NEWSLETTER OF THE MINERALOGICAL ASSOCIATION OF CANADA

NOUVELLES DE L'ASSOCIATION MINÉRALOGIQUE DU CANADA

Number 59, December 1998 Numéro 59, décembre 1998

EDITORIAL

Earth Sciences WHY THE CRISIS IN CANADA?

In the last Newsletter, Jim Nicholls opened a debate on the status and stature of the Earth Sciences in Canada. Below, the Managing Editor provides a family perspective on some of these issues and some of our collective attitudes that create the "crisis". She also provides the appropriate answer for promoting training in the Earth Sciences. Read it.

Jim's editorial focussed on the stature of our discipline in governments, universities and the granting councils. On reflecting upon these issues I came across a recent article by Adams entitled "Benchmarking international research" (Nature, 1998, Vol. 396, pp. 615-618). The impact of Canadian Earth Sciences' research doesn't come out very well in that study, which not surprisingly (based on how we were treated in NSERC's latest reallocation exercise), was mentioned in NSERC's last newsletter. Canadian Earth Sciences' research impact was rated sixth of the 7 countries ranked (US, England, Canada, France, Germany, Australia and Japan). Our scientific nearest neighbours, Chemistry and Physics, were second! They were also the happy recipients of some of OUR research money in the reallocation.

Is part of our difficulty that we have too insular an attitude of what the Earth Sciences are and what career paths Earth Sciences training might lead to? Biological Sciences produce tens of thousands of graduates annually, very few of whom ever work as biologists. Even physics, which graduates fewer students than Earth Sciences annually, doesn't provide jobs in physics. Both biology and physics graduates, however, are well trained for many careers outside their primary disciplines. So are Earth scientists, or if they aren't, then they should be. Why are well trained geologists with an MBA not ideal management candidates? They are familiar with all types of data; assembling them, displaying them, analysing them, deducing from them, etc. Unlike our chemical and physical friends, they are also comfortable with data of widely varying reliability. A modern Earth scientist is also comfortable with spatially related data, the importance of which appears to have been recently discovered by cities, business etc. who now are the main consumers of GIS!

If we look back at Canadian Earth Sciences research over the last few decades, we have made very important contributions. We have been innovators and leaders in a number of areas that should have led to a much higher current stature in the international community (and hence increased and not decreased research funding at home). Why didn't this happen? In my opinion, we don't seem to be very good at capitalizing on our breakthroughs. From personal experience, we were the leaders in development and application of laser ablation ICP-MS and had the most advanced laboratories and capabilities in the world, at Memorial and Montréal in the early 90's. Neither facility capitalized on its early advantages and the key drivers of both facilities left before milking their potential for high impact (and easy!) publications. Do Canadian geoscientists lack the mental toughness to compete? Do we design our graduate student theses around solving major problems or are we only into training HQP that are well rounded?

We need to examine these and many other issues, and quickly, or our future will

(cont'd on page 2)

SUMMARY

This newsletter constitutes an insert to *The Canadian Mineralogist,* Volume 37, Part 1

FROM THE MANAGING EDITOR

LOOKING AT OUR ATTITUDES

Last fall, our oldest son, David, who was studying mathematics at McGill University, announced to us that he was switching to the Earth Sciences program. After the initial shock (after all, he had always sworn he would never be a geologist), I could not help being pleased and flattered that David would follow in his mom's and dad's footsteps.

However, I was not prepared for the reaction I got from many colleagues when I mentioned proudly that my son was going into geology. From an eminent mineralogist, a successful consultant geologist, and government geologists, the advice was the same : Discourage him! This is a lousy profession. The pay is crummy. And it went on and on.

I did not discourage my son. Perhaps I am too much of an optimist and an idealist. My son might not have chosen an easy path and I will worry about the job situation for him. But would a career in biology, history, psychology, and many others be easier? I truly believe that if you are inspired by and good at what you do, you will be happy and successful (but perhaps not rich!)

This got me thinking that if we cannot sell our own profession, who will? Is this one of the reasons university enrolment is down? Why should we not try to attract the bright and creative young people we need to face the challenges ahead? Our profession will change. We will have to adapt like so many species have done before us... or perish. We will need to increase our cooperation with other disciplines. The volume MAC will shortly publish on the health effects of chrysotile asbestos will be a classic example of the contribution mineralogy can make to health and societal issues. We have to let the world know about the importance of mineralogy. We will need people who have a strong mathematical and computing background like David has.

