



Signing in: Kelly Parks, Frank Jefferson and Bev Christian
(l. to r.)

National Chemistry Conference at Loyalist College

by Christine Flett

reporting for "The Intelligencer,"

Sunday, 13 June 1999

and Don Todd

(Department of Chemical & Environmental Studies, Loyalist College)

all photographs, some modifications and additions

In early June, college chemistry teachers from across Canada converged on Loyalist College for an important annual event — the conference of College Chemistry Canada, or C₃ as it is called.

This was the first time the national conference has been held at Loyalist College. Billed as Quinte Chemistry, C₃ involved college and university chemistry teachers as well as a number of local secondary school teachers. Partici-

sharing ideas for teaching purposes

pants came from Newfoundland, British Columbia, Alberta, Manitoba, Quebec and Ontario as well as the United States.

"Sharing ideas for teaching purposes was the main focus of the conference" said Loyalist professor and Ontario director Don Todd, who co-chaired the event with Loyalist Technologist Reg Vinnicombe.

Todd, who has taught in the Chemistry Program at Loyalist since 1968, noted that many presenters were Loyalist graduates. "One of our first speakers, Tom Baker (a graduate of Trenton High School) was in Loyalist's first graduating class in 1970, and eight of the 10 speakers that day were grads," he said. "Over the years I've seen Loyalist grads go into all kinds of jobs, from research and development to routine analysis and many of them have become spokespersons for their companies. They were able to talk about their own work and relate it to teaching." It

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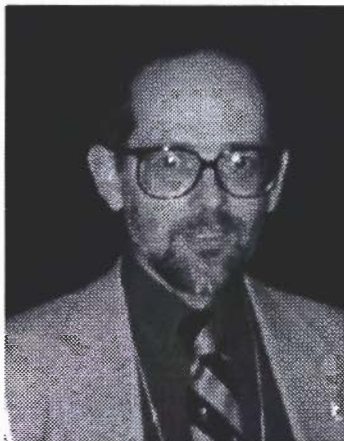
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**President's
Report**
by Bob Perkins

Welcome back to another semester of teaching and another issue of C₃ News. An excellent time was had by all at the Belleville conference due to the outstanding effort on the part of Don and Reg. I

was particularly impressed by the kind words that the graduates of Loyalist College had for their educational experience at Loyalist. It was an excellent example of the very positive effect that those of us teaching in the college system can have on our students. The challenge that we all face every semester is to somehow provide a learning environment in which every student has the opportunity to succeed to the best of his/her ability. It was very gratifying to see how well this had turned out at Loyalist.

As I was preparing my class handouts for my second year organic course (my 35th time through the course) I remembered a discussion I had with a couple of colleagues at the Loyalist conference regarding student motivation and teaching tips for the large volume of material in the course. I decided to include my student handout on the Seven Deadly Sins of Organic Chemistry in this issue; many of the items are applicable to first year as well. Feel free to send me any feedback.

Planning is underway for the Kamloops conference in 2000; future issues of C₃ News will include the details. Geoff Rayner-Canham has been busy behind the scenes trying to work out a deal with the Chemical Institute of Canada (CIC) to give C₃ members affiliate status with the CIC; part of his submission appears in this issue. It is also likely that 2001 may see C₃ taking part in a joint effort with the chemical education division of the CIC for the conference in Montreal. All the details have not been settled yet so stay tuned.

I hope you enjoy this first effort from our new co-editors. Have a good semester in the classroom.

Bob

NEXT C₃ CONFERENCE

1 JUNE - 3 JUNE 2000

KAMLOOPS, BC

FOCUS ON: CHEMISTRY AND WATER QUALITY

LOOK FOR DETAILS IN

WINTER 1999 C₃ NEWS

National Conference (cont'd from page 1)

is noted that many of these graduates are also graduates of Belleville area high schools.

The list of keynote speakers included several members of the program's advisory committee, among them Dr. Bev Christian from Nortel who gave a presentation about Potential Global Warming Contributors, and Patricia Welsh from Mead Johnson (a former student of Loyalist College) who spoke about Education Needs.

