



Biology I – An Introduction

1.1 Introduction to Biology

_____—the science of life

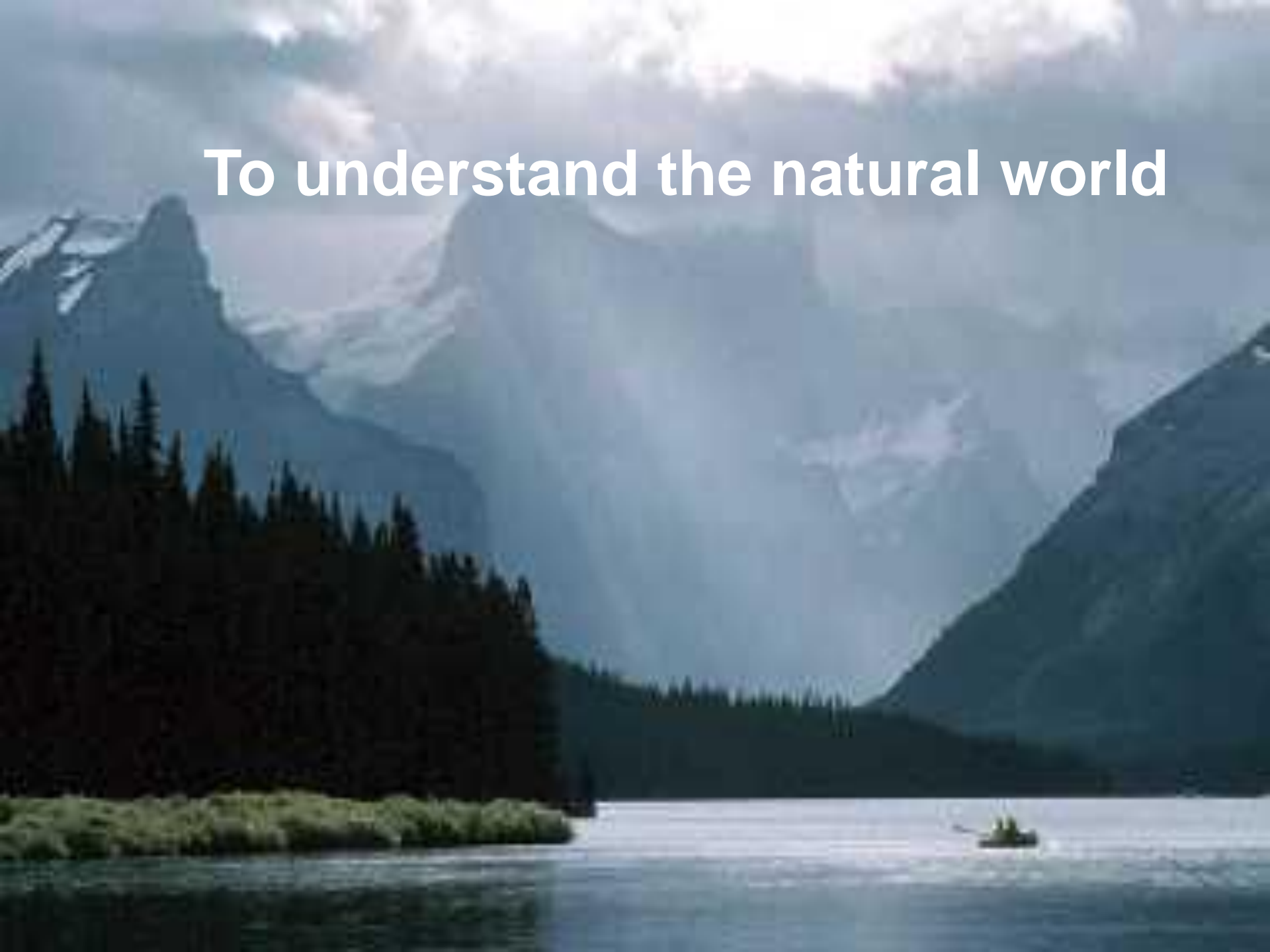
- Study the origins and history of life and once-living things
- Study the structures of living things
- Study how living things interact with one another
- Study how living things function



A photograph of a sunset over a body of water. The sun is low on the horizon, creating a bright orange and yellow glow. In the foreground, the dark silhouette of a plant with small flowers is visible against the bright background. The text "Why Study Biology?" is overlaid in white, bold, sans-serif font.

Why Study Biology?

To understand the natural world



To protect the environment



To develop learning skills for your future lives



1.1 Introduction to Biology

What do biologists do?

- Study the _____
- Research _____
- Develop _____
- Improve _____
- Preserve the _____

1.1 Introduction to Biology

The Eight Characteristics of Life

1. _____

2. _____

3. _____

4. _____

1.1 Introduction to Biology

The Eight Characteristics of Life

5. _____

6. _____

7. _____

8. _____

1.1 Introduction to Biology

- Living things are made of one or more cells.
- Cells are the basic unit of structure and function in all living things.