In the meantime, David is just back from field camp and looking forward to his first summer job as a junior field assistant in Northern Quebec and we, his parents, are delighted that he will be working very close to areas we have also worked in.

Thanks to all of you who have commented on Jim's editorial in the previous Newsletter. We look forward to publishing your views in the June 1999 issue. ▪

Pierrette Tremblay
Managing editor

ASSOCIATION NEWS

THANKS TO THE IMA ORGANIZING COMMITTEE!

I want to take this opportunity to thank the organizing committee of the successful IMA conference held last summer in Toronto, on behalf of the Mineralogical Association of Canada. Tony Naldrett and his team are to be commended for the careful planning, the commitment and the enthusiasm they brought to the task. Their wise decisions allowed this meeting to be successful on all levels, including financial. Hats off!

NEW COUNCILLORS 1999-2001

I am pleased to introduce our three incoming councillors for 1999-2001: Peter C. Burns, Larry Heaman and Pierrette Tremblay.

Peter C. Burns is Assistant Professor of Civil Engineering and Geological Sciences at the University of Notre Dame. He grew up in the Miramichi region of northern New Brunswick. Peter did a B.Sc. degree in geology at the University of New Brunswick (1988), an M.Sc. at the University of Western Ontario (1990), and a Ph.D. at the University of Manitoba (1994). Peter was an NSERC post-doctoral fellow in the Earth Sciences department at the University of Cambridge 1994-1995, and in the Department of Earth and Planetary Sciences, University of New Mexico 1995-1996. He joined the faculty at the University of Illinois in 1996, and moved to his current position at Notre Dame in 1997.

One of his long-term research goals is an understanding of the relationship between the stability of minerals and their crystal structures, and much of his research now focuses on low-temperature minerals that are of significance to the environment. Peter is an Associate Editor of *The Canadian Mineralogist* for the

EDITORIAL *(cont'd from page 1)*

not be bright. I personally think we are up to the challenge but we must examine all of our long cherished assumptions about what is important and be prepared to throw many of them away. The resource and raw material industries are still important to us but they are only one of many areas in which Earth Sciences must contribute if we are to become a leading science discipline. If we aren't a leading discipline, we will be nowhere. The next century isn't for the faint of heart.

As usual criticism and comments are welcome at:

The Great Lakes
Institute for Environmental
Research
University of Windsor
Windsor ON
N9B 3P4 Canada
E-mail: bfryer@uwindsor.ca

Brian Fryer
Vice-president

ASSOCIATION NEWS

term 1998-2000. He was awarded the 1998 Young Scientist Award of the Mineralogical Association of Canada and the Hawley Medal for his paper "U^{6+} Minerals and Inorganic Phases: A Comparison and Hierarchy of Crystal Structures", published in *The Canadian Mineralogist* in 1996.

Larry Heaman received a Ph.D. in geology from McMaster University in 1986. His research involved investigating the Rb-Sr and U-Pb systematics of metamorphic rocks from the Grenville Province to better understand the cause of isotopic disturbance in the Rb-Sr system. He then received an NSERC PDF and pursued research on the U-Pb geochronology of accessory minerals at the Royal Ontario Museum in Toronto under the guidance of Dr. Tom Krogh. During this time, he developed techniques to determine the U-Pb age of baddeleyite (ZrO_2) and perovskite ($CaTiO_3$). He then continued as a Research Scientist at the Royal Ontario Museum for another six years, applying U-Pb baddeleyite geochronology to establish the evolution of Precambrian Large Igneous Provinces, evaluating Precambrian continental reconstructions, and determining the detailed timing of kimberlite emplacement in North America.

In 1994, he moved to the University of Alberta and became co-supervisor of the Radiogenic Isotope Facility in the Department of Earth and Atmospheric Sciences along with Dr. R.A. Creaser. At the present time this facility houses two new ultra-clean chemical laboratories, a recently constructed mass spectrometer laboratory, and three solid source thermal ionization mass spectrometers. This facility is routinely capabable of high precision Sr, Nd, Pb, Os and U-Pb isotopic analyses of samples of interest both to the Earth and Environmental Sciences.

