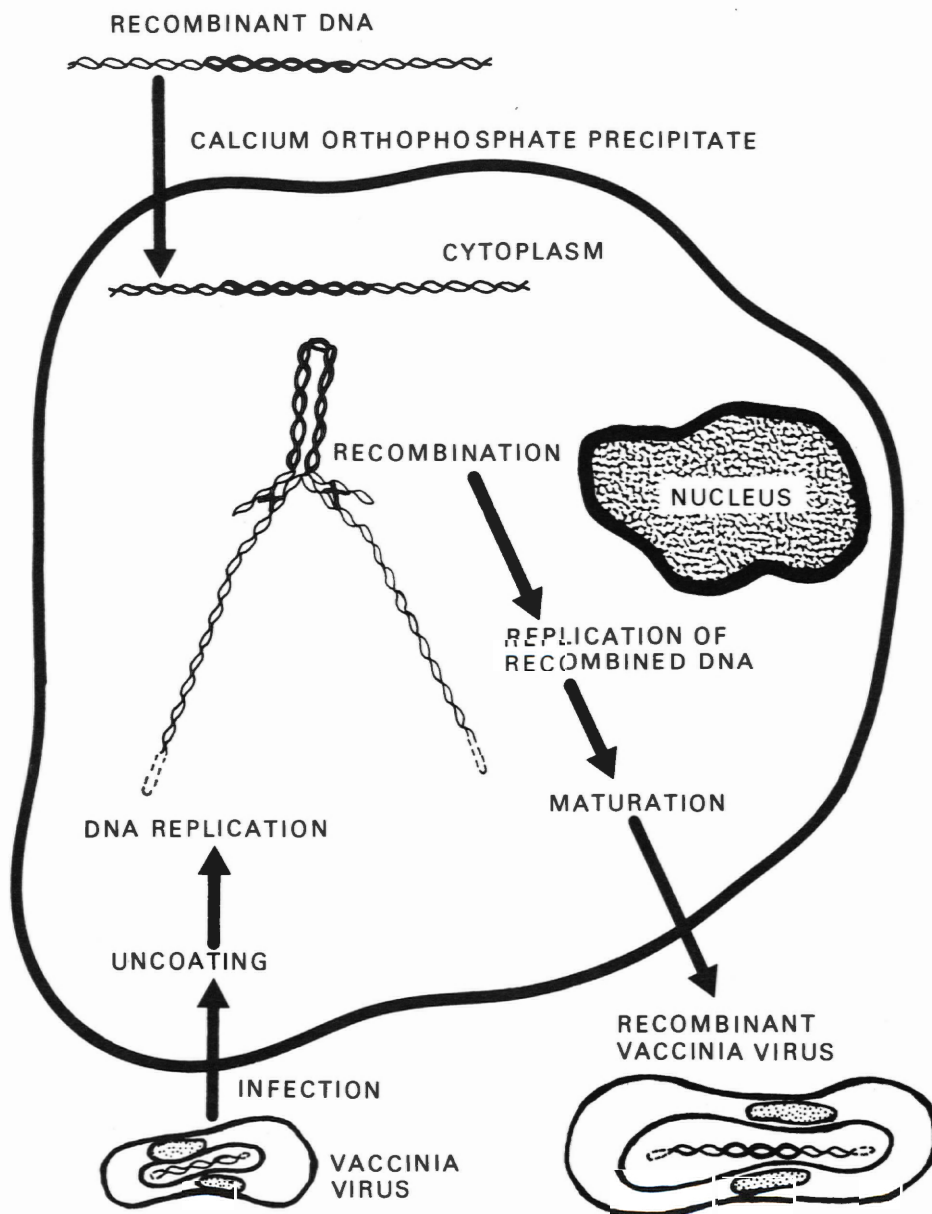


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New Scientists Join Gene Research Group

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Cover

Sketch depicts the construction of recombinant vaccinia virus strains. Recombinant DNA plasmids containing foreign genes of interest are introduced into cells infected with vaccinia virus. The passenger sequences are recombined into the viral genome. The recombinant viral genomes are then replicated and packaged into mature virus particles. These "mutant" viruses can then be isolated for further study. (See story on Hruby, page 3.)

Photos by OSU Photo Service



A little over two years ago, the big news at OSU was the establishment of a Center for Gene Research and Biotechnology. The thrust of that decision was that, through a more unified, university-wide approach, results from basic research in molecular genetics could be applied more quickly to solve pressing problems in agriculture, forestry, and veterinary medicine—all strong areas of research at Oregon State University.

At the time, Drs. Christopher K. Mathews, Department of Biochemistry and Biophysics, and Ralph S. Quatrano, Department of Botany and Plant Pathology, obtained a substantial grant of over half a million dollars from the Murdock Charitable Trust. These funds assured the proper launching of the new Center and allowed the University (with some additional funds from the OSU Foundation) to hire three new young scientists whose particular training in molecular genetics would complement the skills of other researchers in the same field.

The three new scientists, hired in advance of regular faculty vacancies, are in different departments but all in the College of Science. Virologist Dennis Hruby, who joined the Department of Microbiology in 1983, is addressing basic questions in molecular genetics using as a research tool vaccinia virus—a very important system in the development of new vaccines; geneticist Carol Rivin, who has been a faculty member of the Department of Botany and Plant Pathology for about a year, is studying the process of genomic changes in plants—a study that could be enormously useful to crop geneticists; and molecular biologist Gary Merrill, who also joined the Department of Biochemistry and Biophysics about a year ago, is investigating the control mechanisms that regulate cell replication and differentiation.

Although these three scientists work with the genetic material of different organisms, they use many of the same sophisticated techniques to isolate and transfer genes from one system to another. The following sketches are intended to introduce these new faculty members and their research interests to the academic community.

Dennis E. Hruby

Dennis Hruby is not new to Oregon State University. Brought up in Portland, he was an undergraduate student at OSU, where he earned a B.S. degree in microbiology in 1973.

"Some things in the department have not changed since I left," he says. "Some of the signs I put up on the centrifuges over ten years ago were still here. I never anticipated then that one day I would be able to come back to OSU to work. It feels good, almost like coming home."

He came back after a few detours—first to complete a doctoral degree in microbiology at the University of Colorado Medical Center, and later to complete NIH postdoctoral stints at S.U.N.Y. Stony Brook, and University of Wisconsin, Madison. In addition, he spent a year as assistant professor at the University of Texas at Austin.

In less than two years as an OSU faculty member, Hruby has established a very active laboratory. Twelve people (five graduate students, three technicians, four undergraduates, and several visiting scientists) work on a number of different projects that study viruses. Hruby works specifically with vaccinia virus—a prototype of poxvirus, of which the best known is probably smallpox.

"We work with vaccinia virus because it is the most complex of any virus system," explains Hruby. "It provides an appropriate model for the study of a number of basic questions about gene replication and expression. For one thing, since vaccinia replicates in the cytoplasm of the cell (rather than in the cell nucleus as do most other DNA viruses), it has to specify all its own genetic machinery (it replicates DNA and expresses genetic information). Its complex life cycle lends itself well to the study of the biochemistry in the development of gene regulation."

"Two things go on in my lab," he continues. "First we take very specific genes in the virus and try to clone them; we study them to determine their function and see how they are regulated. Second, we use that knowledge to make recombinant viruses."

