

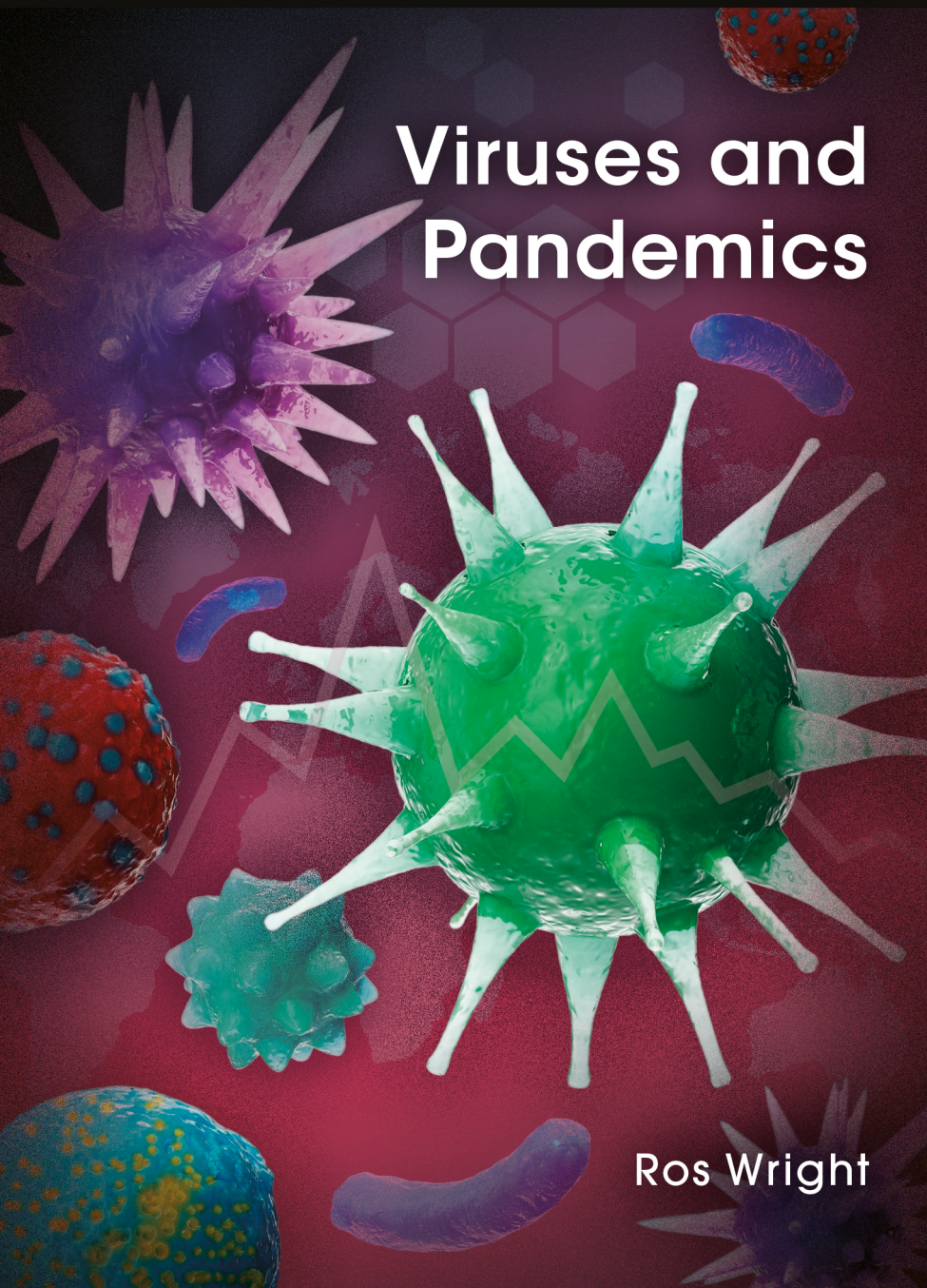
Penguin



Readers

Viruses and Pandemics

Ros Wright



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An introduction to microbiology

To understand viruses, first, it is important to understand what they are, where they come from and what they can do. Welcome to the very *very* small world of microbiology – the study of microorganisms.

