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A world of research & creativity at Oregon State University · Fall 2011

Wired Health

Medicine in
the age of
cyberspace

ALSO IN THIS ISSUE

The Science of Design

Co-conspirators
in Melanoma

Rice Paddy People





FAMILY LIFE

It may be one family or several. Adults and children stand close together in a loose line, framed by fir trees and a cloud-streaked sky. Some hold hands. Others lounge nearby in the grass. Some children stand on adults' shoulders. One is gazing upward. The scene is lit by a crisp brightness, as though the world were just made that morning.

This mural by Ron Mills de Pinyas, Linfield College professor of art, greets visitors to the new Hallie Ford Center for Healthy Children and Families at OSU. Three

other murals in the center expand on his theme of people and nature. These large canvases speak of community and of our place in the world. Of health, laughter, love, the unity of life.

Mills' works tie the center's family-oriented research mission to the deep connections that we have with each other and with our environment. Healthy people depend on clean air and water, a point that villagers in rural China made to OSU anthropologist Bryan Tilt. In this issue of *Terra*, "Rice Paddy People" describes the people he encountered and the lessons he learned.



Healthy people also need to share their experiences with others. Kristin Barker documents that in her analysis of online communities where people describe disease symptoms and encounters with the health-care system. Read about her research in “Is There a Pill for That?”

Community is at the heart of the Hallie Ford Center. Partners in its research efforts include school teachers, Extension educators, engineers, county public

health officers and childcare providers. The knowledge they create together will address some of the most vexing health-care issues we face today. As in Mills’ paintings, the world is indeed being made anew.

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OSU is a leading public research university with more than \$262 million in research funding in FY2011. Classified by the Carnegie Foundation for the Advancement of Teaching in its top category (very high research activity), OSU is one of only two American universities to hold the Land-, Sea-, Sun- and Space-Grant designations. OSU comprises 11 academic colleges with strengths in Earth systems, health, entrepreneurship and the arts and sciences.

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Canada Lynx Thrive with Wolves



AS WOLF POPULATIONS GROW in parts of the West, most of the focus has been on their value in aiding ecosystem recovery. A new study from OSU points out that they could play an important role in helping to save other threatened species.

In research published in *Wildlife Society*

Bulletin, scientists suggest that a key factor in the Canada lynx being listed as threatened under the Endangered Species Act is the major decline of snowshoe hares. The loss of hares, the primary food of the lynx, in turn may be caused by coyote populations that have surged in the absence of wolves. Scientists call this a “trophic cascade” of impacts.

The increase in these secondary “mesopredators” has caused significant ecosystem disruption and, in this case, possibly contributed to the decline of a threatened species, says William Ripple, a professor in the Department of Forest Ecosystems and Society.

“The increase in mesopredators such as coyotes is a serious issue; their populations are now much higher than they used to be when wolves were common in most areas of the United States,” he adds. For more on Ripple’s research on the ecological effects of predators, see oregonstate.edu/terra/2007/04/high-alert/.

Energy Industry Looks at Open Source Solutions

THE ENERGY SECTOR SECURITY CONSORTIUM and the Open Source Lab at OSU will work together to study the use of open source software in the energy industry, especially as it relates to computer security.

Researchers will develop case studies and baseline data with organizations using open source software. They’ll focus on challenges and its use in cybersecurity. The National Electric Sector Cybersecurity Organization, a program partially funded by the U.S. Department of Energy, is funding the study.

“With their earned reputation as a trusted, independent institution with expertise in open source software, we expect the findings will provide us with objective information on the use of open source technology in the energy community,” says Steven Parker, vice president of technology research and projects for the consortium. “This will allow us to better inform and serve our member organizations.”

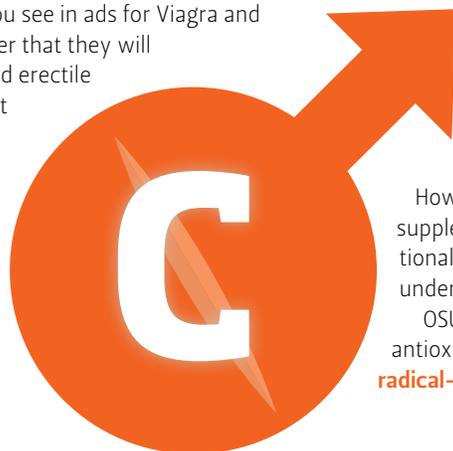
OSU’s Open Source Laboratory serves as a hub for open source research and software. See oregonstate.edu/terra/2006/04/open-source-hot-and-cool/.



Antioxidants Have Potential for Infertility Treatment

IT’S NOT THE 20- or 30-somethings you see in ads for Viagra and Cialis. As people age, chances are higher that they will experience problems with infertility and erectile dysfunction. Now there’s evidence that dietary antioxidants can play a role in maintaining sexual health.

A study published in the journal *Pharmacological Research* in July 2011 by Tory Hagen of the Linus Pauling Institute at Oregon State University and by Francesco Visioli at the Madrid Institute for Advanced Studies in Spain pointed to evidence of benefits from antioxidants such as



vitamins C and E and lipoic acid.

“If oxidative stress is an underlying factor causing infertility, which we think the evidence points to, we should be able to do something about it,” says Hagen, the Jamieson Chair of Healthspan Research.

However, it’s too early to run out and stock up on supplements or antioxidant-rich foods. It will take additional research to identify the biochemical mechanisms underlying infertility.

OSU research has led to greater understanding of antioxidants. See oregonstate.edu/terra/2010/02/radical-defense/.



