



Book Review

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Ebola and Marburg Viruses: A View of Infection Using Electron Microscopy

by **E. I. Ryabchikova and B. B. Price**

Columbus, Ohio: Battelle Press

230 pp., \$65.00, hardcover. ISBN 1-57477-131-0

Filoviruses (marburgviruses and ebolaviruses) are members of a hazardous group of human pathogens that can be studied only in biological high-containment facilities. The hemorrhagic fevers they cause cannot be treated specifically, and vaccines are not available. Furthermore, the natural hosts of these viruses remain unidentified. Accordingly, the U.S. Centers for Disease Control and Prevention classifies these viruses in the highest risk group as biosafety level 4 (BSL4) agents and as potential bio-warfare agents. Until recently, only a few BSL4 facilities globally could conduct experiments on filoviruses, and because of that, few compendia on filoviruses have been published.

Dr. Elena I. Ryabchikova is a world-renowned specialist in electron microscopy (EM). She heads the Laboratory of Ultrastructural Investigations and Pathomorphology at SRCVB "Vector" in Novosibirsk, Russia, one of the few existing BSL4 facilities. With the help of Dr. Barbara B. Saunders-Price, a senior scientist at Battelle Science and Technology International in Aberdeen, Maryland, Dr. Ryabchikova recently published a unique book on her experiments with filoviruses. In contrast to other compendia, this one is not a collection of original scientific articles or of review articles. Instead, Dr. Ryabchikova summarizes her research of the last decade, much of which has either not yet been described in the literature or has been published in

Russian scientific journals with limited availability. This exceptional book's first surprise is found on the cover page, which shows an electron micrograph of a chick embryo infected with Zaire ebolavirus, an infection that has not been reported in the West so far.

The book is divided into nine well-organized chapters. It begins with a somewhat loose introduction to the history and taxonomy of filoviruses. However, the outstanding methods section, which follows and outlines the details of all of Dr. Ryabchikova's experiments, clarifies why this book is an essential addition to the filovirus field, and is especially valuable for Western filovirologists.

First, the described marburgvirus experiments were performed with a strain not used in the West. Second, not only green, rhesus, and cynomolgus monkeys but also baboons were used for infection experiments. So far, baboons have not been evaluated as filoviral infection models in the West. Third, in contrast to Western filovirus research, all described experiments were performed with low infectious doses reminiscent of natural outbreak conditions rather than with overwhelming viral challenges, which result in different pathological outcomes. Thus, the book provides new data and insights even to experts in the field.

In subsequent chapters, numerous impressive EM and light-microscope histology pictures are used to lead the reader through the complex world of the filoviral life cycle. First, the morphological characteristics of filoviruses are outlined, and it is demonstrated that marburgviruses and ebolaviruses can be easily identified and differentiated by EM, both at the level of virion structure and by the shape of viral inclusion bodies. Then, different possible infection

routes and filovirus-susceptible cells are described. Finally, the pathogenesis of filoviral disease in various animal models is meticulously explained for each organ at several time points of infection.

The book's prose makes it easy for laymen to follow the experiments. This way, not only pathologists, but also virologists, students, and biosafety professionals can learn about the hazardous filoviruses and the experiments necessary to study them.

In conclusion, Drs. Ryabchikova and Price have written an excellent summary of the current knowl-

edge on filovirus pathology and the respective contributions of SRCVB "Vector's" laboratories. In addition, the authors convincingly demonstrate that even today EM remains a unique and specific investigative tool for the characterization of especially dangerous infections.

Dr. Ryabchikova is also a specialist on *Variola virus*, the causative agent of smallpox. Hopefully, she will find the time to publish her work with this pathogen in a book similar to that described in this review.