

# GENETIC DIVERSITY AND HONEY BEE VITALITY

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Honey bee queens mate 7 to 25 drones



Hence, bee colonies are genetically diverse

# Genetic diversity does benefit colony fitness

PROCEEDINGS  
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## **Queen promiscuity lowers disease within honeybee colonies**

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**Science***express*

Report

### **Honey Bee Nest Thermoregulation: Diversity Promotes Stability**

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# Division of labor can serve as mechanism

# Vitality of honey bees

- We have defined honey bee vitality, as the colonies' natural capacity to cope with environmental stressors.
- Stressors can be climatic variation, lack of forage or pest and parasites.
- Evolutionary adaptation to local conditions is an important factor in vitality.



Lack of forage is a stressor



Local bees have adapted to the local conditions  
and are in tune with seasonal changes



Varroa is a new stressor, few bees have adapted to, therefore mites results in losses



# Honey bee breeding

- Queens are produced from best colonies
- Isolated mating stations on island or in valleys and artificial insemination employed to facilitate selection of drones
- Mating control helps reduce swarming and aggressive behavior and improve honey production



Matings station with sister queens producing drones for mating, minimal genetic diversity



The result is gentle, non-swarming and productive bees



Small islands fine mating control, in Denmark more than 20 are in use



Elsewhere mountain valleys are used, but genetic drift is high

# How does genetic diversity affect vitality?

- Artificial selection reduce genetic diversity
- To counteract, some breeders produce hybrids between subspecies
- Hybrids are rarely locally adapted
- Not all genetic diversity is beneficial

# How to breed vitality?

- Use large genepools to avoid genetic drift
- Use locally adapted bees
- Adapt metapopulation scheme for rare breeds
- Focus on disease tolerance and survival

Thank you for the attention!

