INQUIRY

Information from the frontiers of knowledge

A magazine highlighting research at the University of Oregon

Fall 1997, Volume III, Number 2

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A Message About Research From

STEADMAN UPHAM

Vice Provost for Research and Graduate Education
and
Dean of the Graduate School

. Ingredients: intellectual curiosity, initiative, accumulated knowledge, dedication, and wisdom. If research universities carried product labeling, these characteristics would be listed among the primary ingredients.

.To make: Mix with human capital, state-of-the-art facilities and equipment, and enthusiasm. Add library and computer center, sprinkle with economic awareness, social responsibility and moral courage. Let ferment . . . .

.Research universities are among the most revolutionary and least understood American institutions. As a faculty member and university administrator, I am frequently asked how students benefit from studying at a research university like the University of Oregon. The simple answer to this question is found in the stories that appear in this issue of Inquiry: students benefit by studying and collaborating with professors who create and apply new knowledge and technology.

.It sounds simple, but think about it. Members of the faculty at research universities are expected not just to transmit knowledge to their students, but also to create new knowledge and show students where and how it fits into the real world. Every University of Oregon faculty member is evaluated based on this principle. As a result, every UO student benefits from exposure to new knowledge in the classroom, lab, studio, or field because our faculty members infuse their teaching with the results of their original research. This is a job for the intellectually curious, a trait we seek to cultivate in every UO student.

.These points are fundamental to understanding the research university. Students who attend the University of Oregon truly have the opportunity to explore the frontiers of knowledge. I encourage you to learn more about this product. I think you'll like the way it's made.

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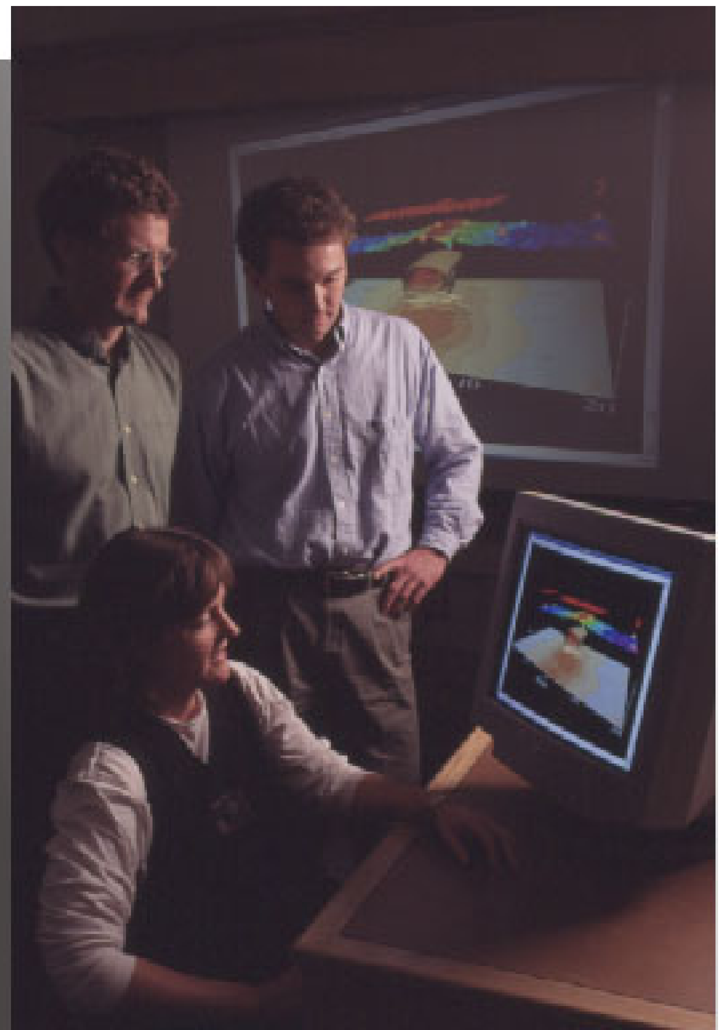
Computer Muscle: Changing the Way Science Gets Done

During an extensive safety-testing program for the new Boeing 777, researchers purposely crashed one multimillion-dollar jumbo jet after another. Surprisingly, destroying multiple copies of the prototype aircraft was not astronomically expensive. Why? Because scientists using extremely sophisticated computer models destroyed "virtual" rather than real jets.



Jan Cuny, Allen Malony, and Doug Toomey

Along with aeronautical engineers, researchers in widely divergent fields of science are using the staggering advances in computers and computer-related technology--known as high-performance computing or, informally, as supercomputing--to extend vastly the scope and complexity of their work. The field is known as computational science.

"For hundreds of years scientists have used one of two approaches--experimental or theoretical--to do their work," says associate professor of computer and information science Jan Cuny, a member of the University of Oregon's Computational Science Institute (CSI). "But now computation is emerging as a third fundamental approach. Computational science is an extremely powerful and rapidly evolving tool."

The tool is composed of high-speed network technology, large-volume data servers, high-performance graphics workstations and, at its core, powerful parallel supercomputers, explains Allen Malony, a CSI member and associate professor of computer and information science.

Since its inception in 1995, CSI has put together a formidable computer facility with funding from the UO, the National Science Foundation, the Murdock Charitable Trust, the Defense Advanced

Research Projects Agency, and the U.S. Department of Energy. Early this year CSI took a major step forward when it opened a new Visualization Laboratory featuring ten high-end Silicon Graphics Inc. workstations suitable for the most complex scientific visualizations.

CSI computer scientists are also involved in larger collaborative computational science enterprises. In one with the Department of Energy, they are working in software support for large computations such as those that will monitor the status of the U.S. nuclear arsenal by exploding "virtual" bombs rather than real ones--at great savings to both the treasury and the environment.

Another aspect of the work of computer scientists at CSI is creating practical applications of computational science for CSI members in other fields of science. "These researchers are eager to apply computational science to their research," Malony says. "Our goal is to develop applications of this tool tailored to their specific needs in fields such as physics, biology, chemistry, linguistics, mathematics, and geology."

CSI member Doug Toomey, a UO seismologist, uses supercomputing muscle to create three-dimensional "CAT scans" of the earth (see photo), that reveal geological features miles below the ocean floor.

COMPUTATIONAL SCIENCE GIVES RESEARCHERS A POWERFUL NEW TOOL

During a continuing series of expeditions to mid-ocean ridges, Toomey has gathered an enormous volume of research data. With the aid of CSI computer scientists, he has been able to sift efficiently through the data and extract useful information in ways previously impossible. Another immensely powerful application of computational science, he says, is combining the data from various research efforts, sometimes conducted years apart. This wrings more results from the resources invested in research.

"Whole new avenues of research have opened up for me--not just because of the hardware but also because of having access to a very sophisticated group of computer scientists," Toomey explains. "With the aid of these scientists, I'm now able to push my research forward more efficiently." For example, one aspect of his work that used to take days is now completed in an hour.

Toomey is certain that scientists will increasingly come to rely on computational science. His students, he says, will be a part of this trend as they mature into tomorrow's working scientists. "My students are gaining experience not only in geology but also in developing algorithms for parallel computers. This is a powerful combination of skills--one future employers will recognize and seek out."

For Jan Cuny and Allen Malony, researchers such as Doug Toomey present challenges that serve as test beds for developing new ways of applying supercomputing power to real-world problems.

"It's a wonderful collaboration," Cuny says. "Together we've created a powerful tool, advancing high-performance computing, accelerating research in seismic tomography, and providing our students the opportunity to learn about the application of sophisticated computational technology to science."

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Computational Science
@ the University of Oregon

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Welcome to the University of Oregon Computer Science department's website for computational science. Computational science is a multidisciplinary field that combines research in the physical sciences with work in applied mathematics and computer science. There are several faculty and graduate students in the department involved in computational science-related projects such as bioinformatics, parallel computing, and software tools for computational science.

Follow the projects link to see what is currently going on in computational science or peruse selected publications in the publications page. The people link has information about some of the professors and students involved, as well as contact information. The conferences link is a list of computational science-related conferences.

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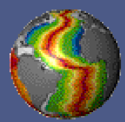

Doug Toomey

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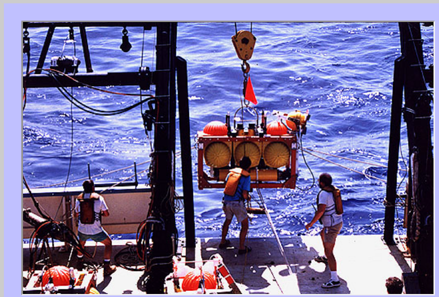

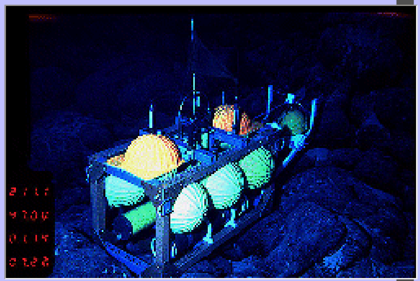

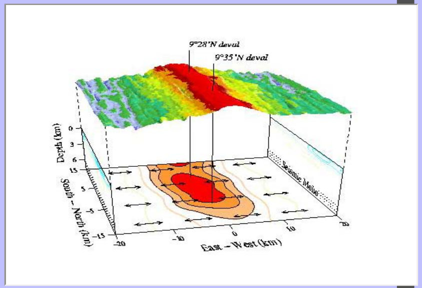

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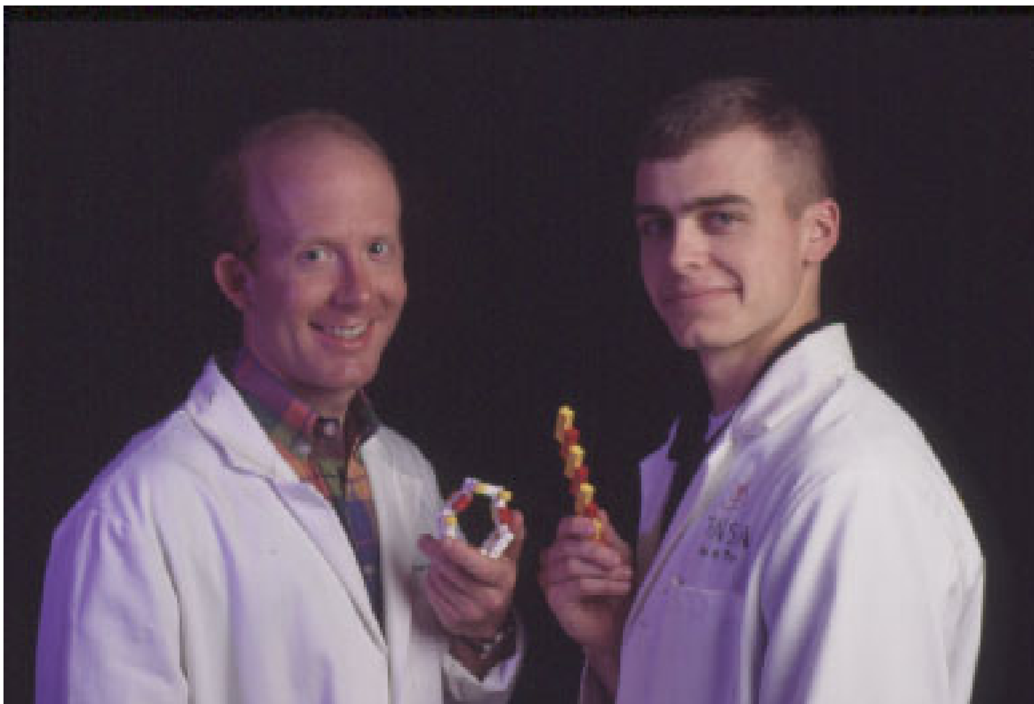
Chemical Bonds



