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THE NUCLEUS

January 2009 *Vol. LXXXVII, No. 5*

Monthly Meeting

ACS President-Elect Joseph S. Francisco to Speak at the Brookline Holiday Inn

2009 Chair's Statement

By E. Joseph Billo

Summer Scholar Report

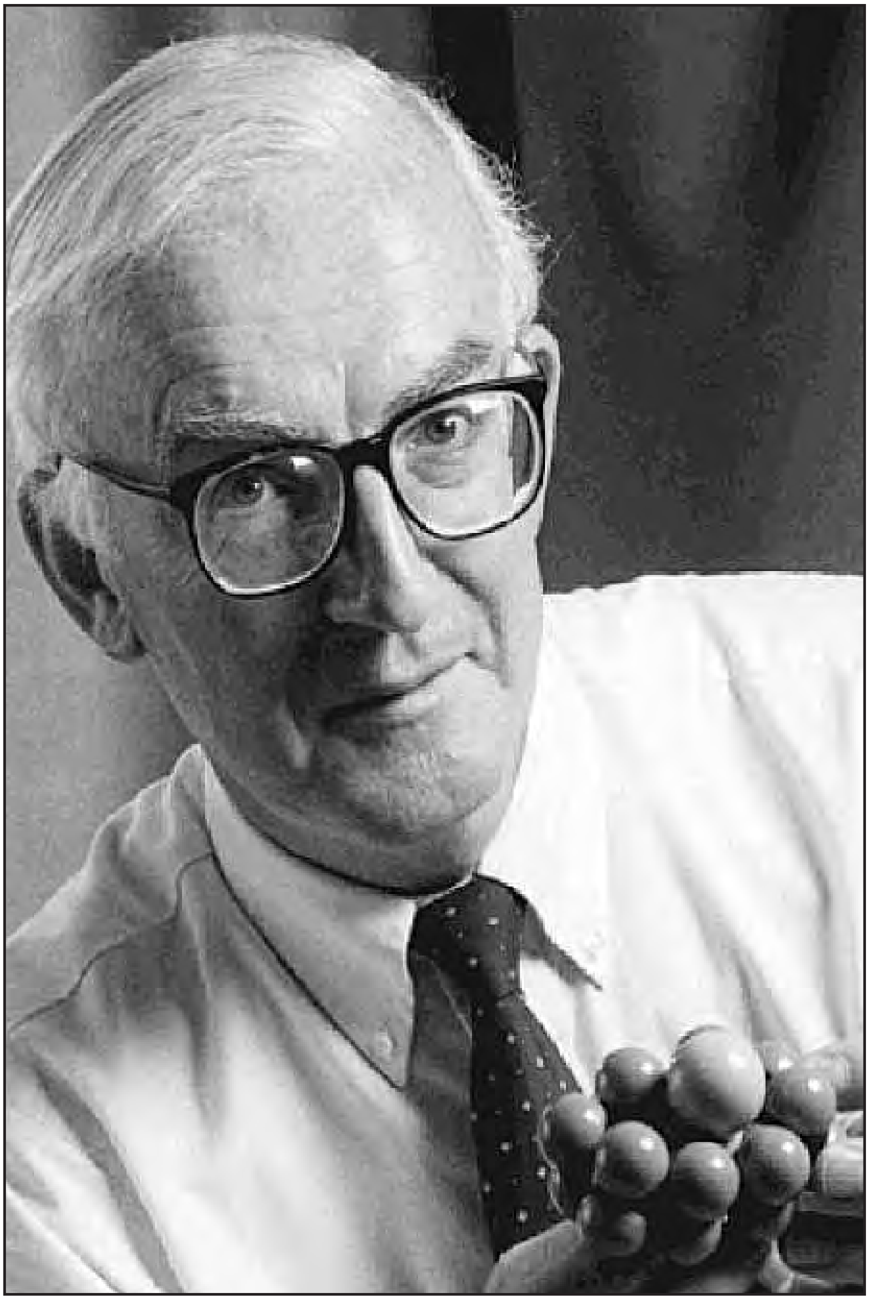
Chemical Weathering Along the Greenland Ice Sheet Margin

By Sam Beal, Wheaton College

Weinberg Lecture Report

Biotech Leader Calls for More Aggressive Fact-gathering in Clinical Research

By Robert Levy



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Contents

Cover: *NESACS 2009 Chair, Dr. E. Joseph Billo (Photo by Gary Gilbert)*

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Notable New England Chemists

By Myron S. Simon

Parker Cleaveland 1780-1858

Parker Cleaveland was born in Rowley, Mass. He entered Harvard College in 1795, had Aaron Dexter as his teacher in chemistry, and graduated in 1799. In 1805 he was appointed Professor of Mathematics and Natural Philosophy at Bowdoin College, began to teach when he was scarcely twenty-five years old, and continued without intermission until his death. Cleaveland began voluntary lectures in chemistry and mineralogy in 1808 and at first called upon Aaron Dexter for assistance in constructing furnaces and procuring apparatus. Subsequently he secured apparatus devised by Robert Hare, and used this kind, ponderous as it was, for many years. One reason he gave for declining to deliver popular lectures after 1818 was the necessity of transporting his apparatus by an ox-team. In 1820 the Medical School of Bowdoin College was established and Parker Cleaveland was appointed Professor of Chemistry and *Materia Medica*. He was soon made Dean of the School. In 1828 his title was changed to Professor of Chemistry and Mineralogy. By accident he had found some sparkling minerals and failing to get satisfactory information about them from Chaptal's "Chemistry" (the only book available, and still in the library at Bowdoin College), he sent them to Aaron Dexter, who not only named them but added other specimens. This incident was the beginning of Parker Cleaveland's career as a mineralogist. He wrote a "Treatise on Mineralogy and Geology" in 1816, which made him famous the world over. This book is of peculiar interest to chemists because in it chemical composition of minerals is the basis of arrangement. His continuous service of a half century exerted a

continued on page 14

2009 Chair's Statement

By Joe Billo

Greetings to all former, current, and future NESACS members! And there are a lot of you – well over 6000 chemists at last count. The section membership covers all walks of life, from industry to academia and everything in between, as well as people at all career stages, from college students to retired chemists. I am looking forward to my year as Section Chair, and hope that you all will continue to participate fully in the variety of NESACS activities that will be taking place over the next twelve months. During my time as program chair and chair-elect, I have continued to explore possible collaborations with area special-interest groups, and am pleased to report that BAGIM (the Boston Area Group for Informatics and Modeling) has expressed an interest in formally allying themselves with NESACS in a manner similar to that of the Medicinal Chemistry Group. We are also looking into the formation of a local Silver Circle group for retired chemists, and former section chair Pam Mabrouk is exploring the possibility of creating a local branch of the Women Chemists' Committee. There is a lot going on this year!

