THE NUCLEUS

April 1996 *Of the Northeastern Section of the American Chemical Society* *Vol. LXXIV, No. 8*

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Letters to the Editor

Dear Sir:

We notice in the January issue a request for nominations for Aula Laudis, the honor society for secondary school chemistry teachers, in which Dr. Olney postulates four criteria for election to Aula Laudis. As Northeastern Section Chairman in 1985 or Planning Committee Chair, and responsible for including an honor roll for secondary school teachers in the awards that the Section gives, we should like to correct the statements in the January issue. The Honor Roll was set up *strictly to honor those teachers who had proven their effectiveness in teaching chemistry to their students*. The teachers whose students did well in the Avery A. Ashdown Examination were to be selected. In other words, of the four criteria only "c." is valid. There was no intent to honor teachers who attend conferences or are retired or worked on alternate curricula, *unless their students have or had done well in the Ashdown.*

We believe that it is time to return to the award that the Board of Directors voted to approve in 1985.

Very truly yours,
Phyllis A. Brauner
1985 Planning Committee Chair

Myron S. Simon
1985 NESACS Chairman

Dear Sir:

The February, 1996 *NUCLEUS* contains related reports. One summarizes the January discussion of humic acids (HA).[1, 2] The other describes polysaccharide (PS) chemistry by Norris Scholar Amy M. Kuhn and Dr. Louis J. Liotta at Stonehill College.[3]

Kuhn and Liotta stress the importance of PS called alginic acids (AA) in alga and seaweeds. HA (2-3%w/w) can be separated[4] from 10-20 times more AA in the commercial kelp *Ascophyllum nodosum* and other live brown alga and seaweeds.[5] Brown alga *Pilayella littoralis* that pollutes our North Shore and other coasts is the richest known live plant source (10%w/w) of HA.[5, 6]

$HA^{1, 6}$ and AA^{3} are important materials. The relationship of HA and PS in live plants is unclear. The Stonehill College work[3] is a solid contribution to understanding.

Amal Radwan, Ronald J. Willey, Chemical Engineering Department; **Geoffrey Davies,** Chemistry Department, Northeastern University, Boston, MA 02115

1. Davies, G., *THE NUCLEUS*, February, **1996**, p. 6.
2. Fulvic acids probably range up to 5 kDa, not 0.5 kDa as printed.[1]
3. Kuhn, A.M.; Liotta, L.J. *THE NUCLEUS*, February, **1996**, p. 12.
4. Whyte, J.N.C., Extraction of alginic acid from a brown seaweed. In *Experimental Phycology: A Laboratory Manual:* Lobban, C.S.; Chapman, D.J.; Kremer, B.P., Eds: Cambridge University Press, New York, 1988, pp. 168-173.
5. Davies, G.; Radwan, A.; Willey, R.J.; Jansen, A.; Ghabbour, E.A., to be published.
6. Ghabbour, E.A.; Khairy, A.H.; Cheney, D.P.; Gross, V.; Davies, G.; Gilbert, T.R.; Zhang, X., *J. Appl. Phycol.*, **1994**, *6*, 459.

The Northeastern Section of the American Chemical Society, Inc.

Office: Marilou Cashman, 23 Cottage St., Natick, MA 01760. 1-800-872-2054 (Voice or FAX) or (508) 653-6329. Any Section business may be conducted via the business office above. Washington, D.C. ACS Hotline: 1-800-227-5558

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Deadline: *Summer, 1996 Issue: June 10, 1996*

Cover: *Professor Roy G. Gordon (Photo by Joe Wrinn, Harvard News Office)*

THE NUCLEUS

The Nucleus is distributed to the members of the Northeastern Section of the American Chemical Society, to the secretaries of the Local Sections, and to editors of all local publications. Forms close for advertising on the 1st of the month of the preceding issue. Text must be received by the editor six weeks before the date of issue.

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Proofreaders:	Ernest I. Becker, Donald O. Rickter, M.S. Simon

Gustavus John Esselen Award

for Chemistry in the Public Interest

by M.S. Simon

The Northeastern Section is proud to be the donor of this important prize, which honors positive values of the chemical profession. It was founded in 1985 at a time when chemophobia seemed to dominate the thinking of this country and had certainly taken over the view of chemistry expressed in the press and other media. This prize was intended to help counteract this biased and incorrect attitude. We sought to highlight the good that chemistry provides by honoring the work of men and women whose science clearly shows benefits to humankind.

The award is especially valuable because it attracts nominees from a wide variety of areas of chemistry, all of which contribute to a better life for the public. The Esselen seeks to honor chemists regardless of whether they work in industry or the university; the science that helps people live longer, better lives can come from any source.

The chemists whose work yields new drugs or improved diagnostic treatments are well represented among previous winners. Alfred Wolf and Joanna Fowler led off the list with their procedures that made positron emission tomography a practical diagnostic tool. Carl Djerassi's work on birth control hormones has had a major effect in modern medicine. Thomas Dougherty was honored for his pioneer work in photodynamic therapy, while Howard Schaeffer's discovery of an effective anti-viral drug also merited the award.

Several winners initiated a completely unique major advance that already echoes throughout medicine. In this category we must put Bruce Ames for his methods for detecting carcinogens and his insight into the causes of cancer and aging, and Kary Mullis for the polymerase chain reaction which has revolutionized biotechnology.

The work of Jerrold Meinwald and Thomas Eisner aims to understand and protect biodiversity, and protest species destruction. The interrelationship between humans and all other life forms is a study in its infancy, and these men are pioneers.

Another major area of chemistry which has provided awardees is that of protection of the environment. The very first Esselen Award went to F. Sherwood Rowland and Mario Molina for their pioneering work in discovering human activities which can make the planet inhospitable to humankind. Their ability to change the thinking of nations is especially noteworthy. James Anderson's work continues the effort to reduce global ozone loss and protect our home planet.

