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Theoretical Biology

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Born in 1973 in Ulm
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FELLOWSHIP
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PROJECT

Variability in Individual Fitness Components

Humans and other species often differ greatly in age at death and in lifetime reproduction. For example, the standard deviation of human age at death was _40% of life expectancy (_35 years) in the early 1800s and _20% in the late 1900s even with a much higher life expectancy (_70 years). This leads to the question why there is so much variability and where does it come from. Does it have a genetic component, is it driven by the fluctuations in the environment, or is it simply chance that determines the course of life? To date, we have no good expectation of variability in fitness components and patterns across species and populations and we are far from quantifying underlying causes of this variability. The large variation in fitness components that is found on all levels, from bacteria to humans, has substantial implications for evolutionary and ecological population dynamics. It confronts us with major challenges in accurately forecasting population dynamics, including forecasts under climate change scenarios and major shifts in the demographic structure human societies face in the near future. I will review existing patterns across the tree of life using neutral theories of life histories to reveal potential unifying or diverging features in observed variability in fitness components among individuals. I will use a neutral theory of life histories that estimates expected neutral variability in individual fitness components within age- and stage-structured populations, assuming a single genotype. If expectations of large neutral variability (non-genetic variability) hold, life courses are mostly be determined by chance and we need not worry; we only need to be lucky.

Recommended Reading
Steiner, U. K. and S. Tuljapurkar (2012). "A neutral theory for life histories and individual variability in fitness components." PNAS 109, 12: 4684-4689.
Tuljapurkar, S., U. K. Steiner, and S. H. Orzack (2009). "Dynamic heterogeneity in life-histories." Ecology Letters 12, 1: 93-106.

PUBLICATIONS FROM THE FELLOWS' LIBRARY

Steiner, Ulrich Karl (Chicago, Ill.,2017)

Drivers of diversification in individual life courses

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1680550578

Steiner, Ulrich Karl (Berlin,2015)

Constraints on the evolution of phenotypic plasticity : limits and costs of phenotype and plasticity

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1680551248

Steiner, Ulrich Karl (Chicago, Ill.,2014)

Generation time, net reproductive rate, and growth in stage-age-structured populations

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1680549960

Steiner, Ulrich Karl (Orlando, Fla,2012)

Structured population models : introduction

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1687900930

Steiner, Ulrich Karl (2012)

Neutral theory for life histories and individual variability in fitness components

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=755868854

Steiner, Ulrich Karl (2012)

Why is the jack of all trades a master of none? Studying the evolution of inducible defenses in aquatic systems

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Steiner, Ulrich Karl (2012)

Trading stages : life expectancies in structured populations

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Steiner, Ulrich Karl (2010)

Dynamic heterogeneity and life histories

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The fitness costs of developmental canalization and plasticity

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=755868382

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Dynamic heterogeneity in life histories

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