

# ASP NEWS



Summer 2011

vol. 40(3)

## Letter from the President



Hello fellow ASP members!

I want to briefly update you on some developments since the last Newsletter. As I indicated earlier, new chairs/co-chairs were appointed for the

awards, education and mentoring, membership, and website committees. The chairs were charged with expanding committee membership and with developing guidelines and programs for the coming year. I am pleased to report that, after meeting extensively “electronically”, the chairs have executed this task brilliantly.

The council met on June 18th 2011 in Cambridge Massachusetts to review reports, and approved most of the recommendations put forward by the committees. We look forward to a very active and fruitful year for the society. I reiterate that if you are interested in joining any ASP committee, please contact the committee chairs listed in the spring 2011 Newsletter.

Of course at this point in time the other major task continues to be the planning of our 36th annual meeting, **June 23-27, 2012 in Montreal, Canada**. In the initial planning we have an exciting program and very much look forward to your participation. We will be contacting some of you very soon to join in the detailed planning. The first announcement of the meeting appears on the last page of this Newsletter. Please note that 2012 is also the 40th anniversary of the founding of the ASP, so I hope that you will all join us for lots of

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‘Science & Fun’ in Montreal.

I wish you all a relaxing summer.

**-Tayyaba Hasan**

## Tale from the Archives

The December 1974 issue of the *ASP Newsletter*, edited by the late **John Spikes**, provides details concerning the policy of handing a bottle of Hankey Bannister Scotch Whisky (Figure 1A) to the incoming ASP President. In the dim recesses of time, predating ASP, **Kendric Smith** and **Farrington Daniels Jr.** were in Washington looking for ‘tax free’ whisky. Dr. Daniels introduced Kendric to the Hankey Bannister brand, noting that it was provided by the supplier to members of the British Diplomatic Corps and Officers in the British Army. No doubt for medicinal purposes.

Daniels later prepared a talk on the ‘Prehistory’ of photobiology for presentation at the St. Louis meeting of the ASP, the 25th anniversary of the founding of the Society by Kendric. The text can

be found in *Photochem. Photobiol* 65S, 111S-115S, 1997 and I will leave it to interested ASP members to determine whether Hankey Bannister was mentioned.

This particular brand of whisky became the unofficial drink for the precursor *Committee on Photobiology* at its assorted meetings and, according to Spikes, this custom has carried over to the ASP. Bottles of HB were dutifully presented by outgoing Presidents to incoming Presidents for many years. In his Presidential speech, **Tom Coohill** (1989-90) took issue with this practice, pointing out that the ‘presentation package’ of Hankey Bannister consisted of a paper bag (Figure 1B) and that the Society surely deserved better. But in 2008, 2009 and 2011, HB won the ‘Best Blended Whisky’ award in London, so the quality may be better than was claimed. The Presentation Pack actually looks a bit better than the proposed sack (Figure 1C).



It should be noted that the awards cited above were given to the 40-year old Hankey Bannister of which it is said that less than 2000 bottles survive. The current market price is £366 which translates to \$600. The more recent bottles go for about \$30. It is unknown whether the handing of the HB will again occur at the Montreal ASP meeting. If so I suspect this will more likely be the more recent blend, and that we will be back to the more humble paper sack.

**-David Kessel**

## Letter from the Editor

This issue of the newsletter, with articles on whisky, contrast vision, and the identification of a UVB photoreceptor in plants, has something for everyone. **Kendric Smith's** article on Photobiological Sciences Online (PSO), which now has 82 modules, is a notable contribution. PSO now gets more than 10,000 unique visitors per month, thus supporting the truism that “content is king”.

The “Basic Photosynthesis” module is the most visited PSO page. However, in the previous newsletter, **Tayyaba Hasan** noted her difficulty in recruiting organizers for plant photobiology sessions at ASP-2012. This is disturbing, because *Photochem Photobiol* has published many great plant science articles and ASP has many distinguished plant scientists among its ranks.

