

University of Montana

ScholarWorks at University of Montana

Vision

University Relations

1994

Vision 1994

Follow this and additional works at: <https://scholarworks.umt.edu/vision>

Let us know how access to this document benefits you.

Recommended Citation

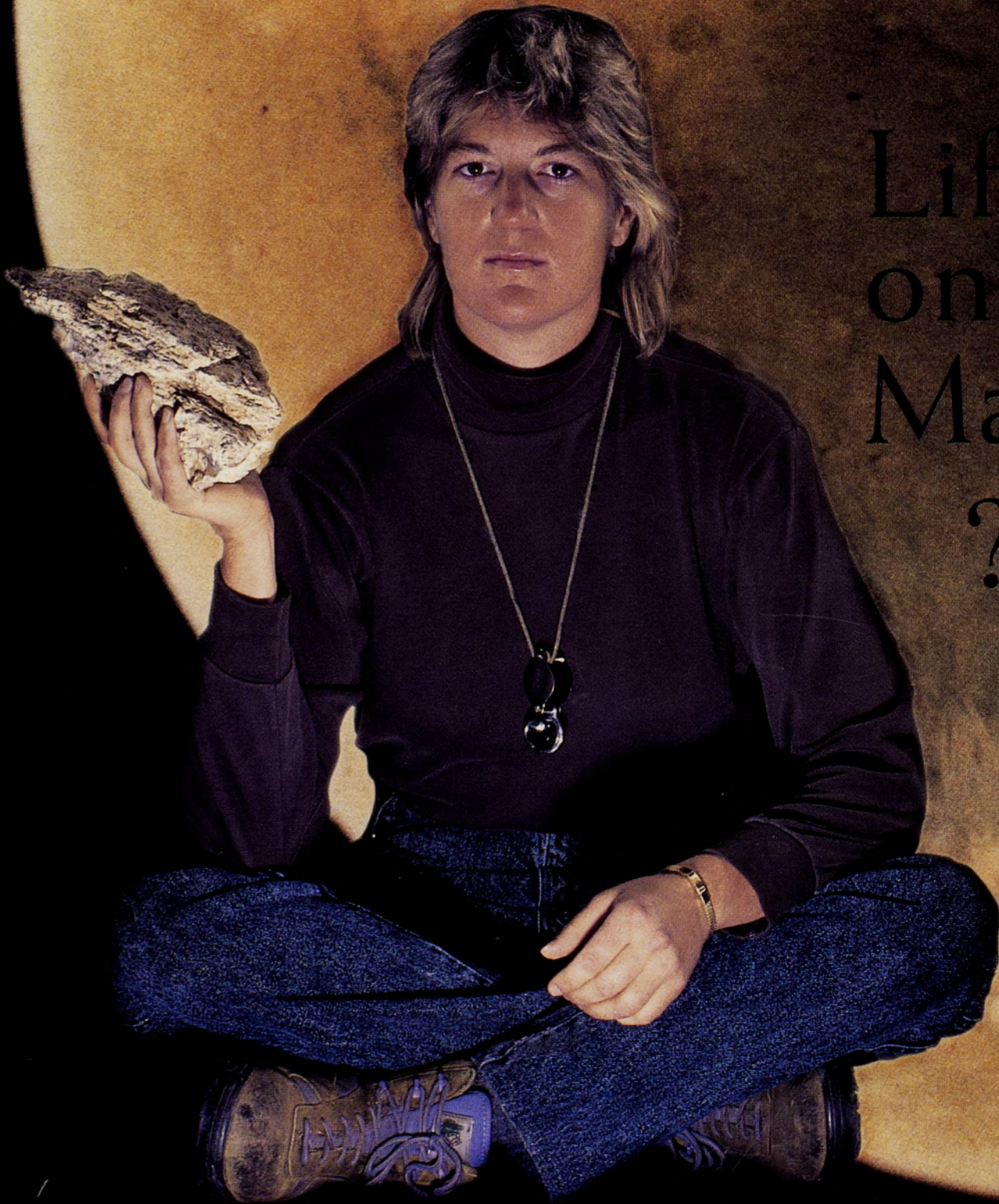
"Vision 1994" (1994). *Vision*. 22.

<https://scholarworks.umt.edu/vision/22>

This Book is brought to you for free and open access by the University Relations at ScholarWorks at University of Montana. It has been accepted for inclusion in Vision by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

VISION

SCHOLARSHIP AT THE UNIVERSITY OF MONTANA



Life
on
Mars
?

"Scholarship at
The University of
Montana is a
service to the people
of Montana and



is conducted in
the spirit of
addressing the needs
of our community."

This new edition of Vision presents the latest in scholarly research and creativity at The University of Montana. These activities are conducted for two fundamental purposes: First, and historically the most significant, is curriculum development. The research and scholarship of the university community generates new elements for existing courses, new courses of study, and ultimately new degree programs. The second purpose is the generation of economic development for the state of Montana. New products and applications are brought to market. Outreach into the community sets the stage for growth. And cultural programs support and enhance the marketplace, enabling business to thrive.

The scholarship we share with you in Vision is not only a contribution to the world's body of knowledge, it is a service to the people of Montana and is conducted in the spirit of addressing the needs of our community.

A handwritten signature in black ink that reads "R.C. Murray". The signature is written in a cursive style.

Raymond C. Murray
Associate Provost for Research & Economic Development
and Dean of the Graduate School

VISION

SCHOLARSHIP AT THE UNIVERSITY OF MONTANA

Vision is published by
The University of Montana Office
of Research Administration,
116 University Hall, Missoula,
Montana, 59812. (406) 243-6670.

Raymond C. Murray,
Associate Provost for
Research & Economic
Development and Dean
of the Graduate School

Judy Fredenberg,

Assistant to the Associate
Provost for Research

Produced by

University Communications,
1994

Editor: Perri Knize

Associate Editor: Virginia Braun

Photographer: Todd Goodrich

Art Director/Designer: Perri Knize

Production/Design: Neal Wiegert

Contributing Writers:

Jane Easter Bahls, Kristin

Bloomer, Terry Brenner,

Perri Knize, Steven Krauzer,

Caroline Patterson, Kristin

Rodine, Carol Susan Woodruff.

The University of Montana includes
Western Montana College of The
University of Montana in Dillon,
Montana Tech of The University of
Montana in Butte, and the Helena
College of Technology of The
University of Montana. In Missoula
are the College of Arts and Sciences
and the College of Technology,
along with the professional schools
of Business Administration,
Education, Fine Arts, Forestry, Law,
Journalism, and Pharmacy and Allied
Health Sciences. Twenty-six
research units include specialized
laboratories, institutes, and centers.
Off-campus facilities include the
Flathead Lake Biological Station at
Yellow Bay in northwestern
Montana, the Lubrecht Forest,
Bandy Ranch, and the Theodore
Roosevelt Memorial Ranch of the
Boone and Crockett program are all
experimental facilities for the
School of Forestry.



FEATURES

COVER STORY: Life on Mars? 4
UM Geologist Nancy Hinman may find out

Telling Tribal Tales 8
Journalism students on the reservation

Facts Man 12
Paul Polzin informs Montana's decisionmakers

Real Math 20
New curricula modeled on real life

Master Mediator 22
Bill Wilmot disarms the workplace

The Geography of the Species 26
Biodiversity project puts UM on the map

HIGHLIGHTS 14
The secrets of sex; help for veterans' children;
faster, healthier meat production; sustaining the
future; studies on motor control; teaching disabled
children

DISTINGUISHED SCHOLARS 18
Award-winners of 1991-1994

PARTING SHOT 30
Social insect scholar Penny Kukuk's love affair
with bees

How would you go about searching for evidence of life on Mars? If you'd watched a few episodes of Star Trek, you might think of beaming down from a space ship and checking caves and crevices with a ray gun. But if you were a geochemist, you might begin

UM geologist
Life Nancy Hinman
may find
out
MARS
?

by taking a trip to Iceland or Australia to examine the rocks surrounding ancient hot springs.

This makes good sense to Nancy Hinman, assistant professor of geology at The University of Montana. Under a grant from the National Aeronautics and Space Administration, she's working with an international team of scientists to lay the groundwork for a search for signs of life on Mars. They're not looking for little green guys with antennae, but they have high hopes of finding fossilized cyanobacteria.

Although this primitive life form is microscopic, its communities of hundreds of thousands of organisms are large enough to detect easily. If a planet has cyanobacteria, Hinman says, there's a good chance it also has—or used to have—more advanced life forms as well.

On Earth, cyanobacteria like to live at the edges of hot springs, where they thrive in the extreme temperatures and salinity. When the mineral-laden water swamps the colonies, they become entombed in silica, which eventually recrystallizes into fossil-laden quartz.

That's where Hinman's trips to such far-flung places as Iceland and Australia come in. "Anywhere there are hot springs there is a modern analogue on Earth for conditions that might have existed on early Mars," she says. She cites NASA evidence that Mars once had volcanos, flowing water, and, quite possibly, hot springs.

For instance, Mars has large plateaus that are thought to be formed by intrusions of igneous rocks. The edges of these plateaus are studded with small canyons where ground water may have flowed. "Any time you have igneous activity and water, you have the potential for hot springs," she says.

That doesn't mean the first Earthlings on Mars can expect to bask in a nice hot pool. "There's no liquid water now on the surface of Mars—it seems to be tied up as permafrost," she explains. "But there might be a life form in permafrost."

by Jane Easter Bahls



The search for evidence of life could focus on ground water or limestone in lakes or shallow seas, but hot springs deposits are easier to find. "Hot springs are points of economic importance," she says, noting the precious metals often found there. "Many companies have gotten very good at finding them."

Studying Martian hot springs may uncover precious metals. Within a few hundred years, Hinman says, people could be mining on Mars. But the potential for mining isn't what drives Hinman. She's excited about the clear, foreseeable goal of sending a probe to Mars and using the data gathered on Earth to direct it in the collection of samples.

Why bother looking for life on Mars? "Our findings will help us understand where we stand in the universe," Hinman says. "It's a question of fundamental curiosity and part of the broader search for extraterrestrial life in the universe."

NASA has scheduled a mission to Mars in 1996, with a specialized all-terrain vehicle programmed to carry out specific tasks after it lands on the red planet, thirty-five million miles from Earth. One of those tasks will be driving to a hot springs formation identified by Hinman's team, making specified measurements, and collecting the number of grams of material her team is allotted.

Programming the probe's computer with specific instructions on what to look for is critical, Hinman says. "We can't ramble over the surface of Mars the way we can on these outcrops," she explains. Nor do team members have the luxury of bringing back tons of rock to sort through. They need to know as much as possible about the features of fossilized bacteria colonies on Earth and how they change over time so the probe will bring back the right samples.

Because the team will already know what they're looking for, analyzing the samples and determining whether there was ever life on Mars is a clearly achievable goal. "It'll probably be in my lifetime," Hinman says happily. "It's wonderful to have this really clear

goal: Do the work, gather the samples, and find out. That gives me a long-term perspective."

Hinman returns from her travels to a rock-bedecked office on the third floor of UM's Science Complex. There's a bicycle under the window, a microscope on the counter, and chunks of crumbly rock stashed everywhere.

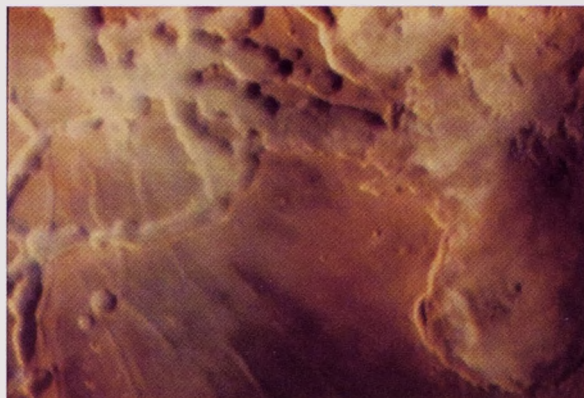
Her enthusiasm is inspiring as she pulls samples of silica and quartz from the narrow drawers of a gray metal cabinet. Here's a chalky mat, a cyanobacteria community preserved in silica. Here's a chunk of quartz showing what happens when the fossils crystallize. Here's one from an active hot spring in Yellowstone National Park; here's one from a hot spring that bubbled in Nevada millions of years ago. Hinman's job is to document and understand what happens through geological time to the silica that swamps the "poor little critters," she explains.

Hinman came to UM in September 1989 to enhance the geology department's program in geochemistry and environmental geoscience. Her training and experience include a degree from Reed College in Portland, Oregon, a doctorate from the Scripps Institution of Oceanography in La Jolla, California, and three years as a post-doctoral fellow at the Battelle Pacific Northwest Laboratory in Richland, Washington, studying the geochemistry of ground water contamination.

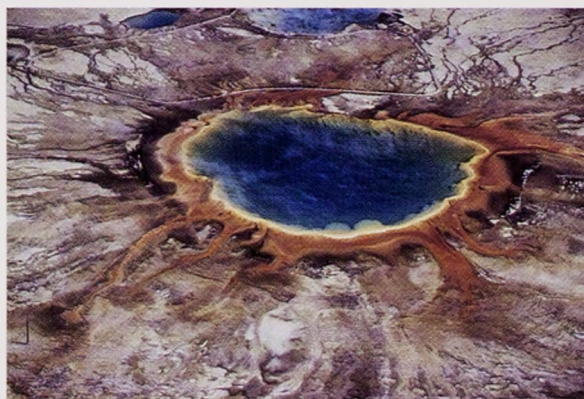
In 1992, Hinman had her first look at Paleozoic hot springs deposits in Edinburgh, Scotland,

when she attended a research conference with two days of observation in the field. She learned that the older the rocks are, the less obvious their features. "It's a matter of training the eye," she says, explaining that it can be very hard to see similarities between modern rocks and those that are as old as 335 million years.

Hinman is a popular teacher who designs her lectures and lab experiences around practical exercises in geochemistry. "A hallmark of Nancy's classes, one missed by many lesser teachers, is that students complete her class prepared to read and critically evaluate current research literature," says Professor Steven Sheriff, chair of



Geomorphic features of Martian surface. Such satellite images are used to locate features indicative of hot spring terrain. Photo courtesy of NASA.



Aerial photo of Grand Prismatic Spring, Yellowstone National Park, shows microbial community-rich outflow channels. Boardwalk for scale. Photo by M.R. Walter.

the geology department. "This is teaching at its best; Nancy gets students intimately involved with modern science and technology."

Hinman's major interest connecting all her research projects is geochemical processes involving silicon, an ubiquitous element in the Earth's crust. "I'm interested in how organic matter and silicates interact," she says. "These types of systems are fascinating, because the reactions that occur in silicate occur fast." The Mars project is a continuation, aimed in a new direction, of the research she conducted for her doctoral thesis.

Her link with the NASA scientists who initiated the project was fortuitous. Hinman heard about a NASA project called JOVE, which links university researchers with NASA scientists, and she called David Des Marais, an isotope geochemist at NASA's Ames Research Center in California, who was about to begin the Mars project. "My area of expertise complemented exactly the hole in their project," she says.

Under a federal JOVE program grant, she began working on the project in September 1991. In addition to Des Marais, the team includes sedimentologist Don Lowe of Stanford University and paleo-biologist Malcolm Walter of Macquarie University in Sidney, Australia, plus electron microscopist David Blake and geologist Jack Farmer of the NASA-Ames Research Center.

The team is an unusual mix. Normally, Hinman says, geochemists pursue more lucrative projects than paleontology, and paleontologists have been working on these problems without help from geochemists or sedimentologists. A paleontologist can identify a fossil and ask why it's preserved in that location, but a geochemist can explain how the microorganisms became fossilized.

The team visits active hot springs in Wyoming or Nevada, measures water temperature, and observes flow paths of hot water from their vents. The highest temperature is in the center of the vent, but cyanobacteria live in the outflow channels.

They categorize the springs and examine the texture of the rocks—whether they are woven, knitted, or palisade. They collect samples for more detailed examination later; each team member looks at them differently. Lowe plots the broad-scale features of the site, Walter

studies how the organisms were preserved, Des Marais analyzes the isotopic composition of carbonates in the fossils, and Farmer researches the changes that must have occurred over geologic time.

Meanwhile, Hinman and her student assistants use a variety of techniques to analyze the geochemistry of the samples. One is petrography, using a microscope to study sections of rock so thin she can shine light through them. Another is electron microscopy, using the synchrotron radiation lab at Stanford. Hinman explains that Stanford's lab has a linear accelerator, one of the few in the country: It accelerates particles to a very high speed to provide better spatial and geochemical resolution, allowing her to study the sample's trace element composition.



Hinman pauses briefly to examine sinter-like rock while traversing Martian surface. Background photo courtesy of NASA.

She hopes Stanford will accept her project for electron microscopy, because few outsiders have access to the facilities. "It is very similar to having an experiment go up in the space shuttle," she says. "You have to have a problem that is doable, solvable using this technique." With the assistance of Blake, the electron microscopist, she's able to answer specific questions such as the location of trace elements in a particular sample.

NASA-Ames Research Center also serves as a gathering place for the team, since four of the six members work nearby. "We meet for kind of an intellectual jam session," Hinman says. "It's very stimulating." Most of Hinman's colleagues on the team are based in California, so they appreciate having

her so close to Yellowstone. "They think it's handy that if they need something, Nancy can go get it," she says.

Hinman recently went to Australia, where the team studied a vast, extinct hot spring in Queensland. The Australian deposits are 290 million years old—younger than the deposits the team hopes to study from Mars. "These deposits had never been examined before," she says. "It's absolutely incredible this area had never been studied—really, nothing had been done."

The team expects to have the first Australian phase of its work done by September 1994. From then, it will be just a year until the space probe heads for Mars to bring back some answers to the question of life on other planets. For Hinman, that's the prospect that makes it all worthwhile.

V

Jane Easter Babbs is a Missoula-based freelance writer.

Nothing in Karen Coates' upbringing prepared her for what she found in Lame Deer, Montana. Coates, a University of Montana School of Journalism senior from the mostly white, middle-class suburb of Brookfield, Wisconsin, and freshman photo-

journalist John Youngbear of Lame Deer were paired for an assignment on the Northern Cheyenne Indian Reservation. That's where they met the "Lysol Gang," a group of 20 Indians who gather daily to drink the household cleaner.

In a house without water, electricity, or furniture, the gang drinks from boredom and hopelessness. Lysol cut with water is cheaper than the bootlegged booze so common on their dry reservation. The mix makes their stomachs hurt, and they know it will almost certainly kill them. "There isn't anything we can do to help these people," Coates says. "They're too far gone. There's no hope." Despite her pessimism, she does hope the story she writes may help other Indians avoid the trap ensnaring the Lysol Gang.

Coates and Youngbear are members of UM's Native News Honors Project, a three-year-old program established by former journalism school Dean Charles Hood to prepare journalists and photographers to report accurately the real—not the romanticized or stereotyped—stories of North American Indians. Hood was convinced of the need for such a program by Indian journalist Tim Giago's 1991 Dean Stone Lecture at the School of Journalism. Indian students know little about their own history, Giago said, and the general public grasps even less about modern Indian affairs. He said he writes most of his columns

Telling Tribal Tales



Photo by John Youngbear

in response to misinformation spread by non-Indian journalists. Their lack of understanding of Indian issues leads to superficial stories inspired by specific events.

"Journalists need to be more than just reporters of events," says Professor Carol Van Valkenburg, the project's main writing coach and editor. "It's important for them to understand the significance of the issues that drive the events."

The Native News program combines the study of Indian culture, education, and health with writing stories, taking photographs, and publishing articles on those subjects in a student-produced tabloid distributed to reservations, state newspapers and agencies, journalism schools, and Indian organizations nationwide. Because the tabloid has been so well-received, by the second year of the program, students had little trouble getting Indians to open up to them. "By then, the access they had to sources was excellent," says photojournalism Associate Professor Patty Reksten. "That's why the students were able to tackle such sensitive issues."

In addition to Van Valkenburg and Reksten, Woody Kipp is the third member of the Native American Honors Project faculty. A Blackfeet, Kipp serves as the minority affairs specialist for the journalism school and is a counselor for UM's Native American Studies Program. Guest speakers have ranged from a tradi-

tional spiritual healer, G.G. Kipp of Heart Butte, to Mark Trahant, one of the country's most prominent Indian journalists and executive news editor of the Salt Lake Tribune.

The students—writers and photographers—are hand-picked by the faculty. What they share is talent,

tremely revealing and difficult for the students to record these problems," says Reksten. Many students, seeing the effects of poverty, high unemployment, and substance abuse for the first time, grapple with depression.

During spring semester 1993,

among Montana Indians aged five to 54 a full 60 percent higher than that of the state's general population. "The problems are enormous, pervasive and ignored," Van Valkenburg says. "If any other population had the kinds of problems the Indian population is hav-

"If any other population had the kinds of problems the Indian population is having, people would be up in arms."



Photo by Jerry Rulfern

social commitment, the desire to work collaboratively, and a willingness to discuss racial and social issues openly. Alone or in reporter-photographer teams, they criss-cross the state—sometimes in blizzards—from one of Montana's seven reservations to another. Time, vast distances and the weather are just a few of their challenges. "We're dealing with such tragic issues that I think it's ex-

fourteen of the program's students tackled the subject of health—a critical issue on reservations, where the major illnesses that lead to early death strike at a far higher rate than among whites. The most recent figures of the American Indian Health Care Association show a death rate

ing, people would be up in arms."

Senior Bernie Azure of Arlee wrote about an Indian high-school basketball star who died of heart failure at age seventeen. An Assiniboine, Azure is no stranger to the tragedies common on reservations. "I've lived around this stuff all

by Carol Susan Woodruff

my life," he says. Still, dealing with a family in mourning posed a considerable challenge. "It wasn't tough asking the questions; it was tough listening to the answers."

As an Indian, Azure, like Kipp, was a reassuring presence and valuable source of information for graduate students in the program. "Bernie made me feel more confident that I wasn't just some weird outsider off on a tangent and totally out of touch with reality," says Elizabeth Ichizawa.



G.G. Kipp and his wife, Melinda, share the practice of traditional medicine at Heart Butte on the Blackfeet Indian Reservation. Photo by Dan McComb.

Ichizawa's first project was to report on substance abuse among young Indians. "The story's important to tell," she says. "On the other hand, I didn't want to feed into the whole drunken Indian image. Although we needed to present the problems Indians face with drugs, we were also able to present what they are doing to solve these social issues."

As the mother of a year-old daughter, Ichizawa, in the second year of the project, took on a subject near to her heart. She interviewed two Blackfeet women

who'd lost babies to Sudden Infant Death Syndrome, which claims twice as many Indians as whites statewide. She also reported on teen-age mothers, who make up 15 percent of all Indian mothers in Montana. A focal point of her story is a woman she calls a "teenage super mom"—an unwed 17-year-old raising her son with the help of her family and boyfriend while earning an A average in high school.

The students have unearthed other success stories: A Salish-Sioux doctor who has won his own battle with alcoholism to become a dedicated professional; diabetics fighting their disease through diet and exercise; and a former substance abuser now giving inspirational lectures to young Indians.

In one case, reporting a triumph led to recording still another tragedy. In 1992, student Dan McComb of Whitefish had just finished shooting photographs of the parents of an outstanding Indian high-school student. While walking down a glass-filled alley, he stumbled upon an Indian couple locked in what appeared to be a romantic embrace. When it suddenly turned into a brutal attack on the woman, McComb instinctively captured the shocking moments on film. When the woman tried to hide behind him as her boyfriend threatened them, he left, feeling powerless and afraid.

"I came up against that classic situation they tell you about in journalism school," recalls McComb, now a graduate. "Should you stop violence or step back and take pictures? In this case, I think I was kind of worried about my own safety. I thought, I'd love to help you out, but I'm a fish out of water." He spent a sleepless night reviewing his actions. "I did a lot of soul-searching and finally came to a conclusion. I don't really believe pictures just by themselves are going to change the world. But you have to believe they'll make a difference. If you don't believe that, then you have to find some other way of making your point or trying to make a difference."

McComb, his fellow students, and his teachers all say the project has opened their eyes. McComb says he learned it's one thing to discuss cultural differences in class and quite another to encounter those differences and try to bridge the gap in person. Ichizawa, who hails from Boston, where Indians are scarce and often romanticized, was shocked by the prejudice against Indians deeply ingrained in many white Montanans.

The group also learned that perennial Indian issues have exceptionally deep roots. "It's more than just poverty," Ichizawa says. "It's more than just unemployment. It really goes back to the experience of Native Americans through the past 100 years." One counselor

talked about the "corporate pain" of the Indian people. "They're still trying to heal themselves from their culture having been ripped away from them and their children having been taken away from their parents and put in boarding schools. That's a painful legacy, and I think it has a lot to do with the problems young Indians are facing today."

Azure would like to see the recent media trend toward fuller coverage of Indians and Indian issues con-

views remain the biggest need. "Indian issues ought to be at the forefront of every Montana journalist's mind," says Van Valkenberg. "We try to change the attitudes of journalists coming out of school and get them to change other journalists' attitudes from the bottom up. It's very hard to do from the top down."

Kipp believes UM's project is making a difference nationwide, causing an ever-increasing number of people to realize the importance of covering Indian is-

"It's more than just poverty....It's more than just unemployment. It really goes back to the experience of Native Americans through the past 100 years."



G.G. Kipp and family at home in Heart Butte. Photo by Dan McComb.

tinue. "I hope this isn't just one of those "discover-the-Indians" things that we will just forget about for the next 500 years. It has to be more than just scratching the surface. It has to be an ongoing effort."

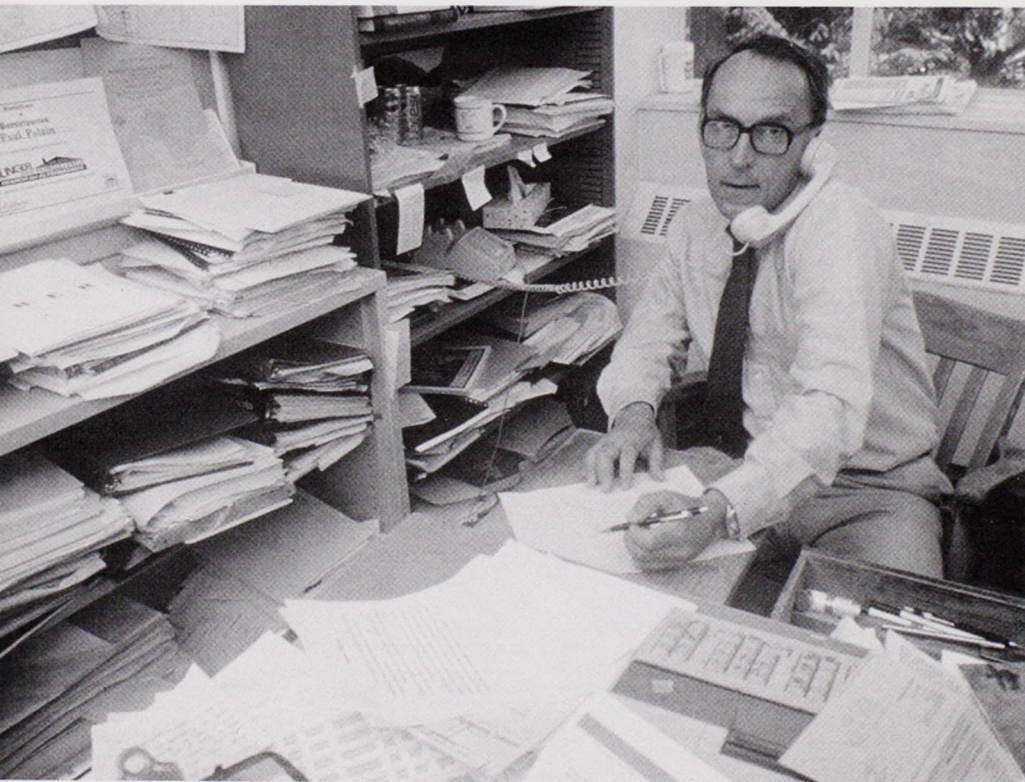
If Van Valkenberg, Reksten, and Kipp have their way, the Native American Honors Project will continue indefinitely. Current financial support comes from the Graduate School, the Davidson Honors College, and Excellence Fund dollars earmarked for the journalism school. Additional funds for travel and telephone inter-

views with the sensitivity and thoroughness they deserve. "I really feel we're doing a lot to create some understanding of Indian issues. The step we're making I see as crucial to bridging the cultural gap we've lived with for years. But it's like the first step on a one-thousand-mile journey." V

Carol Susan Woodruff is a Missoula-based, freelance writer.

In the days leading to Montana's 1993 sales tax vote, proponents for and against battered the public with economic data and forecasts. In the flurry of statistics, Montanans may well have wondered where to turn for the unvarnished truth about the state's economy.

The answer is the Bureau of Business and Economic Research, a department of The University of Montana's School of Business Administration. The BBER's pragmatic mission is to provide all Montana decision-makers—from the governor to prospective new residents—with the economic analysis, survey results, and industry data they need. It's a service the University has provided the state for over 40 years.



Dr. Paul Polzin, the bureau's wiry, bespectacled director, surveys Montana's economic scene from a mountain of statistics piled high on his cluttered desk on the second floor of the Business Administration building. From here the perspective on the state's current fiscal crisis is a longer view, seen as just the latest loop in the economic roller-coaster ride Montana has always been on. "There's always going to be something people are worried about," Polzin says. Twenty years ago the Bureau was busy disseminating information to Montanans alarmed by the impacts of coal mining. In another 20, it will be some other crisis.

Still, the Bureau takes very seriously its role, helping decision-makers guide the state through the crisis of the day. It is now trying to help state officials understand

PAUL POLZIN

AND UM'S

BUREAU OF

BUSINESS AND

ECONOMIC

RESEARCH

Facts Man

INFORM

MONTANA'S

DECISION-MAKERS.

by

Jane Easter Bahl

what caused Montana's current economic problems—why the economy hasn't been growing and why tax revenues haven't gone up. The Bureau confines itself to describing the past and present, and forecasting the future, not making recommendations for change. "We're not in the business of saying we need a sales tax or not," Polzin says. "We view our job as describing the economic environment in which Montanans live and work. If they understand [that], they can make better decisions."

Polzin, a graduate of the University of Michigan and Michigan State, has been at UM since 1968, when he joined the economics faculty and the BBER. He stopped teaching classes in 1984 because of the travel his BBER work demands, and in 1988 he succeeded Maxine Johnson as director.

One-third of the Bureau's funds come from companies and agencies contracting for specific projects or research; the rest come from the state. More than half of these funds pay for economic analysis, both state-wide and county-by-county. By tracking statistics, conducting surveys and analyzing data, BBER researchers keep tabs on population and employment trends, major industries and their effects on the economy, and the economic health of each of the state's major urban areas.

The results of several ongoing projects are available to the public. The Montana Poll takes the pulse of the state. Current population, personal income, and employment information are available in county data packages for \$15 each.

The Bureau's Economics Montana program has been projecting regional and statewide income and employment figures and releasing the latest forecasts through free pamphlets since 1983. Each year, BBER faculty and staff present Montana Economic Outlook Seminars for business people

and government officials in the state's seven urban centers. Experts from other departments, like UM's Institute for Tourism and Recreation Research and Montana State University's Department of Agricultural Economics & Economics, also make presentations. The seminars often include panels of local business people.

"We consider our outlook seminars to be one of our most important activities," Polzin says. Seminars typically draw from 50 to 150 participants, depending on the city, but extensive media coverage expands the audience considerably.

The Bureau gives special attention to the forest products industry because of its significance to Montana's economy. Charles Keegan III directs an ongoing, comprehensive study of the industry in Montana and Idaho, with periodic studies of other Western states. The Bureau, working with the U.S. Forest Service, has developed a data-collection system for surveying forest products firms in each state. BBER researchers use mail and telephone surveys to determine the number and size of mills, the types of commodities produced, the source and ownership of the timber supply, how timber is used, and where the timber is sold.

Recently, Larry Swanson, the BBER's director of economic analysis, has been researching the internationalizing of the world's economy and what that could mean for Montana. Montana's relative isolation, its enormous distance from the nation's major markets in the East and Southwest, has always been a significant hindrance to the state's economic growth. But now that the North American Free Trade Agreement will create a continent-wide, free-trade zone, Swanson feels the Northern Rockies could emerge as a major trade corridor, linking fast-growing

regions of western Canada to the U.S. West and Southwest, and from there, to Mexico. This increasing flow of trade through Montana could create opportunities in product processing and inter-modal transfer. Although cross-border trade and transportation are unlikely to replace natural resource industries as the most important component of the state's economic base, the aggressive pursuit of these opportunities could be crucial to advancing future economic development.

For many agencies and organizations, media coverage is a sidelight or even a distraction. But for the BBER, it's a big part of their mission. "We're a high-visibility agency," Polzin says. "What we do is 5 percent economics and 95 percent show biz." He explains that although the BBER prides itself on thorough analysis of difficult economic problems using complex and careful methodology, that is only the first step. "We never do anything quick-and-dirty," he says. "But we never forget the next step, which is taking the results of our research and making it understandable to our constituents, the decision-makers."

Decision-makers, as Polzin defines them, are state legislators, government officials, business owners, trade associations, chambers of commerce, or ordinary citizens. All are entitled to the Bureau's services. Polzin and the BBER staff are happy to take calls from anyone who wants economic information.

The BBER's steady stream of accurate, understandable information is indispensable for making the important decisions that will determine Montana's future. And in these troubled economic times, plenty of decisions need to be made. V



Uncovering the Secrets of Sex

In a vast laboratory on the third floor of UM's pharmacy building, researchers are unlocking the mysteries of sex. Craig Johnston, an assistant professor of pharmacology, and his 13 research assistants are investigating the workings of the neuropeptide oxytocin, sometimes called "the sex hormone."

Oxytocin is released during sexual arousal; it excites nerve endings and the cardiovascular and respiratory systems. The hormonal build-up also causes nerves in the genitals, and sometimes the entire body, to fire automatically, leading to orgasm and the feeling of losing control.

But Johnston's oxytocin research goes beyond the study of orgasm to also shed light on why and how women ovulate. This investigation could provide the insights needed to develop new contraceptives or cure infertility. It could also help us understand sexual and maternal behavior, birth contractions, lactation, and memory, and help treat cancers of the re-

productive system.

Back in 1988, Johnston broke new ground when he reported that the release of oxytocin, when in the presence of other hormones, stimulates the release of luteinizing hormone (LH), which directly induces ovulation. Previous studies had suggested oxytocin had little or no influence on LH secretion, but those studies were done with either male rats or female rats with their ovaries removed. No ovaries means lower concentrations of estrogen and progesterone in the blood. So Johnston used female rats with their ovaries intact, and that difference gave him his first clue that estrogen and progesterone play a critical role in the oxytocin-induced release of LH.

Johnston, a graduate of M.I.T. and Michigan State University, says his next task is to see where in the brain these effects are taking place, "Where the turn-on occurs. We want to map the location of stimulatory and inhibitory effects in the brain. It may be we find different areas of the brain lit up under the influence of these gonadal steroids. And if we don't—if it is the same area, then we ask, 'What changes make the same event stimulatory rather than inhibitory?' If we can determine that in

this model, it may act as a template for other hormonal-neuronal interactions so we can understand them as well."

—Kristin Bloomer



Help for Veterans' Children

The Vietnam Veterans' Children's Assistance Program (VVCAP), a project of UM's Rural Institute on Disabilities, is designed to aid the children of Vietnam veterans who were exposed to the defoliant Agent Orange. VVCAP connects these children with the services they need to deal with problems—from skin rashes to brain tumors—that are linked to their parents' exposure to the chemical.

VVCAP is one of 71 programs across the nation funded by the Agent Orange Class Assistance Program (AOCAP), established through the 1984 settlement of a multi-million-dollar class action suit against chemical companies that produced the defoliant.

The program addresses the needs of the entire family and looks beyond the immediate medical problem to find services

and programs that will provide the best long-range results for both child and parents, VVCAP Director Gordon Hollingshead says.

"You can't just help one piece of a family and expect that to work," Hollingshead says. "We're trying to get away from Band-Aids and into long-term solutions."

VVCAP's family focus fills a gap in traditional veterans' services, he says, noting that the Veterans' Administration is "still functioning under a medical model: Take the vet with a problem, send him across the country for treatment and then ship him back to the situation he was in. There's no real taking into account the way the home environment affects the veteran or the way the veteran's condition affects his family."

Since its formation in September 1990, VVCAP has provided extensive resource-coordination services for the families of about 210 Montana veterans, Hollingshead says. About 200 additional families have been helped through the program's information and referral service, he says.

Most of the veterans' children served by VVCAP fall between the ages of thirteen and twenty-two,

h i g h l i g h t s

Hollingshead says. There is no real pattern to the health problems encountered, he says, but many of the teenagers have learning disabilities or behavioral problems that require therapy: "These are kids who are struggling with their world."

With its UM headquarters and a satellite office in Billings, VVCAP serves veterans' families throughout the state except in six southeast Montana counties that are covered by a Wyoming-based program. Any veteran who served in Southeast Asia between 1961 and 1972 and who has children with health problems or disabilities is eligible for VVCAP services; direct exposure to Agent Orange need not be established.

VVCAP has an annual grant-funded budget of about \$173,000 and a staff that includes Hollingshead, a full-time resource coordinator, a half-time resource coordinator in Billings and three student interns. An eight-member advisory panel of disability and veterans' service professionals meets monthly to evaluate cases for resource—coordination services and to authorize expenditures of AOCAP funds.

Response to the program has grown consider-

ably in its three years of operation, Hollingshead says. But while the need for VVCAP's services shows no sign of fading, its funding is on the way out. The proceeds from the class-action suit are expected to be depleted by mid-1995.

Hollingshead says he's confident the program will continue under a new funding source. He is investigating possibilities for grants or donations from veterans' organizations, foundations, and other groups. Ideally, VVCAP would be absorbed by the Veterans' Administration, helping to nudge that agency into the direction of family-focused services.

For information about VVCAP, call 243-4131 or 1-800-VVCAP03.

—Kristin Rodine



Unraveling Motion's Mysteries

Motor control is like television, an everyday convenience most everyone uses but very few understand. We don't know why our bodies do what our minds direct, but we take that process for granted.

UM's Motor Control Research Laboratory is un-

raveling the mysteries of motion, from the seemingly effortless grace of a top athlete to the impaired movement caused by disabling conditions. Researchers use computerized high-speed cameras and other devices to record and analyze any movement, no matter how subtle or swift, in three-dimensional detail. The equipment simultaneously assesses the motion and the neural activity that triggers it.

This sophisticated motion-analysis equipment rivals any in the Northwest, lab director Chuck Leonard says. The lab has been acquiring the equipment since receiving a \$250,000 grant from the M.J. Murdock Charitable Trust and is now "at the state-of-the-art level," he says.

Leonard, an assistant professor and research director for the physical therapy department, says the new equipment has been invaluable for his study of how cerebral palsy and strokes affect motion and how those disabling effects might be lessened. His research received another major boost in 1993 with a \$96,765 grant from the National Institutes of Health.

"We know that with cerebral palsy or after a stroke the message is not getting from the brain to

the body part you're trying to move, but we don't know why," Leonard says. "That's what we want to find out. Once you know what specifically is wrong, you can find a way to fix it." Disabling conditions are too often treated by analyzing symptoms, not causes, says Leonard. By pinpointing the underlying reasons for motor control problems, scientists can pave the way for more effective, individualized treatment.

These motion studies could significantly reduce health care costs by helping physicians and therapists get to the root of a problem without taking the shotgun approach of a wide array of expensive tests. They are also making UM a significant player in the burgeoning international field of neuroscience. UM researchers now collaborate with scientists throughout the nation and the world, and the lab has already been visited by colleagues from Japan, Sweden, Russia, and Germany.

