

# Course introduction

Introduction

Thinking conceptually

The cell theory

Doing biology

# Outline

## Introduction

- Ground rules

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- Example: cards and drinks

- Logical inference

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## Doing biology

- Observational studies

- Experiments

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Observational studies

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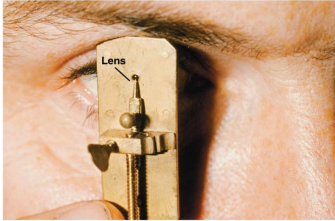
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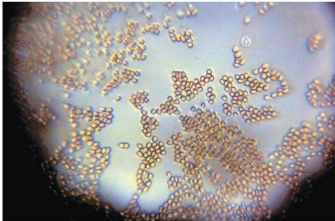
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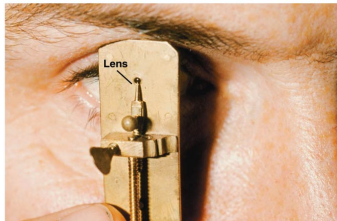


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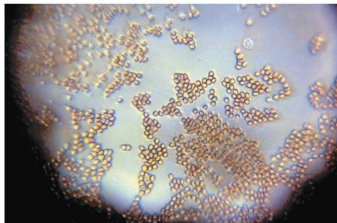
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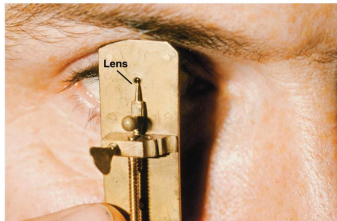
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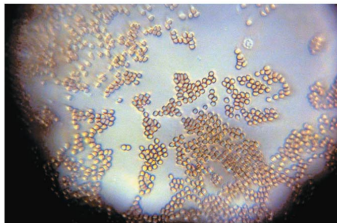
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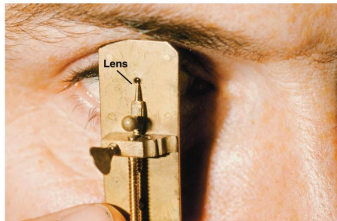


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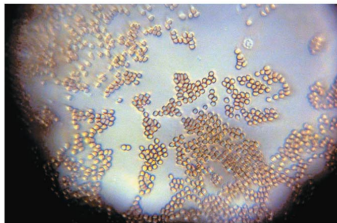
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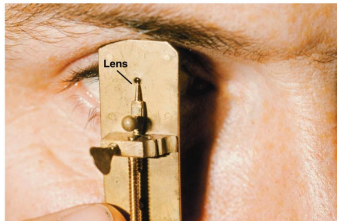


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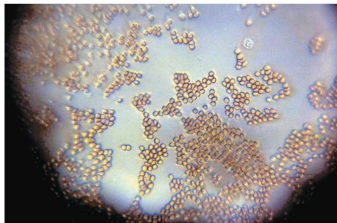
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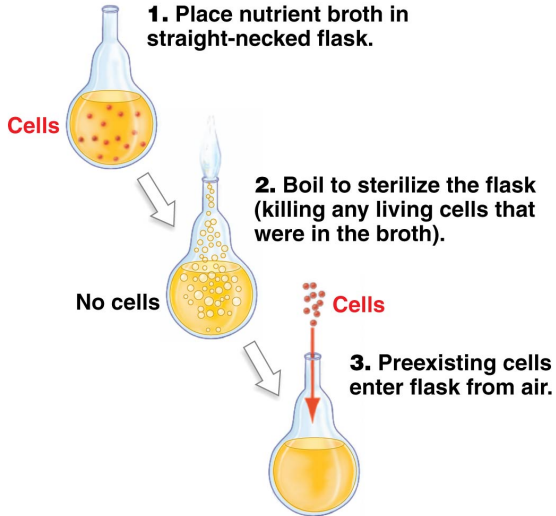
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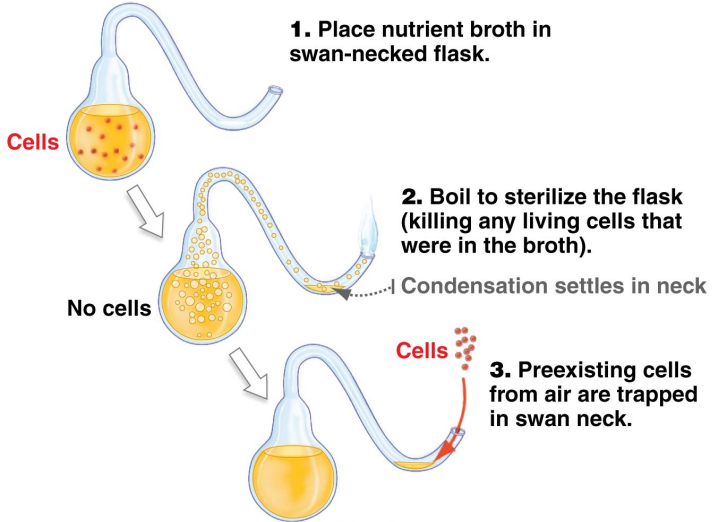
# The Pasteur experiment

