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Theory of advection-driven long range biotic transport OLEG KOGAN, KEVIN O'KEEFFE, Cornell University, DAVID SCHNEIDER, United States Department of Agriculture; Cornell University, CHRISTOPHER MYERS, Cornell University — We consider a new reaction-transport framework, and apply it to the problem of advection-driven biotic transport. The are two compartments - the growth layer, coupled to a separate, advective layer. Density fronts propagate in both layers. Crucially, the downwind front speed goes to a finite value as the coupling goes to zero. We next include diffusion in the growth layer, and study the competition between the advective and diffusive transport mechanisms. Advection wins for small diffusion and cannot be ignored, no matter how weak is the coupling. When coupling is not small, both mechanisms work cooperatively, without a clear winner. A further surprise is the existence of a critical diffusion constant at which the front speed is independent of the interlayer coupling.

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