Pierrette Tremblay graduated with a B.Sc.A. in geology from Laval University in 1971 and a M.Sc. from Queen's University in 1974. She worked for the Quebec Ministry of Natural Resources as an economic geologist until 1979, then left the work place to watch her three children grow. Upon returning to outside work, she became involved in public awareness of science projects at the Quebec Geoscience Centre. She now works as a breastfeeding consultant (and don't ask her what is the link between mineralogy and breastfeeding!)

Her involvement with MAC started innocuously enough when Peter Roeder, president of MAC at the time, and her former thesis supervisor, asked her if she would join the newly formed Public Awareness of Science Committee. She has chaired that committee since 1994. In 1996 she became councillor. She now edits the Newsletter and is a member of the MAC Publications Committee.

Jim Nicholls, president

THE MINERALOGICAL ASSOCIATION OF CANADA FOUNDATION

The establishment of the Mineralogical Association of Canada Foundation (MACF) is a further expression of the status of our Association as a non-profit scientific organization dedicated to the promotion and advancement of mineralogy, crystallography, petrology, geochemistry and mineral deposits. To retain our status as a charitable organization we are required by Revenue Canada to utilize some of our funds for diverse educational and charitable endeavours. These activities may include the organization of short courses and symposia or the funding of conferences.

Over the past 10 years the Association has been guided in financial matters by the MAC Finance Committee, chaired by Norman Halden. This committee has ensured that the MAC has remained financially viable. The finance committee recommended in 1996 at the annual GAC-MAC meeting in Winnipeg that MAC establish a charitable foundation whose principal activity would be to raise and disburse funds for the support of scholarships. MAC council agreed to this proposal and instructed MAC's President, Roger Mitchell, to initiate the action. As a result the ***Mineralogical Association of Canada Foundation*** was incorporated under the Canada Corporations Act by the issuance of Letters Patent on March 7th, 1997. The Corporation's objects as set out in the Letters Patent are:

"To receive or maintain a fund or funds and to transfer from time to time all or part thereof or the income therefrom to the Mineralogical Association of Canada/ L'Association Minéralogique du Canada."

The MACF operates as a "mirror board" to MAC Council, that is, all of the current members of MAC council are automatically members of the MACF. Other persons, who are not part of MAC Council may also be appointed to the Foundation as required. The President and officers of the Foundation are elected by the MACF board members. It is not necessary for the MAC President to be the president of the Foundation. Copies of By-Law No.1, the General By-Law of MACF, which governs the operations of the Foundation, may be obtained from Gina LeCheminant who is the current MAC/MACF Secretary. At the same time, MACF also established a Foundation Fund Raising Committee which currently consists of Roger Mitchell, Jim Nicholls, Mati Raudsepp, Patricia Sheahan and Art Soregaroli.

MAC council in May 1998 authorized the transfer of seed capital from MAC to MACF. Interest from these and other funds invested by MACF are, on a time-to-time or annual basis, transferred back to MAC to fund the MACF Scholarship. The evaluation of applications for this scholarship is the responsability of the MAC Scholarships Committee which currently consists of Roger

(cont'd on page 6)

ASSOCIATION NEWS

FINANCES

As our by-laws require, this Newsletter includes our financial statement for 1997. Please take the time to look at it.

AUDITOR'S REPORT

To the Members of the Mineralogical Association of Canada

I have audited the balance sheet of the General Fund and the net assets of the Treasury Reserve Fund of the Mineralogical Association of Canada as at 31 December 1997 and the statements of revenue and expenditure and changes in cash resources for the year then ended. These financial statements are the responsibility of the organization's management. My responsibility is to express an opinion on these financial statements based on my audit.

Except as explained in the following paragraph I conducted my audit in accordance with generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In common with many charitable organizations, the organization derives revenue from donations, the completeness of which are not susceptible to satisfactory audit verification. Accordingly, my verification of these revenues was limited to the amounts recorded in the records of the organization and I was not able to determine whether any adjustment might be necessary to donation revenues, excess of expenses over revenue, assets and surplus.