## (a) Pasteur experiment with straight-necked flask:



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## (b) Pasteur experiment with swan-necked flask:





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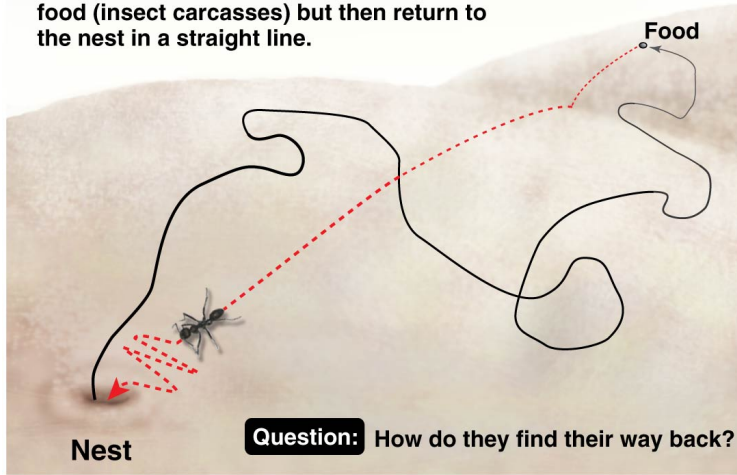
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# Ant navigation

## Observation:

Saharan desert ants meander long distances to find food (insect carcasses) but then return to the nest in a straight line.



**Question:** How do they find their way back?

# Ant navigation

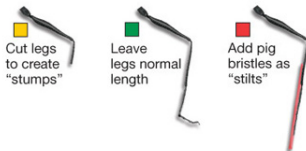
## EXPERIMENT

### EXPERIMENTAL SETUP (TEST 1):

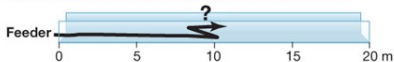
1. Ants walk from nest to feeder. Seventy-five ants are collected.



2. Manipulation of legs. Three treatments, 25 ants each.



3. Ants return "home" from feeder and look for nest hole.



### PREDICTION:

Ants with stilts will go too far; ants with stumps will stop short.

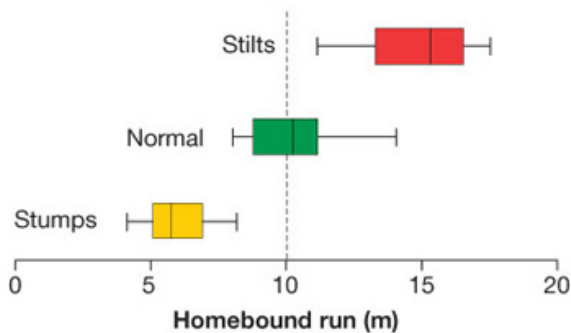
### PREDICTION OF NULL HYPOTHESIS:

No differences among the 3 groups.

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### RESULTS:



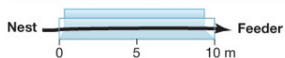
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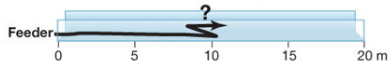
## EXPERIMENT

### EXPERIMENTAL SETUP (TEST 2):

4. The three treatments of ants walk from nest to feeder again.



5. Ants walk back "home" from feeder again.



Stilts make leg length and stride length longer

### PREDICTION:

All three groups will start looking for nest after walking 10 m.

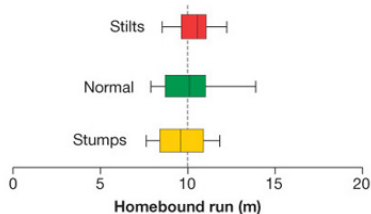
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No difference from the result in Test 1.

# Ant navigation

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**CONCLUSION:** Desert ants use information on stride length and number to calculate how far they are from the nest.

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