

# INTRODUCTION

The word “virus” conjures up the terror of death on invisible wings. It raises images of hospital wards filled with patients dying of Spanish ‘flu; poliomyelitis victims in iron lungs; health workers dressed in full-body suits against the deadly Ebola virus; or babies with microcephaly that could be linked to Zika virus. These are all dreadful human diseases, but they tell only a very small part of the story. Viruses infect all life forms—not just humans; and most viruses don’t even cause disease. Viruses are part of the history of life on Earth; precisely what part they play is a mystery that is slowly being unraveled.

In this book you will find a more rounded picture of viruses. To be sure, you’ll read about viruses that cause disease, but you will also discover viruses that are actually good for their hosts. So good, in fact, that the hosts couldn’t survive without them. The viruses in this book have been chosen to reflect the incredible variety of viruses. Some you will have heard about—others will be new, and strange. Some have played a part in key episodes in the history of science, such as the discovery of the structure of the genetic material, DNA. Others do weird things to the biology of their hosts. Viruses cannot live without their hosts, so this book orders viruses by the kind of living thing they infect. Starting with humans, we move to other vertebrate animals and plants. Insects and crustaceans (invertebrate animals) have their own viruses, as do fungi. Even bacteria—some of which are also agents of disease—can be infected with viruses. The modern age of biology started with understanding how viruses infected common bacteria.

BELOW LEFT When poliomyelitis became an epidemic in the twentieth century, the use of the iron lung to help people suffering from paralysis to breathe saved many lives.

BELOW Healthcare workers in hazmat suits preparing for working with deadly viruses like Ebola.





The book includes illustrations to show off the unique beauty of viruses. Many viruses have precise, geometric structures, made from repeating units of proteins that make up their coats. Viruses of bacteria and archaea have landing gear they use to attach and drill into their hosts, like a space probe landing on another planet. Some viruses look like flowers, albeit on a microscopic scale; others have eerily beautiful effects on their hosts.

ABOVE Virus-infected camellia flowers show a beautiful red and white variation. Viruses that affect flower color are called color-breaking viruses.

This introduction contains all the essentials for you to start to understand viruses and how they are studied: the history of virology (the study of viruses); some current debates; a virus classification scheme; a look at how viruses reproduce themselves; and some sample virus life cycles. You'll discover how viruses interact with their hosts; how they affect their hosts' interactions with the world around them; and how hosts defend themselves against viruses. You'll learn how vaccination is often the best way to protect ourselves against the threat of new and infectious viruses. At the end of the book you'll find a glossary of scientific terms used, and a list of additional resources.