

**Title: The Evolution of Cell Death**

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The study of 'programmed' forms cell death (PCD), was for a long time, confined to macroscopic organisms, predominantly plants and animals. Microbial cell death was usually attributed to aging and predation, and when analogous forms of PCD were identified in the microbial world in the late 1900s, it was viewed more as a curiosity or anomaly than an evolved biological function. But in the last two to three decades the field of unicellular death has been transformed by the evidence that microbial cell death can offer evolutionary advantages. In this seminar I will cover the key parts of this transformation. Briefly, the history of cell death studies (PCD in particular) is discussed, followed by the challenges that the changing landscape of microbial death poses for the paradigm of PCD. The change in our understanding of microbial PCD is relevant for a wide range of fields, from mechanistic disciplines in biology, to more specialized areas relating to infectious diseases, cancer, microbial ecology, biotechnology, climate change, and astrobiology. I will cover some of the main topics in microbial PCD such as the mechanisms and their evolution, and the role of PCD in nature. I will dedicate almost a third of the seminar to the hypotheses for the origin of PCD beginning with the emergence of cellular life in the Archaean era. I will conclude with a discussion of cell death in space travel programs, the probability of establishing a viable colony of extraterrestrial algal or yeast cells, and what this tells us about habitability on exoplanets.

**References**

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