Understanding the educational needs of industry is important. "As chemistry teachers, we have to make sure we are teaching our students what industry needs them to know," Todd explained.

Other presenters included Max Ferguson of Eastern Connecticut State University who discussed the Top Ten Environmental Problems in North America; Wendy Desrocher (a Loyalist graduate) of Dashing Designs who, after a long career in the chemical industry, is applying her knowledge of chemistry and business experience to her own costume design company; and Norm Reed from the University College of the Cariboo (Kamloops, BC) who will host next year's conference.

Other Loyalist graduates were: Mike Ryan (Atomic Energy Commission Limited), Wendy McGeachy and Terry Lynch (Mobil Chemicals), Graham Stratford (Alcan) Roy Paul (McNeil Consumer Products - Johnson & Johnson), and Mike Sullivan (Canada Colors & Chemicals).

The event also included presentations by two Loyalist professors. Mary Taylor spoke of the College's Living Technology Centre which houses a biological water treatment "living machine" and a "breathing wall". The presentation was followed by a tour of the Centre. Ron Ford presented a workshop on surfing the Internet for chemistry topics. This included specific sites and the use of search engines.

Todd said comments about the conference were very positive. "The members really liked the balance of the program. They felt it covered a broad range of interesting topics such as pollution concerns, industrial processes and radioactivity."

Dave Sutton and John Kavanaugh of St. Theresa Secondary School in Belleville showed how they use computers to analyze results in the physics and chemistry courses they teach. Very often, in a standard chemistry experiment, the researcher must manually write down the information and do his or her own calculations, but this system is designed so that information goes directly into memory and the computer does the various manipulations and calculations. The participants were quite impressed with this presentation.

There were also plenty of opportunities to socialize, from the wine and cheese reception on the first night, the official banquet on the

Top Ten Environmental Problems in North America

(presented by Max Ferguson, Eastern Connecticut State University)

Anyone who has attended a C₃ conference in the last decade has met Max Ferguson and his wife Dot; one of the high points of every C₃ conference is Max's presentation. Max (without Dot, who was unable to attend due to a knee operation) attended again this year to add his own brand of humour to the conference.

One never knows what to expect from Max's presentations, and this year's was no exception. With a title like "Top Ten Environmental Problems in North America" one might anticipate a detailed assessment of, well, the top ten problems. That, it appears, would be too obvious for Max. Although he did hand out a sheet listing some possible threats, he was more interested in what his *audience* thought was the most important environmental problem. To this end, he handed each C₃ member a questionnaire asking what he/she thought (he plans to collate the results and submit them to ACSUS, the Association for Canadian Studies in the U.S.). The remainder of his talk was devoted to showing cartoons (Ecotoons) that he uses in his Environmental Chemistry of North America course. By the way, if anyone knows of a source of these cartoons please let Max know about it, since his local newspaper stopped carrying them some time ago.

C₃ conferences suit Max to a "T" since he gets to put the word "international" in his applications for funds, which, he claims, gains them a more sympathetic reception from administration. The feeling is mutual; his presentations are so enjoyed by C₃ that Max and Dot were made honorary Canadians at the 1994 conference in Rhode Island. We all eagerly anticipate next year's talk.✱

by Bob Browne

second, and the buffet on the third, to a tour of the Thousand Islands on the final day. "The trip was a great success," said Todd. "We started at the Lake on the Mountain, which they loved, then via the Glenora Ferry we continued on to the Gananoque area where the group visited the sky deck at the 1000 Islands bridge and had lunch and then took a boat cruise out of Gananoque which included a visit to Boldt Castle. Afterwards, they felt they had seen four very different and interesting things."

Conference co-chair Reg Vinnicombe says organizing the many workshops and seminars for the conference "was a formidable task which took over a year and a half and involved both of us for many, many hours every day." But he is pleased with the balance between aca-



Bob Perkins presents Kelly Parks with \$400 scholarship

ademic and social activities they were able to achieve. "Many of the members are old chums and really like to socialize, so I'm not surprised the tour turned out to be a real highlight," he says.

Much of the conference's price tag was covered by corporate sponsorships. Companies represented included Mobil Chemical, Atomic Energy of Canada, Alcan International, Nortel Networks, Mead Johnson, Celanese Canada, McNeil Consumer Products (Johnson & Johnson), Indsale, Sonoco, Essroc Canada Inc., Cameco Fuels, VWR Canlab, McGraw-Hill, Harcourt Brace, & Patterson Jones.

It has been a tradition of the C₃ Association that the host college receives a student scholarship. Loyalist student Kelly Parks, who has completed the second year of the Chemistry program and will be returning in September for the final year, was the recipient of this \$400 scholarship, which was presented during the conference.

Many of the participants made use of the convenience of the College's Residences. In addition to the convenience (as many had no vehicle for off campus travel) of the residence, the price was excellent at \$20 per night and it was air-conditioned. The other advantage of being on-campus was the availability of food services in the College's cafeteria.

"I'm really happy with the conference itself. It went off without a glitch. I believe we were able to provide a quality conference, and I'm pleased Loyalist had the opportunity to host this event and to highlight our grads who can hold their own anywhere in the world," said Todd.✻

The Chemistry of Pain (presented by Roy M. Paul)

At the C₃ conference last June, Roy Paul gave an informative talk on the chemistry behind pain and the analgesics that we use to treat it. Pain is a response to undesirable stimulation and it provides a defense and preservation mechanism. Though pain can be caused by direct nerve stimulation, it can also be a secondary response to inflammation resulting from bacterial or viral infections or from trauma.

To treat pain, there are two classes of analgesics: opiod (narcotic) analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs). Opioids, such as morphine and codeine, work by stimulating the opiod receptors in the brain, mimicking natural brain opiate-endorphins. The side effects include euphoria, drowsiness, constipation, physiological and psychological dependence, and intolerance. NSAIDs, such as ASA and acetaminophen, function by direct action on the inflammation.

Production of analgesic tablets is a complex process. In addition to the active ingredient, the tablet requires components such as a binder (starch) and a disintegrant (cellulose) to break down the tablet when it reaches the stomach.✻

by Geoff Rayner-Canham

Call for symposia topics for the 2001 Canadian Society for Chemistry meeting and exhibition in Montreal

Dear Colleague,

I would like to ask your assistance in a matter regarding the CSC Meeting and Exhibition that will be held in Montreal in the year 2001. The planning of this meeting is well underway and we are now working on identifying and scheduling the various symposia for each of the divisions. I am organizing the program for the Chemical Education division and this letter is essentially a call for symposia topics. It would also be very useful to have the names of possible organizers for these symposia.

I would be happy to receive suggestions by mail, FAX or e-mail. We are hoping to make the final selection of topics by the end of October of this year.

Please pass this information on to any interested members of your department who may not be a C₃ member.

Sincerely,

Sharon M. Bennett

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Symposiums pour le congrès et l'exhibition de la Société canadienne de chimie à Montréal en l'an 2001.

Cher(e) collègue,

J'aimerais, par la présente, demander votre aide et en contactant les membres de votre département concernant le congrès et l'exhibition de la Société canadienne de chimie qui aura lieu à Montréal en 2001. L'organisation du congrès est commencé et nous sommes rendus à l'étape de l'identification des symposiums pour chaque division et la planification de l'horaire pour le congrès. Je suis responsable de l'organisation du programme de la division de l'éducation chimique. Cette lettre est un appel de suggestions pour les symposiums, dans cette division. Les suggestions pour des organisateurs possibles seront très appréciées.

Je serai heureuse de recevoir vos suggestions (par courriel, FAX ou par la poste) et nous espérons faire la sélection finale de symposia au mois d'octobre 1999.

Je vous remercie de votre précieuse collaboration et je vous prie d'accepter mes meilleures salutations.

