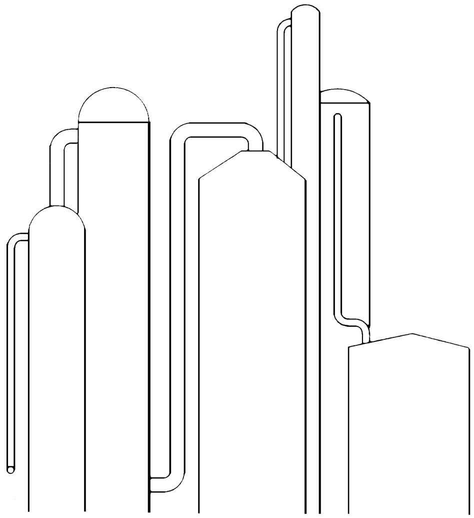
THE Indicator

JUNE 2006 Vol. 87 • No. 6 ISSN0019-6924

45th Regional Buyer's Guide



MARM 2006

June 4-7, 2006 — Hershey, PA

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THE Indicator

CIRCULATION: 8,500

The monthly newsletter of the New York & North Jersey Sections of the American Chemical Society. Published jointly by the two sections.

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Published monthly except July and August. All views expressed are those of the editor and contributors and do not necessarily represent the official position of the New York and North Jersey Sections of the American Chemical Society unless so stated. Subscription price included in dues paid by New York and North Jersey Section members. **Subscription price to non-members of either Section $20.00 per year. To subscribe, make checks payable to The Indicator and mail to the Manager/Editor (see top of left column on this page.**

Address advertising correspondence to Advertising Manager. Other correspondence to the Editor.

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BOOST OUR RATINGS

When you tell our advertisers that you saw their ads here they have more confidence in our newsletter's viability as an advertising medium. They advertise more. This supports our many activities.

Deadline for items to be included in the October 2006 issue of *The Indicator* is August 15, 2006.

WHEN NEWARK WAS AMERICA'S CELLULOID CAPITAL

Although the words plastics and New Jersey are often combined in a number of offensive ways, it should come as no surprise to readers of *The Indicator*, that this state took an early lead in the development of the plastics industry. The first widely manufactured plastic was celluloid and one of the main production and research centers for this material was the city of Newark.

The story of celluloid and perhaps of all plastics began with a fortunate discovery in March of 1846. The Swiss chemist Christian Friedrich Schonbein was the first to successfully nitrify cotton with a mixture of concentrated nitric and sulfuric acids. Because the highly nitrified cotton was explosive it became known as "gun cotton." By publishing incomplete accounts of the research, Schonbein tried to keep the discovery a secret but within a few years every European power was attempting to exploit it for military use.

But what really excited the civilian chemists was the fact that nitrated cellulose was soluble in any number of organic solvents. The non-explosive moderately nitrated form of cellulose was known as pyroxylin. A 1 to 5% solution of pyroxylin in a mixture of ether and ethyl alcohol produced a liquid that was named collodion. When the solvent was evaporated, a thin film was left behind. The first civilian application for nitrocellulose was proposed by J. Parker Maynard, a medical student in Boston. In January of 1847 he applied a solution of nitrocellulose to wounds and surgical cuts (which must have been very painful if the solvent was an alcohol) but once the solvent had evaporated a tough, flexible dressing was left covering the wound.

The first widespread commercial application for collodion was in wet plate photography. The photographer took a washed and chemically cleaned glass plate and coated it with a collodion solution of an halide such as bromine or iodine. While still tacky, the plate was soaked in a solution of silver nitrate for five minutes. Removed from the silver nitrate, it was loaded, still wet, into a light-proof plate holder which was then inserted into the camera. After exposure, the glass plate was returned immediately to the darkroom and developed. (Washing with Pyrogallic acid removed any un-reacted silver salts.)

Obviously this was a very cumbersome process and the glass plates were prone to breakage. Over the next two decades a number of photographic chemists proposed dispensing with the wet plate and using a film of de-solvated collodion.

However these films were prone to shrinkage and warping. By the end of the 1860s chemists had discovered that camphor was an excellent solvent for pyroxylin. Camphor improved the material immensely and when combined with castor, linseed, or other oils, made the material easier to mold. In both Britain and the United States, collodion produced with camphor was used in a variety of applications including waterproof paper, fabric coatings, fake furs, varnish, collars, and cuffs.

But to make pyroxylin into a true plastic required a true plasticizing agent. Camphor would work well but a more effective way to mix it with the pyroxylin was needed. John Wesley Hyatt, a printer from Albany, New York made the critical discovery while on a quest for the perfect billiard ball.

Billiards were big business in the 1800's. Just about every affluent home had a billiard table and it was one of the most common forms of indoor recreation. Most billiard balls were made of ivory. Throughout the later years of the century manufacturers in both Europe and America fretted over the possibility that the elephant might become extinct. Possibly because the Civil War was restricting imports, in 1863 a New York billiard equipment distributor announced a $10,000 prize for an artificial ivory.

Hyatt took up the challenge. While his first attempts at molding billiard balls from wood pulp and gum shellac failed, they did give him experience forming objects under a combination of heat and pressure. This was the critical component, earlier inventors used heat to help work the solvents into the pyroxylin and then allowed them to evaporate. Hyatt and his fellow printer James Brown applied heat and pressure to their mixture of camphor gum and pyroxylin. It resulted in a durable, though sometimes flammable material.

Hyatt's patent number 105,338, dated July 12, 1870, described the process. He explained that

(continued on page 6)

WHEN NEWARK WAS AMERICA'S CELLULOID CAPITAL

(continued from page 5)

the camphor became a solvent for the pyroxylene during the molding process. (Actually, the camphor formed a solid solution and acted as a plasticizing agent) The pyroxylene would

be mixed with water and ground into a pulp. At this point, coloring agents or other additives might be added. With the pulp still wet, finely pulverized gum camphor was added. After another mixing cycle the excess water was drained off. The material was then squeezed to remove additional water before being placed into a mold. The mold was placed under pressure and heated at a temperature somewhere between 150 and 300 degrees Fahrenheit. This was the essential step that allowed the camphor to permeate completely the entire pyroxylin matrix. Released from the mold, the material had the consistency of thick leather. Once the camphor at the surface had evaporated, the celluloid became hard.

The celluloid patent was issued to Hyatt and his brother Isaiah who coined the name "celluloid." What became of Brown is not recorded by historians. John and Isaiah formed the Albany Dental Plate Company in 1870 and before long they had branched out into knife handles, piano keys, and assorted novelties. The firm also supplied celluloid tubes, sheets, rods and blocks to other manufacturers. With the backing of a group of New York financiers, John Wesley moved his operations to a five-story factory on Newark's Mechanic Street.

The firm was renamed the Celluloid Manufacturing Company and it was decided that to concentrate on making unprocessed celluloid. Other manufacturers turned it into harness trimmings, billiard balls, cuffs, collars, brushes, mirror backs, truss pads, napkin rings, and other

flashy trinkets. By March of 1880, some 16 firms had licenses to manufacture these and other articles. Some historians estimate that as many as 40,000 items were made of celluloid.

The celluloid industry was very capital intensive and as a result only four companies in the United States and only one in Great Britain ever manufactured the material. First tissue paper was fabricated from cotton textile scrap. It had to be carefully treated with nitric and sulfuric acids lest the nitration reaction go too far and produce gun cotton. The acids were washed out and the nitrated material was bleached with chlorine or potassium permanganate. Dyes might also be added at this time.

The tissue paper was thus converted to pyroxylin. Next it was powdered before being mixed with camphor. After the mixing the material was dried by a process of pressing, blotting, and air-drying. Finally it was pressed and masticated by steam-heated equipment. An important property of celluloid was that it could be formed and molded just under 100c.

The company suffered a disastrous explosion and fire in 1875. In Newark alone, over the next 36 years, there would be 39 fires and explosions causing nine deaths and 39 injuries. Even Germany's first celluloid plant was destroyed by explosion and fire. As a result, in Europe at least, restrictions were placed on celluloid manufacturing.

As dangerous as it was, celluloid was also lucrative. Despite the 1875 fire, by 1879 the profits of Celluloid Manufacturing Company had reached $71,044. A year later the company stock was paying a 25% dividend and by the fall of 1881, its price was more than $200 per share.

The growth of the company fostered more innovation. Hyatt and his assistant Charles Burroughs to build the world's first injection molding machine in 1878. Hyatt's other notable invention was a lathe for turning perfectly spherical billiard balls, although it was soon used to produce ball bearings. A large order from Oldsmobile jump-started the business and after 1900, the bearing produced on Hyatt's lathes were a major automotive component.

In 1881 the Merchant's Manufacturing Company was established. It became the nation's second most important producer of Celluloid. In 1885 the company was renamed the Arlington Manufacturing Company when it built a new plant in Arlington, New Jersey, a town slightly north of Newark and on the east side of the Passaic River. As near as the author can determine, the manufacturing plant was situated on the Hackensack Marshes. Whether this was because the land was cheap or because the manufacturing process was dangerous, has yet to be determined. The plant was in fact destroyed by an explosion and fire a few years after it opened, but the company survived and rebuilt the facility.

Given the financial success of its producers, it might be supposed that after metals, wood, and ceramics, celluloid was the dominant material in manufacturing. But production of natural rubber and Gutta Percha far exceeded celluloid. Manufacturers also had the choice of many other materials including papier-mâché and a host of moldable formulations made from shellac, wood resins, sawdust or wood fibers. Fancy goods continued to be made from horn, ivory, and tortoise shell. Then in 1882, a chemist working for Hyatt made the discovery that opened up a huge new market for the material. Celluloid was soluble in amyl acetate. The solution could be spread into a thin layer and after the solvent evaporated, a stable, flexible film remained.

It was the breakthrough for which photographers had waited decades but the Celluloid Manufacturing Company did not pursue it. Rather, a Newark minister named Hannibal Goodwin took up the idea. Goodwin was frustrated because the glass slide plates he used to illustrate Bible stories were constantly breaking. He patented a process in 1887 whereby an emulsion could be made to stick to a flexible celluloid film. Unfortunately for Goodwin, errors in the application delayed the patent process so that it was not issued until 1889.

Meanwhile in Rochester New York, George Eastman and his partner William Hill Walker had patented a roll-film holder in 1885. It was used with light sensitive silver bromide-treated photographic paper but this system was short-lived. The poor quality of the bromide photographs prevented serious photographers from adopting the process. Eastman himself considered it as only a stepping-stone (albeit a very profitable one) on the route to true flexible-film photographic stock. Eastman's chemist, Henry Reichenbach, patented a process identical to Goodwin's in 1889.

It was George Eastman's shrewd decision to supply Thomas Edison with the first flexible motion picture film helped that secure him the credit for inventing photographic film. Goodwin's and Reichenbach's nearly simultaneous patents lead to a protracted dispute. In 1914, the courts upheld Goodwin's claims to priority and the settlement with Eastman made Goodwin's widow a wealthy woman.

As we have seen in a previous issue of *The Indicator*, Edward Weston of Newark, New Jersey, patented a process in 1882 where he treated celluloid with reducing agents and thereby rendered it non-flammable. Weston named his new material Tamidine and used it for light bulb filaments.

Celluloid's limitations were well known and it rarely achieved wide use except as an inexpensive substitute for more costly materials. It was highly flammable but its reported tendency to explode must be regarded as a 19th century urban legend. There is one much circulated account of how an exploding celluloid billiard ball in a Colorado saloon triggered a gunfight among the gamblers and cowboys. But there are no other reliable accounts of any such occurrences. On the other hand, there are reliable accounts of celluloid articles catching fire. In one instance, a woman's dress buttons ignited when she sat too close to a fireplace. Movie producers knew celluloid was flammable and ultimately unstable. Almost as soon as it was introduced, chemists began searching for an alternative film stock.

Today there are no companies manufacturing celluloid in the United States. Cellulose acetate has replaced it for most applications. Celluloid is still manufactured in Italy, China, and Japan.

Ironically, celluloid proved a poor choice for making billiard balls and Hyatt continued to search for the perfect material. He shared many of his ideas and frustrations with the chemist Leo Baekeland. Baekeland himself had invented a photographic film and its sale to Eastman made the chemist very wealthy. With time on his hands and the means to pursue his own ideas, Baekeland would go on to invent the first true synthetic plastic resin, Bakelite. In 1912, the Albany Billiard Ball Company, officially adapted Bakelite as the preferred resin for billiard ball manufacture.

Most of the material used in this essay was taken from Robert Friedel's *Pioneer Plastic, the Making and Selling of Celluloid*, University of Wisconsin Press, Madison, Wi., 1983 and from John T. Cunningham's, *Newark Revised and Expanded Edition*, New Jersey Historical Society, 1988. Articles on Hyatt, Bakelite, and Weston can be found in the *Encyclopedia of New Jersey*, Rutgers University Press, 2004. Books about celluloid as well as a large collection of celluloid objects can be found in the Museum of the National Plastics Information Center in Leominster, Massachusetts, 978-537-9529.

THIS MONTH IN CHEMICAL HISTORY - #2

Harold Goldwhite, California State University, Los Angeles
hgoldwh@calstatela.edu

Prepared for SCALACS*, the Journal of the Southern California, Orange County, and San Gorgonio Sections of the American Chemical Society*

In my last column I gave a short biographical sketch of the life and career of Fredrick Accum, a nineteenth century chemist whose most famous book, published first in 1820 was "A Treatise on Adulterations of Food" to give its shortened title. In this column I will examine the scope and intent of this work. Let me quote from the Preface: "Every person is aware that bread, beer, wine, and other substances employed in domestic economy are frequently met with in adulterated state. … To such perfection of ingenuity has the system of counterfeiting and adulterating various commodities arrived in this country, that spurious articles are everywhere to be found in the market … But of all possible nefarious traffic and deception, practiced by mercenary dealers, that of adulterating the articles intended for human food with ingredients deleterious to health, is the most criminal, and, in the mind of every honest man, must excite feelings of regret and disgust."

After an introduction Accum devotes several sections to an examination of water from different sources, and describes the harmful effects of keeping water in lead tanks. Adulteration of wine occupies 23 pages; of bread 15, and of beer no less than 49 pages. We tend to forget, unless we are familiar with domestic practices in the early nineteenth century, or have read a lot of fiction from that period, that beer played much the same part in the everyday diet then that water does in our times. Reliable supplies of drinking water were not available everywhere in England and milk was not at all a popular beverage. Small beer, also called table beer, of low alcoholic content was a safe drink that was to be found on many tables at all meals, including breakfast. Of course stronger beers were also popular.

There were laws governing the ingredients to be used in making beer, which included only malt, hops, and water, but those laws were often violated. Accum shows that the bitter and intoxicating herb cocculus indicus, which contains poisonous picrotoxin, was often used in place of part of the expensive ingredient hops. A certain Mr. Jackson, during the recent wars with Napoleonic France, "fell upon the idea of brewing beer from various drugs without any malt or hops." Mr. Jackson earned his money not by brewing beer himself, but by teaching his recipes to brewers for a substantial fee and supplying them with the necessary materials. Accum's book is noteworthy for giving chapter and verse for such offenses. His "List of Druggists and Grocers, prosecuted and convicted from 1812 to 1819, for supplying illegal Ingredients to Brewers for adulterating Beer" includes 28 names, and indicates penalties of fines ranging from 20 pounds (for selling liquorice to a brewer for darkening beer) up to 500 pounds for selling unspecified adulterating ingredients. Accum makes some interesting observations on the alcohol content of beers. Samples of brown stout obtained directly from reputable brewers (Barclay, Perkins; Truman, Hanbury; Meux – some of those breweries are still in the business) averaged 7.25% of alcohol. Porter, from the same brewers averaged 5.25%. When beers of the same name, allegedly from the same brewers, were obtained from retailers in public houses the brown stout averaged 6.50% alcohol and the porter 4.50%. Accum concludes that the publicans were illegally mixing the cheaper table beer with their stronger brews to increase their profits.

Apart from cocculus indicus the list of substances used to adulterate beer makes troubling reading. It includes quassia wood shavings, another bitter substitute for hops; iron sulphate plus molasses to improve the beer's head; peppers; wormwood; and many other spices and coloring matters. Accum lists the simple tests which can detect the presence of many of these deleterious substances in beer.

Tea was already an important beverage in Accum's time. His chapter on "Counterfeit Tea-Leaves" also makes troubling reading. A number of cases came to trial in early 1818. Edmund Rhodes was convicted of counterfeiting tea with a mixture of sloe leaves, ash leaves, elder leaves, and the leaves of other trees. He was fined 500 pounds. Mr. Palmer's falsification was more dastardly. This grocer concocted black tea by using logwood extracts to dye privet leaves; but his green tea made from sloe and thorn leaves was colored by the action of verdigris, a green copper pigment and noticeably toxic. He was fined 840 pounds.

Accum was a pioneer in the detection of adulteration in foods and drugs. Thanks to efforts by him and his fellow chemists, legislation to help prosecute those involved in such adulteration became part of our legal codes in the second half of the nineteenth century.

38th ACS MIDDLE ATLANTIC REGIONAL MEETING – MARM 06

Co-hosted by SE Pennsylvania and Susquehanna Valley Sections

Date: **June 4-7, 2006**
Place: Hershey Lodge
Hershey, PA

Focal Programming Areas:

Analytical Chemistry
Medicinal/Organic Chemistry
Solid State and Materials Science
Chemical History (esp. J. Priestley)

See the most recent technical program updates

Excellent Plenary Sessions:

Paul Anderson: *A Retrospective View of Drug Discovery*
Tom Mallouk: *Catalytic Motors and Pumps*
Howard and Sally Peters: *Chocolate: Food of the Gods*
Edward Yeung: *Single Molecule Spectroscopy for Early Diagnosis of Disease*

Check out our schedule at a glance

Special Symposia and Programs

The Alfred Burger Award in Medicinal Chemistry
The Cope Scholar Award in Organic Chemistry
Delaware Valley Chromatography Forum Student Awards
The ACS Regional Industrial Innovation Award
Celebration of 100 years of FDA Regulation
Chemistry of Chocolate, Beer, Tea and Wine
Mass Spectroscopy in Toxicology and Metabolite ID
Proteins as Biomarkers and Protein Rational Design
PAT in Pharmaceutical Manufacturing
Cleaning Validation in Pharmaceutical and Food Manufacturing

Undergraduate programs planned for Sunday, June 4th:

Career/Graduate School Panel Discussion
Successful Student Affiliate Programs Workshop
Undergraduate Research Poster Session (abstract required)
Chemical Demonstrations (abstracts required)
Undergraduate Student Reception

For **Expo Information** Contact Pete Christie at **pacwheat@aol.com**

New York Meetings

www.newyorkacs.org

CHEMICAL MARKETING & ECONOMICS (CM&E) GROUP

Topic & Speaker: Not Yet Confirmed.

Date: **Thursday, June 8, 2006**
Times: Cocktails 11:30 AM
Luncheon 12:00 noon
Presentation 1:15 PM
Place: The Chemists' Club
40 West 45th Street
New York, NY

Cost: $40 discount price for Members who reserve by **Tuesday, June 6** (12 noon). $55 for Guests and Members (at the door without reservations)

For an update, contact **cmegroup@yahoo.com** or Phone: (718) 961-8958.

To reserve: Please reserve early to be eligible for discount price. Call Vista Marketing at (718) 961-8958, or via e-mail to: **cmegroup@yahoo.com**. To pay online by credit card (via PayPal), go to the CM&E Website: **http://home.nyc.rr.com/chem-markecon/**

WESTCHESTER CHEMICAL SOCIETY

Dr. Mary Cowman (Director), Jean Delfiner (Co-chair), Dr. Rolande Hodel (Treasurer) presentation on "The Production of Pharmaceuticals in Africa"; Joan Laredo-Liddell (Co-chair), Carol Sencen (Secretary), Joseph Sencen (Director).

North Jersey Meetings

http://www.njacs.org

CAREERS IN TRANSITION GROUP

Job Hunting??

Are you aware that the North Jersey Section holds monthly meetings at Fairleigh Dickinson University in Madison to help ACS members? Topics covered at theses cost-free workshops are:

- The latest techniques in resume preparation
- Ways for improving a resume
- Answers to frequently asked interview question and
- Conducting an effective job searching.

The next meeting for the Careers In Transition Group will be held **Thursday, June 1, 2006**, in the Rice Lounge on the first floor of the New Academic Building. The meeting will start at 5:30 PM and end at 9:00. There will be a Dutch-treat dinner. To get the most from the meeting, be sure to bring transparencies of your resume.

Please contact **vjkuck@yahoo.com**, if you plan on attending this meeting.

MASS SPECTROMETRY DISCUSSION GROUP

Sponsored by Waters

Quantitative Proteomics of Cell Signaling in Neurons

Speaker: Professor Thomas A. Neubert
New York University
Medical School

Communication between neurons often relies on the stimulation of receptor tyrosine kinases with ligands for these receptors. Much can be learned about how this signaling works by using stable isotope labeling methods such as SILAC combined with Q-TOF mass spectrometry to compare the proteins in signal transduction complexes from stimulated and nonstimulated cells. I will describe the use of these methods in our lab to study ephrin signaling in NG108 cell cultures and BDNF signaling in primary hippocampal neurons.

Topic: to be determined

Speaker: Tim Riley, PhD
Waters

Date: **Tuesday, June 13, 2006**
Time: Social 5:30 PM
Dinner 6:15 PM
Announcements and Presentations 7:00 PM
Place: Somerset Marriott
Cost: None

Please visit **www.njacs.org/ms.html** for registration .

NEW JERSEY GROUP OF SMALL CHEMICAL BUSINESSES

Patent Law Basics for the Small Chemical Business

Speaker: Joseph M. Manak, Esq.
Greenberg Traurig LLP

Here is your chance to learn the basics of patent law with a focus on chemical inventions. Joe Manak's talk will focus on such issues as: What exactly is a patent; what constitutes an invention under the US Patent Laws and "Invention" as the solution of a problem. He will put in plain words what must you show in order to get a patent on a chemical-based, or process-based, technology; what are a patent application and its elements and contents; patent claims as the scope of a patent; and how the US Patent Office determine whether to grant a patent on your invention. Using examples of recent and interesting chemical patents, he will also talk about what you can do with your patent - licensing, sale, collateral, defensive protection; how to decide whether to apply for a patent and how much it costs; why patents are important to your business, or why they may not be important; what to do if another infringes your patent and international patents.

Joe Manak has 20 years of experience enforcing and obtaining chemical and pharmaceutical patents. He has litigated and prosecuted patent matters for some of the world's largest technology-based companies. Joe has a degree in chemistry from Manhattan College and is a member of Gamma Sigma Epsilon, the chemistry honors society. He is also admitted to practice before the US Patent and Trademark Office and various federal and state courts.

Date: **Thursday, June 15, 2006**
Times: Networking, Cash - Bar 5:30 PM
Dinner, Attendee Introductions 6:30 PM
Presentation 7:15 PM
Q&A, Networking and Dessert 8:00 PM
Place: Holiday Inn, North
Frontage Road
Newark, NJ
On north side of Newark Airport
Cost: $45 Members; $55 Non-Members

Advance Registration is required. Register by Midnight **Tuesday, June 13**.

Cancellations must also be made by Midnight June 13 or you will be invoiced.

NATIONAL CHEMISTRY OLYMPIAD

Each year the ACS seeks to identify the top 20 high school chemistry students in the country. From this group, four best students are chosen to represent the United States in the International Chemistry Olympiad competition, which will take place in Gyeongsan, Republic of Korea, on July 2-11, 2006.

To arrive at the top 20, the ACS conducts a massive screening of teacher-nominated high school students throughout the US by having a 60-question/2-hour test administered by a coordinator in each section. Such a local section test was given to 125 high school students at Fairleigh Dickinson University (Fordham Campus) on March 29. In the North Jersey Section, 10 students, listed below with their teacher and high school, earned scores which allowed them to move on to the second, semi-finalist level. These students took a two written and one laboratory rigorous tests at FDU (Florham) o April 22, 2006. From the results of the latter tests, ACS will locate the top 20 high school chemistry students in the country and invite them to attend a three week accelerated course covering many phases of chemistry at the Air Force Academy, Colorado Springs, during June 4-18, 2006.

The high school students listed below are semi-finalists in the US National Chemistry Olympiad for the North Jersey Section.

Ziran Xiao
Livingston HS
Theresa Loboda

Justin Leung
East Brunswick HS
Paul Kimmel

Sakul Ratanalert
Livingston HS
Theresa Loboda
J. Guy Morin

Alex Zuzola
East Brunswick HS
Paul Kimmel

Hashim Choudbry
Watchung Hills HS
Michael Amendola

Jason Pflueger
Bergen Academies
David Ostfeld

Diane Wang
Watchung Hills HS
Michael Amendola

Christopher Kennedy
Bergen Academies
David Ostfeld

Vikram Modi
Ridgewood HS
J. Guy Morin

Brian Lee
Bergen Academies
David Ostfeld

LAB ROBOTICS GROUP ANNOUNCES STUDENT POSTER CONTEST WINNERS

The Mid-Atlntic Chapter of the Laboratory Robotics Interest Group is please to announce the winners of the Student Poster Contest which was held on March 23rd. The contest was part of the group's annual Emerging Technologies Meeting and was held on the campus of Montclair State University.

First Place: Nirupama Gupta, New Jersey Institute of Technology, Biodegradation of Polycyclic Aromatic Hydrocarbons by Bacterial Laccase Using Laccase Mediation Systems.

Second Place: Camilia Modenese, New Jersey Institute of Technology, Destruction of Freons in Corona Discharge.

Third Place, Can DNA Cut It? Stephanie Chapelliquen, William Paterson University.

The LRIG Mid Atlantic Chapter wishes to thank the faculty members who encouraged their students to participate in this event and the members of the executive board who served as judges. The winners were awarded $200, $100 and $50.

Others

ASSOCIATION OF CONSULTING CHEMISTS & CHEMICAL ENGINEERS (AC&CE)

Chemical Business in Asia

Speaker: Mr. Douglas Riley

With the movement of technology into Asia and the growth Asia born technology, we are often tasked introducing and training our Asian colleagues on the methods and practices needed either for western quality or safety standards. This discussion will impart the experience gained in the years spent in Asia setting up chemical operations for supplying electronic semiconductor grade materials and services. Mr. Riley initially trained nationals in Operations Management in China for 3 years, and the next 2 years were spent training for Safety, Security, and Chemical Emergency Response across multiple countries throughout Asia.

Mr. Riley's main experiences and specialties include Gases and Chemicals used in Electronics Wafer Manufacturing, Management of on-site Operations Teams, training and application of Chemical Emergency Response techniques, and performing safety audits of employer and customer facilities. He has held numerous positions with a US based International Gas and Chemical Company with annual sales of approximately 7.4 billion US dollars. He has been Project Manager, Project Engineering, Plant Management, and Operations Management for teams on-site at customer facilities handling gas and chemical dispense systems. His experience was obtained working in more than 20 countries. Long term assignments included 1 year in Israel and 5 years in China.

Date: **Tuesday, June 27, 2006**
Times: Networking/Cash Bar 6:00 PM
Dinner 6:30 PM
Presentation 7:30 PM
Place: Snuffy's Restaurant,
Park & Mountain Ave. (Rte. 22 East)
Scotch Plains, NJ
Registration: $40 ACC&CE Members,
$50 Non-members

To Reserve: Call Linda B. Townsend at 1-973-729-6671 or e-mail: **ccce@chemconsult.org**

Advanced registration is required.

Cancellations must be made 24 hrs in advance or be invoiced.

Please visit our web site for more details: **www.chemconsult.org**.

Puzzle — by Steve Waller

CHEMdoku Puzzle - Solve just like a standard Sudoku puzzle, except use the first nine elements from the periodic table. Fill in the blank squares with the elemental symbols such that each row, each column, and each 3x3 block contains all of the elements once. The elemental symbols are given across the top as a guide. There should be no need to guess! Logic will indicate where each elemental symbol belongs, so for this puzzle, the second row should have "Li" in the 3rd column, because "Li" is already in the 2nd and 3rd 3x3 blocks. This leaves only one square where "Li" can be located in this row. Continue to use your own logical methods to discover the remainder of the only solution to this puzzle. When you are done or need a hint, look on page 30 for the answer. Let us know if you like more CHEMdoku puzzles by emailing **waller@njacs.org**.

H	He	Li	Be	B	C	N	O	F

	F		Be	B	He	Li		N
O			H				Be	C
B				Li		F		
	H	F	N	He				
N								F
				Be	Li	N	H	
		H		O				Li
He	Li				Be			B
Be		B	Li	F	N		C	

ANNUAL *INDICATOR* BUYER'S GUIDE

Your Buyers Guide Listing is free! If you are not listed in this year's Guide, please contact Vince Gale at (781) 837-0424, Fax (781) 837-1453, e-mail: vincegale@adelphia.net. The purpose of the Guide is to provide a ready reference of companies providing products and services that are of interest to our American Chemical Society members. Our members will use this guide as a way of finding vendors who can service their needs when they are trying to solve a problem, need equipment, restock inventory, or require consultant services, and they will keep this reference until the next one is published.

This directory will be given to our 12,000 members for their use. This issue has excellent advertising value because it is kept and referenced for the full year. For key numbers, see "Products and Services Directory" on page 25. If you wish to be in next year's Guide, please contact Vince Gale as noted above.

BUYER'S GUIDE - Company Directory

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(609)890-8323 (fax)
www.knf.com/usa.htm
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129

Lab Safety Supply Co.
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(608)757-4645 (fax)
www.labsafety.com
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Lancaster Laboratories Inc.
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65A

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142

Libra Laboratories, Inc.
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(732)321-5203 (fax)
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12B,12C,25,65A,77,80B

Malvern Instruments, Inc.
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(508)460-9692 (fax)
www.bohlinusa.com
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12

MASS VAC, Inc.
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(978)671-0014 (fax)
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137

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80B

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167

Metrohm-Peak, Inc.
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(281)484-5001 (fax)
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Mettler-Toledo Bohdan, Inc.
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(847)680-1199 (fax)
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3

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12C,12F,12G,17,20,23,28,65A, 68,69,74B,80B,81

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(302)998-1836 (fax)
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49

NanoScale Materials, Inc.
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V.P. Marketing & Sales
1310 Research Park Dr.
Manhattan, KS 66502
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(785)537-0226 (fax)
www.nanoactive.com
tallen@nanoactive.com
33

National Institute Stds & Tech
Diane Decker
Standard Reference Data
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Gaithersburg, MD 20899-2310
(301)975-3774 (voice)
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www.nist.gov/srd
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155

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27A

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(610)346-7571 (fax)
www.eclipse.net/~numare/
numare@eclipse.net
72

NuMega Resonance Labs, Inc.
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11526 Sorrento Valley Rd,SteB2
San Diego, CA 92121
(858)793-6057 (voice)
(858)793-2607 (fax)
NuMegalab@aol.com
12H

Oneida Research Services, Inc.
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Whitesboro, NY 13492
(315)736-5480 (voice)
(315)736-9321 (fax)
www.ors-labs.com
lnewkirk@prevalere.com
65

PAC
Jill Orr
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(281)580-0339 (voice)
(281)580-0719 (fax)
www.paclp.com
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5,12,12C,24,32B,43,100,172A

Particle Sizing Systems
Donna M. Budny
Documentation & Standards Mgr.
8203 Kristel Circle
Port Richey, FL 34668
(727)846-0866 (voice)
(727)846-0865 (fax)
www.pssnicomp.com
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114

Pelican Analytics
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22,23,24

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University Park, PA 16802-6001
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179B

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Pfaltz & Bauer, Inc.
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Marketing Manager
172 E. Aurora St.
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www.pfaltzandbauer.com
sales@pfaltzandbauer.com
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Photon Technology Intl.
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1009 Lenox Drive, Suite 104
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www.pti-nj.com
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167

Poly(Chem-Tech)
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Polymer Standards Ser,-USA Inc
Clara Trimmer
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www.polymer.de
ctrimmer@polymer.de
80B

Polysciences Inc.
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Pressure Products Industries
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(215)443-8341 (fax)
www.pressureproductsindustries.com
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127

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65

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12C,19

Princeton-Chromatography, Inc.
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44

Product Safety Labs
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23

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65

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39

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Severntrent Laboratories
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(732)549-3679 (fax)
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Sonics & Materials
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Champaign, IL 61820
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14422 South San Pedro Street
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23

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14

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172

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112

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97

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107

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12C,12D,12E,18,19,20,65,74B,
77

ZirChrom Separations, Inc.
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(763)421-2319 (fax)
www.zirchrom.com
support@zirchrom.com
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ANALYTICAL EQUIPMENT

3-Densitometers
Cargille Laboratories
Mettler-Toledo Bohdan, Inc.
5-Moisture analyzers
EMD Chemicals Inc.
GOW-MAC Instrument Co.
Instrument Distributors Int'l
PAC
7-pH Meters & indicators
Analytical Measurements
Hach Company
8-Polarimeters
Rudolph Instruments
9-Refractometers
Cargille Laboratories
Rudolph Instruments
10-Surface area analyzers
First Ten Angstroms
11A-Titration
Brinkmann Instruments, Inc.
12-Viscometers
ATS RheoSystems
Brookfield Engineering Lab Inc
C.W. Brabender Innstruments
Malvern Instruments, Inc.
PAC
Petrolab Company
12B-Weighing balances & scales
Libra Laboratories, Inc.
Rice Lake Weighing Systems

ANALYTICAL SERVICES

12C-HPLC
Galbraith Laboratories, Inc.
Libra Laboratories, Inc.
Metuchen Analytical, Inc.
PAC
Primera Analytical Solns. Corp
XenoBiotic Laboratories,Inc.
12D-Mass Spectrometry
Alpha-Mos America
Galbraith Laboratories, Inc.
IBC Labs
ISSI Laboratories, Inc.
XenoBiotic Laboratories,Inc.
12E-Radio chromatography
XenoBiotic Laboratories,Inc.
12F-TLC
Galbraith Laboratories, Inc.
Metuchen Analytical, Inc.
12G-UV-Visible Spectroscopy
Galbraith Laboratories, Inc.
Metuchen Analytical, Inc.
Schwarzkopf Microanalytical
12H-NMR Spectroscopy
NuMega Resonance Labs, Inc.

BIOTECHNOLOGY

13-Biochemicals
BACHEM Bioscience Inc.
13A-Biology/toxicology analysis
Celsis Inc.
14-Biomedical equipment
BioPro International Inc.
Techne Inc.
16-Cell disruption
Branson Ultrasonics Corp
SPEX CertiPrep
17-Microbiology
Metuchen Analytical, Inc.

CHEMICAL ANALYSIS

18-Bio-analyses by HPLC
XenoBiotic Laboratories,Inc.
19-Bioanalytical service LC/MS
Primera Analytical Solns. Corp
XenoBiotic Laboratories,Inc.
20-Certificates of analysis
Galbraith Laboratories, Inc.
Metuchen Analytical, Inc.
Schwarzkopf Microanalytical
XenoBiotic Laboratories,Inc.
21A-Elemental Microanalysis
Complete Analysis Laboratories
Galbraith Laboratories, Inc.
Robertson Microlit Labs.
Schwarzkopf Microanalytical
22-Precious metal assay
Galbraith Laboratories, Inc.
Pelican Analytics
Schwarzkopf Microanalytical
23-Testing laboratory
Desert Analytics
Eurofins Scientific, Inc.
Galbraith Laboratories, Inc.
Impact Analytical
Metuchen Analytical, Inc.
Pelican Analytics
Product Safety Labs
Robertson Microlit Labs.
23-Testing laboratory
Schwarzkopf Microanalytical
Stiefel Research Inst.
24-Trace element analysis
Galbraith Laboratories, Inc.
Huffman Laboratories, Inc.
PAC
Pelican Analytics
Robertson Microlit Labs.
Schwarzkopf Microanalytical
VHG Labs
25-Thermal analysis
Libra Laboratories, Inc.

CHEMICALS

26-Catalysts
Strem Chemicals, Inc.
27A-Chiral & custom chemicals
NetChem, Inc.
28-Custom synthesis
Chemo Dynamics LP
Gateway Chemical Technology
Metuchen Analytical, Inc.
Sarchem Laboratories,Inc.
31-Emulsifiers
Jarchem Industries, Inc.
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PAC

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33-Inorganic chemicals
CERAC,Inc.
NanoScale Materials, Inc.
34-Intermediates
Eastern Chemical Corporation
35-Isotopes
ICON (Isotope) Services Inc.
35A-Pharmaceutical intermediates
Matrix Scientific
37-Reagents
BASF Corp. Callery Chemical
Chem Service Inc
Dawn Scientific Inc.
G.J. Chemical Co., Inc.
Pfaltz & Bauer, Inc.
Spectrum Chemicals & Lab Prods
39-Solutions, standard
Absolute Standards Inc.
Inorganic Ventures/I V Labs
RICCA Chemical Company

CHROMATOGRAPHY

41-Accessories & supplies
Alpha Omega Technologies Inc.
Jordi FLP
42-Columns, prepacked
Astec
United Chemical Tech.
42A-Chromatography
Chiral Technologies, Inc.
Chiralizer Services, LLC
Gilson,Inc.
43-Gas
CDS Analytical Inc
GOW-MAC Instrument Co.
PAC
AKZO NOBEL/EKA Chemicals
ES Industries
Hamilton Company
Jordi FLP
Princeton-Chromatography, Inc.
ZirChrom Separations, Inc.
45-Ion
Metrohm-Peak, Inc.

COATINGS

49-Coating facilities
MIRWEC Film - Coating Division

COMPUTER APPLICATIONS

56-Software
Bio-Rad Labs, Informatics Div
CambridgeSoft Corporation
TAL Technologies Inc.

CONSULTING, MANAGEMENT

57B-Investment Management
Repex & Co. Inc.
58-Market research
The Guthertz Group,LLC

CONSULTING SERVICES

64-Chemical Process
Chemir Analytical Services
65-Contract research
Chemir Analytical Services
Chemo Dynamics LP
Oneida Research Services, Inc.
Poly(Chem-Tech)
Prevalere Life Sciences, Inc.
PTC Organics, Inc.
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J.S.T.
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Galbraith Laboratories, Inc.
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Schwarzkopf Microanalytical
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Libra Laboratories, Inc.
Matech Associates
Metuchen Analytical, Inc.
Micron Inc.
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Schwarzkopf Microanalytical
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Metuchen Analytical, Inc.

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GOW-MAC Instrument Co.
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89-Electron Microscopy
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135-Ultra-pure water system
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Keynote Speakers;

Prof. Jim Davis	University of South Alabama, TSIL * Patent holder
Prof. Sanjay V. Malhotra	New Jersey Institute of Technology, ChirIL* Ionic Liquid Research
Dr. Urs Welz-Biermann	Merck KGaA, Director of Ionic Liquid Development Team

**TSIL – Task Specific Ionic Liquids*
**ChirIL-Chiral Ionic Liquids*

Several other speakers will address you with current research projects that are ongoing and are relevant to your industry!

Date: July 13st, 2006 : Time: 9:00 AM
Venue: New Jersey Institute of Technology
Campus Center – Faculty Staff Dining Lounge
C/O:Department of Chemistry & Environmental Science
323 Dr. Martin Luther King Boulevard
University Heights, Newark, NJ 07102-1982
Contact: Sanjay Malhotra; phone: 973-596-5583; Fax: 973-596-3586
e-mail: malhotra@ADM.NJIT.EDU

Free to the First 100 Attendees, Space is Limited

Please contact James Carlton by e-mailing him to reserve your space
James Carlton; jcarlton@emdchemicals.com