ASP NEWS

Winter 2020 vol. 49 (1)

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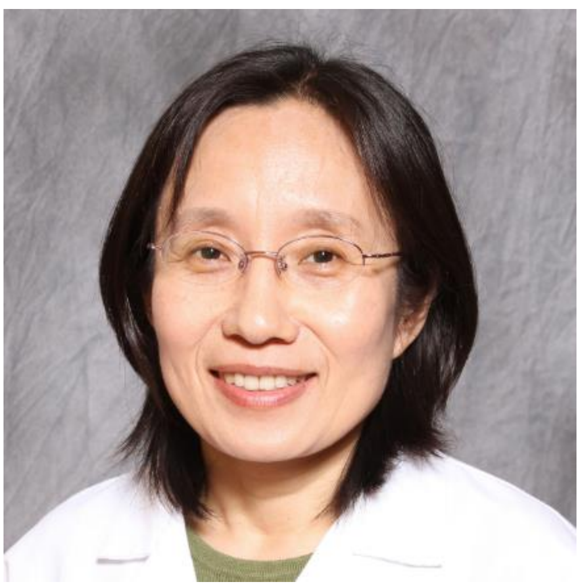
President's Note



Dear ASP colleagues and friends,

Wish you all have had a great holiday! On behalf of the EC, I would like to give you a few exciting updates.

The 40th ASP 2020 meeting, Chicago, June 27-30, 2020

The 40th ASP 2020 Biennial meeting is right around the corner! With the help of the co-chairs and the organizing committee, we have put together an exciting program, including cutting-edge symposia on a wide range of topics. Sessions will address recent advances in photochemistry, photophysics, photobiology, photomedicine, and phototechnology. Please mark your calendar, submit your abstracts, and register for the meeting. For details, please visit the meeting website: http://burkclients.com/ASP/meetings/2020/site/.

The 41th ASP 2022 meeting, Albuquerque, April 9-12, 2022

Thanks to the hard work of Alec Greer, President-Elect, and Lori Strong at the ASP headquarter, we are pleased to announce the 41st American Society for Photobiology (ASP) meeting, which will be held in Albuquerque, New Mexico on April 9-12, 2022. We are delighted bring together photoscientists who work in a variety of areas, including photobiology, photochemistry, photomedicine, dermatology, and phototoxicity. The ASP

Annual Meeting is a unique venue to network and meet scientists from the academic, government, and medical communities throughout the world. The meeting is small enough (usually 300-400 attendees) to provide an intimate and informal opportunity to discuss aspects of the interest to the these communities.

ASP elections

Thanks to the hard work from Georg Wondrak, Past President, and the nomination committee, we also wish to mention the upcoming ASP 2020 elections. As of our ASP 2020 meeting in June, six new council members will take office (each for a 4 year term). Furthermore, a new 'ASP President Elect' and new 'ASP Secretary' will take office. The deadline for nominations for ASP council members has passed, which was on February 18. There is still time to nominate an individual or yourself for President Elect or Secretary, to do so please submit a brief scientific CV, an ASP-directed vision statement, and at least one letter of support by March 31 to: Headquarters@Photobiology.org

The ASP nominations committee is chaired by ASP Past President Georg Wondrak. The online election will take place by ASP membership and is scheduled for late March/early April 2020. For further information on the duties of ASP officers, please see the constitution, bylaws and policies online: http://photobiology.org/?page_id=74.

We look forward to seeing all of you at the ASP 2020 meeting in Chicago.

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We need YOU!

Please submit content (science highlights, suggested links, personal stories, etc) to ASP News.
Email: jflovell@buffalo.edu

Far Red Photosynthesis

Some 3 billion years ago, tiny organisms known as cyanobacteria helped create an oxygen-rich atmosphere on Earth. Their activities, which continue to the present day, provide an essential ingredient for all advanced life. Such organisms convert radiant sunlight into useable energy through photosynthesis, yet scientists are still sketchy on the details of this vital process.

New investigations of photosynthesis demonstrate that certain types of cyanobacteria are able to acclimate to faint, long-wavelength light not normally captured by plants and other species of cyanobacteria. This ability gives these living forms an adaptive edge in environments where direct sunlight is limited. Some species of cyanobacteria can perform a surprising feat. When deprived of direct sunlight, they are able to use long-wavelength light to carry out photosynthesis. Such organisms acclimate to the far-red light by switching from their normal form of chlorophyll —chlorophyll a — to an alternate form, chlorophyll f. This allows absorption of light with wavelengths above 680 nm.

Many species of cyanobacteria are common in both aquatic and terrestrial environments. When they find themselves obscured by other organisms, for example, beneath a pond surface or on a forest floor, some are able to acclimate, harvesting the weaker sunlight filtering down to them and using it to drive photosynthesis.

The talent of cyanobacteria for modifying their own architecture and gathering far red light from their environment highlights the remarkable adaptive and acclimation mechanisms present throughout nature. This newly discovered ability in some microorganisms could one day be harnessed to engineer crops that thrive under shaded conditions and may inspire innovations in sustainable energy. The findings appear in Science Advances.

Cyanobacteria represent about 50% of all earthly photosynthetic activity or primary production — supplying an oxygen-rich atmosphere conducive to life and a rich food supply for aquatic life. Cyanobacteria are so plentiful and ubiquitous across the earth that they reign above all existing plant life in terms of generating oxygen, making them the most important primary producers on the planet. Their ability to thrive in virtually any environmental niche and their simple growth requirements allow them to flourish in astonishing abundance.

The study focused on Fischerella thermalis, a terrestrial cyanobacterium that has been used in the past as a model organism for the study of photosynthesis. When such cyanobacteria are deprived of the white light most conducive to their growth and photosynthetic activities, they shift gears in order to process far-red light.

The complex machinery of photosynthesis is carried out in two primary reaction centers, known as photosystem I and photosystem II, (PSI and PSII). The current study focuses on PSI, teasing out the alterations in F. thermalis that permit it to access and use far red-light for photosynthesis.

In the case of F. thermalis, its usual complement of chlorophyll, known as chlorophyll a, is partially replaced under far-red light conditions with a closely related yet chemically distinct form of the molecule, known as chlorophyll f. It is this alternate form of chlorophyll that enables F. thermalis to harvest and use far-red light to continue photosynthetic activities. By synthesizing and incorporating around 8% chlorophyll f into their photosystem I (PSI) complexes, F. thermalis is able to carry out photosynthesis using far-red light of up to nearly 800 nm. Research suggests that perhaps 25% of all cyanobacteria can access and use far-red light for photosynthesis. This would imply that a significant portion of net primary production on Earth is a direct result of this unusual adaptation.

F thermalis

Using Cryo-EM, the researchers were able to solve the structure of PSI, revealing the locations of chlorophyll f molecules present in F. thermalis responsible for far-red light acclimation.

Further afield, a better understanding of far-red light acclimation in cyanobacteria could also inform a new generation of synthetic light-harvesting technologies like photovoltaics, potentially increasing their versatility under varying sunlight conditions.

Source: Arizona State University

ASP NEWS

Published Quarterly by the American Society for Photobiology

www.photobiology.org

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Squid-derived Sunscreen?

A new method of concocting sunscreen gives a whole other meaning to "natural": modeling it after the built-in UV protection in squid.

Northeastern's Camille Martin, a former graduate student, and Leila Deravi, assistant professor of chemistry and chemical biology, are working to recreate a sun-blocking chemical that naturally occurs in cephalopods, a species that includes squid, octopuses, and cuttlefish.

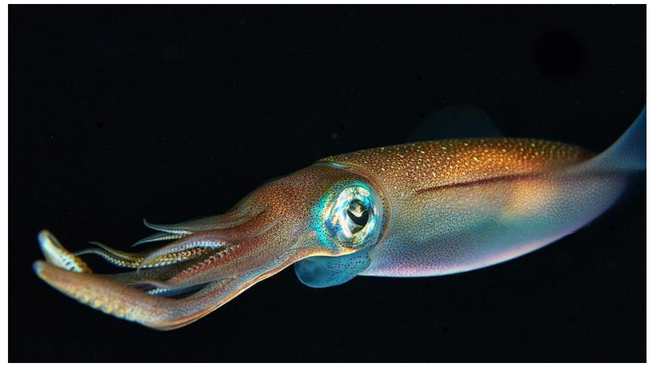
"In the last 20 years, people started to get a little bit more conscious," says Martin. But to put consumers at ease about what they're putting on their skin, what better than a trait bestowed by evolution? "We are really looking forward to getting this out," she says.

Deravi, who runs Northeastern's Biomaterials Design Group, had already been studying cephalopods, but specifically their ability to camouflage and send signals with color. As it turns out, she says, the secret behind the longfin squid's color-changing abilities, a chemical called xanthommatin, can also block ultraviolet light. Being able to extract and isolate this pigment (and then eventually synthesize it, a recent feat of the group) means this material could eventually be incorporated into sun-blocking products.

Currently, only two types of sunscreen are commercially available, and each has pitfalls. Chemical-based sunscreen is meant to be absorbed by the skin, but a May 2019 study by the Center for Drug Evaluation and Research found that four common chemicals seep into the bloodstream, too; not only that—they accumulate in amounts high enough to necessitate further safety testing by the U.S. Food and Drug Administration.

The other option is mineral sunscreen. As popularized by lifeguards with bright white noses, it's just that: bright white. It's chalky, unsubtle, and rubs off on basically everything you touch.

Deravi and Martin are setting the stage for a third option, one that could take countless forms, since xanthommatin essentially corrals the qualities of chemical and mineral sunscreen into one package.



"It's not just absorbing UV radiation; it's really scattering light," says Martin. "That provides another mechanism of protection that is not found in other commercially available UV filters."

The regulatory pipeline is a long one—according to Deravi, the last time the FDA approved a UV filter was in the 1970s—but tests that the Biomaterials Design Group is completing are yielding promising results.

"Not only are we saying that it's really effective as a pigment," says Martin. "We can also now say that it's safe in our system when we're looking at the in vitro models." The next step for Deravi and Martin is to study how xanthommatin behaves in an in vivo model, an environment that more closely resembles the human body as a whole.