Sharon M. Bennett

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Low-Level Finish-on-Fibre Analysis by NMR

(presented by Tom Baker of Celanese Fibres, Millhaven, ON)

Tom Baker works for Celanese Fibres in Millhaven Ontario. Recently, because of environmental concerns, they needed to modify a procedure in their polyester fibre manufacturing process. The paragraphs to follow outline the both the manufacturing process and the new solution.

The Celanese Fibre facility in Millhaven produces staple polyester fibre from ethylene glycol (made in Edmonton) and terephthalic acid (made in Decatur, Alabama). The extruded fibre ranges in "weight" from a very fine 1.3 dtex¹ to a relatively coarse 17 dtex. Most of the fibre is baled and shipped to the US "textile belt" where it is spun by high-speed machinery into yarn for eventual use in a variety of consumer products such as apparel and carpets. The fibre is not shipped "raw", however; the producer must supply the product with a small and appropriate amount of uniformly applied "finish" which serves as a lubricant, as an anti-static agent, and as a cohesion maintainer. The purchasing manufacturer specifies the particular finish; finishes tend to include mineral oil and phosphate.

Application of the finish is a challenge. Finish levels must be accurate to on the order of 0.14% (by mass), which corresponds to about 1.5 microlitres on 10 km of fibre (about 0.3 square metre of surface). Application via solution faces possible solubility problems as well as the need to remove the solvent (too high a temperature could drive off the finish oil). Metering in the neat finish (via a slot in a bar above and below the two and a half million filaments) could result in uniformity problems.

The determination of the level of finish on the fibre used to be accomplished by a solvent extraction technique; this method involved finding the mass of the residue upon evaporation of the solvent. Different solvents were used for different finishes, but one of the main solvents was the ozone-depleter methyl chloroform (1,1,1-trichloroethane).

Environmental concerns dictated that at least the solvent in the process, and at most the entire process, needed to be replaced. Simply finding a different solvent was not a simple alternative; infrared analysis of a

hexachloroethane extract proved unsatisfactory, and supercritical fluid extraction using carbon dioxide was ruled out as being too labor-intensive.

At this point Celanese stepped back to view the larger picture: Were there other methods that could be applied to the analysis? Reflective near IR analysis was tried but found to be not suitably reproducible. Analysis of total organic carbon gave results that did not correlate well with knowns containing the finish of interest.

The method finally decided on was Pulsed low-resolution proton magnetic resonance (using a benchtop instrument). In this method, a 3.5-gram preconditioned fibre sample is packed into the 4-cm analytical zone at the bottom of a large tube (ca. 15 x 2.5 cm). Two signals are applied to the sample 11 microseconds apart (this experiment relies on a phenomenon known as the Hahn spin echo). The second signal is applied to the sample orthogonally to the first, and so interacts only with nonrelaxed protons (in general, signals from solids decay rapidly). Analysis of knowns provides a calibration curve.*

by John O. Olson

RENEWALS

IF YOU WOULD LIKE TO CONTINUE RECEIVING C₃ NEWS, PLEASE REMEMBER TO RENEW YOUR ANNUAL MEMBERSHIP. FORWARD A \$20 CHEQUE MADE PAYABLE TO "COLLEGE CHEMISTRY CANADA" TO THE TREASURER, JACKY MCGUIRE.

NEXT ISSUE

IN KEEPING WITH THE FESTIVE SEASON, THE WINTER 1999 C₃ NEWS WILL ATTEMPT TO INCLUDE ARTICLES ON TEACHING TIPS AND FUN ASSIGNMENTS THAT READERS ARE INVITED TO SUBMIT.

EDS.

EVERY SEMESTER MANY NEW STUDENTS ENROLL IN ONE OF BOB'S ORGANIC CHEMISTRY COURSES. IN AN EFFORT TO HELP THEM SUCCEED, BOB HAS WRITTEN THE SEVEN DEADLY SINS THAT FOLLOW TO WARN HIS STUDENTS OF THE MOST COMMON PITFALLS TO WHICH THEY MAY SUCCUMB TO IN HIS COURSE. THEY ARE TAKEN FROM HIS BOOK, "HOW TO SUCCEED IN ORGANIC CHEMISTRY".

