THE MIDLAND CHEMIST
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Drugs, Fingerprints, and Firearms—A Typical Day at the Bridgeport Crime Lab, p. 3

While many Midland Section chemists are working with polymers and organic syntheses, Karen Brooks is analyzing drug substances seized by Michigan authorities. Find out what goes on at the Crime Laboratory in Bridgeport.

THE MIDLAND CHEMIST

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In This Issue...

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Cover photography by Tina Leaym.

Contributors to this issue: Wendell Dilling, CMU; Tina Leaym, Dow Corning; Fred Vance, Dow; George Eastland, SVSU; Dave Stickles, Dow Corning; Janet Smith, Dow Corning; and Ann Birch, Editech.

Midland Section Reaches Out to Students, Teachers, and Public

The Midland Section has many outreach programs designed to interest students in chemistry and other sciences and to help teachers present these subjects more effectively. Other programs show the public how chemistry and chemists improve their everyday quality of life. Everyone needs to have a basic understanding of science, especially the central science of chemistry, because they will have to make decisions about using chemicals and technologies such as pesticides, pharmaceuticals, atomic energy, and many other materials and processes relating to chemistry. Decisions made on the basis of emotion or invalid scientific evidence have caused many of the problems we have all heard about. Thus we all have a stake in ensuring people can make enlightened decisions about scientific and chemical issues.

Wendell Dilling, Chair
ACS Midland Section

The Midland Section has sponsored programs for students, science teachers, and the public for many years. Some early programs include student essay contests, Science Quiz (started in 1957), science fairs, science seminars for high school students, the Chemistry Explorer Post, Olympics of the Mind, ACS Teachers Affiliate, and the Industrial Symposium, which was started in 1962 and later called the E.C. Britton Symposium on Industrial Chemistry. The Chemistry Explorer Post, a program of the Exploring Division of the Boy Scouts of America, was started in 1967 and was the first post in the United States with chemistry as a specialty. The Explorer post ceased operations in 1996 for lack of adult leadership. We are trying to reactivate the post. Anyone interested in working with young men and women of high school age is encouraged to contact the Section chair about helping to get this program going again.

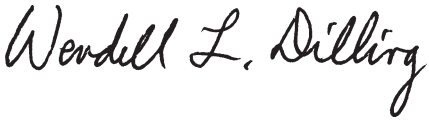
More information on these past programs can be found in historical accounts of section activities [S.P. Klesney, "A History of the Midland Section of the American Chemical Society," *The Midland Chemist* 1976, *13*, No. 4, 3–5, 10 (April); A.L. Smith, V.A. Stenger, F.K. Voci, E.L. Warrick, "History of the Midland Section of the American Chemical Society," *The Midland Chemist* 1994, *31*, No. 5, 5–10 (August 19); Section web site at http://membership.acs.org/M/Midl/Overview.htm].

In recent years the Midland Section has been very active in outreach

programs such as National Chemistry Week (NCW), Sci-Fest, the County Fair demonstrations, Project Science Literacy, Kids and Chemistry, Project SEED, Chemistry Olympiad, Science Promotions, and awards. NCW, which started in 1987 as National Chemistry Day, was first marked in the Midland Section by chemistry demonstrations or "magic shows" at the Fall Scientific Meeting and in schools. Since then many other activities have followed, including Sci-Fest, which was a direct outgrowth of these chemistry demonstrations. The County Fair demonstrations, much like Sci-Fest, enable us to spread the word about the fascination of chemistry to adults and children though demonstrations and hands-on activities. Project Science Literacy has done outstanding work in providing teachers with simplified methods for teaching science to elementary students both locally and nationwide. Kids and Chemistry provides training for adults in how to encourage children's understanding of chemistry.

Project SEED provides economically disadvantaged high school students an opportunity to spend one or two summers working in a laboratory to discover if they would like studying chemistry in college. Chemistry Olympiad gives high school chemistry students an opportunity to compete for a place on the U.S. National Team and go on to the international competition. Former Dow High student David Kurtz's recent first place finish in the international competition is in part a result of the Midland Section's participation in this program. Science Promotions provides financial assistance for college students and high school chemistry teachers to attend regional or national meetings where they present the results of their research. A large portion of the awards program of the Midland Section involves recognizing the achievements of science or chemistry teachers and students in elementary school through college. One goal of the newly organized Minority Affairs Committee is making sure these outreach programs are available and known to minority groups within the Midland Section.

More information about these programs can be found on the Section web site at http://membership.acs.org/M/Midl/ with suffixes ChemEd.htm, JDComPub.htm, and JDComDev.htm and in recent issues of *The Midland Chemist*.



Drugs, Fingerprints, and Firearms—A Typical Day at the Bridgeport Crime Lab

By Tina Leaym

Forensic chemist Karen Brooks describes her job with one phrase: "just like The Discovery Channel." She steps around a shopping cart loaded with odd-shaped brown bags and cased guns, describing the scientific expertise that catches the bad guys.

Karen uses her bachelor's degree in forensic science from MSU on a daily basis as she works to identify narcotics turned over to the Bridgeport Crime Laboratory by police officers. Bags of crack cocaine and heroin lay on her bench top. Her analysis of these illegal substances starts with basic color tests, using the raw samples as they come in. While cocaine gives a rose color when doused with Marquis reagent (sulfuric acid and formaldehyde), heroin, morphine, and codeine give a purple color. Other reagents help to further narrow the search. Once the color tests are complete, giving Karen an inkling of their identity, crystals are examined under a microscope. She describes cocaine crystals as "feathery K's and feathery crosses" (formed using platinic chloride and gold chloride, respectively), and heroin crystals are "very pretty starbursts." Next comes the slam dunk: irrefutable evidence provided by FTIR, once the samples have been purified to remove any cutting agents.

Karen Brooks, forensic chemist at the Bridgeport Crime Lab, uses a GC-MS to analyze for narcotics. Photo: Tina Leaym

A microscope provides positive identification of marihuana plant material, since it has characteristics that make it unique from every other plant in the world. The plants are identified as male or female by examining seeds and flowers. Marihuana leaves are darker on the top than the underside, and both surfaces have hair-like structures that are quite distinctive. Hair on the top side of the leaves has a bear-claw shape, the un-

derside has long, straight hairs. The female plant's flowers have hairs shaped like water towers, straight with a ball on top.

But Narcotics is just one unit at the Bridgeport Crime Laboratory. Karen's tour also included the Polygraph, Microchem, Firearms, and Latent Print units. The polygraph room appears deceptively innocuous; the polygraph chair looks more like a La-Z-Boy recliner than a hot seat. Respiration and pulse are monitored as test subjects are instructed to tell the truth, and then to lie, for baseline patterns to be established… then the real questioning begins. Although polygraph evidence cannot be used in court, confessions are often obtained during interrogations.

The Microchem unit is home to specialists for hair, fibers, paints, glass, blood, arson, footwear, and tire-track impressions. These specialists, like the Narcotics unit personnel, are usually recruited from the civilian population, while the other units generally employ experienced Michigan State Troopers.

Serial number restoration and tool marking are covered by the Firearms unit. Ever wondered how they fire ammunition from a gun and then collect the bullet without destroying the markings? Shots are fired into a 12-foot deep water tank housed in the Crime Lab's garage.

Next stop on Karen's tour is the "powder room." Of course it's for fin-

gerprints rather than shiny noses. Latent Print Unit supervisor D/Lt. Galvan Smith described the various techniques used to raise prints from plastic bags, paper money, fraudulent checks, threatening letters, and the like. A favorite trick involves ninhydrin spray. Ninhydrin, or triketohydrindene hydrate, reacts with amino acids, turning fingerprints a brilliant purple after several hours. The print development can be accelerated using a household iron or a humidity chamber. (Hmm, so maybe an iron *is* good for something.)

Galvan Smith compares a latent fingerprint with a set of known prints. *Phono: Tina Leaym*

The Bridgeport Crime Lab's glue chamber is another tool, with several unique modifications making it safer and more convenient. The chamber is designed around an inadvertent discovery regarding super glue fumes and latent prints. The cyanoacrylate adhesive fumes turn the prints white, making them visible. (The first documented observance of this phenomenon was in 1977 by Japanese forensic scientist Masato Soba.) The technology has been refined over time, and today's traditional glue chambers consist of an enclosed space containing a pan of water, a pan of super glue, and a hot plate as a heat source. The Bridgeport glue chamber is equipped with a hair dryer (instead of the hot plate) and timer, both situated *outside* the glue chamber, so the operator doesn't get a noseful of glue fumes when turning off the hot plate. The operator's fingerprint placed on the inside of the chamber's front window also serves a purpose—when it becomes visible, the articles inside the chamber have been exposed to enough fumes to bring out any latent prints.

Karen finishes up for the day with a last GC/MS injection. About 15 feet away from a bench top loaded with life-destroying drugs, her desk overflows with baby pictures and welcome-back flowers denoting the end of her maternity leave. Bad guys beware, Karen Brooks is back!

Fall 2000 ACS Tour Speaker

Professor Anthony M. Trozzolo
University of Notre Dame

"Photochromism: Molecules that Curl Up and Dye"

Monday, September 25 at 4:00 p.m.
Central Michigan University
Dow Science Building, room 175
(reception at 3:30 p.m. in room 264)

Anyone wishing to have dinner with the speaker at The Embers in Mt. Pleasant should contact Dr. John Warriner at john.p.warriner@cmich.edu or 774-3289 (leave message at 774-3981). RSVP by September 22. Dinner will begin at approximately 5:30 p.m. Meals can be ordered from the menu at your own expense.

Abstract: The solid-state photolysis of oxiranes and aziridines produces highly colored ylide intermediates. The stability of the intermediates is dependent on a combination of electronic and steric factors as well as the solid-state constraints of the environment. "Live" demonstrations will be used to illustrate some of the photochromic systems as well as their applications.

Vita: Anthony M. Trozzolo is the Charles L. Huisking Professor Emeritus of Chemistry at the University of Notre Dame. He received his B.S. degree in chemistry from the Illinois Institute of Technology in 1950 and M.S. and Ph.D. degrees from the University of Chicago in 1957 and 1960, respectively. In 1959, he joined the technical staff at Bell Laboratories in Murray Hill, New Jersey, where he remained until 1975 when he became Huisking Professor at Notre Dame.

Dr. Trozzolo was the founder and first chairman of the Gordon Research Conference on Organic Photochemistry in 1964. In 1988, he was elected to the Board of Trustees of the Gordon Research Conferences. His research interests are in the creation and detection of reactive intermediates. The methodology often involves low-temperature photochemistry or solid-state photochemistry. Dr. Trozzolo has published more than 90 articles and been issued 31 U. S. and foreign patents. He has delivered over 300 invited lectures at universities, international meetings, ACS symposia, and industrial laboratories. He was also the first recipient of the Pietro Bucci Prize (1997) co-sponsored by the Italian Chemical Society and the University of Calabria.

By George Eastland

Fall Scientific Meeting Coming Up Soon

By Fred Vance

Remember that the 2000 Fall Scientific Meeting will be held on October 28, 2000, at the Dow Employee Development Center. The registration form is printed below. There will also be registration at the door. To keep up with FSM news, check the web page at http://membership.acs.org/m/midl/fsm2000. The web page also gives instructions for submitting posters or papers. Although the deadlines for both have expired, there may still be time to get into the schedule.

For posters, contact:

David Karpovich
517-790-4349 (phone)
517-790-2717 (fax)
dsk@svsu.edu

For papers, contact the appropriate symposium chair as listed on the web page, or contact:

Dean M. Millar
517-636-8496 (phone)
517-638-9716 (fax)
dmmillar@dow.com

Registration: Please send the information below to:

Pete Dreyfuss
3980 N. Old Pine Trail
Midland, MI 48642-8891
517-832-6751
mpdrey@aol.com

Registration for Midland Section ACS Fall Scientific Meeting,
Saturday, October 28, 2000

Name: _____

Title: _____

Affiliation: _____

Address: _____

City: _____ State: _____ Zip: _____

e-mail: _____ Phone: _____

ACS Member: ❒ Yes ❒ No

Get Involved!

Influence the Public Image of Chemistry

As the presidents of the American Chemical Society (ACS) in 2000 and in 2001, Dr. Daryle H. Busch and Dr. Attila E. Pavlath would like to ask jointly for your help to enhance the public image of chemistry. In 2001, the ACS will honor its 125th anniversary and the beginning of a new century by celebrating the innovative chemical technological breakthroughs that have transformed our world through the last 125 years. Many of these contributions are taken for granted or attributed to other disciplines. Bringing visibility and public awareness to chemical contributions is an important priority for ACS.

Celebrate 125 years of Technology Milestones in chemistry and chemical engineering that have transformed our world

Through a special project called "Technology Milestones," we want to recognize the role of chemical science in society's remarkable progress by identifying significant technology breakthroughs from 1876–2001 through nominations from the international chemical community. A wide appeal is underway to chemists and chemical engineers of professional societies, industrial companies, and organizations of scientific history around the world to ensure that this project highlights the contributions of many chemical disciplines.

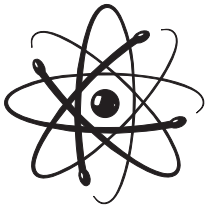
Participate in this project by submitting a completed nomination form to the Office of Industry Relations no later than October 1, 2000, and by spreading the word to our members and your colleagues about this opportunity. The selected Technology Milestones will be featured in a prominent event at the fall 2001 ACS national meeting, and educational materials for the general public will increase awareness of chemistry's role in developing the technologies that have changed the way we live. http://www.acs.org/milestones

Celebrating the 13th Anniversary of

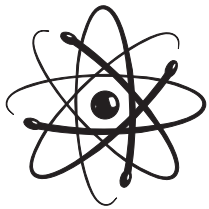
National Chemistry Week

Polymers, Plastics, and Sports

We cordially invite you and your family to attend



Sci-Fest



2000

Saturday, November 4, 2000
10:30 a.m.–2:30 p.m.
Delta College —Pioneer Gym

FREE ADMISSION

Special Science Demonstrations for Kids of All Ages and Information on Science Programs that are Available in Your Area. Sponsored by the Midland Section of the American Chemical Society and the Mid-Michigan Technician Group.

MMTG Members Attend Seminars, Present Papers

By Janet Smith

The Mid-Michigan Technician Group (MMTG) has been busy over the summer. In June, a free luncheon seminar was offered on "Basics of Investing," which was well attended by technicians from both Dow Corning Corporation and The Dow Chemical Company. Ralph Brozzo from A.G. Edwards & Sons presented information on the different types of IRAs and how to get started, and answered questions from the audience.

In July, MMTG met at Hereford & Hops in Bay City for a tour of their brewing process and dinner afterwards. It was a nice event for members and friends to socialize, and for our new members to meet the group. Dave Stickles was presented with an engraved globe from MMTG commemorating his "National Technician of the Year" award.

Several members of MMTG gave papers at the Fall National ACS meeting in Washington, D.C. On Wednesday morning, August 23rd, in the symposium "I Know You're a Technician, But What Do You Do?", Janet Smith began with a presentation on "Weighing the Pros and Cons of Switching Careers from Technician to Chemist." This was followed by Tina Leaym with "From Chem Tech to Chemist: Out of the Frying Pan, Into the Fire" with Tina's perspective on making the career change. Amy Betz presented "Wearing Many Hats; A Comparison Between a Technologist's Job Responsibilities in Different Departments within the Same Company." Finally, Wendy Mallory presented "Keeping the Wheels on a Product Testing Process."

MMTG was also represented by Connie Murphy in her role as councilor for Tech Division and as member of the Membership Affairs Committee and by John Engelman as chair-elect of Tech Division.

