Montana State Legislature

Exhibit Number: 1

HB 531

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McLaughlin Research Institute

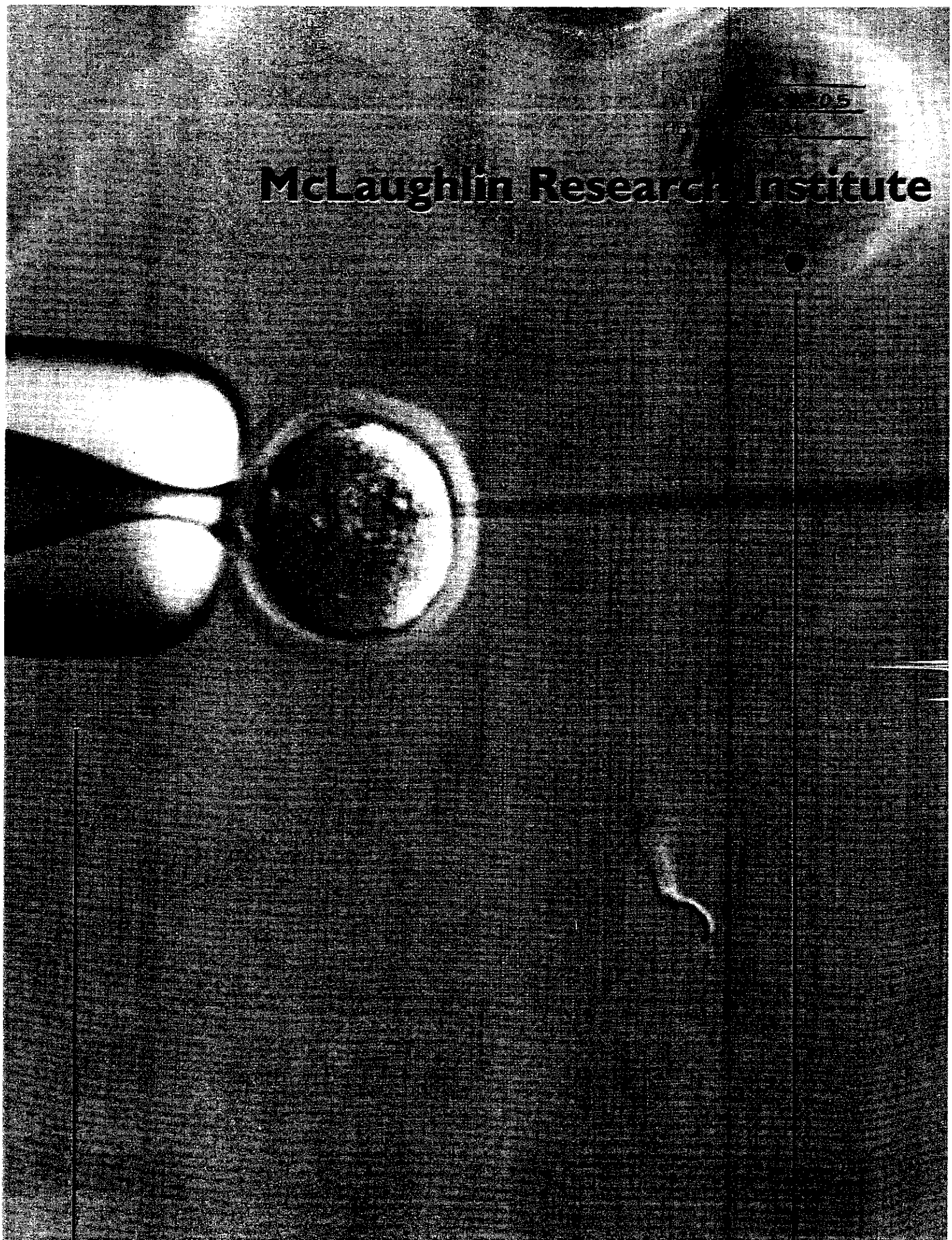

EXHIBIT 1
DATE 2-8-05
HB 531

McLaughlin Research Institute for Biomedical Sciences

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Appropriation Request From McLaughlin Research Institute

McLaughlin's Missions of Research and Education

* McLaughlin scientists conduct research associated with Alzheimer's disease, hearing loss, deafness, blindness, peripheral neuropathy, and prion diseases (chronic wasting disease, mad cow disease and Creutzfeldt-Jakob disease).

