

# 'Time-traveling' pathogens in melting permafrost pose likely risk to environment, say scientists

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Ancient pathogens that escape from melting permafrost have real potential to damage microbial communities and might potentially

threaten human health, according to a new study by Giovanni Strona of the European Commission Joint Research Center and colleagues, published July 27 in the open-access journal *PLOS Computational Biology*.

The idea that "time-traveling" pathogens trapped in ice or hidden in remote laboratory facilities could break free to cause catastrophic outbreaks has inspired generations of novelists and screenwriters. While [melting glaciers](#) and permafrost are giving many types of dormant microbes the opportunity to re-emerge, the potential threats to human health and the environment posed by these microbes have been difficult to estimate.

In a new study, Strona's team quantified the [ecological risks](#) posed by these microbes using [computer simulations](#). The researchers performed artificial evolution experiments where digital virus-like pathogens from the past invade communities of bacteria-like hosts. They compared the effects of invading pathogens on the diversity of host bacteria to diversity in control communities where no invasion occurred.

The team found that in their simulations, the ancient invading pathogens could often survive and evolve in the modern community, and about 3% became dominant. While most of the dominant invaders had little effect on the composition of the larger community, about 1% of the invaders yielded unpredictable results. Some caused up to one third of the host species to die out, while others increased diversity by up to 12% compared to the control simulations.

The risks posed by this 1% of released pathogens may seem small, but given the sheer number of ancient microbes regularly released into modern communities, outbreak events still represent a substantial hazard. The new findings suggest that the risks posed by time-traveling pathogens—so far confined to science fiction stories—could in fact be

powerful drivers of ecological change and threats to [human health](#).

**More information:** Strona G, Time-travelling pathogens and their risk to ecological communities, *PLoS Computational Biology* (2023). [DOI: 10.1371/journal.pcbi.1011268](#). [journals.plos.org/ploscompbiol...journal.pcbi.1011268](#)

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