Michael Haley and Charles Johnson

.While Michael Haley is impressed when he reflects on the achievements of the last fifty years of chemistry--plastics, synthetic fibers, pharmaceuticals, to name just a few--the assistant professor of chemistry at the University of Oregon believes that these are only the earliest contributions of a young, rapidly developing science that is destined to provide humanity with an ever-richer treasure-trove of ingenious and useful discoveries.

.Haley's own research focuses on the promising and rapidly evolving chemistry of carbon-rich molecules. Working in this same area of research, Rice University's Richard Smalley recently won a Nobel Prize in chemistry for his discovery of carbon-rich "buckeyballs," soccer ball-shaped molecules composed of sixty carbon atoms.

."With a buckeyball, you have a large molecule‹a polymer‹of one set shape that has some very interesting properties," says Haley. "In contrast, our group is interested in building up lots of carbon rich molecules of differing sizes and shapes. Our achievement is that we have created a simple method for building these complex compounds from smaller, easy-to-handle component parts. It's almost like snapping together LEGOs."

.What doors might this basic research open? Haley notes that commercial plastic production--an enormous industry--has been severely constrained due to chemists' inability to build up polymers from anything except stable compounds. For example, the common plastic polyethylene is made up of large numbers of stable ethylene subunits (technically called monomers). When banded together, these components form polymers that are remarkably useful and versatile. Haley's group is now able to prepare monomers that are considerably more volatile than ethylene. By allowing for the safe and commercially viable production of materials using volatile compounds, his innovative technique gives scientists a much larger set of building blocks to combine into whole new families of polymers.

"These molecules simply could not be created using old methods," Haley says. "Now that we have developed the technique, other scientists will creatively apply our basic research to innumerable applications--new materials with exciting and exotic properties, superconductivity or nonlinear optical properties, for example. It should be quite exciting."

A LABORATORY FOR MAKING MOLECULES, SHAPING MINDS

Haley credits much of his own success to the help he received from supportive and inspiring professors when he was a student. He now places a high value on training the students who work in his laboratory. "One of the most important things I do, and the chemistry department as a whole does this really well, is to teach undergraduate researchers to think about a problem critically--to be thinking, resourceful, high-quality scientists. These are skills they can use later on in their careers, whether at a chemical company, a pharmaceutical company, or at some other job that requires critical analysis of problems."

Charles Johnson, an undergraduate chemistry major now in his senior year, has worked in the Haley lab for eighteen months. His name appeared as a coauthor, along with two other undergraduates, on the article that presented Haley's breakthrough.

"The article appeared in the Journal of the American Chemical Society," Johnson says, "which is America's top chemistry journal."

In addition to adding a prestigious publication to his résumé, Johnson explains, working in Haley's lab "has shown me what the field of chemistry is like. It was a truly amazing feeling using Mike's technique to create molecules that no one else had ever made. I felt right on the cutting edge of technology."

Inspired by the experience, Johnson plans on pursuing a career as a chemist--another "chemical reaction" that snapped into place in the Haley lab.

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Photo of Mt. Hood by Bernd Mohr.
WEBMASTER: lynde@uoregon.edu

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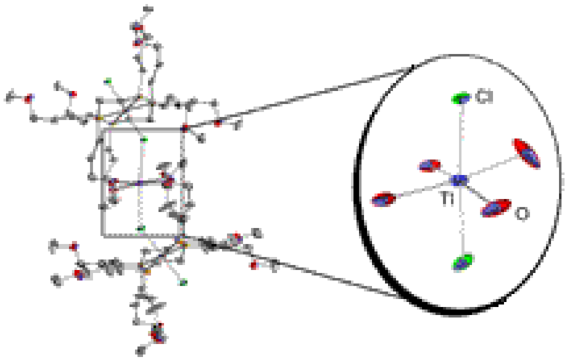

UO Lab Discovers Method to Assemble 1-D Coordination Polymers

Researchers in the Tyler lab recently demonstrated how "arrested" chloride abstraction reactions can be used to assemble 1-D coordination polymers.

PDF: Arrested chloride abstraction from trans-$RuCl_2(DMeOPrPE)_2$ with $TlPF_6$; formation of a 1-D coordination polymer having unusual octahedral coordination around Thallium(I). Nathaniel K. Szymczak, Fusen Han and David R. Tyler, Dalton Transactions, 2004, 3941 - 3942.

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http://www.ocean.udel.edu/extreme2002/ is s int

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Member, Materials Science Institute

B.A., Rice University, 1987. Ph.D., Rice University, 1991 (W. Edward Billups). Postdoctoral: University of California, Berkeley, 1991-93 (K. Peter C. Vollhardt). Honors and Awards: American Chemical Society, Division of Organic Chemistry Fellowship, 1990-91; NSF Postdoctoral Fellowship, 1991-93; NSF CAREER Award, 1995-1998; US-Israel BSF Ernst D. Bergmann Memorial Award, 1997; Richard A. Bray Faculty Fellow, 1998; Camille Dreyfus Teacher-Scholar, 1998-2003; Alexander von Humboldt Research Fellow, 2000-2001; Thomas F. Herman Faculty Achievement Award for Distinguished Teaching, 2002. At Oregon since 1993.

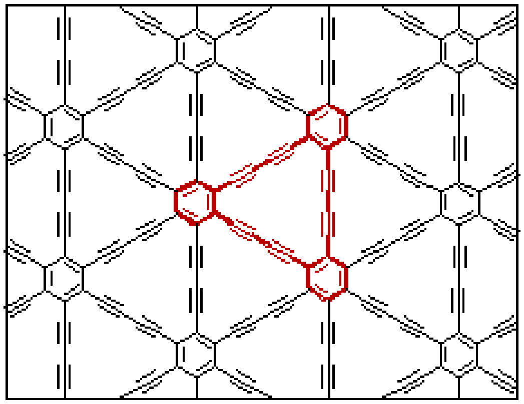
Research Interests:

The research interests of my group are deeply rooted in the exploration of important non-natural aromatic systems. The group utilizes current synthetic methodology for the preparation of novel organic materials and compounds of theoretical interest. We investigate these compounds by modern physical organic methods in order to determine the important physical and chemical properties of these systems, such as conductivity, non-linear optical activity, through-bond and through-space electronic interactions. Graduate and undergraduate students are actively involved in all aspects of the research, thus acquiring a strong synthetic and theoretical background.

1. Acetylene chemistry.

Carbon-rich materials are currently of extreme interest to researchers in many fields and have become the subject of an increasing number of experimental and theoretical studies due to the recent isolation and characterization of the fullerenes (C60, C70, etc.) in macroscopic quantities. The major focus of our research into these materials is on two overlapping subsets: (a) carbon networks and models, and (b) molecules with a high C:H ratio. Both studies are based on a class of molecules known as dehydrobenzoannulenes (DBAs).

Calculations predict stable, low energy phases of carbon consisting of stacked, planar carbon layers occupied by sp and sp2 states (e.g., **1**). The properties of these novel carbon networks are of great relevance in the search for organic conductors, electrochromic display materials, liquid crystals, synthetic ferromagnets, and non-linear optical substances. We have prepared a variety of DBA model compounds (e.g., **2** and **3**) for each network in order to compare the chemical and physical properties of the models with those we observe for the corresponding polymeric materials, thus allowing us to probe the monomer/polymer interface. Investigations with modern X-ray and solid-state NMR spectroscopic techniques are an important part in the identification of the extended frameworks.



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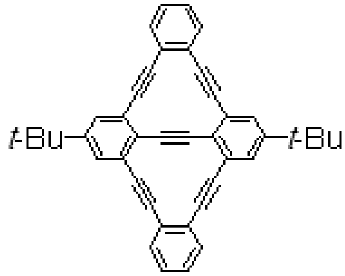

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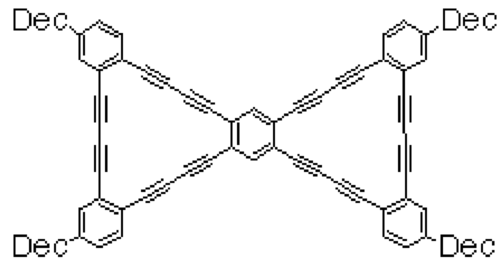

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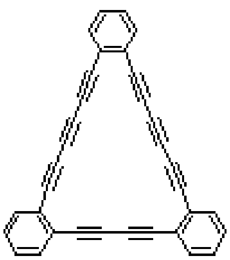
New synthetic methods developed during the network studies have allowed us to assemble a diverse array of DBA topologies, with nearly 100 macrocycles completed in the past eight years. The structures illustrated below represent some of these molecules. Compounds **4** and **5** represent the first examples of DBAs containing more than two consecutive acetylenic units per side. ‘Wheel’ **6** illustrates a new class of π-extended, fully conjugated fenestranes. We can now prepare structures incorporating transition metal fragments (e.g., **7**). Most importantly, the stepwise assembly process used to synthesize our macrocycles allows us to tailor the substituent placement on the aromatic rings, creating for the first time derivatized donor-acceptor structures like **8** for nonlinear optical applications.