* Our summer student and teacher research education program serves high school and college students from throughout Montana and high school teachers from north central Montana. Students and teachers have the unique opportunity to work in a basic research laboratory by participating in ongoing research. Over 80% of our students have gone on to careers in research or medicine.

2005 Appropriation is to expand, renovate and equip the current facility

Key elements of the project:

1) **Expand the cage washing area to meet the demands of the current facility and provide additional space for development of new mouse models.** Due to the large number of mice needed for ongoing and future research programs, the cage washing area is stressed to its maximum capabilities. Additional space for experimental mice will be gained by this renovation. The expanded cage washing facility will be designed to meet increased demand from future expansions.

2) **Purchase a highly efficient tunnel cage washer that can accommodate current and future needs.**

3) **Make more efficient use of existing space by providing single pass air to the second floor laboratory area.** Single pass air will allow us to convert office and corridor areas to research laboratories. This renovation will provide the laboratory space needed for two to three new scientists

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This project would:
1) **Keep McLaughlin's research programs productive.** The goal is to enhance the ability of our current and future scientists to compete successfully for peer-reviewed medical research grants.
2) **Enable the development of new mouse models for human disease.** McLaughlin Research offers some of the most cost effective mouse research in the United States; however, insufficient space prevents us from developing new programs. Renovation and expansion of our current mouse facility would lead to additional cost savings and even more effective use of public and private research dollars.
3) **Provide the space to bring new biomedical research scientists to Great Falls.** With their research grants, scientists bring dollars from outside of the state and thus help create good jobs for Montanans. This money is also used for local services and supplies.
4) **Poise McLaughlin for future expansion.** The changes in the physical plant can be easily adapted and modified in response to advances in research technology.

Cost of Renovation & Equipment: **$3 million**

McLaughlin Board and Council Commitment to Matching Funds

The McLaughlin Board and National Development Council have passed resolutions that commit them to raising **$1.5 million** for construction, renovation, and equipment. After construction is completed, the Board and Council are committed to raising an additional **$2 million** for the start-up research costs and equipment needs of two new scientists.

Total Cost of Project

State Appropriation Request	$1.5 million
McLaughlin Matching Funds:	
Match for Construction	$1.5 million
Recruitment of Scientists	$2 million
Total	$5 million

Economic Impact to Montana

- The State of Montana made a worthwhile investment with the $2 million grant in 1990 and the $500,000 loan in 1992.
- When the state of Montana invested $2 million, which was matched by a $5 million federal appropriation to build our current facility, McLaughlin had one scientist, 10 staff members and an annual budget of approximately $250,000. Today we have five scientists, 44 employees, and an annual budget of approximately $5.3 million.
- Since 1990, McLaughlin has brought in over $35 million in federal and other out-of-state funding.
- All full time positions pay significantly more than minimum wage and include health and retirement benefits.

McLaughlin Research

Institute for Biomedical Sciences

EXHIBIT 1
DATE 2.8.05
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McLaughlin Research Institute Contributes to Montana's Economy and Growth

Employees

Out-of-state employees who came to Montana to work at MRI	17 (including 13 PhDs)
Montana university graduates working at MRI	13
MD/PhD's from Montana working at MRI	3
Montanans working at MRI	16
Total	**49**

Payroll

2002	$1,445,963	Montana withholding	$52,084
2003	1,489,068	Montana withholding	53,376
2004	1,768,563	Montana withholding	70,557

Out of State Funding since 1991

Federal Funding (Competitive Research Grants)	$25,235,000
Other Funding	10,435,000
Royalty Income	92,250
Total	**$35,762,250**

Funding Sources

Federal: National Institutes of Health, National Science Foundation, Department of Defense, Department of Energy, Office of Rural Public Health, and General Service Administration.
Private: American Cancer Society, American Heart Association, American Health Assistance Foundation, University of Toronto, Millennium Pharmaceuticals, Stowers Institute for Medical Research, National Alliance for Research on Schizophrenia and Depression, Research Corporation, CellTech Inc., Amgen, Muscular Dystrophy Association, Oberkotter Foundation, and Murdock Foundation.

