

The severity of inbreeding
depression over seven years in the
self-incompatible, long-lived plant,
Echinacea angustifolia

Ruth Shaw

Charles Geyer

Stuart Wagenius

Photo taken at U.S. Botanic Garden



Schiedea globosa



Gaillardia pulchella

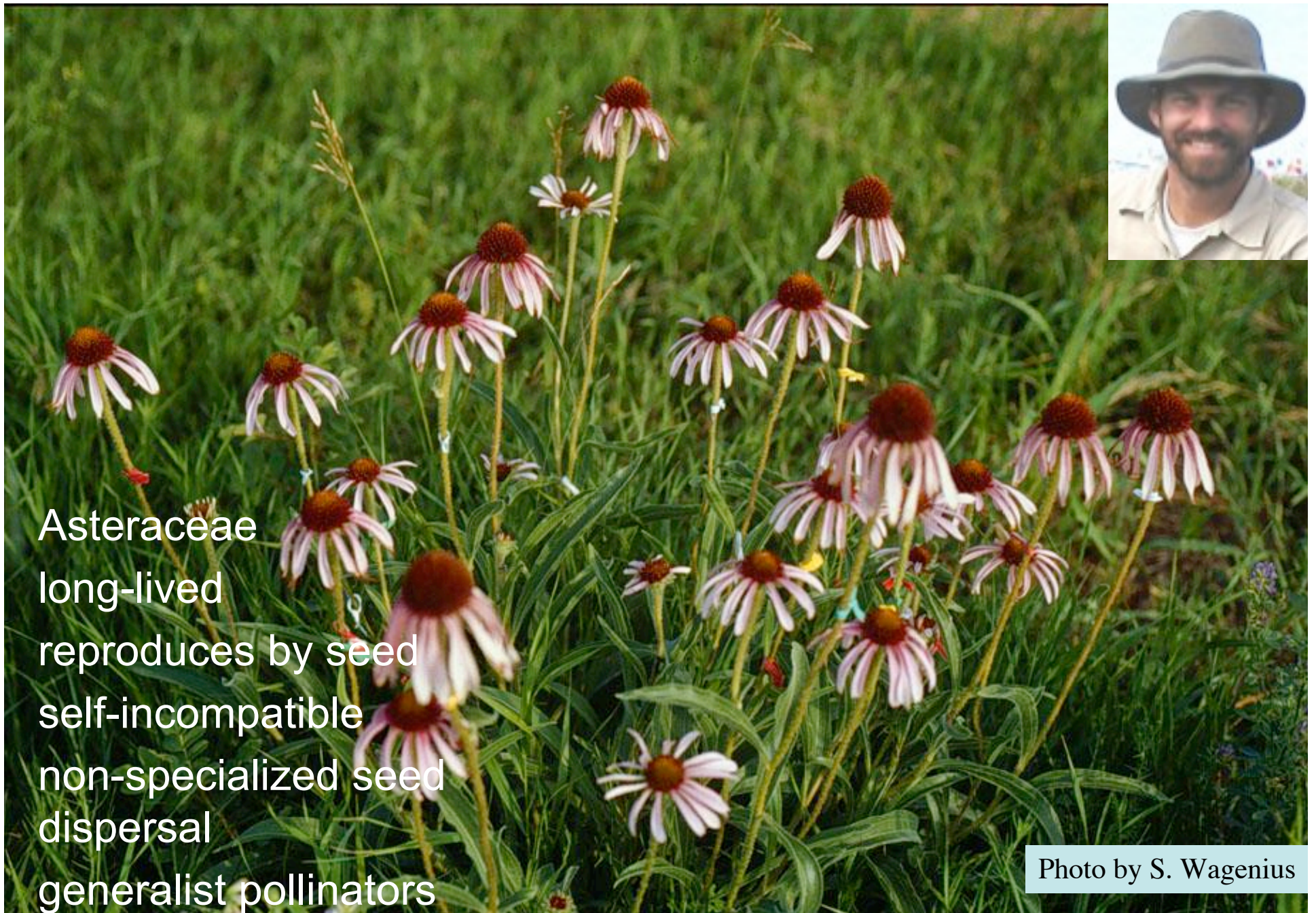
www.sbs.utexas.edu/



Raphanus sativus

www.missouriplants.com

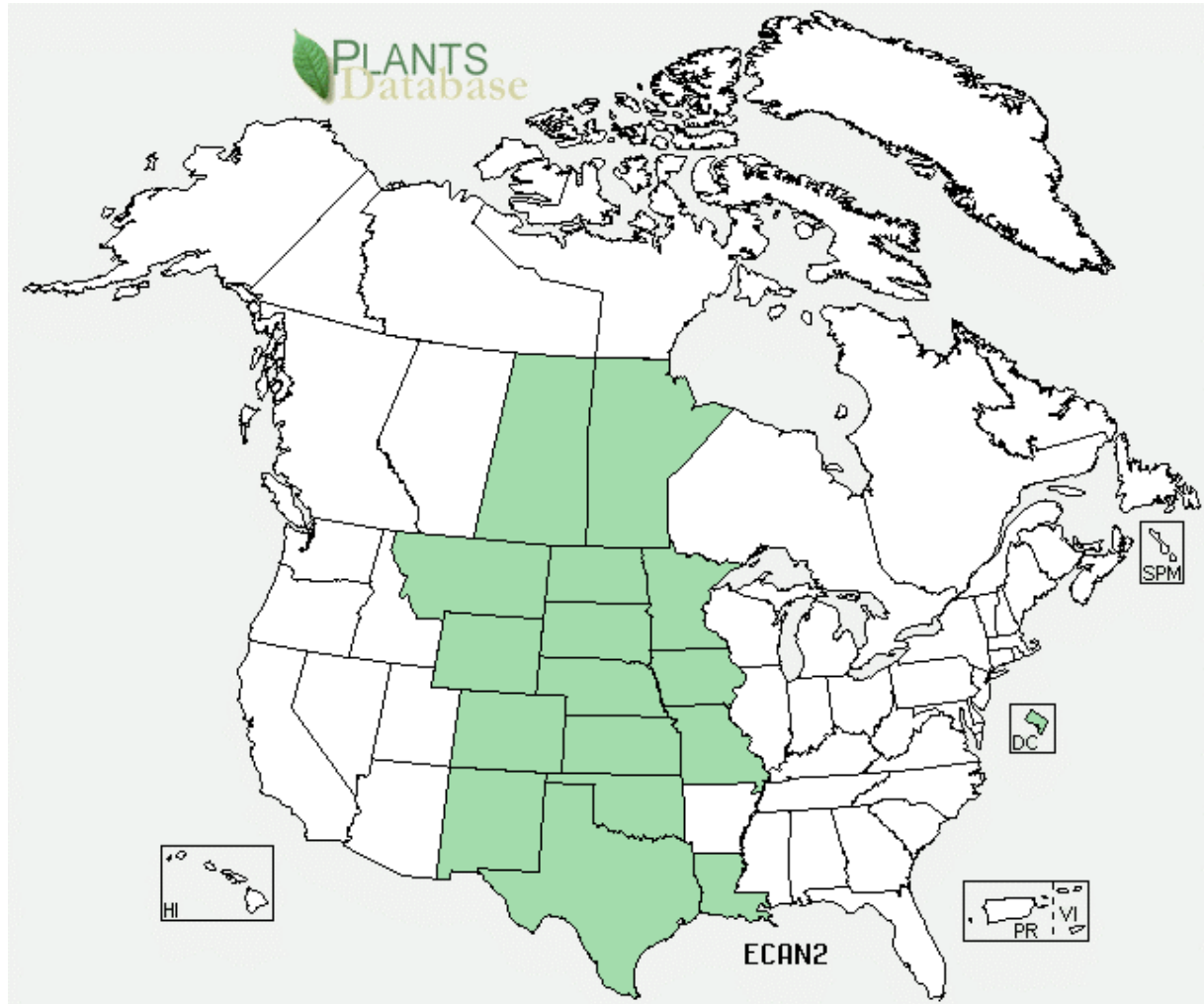
Echinacea angustifolia, purple coneflower

