

**Philip Gerrish**  
CMAF, LISBON UNIVERSITY  
e-mail: pgerrish@unm.edu

## **Genomic mutation rates that cause extinction: general evolutionary predictions**

When mutation rates are low, increasing the mutation rate can give rise to an increase in adaptation rate. If mutation rate is increased further, however, a point may be reached at which fitness declines despite continued adaptive and/or compensatory evolution. If fitness decline persists, it intuitively culminates in population extinction. Mathematical formalization of this criterion for extinction gives rise to a simple relation that puts a dynamic upper limit on viable mutation rates. The particular mathematical guise of this relation suggests encompassing generality, which we confirm using individual-based simulations. Additionally, we re-derive the classical "error threshold" formula and show, by proxy, that it is similarly general when used dynamically an attribute not previously recognized. Finally, we demonstrate the utility of the insights gained from these developments with an example application to immunology.