Positions and Salaries

McLaughlin has positions available for high school graduates, college graduates, MDs, and PhDs. Including: animal technician, business office, maintenance, research assistant, postdoctoral fellow, and scientist.

Entry-level positions begin at greater than $20,000 annually and include health and retirement benefits.

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Collaboration

McLaughlin Research Institute Autumn 2004 **Newsletter** Volume 10, #2

OUR MISSION: To improve human health through innovative genetic research and education.

COVER STORY

Dr. Ryan Karcher Receives National Research Service Award

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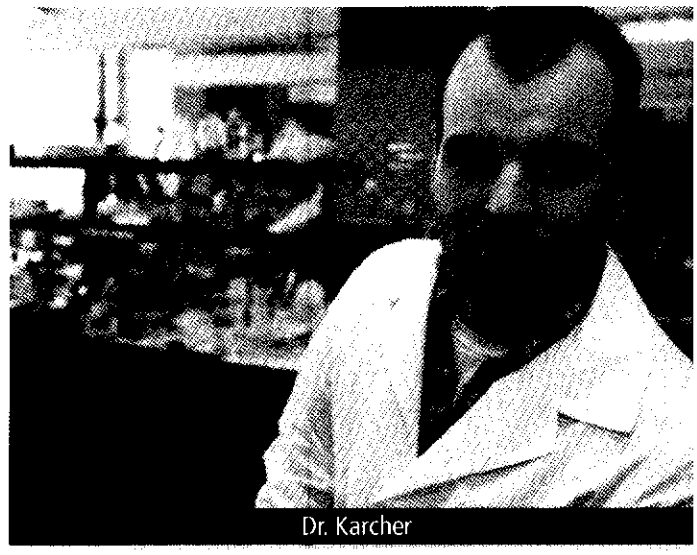
Postdoctoral Fellow Dr. Ryan Karcher has received a National Research Service Award from the National Institutes of Health. The three-year fellowship will pay his salary while he works in Dr. John Mercer's lab studying molecular motors that are involved in inherited deafness. "This is an important milestone for Ryan's progression to an independent career running his own laboratory," Dr. Mercer said. The fellowship pays for additional training toward that goal. Dr. Karcher has worked in Dr. Mercer's lab since November 2003.

With the fellowship funding, Dr. Karcher will study myosin function in the inner ear. Myosins are tiny motors that drive the activity in a cell, thereby controlling many of the body's functions, including hearing, heartbeat, and movement. Karcher will look at two of these motors in the inner ear, myosin-VII and myosin-XV. Inherited deafness disorders have been linked with these myosins, and scientists have some information about the myosins' functions but have many unanswered questions.



Dr. Karcher

Dr. Karcher will use a chemical genetics strategy to answer his questions about the inner ear myosins. Chemical genetics is a research method that uses chemistry to generate small molecules to change the way proteins work–directly in real time rather than indirectly by manipulating their genes. Dr. Mercer has used this cutting-edge method to study hearing loss and Type II diabetes and is now using it to study other conditions. "This is a very sensitive, specific way to study myosins," Karcher said. "It is a valuable tool to have."

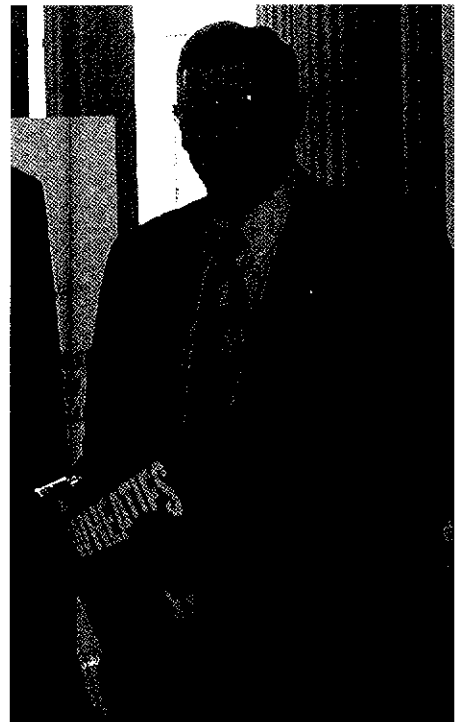
One way he will use the method is working with cultured inner ear cells, in which he can watch tiny hair cells grow. In the cochlea, or hearing organ of the inner ear, hair cells of different lengths get excited by different frequencies. In turn, the hair cells excite nerves that send messages to the

