Outline

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Algebra

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Hockey

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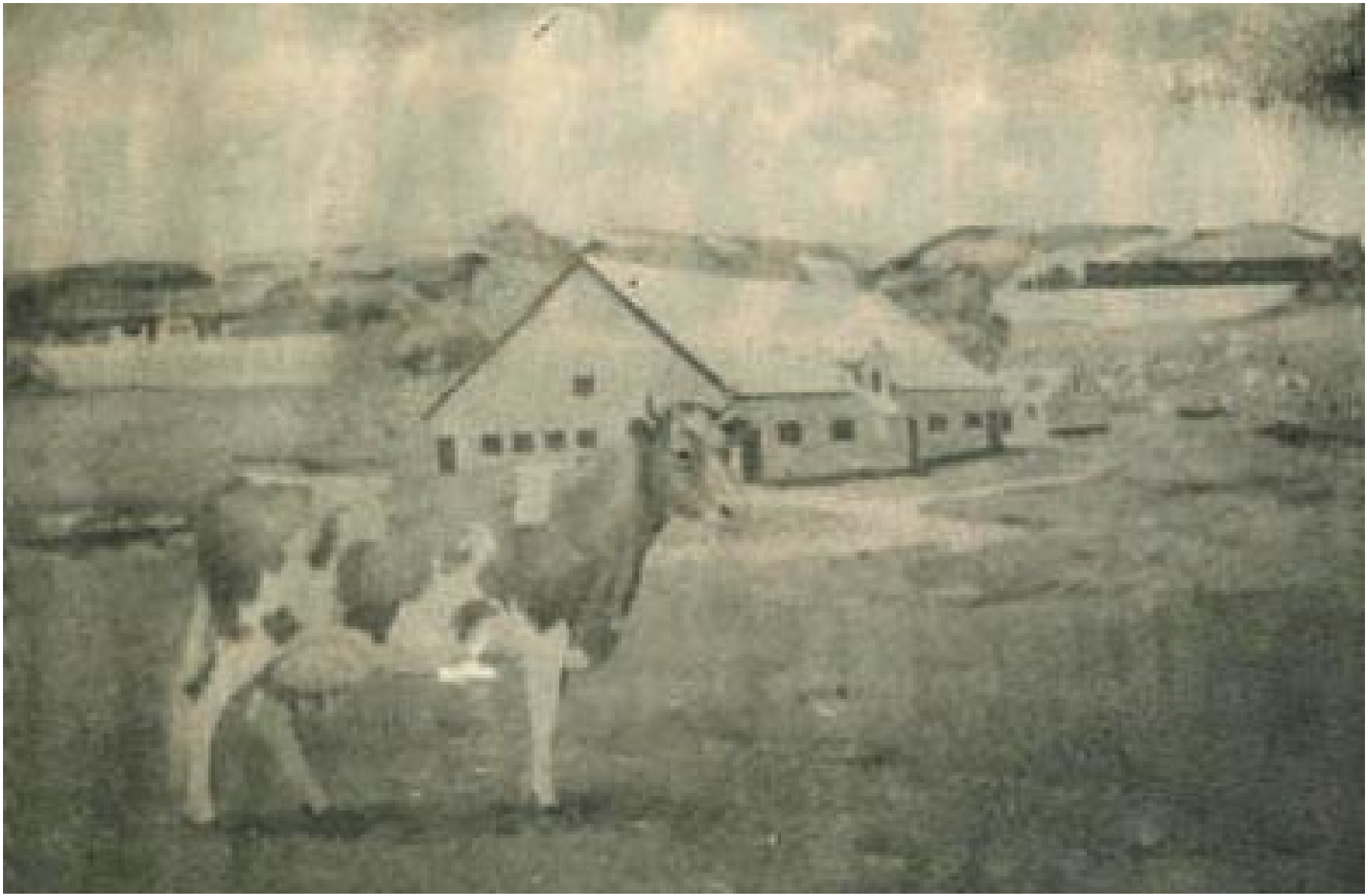