Two prominent ASP plant biologists were recently interviewed for *Annual Reviews of Plant Biology* ([www.annualreviews.org/page/audio](http://www.annualreviews.org/page/audio)). **Winslow Briggs**, who spoke at ASP-2008, talks about his lab's discovery of phototropin, his recent work on seed germination with the California State Park System, a student's possible role in hashish smuggling, and the “Briggs Rule” for reducing the length of faculty meetings. **Govindjee**, former ASP President, talks about his early fascination with the red drop effect in photosynthesis, his move to America to work with **Robert Emerson**, the reason he has a single name, and the controversy on the quantum efficiency of photosynthesis.

We all hope to see that plant photobiology will have a prominent role at ASP-2012.

### ASP News

*Published quarterly by the American Society for  
Photobiology*

[www.photobiology.org](http://www.photobiology.org)

#### Editor

Peter A. Ensminger  
256 Greenwood Place  
Syracuse, NY 13210  
Tel: 315-478-6024

E-mail: [ensminger@twcny.rr.com](mailto:ensminger@twcny.rr.com)

## Contrast Vision

The perception of contrast sensitivity depends on frequency. In other words, we can more readily perceive contrast at certain frequencies.

At high frequencies, contrast sensitivity is limited by the density of photoreceptor cells in the retina. At low frequencies, contrast sensitivity is limited by lateral inhibition of retinal ganglion cells.



*Sinusoidal fluctuation in which contrast amplitude increases from top to bottom and spatial frequency decreases from left to right. Note that for medium frequency (center-right of image), less contrast is needed to detect the sinusoidal fluctuation than at high frequencies (left side) or low frequencies (right side). Image and caption adapted from Wikimedia Commons.*

Researchers at the University of Rochester recently reported that playing video games may improve contrast sensitivity (Li R, Polat U, Makous W, Bavelier D. Enhancing the contrast sensitivity function through action video game training. *Nat Neurosci* 2009, 12: 549-51.)

-PAE

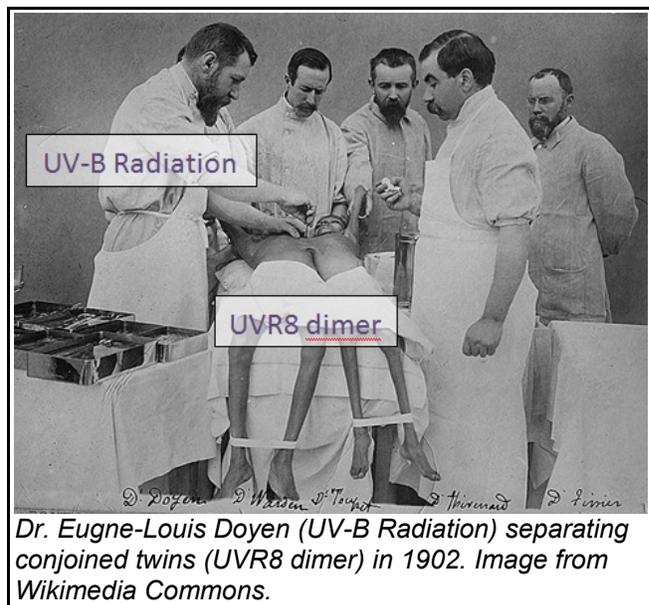
## New UVB photoreceptor in Plants

Plant photosensory receptors can be mapped on the electromagnetic spectrum. Red light sensors -- the phytochromes -- were discovered in the 1950's. Two classes of blue light receptors -- the cryptochromes and phototropins -- were discovered in the 1990s. A recent paper in *Science* reports evidence for a receptor that mediates responses to ultraviolet-B radiation (UV-B). It is not surprising that it has taken so long to identify

a UV-B photoreceptor. Proteins, nucleic acids, and lipids all absorb UV-B, so it has been difficult to separate responses to damage from photosensory processes.

In the recent *Science* paper, **Rizzini and co-authors** (1) demonstrated that the UV REISTANCE LOCUS 8 (UVR8) protein undergoes reversible conformational changes upon absorption of UV-B. They also showed that these conformational changes lead to the association of UVR8 with COP1, a protein that is a hub for regulation of many other photomorphogenic responses.