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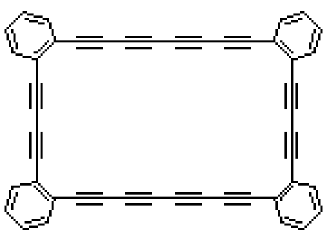

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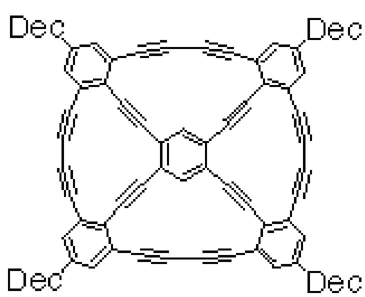

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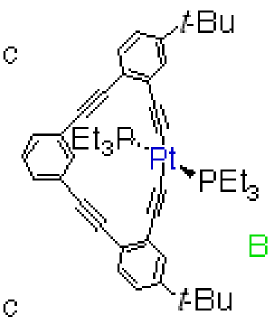

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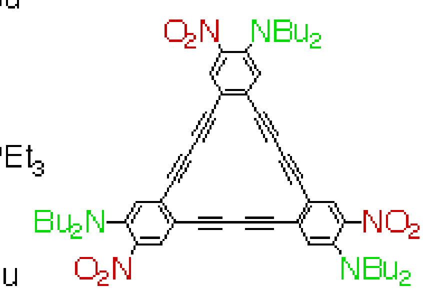

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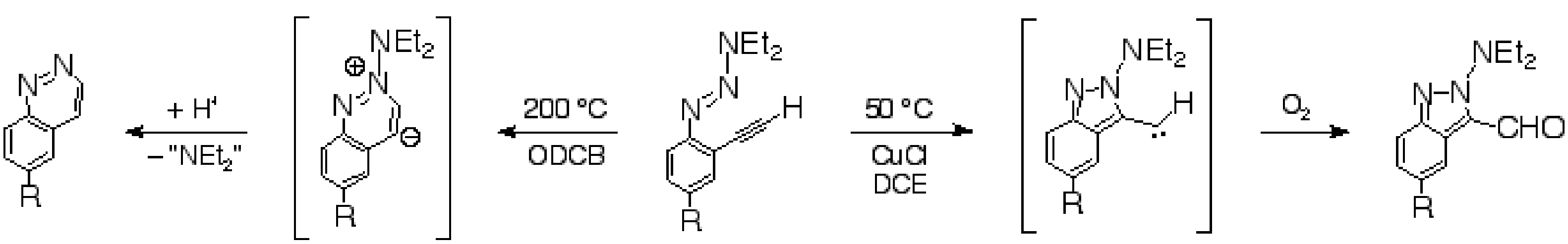
2. Heterocycle synthesis.

An offshoot of our annulene chemistry has been the discovery of two unusual cyclization reactions of (2-ethynylphenyl)triazenes (intermediates in annulene preparation) to give either cinnolines (**9**) or isoindazoles (**10**) in very good to excellent yields. Depending upon the choice of reaction conditions, the cyclizations can favor either a (pseudo)pericyclic or (pseudo)coarctate mechanistic pathway via zwitterion or carbene intermediates, respectively.



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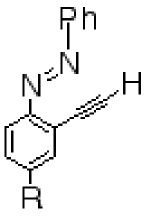
We are exploring the synthetic utility of this class of cyclization reactions to prepare other unusual heterocyclic compounds. In addition, we continue to probe the mechanistic details by both experimental techniques and theoretical (DFT) calculations. (2-Ethynylphenyl)phenyldiazenes (**11**) and 2-(phenylazo)benzonitriles (**12**) are two systems currently under investigation.



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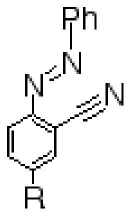

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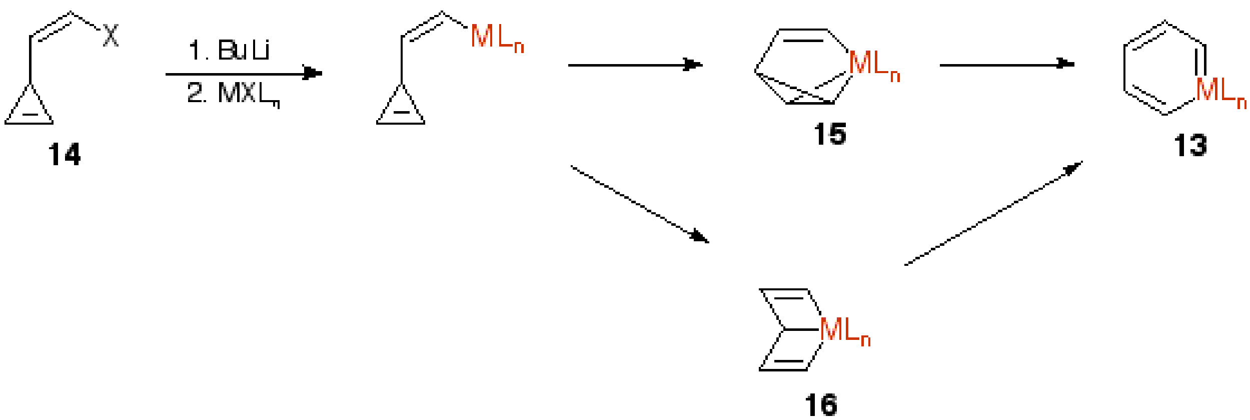
3. Metalla-aromatic chemistry.

This area of chemistry pushes the frontiers of our understanding of the bonding and reactivity in organometallics as often time systems of this type defy conventional wisdom. The key to our research is the preparation of cyclopropenes containing additional unsaturated moieties and their subsequent reaction with transition-metal reagents to yield novel organometallic complexes.

A metallabenzene (e.g., **13**) is a transition-metal analog of benzene in which one methine (CH) is replaced by an isoelectronic MLn fragment, yet the molecule retains "aromatic" physical and chemical properties. Although two dozen or so such structures are known, there was no general route that allowed entry into this class of molecules. Suitably substituted 3-vinylcyclopropenes (e.g., **14**) should make a general route accessible due to the inherent reactivity of the strained cyclopropene to undergo ring cleavage or ring expansion. Depending upon the substitution pattern on the cyclopropene and the organometallic reagent used, it should be possible to isolate the corresponding metallabenzene valence isomers **15** and/or **16**.



Using Vaska complexes and a 1,2-diphenyl derivative of **14**, we have recently prepared several new "iridabenzenes" as well as the first examples of "iridabenzvalenes" (Figure 1). Like a normal benzene valence isomer, iridabenzvalene **15** cleanly rearranges to an iridabenzene upon heating. Investigations into the syntheses and interconversions of these molecules should provide a wealth of new information on the mechanisms by which transition-metal centers effect the formation and cleavage of carbon-carbon bonds.

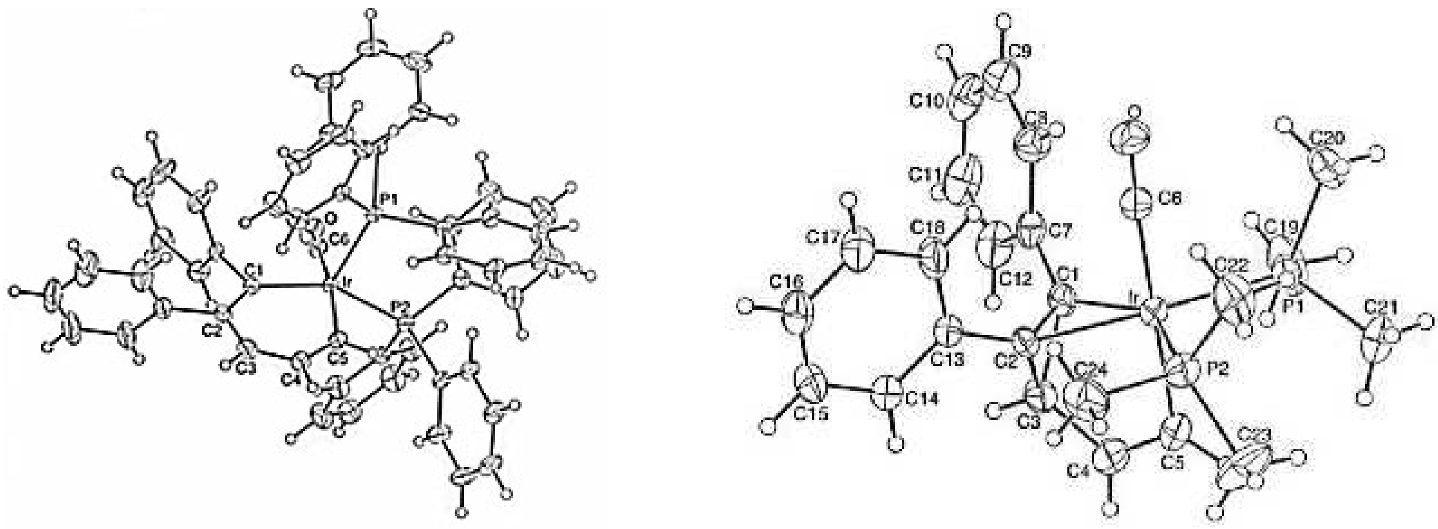


Figure 1. Molecular structures of iridabenzene **13** and iridabenzvalene **15**, respectively; ellipsoids drawn at the 30% level.

We have recently extended this new methodology for metallabenzenes to utilize other metals. The formation of a platinabenzene and a rhodabenzvalene, which are shown in Figure 2**,** illustrate the diversity of our route. Current work is focused on additional metal complexes (Ru, Os), as well as reactions involving new cyclopropene ligands where one or both of the phenyl substituents have been replaced by alkyl groups.

