8 themes of ap biology relating to the cell membrane

Science, Biology

8 themes of biology relating to the cell membraneScienceas a process: Science is a process which encompasses many methods in order to reach a final conclusion. This relates to the cell membrane because it carries out many processes to reach a final product. For example, the cell membrane forms a barrier between the inside of the cell and the outside, so that the chemical environments on the two sides can be different. The cell controls those differences to optimize the working of the organelles inside the cytoplasm.

The cell also causes brief changes in the internalenvironmentby transporting proteins and other materials across the membrane. These changes are the ways in which the cell responds to its environment. All these functions work together as a process to keep the cell happy. Evolution: The early cell membrane’s purpose was to enclose genetic material and protect it from the surrounding environment. The evolution of a membrane surrounding the genetic material provided two huge advantages: the products of the genetic material could be kept close by and the internal environment of this proto-cell could be different than the external environment.

This breakthrough would have jump-started evolution to an organism much like a modern bacterium. Also, the modification of many membrane properties throughout millions of years made it possible for new evolutionary forces to show themselves in eukaryotes, dealing with the presence of cholesterol in the cell membrane directly associated to protein thermo stability. Energy Transfer: The cell membrane participates in energy transfer

with active transport. The cell membrane moves molecules against the concentration gradient from low concentration to high concentration.

This function requires energy, or ATP, to carry out the process. At times, the cell membrane uses a protein pump to channel the molecules for easier transport. Two types of active transport the cell completes are antiport and symport. To transport large molecules through the membrane, the cell membrane uses vesicles. Those vesicles transport the material to the necessary organelle which will eventually turn the material into usable ATP. Continuity and Change: All species tend to maintain themselves from generation to generation using the same genetic code.

However, there are genetic mechanisms that lead to change over time, or mutations. Cystic fibrosis is a product of a mutation in the cell membrane. Cystic fibrosis results from the mutation of a gene coding for a trans-membrane protein regulating chloride ion transport across the cell membrane. This multisystem disease cripples children and leads to early death. This mutation represents the changes found in the cell membrane, but the cell membrane has been doing the same job for millions of years with slight changes. Relationship of Structure to Function:

The cell membrane structure depends on its function; to hold the shape of the cell and to regulate the traffic of the cell. It consists of a phospholipid bilayer which acts as a semi-permeable membrane, various proteins which carry out molecule transfer and certain active transport jobs, carbohydrates, and cholesterol. The shape of the cell membrane all depends on the

environment inside the cell. Regulation: The cell membrane regulates the traffic of the cell. It is semi-permeable which means it allows diffusion for only certain molecules.

It regulates what enters the cell and defends against diseases that may want to enter the cell as well. It also regulates the shape of the cell and holds it together. The membrane is one of the most important structures in a cell. Interdependence in nature: The cell membrane not only regulates the traffic of the cell, but is also the liaison forcommunicationoutside the cell. The membrane includes receptor protiens which aid in communication between cells. The receptor protiens receive specific chemical signals from neighboring cells or the proteins environment. These signals tell a cell to perform a certain job.

It could tell a cell to divide or die, or to allow certain molecules to enter or exit the cell. Science, technology, and society: The study of the cell membrane has further increased our knowledge of the modern cell. We can now fully understand its parts and create valid conclusions of its structure and function. Society can benefit from this because they can be fully aware what is happening in the life around them and also in themselves. The cell membrane is one of the most important structures of the cell and has a very important role in an organism-to keep it healthy and functioning.