Chapter 1: Introduction to biology

Earth's most incredible feature is the presence of life. The probability of life existing is so small that it is remarkable to exist at all, yet we take it for granted every day. We are surrounded by life everywhere we turn. Plants grow in our gardens, paddocks and forests; birds sit on our power lines; spiders inhabit the corners of our homes; ants find their way into our kitchens; bacteria help us to digest food in our stomachs and intestines. In many ways, life defines this planet, yet so many of us know so little about it.

Biology is the field of science that investigates all aspects of life. The life of a human being – biology. Learning about microscopic bacteria, algae, or fungi – biology. Studying how rain and sunlight influences the growth of a plant, this is biology. This field of science incorporates anything and everything imaginable that is related to life on Earth.

Through biology, we can gain an understanding of the life that Earth has supported for 4 billion years. From microscopic bacteria in your stomach to active, intelligent animals and giant trees. There is an incredible array of life existing on this planet and learning about it can change the way you see and think about the world that you live in.

Our understanding and knowledge of the living world is continuously changing. There are, however, a few key principles that define how life is organized on Earth. These are:

1. Cells are the basic unit of life.
2. Genes are the basic units for the passing of traits from parent to offspring.
3. Evolution by natural selection is the process that has led to the great diversity of species on Earth.
4. Living things maintain the environment within their cells and bodies.
5. Living things can acquire and transform energy.

Each of these five universal truths of biology describes an important aspect of life on Earth and are the focus of this first chapter. The first three principles identify the importance of cells, genes, and evolution to life on Earth. The last two principles are mostly concerned with how organisms interact with their environment, both internally and externally.

Biology is a massive field of study. This is only the introduction of an introductory book and we will barely scratch the surface of everything there is to learn but we will cover the basics and discuss the information that everyone should know about the life on Earth. It is virtually impossible to know everything about life on Earth but everyone must start somewhere and this is as good a place as any.

Biology can be challenging. With complicated lingo, names, and processes, there are plenty of difficult topics to tackle. I myself dropped biology in my last year of high school because I found math and chemistry easier. In the end, my passion and appreciation of the natural world brought me back to biology. My advice, don't give up, be patient with challenging topics, and work through issues one step at a time because, if you can stick at it, you will be rewarded with an enlightened

understanding of your surroundings and gain a new perspective of the world around you.

Glossary

Biochemistry – a field of biology that studies the molecules and chemical reactions within organisms

DNA – a type of molecule found in cells that contains genetic information. DNA is short for deoxyribonucleic acid

Habitat – the place or environment where an organism or multiple organisms live

Heredity – the passing of genetic material from parents to offspring

Membrane – a thin and pliable boundary, lining, or barrier

Microscopic – only visible with the use of a microscope

Molecule – a group of atoms bonded together

Organism – a living thing

Photosynthesis – the process of making sugars and other nutrients using carbon dioxide, the sun's energy, and water

Physiology – a field of biology that studies how organisms function

Respiration – the exchange of gases between an organism and the environment

Life is Earth's greatest phenomenon

Of the trillions of planets known to science, only one is so far known to support life, Earth. Life makes Earth unique within our solar system and probably our galaxy. Chances are that there are other life-supporting planets in the universe but they are incredibly rare and the presence of life on Earth makes this planet very special.

Living things are known as organisms. To be considered ‘alive’, an entity must be able to perform seven processes referred to as the seven processes of life. The ability to perform these seven processes is what separates organisms from non-living objects such as water and rocks. The seven processes are movement, respiration, sensitivity, growth, reproduction, the release of wastes (i.e. excretion), and the consumption of food (nutrition). Another collective name commonly used for the seven processes of life is MRS GREN, an acronym of the first letters of each process.

Life has evolved into an incredible array of shapes and forms. Humans belong to the most advanced group of organisms, the animals. Other higher-level organisms include plants and fungi. More primitive life forms include microscopic groups such as bacteria and archaea. Viruses are an unusual group because they are unable to reproduce without the use of a host. As such, viruses are classed by some biologists to be living and by others to be not.

Cells are the basic unit of life