for the lay public and a scientific primer.

The authors succeed in conveying a large body of information at a level that is accessible to the general reader. Chapters are devoted to long-recognized infectious diseases such as influenza—where the dangers of antigenic shift carry the potential for a new global pandemic—and to bacterial diseases, where antibiotic resistance constitutes an ever-increasing challenge to effective therapy. The book addresses in some detail problems that have appeared more recently, such as bioterrorism, the mere threat of which has already disrupted many aspects of life in the developed world. Likewise, recently imported diseases such as West Nile fever and severe acute respiratory syndrome (SARS) are presented in historical context.

The extraordinary story of prion diseases (in particular, bovine spongiform encephalopathy) is presented, although its probable origin from scrapie in sheep is not well explained. From the viewpoint of global health, the three great killer infections are tuberculosis, HIV/AIDS and malaria; tuberculosis is discussed but AIDS is given a cursory summary and malaria is not mentioned.

The central thesis of this book is implied in its subtitle, "How the alarming evolution of mutant germs threatens us all." While I agree with the threat posed by emerging infections, I take issue with the implication that it arises primarily from mutant parasites. Instead, I would read the recent record as evidence that man-made changes in our ecosystem underlie most of the recent threats, such as SARS, monkeypox and West Nile virus.

SARS appears to be caused by a coronavirus that spread from exotic animals such as the palm civet, a delicacy in southwest China. Food handlers involved in the butchery trades presumably became infected and spread the virus to their immediate human contacts, from whom it quickly spread to a few cities around the world.

Monkeypox was probably brought to the US by the importation of exotic pet species such as Gambian rats, then transmitted to other exotic pets such as prairie dogs and, finally, spread from these secondary hosts to their pet owners.

Although the mechanism of importation of West Nile virus from the Near East is debated, a plausible scenario is that infected mosquitoes were imported in airplanes flying between the Near East and New York City airports.

These three recent examples can be interpreted as resulting from perturbations of our ecosystem initiated by human activities—particularly technological changes in transportation—that led to introduction of exotic infectious agents into new susceptible populations. In none of these instances is there any evidence that mutation was a triggering event.

To be fair, a few of the re-emerging diseases are driven by genetic evolution, the most notable being the ongoing spread of antibiotic resistance. That phenomenon is mainly due to transmission of genetic elements—such as plasmids—that carry resistance genes. Among viruses, antigenic shifts in influenza are caused by 'new' reassortant viruses whose genome consists of segments derived from both human and avian or porcine viruses.

Nevertheless, in my opinion, the greatest current threats—as exemplified by AIDS and SARS—are due to agents that infect animals, cross into humans and then spread rapidly around the globe. Both the transmission of zoonotic infections into humans and their spread are closely associated with human behavior and technological 'advances', which frequently perturb the complex ecosystems in which we live.

In a field that is saturated by data in both scientific journals and the popular press, this book fails to find a niche that distinguishes it from existing sources of information. Unfortunately, it lacks the graceful sophistication of the best medical journalism, such as articles published in the *New Yorker* magazine; neither does it possess the authority of scientific accounts by researchers who contribute to the primary literature. In summary, this layman's introduction to emerging infectious diseases, although informative, is unlikely to be remembered as an outstanding exposition of this important topic.

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