The lab, part of UM's physical therapy department, is also available to other University departments for research ranging from a biologist's study of birds in flight to a pharmacy school probe of the effect of drugs on move-

ment. The lab's potential even extends into the arts, Leonard says, citing a proposed analysis of dance motion.

Area physicians and therapists use the lab's motion-analysis equipment to determine what kind of surgery or treatment will most benefit their patients. The lab is also an essential teaching tool for physical therapy students.

"The techniques we're developing today will be the clinical tools of tomorrow," Leonard says. "So the lab is a real advantage to our students. They're probably exposed to as much current technology in rehabilitation medicine as students at any school in the nation."

—Kristin Rodine



Sweet Success

With a little sugar and a lot of effort, UM researcher Geoff Richards has developed a new caramel product that boosts young animals' growth without hormones or antibiotics.

The feed additive, dubbed Techno-Taffy, has already been tested on chickens with dramatic results, and tests on veal

calves and weanling pigs are planned soon, says Richards, a chemistry professor and director of UM's Shafizadeh Center for Wood and Carbohydrate Chemistry. Ultimately, he said, the product could be used for a wide range of animals including dogs and cats.

"This is the best thing I've done in my life; the most exciting," says Richards, citing two virtues that are hard to come by, and rarer still in combination: "The process has an elegant simplicity, and it has an obvious commercial use."

Techno-Taffy—a medium-brown, hard caramel with a pleasant taste that is more tart than sweet—is an intricate mixture of compounds referred to generically as fructose oligosaccharides. Created by melting pure sugar with a small amount of citric acid, the caramel makes food utilization more efficient, enabling young animals to grow more quickly while eating less food.

"The final effect for chicken growers is production of a standard five-pound chicken in six weeks instead of the usual seven weeks, and with less feed," Richards says, citing the results of recent tests at Purdue University in which chickens were given very small amounts of Techno-

Taffy with their food in conditions similar to a commercial poultry farm.

The key to the product's success is that it escapes digestion in the stomach and small intestine, going on to the large intestine, where it fosters the growth of beneficial bacteria and reduces the number of putrefactive bacteria that can cause diarrhea and other gastrointestinal problems, he says.

Richards' research team has been working to develop a sugar-based feed additive since 1989 with funding from The Sugar Association, Inc., a national trade association. Under a licensing agreement with UM, the association is negotiating with companies interested in manufacturing Techno-Taffy as a feed additive.

The caramel can be dissolved in a very small amount of water, then sprayed on livestock feed or (in the case of veal calves) added to milk.

With few steps in the process, the caramel is relatively cheap to produce, Richards said, noting that the simplicity of the process is deceptive.

"It sounds as if it might happen by accident, but it's based on about 30 person-years of research into the chemistry," he said.

—Kristin Rodine



Sustaining the Future

Hal Salwasser, UM's Boone and Crockett Professor of Wildlife Conservation, is teaching a new, innovative course that challenges graduate students to show how people in the Northern Rockies could pursue economic development and environmental protection as complementary endeavors, not competing activities.

The Managing Ecosystems for Sustainable Development project doesn't exactly solve such conflicts. Instead, it focuses on developing methods the region's communities, land-management agencies and scientists can use to work together to produce an economically and environmentally desirable quality of life.

The project began in September 1992 with 14 graduate students, most of them from the School of Forestry and the Environmental Studies Program. Salwasser had his students incorporate the principles of biodiversity, human well-being, and economic growth outlined at last year's United Nations' "Earth Summit" in Rio de Janeiro into a single, comprehensive plan for the

Crown of the Continent Ecosystem. This seven-million-acre region encompasses northwestern Montana, southwestern Alberta and southeastern British Columbia.

In exploring land-use issues from an ecosystem standpoint, students couldn't have a better mentor than Salwasser. Before coming to UM, he initiated sweeping changes in national forest management as director of the Forest Service's New Perspectives program. Salwasser is president of The Wildlife Society, an international organization of wildlife biologists, and director of the Theodore Roosevelt Wildlife Research Station at the Boone and Crockett Club's 6,000-acre ranch near Dupuyer.

He says the ecosystem-management report will be refined by students each spring, laying the foundation for wildlife research funded by the club. Already in progress are studies to determine the economic value of wildlife, of the effect of land-use changes on wildlife populations, and of how demographic changes affect people's perceptions of wildlife. Studies demonstrating ways ranchers might further diversify their operations are also in the works, as is a lecture series featuring gov-

ernment officials, leading journalists, legal scholars and sociologists who will address the relationship of humans with the land and resources in the West.

Such endeavors are all aimed at achieving a sustainable future. "Ecosystem management requires that all humans adopt a wider perspective on their environment," concludes a 92-page report prepared by Salwasser's students. "There is no end to this; rather, it is a process of continuing change."

—Carol Susan Woodruff

.....

Co-Teach

This year, some of UM's most talented students will graduate before they turn five. They attend Co-Teach, where every moment—sharing a snack, raising a hand, dancing in a circle to "Farmer in the Dell"—is an opportunity for learning.

Located in the basement of McGill Hall, Co-Teach Preschool and Kindergarten Readiness Programs have helped more than 250 children with disabilities make the transition from preschool to public school kindergarten. For two-and-a-half hours a day, five days a

week, children with disabilities participate in activities they would encounter in a regular classroom setting, but with special attention paid to their individual needs.

The teachers are fully committed to the program. Lisa Cannon, one of a staff of nine full-time teachers and thirty-five volunteers, received academic credit for her three years' volunteering and worked another three years as an aide before she became an assistant teacher. Now, in the Co-Teach program, she consults with therapists, parents, and other teachers to set goals for the preschoolers based on their individual strengths and needs.

"We try to help the children feel comfortable with regular classroom activities, so that when they do go to school, they'll be ready," Cannon says.

In addition to the preschool and kindergarten programs at the University, Co-Teach also helps more than 400 parents by offering peer support groups. Outside of Missoula, the program's outreach project has touched the lives of thousands of children. Teachers in Bitterroot schools and in cities as far away as Glendive and Miles City say the Co-Teach materials bridge a wide gap in

their ability to reach disabled students. The project also keeps them from feeling isolated.

"When I'm discouraged, I call the project," says Cindy Duarte, a Corvallis special education teacher. "The staff gives me a pep talk, and I'm ready to go on again."

The real strength of the program is clear from visiting the classroom. There, four-year-old Cathy, who has spastic quadriplegia and cerebral palsy, smiles and stands in her upright brace moving gently back and forth on the tips of her sneakers to recorded music, while other children also dance.

"She used to stand in her brace for only five minutes," says her mother, Cheryl. "Now she's up to an hour-and-a-half."

When Cathy's parents first brought her in, doctors thought she had no optic nerve to the brain. But now she can see people across the room, distinguish between her teachers, raise her hand with the other children, and ask for what she wants with a look or a smile.

Last year, she graduated to kindergarten. "Physically and socially, Cathy's come a long way," Cannon says.

—Kristin Bloomer

d i s t i n g u i s h e d s c h o l a r s



WILLIAM KITTREDGE

Mr. Kittredge is clearly one of the most widely known members of our University community, recognized nationally as a major voice of the West. He writes novels, short stories, essays, and articles for the highbrow side of the popular press. His publication list includes 21 book titles. These range from a series of Western novels co-written under a pen name to collections he has edited, to collections of his own fiction and essays. He has also published 55 short stories and 65 articles in major periodicals. Mr. Kittredge also given readings and interviews on National Public Radio, and has worked in film.

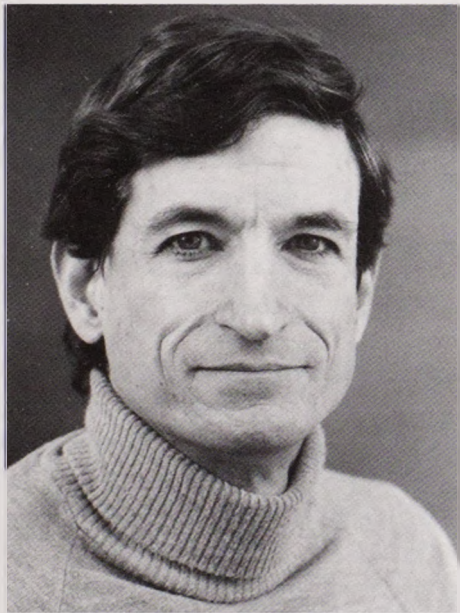
JANET P. WOLLERSHEIM

Dr. Wollersheim received her Bachelor's degree from Gonzaga University in 1958, her Master's in 1960 from St. Louis University, and her doctorate from the University of Illinois Urbana-Champaign in 1968. She joined The University of Montana faculty in 1971. For more than 25 years she has been one of the leading contributors to our knowledge of the assessment and treatment of depression, and problems of childhood and adolescence. In addition, she has been a major player in national and international associations and organizations of clinical psychology. Dr. Wollersheim retired from UM in 1992.



PATRICIA GOEDICKE

Ms. Goedicke was educated at Middlebury College and Ohio University. She joined The University of Montana faculty in the creative writing program in 1981. She has received extensive recognition from many quarters for her poetry, but Henry Harrington, chair of the Department of English, has said it best: "Once UM was known as the place where Dick Hugo taught poetry, now it is known nationwide as the place where Patricia Goedicke teaches. We have in our midst, almost by accident, a major American poet."



GEORGE STANLEY

Dr. Stanley is internationally known and respected among paleontologists. He has authored or co-authored chapters in five books, 32 papers in prestigious national and international journals, and 24 abstracts, many of which were presented as talks in the United States and in other countries. Dr. Stanley has been invited to speak in other countries including Poland, New Zealand, Great Britain, and West Germany.

KEN LOCKRIDGE

Dr. Lockridge received his Bachelor's degree from Yale in 1962 and his Master's (1964) and doctorate (1965) from Princeton. In 1991, he joined The University of Montana history faculty, where he teaches both early American and gender history and serves on the Women's Studies Committee. Dr. Lockridge has lectured in several countries including Norway, Sweden, the Netherlands, Australia, New Zealand, Britain, and Canada. His work is widely published, highly respected, and has been reprinted in a number of countries.