Closer to home, this year's Esselen Award winner, Roy Gordon, has discovered a way to save enormous amounts of fossil fuels and, at the same time, allow people to live more comfortable lives. The very practical discovery of glass which can let us live in lightness and comfort is a major advance in building construction, another feather in the cap of chemistry in the public interest. ◇

Please donate your copies of *THE NUCLEUS* to your local High School when you no longer need them.

Society for Environmental Toxicology and Chemistry

Spring Meeting 26-27 April 1996
Newport, RI
"Ecological Risk Assessment"
Contact: Cornelia Mueller
Tel. (401) 782-1900

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Esselen Forum

"Not All Glass is Created **E**qual: Science in the Service of the Earth"

Monday, April 22, 1996, 7:45 pm
Harvard University Science Center C

Panelists:
Nancy Cole
Union of Concerned Scientists

Roy G. Gordon
Harvard University

David Weitz
Conservation Services Group, Inc.

Moderator:
Robert Cowen
Science Editor Emeritus
Christian Science Monitor

Monthly Meeting

The 779th Meeting of the Northeastern Section of the American Chemical Society

The Gustavus John Esselen Award for Chemistry in the Public Interest

Thursday, April 18, 1996

5:15 Social Hour, *Harvard University Faculty Club*

6:00 Dinner

8:15 **Award Meeting**, Science Center, *1 Oxford St., Lecture Hall B.*
Dr. Patricia L. Samuel, Chairman, Northeastern Section, presiding
The Esselen Award, Dr. Myron S. Simon
Introduction of the Award Recipient, Dr. Dudley R. Herschbach (Harvard University)
Presentation of the Award to Dr. Roy G. Gordon – Gustavus J. Esselen III
Esselen Award Address – *Energy Conserving Windows*

Refreshments will be served after the program

Dinner reservations should be made no later than noon, April 11. Please call or fax Marilou Cashman at (800) 872-2054. Reservations not cancelled at least 24 hours in advance must be paid. Members, $25.00; Non-members, $28.00; Retirees, $15.00; Students, $8.00. THE PUBLIC IS INVITED. Anyone who needs special services or transportation, please call Marilou Cashman a few days in advance so that suitable arrangements can be made. **Free parking** at the Broadway Garage, enter Felton St., level 3 or higher.

Next meeting on May 9, 1996 ***Education Night****. Univ. of Massachusetts, Lowell. 5:30 Social hour and dinner, 8:00 evening meeting. Dr. Wallace J. Gleekman, Chemical Oceanography: Adventure in the Sinai.*

Biography

Professor Gordon studied chemical physics at Harvard with Prof. J.H. Van Vleck. Following a Junior Fellowship at Toronto and Brussels he returned to Harvard, where he has served as Chairman of the Department of Chemistry and its Cabot Professor of Chemistry.

His research spans a wide range of subjects from applied mathematics to quantum mechanics, spectroscopy, intermolecular forces, solid state and materials science.

He developed strategies for the efficient evaluation of many special functions and matrix transformations, such as the Jordan canonical form. These methods have found widespread use in applied mathematics, including application to quantum dynamics, chemical kinetics, and hydrodynamics.

The dynamical information in molecular spectra, such as infrared, Raman, and NMR, was decoded and interpreted by his theoretical work. Several effective semi-classical approaches were developed for the study of time-dependent processes, including molecular collisions, spectral line shapes, and transport properties. He introduced rigorous methods for the evaluation of error bounds to a wide variety of theoretical quantities, including intermolecular forces, thermodynamic properties, and spectra.

His simple electron-gas theory of intermolecular forces demonstrated a surprising level of accuracy, and these "Gordon-Kim" potentials have been very widely used. His newer density functional theory is leading to better understanding of bonding in molecules and solids, and phase transitions between different solid structures, including both simple solids and complex minerals.

The chemical kinetics of crystal growth from vapor systems is being studied both theoretically and experimentally in his laboratory. This work has led to the discovery of new materials and new processes for their production, which are being used to make energy conserving windows, solar photovoltaic cells, and computer microcircuits.

Prof. Gordon has received numerous honors, including the ACS Award in Pure Chemistry, the Bourke Award of the Faraday Society, the Baekeland Award, and an R&D 100 Award. He has held lectureships at a number of institutions in the USA and abroad. He is a member of the American Academy of Arts and Sciences, and has been a Fellow of, among others, the Sloan Foundation (1967-9), the American Chemical Society (1974), the AAAS (1977), and the European Academy of Arts, Sciences and Humanities. ◇

Abstract

The discovery and development of heat-reflecting, transparent and durable glass coating will be reviewed. The material with properties most appropriate for this coating is fluorine-doped tin oxide. Chemical vapor deposition has been adopted as the method for its large-scale production. I will describe the physical and chemical basis for these choices of material and of deposition method. This low-emissivity ("low-E") glass is now being produced world-wide, and used in windows that are saving large amounts of fossil fuels. The electrical conductivity of the coating has also spawned a host of other applications, ranging from solar photovoltaic cells to flat-panel displays and "smart" mirrors and windows. ◇

Book Review

Women Changing Science; Voices from a Field in Transition, by Mary Morse, Insight Books, New York, 1995

Reviewed by Lynne A. O'Connell (Dept. of Chemistry, Boston College)

As politicians and their constituents debate the fate of affirmative action programs in our country, the need to examine the reasons for the continued male dominance of most scientific fields becomes increasingly important. Mary Morse, in her book *Women Changing Science; Voices from a Field in Transition*, approaches such an examination by relating her numerous conversations with women and men in science from a wide variety of backgrounds. In her interviews, she attempts to uncover explanations as to why the proportion of professional women scientists has risen by only a percent or two in the past decade, and then proposes ways to change the structure and attitudes of the scientific community in order to encourage more women to enter such careers.

