# **UNIT 5: Competition**

### **Outline**

#### Introduction

Population model with competition Balanced competition Unbalanced competition

Population-level interactions
Invasion theory

Niches and coexistence
The competitive exclusion principle

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The confused flour beetle

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#### Subsection 1

**Balanced competition** 

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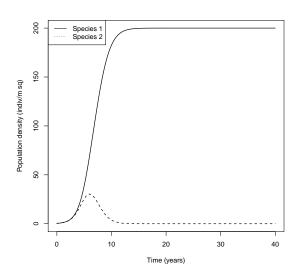
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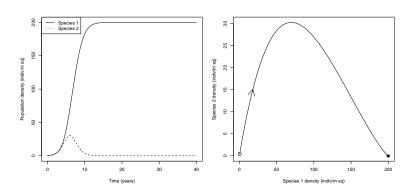
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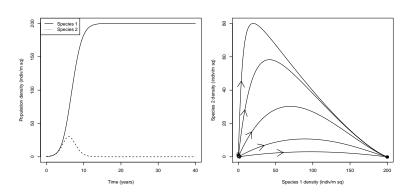
# Dominance time plot



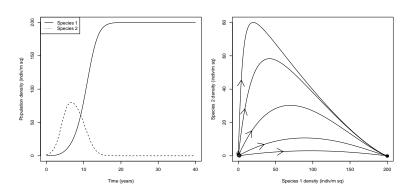
# Dominance phase plot



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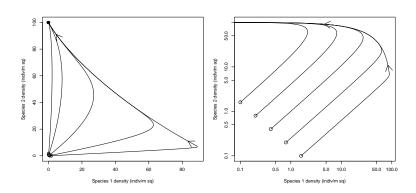
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#### Dominance reversed



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- ► Log plots show *proportional* differences

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## Measuring competitive effects

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#### Subsection 2

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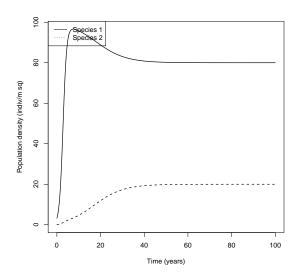
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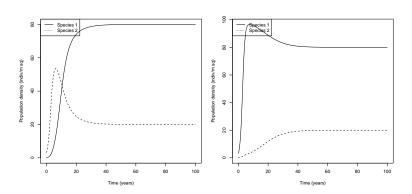
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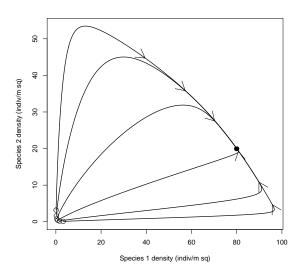




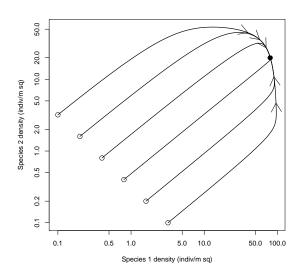




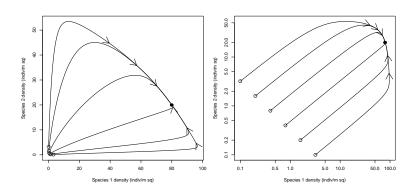
### Coexistence phase plot



### Coexistence phase plot (log scale)



# Coexistence phase plots



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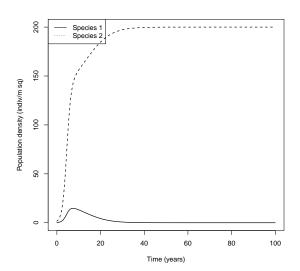
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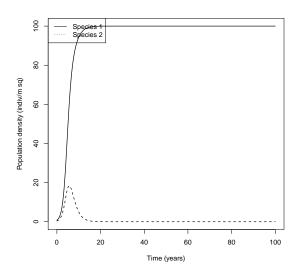


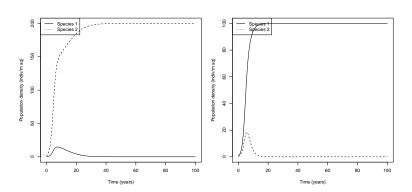
Co-operation



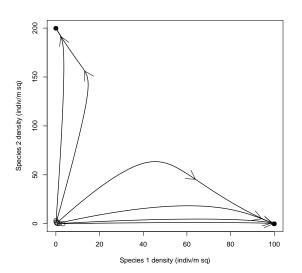
Changing the environment



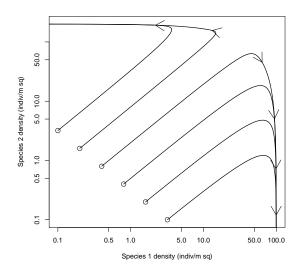




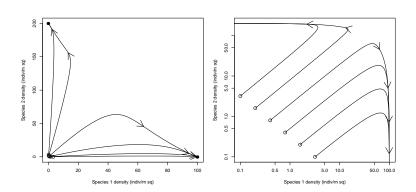
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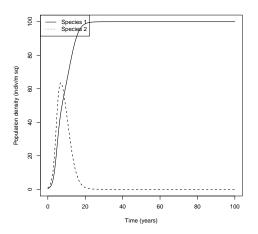
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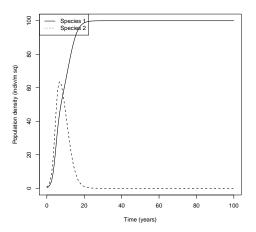
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#### **Outline**

#### Introduction

Population model with competition Balanced competition Unbalanced competition

Population-level interactions
Invasion theory
Colonization and co-existence

Niches and coexistence
The competitive exclusion principle

#### Subsection 1

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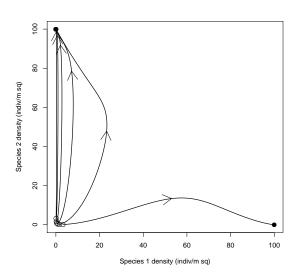
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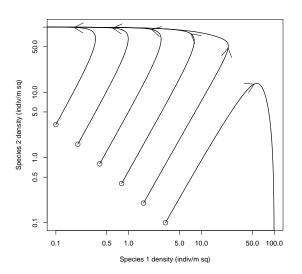
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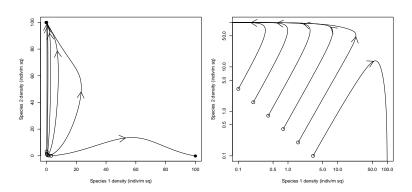
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#### Subsection 2

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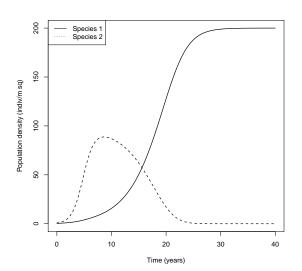
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### **Outline**

#### Introduction

Population model with competition Balanced competition Unbalanced competition

Population-level interactions
Invasion theory
Colonization and co-existence

Niches and coexistence
The competitive exclusion principle

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- ...but it must also break down
- ► Poll: How?
  - \* Species may not use resources in the same way
  - \* The environment may not be stable
  - \* Co-existence may not be "long term"!
  - \* There may be stabilizing factors outside competitive dynamics (e.g., natural enemies)