ASP NEWS

Fall 2015 **vol. 44 (4)**

IN THIS ISSUE

Winter Council Meeting

The date is set for the Winter Council Meeting to proceed on Saturday January 9th. All council members are encouraged to participate.

ASP 2016 is coming…

Mark your calendars for the 38th ASP scientific meeting May 21-26, 2016! The meeting will be held at the Tampa Marriott Waterside Hotel & Marina, Tampa FL, a breathtaking venue with all state of the art accommodations ensuring an enjoyable and productive meeting. We are expecting an absolutely vibrant conference covering all aspects of contemporary photobiology with 400+ attendees from all corners of the globe.

The abstract submission site opens on Dec. 1.

Visit the conference website (accessible via ASP homepage) to view the evolving schedule of outstanding symposia and invited speakers. Check often as we are updating information on an almost daily basis.

Confirmed Symposia:

Frontiers in ocular photobiology (E. Gaillard and T. Sarna, co-chairs)

Frontiers in skin photodamage and sun protection (G. Wondrak, chair)

Frontiers in molecular mechanisms of skin photocarcinogenesis (Y. He, chair)

Excited states in cutaneous photodamage (D. Brash, chair)

Frontiers in DNA bipyrimidine damage and repair (J. Cadet, chair)

Nitric Oxide-Mediated Photobiological Responses (A. Girotti, chair)

2016 Photobiology Science Fair for HS students (F. Gasparro, chair)

Frontiers in Optical Imaging (R. Choe, chair)

Frontiers in Clinical Photodiagnosis and Photodynamic Therapy (C. Simone, chair)

Frontiers in Photophysics and Biomedical Applications (S. Kanick and B. Spring, co-chairs)

Current Trends in Photochemistry and Imaging (A. Greer and L. Kelly, co-chairs)

Symposium in honor of Jack Saltiel (I. Alabugin and E. Gaillard, co-chairs)

Confirmed Keynote Speakers/Symposia:

Keynote speaker:
Doug Brash, Yale University

Kendric C. Smith Interdisciplinary Symposium in Photobiology:
Carlos Crespo, Case Western Reserve University
Mary Harrington, Smith College

ASP/ESP Joint Symposium:
"Combinational Approaches in PDT" Theresa Busch (University of Pennsylvania, ASP co-chair) and Arjan Griffioen (VU University Medical Center Amsterdam, ESP co-chair)

-Beth Gaillard

Awards

The American Society for Photobiology makes several awards at Society meetings. Nominations are now open for these awards. The individuals must be ASP members at the time of award acceptance.

Awards are selected by the Awards Committee, as noted below.

1. The ASP Research Award

This award recognizes individuals who have made significant contributions with major impact in the fields of photomedicine, photobiology, photochemistry, and/or photophysics. The recipient is asked to present a lecture at the ASP meeting.

Each submitted nomination should include:

(i) A signed nomination letter by an ASP member describing the candidate and major accomplishments that justify consideration.
(ii) An updated CV.
(iii) Additional letters emphasizing the impact of the candidate's research. The individual must be an ASP member at the time of award acceptance and must agree to attend the biennial meeting and be present during the awards ceremony.

The award is $1000 plus travel (total not to exceed $1500) and a plaque.

Send nominations to dhkessel@med.wayne.edu

2. The ASP New Investigator Award

This award is intended to recognize research excellence in the fields of photomedicine, photobiology, photochemistry, and/or photophysics, typically carried out within the first ten years of obtaining the terminal academic degree. In exceptional cases senior scientists new to the photosciences will be considered. The recipient is expected to present an award lecture at the ASP Biennial meeting. Each nomination should include:

(i) A signed letter by an ASP member describing the candidate and major accomplishments that justify consideration for this award. Group/joint nomination letters are acceptable. This letter should address research accomplishments and likelihood of continued excellence of the candidate
(ii) An updated CV of the candidate.

The award is $1000 plus travel (not to exceed a total of $1500) and a plaque.

Send nominations to dhkessel@med.wayne.edu

3. The ASP Light Path Award

This award is intended to honor a researcher with substantial and innovative contributions to the fusion of photobiology with other disciplines, thus broadening the frontiers of photobiology. The award will be presented during the ASP meeting. Each submitted nomination should include:

(i) A signed nomination letter by an ASP member describing the candidate and major accomplishments that justify consideration for this award
(ii) An updated CV of the candidate.

The award consists of a plaque.

Send nominations to dhkessel@med.wayne.edu

4. The ASP Urbach Student Travel Awards

These were established in memory of Fred Urbach, ASP past-President. The award is intended to assist ASP students and post-docs with travel expenses in order to present a poster or presentation of their work to the ASP meetings. The award must be applied for and will consist of a cash award determined by the ASP Grants and Awards Committee. Students can be nominated for this award. The Awards committee will evaluate these and make decisions based in part on funds available.

Send nominations to dhkessel@med.wayne.edu

5. The ASP Editor's Student Research Award

This will honor an individual who has published outstanding research in P&P as the first author in 2013-2015, and must have been a graduate or undergraduate student at the time of submission. The research article must have been published in the specified period or (if not yet in print) must have been accepted by the journal and published online. The Award consists of $600 towards travel expenses to the ASP Biennial meeting and a Plaque. In order to be considered for this award, the following application package must be submitted by the applicant:

(i) A PDF file of research paper published in P&P in 2013-2015 indicating first authorship.
(ii) Brief documentation of student status at the time the original manuscript was submitted to P&P.
(iii) Letter of support written by the research advisor detailing the research contributions the applicant made as a graduate/undergraduate student.
(iv) Updated CV of the candidate.

The successful applicant will be selected jointly by members of the ASP Grants and Awards Committee and the P&P Editorial Board. The individual must be an ASP member at the time of the award acceptance.

Nominations for this award should be sent to dhkessel@med.wayne.edu.

6. The ASP Lifetime Achievement Award

This award recognizes the illustrious career of a senior researcher whose work has significantly advanced any of the research areas encompassed by the ASP. The recipient is selected by the President with the approval of Council. A suitable candidate is one who has devoted substantial time and effort on behalf of

ASP over a long period of time. The award consists of:

- A framed hand-drawn certificate
- A suitable gift (~$300, e.g., a sundial or kaleidoscope).
- A plaque containing the awardees' name, name of the award, year, the words "From the Membership", and the ASP logo.

This award is selected by the President/Council. Send nominations to:
keith.cengal@uphs.upenn.edu

7. The ASP Photon Award

This award was established to honor members who have made exceptional contributions and who have served the ASP above and beyond the call of duty.

Such contributions can include service on the ASP Council or as an Officer, involvement in ASP publications or any other service to the ASP deemed exemplary. The award, a statue of the sun god "Ra", is to be made on only when suitable recipients appears.

This award is selected by the President/Council. Nominations can be sent to keith.cengal@uphs.upenn.edu.

We need YOU!

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

The Rikli Award

On the subjects of awards, the Jörg Wolff Foundation has asked us to post the following solicitation:

For photobiological investigations in relation to human beings, we hereby announce the awarding of the Arnold Rikli Prize in the amount of 10,000 Euro.

The prize was originally awarded by the Institute F. Wolff of Riehen, Switzerland and first established in 1989. Jörg Wolff, the brother of the former sponsor, continues this tradition and the price is announced by the Jörg Wolff foundation every year since 2006.

The submitted reports should cover investigations on biological effects of optical radiation (ultraviolet, visible, and infrared radiation). The results should show new aspects for diagnostic investigation and/or therapy or provide guidelines for the practical utilization of biologic basics and/or future research with optical radiation.

Unpublished papers, or papers published after January 1, 2013, must be submitted in English or German language and be delivered to the office address mentioned above not later than March 31, 2016 (two copies required). The submission should focus on one area of specialty. An additional abstract of no more than 300 words should outline the research and the significance of it. In case that the submission is "in cumulo" (five studies at most) a brief explanation should be provided uniting the presentations together. It is desirable to enclose a letter of support for the award nomination.

An independent jury will evaluate the investigations and nominate the winner. The presentation of the award will take place at the 9th Symposium "Licht und Gesundheit", October 11 to 12, 2016 in Berlin (Germany).

Office address: Dr. Peter Bocionek
c/o JW Holding GmbH
Kölner Straße 8

D-70376 Stuttgart
Germany

Ancient rocks record first evidence for photosynthesis that made oxygen

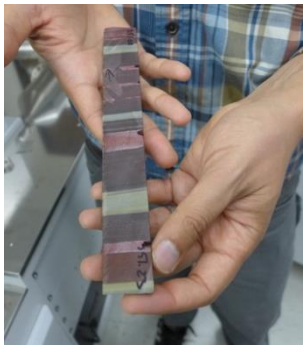
A new study shows that iron-bearing rocks that formed at the ocean floor 3.2 billion years ago carry unmistakable evidence of oxygen. The only logical source for that oxygen is the earliest known example of photosynthesis by living organisms, say University of Wisconsin-Madison geoscientists.

"Rock from 3.4 billion years ago showed that the ocean contained basically no free oxygen," says Clark Johnson, professor of geoscience at UW-Madison and a member of the NASA Astrobiology Institute. "Recent work has shown a small rise in oxygen at 3 billion years. The rocks we studied are 3.23 billion years old, and quite well preserved, and we believe they show definite signs for oxygen in the oceans much earlier than previous discoveries."

The most reasonable candidate for liberating the oxygen found in the iron oxide is cyanobacteria, primitive photosynthetic organisms that lived in the ancient ocean. The earliest evidence for life now dates back 3.5 billion years, so oxygenic photosynthesis could have evolved relatively soon after life itself. Until recently, the conventional wisdom in geology held that oxygen was rare until the "great oxygenation event," 2.4 to 2.2 billion years ago.

The rocks under study, called jasper, made of iron oxide and quartz, show regular striations caused by composition changes in the sediment that formed them. To detect oxygen, the UW-Madison scientists measured iron isotopes with a sophisticated mass spectrometer, hoping to determine how much oxygen was needed to form the iron oxides.

"Iron oxides contained in the fine-grained, deep sediment that formed below the level of wave disturbance formed in the water with very little oxygen," says first author Aaron Satkoski, an assistant scientist in the Geoscience Department. But the grainier rock that formed from shallow, wave-stirred sediment looks rusty, and contains iron oxide that required much more oxygen to form.



Aaron Satkoski holds a sample sawn from a 3.23-billion-year-old rock core sample found in South Africa. The bands show different types of sediment falling to the ocean floor and solidifying into rock.

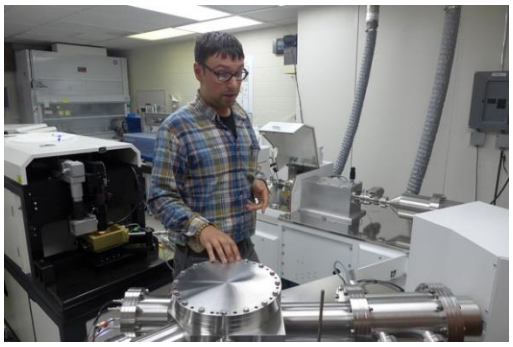
The visual evidence was supported by measurements of iron isotopes, Satkoski said. The study was funded by NASA and published in Earth and Planetary Science Letters.

The samples, provided by University of Johannesburg collaborator Nicolas Beukes, were native to a geologically stable region in eastern South Africa.

Because the samples came from a single drill core, the scientists cannot prove that photosynthesis was widespread at the time, but once it evolved, it probably spread. "There was evolutionary pressure to develop oxygenic photosynthesis," says Johnson. "Once you make cellular machinery that is complicated enough to do that, your energy supply is inexhaustible. You only need sun, water and carbon dioxide to live."

Other organisms developed forms of photosynthesis that did not liberate oxygen, but they relied on minerals dissolved in hot groundwater — a far less abundant source than ocean water, Johnson adds. And although oxygen was definitely present in the shallow ocean 3.2 billion years ago, the

concentration was only estimated at about 0.1 percent of that found in today's oceans.



He is pictured with the high-resolution mass spectrometer used to analyze rock samples from South Africa that push back the date for the first oxygenic photosynthesis to 3.23 billion years ago.

Confirmation of the iron results came from studies of uranium and its decay products in the samples, says co-author Brian Beard, a senior scientist at UW-Madison. "Uranium is only soluble in the oxidized form, so the uranium in the sediment had to contain oxygen when the rock solidified."

Measurements of lead formed from the radioactive decay of uranium showed that the uranium entered the rock sample 3.2 billion years ago. "This was an independent check that the uranium wasn't added recently. It's as old as the rock; it's original material," Beard says.

"We are trying to define the age when oxygenic photosynthesis by bacteria started happening," he says. "Cyanobacteria could live in shallow water, doing photosynthesis, generating oxygen, but oxygen was not necessarily in the atmosphere or the deep ocean."

However, photosynthesis was a nifty trick, and sooner or later it started to spread, Johnson says. "Once life gets oxygenic photosynthesis, the sky is the limit. There is no reason to expect that it would not go everywhere."

-source: David Tenenbaum, UW-Madison

Pineapple genome offers insight into photosynthesis in drought-tolerant plants

By sequencing its genome, scientists are homing in on the genes and genetic pathways that allow the juicy pineapple plant to thrive in water-limited environments. The new findings, reported in the journal Nature Genetics, also open a new window on the complicated evolutionary history of grasses like sorghum and rice, which share a distant ancestor with pineapple.

Humans have cultivated pineapple for more than 6,000 years, beginning in present-day southwest Brazil and northeast Paraguay. Today, more than 85 countries produce about 25 million metric tons of pineapple fruit each year, with a gross production value approaching $9 billion.

Like many plants, the ancestors of pineapple and grasses experienced multiple doublings of their genomes. Tracking the remnants of these "whole-genome duplications" in different plant species helps researchers trace their shared - and independent - evolutionary histories.

Plant biology professor Ray Ming led an international team that sequenced the pineapple genome.

"Our analysis indicates that the pineapple genome has one fewer whole genome duplication than the grasses that share an ancestor with pineapple, making pineapple the best comparison group for the study of cereal crop genomes," said University of Illinois plant biology professor Ray Ming, who led the multi-institutional pineapple genome sequencing effort. The work uncovered evidence of two whole-genome duplications in the pineapple's history, and validated previous findings of three such duplications in grasses.

Photosynthesis converts solar energy to chemical energy, allowing plants to build the tissues that sustain life on Earth. Pineapple makes use of a special type of photosynthesis, called crassulacean acid metabolism, or CAM, which has evolved

independently in more than 10,000 plant species. Pineapple is the most economically valuable plant among those 10,000 species, Ming said.

Most crop plants use a different type of photosynthesis, called C3.

"CAM plants use only 20 percent of the water used by typical C3 crop plants, and CAM plants can grow in dry, marginal lands that are unsuited for most crop plants," said Ming, who is a faculty member in the Carl R. Woese Institute for Genomic Biology at the U. of I.

A closer look at the pineapple genome revealed that some genes that contribute to CAM photosynthesis are regulated by the plant's circadian clock genes, which allow plants to differentiate day and night and adjust their metabolism accordingly.

"This is the first time scientists have found a link between regulatory elements of CAM photosynthesis genes and circadian clock regulation," Ming said. "This makes sense, because CAM photosynthesis allows plants to close the pores in their leaves during the day and open them at night. This contributes to pineapple's resilience in hot, arid climates, as the plant loses very little moisture through its leaves during the day."

CAM photosynthesis allows the plant to absorb and "fix carbon dioxide into molecules during the night, concentrate it in its leaves and release it the next day for photosynthesis," Ming said.

"Drought is responsible for the majority of global crop loss, so understanding the mechanisms that plants have evolved to survive water stress is vital for engineering drought tolerance in crop species," the researchers wrote. "CAM plants can keep their stomata closed during the daytime... greatly reducing water loss."

CAM and C4 photosynthesis, which is common among grasses, use many of the same enzymes to concentrate carbon dioxide in plant leaves, the researchers report. Other plants, such as soybeans, use the less efficient C3 photosynthesis, which lacks the CO_2-concentrating mechanisms of C4 and CAM photosynthesis.

The team discovered that CAM photosynthesis evolved by reconfiguring molecular pathways involved in C3 photosynthesis.

"All plants contain the necessary genes for CAM photosynthesis, and the evolution of CAM simply requires rerouting of pre-existing pathways," they wrote.

Understanding the evolution of these different types of photosynthesis will help scientists in their efforts to develop more productive, drought-tolerant varieties of essential crops, Ming said.

For example, the U.S. Department of Energy has funded a project to explore the genetic mechanisms that enable CAM photosynthesis and drought tolerance in desert-adapted plants - with the aim of introducing those traits to potential biofuels crops.

Adapting food crops to be more tolerant of drought will also help humans adapt to climate change, Ming said.

"Higher water-use efficiency is a highly desirable trait, given the need to double food production by 2050 in the context of a changing climate," he said.

The National Science Foundation, the U.S. National Institutes of Health and the U.S. Department of Energy supported this research.

-source: Diana Yates, Illinois.edu

Upcoming Photobiology Events

ASP 38: May 21-25, 2016, Tampa Bay

The time and place has been set! Mark your calendar and plan on joining ASP for the next conference. We will highlight the upcoming meeting and the destination in the newsletter.

Conference details are available online:
http://photobiology.org/2016minisite/

December 7-11, 2015
3rd International Conference on UV and Skin Cancer Prevention
Melbourne, Australia
http://uvandskincancer2015.org/

January 3-6, 2016
25th Western Photosynthesis Conference
Tabernash, Colorado
https://conferencereg.colostate.edu/WPM2016

March 3, 2016
25th Annual Meeting of the Photomedicine Society
Washington, DC
http://www.photomedicine.org/currentmeeting.php

March 30- April 3, 2016
American Society for Lasers, Medicine & Surgery 36th Annual Meeting
Boston, MA
http://www.aslms.org

April 26-29, 2016
European Networks Conference on Algal and Plant Photosynthesis
Qawra, Malta
http://encapp2016.eu/home/

May 29 – June 2, 2016
19th International Symposium on Bioluminescence and Chemiluminescence
Tsukuba, Japan
http://isbc2016.com

September 1-4, 2016
7th International Conference on Oxidative Stress in Skin Medicine and Biology
Andros, Greece
http://oxstress.pharm.uoa.gr/

October 24-28, 2016
Photodynamic Therapy and Photodiagnosis
Nancy, France
http://www.pdt2016.com/

August 7-12, 2016
The 17th International Congress on Photosynthesis Research
Maastricht, Netherlands
http://www.ps2016.com