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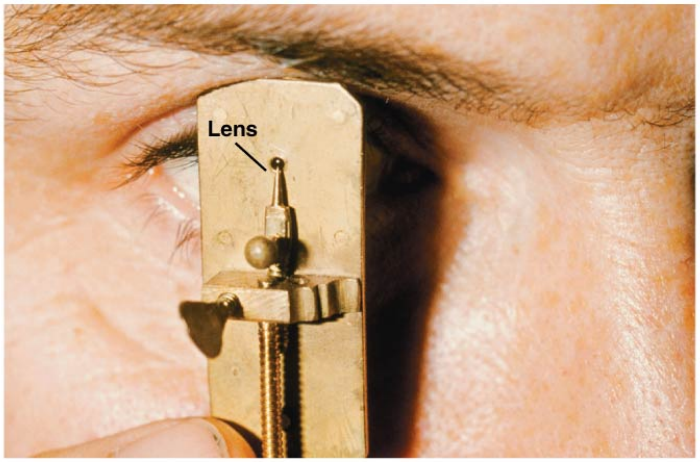
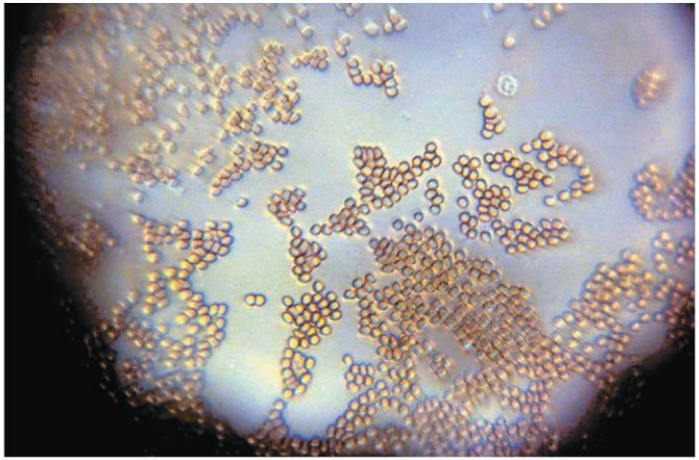
(a) van Leeuwenhoek built his own microscopes—which, while small, were powerful. They allowed him to see, for example ...



(b) ... human blood cells (this modern photo was shot through one of van Leeuwenhoek's original microscopes).



- A **cell** is a highly organized compartment bounded by a membrane

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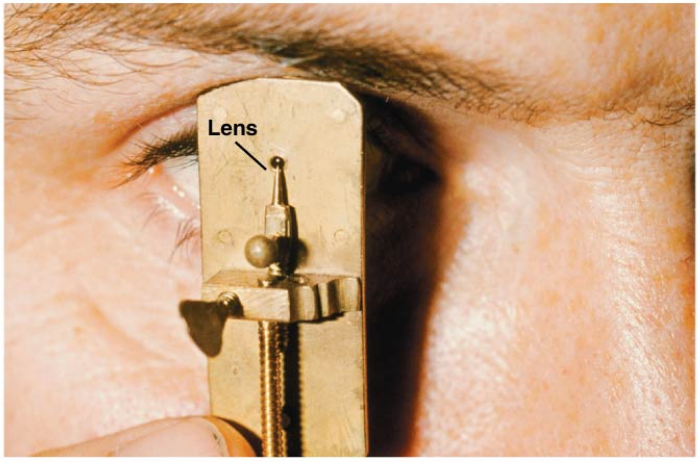

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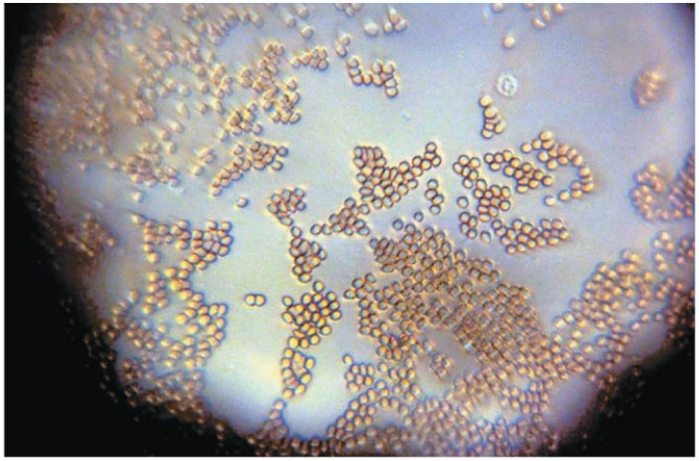