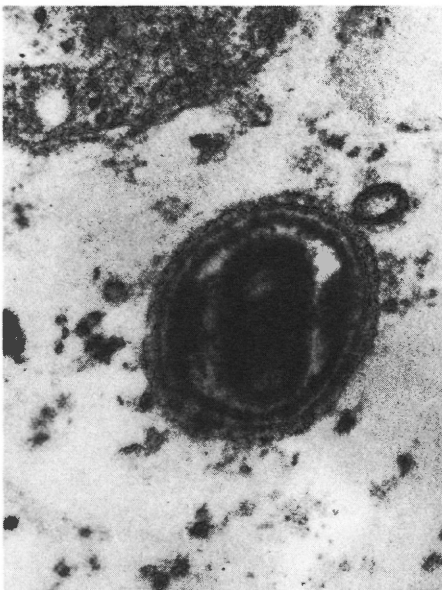
These procedures prove useful in that they allow scientists to make new vaccines. Vaccinia virus has been used for a long time, and it is known to be a safe virus.

"Recombinant viruses can be used to induce immunity to influenza, for example" says Hruby. "By inserting an influenza gene into vaccinia virus, we can inject a rabbit with it and induce immunity to influenza. It works, and new vaccines have been made for rabies, herpes, and hepatitis B. Because of the particular qualities of vaccinia, it is possible to make a multiple vaccine—one that would induce immunity to flu, rabies, malaria, etc. Such a vaccine, for example, would be ideal in third-world countries where it is difficult to get people to go into a clinic for vaccination more than once."

Hruby, however, feels that an even more important aspect of his work with viruses lies in the answers that can be obtained for some basic questions about molecular genetics in general. Recently developed technology allows researchers to take the genetic information from any source (be it a bacterium, a virus, or a human cell) and insert it into the vaccinia virus. That exogenous genetic information will be expressed by the vaccinia virus. Vaccinia thus becomes a "cloning and expression vector." Any gene of particular interest can be taken out of its normal environment, put into vaccinia—the shuttle vector—and moved into any kind of cell, where the gene will then be expressed and studied by itself.



Dr. Dennis E. Hruby (center) discusses the results of a Southern blot analysis of vaccinia virus DNA with two of his research assistants, Chris Franke and Walt Hodges.



Electron micrograph of a thin section from a vaccinia-infected cell showing an individual viral particle.

Hruby is collaborating on several projects with scientists at other institutions. An interesting example of such collaboration is the work he is doing on neuropeptides with Professor Edward Herbert and other scientists at the University of Oregon. Neuropeptides are substances of particular interest in medicine because of their ability to block pain or promote a sense of well being. Under normal circumstances, it is very difficult to study neuropeptides because their expression levels are very low.

Hruby has been able to insert into vaccinia a gene that encodes a neuropeptide. The recombinant vaccinia virus then can be used to infect a cell to see how the gene for neuropeptides is expressed. What makes vaccinia so versatile is that it can be used

with any cell. For example, a gene that is normally expressed into a rat cell can be inserted into vaccinia and then be expressed in a human cell. Although Hruby usually works with monkey cells and human cells, other cells are cultured in his lab—rat, mouse, monkey, human, chicken, and hamster cells.

Other collaborative projects are being carried out with laboratories at North Carolina State University, LaJolla Cancer Research Foundation, and the California Institute of Technology. Hruby is also working with the OSU School of Veterinary Medicine on the development of a special vaccine for animals.

Hruby's research is supported by substantial grants from the National Institutes of Health, the National Science Foundation, and the American Cancer Society.

“The genetic study of plants at the molecular level is still lagging behind the study of animal and bacterial systems.”



Dr. Carol J. Rivin (left) discusses an ear of corn grown in her experimental field. Technician Donna Hazelwood and graduate student Chee Harn are her laboratory assistants.

Carol J. Rivin

Several research projects are already under way in the laboratory of geneticist Carol Rivin, even though she is just completing her first year in the Department of Botany and Plant Pathology. In each of these projects, she is applying the principles of molecular biology to study genome plasticity in plants—the tendency of specific portions of the DNA to be unstable and changeable over the lifetime of an individual plant.

In many respects, the molecular study of plants and their genetic characteristics is a relatively new field that was just beginning to open up in 1978 when Rivin was completing her doctoral degree at the University of Washington.

“The genetic study of plants at the molecular level is still lagging behind the study of animal and bacterial systems,” explains Rivin. “When I was coming out of graduate school, little had been done with plants, and virtually no one had been trained in molecular biology to study their genetic mechanisms.”

Laboratories dedicated to the study of plant molecular genetics were just beginning to form, and Rivin thought this new field, with its many possibilities for the future of agriculture, offered a good starting place for a young scientist. She had studied DNA replication in the yeast cell cycle for her doctoral research, but she decided to work in higher plants because newly developed techniques for cloning and sequencing genes made these larger systems accessible to molecular studies. In the last five or six years, tremendous strides have been made in this field, and today plant geneticists have a wealth of material at their disposal.

“I selected maize as a research tool because much is already known about the genetic make up of this plant,” she notes. “Maize has been around a long time as an agricultural plant, and I could work with a variety of genetically defined lines.”

She pursued this work with the help of two postdoctoral fellowships, first in the Department of Biology at Washington University in St. Louis and then in the Department of Biological Sciences at Stanford University.

Her present research projects are directed toward understanding how some DNA sequences are subject to rapid change while most genes change only on an evolutionary scale.

“One of the things that I am very interested in,” says Rivin, “is understanding the genetic basis for what is known as somaclonal variation—a phenomenon that happens when plants are regenerated from tissue culture. It is possible to take tissue from any part of a plant, like maize or tobacco, put it in a culture dish, and grow it with the proper hormones into a fairly normal plant that will mature and be fully fertile. However, strange things happen. Plants obtained from tissue culture can be very different from the parent plant and very different from each other.”

Somaclonal variation has positive and negative effects. On one hand, it creates new phenotypes—plants with new characteristics that might be very desirable and difficult to produce in any other ways. On the other hand, regeneration from culture is also used as means to propagate plants of a desirable phenotype, in which case no new variants are wanted. While some cultures change tremendously, others do not. Since the cells are grown under the same conditions and in the same media, it is difficult to discover what causes these differences.

No one at this point understands the genetic basis for somaclonal variation. Is it a fundamental change in genes—in one or in many genes? Is it a change that affects several genes, but at a level that is not directly hereditary, as in modification of genes?

“In looking at cells in culture,” notes Rivin, “I was surprised to find quantitative changes in specific DNA sequences—that is, some sequences amplified in tissue culture, while others were, if not fully, partially deleted so that there would be fewer copies of a specific sequence.”

It seems surprising that there should be a very tight check on some DNA sequences, while others could be highly variable. Rivin asked herself whether the two events (changes in DNA sequences and somaclonal variations) were related. Was she looking at the molecular evidence of cultures that would produce variants? Was there some trigger that caused the genome to change? Could she find culture conditions that increased this event? And if she examined the regenerated plants could she find the same genomic change she saw in the cultures?

To answer all these questions required a big project—not all of which is completed. If her investigations work out, the answers to her questions should be useful as a way of predicting at an early stage what culture conditions will give rise to somaclonal variants. Tissue culture is a long and laborious process. Being able to tell at an early stage of culture whether a particular batch of regenerated plants is desirable or not would save a lot of effort and energy.