Two aspects of the mechanism of UVR8 are unusual. *First*, in contrast to the phytochromes, cryptochromes, and phototropins, UVR8 does not have a separate chromophore prosthetic group. Instead, the authors proposed that one or more of the tryptophans in the protein were responsible for photon absorption. *Second*, UV-B activates UVR8 by changing the protein from a dimer into individual monomers (see photograph).



Mutagenesis of three tryptophans of UVR8 interfered with dimer formation and dissolution and altered the interaction with COP1. The researchers monitored UV-B induction of UVR8 monomerization and association with COP1 by co-immunoprecipitation of proteins in extracts from plant tissues and transformed yeast cells that expressed these proteins.

All other plant photosensory receptors have

unique chromophores. Phytochrome has a linear tetrapyrrole, cryptochrome has a flavin and a pterin, and phototropin has two flavins. The phytochromes and cryptochromes are dimers, but light absorption does not monomerize either receptor. Hence, UVR8 has a truly novel mechanism for the transduction of light signals into developmental regulation.

Future research on UVR8 and the other plant photoreceptors will likely show that this report is just the beginning. Each of the other classes of photoreceptors are gene families. Individual members of these families regulate different processes, and some function under different light conditions. For example, the PHYA type phytochromes operate principally in seedling germination while plants make the transition from darkness to light. The other members of the phytochrome family function in mature light-grown plants. UVR8 appears to be similar in specialization, as it does not regulate responses in dark-grown seedlings (2). Other evidence that UVR8 may be the first of several UV-B photosensory systems comes from previous work which indicated that the responses initiated by this photoreceptor are transduced exclusively through the COP1/HY5 signaling chain, but that other UV-B induced responses are independent of this pathway (3). UV-B mediated events that start as damage or stress can also lead to changes in plant development. Thus, the dichotomy between morphogenesis mediated by UV-B damage and a *bona fide* UV-B receptor such as UVR8 may turn out to be arbitrary.

A final coincidence rounds out the discovery and what can be expected in the future. The authors of the *Science* paper have roots in two leading plant photomorphogenesis laboratories, that of **Eberhard Schäfer** at the University of Freiberg and **Gareth Jenkins** at the University of Glasgow. So a dimerization of science traditions was required to discover this de-dimerizing photoreceptor. Given the difficulty of this achievement, it may take equally ambitious combinations of resources to find the next UV-B photosensory receptor.

**References:** (1) Rizzini L, Favory J-J, Cloix C,

Faggionato D, O'Hara D, Kaiserli E, Baumeister R, Schäfer E, Nagy F, Jenkins GI, Ulm R (2011) Perception of UV-B by the *Arabidopsis* UVR8 Protein. *Science* 332 103-106. (2) Gardner G, Lin C, Tobin EM, Loehrer H, Brinkman D (2009) Photobiological properties of the inhibition of etiolated *Arabidopsis* seedling growth by ultraviolet-B irradiation. *Plant Cell Env* 32 1573-1583. (3) Jenkins GI (2009) Signal transduction in responses to UV-B radiation. *Ann Rev Plant Biol* 60: 407-431.

-James Shinkle

## SolarFest 2011

### Middletown Springs, VT

SolarFest 2011 will be held on an 80-acre farm in the Green Hills of Tinmouth, Vermont. This year's event includes a three-day dawn-to-dusk conference on sustainable living and a concurrent trade show that features experienced alternative energy companies, green builders, architects, organic food producers, plus food vendors and dozens of crafts persons and artists displaying their wares. A music festival spotlighting two dozen of today's finest rock, bluegrass, folk, and blues bands will also fill the air.



Solar showers at SolarFest 2010.

This year's event is scheduled for Friday, July 15 to Sunday, July 17. The five educational subjects include Green Building, Renewable Energy, The Solar Generation (workshops for young people), Sustainable Agriculture, and Thriving Locally. All tracks begin on Friday afternoon with from three to five classes, followed by five to eight classes on Saturday and on Sunday. Workshops are held in five tents and outdoor demonstration areas and are presented by educators, trade professionals, authors, engineers, system designers, and builders.