In my opinion, except for the effect of adjustment, if any, which I might have determined to be necessary had I been able to satisfy myself concerning the completeness of the donations referred to in the preceding paragraph, these financial statements present fairly the financial position of the Mineralogical Association of Canada as at 31 December 1997 and the results of its operations and changes in its cash resources for the year then ended in accordance with generally accepted accounting principles, as disclosed in Note 2 to the financial statements, applied on a basis consistent with that of the preceding year.

Vancouver, BC
16 June 1998

Marilyn deRoy, Chartered Accountant

THE MINERALOGICAL ASSOCIATION OF CANADA
BALANCE SHEET
as at 31 December 1997

	notes	1997	1996 note 7
CURRENT ASSETS			
Bank	4	$137,076	$37,284
Short term investments		91,000	50,275
Accounts receivable		24,716	34,026
Accrued interest receivable		7,979	8,175
Prepaid expenses		29,519	14,750
		350,290	144,515
Marketable Securities	5	322,275	413,000
		$672,565	$557,515
CURRENT LIABILITIES			
Accounts payable		66,113	31,715
Deferred revenue	3	68,309	22,435
		144,422	54,150
SURPLUS			
General fund		(1,851)	(9,910)
Treasury reserve fund		529,994	513,275
		528,143	503,365
		$672,565	$557,515

THE MINERALOGICAL ASSOCIATION OF CANADA
STATEMENT OF REVENUE and EXPENDITURES
GENERAL FUND
year ended 31 December 1997

		1997	1996 note 7
REVENUE			
Annual meeting		$33,000	$24,422
Corporate		1,200	-
Donations		2,016	2,691
Encyclopedia		17,778	-
Membership fees		53,494	48,395
Other		4,569	1,690
Posters		6,927	-
Short course notes		40,521	30,528
		$159,749	$105,662
Expenditures			
Annual dues		2,210	133
Bad debts		1,776	-
Bank charges		3,148	2,706
Encyclopedia		62,586	-
Foundation		2,282	-
Grants & awards		307	586
Insurance		-	1,996
Loss(gain) on exchange	5	1,879	946
Meetings		6,783	26,139
Office expenses		21,731	21,344
Postage & shipping		5,830	6,434
Promotion		21,435	25,663
Printing & stationery		-	3,055
Professional fees		2,980	2,289
Short course notes		16,569	-
Travel		7,135	9,141
		161,661	105,454
Excess Revenues (expenditures) over expenditures (revenues)		8,059	(832)
Surplus (deficit), beginning of year		(9,910)	(9,078)
SURPLUS (DEFICIT), END OF YEAR		($1,851)	($9,910)

THE MINERALOGICAL ASSOCIATION OF CANADA
STATEMENT OF REVENUE and EXPENDITURES
TREASURY RESERVE FUND
year ended 31 December 1997

	1997	1996 note 7
REVENUE		
Net earnings from the Canadian Mineralogist (schedule A)	(13,472)	29,691
Interest income	32,191	31,799
	18,719	61,690
NET ASSETS - BEGINNING OF YEAR	513,275	451,585
NET ASSETS - END OF YEAR	$529,994	$513,275

ASSOCIATION NEWS

THE MINERALOGICAL ASSOCIATION OF CANADA
SCHEDULE A - THE CANADIAN MINERALOGIST
STATEMENT OF REVENUE and EXPENDITURES
year ended 31 December 1997

	1997	1996 note 7
REVENUE		
Back issue sales	$6,426	$8,668
Donations	1,000	-
Grants	1,500	-
Membership fees	216,136	184,892
Reprints	15,085	17,074
	$238,148	$208,334
EXPENDITURES		
Editorial assistance	29,666	17,760
Grants & awards	-	6,600
Office Expenses	22,303	23,070
Postage & shipping	16,266	20,352
Publication	184,361	110,731
	252,620	175,433
NET EXPENDITURES OVER REVENUE	($13,472)	$29,891

