Aero2Aqua: A Novel Bioinspired Atmospheric Water Harvester

Sharma, Cameron (School: Mills E. Godwin High School)

The global water crisis is a well-documented fact. It affects all regions and demographics. Atmospheric water harvesters (AWHs) have not been explored well as an option for freshwater. An estimated 12,900 km^3 of water remains suspended in the air, while according to the World Health Organization only 0.075 km^3 meets the daily water requirement of one billion people. Aero2Aqua, an AWH presented here, is a novel invention. It harvests ground-level vapors without using external energy. It combines three diverse bioinspired methods of atmospheric water harvesting into a complementary system. The three methods are hydrophilic and hydrophobic surfaces of the darkling beetle, the water trapping ridges of the cactus spines and the water channeling “liquid diodes” on the skin of Texas horn lizard. A device was designed, built and tested incorporating these three components. Hydrophilic disks with diameters of 10, 15, 18, 20 and 25 mm were the levels of independent variable (IV). There was no control. The amount of water harvested was the dependent variable. It was hypothesized that the AWH using 25 mm disks would collect the most water. Mean values measured for the IV were 3.323, 5.028, 7.475, 15.753 and 24.889 grams. The related t-values were higher than the table t-value of 2.011. Therefore, the null hypothesis was rejected, and the data was significant. The results supported the hypothesis. Future enhancements could include the optimization of sizes and configurations of Aero2Aqua to maximize the water collection. The project was done under adult supervision using safety gear.

Awards Won:

Third Award of $1,000