

The Chemical Record

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Columbus Section of the American Chemical Society, Inc.

James J. Wasil, Section Chair — jim.wasil@scenarial.com

Ashish Deshmukh, Editor — ashishdeshmukh@hotmail.com

Section Website: columbus.sites.acs.org

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ABOUT THE COLUMBUS SECTION



The Columbus Section of the American Chemical Society comprises approximately 1,500 members who live and work in the following central Ohio counties: Delaware, Fairfield, Fayette, Franklin, Hocking, Knox, Licking, Madison, Marion, Morrow, Muskingum, Perry, Pickaway, Ross, and Union.

The Mission of the American Chemical Society (ACS) is to encourage in the broadest and most liberal manner the advancement of the chemical enterprise and its practitioners. Toward that end, the ACS advances scholarly knowledge, provides professional services and support, communicates with varied audiences, and is actively involved in the science, education, and public policy arenas.

The Columbus Section of the ACS adheres to this mission and the strategic thrusts of the national organization and leadership by providing programs and networking opportunities for Chemistry professionals in Central Ohio.

We invite ACS members and scientists in the community to lend their expertise and talents to our activities in science education, government and legislative policy issues, safety in our industrial plants and in our communities, and care of our land.



MEETING NOTICE

Columbus Section of the American Chemical Society, Inc.
columbus.sites.acs.org

Meeting #887

Columbus Section Award

*Targeting Cancer with Transition Metal Complexes: From Basic Science
Toward Therapy*

Claudia Turro, Ph.D.

The Ohio State University, Department of Chemistry and Biochemistry

Tuesday, March 21, 2017

**Mozart's Cafe
4784 North High Street
Columbus, OH 43214
614-268-3687**

PROGRAM DETAILS

5:00 – 6:00 PM	Executive Committee Meeting – All members are welcome to attend.
6:00 – 7:00 PM	Social Hour – Adult beverages available
7:00 – 7:45 PM	Dinner <ul style="list-style-type: none">• Breads• Garden Salad – greens topped with tomato, cucumber and red onions• Entrées:<ul style="list-style-type: none">○ Beef Stroganoff – Tender beef, mushrooms and onions braised in a red wine demi-glacé, topped with a dollop of sour cream.○ Chicken Paprikash – Succulent chicken simmered in a rich Hungarian paprika sauce.

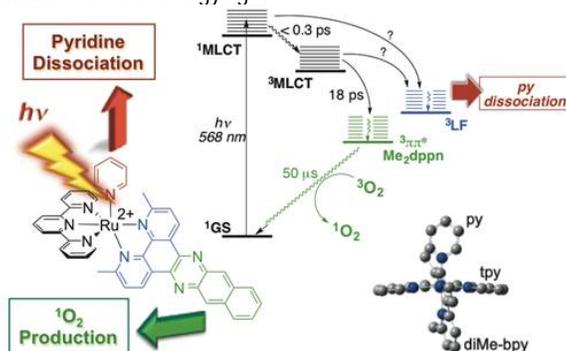


	<ul style="list-style-type: none"> • Accompaniments: <ul style="list-style-type: none"> ○ Redskin Mashed Potatoes ○ Market Vegetables (Special diet option also available) • Beverages – water, coffee, tea, and soft drinks • Plated Dessert
7:45 – 8:45 PM Program	Presentation: Targeting Cancer with Transition Metal Complexes
Cost	The charge for dinner is \$20 per person for members and non-members, \$5 for retired and unemployed members, and \$5 for students. Payment will be collected at the door; cash and checks accepted. There is no cost to attend the program only. <i>Remember that this is a dinner order and must be paid. Please help control costs by honoring your order.</i>
RSVP	To avoid dropped reservations please use the Meeting Reservation Form on the section's website (http://columbus.sites.acs.org/). Alternatively, please send an e-mail with the same information to us at the following e-mail address: columbusacs@gmail.com providing the information listed below.
E-mail Reservations Template	<ul style="list-style-type: none"> • First and last name • Membership category: member, non-member, retired, emeritus, unemployed, student • Employer, if any • Your choice of entrée: Beef Stroganoff or Chicken Paprikash, or advise if you have special needs • Please indicate if you will join us for <u>Dinner & Program</u> OR <u>Program Only</u> • Your phone number, in case we need to contact you.
Reservation Deadline	Friday, March 17, 2017 at 5:00 pm
Program Contact	James J. Wasil , 614-271-5970; jim.wasil@scenarial.com
Directions & Parking (Mozart's is on North High Street between East Cooke and Morse Roads)	<p>From the North - Take I-71 South towards Columbus. Take Exit 116 for Sinclair Road. Turn Left onto Sinclair Road. Turn Right onto Morse Road. Turn Left onto North High Street. Destination will be on the left.</p> <p>From the East - Take I-70 West towards Columbus. Continue to Exit 43 A, following signs for I-70 West/Columbus and merge onto I-70 West. Take Exit 101 A for I-71 North. Take the Henderson Rd exit. Turn right onto W. Henderson Road. Turn left onto N. High St. Destination will be on the right.</p> <p>From the West - Take I-70 East towards Columbus. Take Exit 2B to merge onto OH-315 North. Take the Henderson Rd exit. Turn right onto W. Henderson Road. Turn left onto N. High St. Destination will be on the right.</p> <p>From the South - Take I-71 North toward Columbus. Take exit 106 A - 106 B for OH-315 North towards Worthington. Take the Henderson Rd exit. Turn right onto W Henderson Road. Turn left onto N High St. Destination will be on the right.</p> <p>Parking is free</p>