The initial chapter is a survey of the views which social scientists and feminists have concerning the role of women in science and is an interesting introduction to the topic. The remainder of the book focuses on the viewpoints of scientists themselves. Morse has made extensive use of the Internet to gather information on her topic, posting questions on scientific bulletin boards and Usenet newsgroups and sending out surveys via electronic mail. While she concedes that the methods of her surveys are not "scientific", the responses to her inquiries, some of which will resonate strongly with the experiences of the reader while others may inspire spirited disagreement, are often fascinating. Responses from both men and women scientists are well balanced in these chapters. In the later chapters, she transcribes her interviews with scientists in which the issues raised by the responses gathered from the Internet are further discussed. These include interviews with women who are just embarking on their careers, women who have already established their positions in the scientific community and women who hold positions in the field of science policy.

Some common threads run from chapter to chapter which arise from Morse's recurrent questions on whether men and women "do" science differently and whether the scientific culture would be altered if equal numbers of women and men participated in research. Responses to the first line of questioning vary amongst the interviewees with the majority of scientists, both female and male, being of the opinion that the scientific method requires complete objectivity and therefore does not allow for gender bias. In contrast, the view from many of the social scientists and some of the female respondents allows that differences between the two sexes' approaches to scientific inquiry may reveal themselves in areas such as choice of research topic and responses to ethical dilemmas. Regarding the culture of science, more respondents acknowledge that the personalities of men and women may make significantly different contributions to the climate of the workplace. The idea that, given the choice, women would pursue research from a cooperative approach in contrast to the more traditionally masculine competitive approach is explored, as is the use of intimidation in scientific meetings and peer review. Much attention is also paid to the balance of a professional and private life. The need to devote long hours to labwork is perceived by some as a necessity to the success of any course of research and by others as a necessity merely to please the powers that be. It is, however, this devotion to science at the exclusion of full participation in family and community life which is often cited as the reason many young women and even some young men choose to pursue alternate career paths.

Morse concludes her book with a chapter summarizing changes which she feels would make the community of science more welcoming to women based on her findings. She calls for bringing about a change in the perception of scientists which is formulated in the minds of children, both early on in the classroom and through images in the media. She also suggests looking at a few American universities which are experimenting with flexible schedules, as well as many European institutions, to find models that allow scientists to pursue their outside interests such as family and community. These schedule changes include breaks in the tenure track for parental leaves and part-time research faculty positions.

All of the issues which are raised in *Women Changing Science* are relevant to both male and female scientists. Because the majority of young, married scientists are half of a two-career couple, the problem of balancing family and career applies to both sexes. In addition, the thought that highly qualified and motivated female students of science are being discouraged from entering into a career in research due to an uninviting atmosphere must give every member of the scientific community pause. Mary Morse's examination of the issues concerning women in science should be used as a catalyst for dialogue and discussion amongst all members of our "field in transition". ◇

NESACS Trustees

Condensed Annual Report 1995

1. Status of Trust Funds, 31 December, 1995 – The net worth (investments plus cash balances) of the assets in the seven Trust Funds in the charge of the Trustees was $1,518,000 at the end of 1995, an encouraging 25% increase above their value on 1-1-95. The Consolidated Trust (endowment) alone appreciated 22.8%, to $1,052,755 on 12-31-95, up from $857,120 on 12-31-94.

Numerous investment changes were made during 1995 in the Consolidated portfolio, with $26,266 of fresh cash being added to the capital base for new purchases. Thirty percent of the new income earned from dividends and interest in 1995 formed a significant part of this infusion.

2. Cash Flow in 1995 – New earned income to the Consolidated plus income accounts in 1995 amounted to $68,976, nearly 6% more than received in 1994; the average yield was 5.7% from investments valued at $1,203,388 on 12-31-95. The dividend yield from money market funds (cash liquidity) was steady in the range of 5.1–5.6%, much better than during most of the prior year.

From the Consolidated account 40% ($40,600) was distributed to the income accounts for paying Section expenses, which proved to be less than the amounts budgeted for them. Thus, the income accounts ended the year with cash balances noticeably higher than twelve months earlier. The Section, however, has additional expenses contracted for some Trust Funds, that will not be reimbursable until 1996. Such payments will be hard on only the Norris Trust.

3. Projected Income and Expenses for 1996 – The budgets proposed for 1996 are higher in each Trust Fund than the expenses actually paid out in 1995. They have been adjusted to accommodate paying part of the new expenses for the year from 70% of the new income from the Consolidated Trust Fund, with the remaining 30% being reserved for re-investment as capital growth. Differences between income and expenses in some income accounts can be made up from cash surplusses remaining on 12-31-95. Thus, the cash balances may be somewhat reduced by the end of the coming fiscal year, but will remain as a substantial cushion for 1997 activities.

Prepared for the Trustees by
G. Richard Handrick, 8 February, 1996

Projected Income, Budget, and Expenses for 1996

[column	1	2	3 (=2-1)	4	5	6	7 (=5+6)	8 (=9-7)	9	10]
	estimated income for 1996				sources for 1996 expenses					
					from new div+int			from		
	cash bal. 1-1-96	unpaid exp. due 1-1-96	net cash uncommitted 1-1-96	1996 new div+int	of Consol. (a)	other	total new available (b)	cash bal 1-1-96	Trust budgets 1996	est. cash balance 12-31-96
Consolidated	19,262	134	19,128	58,420	(40,894)	17,526[a]	—	1,200	1,200	17,928
Richards	7,231	-0-	7,231	3,290	4,900	3,290	8,190	3,985	12,175	3,246
Norris	3,699	3,609	90	1,170	23,857	1,170	25,027	(1,277)	23,750	1,367
Publications	12,244	700	11,544	500	3,339	500	3,839	1,161	5,000	10,383
Permanent	10,201	-0-	10,201	1,600	6,756	1,600	8,356	1,644	10,000	8,557
Hill	3,497	-0-	3,497	-0-	2,042	-0-	2,042	(542)	1,500	4,039
	56,134	4,443	51,691	64,980	40,894	24,086	47,454	6,171	53,625	45,520
Esselen	6,307	1,221	5,086	12,000			12,000	(1,000)	11,000	6,086
TOTAL	62,441	5,664	56,777	76,980			59,454	5,171	64,625	51,606

a) Assumes 70% ($40,894) of Consolidated new income is distributed to income accounts and remaining 30% ($17,526) is reserved to increase the capital endowment base of the Consolidated account.

b) Needed to balance projected 1996 budget of ordinary expenses.

Board of Directors

Annual Meeting, January 11, 1996

Reports from Officers:

Chairman: Ms. Wilcox thanked all members of the Board for their hard work during the year.

Secretary: M. Hearn expressed his thanks for the cooperation and volunteer efforts and outreach.

Treasurer: The Section's finances are in a strong position.

Auditor: The auditor reported that the financial report of the Section properly represents the income and expenses of this organization. The Trustees' finances are audited separately.

Archivist: M. Simon reminded members that 1998 will be the centennial year of the Section.

Trustees: R. Handrick stated that the annual report will be available shortly.

Committee Reports: Committee chairmen have presented their reports in writing for the Annual Report of the Section.

The meeting was recessed, to be reconvened after receipt of the Trustees' Annual Report.

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ACS Short Course

How to Develop and Troubleshoot Capillary GC Methods

A One-Day Short Course Sponsored by the Northeastern Section, ACS, Committee on Continuing Education

National ACS is making top-rated ACS Short Courses available to local sections at tuition fees greatly reduced from the normal $425. The NESACS Committee on Continuing Education is pleased to sponsor this newly developed course, which is being presented by one of the program's most experienced instructors.

Date and Time: Wednesday, **May 15, 1996, 8:30 a.m. – 5:00 p.m.**

Place: Frost Lounge, Ell Building, Northeastern University, 360 Huntington Ave

Program Agenda:

The Approach: Systematic, structured approaches to problem solving and method development; how to choose a chromatographic separation technique.

Specifics of "How to"…: Effect of column parameters on separation and resolution; Optimization of methods for performance and/or productivity; Cost reduction methods; Selection of sample preparation/concentration techniques; How to get the results you want from your injector(s) and sample inlet systems; Achieving the required accuracy and precision; Selection of GC detectors; Handling "dirty" samples; Minimizing the cost of methods development and analysis; High productivity methods.

Troubleshooting: Eliminating the bottlenecks in laboratory operation; Method diagnostics and preventative maintenance; How to troubleshoot methods and results.

The Newest Technologies: Programmable temperature injection; Large sample volume injection for sensitivity; Flow programmed injection techniques; Cool on-column injection for quantitation; Columns for very high resolution and fast analysis; Highly selective detectors.

Practical Examples: Examples of how methods are developed, tested, and documented.

Instructor: Stuart F. Cram, Worldwide Marketing Manager, Hewlett-Packard Chemical Analysis Group. Formerly Research Manager for Varian's Instrument Division and Chief of Chromatographic Analysis at the National Institute of Standards and Technology. He has been one of the highest rated instructors in the A.C.S. Short Course Program since 1977.

Pre-registration Required - Registration Fees:
ACS Members if mailed before May 1 ..... $125.00; after May 1 ... $175.00
Non-ACS Members if mailed before May 1 ... $175.00; after May 1 ... $225.00

There will be a limited number of scholarships for unemployed ACS Members on a space-available basis.

Parking Fee $3.00/day University cafeterias will be available for lunch.

For further information contact: Prof. Alfred Viola - (617) 373 2809

Registration form for Short Course:
How to Develop and Troubleshoot Capillary GC Methods

Name: _____

Address: _____

_____

Affiliation: _____

Telephone: _____

Mail with remittance to: (*Please make checks payable to NESACS*)
Prof. Alfred Viola, Chair
NESACS Committee on Cont. Ed.
Department of Chemistry
Northeastern University
Boston, MA 02115

Member News

T. Ross Kelly, Vanderslice Professor of Chemistry at Boston College has been honored by a 1996 Arthur C. Cope Scholar Award for his work in natural products synthesis, molecular recognition, asymmetric catalyst design and nanotechnology.

– (*C & E News, Feb. 5, 1996*)

Mario J. Molina, professor of environmental chemistry at M.I.T., has donated $200,000 of the 1995 Nobel Prize he shared with F. Sherwood Rowland and Paul Crutzen to set up a scholarship. The recipients of his generosity will be graduate students and postdoctoral fellows from Mexico and Latin America who will be enabled to carry out environmental research at M.I.T. It is hoped that corporations and governments will augment this donation to expand the number of students who can participate in this program.

In an article in the February 15, 1996 Boston Globe Molina was reported to have said that scientists from all over the world must be involved in solving the environmental problems of the planet. The scarcity of scientists from developing countries working on these problems led Professor Molina to make this gift of almost two thirds of his prize money.

Molina's efforts to protect our planet's environment began with the work he and Rowland did in the 70's which pinpointed chlorofluorocarbons as agents which could destroy the ozone layer. Both men have been active in convincing lawmakers of the necessity of banning CFCs, and their campaigning contributed to the 1987 agreement to ban known as the Montreal Protocol. We are pleased to note that Rowland and Molina shared the very first Esselen Award of the Northeastern Section in that same year.