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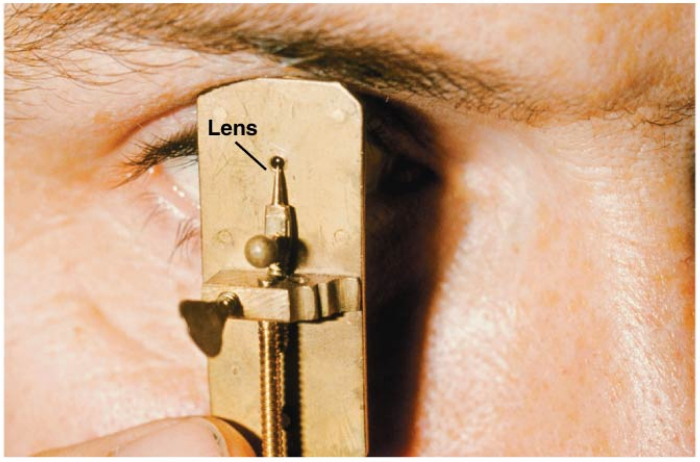

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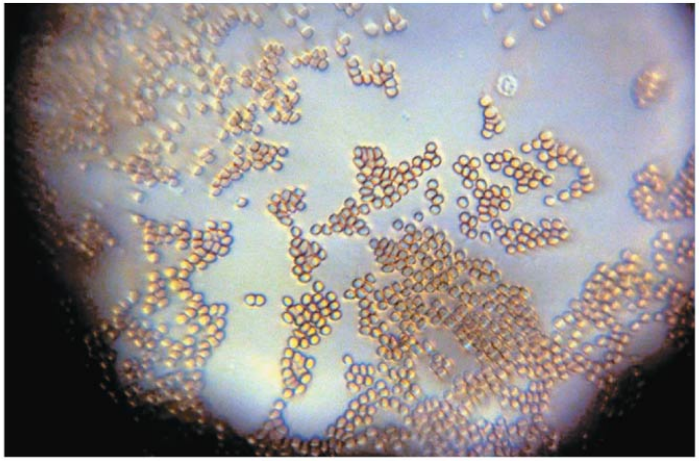

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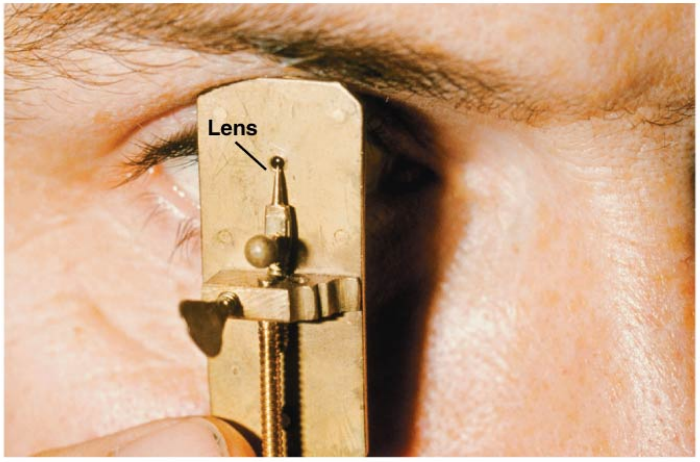

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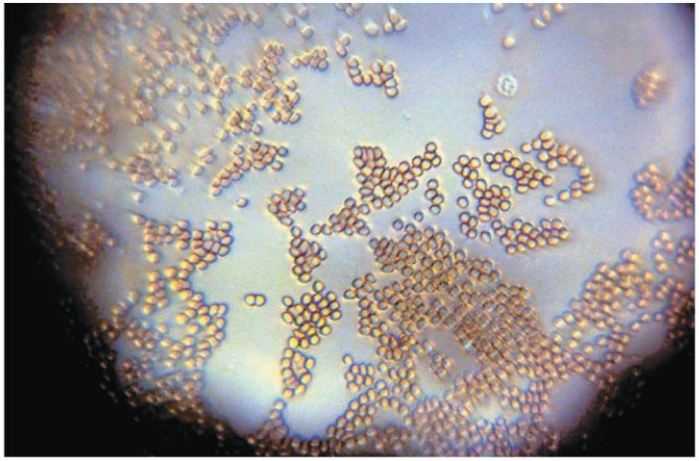

