

# **VERMONT EPSCoR NEWSLETTER**

**Vermont Experimental Program to Stimulate Competitive Research**

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**FALL, 1997**

*Vermont EPSCoR is the Experimental Program to Stimulate Competitive Research, a cooperative effort of federal and state government, the higher education community and the private sector in Vermont.*

## **EPSCoR AWARD FOR 1998**

The **National Science Foundation** has recently extended the Vermont EPSCoR program; the 1998 award will total

\$1 million, which is matched by local private, institutional and state funds. A new 3-year EPSCoR proposal is being developed for submission in July, 1998.

## **CURRENT EPSCoR RESEARCH**

Ongoing research programs feature scientific investigations into four basic areas at the **University of Vermont (UVM): Computational Science and Engineering, Evolutionary Ecology, Receptor-mediated Signaling and Biotechnology, and Advanced Materials.**

The **Computational Science and Engineering (CSEC)** group is led by **Professor David Dougherty**, faculty member in **Civil and Environmental Engineering at UVM** with a secondary appointment in **Computer Science**. Current projects are led by **Drs. Donna Rizzo and George Karatzas, UVM Civil and Environmental Engineering**, and **Drs. Yuanyuan Yang and Guoliang Xue, UVM Computer Science**. The group benefits from mentoring by **Dr. George Pinder, Professor of CEE and of Mathematics**, and **Dorothean Chair Dr. Charles Colbourn**, who chairs the **Computer Science Department at UVM**.

CSEC researches computational science and engineering, mostly related to algorithms for solving specific problems. In addition, CSEC develops ideas that facilitate such advancement, including computer interconnection schemes and experimentation with parallel computing

environments. The cluster members apply computational methods and mathematical modeling to problems in the environment, biology, and computer methodology.

The **Receptor-mediated Signaling and Biotechnology** cluster is led by **Dr. Douglas Johnson, Microbiology and Molecular Genetics Department**. Current members of the Cluster include **Dr. Jose Madalengoitia** in **Chemistry**, **Dr. James Posada** in **Molecular Physiology and Biophysics**, **Dr. Lily Chen** and **Dr. Anne Huot** in **Biomedical Technology**, **Dr. Jen-Fu Chiu** and **Dr. Michael Kalafatis** in **Biochemistry**, **Dr. Lynne Schneider** in **Biology**, **Dr. Karen Plaut** in **Food and Animal Sciences**, and **Dr. Liz Dolci** at **Johnson State College**.

This research group studies fundamental aspects of cellular function with a specific focus on biological signaling mechanisms. These signaling mechanisms play a diverse set of roles within the cell, including the control of cell growth, tumorigenesis, blood clotting, and mammary gland development. This interdisciplinary group draws members from the basic and applied biomedical sciences and biology that work on individual and collaborative projects.

The **Advanced Materials** cluster's new multi-disciplinary approach, led by **Dr. Walter Varhue, Professor of Electrical Engineering at UVM**, has become the research norm for Materials Science at UVM. This is best exemplified by the thin film work centered in the synthesis and characterization work which reaches out to chemistry for molecular precursors, to physics for theoretical understanding and application to sensors, and to mechanical engineering for tool coatings. Major instrument acquisitions by this cluster have resulted in a high quality characterization laboratory being established. New cluster member, **Dr. Hongda Chen, Assistant Professor in the UVM Animal and Food Sciences Department**, provides a unique opportunity for this group to develop a biomaterials initiative. His research will focus on developing a basic science approach to biomaterials characterization and to develop expertise in chemical modification of biomaterials. **Dr. Christopher Landry, UVM Chemistry Department** faculty member, will be concerned with controlling the macroscopic properties of selected organic-inorganic composite materials.

The **Evolutionary Ecology** group led by **Dr. Joseph Schall, Professor of Biology at UVM**, seeks to understand the ways ecological, evolutionary, and historical factors interact to produce patterns in nature. The various subdisciplines that make up evolutionary ecology contribute to solving "real-world" problems as well as contributing to theoretical science. Members of this cluster are studying various aspects of parasite-host biology. The biodiversity crisis is approached in the research on the genetics of small populations, the distribution and genetics of rare species and the invasions of pest plants into natural communities.

Five members of the very successful Evolutionary Ecology cluster have been funded by the **National Science Foundation and the National Institutes of Health** for individual research, and the group was awarded the first **NSF Graduate Training Grant** in Vermont's history.

#### **NSF/VERMONT PARTNERSHIP**

NSF Deputy Director Joseph Bordogna, Luther Williams, Richard Anderson, representatives from NSF Engineering directorates, EPSCoR's Michael Crowley, and Tony Centodocati from NSF SBIR met this August with Project Director Allen, Technology Council Executive Director Dr. Paul Huyffer, EPSCoR Committee Chair Richard Chapman, Commerce and Community Affairs Secretary William Shouldice and MicroStrain President Steve Arms to discuss ways to form state/federal partnerships around SBIR and other economic development ideas.