Last year's keynote speaker was well-known environmentalist **Bill McCibben**. The keynote speaker this year is **Jeff Wolfe** of groSolar, a company that provides solar energy solutions for commercial and residential applications. Jeff will be on the main stage on Saturday to talk about renewable energy, our energy future, and cultural impediments to a clean energy future.

SolarFest was a recipient of a 2011 Vermont Governor's Award for Environmental Excellence. Since its inception, SolarFest has grown into a full-fledged educational conference, music festival, and trade show that draws thousands of participants from all over the northeast. An important reason for its popularity is that SolarFest is designed for families, and supervised classes and activities for children of all ages are scheduled each day of the festival.

Renewable solar energy installations will provide all of the electricity and hot water for SolarFest. SolarFest volunteers will be at these installations throughout the weekend to explain their construction, how they convert sunshine into electricity or heat – even on cloudy days – and to answer questions. Our continued efforts towards sustainability were demonstrated at last year's festival. The many thousands of attendees discarded only 90 pounds of unrecyclable refuse over three days.

A complete schedule and description of all entertainment, classes, demonstrations, and presenters is available at [www.solarfest.org](http://www.solarfest.org).

**-Patty Kenyon** (Managing Director, SolarFest Inc.)

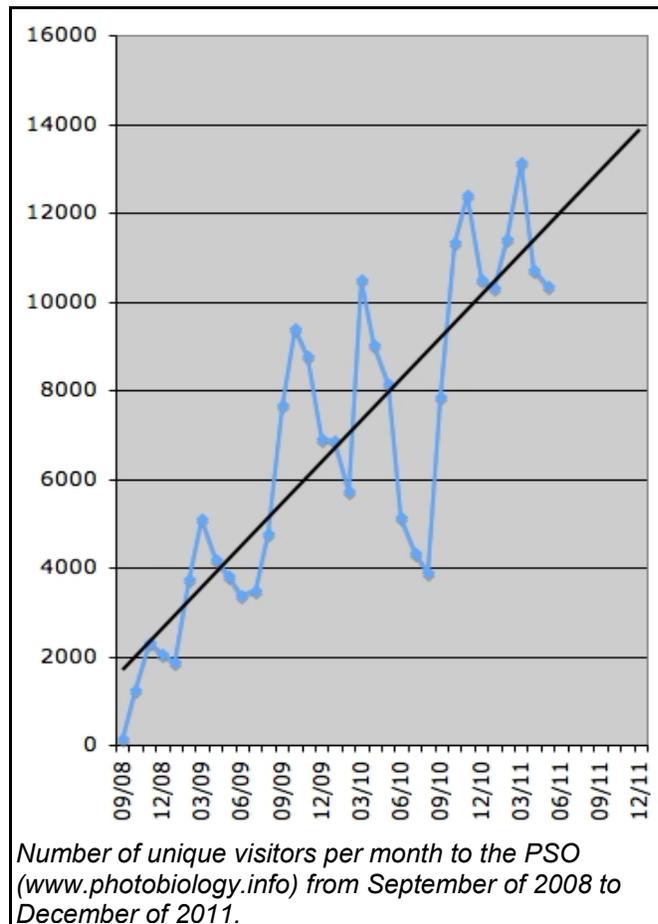
## Photobiological Sciences Online

The first publication of Photobiological Sciences Online (PSO, [www.photobiology.info](http://www.photobiology.info)) was in September of 2008. We now have 82 modules in 13 major areas of photobiology (bioluminescence, environmental photobiology, non-visual photoreception, photochemistry, photomedicine, photomorphogenesis, photomovement, photophysics, photosensitization, photosynthesis, spectroscopy, UV radiation photobiology, and vision). There is also an Introduction Section

(e.g., What is Photobiology?), and a section of Historical Vignettes in Photobiology.

Other sections are: How to Cite Modules, Experiments, Suggested Reading, Help For This Website, Editorial Advisory Board, User Statistics, History of PSO, and Animations for Science.

There are currently more than 10,000 unique visitors each month, and this number doubles every 12-13 months (see below).