Microbes

Micro means “small” in Greek and *microbes* are the smallest kind of life. They are so small we are not able to see most of them with the **human** eye. But, although we can't see them, we know that microbes are everywhere. They are in the water we drink, in the food we eat, in our homes and at work, on our pets and on everything we touch. The human body itself is covered in billions and billions of microbes, living on our skin, in our gut (or stomach), up our noses and in our eyes. There are lots of different types of microbe and many play an important part in keeping us healthy.

The most well-known microbes are **bacteria**. In humans, most bacteria live in the gut where they help with the food we eat and fight **infection**. Some are used to produce foods like yoghurt, blue cheese or beer.

Germ, or pathogens as they are called in the **medical** world,

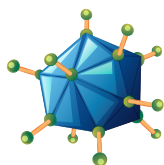
are microbes that cause infection. There are several types of pathogen. Some cause diseases like athlete's foot, while another is carried by **mosquitos** and causes malaria. Some bacteria are also pathogens. These pathogens cause sore throats, as well as more serious diseases like pneumonia.

The smallest microbe is the virus, which comes in different shapes and sizes. These microbes are very small. Scientists tell us that some viruses are about 10,000 times smaller than a piece of salt. Viruses are also pathogens and cause infections like the **common** cold. They also cause chickenpox and measles, as well as more dangerous diseases, like AIDS (Acquired Immunodeficiency Syndrome), SARS (Severe Acute Respiratory Syndrome) and COVID-19.

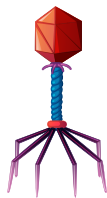
Explaining viruses

Some types of microbes, like bacteria, can live on their own. However, viruses can only live if they enter the living **cells** of humans, plants, animals or bacteria. We call this the "host" cell. Each virus carries its own nucleic acid – **DNA** or RNA – and **protein** and has a special spiky coat to protect it. This special coat helps the virus to join the host cell. Next, DNA or RNA from the virus enters the host cell. Once it is inside the host cell, the virus's DNA or RNA begins to control the cell. First, it destroys the DNA of the host cell and then starts to produce new viruses. Finally, the host cell opens up, and the new viruses escape. Each new virus then enters a new host cell and the story begins again as the number of viruses continues to grow and **spread** through the body.

