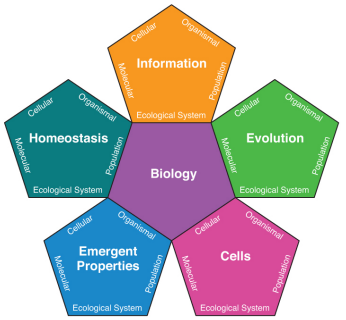
Integrating Concepts in Biology



PowerPoint Slides for Chapter 4:

Evolution and Origin of Cells

4.1 What is evolution?

by A. Malcolm Campbell, Laurie J. Heyer, & Christopher Paradise

Biology Learning Objectives

- Define evolution and distinguish the four mechanisms of evolution.
- Illustrate how natural selection works by giving a real example.

ELSI Learning Objectives

- Distinguish religion and science as two different ways of understanding the world.
- Evaluate the difference between *belief* and *acceptance* of evolution.
- Define the scientific term *theory*.

Fossil Evidence of Early Life

Opening Figure

William Schopf, UCLA

Define Evolution

Change in allele frequency in a population over time.

Define Theory

Change in allele frequency in a population over time.

An understanding that has been validated so often it is accepted as true beyond doubt

Themes of Evolution

- The origin of living systems occurred by natural processes, and life continues to evolve within a changing environment.
- Organisms can be linked by lines of descent from common ancestry.
- Natural selection is a mechanism of evolution that accounts for adaptation.
- Human activity can alter the course of evolution.

Properties of Life

- life replicates itself
- life undergoes changes
- life requires energy
- life occupies three-dimensional space big enough to contain cargo

Natural Selection Example

Five tenants of natural selection:

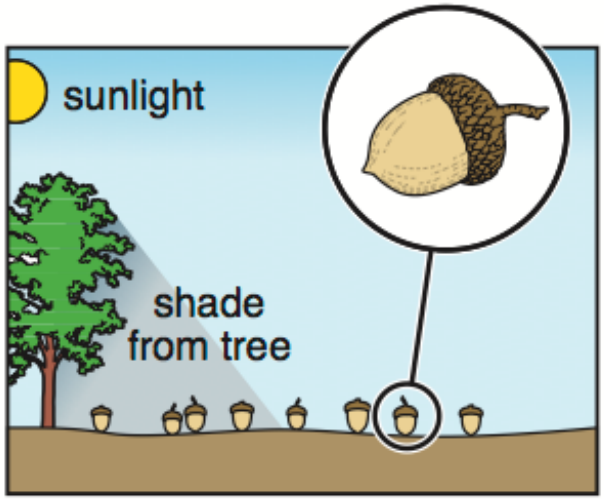


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Fig. 4.1

Natural Selection Example

Five tenants of natural selection: 1) overproduction = limited resources
2) variation in the population

