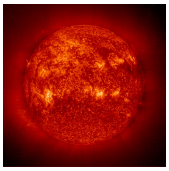
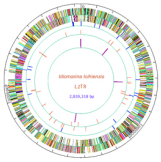
Introduction - 0861

TOPICS

- What is the goal of science?
- Biology as a science
- The diversity of life on earth

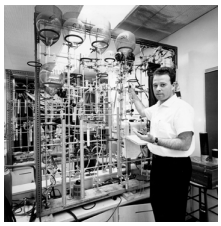




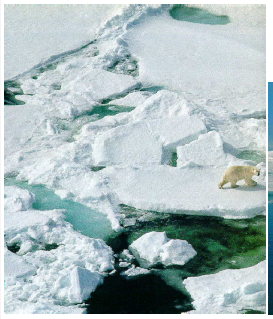
The goal of science

- Understanding the world around us






Zoology




Marine biology

Entomology

Botany

Ornithology

BIOLOGY

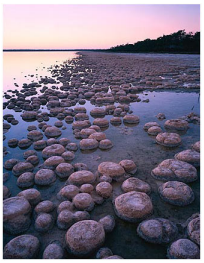
- Biology is the scientific study of life
- Questions:
  - What is life?
  - How did life begin?
  - Why do animals behave the way they do?
  - How do animals and plants interact?

What is a life form?

- Cell(s)
- Obtains nutrients and energy
- Reproduces
- Grows and develops
- DNA or RNA blueprint
- Responds to environment

Is FIRE a life form?
Is a VIRUS a life form?

How did life begin?

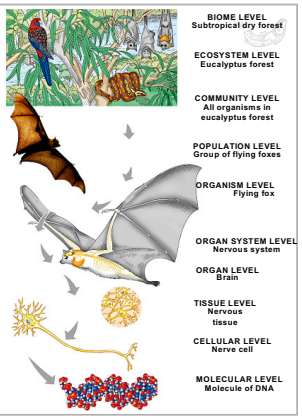


Why do animals behave the way they do?

- Gray-headed flying foxes are closely entwined with the lives of the eucalyptus trees that form their habitat
  - Eucalyptus trees provide food and roosting sites for the flying foxes
  - Flying foxes aid in eucalyptus pollination and help disperse the resulting seeds

- Flying foxes are becoming an endangered species, partly because of habitat destruction

- Levels for studying biology



Structural hierarchy of the universe and the relative sizes of things.

https://www.youtube.com/watch?v=EMLPJqeW78Q

- **Cosmos**
- **Galaxy**
- **Solar System**
- **Biosphere**
- **Biome**
- **Ecosystem**
- **Community**
- **Population**
- **Organism**
- **Organ System**
- **Organ**
- **Tissue**
- **Cell**
- **Organelle**
- **Molecules / Biochemical Pathways**
- **Atoms (including protons, neutrons, electrons)**
- **Quarks, Leptons, Gluons**

Organism

- Most fundamental unit of ecology
  An individual of a species

caribou

Population

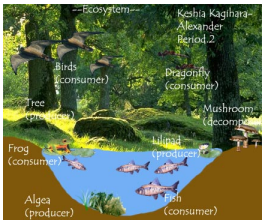
- A group of individuals of one species in a geographical area

Community

Interacting populations in a particular area

Ecosystem

Assemblages of organisms together with their biotic and abiotic environments.



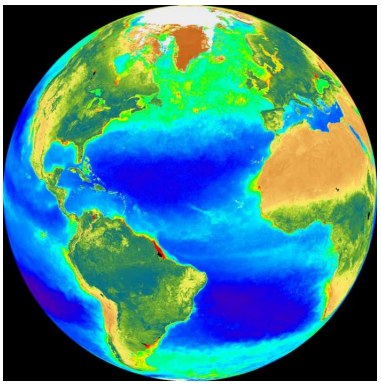
Biome

Environment with characteristic climax community and is determined by climate and geology.
A major regional ecological community

Biosphere

The part of earth where life exists:

All the environments and organisms of the earth including all land, water, and atmosphere



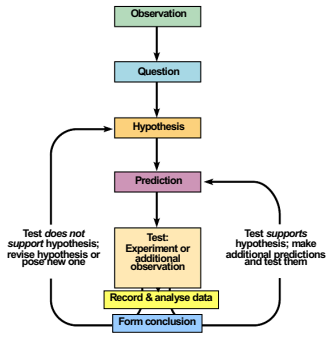
Scientists use two methods to learn about nature

- Discovery method - describe some aspect of the world
  - Example: how newborn flying foxes cling to their mother's chest for the first weeks of life

Presentation adapted from: Campbell, N., Reece, J., Mitchell,L., Taylor,M., 2003. *Biology: Concepts and Connections.* Powerpoint lectures: Pearson Education, Inc. publishing as Benjamin Cummings

- The scientific method
  - Pose and test hypotheses

- The main steps of the scientific method



Scientific method: example

Observation
Eucalyptus trees abundant in areas with flying fox populations

Question
Do eucalyptus seeds germinate only if they pass through the gut of a flying fox?

Hypothesis
If eucalyptus seeds pass through flying fox digestive tract, then they will germinate faster because the seed cover is broken down

Example continued

Prediction
In this experiment, the seeds passed through the flying fox gut will germinate at a greater rate that those that don't.

Testing
Plant seeds from both flying fox and non-flying fox groups, and see which ones germinate.

Record data
Keep a log book of when and how many seeds germinate into seedlings

Scientific method example ...

Conclusion
Seeds germinate at a greater rate if they pass through the gut of a flying fox.

This conclusion supports our hypothesis, but it doesn't *prove* it.