Birth Knowledge

AS A MIDWIFE IN EUGENE,

Bonnie Ruder has overseen more than 150 successful homebirths. When she leaves for Uganda with her family in November, she will be investigating circumstances when things don't go so well.

In OSU's Reproductive Health Laboratory, Ruder is pursuing master's degrees in medical anthropology and in international public health.

In Uganda she will combine these disciplines by studying cultural attitudes toward obstetric fistulas, a medical condition that affects 2 to 3 million women, mostly in Africa. If left untreated, fistulas result in incontinence and devastating social isolation.

"The roots of the problem are complex," says Ruder. "Training traditional birth attendants would help. But there are deep cultural traditions at work." In collaboration with Terrewode, a nonprofit organization in Uganda, Ruder will interview birth attendants and fistula sufferers about their understanding of causes and preventive measures.



Chemical Bonds

OREGON HAS A REPUTATION FOR being clean and green, even in chemistry. With energy efficiency and less toxic manufacturing practices in mind, the National Science Foundation has awarded a \$20 million grant to a partnership between Oregon State University and the University of Oregon.

Under earlier NSF funding, the Center for Sustainable Materials Chemistry generated several patents and a spinoff business, Inpria Corp. The new funding will support research leading to the environmentally friendly synthesis of chemical compounds for industrial use.

Scientists are exploring nanoscale composite and thin-film materials in electronics, solar energy and medicine.

OSU and UO-adjunct chemistry professor Douglas Keszler leads the center with colleagues David Johnson and Darren Johnson at UO and John Wager at OSU. The two universities will each receive \$9 million. Other collabor-

ating institutions include Washington University in St. Louis; Rutgers University; University of California, Davis; the University of California, Berkeley; the University of Victoria, British Columbia; and federal laboratories.



Hallie Ford Center Begins New Era in Family Science

THE OPENING OF THE HALLIE Ford Center for Healthy Children and Families at OSU in September ushered in a new era of collaborative research on children's health, youth development, parenting and family life. For Carmen Ford Philips, it was also a time to reflect. At the grand opening ceremony, she brought a pair of white ladies' gloves and put them in a time capsule with a video of her mother, Hallie Ford. They served, she said, as a reminder of the formality of such ceremonies in times past.

The new center honors the memory of the Roseburg woman who put family before all else and whose \$8 million gift to OSU made the building possible. "I'm thankful for the opportunity to build on Hallie Ford's legacy, to take her spirit of caring for children and families to the student setting through research, and then translate that research into improving the health of all citizens across the lifespan," said Tammy Bray, dean of the College of Public Health and Human Sciences. (See "What's in a Name?" Page 28)



➤ On the Web

oregonstate.edu/terra

The Science of Design

SEE HOW OSU ALUMNI ARE building Oregon's reputation as a world leader in outdoor apparel design.

Water Before Anything

ACCESS TO WATER MEANS LIFE in desert communities. Watch OSU graduate student Sarah Sheldrick's video about how farmers, ranchers and townspeople came together in northeastern Oregon's Umatilla County to preserve this vital resource.



Chemistry for Life

The foundation for OSU's new science center was built a century ago

BY DAVID STAUTH

IN 2011, THE FIRST BABY BOOMER turned 65 — the leading edge of a wave that is going to change the country. By 2030 one in every five Americans will be older than that. People are already living longer, taking time to travel and to enjoy their families. Think gourmet cooking classes, fishing trips and art museums.

But they will increasingly face the diseases that now kill most people in the developed world: heart disease, cancer, stroke, diabetes and neurodegenerative diseases such as Alzheimer's and Parkinson's.

They want answers and solutions. And in the future, many of those answers will come from a new research facility at Oregon State University, the Linus Pauling Science Center.

This new \$62.5 million, 105,000-square-foot research and educational structure, just completed this fall, has arrived at an opportune time in American history. But its foundations were laid 94 years ago, in the fall of 1917, when a young student arrived at Oregon Agricultural College and enrolled in a chemistry course. Linus Pauling, OSU's most accomplished alumnus, went on to win two Nobel Prizes.

"Linus Pauling revolutionized the fields of chemistry and molecular medicine, and

this facility will be a working memorial to him, a great tribute," says Balz Frei, director of the Linus Pauling Institute. "It will help further establish LPI as a national leader in the study of diet, optimal nutrition and micronutrients.

"Chronic disease prevention through diet and lifestyle is the future of medicine," Frei adds. "And it's for everyone, not just the elderly."

Advances in health will come from better understanding of phytochemicals such as sulforaphane, a cancer-fighting compound in broccoli and other cruciferous vegetables. Other research focuses on vitamin D in enhancing immune function and fish oil in preventing fatty liver disease. New types of antioxidants and "anti-inflammatories" are also being investigated, such as lipoic acid, which may be key to getting the most out of life as we age.

Chemical Collaboration

The institute will share the new facility with the OSU Department of Chemistry. Specialists in analytical, materials and organic chemistry will work in close proximity to their peers in the health sciences and develop new strategies for disease diagnosis and treatment. "These new facilities house approximately

Light spectra by artist Stephen Knapp illuminate a wall in the new Linus Pauling Science Center. In their research, scientists use spectra to detect and measure the abundance of chemical compounds. (Photo: Theresa Hogue)

\$10 million in state-of-the-art transmission- and scanning-electron microscopes and nuclear magnetic resonance spectrometers that will serve the entire campus," says Vince Remcho, chemist and associate dean in the College of Science.

The new instruments were made possible by grants from the M.J. Murdock Charitable Trust, the National Science Foundation (NSF) and partnerships between several of OSU's colleges, the OSU Research Office and the Oregon Nanoscience and Microtechnologies Institute (ONAMI).

Chemists in the new facility bring with them "an astonishing research track record, as measured by publication count, impact, external funding and intellectual property development," Remcho adds.

Primary support for the center, which was designed to the U.S. Green Building Council's LEED silver standards, came from the Wayne and Gladys Valley Foundation — a \$20 million gift — and another \$10.6 million from Pat and Al Reser. Most of the research in the facility will be supported by grants from the National Institutes of Health and NSF.



Heading for Health

Research puts exercise and healthy food on the map

BY RICHARD SPINRAD, VICE PRESIDENT FOR RESEARCH

A WOMAN HESITATES TO LEAVE her home for fear of falling and breaking her hip. A child, enjoying fries and a soft drink in the backseat of the car, learns habits that may endanger his long-term health. A man with kidney problems faces a future hooked up to a dialysis machine in a clinic for hours each week.

What can make a difference to the well-being of these people? So much of the research that we conduct at Oregon State University applies to our health. Surveys, measurements, observations in lab and field and the associated analyses have broad relevance for communities. It is clear this land grant institution indeed reaches out to our neighbors.

One example is a project, Generating Rural Options for Weight-Healthy Kids and Communities (GROW). OSU researchers Kathy Gunter and Deborah John of the School of Biological and Population Health Sciences lead efforts to engage residents in rural areas in mapping community features with Global Positioning System technology. Researchers are identifying attributes that promote

or inhibit people's ability to eat healthy foods and participate in physical activity. Because those behaviors strongly relate to risk for obesity and other chronic conditions, Gunter, John and their colleagues are using the information to develop a model of environmental factors that promote weight gain. They will then work with residents to develop improvement strategies through public policies, programs and education.

In a related study, a student in OSU's School of Public Policy and the Rural Studies Program used Geographic Information System technology to identify and analyze "food deserts" on the southern Oregon coast. Pamela Opfer analyzed food access patterns, comparing supermarket locations in higher and lower-income areas. The work explored the technology as well as the ability for community-based organizations to analyze data.

Put Knowledge to Use

These innovations in technology raise our understanding of the myriad lifestyle factors that affect our health — the built environment, education, social interactions. And as scientific data are acquired and analyzed, questions arise. How can we communicate new knowledge to the public? How can decision-makers use it to create effective health-care policies?

The woman I mentioned in the beginning of this column may improve her

balance and bone density, and

with those her confidence, through

Better Bones

and Balance, an

exercise program

developed through

OSU research and

conducted by the

Extension Service and

partner organizations.

The man facing kidney

failure may be able to get

treatment in the comfort

of his own home, thanks

to a startup company,

HomeDialysis+, which

applies innovative OSU

technology, was funded

by the OSU Venture

Development Fund and

has been nurtured by

our Office for Commercialization and Corporate

Development.

I look forward to more of these stories. We have begun the process for national accreditation of our College of Public Health and Human Sciences. Its thrust will be to build partnerships, prevent disease and promote healthy lifestyles.

And that child in the backseat? He may just start walking to the corner supermarket with his parents and choosing among locally grown nuts, vegetables and fruits (many of which have been improved through OSU research).

Here's a toast (with a Powered-by-Orange wine) to our health!





24/7 Checkup

Sensors could transmit vital signs around the clock

BY DAVID STAUTH

A NEW CHAPTER IN HIGH-TECH medicine is being written by electrical engineers at Oregon State University. A team led by Patrick Chiang has confirmed that an electronic technology called “ultrawideband” could lead to the development of sophisticated “body-area networks,” systems of wearable sensors and communication devices designed to track an individual’s health.

Such networks would offer continuous, real-time health diagnosis, experts say, to reduce the onset of degenerative diseases, save lives and cut health care costs. The ideal monitoring device would be small, worn on the body, low cost, and perhaps draw its energy from something as minor as body heat. But it would be able to transmit vast amounts of health information in real time and help to prevent or treat disease.

Sounds great in theory, but it’s not easy. If it were, the X Prize Foundation wouldn’t be trying to develop a Tricorder X Prize — inspired by the remarkable instrument of Star Trek fame — that would give \$10 million to whomever can create a mobile wireless sensor and give billions of people around the world better access to low-cost, reliable medical monitoring and diagnostics.

“This type of sensing would scale down to the size of a bandage that you could wear around you,” says Chiang, an expert in wireless medical electronics and assistant professor in the OSU School of Electrical Engineering and Computer Science (EECS).

“The sensor might provide and transmit data on heart health, bone density, blood pressure or insulin status. Ideally, you could not only monitor health issues but also help prevent problems before they happen. Maybe detect arrhythmias, for instance, and anticipate heart attacks. Or, monitor the indoor location of an elderly person or the early onset of cognitive

decline. Finally, it needs to be non-invasive and able to provide huge amounts of data while consuming little energy.”

Several startup companies such as Corventis and iRhythm have already entered the cardiac monitoring market.

In the *EURASIP Journal on Wireless Communications and Networking*, Chiang and his team reported that one of the key obstacles is the energy required to run the device. A type of technology called “ultrawideband” might have that capability if the receiver getting the data were within a “line of sight” and signals were not interrupted by passing through a human body. But even non-line of sight transmission might be possible using ultrawideband if lower transmission rates were required, they found. Collaborating on the research was Huaping Liu, an associate professor in EECS, and clinical researchers at the Oregon Center for Aging and Technology at the Oregon Health & Science University.

“The challenges are quite complex, but the potential benefit is huge and of increasing importance with an aging population,” Chiang says. “This is definitely possible. I could see some of the first systems being commercialized within the next three years.”

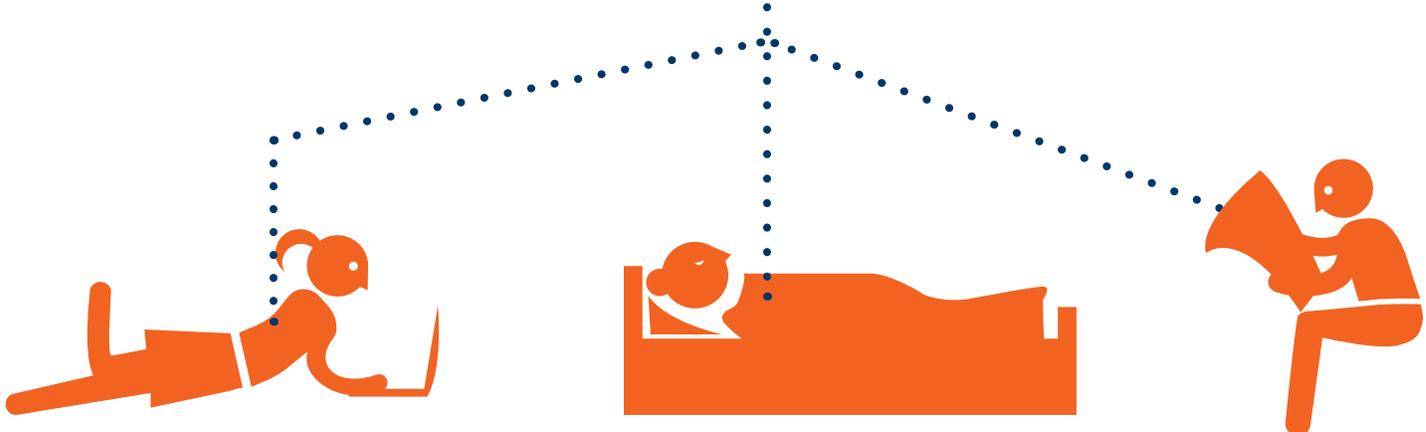
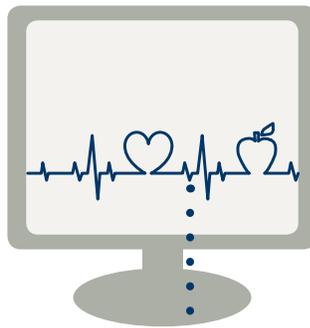
Chiang’s collaborators on projects to develop non-invasive wireless monitoring devices include colleagues at OSU’s Center for Healthy Aging Research, the Linus Pauling Institute and OHSU in Portland. Chiang also collaborates with researchers at Tsinghua and Fudan universities in China.

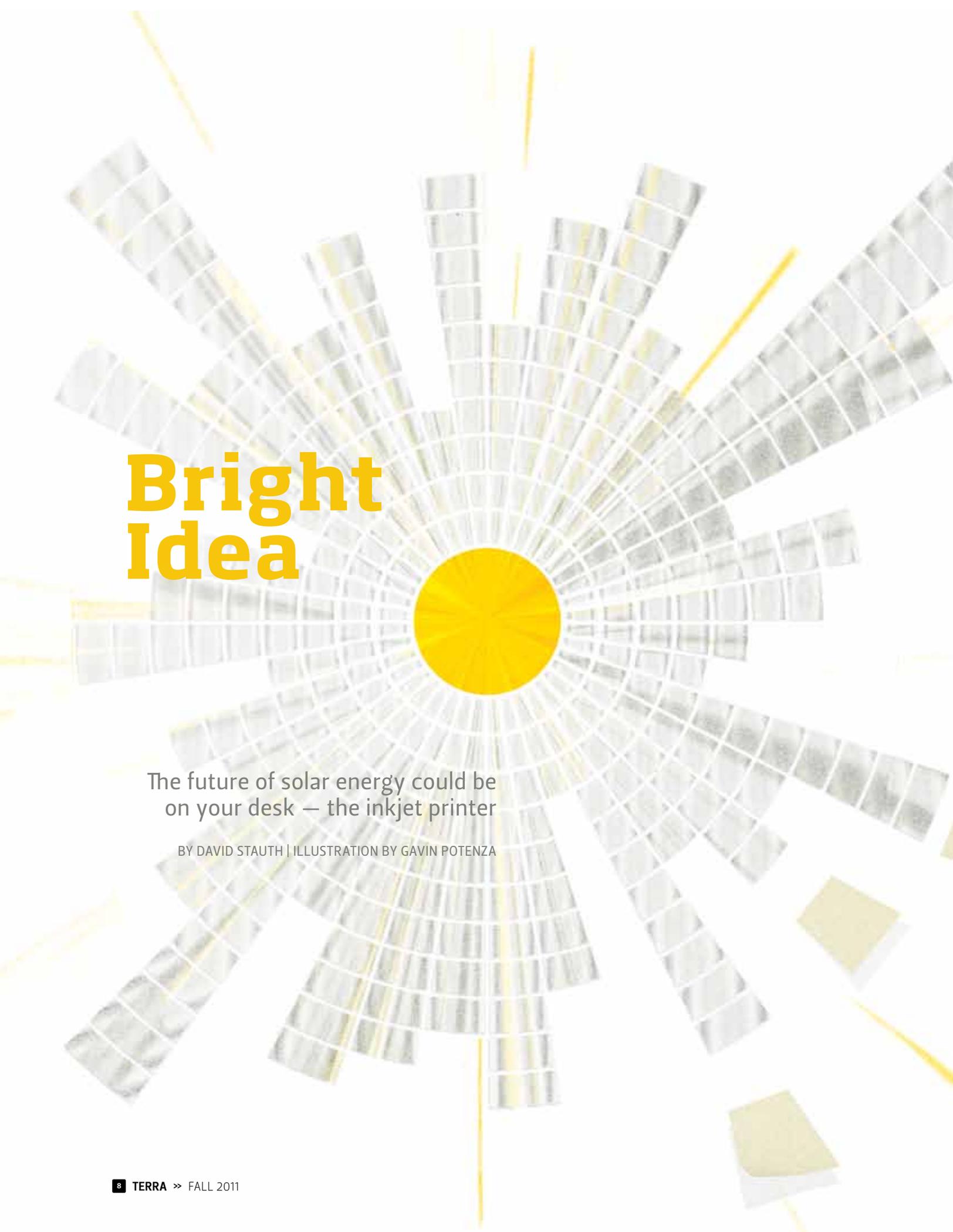
RACHEL ROBERTSON contributed to this story.