Techniques which have worked for you in the past may not work as well with the material in this course.

Do not try and read the entire chapter word-for-word before coming to class.

You cannot do too many problems!!

[There is] too much material for you to try and simply memorize.

Understand the vocabulary.

Think in 3D !

ONLINE ?

VISIT THE C₃ WEB SITE AT www.c3.douglas.bc.ca
FOR MORE INFORMATION AND ARCHIVES.

The Seven Deadly Sins of Organic Chemistry *by Bob Perkins*

Many of you will have had friends and/or family members who have taken introductory organic chemistry. Their comments about the course (usually found to be in direct correlation with the grade that they achieved) will likely span the range from impossible through wonderful. Many of you will have developed strategies for coping with the new material presented in science courses.

However, I would like to offer a word of caution concerning this course and the material presented in it. Techniques which have worked for you in the past may not work as well with the material in this course. The volume of material can be very frustrating to the beginning organic chemistry student due to the interdependence of most of the topics.

There are seven deadly sins which I believe (based upon the experiences from over 20 years of teaching this course) can lead to potential problems for students embarking on a journey through the wonderful world of carbon. Let me guide you through them and suggest some ways to minimize their effects.

Falling Behind

In order to make the most of your classroom time, you should attempt to come prepared. Your time should not be spent on simply taking dictation, but rather a chance to do some critical thinking and problem solving with the new vocabulary. Your instructor should have provided you with an outline listing the topics to be covered in each class. Do not try and read the entire chapter word-for-word before coming to class. Instead you should read the introduction to the chapter and then the summary at the end of the chapter. Skimming through the rest of the chapter will give you a feel for the material (including the new vocabulary) and allow you to take part in class discussions, asking or answering questions and to actively listen rather than merely copying down lecture notes from the blackboard or overhead. If you fall behind it is unlikely that you will understand much of the classroom presentation and problem-solving will become more difficult.

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Ineffective Study Habits

You should try to read through your notes before the next class. You can make a few additional notes from the textbook for clarification if part of the material does not make sense. Any remaining time should be spent at the end of the chapter putting into practice what you have learned. You cannot do too many problems!! Your success in the course will be directly related to the number of problems which you do. You should find a study buddy to problem solve with as two heads are usually better than one. You may need to review some of the topics from your first year chemistry course to completely understand a particular point. This will most likely be true at the beginning of the semester.

Making Mistakes While Note-taking

One of the most frustrating aspects of this course is finding out several days after a class that you have incorrectly copied down a structure from the blackboard or overhead.

Please remember that every carbon atom must have four covalent bonds, every nitrogen atom must have three covalent bonds, every oxygen atom must have two covalent bonds and every halogen atom must have one covalent bond in order to have a stable neutral compound!! If these bonding requirements are not satisfied then the structure you have drawn will either be impossible or some type of reactive intermediate.

If possible you should compare lecture notes with your study buddy to ensure that a misplaced atom or bond does not lead to difficulties when it comes time to attempt a question at the end of the chapter. Did you copy down a *cis* compound instead of *trans*? Was that group attached in an equatorial or an axial position?

Another suggestion is to take notes as part of a team. One person copies down the structures from the overhead/blackboard, another summarizes points made orally by the instructor or those resulting from a student question, while a third person just listens. After class, these three people get together to go through their perceptions of the class and develop a complete set of notes for that class. This technique works very well when the course is presented in an accelerated format like summer school or a three hour class one night a week.

continued next page

The Rationale for an Affiliation with the CIC

by Geoff Rayner-Canham

The primary focus of the CIC is *not* chemical education. In fact, in the 1970s and 1980s, many CIC conferences had barely a mention of chemical education at all (I recall attending one conference where the sole Chem. Ed. session ran part of one afternoon and had less than 10 attendees). The CIC closed down the Canadian Chemical Education journal during that period as well, leaving us as the only developed country without a national journal of chemical education (to digress, even tiny Slovenia has its own chem. ed. journal). This decision indicated to many people, including myself, the lack of support for chemical education by the CIC and, in particular, its lack of interest in the rapidly growing share of the tertiary educational burden taken up by the two-year colleges (unlike the ACS, which generated the 2YC₃ to fill this need).