The recently-posted revised or new modules are:

Molecular Targets of Photosensitization. Some Biological Chemistry of Singlet Oxygen. Garry R. Buettner (Revised: 04/17/11)

UV Radiation and Spontaneous Mutagenesis. Kendric C. Smith (New: 05/04/11)

Critical Transfer Distance Determination Between FRET Pairs. Antonie J.W.G. Visser, Eugene S. Vysotski, and John Lee (New: 05/30/11 [Experiment])

Light Coherence: Is this Property Important for

Photomedicine? Tiina Karu (New: 06/04/11)

-**Kendric C. Smith** (PSO Editor and Webmaster)

## Research by ASP Members

### The Vitamin D Debate

The ultraviolet radiation of sunlight has positive effects and negative effects on human health. It induces vitamin D synthesis, but can also damage the skin and cause various forms of skin cancer.

The May/June 2011 issue of *Photochemistry and Photobiology* features an article by **Ann Webb and colleagues** from the University of Manchester (United Kingdom) that attempts to determine optimal sunlight exposure times (The Vitamin D Debate: Translating Controlled Experiments into Reality for Human Sun Exposure Times. *Photochem Photobiol* 2011; 87: 741-45). The results of their modeling and experimental data indicate that "relatively short exposures of a modest amount of unprotected skin to summer sunlight in northern climes, on a regular basis during lunchtime hours, increases vitamin D to sufficiency status ( $\geq 20$  ng/mL) in the white Caucasian population."

### Blue Light Effects in Biology

The May/June issue of *Photochemistry and Photobiology* features a Symposium-in-Print on blue light effects in biology. This series includes an introductory review by ASP members **Aba Losi and Wolfgang Gärtner** (Old chromophores, new photoactivation paradigms, trendy applications: Flavins in blue light-sensing photoreceptors. *Photochem Photobiol* 2011; 87: 491-510) and nine research papers.

The currently known blue light photoreceptors in plants are the cryptochromes, phototropins, Zeitlupe (ZTL), LOV Kelch Protein 2 (LKP2), and Flavin-binding Kelch F-box1 (FKF1), all of which are flavin-based proteins. The papers in the current Symposium-in-Print focus on the phototropins, proteins with a light-oxygen-voltage (LOV) domain, and the Blue Light Sensing Using FAD (BLUF) proteins, a recently discovered group that occurs in Euglenoids and Bacteria. The specific topics include proton-coupled electron transfer in BLUF receptors, the primary

photophysics of the phototropin LOV2 domain, and light-induced germination of spores in a red-tide diatom.

-**PAE** (modified from ASP web site)

## New Sunscreen Rules

The Food and Drug Administration (FDA) recently mandated sunscreen manufacturers to change the marketing terms on their labels. These new rules aimed to clarify the meaning of the sun protection factor (SPF) and to urge manufacturers to provide products that protect against UV-A and UV-B radiation. The new rules will go into effect in one year.

Drug Facts	
<b>Active Ingredients</b> Avobenzone 3% Homosalate 10% Octyl methoxycinnamate 7.5%	<b>Purpose</b> Sunscreen
<b>Uses</b> <ul style="list-style-type: none"><li>• helps prevent sunburn</li><li>• if used as directed with other sun protection measures (see <b>Directions</b>), decreases the risk of skin cancer and early skin aging caused by the sun</li></ul>	
<b>Warnings</b> <b>For external use only</b> <b>Do not use</b> on damaged or broken skin <b>When using this product</b> keep out of eyes. Rinse with water to remove. <b>Stop use and ask a doctor</b> if rash occurs <b>Keep out of reach of children.</b> If product is swallowed, get medical help or contact a Poison Control Center right away.	
<b>Directions</b> <ul style="list-style-type: none"><li>• apply liberally 15 minutes before sun exposure</li><li>• reapply:<ul style="list-style-type: none"><li>• after 40 minutes of swimming or sweating</li><li>• immediately after towel drying</li><li>• at least every 2 hours</li></ul></li><li>• <b>Sun Protection Measures.</b> Spending time in the sun increases your risk of skin cancer and early skin aging. To decrease this risk, regularly use a sunscreen with a broad spectrum SPF of 15 or higher and other sun protection measures including:<ul style="list-style-type: none"><li>• limit time in the sun, especially from 10 a.m. – 2 p.m.</li><li>• wear long-sleeve shirts, pants, hats, and sunglasses</li><li>• children under 6 months: Ask a doctor</li></ul></li></ul>	
<b>Inactive ingredients</b> aloe extract, barium sulfate, benzyl alcohol, carbomer, dimethicone, disodium EDTA, jojoba oil, methylparaben, octadecene/MA copolymer, polyglyceryl-3 distearate, phenethyl alcohol, propylparaben, sorbitan isostearate, sorbitol, stearic acid, tocopherol (vitamin E), triethanolamine, water	
<b>Other information</b> <ul style="list-style-type: none"><li>• protect this product from excessive heat and direct sun</li></ul>	
<b>Questions or comments?</b> Call toll free 1-800-XXX-XXXX	