On a final note, four MMTG members will be actively serving at the national level in Tech Division in the year 2001. John Engelman will be chair, Janet Smith will be treasurer, Connie Murphy was re-elected as councilor, and Wendy Mallory was elected as alternate councilor.

Former Midland Section Chemistry Olympian Wins International Competition

David Kurtz, who took first place in the Midland Section Chemistry Olympiad as a high school sophomore, also took first-place honors in the 2000 International Chemistry Olympiad. The international competition, held in Copenhagen July 2–11, included a field of 112 students from 53 nations. Kurtz is currently a high school senior in Idaho Falls, Idaho.

Volunteers Needed for Sci-Fest

By Dave Stickles

Sci-Fest 2000 (see announcemnt on page 9) is looking for volunteers to put on exhibits of scientific interest to excite children in the pursuit of the sciences as a career. If you are interested in doing something along this line, or if you would just like to help set up and take down the exhibits, or help with the Midland Section Mid-Michigan Technician booth doing experiments, please contact Dave Stickles at 517-496-5626 or d.stickles@dowcorning.com.

Once a Chemist, Always a Chemist

In a recent article in *C&E News*, Midland Section member Vernon A. Stenger was upheld by Paul Bouis, chair of the Committee on Analytical Reagents, as the "elder statesman" of that committee. At 91, Vernon is still active in ACS programs and goes to his Dow Chemical laboratory for three hours every day.

For Continuing Ed, Check Out ACS

By Ann Birch

Need a refresher in statistics? How about safety information on compressed gases? Training on computer modeling? ACS has continuing education available on a wide variety of topics, all available or described at http://www.acs.org/education/professional/. Many ACS members faithfully pay their dues and carry their cards without ever taking advantage of what ACS has to offer. Here's your chance to improve your skills and add to your expertise, often from the comfort of your own workstation.

ACS offers continuing education in three ways: Internet courses, video courses, and ACS short courses. Internet courses are interactive with online exercises to keep track of your progress. They also offer participation in on-going discussion forums and interaction with instructors and other professionals taking the course. You can start a course at any time and take from 7 to 90 days to complete it, depending on the course you choose. Here is a list of the courses currently available:

- Basic Statistical Analysis of Laboratory Data
- Chemistry for the Non-Chemist: Part 1, Atoms and Molecules
- Chemical Laboratory Calculations
- Computer Desktop Applications
- Laboratory and Industrial Safety

Although ACS no longer produces video courses, ACS videos are still available through Amazon.com. The ACS Continuing Ed web page gives links to courses such as:

- Starting with Safety: An Introduction for the Academic Chemistry Laboratory
- Close-Up on Chemistry: Chemical Demonstrations
- Using Chemical Hoods—A Laboratory Safety Test

There are eleven more videos listed and one textbook. One caution: the Amazon description does not give publication dates for the videos, so it may be worthwhile to check with ACS or Amazon to see if the video you're interested in is current.

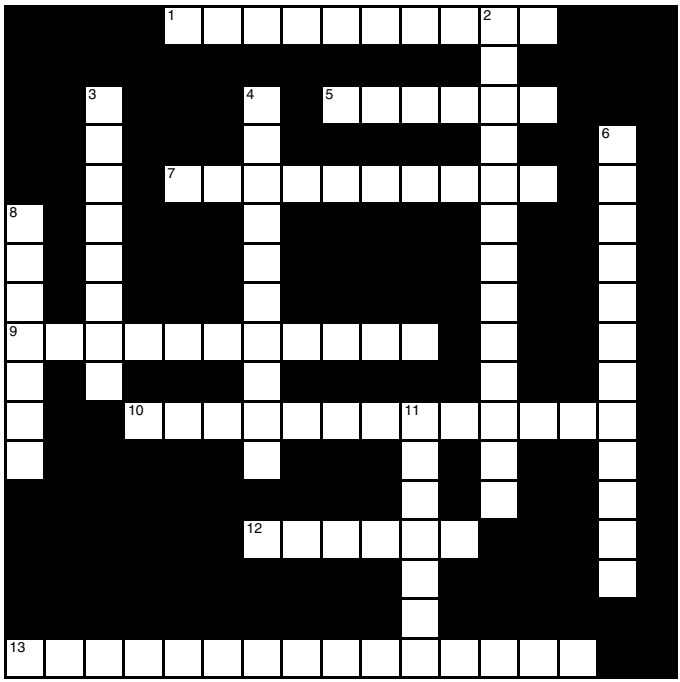
ACS short courses usually last one to two days, often associated with regional and national meetings. However, there are other venues, and the web page lists short courses for the following topics:

- Analytical
- Biological/pharmaceutical/medicinal
- Engineering
- Management/professional development
- Quality/regulatory/compliance
- Spectrometry
- Experimental design/chemometrics
- Chromatography
- Computers
- Environment
- Organic/physical
- Polymer
- Statistics

September ChemPuzzler

Don't Just Stand There, React!

Note: Most of the clues for this ChemPuzzler were taken from Hawley's *Condensed Chemical Dictionary* or McGraw-Hill's *Dictionary of Scientific and Technical Terms*. Only when desperate did we simply make them up (just kidding!). We welcome contributions to the ChemPuzzler.



Across

1. Reaction in which aldehydes that do not have a hydrogen attached to the carbon adjacent to the carbonyl group, upon encourntering strong alkali, readily form an alcohol and an acid salt.
5. Formation of unsaturated cinnamic-type acids by the condensation of aromatic aldehydes with fatty acids in the presence of acetic anhydride.
7. The 1,4 addition of a conjugated diolefin to a compound containing a double or triple bond.
9. The ionic addition of an acid in the absence of peroxides, to the carbon-carbon double bond of an alkene, resulting in the acid hydrogen attaching to the carbon atom that already holds the greatest number of hydrogens.
10. A substitution reaction, catalyzed by aluminum chloride, in which an alkyl or acyl group replaces a hydrogen atom of an aromatic nucleus to product hydrocarbon or a ketone.
12. The rearrangement of benzyl and alkyl ethers when reacted with a methylating agent, producing secondary and tertiary alcohols.
13. 9 across, with peroxides

Down

2. Formation of phenolic aldehydes by reaction of phenol with chloroform in the presence of an alkali.
3. A reaction between an alkyl or aryl halide and magnesium metal in a suitable solvent to form an organometallic halide.
4. Method of reduction consisting of refluxing a ketone with amalgamated zinc and HCl.
6. Reduction reaction where a ketone or aldehyde is converted into the hydrazone, and this derivative is heated in a sealed tube or autoclave with sodium ethoxide in absolute ethanol.
8. Degradation in which bromine and an alkali act on an amide so that it is converted into a primary amine with one less carbon atom.
11. Condensation in the presence of sodium ethoxide of esters or of esters and ketones to form beta-dicarbonyl compounds.

Important Dates on the ACS Midland Section Calendar

September 11	Midland Section board meeting, Delta College Midland Center, Room 12, 7:00 p.m.
September 15	Deadline for Section award nominations (Philip Squattrito, 517-774-4407, p.squattrito@cmich.edu)
September 25	Professor Anthony M. Trozzolo, "Photochromism: Molecules that Curl Up and Dye," ACS Tour Speaker, Central Michigan University, Dow 175, 4:00 p.m., reception preceding at 3:30 p.m. in room 264 (Dr. John Warriner, john.p.warriner@cmich.edu or 517-774-3289)
October 2	Midland Section board meeting, Delta College Midland Center, Room 12, 7:00 p.m.
October 28	2000 Fall Scientific Meeting, Dow Employee Development Center, 8:00 a.m.-3:00 p.m. (Fred Vance, 517-636-0390, fwvance@dow.com)

Need to Update ACS Info?

Is your copy of *The Midland Chemist* going to the wrong address? We use the address list provided by National ACS, so if you need to update your mailing information, please call National at 1-800-333-9511. You may also want to be sure they have your current e-mail address.

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