Alfred Bader fonds

Correspondence

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1993-1997

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3 April 1995

Dr. Alfred R. Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
U.S.A.

Dear Alfred:

<u>My</u> picture in <u>your</u> autobiography ... I am curious and confused. I hope it is not a "*Wanted, Dead or Alive*" poster!

Thanks very much for your best wishes on my new assignment. I feel a little like the guy who has agreed to go on a suicide mission - why me? Anyway, duty is duty.

I have enclosed a copy of an "explanation" of the medical school thing. As usual it sounds worse than it actually is; everybody is extremely sensitive these days.

I hope the onset of Spring finds you and Isabel well. We are all well here. Thanks again for thinking of me. (P.S. My hair is shorter now and pulled back!).

Kindest regards,

Alan

Alan Shaver
Professor and Chair

AGS/ag

enclosure

PROVINCIALISM HITS MEDICAL SCHOOL ADMISSIONS

The worst sort of provincial barrier has hit Quebec medical schools with a ban on out-of-province students

by Janice Paskey

McGill is protesting vigorously and lobbying Quebec's new minister of health, Jean Rochon, to reverse the chilling decision of a predecessor: no out-of-province students will be admitted to any of Quebec's four medical schools, including McGill, beginning in September 1995. The current quota of 30 foreign medical students remains unchanged. The ban on Canadian students appears to be part of a government effort to control the number of doctors. While other Canadian medical schools give preference to applicants from the home province, none, except Quebec, completely bans students from other provinces.

"There are emotions of rage and disappointment, and these are emotions which we share," says McGill's Dean of Medicine, Dr. Richard Cruess, about the reaction of McGill friends and supporters to the decision. "Planners like black boxes, and to control the point of entry in and out of the system, but this is not great for the intellectual life of the country and medical community," says the Ontario-born dean, who studied at Princeton and Columbia universities before coming to McGill as a professor of orthopedic surgery in 1963. Cruess believes that while it's too late to admit out-of-province applicants for September 1995, a change of heart is possible. "We believe this is not a *fait accompli,*" he says.

FINGER IN THE DIKE

The decision barring out-of-province students has nothing to do with the recent election of the separatist Parti Québécois, as the edict was formulated under the preceding Liberal government. When McGill found out about the proposal last year, it represented the worst case scenario in a lengthy process of quota negotiations with the government of Quebec.

Ontario's Ruth Grier sought to keep Ontario students out of McGill

Quotas and restrictions began 14 years ago when, in an effort to control medical manpower, the province of Quebec required its medical schools to decrease the number of Quebec medical students by 18 percent. McGill dropped from 115 Quebec students to 101. Yet McGill maintained its enrolment by taking more out-of-province Canadian and foreign students, mainly Americans, with Quebec government approval. "Because physicians in our society are paid out of the public purse, governments don't want to flood the market," says Cruess.

In 1985, two sets of quotas were imposed. The first was 30 places for foreign students in undergraduate medicine among all of the medical schools. McGill negotiates with the other Quebec medical schools over its share. This year, McGill has 27 of the 30 foreign students.

The second quota was placed on out-of-province Canadians because they have a legal right to practise in Quebec, under the Canadian Charter of Rights and Freedoms, though few choose to do so. McGill statistics show that, out of the 262 out-of-province graduates from 1985 to 1992, only two have sought licences within Quebec. Further, four years ago Quebec instructed McGill to require out-of-province

Canada Press

BANNER YEAR

Marc-Yvan Côté banned out-of-province medical students

students to sign a document saying they would not practise in Quebec, or that they would practise in an underserviced area or, if they did want to practise in a metropolitan area like Montreal, they would agree to pay a $200,000 fine. As this medical class is just graduating, there have not been any challenges to the legality of this document.

The issue in question, the out-of-province quota, began with 40 students per year for Quebec's medical schools. It was first reduced to 23 students. In 1991 the Ontario New Democratic government set out to reduce the numbers of its doctors, in the wake of a meeting of all the provinces about health care and the Barer-Stoddart report which recommended all provinces reduce medical school enrolments by 10 percent. According to the Ontario health ministry, Ontario noticed that Quebec-trained MDs were the second largest source of physicians. And McGill was identified as the culprit, the hole that needed to be plugged. In July of 1993, Health Minister Ruth Grier wrote to her Quebec counterpart, Marc-Yvan Côté, asking Quebec to diminish the numbers of Ontario students at Quebec medical schools. (The Ministry would not release this letter, calling it "privileged ministerial correspondence.") Spokesperson Barbara Selkirk said that Côté then reduced the out-of-province quota to 10. (McGill has five of the 10 out-of-province students this year.) "We wrote back and said, 'This is terrific, we appreciate the effort to merge physician resources. Let's discuss this further,' " says Selkirk. "We never asked for a ban."

Nevertheless, a ban it was. McGill was furious with the Ontario government, which it said gave the impetus to "balkanize" education. "Mr. Côté also stated that he had verbal requests from two other provinces requesting the same thing. This was given as the justification for eliminating the Canadian quota allowed to study medicine in Quebec," wrote Cruess in his official statement on admissions policy.

The ban mainly affects McGill, which is the prime destination for out-of-province students as it teaches in English (though all students have the option to write exams or papers in French). "A communist world would do things like that, we don't do things like that," Dr. Cruess said. The McGill Faculty of Medicine did not publicly protest but employed quiet diplomacy. After Côté resigned in December of 1993, the Faculty asked for a meeting with the new minister, Lucienne Robillard, which was not granted. "She never really settled into the ministry," said Cruess. After the Quebec election last September, McGill asked the incoming Parti Quebecois, which won the September 1995 election, to review the policy.

But something had to be said to the out-of-province students who began applying for September '95 admission. They were sent letters from the McGill Faculty of Medicine that read: "We are happy to provide you with this material but note that your place of residence appears to be outside the province of Quebec. The Quebec government, in response to a request from the province of Ontario, has recently prohibited us from accepting applicants who are Canadian citizens or permanent residents, whose place of residence appears to be outside the province of Quebec.

"If you, as a Canadian, were to change your residency to Quebec we would be delighted to consider your application. You should know, however, that if you were to apply to other Canadian universities they would be aware that you had applied to us as a Quebec resident and for that particular year's competition you would be classified by them as a resident of Quebec."

One applicant from Scarborough, Ontario, a McGill graduate who is currently a student at Harvard, was shocked. "This is extremely frightening. I think it will cause an inbreeding in education that is dangerous," she said in a telephone interview from Boston. She sent a copy of the McGill letter to her Member of Provincial Parliament, Liberal Alvin Curling. This student asked not to have her name used as she's applying to medical schools in Ontario. "There is a lot of politics in medical school admission and I don't want to be seen as a troublemaker. But I can't believe more people didn't speak up." Her action prompted airing of the issue. Curling alerted health critic Dalton McGuinty and the leader of the Ontario opposition, Lyn McLeod, who raised the question in Question Period on November 28 and 29 last fall. "This is absolutely unprecedented and, for us, a very serious issue of restricting the right of choice for Ontario students," McLeod said, according to the official public record, *Hansard*.

For Grier it seemed that 10 out-of-province students in Quebec was 10 too many. She admitted to writing the letter: "I wrote to my Quebec counterpart and asked them to work with us to limit the number of undergraduates who were being trained in Quebec, not to eliminate the possibility of Ontario residents being trained in Quebec." Yet under her government's "Social Contract" only doctors educated in Ontario would receive a billing number, thereby rendering Quebec medical education useless for Ontario students.

The story was discussed in the Canadian media. A *Montreal*

Gazette editorial said, "Ontario already limits who can practise within its borders, now it apparently wants to restrict who can study outside its borders." The *Toronto Sun* ran an erroneous story, "PQ Bars our Kids," which served to inflame the tension between federalists and separatists. *Globe and Mail* columnist Robert Sheppard dealt with the issue as well, and dismissed McGill's faith in Quebec's health minister. "McGill fought those quotas, and has hopes that the Parti Quebecois may yet change them. (Yeah, right.)" Yet Cruess believes the education minister himself is more important than the party represented. Quebec's current minister, Jean Rochon, is a doctor, the former dean of Laval University's medical school. In short, he is someone who can appreciate why it might be worthwhile to have a diverse mix of students studying medicine in Quebec. When the story broke in the media, Cruess immediately sent a letter to Rochon: "Je désire vous informer officiellement et de façon personnelle que ni la Faculté de médecine ni les départements de McGill ne sont responsable de l'information reçue par les journaux ontariens."

McGill is making its case on academic grounds and fighting for the values underpinning the teaching and research mission of the University – free exchange of ideas, excellence in teaching and research and the advantages inherent in a diverse student body. In short, the types of things necessary to maintaining its position as one of the world's top medical schools. Principal Bernard Shapiro says he can understand the Quebec government policies in terms of trying to control the number of physicians. "We do understand McGill has a special obligation to Quebec residents; this is reasonable, given the subsidies from the Quebec government. I don't want to be disrespectful, but this policy is very unfortunate on educational grounds. Having a range of backgrounds in any class, not just medicine, is beneficial, so it's quite inappropriate. As well, there appears to be no particular objection to bringing in Americans, as long as they pay enough." The foreign student tuition fee is $7,635.06 while Canadians and Quebecers pay $1,845.06.


Jonas Papaurelis

LET MY PEOPLE COME

McGill's Richard Cruess fights for the out-of-province students

DOCTOR'S ORDERS

PQ's Jean Rochon could reverse the draconian policy of the last Liberal government

McGill medical alumni are disheartened and incredulous at the situation. "I spent five minutes talking to a [McGill] doctor in an operating room in Calgary explaining that this wasn't McGill's policy," says Scot DeJong, Director of McGill's Alma Mater Fund. McGill Principal Bernard Shapiro has received about 30 letters along with the alma mater fund request form, asking about the situation. Meanwhile, a fax of a *Globe and Mail* article on Ontario's role in the debate came to McGill with the question: "Who is running McGill, Dr. Shapiro or [Ontario Premier] Bob Rae?" The man responsible for private funding, Michael Kiefer, Vice-Principal (Advancement), commented, "What I would say to supporters is this is not the time to desert the McGill Faculty of Medicine. We must pull together to make the point that our Faculty of Medicine is as strong as it is today because of a long history of geographically diverse students and a commitment to being much more than a purveyor of medical manpower."

Bill Tholl, an economist with the Canadian Medical Association (CMA), notes the "deafening silence" of federal and provincial education ministers in the debate. He says the CMA opposes these educational restrictions and disputes the government calculation of health costs. He says medical costs, which are calculated as a percentage of gross national product, have increased because the GNP has decreased in the last few years, but expenditures have actually decreased in line with cuts in government spending.

Despite government attempts at doctor regulation, there is one area where the governments lose control: the numbers of doctors leaving the country increased from 427 in 1980 to 635 in 1993, taking expertise and millions of dollars of Canadian taxpayer-subsidized education with them.

For the young McGill graduate at Harvard, a research fellow in pathology who just wants to be a doctor, "I feel as if I'm in no man's land. I'm in the U.S. but from Ontario and my last address is Quebec, but if I'm considered a Quebec resident, I'll have fewer chances of entering Ontario medical schools. If I train at McGill, I can't practise in Ontario. And I feel if I don't get back to Canada and get into medical school quick enough, I will never be allowed to return there."

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

November 8, 1993

Professor Masad Damha
Department of Chemistry
McGill University
801 Sherbrooke St. West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Damha:

You must have realized how very much Isabel and I enjoyed our two days at McGill, particularly because of your great care, looking after all of the details.

It would be great fun if the next time we visit Montreal we could meet all six members of the firm, even Catherine and Melissa.

As I explained to you, it is difficult to calculate and document exactly what the travelling expenses for our visits to McGill and Concordia Universities were. We flew to Montreal over the weekend to reduce air travel costs, and as you know we stayed with my adoptive family, again to reduce costs. I hope that you will consider the enclosed statement fair.

All good wishes to you and our mutual friends at McGill.

Sincerely,

Enclosure

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

STATEMENT OF EXPENSES

for Dr. Alfred Bader
October 24 and 25, 1993

McGill and Concordia Universities' share in travel expenses to Montreal	$ 300.00

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

November 8, 1993

Professor Alan Shaver
Department of Chemistry
McGill University
801 Sherbrooke St. West
Montreal, Quebec H3A 2K6
Canada

Dear Alan:

It was such fun to see you again and to be able to thank you personally for all your help during the last two years.

If you can find Otis Ramka's address in Venezuela, please send it to me. I would love to write to him.

All good wishes to you and your associates.

Sincerely,

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

November 8, 1993

Professor John T. Edward
Department of Chemistry
McGill University
801 Sherbrooke St. West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Edward:

Isabel and I so enjoyed seeing you at McGill and being able to thank you personally for all your help. Now I also have to thank you for your kind introduction and your thanks after the Loschmidt lecture.

Thank you also for giving me the copy of your 1984 paper celebrating McGill's 1000th PhD in Chemistry. I must tell you, however, that I was amused by your coyness in writing on page 16 that, "The reasons why the graduate school of the Department of Chemistry at Toronto before 1950 never reached the size of that of the McGill department are not clear to the author." Professor Edward: surely you know about the influence of George F. Wright who I have been told has driven more chemistry students into theology than any other. There is the simple explanation why Toronto was behind McGill.

All good wishes.

Sincerely,

McGill

2 November 1993

Dear Dr. Bader,

The enclosed reprint from my article in The *Journal of Chemical Education* has a little on Dr. Raymond Boyer at the end, but is mostly very chemical. I don't think it has had much impact on the chemical scene: very few chemists work in this area now.

Your three lectures in Montreal last week were unalloyed delight, and it was a great pleasure for me to meet you and your wife Isabel again. I look forward to further meetings at ACS conferences (or whatever!)

With all good wishes to both of you,

Sincerely,

Jack Edward

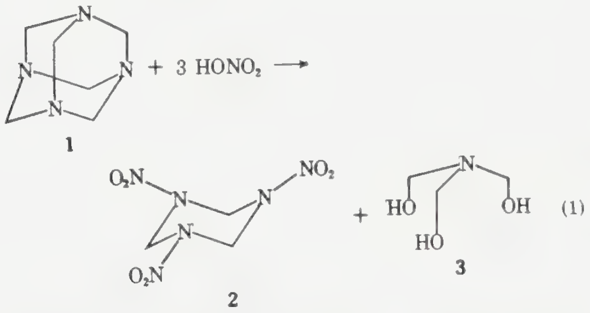
Reprinted from Journal of Chemical Education, Vol. *64*, Page 599, July 1987

Wartime Research on RDX

"A False Hypothesis Is Better Than No Hypothesis"

John T. Edward
McGill University, Montreal, PQ, Canada H3A 2K6

In 1899, Henning (*1*) obtained a compound $C_3H_6N_6O_6$ by treating hexamethylenetetramine (hexamine) (1) with nitric acid and, in an action revealing much about the practices of industry, patented it as a urinary antiseptic. Hexamine hydrolyzes slowly to formaldehyde and ammonia at physiological pH and had already been used as a urinary antiseptic, whence its alternative name of urotropine; however, we now know that Henning's compound is completely useless for this purpose, being much too stable to hydrolysis.

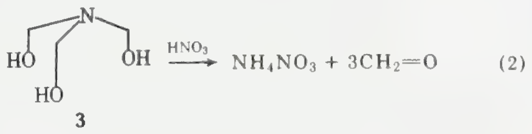


More than two decades later, Herz (*2*) recognized that Henning's compound had the structure **2** and was a powerful high explosive. In 1925 Hale (*3*) of Edgewood Arsenal, New Jersey, published a detailed account of its preparation in 99.8% nitric acid. After this, the military research establishments of several countries began to study its manufacture and military applications, giving it various trivial names such as RDX, cyclonite, hexogen, etc. Most of this work was secret. With the coming of World War II many academic chemists became involved in RDX research, and several new methods of preparing it were discovered. Some of these were applied on a large scale, so that in the USA alone RDX was manufactured at the rate of 300 tons a day at a single plant in Kingsport, Tennessee. Since the war some, but not all, of this research has been published. The present account focusses on wartime research in Canada, the USA, and Great Britain and then mentions briefly developments in wartime Germany.

Figure 1. Robert W. Schiessler.

The Schiessler–Ross Process

The nitrolysis[1] reaction studied by Hale (*3*) (eq 1) suffers from a fundamental defect: of the six molecules of formaldehyde going to make one molecule of hexamine, only three can go into the formation of RDX **2**, and the other three must appear in degradation products in the spent acid. The first degradation product may be **3** or its trinitrate ester; however, these would be hydrolyzed when the nitric acid is diluted to 70% acid to precipitate the RDX, according to the equation



$$\xrightarrow{HNO_3} NH_4NO_3 + 3CH_2{=}O \qquad (2)$$

In practice, the formaldehyde thus produced is oxidized in the 70% acid to CO_2 in a controlled "fume-off" with the

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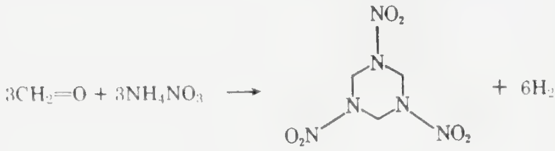
[1] The term "nitrolysis" is reserved for reactions involving the rupture of an N–C bond by $HONO_2$ with replacement of C by NO_2; "nitration" involves rupture of a C–H, N–H, or O–H bond, with replacement of H by NO_2.

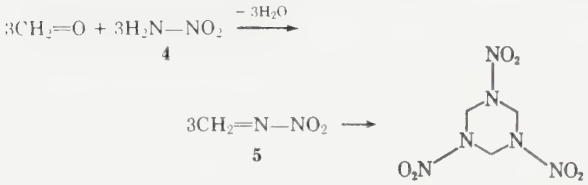
evolution of N_2 and NO_2, and the spent acid liquors are then distilled to recover 98% nitric acid.

In 1940 Robert W. Schiessler[2] (Fig. 1), a graduate student supervised by James H. Ross of McGill University, found that RDX could be synthesized in about 50% yield directly from the reaction of formaldehyde (in the form of its solid polymer, paraformaldehyde) with ammonium nitrate in acetic anhydride at 65 °C:



2 (3)

Schiessler arrived at this novel idea by considering the facts of formaldehyde and of nitramine chemistry as understood in 1940. First, he knew that formaldehyde does not react with primary amines to give Schiff bases, but rather gives their cyclic trimers. Consequently, it seemed likely that the condensation of formaldehyde with nitramide **4** would not give **5** but rather its trimer RDX (**2**).



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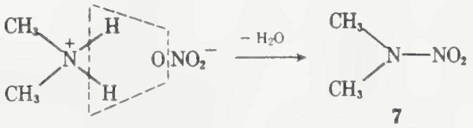
Nitramide **4** had been made previously by roundabout methods (*4*) unsuitable for industrial purposes. How could it be made cheaply from abundantly available materials? Schiessler knew that Bamberger and Kirpal (*5*) had obtained N,N-dimethylnitramine **7** by the "dehydration" of dimethylammonium nitrate **6** with acetic anhydride and supposed that possibly the dehydration of ammonium nitrate by acetic anhydride might give nitramide as a transitory intermediate before further dehydration gave nitrous oxide, the "laughing gas" discovered by Humphry Davy around 1798. If the formaldehyde could react rapidly enough with nitramide, it should give RDX.



6 **7**

Scheissler showed remarkable originality for someone newly embarked on research. However, this hypothesis, so fruitful in suggesting a new reaction, was later proved to be wrong in almost every detail. Firstly, George Wright[3] (Fig. 2) and his students at the University of Toronto could find no conditions (including those of the Schiessler–Ross process) under which formaldehyde would react with nitramide to give RDX (*7, 8*). Secondly, they found that nitramide could not be obtained from the action of acetic anhydride on ammonium nitrate and in fact decomposed in acetic anhydride with explosive violence (*8*). And thirdly, their attempts to repeat the work of Bamberger, in which dimethylammonium nitrate was "dehydrated" with acetic anhydride to dimethylnitramine, failed until by accident a small amount of chloride[4] was introduced into the reaction. In that way the chloride-catalyzed nitration of secondary aliphatic amines was discovered (*9*). In the presence of nitric acid (from dimethylammonium nitrate in acetic acid) chloride ion is oxidized to "positive" chlorine—hypochlorous acid, chlorine acetate, or chlorine—which reacts with amines to form chloroamines **8**. These in turn react with nitrating agents such as nitric acid in acetic anhydride to give nitramines **9**,

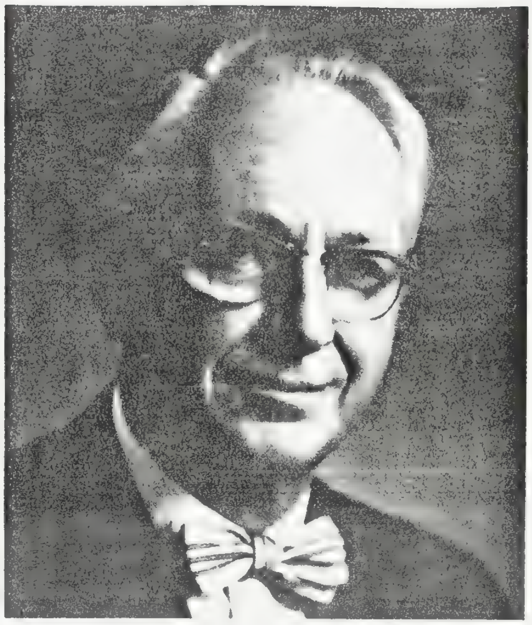
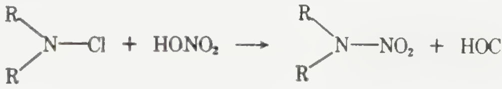


Figure 2. George F. Wright.



