

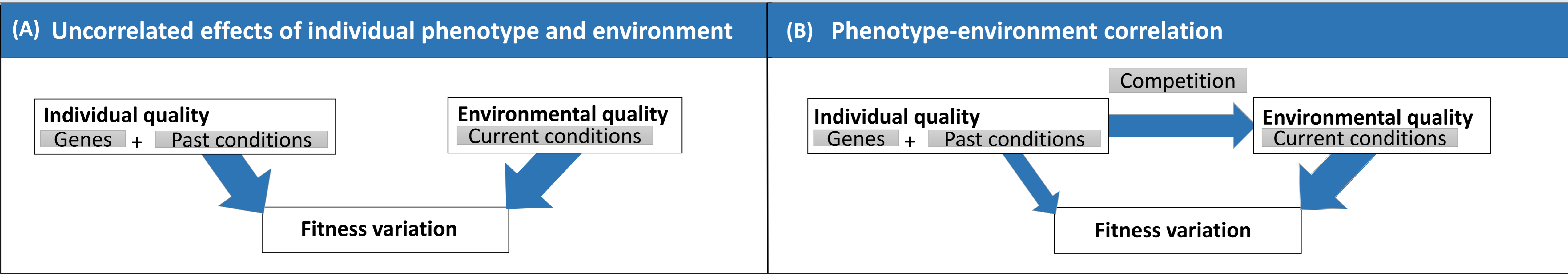
# Understanding between-individual fitness variation: connecting the individual to its environment

A project proposal by: Rienk Fokkema, Bielefeld University, Germany, e-mail: rienkfokkema@gmail.com

## Background

**Abundant fitness variation:** there is often large variation in individual reproductive performance within populations

**Individual versus environment:** the contributions of individual and environmental ‘quality’ to fitness variation are often implicitly assumed to be uncorrelated (panel A, below). However, in natural populations, through competition, effects of individual quality may act mostly indirectly via the probability of individuals to claim high-quality environments (panel B)



## Objectives

I aim to determine the importance of indirect effects of the individual phenotype on fitness that operate via environmental quality

## Proposed research

### Analysis of long-term data on songbird populations

**Aim:** investigate the occurrence of phenotype – environment correlations in natural populations (ecological significance)

**Data:**

Study population	Species	Migratory	No of nestboxes	Year started	Breeding events recorded
Vosbergen (NL)	Blue tit	No	220	2001	~1800
Lauwersmeer (NL)	Great tit	No	600	1993	~5100
Lingen/Ems (DE)	Pied flycatcher	Yes	200 - 600	1974	~3700



**Approach:**

- Step A:** assess breeding site quality based on measures independent from and derived from the breeding records (e.g. habitat characteristics, nestbox productivity)
- Step B:** investigate whether individuals consistently and heritably differ in their probability to claim high-quality breeding sites