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Member News

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John F. "Jack" Downey, 62, died on January 11, 1996. He was born in Lexington, MA, graduated from Lexington High School and attended Tufts College where he received his bachelor's degree in chemistry. He took a master's degree at Canisius College while working as a research chemist at National Aniline in Buffalo, NY. He came to Polaroid in October, 1959 and joined my research group where he quickly showed stellar qualities. His studies of magenta anthraquinone dyes led to three publications including the discovery of a novel rearrangement of side chains, and a series of patents on related dye developers. He retired as Senior Research Group Leader in 1993 after 34 years at Polaroid, after having carried out research and development work in projects as varied as thermal imaging, liquid crystal displays, polymer synthesis and photographic coatings. His work led to patents in polymer applications and silane coatings, and patents are pending for his improvements in passport security. He retired with the happy record of having made sterling friends in every area of the chemical and photographic research and development departments. His outside interests included extensive travels in Europe, Asia and Africa, bird watching, his home in the historic area of Lexington, followed by his retirement home in Ipswich, but above all, his wife and family. It was a pleasure to work with him, to walk with him and to talk with him. – M.S. Simon ◇

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Historical Notes

by Edward R. Atkinson

Arno Heyn's recent article (*THE NUCLEUS* **74** (2), 12, October 1995) about how the gospel of gas chromatography was brought in 1954 to the wilds of New Hampshire reminded me of a time in the early 1960's when I was involved in a project at Arthur D. Little, Inc. for the synthesis and optical resolution of several dozen organic compounds of high pharmacological activity. The significance of the optical resolution of racemic drugs was well-known in those days. A summary of its current commercial importance appeared in the October 9, 1995 issue of *Chem. & Eng. News.*

I was puzzled by what seemed to be claims of originality for techniques of optical resolution, at least one of which appeared in *Chemistry and Industry*, coming from an institution washed by the waters at the head of the Charles River and known locally as The World's Greatest University (WGU). I sought advice from my colleague, William A.G. Graham, who had in 1956 received his Ph.D. in inorganic chemistry as the first student of Gordon Stone at the WGU. Bill and I had joined the staff at Little's on July 1, 1957, I from Dewey & Almy across Route 2, and Bill from the University of Southern California where he had spent a post-doc year in an area where classical music on the radio during commuting hours was unknown.

Bill composed a letter to *Chemistry and Industry* (reprinted below) on the subject "Separation of Enantiomorphs by Gas Chromatography." He used his home address in Reading, Mass. lest correspondence tax the facilities of our employer. He was just about to leave for a career at the University of Alberta in Edmonton. He had tired of "living by his wits" (as he put it) and wanted "to be free from the constraints of immediate relevance" (as one of his friends remarked).

The details of Bill Graham's achievements as a teacher and in research in organometallic chemistry, along with a fine portrait, are presented (in English as well as French) in a special issue of the *Canadian Journal of Chemistry* **73** (7), July 1995, dedicated to Bill on the occasion of his approaching retirement to emeritus status. He now serves as Associate Dean (Research) at the University.

The letter referred to above appeared in *Chemistry and Industry*, August 25, 1962, 1533:

"SIR,— The gas-chromatographic separation of enantiomorphs is the object of intensive investigation, as revealed by several recent communications in *Chemistry and Industry*. Accordingly, we think it appropriate to make known our approach to this problem.

Use of optically active column material is the essential feature of previous work. It occurred to us some time ago that a more effective separation might be achieved if this principle could be combined with the use of mirrors, the latter having been associated with stereochemistry for many years. We were led to this view by a consideration of the mechanism of adsorption at a mirrored surface. The vacant sites adjoining an adsorbed molecule of the *d*-form would appear to be occupied by molecules of the *l*-form. Fewer adsorption sites would thus be available to the *l*-form, which as a consequence should be eluted first from the column. Evidently, a modification of this hypothesis would account also for the prior emergence of the *d*-form.

We consider that a satisfactory column for work of this nature might be packed with glass micro beads, mirrored by the thermal decomposition of dextrorotatory methyl sec. butyl mercury. An elaboration of the theory will soon appear. (*J. Cachinnation*, in press) and it is hoped that further details will be published when experimental confirmation has been obtained.

Yours faithfully,
William Graham,
Reading, Massachusetts, USA"

Bill Graham has recently transferred his ACS membership from the amorphous ranks of foreign members to that of the Northeastern Section. As a faithful reader of *THE NUCLEUS* he will probably be surprised to read this Note. Speaking of probability, Bill and I once defined zero probability as the chance that he and I would meet in the stands during the seventh game of the Stanley Cup finals between the Edmonton Oilers and the Boston Bruins. At the time we made this definition the Oilers had the quality of an expansion team, while the Bruins were on the way to the Cup. As times passed the roles were reversed, as all good hockey fans know!

–Amherst, MA; 4/1/96 ◇

Board of Directors

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Monthly Meeting of the Board, January 11, 1996

NOTE: Board meetings are held on the monthly meeting day at 4:30 p.m. Section members are invited to attend. Call 1-800-872-2054 for information.

Officer's Reports:

Chairman: P. Samuel welcomed members of the Board. She presented the ACS Service Pin to Immediate Past Chairman, Valerie Wilcox. Dr. Samuel asked Councilors to notify the Secretary concerning their availability for attending the National ACS Meeting in New Orleans in March.

Chairman-Elect: M. Idelson reviewed plans for the upcoming meetings.

Treasurer: J. Piper presented the current financial report and budget report. (The budget is to be voted at the February meeting).

Trustees: R. Handrick reported that the asset value of the trust funds has increased significantly and that earnings should be on target.

Archivist: M. Simon requested help from board members in identifying persons in photographs on file.

Editor: A. Heyn reported that the February issue will be 20 pages.