8 **9**

with regeneration of the catalytic positive chlorine. If the amine is only very weakly basic, catalytic chlorine is not necessary. Thus imino-*bis*-acetonitrile **11** is converted into the nitramine **12** by nitric acid–acetic anhydride alone.

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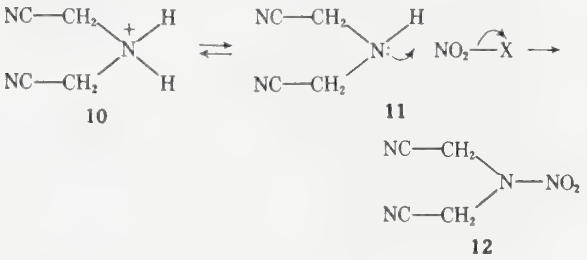
[2] Schiessler was born in Honesdale, Pennsylvania, in 1918 and graduated with a BSc (Chem. Eng.) from Pennsylvania State University (P.S.U.) in 1939, an MSc in chemistry from McGill in 1941, and a PhD in physical chemistry from P.S.U. in 1944. From 1941 to 1955 he was on the staff of P.S.U., rising in rank from Instructor to Professor, and then joined Mobil Oil Corporation, first as Manager of Central Research (1955–1962) and then as Vice-President, Research (1962–1968). In 1968 he left Mobil Research to organize a special new Corporate Planning Group, and from 1973 to 1983 was General Manager of Mobil's Real Estate. He retired from Mobil Corporation in 1983 to become President of Sandvik, Inc., until 1984. He remains a Director and consultant to this corporation. The photograph shown in Figure 1 was taken in about 1960 but shows him little changed from what I remember of the graduate student of 1941.

[3] George F. Wright obtained his PhD with Henry Gilman at Iowa State College, and after postdoctoral work at Harvard, Vienna, and McGill joined the staff of the University of Toronto. He started work on explosives early in the war and produced an impressive amount of important research. His survey on the chemistry of explosives (*6*), although more than 30 years old, remains one of the most useful for the general reader.

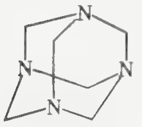
[4] It seems likely that the acetic anhydride available to Bamberger in 1895 was made by the action of acetyl chloride on sodium acetate, and contained a small amount of acetyl chloride as an impurity.

While in this acidic medium the amine **11** is largely converted into its inert protonated form **10**, it is weakly basic enough to ensure that enough of the reactive free base **11** remains present for nitration to take place at a reasonable rate.



The Bachmann Combination Process

The United States entered World War II more than two years after Canada and so the researches of Canadian academic chemists on RDX had started before those of their American counterparts. However, even before Pearl Harbor, research on RDX in Canada, Great Britain, and the USA had become closely coordinated. Much of the American work has never been published, but the outstanding discovery of a "combination process" by Werner E. Bachmann and John C. Sheehan (later famous for the synthesis of penicillin) at the University of Michigan was published in 1949 (*10*). Bachmann recognized that the three molecules of formaldehyde and one molecule of ammonium nitrate obtained as byproducts in the nitrolysis of hexamine (eq 2) could become, with the addition of two more molecules of ammonium nitrate and sufficient acetic anhydride, the reactants for the Schiessler–Ross process (eq 3), so that all of the formaldehyde going to form hexamine becomes theoretically available to form RDX, according to the equation,



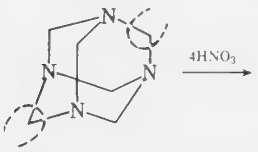
1

$$+\ 4NHO_3 + 2NH_4NO_3 + 6(CH_3CO)_2O \longrightarrow \underset{2}{2C_3H_6N_6O_6} + 12CH_3CO_2H \quad (4)$$

In fact, yields of about 85% of RDX (based on eq 4) were obtained, and Bachmann's process was developed for large-scale production in Kingsport, Tennessee.

Wartime Developments in Germany

Early in the war, analysis of the explosive fillings of captured or unexploded German bombs, shells, torpedoes, etc., showed that Germany was also producing RDX. However, toward the end of the war it was found that some samples of German RDX, like that produced at Kingsport, contained a small amount of the eight-membered ring HMX ("high melting explosive"), which melts 64 °C higher than RDX. HMX is present in the RDX produced in the Schiessler–Ross and Bachmann processes but not in RDX produced by the nitrolysis procedure of Hale. Evidently the Germans too had discovered new methods for making RDX.



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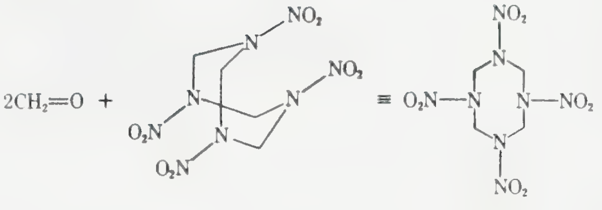


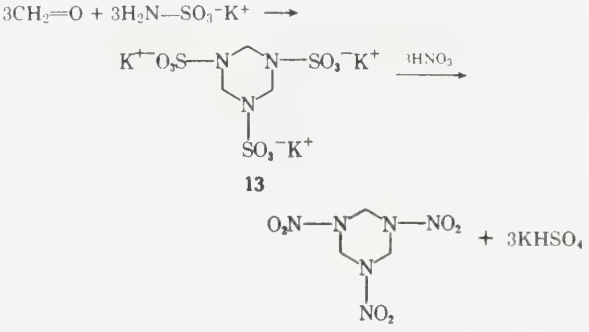
HMX

These methods were revealed, after the war, when teams of allied scientists and engineers visited German laboratories and factories. Their reports are summarized by Crater (*11*). The Germans had independently discovered not only all the Allied processes described above but several more. Altogether, they had five processes in active production. Three of these were essentially identical to the processes described above (the Henning nitrolysis, the Schiessler–Ross process[5], and the Bachmann combination process), but two were novel. In the K process, worked out by Knoffler, hexamine was treated with absolute nitric acid containing ammonium nitrate. Under the proper conditions the formaldehyde liberated by the nitrolysis of hexamine reacted with ammonium nitrate (even in the absence of acetic anhydride) to give more RDX. Based on the equation

$$\underset{<1>}{C_6H_{12}N_4} + 4HNO_3 + 2NH_4NO_3 \rightarrow \underset{<2>}{2C_3H_6N_6O_6} + 6H_2O$$

the yield of RDX was about 65%.

The second novel (W) process was developed by Wolfram of I. G. Farbenindustrie. Formaldehyde reacted with potassium sulfamate to form the cyclic compound **13** (*12*), which on treatment with nitric acid gives RDX and potassium hydrogen sulfate. The latter when neutralized can be used as a fertilizer.



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It is hard to avoid the conclusion that by academic criteria the German research was superior to that of the Allies. However, neither of their two novel processes proved in practice to be superior to the Bachmann combination process, and the American genius for large-scale production meant that German output never approached the American in volume.

Mechanistic Considerations

A very large amount of work was done during and after the war in an attempt to elucidate the mechanisms of the various processes; summaries are given by Wright (*6*) and Lamberton (*13*). However, the mechanisms remain obscure. The processes must involve many unstable intermediate com-

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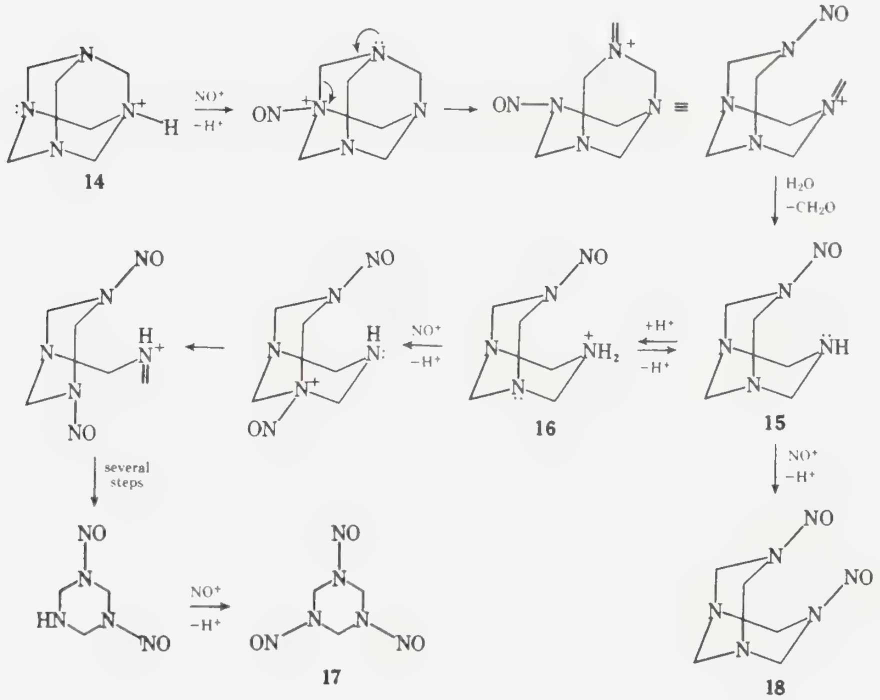
[5] The Schiessler–Ross process was operated briefly on a pilot-plant scale at Shawinigan Falls, Quebec, but the factory there adopted the Bachmann process because hexamine was a much easier material than paraformaldehyde to handle on a large scale.

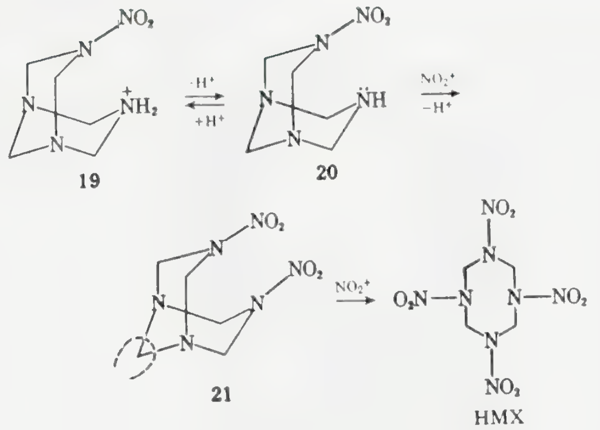
pounds, only a few of which have been isolated. It seems likely that now with the use of ^1H, ^{13}C, and ^{15}N NMR many more unstable intermediates might be identified. However, besides advances in instrumentation in the last 40 years there have been great advances in our understanding of the mechanisms of reactions in acid solution, and it would seem that the field of RDX chemistry is ripe for reexamination. In the meantime a few speculations on possible reaction pathways may be in order.

We start with the Hale nitrolysis of hexamine. Why does this process give only a minute trace of HMX, while the Bachmann process gives a yield of 5–10% HMX accompanying a 70–80% yield of RDX (*14, 15*)? A suggestion comes from the studies of Bachmann and Deno (*16*) on the nitrosolysis of hexamine, which can be carried out with nitrous acid in dilute aqueous solution. These studies show that at pH 1 the reaction yields the trinitroso compound **17** but, at pH 3 and higher, yields the bicyclic dinitroso compound **18**. A possible explanation comes from the mechanism shown below.



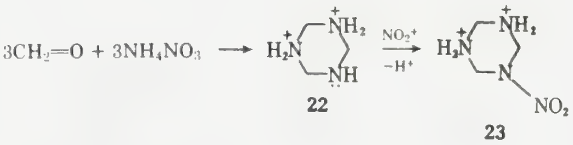
Hexamine is a weak tertiary base ($pK_{BH^+} = 4.9$ for **14** $\rightleftarrows$ **1** + H^+ (*14*); $pK_{BH_2{}^{2+}} \approx 0.3$ (*17*); $pK_{BH_3{}^{3+}}$ perhaps ≈ -4.5), and pK_{BH^+} for the crucial intermediate **16** should be ~3, because of the field effect of the nitrosamino group. From the equilibrium acid–base pair **16**–**15**, the pathways to **17** and **18** branch as shown above. In more acid media the nucleophilic nitrogen of **15** required for the formation of the bicyclic **18** is masked by protonation, so that only the route from **16** to the monocyclic **17** is available.

It seems likely that similar considerations apply to the nitrolysis of hexamine. The reaction mechanism in the Bachmann process (98% nitric acid, ammonium nitrate, acetic anhydride) is almost certainly less acidic than the 98–100% nitric acid used in the Hale process, although no measurements using acidity function concepts have been made. It then seems likely that under these conditions **20**, the nitro analogue of **15**, will not be completely protonated to **19** (and hence not constrained to go solely to RDX by a route paralleling **16** → **17**), but will react at a reasonable rate to give **21** and thence HMX.



Indeed, **21** can be obtained by treatment of hexamine dinitrate with acetic anhydride (*7*) and converted in high yield into HMX on treatment with nitric acid–ammonium nitrate–acetic anhydride (*15*). Under proper conditions and with the latter reaction mixture, hexamine can be converted directly into HMX in 71% yield (*18*).

A possible route to RDX by the Schiessler–Ross process would involve first **22**, then the mononitro **23**, and then the dinitro compound as intermediates. The Bamberger–Kirpal nitration steps would be possible because at each step a secondary amine group would remain only partially protonated due to the acid-weakening effect of nearby groups. However, mechanistic studies of this reaction remain very incomplete, and reveal nothing beyond the fact that one or more intermediates must be involved (*19*).



The Political Aftermath

A Soviet technical mission to the United States in August 1943 made enquiries about RDX, and a year later (8 August 1944) two Soviet experts (B. Formin and P. Solodon) visited the Shawinigan plant in Canada. It is not clear how much they learned on this occasion.

In September 1945 Igor Gouzenko, a cipher clerk in the Soviet embassy in Ottawa, defected with a mass of documents which indicated the existence of a Soviet spy network in Canada. A number of Canadians and Britons were arrest-

ed, and several were brought to trial on the charge of releasing secret information. One of these was Raymond Boyer[6], professor at McGill University (see Fig. 3), who along with J. H. Ross had supervised several graduate students (including the author of this article, PhD 1942) in research on RDX. Boyer was identified by Gouzenko as "The Professor", a code name for one of the agents in the network[7] organized by Col. Zabotin of the Soviet embassy.

At Boyer's trial it came out that the Soviet technical mission of August 1944 had contacted Fred Rose, a Member of Parliament belonging to the Labour–Progressive Party (the successor to the Communist Party of Canada, which was banned early in the war). Rose in turn had contacted Boyer in an attempt to learn details of the Shawinigan RDX process. Boyer gave Rose[8] some details, the most important being that acetic anhydride was used. Boyer did not deny these allegations but claimed that the technical details were trivial or common knowledge.

The first trial ended in a split jury. In the second trial George Wright testified on behalf of Boyer. However, the latter was found guilty and went to prison for some years. After coming out he became a criminologist, worked as a Research Associate in the Institute of Forensic Psychiatry of McGill University, and wrote one book about his prison experiences and another on crime and punishment in Canada under the French regime, before the British conquest. He now lives in retirement.

We may note that after May 1945 the Russians probably knew everything of practical importance about German processes for making RDX through their occupation of eastern Germany, and hence any information transmitted to them in August 1944 had only fleeting importance.

Figure 3. Raymond Boyer.

Conclusions

The story of research on RDX is now only a fading memory for elderly chemists and is unknown to younger chemists. It is worth preserving for several reasons. It illustrates the value of hypotheses, even false hypotheses (see the quotation from E. Mach at the head of this article), in systematizing our knowledge and thus, most importantly, in suggesting experiments. And it illustrates the connection between social needs and the areas of scientific research pursued at a given time. A flurry of articles on RDX and hexamine chemistry appeared in the open literature for seven or eight years after the war, and then the field was abandoned by British and North American chemists, but articles on these topics continue to appear sporadically in Korean, Indian, Chinese, and other Asiatic journals. The field offers interesting problems for young physical–organic chemists, but they must ask the question: how will funding agencies like my proposal?

Acknowledgments

I am grateful to H. S. Sutherland and J. Ritchie Donald, both connected with RDX production in Canada during the war, for information; to Sue McClelland for the photograph of George Wright; and to Joan Edward for permission to reproduce her drawing of Raymond Boyer.

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[6] Boyer obtained a PhD at McGill in 1933, and then went to Harvard (where he met George Wright), Vienna, and Paris for postdoctoral work.

[7] It seems likely that several names in Zabotin's list were of people known to be politically on the left and hence considered to be potentially useful, but not trained agents. Boyer had been active in the Canadian–Soviet Friendship League, and at the time of his arrest was the president of the Canadian Association of Scientific Workers (which collapsed soon afterwards), but in my opinion was certainly never a spy.

[8] Rose went to prison for some years and was then deported to his native Poland. He died about 10 years ago. Since his time the Labour–Progressive Party, which changed its name back to the Communist Party of Canada in the 1950's, has failed to elect any member to the federal parliament of Canada.

This appeared at about the same time as "The Aldrich Story", and is another success story.

Be Cited or perish

John T. Edward

The Citation Index suggests a linkage between the frequency of the citations and the utility of the research.

Science is a communal enterprise. A discovery made by one scientist and reported in a paper can become the springboard for further discoveries by others, and will be cited by subsequent researchers in the papers they write. Consequently, a rough criterion of the importance or impact of a paper would seem to be the number of times it is subsequently cited—its citation count or score.

Until 1961, when Eugene Garfield started publishing the *Science Citation Index* (SCI), it was not possible to know how often a paper was cited after its publication.

SCI appears six times a year and lists in chronological order under an author's name (or in cases of multiple authorship, under the first author's name) his/her cited papers, giving the year, journal, volume, and page number, or cited books or patents. SCI is cross-indexed by items cited. Each year the summation of these data appears in an annual volume; each five years in a quinquennial volume. The data make it possible to count the number of cited papers of any author, and also the number of citations each paper receives. Probably few or none of the papers of outstanding scientists escape any citation. However, the uncomfortable truth is that most scientific papers have little or no impact, being cited only once or not at all (*1, 2*). On the other hand, a few papers have enormous impact, being cited hundreds or even thousands of times (*3*). (Table 1)

The items shown in Table 1 include not only refereed articles, reviews, and notes, but also meeting abstracts, editorials, obituaries, and other marginalia, which are unlikely ever to be cited (*4*). But even after taking account of the fact that perhaps up to 30% of the 11 million items cited only once may belong to marginalia, the figures remain profoundly disturbing. They show that most of us will be lucky to have a few papers cited 100 or more times and belonging to the top 0.3% in terms of citations or recognition. Moreover, if we look at the titles of the 100 papers most cited over the 22 years 1961–1982 (all of which received at least 2000 citations) (*3*), we find that the aristocracy is largely a meritocracy of plebian trade recipes, rather than the blue-blooded theoretical papers we expected. Most are in the biological sciences, and leading all by a large margin is the paper by O.H. Lowry and co-workers giving a convenient micromethod for analyzing protein (*5*), with 100,639 citations.

***Table 1.* Listings in SCI, 1961–1980**

Number of citations per item	Number of items	% of entire field of items
> 5000	20	—
4000–4999	11	—
3000–3999	25	—
2000–2999	44	—
1000–1999	334	—
500–999	1500	—
100–499	54,000	0.3
50–99	145,000	0.7
25–49	393,000	2.0
15–24	558,000	2.9
10–14	656,000	3.4
5–9	1,690,000	8.8
2–4	4,562,000	23.7
1	11,228,000	58.2
Total	**19,288,000**	**100.0**

Lowry (*6*) has given a modest account of how his famous paper came to be written. He and his collaborators needed a quick and easy method for measuring antigen–antibody precipitates. They tried a method in the literature, "but could not help tinkering with it, particularly in regard to the Cu^{2+} requirement that was first recognized by Herriot [*J. Gen. Physiol.* **1935,** *19,* 283]. . . . We continued to use our modified method without publishing the details, but passed them on to whoever wanted them. This included Earl Sutherland. . . . He complained of being tired of referring to 'an unpublished method of Lowry.' So we finally got down to making a thorough study of the procedure. . . ."

Lowry discovered many ultramicro methods for measuring a metabolite or an enzyme using enzymatic cycling amplifier systems (*6*); methods much more brilliant in conception than the protein measurement described above. But obviously the scientific market for these methods was much smaller.

This experience is common. The biochemist Heinz Fraenkel-Conrat and two co-authors (*7*) wrote a paper so much cited that it became a "citation classic," and said, "What this paper is quoted for is not its intrinsic point (which had some importance) but the fact that it contains a paragraph describing the method of washing and suspending commercial bentonite clay" (*8*).

Scanning the titles of the 100 papers most cited in 1961–1982 (*3*), I found besides Lowry's paper only 11 others I could classify as "chemical," and many of these were also methodological and biologically oriented. No article dealt with synthesis or with organic reaction mechanisms.