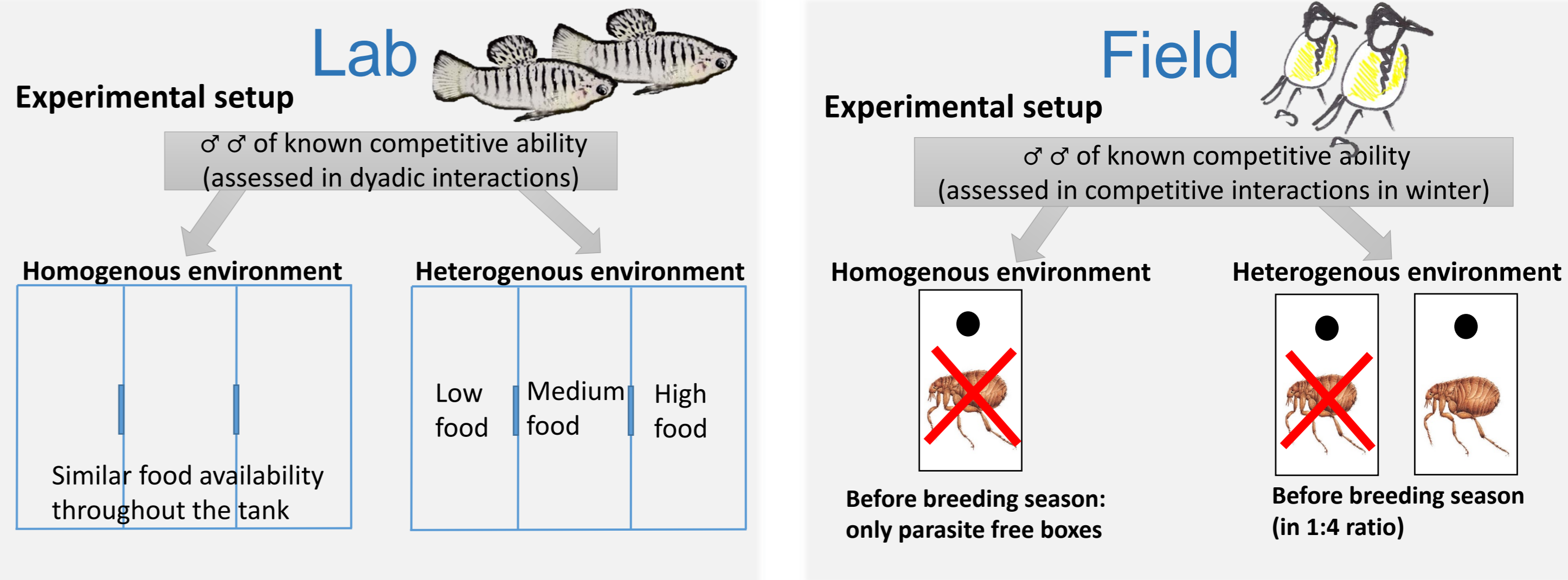
### Focused experiments in fish and songbird populations

**Aim:** test the importance of indirect effects (via the environment) of the individual phenotype on fitness

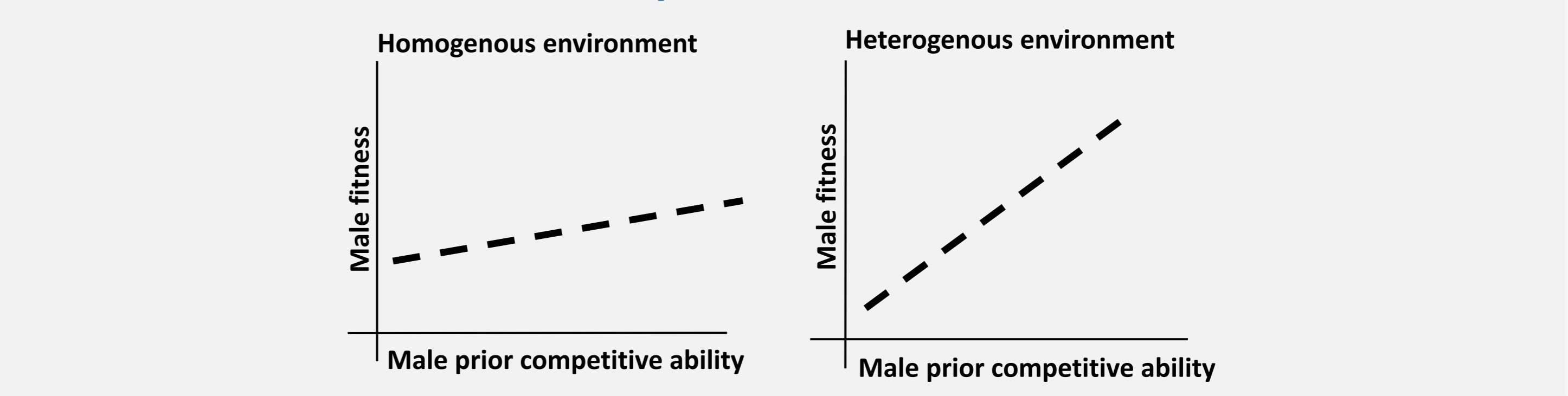
**Approach:**

- Step A:** characterize individual competitive ability
- Step B:** manipulate the presence of a phenotype – environment correlation

**Two options:**



### Expectations



## Implications

**The speed of microevolution:** even when a phenotypic trait is heritable and under positive selection it may still not evolve if the trait predominantly influences fitness through affecting an individual's competitive ability for scarce high-quality environments

## Collaborators

Peter Korsten, Tim Schmoll, Wolfgang Winkel (Bielefeld University) & Joost M. Tinbergen, Jan Komdeur (University of Groningen) & Alastair Wilson (University of Exeter)