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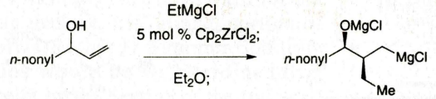
Catalytic and Enantioselective Addition of Alkyl Metals to Olefins

A talk given by Dr. Amir Hoveyda of Boston College at the February Meeting

Reported by M.S.Simon

Dr. Hoveyda's talk stressed two concepts: (1) additions to olefins to give a single enantiomer and (2) the formation of multiple bonds in sequence in a single flask, cascade catalysis. A major goal is to achieve practical synthetic routes. His research is planned to progress from understanding the mechanism of the reaction to learning to make it regioselective, diastereoselective and enantioselective in high yield. The third stage is the synthesis of biologically significant molecules. The fourth stage, which his studies have not yet reached, is the understanding of the mechanism of the biological action.

Alkylmetals add readily to carbonyl groups, but require zirconium (IV) catalysts to add to olefins. Zirconium (IV) compounds are available, inexpensive and are not toxic. In his study of the reaction with allyl alcohols and ethers he obtained high diastereo selectivity:



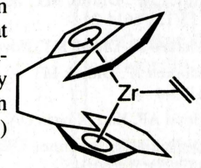
95:5 Diastereoselection

90:10 Diastereoselection

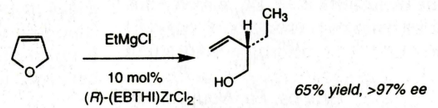
(Cp = η5-cyclopentadienyl)

Either diastereotopic face of a chiral olefin can be selectively functionalized, depending on whether the alcohol or the ether is used. Yield of the reaction with the allyl alcohol was 85%. Yield with the allyl ether was 92%.Two moles of EtMgCl were required.

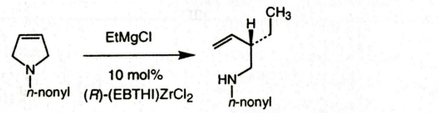
The reaction of the Cp_2ZrCl_2 catalyst with ethylmagnesium chloride had been shown earlier by Buchwald and Negishi (1987) to replace both chlorines with ethyl groups, followed by elimination of ethylene to form a zirconium-olefin complex: $Zr(\text{-}CH_2CH_2\text{-}) <\!\!-\!\!> Zr\text{ -}(CH_2{=}CH_2)$. The requirement of two moles of EtMgCl in the reactions shown above suggests that this metal-ethylene complex is the catalyst. Still cleaner diastereoselectivity could be achieved using a chiral version of the zirconium catalyst, (EBTHI) $Zr(CH_2{=}CH_2)$. The R form is shown:



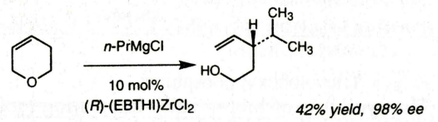
Dihydrofuran with EtMgCl and 0.4-2.5 mole % of the (R)-catalyst gave greater than 97% e.e. of the ethylmagnesation product shown. Similar reactions were obtained with analogous dihydropyrans or N-alkylated dihydropyrroles.



65% yield, >97% ee

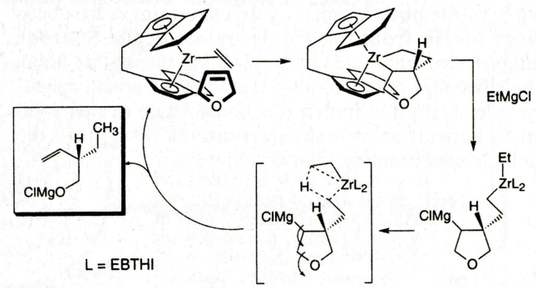


75% yield, >95% ee



42% yield, 98% ee

The mechanism for this reaction is described by:



Racemic 2-alkyl dihdropyrans lend themselves readily to kinetic resolution using zirconium catalysis because of the high enantiofacial selectivity of the reaction. Because of interference with the cyclohexyl rings of the catalyst, only one of the two stereoisomers at the 2-alkyl position will react rapidly. Hoveyda used this finding to construct the

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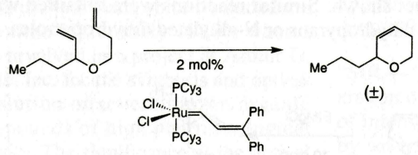
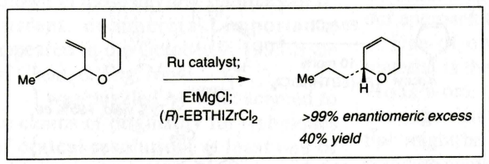
Addition of M-C to Olefins

continued from page 11

following cascade wherein the ruthenium reaction leads to the dihydropyran which, in the same flask is resolved to yield in essentially enantiomerically pure condition the enantiomer which reacts sluggishly or not at all in the zirconium carbomagnesation reaction. Hoveyda noted that an entire series of catalyzed reactions can be carried out in a single reaction vessel in stepwise fashion without the need for isolation.



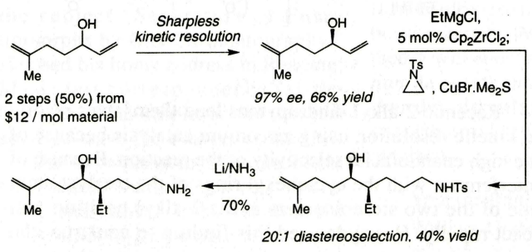
Grubbs, Fu, Nguyen, 1993



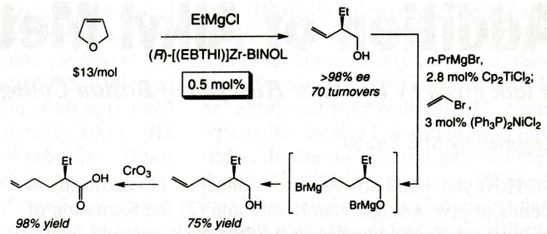
PCy_3 = Tricyclohexyl phosphine

The synthesis of biologically interesting molecules using this chemistry was illustrated by Hoveyda in the synthesis of Schering-Plough's antifungal compound, Sch 38516. This was accomplished by (1) synthesizing an amine segment and an acid segment, (2) joining them to form the amide with unsaturation at each end, (3) forming a 14-membered macrocycle containing a trisubstituted olefin from the amide by using the Schrock catalyst, and finally (5) hydrogenating the double bond. The advantage of this route is that the unsaturated macrocycle lends itself to further functionalization to alter solubility as well as to make derivatives to explore the biological mechanism.

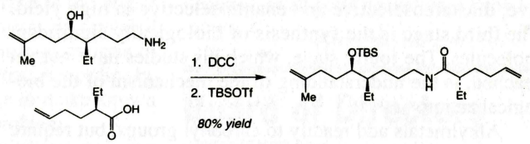
Sch 38516. Synthesis of the amine segment



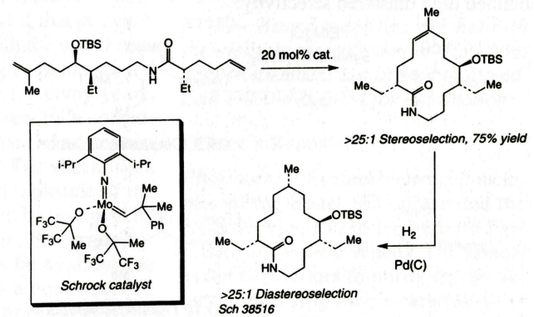
Sch 38516. Synthesis of the acid segment



Amide Synthesis



Macrocycle Synthesis & Diene Metathesis?



It is instructive to note that nine of the thirteen reactions used a metal catalyst: titanium (twice), zirconium (twice), copper, nickel, palladium, molybdenum, ruthenium.

References to Dr. Hoveyda's work on zirconium-catalyzed carbomagnesation of olefins:

Hoveyda AH, Xu Z, *JACS*, **1991**, 113(13), 5079-80

Hoveyda AH, Xu Z, Morken JP, Houri AF, *JACS*, **1991**, 113(23), 8950-2

Hoveyda AH, Morken JP, Houri AF, Xu Z, *JACS*, **1992**, 114(17), 6692-7

Hoveyda AH, Morken JP, *J Org Chem*, **1993**, 58(16), 4237-44

Houri AF, Didiuk MT, Xu Z, Horan NR, Hoveyda AH, *JACS*, **1993**, 115(15), 6614-24

Morken JP, Didiuk MT, Hoveyda AH, *JACS*, **1993**, 115(15), 6997-8

Morken JP, Didiuk MT, Visser MS, Hoveyda AH, *JACS*, **1994**, 116(7), 3123-4

Houri AF, Xu Z, Cogan DA, Hoveyda AH, *JACS*, **1995**, 117(10), 2943-4

Didiuk MT, Johannes CW, Morken JP, Hoveyda AH, *JACS*, **1995**, 117(27), 7097-104 ◇

Board of Directors

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Committee Reports:

Board of Publications: E.J. Billo reported that the Section subsidy for operating *THE NUCLEUS* has decreased substantially, largely because of good advertising income.

Chemical Education: M.Z. Hoffman stated that 1995 closed as a banner year: There were four Norris/Richards Summer Scholars, and four undergraduates presented papers at the poster session for undergraduate research at the Anaheim ACS meeting with Northeastern Section grants-in-aid. Two of the Section's Student Affiliates Chapters were cited for excellence: Boston University (Commendable, Drs. Samuel and Giering, advisers) and Merrimack College (Honorary Mention, Dr. McGowan, adviser). After discussion, the directors VOTED that the award letters state that the institutional portion of Norris/Richards Summer Scholarships would be withheld pending receipt by the Section of the final student report.

Continuing Education: A. Viola indicated that a second session of the Microsoft Excel course was offered in January and that another short course may be offered in the Spring.

Nominating: V. Wilcox stated that the slate of candidates will be presented at the next Board meeting.

Project SEED: D. Phillips stated that in 1995 nine students were funded through SEED and the Millipore Foundation. One of the Project SEED students presented a report at the National ACS meeting in Chicago. February 1 is the deadline for prospective advisors to apply for support for ACS funding.

Summerthing: J. Perkins announced that there will be a summer event this year.

New Business: At the February meeting the Board is to discuss increasing the amount connected with the National James Flack Norris Award in Physical Organic Chemistry. ◇

Call for Papers

Undergraduate Research Poster Session at the 212th National Meeting of the American Chemical Society Orlando, Florida August 25-29, 1996

The ACS invites undergraduate students to submit abstracts of their research papers for presentation at the Undergraduate Research Poster Session, which will be part of the extensive programming for undergraduates at this national meeting. Send abstracts on standard ACS forms to:

John W. Higuchi
Student Affiliates Program
American Chemical Society
1155 Sixteenth St., NW
Washington, DC 20036

Deadline for receipt of abstracts: May 1, 1996

The Thirty-fifth Annual Undergraduate Research Symposium of the Northeastern Section of the American Chemical Society on Saturday, April 27, 1996 at Boston University

Metcalf Center for Science and Engineering
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(hosted by the Department of Chemistry and Chemia, the ACS Student Affiliates Chapter) Send abstracts on standard ACS forms to the organizer:

Prof. Warren P . Giering
Department of Chemistry
Boston University
Boston, MA 02215
Tel.: 617-353-2488
Fax: 617-353-6466
e-mail: giering@chem.bu.edu

