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Emilijus Maskvytis

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## STUDY OF NEW ANTI-PHAGE DEFENSE SYSTEMS

Viktorija Rainytė<sup>1</sup>, Paulius Toliušis<sup>1</sup>, Mindaugas Zaremba<sup>1</sup>

<sup>1</sup>Department of Protein - DNA Interactions, Vilnius University Life Sciences Center, Lithuania  
[viktorija.rainyte@gmc.vu.lt](mailto:viktorija.rainyte@gmc.vu.lt)

The perpetual conflict between bacteria and bacteriophages has driven the evolution of intricate immune networks, shaping bacterial defense mechanisms against phage attacks. Historically, the exploration of bacterial defense systems emphasized well-established players like restriction-modification (RM), abortive infection systems (Abi), and CRISPR-Cas. However, recent studies are shedding light on the vast landscape of the bacterial pangenome, revealing previously unknown defence systems that are found on so-called defence islands[1,2].

This study focuses on newly identified bacterial defense systems featuring nucleases and ATPase domains, contributing to the growing understanding of bacterial defense strategies against bacteriophages. By analyzing how the catalytic domains of nucleases and ATPases interact, the study uncovers the molecular processes that control hydrolysis of DNA bonds.

Beyond fundamental insights into bacterial defense, our results hold potential applications in biotechnology, offering novel perspectives for the development of tools with practical implications across diverse industries.

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- [1] Vassallo, C.N. et al. (2022) "A functional selection reveals previously undetected anti-phage defence systems in the E. Coli pangenome," *Nature Microbiology*, 7(10), pp. 1568–1579.  
[2] Millman, A. et al. (2022) "An expanded arsenal of immune systems that protect bacteria from phages," *Cell Host & Microbe*, 30(11).