Lipid Layer's Permeability of Amino Acids in Primordial Earth

Brigman, Mark (School: Polk State Collegiate High School)

The purpose of this experiment was to simulate conditions of primordial Earth to demonstrate how life could have been created from the gases (nitrogen, carbon dioxide, ammonia, methane) present. This research tested the ability to create amino acids synthetically inside a homemade apparatus (Mark IV) to determine if they could be contained in a layer of fatty acids. The Mark IV apparatus contains gases present in primordial Earth regulated by a robot with gas canisters. The apparatus had electrical arcs that strike a small bath of water that represented lightning strikes on a body of water that provides energy to bind the molecules together and create amino acids. Those amino acids were then combined with a simple fatty acid (stearic acid) that could be created by geothermal vents in the natural world. To test whether these fatty acid layers did contain the amino acids, they were agitated in a dyed water solution then subjected to a chemical indicator (elemental iodine/nitric acid - xanthoproteic test) to test whether the presence of amino acids still remained in the fatty acid layer or if it had diffused into the aqueous layer upon agitation. The experiment's results showed both the iodine fumigation test and the xanthoproteic test indicated consistently a 100% concentration of amino acids to be in the fatty acid layer and 0% in the aqueous layer even after multiple washing phases. This indicated that fatty acids containing amino acid broth will form a vesicle-like structure with the amino acids inside.

Awards Won: