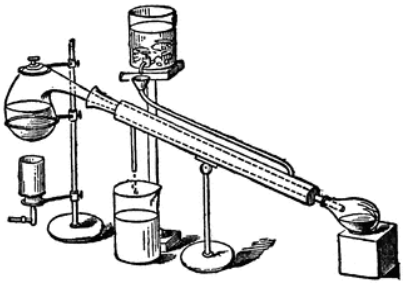
SOUTHWEST RETORT



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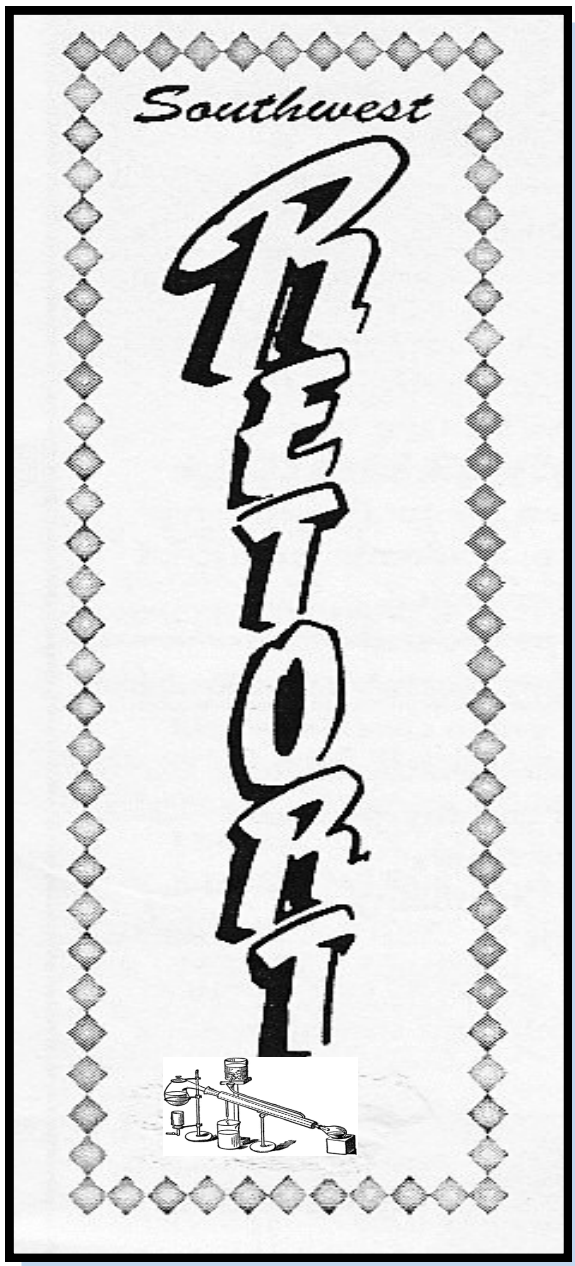

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FIFTY YEARS AGO IN *THE SOUTHWEST RETORT*

The ACS tour speakers for January are **Dr. Herbert H. Hyman** from Argonne National Laboratory and **Dr. Herman S. Kaufman** from Teaneck, New Jersey. Dr; Hyman's talk will be on "The Chemistry of Nobel Gases," while Dr. Kaufman will speak about "Plastics Have Come of Age---What Now?".

Member of the ACS Ark-La-Tex local section have voted on separating into two new sections. The Texas members voted 35 to 8 in favor of forming an East Texas Section. The Louisiana members voted 31 to 8 in favor of forming two new sections, one in Lousiana.

In the Central Texas ACS Section at the University of Texas at Austin, **Dr. Rowland Pettit** has been appointed the new Chair of the Chemistry Department, succeeding **Dr. William Shive**. **Dr. Ben Shoulders** was the official representative of the Central Texas Section to the Southwest Regional ACS Meeting. **Dr. Michael Dewar** was the Barton Lecturer at the University of Oklahoma in November. **Dr. George Watt** attended the meeting of the ACS Board of Directors held in Washington, D.C. in December.

In the Southeastern Texas ACS Section, two short courses are going to be offered at Rice University in February. **Prof. Fred W. McLafferty** of Cornell will teach a course on "Interpretation of Mass Spectra," while **Dr. Edwin D. Becker** of NIH will teach "Intermediate NMR Spectroscopy." At Esso's research facility in Baytown, new employees are **Drs. Edward F. Johnson, Richard J. Holt,** and **Charles S. Speed. Dr. Thomas Aczel** has been promoted to Research Associate. He is currently working on analytical mass spectrometry.

In the Dallas-Fort Worth ACS Section, Texas Woman's University has been awarded an NSF grant of $41,680 to support a Summer Institute in Analytical Instrumentation under the direction of **Dr. Norman G. Foster**. The eight week program will allow college chemistry teachers the opportunity to select from four two-week all day "total immersion" courses from the areas of UN-visible spectrophotometry, infrared spectrophotometry, mass spec, proton NMR, atomic absorption, gas-liquid chromatography, neutron activation, and emission spectroscopy. At UT-Dallas **Drs. Harold Werbin** and **David Creed** attended the ACS Southwest Regional Meeting in Tulsa.

In the Texas A&M ACS Section, **Dr. Henry Eyring** of the University of Utah presented both a general lecture and a technical lecture in November. Faculty member **Dr. Kurt J. Irgolic** has received a $8200 research grant from the Selenium-Tellurium Development Association.

At Baylor Welch Professor **Dr. Malcolm Dole** attended the second United States-Japan Conference on Radiation Chemistry held in Hakone, Japan, in November.

Compiled by E. Thomas Strom

From the ACS Press Room

BPA Activates Immune Response in Mice that Passes Down Through Generations

"Bisphenol A Activates an Innate Viral Immune Response Pathway"

Journal of Proteome Research

Some plastic food and beverage containers still contain bisphenol A (BPA), which can mimic the hormone estrogen. Although experts say that small amounts of BPA detected in foods are unlikely to cause problems, some people worry that constant low-level exposures could have health effects, especially for developing fetuses, infants and children. Now, researchers report in ACS' ***Journal of Proteome Research*** that in mice, BPA activates an immune response that persists for at least three generations.

Epidemiological studies have linked in utero BPA exposure with the onset of childhood asthma. Other studies have shown that treating pregnant mice with the substance induces asthma-like symptoms in the mothers and their pups. To better understand how BPA could trigger allergic asthma, Terumi Midoro-Horiuti, Kangling Zhang and colleagues analyzed the proteins produced by immune cells of BPA-treated pregnant mice, their pups and two generations of mice afterward that had not themselves been exposed to BPA.

Using mass spectrometry, the researchers compared the proteins produced by certain immune cells from BPA-exposed mice and their descendants with those from control mice. In the BPA-exposed mice and subsequent generations, some proteins related to an activated innate immune system — which plays a key role in antiviral defense and is also related to allergic diseases — were produced at higher amounts than in

control mice. In particular, the BPA-exposed mice and their offspring produced about twice as much of a protein called ZDHHC1, which is also produced at higher levels in response to estrogen. In addition, BPA exposure caused changes in enzymes that modify DNA-binding proteins called histones. That kind of modification can cause heritable changes in gene expression. Therefore, descendants of the original BPA-exposed mice could have inherited changes in DNA expression that cause aberrant immune system activation, even in the absence of BPA, the researchers say.

The authors acknowledge funding from the National Institute of Environmental Health Sciences.

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Call for Papers for BCCE 2020

Abstract submission is now opened through the American Chemical Society (ACS) Meeting Abstract Programming System site (ACS MAPS) through February 24, 2020. Registration and housing for the conference will open after March 30, 2020.

https://bcce2020.org/call-for-abstracts/

The BCCE 2020 will be held on the beautiful Campus of Oregon State University July 18 - 23. The program will feature 186 technical symposia and 137 workshops, two poster sessions, four plenary sessions, and an exhibition area with over 70 booths. Oregon State University is home of the Linus Pauling Collection. Conference participants will be able to view some of Professor Pauling's historical documents, artifacts, and rare letters.

Plus, unique to the BCCEs - a Wednesday evening social and dance with live music from Al D. Hyde and the Key Tones -

From the ACS Press Room

A New 'Cool' Blue

"Hibonite Blue: A New Class of Intense Inorganic Blue Colorants"

ACS Omega

Throughout history, people have sought vibrant blue pigments. The Egyptians and Babylonians used lapis lazuli 6,000 years ago. In 1802, a French chemist synthesized cobalt blue. More recently, in 2009 scientists discovered YInMn Blue, otherwise known as "Oregon Blue." But most of these pigments have limitations in terms of cost, stability, color or toxicity. Now, researchers in ACS ***Omega*** report a new class of 'cool' blue colorants that are inexpensive, durable and more environmentally friendly.

For the last 200 years, cobalt blue ($CoAl_2O_4$) has been a dominant commercial blue pigment because of its color intensity, ease of synthesis and versatility. However, 33% of the colorant by mass is carcinogenic Co2+, making cobalt blue relatively expensive and environmentally harmful to produce. Mas Subramanian, who discovered Oregon Blue, and colleagues at Oregon State University wanted to develop a new class of blue pigments that had enhanced color properties, reduced cost and lower cobalt content than cobalt blue.

The researchers were inspired by the crystalline structure of a light-blue mineral called hibonite. The team systematically substituted Al3+ (aluminum) ions in hibonite with Co2+, Ni2+ (nickel) or Ti4+ (titanium) ions. The resulting series of pigments showed a range of intense blue colors, some with reddish hues. The pigments were stable even when soaked in acidic or basic solutions. In contrast to cobalt blue, the new blues reflected near-infrared light, which could make them useful as 'cool pigments' in energy-saving, heat-reflecting coatings. Importantly, the Co2+ concentration in the new compounds in hibonite blues was as low as 4% by mass, making the pigments cheaper and more environmentally friendly.

The authors acknowledge funding from the National Science Foundation.

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From the ACS Press Room

Examining Vaping Particle Size and Deposition

"Investigating E-Cigarette Particle Emissions and Human Airway Depositions under Various E-Cigarette-Use Conditions"

Chemical Research in Toxicology

E-cigarette use is rising, particularly among young adults and teens. Recent illnesses and deaths attributed to vaping have caused intense scrutiny of the chemicals in e-liquids and vapor, but little is known about the size of vaping particles and their deposition patterns in human airways. Now, researchers reporting in ACS' ***Chemical Research in Toxicology*** have analyzed how e-cigarette particle size and deposition change with factors such as device power, e-liquid composition and vaping practices.

Unlike regular cigarettes, which burn tobacco to produce smoke, e-cigarettes are battery-powered devices that heat an e-liquid to form an aerosol, which the user inhales. E-liquids typically contain nicotine, flavoring agents and a base material, such as vegetable glycerin or propylene glycol. Because e-cigarettes do not combust tobacco, they are thought to be less harmful to human health than regular cigarettes. However, actual health risks are not well understood. Therefore, Qingyu Meng and colleagues wanted to investigate the particles produced by vaping, which typically consist of liquid droplets of the base material, and how they might be deposited in human airways.

The team observed vaping sessions of 23 volunteers and used these findings to simulate human vaping with a smoking machine. The researchers then collected the aerosol and measured particle size distribution. They also tested the impact of various factors.

Among their results: higher device power settings and the use of vegetable glycerin-based e-liquids produced larger particles than lower settings and propylene glycol-based liquids. Also, at a fixed puff volume, longer puff durations (in other words, slower air flow) generated significantly larger particles. The researchers estimated that most of the particles were deposited in the lower respiratory tract (the trachea and bronchi), whereas a smaller amount entered the deeper bronchoalveolar regions of the lungs. Although e-cigarette particles were smaller and less abundant than those generated by regular smoking, they have similar human airway deposition patterns, the researchers say.

The authors acknowledge funding from the Rutgers Cancer Institute of New Jersey, New Jersey Health Foundation, Inc., the National Institute of Environmental Health Sciences, the National Cancer Institute and the FDA Center for Tobacco Products.

Biennial 2020

We are in the process of updating this website with information for the 2020 conference!!
Please be patient and know that we are updating it as quickly as we finalize plans!!

Who: (Chemistry) Teachers

What: ACT2 Biennial 2020

Where: Texas A&M University - San Antonio

San Antonio, TX

When: Mon, 15 June - Thurs, 18 June, 2020

Why: share best practices

Got questions? please email them to act2biennial@gmail.com

Early Registration fees:

- staying in the dorm (assuming you are sharing a room) - $ 325
- not staying in the dorm (all meals are included) - $ TBD

If you are the primary presenter of a session, you receive a $25 discount off the above fees.

Registration cost includes:

- meals (light breakfast, lunch and dinner)
- conference t-shirt
- Banquet
- goodies
- 2 year membership in ACT2
- housing in the dorms (assuming you select that option at registration)
- ESSENTIALLY EVERYTHING EXCEPT TRAVEL TO AND FROM THE CONFERENCE!

Forms (registration, presentation proposal, scholarship application, etc) can be found on the Forms 2020 page, link.

https://sites.google.com/site/act2biennial/biennial-2014

From the ACS Press Room

The Smell of Old Books Could Help Preserve Them

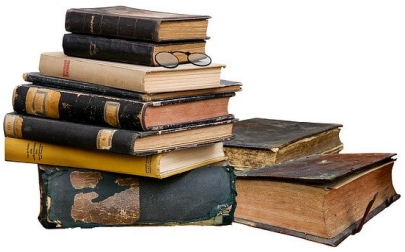
"Preserve Your Books through the Smell"

ACS Sensors

Old books give off a complex mélange of odors, ranging from pleasant (almonds, caramel and chocolate) to nasty (formaldehyde, old clothes and trash). Detecting early signs of paper degradation could help guide preservation efforts, but most techniques destroy the very paper historians want to save. Now, researchers reporting in ACS ***Sensors*** have developed an electronic nose that can non-destructively sniff out odors emitted by books of different paper compositions, conditions and ages.

Paper is made primarily of cellulose, along with other plant components, and additives that improve the paper's properties. Cellulose is resistant to ageing, but the other paper components are much more vulnerable to degradation by heat, humidity and UV light. Before 1845, paper was made mainly from cotton and linen rags, which were relatively pure forms of cellulose and therefore quite stable. Then, in 1845, inventors developed a process to make paper from wood-pulp fibers. This paper is less durable than that made from cotton, but wood is cheaper and more readily available. In 1980, the advent of acid-free paper was a boon to preservationists because it degrades much more slowly than acidic wood-pulp paper. Marta Veríssimo, M. Teresa Gomes and colleagues wanted to develop an electronic nose that could non-destructively detect early signs of paper degradation from the volatile organic compounds (VOCs) books emit.

The researchers collected 19 books published from 1567 to 2016. They classified the books by time period, paper composition, color and visible state.



Then, the researchers collected VOCs released from the books and detected the gases with an electronic nose containing six sensors that selectively bound different VOCs. The electronic nose clearly distinguished between paper from cotton or linen rags and paper from wood, as well as among books from three different time periods. Unexpectedly, some books published after 1990 still contained acidic paper, which the sensor discriminated from books with acid-free paper. And finally, the device sniffed out yellowing books, and new and used books from the same time period. The sensitive new method could help identify books in need of preservation, as well as help protect books from VOCs emitted by their neighbors on a shelf.

The authors acknowledge funding from the Portuguese Foundation for Science and Technology.

About

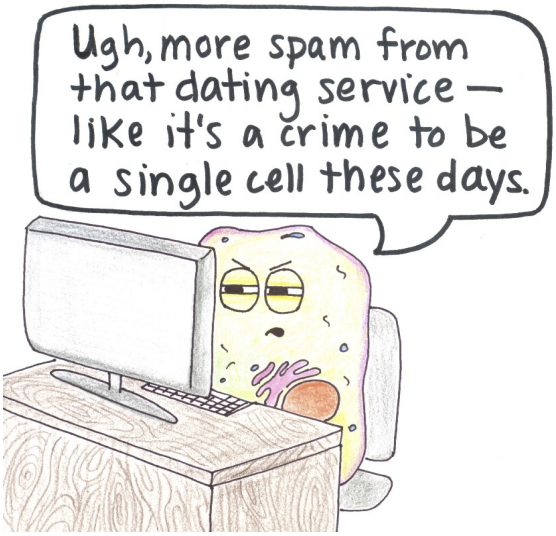
Please mark your calendars for **The 2020 Meeting in Miniature at UT Dallas**. This meeting will be hosted by The University of Texas at Dallas in Richardson, Texas on April 18th.

We look forward to seeing you at UT Dallas! WHOOSH!

Location

The University of Texas at Dallas
800 West Campbell Rd
Richardson, TX 75080

To volunteer as a presentation judge or for other inquiries please reach out to Dr. Jeremiah Gassensmith.



From the ACS Press Room

How Rattlesnakes' Scales Help Them Sip Rainwater from Their Bodies (video)

"Role of Scale Wettability on Rain-Harvesting Behavior in a Desert-Dwelling Rattlesnake"

ACS Omega

During storms in the southwestern U.S., some rattlesnakes drink rain droplets from scales on their backs. This unusual behavior could help them survive in a desert environment with infrequent rain. Now, researchers have figured out how the nanotexture of scales from these snakes helps them use their bodies to harvest rain. They report their results in ***ACS Omega***. Watch a video about the snake scales here.

https://youtu.be/6d3LC2ucHfg

The western diamondback rattlesnake (*Crotalus atrox*) from southern Arizona and other areas of the U.S. Southwest has been seen emerging from its den to harvest rain, sleet and even snow. The snake flattens its body and often forms a tight coil, presumably to maximize the area for water-gathering. As rain droplets coalesce on its back, the slithery reptile sucks water from the scales. Gordon Schuett, Konrad Rykaczewski and colleagues wanted to take a closer look at rattlesnake scales to determine what makes these serpents so adept at harvesting precipitation.

The researchers compared the surface wettability and nanotexture of scales from the western diamondback rattlesnake and two other species of desert-dwelling snakes that do not show rain-harvesting behavior: the desert kingsnake and the Sonoran gopher snake. The team dropped water onto the snakes' backs, finding that the droplets beaded up, coalesced and stuck to the rattlesnake's scales, whereas they formed shallow puddles that often slipped off the other snakes' bodies. Scanning electron microscopy of rattlesnake scales revealed nanochannels that form a labyrinth-like network, but scales from the other two snakes did not show these same features. The rattlesnake's dorsal scales aid in water collection by providing a sticky, hydrophobic surface that "pins" water droplets to the surface, the researchers say.

The authors acknowledge funding from the Biomimicry Center at Arizona State University.

From the ACS Press Room

New Spray Gel Could Help Take the Bite Out of Frostbite

"Heparin-Encapsulated Metered-Dose Topical "Nano-Spray Gel" Liposomal Formulation Ensures Rapid On-Site Management of Frostbite Injury by Inflammatory Cytokines Scavenging"

ACS Biomaterials Science & Engineering

Mountaineers and winter sports enthusiasts know the dangers of frostbite — the tissue damage that can occur when extremities, such as the nose, ears, fingers and toes, are exposed to very cold temperatures. However, it can be difficult to get treated quickly in remote, snowbound areas. Now, researchers reporting in ACS ***Biomaterials Science & Engineering*** have developed a convenient gel that could be sprayed onto frostbite injuries when they occur, helping wounds heal.

Frostbite causes fluids in the skin and underlying tissues to freeze and crystallize, resulting in inflammation, decreased blood flow and cell death. Extremities are the most affected areas because they are farther away from the body's core and already have reduced blood flow. If frostbite is not treated soon after the injury, it could lead to gangrene and amputation of the affected parts. Conventional treatments include immersing the body part in warm water, applying topical antibiotic creams or administering vasodilators and anti-inflammatory drugs, but many of these are unavailable in isolated snowy areas, like mountaintops. Others, such as topical medications, could end up freezing themselves. Rahul Verma and colleagues at the Institute of Nano Science and Technology wanted to develop a cold-stable spray gel that could be administered on-site for the immediate treatment of frostbite injuries.

To develop their spray, the researchers packaged heparin, an anticoagulant that improves blood flow by reducing clotting and aiding in blood vessel repair, into liposomes. These lipid carriers helped deliver heparin deep inside the skin. They embedded the heparin-loaded liposomes in a sprayable hydrogel that also contained ibuprofen (a painkiller and anti-inflammatory drug) and propylene glycol, which helped keep the spray from freezing at very low temperatures. When the researchers tested the spray gel on rats with frostbite, they found that the treatment completely healed the injuries within 14 days, whereas untreated injuries were only about 40% healed, and wounds treated with an antibiotic cream were about 80% healed. The spray reduced levels of inflammatory cytokines at the wound site and in the blood circulation, which likely accelerated healing, the researchers say.

The authors acknowledge funding from the Defence Institute of High Altitude Research.

From the editor

The 2020 Meeting-in-Miniature is coming up at UTD on April 18: mark your calendars and start harassing students on preparing their presentations. One of the most important skills you can develop—either as an undergraduate or graduate student—is the ability to give an oral presentation and then field the questions. (As the Ugnaught said, I have spoken.) One really good thing to happen in the last couple of decades is that light pointers have become smaller and lighter, down to the size of a regular pen. When I gave my first seminar (and no, I'm not going to tell you how long ago that was), the light pointer was the size and weight of an old green Coke bottle. If you were nervous and your hands shook, so did the light on the screen...but it was amplified. I always jammed the thing right into my belt and held it steady that way!

This month, I like the rattlesnake article best. It sounds like a nice surfactant project to me: what is the composition of the sticky, hydrophobic surface on the snake's dorsal scales?

Now that we are past the holidays, the next issue of the Retort will be back on the regular schedule, with a call for material going out on the first and due in on the 6th or 7th.

Best regards,
Connie