Continued on page 2

wild deer are infected. Scientists do not know if it is transmissible through contact between animals of different species, but they have injected CWD from deer into the brains of cows and infected the cattle. Dr. Carlson suggested that the most important step in controlling the disease is the regulation of game farms. "At a minimum, double fencing should be required," he said. And the rapid, sensitive, inexpensive blood test he hopes to develop would "ensure that game is safe to eat, preserving the economic benefits of hunting and Montana's way of life."

Senator Conrad Burns: A Champion of Science

Senator Conrad Burns, a longtime supporter of McLaughlin Research Institute and member of its National Development Council, received a Champion of Science award for his leadership and support of federal funding for basic science research. At the Science Coalition's award ceremony, Dr. Shirley Ann Jackson told Senator Burns and five of his fellow members of Congress, "Your continued efforts on behalf of scientific research, discovery, and innovation are the key to a future where there will be cures for disease, more security and prosperity, and a brighter, better future for all." Dr. Jackson, president of the American Association for the Advancement of Science, addressed the lawmakers at a "Breakfast of Champions" in July.



The Science Coalition presented Senator Burns with a box of Wheaties personalized with his photograph.

"Looking back just a few years, the strides we have made in the science world are enormous," Senator Burns said. "Each day can bring a key to unlock a new door – keys that are critical to our future, and we must continue striving towards these advances in the science world. I will continue working in my role as United States Senator to make sure Congress does not lose focus of this great goal," he said.

Senator Burns has been a strong and consistent advocate for funding scientific research in Montana. Dr. Richard Lauritzen, Chair of McLaughlin's Board of Directors, praised him for his efforts. "I think it's wonderful that our Senator won a Champion of Science award for his leadership in funding scientific research, and he is to be congratulated for that," he said. "We appreciate his support, especially in this region of Montana."

The Champions of Science awards are given by The Science Coalition, which represents more than 400 organizations. Its mission is to expand and strengthen the federal government's investment in university-based scientific, medical, engineering and agricultural research. During the past twenty years, that investment has declined by one third, and the percentage of articles by U. S. scientists in physical science journals dropped from 61% to 29% last year. The Science Coalition's philosophy is that "sustained support for research is the most important step the nation can take to maintain America's position at the forefront of scientific discovery, technological innovation, and economic growth in the 21st century."

Along with Senator Burns, the Champions of Science included Senator Paul S. Sarbanes (D-MD), Speaker Dennis Hastert (R-IL), Minority Leader Nancy Pelosi (D-CA), and Representatives Martin Olav Sabo (D-MN), and Judy Biggert (R-IL). "We pay tribute to the men and women in Congress who have recognized, throughout their careers, that a federal investment in science is an investment in our security and in our future," Dr. Jackson told the crowd of university presidents and leaders of the science and business communities.

"I think it's wonderful that our Senator won a Champion of Science award for his leadership in funding scientific research, and he is to be congratulated for that."