Last summer Rivin grew a big maize field with about 4,000 plants—not many for agricultural purposes but a lot on which to do genetics. Another research project involves the study of genome variation in hybrid maize. Her work will continue in an effort to provide answers to some crucial questions about the biological significance of genomic flexibility. Is it related to evolutionary change? Is it a response to stress? What are the molecular mechanisms involved? What DNA sequences are subject to change and what is special about this genome function? Can these variations be manipulated in the bio-engineering of crop plants? If the answer to this last question is positive, the benefit will be immense.

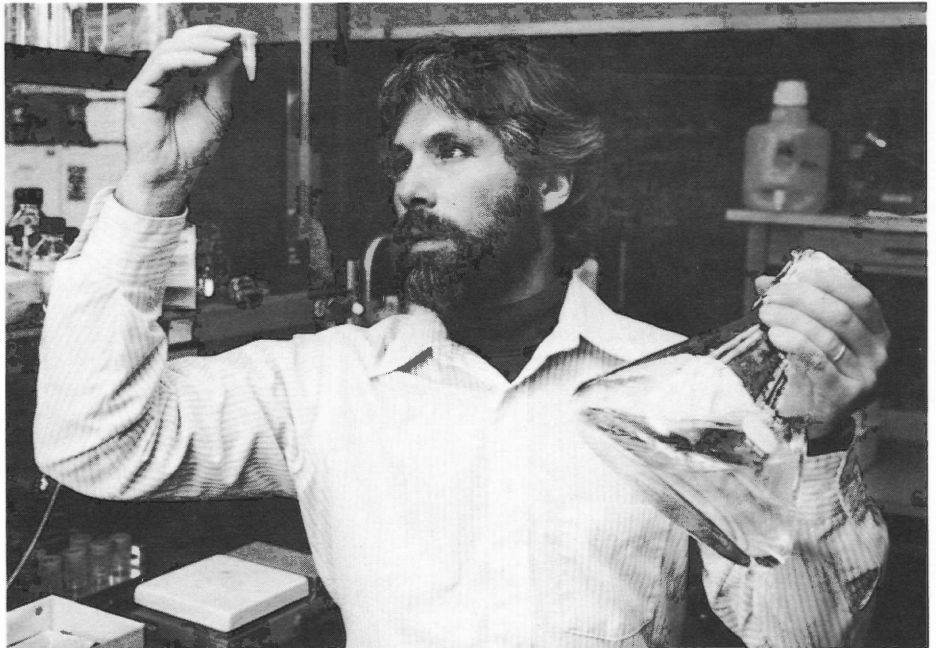
Rivin's research is currently funded by the Department of Energy (Basic Biological Research). Her laboratory now includes a full-time technician, a graduate student, and a senior thesis student.

Gary F. Merrill

As an undergraduate, Gary Merrill thought that he wanted to be a field biologist. His professional life, however, took a different turn once he was exposed, as a senior, to his first course in developmental biology. Today instead of doing field work, he manipulates genes in his laboratory in the Department of Biochemistry and Biophysics.

Early on, he became interested in a particular aspect of cellular development—cessation of cell growth during differentiation. Cells grow for a period of time during embryonic development and then stop growing to differentiate into tissue-specific cells. Only after cells have stopped dividing, do skin cells, for example, start making keratin, or cells in the human pancreas start producing the hormone insulin, or muscle cells start producing contractile proteins.

"The cessation of cell division according to a precise program seems to be a general



Dr. Gary F. Merrill holds in his left hand a one-liter bacterial culture of a cloned replication enzyme (TK gene). When the DNA is finally precipitated from this culture, it is resuspended in the miniscule container shown in his right hand. To give a more accurate idea of its contents, Merrill notes that the small tube holds more copies of that gene than are present in all cells in the bodies of all OSU students.

cell characteristic," notes Merrill. "To me it seemed an interesting biological phenomenon that had great medical relevance as well. One thing that can be said about all forms of cancer, one of our most dreaded diseases, is that it is characterized by cells not obeying the normal differentiation process. And biological aging, on the other hand, might be caused by a cell's limited ability to replicate. So I was intrigued by the controlling mechanism in cell replication and differentiation."

In graduate school at Syracuse University, Merrill investigated those hormones that stimulated cell growth in culture. He worked with mouse muscle cells, which grow well in culture. These cells stop growing and start their differentiation program *in vitro*. Once they reach maturity it is possible to watch them contract right under the microscope.

"But hormones are in the environment of the cell or in the culture media," says Merrill. "And I really wanted to find out what was going on inside the cell. In other words, to study my problem I wanted to develop a cellular approach instead of an organismic approach."

Since making that decision, Merrill has continued to investigate cell replication. On his first postdoctoral position at the University of Washington in 1977, he tried first a popular approach called somatic cell genetics where two cells are fused together with polyethylene glycol. If a proliferating muscle cell was fused with one that was no longer proliferating, which genetic program would dominate? The answer, he found out, was that the genetic program of the differentiating cell would dominate. However, he soon realized that only a limited number of questions could be asked with this technique.

When techniques to clone genes became available, they also opened immense possibilities. Merrill immediately posed this research question: If I introduce into muscle cells a cloned gene that is involved in cell replication, will this gene be expressed, and will it be appropriately regulated during differentiation? For this problem, he began working with the thymidine kinase (TK) gene, a key enzyme in the biosynthesis of a DNA precursor. The TK enzyme disappears when the cells begin differentiation.

"When I introduced a cloned TK gene in a TK-deficient muscle cell," notes Merrill, "I was very excited to discover that this cloned exogenous gene was expressed and regulated every bit as tightly as the endogenous gene. The fact that the cloned gene was regulated implied that the regulatory entity was on the cloned gene, but where?"

Since Merrill had little background in genetic engineering (i.e., manipulating genes *in vitro*), he joined Dr. Steven McKnight and his research group at the Fred Hutchinson Cancer Center in Seattle. McKnight had just completed a study on the characterization of a herpes virus gene, which is widely recognized as one of the best characterizations done to date.

Merrill spent the next two years doing "mixing and matching" experiments in an effort to define the region of the gene that contains this regulatory entity. He discovered that the regulatory entity for the TK gene was in the coding region—somewhat of a surprise since, previously, scientists who were pursuing these studies thought that the head of the gene would be important.

Genes are composed of heads (promoters of the gene), bodies (the protein-encoding region), and tails (whose functions are not yet clear).

Now that he has located the region of the regulatory entity, the problem at hand is to define this intragenic region and determine its sequence.

"My approach is fairly unconventional," notes Merrill, "because most people who study cell replication begin by studying the hormone that touches the cell receptor and somehow conveys the command to grow to the cell nucleus. I am starting at the gene inside the nucleus that is activated (when it receives the command to grow) and going backwards up the command structure."

Merrill has recently received a substantial grant from the National Institutes of Health that will provide salaries for graduate students and technicians. His long-term goal is to determine how the cell shuts down its replicative apparatus at the molecular level.

* * *

Since Drs. Hruby, Rivin, and Merrill have

joined OSU, much scientific activity has been going on in their laboratories, adding to the work carried out by an already established core of gene researchers within the Center. Although scientific activity sometimes looks like a lonely activity, it is in fact the opposite of lonely, with information moving swiftly from one laboratory to another.

Hruby collaborates with other scientists on and off-campus. Rivin interacts with researchers in her own department as well as in Crop Science and Horticulture. She also collaborates with Dr. Vicki Chandler of the Institute of Molecular Biology at the University of Oregon. Merrill is always ready to offer his particular skills to other OSU investigators who might be having difficulty in isolating RNA or having similar problems.

The director of the OSU Center for Gene Research and Biotechnology is Dr. Ralph S. Quatrano, professor of botany and plant pathology. It is his task to emphasize the common goals and needs of all those investigators who work in molecular genetics and related fields (a total of approximately 50 people). □

Symposium on Climate

The Department of Atmospheric Sciences held a special symposium on climate and the boundary layer on March 4, 1985, as part of a week-long series of activities scheduled to commemorate the inauguration of President John Byrne.

The symposium began with a keynote presentation given by the well known climatologist Timothy R. Oke, professor of geography at the University of British Columbia. His talk was followed by four presentations given by faculty members of the OSU Department of Atmospheric Sciences.

Professor Oke is an international expert on urban climatology, and in his discussion he examined how the very structure of cities affects local climate. He emphasized, for example, that the structures of North American cities are at a disadvantage when it comes to climate. Canyons created by tall, downtown buildings, he pointed out, and

association radiation geometry, lead to meteorological situations which can cause serious buildups of atmospheric contaminants. Furthermore, the sprawling nature of North American cities leads to poorer ventilation of contaminants compared to that in their more compact, European counterpart.

W. Lawrence Gates, chairman of the Department of Atmospheric Sciences and director of the OSU Climatic Research Institute, discussed the link between local climatology and the global atmospheric circulation. Professor Gates outlined some of the useful results and limitations of atmospheric general circulation models. He provided examples from the model used at the Climatic Research Institute.

James Deardorff discussed studies of transport of air pollution by boundary layer circulations using laboratory flows. He

provided several laboratory examples from experiments in which contaminants are released from a point source analogous to a smoke stack.

Larry Mahrt presented examples of the influence of local boundary-layer circulations on agriculture, forestry, and pollution transport. He summarized several boundary-layer research projects in the Department of Atmospheric Sciences, including a joint hydrological project with French scientists.

Kelly Redmond surveyed several aspects of local variations of Oregon climate, noting interesting differences in the temperature patterns for Newport, Corvallis, Santiam Pass, and Redmond.

The symposium was well attended, especially by faculty and students in atmospheric sciences and related disciplines. The new president of Oregon State University, Dr. John V. Byrne, was also present.

Edward Piepmeier Develops New Analysis Method

Sometimes the path to an invention of significant import is purely accidental. More often than not, however, a germinal idea comes to fruition after several years of speculation and work. Such is the case for a new technique for the analysis of trace elements recently patented by chemistry professor Edward H. Piepmeier.

The new technique is a new type of electrical plasma source to improve the determination of concentrations of trace elements in powdered and dissolved samples. Other applications, however, are possible with this new method, particularly in the manufacture of materials at high temperatures.

"The general purpose of the plasma source," says Piepmeier, "is to surround completely a flowing sample stream with extremely hot plasma. The energy that is rapidly transferred from the plasma to the sample stream causes desolvation, vaporization, atomization, and excitation. The emission of light by the resulting gas at wavelengths characteristic of the chemical elements present in the sample stream is used to determine the concentrations of elements in the sample, from trace to major constituents. This determination is accomplished by comparing the relative emission intensities of samples with known standards."

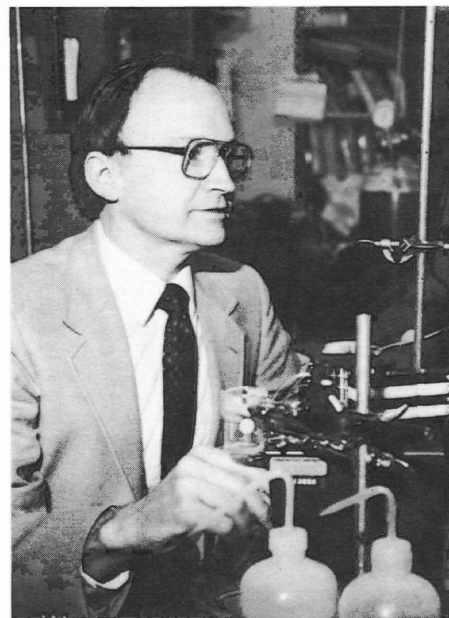
Piepmeier's interest in a possible new method of analysis began "as one of those wild ideas" several years ago, he says. The question he asked himself was: How do you surround a sample stream with plasma us-

ing electrodes instead of an induction-coupled plasma? He conceived the idea, began investigations, and finally after obtaining results he initiated the lengthy patent procedure.

Prior to his patented technique, the only method available to surround completely a sample stream with hot plasma was to use an inductively coupled plasma (ICP)—a method that requires an expensive, high powered radio-frequency generator. The new plasma sources developed by Professor Piepmeier are powered by relatively inexpensive dc and/or ac power supplies that produce no radio frequency noise. The electrical energy is coupled into the new plasma sources via electrodes. The main advantage with these new sources is that it is possible to shape the plasma into desired shape by properly positioning the electrodes.

For example, the plasma can also be shaped into a horizontally elongated form that can replace the elongated flame in the widely used atomic absorption spectrometers found in most analytical chemistry laboratories. Since the plasma is much hotter than the flames now used, the sample is atomized completely, thereby reducing matrix interference effects that plague atomic absorption methods of analysis.

Potential practical applications of this newly patented method of analysis are numerous in industry as well as in the research laboratory. Funds for this work were contributed by Spectrometrics, Inc., Leeman Labs, Inc., and the National Science Foundation.



Edward H. Piepmeier

Undergraduate Awards Established in Mathematics

The Department of Mathematics has recently established a program of awards to recognize undergraduates who excel in mathematics. Gifts by an OSU alumnus who wishes to remain anonymous have made the program possible.

The awards are intended to encourage juniors, and possibly sophomores, whose outstanding work and interest in mathematics have impressed their instructors. Nominations are solicited from the entire mathematics faculty, and decisions are made on

the basis of letters of support, performance in classes, and other evidence of mathematical talent. Although the department has not established a fixed number of awards, it expects to give one or two awards per year—each covering the cost of tuition and fees for spring term.

The first awards were presented on April 9, 1985. In a slight departure from the norm, some awards were also given to seniors in recognition of achievements that would have

merited consideration earlier, had the awards existed in past years. The recipients are: **Thomas Adelman**, junior in physics from Portland; **Christopher Fonda**, junior in mathematics from Nyssa; **William Hoffman**, senior in mathematics from Canyon City; **William Pierce**, senior in mathematics from Albany; and **Bennett Yee**, senior in mathematics/engineering from Beaverton. The two juniors received \$300 each, and the three seniors \$100 each.

NEWS AND NOTES

ATMOSPHERIC SCIENCES

Jeffrey R. Barnes began work in April on a research project, funded by NASA, on "Possible dynamical mechanisms for the Martian polar warming phenomenon." In the same month, Dr. Barnes, along with seven other scientists, proposed to NASA Headquarters an imaging experiment for the Mars Observer Mission, scheduled for launch in 1990. In May, Dr. Barnes visited NASA Ames Research Center to discuss with several scientists results from a general circulation modeling project for Mars.

