

Introduction: Virology in the Headlines

In March 2020, the World Health Organization declared that COVID-19 was a pandemic. Since then, virology and virologists were in the news every day. Trying to do science in the pandemic was challenging indeed, but virologists and our allies worked hard all over the world to bring their expertise to the battle. With substantial contributions from virologists in a variety of settings, companies (large and small) brought new vaccines, therapeutics, and diagnostics to bear. Those efforts were unprecedented and amazingly productive. In less than a year, we developed and tested an entirely new class of vaccines that showed unprecedented activity and then vaccinated billions of people around the world! We learned more about SARS-CoV-2 and the inflammatory and immune responses it elicits than almost any other virus.

In stark contrast, we learned that effective, coordinated public health efforts are difficult and sometimes nonexistent. Even the most basic of diagnostics, treatments, and laboratory and clinical reagents were not available for everyone. We learned about exponential spread of infection and its effects on our hospitals. Too many people died, and we grieve their passing. Misinformation and disinformation were rampant and disruptive. Public health efforts became politicized. Underlying barriers responsible for health disparities were magnified, and the costs of social isolation, especially for children, became manifest. We have come to understand that the COVID-19 pandemic, while waning in some parts of the world, continues and is not likely to disappear quickly. The end game of the pandemic is difficult to predict. Of the many lessons learned, one major message is that we cannot let our guard down. There are simply too many viruses circulating in nature.

The best defense against the next pandemic is to fortify ourselves with continuing knowledge about viruses, cells, molecules, and physiology. This knowledge should not be limited to pathogens and applied science but should include basic discovery science that will identify unknown viruses about to leap into humans or new biochemical approaches that will surprisingly lead to the next surveillance strategy, vaccine, or antiviral agent. This volume is dedicated to these advances in virology, ranging from basic to applied, from curiosity driven to practical necessity.

We begin with wonderful autobiographies by Pat Spear and Marilyn Roossinck and Angela Creager's fascinating account of the history of molecular biology as taught by tobacco mosaic virus. We cannot imagine a better teacher for this subject than a virus. There are several reviews on various aspects of viral ecology and evolution, including those focused on bacteriophages, amoebal viruses, and viruses lurking beneath the surface, and more general pieces on natural selection, viral host-range evolvability, and viral emergence. We feature new developments in RNA virus, DNA virus, and retrovirus replication; insights into formation and function of viral replication factories; and an update about systems biology of virus-host protein interactions. We offer new stories about

Citrus tristeza virus and Rift Valley fever virus and exciting work on antiviral immune defenses and vaccine development. This is an outstanding volume of the *Annual Review of Virology*.

As amply illustrated by the COVID-19 pandemic, the constant in virology is change. Stories about viruses continue to unfold and move in often difficult-to-predict directions. Our challenge as virologists is to do our best to understand these stories and share them with the largest possible audience, to teach, to help us understand uncertainty, to improve the health of our planet and its inhabitants, and perhaps most of all, to fascinate.

Assembly of each volume of the *Annual Review of Virology*—copyediting, illustration creation and editing, watching for consistency in style, and corresponding with authors and Editorial Committee members—requires considerable effort. The ARV production staff, including Production Editor Annie Beck and Illustration Editor Erin Hunter, is outstanding. We offer our heartfelt thanks.

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