

## The Benefits of Light

Nobuhiko Tsunefuka

What awaits the office worker on his way home from a day's work is a sea of light, whether it comes from the glaring neon signs or the signboards of the familiar shop. Some are drawn to the lights (positive phototactic type) and some are repulsed from it sensing danger and wanting to avoid it (negative phototactic type). This character trait of being attracted to or being repulsed from light is known as phototaxy, a response to light that can be widely observed in plants and animals. Come summer, and the phototactic behavior of many insects such as moths and mosquitoes is used to kill them. The electric insect-killers with their bluish fluorescent lights inside to attract insects are a common sight at parking places or fish stores in the summer. Are convenience stores and food or drink vending machines brightly lit? This lighting exploits our positive phototactic response that draws the customer to the light. It remains for us to muse as to whether the bright light that is designed to prevent theft exploits a positive or negative phototactic response. Be that as it may, the way the vending machines packed with refreshment drinks are laid out is such that new products are always placed in the most readily selected position, the location the user is drawn to first, and the choice is made so easily, as a matter of sheer impulse. The rest areas in sports facilities such as sports grounds or tennis courts are equipped with vending machines filled with sports drinks that await the thirsty facility user after his or her workout drenched in beads of sweat. In Japan alone, there are over 2 million drink and food vending machines packed with the appropriate foods and drinks to suit the season and the nature of the site, ready to serve the user at the tender of a coin or bank note.

- For more about phototaxy in insects and insect killing, visit our homepage:

<http://www.kanyaku.co.jp/kouza1-4.htm>

- For more about phototactic experiments on the common sea louse (hime-funamushi), visit our homepage:

<http://www.hi-ho.ne.jp/~takahachi/sn27/sn27.htm>

- For more about electric insect-killers and insect-attracting light, visit our homepage:

<http://www.kanyaku.co.jp/kouza1-4.htm>

- Visit the homepage of the Japan Vending Machine Manufacturers Association:

<http://www.jvma.or.jp/>

- For more about the successive generations of vending machines, visit our homepage:

<http://sts.kahaku.go.jp/sts/thumb.php?18=%BC%AB%C6%B0%C8%CE%C7%E4%B5%A1&APage=6>

Sun-baked mud bricks dried in the sun were used as a building material in all ancient civilization - the Mesopotamian Civilization in Iraq, the Yellow River Civilization of ancient China, the Maya Civilization in Mexico,

and the Inca Civilization in Peru. There are also many foods that are sun-dried - sun-dried fish, sea weeds, persimmon and sweet potatoes, for example - taste so much more savory than raw. Our ancestors knew how to make use of the sun's light for drying and as the source that drives certain chemical changes.

The sea weeds in the sun-exposed sea use up carbon dioxide by way of photosynthesis and thereby contributed to an increase in the atmosphere's oxygen concentration. As the atmosphere grew oxygen-rich, unicellular life was eventually born. The process of evolution has moved in the direction of growing complexity with the emergence of animals and plants that are more sophisticated multicellular life forms. A certain part of the atmosphere's oxygen forms the ozone layer (O<sub>3</sub>) in the upper region of the air. This ozone layer plays an important role as a shield that reduces the amount of harmful ultraviolet radiation filtering through to the earth's surface. It has thus made it possible for life to evolve on earth.

A good 1% of the solar energy that reaches earth from the sun is used by plants for photosynthesis. It may be surprising to know that plants grow by using this energy at a startling 99% efficiency. The sequence by which plants generate energy from photosynthesis is known as the TCA or citric acid cycle.

- For more about sun-dried mud brick architecture, visit our homepage:

<http://www.asahi.com/housing/world/TKY200406260189.html>

- For more about sub-dried sea weed (the brown-black algae hijiki), visit our homepage:

[http://www.kurakon.jp/ency\\_hijiki/04.html](http://www.kurakon.jp/ency_hijiki/04.html)

- For a list of back numbers on your favorite sun-dried foods, visit our homepage:

<http://www.hjcenter.ne.jp/life/favorite/back.htm>

- For more about the origin of life, visit our homepage:

[http://www2u.biglobe.ne.jp/~rachi/life\\_h.htm](http://www2u.biglobe.ne.jp/~rachi/life_h.htm)

- For more about the TCA/citric acid cycle, visit our homepage:

[http://133.100.212.50/~bc1/Biochem/TCA\\_cycl.htm](http://133.100.212.50/~bc1/Biochem/TCA_cycl.htm)

The sun's light is also used by modern technology in the form of photo-catalysts or photovoltaic batteries, to name but a few. The photocatalyst effect is widely used for a range of purposes such as decontamination, sterilization, deodorizing and cleaning. Thus organic contaminants adhering to the titanium oxide treated surface can be decomposed by photocatalysts and caused to fall off. Research into photo-catalysis began with the production of hydrogen in an attempt to upgrade the efficiency of this process. As this research progressed and the conversion efficiency was improved photo-catalysis came to be used also for the supply of hydrogen to fuel cells.

