The bright sun's always the star of the show

By Joseph Brockhoff May 31, 2012 10:21 am

The recent solar eclipse witnessed throughout Sonoma County on May 20 brought our collective attention toward the sun for an extended period of time, and after the moon completed its passage between the earth and the sun, we all went back to the basic rituals of life. But, more importantly, the sun went back to the basic rituals of making our lives possible through the process of photosynthesis.

The photosynthetic equation, 6H2O + 6CO2, plus sunlight = C6H12O6+6O2+6O2 translates to: six water molecules, plus six carbon dioxide molecules, plus sunlight, make one sugar molecule plus six molecules of oxygen. This assembly line, vital for the existence of life, has been running strong for roughly 3.5 billion years.

We don't spend a lot of time thinking about the importance of the sun in our daily lives, but without photosynthesis, our very existence would not be possible. The idea that light itself, which possesses unstable characteristics, can transform into a stable form of energy and in turn become energy for other life forms seems rather bizarre upon first inspection, but the first law of thermodynamics sheds light on this subject: "Energy cannot be created or destroyed"…in essence, energy is merely being converted continuously from one form into another.

In the case of photosynthesis, light energy provides the catalyst for the creation of solid energy, also known as matter. This means that light not only illuminates our natural world, but it also animates, and molds it as well. This happens through a two-stage process called light and dark reactions.

The light reactions are light dependent and occur mainly when sunlight is converted into solid or chemical energy called "free energy," containing molecules and high-energy electron carrying molecules. The dark reactions then use this energy along with carbon dioxide in the atmosphere to make sugar.

The sun's ability to transform the landscape is currently at center stage throughout Sonoma County.

The spring to summer climate brings about a new stroke of nature's brush as colorful and vibrant tones augment the green lushness created by another important element of photosynthesis called "chlorophyll." Chlorophyll is essentially a magnesium-based green pigment found in plants that absorb different spectrums of the sun's wavelength.

Similar to how hemoglobin absorbs different wavelengths of light except for red, and we see it as red, the beautiful green colors of nature are the part of the light spectrum not absorbed by plants and thus reflected back to our eyes as green light. This means photosynthesis works primarily by absorbing blue and red wavelengths, which happen to be the dominant composition of the sun's spectrum. This is an efficient and convenient partnership that is quite remarkable and worthy of our collective awe and appreciation.

Working along the Laguna de Santa Rosa channel as an intern for the Cotati Creek Critters, I've been privileged to have a front row seat to nature's unique transformations, and there are many opportunities to not only see these transformations, but to interact with them, and sometimes push them toward a restorative state that supports ecological diversity and reflects the entire spectrum of natural and human effort.

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