During April 2-19, **W. Lawrence Gates** visited the Max Planck Institute for Meteorology in Hamburg, West Germany. Later in April, he attended the third session of the TOGA (Tropical Ocean Global Atmosphere) steering group in La Jolla, CA.

Larry Mahrt participated in a committee meeting of the National Academy of Sciences on mountain meteorology, held at Yale University, May 28-30. He also presented results on the analysis of clear air turbulence over mountain ranges at a concurrent meeting of the Alpine Experiment.

Allan H. Murphy presented three papers at the Eighth National Fire and Forest Meteorology Conference, held in Detroit in late April. The conference was sponsored jointly by the American Meteorological Society and the Society of American Foresters. In early May, he also participated in a Climate Impacts Network workshop at the National Center for Atmospheric Research in Boulder, CO.

Hua-Lu Pan presented a paper on the tropical-midlatitude interactions during Winter MONEX at the 16th Conference on Hurricanes and Tropical Meteorology, held in May in Houston. In late May, Dr. Pan gave a seminar in the Department of Meteorology at Florida State University.

Steven A. Rutledge is participating in the PRE-STORM meteorological field experiment during May and June. Dr. Rutledge will spend six weeks near Wichita, KS, directing the operation of two Doppler weather radars from the National Center for Atmospheric Research. The experiment will also include two other Doppler radars, seven National Weather Service radars, six aircraft and an extensive surface mesonet network that will be used to study the evolution and physical processes associated with mesoscale convective storms.

Michael E. Schlesinger presented an invited seminar, "Modeling the climatic effects of increasing CO₂," on April 16 at the Quaternary Research Center, University of Washington. In late April, he participated in the NASA/WMO panel on climate effects of trace gases and presented an invited seminar at the NASA Goddard Space Flight Center. In May, Dr. Schlesinger visited the Oak Ridge National Laboratory to discuss specific research topics on climate models.

BIOCHEMISTRY AND BIOPHYSICS

Juan Ausio attended the meeting on Chromosome Structures and Expression, held in Cold Spring Harbor, NY, May 8-12.

Ann Brodie presented a poster session at the annual meeting of the American Association for Cancer Research in Houston, May 21-24.

Wilbert Gamble presented a paper at the annual meeting of the Federation of American Societies for Experimental Biology, held in Anaheim, CA, April 21-25.

Laura Kochevar, research associate in Dr. Mathews' laboratory, attended the meeting of the Federation of American Societies for Experimental Biology. Graduate students **Janet Leeds**, **Denice Mittelstaedt**, **Kristin Olafsdottir** and **Geoff Sargent** gave papers at the meeting.

Gary F. Merrill presented a poster session at the UCLA Symposium on Transcription, held in Steamboat Springs, CO, in early April.

Parthasarathy Manavalan attended the UCLA Symposium on Protein Structure, Folding and Design, held in Keystone, CO, in early April.

George D. Pearson spoke on "Basic Cancer Research" at Linfield College during Cancer Awareness Week on April 17. His talk was part of the fund-raising activities for the T. J. Martell Foundation for Leukemia and Cancer Research, sponsored by the campus radio station at Linfield.

Michael Schimerlik presented a seminar in the Department of Pharmacology at the University of Rochester, NY, on April 8.

Kensal E. van Holde taught a course on the structure and function of chromatin in Rehovot, Israel, in mid-April. Graduate student **Cynthia McMurray** also attended the course.

BOTANY AND PLANT PATHOLOGY

H. Ronald Cameron attended the WRCC-20 meeting for research of virus and virus-like diseases of fruitcrops, held at the Hilo Research Station of the University of Hawaii, April 1-3. As the Oregon representative, he reported on current research on fruit tree virus in Oregon. In June, Dr. Cameron will present two papers at the 13th International Symposium on Fruit Tree Virus Diseases, held in Bordeaux, France. Later in that month, he will consult on pear decline with colleagues at the East Malling Research Station in England.

Richard H. Converse consulted with Ms. Olivia Broome, plant tissue culture research specialist with the U.S. Department of Agriculture, Agricultural Research Service, Beltsville, MD, in late April, and with Dr. V. V. Chenulu, FAO Fellow and dean of the School of Plant Virology, Indian Agricultural Institute, New Delhi, India, in May. During the month of June, Dr. Converse will visit the plant virology laboratory of Dr. Rudolf Casper, Biologische Bundesanstalt, Braunschweig, West Germany, and attend the Fourth International Symposium on Small Fruit Diseases and the 13th

David T. Jones Awarded NSF Fellowship for Graduate Study

David T. Jones, a 1984 OSU graduate in Biochemistry and Biophysics, was recently awarded a National Science Foundation Fellowship for Graduate Study. The 540 NSF winners were chosen from 4,400 applicants, and Jones was one of two students selected from Oregon State University. The prestigious fellowships provide a stipend of \$11,000 per year for three years of full-time graduate study and include an annual educational allowance to the institution selected by the recipient.

Jones is now a graduate student in the Department of Biological Chemistry, School of Medicine, Johns Hopkins University. He spent three years at OSU, having transferred as a sophomore from the University of Denver. He was an outstanding student and was awarded the Milton Harris scholarship by the College of Science in 1984 as the top undergraduate student in Biochemistry and Biophysics. While at OSU, Jones also received two DeLoach Work Scholarships that enabled him to conduct research on the biochemistry of cellular proliferation in mammalian cells. He pursued this research in the laboratory of Dr. Adolph Ferro, Department of Microbiology.

International Symposium on Fruit Tree Virus Diseases in Bordeaux, France.

Research associate **Hossein El-Nashaar** attended the 31st Annual Soil Fungus Conference, held in Tucson, AZ, in late March.

Dallice I. Mills presented invited papers at the U.S.-Japan Cooperative Science Seminar on Biochemical and Molecular Determinants of Microbe-Host Plant Interactions, held in Inuyama City, Japan, May 20-25, and the Sixth International Conference on Plant Pathogenic Bacteria, held in early June at the University of Maryland, College Park. His presentations discussed molecular and genetic analysis of pathogenicity of *Pseudomonas syringae* Pathovars *phaseolicola* and *syringae*.

Research associate **Frank D. Niepold** and graduate student **Marilyn Ehrenshaft** presented papers (**Dallice Mills**, coauthor) at the Sixth International Conference on Plant Pathogenic Bacteria, held at the University of Maryland in early June.

Ralph S. Quatrano attended a panel meeting of the U.S. Department of Agriculture Competitive Grants Biotechnology Program in Washington, DC, in mid-May, and a conference on "Biotechnology in Agriculture" at Cornell University, NY, in June.

Fred R. Rickson is participating in a Projecto Flora expedition in Amazonas (Brazil) from April 1 to July 1, 1985. The expedition is financed jointly by the National Science Foundation, the Brazilian government, and the New York Botanical Garden."

Carol J. Rivin attended the cooperative annual meeting on maize genetics, held in Delavan, WI, in late March.

CHEMISTRY

The Department of Chemistry has received several generous donations from the Tektronix Foundation. Donated equipment includes eleven complete electronic test stations, an advanced logic analyzer, and a digital plotter. The value of the equipment exceeds \$40,000.

William J. Fredericks gave an invited paper on "Chemical methods for purification" at a workshop on Purification of Materials for Crystal Growth and Glass Processing, held May 14-17 at the Pajaro Dunes Conference Center in Watsonville, CA. The workshop was sponsored by the American Association for Crystal Growth.