These impressions are confirmed by an examination of the titles of the 250 items (papers or books) most cited in 1955–1964 (*9*). Again, chemical items make up only 11%, being greatly outnumbered by papers devoted to analytical methods in biochemistry (*5*). The 28 items that I classified (somewhat arbitrarily) as chemical included one book by S. Glasstone, K. J. Laidler, and H. Eyring (published in 1941); two books by G. Herzberg (1945 and 1950); and one by J. O. Hirschfielder, S.C.F. Curtis, and R. B. Bird (1954); all dealing with physical or theoretical

chemistry, and well known to chemists of my generation. In the same field were papers by S. Brunauer, P. H. Emmett, and E. Teller (1938) on the adsorption of gases; P. Job (1928) on the formation and stability of complexes in solution; R. S. Mulliken (1952) on molecular compounds and their spectra, and R. Pariser and R. G. Parr (two papers in 1953) on a semiempirical theory of electronic spectra and structure. The book *The Ultracentrifuge*, by T. Svedberg and K. O. Pedersen (1940), which I classified as chemical, could equally be claimed by physics or biochemistry.

To my chagrin, I could classify only eight of the 250 most cited items as belonging to organic chemistry, and of these only two were concerned with synthesis. One was a paper co-authored by K. Bowden, I. M. Heilbron, E.R.H. Jones, and B.C.L. Weedon, "Researches in acetylenic compounds. Part I. The preparation of acetylenic ketones by oxidation of acetylenic carbinols or glycols" (*J. Chem. Soc.* **1946**, 39), which contains the first description of the oxidation of alcohols by chromium trioxide-sulfuric acid in acetone solution (the Jones oxidation). The other was by G. I. Poos, G. E. Arth, R. E. Beyler, and L. H. Sarett on "Approaches to the total synthesis of adrenal steroids. V." (*J. Am. Chem. Soc.* **1953**, *75*, 422; 350 citations in 1955–1964; 400 citations in 1965–1983) (*10*), which contains a description of the preparation of a chromium trioxide-pyridine complex, a new reagent for the oxidation of alcohol groups (the Sarett reagent).

The great flowering of steroid chemistry at this time was due in part to the development of conformational analysis by Derek Barton after 1950, for which he won the 1969 Nobel Prize. Only one of Barton's papers appears in the list of 250 most cited items (Table 2), and it is the least cited of all of them.

It is instructive to compare the paper with the item listed next to it in Table 2, L. J. Bellamy's *The Infrared Spectrum of Complex Molecules* (1954) (*9*). Every organic chemist of my generation was familiar with these two items. We kept Bellamy's book on our shelves, and cited it wherever we used infrared evidence to support a structural feature in a molecule under discussion. And we had discovered the explanatory power of conformational analysis from Barton's 1953 paper, with its abundant examples. If we had been asked "Which item is more important?", we would undoubtedly have replied "Barton's," without denying the usefulness of Bellamy's. This points out that widely used reviews and compilations of data, or papers on analytical procedures useful in biochemistry, are often more cited than papers advancing novel theoretical ideas, because the latter quickly become too familiar to require citation. This is what R. K. Merton calls the "obliteration effect" (*11*).

This point is illustrated even more forcefully by looking at three papers by authors whose names start with W (Table 2). Most scientists would probably agree that Watson and Crick's paper is the most important of the past half-century. But this is not apparent from its citation frequency; the "obliteration effect" began to operate quickly. This is the only paper of Watson and Crick to appear in the 1955–1964 list; in contrast, six papers on the column chromatography of amino acids by Moore, Stein, and their colleagues at the Rockefeller Institute for Medical Research appear in this list, most of them more heavily cited. I would not wish to denigrate the achievement of Moore and Stein, which was recognized by a Nobel Prize in 1972. But I suspect that they would agree with me about which paper was the most important. Watson and Crick's double helix structure now appears in textbooks of biology for high schools, and is likely to be found in such books in the next century.

Table 2. **Eight of the 250 most cited papers in 1955–1964** *(9)*

Number of citations		
1955–1964	1965–1985	Author (alphabetical)
1446	1811	Barker, S. B.; Summerson, W. H. The colorimetric determination of lactic acid in biological material. *J. Biol. Chem.* **1941**, *138*, 535.
279	261	Barton, D.H.R. The stereochemistry of cyclohexane derivatives. *J. Chem. Soc.* **1953**, 1027.
604	735	Bellamy, L. J. *The Infrared Spectrum of Complex Molecules.* Wiley: New York, 1954. 323 p.
372	4649	Warren, I. The thiobarbituric acid assay of sialic acids. *J. Biol. Chem.* **1959**, *234*, 1971.
477	612	Watson, J. D.; Crick, F.H.C. Molecular structure of nucleic acids: a structure for deoxyribose nucleic acid. *Nature* **1953**, *171*, 737.
401	3061	Watson, M. L. Staining of tissue sections for electron microscopy with heavy metals. *J. Biophys. Biochem. Cytol.* **1958**, *4*, 475.
376	97	Van Dyke Tiers, G. Proton nuclear resonance spectroscopy. I. Reliable shielding values by "internal referencing" with tetramethylsilane. *J. Phys. Chem.* **1958**, *62*, 1151.
5021	97,113	Lowry, O. H.; Rosebrough, N. J.; Farr, A. L.; Randall, R. J. Protein measurement with the Folin phenol reagent. *J. Biol. Chem.* **1951**, *193*, 265.

Finally, the "obliteration effect" works sometimes for experimental as well as for theoretical papers. Probably every elementary textbook in organic chemistry now refers to tetramethylsilane as an internal reference in

proton NMR. This would account for the drastic fall-off over the years in citations to the paper of G. van Dyke Tiers, whereas Lowry's paper, which is probably not mentioned in elementary textbooks, continues to be cited (Table 2).

The bibliography in Garfield's article (*9*) includes many other papers that led to Nobel Prizes: two by T. D. Lee and C. N. Yang on parity conservation; one by F. Jacob and J. Monod on genetic regulatory mechanisms in the synthesis of proteins; and one by J. Bardeen, L. N. Cooper, and J. R. Schrieffer on the theory of superconductivity; as well as the famous paper of O. T. Avery, C. M. MacLeod, and M. McCarty in 1944 identifying DNA as the substance inducing transformation of pneumonococcal types, which many people think also deserved a Nobel Prize. It becomes apparent that excellent papers are highly cited, so that every Nobel Prize winner has written a highly cited paper. But usually these papers are less cited than the ones with practical use in heavily populated research areas such as biology and medicine.

All of this would seem to prove that citation frequencies are a partial indicator of scientific excellence. But their use for this purpose remains a controversial and emotion-laden issue, and has been characterized by British academics as "pseudoscience," "utterly misconceived," "based on a conceptual fallacy," "totally mistaken," and "the refuge of Philistines" (*12*). Von Borstel, in a witty and mischievous letter (*13*), gives arguments why citation counts should be mistrusted. However, even though the citation count for a single paper can be a bit capricious as an index of quality, the citation count for the whole corpus of papers of given scientists provides a good if approximate estimate of the quality of their research. Let me demonstrate this generalization for organic chemists. I'll compare citation counts among organic chemists, not citation counts among a mixed bag of, say, organic chemists and biologists. Papers in biochemistry make up about 40% of those abstracted by *Chemical Abstracts*; papers in organic chemistry only about 7% (*14*), indicating perhaps that the research community of organic chemists is much smaller than that of the biochemists and related scientists. Consequently, their papers must, on average, be read and cited less than those of the biochemists. Yet, a closer look at citations of organic papers is instructive.

Table 3 lists the 49 organic chemists out of the 1000 scientists most cited for the period 1965–1978. The classification of chemists proved difficult (*15*), and sometimes chemists whom most of us regarded as organic classified themselves differently when they were queried. Hence, Nelson J. Leonard turns up as a biochemist; Edgar Lederer as an immunologist; and Jacques-Emile Dubois, Jean-Marie Lehn, and Saul Winstein as physical chemists (see Table 4); and all are missing from Table 3.

Table 3.* The 49 most cited organic chemists for the period 1965–1978 *(15)

Name	(Year of birth)	Number of citations	Number of papers	Citations per paper
Allinger, N. L.	(1928)	3023	116	26
Baker, B. R.	(1915)	2657	191	13
*Barton, D.H.R.	(1918)	3177	255	12
Battersby, A. R.	(1925)	2560	134	19
Bender, M. L.	(1924)	3119	115	27
Bohlmann, F.	(1921)	2640	412	6
Bowie, J H.	(1938)	2627	154	17
*Brown, H. C.	(1912)	8756	393	22
Bruice, T. C.	(1925)	2876	160	17
*Corey, E. J.	(1928)	9152	273	33
*Cram, D. J.	(1919)	2849	137	20
Djerassi, C.	(1923)	7704	378	20
Eliel, E. L.	(1921)	2981	94	31
Folkers, K.	(1906)	2999	203	14
Gassman, P. G.	(1935)	2997	159	18
Hammond, G. S.	(1921)	2858	106	26
Hansch, C.	(1918)	3926	110	35
Heilbronner, E.	(1921)	3156	145	21
House, H. O	(1929)	2914	88	33
Huisgen, R.	(1920)	5087	203	25
Ingold, K. U.	(1929)	2619	132	19
Jencks, W. P.	(1927)	3527	110	32
Jerina, D. M.	(1940)	5033	155	32
Johnson, B.F.G.	(1938)	3045	204	14
Katritzky, A. R.	(1928)	4385	360	12
*Khorana, H. G.	(1922)	4409	131	33
Kupchan, S. M.	(1922)	2997	173	17
Mislow, K.	(1923)	3202	154	20
Nakanishi, K.	(1925)	2593	213	12
Neta, P.	(1938)	2460	74	33
Nozaki, H.	(1922)	2680	245	10
Olah, G. A.	(1927)	7910	403	19
Paquette, L. A.	(1934)	5116	345	14
Ramirez, F.	(1923)	2999	144	20
Roberts, J. D.	(1918)	5941	201	29
Robins, R. K.	(1926)	4157	241	17
Schleyer, P.v.R.	(1930)	5736	189	30
Sorm, F.	(1913)	4890	382	12
Sweeley, C. C.	(1930)	2851	84	33
Trost, B. G.	(1941)	3087	142	21
Turro, N. J.	(1938)	3101	143	21
Wenkert, E.	(1925)	2637	142	18
Whitesides, G. M.	(1939)	2625	79	33
Wiberg, K. B.	(1927)	2769	106	26
Williams, D. H.	(1937)	5591	203	27
Witkop, B.	(1917)	3921	169	23
*Woodward, R. B.	(1917)	3644	49	74
Yagi, H.	(1939)	2841	147	19
Zimmerman, H. E.	(1926)	3226	113	28

* Nobel laureate

On the other hand, a few names in Table 3 are less familiar. The inclusion of B.F.G. Johnson, an inorganic chemist, would seem to be an error; others are only marginally organic (e.g., Bowie, mass spectroscopy; Neta, pulse radiolysis of organic compounds) or could be biochemists (Sweeley, lipids; Jerina and Yagi; metabolism of polycyclic carcinogens).

Leaving out these names, almost all the others were well known to organic chemists, such as myself, who were active in organic chemistry in the sixties and seventies, and would have been recognized by us as front runners. But we would have ranked with them a large number of others (P. D. Bartlett, A. J. Birch, R. Breslow, R. U. Lemieux, G. Stork, E. E. van Tamelen, etc.) of outstanding merit, but obviously less cited—perhaps only slightly less cited.

When we rank the 49 names by number of papers, we find R. B. Woodward's name at the bottom of the list (Figure 1). This case is somewhat exceptional because Woodward had been the uncrowned king of the organic chemical world since the late forties. But he had disdained publishing papers that were less than complete and perfect. The average organic chemist of Table 3 published about 150 papers over this period, with a small and quite exceptional group (F. Bohlmann to L. A. Paquette) publishing many more, so that we have a bimodal distribution in Figure 1. Some of these high flyers show no signs of slowing down. A recent listing of the world's 20 most prolific researchers (in terms of publications) over the decade 1981–1990 (*16*) showed Bohlmann in fifth place (on an average, one paper every 6.4 days) and A. R. Katritzky in twelfth (one every 9.1 days).

Ranking the organic chemists by total citation counts of papers published from 1965 to 1978 works better (Figure 2). Nobel Prize winners E. J. Corey and H. C. Brown now lead the list, with Woodward moving up (but still far from the front). Again, a few exceptional individuals seem to be running away from the pack, but below F. Sorm citation numbers crowd together enough so that extrapolation can be attempted. This is done in Figure 3, and indicates that for 1965–1978 we can expect about 47 chemists as well as Neta to have received 2001–2500 citations, about 110 to have received 1501–2000, and 251 to have received 1001–1500. Somewhere here are our missing stars, Bartlett, Breslow, Birch, etc.; we can guess that they will be in the upper 47, but this still has to be proved.

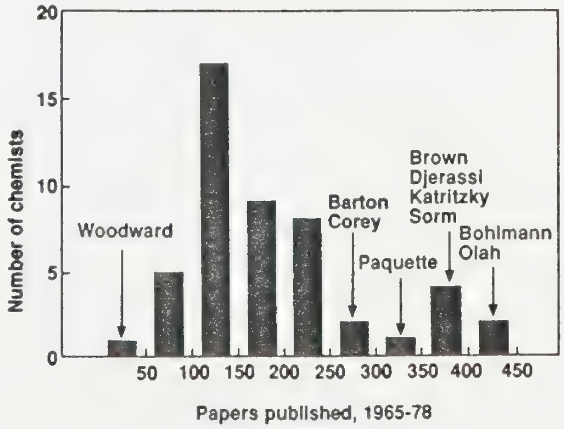

***Figure 1.* Organic chemists' publications, 1965–1978.**

Table 4.* Five of the 22 most cited physical chemists for the period 1965–1978 *(15)

Name	(Date of birth)	Number of citations	Number of papers	Citations per paper
Dubois, J E.	(1920)	2798	288	9
Grant, D. M.	(1931)	4248	166	40
[a]Lehn, J. M.	(1939)	2568	118	21
[a]Polanyi, J. C.	(1929)	2831	71	39
Winstein, S.	(1912)	3146	93	33

[a] Nobel laureate.

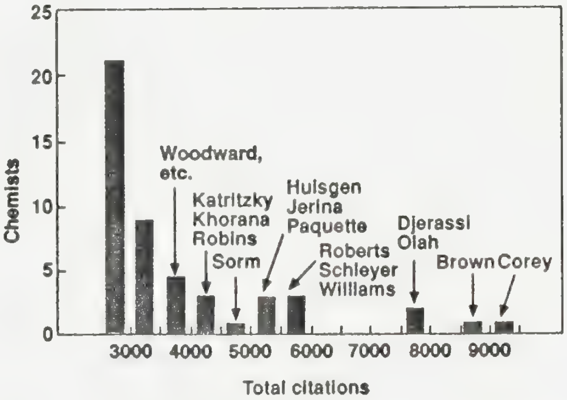

***Figure 2.* Citations of organic chemists' publications, 1965–1978.**

Yet another possible index of quality would be the average number of citations per paper (Figure 4). Now Woodward leads by a large margin. Surprisingly, the second-ranking chemist by this criterion is Corwin Hansch. Most of the names in Table 3 come from the great U.S. research universities; a few (B. R. Baker, K. Folkers) from laboratories of the great drug companies; Hansch came from Pomona College, originally a women's college and dedicated to undergraduate teaching, so that he would have seemed to be out of the competition. It is my guess that his high citation average comes from a few theoretical papers developing the Hansch equation—an extension of the Hammett equation—which correlates substituent effects with biological activity. This equation has been used a great deal by chemists in the big drug companies who are trying to enhance the activities of their compounds by systematically adding substituents. This shows why papers in the biological sciences often tend to get more citations (Tables 5 and 6). This would also explain the high ranking of T. C. Bruice, W. P. Jencks, D. M. Jerina, H. G. Khorana, and C. C. Sweeley (see Figure 4). A different chemical affiliation would explain the low ranking of Bohlmann in Figure 4.

Table 5. **The 1000 contemporary scientists most cited in 1965–1978: numbers of authors in some disciplines *(15)***

Discipline	Number	Discipline	Number
Biochemistry	84	Chemical physics	2
Cell biology	57	Geophysics	2
Endocrinology	74	Inorganic chemistry	27
Immunology	128	Organic chemistry	51[a]
Molecular biology	67	Organometallic chemistry	10
Oncology	48	Theoretical chemistry	7
Pharmacology	59	Physics	77

[a] This number differs from the number in Table 3, taken from ref. 15b. Between the time of writing the two articles (*15a, 15b*), certain chemists had been shifted from one classification to another.

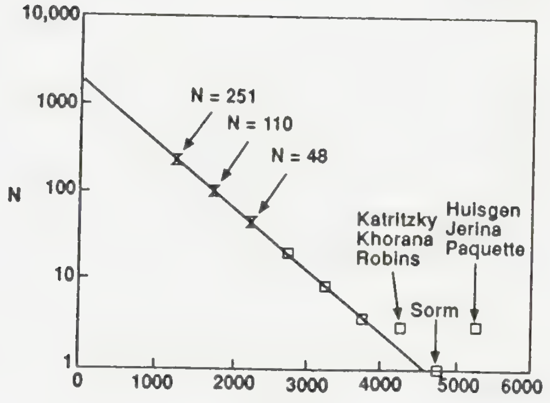

Figure 3. **Semilogarithmic plot of organic chemists, N, against number of citations received by their papers in 1965–1978.**

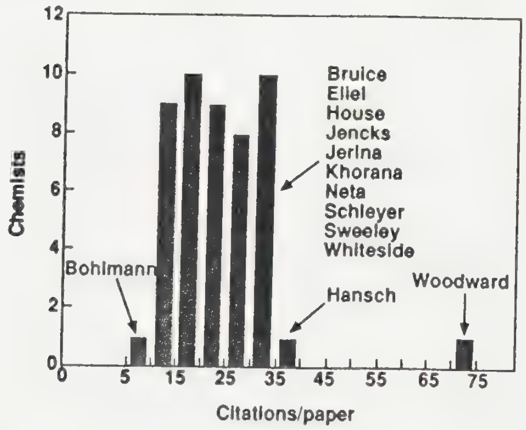

Figure 4. **Citations per paper for organic chemists, 1965–1978.**

Bohlmann, of the Technical University of Berlin, publishes an enormous number of papers on the identification (and occasionally structure determination) of compounds isolated from plants by chromatography and studied by spectroscopic techniques. This work is of interest to a very small audience.

Unfortunately, Tables 3–6 represent the most recent data covering authors over a lengthy period. These came from a costly and time-consuming survey (*16*). A more recent survey (*17*) covers the 103 articles (not authors) in chemistry published in 1981 that were most cited by SCI in 1981–1983. The authors of organic articles include A. L. Beckwith, D. A. Evans, C. H. Heathcock, R. E. Ireland, T. Kametani, A. S. Kende, K. B. Sharpless, S. Masamune, R. E. Moore, M. Nishizawa, R. Noyori, A. Ohno, L. A. Paquette, M. C. Pirring, K. L. Rinehart, J. R. Rokach, K. Shinkai, A. B. Smith, B. M. Trost, P. D. Bartlett, R. West, and M. Yoshifuji. Evidently a new generation of organic stars is arising. Again, we can sense a correlation between citation frequency and our highly subjective notion of excellence. The national origins of the authors of the 103 articles are as follows: U.S.A., 66; Japan, 11; Canada, 8; U.K., 7; Switzerland, 5; Germany, 5; Australia, 3; France, 2; Italy, 2; Mexico, 1; Netherlands, 1; U.S.S.R., 1.

The predominance of U.S. chemists was already evident in Table 1; rising numbers of Japanese appear in the later group.

Conclusion

We return to the question with which we started: Can citation counts give some indication of scientific excellence? I would answer yes, if we are considering a whole corpus of papers, rather than individual papers, and if we confine ourselves to chemists working in the same field. In addition, SCI helps in studying the genealogy of ideas. And, at a more practical level, SCI enables the investigator to dig up the most recent improvements of a well-known procedure. Active researchers would profit from periodically finding out who cites their papers, and why. They might learn that others have developed their discoveries in ways that they had not thought of, and try to become more alert to do this themselves. But I must confess that I was never this wise in the days when I was active in research, and I suspect that few people are.

References

(1) Hamilton, D. P. *Science* **1990**, *250*, 1331.
(2) Hamilton, D. P. *Science* **1991**, *251*, 25.
(3) Garfield, E. *The Awards of Science and Other Essays: Essays of an Information Scientist, 1984*; ISI Press: Philadelphia, 1985; Vol. 7, p. 175.
(4) Pendlebury, D. *Science* **1991**, *251*, 1410.

How SCI came to be

Eugene Garfield is the classic American success story *(18)*. Born in 1925, he was brought up in the Bronx by a Jewish mother and Italian stepfather at a time when such mixed marriages were rare. His family was poor, hardworking, lively, affectionate, socialist, and respectful of learning. After high school he worked briefly as a welder in a shipyard, studied engineering, and worked on a construction site in Colorado before being enlisted in the 10th Mountain Division in 1943.

After the war Garfield studied chemistry at Columbia University while driving a taxicab at night. He obtained a B.S. in 1949 and went to work in Louis P. Hammett's laboratory at Columbia. However, after two explosions while trying to make crystalline picrates, Garfield agreed with Hammett that he did not have the aptitude for bench-top experimentation. He obtained a job at the Welch medical indexing project at Johns Hopkins University, and started looking at new ways to index the scientific literature.

In 1953 he organized the first symposium on machine methods in scientific documentation. This drew 300 people and considerable press coverage. He received a letter from William C. Adair, retired vice-president of the company publishing *Shepards Citations*, which had been listing citations for lawyers for more than a century. At Adair's suggestion, Garfield looked up *Shepards Citations* and had, he claimed, the "eureka experience." He saw what he had to do for science.

In 1961 he obtained a Ph.D. in Linguistics at the University of Pennsylvania in Philadelphia, but in 1955 had already started printing *Management DocuMation Preview* (MDP).

Frequent loans kept DocuMation Inc. (later to become Eugene Garfield Associates, and then, in 1961, ISI) alive, and in 1957 he started printing *Current Contents/Life Sciences*. This weekly is made up of photocopies of the tables of contents of the significant journals in the life sciences as they appear, and alerts research scientists to articles they should look up immediately. Other versions followed and became immensely popular.

Business took off, and other journals followed. In 1960 *Index Chemicus* was started, and in 1961 Garfield obtained a grant from the National Institutes of Health to produce a pilot citation index of the genetics literature and to study the feasibility of a citation index to all scientific literature. When the genetics index and feasibility study were in, Garfield pressed for the publication of the multidisciplinary index. The NSF said no; it had no future. Garfield decided to go it alone. So SCI was born.

By 1978 ISI was publishing *Current Contents, Science Citation Index, Index Chemicus, Social Sciences Citation Index*, and a number of other journals, employed 470 people, had offices in nine countries, and boasted sales of $15,000,000 a year. Garfield was president and owned 65% of the stock of ISI. The headquarters was to be large enough to accommodate 1000 employees, and to have a day care center for their children. Garfield, who prefaces almost all issues of *Current Contents* with an interesting and idiosyncratic essay on topics as varied as art in Central America, dry cleaning, snoring, the language of apes, or cremation, devoted one essay to the murals of the day care center.

What is the lesson? Find the niche that suits you. Garfield has made a lot of money, but it would seem (from reading his essays) that he has enjoyed every minute making it.

(5) Lowry, O. H.; Rosebrough, N. J.; Farr, A. L.; Randall, R. J. *J. Biol. Chem.* **1951**, *193*, 265.
(6) Lowry, O. H. *Ann. Rev. Biochem.* **1990**, 59, 1.
(7) Fraenkel-Conrat, H.; Singer, B.; Tsugita, A. *Virology* **1961**, *14*, 54.
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(9) Garfield, E. *Ghostwriting and Other Essays: Essays of an Information Scientist, 1986*; ISI Press: Philadelphia, 1986; Vol. 8, p. 35.
(10) Djerassi, C. *Steroids Made It Possible*; American Chemical Society: Washington, D.C., 1990.
(11) Merton, R. K. Foreword to Garfield, E. *Citation Indexing: Its Theory and Application in Science, Technology, and Humanities*; John Wiley & Sons: New York, 1979.
(12) Anderson, A. *Science* **1991**, 252, 639.
(13) von Borstel, R. *Science* **1991**, *251*, 1546.
(14) *Chem. Eng. News*, August 19, 1991; p. 40.
(15) Garfield, E. *Essays of an Information Scientist*; ISI Press: Philadelphia, 1983; Vol. 5, (a) p. 269, (b) p. 428.
(16) Anderson, C. *Nature* **1992**, 355, 101.
(17) Garfield, E. *Essays of an Information Scientist*; ISI Press: Philadelphia, 1985; Vol. 8, p. 105.
(18) Broad, W. J. *Science* **1978**, *202*, 853.

Table 6. The eight contemporary scientists most highly cited in 1965–1978 _(15)_

Name	Field	Citations
Robert A. Good	Immunology	17,679
[a]Andrew V. Shally	Endocrinology	15,340
Eugene Braunwald	Cardiology	13,463
Klaus Weber	Biochemistry	13,427
Kelle G. Fuxe	Cell biology	13,319
Solomon H. Snyder	Pharmacology	13,149
[a]Julius Axelrod	Pharmacology	12,425
John A. Pople	Theoretical chemistry	12,714

[a] Nobel laureate.

John T. Edward is Emeritus Professor of Organic Chemistry at McGill University (Otto Maass Chemistry Bldg., 801 Sherbrooke St. West, Montreal, P. Q., Canada H3A 2K6; 514-398-6233), and a Fellow of the Royal Society of Canada. He received a B.Sc. and Ph.D. from McGill and a D.Phil. from Oxford. He has published about 200 papers in chemistry, and has worked in laboratories in England, Ireland, France, Sweden, the United States, Brazil, Czechoslovakia, and Bulgaria.

McGill

27 October 1993

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
U.S.A.

Dear Dr. Bader:

Just a note to say how much I enjoyed the visit by you and Mrs. Bader. It did my heart good to see you in your element talking to us all like old friends. Your prints are as popular with the students as ever and the walls of the labs are much more interesting now. You made us think too. Your discussion of Loschmidt and Kekulé has changed forever my perspective on the "ring saga". Several undergraduate and graduate students have come up to me to say nice things about you. So as usual you were a big hit with all of us. Come back soon.

Best regards,

Alan

Alan Shaver
Professor and Chair

AGS/ag

McGILL CHEMICAL SOCIETY LECTURE

by

DOCTOR ALFRED R. BADER
Alfred Bader Fine Arts

entitled

"Adventures of a Chemist Collector"
subtitled
"Chemistry in Art Restoration"

Oct. 25th 1993
6:00 P.M.

Otto Maass
Room 112

ALL WELCOME

McGill

Department of Chemistry
Otto Maass Chemistry Building
McGill University
801 Sherbrooke Street West
Montreal, PQ H3A 2K6

Département de chimie
Pavillon Otto Maass de chimie
Université McGill
801, rue Sherbrooke ouest
Montréal, PQ H3A 2K6

Tel.: (514) 398-6999
Fax: (514) 398-3797

19th October 1993

Dr. Alfred Bader,
FAX 414-277-0709

Dear Dr. Bader.

Do not go to Redpath Museum, because:—
Lecture is in OTTO MAASS BUILDING
ROOM 10 (Chemistry Dept)
6 pm

Reception by ΣΞ members and
Council in Ruttan Room for you
Otto Maass Building
(i.e Chemistry Dept.)
⟶ 5pm. ✳

2 slide projectors and wide two projectors
screen available. Please arrive by 5pm.

Prof. M. A. Whitehead
ΣΞ President.
Professor of Chemistry.

Dr. Alfred R. Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

September 27, 1993

Professor Alan Shaver
Department of Chemistry
Otto Maass Chemistry Building
McGill University
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6, Canada

Dear Professor Shaver:

I probably have you and Professor Edwards to thank for being invited to speak in Montreal on the 25th and 26th of October, and I much look forward to being with you.

Also, I very much hope to have a chance to thank you personally.

All good wishes.

Sincerely

FAX FROM

DR. ALFRED R. BADER
Suite 622
924 East Juneau Avenue
Milwaukee, Wisconsin 53202
Telephone 414-277-0730
Fax No. 414-277-0709

August 4, 1993

To: Professor Masad J. Damha
President, McGill Chemical Society
McGill University - Fax 514 398 3797

Dear Professor Damha:

In response to your letter of July 20th, I believe that my lecture schedule in Montreal will be as follows:

Monday, October 25 - "The History of Sigma-Aldrich" at Concordia University, Chemistry, at Noon

Monday, October 25 - "Adventures of a Chemist Collector" subtitled "Chemistry in Art Restoration" at the Redpath Museum, McGill Sigma Xi, at 6:00 p.m.

Tuesday, October 26 - "Josef Loschmidt--The Father of Molecular Modelling" at McGill Chemical Society at 12:30 p.m. An abstract of the Loschmidt lectures follows.

For the two talks at McGill, but NOT for the talk at Concordia, I will need two projectors and either two screens or one large white wall to show two slides simultaneously.

I will let you know a week or so before our visit whether we will require hotel reservations.

I much look forward to being with you.

Sincerely,

Friday, May 15

Josef Loschmidt, The Father of Molecular Modelling

ALFRED R. BADER, M.Sc., Ph.D.
Chairman Emeritus, Sigma-Aldrich, U.S.A.

One of the greatest scientific achievements of the century is the recognition that all matter is constructed of molecules, and that molecular modelling accurately depicts molecules in space. At the beginning of this century some scientists still doubted the very existence of molecules. Since then, many physical methods such as NMR and X-ray crystallography have helped scientists to prove that molecules really look as the models show. That proof has been developed in the last two hundred years by many brilliant minds and today we deal with molecular modelling as a matter of course. Yet Josef Loschmidt, the first scientist who drew many molecules "geographically", i.e. in space, has been virtually forgotten.

Loschmidt was the first accurately to depict unsaturation through double and triple bonds, to predict the existence of cyclopropane, to show ozone as O_3 and benzene as a molecule with six carbon atoms in a circle. His small book, "Chemische Studien I" was published in Vienna in 1861. It contains 368 graphic formulae, 121 of which are aromatic.

The famous German chemist, August Kekule, has generally been credited with being the first to describe benzene as a circular structure, in 1865. Later, he told how that idea came to him while on a bus in London or before a fire in Gent — a snake biting its tail. But Kekule had certainly seen Loschmidt's book four years earlier, though he may not have understood it.

Loschmidt was a wonderful human being, totally unmaterialistic, shy, self-effacing, loved by his colleagues in Vienna. He never pushed the priority of his work, but whoever reads it carefully today will realise that molecular modelling would have been developed a century earlier, if Kekule and his contemporaries had understood and encouraged Loschmidt.

The lecturer: born in Vienna 1924, came to England in 1938, was interned and sent to Canada in 1940. On his release in 1941, he studied engineering chemistry at Queen's University (B.Sc., 1945) worked with the Montreal Murphy Paint Company which encouraged him to return to Queen's for an M.Sc. in organic chemistry (1947) and a Ph.D. with Professor Louis Fieser at Harvard (1949). He then joined the paint division of the Pittsburgh Plate Glass Company which had acquired the Murphy Paint Company. In 1951 he founded the Aldrich Chemical Company in Milwaukee which has grown from tiny beginnings to one of the largest suppliers of research chemicals. Aldrich merged with Sigma, the biochemical supplier in St. Louis in 1975, and he has been President, Chairman and now Chairman Emeritus of Sigma-Aldrich, a company employing over 4,000 worldwide, with three operations in England. He has always been interested in the ABC of his life: art, Bible and chemistry, and their histories. He has lectured widely on all three, has been guest curator of old master exhibitions and has acquired many old master paintings, many of which have been given to or are destined for Queen's University.

THE SOCIETY OF THE SIGMA XI
For the Encouragement of Scientific Research

McGill
McGill Chapter
Montreal, Canada

Professor M.A. Whitehead

Chemistry Department
801 Sherbrooke St. West
Montreal, Quebec, Canada
H3A 2K6

Tel (514) 398-6239
Fax (514) 398-3797

20th July / 1993.

Dear Dr. Bader,

I have the honour to invite you to Address the McGill Chapter of the Society of Sigma Xi

on Monday 25th October 1996

at 6 pm

in The Redpath Museum

on the topic of

"Chemistry in Art Conservation."

The Society is looking forward to your visit and lecture.

Yours faithfully

Prof M. A. Whitehead

Dr. Alfred R. Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

August 4, 1993

Professor T. H. Chan
Dean, Faculty of Science
McGill University
853 Sherbrooke Street, West
Montreal, Quebec
Canada H3A 2T6

Dear Professor Chan:

I so appreciate the thoughtfulness of your letter of July 20th with a copy of that really thought-provoking address.

I much look forward to giving several lectures at McGill University and Concordia University late in October, and hope then to have a chance to thank you personally.

Best regards.

Sincerely,

McGill

Faculty of Science
McGill University

853 Sherbrooke Street West
Montreal, Quebec, Canada H3A 2T6

Fax: (514) 398-7185

July 20, 1993

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
USA

Dear Dr. Bader:

I am writing to you to bring you up-to-date on news from the Faculty of Science.

At the 1993 spring convocation, the Faculty of Science graduated 425 students with a Bachelor of Science degree, 40 with a Masters of Science degree, 44 with a Doctorate of Science degree, and 6 with Science diplomas. This was a superb effort on behalf of both students and faculty. I was very proud, as I am at each convocation, to see so many fine young men and women receive recognition for their hard work. The graduation ceremony is truly a special time for students as they begin the next step in their careers. An exciting and challenging time, one which I am sure you remember.

The students were addressed by Eville Gorham, professor of Ecology and Botany at the University of Minnesota, who received an honourary doctorate at the convocation. Dr. Gorham is most widely known for his work on acid rain and its effects on land and water. I have included Dr. Gorham's speech for your information. I hope you enjoy it.

In the near future I will be sending you the Faculty's 1993-1994 Newsletter.

Have an enjoyable summer.

Yours sincerely,

T.H. Bill Chan
Dean, Faculty of Science

THC:anp
Enclosure

P.S. We miss your regular visits to the Chemistry Department. Hope to see you again.

1/2

McGill

[redacted]

[redacted]

[redacted]

July 20, 1993

Dr. Alfred Bader
Alfred Bader Fine Arts
Suite 622
924 East Juneau Avenue
Milwaukee, Wisconsin 53202

Dear Dr. Bader:

As President of the McGill Chemical Society, acting on behalf of the Chemistry Faculty of the Department of Chemistry at McGill University, I am pleased to formally confirm our invitation to you to present a lecture in our McGill Chemical Society Lecture series. These lectures are held on Tuesday afternoons at 12:30 p.m. and are attended by our graduate students, faculty, and local industrial chemists. We would also like to have you spend at least a full day with us so the faculty can have a chance to visit with you individually.

Most members of this Department have expressed a particular interest in hearing about your recent activities and we are delighted that you have agreed to visit us. As requested, I have scheduled your lecture for **Tuesday, October 26, 1993**

In the meantime, I would appreciate receiving, by August 15, a tentative title and a brief (4-5 lines) abstract for your talk, as well as some information regarding your travel plans so we can make hotel reservations for you. Thanks again for agreeing to visit us.

We look forward to hearing from you in the near future and to your visit.

Best regards,

Masad J. Damha

Masad J. Damha
Assistant Professor and
President, McGill Chemical Society

P.S. Both Professors Tony Whitehead (McGill) and Youla Tsantrizos (Concordia) will be in touch with you to inform you about the Sigma Xi and Concordia Lectures.

ALFRED BADER TALKS

[illegible]

1. ~~Challenges~~ at Sigma-Aldrich (A)
2. Josef Loschmidt--The Father of Molecular Modelling, slide talk (A) *
3. The Bible through Dutch Eyes, slide talk (B)
4. The Adventures of a Chemist Collector, slide talk (C)
5. The Detective's Eye I, slide talk (C)
6. The Detective's Eye II, slide talk (C)
7. On the Unimportance of a Liberal Arts Education
8. Jan Lievens: Out of the Shadow, slide talk (D)

A. For chemists only

B. For art historians, theologians, Bible students

C. Mainly on art, art conservation, some chemistry

D. For art historians

9/9/92

* [illegible]

To [illegible]

[illegible]

McGill

2-19-93

10:30 AM Friday

Alfred

Dr Allen Shaver from
McGill University

514 398 6940

will call next Monday

Isabel!

Ann Stratton
United Performing Arts Drive
241 5741

er
or Secretary
nd Technology

W.

7341 (h)

BITNET:

MARTHA M. TEETER (1992)
Department of Chemistry
Boston College
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JACK M. WILLIAMS (1991)
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Argonne, IL 60439
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1 514 398 0797

Tuesday, Feb. 23   9 am

FAX FROM

DR. ALFRED R. BADER
Suite 622
924 East Juneau Avenue
Milwaukee, Wisconsin 53202
Telephone 414-277-0730
Fax No. 414-277-0709 ←

To: Prof. Alan Shaver
Chemistry, McGill

Dear Prof. Shaver

I have been trying to return your call - unsuccessfully

Faxes might be easier -

Best wishes

Alfred Bader

McGill

Department of Chemistry
Otto Maass Chemistry Building
McGill University
801 Sherbrooke Street West
Montreal PQ H3A 2K6

Département de chimie
Pavillon Otto Maass de chimie
Université McGill
801, rue Sherbrooke ouest
Montréal PQ H3A 2K6

Tel.: (514) 398-6999
Fax: (514) 398-3797

19 November 1992

Dear Dr. Bader,

Thank you for your letter of 30 October 1992, together with the copies of three letters on the "Cori Affair" and the list of possible talks. The last has gone to both Joan Power and Alan Shaver, and I hope one of them will get in touch with you soon. I shall get in touch with the Department of Art History at McGill to find out whether they might not want to hear one or two of your talks.

Now for the absurd affair of the reprints. I sent you a copy of Lauren Dodge's letter of 8 September 1992, in which she said that I should be receiving the reprints "in the next two weeks". I have been phoning her every week since October 1st, and last week she confessed that the reprints had been sent out but somehow had got lost. However, she promised ~~[illegible]~~ that a new batch was being printed, and that she would pick them up herself and send them to me by purolator (a delivery service). So I expect them momentarily. Next Monday I go to hospital for a prostate operation, so you may not receive the reprints before you return to Milwaukee on December 22nd

With all best wishes – Jack Edwards

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

November 5, 1992

Professor Alan Shaver
Department of Chemistry
McGill University
801 Sherbrooke Street, West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Shaver:

I have just seen your letter in the October issue of the Canadian Chemical News, and I want to thank you most sincerely for your thoughtfulness.

Best personal regards,

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

October 30, 1992

Professor J. T. Edward
Department of Chemistry
McGill Unviersity
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Edward:

Your two very kind letters of October 15th and 23rd arrived here together, yesterday.

Isabel and I will be leaving shortly on a long trip to Canada and Britain. We will be in Kingston, staying with Principal David Smith, on the 10th and 11th of November and with my sister-in-law, Mrs. Marion Dick in Ottawa, from the 12th to the 14th of November. Then we fly to England. Marion's address is: 23 Lipstan Avenue, Ottawa K2E 5Z2, telephone 613 225 7909.

If, per chance, you have not yet sent the reprints but they arrive between now and, say, November 6th, may I impose on you to send them to me in care of Marion Dick in Ottawa. If they arrive after that date, then please send them to Milwaukee, where we will see them after our return on December 22nd.

As you will be able to imagine, I have received hundreds of truly supportive letters, and now the three letters which appear in the October Canadian Chemical News which I have just seen for the first time.

You also sent me the page regarding Dr. Jankowski's letter which really did "stir the pot."

From the letters I have received, I enclose copies of three. One of these, from an old friend who has known Tom Cori and me for many years, is very sharp, but may be quite correct. The second, from the secretary of the Royal Spanish Chemical Society, is the most poetic I have received.

The third, from one of Denmarks ablest chemists, Dr. Niels Clauson-Kaas, I send to you for a special reason. Niels wrote that my dismissal reminded him of what his father often said, all too often to him, "How can one be so stupid?" But stupidity is not limited to chief executives. Looking over my correspondence with you I note that I send you a check for only $116.00, which is really silly. Here you went to a great deal of trouble to write a magnificant article, and should pay for half of the cost of the reprints! How silly can I get? The second check is enclosed.

During my stay in Ottawa, I will be speaking on Josef Loschmidt at Carlton and on paintings at the National Gallery. I have not heard from Joan Power. My calendar for 1993 is filling up rapidly, but is still reasonably open for early November. I would be happy to come to Montreal, say, on the 4th and 5th of November in 1993 and give several lectures, perhaps both at Mcgill and your art museum. A list of possible talks is enclosed.

I do not want to end this letter without telling you what an enormous personal pleasure your article has given me.

Best personal regards,

Enclosure

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

September 30, 1992

Professor John T. Edwards
Department of Chemistry
McGill University
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Edwards:

I so enjoyed your "Aldrich History" and particularly appreciated your omitting your doubts about my view on Loschmidt. Some day you might get the Chemistry Department at McGill to invite me to speak about Loschmidt, and I think you will then become a believer. An abstract of the talk which I just presented at the annual meeting of the Royal Spanish Chemical Society is enclosed.

I had hoped to visit Montreal the week of November 9th while in Canada. However, I have so much to do in Kingston and Ottawa that I will just have to skip Montreal on this trip.

I would appreciate your sending me the reprints when you receive them. Again, many thanks, and best personal regards.

Sincerely,

Enclosure

Canadian Chemical News
L'Actualité chimique canadienne

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[illegible]
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[illegible]

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

October 30, 1992

Professor J. T. Edward
Department of Chemistry
McGill Unviersity
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6
Canada

Dear Professor Edward:

Your two very kind letters of October 15th and 23rd arrived here together, yesterday.

Isabel and I will be leaving shortly on a long trip to Canada and Britain. We will be in Kingston, staying with Principal David Smith, on the 10th and 11th of November and with my sister-in-law, Mrs. Marion Dick in Ottawa, from the 12th to the 14th of November. Then we fly to England. Marion's address is: 23 Lipstan Avenue, Ottawa K2E 5Z2, telephone 613 225 7909.

If, per chance, you have not yet sent the reprints but they arrive between now and, say, November 6th, may I impose on you to send them to me in care of Marion Dick in Ottawa. If they arrive after that date, then please send them to Milwaukee, where we will see them after our return on December 22nd.

As you will be able to imagine, I have received hundreds of truly supportive letters, and now the three letters which appear in the October Canadian Chemical News which I have just seen for the first time.

You also sent me the page regarding Dr. Jankowski's letter which really did "stir the pot."

From the letters I have received, I enclose copies of three. One of these, from an old friend who has known Tom Cori and me for many years, is very sharp, but may be quite correct. The second, from the secretary of the Royal Spanish Chemical Society, is the most poetic I have received.

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

The third, from one of Denmarks ablest chemists, Dr. Niels Clauson-Kaas, I send to you for a special reason. Niels wrote that my dismissal reminded him of what his father often said, all too often to him, "How can one be so stupid?" But stupidity is not limited to chief executives. Looking over my correspondence with you I note that I sent you a check for only $116.00, which is really silly. Here you went to a great deal of trouble to write a magnificant article, and should pay for half of the cost of the reprints! How silly can I get? The second check is enclosed.

During my stay in Ottawa, I will be speaking on Josef Loschmidt at Carlton and on paintings at the National Gallery. I have not heard from Joan Power. My calendar for 1993 is filling up rapidly, but is still reasonably open for early November. I would be happy to come to Montreal, say, on the 4th and 5th of November in 1993 and give several lectures, perhaps both at Mcgill and your art museum. A list of possible talks is enclosed.

I do not want to end this letter without telling you what an enormous personal pleasure your article has given me.

Best personal regards,

Enclosure

Canadian Chemical News
L'Actualité chimique canadienne

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Ottawa, Ontario K1P 6E2
Tel/Tél: (613) 232-6252
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1992 September 8

Dr. J.T. Edward, FCIC,
Department of Chemistry,
McGill University,
801 Sherbrooke Street West,
Montreal, Quebec
H3A 2K6

Dear Dr. Edward:

I have checked with our printer regarding your reprints of the Aldrich story.

The reprint order got misplaced. They are now doing this order for you and you should have them within the next two weeks.

I am returning your original cheque and would ask that you issue a new one in the amount of $226.84 ($212.00 plus 7% G.S.T.).

Please accept our apologies for this oversight and let me know if you do not receive the reprints in two weeks.

Thank you.

Yours sincerely,

Laureen Dodge

Laureen Dodge
Editorial Department.

McGill

23 October 1992

Dear R. Bader,

I have been informed by Laureen Dodge of the C.I.C. that our reprints should arrive next week. So only a little more patience! You may be interested in two papers from the Letters section of ACCN, which published "The Aldrich Song".

I hope Joan Power of the McGill Chemical Society has got in touch with you. I'll keep pressing her (whenever I find her).

All best wishes —

Jack Edward

McGill

Department of Chemistry
Otto Maass Chemistry Building
McGill University
801 Sherbrooke Street West
Montreal, PQ H3A 2K6

Département de chimie
Pavillon Otto Maass de chimie
Université McGill
801, rue Sherbrooke ouest
Montréal, PQ H3A 2K6

Tel.: (514) 398-6999
Fax: (514) 398-3797

15 October 1992

Dear Dr. Bader,

Thank you for your recent letter. Unfortunately, I seem to have misplaced it, but the most important point concerned the reprints. These are giving me much trouble: see the enclosed letter from Laureen Dodge. I phoned her a few days to tell her that they have still not arrived, and she promised to look into it.

My article has proved very popular in Canada, and I've had good comments from a number of people.

I've given your name and address to Dr. Joan Power, the present President of the McGill Chemical Society, and she may be getting in touch with you soon about a talk on Loschmidt next term. I suggested that she also let the student chapter of the C.I.C. know about your talk on Chemistry and Painting. I hope we shall be able to hear you on one or both topics in the next term.

With all best wishes to Mrs. Bader and yourself –

Sincerely,

Jack.

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

October 20, 1992

Professor Alan Shaver
Department of Chemistry
Otto Maass Chemistry Building
McGill University
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6, Canada

Dear Professor Shaver:

Many thanks for your kind letter of September 23rd.

Indeed, a great many letters and articles have appeared, and several long articles are in preparation.

Perhaps the most telling letter was the one from Professors Steven Ley and Ralph Raphael in Chemistry in Britain, copy enclosed.

We will be in Canada the week of November 8th, but I have so many meetings and talks scheduled in Toronto, Kingston and Ottawa that we will not have a chance to visit Montreal.

Please do give me a rain check.

Best personal regards,

Enclosure

McGill

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801 Sherbrooke Street West
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Fax: (514) 398-3797

23 September 1992

Dr. Alfred Bader
52 Wickham Avenue
Bexhill-on-Sea
East Sussex
TN39 3ER
U.K.

Dear Dr. Bader:

I hope you and your wife are well. I have been reading the many supportive letters that your friends and supporters have been sending to Chem and Eng News. You deserve every word. I sent a letter to Canadian Chemical News in late July; perhaps they will publish that too.

In your last letter you indicated you might drop by McGill in November. Could you let me know when that might be? I may have to be away 3 - 6 November and I would hate to miss your visit. Best wishes from the chemists at McGill. You are always welcome here.

Kindest regards,

Alan Shaver

Alan Shaver
Professor and Chair

AGS/agc

McGill

[redacted] [redacted] [redacted]

23 September 1992

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Kindest regards,

Alan Shaver

Alan Shaver
Professor and Chair

AGS/agc

McGill

[redacted] [redacted] [redacted]

16 January 1992

Dear Dr. Bader,

I am returning the first Aldrich Chemical Co. annual report. In answer to your query in your letter of 31 December 1991, I am pleased to give permission to have the article reprinted. Since I sent the article on 12 September 1991 to Sandra Hollingshead, Editor of *Canadian Chemical News*, Ms. Hollingshead has resigned as Editor. However, I telephoned her temporary replacement in Ottawa, and was assured that she would be carrying out the committments made by Hollingshead. I'll keep you informed of the progress of the article, and send you ten reprints.

With best wishes for the New Year,

Sincerely,

Jack Edward

Canadian Chemical News
L'Actualité chimique canadienne

Vol. 36, No. 4
April/avril 1984

McGill Chemistry: 1000th PhD Coming Up

John T. Edward

12-17

File

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McGill Chemistry: 1000th PhD Coming Up

John T. Edward, FCIC, Department of Chemistry
McGill University, Montréal, Québec H3A 2K6

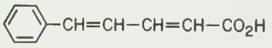
Sometime in 1984 the McGill Chemistry Department will graduate its 1000th PhD, and to celebrate this occasion the department will hold a one-day conference on June 2nd, immediately preceding the annual meeting of the CIC. In this article J.T. Edward, himself a PhD (1942) of the department, will review some of the highlights since 1910, when Annie Louise MacLeod received the first PhD.

Research in Chemistry Begins

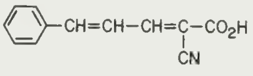
In 1892 Sir William Macdonald, the wealthy tobacco manufacturer, gave McGill University $425,000 to construct a building for the Department of Chemistry, and in 1898 the staff of the department belonging to the Faculties of Arts and of Applied Sciences[1] (later Engineering) moved into the new Macdonald Chemistry and Mining Building.

With this move serious research in chemistry became possible, and in 1907 two students received MSc degrees for research ("Some reactions of the monoamino acids", "Notes on some reductions in the presence of finely divided nickel") supervised by Prof. J. Walker (MA, St. Andrews, PhD, Leipzig), Macdonald Professor of Chemistry. Thereafter a steady stream of MSc theses came from the department.

The university started granting PhDs in 1909, and in 1910 the first PhD in chemistry was awarded to Annie Louise MacLeod (BA, McGill) for a thesis entitled: "A comparison of certain acids containing a conjugated system of double bonds". The thesis is made up of 45 hand-written pages describing the reactions of the conjugated acids **1** and **2**.



1



2

The experimental work was done at Bryn Mawr College under the direction of Professor E.P. Kohler[2], and it would seem that the roles of J. Walker and R.F. Ruttan (identified in the McGill graduate records as research supervisors) were purely nominal.

Annie Louise MacLeod went on to become dean of women at Barnard College. Since her time 992 PhDs in chemistry have been awarded by McGill, and sometime in 1984 a current graduate student will receive the 1000th PhD, as shown in Figure 3. This number is probably unique for any department in any subject in Canada. The present article can only sketch some of the highlights of the history of the department, focusing particularly on the four professors (Maass, Hibbert, Winkler, and Purves) who together supervised 400 PhD students.

They, however, come later. The second PhD in chemistry was awarded in 1912, again for experimental work done away from McGill. The thesis, entitled "The hydrolysis of gelatin by baryta. The transformation of glutamic acid into proline", was submitted by Reginald S. Boehner (BSc, Dalhousie) and consists of 26 pages, now typewritten. On the last page we read: "The experimental part of this thesis was begun in the First Chemical Institute of Berlin University in May 1909 and finished in March 1911. To His Excellenz Herrn Geh. Reg.-Rat Prof. Dr. E. Fischer .... I would express my sincere gratitude." Professors in Germany at that time were treated with proper respect! In fairness, it should be remembered in 1909 Emil Fischer was a Nobel Laureate, and the world's outstanding chemist in the fields of carbohydrates, proteins, and purines.

Walker died in 1912. Under his supervision Vernon K. Krieble (BSc, Brown) in 1909 had already obtained an MSc for a thesis on the glycoside amygdalin, and in 1913 he obtained a PhD for another thesis supervised by Walker, entitled "Amygdalins and their interactions with emulsin", reporting on research done entirely at McGill. Amygdalin is D(−)mandelonitrile β-gentiobioside, and the nitrile group can be hydrolyzed by alkali. Krieble went to Trinity College, Hartford, Connecticut, where he pioneered in what would now be recognized as physical organic chemistry, with studies of the rates of hydrolysis of nitriles and amides in acid and alkali. This topic was investigated in greater depth at McGill by B.S. Rabinovitch, (PhD thesis 1942, directed by C.A. Winkler) and later still by H.J. Campbell (PhD thesis 1961, directed by J.T. Edward) and S.C. Wong (PhD thesis 1974, directed by J.T. Edward), so the departmental commitment to this topic has been prolonged!

The Department under R.F. Ruttan

With the emergence of a unified department in 1912 under Robert F. Ruttan the pace of research quickened.

---

[1] A second Department of Chemistry offered instruction in the Faculty of Medicine, and was housed in the Medical Building. In 1912 a unified department, housed in the Macdonald Building, came into existence, with Prof. R.F. Ruttan as its first director.

[2] E.P. Kohler became one of America's outstanding chemists. From Bryn Mawr he went to Harvard, where he directed a large number of graduate students (*inter al.*, Adams, Conant, Whitmore, Westheimer) later to become famous. One of his last postdoctoral assistants was R.B. Woodward. The reactions of conjugated carbonyl compounds remained one of his abiding research interests.

Figure 1. Annie Louise MacLeod

Figure 2. R.F. Ruttan

Ruttan was a towering figure among the chemists of Canada of that time. R.V.V. Nicholls writes:

> During the fifteen years that Ruttan served as Director of the Department of Chemistry, it was to become pre-eminent. He possessed to a high degree those attributes necessary to achieve eminence in the academic life; he was at once a teacher, an administrator, a researcher and a personality. In addition, his training was above reproach. At Toronto, as a student of Croft and Pike, he received the BA degree in 1881 with a gold medal in natural science, and at McGill, as a student of Girdwood, the MD degree in 1884 with a gold medal in chemistry. Like most ambitious young chemists of his time, he chose to study in Germany and spent a year (1885-1886) at Berlin under the great Hofmann.
>
> His influence in scientific affairs was natural and great. During the early years of the First World War, the disadvantages resulting from the primitive conditions of research in Canada were overcome, in part at least, by the Honorary Advisory Council for Scientific and Industrial Research. Dr. Ruttan was appointed a member and became, before long, its chairman. In the postwar years and under his care, the Council became the National Research Council of Canada. As Chairman of its Committee on Assisted Research, Dr. Ruttan was responsible for the birth of the present system of grants-in-aid and scholarships.
>
> During the 1920s, Ruttan's life was filled with responsibilities and honours. In 1895, he was elected Fellow of the Royal Society of Canada and, in 1920, he became its President. In 1912, he was elected Chairman of the Canadian Section of the Society of Chemical Industry and, in 1921, he became the first Canadian president of the international Society. In 1922, he was one of the founders of the Canadian Institute of Chemistry, the first professional society of chemists in this country .... In 1924, he was appointed

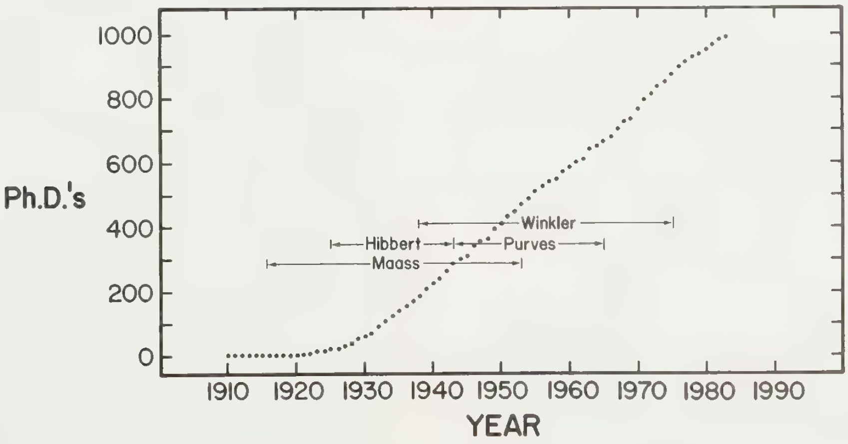


Figure 3. Cumulative total of McGill chemistry PhD's plotted against year of graduation.

Figure 4. A photograph of the staff and graduate students of the McGill Chemistry Department in 1927-1928. Front row, left to right: W.H. Hatcher, H. Hibbert, O. Maass, R.F. Ruttan, unidentified, G.S. Whitby, F.M.G. Johnson. Second row: between Ruttan and unidentified, E.W.R. Steacie, between Whitby and Johnson, L. Marion.

first Dean of McGill's new Faculty of Graduate Studies and Research. Robert Fulford Ruttan ... resigned in 1927 and died in 1930.

Ruttan was indeed a many-sided figure: an officer in the militia, a clubman, and a prominent member of the Montreal society of his day. An apocryphal story (probably untrue, but we would like to believe it!) tells of how Madame X of a fashionable *establishment* came one morning with an umbrella and gave it to the porter, Mr. P of the Macdonald Chemistry and Mining Building, saying that Professor Ruttan had left it in the room of one of her girls the previous night. Mr. P took it up to Ruttan, wondering what his reaction would be, and told him how it had come into the possession of Madame X. Ruttan looked at the umbrella and said yes, it was his, and then turned to the porter: "You see the moral of this, Mr. P: never loan your umbrella to a student!" His magisterial bearing is evident in the photograph of the chemistry staff and students for the year 1927-1928 (see Figure 4). E.W.R. Steacie, the most junior member of staff, appears in the second row, along with graduate students C.C. Coffin, Leo Marion, and others.

Ruttan directed or codirected 32 MSc students on a bewildering variety of topics (turpentine, optical activity, gallic acid, lipids, amino acids, oil shales, rubber, asphalt from the Alberta tar sands, ethylene oxide, hydrogen peroxide, specific and latent heats of fusion, adsorption of ammonia by alumina, purification of coal gas, molecular compounds of aromatic hydrocarbons and HBr, aromatic antimony compounds, beryllium, diquinolines, etc.) but only five students for the PhD, on work dealing with amino-acid analysis, rubber, fats and fatty acids, kerogen from oil shale, and margerine.

Otto Maass Arrives

The great output of PhD's began within a few years of the appointment of Otto Maass to the department in 1916 (see Figure 3). Maass was born in New York City in 1890 of German parents, but brought at an early age to Montreal. He enrolled in the Honours Mathematics and Physics program at McGill, but was lured into chemistry by Douglas McIntosh (father of R.L. McIntosh of Queen's), who supervised his 1912 MSc thesis entitled: "Phase rule studies: organic compounds containing oxygen with the halogens and halogen hydrides." He then went to Harvard to obtain a PhD with T.W. Richards (the first American chemist to receive a Nobel Prize), and then to Germany to work with Walther Nernst, another Nobel Laureate. On the outbreak of the First World War he narrowly escaped from Germany into Switzerland and thence to Canada.

The first PhD supervised by Maass graduated in 1921, and the last in 1953. Altogether he directed or co-directed the work of 145 graduate students, 131 of whom obtained the PhD. His research covered a very broad range of topics: calorimetric studies; investigations of the critical state; the preparation and properties of pure hydrogen peroxide; and later, in the laboratories of the Pulp and Paper Research Institute, basic studies of cellulose and of the fundamentals of the chemical pulping of wood. At this period the only other chemistry department in Canada offering a PhD was that of the University of Toronto, and it had far fewer graduate students. Consequently Maass's students came to occupy a unique position in the Canadian chemical scene. This was described by E.W.R. Steacie, at one time president of the National Research Council of Canada, and himself a McGill PhD (1926, supervisor F.M.G. Johnson) in an informal address in 1955:

> No one can deny the fact that the first real graduate school in any Canadian science (with the possible exception of Medicine) was developed by Dr. Maass. The Graduate School in Chemistry, sparked by him, grew very fast. As a result today [1955] 500 people have obtained their PhDs through this [McGill] department. A very large number of them, particularly in the period up to the beginning of the last war, were Dr. Maass's own students .... The result of this is that O.M.'s position in Canadian Chemistry is an extremely unusual one, and is one of those things that will crop up only once in any given country .... It would not be very far wrong to say that almost all physical chemists in this country can trace their ancestry back to O.M. If one takes the list of his people there are 25 Canadian professors, past or present, and if one considers their

students, and so on, and gets down to scientific grandchildren and even great-grandchildren the number become enormous.

Carbohydrate Chemistry

Only slightly less important than Maass in training PhDs during this period was Harold Hibbert. Hibbert, a brilliant and eccentric Englishman who had been trained in Germany, came to McGill from Yale in 1925 as E.B. Eddy Professor of Industrial and Cellulose Chemistry. In 1927 he and his students moved into the newly completed Pulp and Paper Research Institute of Canada, on the McGill campus not far from the Macdonald Chemistry and Mining Building. Between 1925 and 1943 Hibbert directed the work of 69 students for the PhD, on topics related to cellulose and lignin.

I remember Hibbert in the early 1940s, when I was a graduate student, as a tall, handsome man with flowing white hair and a distinguished bearing (see Figure 6). He ran his laboratory in no-nonsense authoritarian fashion. He insisted that students work late hours at night, but next morning would be standing at the bottom of the staircase just before 9 o'clock with a big watch in his hand, saying good morning to each student as he entered.

Hibbert was succeeded in 1943 by Clifford Purves, a gentle, soft-spoken Scot who had learned his carbohydrate chemistry from Sir James Irvine at St. Andrews University, Scotland, and Claude S. Hudson at the National Bureau of Standards, U.S.A., and came to McGill from MIT. While continuing his work on carbohydrates, Purves started to study lignin and other extractives of bark and wood. This was difficult and relatively unrewarding research, but Purves nonetheless attracted a large number of graduate students. Before his death in 1965 he had supervised the work of 83 PhDs. Through their students Hibbert and Purves determined to a large extent the character of organic research in Canada for a generation: in particular, the preponderance at one time of carbohydrate chemists.

The Winkler Era

The fourth leader of a great team was Carl Winkler. Winkler was of Danish ancestry, and grew up on the prairies near Virden, Manitoba. He obtained a BSc and MSc in cereal chemistry (supervised by W.F. Geddes[3]) from the University of Manitoba, and then came to work with Otto Maass on phenomena near the critical point. After receiving a McGill PhD in 1933, he went to Oxford as a Rhodes Scholar, where he obtained a DPhil in 1936 for work with C.N. Hinshelwood (later to win the Nobel Prize) on various kinetic studies: of the thermal and photochemical decomposition of simple aldehydes and ketones; of the formation of quaternary ammonium compounds in benzene; and of the oxidation of cyclic compounds by permanganate.[4]

After three years with the NRC in Ottawa, where he studied, among other things, the kinetics of bacon curing, Winkler came to McGill in 1939 to replace E.W.R. Steacie, who left to head the Division of Chemistry of the NRC. He had barely settled into his job when he was swamped with work. With the fall of France in June, 1940, a sudden sense of urgency swept across Canada. Otto Maass had already been co-opted into a large number of government committees, and now became virtually unavailable to the department. His graduate students were looked after by R.L. McIntosh, but Winkler undertook most of the lectures in physical chemistry (15 hours a week!) as well as directing a group of 15-20 PhD students working on chemical warfare, explosives, synthetic rubber, and other problems. It was a crushing load, but Winkler always seemed relaxed and unpressured, and was always available to students, graduate and undergraduate. He con-

Figure 5, Otto Maass

Figure 6, Harold Hibbert

---

[3] Winkler published more than 200 scientific papers; the first four came from his work with Geddes.