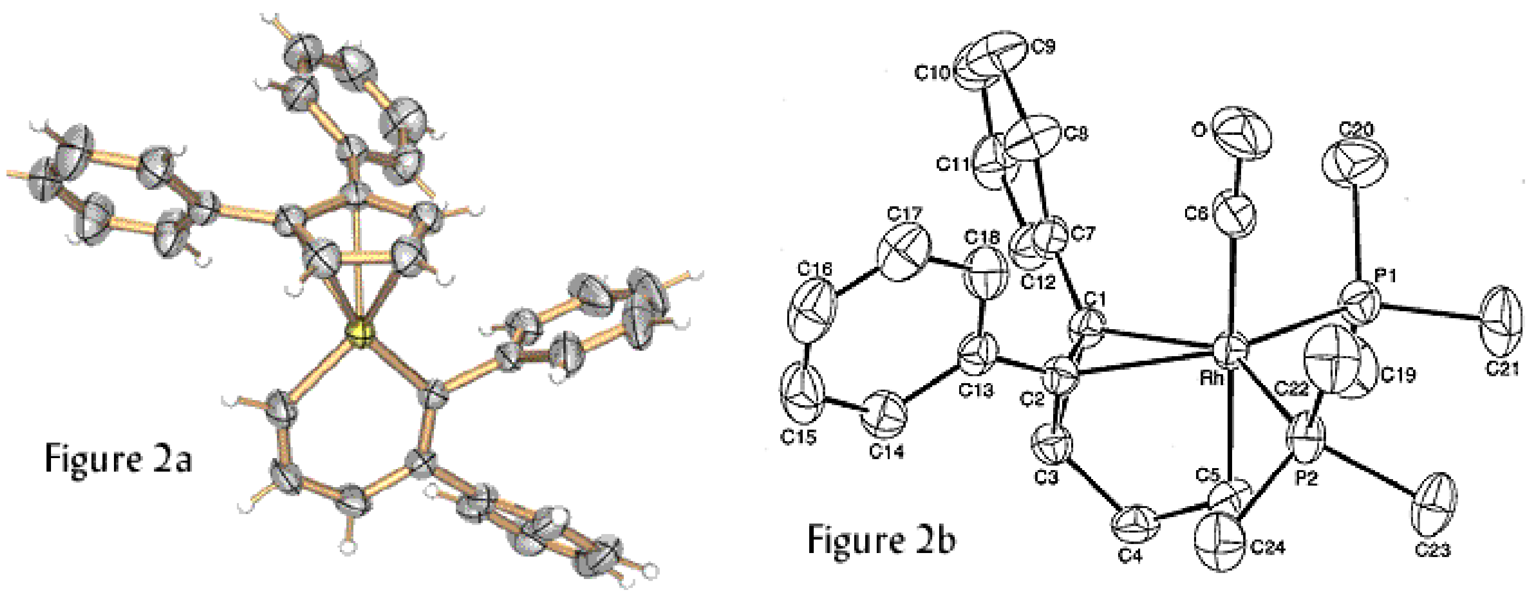


Figure 2. Molecular structures of a platinabenzene (left) and a rhodabenzvalene (right).

The work described on this web page has been generously supported by The National Science Foundation, The Petroleum Research Fund, The Camille and Henry Dreyfus Foundation, and The Alexander von Humboldt Foundation.

Selected Publications:

"Synthetic Strategies for Dehydrobenzo[n]annulenes." J. A. Marsden, G. J. Palmer, and M. M. Haley, *Eur. J. Org. Chem*. **2003**, 2355-2369.

"Let the Best Ring Win: Selective Macrocycle Formation via Pd-catalyzed or Cu-mediated Alkyne Homocoupling." J. A. Marsden, J. J. Miller, and M. M. Haley, *Angew. Chem. Int. Ed.* **2004**, 43, 1694-1697.

"Synthesis and Characterization of Multiply Fused Dehydrobenzoannulenoannulene Topologies." J. A. Marsden, M. J. O'Connor, and M. M. Haley, *Org. Lett.* **2004**, 6, 2385-2388.

"Cyclization of 1-(2-Alkynylphenyl)-3,3-dialkyltriazenes: A Convenient, High-Yield Synthesis of Substituted Cinnolines and Isoindazoles." D. B. Kimball, T. J. R. Weakley, and M. M. Haley, *J. Org. Chem.* **2002**, 67, 6395-6405.

"Deciphering the Mechanistic Dichotomy in the Cyclization of 1-(2-(Ethynylphenyl)-3,3-dialkyltriazenes: Competition Between Pericyclic and Pseudocoarctate Pathways." D. B. Kimball, T. J. R. Weakley, R. Herges, and M. M. Haley, *J. Am. Chem. Soc.* **2002**, 124, 13463-13473.

"Synthesis, Spectroscopy, and Structure of a Family of Iridabenzenes Generated by the Reaction of Vaska-type Complexes with a Nucleophilic 3-Vinyl-1-cyclopropene." R. D. Gilbertson, T. L. S. Lau, S. Lanza, H.-P Wu, T. J. R. Weakley, and M. M. Haley, *Organometallics* **2003**, 22, 3279-3289.

"Rational Synthesis of Platinabenzenes." C. W. Landorf, V. Jacob, T. J. R. Weakley, and M. M. Haley, *Organometallics* **2004**, 23, 1174-1176.

Additional Publications

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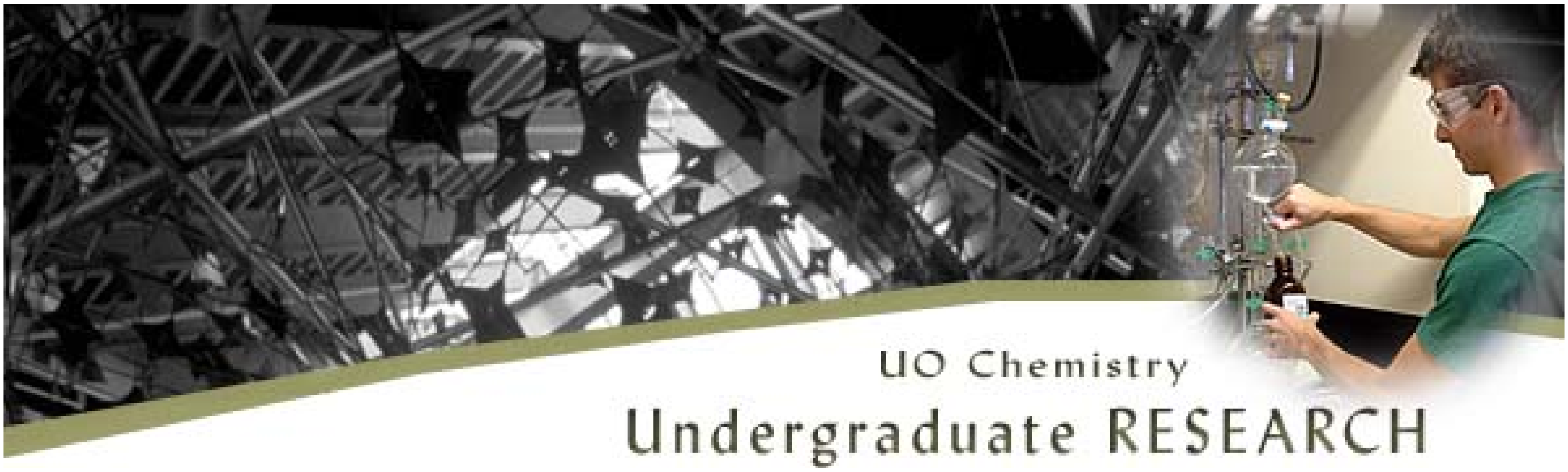

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Opportunities for Current Students:

The Department of Chemistry encourages well-prepared students to consider the possibilities of pursuing an undergraduate research project. Before enrolling in undergraduate research (CH 401) the student needs to consider the extent of his/her background and future interest in science. The great advantage of the undergraduate research experience is the opportunity it provides the student to work in a research equipped laboratory on a scientific problem that will take the student well beyond the scope of textbook instruction. Students can consider research options as early as the sophomore year. However, it is more common to find students in research laboratories during their junior and/or senior years. Excellent opportunities for undergraduate research are also presented during the summer months. While this can prove to be an exciting option for undergraduate majors in chemistry it is not one that should be taken lightly, for the research experience presents responsibilities both to the student and for the instructor.

The selection process for finding a research project involves approaching three to four faculty members, introducing oneself and explaining that you are interested in pursuing an undergraduate research project. After consideration of the research options available the student should make a decision and then revisit each faculty member and tell her/him what decision has been made. Students are not limited only to faculty members formally in the Department of Chemistry. There are many faculty members in related areas of science outside of the Department of Chemistry, molecular biology, neuroscience, chemical physics, physics, and cell biology, with whom students may conduct research projects for credit towards a chemistry degree.

Students earn academic credit from the undergraduate research experience by enrolling in Research (CH 401). Alternatively, students may earn an hourly wage in the research laboratory by arrangement with the individual faculty member. However, academic credit and an hourly wage can not be claimed for the same time commitment. Academic credit hours are required for the research experience to be applied towards the requirements for the B.S. or B.A. degree. If academic credits are selected the student needs to understand that three hours of laboratory work per week for the ten week term (fall, winter, spring or summer) are equivalent to one credit hour in CH 401. The exact number of credit hours for which a student may enroll during any one term depends upon the agreement reached with the faculty director. Students usually register for three credit hours each term, and consequently, assume a minimum weekly time commitment of 9 hours. If chemical research is included as part of the advanced elective for the chemistry major at least six credit hours of CH 401 must be completed. For more information students may contact jhaack@oregon.uoregon.edu in the Chemistry Office or any member of the chemistry faculty.

Summer Research Opportunities Outside UO

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Fall 1997

The Climes They Are A-Changin'

.Some climate models predict that Northwest temperatures may increase nearly seven degrees Fahrenheit in the next century. Along with changes in precipitation, these higher temperatures might give western Oregon hotter, drier summers like those now found in Sacramento but wetter winters like those that shroud the Olympic peninsula. "We haven't seen these kinds of conditions for thousands of years," says University of Oregon geography professor and climatologist Pat Bartlein.

Pat Bartlein

.What's behind these epochal changes? Bartlein explains that the climate of a place results from the globally interconnected forces that shape it...interactions among the atmosphere, oceans, ice sheets, the biosphere and, in the past 100 years, human beings.

."The effects on climate brought about by humans--primarily through greenhouse warming--seem to be increasing in scope and are potentially devastating," says Bartlein. "We're in a race to understand the changes in climate before they happen."

.But the race is more difficult than it once appeared. "Fifteen years ago climatologists generally felt that we would soon understand the 'climate system,' but now we are appreciating more and more fully the complex and often subtle nature of that system," he says.

.Bartlein sheds light on these subtleties by researching how past changes in large-scale climatic controls are felt at the regional and landscape level. "Our research shows that past temperature and rainfall changes have produced dramatic changes in vegetation," he says. "From this we know that the predicted changes in Northwest climate will significantly affect the region's plant life."