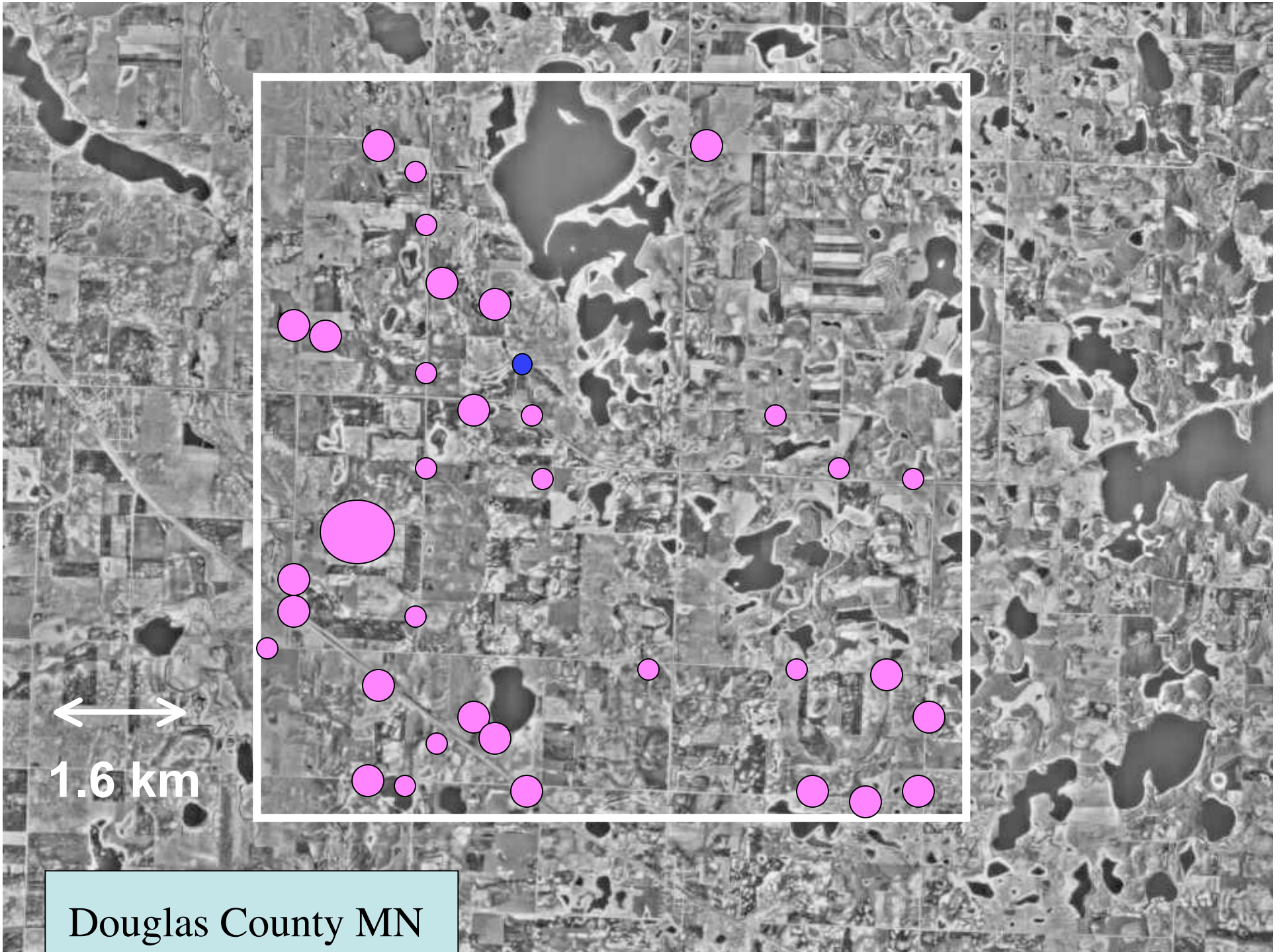


Asteraceae
long-lived
reproduces by seed
self-incompatible
non-specialized seed
dispersal
generalist pollinators