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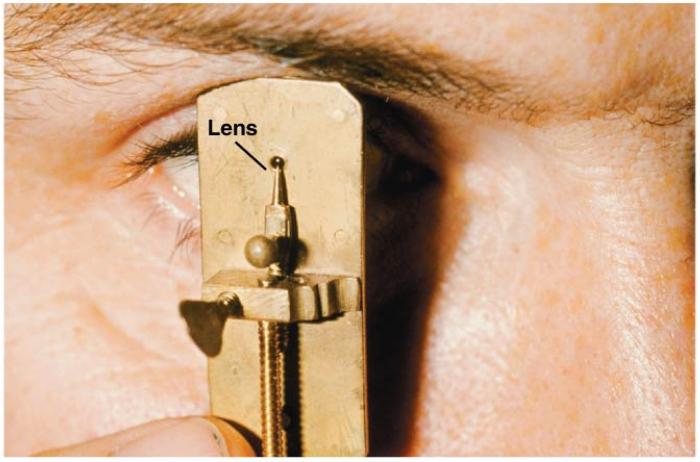

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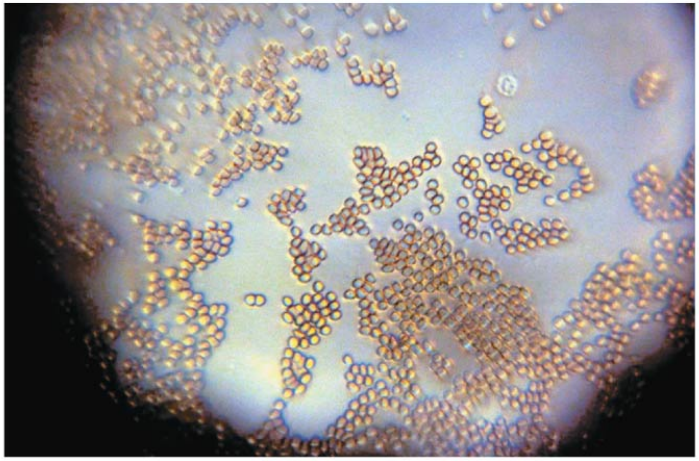

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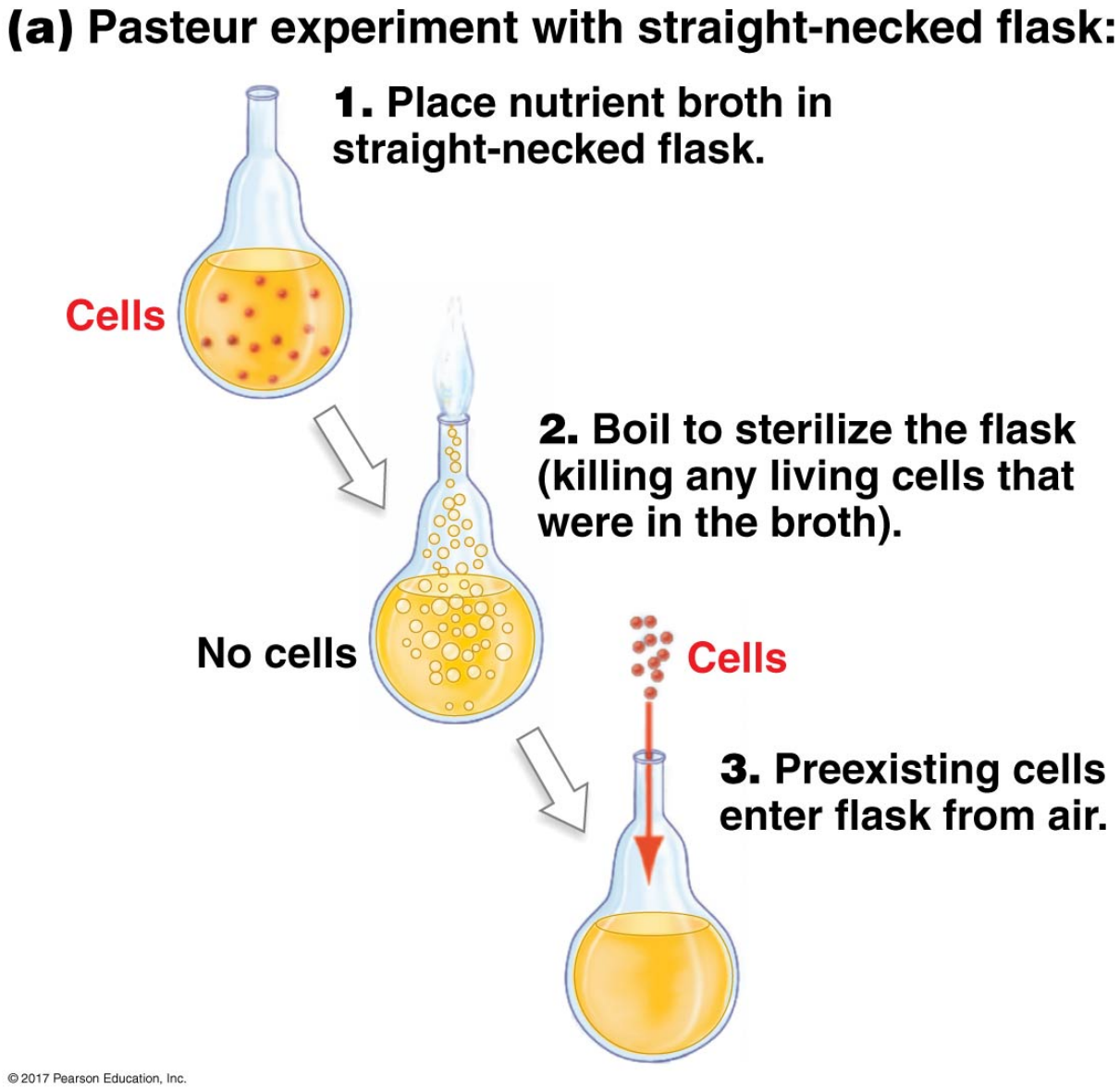