If University of Montana math professors Rick Billstein and Johnny Lott have their way, sixth-grade classrooms across the nation will be filled with human skulls. Sixth graders will be avidly dividing the distance between a skull's front teeth and the bridge of its nose by the distance between its cheekbones. A large ratio between the two measurements will indicate a



narrow face and that the deceased was white. A small ratio will suggest either Asian or Native American origins. In the meantime, the students will have learned how to formulate and use ratios, a basic component of sixth-grade mathematics.

The skull exercise is an example of Billstein and Lott's hands-on approach to mathematics in new curricula they are testing nationwide. The idea is to substitute thinking for rote memorization of formulas. By using real-life problems, Billstein's Six Through Eight Mathematics project (STEM) and Lott's Systemic Initiative for Montana Mathematics and Science project (SIMMS) aim to develop students' powers to explore, conjecture, and reason mathematically. STEM and SIMMS, funded by the National Science Foundation, will also revise the way students' progress is evaluated.

In nine chapters or modules covering a year's study, STEM middle-school students might graph their own consumption of glass, paper, and plastics. Or they might compute the space needed to store the 3,100 tons of garbage on the Mobro 4000, the barge that traveled 6,000 miles from Long Island in search of a place to dump its load. "The emphasis is on knowing the process they need to use to solve the problem," Billstein explains. "In drill math problems, students

don't know that."

Rather than relying on multiple-choice or "drill and kill" math tests, STEM teachers will evaluate students by how clearly they think through open-ended problems and present their solutions. Both the teacher and the student will rate the student on six assessment criteria, such as reasoning. A score of one on the reason-

REAL MATH

UM's New Math Curricula Use Real-Life Problems

ing scale, for example, means the student's reasoning was not evident or did not produce correct results. A five means the student has explained and verified the accuracy of the solution. With this multidimensional rating system, students will better understand and be able to improve their own performance. "The teacher becomes not the sage on stage but a guide on the side," Billstein says.

SIMMS, co-directed by Lott and Montana State University Professor Maurice Burke, aims to revolutionize how teachers teach high-school students and what tools they use. "Instead of pages of problems, we are trying to present the reasons for doing the problems," Lott says. In textbooks organized around topics ranging from airplanes to human giants, students learn to use algorithms to schedule airplane flights, graph scatterplots to show the spread of AIDs, or design travel circuits for a six-city band tour.

They use calculators and computers as necessary tools for their problem-solving, even during tests. Lott says the use of technology such as graphing calculators

by Caroline Patterson

and geometry-drawing software increases students' facility for applying their skills. "Chalk and a chalkboard are no longer enough," Lott says. "Students will be using the technology that is available to the work force."

Nearly 200 teachers across Montana have taken workshops to learn the SIMMS multidisciplinary approach. In the six-week courses at UM and MSU, teachers may practice-teach a module on circuits, write a short story about a day in the life of a light ray or use computer software to draw parallelograms.

SIMMS has worked with the Office of Public Instruction to include certification standards requiring that math teachers know or learn this multidisciplinary approach. The Board of Regents and the Board of Public Education have approved the SIMMS curriculum for college admissions by accepting its equivalence to two years of algebra and one year of geometry. "We have started the momentum for change," Lott says.

But is there a need for this change?

Apparently so. Declining test scores prompted the Bush Administration's America 2000 plan, calling for an overhaul of math and science instruction in the nation's public schools. According to one survey, less than 30 percent of what United States sixth, seventh, and eighth graders learn is new material. When they reach the ninth grade, where 90 percent of the material is new, they flounder. Although Montana students scored at the top of the 1990 National Assessment of Education Progress for eighth-grade math, scores were still lower than those of countries such as Japan and the Netherlands. "We're happy to have done well, but who wants to be the fastest dog in a slow pack?" Billstein asks.

Concerned with what it also deemed an inadequate national math curriculum, in 1989 the National Council of Teachers of Mathematics refocused math education in grade school and high school on problem-solving, saying it is "the central focus of the mathematics curriculum.... It is a primary goal of all mathematics instruction and an integral part of all mathematical activity." The model for this new curriculum is Realistic Mathematics, a mathematics instruction system developed over the past seventeen years by researchers at Utrecht University's Freudenthal Institute in the Netherlands. "Realistic math is a way of taking common problems and approaching them mathematically," Lott says. Apparently, it works. The Netherlands is one of the world's leaders in math education. Over 90 percent of Dutch high-school students take advanced math courses. When Billstein set out to design a "world-class" math curriculum, he invited Utrecht math Professor Jan de Lange to UM. De Lange reviewed the STEM

and SIMMS project designs, made suggestions based on his experience with Realistic Mathematics, and currently serves on the STEM advisory board.

How does all this fly in the classroom?

Cheryl Wilson at Hellgate Elementary says her seventh-grade students are not just doing pencil and paper activities; they are building models. She especially likes the STEM approach to evaluating students. "Students have an opportunity to see what they do well, rather than just getting a number that says they know 76 percent of the material."

"It is a mistake to teach algebra, geometry, and trigonometry in fragments the way we have been," says Mike Trudnowski at Loyola-Sacred Heart High School. He is one of 10 teachers in Montana who pre-tested the SIMMS ninth-grade text in 1992-93.

Trudnowski said the integrated system has increased his students' interest in math and science. They enjoy using computers and graphing calculators to write papers or to do spreadsheets. "I even had one kid who wasn't going to take any more math after the required courses, but he heard such good things about SIMMS that now he wants to take two more courses."

SIMMS demands more of teachers, Trudnowski says. He spends more time setting up lab experiments, helping students work together, and evaluating their efforts. "It's not like the old math classes where you just give the students a test and a grade. Math teachers used to be the first teachers out of the classroom, but not any more." The biggest difference Trudnowski sees is in his students' understanding of mathematical concepts. The teacher is not just ramming them down their throats, and the students take ownership of the concepts. "They feel a part of the math they're learning."

High-school freshman Ryan Surmi likes his new math class because, "It deals with real life. You can figure out things like car wrecks." Ryan's grade rose from D- in the spring of 1992 to an A- in the fall quarter of 1993. Surmi says he remembers more of what he learns. "If I hear about an oil spill on the news, I can figure out how thick the oil will be, how wide the spill will be and whether or not the fish will survive."

What is the vision for the classroom of the future? Lott says he hopes to walk in and see students talking to each other, using calculators, CD-Roms, VCRs, and interactive videos. They will be rushing from their practical experiments to their computers to analyze their data. But more than anything, he says, "I want to see kids actively involved mathematically. I want to see kids helping kids, and teachers as co-investigators with students." V

MASTER MEDIATOR

WHEN ON-THE-JOB CONFLICT TAKES ROOT, THAT CONFLICT IS OFTEN THE ONLY THING THAT FLOURISHES. TEMPER FLASH, PRODUCTIVITY SLOWS AND WORKERS SPLIT INTO OPPOSING CAMPS. SUCH IS THE TREACHEROUS TERRITORY FREQUENTED BY BILL WILMOT, UM COMMUNICATION STUDIES PROFESSOR SINCE 1972. WILMOT PRACTICES WHAT

he teaches: Ways to detoxify conflict and mediate disputes.

Over the past decade, Wilmot has intervened in disputes for about 60 organizations, ranging from family partnerships to government agencies, from grade schools to manufacturing plants. He loves the diversity and complexity of the conflicts he's encountered, and the way the disparate cases lend shading and depth to his understanding of communication dynamics. These practical experiences are reflected in his latest two books, *Mediation Skills for Managers*, with Elaine Yarbrough, and *Work Fights*. His four previous books include the textbook *Interpersonal Conflict*, now in its third edition, which he co-authored with Joyce Hocker.

Many of Wilmot's interventions, stripped of their identifying specifics, find their way into his classroom, where students analyze the

UM's Bill Wilmot Disarms the Workplace

basic elements that triggered and fueled the disputes. Students in his interpersonal conflict course are then encouraged to apply those principles close to home.

"I have them go out and study a real-life conflict, interview the people and then write a paper about what the issues are and why the conflict is going on," Wilmot says. "It changes their perspective on conflict and what to do about it. They start to learn concepts like: It's the people who feel powerless who cause the problems. Not only does power corrupt, powerlessness corrupts."

Workers who feel powerless strike out, often in devious or indirect ways. When confronted by such behavior, most people's impulse is to withdraw or retaliate, but that only intensifies the problem, he says. The best response is to address the insecurity and frustration that feed the negative behavior: Help the per-

BY KRISTIN RODINE



son feel safe, respected and understood.

"What you have to do is empower the person rather than trying to disempower them, which is quite paradoxical," Wilmot says. "If you want a hint of what to do in a conflict, do what comes unnaturally. Whatever's the hardest thing for you to do is probably what you should do. If you're an avoider, directly address the problem. If you're a talker, keep quiet and listen."

Many people assume that power is a function of position, Wilmot says, but frustration and powerlessness are as common at the top of an organization as they are at the bottom.

"In every situation I've gone into where there's a dispute between a supervisor and an employee, the supervisor always feels powerless," he says. "Oftentimes the employee is more verbally skilled than the supervisor, or has been there longer, and the supervisor's intimidated. So the supervisor either avoids the problem or starts hollering and being demanding. Those are powerless moves."

As a mediator, Wilmot helps workers and supervisors identify the real sources of conflict and agree to participate in fixing them. He meets with each person individually, then gets them together to tell each other what they need and what they are willing to do to remedy the situation. They forge contracts, each agreeing to take specific actions to improve their working relationships.

"It's sort of like organizational therapy," he says. "You're trying to find what people need and want, which is almost always respect and acknowledgement and for somebody to walk up and say, 'Hey, good job. Thanks for putting in that extra effort.'

"But they don't feel comfortable asking for more respect or acknowledgement, so they fight over who gets the computer or who gets the corner office," he says. "Most of the people most of the time feel like they're doing most of the work and getting none of the rewards."

One of the most common and destructive elements of office conflict is avoidance. "In 100 percent of the disputes I've gone into, there's been a lot of avoidance," Wilmot says. "People make their moves in a conflict to protect themselves. It's a deadly pattern: avoid, avoid, avoid, blow up!"

Part of avoidance is the common process of banding together with co-workers to vent frustrations. "People turn to each other and complain to feel support and feel strong," he says. "It can be a good first step, but most people stop there. They never take action, they never change things for the better. They just sit and complain. They're stuck; they can't get out of the loop."

To help break that cycle, Wilmot includes a provi-

sion in every mediation agreement that workers must take their problems directly to the source rather than complaining to allies.

Wilmot's form of organizational intervention is highly effective, says UM Director of Human Resource Services Kathy Crego. When disputes within University departments grow so complex or deep-rooted that they can't be quickly resolved, Crego recommends the departments call in Wilmot.

"I've been very pleased with the outcome, and I believe that the parties involved have been satisfied," Crego says. "In each case, Bill has done one of two things: He has gotten the group back on track and restored that relationship, or all the parties concerned have agreed that isn't possible and we implement another solution, such as a transfer.

"Bill has exceptional communication skills, not only being a good listener but also being able to understand what the issues are, regardless of how the employee or the supervisor might be able to communicate them," Crego says. "He's able to really dig in and find out what the bottom-line issues are and then help that person to resolve them."

Western Montana Clinic Administrator Gary Larson, whose Missoula-based organization has a staff of 300 and four satellite clinics in western Montana and northern Idaho, took Wilmot's course on interpersonal conflict and has brought the professor in several times to intervene in conflicts involving clinic doctors.

Sometimes an administrator is perceived as too close to a situation to be impartial, Larson says, and the people in dispute are more likely to talk freely to a neutral mediator. Calling in Wilmot has always improved the situation, he says, but the longer the dispute festered before mediation, the less complete the recovery.

"I have learned to try to resolve conflicts before they escalate too far," Larson says. "Otherwise it's like calling the fire department after the house burns down."

Al Lemieux, an assistant elementary school principal in Colorado's Boulder Valley, also stresses that early intervention is crucial. In 1992 he found himself at the center of an extremely heated conflict that eventually forced him to change jobs.

He had taken a job as principal of a school that was implementing a new program, unaware that the faculty did not support the program. Unrest became evident early in the fall, he says, but by the time mediation was launched in March, it was too late. The opposition to him was too well-organized and resolute.

"My biggest mistake was coming in and thinking I could figure it out myself," Lemieux says. "Because I'd

been successful before, I assumed I'd be successful there."

The mediation session with Wilmot seemed to steer things in the right direction, he says, but the progress was short-lived. He soon decided the only reasonable course would be to transfer to another school. "Mediation made it really clear what the issues were," he says. "Had we done that earlier, I have no doubt that we would have been able to resolve them."

Although the experience was the most stressful of his career, Lemieux says he learned a lot from both the conflict and the intervention, and he is applying those lessons successfully in his new job. In particular, he says, he has learned to find out the feelings and motivations of the people working for him, and to make an effort to build support, alliances, and understanding.

One of the central dilemmas faced by mediators, Wilmot says, is that most people don't call one in until the situation is unbearable for all concerned. Following a few simple rules can help prevent such office quagmires.

Perhaps the most effective way to prevent disputes from getting out of hand, he says, is to go directly to the source of your unhappiness or frustration and "use clear, descriptive behavioral language: 'When you do X in situation Y, I feel Z.'"

For managers, one of the best ways to avoid conflict is to consult with employees before making decisions that affect them. Too many organizations practice a pattern dubbed DAD—"Decide, Announce, Defend." A quick decision may seem expedient, he says, but the resulting resentment and discord are likely to consume much more time and energy than was saved by not consulting.

Another important rule for supervisors is to make

employees feel safe to come forward with problems or complaints. Ideally, he says, supervisors should go to the employees to encourage their comments rather than waiting for them to walk in.

"Every manager says 'I have an open-door policy,' but it isn't the door that's the problem," Wilmot says. "Better to have an open mind than an open door."

Part of having an open mind is to be able to adjust to the individual quirks and demands of employees or co-workers, even if you find them unreasonable. Bosses are often unwilling to take steps to satisfy a troublesome employee because they're afraid it might dilute their authority or reinforce unreasonable behavior. But, he says, the bottom line is that an unhappy worker makes things difficult for the employer, so it's in the boss' best interests to adapt.

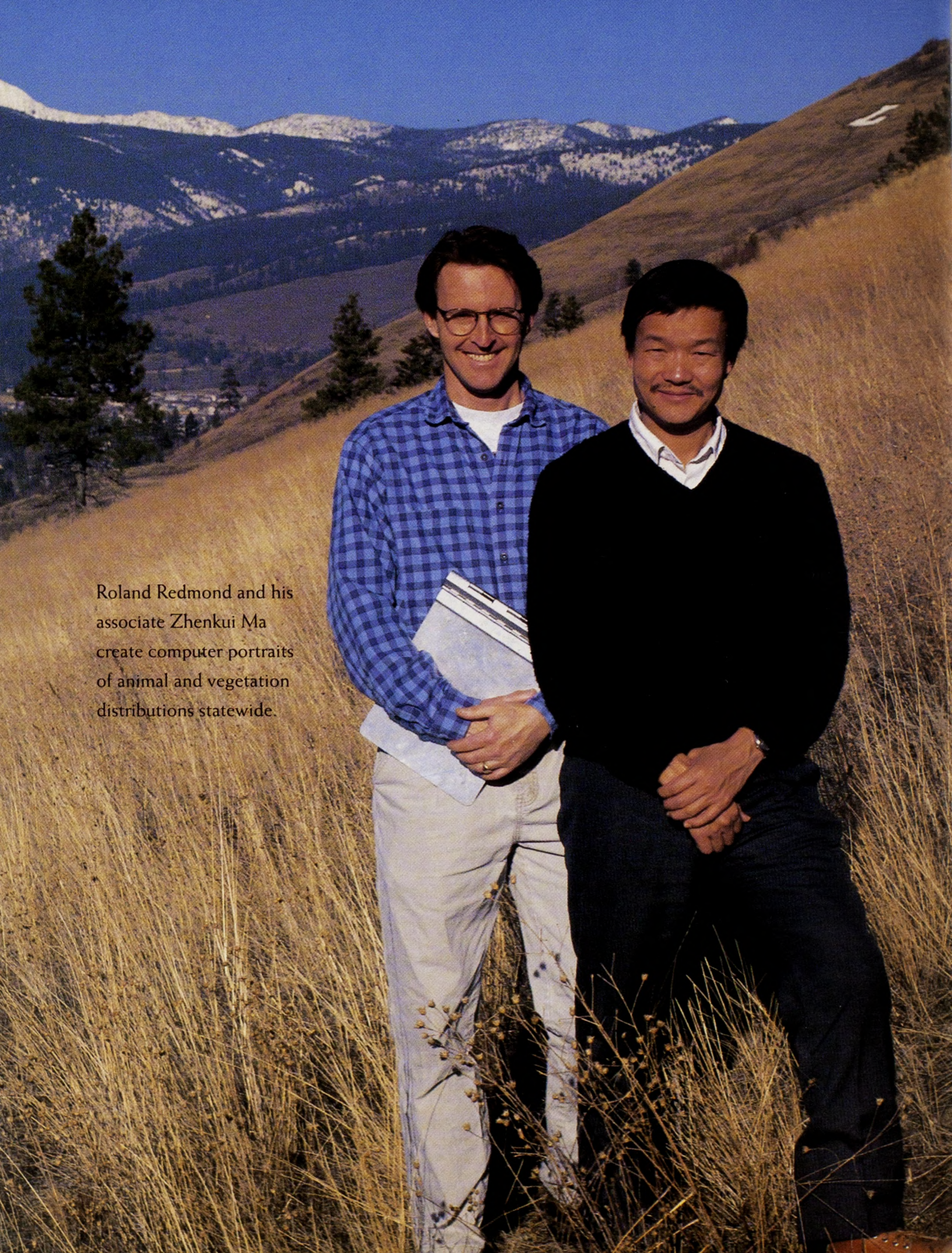
No matter how sound your theory or defensible your position, if it's not working, you should try something else, he says. Sometimes even a tiny adjustment in work habits or style can mend a relationship. "I've had disputes resolved by getting people to say 'hello' in the morning when they walk in the office," Wilmot says.

Ideally, he says, conflict mediation helps people learn more about themselves and the elements of their behavior that drive or perpetuate conflict. But, he says, "Sometimes all you can do is get people to stop doing nasty stuff, to realize that it's counter-productive. You start with self-inter-

est. You might get to introspection—sometimes you do. But you can settle for self-interest." V

*"It's the people
who feel power-
less who cause
the problems.
Not only does
power corrupt,
powerlessness
corrupts."*

Kristin Rodine is a staff writer at University Communications.

A photograph of two men standing in a field of tall, golden-brown grass. The man on the left is wearing a blue and white checkered shirt, glasses, and light-colored pants, and is holding a folder. The man on the right is wearing a black sweater over a white collared shirt and dark pants. In the background, there are rolling hills and mountains under a clear blue sky, with some snow visible on the distant peaks.

Roland Redmond and his
associate Zhenkui Ma
create computer portraits
of animal and vegetation
distributions statewide.

You are, let us imagine, a wildlife photographer assigned to capture a shot of a bull elk and his harem. You are out of sight of roads, on public land, in a meadow with a backdrop of forested mountains. You might have to stalk the high country for weeks, relying on anecdotal reports and hoping to get lucky. But by 1995, when Roland Redmond's Montana Biodiversity Project is complete, a few minutes at a computer keyboard will call up terrain and habitat that fit your assignment, broken into areas about the size of a football field.

Redmond can't guarantee you will get your picture, but he does promise broad benefits to every Montanan: An inventory covering the entire state, with details of vegetation, elevation, topography, land ownership, management of public land, road density, and the distribution of 410 land animals, all vertebrates, from robins to grizzlies, in units as small as five acres. This database will ultimately be large enough to fill more than 100 home-computer hard disks.

