

EINLADUNG

zum

HABILITATIONSVORTRAG

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“Towards a general theory of species' ranges.”

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Abstract. What stops a species adapting to an ever-wider range of conditions, continuously expanding its geographic range? All species have restricted distributions. Yet a theory explaining the span, continuity and borders of species' ranges has been missing both due to the complexity of the problem and the disparate traditions in ecology and evolution. It has been hypothesized that populations may simply not have enough genetic variation to adapt further, or that dispersal across heterogeneous environments swamps adaptation to local conditions in marginal populations, thereby preventing range expansion. To capture the dynamics, the processes of ecology (population dynamics) and evolution need to be considered jointly, whilst accounting for both genetic and demographic stochasticity. This creates a complex model. In this talk, I will show that dimensional analysis brings a crucial insight: species' range dynamics is fundamentally driven by just two compound dimensionless parameters. These are i) the fitness cost of dispersal – a measure of environmental heterogeneity – and ii) the strength of genetic drift, which reduces genetic variation. Together, these two parameters define an expansion threshold: adaptation fails when the local population size is so small that genetic drift reduces diversity below the level required for adaptation to environmental heterogeneity. Finally, I will explain how these dimensionless parameters can be used to predict limits to adaptation in natural populations, and discuss the challenges of quantifying them experimentally.

**Montag, 18. November 2019,
16:00 Uhr – 16:45 Uhr,**

**Fakultät für Mathematik,
Ort BZ 09 (09.143), 9 OG.
Oskar-Morgenstern-Platz 1, 1090 Wien**

Josef Hofbauer
Christian Krattenthaler