Review of: "Branching Markov Chains: Survival Thresholds and Applications to Species Navigation"

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Potential competing interests: No potential competing interests to declare.

The paper introduces a theoretical framework to describe the probability of a species surviving when it is constrained to return to its birthplace for reproduction. Although the model is highly simplified and cannot be directly applied to real-world scenarios, the author successfully proves several theoretical results. Notably, the author establishes a condition that a species must satisfy to survive, which connects the probability of returning to its birthplace with the probability of dying at each step. The author demonstrates that if the probability of returning to the birthplace is less than 1/2, the species cannot survive. However, if this probability is higher, the species can survive only if its probability of dying at each step is sufficiently low.

The paper is well-written: the motivation is clear, the results are presented effectively, and the author clearly highlights the novel aspects of their approach. However, while the author suggests that the results in the paper imply an evolutionary push toward greater navigational skills, the model is so simplified and omits so many factors that it is challenging to draw any significant biological conclusions from the study. Nonetheless, the result is mathematically interesting, it is exposed in an elegant and concise way, and opens the door to further research.