THE MINERALOGICAL ASSOCIATION OF CANADA
STATEMENT OF CHANGES IN CASH RESOURCES
year ended 31 December 1997

	1997	1996 note 7
NET INFLOW (OUTFLOW) OF CASH RELATED TO THE FOLLOWING ACTIVITIES:		
OPERATING		
Excess expenditures over revenue for the year - General Fund	$5,059	($532)
Excess revenue over expenditures for the year - Treasury Fund	16,719	51,590
NET CHANGE IN NON-CASH WORKING CAPITAL ITEMS	55,014	(59,102)
Increase (decrease) in cash resources	169,792	1,756
INVESTING ACTIVITIES		
Acquisition of marketable securities	-	(331,699)
Disposal of marketable securities	59,999	112,138
Cash from (applied to) investing activities	59,999	(219,561)
INCREASE (DECREASE) IN CASH	169,792	(217,805)
Cash, beginning of year	37,284	255,089
CASH, END OF YEAR	$197,075	$37,284

NET CHANGE IN NON-CASH WORKING CAPITAL ITEMS

Decrease (increase) in marketable securities	40,726	26,326
Decrease (increase) in short term investments	(40,726)	-
Decrease (increase) in accrued interest receivable	198	(3,250)
Decrease (increase) in accounts receivable	9,213	(22,720)
Decrease (increase) in prepaid expenses	(14,768)	(5,596)
(Decrease) increase in accounts payable	58,397	(820)
(Decrease) increase in deferred revenue	33,874	(52,099)
	$55,014	($59,102)

THE MINERALOGICAL ASSOCIATION OF CANADA
NOTES TO THE FINANCIAL STATEMENTS
year ended 31 December 1997

1. PURPOSE OF THE ORGANIZATION

The Association was incorporated on 5 August 1955, by Letters Patent under the Canadian Corporations Act for the purposes of advancing knowledge in crystallography, geochemistry, mineralogy, petrology, mineral deposits and allied sciences. The Association is incorporated without share capital.
The Association is a registered charity under the Income Tax Act.

2. SIGNIFICANT ACCOUNTING POLICIES

REVENUE RECOGNITION
The Association uses the accrual basis of accounting, matching revenue with expenditures. Membership fees are allocated 20% to the General Fund and 80% to the Treasury Reserve Fund.

CAPITAL ASSETS
Capital assets are expensed on acquisition. During the year, one computer was purchased for a total cost of $1,200. This amount is included in office expenses in the statement of Revenue and expenditures - General Fund.

FOREIGN CURRENCY TRANSLATION
The Association follows the Temporal method of translation whereby:
i) balance sheet items are translated at the rate of exchange in effect at the balance sheet date;
ii) revenue and expense items are translated at the rate of exchange in effect on the dates they occur.
Any gains or losses are charged directly to income.

3. DEFERRED REVENUE	1997	1996 note 7
Prepaid membership dues	$56,309	$22,435
	$56,309	$22,435

4. BANK	1997	1996 note 7
Operating account - Canadian dollar	72,248	1,755
Operating account - US dollar	8,383	21,330
Visa account	8,783	3,459
MasterCard account	28,117	7,551
RBC Dominion Securities - cash account	83,836	3,148
	$197,075	$37,284

6. MARKETABLE SECURITIES	1997	1996 note 7
Market value	433,618	466,482
	$433,618	$466,482

5. INVENTORIES

The Association's inventories consist of short course notes, back issues and special publications which are available for future sale. Due to the nature of the inventories, the costs are expensed as incurred when preparing short courses and publications and revenue is recognized when realized. The cost of inventories on hand is estimated by management to be $500,470.

7. COMPARATIVE FIGURES

The comparative figures are based upon financial statements which were reported on by other auditors. The figures have been restated for comparative purposes.

(cont'd from page 3)

Mitchell (Chairman), Yuanming Pan, Jeanne Percival and Jonathan Fowler.

At the 1998 May Council meeting in Quebec City, MAC approved the guidelines for the scholarship (see last Newsletter) and application procedures. The first MACF Scholarship will be awarded this year and will have a value of $10,000. MAC believes that by supporting graduate students with this scholarship, we are meeting the conditions required by our charitable status and contributing to the education of the next generation of geoscientists in the fields supported by MAC. ■

Roger Mitchell
Past President

BRIEFLY NOTED

17th annual Gem and Mineral Show

The Sudbury Gem and Mineral Show presented by the Sudbury Rock and Lapidary Society will be held on July 16 to 18 at the Carmichael arena, Bancroft drive, Sudbury, Ontario. For more information, contact Ed Debicki at ed.debicki@sympatico.ca