1.1 Introduction to Biology

Displays Organization

- Living things also display _____, which means they are arranged in an orderly way.
- Specialized cells are organized into groups that work together called _____.
- Tissues are organized into organs.
- Organ systems work together to support an organism.

1.1 Introduction to Biology



- A _____ is a group of organisms that can breed with one another and produce fertile offspring.

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Responds to Stimuli

- Anything that is part of the internal or external environments and causes some sort of reaction by the organism is called a _____.

- The reaction to a stimulus is a _____.



Venus flytrap

1.1 Introduction to Biology

Requires Energy

- Living things get their _____ from food.
- Most plants and some unicellular organisms use light energy from the Sun to make their own food and fuel their activities.
- Organisms that cannot make their own food get energy by consuming other organisms.

1.1 Introduction to Biology

Maintains Homeostasis

- Regulation of an organism's internal conditions to maintain life is called _____.
- If anything happens within or to an organism that affects its normal state, processes to restore the normal state begin.

1.1 Introduction to Biology

Adaptations Evolve Over Time

- An _____ is any inherited characteristic that results from changes to a species over time.

1.2 The Nature of Science

Expands Scientific Knowledge

- Most scientific fields are guided by research that results in a constant reevaluation of what is known.
- This reevaluation often leads to new knowledge that scientists then evaluate.

1.2 The Nature of Science



Challenges Accepted Theories

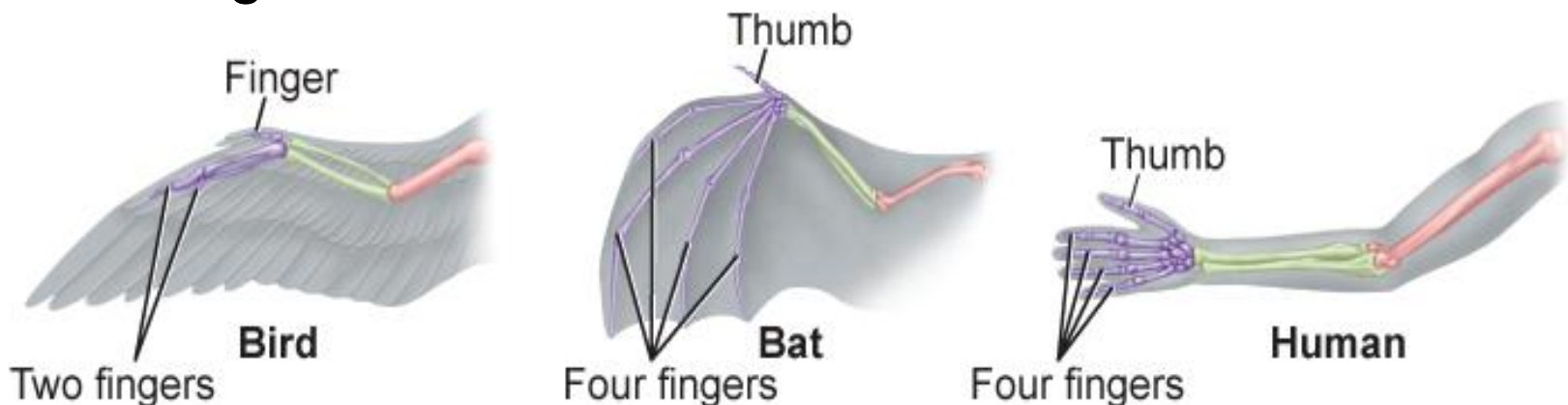
- Scientists welcome _____ about one another's ideas.
- Sciences advance by accommodating new information as it is discovered.

1.2 The Nature of Science

Questions Results

- ---

that are not consistent with current scientific understanding are of interest to scientists.
- These inconsistencies often lead to further investigations.



1.2 The Nature of Science

Tests Claims

- Science-based information makes claims based on a _____ amount of data and observations obtained from _____ investigations and carefully controlled experimentation.
- Conclusions are reached from the _____.

1.2 The Nature of Science

Undergoes Peer Review

- Before it is made public, science-based information is reviewed by scientists' peers.
- Peer review is a process by which the procedures used during an experiment and the results are evaluated by other scientists who are in the same field or who are conducting similar research.

1.2 The Nature of Science



Uses Metric System

- Scientists can repeat the work of others as part of a new experiment.
- The metric system uses units with divisions that are powers of ten.