Since this information has never before been available in one place and in such detail, its value is incalculable. But one outcome is certain. The MBP will set to rest many of the arguments fueling long-simmering controversies like the Montana Wilderness Bill. "We'll be able to say, 'Here is what you've got, you decide what to do with it,'" Redmond says.

Redmond is a research associate professor in the Division of Biological Sciences. He directs the project's nine-person team from a long, narrow office on the second floor of the Botany Building. His desk, worktable, and a converted laboratory counter are cluttered with dozens of stacks of documents. The multitude of reports, journals, and memoranda cover every inch of surface and are a metaphor for Redmond's work: multitudinous fact, efficiently and accessibly crammed into a small space. The biologist rummages through them as he explains the project's genesis.

In 1989, the U.S. Fish and Wildlife Service established the Gap Analysis Program to inventory the biodiversity of the entire nation. The purpose was to predict where certain species

the Geography

The
Montana
Biodiversity
Project
puts
UM on
the map.



of the Species

by Steven M. Krauzer

are likely to occur and so better anticipate potential land-use conflicts. With Gap, management priorities could be set before costly and heroic measures are required to save another endangered species like the grizzly bear, wolf, or black-footed ferret.

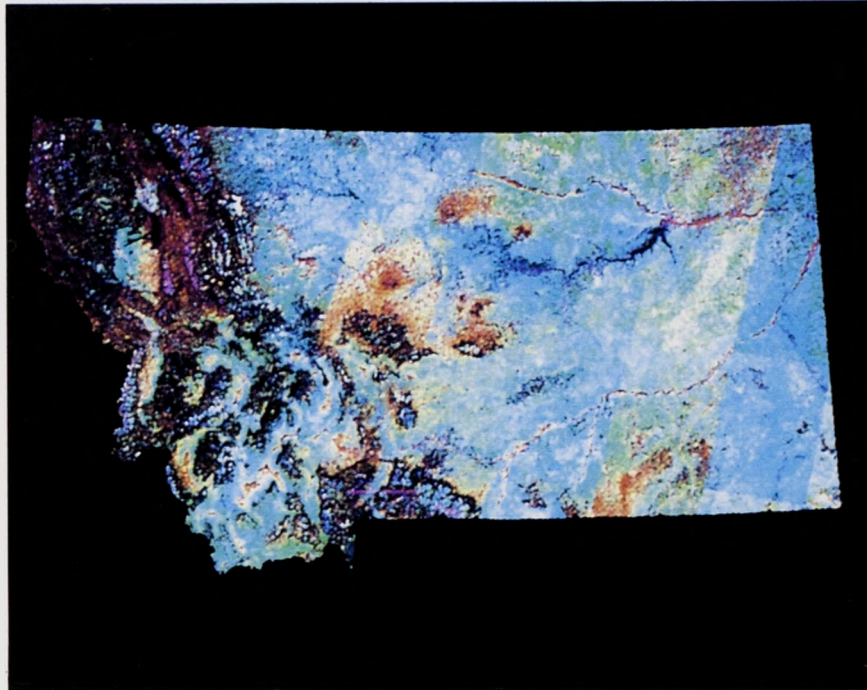
Redmond was at the time a post-doctoral scholar with a UM doctorate in zoology and a yen to remain in Missoula. In collaboration with forestry Professor Steven Running, Redmond put together an initial proposal for the Montana landscape. Since then, the five-year budget has grown from \$45,000 in seed money from the Fish and Wildlife Service to \$1.5 million raised, or still to be raised, from public agencies and private companies. Project collaborators now include computer science Associate Professor Ray Ford, biological science Professor Richard Hutto, forestry Research Associate Professor Paul Hansen and forestry Research Professor Robert Pfister.

Redmond, a trim forty-three, clearly gets out from behind his desk often and is much-involved in every facet of the MBP, including "ground-truthing," confirming by observation in the field the hypothesized data on habitat and vegetation. But when asked to assign himself a job title, he laughs and suggests "research administrator." He ferrets out of his piles what appears to be a work of modern art: a field of splotches of color ranging from deep crimson to pale ecru. Actually, it's a map overview of north-central Montana along the Canadian border. This map is one of the computer-enhanced breakdowns of thirty-one Landsat satellite images that, tiled together, cover the state. The colors are measures of light reflected from the earth's surface. This spectral information is used in conjunction with biophysical data such as slope, elevation, and aspect to map existing vegetation and land cover. While such maps are only a by-product of MBP,

Redmond appreciates their beauty and utility. He notes the potential for developing commercial products from these images.

In the third-floor computer room, Redmond's associate, Zhenkui Ma, peers into a twenty-three-inch-high-resolution color monitor, part of a computer nicknamed "Atlas" for its power and mapping ability. This IBM RS/6000 workstation and associated software, a donation

from its manufacturer, was valued at close to \$200,000. Although the machine is not significantly larger than a personal computer, its speed and storage capacity are equivalent to that of a large main-frame computer of 15 years ago. Without the processing power of Atlas, Redmond says, the FWS would likely have turned to research groups in Utah, Idaho, or Wyoming to do this project. Redmond also believes he was fortunate to find Ma and Ray Ford from computer science, who have the skills to harness that power.



Mosaic of 31 Landsat Thematic Mapper images covering the state of Montana. All were acquired during the growing seasons (June-August) between 1989 and 1992.

Thanks to programs written by Ma, a slight, thirty-eight-year-old who came to UM with a doctorate in remote sensing from the University of Michigan, Atlas can do the work of many people with greater objectivity, consistency, and precision. One wonders if, in the close-knit world of specialized programming, Ma is a "star." "When this stuff is published," Redmond says, "he will be."

The MBP database begins by combining three of seven spectral bands recorded in a Landsat image of the landscape and describing them as vegetation or land cover. Gap analysis projects in other states often do this manually. Then, Atlas' vegetation portrait is filtered through a model that predicts what animal species should be found

in a particular habitat. "If this cover type is suitable for ground squirrels," Redmond gives as an example, "we will say there are, potentially, ground squirrels living there." By mapping animal distributions statewide, and eventually nationwide, areas that may be important for many different species can be identified. At that point, land ownership and current management become important to identify gaps in current levels of species protection.

After the project is completed, the data will be released to the public through the State Library in Helena. Networks could make the information accessible through terminals at libraries and schools across the state. Anyone, be they logger or environmentalist, will be able to get their resource questions answered through an icon-based computer program, Arc/View.

Because of the magnitude of the data and its inchoate form as billions of binary bits, it is perhaps difficult to imagine its potential benefits. It helps to set aside the question of how it works in favor of what it does. Using Arc/View for your elk-photographing assignment, for example, you might ask, "Given public land, elevation above five thousand feet, meadow, no roads, and forested mountains within a mile, where can I find elk?" This predictive capability is likely the database's most useful feature. The impacts of mining, timber harvest, agriculture—Montana's historic economic base—are at once both inevitable and potentially far-reaching. But until recently neither the data nor the technology has been available to help us predict how these practices, coupled with increasing urban and suburban development, will change the face of the state. "The

more we know," Redmond says, "the better we're going to manage what we have left."

A Forest Service manager contemplating a timber sale but concerned about the effect on an elk migration corridor, a group opposed to a subdivision, even a hunter determined to get a deer this season—all will be able to use the database to project the results on the ground.

Redmond says the project takes no position on de-



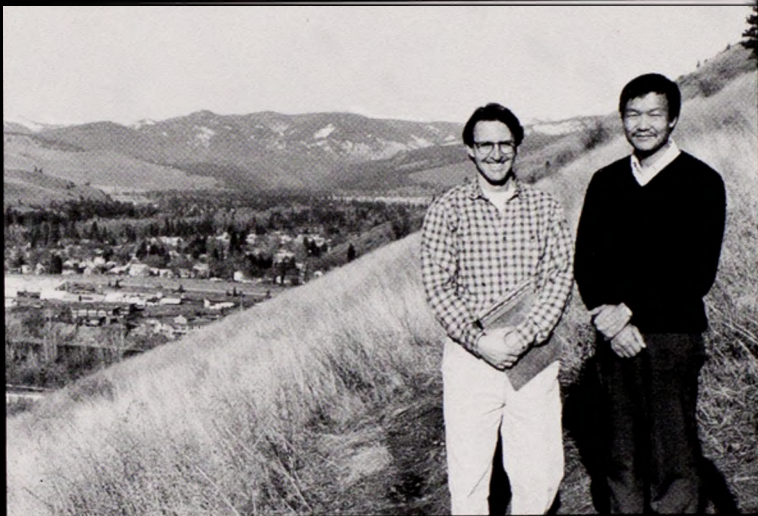
In addition to the statewide project described in the article, the Wildlife Spatial Analysis Lab is used by faculty and graduate students for a variety of related projects. Shown above is Claudine Tobalske, a doctoral student from France, who is digitizing a cover/non-cover map of the Upper Jura Mountains Regional Park in France.

cisions that may be made based on MBP's data. MBP is merely a compiler, a seeker of facts—albeit a huge quantity of facts arranged in a complex matrix. And, potentially, a facilitator. "Agencies sometimes have difficulty working together," says Redmond. "This is not surprising given the different resources they manage. It is often easier for an independent group like the University to facilitate cooperative efforts." V

Stephen Krauzer is a Missoula-based free-lance writer.

Bees are wonderful," says Penny Kukuk, a UM research associate professor specializing in "social insect studies." *Lasioglossum hemichalceum*, or the Communal Halictine Bee, fascinates Kukuk because it lives in harmony in small, communal groups where there are no hierarchies and no fighting, yet the bees aren't related. They even feed each other. With the help of a three-year National Science Foundation grant, Kukuk is finding out what social conventions allow the bees to live so cooperatively and how their social machinery evolved. "The conventional theory is that animals only help their relatives, so this type of system is rare," says Kukuk. "We don't understand it."





Division of Biological Sciences Research Associate Professor Roland Redmond and his associate Zhenkui Ma create computer portraits of animal and vegetation distributions statewide. This computer enhancement portrays the Rattlesnake Valley north of Missoula.

On the cover: Assistant Professor of Geology Nancy Hinman is working with a team of scientists to lay the groundwork for a search for signs of life on Mars.

