Rarely clicking Muller's ratchets STEPHAN EULE, JAKOB MET-
ZGER, MPI for Dynamics and Self-Organization, Göttingen — In populations of
finite size, weakly deleterious mutations can fix by chance. This phenomenon has
been termed Muller's ratchet and one click of the ratchet refers to the loss of the
fittest class of individuals with the fewest mutations. Despite the simplicity of
the classical mathematical model of Muller's ratchet, surprisingly little is known in
the biologically relevant regime where a click of the ratchet is a rare event. Here
we show numerically that in this regime the rate of the ratchet strongly depends
on the applied microscopic formulation (Wiright-Fisher/Moran) of the model, thus
challenging the widely used diffusion approximation. Furthermore by employing a
WKB-approximation in a simplified model, we obtain analytical results for the click
rate, which agree well with the click rate of the full ratchet of the corresponding
microscopical model.

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