During the months of April and May, **Steven J. Gould** gave seminars on "Recent discoveries in antibiotic biosynthesis" in the chemistry departments of Indiana University, Ohio State University, UCLA, and the California Institute of Technology.

Steven J. Hawkes is chairman of the committee that will prepare the 1987 ACS Examination in General Chemistry.

Kenneth W. Hedberg gave an invited seminar on the determination of molecular structures by electron diffraction from gases to the Department of Chemistry at the University of Idaho in mid-April.

Lawrence C. Thomas attended the Pittsburgh Conference on Analytical Chemistry in New Orleans in late February. Between January and April, he presented seminars on "Quantitative measurements without analyte identifications" at the University of Washington, University of Hawaii, Emory University, Seattle University, Reed College, and OSU.

On April 22, **Philip R. Watson** represented the College of Science in a special presentation on materials research at OSU given to the Governor's Education Mission. The visit of Governor Atiyeh, Chancellor Davis, President Byrne, and 45 prominent Oregon business, civic, and media leaders was the first step on a tour of all the state system campuses intended to increase support for higher education in the state.

The visitors viewed the molecular beam epitaxy laboratory in the Department of Electrical and Computer Engineering, where they learned of the

developing multidisciplinary research effort in advanced materials at OSU and its role in the educational and economic development in the state. Dr. Watson's presentation centered on research carried out in the Departments of Chemistry and Physics, particularly in the area of surface chemistry.

John C. Westall participated in the program review at the Athens Environmental Research Laboratory (U.S. EPA) in late March. In April, he presented invited lectures at Woods Hole Oceanographic Institution and at a N.A.T.O. advanced study workshop in Faro, Portugal.

COMPUTER SCIENCE

Bella Bose will present two papers at the International Conference on Information Theory, held in Brighton, England, in late June.

Brenda Bowman, graduate teaching assistant in computer science, attended the Ninth Annual Conference on Contour Plotting and Contour Graphics, held in Austin, TX, in early April.

Curtis R. Cook attended CHI '85, a conference on Human Factors in Computing Systems, held in San Francisco in mid-April.

Thomas G. Dietterich presented a paper and participated in panel discussions at the Third International Workshop on Machine Learning, held at Rutgers University in early June.

Theodore G. Lewis gave an invited seminar at the University of California at Davis on April 18.

ENTOMOLOGY

Ralph E. Berry has been appointed Acting Associate Director of the Agricultural Experiment Station.

Brian A. Croft participated in early March in a research planning meeting of the Western Regional Pest Management Project (W-161), held in Reno. In February, he also attended a meeting of the Consortium for Integrated Pest Management, held in Las Vegas.

Bruce F. Eldridge gave an invitational paper on isozyme analysis of populations of snow pool mosquitoes at the national meeting of the American Mosquito Control Association, held in Atlantic City, NJ, March 15-23.

John D. Lattin and **Nancy L. Stanton**, head of the Department of Zoology and Physiology, University of Wyoming, convened an NSF-sponsored workshop for ecologists and systematists of soil organisms, held in Corvallis, May 20-21. Ten specialists met with representatives from the 11 NSF-funded Long-Term Ecological Research sites in the United States to establish priorities for collaborative research programs.

Jeffrey C. Miller presented a paper on biological control of insects at the Workshop on Entomophagous Insects, held in Tucson, AZ, in late April.

Timothy D. Schowalter participated in early March in a workshop on cone and seed insects, held in Boulder, CO.

GENERAL SCIENCE

David LaTouche participated in a conference on the speciation of radionuclides in the environment, held at Oxford University, England, in mid-April.

Michael C. Mix is a member of an EPA peer review panel (Environmental Biology), which met in Dallas, in late March.

David L. Willis, **David LaTouche**, and graduate student **Larry Anellis** attended the annual meeting of the Health Physics Society, held in Chicago, May 27-31. Mr. Anellis received a student Travel Award from the Society.

Robert C. Worrest was an invited participant at a workshop on the environmental consequences of nuclear war. The workshop, organized by the Scientific Committee on Problems of the Environment/International Council of Scientific Unions, was held in Toronto, Canada, in March. Previous workshops in this series were held in Tokyo (Human Impacts), Colchester (Atmospheric Uncertainties Relating to Nuclear Winter Predictions), Paris (Radiological Dose Assessments), and Caracas (Effects on Tropical Forests and Agriculture).

GEOGRAPHY

Mary Lee Nolan presented a paper on pilgrimage and religious tourism in the United States at the meetings of the Southwest Anthropological Association, held in Chico, CA, April 25-27.

Gordon Matzke and **James Pease** participated in a four-day training workshop sponsored by the Agency for International Development. The theme of the workshop was "Farming Systems Research/Extension."

Keith Muckleston, **Robert Frenkel**, **Gordon Matzke**, **Ray Northam** and **Philip Jackson** attended the annual meetings of the Association of American Geographers in Detroit, April 21-24. Dr. Muckleston presented a professional paper on water resources management in West Germany. Dr. Frenkel organized and led a panel discussion on "The Automobile as an Ecological Agent." He also organized a paper session on "Weeds, Pests and Aliens."

In mid-May, **Keith Muckleston** attended a one-week short course on planning and management of water resources at Case Western Reserve University.

GEOLOGY

Allen F. Agnew is member of a NAS/NRC Committee on Known Geologic Structure for BLM's management of petroleum on Federal Lands. The Committee met in Washington, DC, in January; Bakersfield, CA, in March; and Washington, DC, and Casper, WY, in April. Dr. Agnew was a visiting lecturer at the University of Wisconsin, Oshkosh, and at Lawrence University in March and April. He presented talks and seminars on congressional aspects of geology and public policy

and on professionalism and ethics in geology. In April, he presented a talk on ground water pollution with organic materials for the Oregon Environmental Health Association.

Ellen T. Drake is editor of a special volume commemorating the centennial of the Geological Society of America and entitled *Geologists and Ideas: A History of North American Geology*. Dr. Drake is author of a chapter in the volume entitled "The Coon Butte Crater Controversy." She is currently serving as a member of the NRC/NAS Committee, the United States Committee on History of Geology, which is planning for the International Geological Congress to take place in Washington, DC, in 1989. Dr. Drake, who holds a joint appointment in the College of Oceanography, has recently been named Program Coordinator for Section W (II), Oceanography and Limnology, of the Pacific Division of AAAS. She has also been newly elected full member of the Corvallis chapter of Sigma Xi.

Cyrus W. Field and **Sara G. Power** recently presented an invited symposium paper entitled "Metallization in the Western Cascades, Oregon and southern Washington" at the April meeting of The Geological Society of America, Rocky Mountain Section, in Boise, ID.

Robert J. Lillie gave invited presentations on the tectonic interpretation of seismic reflection data at the University of Pennsylvania, Cambridge University, and the University of Leicester during the month of February. He also visited groups working on the interpretation of seismic reflection data at Stanford University and on the geology of the Himalayas at Imperial College, London. He attended symposia on the continental lithosphere at Yale University, in February, and on the Canadian LITHOPROBE project in Victoria, BC, in April. During the period March 3-21, Dr. Lillie participated in joint fieldwork in the Himalayas with members of the Geological Survey of Pakistan and the Oil and Gas Development Corporation of Pakistan.