NESACS as a whole is a vibrant and active section. This past year, the section received three ChemLuminary awards at the national meeting in August, and was runner-up for three more. This is an amazing accomplishment, and a great deal of credit goes to the section members responsible for organizing the relevant activities and putting together the award packets. NESACS has a long history of outstanding service, and I hope to continue that practice in the next year.

Currently, attendance at the monthly section meetings averages less than 50 members. We are exploring ways to make meetings more attractive. I would love to hear from any of you with your thoughts and ideas. What would make YOU come to a monthly meeting? Would a different day be better? Different time? Different format? We need your perspective; after all, it is your section!

You can keep track of upcoming events by reading *The Nucleus*. You can also check the section website (newly redesigned) at http://www.nesacs.org for breaking news (as well as to read *The Nucleus* in PDF format when you can't find your paper copy). You can also read our outstanding blog at http://blog.nesacs.org/. I hope to see more and more of you attending the many and varied events that we offer, and wish you all the best in the upcoming year. ◇

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Monthly Meeting

The 893rd Meeting of the Northeastern Section of the American Chemical Society

Thursday – January 15, 2009

Holiday Inn, 1200 Beacon Street, Brookline, MA.

4:30 pm Board Meeting

5:30 pm Social Hour

6:30 pm Dinner

7:45 pm Evening Meeting

Dr. E. Joseph Billo, 2009 NESACS Chair, presiding

Evening Lecture: Dr. Joseph Francisco, 2009 President-Elect, American Chemical Society, *"Everything Flows, Nothing Stands Still": A Future for the Chemical Sciences*

Dinner reservations should be made no later than noon, Thursday, January 8, 2009. Please call or fax Marilou Cashman at 800-872-2054 or e-mail at Mcash0953(at)aol.com. Please specify vegetarian. Reservations not cancelled at least 24 hours in advance must be paid. Members, $30; Non-members, $35; Retirees, $20; Students, $10.

THE PUBLIC IS INVITED

Directions

From the Mass Pike East/Route 90:

Take the Mass Pike East to exit 18, Allston/Cambridge, the exit will be on the left. Bear right, following signs towards Cambridge. Turn right on to Storrow Drive. Follow Storrow Drive to the Boston University exit. Off the exit follow Carlton Street approximately one block to Commonwealth Avenue and turn right. Follow Commonwealth Avenue west and turn left at the second traffic light onto Saint Paul Street. The hotel is six blocks down on the left, on the corner of Beacon Street and Saint Paul Street

From 93 North or South:

Take Exit 26, Storrow Drive. Follow Storrow Drive to the Kenmore Square exit, the exit will be on the left. Off the exit, turn right at the first light onto Beacon St. The hotel is one mile up on the right at 1200 Beacon St.

The Holiday Inn is conveniently located at the Green C Line "St. Paul Street" T Stop.

Parking

Meter parking is available on Beacon Street as well as Holiday Inn garage parking (It is $6 for unlimited parking. Guests can pick up a voucher from the hotel and pay when they leave.) ◇

Biography

Joseph S. Francisco completed his undergraduate studies in Chemistry at the University of Texas at Austin with honors, and he received his Ph.D. in Chemical Physics at the Massachusetts Institute of Technology in 1983. Francisco spent 1983-1985 as a Research Fellow at Cambridge University in England, and then returned to MIT as a Provost Postdoctoral Fellow. In 1986 he was appointed Assistant Professor at Wayne State University. In 1991 he was a Visiting Associate in Planetary Science at California Institute of Technology. He accepted an appointment as Professor of Chemistry and Earth & Atmospheric Sciences at Purdue University in January 1995, and in 2006 was appointed the William E. Moore Distinguished Professor of Earth and Atmospheric Science and Chemistry at Purdue University.

Dr. Francisco has received a National Science Foundation Presidential Young Investigator Award, an Alfred P. Sloan Fellowship, and a Camille and Henry Dreyfus Foundation Teacher-Scholar Award. He has received the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers Outstanding Teacher Award. In 1993, Dr. Francisco was a recipient of a John Simon Guggenheim Fellowship, which he spent at the Jet Propulsion Laboratory at the California Institute of Technology. He received an American

continued on page 16

ABSTRACT

Societal and financial drivers are pushing U.S. chemical enterprises to go global. But what does globalization mean for the domestic employee in terms of job security and early retirement? The solution to a number of global issues-such as clean water, global climate change, and sustainable energy-requires skilled scientists working together. Do we have that new workforce and its leadership that are capable of working with and across different cultures to tackle these global societal challenges? The U.S. has been a leader in the fields of chemistry and chemical engineering because of its commitment to and strength in research and innovation. However, declining funds for basic research are compromising our leadership in discovery and innovation. I will lay out my vision for how the chemical enterprise can address these challenges. ◇

NSYCC Brewing Competition

We wish to thank all the scientists (and friends) from across the Northeastern Section Younger Chemists Committee, as well as NSYCC who attended our first event of the semester, a beer-tasting at Cambridge Brewing Company (http://www.cambrew.com, One Kendall Square, Cambridge, MA).

Lead Brewster Megan Parisi was very willing to entertain all questions from the attendees while providing insightful commentary on the beers, both on and off the tasting list. We wish to thank Megan and owner Phil Bannatyne for arranging this excellent event.

In the spirit of our fall event, we are planning a friendly brewing competition among amateur scientist-brewers! Because so many of our colleagues showed such an interest in brewing beer, we've decided to host a contest.

We're calling on the home-brewers and beer-aficionados among us to *show their stuff*. This will be a social event where brewers and non-brewers will be welcome. Details on the upcoming *NSYCC Brewhaha* will be forthcoming, including the requirements and fees for entry, dates, judging criteria and prizes, so please keep an eye on our website, www.nsycc.org.

The current plan is to hold this competition in early April 2009. So,º plan your brewing accordingly! Feel free to email any comments or questions about the event to leland.johnson(at)nsycc.org. ◇

Looking for seminars in the Boston area?

Check out the NESACS Calendar

www.nesacs.org/seminars

Connections to Chemistry

By Ruth Tanner

The Ninth Annual *Connections to Chemistry* program took place at Burlington High School (Burlington, MA) on Thursday, October 16th, 3:30–8:00 PM. Each registrant participated in two of the four different scheduled workshops. These included a workshop on forensics, a pharmacy workshop, a National Chemistry Week workshop on baseballs, and a computer workshop for searching several data bases for high school chemistry information and for the Journal of Chemical Education. The computer workshop was led by Liana Lamont, the Assistant Editor of the Journal of Chemical Education, from the Department of Chemistry at the University of Wisconsin-Madison. Registrants, totaling 114, were from high schools in five different states: Massachusetts, Maine, New Hampshire, Connecticut and Rhode Island. Dr. Thomas Lane, President-Elect of the ACS and Director of Global Science and Technology Outreach at Dow Corning Corporation, welcomed the participants on behalf of the American Chemical Society and Steve Lantos, Chair of the NESACS High School Education Committee, welcomed the participants on behalf of NESACS.

Dr. Lane gave the evening address entitled *And Now for Something Completely Different*. He discussed the history of research at Dow Corning through the good times and the bad times. As the essential component in the survival and growth of Dow Corning, he stressed the continuing faith and backing of the management of the company in the research efforts and creativity of its chemists.

He reminded us that the challenges and demands are high given that chemistry supports 25% of the US GDP. Jobs are increasingly more complex and require new and more highly developed skills, as well as better-trained and educated workers. He told the high school-Chemistry teachers that they are the front line and we need to rethink our traditional education models. He stressed that competency is no longer the ticket to success; it is simply the price of admission. To be successful, we must be masters of what were once the softer skills, but what are now, in fact, the *Essential Skills*.

His address was followed by our traditional raffle of American Chemical Society items and subscriptions to the Journal of Chemical Education (2 of which were donated by the Journal) and memberships in CTC (Chemistry Teacher Connection). In addition, Thomas Lane donated 5 Visa cards worth $100 each for the raffle. ◇

Honor an Outstanding High School Teacher

The *Aula Laudis* society was created by the section to honor outstanding teachers who teach in our geographical area. Awardees are selected for displaying any of several criteria, including teaching Avery-Ashdown winners, publishing articles in Journals such as J CHEM ED or NEACT JOURNAL, leading workshops for colleagues, or approaching retirement after many years in the high-school classroom. We will be pleased to send a complete list of possible criteria if requested.

If you know of such a high-school teacher, please feel free to contact the selection committee with a half-page or more description of their contribution. It may be sent to djolney@verizon.net, the committee chair.

Awardees each year are given a plaque and are guests of the Section at the annual awards dinner in May. ◇

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WWW.NESACS.ORG/CAREERS

Mort Hoffman's Introductory Remarks

The James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry

Presented at the November 13, 2008 Monthly Meeting of NESACS

Good evening, ladies and gentlemen. It is very appropriate that the 2008 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry, which is being made in recognition of the creation of a pedagogy of teamwork among students, is being given to a collaborative team: a team of educators that has worked together as leaders in the creation, development, implementation, and dissemination of the Peer-Led Team Learning Workshop model (or PLTL) for the teaching of chemistry and, by extension, biology, physics, mathematics, and many other subjects. I am personally very pleased and honored to have been asked to introduce the winners of this award. They are my personal friends and colleagues, and were the role models for my own application of PLTL to general chemistry at B.U., which I was able to demonstrate at this same forum in 2005 when I was fortunate to be presented with the Norris Award.

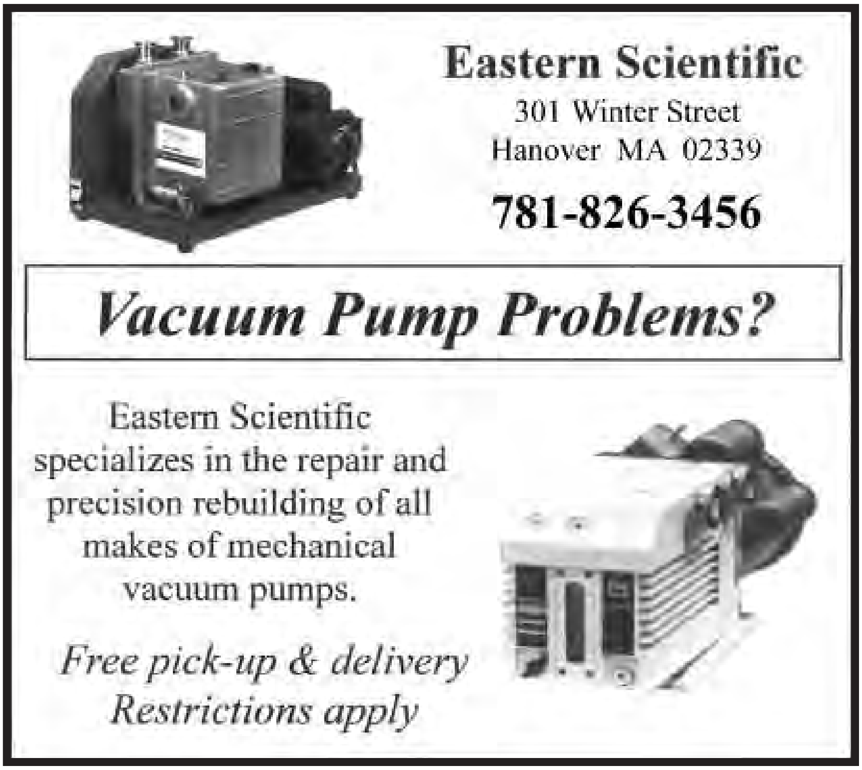
The honorees tonight are David K. Gosser, Jr., Professor of Chemistry at the City College of the City University of New York; Jack A. Kampmeier, Professor of Chemistry Emeritus at the University of Rochester; and Pratibha Varma-Nelson, Professor of Chemistry and Executive Director of the Center for Teaching and Learning at Indiana University-Purdue University Indianapolis.

As with many educational developments, PLTL was created in response to a real need. Some of you may remember that through the decade of the 1980s, the number of undergraduate students majoring in chemistry decreased significantly, such that Paul Gassman, the president of the ACS in 1990, predicted that the needs of industry and academia would soon outstrip the supply of qualified chemists from domestic academic programs in chemistry. At the same time, the students who were entering our colleges and universities were becoming increasingly more poorly prepared in chemistry and mathematics, which resulted in a dramatic increase in the percent of poor grades in general and organic chemistry and the resulting dropout rate. David Gosser at CCNY concluded that there was something wrong with the way chemistry was being taught at the tertiary level, and saw the possibility of enhancing students' understanding through their greater participation in the educational process and the development of leadership skills. In the early 1990s, he introduced the Workshop model into his classroom, and spoke about it at ACS national meetings and other chemical education forums. A quick scan of the collection of programs from those ACS meetings in my office shows an early paper in the Division of Chemical Education by Gosser with Woodward and Weiner at the San Francisco meeting in April 1992, which was followed by a paper in the *Journal of Chemical Education*.

The collaborative nature of PLTL led to the organization of partnerships with other institutions. Jack Kampmeier introduced PLTL into the sophomore organic chemistry course at Rochester, and Pratibha Varma-Nelson, (and later as chair of the chemistry department at Northeastern Illinois University), applied the pedagogic technique to the general/organic/biochemistry (GOB) course. Together, the three emerged as the *de facto* leadership team that soon included another 10 or so schools in the implementation of PLTL.

Significantly, the PLTL Workshop model was chosen in 1995 by NSF as one of the five systemic change initiatives to receive significant funding for its further development and dissemination. In the opinion of many in the

Continued on page 14



Summer Scholar Report

Chemical Weathering along the Greenland Ice Sheet Margin

Sam Beal, Department of Chemistry, Wheaton College, Norton, MA

Introduction

Chemical weathering is vital to life in two basic ways: it breaks down rock surfaces to provide the minerals for soil, and it regulates global temperature over geologic time by removing carbon from the atmosphere.[1,2,3,4] Chemical weathering is defined as a "spontaneous thermodynamic process" involving the reaction of acidic, oxidizing waters with minerals contained in rocks and soils.[5] The ionic and aqueous products of chemical weathering cycle major elements to be incorporated as nutrients in soils.

Crucial to the climate-related role of chemical weathering are the carbonation reactions involving silicate and carbonate minerals. Carbonation reactions involve the diffusion of atmospheric carbon dioxide into solution to form carbonic acid (Eq. 1):

$$CO_{2\,(aq)} + H_2O_{(l)} \leftrightarrow H_2CO_{3\,(aq)} \qquad (1)$$

This carbonic acid then reacts with the minerals at the Earth's surface to produce alkalinity and calcium ion in solution (Eq. 2, calcite is used as an example):

$$CaCO_{3\,(s)} + H_2CO_{3\,(aq)} \leftrightarrow Ca^{2+}_{(aq)} + 2HCO_{3\,(aq)}^{-} \qquad (2)$$

The products of Equation 2 are then carried by rivers to the ocean where they can be used by marine organisms to form biogenic carbonate, with a molecule of carbon dioxide as a byproduct (Eq. 3):

$$Ca^{2+}_{(aq)} + 2HCO_{3\,(aq)}^{-} \leftrightarrow CaCO_{3\,(s)} + CO_{2\,(aq)} + H_2O_{(l)} \qquad (3)$$

The degassing of the molecule of carbon dioxide formed during calcite precipitation (Equation 3) balances with the molecule removed from the atmosphere (Equation 2), yielding no net change in the amount of carbon dioxide in the atmosphere. The carbonation of silicate minerals, however, is thought to eventually remove carbon dioxide from the atmosphere-ocean system (Eq. 4):

$$\begin{gathered} CaAl_2Si_2O_{8\,(s)} + 2H_2CO_{3\,(aq)} + H_2O_{(l)} \leftrightarrow \\ Ca^{2+}_{(aq)} + 2HCO_{3\,(aq)}^{-} + Al_2Si_2O_5(OH)_{4\,(s)} \\ (4) \end{gathered}$$

In Equation 4, the mineral anorthite reacts with carbonic acid to form bicarbonate ions and the secondary clay mineral kaolinite. Of the two bicarbonate ions formed, each one contains a carbon originally from carbon dioxide, as opposed to only one from calcite in the carbonate carbona-

tion of Equation 2. Although one of the bicarbonate molecules will be reduced to carbon dioxide in precipitation as in Equation 3, the other bicarbonate will be sequestered into marine calcite, effectively removing carbon from the atmosphere-ocean system. It is due to these carbonation reactions that chemical weathering of carbonates can affect carbon balances on timescales of the residence time of bicarbonate (~100,000 years), but silicate weathering can have longer term effects on atmospheric carbon dioxide.[5]

Chemical weathering rates in glacial environments are traditionally thought to be reduced by orders of magnitude due to cold temperatures that yield slower reaction rates and the near absence of organic matter, liquid water, and soils.[6] However, a direct correlation between physical erosion rates and chemical weathering fluxes,[3] as well as studies that show some glaciated areas can produce solute fluxes greater than the global mean[7] indicate that the global contribution of chemical weathering from glacial environments may be severely underestimated. The ice sheet margin is an important place to study chemical weathering because this location encounters great amounts of physical weathering and water discharge. In this research, stream waters from a previously unstudied area of Greenland will be examined to determine the extent and types of chemical weathering that are taking place at the ice sheet margin.

Methods

A common method of examining a river system for the amounts and types of chemical weathering is to analyze for major ions in solution. Samples were collected during July of 2008 along a roughly 5.4 kilometer stretch of a stream exiting the Greenland Ice Sheet on the southwestern side. Duplicate samples were taken from seventeen sites and stored in acid washed HDPE bottles after filtering through 22-μm mixed ester filters. The cooled samples were transported back to Wheaton College where they were analyzed for alkalinity, the sum of bicarbonate and carbonate concentrations (in the absence of organic bases), and for the major ions Na^+, K^+, Mg^{2+}, Ca^{2+}, Cl^-, and SO_4^{2-}.

Alkalinity was determined by potentiometric titration of a 25.00-mL aliquot of sample with 9.436 mM hydrochloric acid, using the Gran method to accurately determine the endpoint. Major ion concentrations were determined using a Dionex ICS-1000 Ion-exchange Chromatography system with anion and cation specific columns. The eluents for the anion and cation analyses were 4.5 mM Na_2CO_3 / 1.4 mM $NaHCO_3$ and 20 mM methanesulfonic acid respectively. A 100-μL sample loop was used for increased sensitivity. Concentration values were calculated using standard curves with R^2 values greater than 0.99. The detection limits were 0.4, 0.25, 0.07, 0.17, 0.48, and 0.15 μM for Na^+, K^+, Mg^{2+}, Ca^{2+}, Cl^-, and SO_4^{2-} respectively.

Results and Discussion

Major ions are plotted in Figure 1 for each sample to qualitatively compare major ionic species. Figure 1b shows that all the sites are relatively balanced between calcium and the sum of sodium and potassium. This indicates equal amounts of carbonate and silicate rock denudation, which is surprising considering the much slower reaction rates of silicates compared to carbonates.[3] This near equivalence of carbonate to silicate may be a result of exhausted carbonate

continued on page 17

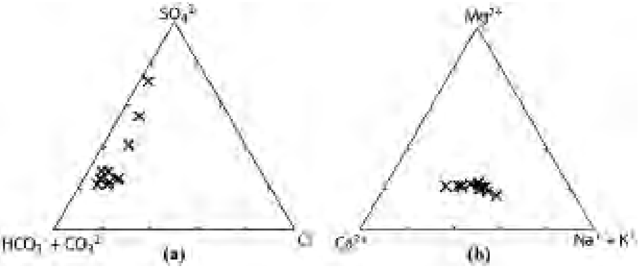


Figure 1: Ternary plots of (a) anions and (b) cations for the stream waters

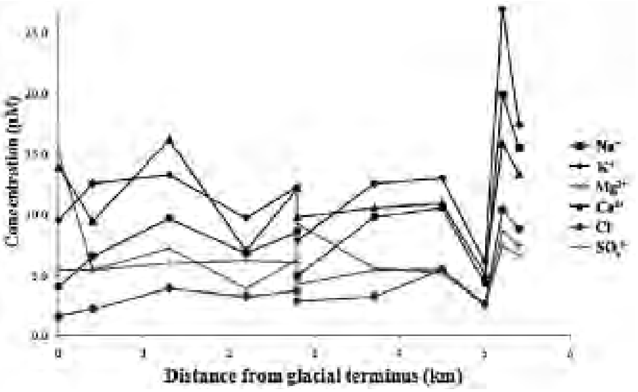


Figure 2: Major ion concentrations in stream waters as a function of distance from the glacial terminus

Sample ID	Distance from terminus (km)	pH	Concentration (µM)						
			HCO_3^-	Na^+	K^+	Mg^{2+}	Ca^{2+}	Cl^-	SO_4^{2-}
2	0	6.16	11	4.1(±0.1)	9.53(±0.05)	5.44(±0.04)	13.96(±0.06)	1.64(±0.08)	15.19(±0.02)
4	0.4	6.04	26	6.6	12.56	5.47	9.47	2.22	5.48
5	1.3	6.70	40	9.7	13.28	7.31	16.19	3.95	6.03
6	2.2	6.01	15	6.8	9.77	3.93	7.09	3.25	6.24
8	2.8	5.94	28	8.6	12.26	6.29	12.16	3.72	6.10
9	2.8	5.88	15	5.0	7.87	4.31	9.86	2.88	9.28
13	3.7	6.62	32	9.8	12.56	5.44	10.59	3.25	5.61
17	4.5	6.50	33	10.6	13.00	5.55	10.94	5.50	5.26
18	5.0	6.05	15	4.4	6.08	2.49	5.13	2.64	2.54
12	5.2	6.75	45	19.9	26.92	7.48	15.90	10.43	8.69
11	5.4	6.62	37	15.5	17.41	6.65	13.33	8.85	7.42

Table 1: Chemical compositions of stream waters

Biotech Leader Calls for More Aggressive Fact-gathering in Clinical Research

The 12th Annual Andrew H. Weinberg Memorial Lecture, April 9, 2008

by Robert Levy *(Reprinted with permission by the Dana Farber Cancer Institute)*

James Weinberg (L), father of Andrew Weinberg, for whom the lecture is named, and David Parkinson (Photo by Sam Ogden)

Despite the cavalcade of discoveries about the basic machinery of cancer, and the creation of molecules able to hit minute bull's eyes in tumor cells, "the pace of progress in developing new therapies for patients is not satisfactory," biotech company president David R. Parkinson, MD, told an overflow crowd in a Smith building conference room at the 12th Andrew H. Weinberg Memorial Lecture on April 9. Then he offered some ideas for picking up the tempo.

Noting that in just 50 years, oncologists have gone from believing that some people have "cancer-prone personalities" to knowing the genes that underlie many forms of the disease, Parkinson said that cancer is today understood in purely physical terms, rather than the superstitious, mystical ideas of an earlier era. Unraveling the mysteries of cancer "remains a huge technical problem, but nothing more than that," he said.

While physicians have effective treatments for some rapidly growing tumors, progress against slow-growing tumors has itself been disappointingly slow. Measured against the scale of the effort to understand and defeat cancer, the output of new therapies has been inadequate, Parkinson commented, echoing a critique often voiced inside and outside the world of cancer science.

Case in point, although more cancer drugs were approved by the U.S. Food and Drug Agency between 1996 and 2005 than during the previous decade, the numbers aren't as high as

continued on page 11

Biotech Leader

Continued from page 10

they could or should be, Parkinson asserted, adding the problem isn't confined to cancer drugs. Last year, for example, across the entire spectrum of human diseases, only 16 new therapeutic entities gained FDA approval.

"Even though we have great insight at many levels into the biology of cancer and the effect of some treatments, we haven't been breaking this field open as fast as we'd like," said Parkinson, who is president and CEO of San Francisco-based Nodality, Inc., and has tackled the cancer problem as an academic and government scientist.