ABOUT THE TALK:

TARGETING CANCER WITH TRANSITION METAL COMPLEXES: FROM BASIC SCIENCE TOWARD THERAPY

The use of light to activate the action of a drug has become important as mode of cancer therapy, in some cases superior to traditional treatments, because it significantly less invasive and poses low levels of systemic toxicity to the patient. Photoinduced ligand exchange, which can be used to release caged drugs or to induce covalent DNA binding with spatiotemporal control, together with the sensitization of $^1\text{O}_2$, represent important reactions initiated by light with potential applications in photochemotherapy (PCT). These photoinduced reactions of Ru(II) and Rh₂(II,II) complexes will be presented, along with their activity towards biological targets and cancer cells. Importantly, Ru(II) complexes were recently discovered to undergo multiple photochemical pathways following activation with light, and this property was used to design new dual-action compounds. These new complexes can both release a medically relevant compound and to produce $^1\text{O}_2$ and were shown to exhibit significant enhancement of activity stemming from their ability to induce cell death via two different, independent pathways. A schematic representation of these processes with pyridine as a model compound representing a caged drug is shown in the figure below, along with observed excited state dynamics and distortions around the Ru(II) center that lead to efficient photo-dissociation of pyridine. New strategies developed for the photoinduced exchange of pyridine-containing drugs and their attachment to tumor-targeting antibodies will also be presented. These new complexes provide a new platform for drug delivery and enhanced therapeutic activity upon excitation with low energy light.



ABOUT THE SPEAKER:

CLAUDIA TURRO, PH.D.

THE OHIO STATE UNIVERSITY, DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Claudia Turro was born in Buenos Aires, Argentina, and moved to the U.S. with her family right before the start of her high school years. She received her B.S. with Honors in 1987 from Michigan State University. She worked with Daniel G. Nocera and George E. Leroi at Michigan State University and received her Ph.D. in 1992.

Claudia was awarded a Jane Coffin Childs Memorial Fund for Medical Research Postdoctoral Fellowship to conduct postdoctoral work at Columbia University with Nicholas J. Turro (no relation) from 1992 to 1995, and has been a faculty member at The Ohio State University since 1996. She received the Early CAREER Award by the National Science Foundation in 1998, the Arnold and Mabel Beckman Foundation Young Investigator Award in 1999, was named a 2010 Fellow of the American Chemical Society (ACS), and a 2012 Fellow of the American Association for the Advancement of Science.

She was elected President of the Inter-American Photochemical Society (2012-14) and Chair of the ACS Division of Inorganic Chemistry (2016). She received the 2014 College of Arts and Sciences Susan M. Hartmann Mentoring and Leadership Award, the 2014 Award in Photochemistry from the Inter-American Photochemical Society, and the 2016 Edward W. Morley Medal from the Cleveland Section of the ACS. Since 2016, she has been serving as Associate Editor for the *Journal of the American Chemical Society*.