MATHEMATICS

The Mathematical Sciences Learning Center (MSLC) officially opened a new microcomputer classroom/laboratory on April 23 with a special ceremony and open house. The new facility, located in Kidder 108J, is equipped with 18 Apple IIE microcomputers and two printers. In addition, it also has a microcomputer for the instructor and a large monitor used to display computer software to an entire class. The room will be used as a classroom by faculty members of the mathematics department at pre-scheduled times and as a lab facility during remaining hours when the MSLC is open.

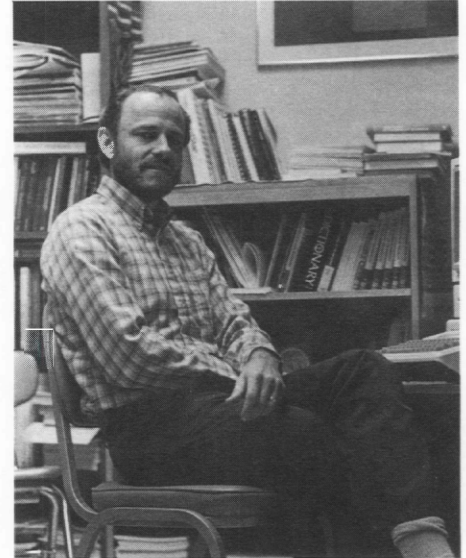
Shaughnessy Receives NSF Grant

Mathematics professor J. Michael Shaughnessy has received a large, two-year grant (\$231,651) from the National Science Foundation to conduct intensive, summer workshops and follow-up activities for high school and middle school teachers of mathematics.

This program is part of a special NSF Honors Teachers Workshop Program intended to improve teaching and learning in mathematics. Workshop sessions will cover creative, alternative approaches to teaching algebra, geometry, probability and statistics, computers and mathematics.

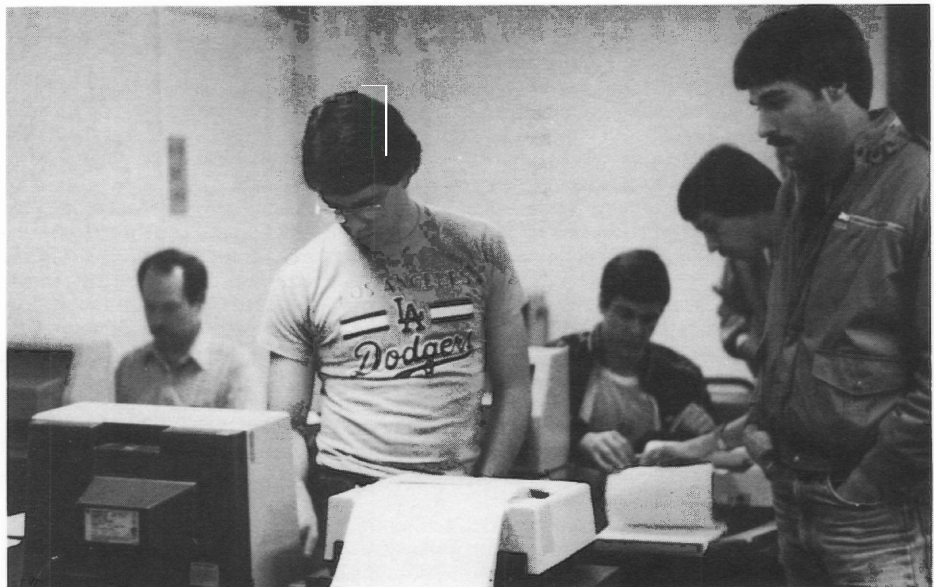
The program will provide intensive workshop in 1985 and 1986 for 60 teachers from Oregon, Idaho, southwest Washington, and Northern California. Half of the participating teachers will attend workshops at OSU this summer, while the other half will attend workshops at Portland State University. Winter and spring conferences will follow the workshops to allow a sharing of classroom experiences.

Michael Shaughnessy is director of the program. Marjorie Enneking of the Department of Mathematics at Portland State University is co-director.



J. Michael Shaughnessy

Students in Mathematics for Secondary Teachers (Mth 493) use the new microcomputer classroom/laboratory in the Mathematical Sciences Learning Center (MSLC). Kathleen Seagraves is director of MSLC.



Oregon Invitational Mathematics Contest

The Department of Mathematics hosted the fifth annual Oregon Invitational Mathematics Contest on May 11. Approximately 300 high school students, who were winners in local and regional mathematics contests, were invited to participate. **Howard Wilson** was the contest director. He was assisted by **William Burger**, **Stephanie Jorgensen**, **John Lee**, **Gary Musser**, **Kathleen Seagraves**, **Michael Shaughnessy**, and **David Stacy**. Many other department members, as well as graduate and undergraduate students, were involved in the contest activities.

Awards included scholarships funded by the Tektronix Foundation and the OSU College of Science. Several calculators donated by Hewlett-Packard were also given as prizes. Additional financial support for the contest was provided by the College of Engineering, the OSU Century Club, and the Department of Mathematics.

* * *

William F. Burger prepared a paper, "The van Hiele levels: a framework for describing reasoning processes in geometry," for the annual meetings of the National Council of Teachers of Mathematics, held in San Antonio, April 17. Since Dr. Burger was unable to attend the conference, the paper was presented by **J. Michael Shaughnessy**.

Dennis Garity gave an invited talk at the Geometric Topology Conference, held at Brigham Young University in late April.

Michael Shaughnessy presented an invited address and conducted a workshop at the 63rd Annual Meeting of the National Council of Teachers of Mathematics (NCTM), held in San Antonio in mid-April. He also gave an invited talk and workshop at the regional meetings of NCTM, held in San Diego in late January.

Edward C. Waymire was an invited speaker at the conference on Dependence in Probability, held at Oberwolfach, West Germany, in early April. He presented results from a paper on block correlations for infinitely divisible distributions. Dr. Waymire also gave an invited presentation at the Western Conference on Mathematical Physics, held at the California Institute of Technology. He presented results on ferromagnetic correlation inequalities for spin systems. He also gave invited colloquium talks to the OSU Departments of Atmospheric Sciences and Statistics.

MICROBIOLOGY

Penny S. Amy presented a paper on cloning genes that specify 2,4-D degradation in aquatic bacteria at the meetings of the American Society for Microbiology, held in Las Vegas in early March.

Dennis E. Hruby attended the UCLA meetings on transcription and termination, held in Steamboat Springs, CO, on March 20-April 6. He was invited to speak on new methods of vaccine development at a symposium at the State University of New York at Buffalo in late May.

IN MEMORIAM

Violette O. Gilfillan
1903-1985

Violette O. Gilfillan, widow of former Dean Francois A. Gilfillan, died on April 25. A long-time friend of the College of Science, she was responsible for establishing in 1984 a special award in memory of her husband, the F. A. Gilfillan Memorial Award for Distinguished Scholarship in Science.

Jo-Ann C. Leong gave an invited seminar on the molecular characterization of fish viruses at Portland State University in March. Early in May, she presented a seminar on recombinant DNA technology in aquaculture at Wichita State University.

Richard Y. Morita was elected to the 1985-86 nominating committee of the American Society for Microbiology. He was reappointed to a four-year term on the Advisory Committee of the Marine Ecology Progress Series. **Dr. Kouichi Ohwada**, section chief of the National Research Institute of Aquaculture, Japan, was a recent visitor to Dr. Morita's laboratory.

