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Health, zoonotic pathogens and parasites

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**Predictive relationships between rodent abundance and tick-borne disease patterns in central Europe**Tkadlec, Emil<sup>1\*</sup>; Kučerová, Monika<sup>1</sup><sup>1</sup> Palacký University, Department of Ecology and Environmental Sciences, Olomouc, Czech Republic

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Small rodents are among the most significant reservoirs for many zoonotic pathogens, including those transmitted to humans by ticks. Annual incidences of tick-borne encephalitis and Lyme disease—the most severe tick-borne illnesses in central Europe—vary considerably from year to year. In Europe, the generalist tick *Ixodes ricinus* is the primary vector transmitting tick-borne pathogens to humans. This tick has three blood-feeding stages, with voles and mice acting as the main reservoir hosts for larval ticks. The transition from larva to nymph is a critical phase in pathogen transmission, as exposure to pathogens is most likely at this stage, directly affecting the density of infected nymphs. Vole population densities, in particular, change dramatically over time in 3-5-year cycles, influencing the likelihood that questing larvae will encounter a host and leading to significant variability in infection rates. Our previous research, based on a 17-year dataset, demonstrated that common vole (*Microtus arvalis*) abundance and climate variability can predict annual incidences of both diseases. Given the erratic nature of common vole population dynamics, we tested the robustness of these predictors with a longer data series of disease incidence from the Czech Republic. Our results confirmed that the predictive ability holds for tick-borne encephalitis but is weaker for Lyme disease. We propose a potential explanation for the stronger association between tick-borne encephalitis and the common vole.

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