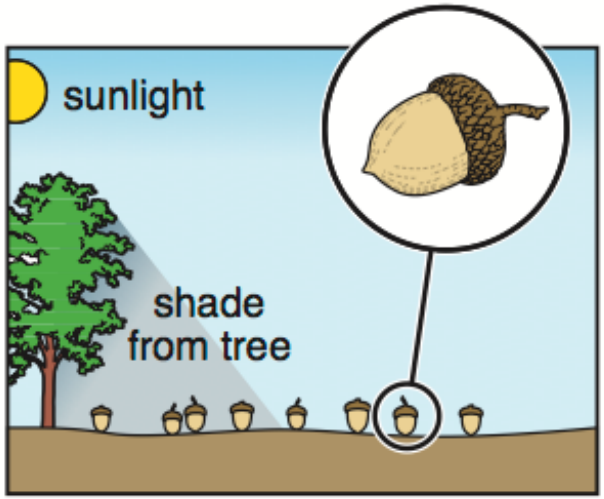

Fig. 4.1

Natural Selection Example

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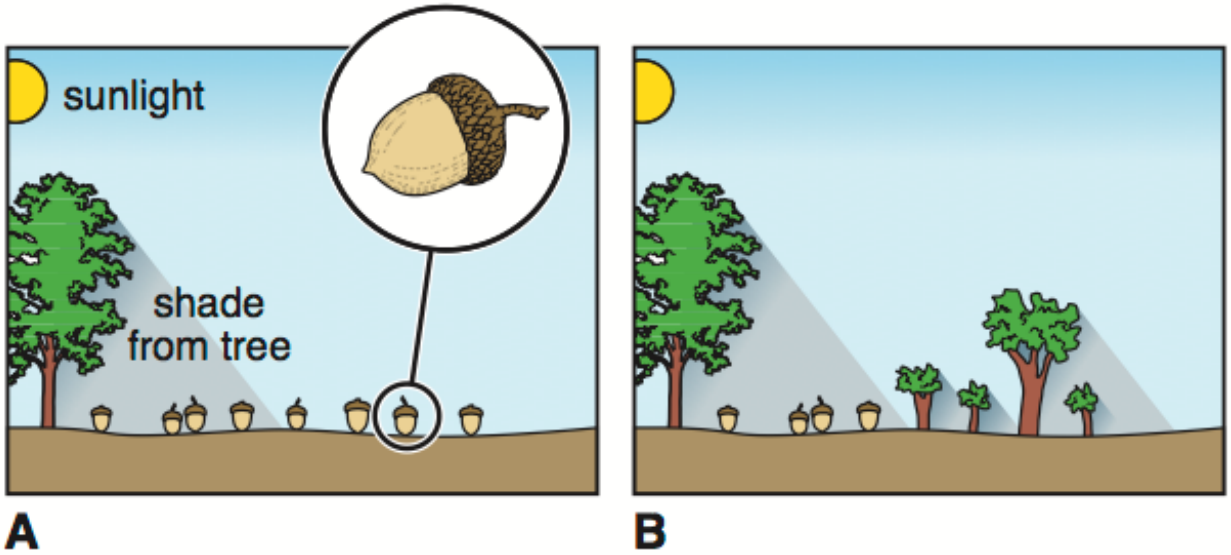

Fig. 4.1

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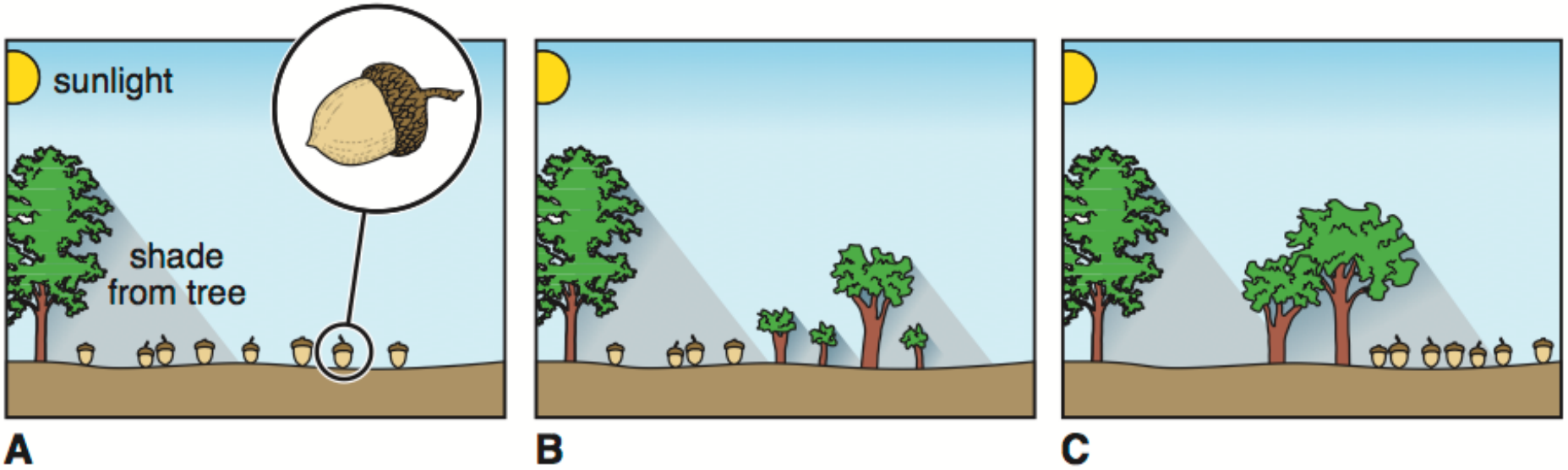


4) adaptive advantage for some.
5) reproduction for those who survive.

Fig. 4.1

Working in your group, apply natural selection to cancer. Make sure to keep in mind the true definition of evolution.