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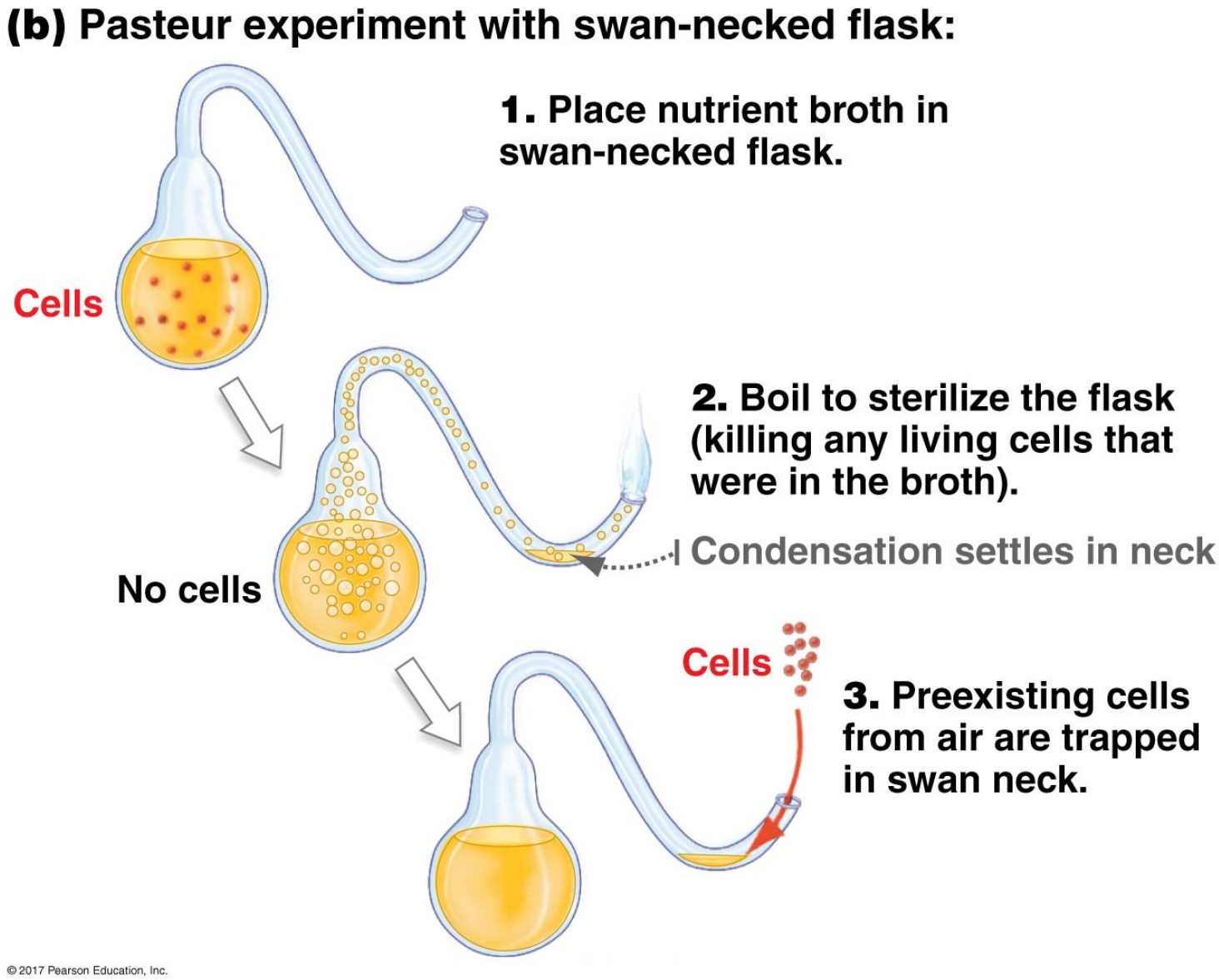

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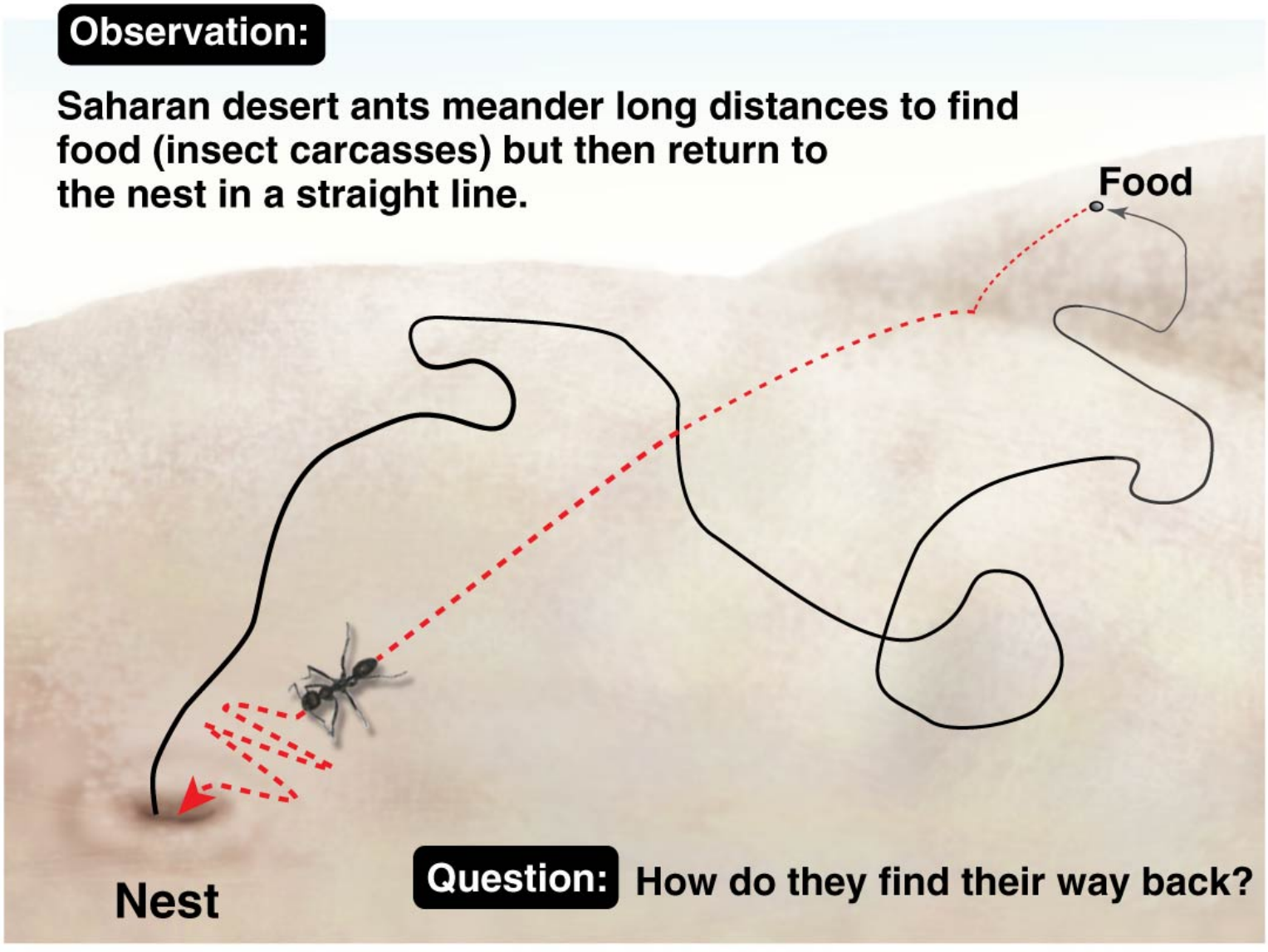
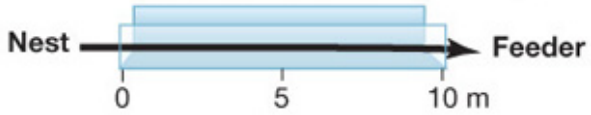