Deadline for receipt of abstracts: April 12, 1996

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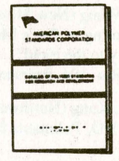

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Calendar

March 21
Prof. Tadhg P. Begley (Cornell Univ.)
"The Biosynthesis and Degradation of Thiamin"
Boston College, Merkert Chemistry Ctr.,
Rm. 127, 4:00 pm

Prof. Steve Chu (Stanford Univ.)
"Studies of Polymer Dynamics with Single Molecules of DNA"
Harvard Univ., 12 Oxford St., Mb-23, 5:00 pm

March 25
Prof. Robert Weber (Yale Univ.)
"Oxidation of Alcohols Catalyzed by Well-Defined Oxide Clusters"
Tufts Univ., AV Room, STC Bldg., 2:30 pm

March 26
Prof. Howard Weetal (NIST)
"Optical and Electronic Characterization of Bacteriorhodopsin as a Possible Material for Information Storage and Retrieval"
Tufts Univ., Rm. 104, Pearson Hall, 4:30 pm

March 28
Prof. Barry Sharpless (Scripps Institute)
"Oxidative Amination of Olefins"
Boston College, Merkert Chemistry Ctr.,
Rm. 127, 4:00 pm

April 1
Prof. Laura Kiessling (Univ. of Wisc., Madison)
"Monovalent and Multivalent Inhibitors of Carbohydrate Function"
Harvard Univ., 12 Oxford St., Mb-23, 4:15 pm

Prof. Peggy Cebe (Tufts Univ.)
"Thermal and X-ray Scattering Studies of Polymer Blends"
Tufts Univ., AV Room, STC Bldg., 2:30 pm

April 2
Prof. Charles Zercher (Univ. of New Hampshire)
"Diastereoselective Synthesis of Polycyclopropanes"
Tufts Univ., Rm. 104, Pearson Hall, 4:30 pm

April 8
Prof. Tom Kodadek (Univ. of Texas at Austin)
"Mechanistic Studies of Transcriptional Regulation"
Harvard Univ., 12 Oxford St., Mb-23, 4:15 pm

April 8 cont.
Dr. Yiannis Monovoukas (Thermo-Electron, Waltham, MA)
"Polymer Colloidal Crystals and Sol-Gels Glasses"
Tufts Univ., AV Room, STC Bldg., 2:30 pm

April 9
Prof. Tom Beebe (Univ. of Utah)
"STM and 'Molecule Corrals' for Understanding Organic Monolayer Self-assembly"
Tufts Univ., Rm. 104, Pearson Hall, 4:30 pm

Prof. Isiah M. Werner (Analytical and Environmental Chem., Louisiana State Univ.)
"Analytical Chemistry in Organized Media"
Univ. of New Hampshire, Iddles L103, 11:10 am

April 11
Prof. Barry Honig (Columbia Univ.)
"Electronic Properties of Molecules in Aqueous Solution: Chemical and Biological Applications"
Boston College
Merkert Chemistry Ctr., Rm. 127, at 4:00 pm

Prof. Urs Wild (ETH Zurich, Switzerland)
"Single Molecular Spectroscopy and Microscopy in Condensed Phases"
M.I.T., Rm. 6-130, 5:00 pm

April 15
Prof. Barry Trost (Stanford Univ.)
"Designing Active Sites for Molecular Recognition in a Synthetic Reaction"
Harvard Univ., 12 Oxford St., Mb-23, 4:15 pm

April 16
Prof. Daniel Kahne (Princeton Univ.)
"Carbohydrates as DNA Binders: Structure, Function and Design"
Tufts Univ., Rm. 104, Pearson Hall, 4:30 pm

April 18
Prof. Rachel Klevit (Univ. Washington, Seattle)
"Structure and Dynamics of a Zinc-Finger-DNA Complex"
Boston College, Merkert Chemistry Ctr.,
Rm. 127, 4:00 pm

Prof. S. Gellman (Univ. of Wisconsin)
Biopolymer Folding and Refolding: from Model Studies to the Real Thing"
Northeastern Univ., Rm. 129, Hurtig Bldg.,
4:00 pm

April 18 cont.
Prof. Myron Rosenblum (Dept. of Chemistry, Brandeis Univ.)
"Polymers from Cofacial Metallocenes"
UMass Lowell, Olney Hall, Rm 428, 3:30 pm

April 22
Prof. Barry Sharpless (Scripps Research Institute)
Title TBA
Harvard Univ., 12 Oxford St., Mb-23, 4:15 pm

Prof. Joseph Wang (New Mexico State Univ.)
"Field Monitoring of Trace Metals – Bringing the Laboratory to the Field"
Tufts Univ., Rm. 104, Pearson Hall, 3:30 pm

Dr. Harold H. Kung (Northwestern Univ.)
"Removal of NO_x Pollutants from Automobile Exhaust"
Tufts Univ., AV Room, STC Bldg., 2:30 pm

April 24
Prof. Wolfgang Ketterle (M.I.T.)
"Bose-Einstein Condensation of an (Almost) Ideal Gas"
Harvard Univ., 12 Oxford St., Mb-23, 4:00 pm

April 25
Prof. Evan Kantrowitz (Boston College)
"Global Energy Changes as the Means of Allosteric Control in Aspartate Transcarbamoylase"
Boston College, Merkert Chemistry Ctr.,
Rm. 127, 4:00 pm

May 1
Minisymposium "Chemical Mechanisms in Atmospheric Chemistry"
2:00 pm Prof. Paul Wennberg (Harvard Univ.)
3:00 pm Prof. Roger Miller (Univ. N. Carolina)
4:30 pm Prof. Mario Molina (M.I.T.)
Harvard Univ., Science Center D

Notices for the Nucleus Calendar should be sent to:

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