Definition of Evolution

Fig. 4.2

Definition of Evolution

change in allele frequency in a population over time

Fig. 4.2

Four Mechanisms of Evolution

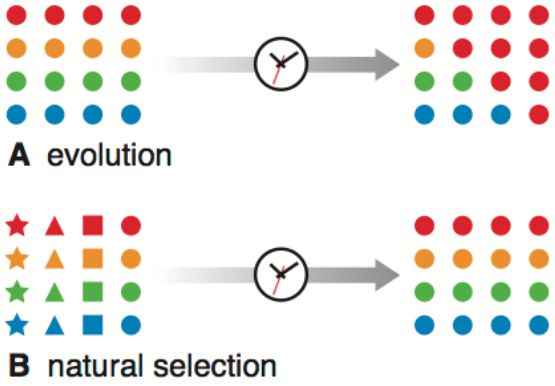
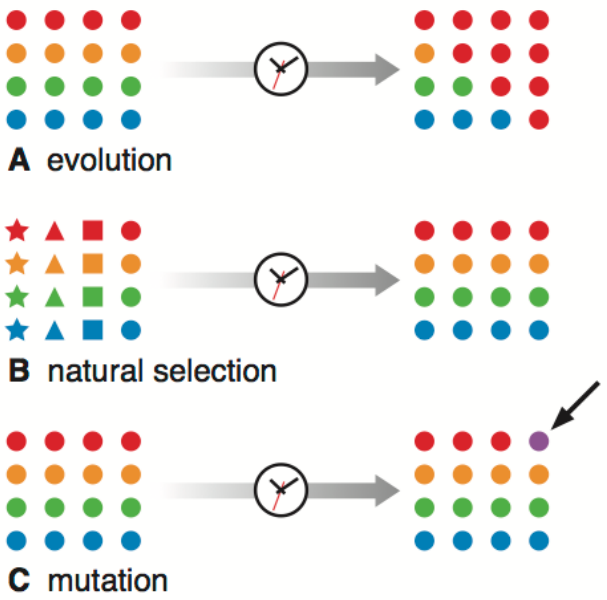


Fig. 4.2

Four Mechanisms of Evolution



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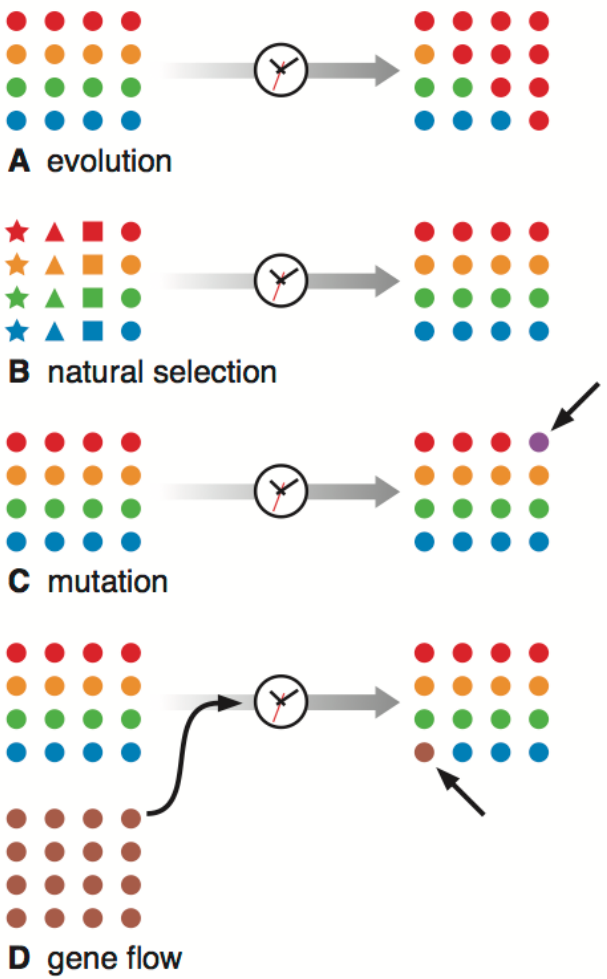