Australian Clay Minerals Society

The Australian Clay Minerals Society has a new web page. There you can find information about the society, the next ACMS meeting (10-12 April, 2000), current and pending society activities an electronic version of *The Interlayer* and links with other webpages of interest. For more information, contact Dr William Gates at will.gates @ adl.clw.csiro.au http://www.unisa.edu.au/acms

FEATURE ARTICLE

The Canadian Light Source: An Exciting New Tool for Mineralogy

The recently funded Canadian Light Source (CLS) will provide new opportunities for Canadian geoscientists. The Canadian Light Source is a national synchrotron facility funded by the Canada Foundation for Innovation and will be built at the University of Saskatchewan. It is the largest single investment in science ever made in Canada, $173.5 million. When completed in 2003 this will be a world class synchrotron facility providing high energy and high flux radiation useful in many studies of condensed matter. For more information on the CLS see their website (http://www.cls.usask.ca/). The following report offers an introduction to the CLS and the opportunities it will provide to geoscientists.

SYNCHROTRONS AND LIGHT

A modern synchrotron light source (or more technically correct, a storage ring) produces light ranging from infra-red to hard X-rays. It does this naturally in the bending magnets which are used to keep the electrons in a circular orbit and by special devices called "wigglers" and "undulators" located in straight sections of the storage ring. The wigglers and undulators can produce very intense photon beams. When synchrotron radiation was discovered by particle physicists in the early part of this century, it was considered a nuisance. Now, however, synchrotron radiation is a valuable tool for the analysis of condensed matter because of its energy, collimation and intensity (brightness).

BEAMLINES AT THE CLS

The synchrotron serves only as a light source; attached to the synchrotron are various types of beamlines that utilize the synchrotron radiation as an analytical tool. An analogy familiar to many geoscientists is to compare the synchrotron with an X-ray tube and the beamlines with either a fluorescence detector (to create an XRF for elemental analysis) or a goniometer (to create a diffractometer for structural analysis). The significant difference is that the intensity of X-ray light (brightness) is many orders of magnitude greater than that which can be achieved with a normal laboratory X-ray generator (even a rotating anode generator). The first phase of the CLS construction envisions the creation of 12 beamlines. Among them are X-ray energy beamlines that will be of great potential use to geoscientists.

Of specific interest are the beamlines dedicated to single crystal diffraction, to powder diffraction, to X-ray absorption studies and to micro-XRF studies. The beamlines dedicated to single crystal studies and powder diffraction provide the ability to study the structure of single crystals or powdered samples. Because of the intensity of synchrotron light, structure determinations can be made on smaller samples than possible with laboratory sources. Structures have been determined on a crystal with a radius less than 6 μm (L. Groat, U.B.C., pers. comm. 1998).

The high intensity of the synchrotron light allows the study of weak or "forbidden" reflections from macroscopic crystals and the investigation of twinning, domain size and strain in those crystals (L. Groat, pers. comm. 1998). The intensity of synchrotron light also results in more rapid data collection of structural information. Crystals which need days of exposure on a laboratory source to produce a usable pattern can be exposed for only minutes or hours to a synchrotron source. Thus these X-ray diffraction beamlines will provide the tools to enhance our understanding of the structure of natural crystals and their processes of formation.

The X-ray absorption beamlines provide the ability to analyze the local structure around an element and often the oxidation state of the element. The fine structure of

the X-ray absorption (and emission) spectrum of an element shifts in energy (frequency) and changes shape as both the local structure and the oxidation state changes. Such changes are similar to those encountered when using an electron microprobe to analyze a light element. If you don't use a standard with a similar structure and oxidation state to your unknown, you can't get a good analysis. The best example that springs to my mind is analyzing sulphur in a sulphide or sulphate, which display significantly different S emission peaks.

