

Host in reserve: the role of common shrews (*Sorex araneus*) as a stable supplementary source of tick hosts in small mammal communities influenced by rodent population cycles

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Abstract

In recent decades, warming temperatures and changes in land use are supposed to have enabled several tick species to expand their distribution limit northwards. The progression of ticks to new areas may introduce new and emerging tick-borne pathogens as well as increase existing diseases. Aside from climatic conditions, ticks are dependent on hosts for survival, and rodents often act as important hosts for ticks and as pathogen reservoirs. At northern latitudes, rodents often undergo multi-annual population cycles, and the periodic absence of hosts may inhibit the further progression of ticks. We investigated the potential role of common shrews (*Sorex araneus*) to serve as a stable host source to immature life stages of a generalist tick *Ixodes ricinus* and a specialist tick *I. trianguliceps*, during decreasing abundances of bank voles (*Myodes glareolus*). We tested whether ticks would have a propensity to parasitize a certain host type dependent on host population size and composition in two high latitude locations in southern Norway, by comparing tick burdens on trapped animals. We found that *I. ricinus* larvae showed an equal propensity to parasitize both host types as the host population composition changed, but voles had a higher level of parasitism by nymphs ($p < 0.004$). An overall larger host population size favored the parasitism of voles by larvae ($p = 0.027$), but not by nymphs ($p = 0.074$). *I. trianguliceps* larvae showed a higher propensity to parasitize shrews, regardless of host population size or composition ($p = 0.004$), while nymphs parasitized shrews more as vole abundance increased ($p = 0.002$). The results indicate that common shrews may have the potential to act as a replacement host during periods of low rodent availability, but long-term observations encompassing complete rodent cycles may determine whether shrews are able to maintain tick range expansion despite low rodent availability.

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