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## **Host-parasite co-evolution in space: it's reproduction that really matters**

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The impact of spatial structure on evolutionary outcomes can be profound due to both ecological and genetic correlations. One of the best developed areas of spatial evolutionary theory has focused on the coevolution of hosts and parasites. There are profound impacts of local as opposed to global infection on both parasite and host evolutionary outcomes. Using a combination of pair approximations to apply approximate adaptive dynamics to spatial models and simulations we show the central importance of reproduction to the outcome. For example spatial effects on the evolution of resistance arise to due less costly local reproduction rather than spatial epidemiological patterns, the host spatial structure that is created by local reproduction has profound effects on parasite evolution even if transmission is mostly global and the impact of disease on reproduction rates impacts ESS virulence. This highlights the importance of indirect spatial effects on the spatial evolutionary ecology of focal traits.

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