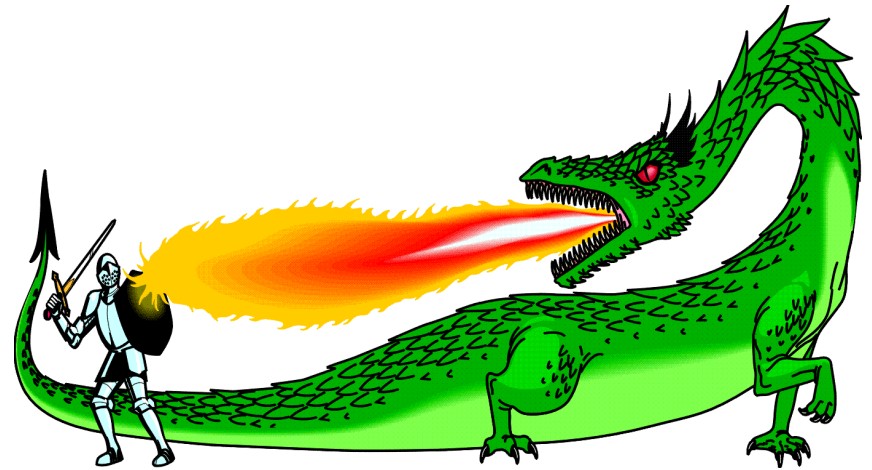
1.2 The Nature of Science

Science in Everyday Life

- A person who is scientifically literate combines a basic understanding of science and its processes with reasoning and thinking skills.
- Ethical issues must be addressed by society based on the values it holds important.

The First Step: Reject The Old Myths About Life

- *for example...*
- Disease is caused by evil spirits
- Your blood determines your heredity
- Your heart carries your emotions



**SO, HOW DOES SCIENCE
SEPARATE MYTHS FROM
REALITY?**

The Scientific Method

Scientific Method



- Observation
- Form Hypothesis
 - ▣ Prediction
- Test Hypothesis
 - ▣ Experiment
 - ▣ Make Further Observations
- Make Conclusions
 - ▣ *for example...*

1.3 Methods of Science



Ask a Question

- Scientific inquiry begins with _____.
- Science inquiry involves asking questions and processing information from a variety of reliable sources.

Edward Jenner (1749-1823)



- Smallpox
 - ▣ nasty disease killed millions

- Scientific Method
 - ▣ technique he used to find a vaccine for it

First Step: Observation

Smallpox is Deadly (40-60% mortality rate)



Patient's leg covered in smallpox



First Step: Observation

But, those who survive the disease are _____ (they don't get sick again)



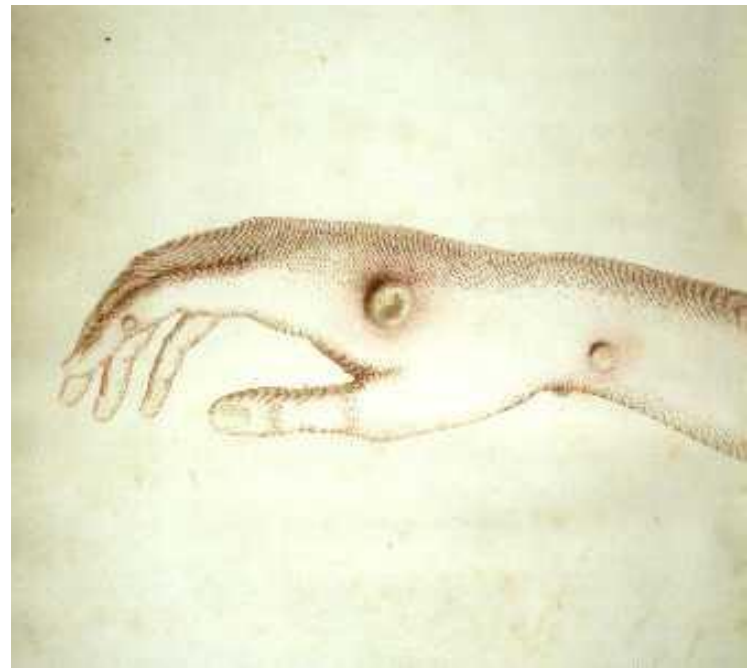
First Step: Observation

In addition, milkmaids don't get smallpox...



First Step: Observation

However, milkmaids get cowpox, a minor form of smallpox



1.3 Methods of Science



- When a hypothesis is supported by data from additional investigations, usually it is considered valid and is accepted by the scientific community.

Third Step: Make a Prediction

- _____: If you're exposed to cowpox, you will be immune to smallpox
- This hypothesis and prediction is based on Jenner's milkmaid and cowpox observations

Fourth Step: Experiment



Fourth Step: Experiment

- In 1796 Dr. Jenner tested his idea for a smallpox “vaccination” on his gardener's son, 8 year-old James Phipps.
- He got the term vaccination from the Latin word for cow, which is “vacca”



Fourth Step: Experiment



- He injected the boy with Cowpox, but he recovered from it within a few days.
- Jenner then waited eight weeks for the boy's body to build an immunity.
- To complete his experiment, Jenner exposed James to Smallpox.
- Amazingly, the boy did not contract the deadly disease, and the doctor claimed success!