Part of the problem lies in the current focus on individual cell components – DNA, RNA, and proteins – involved in cancer. While this "reductionist biology" approach has resulted in the development of targeted therapies that act against specific genes, it overlooks the perhaps more important question of the relationship between genes.

In concentrating on the individual "parts" of cell division machinery, Parkinson said, cancer biologists are following in the steps of physicists who, in the late 19th century, embarked on a search for the fundamental building blocks of matter, an effort that resulted in the discovery of quarks, leptons, bosons, and the other subatomic particles of the quantum world. But just as physicists realized that such a narrow focus was insufficient to understanding the properties of matter, oncologists are coming to recognize that what's important in cancer is how genes interact with one another.

"Studying the role of individual cell components isn't enough," Parkinson said. "We have to get past thinking that the answer lies in creating the right molecule for a single target, and that simply understanding a target is the key to more effective therapies."

In place of this approach, Parkinson proposed a new, more intensive form of clinical research: using cutting-edge technology to glean more precise information about the genetic

continued on page 15

Grants-in-Aid

The Education Committee has awarded Grants-in-Aid of $350 each to three undergraduates at colleges and universities within the Northeastern Section to enable them to attend the ACS National Meeting in Salt Lake City, Utah, to present papers at the Undergraduate Research Poster Session in the Division of Chemical Education on Monday, March 23, 2009. Matching funds have been committed by the institutions to support the students' travel. The recipients are also required to participate in the Northeast Student Chemistry Research Conference (NSCRC) in May 2009.

The awardees, their research supervisors, and the titles of the papers are as follows:

Daniel Abbott, Framingham State College, (Prof. Catherine Dignam) *Design and Synthesis of New Chiral Diketimine Complexes for Asymmetric Catalysis*

Natalie Dogal, Stonehill College (Prof. Louis Liotta) *3-(hydroxymethyl)hexahydro-1H-pyrrolizine-1,2,6,7-tetraol synthesis from D-glucose*

Henry Kells, University of Massachusetts Lowell (Prof. Daniel Sandman) *Polymerization of Ethynylpyridines with Electrophilic Carbohydrate Reagents*

Applications for the travel stipend are accepted from students majoring in chemistry, biochemistry, chemical engineering, or molecular biology who are in good standing with at least junior status and are currently engaged in undergraduate research. Abstracts for the Undergraduate Research Poster Session were required to be submitted by electronic transmission to the ACS National Headquarters by October 20, 2008 (11:59 pm EST). ◇

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SECONDARY SCHOOL CHEMISTRY TEACHER AWARD

REQUEST FOR NOMINATIONS FOR 2009

The New England Institute of Chemists (NEIC) is now seeking nominations for its annual **Secondary School Chemistry Teacher Award.** The award recognizes outstanding secondary school chemistry teachers in New England who have also fostered an interest in chemistry through outreach programs and extracurricular activities.

The candidate must be currently teaching chemistry in a secondary school in one of the six New England States. We are seeking teachers who have encouraged an interest in the field of chemistry through innovative and inspirational teaching, improved the image of chemists and chemistry, promoted extracurricular activities relevant to chemistry, and offered opportunities to students who might otherwise miss the “chemistry” experience.

The awardee will receive a plaque and be honored at the annual NEIC Awards Dinner, which will be held this year at Brandeis University on Thursday, April 23, 2009. At the dinner the NEIC also presents the American Institute of Chemists Foundation Student Award to outstanding college seniors and graduate students at the departments of chemistry, chemical engineering, and biochemistry from New England colleges and universities.

To facilitate the nomination process, the nominator need only mail or e-mail a letter with the candidate’s mailing address and telephone number, where he/she heard about the award, and up to one page describing why the candidate is deserving of the award. The NEIC will contact the candidate directly to obtain supporting bibliographic information. The NEIC State Council and its committee chairmen will select the awardee. Nominations are requested by **March 1, 2009.** The NEIC may, at its discretion, select one awardee from each New England state. The NEIC has limited funds available to offset out-of-pocket travel expenses to attend the dinner if the awardee is from outside the Boston area. Nominations should be mailed to Dr. Lois Robblee, Chairman Secondary School Awards Committee, 101 Brooksby Village Drive, Unit TG408, Peabody, MA 01960, or e-mailed to lsrob408(at)verizon.net.

January Historical Events in Chemistry

by Leopold May, The Catholic University of America, Washington, DC

January 1, 1907
Aluminum Company of America was (ALCOA) renamed on this date. It was founded as the Pittsburgh Reduction Company in 1888.

January 2, 1947
US Atomic Energy Commission took over from the wartime Manhattan Engineer Commission District.

January 4, 1905
Seventy-five years ago in 1934, Aristid V. Grosse isolated protactinium metal from the pentoxide that he isolated in 1927. He was born on this date.

January 6, 1872
John V. N. Dorr, inventor and chemical engineer, was born on this date. He developed the Dorr classifier for extracting ore, which became a practical method for the separation and chemical treatment of fine solids suspended in liquid.

January 7, 1941
John E. Walker, who was born on this day, studied the amino acid sequences in protein units of ATP synthetase. He shared the Nobel Prize in 1997 with Paul D. Boyer for elucidation of the enzymatic mechanism underlying the synthesis of adenosine triphosphate (ATP) and Jens C. Skou for the first discovery of an ion-transporting enzyme, Na^+, K^+-ATPase.

January 10, 1916
Sune K. Bergström, who shared the Nobel Prize in Physiology or Medicine 1982 with Bengt I. Samuelsson and John R. Vane for their discoveries concerning prostaglandins and related biologically active substances, was born on this date.

January 12, 1916
Ruth R. Benerito, who was the first woman to win the Southern Chemist Award for research in cotton chemistry, was born on this day.

January 14, 1895
Armstrong World Industries incorporated as Armstrong Cork Co. on this day.

January 15, 1912
Frank H. Westheimer, who was born on this date, was a researcher in physical organic chemistry, the calculation of electronic effects in chemistry, and developed the idea of photoaffinity labelling of the active site of proteins.

January 16, 1767
Anders G. Ekeberg, who discovered tantalum in 1802, was born on this date.

January 18, 1861
Hans Goldschmidt invented the alumino-thermite process (Goldschmidt Process) on this day.