Photo by S. Wagenius

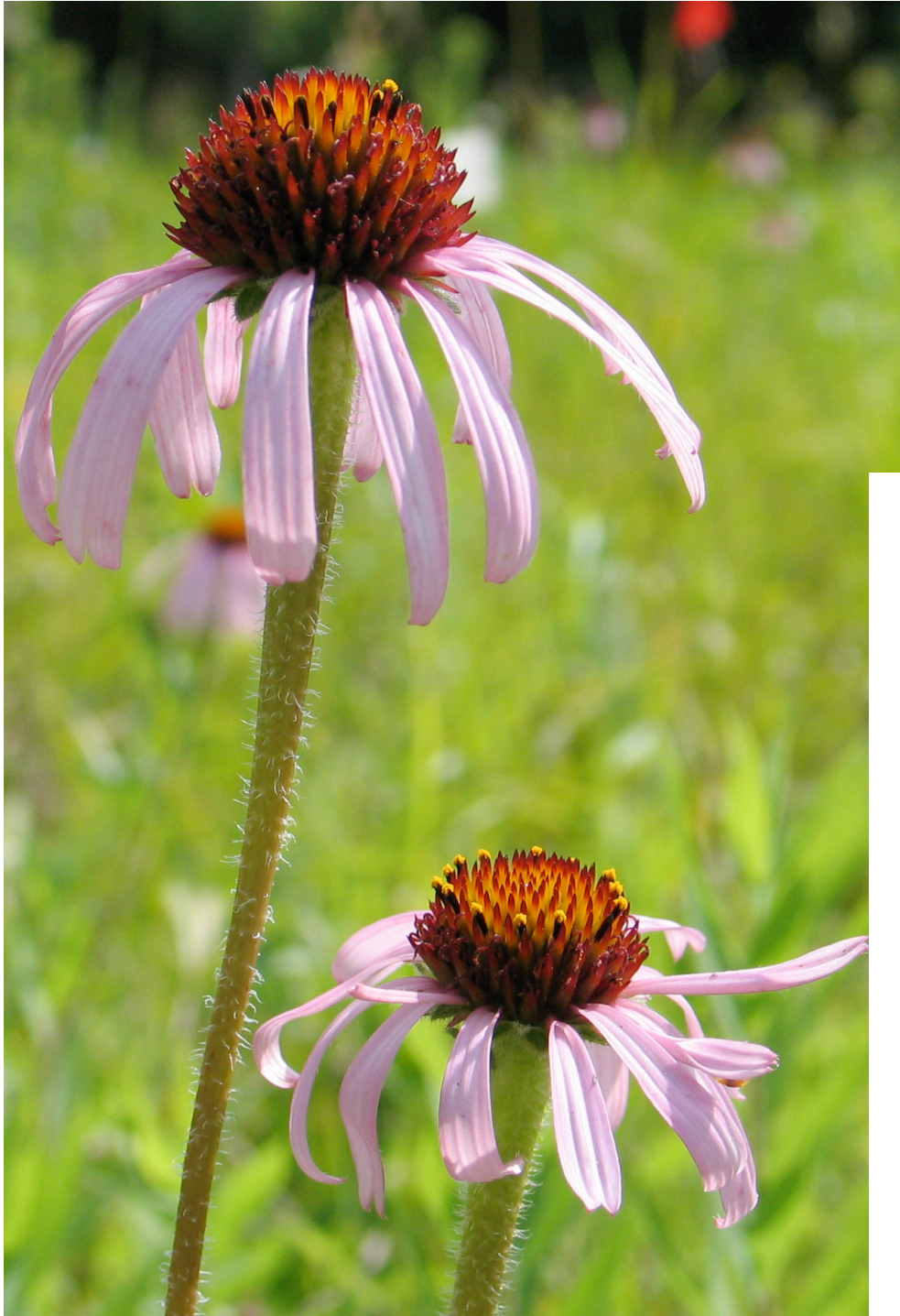
Echinacea angustifolia DC. blacksamson echinacea