Synchrotron light provides enough illumination to study the X-ray absorption fine structure (XAFS), which cannot be seen using X-ray emission or absorption from a laboratory X-ray source. Because XAFS is only sensitive to the local coordination sphere around an element, it can be used to study structure in amorphous materials, such as glass, which cannot be investigated using diffraction techniques. Using XAFS the oxidation state of samples can be rapidly determined without sample damage. An example of this is the contamination of soils with Cr. Cr^{6+} is highly toxic, but Cr^{3+} is not. The reduction of chromium from the toxic 6+ state to the non-toxic 3+ state can be achieved on magnetite surfaces or in plants such as water hyacinths (G. Brown, Stanford, pers. comm. 1998). These results suggest possible remediation mechanisms which are now being investigated.

The X-ray fluorescence microprobe (XRFM) beamline will analyze elemental concentrations at the ppm level in a spot size similar to that of an electron microprobe (~1 μm). This sensitivity in both spatial resolution and elemental sensitivity makes the XRFM a great tool for studying the distribution of trace elements within crystals. Although the lower limits of detection of the XRFM may be greater than the next generation laser-ablation ICP-MS machines, the spot size will be smaller and the technique is non-destructive. The XRFM will play a significant role in studies of finely zoned, rare samples (such as meteorites, future samples from the Moon, Mars, comets, or asteroids) which we may want to study using a variety of analytical techniques. The XRFM has other attributes which make it a complement to laser-ablation ICP-MS.

The XRFM at the CLS will be designed to perform XAFS studies similar to those described above, but at the microscale, (micro-XAFS). It has already been shown that zonation in Fe speciation in crystals can be studied with micro-XAFS. Similar studies using plant roots have demonstrated changes in oxidation states between the outer edge and core of the roots. Micro-XAFS will also allow the study of the local structure around elements in small samples.

The XRFM will also be used in tomographic studies of samples up to millimeters in size. Using the intensity of the synchrotron light, absorption of X-rays can be measured from all angles and a 3-dimensional image of the sample can be constructed. This is exactly the same technique as used in a hospital CAT scan. However, when the tomographic studies are combined with micro-XAFS a three-dimensional qualitative, and in some cases quantitative, map of the specimen can be constructed without sample destruction.

AVAILABILITY AND CALL FOR INTEREST

All of these beamlines will be available to the scientific community for their research. Investigators will submit brief proposals of their topics of investigation to a committee that will evaluate the proposals and award beamtime. At the present time no charges for NSERC-sponsored research are planned. We envision the CLS and its beamlines as serving all Canadian scientists and we especially want to encourage its use by students. I ask all potential users to think about what they will be able to do with these beamlines when they first see light in 2003. I would also like to ask that anyone with an interest in using the X-ray fluorescence microprobe con. tact me by e-mail(donb@ eps. mcgill.ca) and describe your interests in the machine. ■

Don R. Baker

Earth and Planetary Sciences,
McGill University
3450 rue Université, Montréal QC
H3A 2A7 Canada
514-398-7485

SPARK

Thanks to MAC for the financial support of EdGEO workshops and especially for the mineral posters which were given to participants at the EdGEO Workshop held on February 2, in Hanover, Ontario for the Bruce Grey Catholic School Board. Twenty teachers received posters, mineral postcards and MAC bookmarks as part of a daylong workshop. The teachers were also given mineral kits for use in the classroom. A follow-up field trip will be held June 5th. The instructors for the workshop were Paul Karrow, Mario Coniglio and Peter Russell from Waterloo.

On May 2, Peter Russell also presented a workshop focusing on rocks and minerals. The workshop was held for teachers attending the Ontario Society for Environmental Education weekend workshop at Paradise Lake near Waterloo. Twenty-one teachers attending this workshop appreciated receiving MAC posters together with mineral and rock kits.

Get involved with your local school board and offer to hold similar workshops. Funding is available to support workshops: contact Fran Haidl, Chair of the National EdGEO Committee by e-mail at: fran.haidl@sem.gov.sk.ca

Peter Russell

OUTSIDE NEWS

International Centre for Diffraction Data 2000 Crystallography Schorlaship Awards

Crystallography has played a key role in the development of X-ray diffraction, electron diffraction and neutron diffraction for the elucidation of the atomic structure of matter. To encourage promising graduate students to pursue crystallographically oriented research, the International Centre for Diffraction Data (ICDD) has established a Crystallography Scholarship Fund. The ICDD has awarded twenty-eight scholarships in the amount of $2,000 each since 1992. The year 2000 Scholarship Award has been increased to $2,250. Applications for the year 2000 awards must be received by ICDD no later than 29 October 1999.