January 20, 1834
One hundred and seventy-five years ago, Adolph Frank was born. He made calcium cyanamide from calcium carbide and nitrogen in1898.

January 21, 1845
The founder of the Mallinckrodt Chemical Works, Edward Mallinckrodt, was born on this day

January 23, 1918
Gertrude B. Elion who was a researcher on the synthesis and development of therapeutic agents, was born on this date. She shared the Nobel Prize in Physiology or Medicine in 1988 with James W. Black and George H. Hitchings for their discoveries of important principles for drug treatment.

January 26, 1939
Niels Bohr reported the discovery of nuclear fission by Otto Hahn and Fritz Strassman at Fifth Washington Conference on Theoretical Chemistry on this date.

January 27, 1926
Chevron was incorporated on this date.

January 31, 1963
The first manuscript on the solid phase synthesis of peptides by R. B. Merrifield was received on this date by the *Journal of the American Chemical Society* [**85**, 2149 (1963)].

Additional historical events can be found at the CSW website or Dr. May's website, faculty.cua.edu/may/history.htm. ◇

Northeast Regional Undergraduate Day

The Fifteenth Annual ACS Northeast Regional Undergraduate Day was held at Simmons College on Saturday, November 1, 2008. It was attended by 67 students from colleges and universities including Baldwin-Wallace College (Ohio), Boston University, Bunker Hill Community College, Gordon College, Keene State College, Massachusetts College of Pharmacy and Health Sciences, Simmons College, Stonehill College, Suffolk University, University of Connecticut, University of Massachusetts – Amherst, University of Vermont, Wellesley College, and Worcester State College.

An inspirational keynote address by John Warner entitled *“Green Chemistry: Designing a Sustainable Future with Beakers and Flasks”* started the day. He challenged undergraduates, as the future of chemistry, to incorporate the principls of green chemistry into their daily laboratory practices.

Other program highlights included research talks, presentations, and panels on applying to Research Experience for Undergraduate (REU) programs, and graduate schools, a resumé review session, and a graduate school / industry fair.

In the afternoon, student affiliates attended green chemistry outreach workshops, where they were able to perform hydrolysis of polylactic acid cups to make lactic acid soap-scum remover, extraction of orange oil using liquid carbon dioxide, construction of solar cells using blackberry juice, and / or production of soap using biodiesel glycerin byproduct. ◇

Notable Chemists

Continued from page 4

wholesome, stabilizing influence on New England chemistry.

Oliver Payson Hubbard 1809-1900

Oliver Payson Hubbard was born in Pomfret, Conn. After two years of study at Hamilton College, he entered Yale College and graduated in 1828. While at Yale he studied chemistry under Benjamin Silliman. The chair of chemistry in Dartmouth College was abolished in 1835— perhaps to settle a religious controversy. However, it was re-established the next year, and Hubbard was made Professor of Chemistry, Pharmacy, Mineralogy and Geology. He taught chemistry and allied subjects in Dartmouth College until 1883—nearly fifty years.

Hubbard was one of Silliman’s private students and laboratory assistants. Of him Silliman says,”—“his knowledge of science in all the branches that belonged to the department qualified him to render efficient assistance.” He married Silliman’s daughter. When Hubbard came to Dartmouth he not only brought a mind and hand trained in good chemistry, but he also transferred the good will of Yale to Dartmouth at a time when Yale was strong and Dartmouth was growing. These men were associated for several years in many investigations, e.g., in 1832 in an examination of the eastern part of the United States as a suitable place for the cultivation of the sugar beet. The pages of Silliman’s Journal contain many articles on industrial and practical chemistry by Oliver P. Hubbard. The two men were mutually helpful in pharmacy, both being compelled—- shall we say? —- to teach this branch of chemistry. Hubbard received an honorary M.D. from the South Carolina Medical College in 1837 and an L.L.D. from Hamilton College in 1861. He was a great help to Dartmouth College, especially the Medical School, and throughout his long term of service kept chemistry in the foreground. ◇

Mort Hoffman Intro

Continued from page 7

chemical education community, the Workshop model has been, by far, the most successful of the systemic change initiatives. The project received a National Dissemination Award from NSF in 1999 and again in 2003. It is estimated that currently 1500-2000 peer leaders are engaged on more than 150 college and university campuses to facilitate workshops for more than 20,000 students per year in chemistry, biology, physics, mathematics, and computer science, and possibly many other subjects.

We honor this evening the creators and leaders of a national partnership of faculty, learning specialists, and peer leaders that have worked together to help students build conceptual understanding and problem-solving skills in their science and mathematics courses. For those who are not yet acquainted with the technique, let me say that the model introduces a new structure, the peer-led workshop, where students work together in groups to solve challenging problems that have been designed by the faculty in order to engage them with the subject material and with each other. The team is guided by an experienced student, perhaps one who had taken the course earlier and who is trained to lead the workshop. In short, PLTL provides an active learning experience for the students, a leadership role for the undergraduate peer leader, and a creative new dimension to faculty teaching.

Gosser, Kampmeier, and Varma-Nelson have worked with colleagues to formulate and implement the critical components for successful PLTL programs, to broaden the dissemination in chemistry teaching and beyond by encouraging PLTL leadership, and to develop models for the institutionalization of PLTL.

I would like to close this introduction by quoting the words of Professor George Bodner of Purdue University, who nominated the team for this award: “They have brought the PLTL Workshop model from a local

continued on page 15

Biotech Leader

Continued from page 11

makeup of each patient's tumor, identify different cell types within a single tumor, and determine precisely which ones respond to treatment and which are resistant it. The emphasis is on learning everything possible from each patient and each tumor sample.

Adopting such an approach will enable researchers to enroll fewer patients in clinical trials, obtain more nuanced, definitive results, and plan follow-up trials more quickly ¬– producing fewer experimental "dead ends" and speeding the development of effective, safe new therapies, Parkinson said. "This type of more personalized therapy is the only way we are going to move forward."