- For more about hydrogen preparation using sun light, visit our homepage:

<http://web.bureau.tohoku.ac.jp/manabi/manabi23/mm23-5.html>

Broadband communication is essentially optical communication using optic fibers. Originally, optic communication was intended for trunk networks to provide a high-speed communication service and its use has gathered greater momentum and spread to the ordinary household in the wake of wide popular demand for broadband services to be available on the Internet. The system that connects optic fiber transmission to the private home is FTTH (Fiber to the Home). The optic signal received by the FTTH is converted to an electric signal with an O/E (optic/electric) converter. Similarly, when electric signals are emitted, they are converted to optic signals with an O/E converter and the resulting optic signals are sent through the optic cable. There is a tendency for people to believe that optic communication has nothing to do with electromagnetic induction, but this is a fallacy. The signal converters located at transmitting and receiving ends of the optic fiber have built-in electronic circuits that operate at speeds in the Giga-Hertz range. Here the EMC design, including SI and PI, is a key technology for the design of the converters. With the ever-wider spread of optic communication, progress may well move on from the EMC to the (EM&OP) C era.

- For more about optic fibers and optic communication, visit our homepage:

<http://www.kurejbc.com/technical/technical-3.htm>

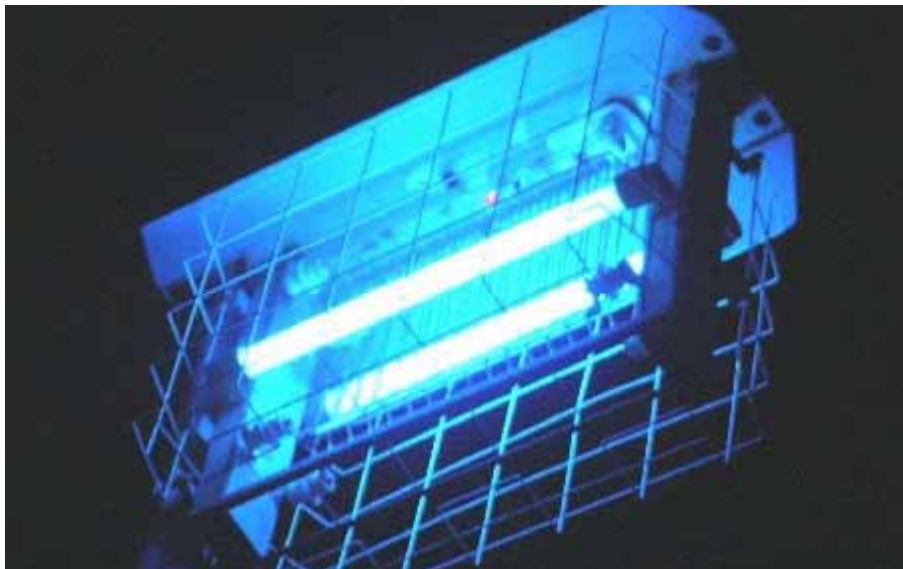
<http://www4.plala.or.jp/infobell/kiso-hika/kisohikari.html>

- For more about current trends for the diffusion of FTTH, visit our homepage:

<http://japan.cnet.com/news/com/story/0,2000047668,20075564,00.htm>

- For more about examples of FTTH noise suppression measures, visit our homepage:

[http://www.murata.co.jp/emc/example/k\\_9/ftth\\_2.html](http://www.murata.co.jp/emc/example/k_9/ftth_2.html)



Electric insect-killer



House built with sun-dried bricks



Nobuhiko Tsunefuka

1943 Born in Tokyo

1968 Graduated from Department of Engineering Science, Osaka University

~ 1984 Worked on developing Information Technology Device at Taga Works, Hitachi, Ltd.

1991 ~ Engaged in education on EMC related matters at Hitachi Institute of Technology

1999 ~ Planning Manager