Biology 1-2 Unit 1 Reading

Performing an Experiment:

1-Ask a question
2-Test the question.
3-Record observations.
4- Modify your thoughts based on your observations and re-test the new question.
5-Analyze the data and draw a conclusion and formulate what other information might be helpful.

Graphing:

All graphs should contain a title, correct scales, labeled axis including units, and the independent variable should be on the x-axis and the dependant variable on the y-axes.

Properties of Life

A. Use of energy and matter

A rock can passively have its energy increased! When sunlight strikes a rock, the temperature of the rock and the total amount of thermal energy it possesses increases. However, a rock cannot control this process, nor can it use the energy to do work or to obtain nutrients.

Living things by contrast can obtain and control energy through processes like photosynthesis and metabolism. Photosynthesis is the conversion of visible sunlight energy into other stored or usable forms of energy. Metabolism is the process of converting energy from a stored form (e.g. energy in a sugar molecule) to other forms. All living things perform metabolism, but for those that cannot photosynthesize it is the only way to get usable energy. One type of energy releasing metabolism is called aerobic respiration. It is basically the opposite of photosynthesis and therefore requires energy rich molecules like simple sugars and oxygen to work.

The energy from photosynthesis and metabolism can be used to do work such as building molecules of the body structure and creating movement. To summarize, all forms of life show metabolic activity; they extract & transform energy from their environment and use it for manipulating materials in ways that assure their own maintenance, growth, development & reproduction.

Nutrients are substances that an organism takes in and uses for growth and maintenance. Animals, for example, must metabolism nutrients to get the energy necessary to live. However, they also must use the atoms and molecules of nutrients as raw material for building their own molecules that make up their bodies. Both energy and materials are needed by all organisms.

B. Homeostasis

Living things must keep levels of internal conditions at levels appropriate for other life processes to occur. These include things like temperature, pH (acid levels), nutrients, hormones, water, waste concentrations, and many others. Similarly, external conditions must be appropriate for life. For example, lizards thermoregulate (adjust their body temperature) by such behaviors as orienting in certain ways to the sun and moving to rocks that have appropriate temperatures. In this way, their can keep their muscle tissues at temperatures for optimum performance. This helps them capture prey and escape from predators. The term that refers to all ways that an organism regulates its internal and external environment is homeostasis. The ability to respond to stimuli in the environment is often called irritability. This ability allows all forms of life to use homeostatic controls that maintain the living state even when internal and external conditions change. These controls may be behavioral or physiological.

C. Reprodution and Inheritance

Life is unique in its possession of a chemical coding mechanism that allows organisms to produce offspring of their own kind. One special type of nucleic acid, DNA, is the code-carrying molecule. All living things possess their own copies of the genetic instructions to operate their bodies. Furthermore, these instructions can be duplicated and passed on to reproductive cells that develop into offspring. Aspects of an organism that are due to this genetic code are referred to as genetically inherited characteristics.

Two important reasons that reproduction is necessary are: 1) organisms wear out and die, and 2) the reproductive process allows for "descent with modifications." Descent with modifications means that the offspring can be different than the parents in ways that allow survival in a changing environment. Without the ability to change, life would not exist in all its glorious diversity.

DNA is the storehouse of genetic information for all organisms. Mutations, however, introduce variations in the patterns, and this allows survival in changing environments. Nature is the testing ground for the combination of patterns that come to be expressed in each individual.

D. Interact with the environment

The ways that organisms interact and depend on each other are countless. Extreme dependence between two species is illustrated by a species of yucca (a plant) that must be pollinated by a one species of moth. The moth requires the yucca and the yucca requires the moth. Squirrels need trees for food and cover. Humans need bacteria to help maintain homeostasis in their digestive tract. Energy flow and nutrient cycling are two major processes that connect all living things in the biosphere.

E. Growth and Development

From the beginning of the life of each organism, its body undergoes an amazing series of changes. Cells are replicated, materials are constructed, body size increases, and body form develops. The master plan for these processes is found in the coded instructions (genes) of DNA. Growth and development follow this genetic program faithfully. (Although do not forget that the genetic program received may be different in detail to that of the parents.)

Think of the process of metamorphosis in butterflies. This has intrigued humans throughout history. Sexual reproduction between a male and female of the same species produces a fertilized egg (zygote). This zygote divides and produces immense numbers of descendant cells that differentiate into the various tissues, organs and organ systems of the caterpillar (the larval stage). This herbivorous (plant eating) larva enters the pupa stage in which the entire body is overhauled and transformed. Finally, the adult butterfly emerges in all its glorious beauty!

From the moment of its emergence, each living thing goes through a series of developmental stages, a continuum of changes in form and behavior. These developmental stages unfold at about the same rate and in the same way for all organisms of a given species. You yourself went through distinctive stages (e.g. the "terrible twos")!

F. Evolution and Adaptation

Life changes over time as surviving mutations are passed from one generation to the next. This is a fact that is observable and consistent which all laws of genetics, chemistry and physics including the laws of thermodynamics. Evolution has produced an incredible array of species of living things. Diversity is the sum total of variation in different lines of organisms. These variations are generally adaptive to present conditions or were adaptive to conditions that existed in the past.

Microscopes:

Microscopes are to microbiology what telescopes are to astronomy.

The earliest microscopes were simple instruments consisting of one or more crude glass lenses similar to those used to make early spectacles. The invention of the first true microscope is credited to the Jansen family of Middleburg, Holland, around 1595.

Later, in the 17th century, Dutch cloth merchant and amateur scientist Anton van Leeuwenhoek enlightened the world to what he dubbed “animacules” such as protozoa found in standing water.

Using microscopes he made himself, Leeuwenhoek wrote up what he viewed in pond water, plant material, even gunk scraped off his teeth. He was the first to identify sperm and red blood cells.

Magnification can be determined by multiplying the magnification on the ocular by the magnification on the objectives.