The Creation and Sustainability of a Symbiotic Atmosphere in Relation to Surface Area

Krohnfeldt , Bryce (School: Estero High School)

I studied and tested the ability of freshwater aquatic plants to create a symbiotic atmosphere with mice relative to the plant's surface area. What was found was that plants with a higher surface area are able to create this symbiosis for a longer period of time. This is due to the fact that plants with a greater surface area have more stomata, meaning they can intake more carbon dioxide used in photosynthesis faster than plants with lower surface areas, increasing their rate and sustainability of oxygen production. More of the plants chlorophyll (light absorbing part of the chloroplasts which are the organelles responsible for photosynthesis in plants) are exposed to light at any given time as well, meaning they have more energy to undergo photosynthesis. This was done by creating a vacuum of around 100 pascals inside of a vacuum chamber with a specific plant species in it. Carbon dioxide was then injected until the pressure was back up to atmospheric pressure. The plants were then allowed to photosynthesize via uv growth lights for 20 minutes. An airtight container containing two mice was then connected to this chamber, and it was measured how long these plants could continue to produce oxygen for the mice before the levels became dangerous via an oxygen meter. This research is important as it can be a step towards solving the global climate crisis by finding and identifying types and characteristics of plants that are able to sustain life and repair atmospheres such as Earth's damaged one. This research can also be utilized in space travel for easier oxygen production and creating atmospheres on other planets such as in biospheres or the planet itself.

Awards Won: