Cells: The Building Blocks of Life

 Cells are the fundamental building block for living organisms. Cells are small, membrane bound units that contain concentrated liquid solution of chemicals. What makes cells even more special and is that they have the amazing ability to replicate themselves and divide into two. Some organisms are just a single cell while others, like humans, are communities of cells that have been specialized to perform different functions. In this paper, we are going to be talking about why cells are the building blocks of life, how cells came to be ubiquitous on earth, and the fundamentals of the cell as far as what they are composed of, how the divide, specialize and also function.

 Cells have the amazing ability to divide themselves; they can survive in extremely harsh places as well. They are able to communicate with other cells and with being able to do this they are able to accomplish phenomenal feats. Cells are all around us, they are us, and they make up all living things. They make up the smallest of insects and they are also the things that build the largest of animals like whales and elephants. They are also the building blocks of plants and bacteria. Each cell has its own set of DNA. The DNA encodes all of the instructions that the cell will need to thrive, grow, develop, specialize and also has the instructions about what kinds of materials need to be made within the cell in order for the cell to function properly. The DNA for each cell is found within the control center of the cell which is called the Nucleus. The Nucleus is where all the commands take place in the cell. For extra protection, the nucleus is enclosed in something called the nuclear envelope (2(pg. G:17)). All the organelles in the cell are found within the walls of the cell called the plasma membrane. This membrane is semi-permeable which means that it allows the necessary things that the cell needs (2(pg. G:18)). The organelles in the cell are resting in the cytosol; this is the liquid that is found in the cell. The next organelle we will touch on is the lysosome (2(pg. G:14)). This organelle is capable of breaking down worn out proteins and other organelles. They can also break down waste materials. This is the garbage man of the cell. With enzymes that digest all of this waste the lysosome is able to clean the cell’s waste pretty effectively. The next major organelle found in the cell is called Mitochondria. Mitochondrion is the power house of the cell. It produces ATP (Adenine Tri-Phosphate) through a process called oxidative phosphorylation (2(pg. G:15)). Some other organelles in the cell are the: Golgi apparatus, the endoplasmic reticulum (2(pg’s G:8&11)). These two organelles are responsible for making and transporting lipids and proteins throughout the cell. These are the major components of the cell, these are their “organs”. Cells eat and also excrete materials through the process’ called endocytosis and exocytosis. Endo refers to the bringing in of materials and Exo refers to the exporting of waste materials out of the cell. Cells are fascinating in so many ways, one key thing that they do that makes all life on Earth possible is the fact that they can divide by themselves (without outside influence).

 Cell division is divided up into multiple stages; there are 5 specific stages that must take place for cell division to be successful. The first stage is called Prophase: this is when the chromosomes in the nucleus start to condense, spindle fibers emerge, the nuclear envelope falls away and lastly the centrosomes move towards the poles of the cell. I know that was a lot for the first stage but it is all super easy to follow. The chromosomes are the composed of DNA and protein and they carry the genetic information necessary for a new cell to be formed and function properly (pg. G:5). The spindle fibers are like long arms that come out of the centrosomes that are located at opposite ends of the cell. The next phase of cell division is Prometaphase, this is when the chromosomes keep condensing and the attachment cite of the centrosomes, known as the kinetochores, appear for the spindle fibers to attach to. The next phase of cell division is called Metaphase. This is when the chromosomes line up in the middle of the cell and the spindle fibers take position to begin division on their respective ends. The next step in cell division is Anaphase. This is when the centromeres split in two and half of the chromosome is pulled to one side of the cell and the other side is pulled to the other. Then some of the spindle fibers start pushing the cell at the poles to stretch the cell and start the physical division of the cell. The last step is called Telophase. This is when the chromosomes have reached their respective sides of the cell and the nuclear envelope starts to reform around the chromosomes. The spindle fibers break down and the cell divides into two (1). All of these steps are necessary for a cell to divide properly. This division allows for organisms to be, it allows for life to take place, for reproduction to occur, and lastly it is essential for cells to live. Without division they would just grow old and cease to exist. With them being able to replicate themselves it is literally makes a copy of itself to start a new generation that will also grow, thrive, develop and will also divide to keep forming new cells and more generations of cells.

 Cells are able to become specialized, such as neurons, red blood cells, white blood cells, macrophages, and so many more. Cells for an organism develop from one single cell and with the DNA that is encoded within the cell it directs the cell to from these different specialized cells. The DNA consists of four different base pairs known as Cytosine, Guanine, Thymine and Adenine. These four base pairs combine in combinations of threes to form amino acids. Each amino acid has its own command, some form proteins, some start process’ and some end process’. There are twenty amino acids that can be formed from all of these combinations, and in doing so makes it to where there is a great diversity amongst all of these cells, hence being able to form specialized cells. The DNA also holds the information for the necessary proteins to be made. With specific cells needing specific proteins, we can see why needing specialized cells has come to be in all organisms. As humans the majority of our cells are specialized from all of the cells that make up our immune system, to our skin and muscles all the way down to our organs. Every cell that is made has a particular function and the fact that so many cells are formed from these four simple base pairs is astounding. Each cell is programmed from many previous generations of cells that came before. At one point in time, all organisms were derived from a single cell.

 In conclusion, each cell has specific tasks that they must perform in order for the organism to function as a whole. Cells replicate to form two identical cells and they give a DNA stand to each of them so they each have a template/code for the future development of each cell. DNA is comprised of four different base pairs; these base pairs are responsible for holding he code for the cells future development, gene expression, and overall function. Cells divide when they have multiple genes expressed at once. This ensures that the cell won’t divide when it isn’t ready. The cell is the most fundamental building block to all living organism. All cells are derived from one ancient ancestral cell which explains why all organisms are related to each other in one way or another. Cells are capable of extraordinary feats, and life is one of the most amazing things they provide. Without cells, life would cease to be.

Citations

1. "School of Life Sciences | Ask A Biologist." *Ask A Biologist*. N.p., n.d. Web. 04 Mar. 2016.
2. Alberts, Bruce. Essential Cell Biology. New York, NY: Garland Science, 2014. Print.