

Title: Interplay between morphology and competition in two-dimensional colony expansion

Abstract: In growing populations, the fate of mutations depends on their competitive ability against the ancestor and their ability to colonize new territory. Here we present a theory that integrates both aspects of mutant fitness by coupling the classic description of one-dimensional competition (Fisher equation) to the minimal model of front shape (KPZ equation). We solved these equations and found three regimes, which are controlled solely by the expansion rates, solely by the competitive abilities, or by both. Taken together our results not only elucidate many subtleties associated with mutant establishment, but also pave the way for a more parsimonious and universal description of evolutionary and ecological processes in growing populations that is also very amenable to theoretical analyses.