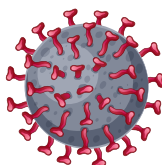
Types of virus



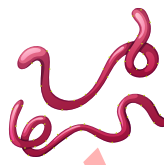
Adenovirus



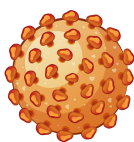
Bacteriophage



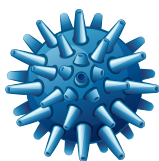
COVID-19



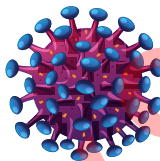
Ebola Virus



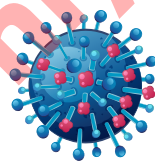
Hepatitis B



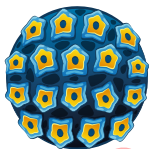
Herpes Virus



HIV



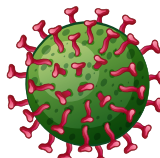
Influenza



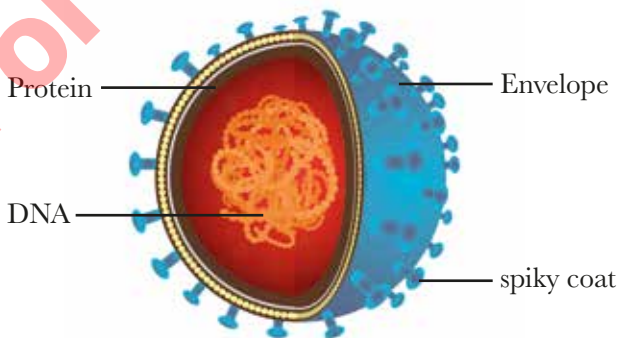
Papillomavirus



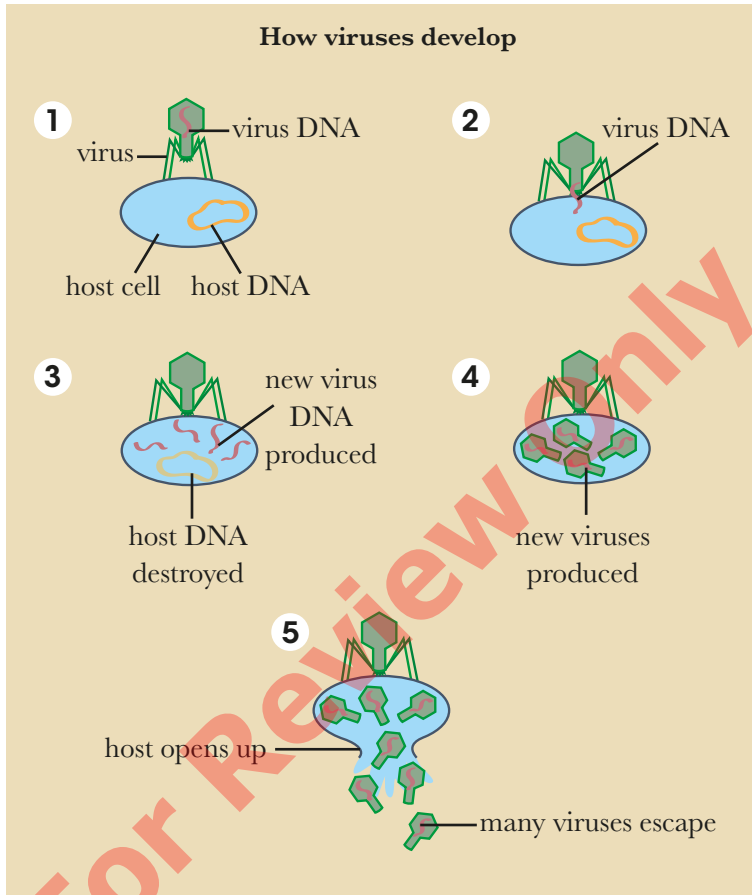
Rabies Virus



Rotavirus



Parts of a virus



Transmitting viruses

So how do viruses enter the body? And how are they **transmitted**? Viruses can live for some time on our clothes, on a door handle or on a coin. So, one way to transmit this microbe is by touching something that already has a virus on it and then touching the face. According to **research** we touch our face

around sixteen times an hour and young children probably more often. But viruses can also be transmitted through the mouth and nose by breathing them in, or through broken skin after a cut or an insect bite when the virus gets into the blood.

Another way to transmit viruses like a cold, influenza or chickenpox to another person is through the air by sneezing, coughing or simply by talking. In 2019, scientists at the University of Bristol in the UK discovered that the 100,000 pathogens from one sneeze could travel up to 160 kilometres an hour. This can **infect** another person two metres away, usually in the first few minutes. Other ways to transmit viruses between humans are during unprotected sex or by kissing. A mother might also transmit a virus to her baby. This can happen before or during the birth, or after, through the mother's milk.

Herpes simplex virus-1 (HSV-1), also called herpes, is the virus that causes cold sores – a small painful area on or around the lips. Herpes can be transmitted quite easily from person to person by touching the skin, kissing or sharing food. It can also be transmitted by drinking from the same glass or using the same towel.

Viruses can be transmitted in water. This happens very often in countries where water is not safe to drink. We can also find viruses in food, for example meat and fish. People working in hotel kitchens or in factories where food is produced must be very careful and wash their hands often, otherwise they could easily transmit viruses through the food they prepare.

Many of the viruses we know actually come from animals or insects. Birds and insects carry viruses across land, or from

country to country, without ever becoming ill themselves. These viruses are then transmitted to humans or other animals. Humans can become infected with some viruses after touching the urine or faeces of infected animals or by eating infected meat. Sometimes viruses even jump from birds or animals like **bats** to humans, to create a new type of virus. Rabies can be transmitted to humans from dogs and the hantavirus from rats. Many of these viruses cause very dangerous diseases that can kill humans, for example, the SARS virus.

Plants also carry viruses. The tobacco mosaic virus (TMV), for example, infects the leaves we use to make cigarettes. TMV can also infect other types of plant, including vegetables. When the disease appears in tomatoes, it damages them, and the only way to stop it is to destroy all the infected plants. This can result in farms losing extremely large amounts of money.

However, infection does not always cause disease. People can become infected and carry a virus without actually becoming ill. These people are called carriers. Disease only happens if the infection damages the cells in the body. This means viruses may only cause disease in some people, while many more can just be carriers. Viruses also act in different ways. Some viruses affect cats but not dogs, for example, and a virus that infects a dog may not infect a human; one example of this is parvovirus.

Incubation and contagious periods

The time after catching the virus but before the **symptoms** appear is called the incubation period. During this time, the virus is developing. Each virus has its own incubation period.