–Dr. Richard Lauritzen

Dr. Karcher

Continued from cover story

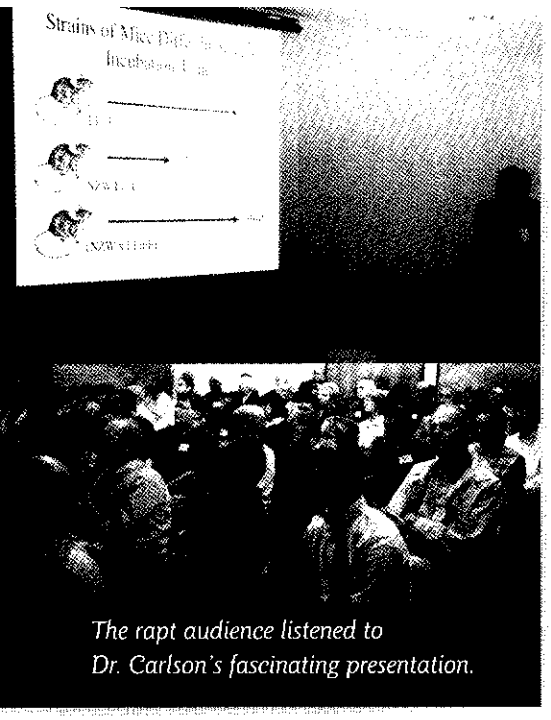
brain, and the movement is translated to sound. Using a chemical that mimics the myosin's fuel, Dr. Karcher can freeze the activity of one of the myosins at any point as the hair cells grow in the culture, then watch to see how that affects hair cell formation, and later, hair cell maintenance. Learning about myosin function in hair cells will be instrumental to understanding the development of hearing, and the lack of that development.

Genetics is a new field for Dr. Karcher. In graduate school at the University of Illinois, he studied myosins in xenopus (an African frog). According to Karcher, xenopus is a good system for cell biology but doesn't lend itself to genetics. In August, he attended a course in experimental mouse genetics at the Jackson Laboratory in Bar Harbor, Maine. Now he is looking forward to diving into his new research project.

"I'm really happy here," Dr. Karcher said of his first year at the Institute. "It's a nice atmosphere to do research, and the setting is perfect for me. I love the fishing on the Missouri and exploring places like the Bob Marshall and Glacier Park."

Mad Cow Disease Prevention Discussed at NDC

"There is sufficient scientific information available to all but eliminate the risk of a BSE epidemic in the US," Senior Scientist and Director Dr. George Carlson told the audience at McLaughlin's annual meeting of the National Development Council (NDC) in June. NDC Chair Jerry Molen, a Hollywood film producer, introduced Dr. Carlson, whose keynote address was titled, *Mad Cows & Englishmen: Preventing the Spread of Prion Diseases.*



The rapt audience listened to Dr. Carlson's fascinating presentation.

BSE stands for bovine spongiform encephalopathy, commonly known as mad cow disease. The 1990s epidemic in the United Kingdom was associated with over a hundred human deaths from new variant Creutzfeldt-Jakob disease (nvCJD), which the victims apparently contracted from eating contaminated beef products. According to Dr. Carlson, it is political and economic factors, not scientific ones, that keep the U.S. government from instituting a total ban on cow, sheep, deer, and elk by-products in feed for animals meant for human consumption. "Such a ban would maintain consumer confidence in the safety of eating beef, while the current partial ban raises compliance issues and increases the need for testing," he said. With a total feed ban in place, some testing would still be necessary, but only of older animals that have a higher incidence of sporadic BSE. Without the complete ban, Carlson said, all cattle over two years old should be tested. Currently, Japan tests 100% of its cattle: Europe tests 70%, and the U.S. tests only .06%.

Meanwhile, Dr. Carlson and his co-investigator, Dr. Leroy Hood of the Institute for Systems Biology in Seattle, WA, are trying to develop a rapid, sensitive blood test to identify individual animals and humans who are infected with prions, the misfolded proteins that cause BSE, nvCJD in humans, and chronic wasting disease (CWD) in deer and elk. Such a test is important since people and animals can carry and spread prion diseases for years before developing symptoms.

Rather than looking for the misfolded proteins themselves, Drs. Carlson and Hood are looking for the effects of misfolded proteins on mice. Their work is based on the hypothesis that prion infection results in changes in blood cell populations or changes in gene expression. Dr. Hood, who is a member of McLaughlin's Scientific Advisory Committee, is using microarray analysis, or DNA technology, to profile gene expression in blood cells. Microarrays are ordered sets of DNA molecules of known sequence, made possible by the human genome project. Scientists can detect thousands of genes in a small sample simultaneously and analyze their expression.