William E. Sandine chaired a symposium on genetics and plasmids of lactic acid bacteria at the meetings of the American Society for Microbiology, held in Las Vegas in early March. He also presented two papers at those meetings. In late March, he gave an invited seminar at MicroLife Genetics, in Sarasota, FL.

Ramon J. Seidler served as co-convenor of the session on genetically engineered microorganisms in the environment at the meetings of the American Society for Microbiology. He also presented a paper with **Bruce A. Caldwell** on the detection of coliform in small public water supplies. Seidler and Caldwell also participated in a workshop on new developments in drinking water microbiology.

PHYSICS

Kenneth S. Krane collaborated on research projects at the Daresbury Nuclear Structure Facility in England during April 14-24. On May 13-16, he was at the Oak Ridge National Laboratory, TN, designing the new low-temperature nuclear alignment facility, and on May 17-18 he attended the Conference for Departmental Chairs in Physics, held in Washington, DC.

Rubin H. Landau gave a talk on continuum and bound states of kaonic hydrogen at the Third International Symposium on Mesons and Light Nuclei, held in late May at Bechyně Castle, Czechoslovakia. In early June, he gave an invited talk at the Tenth European Symposium on the Dynamics of Few-Body Systems, held at Lake

Balaton, Hungary. He was also an invited lecturer at the Institute for Nuclear Studies in Warsaw, Poland.

Allen L. Wasserman participated in the Fourth Workshop on Synthetic Metals, held at Los Alamos, NM, in early April.

STATISTICS

Jeffrey Arthur attended the joint national meeting of TIMS/ORSA in late April. He presented an invited paper, chaired two technical sessions, and performed duties as chairman-elect of TIMS College on Engineering Management and as chairman of ORSA committee on demonstration hardware guidelines.

W. Scott Overton attended the Data Analysis workshop for the National Lake Survey, held in Knoxville, TN, in late March. Dr. Overton also attended the Stream Survey and Sampling workshop, held in Asheville, NC, in mid-April.

Roger Petersen was an invited participant in a workshop on "Crop Rotation Trials in Rainfed Agriculture," held in Damascus, Syria, March 8-13. The workshop was sponsored by several international organizations.

Donald A. Pierce has been appointed to a National Academy of Sciences committee to investigate the biological effects of internally deposited alpha-emitting radionuclides.

Fred L. Ramsey presented seminars on the "Penk et al vs Oregon State Board of Higher Education" case for the Oregon Chapter of the American Statistics Association and for the mathematics department at Reed College.

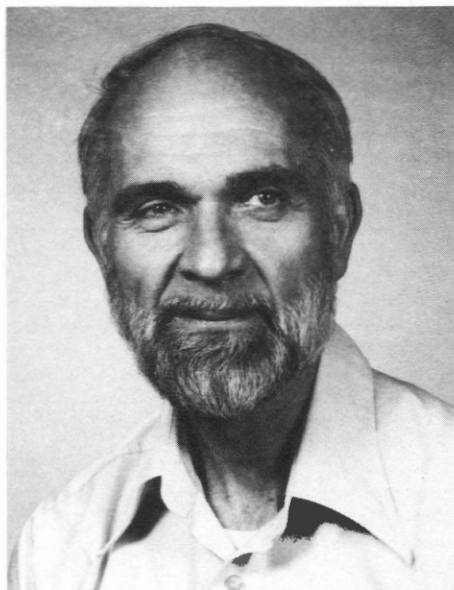
ZOOLOGY

Jane Lubchenco presented an invited seminar to the Departments of Zoology and Botany at Ohio State University. She spoke on "Seawater-herbivore interactions and community ecology's quandary: variability." In June, Dr. Lubchenco will attend the meetings of the Ecological Society of America and the American Society of Limnology and Oceanography in Minneapolis. She will chair a symposium, present a paper, participate as an officer in ESA business meetings, and, as chair of the ESA Awards Committee, present the Society's awards at the annual banquet.

Frank L. Moore organized the 46th Annual OSU Biology Colloquium, which was held on April 25-27. Six internationally renowned endocrinologists spoke on molecular endocrinology, and about 40 papers were contributed by endocrinologists from the western United States, Canada, and Mexico.

John E. Morris attended the Northwest Regional Developmental Biology Conference at Friday Harbor Laboratories in early April. He presented a paper on biochemical and structural changes in uterine epithelium at a Conference on Blastocysts Implantation, held in Cincinnati, May 2-4.

Victor A. Madsen Receives Harris Award in Basic Research



Victor A. Madsen, an internationally recognized authority in theoretical nuclear physics, is the recipient of the 1985 Milton Harris Award in Basic Research. The announcement was made by Thomas T. Sugihara, dean of the College of Science. The Harris Award, which carries a prize of \$1,000, was first established in 1983 through the generosity of Dr. Milton Harris, an eminent OSU alumnus.

Professor Madsen has established and maintained a distinguished career in theoretical nuclear physics at Oregon State University. The work for which he receives this special recognition began in 1975. It relates to the differing contributions of neutrons and protons to low-lying collective excited states of nuclei. While this work has been an important theoretical contribution in itself, it has also had a large impact on experimentalists, directing them toward new areas of study and new demonstrations of the elucidated phenomena. The results of Professor Madsen's original ideas have provided some strong justification for the proposed construction of intermediate energy neutron facilities.

In 1975, Madsen and his collaborators published two papers of great significance on the collective structure of nuclei. Experimental work had shown that many nuclei tend to have spherical equilibrium shapes, but that in their excited states they can oscillate rapidly back and forth between spherical and instantaneously deformed shapes. By a careful analysis of the data, Madsen and his collaborators showed that the deformation is different in a systematic way for the protons and neutrons in the nucleus, depending on their individual shell structures. Moreover, they showed how using various reaction probes to measure the deformation can enhance the experimental observation of that difference. Because the

deformation parameter is essential to the understanding of nuclear structure, this work by Madsen was of critical importance in the interpretation of the properties of nuclear states. It extended the understanding of fundamental nuclear physics, and it also stimulated much experimental activity.

Professor Madsen has achieved national and international renown for his work, which was recognized last year when he was elected Fellow of the American Physical Society. His certificate of fellowship reads, "for continuous efforts at helping us understand nuclear reaction mechanisms and their use in probing nuclear structure."

The theoretical work done in 1975 continues to be cited repeatedly in the literature every year—an indication of its impact in nuclear physics. He is a frequent visiting scientist at leading centers of theoretical physics, including the Lawrence Livermore Laboratory and the Kernforschungsanlage-Jülich, West Germany, where he has conducted research in nuclear scattering and reactions during his last two sabbatical leaves.

Professor Madsen came to OSU in 1963 after completing B.S. and Ph.D. degrees in physics at the University of Washington. He reached the rank of professor of physics in 1972. Since the beginning of his professional career at OSU, he has published more than 60 scientific papers, and he has often been invited to speak at national and international meetings. He has been a consultant at the Los Alamos Scientific Laboratory, and since 1964 he has been a consultant at the Lawrence Livermore National Laboratory.

A theorist of stature, as well as a dedicated and popular teacher, Professor Madsen brings international attention to the Department of Physics and Oregon State University.