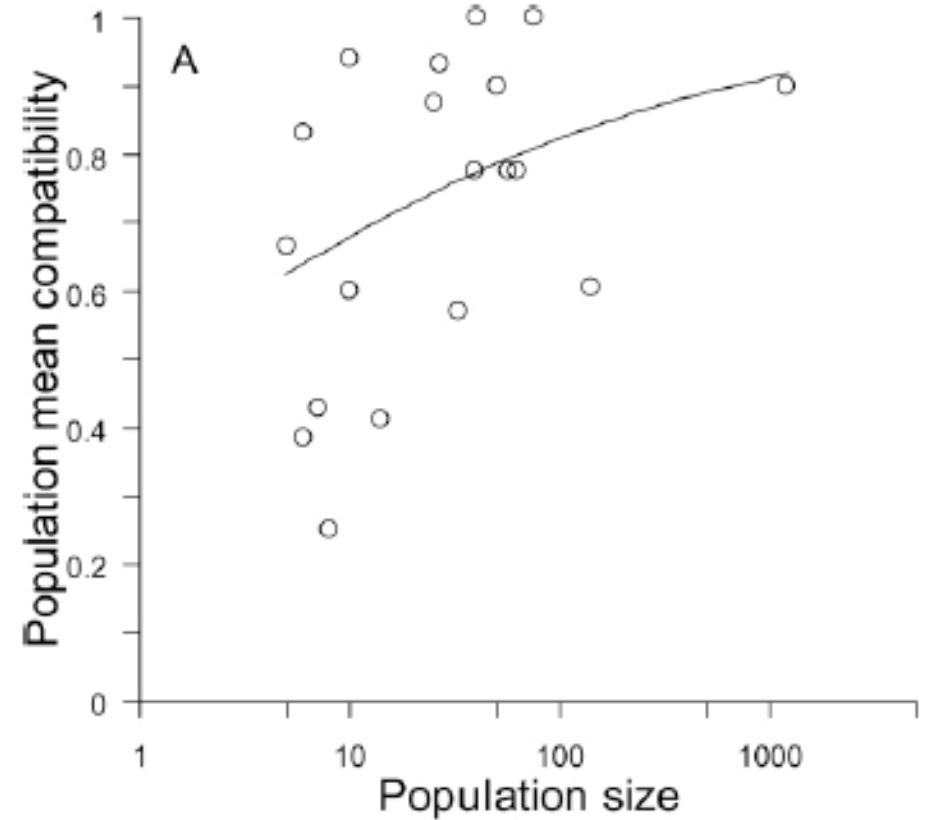
1.6 km

Douglas County MN



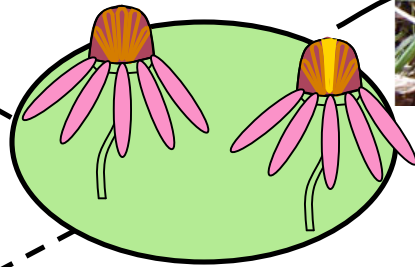
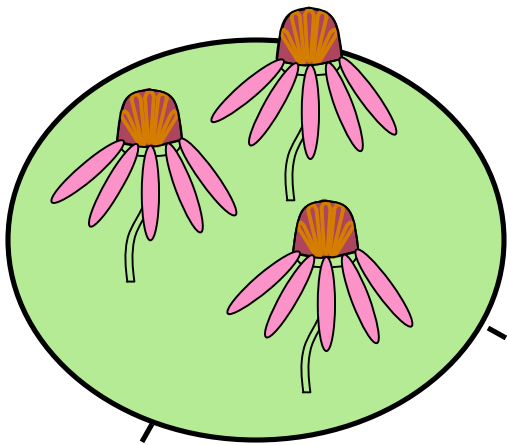
Sporophytic incompatibility (SI)
bars production of seeds via

