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On the Border of Life: Bacteriophages and Biodiversity

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Bacteria and viruses are the most prolific biological entities on Earth. Although they are very small, their impacts have shaped human history. The Bubonic Plague, attributed to the bacteria *Yersinia pestis*, killed between thirty to sixty percent of those infected, reshaping European labor markets and undermining feudalism as the major political system. Prior to the discovery of antibiotics in the 20th century, even common bacterial infections could prove to be a death sentence. Once heralded as a “miracle drug,” pharmaceutical antibiotics are becoming less effective due to their widespread overuse, threatening to cause ten million deaths annually by 2050. This is because bacteria are living systems, constantly copying their DNA in order to reproduce. If a random error occurs during DNA replication, and that DNA change helps an individual bacterium survive antibiotic treatment, the mutation can be passed on to other bacteria and will become more common. It is possible that humans could use viruses to kill these antimicrobial resistant bacteria, but it is important to be very intentional about their use to prevent bacteria from evolving resistance to this treatment method as well.

(Developed for Environmental Science, grade 9; recommended for Environmental Science and Biology, grades 9-12)

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