1.3 Methods of Science



Collect the Data

- When a biologist conducts an experiment, he or she investigates a phenomenon in a controlled setting to test a hypothesis.

1.3 Methods of Science

Controlled Experiments

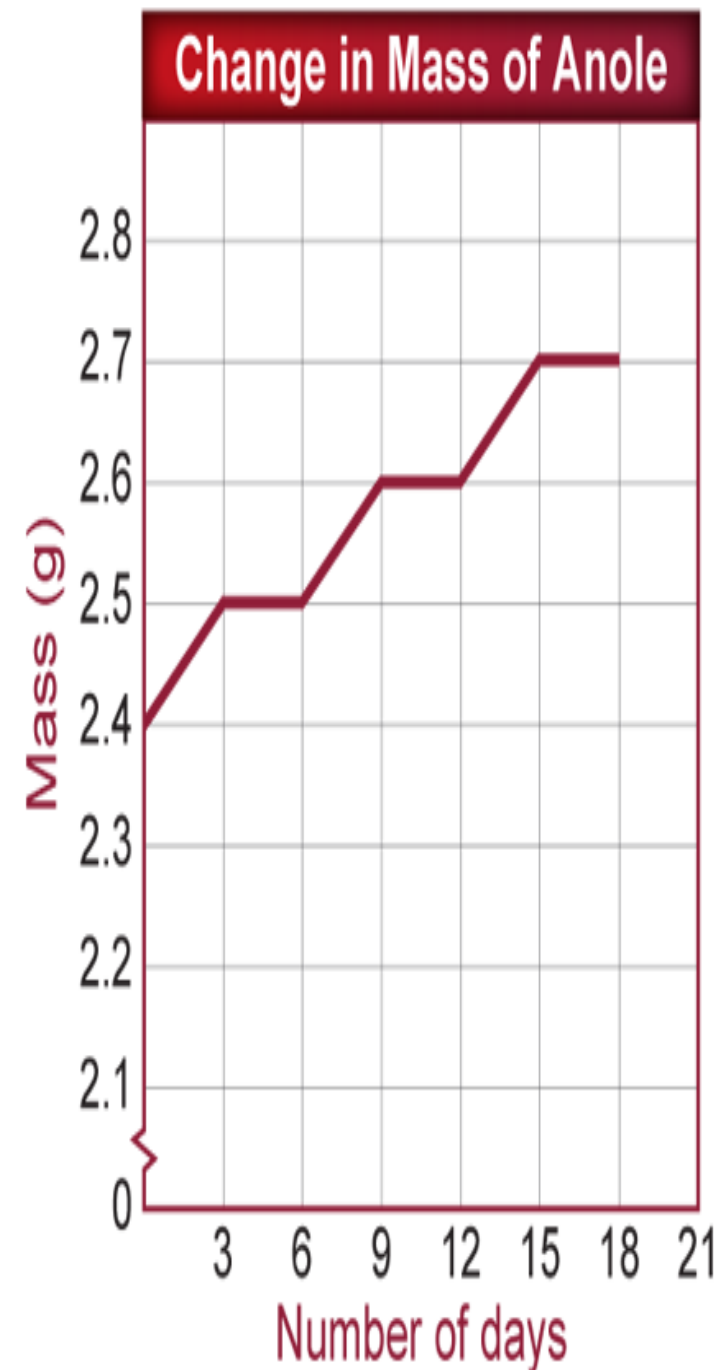
- A _____ in an experiment is a group used for comparison.
- The _____ is the group exposed to the factor being tested.

1.3 Methods of Science

Analyze the Data

- A graph of the data makes the pattern easier to grasp.
- Even when a hypothesis has not been supported, it is valuable.

Change in Mass of Anole	
Date	Mass (g)
April 11	2.4
April 14	2.5
April 17	2.5
April 20	2.6
April 23	2.6
April 26	2.7
April 29	2.7



Fifth Step: Conclusion

- Since getting Cowpox seemed to prevent anyone from getting Smallpox, Jenner had confirmation of his original hypothesis
- *His hypothesis was supported by his experiments*

1.3 Methods of Science

Report Conclusions

- If the reviewers agree on the merit of the paper, then the paper is published for review by the public and use by other scientists.

Scientific Method

- Really, it's just a formal breakdown of how our minds work when we're trying to solve a problem, or *Common Sense*...
- In life, we see a thing we don't understand, we question it, think of an explanation or idea to explain it, test that explanation, and decide if our explanation was correct.

Life is Cool, Dudes & Dudettes