The Weinberg lecture was established by the family of Andrew H. Weinberg, a Dana-Farber patient who died shortly before his third birthday as a result of rhabdomyosarcoma, a rare muscle tumor. The lectureship is supported by a fund created in 1994 and endowed in 2001 by Weinberg family members and friends, the Medicinal Chemistry Group of the Northeastern section of the American Chemical Society, and Dana-Farber. The fund is dedicated to bringing together scientists from the fields of chemotherapy development, biomedical research, and clinical care to encourage synergy and originality in cancer research. ◇

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Mort Hoffman Intro

Continued from page 14

approach to instructional innovation to one of the most respected and highly implemented approaches for curriculum reform in chemistry across the nation, to the stage where the PLTL model is a sustainable approach to the teaching of chemistry that remains in place in hundreds of chemistry departments long after other approaches to innovation have disappeared. I can think of nothing that has transformed the teaching of chemistry in the last 15 years more than the work of David Gosser, Jack Kampmeier, and Pratiba Varma-Nelson with the PLTL Workshop model."

PLTL continues to be a national partnership that builds on the contributions of hundreds of individuals; this team of three has provided the essential continuity and leadership, and they are recognized for their efforts tonight by the presentation to them of the 2008 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry from the Northeastern Section of the American Chemical Society.

Morton Z. Hoffman
Professor Emeritus of Chemistry
Boston University ◇

November Meeting Photos

(Photos by James Phillips)

Vivian Walworth - 2008 recipient of the Arno Heyn Memorial Book Prize.

Professor Marilena Hall (R), Stonehill College, with her group of PLTL Peer Leaders: (L-R) Ashley Lajoie '09, Natalie Dogal '10, Christopher Kelly '10, Allison Colthart '10, Evan Tallmadge '10, Michelle Houle '10, and Brian French '09.

Professor Hannah Sevian, UMass Boston, with her post-doctoral associate, Dr. Marilyne Stains.

Amy Tapper, past NESACS Chair, with Professor J. Don Smith, UMass Dartmouth, of the Norris Award Committee.

Biography

Continued from page 5

Association for the Advancement of Science Mentor Award in 1994, and the Percy L. Julian Award for Pure and Applied Research from the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers in 1995. He was a Sigma Xi National Lecturer from 1995 to 1997. In 2007 he was the recipient of the Purdue University McCoy Award; this is the highest research award given to a faculty member for significant research contributions. He has been elected a Fellow of the American Physical Society and a Fellow of the American Association for the Advancement of Science. He was recently awarded an Alexander von Humboldt U.S. Senior Scientist Award by the German government, and was appointed a Senior Visiting Fellow at the Institute of Advanced Studies at the University of Bologna, Italy.

Dr. Francisco has been appointed to and served on committees for the National Research Council, National Science Foundation, American Chemical Society, and the National Aeronautics and Space Administration. He has been a member of the Naval Research Advisory Committee for the Department of Navy (appointed by the Secretary of the Navy, 1994-1996). He has served as a member of the Editorial Advisory Boards of *Spectrochimica Acta Part A, Advances in Environmental Research, Journal of Molecular Structure (Theochem)*, and the *Journal of Physical Chemistry*. He is a coauthor of the textbook *Chemical Kinetics and Dynamics,* published by Prentice-Hall. He has also published more than 400 peer-reviewed publications in the fields of atmospheric chemistry, chemical kinetics, quantum chemistry, laser photochemistry and spectroscopy. He served as President of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers from 2005-2007. He has been elected President-Elect of the American Chemical Society for 2009, and will become President in 2010 ◇

Summer Scholar

Continued from page 9

minerals[6] and a predominance of underlying silicate-mineral rich bedrock. Figure 1a indicates a significant contribution of sulfate to the anion load. The presence of sulfate-influenced waters can indicate sulfide oxidation as a source of acidity in weathering reactions but this requires further study.

Major ion concentrations, pH, and the collection site's distance from the glacial terminus are presented in Table 1 for each sample site. Preliminary analysis of the results in Table 1 and Figures 1 and 2 suggest that several weathering regimes may be present in the sampled stream system. Total ion concentrations are very low compared to studies from other glaciers[7,8], indicating a strong dilution input by supraglacial melt water. Of particular interest are the relatively high concentrations of potassium from almost every sample site. A possible explanation for these high potassium concentrations is preferential weathering of sheet silicates (micas). Weathering of micas releases potassium from its interlayer site by cation exchange with protons or metal ions.[9] This process is dramatically accelerated when particle sizes are small, for instance in fine-grain glacial debris, because there is greater surface area for ion exchange.[9]

Acknowledgments

I thank the NESACS and the Norris/Richards Summer Research Scholarship selection committee immensely for providing me with this invaluable opportunity. I extend many thanks to my research and thesis advisor Professor Matt Evans, the Wheaton College Chemistry Department, and Sarah Das from Woods Hole Oceanographic Institution.

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MSU is committed to achieving excellence through cultural diversity. The university actively encourages applications and/or nominations of women, persons of color, veterans and persons with disabilities.

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Calendar

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Jan 21

Prof. Hao Yan (Arizona State Univ.)
TBA
MIT, 6-120
4:00 pm

Jan 22

Prof. Hee Cheul Choi (Pohang Univ.Science & Technology, South Korea)
TBA
Boston College, Merkert 130
4:00 pm

Prof. Amos B. Smith (Univ. Pennsylvania)
George Buchi Lecture in Organic Chemistry:
TBA
MIT, 6-120
4:00 pm

Jan 23

Prof. Sam Gellman (Univ. Wisconsin)
TBA
Boston College, Merkert 130
4:00 pm

Jan 26

Prof. John Porco (Boston University)
TBA
Brandeis University, Gerstenzang 122
3:45 pm

Prof. Keith Fagnou (University of Ottawa)
The Eli Lilly Symposium
TBA
Harvard, Pfizer Lecture Hall
4:00 pm

Jan 27

Prof. Mary Beth Williams (Penn State)
TBA
Boston College, Merkert 130
4:00 pm

Jan 29

Jun Ye, JILA (University of Colorado)
TBA
Harvard, Pfizer Lecture Hall
4:00 pm

Prof. Joe Belbruno (Dartmouth College)
TBA
University of New Hampshire, Iddles L103
11:10 am

Notices for The Nucleus Calendar of Seminars should be sent to:

Sheila E Rodman
250 Kennedy Drive
Unit #403, Malden, MA 02148.
E-MAIL: serodman(at)hotmail.com ◇

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