Other basic stuff everyone should know about living things.....

Carbohydrates are made of chains (or polymers) of sugar molecules called polysaccharides.

Carbohydrates are only made in significant quantities by plants.

Cellulose is a carbohydrate. Starch is a carbohydrate also.

Starch and cellulose are structurally similar.

Starch is used by plants to store energy because it is insoluble. Sugars are hard to store because they dissolve in water and could wash away.

Most plants cells have a strong, inflexible exterior wall made of cellulose. Cellulose is what gives plants most of their structural strength.

Algae have cell walls made of cellulose or some other carbohydrate.

Most bacteria have a cell wall made of carbohydrates other than cellulose.

Animal cells do not have a cell wall.

Starch can be digested by animals. Cellulose generally cannot.

Wood and many other plant parts are made primarily of cellulose.

Although cellulose cannot be easily digested by animals, it can be digested by some bacteria.

Bacteria in the gut help some animals to digest cellulose.

Large mammals are more likely to eat cellulose than small ones because digestion of cellulose is more efficient inside a large, bacteria filled fermentation chamber.

Most bacteria have a cell wall made of carbohydrates other than cellulose.

Proteins are made of chains of amino acids. These chains are called polypeptides. Most proteins and enzymes contain several different types of polypeptide.

Enzymes are proteins.

Enzymes do things, like building or destroying other molecules.

Typically, one gene makes one enzyme or polypeptide.

Since one enzyme typically performs one job, in cases where the result of this job is a single observable trait (called the phenotype), then just one gene is responsible for the phenotype displayed by the organism. Traits like this are quite easy to understand. They are sometimes called Mendelian or simple traits after the monk who first described their simple pattern of inheritance.

Unfortunately, many traits are polygenic, that means that the phenotype (the external trait that you see) is controlled by MANY genes. These genes may interact in complex ways, and may or may not be inherited in ways described by Mendel. This makes understanding genetics much more complicated in practice than it appears in text books.

Genes come in different versions or alleles.

It is the difference between the DNA sequences of different alleles and the different combinations of alleles in different individuals that accounts for variation. New alleles appear all the time as a result of mutation and other evolutionary forces.

When a new allele appears one of three things may occur; the new allele may become extinct, OR it will persist in the population along with other alleles of the same gene, OR it will slowly spread through the population excluding other alleles until the new allele is the only version of that gene within the population.

Diploid organisms have two copies of each gene. These may both be the same allele (in which case the organism is homozygous for that allele), or they may be different alleles (in which case the organism is heterozygous for that allele).

DNA is Deoxyribose Nucleic Acid.

Nucleic acids like DNA are made of chains of nucleotide bases. DNA is made of two such chains coiled around each other.

The sequence in which the bases occur is what carries information in living things.

The way that living things make meaning of the sequence of nucleotides is similar in all species and is called the genetic code.

Essentially the genetic code is a language with just four letters. Four letters doesn't sound like much, but remember, computers only use two. (0 and 1). Any amount of information can be conveyed with simple languages as long as the string of information is long enough.

Every cell in a given organism generally contains a complete copy of the DNA, Hence, in theory, any single cell can be used to create a new copy of the entire organism.

A chromosome is a single molecule of DNA held together with proteins called histones.

Prokaryotes are bacteria. They have no nucleus or other organelles.

Cyanobacteria are ancient prokaryotes that used to be called "blue green algae". They can be quite large compared to other algae and they are photosynthetic.

Eukaryotes such as plants, algae, protozoa and animals have a nucleus and other organelles.

(YOU are a eukaryote, your cells all have a nucleus (or, in the case of red blood cells, they had a nucleus at some point)

Some eukaryotic organelles are derived from endosymbiotic bacteria.

endo > inside a cell. **sym** > two things in harmony. **biotic** > related to biology

Chloroplasts are descended from endosymbiotic cyanobacteria.

Chloroplasts and some other organelles contain their own DNA, a remnant of their formerly independent existence.

Endosymbiotic organisms tend to become reduced over time, meaning that they lose structures and genes that they no longer need.

Plants are green because their chloroplasts contain the green pigment chlorophyll.

Chlorophyll (assisted by some other pigments) is responsible for capturing light energy so that it can be used to build carbohydrates such as sugar and starch.

Photosynthesis uses carbon-dioxide, water and light to make carbohydrates. Oxygen is produced as a waste product.

Plants and animals chemically burn carbohydrates by reacting it with oxygen to release energy. Water and carbon dioxide are produced as waste products.

Plant cells contain a large fluid - filled sack called a vacuole. The rest of the cytoplasm is usually squeezed out towards the periphery of the cell

Plants need to get nitrogen from the soil to help them make proteins and other compounds

Nitrogen in the soil or water comes from nitrogen-fixing bacteria, animal waste, decomposing plants or animals, the action of lightning, or from artificial nitrogen fertilizer.

Plants turn rocks into soil.

To a flower, a bee is essentially a flying penis.

Flowers are kinky. VERY kinky.

Wind pollinated flowers (like grass and corn) ejaculate into the wind.

If plants had not moved onto the land, the animals probably would not have bothered either.

Plants have a waxy, outermost waterproof layer called a cuticle.

All the cells in a plant are connected by tiny holes in the cell wall called plasmodesmata.

Plants grow from meristems which are either generally located at the very tip or very bottom of the plant.

Secondary growth involves a thickening of stems due to growth in cylindrical meristems sometimes called cambium.

Coal is made of dead plants, mainly lycophytes and other ancient species.

The world was once covered in lycophyte forests.

Sex minimizes useless variations and maximizes the good stuff. It minimizes the role of chance in evolution.

In a sense, most of you are having sex with various viruses right now!

Rhizobium is a nitrogen-fixing bacteria.

The underside of ferns are covered in "sori" which produce spores..

Only about 10 % of the energy in one trophic level appears in the next trophic level.

Only one organism can permanently occupy one niche unless disturbance reduces the competition between them.

Plants can be genetically transformed using Agrobacterium or with a "DNA gun".

PCR amplifies or increases tiny amounts of DNA in a test tube using special enzymes and a cyclic change of temperature.

Evolution can occur because of genetic drift (chance) alone. Selection is not always necessary, but it usually helps.

Small, isolated populations evolve faster than large populations.

Certain areas of an organism's DNA change at a fairly steady rate over long periods of time. When the DNA in these regions is compared between different organisms, scientists can determine approximately how much time has elapsed since those organisms shared a common ancestor. This is called the molecular clock.

Populations that are in Hardy Wienberg equilibrium are not evolving. It is easy to determine whether or not a population displays this kind of genetic equilibrium. No examples have been found in nature.