



## Do Microbes Have Immune Systems? Professor Robin May

2 October 2024

*For this year's lecture series, I am trying a different format of transcript. Rather than a long-form written document, which has been largely rendered obsolete by the ability to transcribe from the YouTube recording, this handout is a brief summary of the key topics in the lecture, together with some more extensive suggestions for extra reading. As ever, we would be delighted to hear your thoughts on this new approach!*

We are all used to the concept of immunity. During the Covid-19 pandemic, the global media conversation was dominated by immunity – are some people more immune than others, what can we do to boost our immunity and, critically, will we ever have a vaccine to boost our immune systems against this new virus? As a result, immunity is now a common topic of conversation at dinner tables and social gatherings around the world. Almost all of these conversations focus on human immunity; perhaps with the occasional segue into consideration of immunity and vaccination for our domestic pets and livestock. And yet immunity is not restricted to mammals or even to multicellular organisms. In this lecture we delve into the fascinating world of microbial immunity. How do bacteria fight off viruses? Why is your bread dough a seething warzone between microbes? And how might we be able to harness microbial immunity for human benefit?

### Key topic in the lecture

Restriction enzymes as a bacterial defence against viruses

The CRISPR system – immunological 'memory' for bacteria

Harnessing bacterial immune mechanisms for human biotechnology

Social amoebae – from single cells to multicellular slugs

Immunity in social amoebae – sentinel cells

Viruses of yeast and what they have taught us about fungal immune systems

Giant viruses and their satellite virus foes

Harnessing satellite viruses for immune defences in protists

Intracellular parasites of amoebae

### Further reading

[Diverse Functions of Restriction-Modification Systems in Addition to Cellular Defense | Microbiology and Molecular Biology Reviews \(asm.org\)](#)

[CRISPR Immunity Explained: How Cas9 Protects Bacteria from Viruses \(youtube.com\)](#)

[The CRISPR-Cas immune system: Biology, mechanisms and applications - ScienceDirect](#)

[Jennifer Doudna: How CRISPR lets us edit our DNA | TED Talk](#)

[Dictyostelium: a cellular slime mold – Inanimate Life \(geneseo.edu\)](#)

[Immune-like Phagocyte Activity in the Social Amoeba | Science](#)

[Diverse yeast antiviral systems prevent lethal pathogenesis caused by the L-A mycovirus | PNAS](#)

[rapidly expanding universe of giant viruses: Mimivirus, Pandoravirus, Pithovirus and Mollivirus | FEMS Microbiology Reviews | Oxford Academic \(oup.com\)](#)

[Endogenous virophages are active and mitigate giant virus infection in the marine protist Cafeteria burkhardae | PNAS](#)

[A Systematic Review of Intracellular Microorganisms within Acanthamoeba to Understand Potential Impact for Infection \(mdpi.com\)](#)