[4] The results of Winkler's PhD work with Maass were published in four papers in *Can. J. Chem.*, but the results of his DPhil work with Hinshelwood were published in *nine* full papers, only two with authors other than Hinshelwood and himself. He was obviously a gifted experimentalist.

tinued to direct large numbers of PhD students after the war (the maximum number at any one time was 26) on topics such as the kinetics of formation of RDX (a military high explosive); the kinetics of various polymerization reactions; the electrodeposition of metals; and the reactions of active nitrogen (his great chemical love!) and of atomic hydrogen with organic and inorganic compounds.[5] Altogether, Winkler directed the work of 136 graduate students, 126 of whom obtained the PhD. His peak year was 1953, when 11 PhDs directed by him graduated. His cumulative total of PhDs against years is plotted in Figure 7, and shows his remarkable productivity in the 1940s. The curve bends over in 1952, because of the arrival at McGill of Harold Schiff in 1950 and of Leo Yaffe in 1952, and flattens still further after 1958 because of the arrival of more physical chemists after 1956. However, Winkler continued to supervise PhD students even after undertaking such onerous tasks as chairman of the Chemistry Department (1955-61) and vice-principal, planning and development (1966-69), as shown by the curve of Figure 7 steadily ascending up to 1975, when he reached retirement age.

Many of Winkler's graduates achieved great prominence. To take three examples almost at random, the editorial boards of several of the American Chemical Society journals over the past 20 years have almost always at some time or another displayed the names of B.S. Rabinovitch (PhD, 1942), R.A. Marcus (PhD, 1946), or Jack Halpern (PhD, 1949).

Other Research Supervisors

In 1950 the McGill Chemistry Department had ten professors, about half of whom were occupied almost exclusively in teaching, plus a few loosely associated research fellows such as Stanley G. Mason of the Pulp and Paper Research Institute. In 1984 it has 28 professors, most of them involved in research, and six members of the Pulp and Paper Research Institute who have formal appointments as research associates of the department. At the same time, the number of graduate students, which peaked at about 120 in 1960-70, is now about 100. It is evident that large research groups are unlikely to recur, and that the curve of Figure 3 should show signs of flattening. Still, it remains remarkably linear from 1933 up to the present (correlation coefficient $r^2 = 0.999$), a statistical oddity, with a slope of 17.97 PhDs per year.

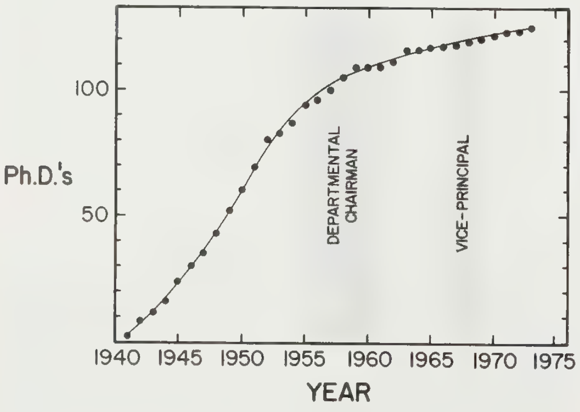


Figure 7. Cumulative total of PhDs supervised by Winkler, plotted against year of graduation.

TABLE 1. McGill chemists who up to 1983 have directed ten or more PhD theses

Name	Specialty	Period*	Number
O. Maass	Physical	1921-53	131
G.S. Whitby	Polymers, organic	1923-29	10
H. Hibbert	Cellulose, lignin	1925-43	69
W.H. Hatcher	Organic	1927-41	14
C.F.H. Allen	Organic	1930-37	21
E.W.R. Steacie	Physical	1933-40	17
R.V.V. Nicholls	Organic	1940-54	19
C.A. Winkler	Physical	1941-74	126
C.B. Purves	Cellulose, lignin	1944-65	83
A. Taurins	Organic	1951-73	29
S.G. Mason	Physical	1953-	49
T. Timell	Organic	1955-63	14
H. Schiff	Physical	1955-66	13
L. Yaffe	Radiochemical	1955-	34
A. Sehon	Biophysical	1957-72	27
J.T. Edward	Organic	1960-80	25
M. Onyszchuk	Inorganic	1960-	12
G. Just	Organic	1962-	47
D.A.I. Goring	Physical	1963-	17
G.C.B. Cave	Analytical	1966-78	12
M.A. Whitehead	Theoretical	1967-	13
I.S. Butler	Inorganic	1968-	11
L.E. St. Pierre	Polymer	1969-	16
J.F. Harrod	Inorganic	1969-	10
D.N. Harpp	Organic	1970-	11
T.H. Chan	Organic	1971-	10
D. Patterson	Physical	1972-	15

*Graduation date of first and last PhD.

Reasons of space make it impossible to discuss adequately the other professors who over the years directed the work of about 590 PhD graduates. Those who have (to date) directed ten PhD students or more are listed in Table 1. The achievements of these professors should not be underrated. In particular, the graduates of Whitby, Hatcher, Allen, and Nicholls formed a very substantial fraction of the organic chemical community in Canada before 1950. Similarly, it is likely that the PhDs of Yaffe and Whitehead form a substantial fraction of their very specialized communities today.

The reasons why the graduate school of the Department of Chemistry at Toronto before 1950 never reached the size of that of the McGill department are not clear to the author. Some reasons for the depressed number of graduate students in organic chemistry may be inferred from the reminiscences of Douglas Downing in *Chemistry in Canada* **35**, No. 3, 1983.

Celebration of the 1000th PhD

After the Second World War, many other universities joined McGill and Toronto in having PhD programs. By now there are about 50 such departments, and graduate students in chemistry at McGill make up only a small fraction of the Canadian total. However, the department remains justifiably proud of its record. To celebrate the 1000th PhD sometime in 1984, it will hold a one day

---

[5] He kept up a minor interest in food chemistry, from his early years at Manitoba and at NRC, so that as late as 1949 a PhD thesis on "Oxidation of carotenoid pigments during the processing of macaroni" appeared.

meeting in June 1984 (just before the Annual Meeting of the CIC in Montreal). It is hoped that as many as possible of our graduates will return for a day devoted to nostalgic and not-too-serious reviews by past generations of students, with a chance of renewing acquaintances after long separations. The program is being organized by Dr. G.R. Brown (PhD, 1970; Winkler) who should be contacted for details about registration. Speakers will show how their PhD training did (or did not!) prepare them for their present responsibilities, sometimes in fields remote from chemistry. The list includes Carole Maass (PhD, 1927), Leo Yaffe (PhD, 1943), of McGill, Orrie Friedman (PhD, 1944) of Collaborative Research, Samuel Epstein (PhD, 1944), a Professor of Geology at Cal Tech, D.M. Wiles (PhD, 1957) of NRC, Otto Forgacs (PhD, 1959) of MacMillan-Bloedel, J. Schwarcz (PhD, 1974) of Vanier College, L. Siminovitch (PhD, 1944) Department of Genetics, University of Toronto.

Cautionary Postscripts

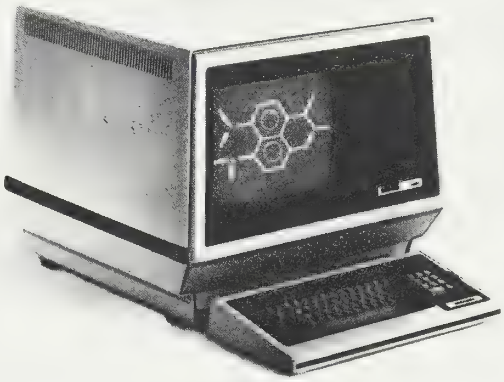
Lest the above account be regarded as unduly complacent and self-congratulatory, let us end on a critical note. Professor Walker, who supervised the earliest work described above, dismissed the suggestion of a very much younger physics professor, Ernest Rutherford, that they collaborate. Fortunately, a newly arrived lecturer of the Chemistry Department, Frederick Soddy, fresh out of Oxford, had started no research program and could be enticed to collaborate with young Rutherford over the years 1900-03. This work led to the discovery of the steps by which uranium decays to lead. Rutherford left McGill in 1907 for Manchester, and in 1908 received the Nobel Prize (for chemistry!), and Soddy received the same prize in 1921, largely for the work begun at McGill. Many other decisions of our research professors can probably be shown to be short-sighted and misguided, but that awaits another article!

I am grateful to Jeremy Edward for the statistical analysis related to Figure 3, and to my chairman, Mario Onyszchuk (PhD, 1954; Winkler) for allowing me to write this uncensored account of an epoch in our department's history.

References

1. F. Spitzer and E. Silvester, *McGill University Thesis Directory*, vol. 1, p. 7, McGill-Queen's University Press, Montreal, 1976.
2. C.J. Warrington and R.V.V. Nicholls, *A History of Chemistry in Canada*, Sir Isaac Pitman and Sons, Toronto, 1949, pp. 465-466.

John T. Edward, *FCIC, is Macdonald professor of chemistry at McGill University. He was born in London, England but came to Canada at the age of five months. Dr. Edward graduated in honors chemistry from McGill in 1939 where he remained to take a PhD doing research on the explosive RDX. He did postdoctoral work under Henry Gilman at Iowa State and under Sir Robert Robinson at Oxford University, where he received a D.Phil in organic chemistry. After a period as a lecturer at Trinity College in Dublin Dr. Edward joined the faculty of McGill in 1956. His research interests range from natural products where he has made contributions to the chemistry of carbohydrates, terpenes and steroids to physical organic chemistry.*



McGill

Faculty of Science
McGill University

853 Sherbrooke Street West
Montreal, Quebec, Canada H3A 2T6

Fax: (514) 398-8102

June 16, 1994

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
USA

Dear ~~Dr. Bader~~ Alfred:

I am writing to inform you that as of July 1, 1994, I will become Vice-Principal (Academic) at McGill. This is a tremendous honour and I look forward to serving the University in my new role.

I have been working in the Faculty of Science for the last 25 years, of which the last three years have been as Dean. It has been a pleasure writing to you over this time to bring you news of the Faculty. One point that I would like to emphasize in this letter is that your commitment and interest to help the Faculty is deeply appreciated by students and faculty alike.

The selection process for my replacement is well under way, and in the interim, Professor Nicholas de Takacsy will assume the responsibilities as Acting Dean.

Thank you for your continued support of the Faculty.

Best wishes for the future,

Yours sincerely,

Bill

T. H. Chan
Dean, Faculty of Science

THC:mft

McGill

Faculty of Science
McGill University

853 Sherbrooke Street West
Montreal, Quebec, Canada H3A 2T6

Fax: (514) 398-7185

November 26, 1993

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
USA

Dear Dr. Bader:

It gives me great pleasure to forward to you the 1993-94 Faculty of Science Newsletter. I hope you enjoy reading about some of the Faculty's recent achievements and activities.

If you have any comments or would like more information, please don't hesitate to write or telephone me at (514) 398-4211.

With my warmest regards,

Sincerely,

Bill

T.H. Bill Chan
Dean, Faculty of Science

THC:mft
Enclosure 1

P.S. It was a pleasure to see you and your wife again in McGill. Best wishes

[illegible]

McGILL MATHEMATICIAN AND TEAM SOLVE MATHEMATICAL MYSTERY

[illegible] certain nonlinear differential equations with a puzzling [illegible]

Jacques Hurtubise, a native Montrealer, received his BSc from the [illegible] de Montréal in [illegible]

Professor Hurtubise [illegible]

Professor Hurtubise [illegible] the plenary address at the American Mathematical Society [illegible]

THE CANADIAN GENOME AND TECHNOLOGY PROGRAM

Professors Howard Bussey and Michael Clark of the Department of Biology at McGill lead a group under the Canadian Genome and Technology Program working to [illegible] Genome Sequencing [illegible] allotted numbers I and XVI, the McGill group will coordinate the work and analyze CH [illegible]

[illegible] wine. It has recently found extensive use in the new biotechnology industries, for example in the production of human insulin. It is now considered to be the [illegible]

[illegible] in function result [illegible] check") as well as through other methods. The Yeast Genome Project has already identified a large number of genes of diverse [illegible]

[illegible] phase of the human genome project. As work proceeds it is becoming evident that there is a common core of genes that defines all eukaryotic cell[illegible] their regulatory information (as opposed to 5-10% of the human genome) make it ideal for detailed study.

Professors Bussey and Clark stress that work of this kind in biology [illegible] David Koback and Ian [illegible] with a team of technicians [illegible] postdoctoral associates.

[illegible]

[illegible]

THE MIT-IBM-McGILL SYNCHROTRON PROJECT

Professor Mark Sutton of the Department of Physics at McGill [illegible] MIT-IBM [illegible] Massachusetts Institute of Technology in studying [illegible] emitted by the synchrotron now being constructed at the Argonne National Laboratory near Chicago.

A synchrotron is a large machine which accelerates electrons in a circle inducing [illegible] radiation. The radiation is emitted from the [illegible] collected in [illegible] constructed around the edge of the facility. A beam line is a large laboratory in itself, each is awarded to a scientific team.

The new synchrotron at Argonne is called the Advanced Photon Source. It will be about one kilometer in circumference [illegible] the MIT-IBM-McGill team will [illegible] lines there. While synchrotrons are used as sources for two types of radiation, ultra-violet and x-ray, the team is interested in using x-rays primarily to study the structure of materials.

The facility will offer a remarkable opportunity to measure x-ray scattering patterns, a technique for measuring the structure of matter that results in important insights into our understanding of the microstructure of materials. The control of the microstructure of materials is important in industrial processing, for instance in the [illegible] of higher-quality steel. [illegible] to running and improving these capabilities. Professor Sutton believes it is important for Canada to become more heavily involved in this rapidly growing field.

[illegible] and did post-doctoral studies at MIT. He has been at McGill since 1985.

ALUMNI NEWS

Here are some news items and comments we have received from [illegible]

[illegible] **John S. Foster Jr.** [illegible] award in science and technology. The Prize is given for a lifetime of achievement in the field of nuclear energy; it was presented to Dr. Foster by U.S. President Clinton. Dr. Foster resides in California.

Hubert Reeves, MSc'56, this [illegible] *Astrophys*[illegible] as the nature of time, chaos theory and the future of the universe. Mr. Reeves is Director of Research at the *Centre nationale de la recherche* near Paris [illegible]

Julian Adams, BSc'77, coedited *The Search for Antiviral Drugs: Case Histories from Concept to* [illegible] Dr. Adams is Director of the Department of Medicinal Chemistry of Boehringer Ingelheim Pharmaceuticals Inc., Connecticut.

Walter M. Palmer, BSc'44, MSc'47, PhD'49, wrote from [illegible]

Alexandra Cowie, BSc'50, from Victoria, British Columbia wrote to say she found last year's Newsletter very satisfying and enjoys to being kept informed of Faculty highlights. She says [illegible]

Mrs. E. K. Hope Cook, BSc'34, from Dowellton, Tennessee, wrote to say that she enjoys reading the Newsletter. Now 80 years of age, she is still working, carrying out peptide research at Vanderbilt University.

The Faculty wishes to thank [illegible] *written much of the text of the Newsletter.*

> **KEEP IN TOUCH**
>
> *If you know of any graduates who aren't receiving our newsletter, please let us know.*
> *We always enjoy hearing about your recent news and your comments on the Faculty of Science and the University.*
>
> *Please write to:*
> *The Dean, Faculty of Science*
> *[illegible]*
> *853 Sherbrooke Street West*
> *Montreal, Quebec, Canada*
> *[illegible]*

F A C U L T Y   O F

SCIENCE

NEWSLETTER • McGILL UNIVERSITY • FALL 1993

DEAR GRADUATES AND FRIENDS,

Greetings! The Faculty of Science has had another challenging year. As the Dean of Science, I want to keep you informed of the [illegible]

UNDERGRADUATE STUDENTS AND TEACHING

After a decade of almost stable undergraduate enrolment in science, we saw quite an increase in the number of students apply[illegible] tember 1993 was another increase. While this may represent a cyclical change in student interest, the fact that McGill has been ranked highly among Canadian universities may also account for this pattern. [illegible]

Since most of the greater enrolment is due to our attracting out-of-province students, the Faculty has introduced a mentorship program for the entering U-O scholarship students. The freshman student is [illegible] in a new environment and someone to turn to for academic and personal advice. While it is too early to draw any definite conclusion about the success of [illegible] one student a very enriching experience leading to a short summer job and the production of a fine research report" (see the article on the mentorship program in this Newsletter).

[illegible] In the year 1992 [illegible] the most exciting change [illegible] transformation of the Department of Geology into a new Department of Earth and Planetary Sciences. The change [illegible] accompanied by the creation of new undergraduate programs [illegible]

The Faculty recognizes outstanding teaching at the undergraduate level through the Leo Yaffe [illegible] (see article in this Newsletter).

[illegible] Geography have nominated new Chairs.

[illegible]

[illegible]

GRADUATE STUDENTS AND RESEARCH

The number of graduate students in the Faculty reached a record total of 713 in the year 1992-93. [illegible]

[illegible] of Science [illegible] related [illegible]

HONOURS

[illegible] the chemistry [illegible] going on [illegible] members [illegible] Vice-Principal (Academic) Bill [illegible]

[illegible] Canada [illegible] Mathematics [illegible] Martin Zuckermann [illegible] Professor Lawrence Mysak was [illegible] problem in the [illegible]

BEQUESTS

[illegible] grateful and [illegible]

THE BUDGET SITUATION

Many of you have [illegible] exempt from these cuts. For the [illegible], the diminution for McGill [illegible] Faculty of Science has to carry its share of cuts. This is done, essentially, by reducing the number [illegible] without [illegible] would be unrealistic for [illegible] to expect [illegible] and to private corporations and foundations for support.

ALMA MATER FUND

During the last year, 2,693 Science graduates gave $282,324 to the McGill Alma Mater Fund. [illegible]

[illegible] Science when graduates select the box marked Faculty/School [illegible] support student projects. These [illegible] Physics [illegible] Pugwash, the McGill Debating Union, the International Relations Society; and the Student C-GCR ([illegible] Global Change Research).

Your support certainly does make a difference to the life of Science students at McGill. When making [illegible] please direct [illegible] by selecting the Faculty/School Development Fund box on the card you return with your donation.

[illegible] Bill Chan
Dean of Science

THE MENTORSHIP PROGRAM

[illegible] the McGill Mentorship Program [illegible] Rhodes Scholarship [illegible] advise and help him throughout his McGill years.

[illegible] small job in the professor's department, and offered help in finding summer employment. In addition he or [illegible] for graduate stud[illegible]

The project has been in place for one year, and eight departments in the Faculty of Science are participating.

LEO YAFFE AWARD GOES TO SAMUEL MELAMED OF MATHEMATICS DEPARTMENT

Professor [illegible] Melamed has been at McGill ever since the completion of his studies, apart from service with the Royal Canadian Signal Corps and the [illegible] been honoured by his peers with the Leo Yaffe award for excellence in the teaching of science [illegible] committee awarding it was made up of representatives of various science departments at McGill [illegible] When Professor Melamed received his prize he noted that several of his former students were on the platform with him.

Professor Melamed [illegible] lifetime making mathematics understandable to students, usually to 300 or more students at a time. [illegible] Professor Melamed teaches differential equations using transparencies [illegible]

Professor Melamed was asked to help McGill solve some scheduling difficulties in the early [illegible] the York Theatre. Melamed used his mathematical skills to schedule lectures, juggling the timetables [illegible] students.

[illegible] it essential to be available to students who are experiencing difficulties. In mathematics, each principle is based on a previous one, and a student must understand the basic material before he or she can proceed. According to one of [illegible] the first time.

[illegible] Professor Melamed [illegible] for three years.

LAWRENCE MYSAK NEW PRESIDENT OF ACADEMY OF SCIENCE

The Royal Society of Canada consists of three academies [illegible] English). Professor Lawrence Mysak, director of McGill's Centre for Climate and Global Change Research, [illegible] Science for a three-year term.

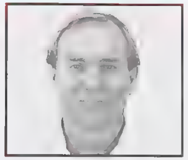
The Royal Society is the recipient of [illegible] chaired by *Maclean's* magazine publisher Brian Segal is trying to figure out whether the government should establish [illegible] Academy [illegible] Royal Society considered too elitist by some. If the grant is not renewed the Society will still carry on, but with far fewer resources.

The Society has pursued many goals and created many initiatives. It is committed to the promotion of women in scholarship, it has commissioned studies on AIDS [illegible] spurred research projects on various elements of global change. It attempts to raise public awareness [illegible]

Professor Mysak [illegible] would like to see the Academy focus on the following areas: The State and Matters of the Mind; Education; Environmental Issues; Canada's [illegible]; and The Society as a Facilitator. He intends to visit cities with a substantial Academy of Science [illegible]

A bilingual pamphlet giving an introduction to the [illegible] Royal Society [illegible] Courtesy visits to other National Academies of Science will be made, and a lecture exchange program is also in the works.

Professor Lawrence A. Mysak is a third-generation Ukrainian-Canadian from Edmonton. He is a graduate of the University of Alberta [illegible] Oceanography at the University of British Columbia from 1967 [illegible] Professor Mysak made [illegible] McGill in 1986, he has established a research group on air-ice-sea interactions in the Arctic.



Professor Mysak is particularly interested in setting up an exchange with the Ukrainian Academy of Sciences; he is [illegible] the Kiev-Mohyla Academy, an institution that is trying to regain its status as the leading centre of Ukrainian higher education. As well, he [illegible] Royal Society [illegible]

THREE FACULTY MEMBERS NAMED TO ROYAL SOCIETY OF CANADA

The Faculty [illegible] three other faculty as Fellows of the Society.

Professor Robert [illegible] Chairman of the Department of Biology, is a world authority [illegible] vertebrate paleontology. His research [illegible] birds, the transition between terrestrial mammals and secondarily aquatic mammals, and [illegible] vertebrate paleontology.

Dean of Science Tak-Hang (Bill) Chan, McGill [illegible] new synthetic methodologies. He has introduced the use of [illegible] new elements into organic chemistry. He has recently [illegible] world-wide.

[illegible] MacDonald Professor of Physics and Director of the McGill Centre for the Physics of Materials [illegible] biological [illegible]

DRS. HARPP, FENSTER, AND SCHWARCZ RECEIVE McNEIL MEDAL

[illegible] David Harpp [illegible] Professor [illegible]

[illegible] Department [illegible]

In 198[illegible] Harpp, Fenster and [illegible]

McGill

[illegible]

7 March 1994

Dr. Alfred R. Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
U.S.A.

Dear Dr. Bader:

Thank you for your congratulations on our vanadium work. I'm very pleased with our progress. Barry Posner is a remarkable person and I'm lucky to be associated with him. We hope to continue Canada's role in the struggle against diabetes.

I will be at the C.I.C. meeting in Winnipeg and I look forward to seeing you and Mrs. Bader there.

Best wishes,

Alan

Alan Shaver
Professor and Chair

AGS/ag

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin 53211

February 25, 1994

Professor Alan Shaver, Chair
Department of Chemistry
McGill University
801 Sherbrooke Street West
Montreal, Quebec H3A 2K6
Canada

Dear Alan:

How often does it happen to you that you see two different photographs of a good friend on the same day? That happened to me yesterday when I received the beautiful photograph which reminded me of my talks at McGill, and also saw your photograph with Barry Posner with the article on your important work on vanadium compounds in the February 21st issue of the C & E News.

Congratulations--excellent work!

Perhaps you know that I have been trying to do exactly what you suggested, to support graduate students, but at my own alma mater, Queen's University, and through the C.I.C.

I will be happy to discuss this with you. Will you, per chance, be at the C.I.C. meeting in Winnipeg, which Isabel and I plan to attend.

Sincerely,

McGill

Department of Chemistry
[illegible]

Département de chimie
[illegible]

Tel.: (514) 398-6999
[illegible]

10 February 1994

Dr. Alfred R. Bader
2961 North Shepard Avenue
Milwaukee, WI 53211
U.S.A.

Dear Dr. Bader:

I have enclosed a little memento of your and Mrs. Bader's visit here last Fall. Our staff and students are still talking about how entertaining and informative your lectures were. You certainly have many admirers here in the Department of Chemistry.

As you are aware, I have been Chair of the Department for just over two years. During this time, I have become increasingly aware of the importance to plan ahead for the future of our profession. I remember when you used to visit me in the laboratory, you would ask "what can we do for you?". I would like to now call upon your help and ask you consider a special request.

The Department is currently seeking support for its graduate students in the form of endowed fellowships and we would be honoured to have your name permanently associated with helping young chemists at McGill to pursue their careers. I realize that this may appear to be a bold gesture on my part, but I only ask knowing how important it is for students to receive assistance when starting off. As well, I could think of no better incentive for a graduate student to strive for excellence in their work than to receive an award in your name.

I would be delighted to hear your ideas and if a request of this nature is something that you could consider. Perhaps we could meet to discuss this proposal further.

In closing, Jack and Masad join me in wishing your and Mrs. Bader the best in 1994.

As always, I look forward to hearing from you.

Kindest regards,

Alan Shaver

Alan Shaver
Professor and Chair

AGS/ag

THE SOCIETY OF THE SIGMA XI
For the Encouragement of Scientific Research

McGill
McGill Chapter
Montreal, Canada

Professor M.A. Whitehead
Chemistry Department
801 Sherbrooke St. West
Montreal, Quebec, Canada
H3A 2K6

Tel.: (514) 398-6239
Fax: (514) 398-3797

Dr. Alfred Bader,
Alfred Bader Fine Arts.

26th October 1993.

Dear Dr Bader,

On behalf of the Society I wish to thank you for your superb talk "Adventures of a Chemist Collector; Chemistry in Art Restoration" before the McGill Chapter.

Visually and Intellectually it stimulated; your witty and urbane delivery delighted: artes, scientia, veritas!

With your wife Isabel, you formed a joyous pair talking of their mutual interests and apparently extolling the motto 'credo quia absurdum est'

The Chapter has rarely had such a fine lecture.

With sincere thanks

Prof M.A. Whitehead
President.

Dr. Alfred Bader
924 East Juneau, Suite 622
Milwaukee, Wisconsin 53202
Phone: 414/277-0730
Fax: 414/277-0709

A Chemist Helping Chemists

June 2, 1997

Dr. Aurèle Parisien
Acquisitions Editor
McGill-Queen's University Press
3430 McTavish Street
Montreal, Quebec H3A 1X9
Canada

Dear Dr. Parisien:

Your letter of April 29th regarding the publication of the diary of Abraham Joseph has, of course, had my wife's and my close attention.

As you perhaps know we have tried to help our universities, Queen's and Victoria in Toronto, very substantially, both personally and through the family foundation.

However, our help has almost always been toward helping students and establishing Chairs.

There is no question in my mind that Abraham Joseph's diary is of very great interest, but specifically to Quebec. Also I have known Annette Wolff since 1939 and I know her to be an excellent writer. But it seems to me that funding for this important project should come from Quebec.

With all good wishes, I remain,

Yours sincerely,

AB/nik

McGill-Queen's University Press
3430 McTavish Street, Montreal, Quebec, Canada H3A 1X9
Tel: (514) 398-3750 • Fax: (514) 398-4333 • E-Mail: MQUP@PRINTING.LAN.MCGILL.CA

29 April, 1997

Dr. Alfred Bader
2961 North Shepard Ave.
Milwaukee, Wisconsin
53211-3435 USA

Dear Dr. Bader,

I understand that Miss Annette Wolff has discussed with you strong interest that McGill-Queen's University Press has in publishing the diaries of her great-grandfather, Abraham Joseph. We would like to bring out the diaries as a four-volume project within our series Studies on the History of Quebec\Etudes d'histoire du Québec. I write to enquire whether you have any interest in supporting this project.

Abraham Joseph was a member of a prominent Lower Canada trading family and his diaries give a unique picture of Jewish, French-Canadian, and English-Canadian life from 1836 through to his death in 1879. Written in the chatty and personal style of the nineteenth-century diarist, they provide important information about the 1837-38 rebellions, the great fire of Quebec, and Confederation. Joseph writes with a crisp, Pepys-like style that conveys a strong, practical, and appealing character. The diaries are particularly valuable for the contribution they make to undestanding the important political and social roles of the anglophone business community in Quebec and the high level of interaction between the different linguistic, religious, and ethnic communities.

Annette Wolff has devoted most of her life to accumulating and preparing the diaries and related archival material. Her dedication to this project and the sacrifices of time and material resources she has devoted to it are quite awe-inspiring. Brian Young, a prominent Quebec historian, has looked over Miss Wolff's materials and is very impressed by the professionalism with which she has laboured all these years. It is now time for this work to be brought to fruition. To do so, a substantial amount of preparatory and scholarly work is still required, however, and it is important to get this underway while the 85-year-old Miss Wolff is still able to contribute her expertise. Professor Young has committed himself to oversee the project, annotate the diaries, and contribute a substantial introduction to each volume as part of his regular research responsibilities. He will, however, require a research assistant and clerical help. With adequate support for research, manuscript preparation, and publication this project will result in several volumes of fascinating material significant to both Quebec and Canadian history.

The series Studies on the History of Quebec\Etudes d'histoire du Québec was established in 1992 to give greater prominence to what has always been one of the most significant areas of our list. Edited

. . . 2

by historians from McGill and the Université de Montréal and including works in both French and English, the series to date consists of seven titles (see attached list) and includes works ranging from studies of communities in the Eastern Townships, to the history of Arvida, and a translation into English of Louise Dechêne's award-winning study of seventeenth-century Montreal. The series attracts readers in the student and academic communities across Canada. Despite the significant contribution these books make to the understanding of Quebec, sales are limited. Since the revenues from sales do not cover the cost of publishing we must find publication subsidies for each of the volumes.

Since the publication of edited diaries is not supported by the government programs to which we would normally apply for grants in aid of the publication of scholarly monographs, the Joseph project requires $80,000 to support additional research, manuscript preparation, and publication of four volumes. We have approached a number of foundations and individuals for support of this project. We ask that you would consider making a contribution of $20,000.

Please do not hesitate to call should you wish to have more information on the diaries. I would be pleased to discuss the project with you further or to provide any further information for your consideration. I have enclosed copies of our most recent catalogues to give you a better idea of our list.

Yours Sincerely,

Aurèle Parisien
Acquisitions Editor

Enclosures: Series List
Catalogues

STUDIES ON THE HISTORY OF QUEBEC/ÉTUDES D'HISTOIRE DU QUÉBEC

Series editors: Brian Young and John Dickinson

1. HABITANTS AND MERCHANTS IN SEVENTEENTH-CENTURY MONTREAL

    Author: Louise Dechêne, Translated by Liana Vardi
    Publication: 1993
    ISBN: 0-7735-0658-6 Cloth $55.00
    ISBN: 0-7735-0951-8 Paper $24.95

2. CROFTERS AND HABITANTS: Settler Society, Economy, and Culture in a Quebec Township, 1848-1881

    Author: J.I. Little
    Publication: 1991
    ISBN: 0-7735-0807-4 Cloth $49.95

3. THE CHRISTIE SEIGNEURIES: Estate Management and Settlement in the Upper Richelieu Valley, 1760-1854

    Author: Françoise Noël
    Publication: 1992
    ISBN: 0-7735-0876-7 Cloth $49.95

4. LA PRAIRIE EN NOUVELLE-FRANCE, 1647-1760: Étude d'histoire sociale

    Author: Louis Lavallée
    Publication: 1993
    ISBN: 0-7735-0933-X Cloth $55.00
    ISBN: 0-7735-1108-3 Paper $29.95
    Available in French only

5. THE POLITICS OF CODIFICATION: The Lower Canadian Civil Code of 1866

    Author: Brian Young
    Publication: January 1995
    ISBN: 0-7735-1235-7 Cloth $44.95

6. ARVIDA AU SAGUENAY: Naissance d'une ville industrielle

    Author: Jos, E. Igartua
    Publication: 1996
    ISBN: 0-7735-1377-9 Cloth $49.95
    ISBN: 0-7735-1378-7 Paper $24.95
    Available in French only

7. STATE AND SOCIETY IN TRANSITION: The Politics of Institutional Reform in the Eastern Townships, 1838-1852

    Author: J.I. Little
    Publication: 1997
    ISBN: 0-7735-1544-5 Cloth $55.00
    ISBN: 0-7735-1545-3 Paper $24.95

McGill

Faculty of Science
McGill University

853 Sherbrooke Street West
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August 13, 1997

Dr. Alfred Bader
2961 North Shepard Avenue
Milwaukee, Wisconsin
53211, USA

Dear Dr. Bader,

It is with a real sense of pride that I am sending you a copy of the latest edition of the Science Faculty's newsletter. It highlights the accomplishments of some of the more longstanding professors within the Faculty as well as some of our newer appointments.

From the underwater world of seahorses, to the study of aging to the complexities of mathematical formulae - new ground is being broken here at the University. As well as taking pride in the work of our younger professors, we also celebrate the recognition being accorded to a couple of the more senior professors in the Faculty. And where would we be without students?! They too are making their marks, as you will soon see in the newsletter.

The Science Faculty is a dynamic part of McGill University and private support is vital to the quality of teaching and research undertaken here. Indeed, as evidenced by the articles in the newsletter, this support empowers us to be so much more than government funding alone permits.

Best wishes for the end of the summer.

Alan

Alan Shaver
Professor of Chemistry
Dean, Faculty of Science

SPRING 1997

McGill Faculty of SCIENCE

Dear Fellow Graduates:

What's a university for? Surprising question? Not really. These days all our institutions are examining themselves and asking tough questions. Obviously, universities teach. The best ones, like McGill, also do cutting-edge research. Yet I believe neither teaching nor research is an end in itself. Both are means to an end, that is, understanding.

Excellence is not an end in itself, either, but a measure of teaching and research – and thus, we hope, of the level of understanding being achieved. The essence of understanding is the generation, comprehension, and evaluation of ideas. The fruits of understanding benefit people and society.

I am particularly excited about this year's newsletter because it describes how some of our youngest professors are developing deeper understanding of our universe. You will learn about Siegfried Hekimi's worms, Amanda Vincent's seahorses and Gillian O'Driscoll's research into schizophrenia. Two young mathematicians, Lisa Claire Jeffrey and Henri Darmon, are receiving prizes and awards for their separate work. Siegfried and Amanda have had their work highlighted in *Time* magazine; Amanda was recently featured in a PBS documentary about her efforts to conserve seahorses.

Other big news? How about the possibility of life on Mars? Hojatollah Vali in the Department of Earth and Planetary Sciences has contributed crucial electron micrographs of mineral samples from martian meteorites that may have biological origins. It is an exciting time to be a scientist, and McGill scientists are taking their place in the world.

Our youngest scientists at McGill are our undergraduate students, and we are proud of them. Not only are they outstanding academically, they are dedicated

The Dean of the Faculty of Science, Alan Shaver, with Jeff Kwong, BSc'97. Jeff was President of the Science Undergraduate Society in 1996-97 and Faculty Chair for Class Action '97.

THIS ISSUE

Writer: Elaine Waddington
Editor: Daniel Chonchol
Design: McGill ICC
Photos: Claudio Calligaris

to McGill. Students from previous years voted annual contributions to improve equipment in the teaching labs in the Faculty and to launch Operation Access – an ambitious project to provide computer access to every science undergraduate. The Faculty matches each dollar the students collect. Together, we have installed more than 50 computers in hallways, labs, and libraries frequented by science students. The students are still paying these self-assessed charges to keep improving their collective educational experience.

This year the Class of '97, through the Class Action program, has committed donations and pledges to Work Study. Work Study provides opportunities for students to learn while working in McGill research labs. It has been my pleasure and privilege to work with the Science Undergraduate Society (SUS). I enjoy and appreciate their involvement with McGill in such sophisticated projects. Jeff Kwong, BSc'97, this year's President of the SUS, is graduating. I am proud to have been associated with him and wish him and all the other graduating students the best of luck.

IT Fund

We have all heard what great promise information technology (IT) holds for university teaching. Now the time has come to experiment. In November, the Faculty of Science established a fund to foster new teaching techniques that use information technology. The program permits acquisition of new hardware and software, hiring student assistants, and even release time for professors. Red tape is minimized, to maximize freedom of experimentation.

Professor John Crawford in Physics aims to create a computer planetarium to help him teach the popular course Planets, Stars, and Galaxies. Professor Thom Meredith in Geography has set up a Web site for his Environmental Studies Seminar so students can communicate their interdisciplinary team research to the public. Professors Pat Farrell and Arthur Grosser in Chemistry are developing "Future Lab" in which introductory chemistry students conduct experiments away from the lab with the help of interactive tutorials over e-mail and the web. No one really knows the future of IT-based teaching, but we at McGill intend to be active in everything the future holds.

School of Computer Science

Early this year, Senate approved the transfer of the School of Computer Science to the Faculty of Science. This event has raised great expectations in the Faculty. We hope to build even better teaching and research programs at McGill, and anticipate new links between the School and the Department of Psychology and stronger ties between the School and the Department of Mathematics and Statistics.

The School has only 15 professors – that's small by Canadian standards – but it ranks high in research quality and output and has teaching responsibility for a large number of BSc and BA students. Its professors have won rewards for their research; its students have won prizes in important competitions; and its graduates have started some very successful commercial software companies.

The School plans to build on its recognized strengths in theory and in systems research by developing greater strength in advanced applications, the cutting edge in science and technology. Applications include networks, graphics, computer-assisted design, and computational intelligence. Last but not least, we should mention that Professor Monroe Newborn of the School organized and officiated over the recent highly-publicized chess match in which IBM's Deep Blue beat the world chess champion Garry Kasparov. Professor Newborn organized the initial Deep Blue-Kasparov match a year ago.

McGill School of the Environment

Perhaps the most exciting development in the Faculty and the University in many years is the McGill School of the Environment (MSE).The Faculties of Arts, Science, and Agricultural and Environmental Sciences will forge a unique approach to the study of the environment. The three Faculties received University funding to create a new, interfaculty MSE by September 1998.

The MSE will have its own Director and a number of directly involved staff from Departments in the three Faculties. Arts and science students will attend the same introductory core courses and will learn together by means of problem-based teaching. This will re-connect the "two solitudes." Students will also choose interdisciplinary domains and receive advanced instruction in the principles and techniques of specialized areas of learning related to the environment. We hope to bring arts and science students back together in their final year for seminars where they form teams to address advanced issues and problems, possibly in the context of research with professors.

Some of us feel our society is on the verge of a golden age of learning. Experts in many areas of inquiry are starting to build bridges between topics long thought mutually incompatible. The results can be spectacular advances in genetic engineering, computers, materials, and the understanding of the environment. This brings this long letter full circle; back to understanding as McGill's mission. The mission is a worthy one, and we in the Faculty of Science invite you not just to "stay tuned for future developments" but to get involved. We need both your moral support and your financial support to achieve this mission. So when you encourage a bright young student to attend McGill, or send your annual gift to the McGill Alma Mater Fund in support of our programs, you can be sure that you are engaged in the most exciting "game in town" – the creation of deeper understanding of science, our planet, our universe, and ourselves.

Alan Shaver

Alan Shaver
Dean, Faculty of Science

P.S. Visit our web site at:
www/mcgill.ca/science

Students gain research experience over the summer

For the tenth consecutive summer, the labs in the Chemistry Department will offer undergraduate students rare research opportunities. Thirty to forty students will work in such research areas as enzyme molecular biology, artificial membranes, polymer science, optical materials (for example laser materials), insulin mimics, the synthesis of RNA, studies in analytical chemistry related to the environment, and paper manufacture.

Students are paid about $1,000 a month. The experience helps them decide whether their futures lie in research and ensures they are more seasoned researchers when they reach graduate level labs, should they choose that route. The students are accepted as colleagues by graduate students and included as major contributors in articles. They attend meetings with their research colleagues and go on field trips to the labs of such companies as Merck-Frosst, IBM, and the Pulp and Paper Research Institute. At the end of the summer, they present their research findings at a mini-symposium. Professor Mark Andrews, who has been coordinating the program (the new coordinator is Professor Jik Chin), says some of these findings are "very impressive."

Half the participants come from McGill and half, from other universities. A few high school students are also invited to participate. Many participants retain their interest in chemistry and go on to postgraduate studies at McGill and elsewhere. Funding comes from professors' research grants, and Merck-Frosst makes an annual contribution of $12,000 – for which the Department is most grateful.

Bolstering the Work Study Program – Thanks to the Class of '97

In 1990, McGill students helped create Class Action to raise funds on behalf of the graduating class. The funds go to projects students feel can improve their successors' education.

This year, under the leadership of Jeff Kwong, President of the Science Undergraduate Society, Class Action encouraged graduating students in the Faculty of Science to pledge money to the faculty's Work Study Program. Since more and more students need part-time work and also seek job experience related to their field of study, Class Action volunteers decided that bolstering Work Study was a good idea. The Work Study Fund subsidizes salaries of students working in research and laboratory positions.

More than 60 students were hired through Work Study this past year. Most of them participated in laboratory research with professors who would not ordinarily have been able to afford research assistance.

Suj Sivaraman, BSc'96, and Zoe Lee are two students who took part. Suj, now a first year medical student, worked as a third year Anatomy student with Professor Michael Guevara, BSc'73, BEng'79, PhD'84, in cardioelectrophysiology. Suj says Work Study helped him out a great deal financially, and he learned to use several types of lab equipment. Zoe, a third year Computer Science student, worked in the School of Computer Science (SOCS). She developed software for Science Undergraduate Society Infopoints, prepared user accounts for the Infopoint network, and staffed the SOCS help desk.

Life on Mars?

In August 1996 an article appeared in *Science* with the intriguing title "Search for Past Life on Mars: Possible Relic Biogenic Activity in Martian Meteorite ALH84001." This NASA discovery made headlines around the world. One of the lead investigators was Dr. Hojatollah Vali of McGill's Department of Earth and Planetary Sciences.

Here is the recent history of the "life on Mars" debate. In 1976, a Viking lander that visited the planet failed to find evidence of organic material. Scientists have also sought to find information from the SNC class of meteorites which have come from Mars to Earth.

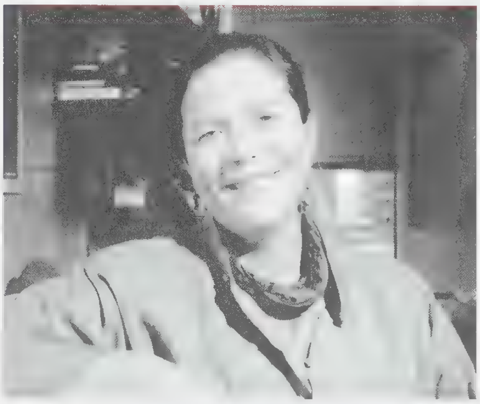
The meteorite ALH84001, collected in Antarctica and found to have crystallized about 4.5 billion years ago, was shown to contain carbonates associated with magnetite and iron sulfides. These could be inorganic or organic in origin. However, there is evidence of biological origin: the similarity to mineral phases formed by terrestrial bacteria.

Meteorite scientists who are skeptical about life on Mars pointed out that since the ambient temperature on ancient Mars is thought to have been about 700°C, there would be no possibility of life there. However, more recent studies using paleomagnetic data published in *Science* in March 1997 showed that the carbonate globules were formed after crystallization and that the meteorite had not been heated significantly since that time. The formation temperature was calculated to have been not more than 110°C.

Dr. Vali, who is the first microbiologist to work with meteorites, began his teaching career at McGill in 1989 as Professional Research Associate in the Department of Geological Sciences. He was asked to join the NASA team of geochemists and organic chemists because of his previous studies on magnetic bacteria and his experience with the biological aspects of minerals. Born in Iran, he received his doctorate at the Technical University in Munich in mineralogy, geochemistry, and electron microscopy; he subsequently worked with magnetic bacteria at Cal Tech.

This past March he was named the first Scientific Director of the McGill Electron Microscopy Centre. The Center, shared by Science and Medicine, is located in the Department of Anatomy. Its mission is to provide training in and encourage the use of electron microscopy in research.

THE NEXT GENERATION: SOME NOTABLE WORK FROM THE FAC



Professor Amanda Vincent

Dr. Amanda Vincent, Assistant Professor in the Department of Biology, is at the centre of a worldwide movement to study and preserve the seahorse, or Hippocampus – a most appealing and interesting species.

Seahorses are thought to have evolved at least 40 million years ago. They are as notable for their male pregnancy as for their distinctive shape. Ancient writers credited them with medicinal properties, and the European use of seahorses as medicinal ingredients continued at least until the 18th century. They are still used in traditional Chinese and other Oriental medicines and are in demand for the curio and aquarium trades. The total trade in seahorses, dead and alive, may exceed 20 million per year and involves at least 32 countries worldwide.

The harvesting of seahorses provides a living to subsistence fishers in many countries. Unfortunately, numbers are dwindling, and attempts at "farming" have not been very successful. Conservation methods seek to protect the pregnant males until they have given birth, by putting areas of ocean off limits during certain periods and by harvesting seahorses more selectively. These approaches are proving successful, for example, in a Filipino fishing community where the villagers themselves are in charge of the project.

Dr. Vincent has carried out field studies in Australia, Vietnam, the Philippines, China, Hong Kong, Indonesia, Thailand, India, Bonaire and Sweden. She is an adept snorkeller and scuba diver, and was the first person to do underwater studies of the species. She is a graduate in zoology of the University of Western Ontario, and obtained her PhD at Cambridge University studying the reproductive ecology of seahorses. From there, she came to McGill last fall.

Under the auspices of the Zoological Society of London, Dr. Vincent and two colleagues head Project Seahorse, which undertakes seahorse conservation in the Philippines, Vietnam, Hong Kong, and other locations.

Dr. Vincent's dedication has made McGill the world centre for seahorse research and conservation. She has written articles in *National Geographic* and other popular publications. Her work has been featured in programs of the British Broadcasting Corporation and was the subject of a hour-long television documentary, *"The Kingdom of the Seahorse,"* on NOVA (PBS) this spring.

Professor Siegfried Hekimi

Professor Siegfried Hekimi of the Department of Biology heads a team that has made a significant contribution to the study of aging.

It is not known why organisms senesce and age. One theory suggests there is an innate timing mechanism determining the length of life. Another, that the accumulation of cell damage eventually leads to the failure of key physiological systems. A third theory proposes that the causative agent of such cell damage might be the toxicity of natural by-products of metabolism.

Dr. Hekimi and his group have used the nematode worm, *Caenorhabditis elegans*, as a model. They have identified mutations in four genes which interact to influence both the duration of development and life span. They have named these the Clock (Clk) mutations.

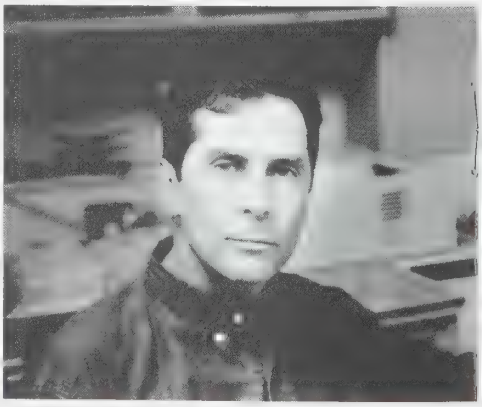
Worms with these mutations can live as much as six times as long as normal worms – fifty days versus nine days. This is the largest increase in life span seen in any organism.

Life in organisms with the Clk mutations appears to proceed at a slower pace, probably due to an altered rate of metabolism. The reduced metabolic rate in turn could lead to a slower production of waste products.

Genes functionally and biochemically similar to a gene called *clk-1* were identified in yeast and also in the rat and man. Dr. Hekimi says these "homologous" genes are very likely to function in similar ways in these other species. However, there is no guarantee that disrupting *clk-1* will have the same effects in man as it does it worms.

These findings were published in the journal *Science* and were also reviewed in an article on aging appearing in *Time* magazine in November 1996.

Siegfried Hekimi was born in Zurich and obtained his PhD in biology at the University of Geneva. From 1988 to 1991, he was a postdoctoral fellow at Cambridge. He became Assistant Professor of Biology at McGill in 1991. Dr. Hekimi is also a successful competitive cyclist.



ULTY'S YOUNG RESEARCHERS

Professor Gillian O'Driscoll

Dr. Gillian O'Driscoll of the Department of Psychology is researching behavioural and biological aspects of risk for schizophrenia. The goal of this work is to better identify carriers of risk for schizophrenia for the purpose of genetic studies, and to better understand how risk for schizophrenia may be manifest at the level of the brain.

At the Society for Neurosciences Annual Meeting in Washington in November, Dr. O'Driscoll reported findings from a PET study comparing healthy relatives of schizophrenic patients with a control group. Approximately 40 per cent of relatives of schizophrenic patients have subtle deficits in eye movement control, an abnormality also highly prevalent in schizophrenic patients but uncommon in the general population. Eye movement abnormalities are considered to be a promising means of identifying people at risk for schizophrenia. In preliminary results from the PET study, the relatives with eye movement abnormalities had significantly lower activity in prefrontal cortex than normal controls. These results suggest that even in the absence of clinical psychopathology, people at increased risk for schizophrenia may show, in attenuated form, abnormalities in brain function also found in schizophrenic patients. The study was conducted in collaboration with Dr. Chawki Benkelfat and others in the Department of Psychiatry at McGill and with Dr. Alan Evans at the Montreal Neurological Institute.

Dr. O'Driscoll has received three international awards for her research. She has a Young Investigator award from the International Congress of Schizophrenia Research, the world's largest conference on schizophrenia research, and a Young Scientist Award from its European counterpart. Both recognized her work describing abnormalities in motor control in populations at increased risk for schizophrenia. She also received a Young Investigator award from the National Alliance for Research on Schizophrenia and Depression (NARSAD) for her PET research in first-degree relatives.

Professor Lisa Claire Jeffrey and Professor Henri Darmon

Dr. Lisa Claire Jeffrey and Dr. Henri Darmon of the Department of Mathematics have been selected as Alfred P. Sloan Research Fellows in Mathematics. The fellowship carries with it a grant of $35,000 to be used in a flexible and unrestricted manner. In addition, Professor Jeffrey has been appointed to the council of the NSERC (National Science and Engineering Research Council) of Canada, its highest decision-making body.

Dr. Darmon also received the G. de B. Robinson Award of the Canadian Mathematical Society for his paper "Thaine's Method for Circular Units and a Conjecture of Gross," and the 1996 André Aisenstadt Mathematics Prize given by the Centre de recherches mathématiques of the Université de Montréal.

Dr. Darmon's field of specialization is algebraic number theory, and particularly the theory of elliptic curves. His work laid part of the groundwork for an important mathematical breakthrough when a fundamental conjecture on elliptic curves (the so-called Shimura-Taniyama conjecture) was proved by Andrew Wiles, leading to a proof of Fermat's Last Theorem, one of the oldest unsolved problems in mathematics. This breakthrough has deep implications for number theory, says Dr. Darmon, and he is exploring some of them.

Dr. Jeffrey's research uses techniques from pure mathematics to prove results obtained by theoretical physicists using the methods of quantum field theory. Using the {\em functional integral} or {\em Feynman path integral}, physicists have discovered many formulas which are very surprising and unexpected to pure mathematicians. These formulas can often nonetheless be proved by orthodox mathematical methods, though pure mathematicians might have been unlikely to discover them without recourse to ideas from physics.

Professor Lawrence Mysak receives Order of Canada

Professor Lawrence Mysak, Canada Steamship Lines Professor of Meteorology and founding director of McGill's Centre for Climate and Global Change Research was made a Member of the Order of Canada in January, 1997.

The Order of Canada recognizes a lifetime of achievement, merit, and service to the community or country. It was created in 1967, Canada's centennial year. The Member designation is given for "distinguished service in or to a particular group, locality or field of endeavour."

Lawrence Mysak was born in Saskatoon and was educated at the University of Alberta (where he received a diploma in flute as well as a BSc in mathematics), Adelaide University, and Harvard University. He has broad training in mathematics, physics, engineering sciences, and geophysical fluid dynamics, and is internationally renowned for his extensive applications of mathematics to physical oceanography and his fundamental research on natural climate variability. His work has covered wave propagation, oceanography, climate influence on fisheries, and paleoclimates. In 1978, Dr. Mysak, then a professor of mathematics and oceanography at UBC, published with P.H. LeBlond the 600-page treatise *Waves in the Ocean*, for which the pair received the President's Prize of the Canadian Meteorological and Oceanographic Society.

Upon moving from UBC to McGill in 1986, Professor Mysak established an active research program focusing on the analysis of air-sea-ice interactions in the Arctic, among other projects. In 1990 he and Professor Charles Lin founded what is now the Centre for Climate and Global Change Research. (*see page 7*).

Professor David Harpp again recognized for teaching excellence

Dr. David Harpp is a very popular McGill Chemistry professor. Previous newsletters have described his "Chemistry for the Public" courses, given with Professors Ariel Fenster and Joseph Schwarcz, and a show he organized to bring chemistry to the general public at Montreal's Expotec last summer. In the past two years, Dr. Harpp has racked up four prestigious teaching awards.

To begin with, the American Chemical Society Division of Organic Chemistry presented him with the first Edward Leete Award for Teaching and Research in Chemistry in October 1995. Dr. Harpp pioneered the "registered lap-dissolve projection" teaching technique now used in colleges and universities across the continent. Here is how Dr. Harpp describes it:

"You focus two 35mm slide projectors on a common point on a single screen. One of the projectors is on slide 1; the second projector, which is dark, holds slide 2. Linked to these projectors is a dissolve unit which, from the front of the lecture theatre, controls the light level in each projector… Slides have been created to depict a time-lapse, or sequential event…the dissolve unit keeps a constant light level on the screen as the images pass from one to the other. The net result is that there is an effective time-lapse dissolve or a clear semblance of motion in the unfolding pictures…". The technique is useful in teaching because, unlike computer animation, where the motion cannot easily be stopped, "lap-dissolve is always stopped until activated. This pace suits the lecture very well."

Dr. Harpp also received the 1996 Michael Smith Award for Science Promotion. The award is for "inspiring young Canadians to study science and consider related careers." The animation techniques he invented to show university students and the public how molecules interact in chemical reactions, and his work at Expotec were commended.

The David Thomson Award for Excellence in Graduate Supervision and Teaching went to Dr. Harpp in April 1996. Voters in McGill's Faculty of Graduate Studies and Research were unanimous in recognizing his outstanding accomplishments supervising graduate students and teaching graduate courses.

Finally, the New England Association of Chemistry Teachers selected him to receive the John A. Timm award for the Furtherance of the Study of Chemistry. The citation refers to the Introductory Organic Chemistry course he has taught since 1966 to over 6,500 undergraduate students, his slide projection technique, his 34 conferences on chemical education, as well as the other accomplishments described above.

Dr. Harpp was educated at Middlebury College, Wesleyan University, and the University of North Carolina. He came to McGill in 1966 from Cornell University.

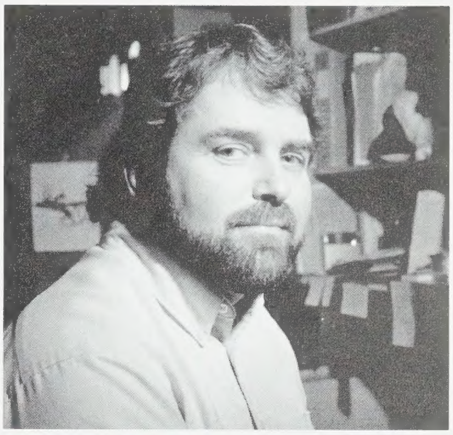
Changes at the Centre for Climate and Global Change Research

McGill's Centre for Climate and Global Change Research has a new director and new premises. Geography professor Nigel Roulet is the second Director in the history of the Centre, which has moved to new, larger offices on the seventh floor of Burnside Hall. The expansion will support a stronger emphasis on research and graduate training.

Founded as the Climate Research Group by Professors Lawrence Mysak and Charles Lin in 1990, the Centre for Global Change and Research (C^{2}GCR) has benefited since 1993 from Quebec funding through FCAR (Fonds pour la formation de chercheurs et l'aide à la recherche). The Centre's objectives are to promote research on the interacting physical, biological, chemical and socio-economic processes that regulate our global environment. The Centre seeks to provide a stimulating academic environment for graduate and postdoctoral students in the emerging fields of "earth system science" and climate and global change.

Activities include research by academic staff members of three Quebec universities and by graduate and post doctoral students, a lively lecture series, and a publication, *C^{2}GCR Quarterly*. A biennial symposium is open to the public. In February 1996 it featured a number of well-known scientists addressing the topic "Should we still be concerned about Greenhouse Warming?"

Professor Nigel Roulet, the new Director, has taught at McGill since 1994. He earned his BSc and MSc at Trent University and his PhD at McMaster University and taught Environmental Studies and Earth System Science at York University. After a year as a Visiting Research Professor at the University of Umea in Sweden, he arrived at McGill, where he teaches in the Geography department.



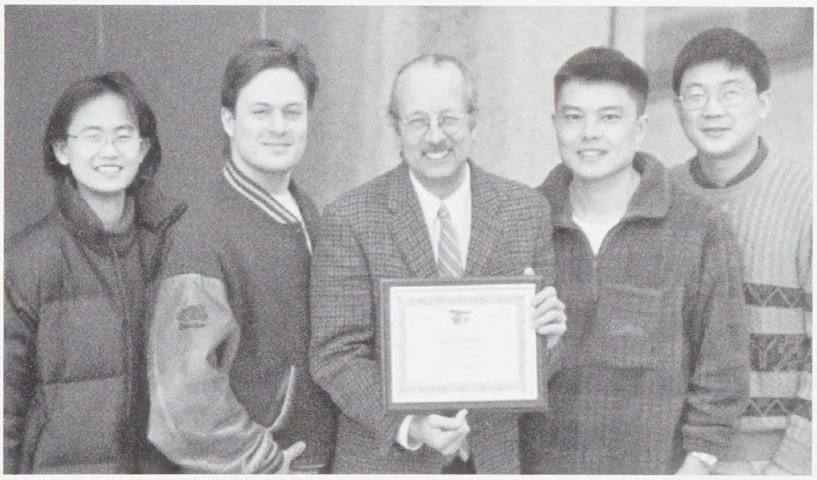
Professor Nigel Roulet

The Centre's FCAR grant was recently renewed for an additional three-year period, in part to recognize the Centre's success in achieving inter-departmental and inter-university collaboration. In addition to researchers from Atmospheric and Oceanic Sciences, Economics, Geography, Biology, and Natural Resource Sciences at McGill, the C^{2}GCR team includes scientists from l'Université de Québec à Montréal and l'Université de Montréal.

Mathematics Students receive honourable mentions

At the 57th annual William Lowell Putnam Mathematical Competition, held December 7, McGill University students Jacob Eliosoff and François Labelle placed 34th and 51st respectively out of 2407 participants. Awards and honourable mentions were given to the top 60 students, 7 Canadians among them. McGill received the only ones awarded to students in a Quebec university. In team standings, McGill placed 27th out of 408.

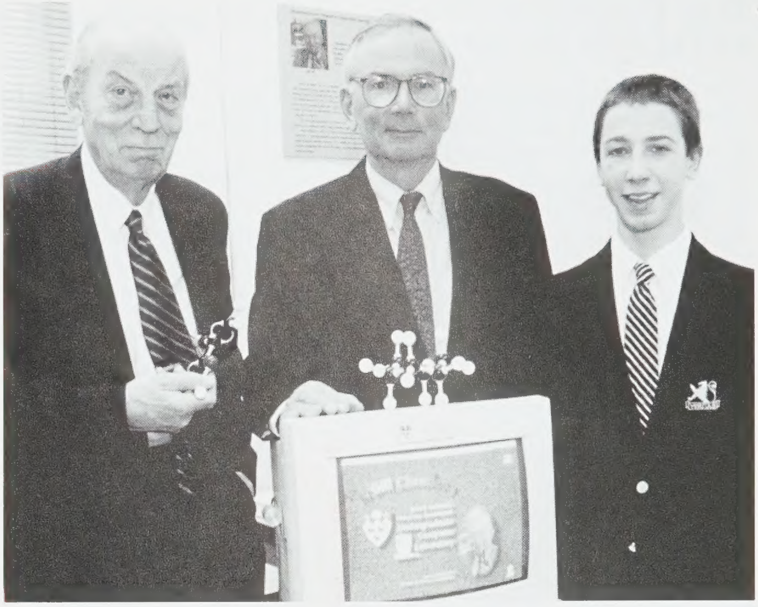
Participants in this important North American problem-solving competition are undergraduate students; they individually write two, three-hour exams. This year Professor Wilbur Jonsson coached the McGill team with the help of Professor James Loveys.



With 17 winners in a recent Java programming competition, McGill ranked an emphatic first among eight participating universities. MIT came in second with eight of the 50 winners. Java is a relative newcomer as a programming language, but it has caught the attention of many in the software industry because its programs, called applets, run on any computer platform through an Internet browser. Pictured from left to right are McGill students Anne Kwong (computer engineering) and Mark Aiken (electrical engineering), Professor Tim Merrett of the School of computer Science with plaque honouring McGill's performance, and students Biao Hao and Ke Xin (both computer science). (Photo: Owen Egan, text: The McGill Reporter)

Four generations

Pictured during a recent tour of the Vernon K. Krieble Chemistry Computing Laboratory in the Faculty of Science are, left to right, the late Dr. Robert H. Krieble, Frederick B. Krieble, and Robert Krieble. Frederick Krieble is the President of the Vernon K. Krieble Foundation, which donated US $305,000 to establish a state-of-the-art computing laboratory for undergraduate students. The late Vernon K. Krieble, MSc'09, PhD'13, (whose photo is on the screen) discovered anaerobic sealants, used primarily as adhesives for industrial purposes. Vernon Krieble is the great-grandfather of Robert Krieble, the grandfather of Frederick Krieble and the father of Robert H. Krieble.



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Many exciting and valuable initiatives in McGill's faculties and schools are paid for by graduates' gifts to the Alma Mater Fund. If you have not made your gift this year – or even if you have never given – now would be a perfect time. Please return your contribution with this form.

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January 16th, 1996

Dr. Alfred Bader
924 East Juneau, Suite 622
Milwaukee, Wisconsin 53202

Dear Alfred,

Thank you for your congratulations; however, I sometimes think I was crazy to accept. It is a very tough time to be a Dean. I'll do my best.

I hope you will drop by to see me. You know that you have visited me in every lab and office I ever had from graduate school to Dean! So next time you are in Montreal please drop by.

Sincerely,

Alan Shaver

Alan Shaver
Professor of Chemistry
Dean, Faculty of Science

AS:lr