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Population Genetics of Three Dimensional Range Expansions MAXIM LAVRENTOVICH, DAVID NELSON, Lyman Laboratory, Harvard University — We develop a simple model of genetic diversity in growing spherical cell clusters, where the growth is confined to the cluster surface. This kind of growth occurs in cells growing in soft agar, and can also serve as a simple model of avascular tumors. Mutation-selection balance in these radial expansions is strongly influenced by scaling near a neutral, voter model critical point and by the inflating frontier. We develop a scaling theory to describe how the dynamics of mutation-selection balance is cut off by inflation. Genetic drift, i.e., local fluctuations in the genetic diversity, also plays an important role, and can lead to the extinction even of selectively advantageous strains. We calculate this extinction probability, taking into account the effect of rough population frontiers.

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