- self-pollen
- pollen from plant sharing either allele at the SI locus



Wagenius et al. 2007

Cross treatments



Common field

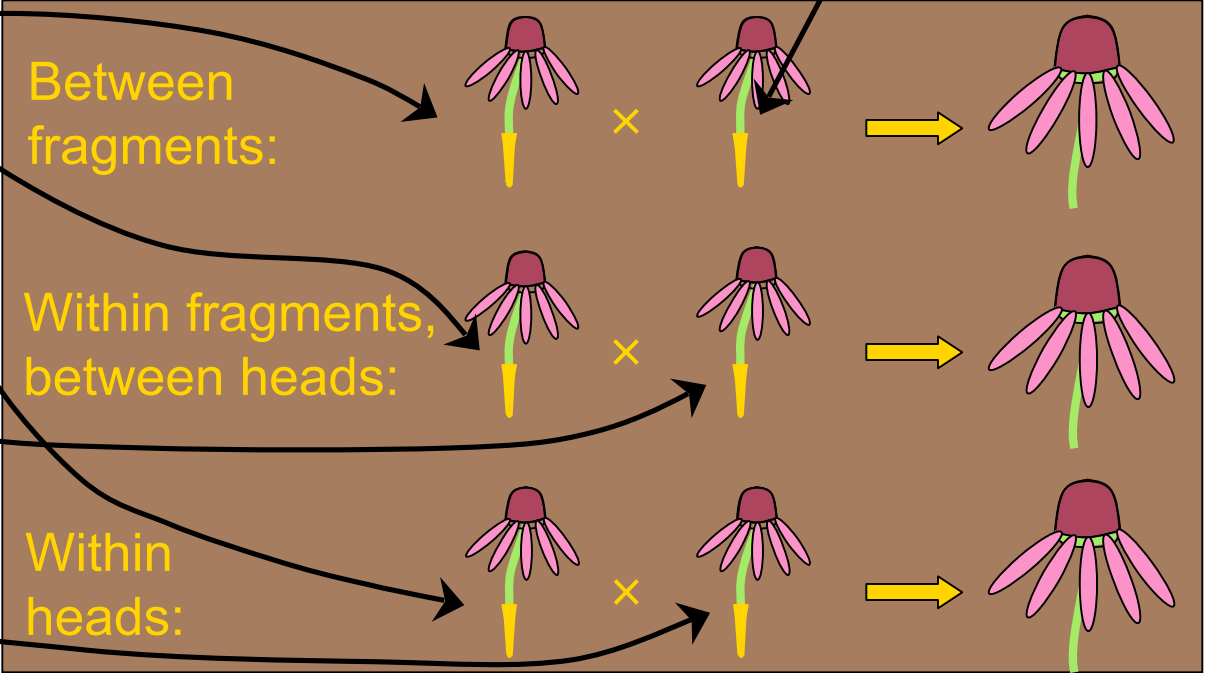
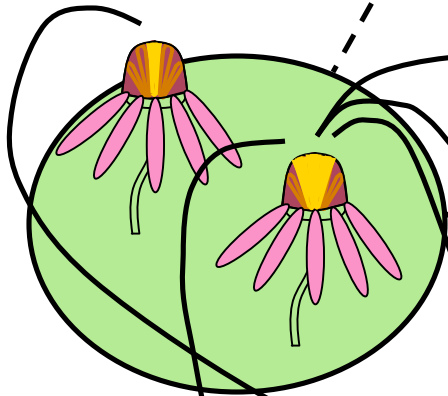