Template of the label for sunscreens required by new FDA guidelines.

## New FDA Regulations for Sunscreens

Sunscreen products that are not broad spectrum or that are broad spectrum with SPF values from 2 to 14 will be labeled with a warning that reads: "Skin Cancer/Skin Aging Alert: Spending time in the sun increases your risk of skin cancer and early skin aging. This product has been shown only to help prevent sunburn, not skin cancer or early skin aging."

Water resistance claims on the product's front label must tell how much time a user can expect to get the declared SPF level of protection while swimming or sweating, based on standard testing. Two times will be permitted on labels: 40 minutes or 80 minutes.

Manufacturers cannot make claims that sunscreens are "waterproof" or "sweatproof, or identify their products as "sunblocks." Also, sunscreens cannot claim protection immediately on application (for example, "instant protection") or protection for more than two hours without reapplication, unless they submit data and get approval from FDA. (from [www.fda.gov](http://www.fda.gov))

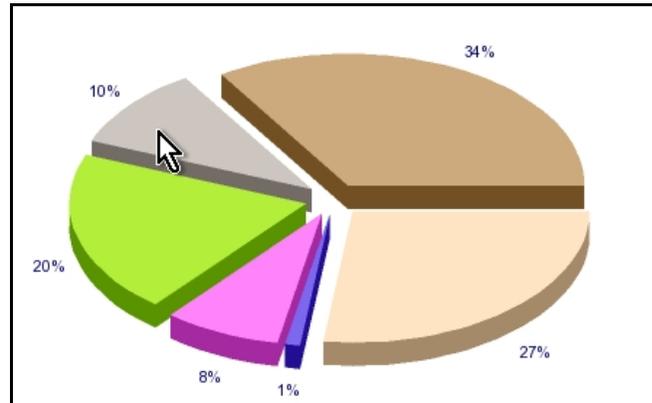
-PAE

## ASP Homepage Visitors

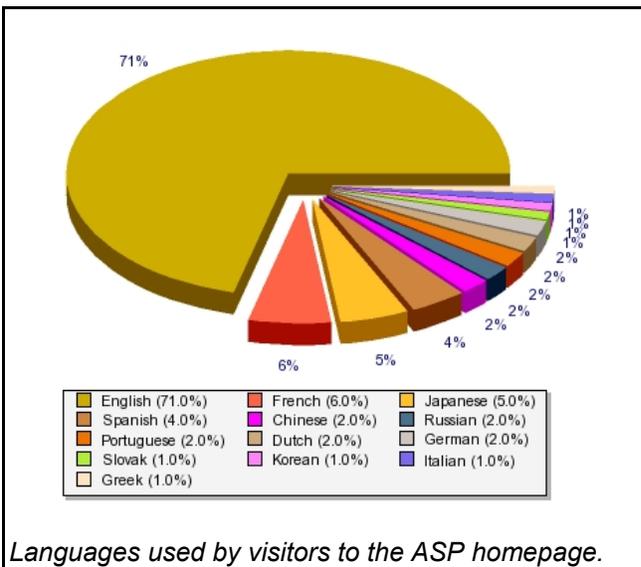
April 12 to July 1, 2011



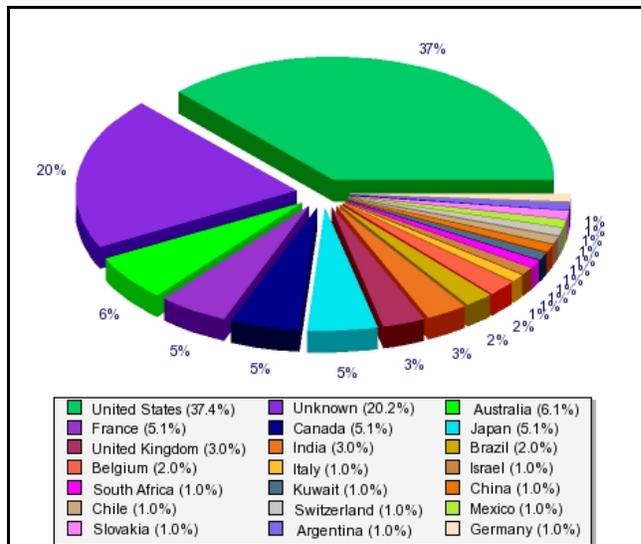
Most recent 100 visitors to the ASP homepage as of 12-noon July 1 (red: most recent visitor, green: most recent 10 visitors, white: most recent 100 visitors).



Browsers used to visit the ASP homepage (Firefox: 34%, Safari: 27%, Internet Explorer-8: 20%, Internet Explorer-9: 10%, Internet Explorer-7: 8%, Opera: 1%)



Languages used by visitors to the ASP homepage.



Nationalities of visitors to the ASP homepage.