#### **HIGH SCHOOL OUTREACH**

The **EPSCoR High School Outreach Program** was begun in 1994. In that year, four teachers and 10 students were involved in the program designed to provide summer research experiences in college laboratories, learning from college faculty sponsors. There were four faculty sponsors at that time. In 1995, eight teachers and 18 students were involved, requiring eight faculty sponsors, six of whom were in **UVM** labs, one at **Johnson State**, and one at **Lyndon State**. In 1996, nine teams involved nine high school teachers, 18 students, and nine faculty sponsors, six at **UVM**, one at **Middlebury College**, one at **Lyndon State**, and one at **Norwich University**. This year's Outreach Program involved a similar number. Over 50% of the student participants in this program are female. Contact **Maria Timmons**, High School Outreach Coordinator at 802-656-0706 or e-mail [mtimmons@zoo.uvm.edu](mailto:mtimmons@zoo.uvm.edu) for more information about this and the **Science and Technology Careers Day**.

#### **SCIENCE AND TECHNOLOGY CAREERS DAY**

The first **S&T Careers Day** was held at **UVM** in May, 1995. About 80 high school students, teachers and parents attended the day of lab tours and posters done by the summer research teams from the **High School Outreach Program**. Ten varied research demonstrations were held. On May 23, 1996, **350** students, teachers and parents attended this expanded event. This year's event was held at UVM on **May 21, 1997**. Thirty-six University faculty participated through scientific demonstrations and lectures on careers in science. Once again, over 350 students, teachers and parents attended. Contact **Maria Timmons** at 802-656-0706 for information about these programs.

#### **PHASE 0 SBIR**

This program serves to introduce local entrepreneurs to the federal **Small Business Innovation Research (SBIR)** program. To date, **Vermont EPSCoR** has made 35 awards of \$5,000 each and 4 Incentive Awards of \$3,000 contributed by the State of Vermont. At least eight Phase 0 awardees have gone on to achieve funding from the federal SBIR program. The federal SBIR awards range from \$100,000 (Phase I) to \$750,000 (Phase II). In 1997, 28 Phase 0 proposals were received; 7 were selected for funding at \$5,000 each. Awards were received by **MicroStrain, Inc. (Burlington)** for "Microminiature, high resolution, reusable peak strain detector for smart structures;" **Beeken/Parsons (Shelburne)**, for "Toward a sustaining forest: A project to survey consumer response to furniture made with character marked northern hardwoods;" **XC Associates, Inc. (Bennington)** for "Thermal imaging of lightweight, composite thermal cores;" **John LaRue (Underhill)** for "Reduced visibility of structures...;" **Omega Optical, Inc. (Brattleboro)** for "Proposal to study the impact of fluctuations in process gas composition on yields in the manufacture of high-precision multiple-cavity optical bandpass filters;" **Vermont Electric Car Co. (Middlesex)** for "Electric/indigenous biofuel powered commuter vehicle;" and **Valley Dental Associates (Waitsfield)** for "Microbial biofilm decontamination in dental unit waterlines." The **due date** for the **1998** round of competition is late **January**. Call 656-7969 for details.

#### WWW INFORMATION

You may view our **EPSCoR Home Page** at <http://epscor.uvm.edu> Within our home page you will be able to access our searchable **Environmental Database**, a directory which provides **information on over 900 environmentally-related researchers** in academia, business and government. A Materials database is currently under development.

#### STATE PLAN: CENTERS OF EXCELLENCE

The **State Plan for Science and Technology** was updated in November, 1996 as a "Second Anniversary Progress Report." A copy is available through the EPSCoR office. Call 802-656-7969.

**Dr. Paul Huyffer** is now formally on board as **Executive Director of the Vermont Technology Council**. His office is in the Kalkin Building at the University of Vermont. He also has a UVM appointment as Special Assistant to the President for Economic Development. He can be reached at his e-mail address [phuyffer@emba.uvm.edu](mailto:phuyffer@emba.uvm.edu)

**Dr. Catherine Donnelly**, **Associate Dean, College of Agriculture and Life Sciences** at UVM, is the new leader of the **Food Science Center**. The Food Science Center expects the completion of the UVM **Carrigan Hall** renovations in January.

The **Applied Biotechnology Center of Vermont (ABCV)** is led by **Dr. John Evans, Executive Dean of the UVM College of Medicine**. Former director of this Center, **Dr. Norman Alpert**, has taken over the leadership of the **Vermont Academy of Science and Engineering (VASE)** following **Dr. Tom Tritton's** departure to **Haverford College** in Pennsylvania. Several research-based businesses are targeted for development.

**UVM President and Professor of Biology Judith Ramaley** has taken former **President Thomas Salmon's** place on the Vermont Technology Council.

**Dr. Robert Arns, Interim Dean of the UVM College of Engineering and Mathematics**, has also joined the Vermont Technology Council, and chairs the **Advanced Materials Committee**.

