



Investigating tick biology for disease prevention and novel biotechnological solutions

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ABSTRACT

Our research uses ticks as model organisms to investigate key aspects of Disease Vector Biology, focusing on enhancing public health preparedness in southern Europe through education and proactive measures to mitigate the risks of tick-borne diseases. With climate-driven tick population expansion, we stress the need for robust surveillance and monitoring systems. Simultaneously, we explore the molecular and biochemical mechanisms of disease transmission by arthropod vectors, particularly the role of tick salivary secretions in manipulating vertebrate hosts during feeding. This research bridges fundamental biology with practical applications, including the potential of tick salivary molecules in drug development, the identification of markers for tick exposure, and the advancement of anti-tick vaccines. To achieve this, we analyze tick saliva composition using transcriptomics and proteomics to understand its role in tick-host interactions and pathogen transmission, and we investigate the pharmacological effects of tick salivary protease inhibitors on vertebrate hosts to explore their drug development potential. Our research seamlessly integrates basic biological insights with tangible health applications, aiming to develop novel biotechnological solutions and address both the ecological role of ticks and their public health impact.