



# York Chemical Society Gazette

York Chemical Society ([www.chem.yorku.ca/YCS/](http://www.chem.yorku.ca/YCS/))

Year II N<sup>o</sup> 8 July 2000

## The Summer Edition...

Summer in Toronto. Is anyone still working? We are. First, some medicinal chemistry to keep up with developments in the fight against schizophrenia and Alzheimer's disease. Second, a commentary on the recent field work done by atmospheric chemists at York - our thanks go to professor Robert McLaren for writing an article during a busy time for atmospheric researchers. We are also glad to report that the Department of Chemistry has grown over the month of July. Two new professors, Philip Johnson and Sergey Krylov, have joined our Department. Welcome!

### Probing the fight against Alzheimer's disease

Alzheimer's disease (AD) can still only be diagnosed based on the clinical observation of cognitive decay in patients suffering from it and confirmation of the diagnosis can only be made by postmortem examination of the brain. Interest therefore, lies in the development of chemical probes that can reveal the presence and evolution of the disease. AD brains are characterized by a loss of neurons in the hippocampus, the region of the brain responsible for learning and memory, and by the appearance in this region of what are known as extracellular amyloid plaques. Amyloid plaques are protein deposits in blood vessels of the brain that can allow blood to leak out and cause hemorrhagic (bleeding) strokes. (cont'd on pg 2)

## The Southern Ontario Aerosol Study 2000

There was a hustle and bustle about the Petrie Science Building in June. Preparations were underway during the pre summer-solstice period for the deployment of a multitude of equipment and personnel to the field for the Southern Ontario Aerosol Study 2000 (SONTAS 2000), which took place June 19-July 19, 2000. The field study involved participation from 5 research groups in the Centre for Atmospheric Chemistry; including ~ 25-30 graduate students, post-docs, undergraduates and faculty. An atmospheric chemistry field study includes an intense measurement campaign where scientists use the atmosphere as a

natural laboratory, probing its chemistry and processes. Summer time is favoured for these studies not only for logistical and solar comfort reasons, but also due to the increased incidence of episodes of smog laden air impacting Southern Ontario that coincides with the arrival of higher temperatures, humidity, photochemical activity, kinetic rates and southwesterly winds. The purpose of this particular field campaign was to study atmospheric aerosols, small particles of either liquid or solid content, ranging in diameter from a few nanometers to a few tens of micrometers. (cont'd on pg 3)

## An alchemist's look at the curative powers of a noble metal

Drinks with a trace of gold "makes the heart happy", wrote sixteenth-century Hermeticist, Paracelus. Because alchemists associated gold with the sun, and the sun with the human heart, they prescribed gold-based medicines for ailments from chest pain to melancholy. That practice may have inspired sixteenth-century creators of Danziger Goldwasser. Still sold in Europe, "gold water from Danzig" contains flecks of 22-carat gold and a host of medicinal herbs. (cont'd on pg 4)



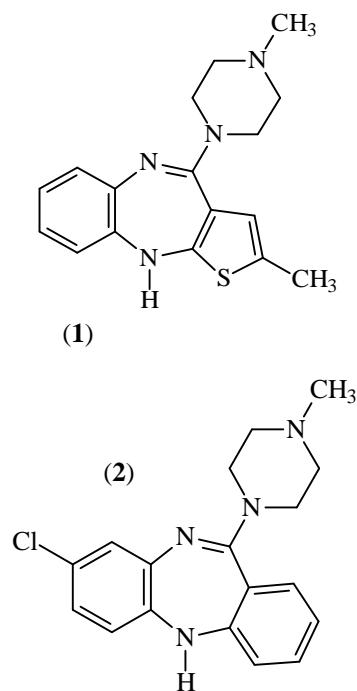
**YCS Seminar:** "Did you know?: A Who's Who of Chemistry."

Presented by Dr. John Andraos on Friday, September 22, 3:00 PM

## A new antipsychotic drug for the treatment of schizophrenia

Olanzapine (**1**), a thienobenzodiazepine, is the latest antipsychotic drug in the fight against schizophrenia. Its structure is very similar to the classical pharmaceutical remedy clozapine (**2**) still used in the treatment of the condition. Clinical trials, however, suggest that not only olanzapine is just as efficacious in treating the positive symptoms of schizophrenia (hallucinations, delusions, hostility) but it is more efficacious for negative symptoms (blunted affect, emotional and social withdrawal) and depressive symptoms than traditional antipsychotics. Its pharmacology, as with other antipsychotic drugs, is unknown. However, it has been proposed that this drug's antipsychotic activity is mediated by dopamine and serotonin receptors.

A. Vera,  
Chemistry Student



## Is it sugar or phthalates?

Samples for many kinds of foodstuffs were received from manufacturers together with basic information about the materials used in their production. Half of the 29 samples studied contained phthalates in amounts exceeding 5 mg/kg. Two types of paper bag intended for sugar had exceptionally high phthalate contents although they were flexo printed. The maximum contents of di-isobutylphthalate (DIBP) and dibutylphthalate (DBP) were 450 and 200 mg/kg, respectively. The phthalates found originated from adhesives used in the joints of the packaging. Phthalates were also determined in sugar before and after packaging. Migration of phthalates ranged from 57 to 74% of the original content in the packaging after 4 months of storage.

Aurela B. et al. part of abstract  
from *Food Addit Contam* **1999**  
Dec:16(12):571 -7

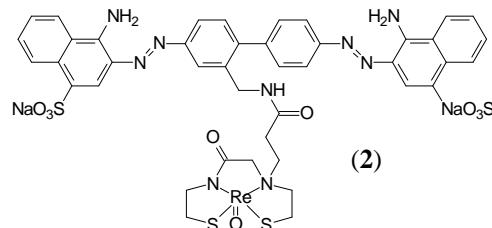
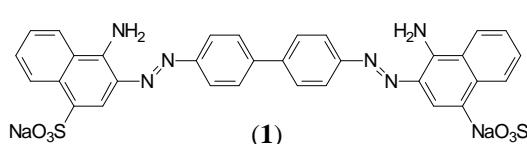
## Probing the fight against Alzheimer's disease

(Cont'd from pg 1) It also seems that the amount of amyloid deposits approximately equates with the severity of the symptoms. Therefore, chemical research in this area has mainly focused on the design of non-invasive amyloid probes. For example, Zhen and his colleagues at the Harvard Institute of Medicine and at MIT (Massachusetts Institute of Technology) are working toward

the modification of Congo Red (CR, **1**), a molecule used for decades to stain amyloid plaques in AD brain tissue sections. The modification of CR is straightforward in that it involves the introduction of a transition metal complex (a Re complex in their case) covalently linked to the molecule (**2**). Others have exploited this approach before (by introducing Tc complexes, for

example) but Zhen's modification seems to overcome two major problems: passage across the blood-brain barrier and the possibility of making (**2**) in high yield and purity. For a more complete inspection of the subject see Zhen et al. *J. Med. Chem.* **1999**, 42, 2805.

Fabio Zobi



# The Southern Ontario Aerosol Study 2000

Atmospheric aerosols are known to have adverse human health effects, especially those particles of inhalable ( $<10\mu\text{m}$  diameter,  $\text{PM}_{10}$ ) and respirable sizes ( $<2\mu\text{m}$ ,  $\text{PM}_{2.5}$ ). Their chemical composition is complex, containing many inorganic ions, elemental carbon (soot), organic carbon, trace metals and water. The organic compounds have few bounds, containing mixtures of hundreds or thousands of compounds from C<sub>1</sub>-C<sub>40</sub> with a variety of functional groups. Of particular interest are the formation processes of secondary organic aerosols (SOA's), including nucleation of non-volatile vapours, coagulation of particles, growth and adsorption on preexisting particles and other gas to particle partitioning processes. Many of these processes start with oxidation of hydrocarbons in the atmosphere by free radicals, and thus the gas phase chemistry must be probed in addition to the particle phase. Apart from the secondary processes, atmospheric particles have a variety of primary sources, including anthropogenic sources related to fuel combustion (diesel, coal, gasoline, biomass) and natural sources such as those of geological origin (wind blown dust) and biogenic origin (pollens).

The SONTAS 2000 campaign took place at two sites, an urban site in downtown Hamilton, and a rural site near Simcoe about 70 km southwest of Hamilton close to Lake Erie. Both sites coexisted with Ontario Ministry of the Environment monitoring stations where hourly average measurements of O<sub>3</sub>, CO, SO<sub>2</sub>, NO, NO<sub>2</sub> and PM<sub>2.5</sub> could supplement the gaseous data base. The SONTAS 2000 campaign included measurements of gaseous HNO<sub>3</sub>, NH<sub>3</sub>, OH, ~40 hydrocarbon species and ~30 oxygenated hydrocarbons. Particle samples were collected on several types of filter media for measurement of major inorganic ions, trace metals, organic acids, organic aldehydes



and ketones, PAH's and alkanes. A major effort was put towards measurement of particle counts, and particle size distributions using several types of measurement equipment. In addition, other meteorological parameters such as temperature, humidity, wind speed and direction were monitored for data interpretation. Details of the methods by which these measurements are made can be found in the CAC Seminar Series this fall; please plan to attend!

The logistics of such a field campaign are ....well, interesting. As a rule of thumb, what takes an afternoon to complete in the comfort of a well controlled laboratory will take ~ 3 days to complete in the field. Field studies of this type, to which this one was no exception, can be plagued by equipment failures, power failures, brown-outs, mosquitoes, ear-wigs and other insects, thunderstorms, tornadoes, lightning, micrometeors (hail and rain), traffic jams and road rage, to name just a few. These elements were battled with long 16-hour days and frequent doses of Tylenol (or other legal drugs). Rumor has it that the occasional distraction of the sound of guitar playing could be heard wafting through the air around the campfire

at Turkey Point, as part of the survival series for those permanently deployed to the Simcoe site.

In the end, we did not observe any major air quality episode during the study, although such episodes are not necessarily crucial to the study. But such is a time for reflection; Professor Rudolph philosophizes with what we now fondly refer to as the Rudolph Law,

*"The probability of having an episode [the desired conditions] during a field study is inversely proportional to the amount of effort you put into the campaign".* If such is the case, all of the students involved can be very proud of their efforts. The amount of data that was collected is certain to take some time to interpret in order to yield scientific truths about the atmosphere. In the end this data will also be used by some of our collaborating partners at York, NRC and RWDI, who will use the data to improve chemistry aerosol modules in their photochemical models. We can also thank NSERC and CressTech for funding and the OME for their support.

Robert McLaren

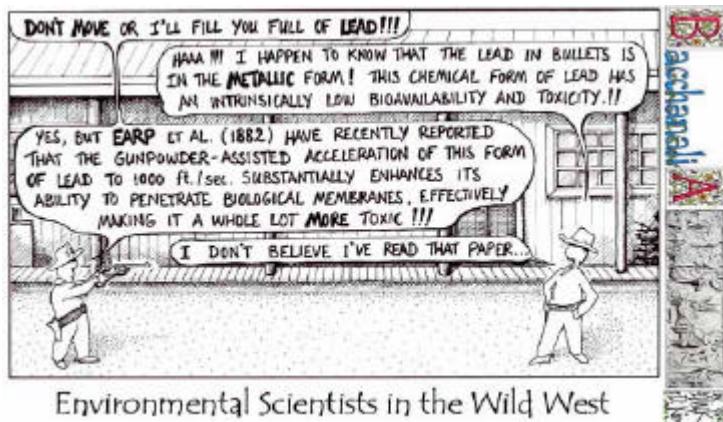
## An alchemist's look at the curative powers of a noble metal

But although herbs and alcohol have an undeniable effect on the body, the gold in Goldwasser probably does not. Doctors have known since the late 1600s that gold is all but inert and passes through the body unchanged. Nonetheless, physicians have continued to try medicines based on gold compounds. In the 1890s, Illinois doctor Leslie Keeley used  $K[AuCl_2]$  to treat tens of thousands of alcoholics at sanitariums throughout the United States. Grateful ex-patients founded clubs to popularize the Keeley cure, which did not survive the death of its inventor in 1900. Another compound, gold cyanide, inhibits the growth of tuberculosis bacilli in

the lab and became a common remedy for that disease in the early 1900s. Later clinical trials proved the treatment ineffective for people, but not before two French doctors tried similar gold compounds on patients suffering from rheumatoid arthritis. The results of their work, published in 1929 and confirmed many times since, have offered substantial relief of arthritics. Although some show little response and a few suffer side effects, about 60 percent of those treated with gold compounds feel less pain, sleep better, experience fewer muscle cramps, and show measurable reduction in joint swelling, bone deterioration, and stiffness. But despite its

acceptance by the medical community, gold treatment is as mysterious today as in the age of Paracelus. Until science learns the cause of arthritis, the way gold combats the disease will likely remain an enigma as well.

From Secrets of the Alchemists,  
Time-Life Books Ed., Virginia,  
1990, p. 116



## PEOPLE WHO MAKE IT WORK

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### YCS Seminar:

*"Did you know?: A Who's Who of Chemistry."*

Presented by  
Dr. John Andraos

September 22, 3:00 PM

Learn interesting facts  
and stories about  
renowned chemists

Coffee and refreshments  
will be served