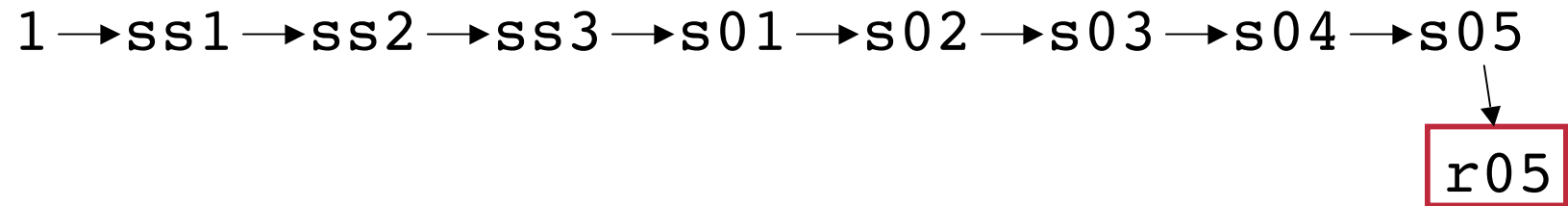


Photo by H. Hangelbroek





Fitness through age 5



Aster models for life history analysis

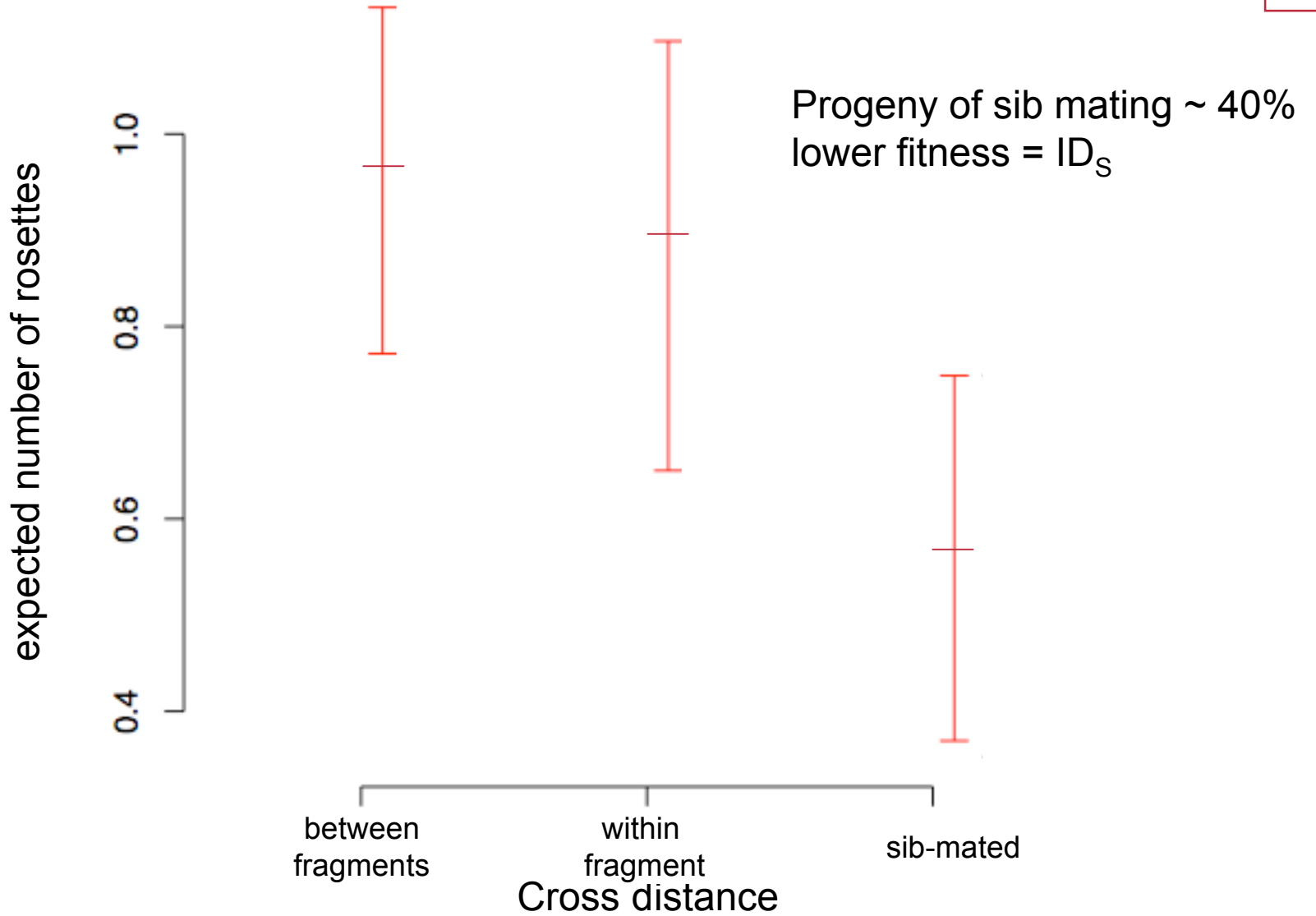
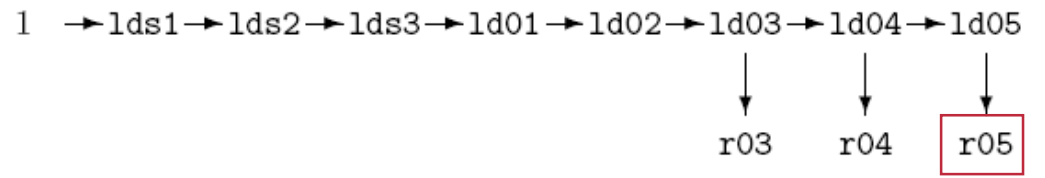
www.stat.umn.edu/geyer/aster/