➤ Online: learn more about Patrick Chiang’s research at eecs.oregonstate.edu/people/chiang.



Patrick Chiang (Photo: Oregon State University)





Bright Idea

The future of solar energy could be on your desk — the inkjet printer

BY DAVID STAUTH | ILLUSTRATION BY GAVIN POTENZA

IN THE BEGINNING there was silicon, and it was really good.

Silicon is one of the most abundant elements on Earth. It gave us golden, sandy beaches and sunlit kitchen windows. Beer mugs and home insulation. Silicon Valley in California and Silicon Forest in the Pacific Northwest. Personal computers and the Information Age.

And solar energy — in its infancy. But for this critically important energy source, which is one of the most promising of all the alternative energy forms, silicon may not be the only source.

“Solar energy has enormous potential, but to reach that potential with large-scale electrical generation we’re probably going to need something besides current silicon technology,” says Chih-hung Chang, professor of electrical engineering at Oregon State University and director of the Oregon Process Innovation Center for Sustainable Solar Cell Manufacturing, or OPIC.

“We need huge improvements in solar cell manufacturing, to lower costs and reduce environmental impacts at the same time,” he adds. “Silicon will probably always be a significant player, but for mass commercial power production we will need additional solutions.”

Those solutions, OSU researchers say, may be with thin-film compounds that have an ability to outperform silicon by capturing more energy from photons at a lower cost, such as one called chalcopyrite that’s made from copper, indium, gallium and selenium. Or a less expensive but also promising compound made from copper, zinc, tin and sulfide.

There is one problem. Chalcopyrite doesn’t offer the crisp name recognition of Silicon Valley. So that’s bad. The wordsmiths may have to think of a catchy or colorful name.

But that aside, it could work better and usher in an era of high

performing, rapidly produced, ultra-low-cost thin-film solar electronics. And it’s happening right now in Oregon.

Bay Area Partners

“We have five private companies already working with OPIC, including some Bay Area companies, and we’ve had discussions with several others,” says Greg Herman, an OSU associate professor of electrical engineering and associate director of the center. “So far this has attracted around \$3 million in support, and Oregon is continuing to evolve as a focus of the solar energy industry.”

Earlier this summer, OSU researchers took an important step in that direction with a publication and patent application on a new technology that, for the first time, has created successful solar devices with inkjet printing. This rather pedestrian technology that decades ago revolutionized home and small office printing may now have unanticipated benefits for solar energy.

This novel approach reduces raw material waste by 90 percent. Instead of depositing chemical compounds on a substrate with more expensive vapor phase deposition — wasting most of the material in the process — inkjet technology creates precise patterning with a very low waste.

“Some of the materials we want to work with for the most advanced solar cells, such as indium, are relatively expensive,” Chang says. “If that’s what you’re using, you can’t really afford to waste it, and the inkjet approach almost eliminates the waste.”

Power Conversion

So far, researchers have created an ink that can print chalcopyrite onto substrates with a power conversion efficiency of about 5 percent. With continued research they hope to achieve an efficiency of about

12 percent, which would make a commercially viable solar cell. In related work, Herman is continuing research with other compounds that might also be used with inkjet technology and cost even less.

Others are helping. OPIC is a collaboration of OSU, the University of Oregon, Portland State University, Oregon Institute of Technology, the Pacific Northwest National Laboratory, private industry and the Oregon Built Environment and Sustainable Technologies Center (Oregon BEST). Support is being sought from the U.S. Department of Energy, National Science Foundation, and Department of Defense. Collaborators are coming from Germany, Taiwan and South Korea.

In another advance reported last year, researchers used a “microreactor-assisted nanomaterial deposition” process to rapidly deposit thin films for solar cells, sidestepping more expensive processes such as sputtering and evaporation.