# Photobiology Events

**Interactive Map/Table:**  
[www.pol-us.net/meetings.html](http://www.pol-us.net/meetings.html)

## **Jul 9-15, 2011**

GRC: Photochemistry  
Easton MA (USA)  
Web site: [www.grc.org](http://www.grc.org)

## **July 15-17, 2011**

SolarFest  
Tinmouth VT (USA)  
Web site: [www.solarfest.org](http://www.solarfest.org)

## **Jul 24-28, 2011**

ICTPPO-2011  
Berlin (Germany)  
Web site: [ewww.mpi-muelheim.mpg.de/ictppo2011](http://ewww.mpi-muelheim.mpg.de/ictppo2011)

## **Jul 30-Aug 1, 2011**

5th Asia and Oceania Conference on Photobiology  
Nara (Japan)  
Web site: [www.med.osaka-u.ac.jp/pub/radbio/www/AOCP2011/index-jp.html](http://www.med.osaka-u.ac.jp/pub/radbio/www/AOCP2011/index-jp.html)

## **Aug 6-10, 2011**

Plant Biology 2011  
Minneapolis MN (USA)  
Web site: [my.aspb.org/?page=Meetings\\_Annual](http://my.aspb.org/?page=Meetings_Annual)

## **Aug 7-11, 2011**

25th International Conference on Photochemistry  
Beijing (China)  
Web site:  
[www.conferencenet.org/conference/ICP2011.htm](http://www.conferencenet.org/conference/ICP2011.htm)

## **Aug 21-25, 2011**

SPIE Optic+Photonics  
San Diego, CA (USA)  
Web site: [spie.org/x30491.xml](http://spie.org/x30491.xml)

## **Aug 28-Sep 1, 2011**

14th International Congress of Radiation Research  
Warsaw (Poland)  
Web site: [www.icrr2011.org/main/article/ptbr](http://www.icrr2011.org/main/article/ptbr)

## **Sep 2-7, 2011**

ESP Congress  
Geneva (Switzerland)  
Web site: [www.esp-photobiology.it](http://www.esp-photobiology.it)

## **Nov 14-15, 2011**

Can Solar Power Deliver?  
London (England)  
Web site: [royalsociety.org/events/solar-power/](http://royalsociety.org/events/solar-power/)

## **Jan 21-26, 2012**

SPIE Photonics West  
San Francisco, CA (USA)  
Web site: [spie.org/x2584.xml](http://spie.org/x2584.xml)

