

O Sun God, Savitr!
Thou dazzling fount of life-persuasive light!
Sublimest mystery speeding from afar!
Swift became that burst too potent on the sight!
This radiant type of strength and youth!
Glowing eternally!



శ్రీ వేపచేదు విద్యా పీఠము

VEPACHEDU EDUCATIONAL FOUNDATION

May the golden-eyed Savitar, come hither!
Shining forth he rises from the lap of the dawn!
Praised by singers, my God Savitar!
Stepped forth and never missed his place!
He steps forth the splendor of the sky the wide!
Seeing, far-shining, the shining wanderer!
- Rig Veda, vii. 65

He alone shines!
All luminaries get illuminated by His Illumination!
The whole Universe is enlightened by His light!
- Kathopanishad

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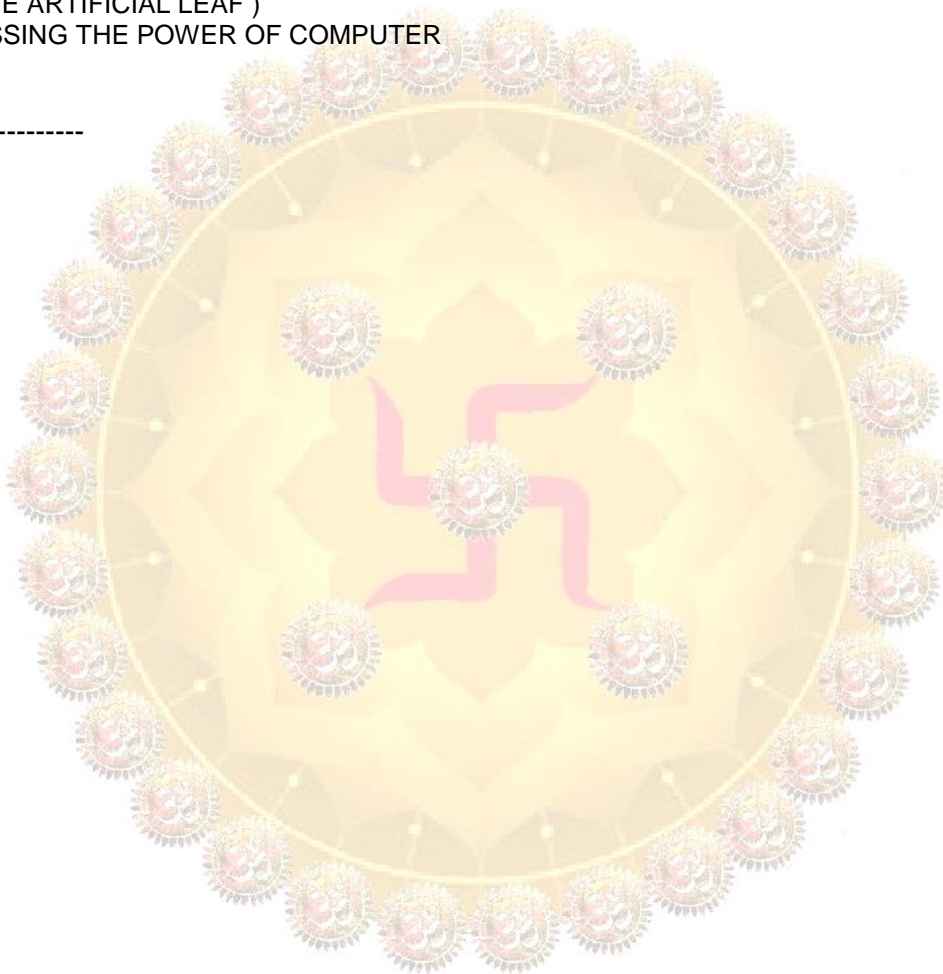
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Issue 233

Chief Editor: Dr. Sreenivasarao Vepachedu¹

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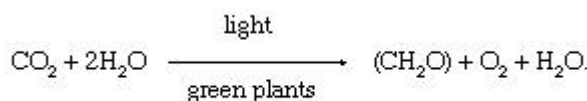
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THE BIONIC LEAF (THE ARTIFICIAL LEAF)

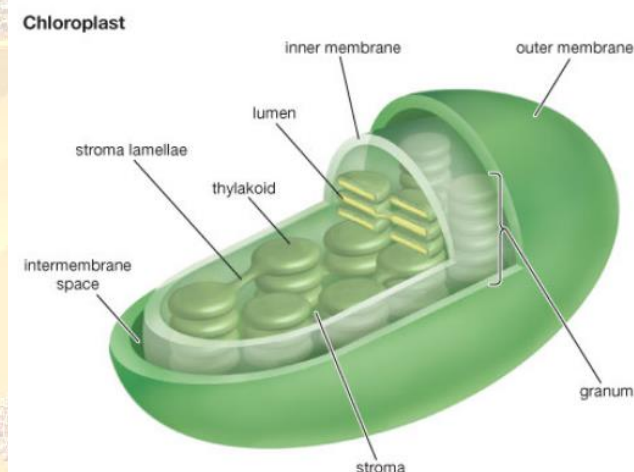
The first Green Revolution in the 1960s saved millions of lives, particularly in Asia, by doubling agricultural production with new varieties of rice and wheat, and increased use of fertilizer resulting in serious environmental damage, according to the United Nations (UN) Food and Agriculture Organization.