Before landing on this project, and never abandoning a love of cosmetics throughout her studies, Martin met with various professors to learn about their labs and find the right fit.

As Martin recalls, during a presentation Deravi was giving on her work with color-changing animals, she revealed a nascent goal: figuring out how to apply the materials she studies to cosmetics and skin care.

Martin's first thought? "This is a great match." Yeah—no squidding.

The work was published in Chemical Communications.

Source: Northeastern

Upcoming Photobiology Events

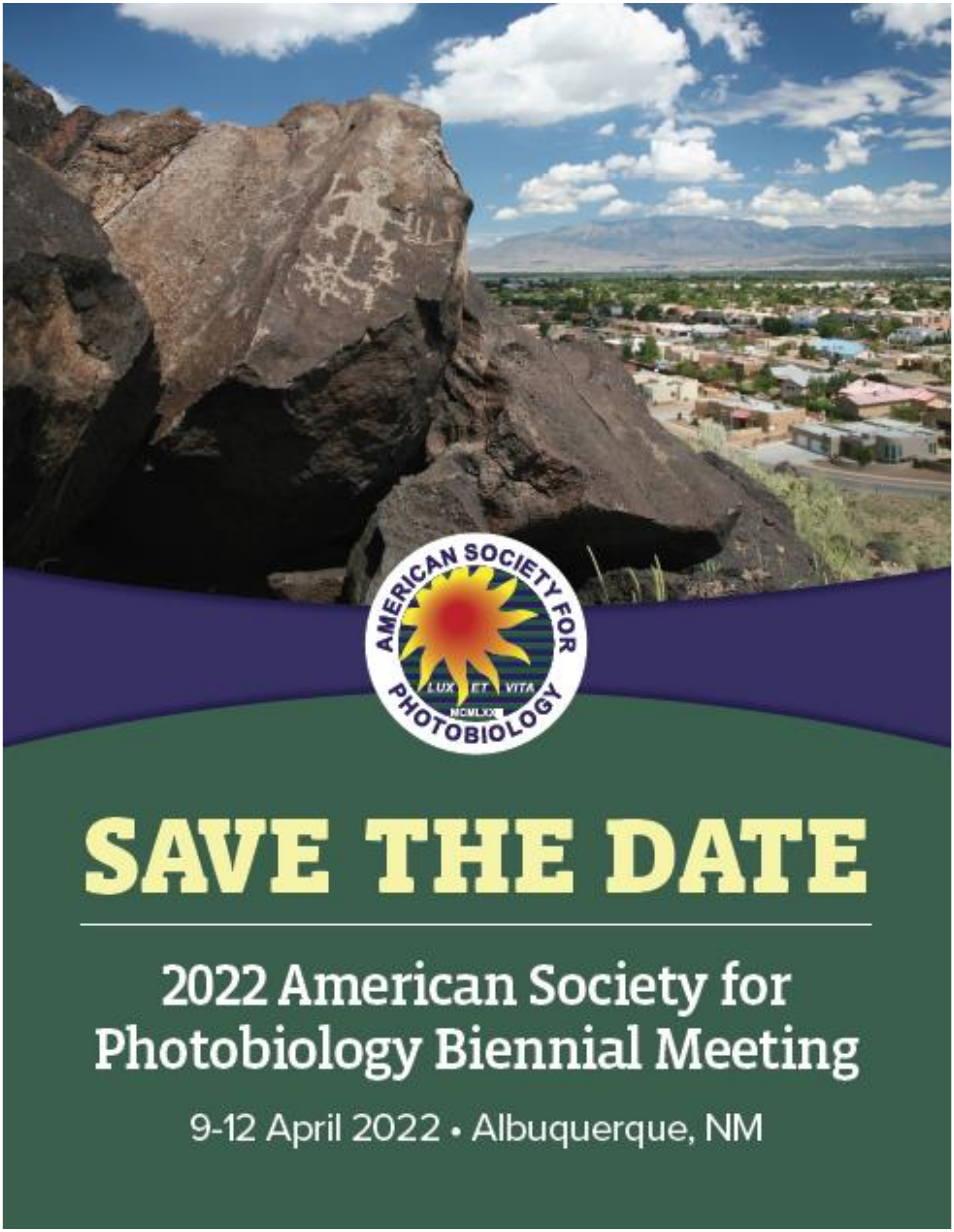
Jun 27-30, 2020, Chicago
ASP Biennial Meeting
http://burkclients.com/ASP/meetings/2020/site/

Jul 12-17, 2020, Amsterdam, Holland
28th IUPAC Symposium on Photochemistry
https://www.aanmelder.nl/iupac2020

Aug 2-7, 2020, Rotorua, New Zealand
International Congress on Photosynthesis Research 2020
http://www.ps2020.nz/home.html

Aug 6-9, 2020, Arlington, VA
NAALT/WALT 2020
https://www.naalt.org/event/naalt-walt-ald-2020/

October 26-30, 2020, Nancy, France
PDT2020
http://www.pdt2020.com/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SAVE THE DATE
2022 American Society for Photobiology Biennial Meeting
9-12 April 2022 • Albuquerque, NM