Other new Council members include **John Kimbell, President and CEO of Vermont Gas Systems, Inc.**, and **Norbert B. Lavigne, President of GBIC**.

## **NSF/AAAS CONFERENCE at BASIN HARBOR**

<http://www.aaas.org/spp/dspp/rcp/rcp.htm>

The first **Research Competitiveness Program** conference, sponsored by the **National Science Foundation EPSCoR** program and the **American Association for the Advancement of Science (AAAS)** was held at the **Basin Harbor Club** in Vergennes, Vermont on September 21-23. **Lieutenant Governor Douglas Racine**, delivered the keynote address. The conference was entitled "**Building Links between Academic Research and the Private Sector**," and was held to enhance research competitiveness in EPSCoR states through improving academic-industrial collaboration, with an emphasis on small business. Invited participants included twelve leaders in science and technology from Maine and Vermont and participants from each of the other 19 EPSCoR jurisdictions.

The conference agenda included presentations by national experts in academic-industrial collaboration, who also participated in group discussions on:

1) identification or creation of small business partners; 2) funding university-small business partnerships; and 3) establishing and operating collaborative academic-industrial R&D Centers.

A result of the conference is the expectation of a clarified technology transfer process at UVM, with tangible economic outcomes for Vermont anticipated.

## **NSF EPSCOR Grant**

Vermont recently received notice of a \$500,000 **NSF EPSCoR** grant. This grant is designed to advance the development of three identified projects in the **Centers of Excellence**: 1) utilization of whey-based edible films (collaboration between the **Environmental and Food Science Centers**); 2) development of a reagent kit and instrumentation for rapid determination of platelet activation thresholds (**Biotechnology Center**); and 3) development of a thin film blister detector for microelectronics manufacturing (**Advanced Materials Science Center**).

In addition to the research projects within each Center, infrastructure will be developed that is focused on development of an effective **technology transfer** program at UVM.

#### DEPARTMENT OF DEFENSE EPSCoR (DEPSCoR)

In **1997**, of 15 DEPSCoR proposals submitted from Vermont, two awards were made to **UVM** researchers. **Dr. Kurt Oughstun, Department of Electrical Engineering and Mathematics, and Dr. Robert Snapp, Department of Computer Science** were two of 55 applicants from 17 states to receive \$16.2M in FY97 DEPSCoR awards. Dr. Oughstun's proposal is entitled "A research program on the asymptotic theory of ultrawideband pulse propagation in dispersive media." This theory can be applied to undersea communications systems, plasma diagnostics, and the remote sensing of geophysical structures.

Dr. Snapp's research in "Finite sample analyses of nearest neighbor algorithms" is motivated by the need to automate accurate and rapid decisions based on image and environmental data.

#### SMALL COLLEGE DEVELOPMENT PROGRAM

The Vermont EPSCoR Small College Development Program has been a long-standing opportunity for faculty at undergraduate colleges in Vermont to pursue summer research. Over the years, seventy-eight projects involving faculty and students have been supported at eight different colleges (**Bennington College, Castleton State College, Johnson State College, Lyndon State College, Marlboro College, Middlebury College, Norwich University, and St. Michael's College**). Most projects are within the \$3,000 - \$6,000 range.

In **1997 awards** were made to the following faculty members:

**Tania S. Bacchus**, Department of Environmental and Health Sciences at **Johnson State College** for "Mapping the glacial-deglacial history of the Gulf of Maine."

**George T. Byrd**, Department of Biology, **St. Michael's College** for "Water use between different genotypes of *Panicum virgatum*, a C<sub>4</sub> plant."

**Elizabeth D. Dolci**, Department of Environmental and Health Sciences, **Johnson State College** for "Use of parallel computing for integrated signalized intersection control and simulation models."

**Robert B. Genter**, Department of Environmental and Health Sciences, **Johnson State Colleges**, for "Biological Assessment of metal stress using communities of algae in a small river."

**Kathleen Mondanaro Lynch**, Department of Chemistry and Physics, **St. Michael's College** for "Triblattanes and Paddlanes: Synthesis and study of strained-ring compounds containing formally non-conjugated double bonds."

**Stephen R. Van Horn**, Department of Environmental and Health Sciences, **Johnson State College**, for "Role of structural control on dike emplacement: Evidence from an echelon lamprophyric dike, Johnson, VT."

**David S. Westerman**, Department of Geology, **Norwich University** for "Mapping internal zonations within a neogene granitoid, Monte Capanne Granodionite, Elba Island (Italy)."

**Phanindra V. Wunnava**, Department of Economics, **Middlebury College** for "An investigation of union wage premiums by gender and race: Evidence from PSID."

**Proposals for the 1998 Small College Development competition are due in the EPSCoR office on February 16<sup>th</sup>.**

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For more information about the EPSCoR program, please e-mail  
Lilian.Gamache@uvm.edu or call 802-656-7969