Ant navigation

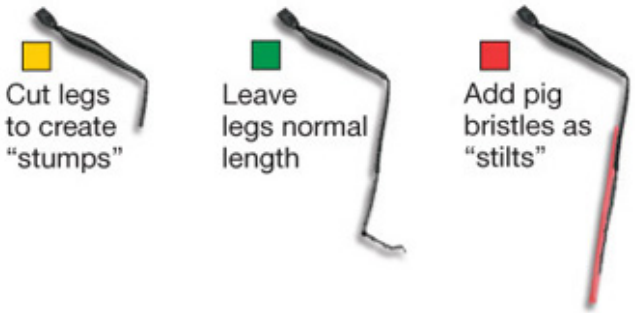
EXPERIMENT

EXPERIMENTAL SETUP (TEST 1):

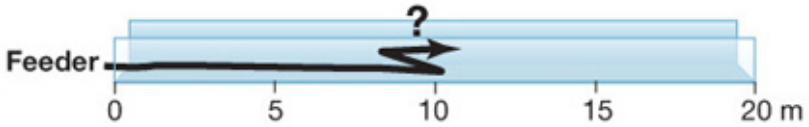
1. Ants walk from nest to feeder. Seventy-five ants are collected.



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



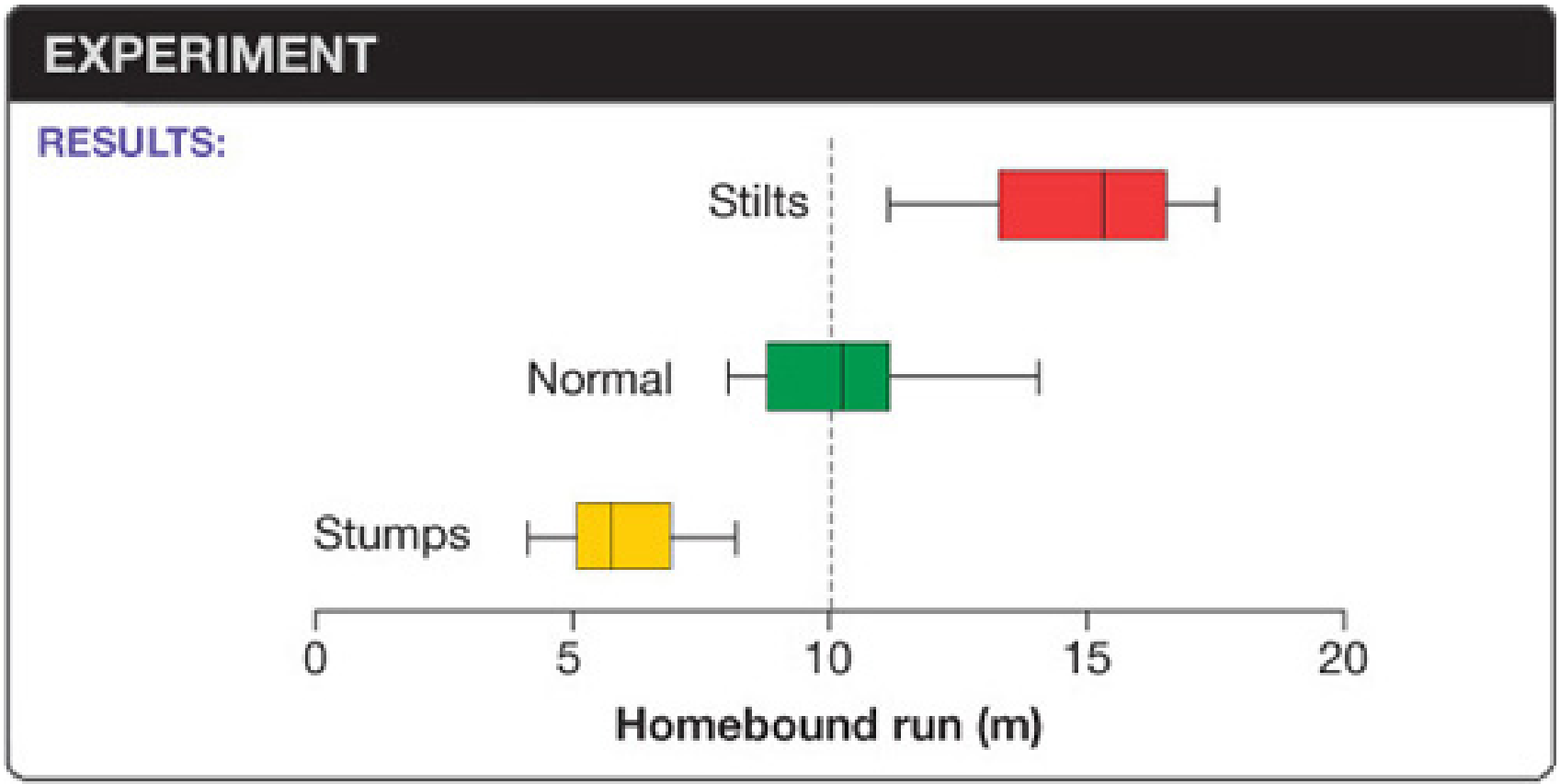
3. Ants return "home" from feeder and look for nest hole.