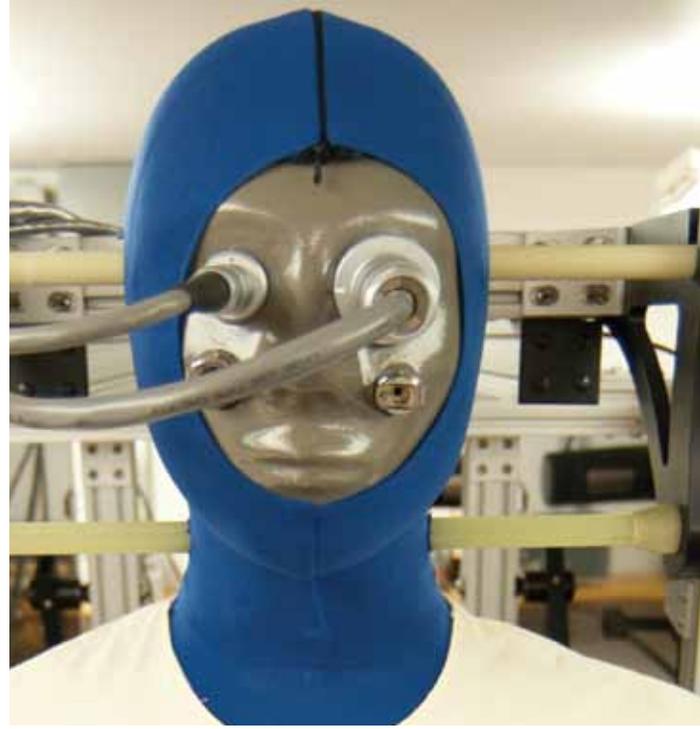
There may even be spinoffs that go beyond solar energy. Another application of these deposition processes is use of nanostructure films as coatings for eyeglasses, which could capture more light, reduce glare and cost less than existing coatings.

But solar energy is the primary target, and making Oregon a focus of that industry is a significant goal.

“We think with improved manufacturing processes and new materials, we can cut the materials cost of solar cells and produce these materials with low-cost, Earth-abundant materials in an environmentally sustainable way,” Herman says. **terra**



Chih-hung Chang (Photo: Oregon State University)



The Science of Design

On the cutting edge of functional apparel for health, comfort and sustainability

BY LEE SHERMAN

One day last spring, a Nike executive was touring Oregon State University's apparel design facilities. After being shown the textile lab, the thermal lab and the chemistry lab, he blurted out: "Oh my gosh! This is design with beakers!"

Design professors Leslie Burns, Brigitte Cluver and Hsiou-Lien Chen watch Newton, a manikin used in fabric research, go through his paces. Newton is sporting a sweat-duplicating fabric on his moveable frame. Above: Hoses through Newton's face bring water to pores that "sweat" in fabric tests. (Photos: Jeff Basinger)

He was right — but only partly. Beakers are just the beginning of science-based apparel design in the Department of Design and Human Environment (which also offers undergraduate degrees in interior design and merchandising management). In their investigations, students and professors employ such high-tech instruments as a scanning electron microscope for examining fibers and a \$20,000 machine for gauging the moisture-management properties of fabrics. They use a wind tunnel for simulating air resistance during walking or jogging. They master CAD software (computer-aided design) for rendering functional items like ski boots and running shoes.

A manikin named Newton is the *pièce de résistance* of OSU's apparel labs. Cast in aluminum and jointed at the elbows, knees, ankles, hips and shoulders, he looks a lot like the Tin Woodsman — that is, until researchers wrap him in an indigo-blue “sweating skin” to measure the thermal properties of clothing. They have used this \$200,000 system, manufactured by Seattle-based Measurement Technology Northwest, to research everything from military helmets for Oregon Ballistics to fire-fighting uniforms for Ohio-based Fire-Dex to adult diapers for a Japanese firm specializing in geriatric health care.

OSU prepares fashion designers who have special expertise in “functional” apparel — that is, clothing made of specialized fabrics for specialized purposes. In Oregon, that often means outdoor and athletic wear. But it can also mean apparel that ensures safety for the military and police, comfort for the old and infirm, and even sustainability for the planet and its inhabitants.

“We are not an art school,” emphasizes Leslie Burns, department chair. “Granted, we do have the fashion component, the aesthetic piece. But this is a research univer-

sity, so our program is research-based. We focus on problem solving and commercialization of design.”

At the Industry Nexus

Many of the problems they tackle are quintessentially Oregon — that is, how to stay dry and comfy when you throw yourself headlong into the watery wilds of the Pacific Northwest. Oregonians’ full-tilt embrace of nature (bumping down hillsides on mountain bikes, shooting class-3 rapids in kayaks, tramping old-growth trails in boots and backpacks, plying fresh powder on skis or snowshoes) has created a fertile seedbed for active-wear entrepreneurs. Here was a captive market for high-performance gear that resists wind and rain, holds in warmth while wicking out sweat, weighs little but breathes a lot.

As far back as the early 1900s, pioneering firms such as White Stag (skiwear), Jantzen (swimwear), Pendleton (woolen sportswear) and Danner (boots) catalyzed an athletic and outdoor cluster in the Portland metro area that’s now 300 companies strong. Anchoring it are the world headquarters for industry giants Nike, Columbia Sportswear and Adidas America. KEEN, Korkers and Icebreaker are just some of the up-and-coming brands in the cluster. The Portland Development Commission (PDC) has named this sector one of its five “signature industries.” Aiming to create 10,000

Partnerships and Projects

AS THE INDUSTRY’S HIGHER-ED PARTNER, OSU is tightly linked with the Portland area’s apparel community. Examples include:

» The OSU Design Network brings together professionals across the industry for informal gatherings and annual events in Portland, like last year’s Recycled Fashion Show — the longest-running fashion show of designs made from recycled materials in the country.

» OSU’s Apparel Research Center offers fabric-testing services to small firms and start-ups. At the Textile and Apparel Performance Testing Lab, clients can get measurements on a full array of variables in fabric and clothing construction (yarn count, weight, thickness), aesthetics (wrinkle recovery, drape, stiffness), durability (tear strength, abrasion resistance) and comfort (thermal properties, moisture management).