Geyer et al. 2007. Biometrika

Shaw et al. 2008. American Naturalist

Geyer et al. 4:30 today Anderson 230

Fitness through age 5



Fitness through age 7

1 → s01 → s02 → s03 → s04 → s05 → s06 → s07



hdct05

Aster models for life history analysis

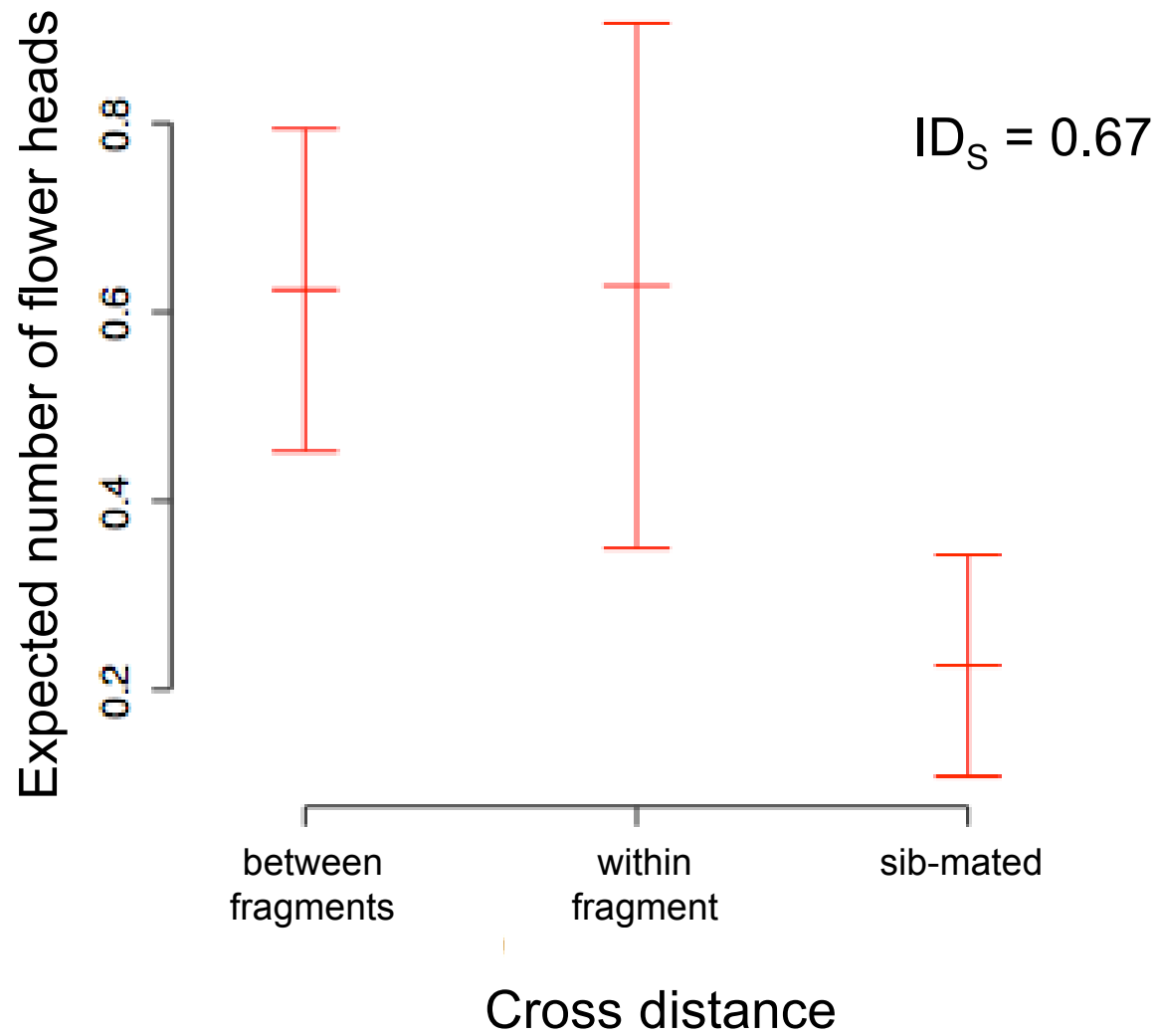
www.stat.umn.edu/geyer/aster/

Geyer et al. 2007. Biometrika

Shaw et al. 2008. American Naturalist

Geyer et al. 4:30 today Anderson 230

Mean Fitness through age 7



Sakai 1989: $ID_{FS} = 0 - 0.49$

Photo taken at U.S. Botanic Garden



Schiedea globosa

Heywood 1993: $ID_{FS} = 0.22$



Gaillardia pulchella

www.sbs.utexas.edu/

Nason and Ellstrand 1995:
 $ID_{FS} = 0.58$

Raphanus sativus

www.missouriplants.com



- Inbreeding depression is becoming more severe as the cohort ages.
- Aster makes possible joint analysis of components of life history, quantifying fitness differences (including uncertainty in fitness estimates).

Acknowledgments


Gretel Kiefer
Helen Hangelbroek

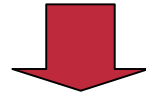
Janis Antonovics
Don Burdick

National Science Foundation



Disruption of gene flow among fragments of a population.....

- promotes drift: deleterious alleles may become more common
- increases autozygosity  inbreeding depression



- selection against recessive, deleterious alleles - ‘purging’
- facilitates adaptation to local conditions

How do these genetic processes interact with demography to affect individual fitness and the size and persistence of populations?

THE AMERICAN NATURALIST

Vol. XCIV

January-February, 1960

No. 874

THE GENETIC FACTOR IN POPULATION ECOLOGY

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INTRODUCTION

The ecological problem of populations has to do with the numbers of animals and what determines these numbers. The genetical problem of populations has to do with the kind or kinds of animals and what determines kind. These two disciplines meet when the questions are asked, how does the kind of animal (i.e., genotype) influence the numbers and how does the number of animals influence the kind, i.e., the genetical composition of the population? These questions are as much ecological as they are genetical.

Mean Fitness through age 7