At this time, it is appropriate that C₃ explores an affiliate relationship with the CIC in order to renew the CIC link to chemical education. After all, C₃ is a federally chartered organization for the promotion of chemical education and the exchange of ideas among two-year college chemistry faculty. If the CIC Board approves of affiliate status for C₃ members, we can explore a range of useful common activities, especially joint-sponsored chemical education programs at conferences. I feel strongly that C₃ should be linked directly with the Chem. Ed. division of the CIC as it is chemical education that provides the affinity between the two organizations. My only regret is that, even if the recommendation were to be passed by the Board, the late November date will preclude the inclusion of the affiliate status box on the C₃ membership renewal form for 2000. Thus it will not be until 2001 that such status could be an option.*

E-MAIL-DELIVERY?

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patrick@kwantlen.bc.ca

WITH THE SUBJECT LINE:
ELECTRONIC C3 NEWS

Trying to Memorize Your Way Through the Course

No matter which textbook you are using for the course, there are too many pages containing too much material for you to try and simply memorize; you will run out of places to store the information. It will be necessary to find ways to organize rather than memorize the material.

The greatest problem for the beginning student is that there is no best way to organize. What works for one individual may not work for another. Flash cards may work for some of the material; mind mapping (inter-connected flow charts from a central theme) can be effective as well. Feel free to try out different techniques with your study buddy. It is important to find a technique that works for you.

Reading (but not using) the Vocabulary

An introductory course in organic chemistry is similar to a foreign language course. In order to be able to solve problems, it is necessary to understand the vocabulary. In the appendix at the end of your textbook you will find a glossary of terms. Depending on the particular textbook which you are using, this glossary may be twenty to forty pages long. You should try very hard to learn what the new terms mean in words as well as pictures.

A clear understanding of nomenclature and the relationships between isomeric compounds will assist you when it comes time to consider their physical and chemical properties. You cannot become fluent in Spanish by merely reading about it, a great deal of practice is necessary. The same is true for organic chemistry. Pick a molecular formula and try drawing the structures of compounds to illustrate the various type of isomers. For many questions there will be more than one correct solution.

Ignoring Your Molecular Modeling Kit

Many students have difficulty when it comes time to use the shapes of organic molecules. If you never could manage to solve the Rubik's cube then you should make effective use of your molecular model kit to think in 3D. Many of the problems in the course will require you to mentally lift a two-dimensional structure off the page and examine it in three dimensions to formulate a solution.

You will need to be able to interconvert between the various ways to represent organic molecules; e.g., condensed formulas, dimensional formulas, Newman Projections, Fischer Projections and Haworth Projections. You are allowed to use molecular models on all exams, but it is much faster if you have had sufficient practice with the models in order to see the molecules (and their manipulation) in 3D.

Not Practicing Reaction Problems

Organic molecules are capable of undergoing a wide range of different chemical reactions. You may find it useful to become one with the molecule to visualize the reaction. By imagining that you are sitting on one end of the molecule you will be able (with practice) to see how to correctly shift valence electrons around to move from starting material to product. There are several conventions to remember when you consider which electrons to shift and where to shift them to. Just as the north poles of two magnets will repel each other so will like charges repel each other; only opposite charges will attract each other. Learn the notation too.

Organic chemists make frequent use of arrows to denote the movement of valence electrons when postulating a reaction mechanism. A single-headed arrow will represent the movement of a single electron. Arrows of this type are used when free radicals are postulated as reactive intermediates. A double-headed arrow will represent the movement of a pair of electrons. Arrows of this type are used when carbanions or carbocations are postulated as reactive intermediates. These double-headed arrows will be drawn from a centre of high electron density (nucleophilic centre) toward a centre of low electron density (electrophilic centre). A positively charged intermediate will not likely be found in a basic solution and a negatively charged intermediate will not likely be found in an acidic solution.*

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