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

PREDICTION OF NULL HYPOTHESIS:
No differences among the 3 groups.

Ant navigation

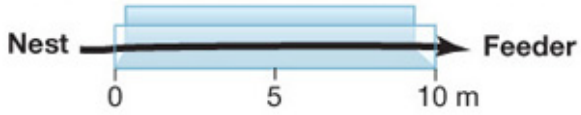


Ant navigation

EXPERIMENT

EXPERIMENTAL SETUP (TEST 2):

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



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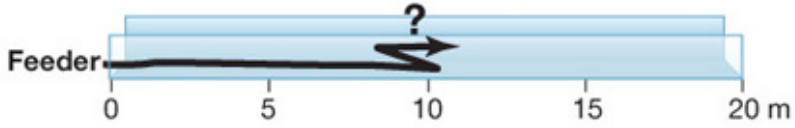


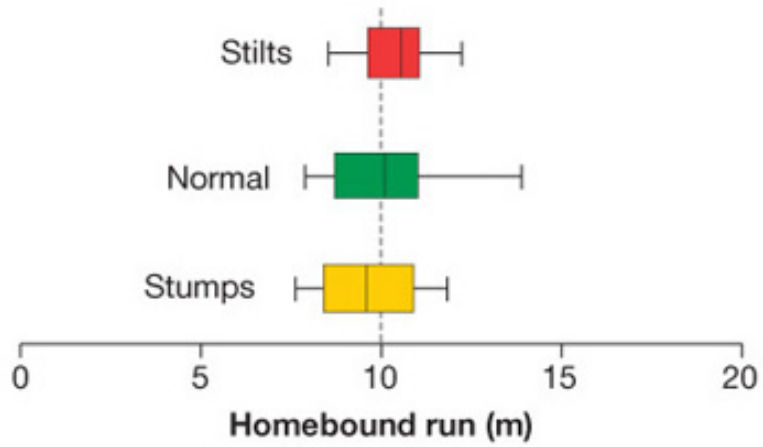
PREDICTION:
All three groups will start looking for nest after walking 10 m.

PREDICTION OF NULL HYPOTHESIS:
No difference from the result in Test 1.

Ant navigation

EXPERIMENT

RESULTS:



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

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- What if we put all the mice that get vitamin supplements in one cage, and the others in another cage?
  - * We then have to worry about all possible differences between the two cages

Replication

- Good experiments are **replicated**: each group has more than one **replicate**
  - A replicate is a unit which is subjected to a chosen treatment mouse, a troop of baboons, a flask
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