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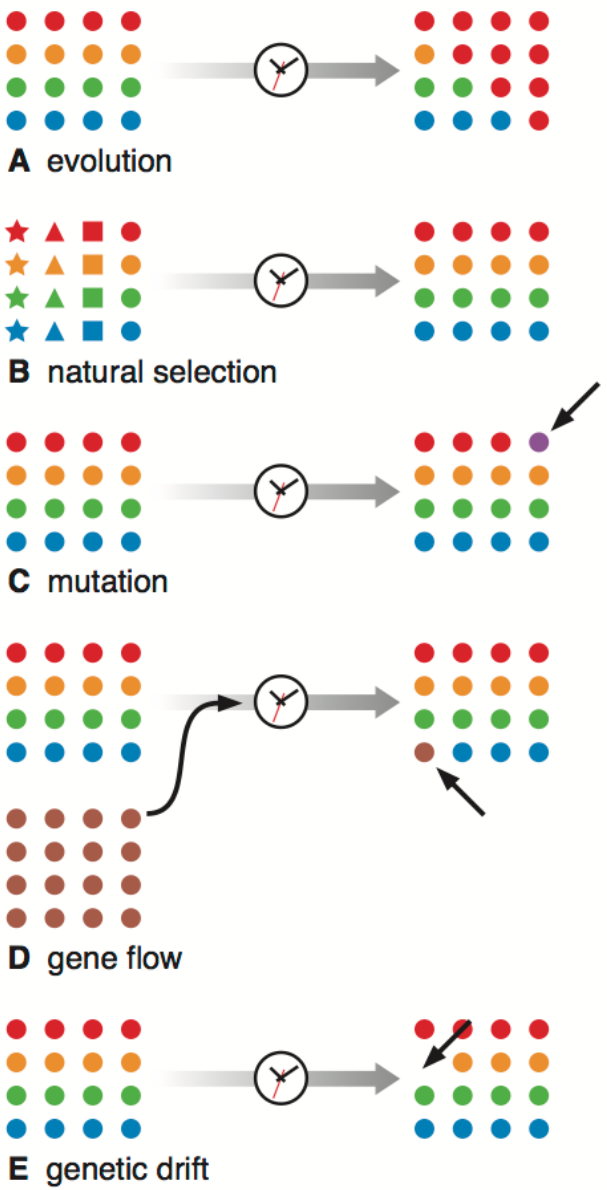
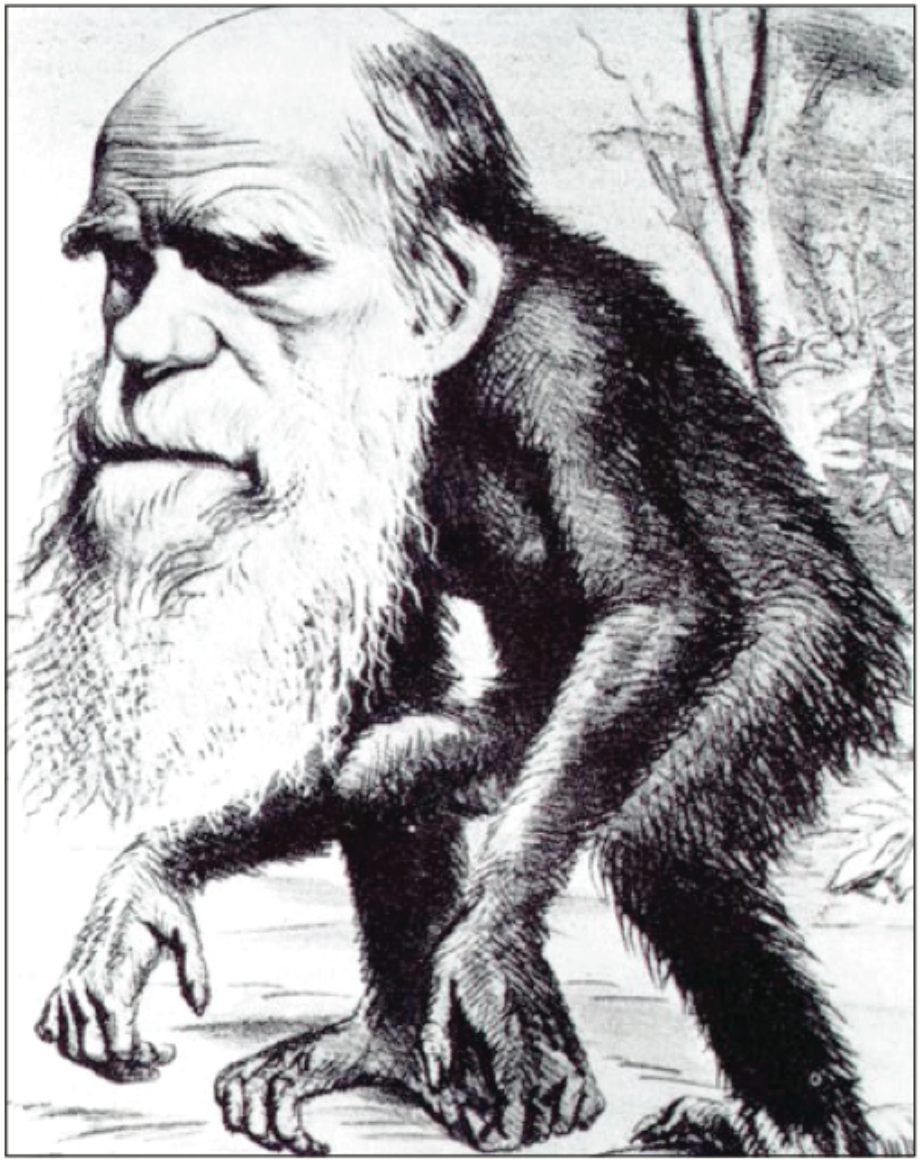


Fig. 4.2

Political Satire of Darwin



ELSI Fig. 4.1

Why are religion and evolution often pitted against each other?