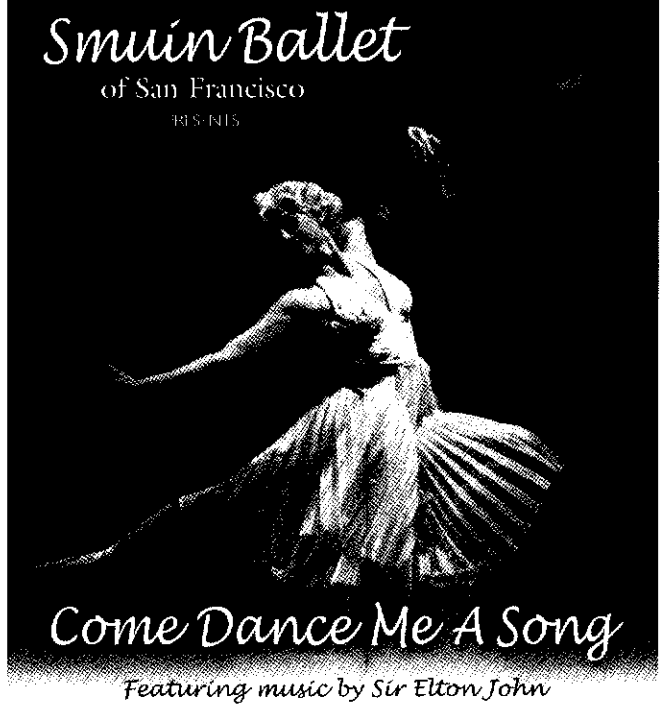
The power of the microarray technique also can be applied to studying chronic wasting disease, which Dr. Carlson called "America's prion epidemic." CWD is easily transmissible and much harder to contain, since, unlike BSE, it is spread by animal to animal contact. It occurs in the wild as well as in captivity. In some areas, as many as 15-20% of

McLaughlin Summer Interns

Where Are They Now?

In 1994, **Sarah Cowgill** spent a summer in Dr. Bill Crain's lab. After finishing her undergraduate degree at the University of Montana, she was accepted to medical school at Penn. State. Dr. Cowgill now serves as Chief Resident of General Surgery at Ohio State University School of Medicine. Upon completion of her residency, she plans to do a fellowship in gastro-intestinal surgery at the University of South Florida.

After spending one summer (1997) at McLaughlin as an American Cancer Society summer intern, **Brian Dunn** decided to come back for a second year in Dr. George Carlson's lab (1998). Brian went on to earn a Bachelor of Science in Biology from Wheaton College. He is now in the PhD program at Yale University, Department of Cell Biology, studying the role of myosin V in the transport and localization of messenger RNAs in budding yeast.



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Publisher
MRI Development Office

Editors
David Crum, Kristen Jacobsen

Writer
Janet Henderson

Designer
Pam Lemelin, Renaissance Creative

Printer
Advanced Litho Printing

Photo Credits
Square Butte: McMillan Studio
Dr. Karcher: Larry Beckner
Breakfast of Champions: Office of Senator Burns

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Pamphlet - Front

Dedication to Discovery

McLaughlin Research Institute

2003-2004 Annual Report

Research–

To search, and search again. A continued, careful inquiry into a subject in order to discover facts or principles.

Basic scientific research–that's what the scientists at McLaughlin Research Institute do. Biomedical research carefully conducted, *with precision, with patience, with persistence.*

We conduct research into diseases that affect young and old, individuals, couples, families ... Alzheimer's diabetes, blindness, deafness, hearing loss, multiple sclerosis, muscular dystrophy, peripheral neuropathy, Creutzfeldt-Jakob disease and more.

There are no short-cuts to unlocking the mysteries of disease. Our people spend long hours, days, and years in search of understanding, genetic links and causes of human disease.

Discovery comes from this long-term dedication to research.

Dr. John Bermingham, Jr. is studying levels of myelin gene expression in mouse brain and sciatic nerve tissue. One of these images is pictured on the front cover.

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Publication Credits

Editors . . . . . Dave Crum & Kristen Jacobsen

Graphic Designer . . . . . Pam Lemelin

Writer . . . . . Janet Henderson

Photography . . . . . Larry Beckner Photography, Centennial Photography, Photo Plus, David Scott Smith/Right Image

Printing . . . . . Advanced Litho Printing

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