Photosynthesis² is one of the most fundamental processes in nature, absorbing ever-present sunlight, water and carbon dioxide, and then converting it to glucose and oxygen. Chloroplast, structure within the cells of plants and green algae is the site of photosynthesis. Energy produced



by photosynthesis carried out by plants millions of years ago is responsible for the fossil fuels (i.e., coal, oil, and gas) that power industrial society. In past ages, green plants and small organisms that fed on plants increased faster than they were consumed, and their remains were deposited in Earth's crust by sedimentation and other geological processes. There, protected from oxidation, these organic remains were slowly converted to fossil fuels. These fuels not only provide much of the energy used in factories, homes, and transportation but also serve as the raw material for plastics



and other synthetic products. The next Green Revolution is going to be with the artificial leaf that mimics a natural leaf when exposed to sunlight by splitting water into hydrogen and oxygen. A bionic leaf that pairs a water-splitting catalyst with a bacteria called *Ralstonia eutropha*³. The artificial leaf is a device that, when exposed to sunlight, mimics a natural leaf by splitting water into hydrogen and oxygen. This led to the development of a bionic leaf that pairs the water-splitting catalyst with the bacteria *Ralstonia eutropha*, which consumes hydrogen and takes carbon dioxide out of the air to make liquid fuel⁴.

Hydrogen-oxidizing lithoautotrophic bacterium *Ralstonia eutropha* is a metabolically versatile organism capable of subsisting, in the absence of organic growth substrates, on hydrogen and carbon dioxide as its sole sources of energy and carbon. *R. eutropha* first attracted biotechnological interest nearly 50 years ago with the realization that the

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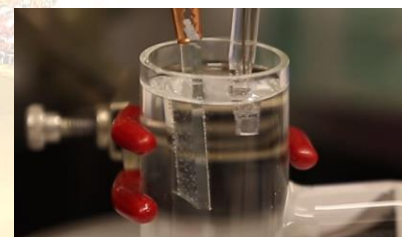
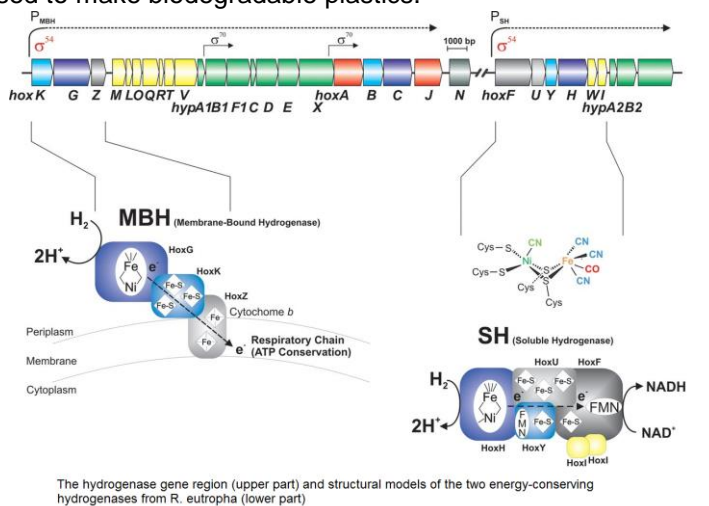
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organism's ability to produce and store large amounts of poly[R-(-)-3-hydroxybutyrate] and other polyesters could be harnessed to make biodegradable plastics.



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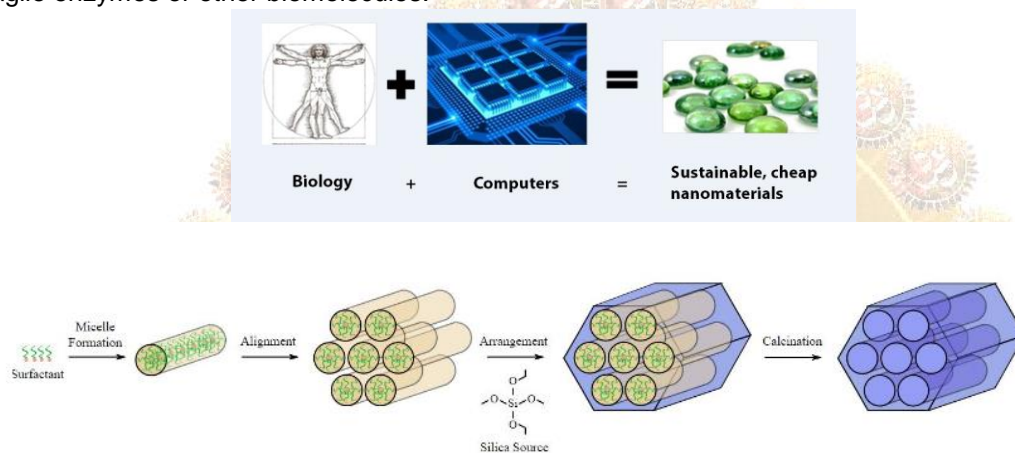
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NANOSILICA HARNESSING THE POWER OF COMPUTER

By harnessing the power of computer simulations, and applying green principles to the technique design, cut down energy costs of material purification significantly and avoid damage to the template, allowing for it to be reused. Not only that, but the elimination of harsh conditions during all parts of the process enables new applications of nanosilica⁵ in carrying fragile enzymes or other biomolecules.



Using the ability to purify and tailor the composition, porosity, and surface chemistry of bioinspired silica, elemental analysis, and N₂ and CO₂ adsorption, an extraction based on molecular dynamics involving surface-charge interactions has been developed. The environmental benefits of the new method are estimated to be significant with improved sustainability⁶.

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REFERENCES AND NOTES

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² Photosynthesis <https://www.britannica.com/science/photosynthesis>; <https://www.youtube.com/watch?v=rsYk4eCKnA>; <https://www.britannica.com/science/chloroplast>.

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⁴ A 'bionic leaf' could help feed the world, <https://www.acs.org/content/acs/en/pressroom/newsreleases/2017/april/bionic-leaf-could-help-feed-the-world.html>

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