Qualifications for the applicant:

The applicant should be a graduate student seeking a degree with major interest in crystallography e.g. crystal structure analysis, crystal morphology, modulated structures, correlation of atomic structure with physical properties, systematic classification of crystal structures, phase identification and materials characterization. There are no restrictions on country, race, age or sex. The term of the scholarship is one year. The recipient may make application for one renewal at the end of the first year. Because a limited number of scholarships are awarded, renewal applications will be considered on a competitive basis in conjunction with all applications that have been submitted up to the closing date.

Submit:

- Curriculum Vitae, listing degree(s) held and degree(s) sought.
- A one page proposal by the graduate student describing the type of crystallographic research to be partially supported by scholarship.
- A supportive letter from the sponsoring professor of an accredited university or an institute of technology on institution letterhead.

Restrictions on the scholarship fund:

- The scholarship stipend is to be used by the graduate student to help defray tuition and laboratory fees. A portion of the stipend may be applied to registration fees to accredited scientific meetings related to crystallography.
- No more than one scholarship will be awarded to applicants at any one accredited institution per year.
- The funds of the scholarship are not to be used for travel.

Applications must be received by 29 October 1999. Please mail to:

Secretary, International
Centre for Diffraction Data
12 Campus Boulevard
Newtown Square,
PA 19073-3273 U.S.A.

CONFERENCES COMING UP

JUNE 26-JULY1, 1999

The Clay Minerals Society 36th Annual Meeting, Purdue University, West Lafayette, Indiana. Workshop to be held on Saturday June 26 on the electrochemical properties of clays, organized by Alanah Fitch. General chair: Professor Cliff Johnston, Crop, Soil, Environmental Sciences, Purdue University, 1150 Lilly Hall, West Lafayette IN 47907-1150; tel.: 765-496-1716; fax: 765-496-1368; e-mail: clays@purdue.edu

For more information on publicity, contact Patricia Jo Eberl, Manager, the Clay Minerals Society, P.O. Box 4416, Boulder Co 80306; tel.: 303-444-6405 fax: 303-444-2260; e-mail: peberl@clays.org

AUGUST 2-6, 1999

The 1999 Denver X-ray Conference will be held August 2 - August 6 at the Sheraton Steamboat Resort, Steamboat Springs, Colorado. Detailed conference information and a tentative program is available on the Denver X-ray Conference web page at http://www.dxcicdd.com. For further information, please contact Denise Flaherty, Conference Coordinator, ICDD, 12 Campus Blvd., Newtown Square, PA 19073-3273; tel.: 610-325-9814; fax: 610-325-9823; e-mail: flaherty@icdd.com

AUGUST 22-27 1999

9th V.M. Goldschmidt Conference to be held at Harvard University, Cambridge, MA. Contact Stein B. Jacobsen, Dept. Of Earth and Planeatary Sciences, Harvard University, Cambridge MA 02138; tel.: 617-495-5233; fax: 617-496-4387; e-mail: goldschmidt@eps.harvard.edu

MAY 26-JUNE 1, 2000

GEOCANADA 2000 - JOINT MEETING OF CANADA'S MAJOR GEOSCIENCE SOCIETIES including the Mineralogical Association of Canada, the Geological Association of Canada, the Canadian Society of Petroleum Geologists, the Canadian Well Logging Society. To be held at the University of Calgary.

This Newsletter is published twice a year by the Mineralogical Association of Canada.

For information on membership and publications, contact our business office at
MAC
P.O. Box 78087
Meriline Postal Outlet
1460 Merivale Road
Ottawa, ON, Canada K2E 1B1
Tel. & fax: (613) 226-4651
e-mail: canmin.mac.ottawa@sympatico.ca

Send articles for the Newsletter to the Managing Editor:

Pierrette Tremblay
1260 de la Chaudière
Saint-Rédempteur QC
Canada G6K 1C5
mac_amc@hotmail.com
Editor: Brian Fryer
Managing Editor: Pierrette Tremblay
Contributors: Don Baker, Brian Fryer, Jim Nicholls, Peter Russell
Revision: Thomas Clark
Graphic design: Info•1000•Mots inc.
Printer: Nicober inc.