» This fall, the center is expanding into Portland, where it will host a series of research-based workshops for design professionals at the university’s Food Innovation Center on N.W. Naito Parkway. Topics on the agenda include sizing and fabric grading, sourcing and sustainable textiles and materials.

» Another new initiative, called Design Forum/PDX, is a partnership among the Portland Development Commission, the City of Portland and the Oregon University System, along with private-sector businesses. The initiative is compiling the West Coast’s first materials resource library available to design professionals, says OSU’s Leslie Burns, who serves on the forum’s board of directors.

In Brief

The Issue Oregon has achieved an international role in outdoor apparel design. Maintaining that edge takes knowledge of new materials and how they can function not only on the trail but in the stress of battle, disaster response and other adverse circumstances..

OSU Leadership Students and faculty in the Department of Design and Human Environment work at scales micro to macro, studying new textiles and design trends in functional apparel. Their research supports the growth of this robust industry cluster in the Portland metro area, including some of the world’s leading outdoor apparel firms.



new jobs in the next five years, the PDC is directing resources to its target industry clusters with an eye to drawing new talent and new investment opportunities to the city.

“There’s a wonderful quote from the PDC that goes, ‘What Hollywood is to the movie industry, Portland is to the athletic and outdoor industry,’” says Burns, who serves on the forum’s board. “There’s no place else like it.”

And OSU, boasting the West Coast’s only research-based apparel design school, is right in the middle of it all. “We’re the industry’s higher-education partner,” says Burns. “The PDC wants Portland to be identified as the worldwide hub for sustainable design — not just in athletic and outdoor but inclusive of all the sustainability aspects of Portland.”

Materials in the Raw

More often than not, when Hsiu-Lien Chen tells people she’s a professor in apparel design, they say, “Oh, so you sew!”

“I tell them, ‘No, I don’t even know how to make a pillowcase,’” she reports ruefully. Stereotypes from the old days of “home economics” linger, it seems, much to Chen’s chagrin.

Chen is not a seamstress but a fiber scientist. She studies the raw materials from which textiles are woven.

“I’m fascinated,” says Chen, “with environmentally friendly fibers.”

That fascination is easy to understand when you put your eye to the lens of an electron microscope. The internal structures of nature’s fibers — everything from silk, cotton and wool to flax, poplar and hops — zoom into view, magnified nearly 1,000 times. Some look like forests of battered drinking straws. Others resemble dried pasta or strands of DNA. Are the fibers long or short? Hollow or solid? Thick or thin? From these observations Chen can

determine their strength, weight, durability, insulating properties and, ultimately, their suitability for textiles.

Chen’s research at OSU began with naturally colored cottons — those fluffy bolls that burst from the plant already tinted with pigment. Spanning an earthy palette from ochre and rust to moss green and even blue, they benefit Planet Earth by negating the need for chemical dyes. One intriguing finding: Instead of fading in the wash, these colors get darker.

She has gone on to investigate the properties of poplar fibers — those wispy, hair-like strands that float on autumn winds when seedpods burst — already being used by a German firm for insulating winter wear, comforters and sleeping bags. In a study that examined the physical, chemical and thermal properties of poplar, Chen and OSU apparel design colleague Brigitte Cluver found it to be an ideal alternative to synthetic insulation materials such as polyester, which is made from petrochemicals. “Evolution has provided poplar seed hair with several characteristics that enhance seed dispersal, both in air and on water: light-weight, fine, hollow and resistant to wetting,” the researchers wrote in *Clothing & Textiles Research Journal* in 2010. “This combination of characteristics is also the basic prescription for an effective bulk textile insulation material.”

Another of her subjects is flax, a super-strong fiber inside the stalks of plants that have been used for clothing in the past, but now are being grown mainly for their oily seeds. “The Willamette Valley has perfect weather for growing flax,” she says. “Here at OSU where we are doing research on making bio-fuels from oilseeds, the stems get burned.” She and a colleague are designing a machine that can quickly separate the sturdy fibers from the woody

material that encases them. “We want to optimize the mechanical separation process,” she says, envisioning a potential patent on the horizon.

And then there are hops. A couple years ago, a consultant for Rogue Ales sent Chen an email probing the feasibility of extracting fiber from Oregon hop vines. “As you are likely aware,” he wrote, “hop vines and stems are in no short supply here in Oregon. At present, they are discarded, since it is only the strobile (fruit) that is used for brewing.” From a corner of her lab, Chen picks up a fat bundle of dried plant material and holds it to the light. Lamenting the waste of thousands of pounds of textile potential each year, she notes, “Hops fibers have the same chemical composition as cotton.”

From 4-H to *Fashionista*

When Leslie Burns was a girl growing up in Cut Bank, Montana, she couldn’t have imagined that her 4-H clothing club would lead to a career as a university department head, co-author of a widely used textbook (*The Business of Fashion*, now in its fourth edition), and researcher (investigating how culture influences design and consumers’ perception of products).

The latest feather in her cap was the *Fashionista* blog’s 2011 rankings of U.S. fashion schools, which put OSU among the top 20. The heady list included such elite institutions as Parson’s, Pratt and the Rhode Island School of Design.

Fashionista exists, in its own words, to “chronicle the fashion trail from the runway to the first Canal Street knockoffs.” OSU has mapped out its own path along that trail.