.This link was firmly established in his recent collaboration with fellow UO geography professor

Cathy Whitlock. By examining pollen in sediment at Carp Lake in southwest Washington, Whitlock established an unbroken history of local plant life dating back 125,000 years. She and Bartlein correlated this record with the known history of climate controls. At times the climate and vegetation at Carp Lake have switched dramatically, for example, between warm, moist forest and cold, dry steppe environments--sometimes within a few decades.

"Changes like this, accelerated in the next century by the Greenhouse Effect, could have big implications for the agriculture and forestry that are such important parts of the Northwest economy," Bartlein observes.

SCIENTISTS RACE TO UNDERSTAND EARTH'S DELICATELY INTERACTING AND POTENTIALLY DEVASTATING CLIMATE SYSTEM

Often in the headlines, El Niño is a set of unusual climatic conditions in the tropical Pacific that ultimately influence weather patterns in the midlatitudes, including Oregon. Bartlein is currently using El Niño as a teaching tool in his and Whitlock's introductory physical geography class. By monitoring a wide variety of resources he has gathered on the World Wide Web, Bartlein's students closely track El Niño's development.

"It clearly demonstrates the global nature of climate by showing that our weather is directly connected to weather patterns in South America, the Pacific, and Asia," he says. "In the long run, El Niño-produced climatic variations are smaller than those that could result from global warming, but their day-to-day effects are quite remarkable and instructive." Nevertheless, it is the long-term effects of greenhouse warming that concern Bartlein most.

"Climatologists are doing all we can to discover the mechanisms and implications of this change before it is too late to take steps to reduce the effect or adapt to the change," he says. "This is not a race we can afford to lose."

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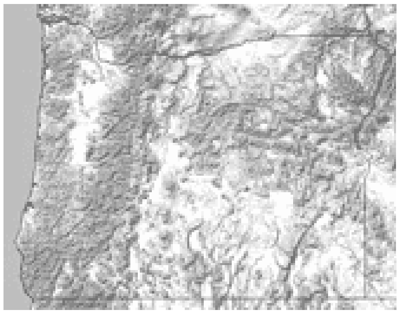

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Bill Loy Award for Excellence in Cartographic Design and Geographic Visualization

We are pleased to announce the establishment of an award to honor Bill's many contributions in cartographic education. The *Bill Loy Award for Excellence in Cartographic Design and Geographic Visualization* will be given annually to deserving graduate and undergraduate geography students at the University of Oregon. Students will submit a cartographic or visualization product and written statement explaining the significance of the design and their role in developing the product.

Announcement of the competition will be on Oct. 13th (Bill's birth date and the copyright date of the *First and Second Editions of the Atlas of Oregon*). The award will be given at the end of winter term.

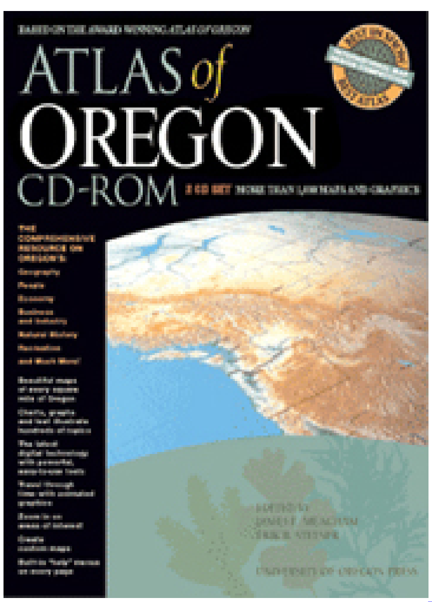
Donations to the *Bill Loy Award Fund* are appreciated. Donations can be directed to the University of Oregon Foundation (PO Box 3346, Eugene, OR 97403-3346) for the Geography Department in the name of Bill Loy.

UNIVERSITY OF OREGON
DEPARTMENT OF GEOGRAPHY

Bill Loy (1936-2003)

Bill Loy Award for Excellence in Cartographic Design

To apply for the Loy Award -click here



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- Available now from the ***UO Press***
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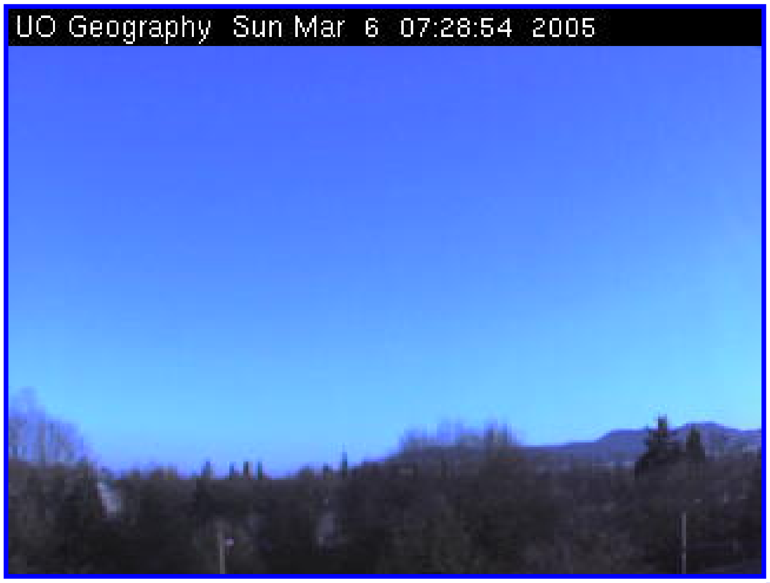

[Department Weathercam [click to enlarge]]

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INQUIRY

Fall 1997

Getting Things Done in Rural Oregon


David Povey

.Towns in rural Oregon are facing some tough questions. *What will our community be like in ten years? What employment opportunities will exist? Should we try to attract tourists? How will watershed protection, ecosystem analysis, and other "new" environmental-management techniques affect our economy, our salmon stocks, and our quality of life?*

."The answers to these questions are important for almost every rural town; for some, they may be the difference between flourishing and fading away," says David Povey, a University of Oregon professor of planning, public policy and management.

.Since 1994, Povey has been helping rural communities find answers through a program he heads called Resource Assistance for Rural Environment (RARE).

.Here's how RARE works. Students interested in gaining experience in community and regional development apply for placements in rural Oregon communities. Every year approximately twenty-five students (a mix of undergraduates and graduates) are selected. Each participant receives a year of training at the UO, before moving to a community where he or she works 1,700 hours over a year's time. An additional five students each year choose to participate in RARE after they have completed their master's degrees.

.The rural community provides half of the $30,000 it costs to train, place, and support a full-time RARE intern. Each participant goes to a community equipped with a computer, modem, and printer; this hardware stays in the community after completion of the RARE assignment. "Our aim is to get things done in the towns of rural Oregonóand that's what we do. We started out in 1994 with fourteen students," Povey says. "Now we are up to about thirty per year. By the end of this year's program, we'll have found rural-development opportunities for ninety-four students in as many towns or watersheds across the state of Oregon."

.RARE participants provide various kinds of community services, including:

- **Community Development:** Main-street renovations, business assistance, and development of community volunteer programs
- **Community Planning:** Assisting with land use inventories, developing GIS maps, planning revisions, and encouraging citizen involvement
- **Watershed Coordination:** Helping to form, train, and staff watershed councils; training residents in water-quality assessment; writing grants
- **Rural Policy Liaison:** Helping to connect rural issues and opportunities with emerging state policies
- **Schools:** Engaging students and teachers in community-service activities such as stream renovation

."Our students are widely noted for their success in writing proposals that bring in much-needed funding," Povey says. "In the past thirty months alone, they've helped find $2.2 million."

THE RARE PROGRAM BRINGS ENERGY, EXPERTISE, AND GRANT MONEY TO SMALL TOWNS

.The money is earmarked for such useful projects as renovation of a coastal cannery, downtown improvements, water projects, training for displaced timber workers, and events to increase tourism. RARE-generated grants have also helped fund volunteer fire fighting, recycling and weed-eradication programs, water festivals, water conservation programs, and other events that protect and enhance the rural environment and help promote community solidarity.

.More than fifty towns requested this year's thirty participating students. These students outshined forty other student applicants who were not accepted into the highly competitive program.

."RARE provides know-how and energy in the form of highly motivated students," Povey notes. "It really gets results for rural communities and provides valuable professional experience for our students."

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[U of O]

Department of Planning Public Policy & Management
University of Oregon

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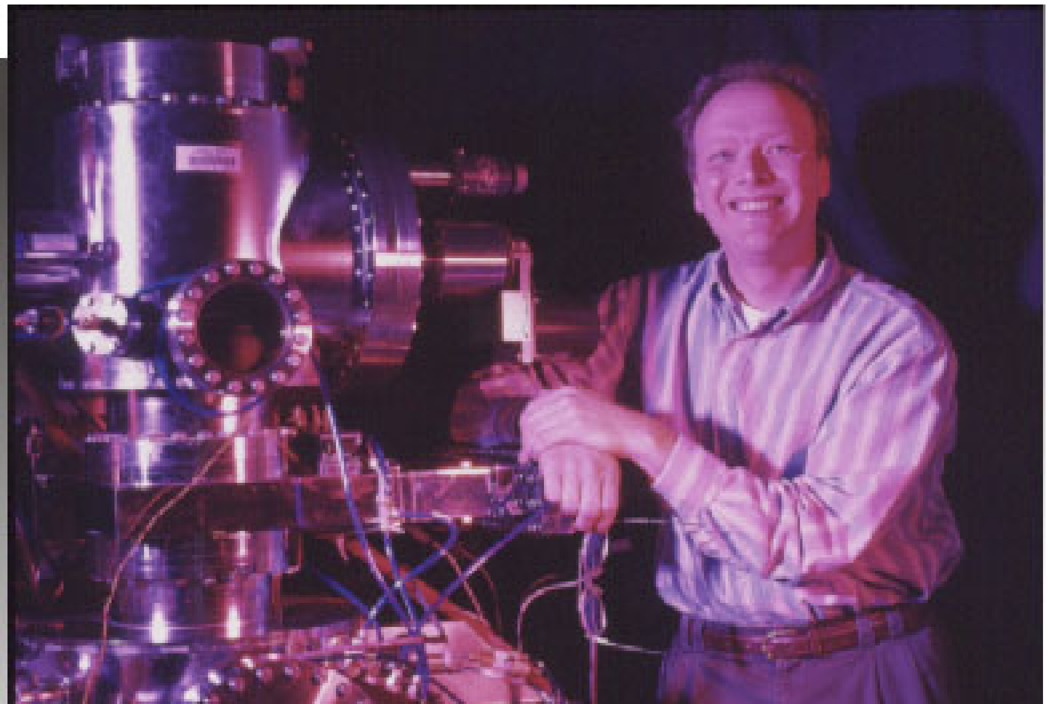
Compound Interest

Waterproof Gortex, stick-resistant Teflon, and bulletproof Kevlar are just a few of the extremely useful materials common today that until quite recently were unknown. Remarkably, the rapidly developing field known as materials science, which has already made significant contributions in such important fields as medicine, computer technology, and telecommunications, is still in its infancy.


