

FLUCTUATION ANALYSIS WITH CELL DEATHS

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SUMMARY

The classical Luria-Delbrück model for fluctuation analysis is extended to the case where cells can either divide or die at the end of their generation time. This leads to a family of probability distributions generalizing the Luria-Delbrück family, and depending on three parameters: the expected number of mutations, the relative fitness of normal cells compared to mutants, and the death probability of mutants. The probabilistic treatment is similar to that of the classical case; simulation and computing algorithms are provided. The estimation problem is discussed: if the death probability is known, the two other parameters can be reliably estimated. If the death probability is unknown, the model can be identified only for large samples.

Keywords and phrases: Bellman-Harris branching process; cell kinetics; fluctuation analysis; Luria-Delbrück distribution; mutation model

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