## **Jan 21-27, 2012**

GRC: Photosensory receptors & signal transduction  
Galveston, TX (USA)  
Web site: [www.grc.org](http://www.grc.org)

## **Apr 16-20, 2012**

SPIE Photonics Europe  
Brussels (Belgium)  
Web site: [spie.org/x12290.xml](http://spie.org/x12290.xml)

## **Jun 3-8, 2012**

GRC: Multiphoton Processes  
June 3-8, 2012  
South Hadley, MA (USA)  
Web site: [www.grc.org](http://www.grc.org)

## **Jun 23-27, 2012**

GRC: Photosensory Receptors and Signal Transduction  
Galveston, TX (USA)  
Web site: [www.grc.org](http://www.grc.org)

## **June 23-27, 2012**

ASP-2012: 36<sup>th</sup> ASP Meeting  
Delta Center-Ville  
Montreal (Canada)  
Web site: [www.asp2012.org](http://www.asp2012.org)

## **Jul 7-13, 2012**

GRC: Photosynthesis  
Davidson, NC (USA)  
Web site: [www.grc.org](http://www.grc.org)

## **Jul 20-24, 2012**

Plant Biology 2012  
Austin TX (USA)  
Web site: [my.aspb.org/events/event\\_list.asp](http://my.aspb.org/events/event_list.asp)

## **Oct 21-26, 2012**

IPMB-2012: 10<sup>th</sup> International Congress on Plant  
Molecular Biology  
Jeju City (Korea)  
Web site: [www.ipmb2012.org/main.html](http://www.ipmb2012.org/main.html)

## **Jul 20-24, 2013**

Plant Biology 2013  
Providence, RI (USA)

**All Submissions to:**  
[ensmingr@twcnny.rr.com](mailto:ensmingr@twcnny.rr.com)

# American Society for Photobiology



*Lux et Vita* since 1972

The American Society for Photobiology promotes research in photobiology, integration of different photobiology disciplines, dissemination of photobiology knowledge, and provides information on photobiological aspects of national and international issues.

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**Fax: (785) 843-1274**

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Fax: \_\_\_\_\_

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## Membership type:

\$45/yr Associate Member (student/post-doc; online access to *Photochem Photobiol*)

\$120/yr Member (online access to *Photochem Photobiol*)

\$228/2-yrs Member (online access to *Photochem Photobiol*)

\$160/yr Member (printed version and online access to *Photochem Photobiol*)

\$308/2-yrs Member (printed version and online access to *Photochem Photobiol*)

\$40/yr Emeritus (printed version and online access to *Photochem Photobiol*)

\$0/yr Emeritus (online access to *Photochem Photobiol*)

## Payment Type:

Check

Master Card

Visa Credit

AMEX

Credit Card Number \_\_\_\_\_

Card Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_



# 36<sup>th</sup> Meeting of The American Society for Photobiology (ASP 2012)

[http://www.pol-us.net/ASP\\_Home/index.html](http://www.pol-us.net/ASP_Home/index.html)



June 23-27, 2012

Delta Center-Ville, Montréal, Canada

Chairs:



**Tayyaba Hasan**

Massachusetts General Hospital  
Harvard Medical School



**David Mitchell**

University of Texas MD Anderson  
Cancer Center



## ***Topics include***

- Emerging Technologies in Photobiology
- Photobiology in Extreme Environments
- Artificial Tanning: Risks and Benefits
- Oxygen Effects and Optical Probes
- UVA, Sunscreens and Melanoma
- Magnetomotive optical imaging
- Photochemical Internalization
  - DNA Damage and Repair
  - Photodynamic Therapy
    - Nanotechnology
    - Optogenetics

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## ***Networking Events***

- Mentoring Lunch
- ASP-ESP Symposium
- Posters, Prizes, Reception
- NIH Grant Writing Workshop
- Associate Member Travel Awards
- Banquet, Entertainment and Awards

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## ***Enjoy Montreal Attractions and Jazz Festival***

Festival International de Jazz de Montréal - June 28 - July 7, 2012