Dave Johnson and evaporation chamber

"It is a very 'hot' area of science," says Dave Johnson, director of the University of Oregon's Materials Science Institute, "in part because advances in our labs can find their way into the market in a very short time."

Johnson likes to explain his work in, well, concrete terms. "Construction engineers have known for a long time that concrete has great compressive strength and steel has great tensile strength. By combining the two materials in steel-reinforced concrete, they end up with a superior material that utilizes the best characteristics of both. We do a very similar thing on a molecular level." (see "Principal Research Interests".)

While reinforced concrete is useful for construction purposes, the techniques Johnson is developing could yield exotic new materials useful in many fields. For example, superhard materials could make better drill bits, industrial saws, or razor blades; materials that combine hardness and heat resistance could be used in superdurable jet engines.

"We are learning how to combine the desirable properties of material A and material B to make hybrid materials with combinations of hardness, slipperiness, resistance to acid, special electrical responses--all kinds of properties."

To make these materials, Johnson uses a sophisticated machine called an evaporation chamber. By vaporizing material at very high temperatures, then "letting the dust settle," the machine lays down extremely thin layers--often only one atom thick--of individual materials one on top of another, like layers of different-colored paint. The materials can then be made to combine into new supercompounds.

> BY PUSHING THE LIMITS OF KNOWN CHEMISTRY AND PHYSICS, RESEARCHERS ARE CREATING NEW AND USEFUL MATERIALS

One of the compounds Johnson is investigating has "thermoelectric" properties; that is, a flow of electricity makes the material cool at one end and hot at the other. This property can be exploited in various ways: power generation from waste heat, air conditioners, or small refrigerators--even a "cooling chip" for personal computers and other microelectronic devices where heat buildup is a problem. Using old methods only a few thermoelectric materials could be produced, but Johnson's lab has devised trail-blazing techniques to produce numerous new thermoelectric compounds with the potential for enhanced performance. Several manufacturers are working with the lab to explore the commercial potential of these new materials.

In the mid 1980s the Oregon Centers of Excellence program, instituted by the Oregon Legislative Assembly to promote the state's economic future, provided the university with funds to create the Materials Science Institute. Johnson, then working as a senior scientist for the DuPont corporation, was one of the first researchers hired. Since then, the institute has blossomed, growing to fourteen faculty members and between forty and fifty graduate students.

"Our work feeds the developing Oregon economy with highly skilled individuals," Johnson says. "Our students get the best of both worlds: a big research university's facilities and top professors, but small classes and the opportunity--even as undergraduates--to work in a research lab." In addition, he notes, beginning next year, the institute's graduate students will be able to apply for six- to nine-month internships with some of Oregon's leading high-tech corporations.

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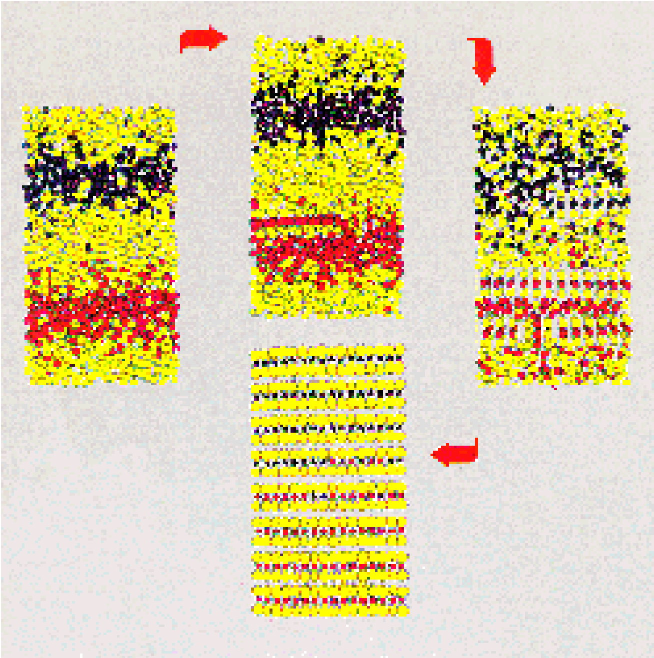
Member, Materials Science Institute

B.A., Rutgers University, 1978. Ph.D., Cornell University, 1983 (M.J.Sienko). Postdoctoral: Cornell University, 1983-84 (M.J.Sienko). Honors and Awards: Henry Rutgers Undergraduate Research Scholar, 1977-78; Office of Naval Research Young Investigator Award, 1987-1990. At Oregon since 1986.

Research Interests:

Our objective has been to develop a new synthetic strategy which overcomes the limitations inherent in the currently used techniques. The key conceptual advances which we developed are the use of a homogeneous amorphous solid as a reaction intermediate and the use of elementally modulated superlattices as a reactants.

The use of elementally modulated superlattices as reactants give us several important synthetic parameters and in situ probes which we exploit when using our synthetic approach. These reactants are prepared using thin film deposition techniques and consist of ƒngstrom scale layers of the elements to be reacted. One element can be easily substituted for



another, allowing rapid surveys over a class of related reactions and synthesis of isostructural compounds. The diffusion distance is determined by the multilayer repeat distance which can be continuously varied. This has proven to be an important advantage of our approach, allowing us to experimentally demonstrate changes in reaction mechanism as a function of interdiffusion distance. The multilayer repeat distances can be easily verified in the prepared reactants using low angle x-ray diffraction.

The second important advantage of elementally modulated reactants are the availability of in-situ probes of both energy and structure. These in-situ probes allow us to follow structural and energetic changes in reactants as a function of initial structure and subsequent annealing conditions. The short diffusion distances in the multilayer reactants result in low reaction temperatures and rapid reaction rates allowing the energetic changes occurring in the reactions to be followed using scanning calorimetry. Low angle x-ray diffraction collected as a function of temperature and time permits the interdiffusion of the reactant to be characterized quantitatively. High angle diffraction combined with transmission electron microscopy are used to determine the structure of crystalline products and the absence of crystalline compounds in amorphous intermediates. These techniques provide detailed information about the reaction pathway, enabling us to tailor the structure of the initial multilayer precursor and the annealing parameters to produce a desired product.

The information obtained from these in-situ probes has permitted us to develop reaction mechanisms for the evolution of these reactants and demonstrate how the initial structure controls the subsequent reaction pathway. We have found that it is generally possible to decrease the layering thickness to the point where binary compounds no longer nucleate at the reacting interfaces. By using ultra-thin repeat distances in the starting multilayer below this critical thickness, it is possible to completely eliminate diffusion as a rate limiting step, forming a metastable amorphous mixture. From this intermediate amorphous phase, the kinetics of nucleation determine which of many possible compounds will form. We have shown that the nucleation kinetics can be controlled by the average composition of the mixture. This approach has been used to selectively prepare both binary and ternary compounds without the formation of crystalline compounds as reaction intermediates.

Our research has shown that the synthetic strategy outlined above is successful in a variety of different materials systems. We have prepared binary and ternary selenides, carbides, silicides, and antimonides containing transition metals as well as rare earth metals using this methodology. This makes this approach very powerful for exploratory synthesis. One can avoid known compounds, which are thermodynamic traps, in a wide variety of systems using the same synthetic methodology. Present efforts are centered on ternary iron antimonide thermoelectric materials as well as ternary transition metal systems with extended metal-metal bonding. These metal-metal bonded "molecular" solids have unusual chemical flexibility and a wealth of unusual properties, which make them ideal candidates for materials research. Synthesis is usually difficult because stable binary phases tend to form, and these are very inert towards further reaction. The kinetic control of the reaction pathway provided by elementally modulated reactants allows us to avoid the formation of these binary phases. We also exploit the chemical flexibility of these systems to fine- tune structural parameters. In this way, traditional chemical concepts such as bond ionicity and localized magnetic moments are related to more exotic phenomena such as superconductivity and lattice instabilities.

More recently, we have used the ability to tailor diffusion path lengths to prepare crystalline superlattices with designed superstructure. These crystalline superlattices contained the desired number of unit cell thicknesses of two binary or ternary compounds within the repeating unit of the superlattice. This synthesis begins with the preparation of a modulated reactant. By depositing controlled amounts of each element in a desired sequence, we control the exact amount and spatial location of all of the elements necessary to make the desired superlattice. Annealing at low temperatures results in the crystallization of the desired binary compounds, which form layers due to their spatial modulation. Higher temperature annealing eliminates defects and results in well formed crystalline superlattices.

While work in this area is relatively new, it raises exciting possibilities. What determines whether a superlattice product is a composite or a new compound? Obviously, on a micron modulation scale, the material is a composite in which the physical properties result from the component compounds. As the length scale of the compositional modulation decreases to a few ƒngstroms, a transition from composite behavior to that of a new compound should occur in which observed physical properties do not derive from the component compounds. Exploring the evolution of properties throughout this transition region presents an important opportunity to gain insight into the design of materials with desired properties. Such research is multidisciplinary in nature, presenting significant challenges in synthesizing new materials with designed structures, determining their atomic structure (particularly through the transition region between component compounds), and measuring their physical properties. Controlled crystallization of superlattice reactants provides an additional synthetic route to these materials and increases the variety of compounds which can be intergrown.

Researchers in Johnson's group characterize the materials they make in several ways. They use variable temperature X-ray diffraction (both powder and single crystal) and transmission electron microscopy to obtain structural information. They measure physical properties such as magnetic susceptibility, electrical conductivity, electron spin resonance, thermal conductivity, Seebeck coefficients, superconducting critical temperatures - in short, anything that gives them information about the electrons in the system, both as magnetic moments and as charge carriers. Because many interactions are temperature-dependent and rather weak, they measure many of these properties as a function of temperature, typically from below 4.2K to room temperature or above. The results of the measurements are used to guide further synthetic efforts. Researchers become experts in both synthesis and characterization of the new compounds they prepare.

Research in the Johnson Lab is Supported by: The National Science Foundation, The Office of Naval Research, and the National Renewable Energy Laboratory.

Selected Publications:

109. J M. Jensen, A. B. Oelkers, R. Toivola, David C. Johnson, J.W. Elam and S. M. George, "X-ray

Reflectivity Characterization of ZnO/$Al_2$20$_3$ Multilayers prepared by Atomic Layer Deposition" Chemistry of Materials, 14 (2002) 2276-2282.

110. Polly A. Berseth, Thomas A. Hughes, Robert Schneidmiller, Arwyn Smalley and David C. Johnson, "Low Temperature Synthesis Using Modulated Elemental Reactants: A New Metastable Ternary Compound NixMoSe2" Solid State Science 4 (2002) 717-722.

111. Joshua R. Williams, Mark Johnson and David C. Johnson, 'Suppression of Binary Nucleation in Amorphous La-Fe-Sb Mixtures" Journal of the American Chemical Society. 123(12) (2003) 3589-3592.

112. Joshua R. Williams, Mark Johnson and David C. Johnson, "Synthesis of Crystalline Superlattices Using the Modulated Elemental Reactant Method" Journal of the American Chemical Society, 12(34) (2003) 10335-10341.

113. Jacob M. Jensen, Sochetra Ly, Xavier Kyablue, and David C. Johnson, "Selective Preparation of Nickel Silicides and Germanides Using Multilayer Reactants," Mat. Res. Soc. Symp. Proc. 2002, 755 (Solid State Chemisry of Inorganic Materials IV), 393-397.

114. Jacob M. Jensen, Sochetra Ly, Xavier Kyablue and David C. Johnson, "Length scale dependent variation of the first nucleated phase in nickel-silicon multilayers", Journal of Applied Physics, 94(2), (2003) 1252-1257.

115. Fred. R. Harris, Stacey Standridge, Carolyn Feik and David C. Johnson, "Design and Synthesis of [(Bi2Te3)x(TiTe2)y] Superlattices", Angewandte Chemie, International Edition 42(43), (2003) 5296-5299.

116. Jacob M. Jensen, Sochetra Ly and David C. Johnson, "Low Temperature Preparation of High Temperaure Nickel Germanides Using Multilayer Reactants." Chemistry of Materials, 15(22) (2003) 4200-4204.

117. Arwyn L. E. Smalley, Seok Kim and David C. Johnson, "Effects of Composition and Annealing on the Electrical Properties of CoSb3" Chemistry of Materials, 15(20) (2003) 3847-3851.

118. Arwyn L. E. Smalley, Michael L. Jespersen, David C. Johnson, "The Synthesis and Structural Evolution of RuSb3, a New Metastable Skutterudite Compound" Inorganic Chemistry, 43(8) (2004) 2486-2490.

Additional Publications

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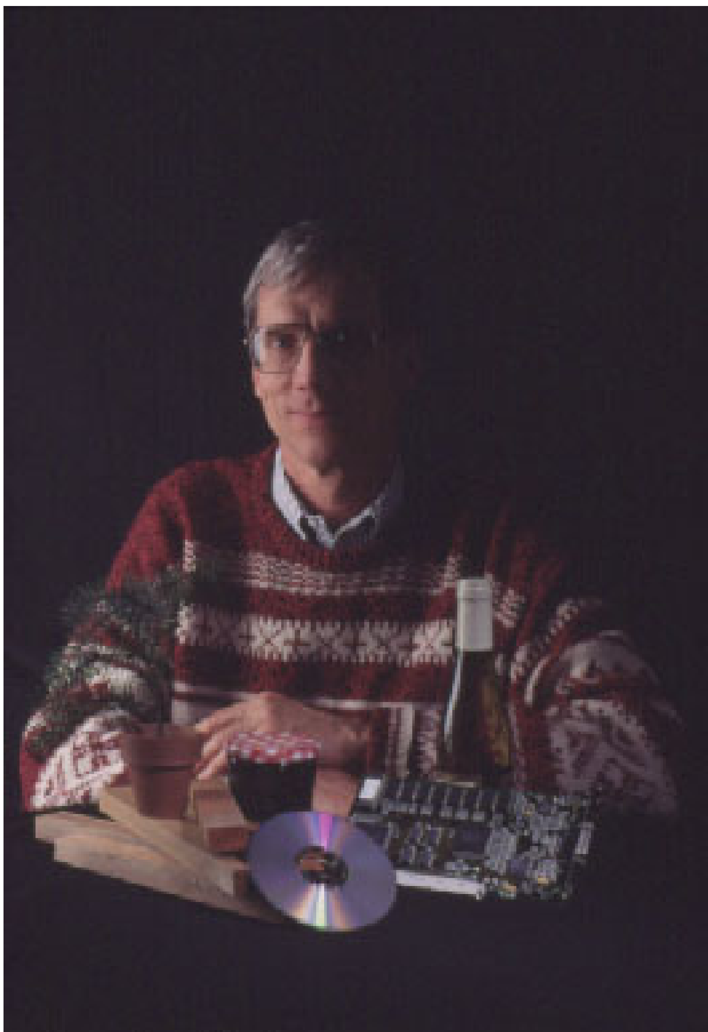
Electrochemistry & Materials Science

INQUIRY

Fall 1997

Costs and Benefits: Reflections of an Oregon Economist



Ed Whitelaw

Professor Ed Whitelaw has been in the department of economics at the University of Oregon since 1967. A recognized expert on the state's economy, Whitelaw has written extensively about urban and regional economics, resource and environmental economics, and the economic consequences of policy decisions. He has served on advisory panels for organizations ranging from the Oregonian and the Portland Business Journal to the Northwest Power Planning Council, the U.S. Environmental Protection Agency, and the Governor's Council of Economic Advisors.

Much of your recent work focuses on the relationships among regional economic growth, environmental amenities, and natural resources. How can we most successfully balance these areas?

EW: By paying close attention to them. Historically and politically, we, as a state, tend to get seduced by the siren call of exports, whether it's two-by-fours, CDs, or wine. We forget that it is internal factors-our human capital, our education and training, as well as our natural capital, ranging from streams and rivers to the coastline to the mountains to the forest slopes-that play an enormous and determining role in the Oregon economy over time. How we deal with these things, husband them, conserve them, and use them shrewdly--that's really what determines our economic future.

. You once wrote, "Growth, slow growth, no growth, the debate never goes away." Where are we with the debate now?

. EW: Probably where we were when I said that! Well, actually I think we may have made some progress. I get the impression more voters are beginning to understand that with growth we get both costs and benefits and that individuals, households, firms, and governments should pay for or otherwise account for the cost they impose on others. That goes for traffic congestion, air pollution, noise, water pollution . . . the list goes on.

. That's a list of what economists call externalities--things often overlooked in short-sighted accounting--isn't it?

. EW: You got it.

. How's Oregon stacking up to the rest of the country?

. EW: Well, I still think it's a great place to live. And our unemployment rates are very low. Of course, this is a two-edged sword: more people who aren't here now will find it attractive to move here. Many of the things we value will be threatened by those who would like to share them with us. Therefore the growth, slow-growth, and no-growth debate will persist.

. What role does education play in our prosperity?

. EW: Education plays a complementary and pervasive role in helping the economy, in the human capital it builds through educating our kids as well as in the linkages between the researchers and teachers on our campuses and the rest of the state. By almost any yardstick you use to measure the state and its prosperity, education plays a very positive role.

. How does education build capital?

. EW: For economists, capital is the product of investment. It could be investment in machinery, buildings, roads, and sewers, it could be the investment we make to educate a ten-year-old elementary school kid, a twenty-year-old college student, or a fifty-year-old who is seeking some additional knowledge or training. Those are all investments that are durable, that last, and that we, as a society, can benefit from over a long period of time. In addition, there is the research, the ideas, the innovative, catalytic, stimulative role that a university can play.

"GROWTH, SLOW GROWTH, NO GROWTH, THE DEBATE NEVER GOES AWAY."

. How would you complete this sentence? "My biggest fear for Oregon is . . . ."

. EW: The all-too-human traits of squinting, of myopia, of failing to see the forest for the trees, of failing to look beyond next November's elections, of living for today and forgetting tomorrow--all of those cliches. There isn't a quick fix, nor is there a silver bullet. It's complex, it's dynamic; and eternal vigilance is the price of prosperity.

. Are you generally optimistic or pessimistic about where the state is headed economically?

. EW: I confess to being a congenital optimist. In this case, however, I think there's a good chance we will blow it. By that I mean not exploit the comparative advantages we have in both our natural and our human capital. But I hope we figure it out--with time and education and thoughtful conversations, I think we might. I don't know that we will, but I think we might.

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UO in the Spotlight

Attention Shoppers: UO Named a "Best Buy"

.The University of Oregon is one of the best bargains around, according to The Fiske Guide to Colleges, a popular college guide for prospective students. In its "Best Buys" list of 43 public and private schools in the 1998 edition, the UO is one of only three universities on the West Coast and one of only four schools west of the Mississippi River to make the list. The Fiske Guide includes the editors' selection of public and private schools that "constitute the 'Best Buys'--where you can get the best possible education at the most reasonable cost."

UO Research Funding at Record Level

.UO researchers are attracting record levels of support, with 567 individual research awards bringing in $54.7 million in external funding for fiscal year 1996-97. This total compares to 534 awards in FY 1995-96 which totaled $46.2 million.

The Next 'Net

.UO researchers are playing a key role in developing technologies to replace today's Internet with the Next Generation Internet, a network of vastly increased power and capability. The Defense Advanced Research Projects Agency, developers of the first Internet, has awarded UO computer scientists $1.2 million to conduct basic research for the project. UO researchers will address quality of service issues in the $300 million effort.

Genius Grant

.UO biologist Russell S. Lande has received a $250,000 1997 MacArthur Fellowship, also known informally as a "genius grant." Lande's contributions in quantitative genetics have influenced the work of researchers in many areas of evolutionary biology, including animal and plant breeding systems, extinction processes and sexual selection.

