

Preface

Filoviruses have captivated the imagination of scientists and the public alike since Marburg virus was first isolated in Germany in 1967. Through the years, these viruses have gained much notoriety for the devastating nature of the outbreaks they cause and their repeated sensationalization by mainstream media and the entertainment industry. Over the last 50 years, we have seen tremendous advances in our understanding of these agents, and this book endeavors to capture the major areas of discovery but in no way expects to be an all-encompassing source. Perhaps it is appropriate that the completion of this book coincides with the 50-year anniversary of the discovery of the first filovirus.

The outline for this book was conceived in 2013, prior to the start of the West African Ebola virus outbreak. Many of the contributors to this book were among those who volunteered to respond to the outbreak, some for over a period of years, or set aside their normal work to help support outbreak response efforts.

A wide spectrum of renowned experts in the field worked together to make this book happen. They range from clinicians to virologists to biochemists, and we are incredibly grateful for their contributions. Some of the authors have worked on filoviruses since their discovery, while others are much newer to the field. Despite these differences, all of the authors have one common goal—to better understand how filoviruses work, and to use their knowledge to help prevent or mitigate the impact of future filovirus outbreaks.

We have separated this book into four parts. Part I covers filovirus ecology, outbreaks, and clinical management. It begins with a fascinating first-hand account of the challenges that faced researchers 50 years ago in a small German town when they encountered a highly virulent infectious agent of unknown origin. Chapter “[Filovirus Research: How it Began](#)” was written by one of the original filovirus discoverers and describes the first isolation of Marburg virus in 1967 during a time long before virologists had use of modern biocontainment facilities. We then move on to a global view of filovirus distribution and emergence in the chapter “[Ecology](#)

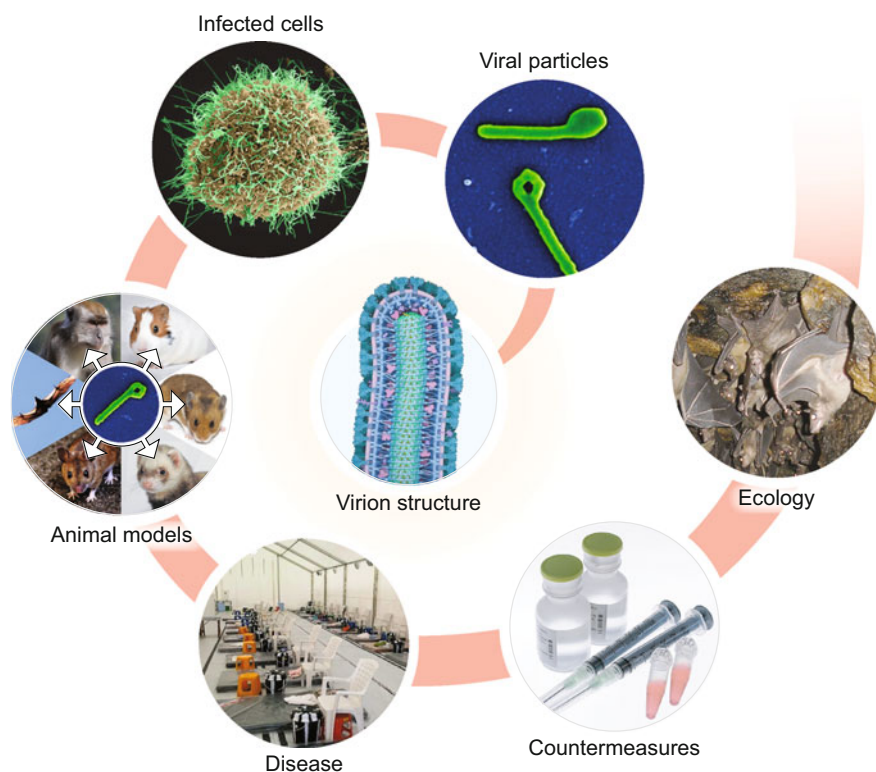
of [Filoviruses](#)” in which we learn about the natural origins of some enigmatic viruses, how they persist long term in nature, and what drivers might promote their spillover to other animals including humans. One of these spillover events led to the largest Ebola virus outbreak on record and is described in the chapter [“West Africa 2013 Ebola: From Virus Outbreak to Humanitarian Crisis”](#). This comprehensive account describes the devastating epidemic that not only brought Ebola virus directly to Europe and the USA, but overwhelmed the long-neglected public health infrastructures in Guinea, Sierra Leone, and Liberia and the international response alike. The next two chapters, [“Clinical Management of Ebola Virus Disease Patients in Low Resource Settings”](#) and [“Clinical Management of Patients with Ebola Virus Disease in High Resource Settings”](#), describe the challenges and risks facing clinicians when they treat patients infected with Ebola virus and how their approaches differ depending on the resource environment.

Part II of the book focuses on filovirus pathogenesis and protection. Chapter [“Ebola Virus Disease in Humans: Pathophysiology and Immunity”](#) provides a detailed review of the human disease, including fascinating new studies of the human immune response that resulted from the West African Ebola virus outbreak. Chapters [“Nonhuman Primate Models of Ebola Virus Disease”](#) and [“Small Animal Models for Studying Filovirus Pathogenesis”](#) summarize the vast body of work using animal models, big and small, to study filovirus disease and develop experimental treatments and vaccines. Part II concludes with the chapters [“Accelerating Vaccine Development During the 2013–2016 West African Ebola Virus Disease Outbreak”](#) and [“Therapeutics Against Filovirus Infection”](#) that each provide state-of-the-art summaries of current experimental countermeasures used to combat filovirus infections, including those deployed during the Ebola virus outbreak in West Africa.

The first three chapters of Part III take us deep into the cellular level of filovirus infection. Chapter [“Filovirus Strategies to Escape Antiviral Responses”](#) provides a comprehensive account of mechanisms used by filoviruses to counteract antiviral responses. In the following two chapters, [“Mechanisms of Filovirus Entry”](#) and [“Inside the Cell: Assembly of Filoviruses”](#), we learn how filoviruses make their way into cells and which strategies they use to replicate their genomes and assemble to new particles. Finally, we reach the atomic level in [“Filovirus Structural Biology: The Molecules in the Machine”](#) which focuses on the structural analysis of filovirus proteins through the use of stunning images of these structures.

The book ends with a description of research tools used to study filoviruses. Chapter [“Reverse Genetics of Filoviruses”](#) summarizes the use of reverse genetics as a powerful tool to investigate virus replication and pathogenesis. The last chapter, [“Guide to the Correct Use of Filoviral Nomenclature”](#), is meant as a useful tool to help guide virologists through the sometimes confusing, and recently evolved, world of filovirus taxonomy.

Last but not least, we wish to thank all the authors who have contributed their work to this book. We are grateful to Jens Kuhn, who volunteered to critically read and edit almost all of the chapters, and to Jiro Wada for designing the preface figure. We also wish to state up front that any views or opinions expressed in the book do not necessarily reflect those of the editors, authors, or their respective institutions.



Preface Figure Marburg- and Ebolaviruses: From Ecosystems to Molecules.

Figure designed by Jiro Wada, NIH/NIAID, Integrated Research Facilities. The watercolor of the virion structure was kindly provided by David S. Goodsell, RCSB Protein Data Bank. Bat photo provided by Chris Black, WHO.

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Marburg- and Ebolaviruses

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