SPRING 2017, 253RD ACS NATIONAL MEETING AND EXPOSITION
APRIL 2-6, 2017
SAN FRANCISCO, CA



21ST ANNUAL GREEN CHEMISTRY & ENGINEERING CONFERENCE
JUNE 13-15, 2017

Join us in 2017 at the must-attend event for green chemists and engineers. The 21st Annual Green Chemistry & Engineering Conference (GC&E), hosted by the ACS Green Chemistry Institute®, will be held in Reston, Virginia on June 13-15, 2017. GC&E provides an opportunity for a diverse network of over 500 academic, industrial and government stakeholders to network and learn about the newest ideas in sustainable approaches to chemistry, chemicals, processes and products. Featuring over 30 technical sessions, a robust poster session, keynote lectures, workshops, social events and a Green Expo, GC&E is the premiere forum for sustainable and green chemistry and engineering.

The overarching theme of the conference in 2017 will be "Making Our Way to a Sustainable Tomorrow." The conference invites scientists and leaders from all sectors to come together to address critical topics such as the design of sustainable chemicals, flexible chemical manufacturing, more efficient processes, green chemistry curricula, circular economy considerations, sustainable materials, academic-industry collaborations, chemicals policy and more.



UPCOMING ACS WEBINARS
FROM THE ACS WEBSITE

Fighting Cancer: Allosteric and Targeting Cancer Cell Metabolism

Thursday, March 23, 2017 @ 2-3pm ET

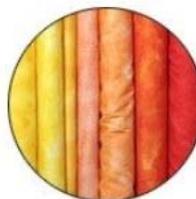
Join us as Stefan Gross shows how targeting these unique adaptations could lead to drugs with potential to transform clinical outcomes across many cancer types.



Sustainability Challenges of the Textiles, Dyeing and Finishing Industries: Opportunities for Innovation

Thursday, March 30, 2017 @ 2-3pm ET

Richard Blackburn from the University of Leeds discusses the techniques being scrutinized so that textiles become more efficient from the technical, economic and ecological perspective.



The Good, The Bad and the Uncertain: Public Perception of the Chemical Enterprise

Thursday, April 13, 2017 @ 2-3pm ET

We live in a time when much of society is averse to chemicals. Mark Jones will join us to share some examples of good done by the chemical enterprise and lead a discussion of the origin of chemistry's bad reputation.



Why Attend ACS Webinars®?

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ACTIONABLE – Learn from luminaries and subject matter experts on strategies and tactics you can use immediately after the webinar.

LEARN – Share with friends and engage group discussions on key issues in a fresh new manner.

AFFORDABLE – A free weekly online event provided to by the American Chemical Society.

All recordings of ACS Webinars® are available as a benefit to current ACS members. Live weekly ACS Webinars® continue to be available to the general public.

Editor's Note: For more details about the webinars described above, please visit <https://www.acs.org/content/acs/en/acs-webinars.html>

UPCOMING ACS SHORT COURSES
FROM THE ACS WEBSITE



Upcoming Courses at the ACS National Meeting

April 1 – 5, 2017

American Chemical Society will be holding Short Courses in San Francisco, CA on April 1 – 5, 2017 at the [253rd ACS National Meeting & Exposition](#) to help you gain invaluable training in just a few days. Short Courses from the ACS give you the tools to stay on top of new technology, growing trends in the science industry and basic skills you need to advance in your career. [See all courses »](#)



Register for “Survey of Flavor Science”

April 3 – 4, 2017

American Chemical Society will be holding “Survey of Flavor Science”, developed in partnership with the [Flavor Research and Education Center](#) at Ohio State University, on April 3 – 4, 2017 to help you learn about important flavor chemistry and technology topics from seasoned experts. Short Courses from the ACS give you the tools to stay on top of new technology, growing trends in the science industry and basic skills you need to advance in your career. [Read more »](#)



Register for “Patent Law Fundamentals Online”

June 2 – 9, 2017

American Chemical Society will be holding “Patent Law Fundamentals Online” on June 2 – 9, 2017 to help you learn how to identify and document an invention, search for patents related to the invention, and apply for a patent application. Short Courses from the ACS give you the tools to stay on top of new technology, growing trends in the science industry and basic skills you need to advance in your career.

Editor's Note: For more details about the short courses described above, visit www.proed.acs.org/.

STATE SCIENCE DAY 2017: VOLUNTEERS NEEDED!

By BOB KROSHEFSKY



On Saturday, May 13th, State Science Day 2017 will be hosted by The Ohio State University at the French Field House in Columbus – just up the road from the ‘Shoe. This is the Saturday BEFORE Mother’s Day this year. Since 1998, as part of its commitment to chemical education at all levels, the Columbus Section has sponsored awards for outstanding projects in the chemical sciences. The objective is to acknowledge and reward those students who have not only understood the scientific method, but also have exhibited creative thought. The section awards \$2,500 in prizes to the various winners.

Clearly, these students are some of the best that Ohio has to offer and are already showing an interest in chemistry. What better way to encourage them and show them the human face of the chemical enterprise? Professors and employers, it might also be a good way to do early recruiting for future students and interns.

WE NEED YOUR HELP!!!

The number of projects entered is large (~140) and we need around 30 judges to evaluate them and decide on the winners. A general knowledge of some branch of chemistry is desirable, but being a chemist or ACS member is not required. And even having limited knowledge in one area can be supplemented and effectively utilized through interactions with judges having complementary skills.

Judging is scheduled to run from 9:00 a.m. to noon. Refreshments and orientation will occur from 7:00 to 8:30 a.m. Access and parking get more difficult the later it gets, but you really need not be there much before 8:00 a.m. in order to get a clear idea of what will be happening that morning. You will be well-informed in advance. Previous judges have thoroughly enjoyed the experience.

Please consider taking one morning out of the entire year to offer encouragement and advice to someone who could be taking the first steps in an illustrious career. If you would enjoy the opportunity to meet the next generation of chemical scientists, e-mail me at bobkro@embarqmail.com or call me at 937-707-9276.

Refer to The Ohio Academy of Science Web site <http://www.ohiosci.org/ssd.htm> for more details.



FROM CHEMICAL & ENGINEERING NEWS MARCH 13, 2017
SPIDER VENOM: AN INSECTICIDE WHOSE TIME HAS COME

When it comes to solving difficult insect problems, it helps to consult an expert. For example, you could ask *Hadronyche versuta*, the Blue Mountains funnel-web spider. It has a few tried-and-true tools for killing: a funnel-shaped web to hide in, really large fangs, and a venom laced with the powerful insecticide versutoxin. "It has a well-earned, fearsome reputation," says John Sorenson, chief executive officer of the biobased pesticide firm Vestaron. Like seemingly all things super venomous, the spider comes from Australia—specifically, the coastal range of New South Wales.

A farmer or gardener could travel to eastern Australia, gather up some *Hadronyche*, and milk them to obtain their insect-killing venom. But that's not very practical. So for years scientists have been working out how to make a pesticide based on, or inspired by, the spider's powerful weapon. After successful registration with the Environmental Protection Agency in 2014, Vestaron is about to introduce its first product, which is based on a peptide in versutoxin. The insecticide, called Spear T, is effective against thrips, whiteflies, and spider mites in greenhouse settings. "Those three are the trifecta—the FBI most wanted—of greenhouse pests," Sorenson says.

Getting to launch has not been easy or quick. Vestaron was founded in 2001 with the more ominous-sounding name Venomix. That was before the time when pesticides based on biological, rather than synthetic, compounds were considered sexy. Since then, major agrochemical companies have invested in biopesticides and acquired biobased chemical firms with the hope of providing more options to farmers. The marquee deal was Bayer's 2012 acquisition of AgraQuest for \$425 million. But even after a few decades of trying, convincing growers to adopt new pest control methods for their high-value fruit and vegetable crops is challenging. Early entrants were pricey and gave inconsistent results. To succeed, Vestaron will have to build a track record of efficacy, compete on price, and get visibility for its product in a marketplace crowded with bigger players. "It's actually easier to develop a product than establish it on the market," warns Duane Ewing, an agricultural products consultant who was one of the cofounders of AgraQuest. "This is not for the fainthearted."

In 2016, the North American biopesticide market was worth \$1.2 billion, only about 8% of total pesticide sales, according to Arun Ramesh, an analyst at the market research firm Frost & Sullivan. Bioinsecticides claimed 30% of that slice. Although biopesticide sales in general are growing by 11.5% annually, he says, bioinsecticides are stuck at 2% growth because of lingering farmer skepticism about their efficacy.

Even among biopesticides, Spear T is unusual. Most are used to kill fungal diseases, not insects. That's not surprising, because until now biopesticides have all come from soil bacteria, and bacterial chemical defenses are designed mainly to combat other microbes. Even the most famous biological insect killer, *Bacillus thuringiensis*, or Bt, is a protein made by a microbe.

And spider venom presented a web of challenges, Sorenson says. When scientists first attempted to identify and characterize venom peptides, they didn't have the necessary molecular biology tools. When that problem was solved, no one knew how to manufacture the peptides. And the peptides—large molecules the size of insulin—did not look like they would be bioavailable, except via spider bite.

Vestaron's active ingredient came out of research by Glenn King, a professor of chemistry and structural biology at the University of Queensland. King found a variety of disulfide-rich peptides in venom. Some are used for defense against other spiders or mammals, and others are tuned to kill insect prey. All of them work by disrupting ion channels of the victim's nervous system.

"The genius of Glenn's work is that he looked at the minor components that had broad insecticidal activity but not mammalian activity," Sorenson says. The peptide at the heart of Spear T is called GS-omega/kappa-Hctx-Hv1a.

As an active ingredient, the peptide did not look very promising at first; its structure violated most of the rules said to define a good insecticide. It has a large molecular weight, is hydrophilic, and has many hydrogen donors. But surprisingly, tests showed that it kills some insects on contact.



The peptide blocks two ion channels in the insect nervous system—a voltage-gated calcium channel and a calcium-activated potassium channel. Both modes of action differ from the way Bt toxin and many other pesticides work. That means growers can use the peptide with other products to prevent the emergence of resistant insects. “It’s a magnificent partner for rotation with other agricultural chemicals,” Sorenson claims. Vestaron scientists inserted the gene responsible for producing the peptide into yeast so it can be manufactured in large quantities via sugar fermentation. Last August, the company contracted Capua Bioservices to make its products in Italy.

Also in August, Vestaron’s venture investors put an additional \$18 million into the company. With the help of the funding, it is gearing up for distribution of Spear T and finalizing two follow-on products for release later this year and in 2018. The new versions will be combined with Bt to control caterpillars and the Colorado potato beetle. Sorenson says the first Vestaron products will be price-competitive with “top-tier synthetic chemicals.” But they can also play a different role than most synthetics because of their low toxicity to nonpest species, he says. After application, farm or greenhouse workers need wait only four hours rather than days to resume working. And Spear products can be applied right up until harvest.

Ewing, the consultant, sees more growth ahead for biological insect control. Even agchem companies wedded to synthetics are introducing products that mimic biological compounds to decrease damage to mammals and beneficial insects. “They’re not like parathion where you spray and kill everything for 30 days,” he says.

Vestaron, meanwhile, is screening synthetic mimics that share the insecticidal and toxicity characteristics of spider venom peptides. And it hopes to grow its market by inserting venom peptide genes into corn, cotton, and soybeans. But for now, Sorenson is pleased to introduce a product he calls extraordinary. “It’s the first peptide product of this kind ever to be commercialized,” he says. .

COLUMBUS SECTION ACS CALENDAR OF EVENTS

Year	Month	Date	Day	Location	Comments
2017	March	17	Friday		5:00 pm: Deadline for reservations for March, 2017 Section meeting.
2017	March	21	Tuesday	CAS	Monthly Section Meeting; see details elsewhere in this issue of <i>The Chemical Record</i> .

ABOUT THE CHEMICAL RECORD

The Chemical Record, official newsletter of the Columbus Section of the American Chemical Society, Inc., is published monthly, February-May and September-December (eight issues per year.) Opinions expressed by editors or contributors do not necessarily represent the official position of the Columbus Section or of the editorial staff. We welcome your contributions to your *Chemical Record*. Please submit them via postal or electronic mail to **Ashish Deshmukh**, 2690 Fisinger Road, Columbus, Ohio 43221, ashishdeshmukh@hotmail.com. Electronic mail contributions should be in MS Word file attachments (preferred) or plain-text messages. *Thank you very much!*

CHANGE OF ADDRESS

Changes in postal or e-mail address should be reported to the Membership Chair, **David Speth**, 614-688-5162, drspeth@sbcglobal.net. David will forward the change-of-address information to ACS Headquarters.

ADVERTISING RATES

Advertising rates for *The Chemical Record* are as follows (per single insertion): Full Page, \$250; Half page, \$150; Quarter Page, \$120; Eighth Page: \$60; Business Card, \$50. Discounts: 5% for four insertions or 10% for eight insertions during a calendar year. There is no charge for “help wanted” ads.