Kudos for Entrepreneurship Program

.The U.S. Association for Small Business and Entrepreneurship has selected the University of Oregon's Charles H. Lundquist College of Business to receive its award for the 1997 Outstanding MBA in the Field of Entrepreneurship.

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UO JOURNALISM SCHOOL HOSTS WORKSHOP FOR MINORITY TEENS

Contact John R. Crosiar (541) 346-3135 June 12, 1997

NOTE TO EDITORS: For information about workshop activities through June 21, please call the UO Office of Communications, (541) 346-3134.

EUGENE--Eighteen minority teens from 16 high schools in 12 Oregon cities will learn about newspapers and polish their journalistic skills during a June 15-21 workshop at the University of Oregon School of Journalism and Communication.

Funded by a grant from the Oregonian Publishing Co. and the S.I. Newhouse Foundation, the week-long session will provide instruction and hands-on practice in topics ranging from interviewing to digital imaging, according to John Russial, assistant professor and workshop coordinator.

"The workshop is an excellent opportunity for minority students to explore journalism as a career option," he said. "It's also a great opportunity for news professionals to serve as mentors for high school students who have an interest in the field."

Russial added that the UO workshop and others like it across the country "support the newspaper industry's very important goal of ensuring that a wider range of voices and perspectives are heard in journalism."

Students, ranging in age from 15 to 18 years old, were recruited from communities throughout Oregon by their teachers, advisers and local newspaper editors and publishers. Reporters, editors and photographers from The Oregonian in **Portland**, The Mail Tribune in **Medford**, The Statesman Journal in **Salem** and The Register-Guard in **Eugene** will join Russial, emeritus professor Ken Metzler and journalism dean Tim Gleason as the teaching faculty for the workshop.

Anne Burnett, a UO journalism graduate student, and Kathryn Campbell, a UO journalism alumna now pursuing a doctoral degree at the University of Wisconsin, Madison, will assist.

While they're on campus, workshop participants will "learn by doing," studying reporting and newswriting, interviewing and feature writing, news photography, copyediting, newspaper design and layout, opinion writing, legal issues and media careers.

"They'll also interview campus sources and participate in mock news conferences," Russial said. "Throughout the week, the students will create and produce a lab newspaper that we plan to publish on the World Wide Web, making it available to anyone with Internet access."

Workshop participants will stay in the university's Walton residence hall complex. Serving as resident assistants will be Jack Orozco, a senior electronic media journalism major from **Eugene**, and Erica Pereira, a junior journalism student from **Rio de Janeiro, Brazil**.

Oregon high school students selected for the UO workshop include:

COOS BAY--Meliah Mesiba, 15, a freshman at Marshfield High School.

DALLAS--Andrea Kezar, 15, a freshman at Dallas High School.

EUGENE--Favoure Miller, 18, a senior, and Brandy Rochelle, 16, a sophomore, both at Churchill High School; and Marieke Young, 16, a junior at South Eugene High School.

GERVAIS--Karina Morales, 17, a junior at Gervais High School.

HERMISTON--Angelic Rome, 16, a junior at Hermiston High School.

INDEPENDENCE--Cruz Lopez, 15, a freshman at Central High School.

MILWAUKIE--Yvonne Ngai, 16, a sophomore at Milwaukie High School.

ONTARIO--Natalie Lopez, 16, a sophomore at Ontario High School.

PORTLAND--Heather Cain, 17, a junior at Benson High School; Eric Mashia, 16, a junior at Jefferson High School; Wasim Rahman, 16, a junior at Lincoln High School; and Sony Han, 16, and Annalisa Perez, 15, both sophomores at Marshall High School.

REEDSPORT--Ana Laura Villalobos, 16, a junior at Reedsport High School.

SALEM--Jenny Hsu, 15, a sophomore at Sprague High School.

SPRINGFIELD--Rebecca Sanchez, 15, a sophomore at Thurston High School.

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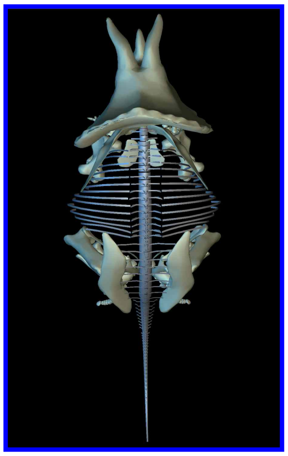

Bioinformatics Research Published in *Nature*

 CIS graduate student, Bryan Kolaczkowski, and UO assistant professor of biology, Joe Thornton, used a small supercomputer to simulate the evolution of thousands of gene sequences on a hypothetical evolutionary tree. (cont.)

Colloquium Honors Work of Prof. Andrzej Proskurowski

 The Department recently hosted a special Colloquium honoring CIS theory faculty Dr. Andrzej Proskurowski on the occasion of his birthday. (cont.)

Welcome to New AI Faculty Dejing Dou

 The CIS department welcomes our newest faculty member, Assistant Professor Dejing Dou, whose research focuses on practical as well as theoretical aspects of Artificial Intelligence, Databases, Biomedical Informatics and the Semantic Web. (cont.)

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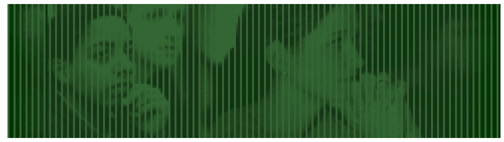

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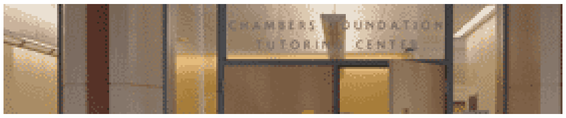

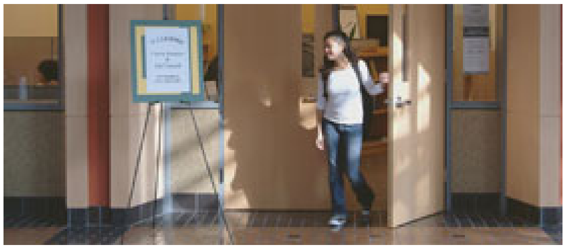

New Tutoring Center Location Breeds Success

The Lillis Business Complex is more than a new state-of-the-art facility. It is a functional part of the curriculum, a physical presence that plays a major role in the unique approach to business education at the University of Oregon's Charles H. Lundquist College of Business. Read More...

When was the last time you acquired 24 skills in just one day?

Negotiations Seminar March 17-18

::More News

Students Analyze Case Developed by Professor and Hewlett-Packard

Four Recognized as Distinguished Research Scholars

New Research Argues that Mutual Funds Are Priced Incorrectly

Accounting Department Hosts Extreme Competition

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::Events Calendar

03/17 Negotiations Seminar

03/30 8th Annual Sustainable Business Symposium

04/06 New Major Celebration

04/07 New Venture Championship

:: More events

::Program News

Congratulations to Bob Madrigal!
Posted on March 04, 2005 at 04:04:03 PM

Apply for Major Status
Posted on March 04, 2005 at 08:39:54 AM

Study in Italy Fall Term!
Posted on March 04, 2005 at 08:37:44 AM

Scholarship Apps Due March 18!
Posted on March 04, 2005 at 08:34:45 AM

:: More program news

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UO BUSINESS COLLEGE CAPTURES NATIONAL AWARD FOR MBA PROGRAM IN ENTREPRENEURSHIP

Contact Pauline Austin (541) 346-3133 July 15, 1997

EUGENE--A national group who knows best how to jump start a new business this year said one of the outstanding MBA programs to help you learn how to do that is found at the University of Oregon's Charles H. Lundquist College of Business.

In a national competition that included a finalists' presentation before a panel of judges, the U.S. Association for Small Business and Entrepreneurship (USASBE) handed the UO college its award for the 1997 Outstanding MBA in the Field of Entrepreneurship.

"This award is testament to the efforts of many within the Lundquist College of Business to create a learning community focused on entrepreneurship and emerging business opportunities," says Dean Timothy McGuire.

The USASBE honored the Lundquist College of Business with this prestigious award for two reasons. One, the MBA program integrates a broad spectrum of entrepreneurial themes throughout its new curriculum, specifically Opportunity Planning Teams that emphasize working with actual companies to assess and pursue opportunities. Second, activities such as the New Venture Competition, internships, and student and community outreach programs sponsored by the Lundquist Center for Entrepreneurship help to keep faculty and students focused on entrepreneurship.

"We used a different approach to present our program at this conference," adds Mark Lange, director of the Lundquist Center for Entrepreneurship. "We featured our best product--a first-year student, Lisa Menachof of **Santa Rosa, Calif**.--to describe our `new generation' curriculum."

The finalists' made their presentations at a pre-conference meeting on entrepreneurial education sponsored by The Ewing Marion Kauffman Foundation. The college received its award at the 42nd Annual International Council for Small Business World Conference held in San Francisco in June.

"I like the size of the Lundquist program and how responsive they are to students," says Lisa Menachof, who helped Lange make the winning presentation at the pre-conference event. She related her experiences in her just-completed first-year work toward her MBA in entrepreneurship. Menachof says she helped out at the New Venture Competition and got some valuable insight into what to do in making a presentation for a new venture to investors--not just for the professor in class. As a first-year student also she worked with a small student team to help a local manufacturer research and analyze a new business venture.

-more-

Thanks to the Lundquist college approach, this summer Menachof is working as a marketing intern with Community Hospital in Santa Rosa on projects related to its acquisition by a larger health care organization. As an intern focusing on internal communications and marketing projects with Sutter Medical Center of Santa Rosa, her work will enable the organization to react more entrepreneurally to the turbulent health care environment.

According to USASBE president-elect Charles Hofer, a faculty member at the University of Georgia's Terry College of Business, the Lundquist College's MBA program is tailored to meet today's business students' needs since more than half a million businesses are started every year in the U.S..

"Entrepreneurship is the most rapidly growing field in business education in the country. In the 1960s, fewer than 10 schools offered courses in small business and entrepreneurship. Now there are more than 500," Hofer said.

USASBE is the U.S. affiliate of the International Council for Small Business. The 42nd annual world conference represents small businesses in 67 countries.

The international council's membership represents the leading educators, trainers, consultants and government officials involved in supporting small business and entrepreneurship. The primary goal of the international council is to promote the exchange of information, programs and research targeted at examining the issues of starting, managing, and growing small businesses and entrepreneurial ventures.

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#P-1005/Lcl Bus, OrD/Bus, SBus

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