“Our program is a wonderful combination of science and art, function and fashion,” says Burns. “It has very much a target consumer orientation. If people aren’t going to wear it, we’re not going to design it.”

terra

Talent for Threads

If there's a "fashion gene" in human DNA, OSU apparel design students and alums have it. Almost to a person, they report loving apparel — the palette, the panache, the voice, the statement — ever since they could dress themselves. Amanda Grisham is one outstanding example. In October, the senior from Tigard won the Emerging Designer's Competition in conjunction with Portland Fashion Week. *Portland Monthly* style editor Eden Dawn wrote on her blog that Grisham's designs were "hands down some of the strongest of the show."

Fortunately for them, they have ample opportunities to parlay their inborn passion into a profession. That's because the vortex of the U.S. outdoor and athletic-wear industry is just 80 miles north of Corvallis. "Portland is recognized as the global hub for the athletic and outdoor industry," according to the Portland Development Commission.

"There's an enormous cluster of expertise in the Portland area," affirms OSU alum Ron Parham, a public relations executive at Columbia Sportswear. Within that cluster of expertise, there are many alumni of the OSU apparel design and graphic design programs. Meet a few:

KATHLEEN MCNALLY

Creative Director for Apparel, Columbia Sportswear

HOMETOWN: Portland

BEGINNINGS: Started sewing her own wardrobe (and Barbie's) in second grade

OSU APPAREL DESIGN: "The thing I liked best about the program was the freedom to tailor it to my strengths. I did a lot of independent projects."

PREVIOUS WORKPLACES: Nike, Lucy Activewear, J. Crew

CURRENT TRENDS: "Packability, compactability, ultra-light-weight"

INDUSTRY CLUSTER: "So many creative people move to Portland because it's an outdoor nirvana. New York is the only other city with ready access to this kind of talent, especially talent so strongly oriented to the outdoors."

ABBY WINDELL SWANCUTT

Apparel Designer for Young Athletes, Nike

HOMETOWN: Newport

BEGINNINGS: Started revamping hand-me-downs in elementary school; designed her formals for high school dances

OSU APPAREL DESIGN: "The best thing about the program was that every professor knew me as a person and genuinely cared. They came to all my volleyball games. My favorite class was fashion merchandizing and marketing, where I learned that you have to get to know the customer inside and out. Your consumer's your boss."



CHRISTINE CYPHERS

Global Sourcing and Manufacturing, Columbia Sportswear

HOMETOWN: Portland

BEGINNINGS: Grew up sewing, but also loved math; mom tried to steer her toward engineering. "Now I tell my mom, 'You know what? You were right — we engineer clothing. Everything we do is math-related.'"

OSU APPAREL DESIGN: "OSU is a well-rounded education. It's not just focused on apparel. It's also about business — marketing, finance, international trade, foreign exchange. And it's about science, like the chemistry of textiles and the carbon properties of fibers."

PREVIOUS WORKPLACES: Pendleton Woolen Mills, Lands' End

CURRENT TRENDS: "Cotton prices and oil prices play into the bigger business dynamic. We're always asking, 'What can we do with the commodities that are available to us?'"

LAUREN STEWART ROSS

Sourcing Analyst, Columbia Sportswear

HOMETOWN: Central Point

BEGINNINGS: 4-H

OSU APPAREL DESIGN: Started college with K-12 teaching aspirations, but stumbled across an apparel course called "Appearance, Power and Society" and promptly switched majors. Study tours to Las Vegas, Europe and Hong Kong steeped her in the international nature of the apparel industry.

INDUSTRY CLUSTER: "In Portland it's such a close-knit community that everyone knows everyone else. You can make great connections and build a great career here."

ANGELA SNOW

Director of Creative Operations and Macro-Trends, Nike

HOMETOWN: Beaverton (a half-mile from today's Nike campus)

BEGINNINGS: Started by creating fashion illustration in grade school; mother sewed her designs for her to wear

OSU GRAPHIC DESIGN: "The program had world-class graphic design professors, which was enriching and provided a great education. I also did coursework in apparel design. It was a perfect combination of design disciplines."

CURRENT TRENDS: "We research patterns in macro-trend culture, innovation, technology, fashion, science and biometrics — we synthesize this information to help inspire and inform the design community."



Is There a Pill for That?



How the Internet is changing the way Americans seek health care

BY LEE SHERMAN | ILLUSTRATIONS BY THOMAS JAMES



The classic Norman Rockwell painting *Doctor and Doll* from the late 1920s — a kindly physician in a cozy office listening to the “heartbeat” of a little girl’s beloved toy — looks as quaint today as those ‘50s-era scenes from the movie *Grease*, where teenagers in ducktails and ponytails cluster around a jukebox snapping their fingers to songs like Jerry Lee Lewis’ *Whole Lotta Shaking Going On*. Or the freckle-faced kid on *Leave It to Beaver*, tossing newspapers from a canvas bag slung over his shoulder.

Those halcyon days of trusted family doctors, vinyl discs and hometown papers are being left far, far behind as the world hurtles ahead on ever-faster, ever-smaller, ever more potent computing devices. Just as the revolution in technology has given everyone 24-7 access to *The New York Times*, a ballooning blogosphere and personalized, portable playlists, so has it given patients and consumers a limitless gateway to health-care resources. Within seconds, we can find news, information and chatrooms on WebMD, the world’s largest commercial health-care website, or up-to-date medical research on PubMed, the open-access site of the National Institutes of Health. We can get data on every disease under the sun. We can access details about an ever-widening rainbow of capsules, tablets,

potions, ointments and salves. And we can solicit feedback from fellow sufferers around the globe, sharing symptoms and comparing diagnoses.

Now, instead of blindly following “doctor’s orders,” patients can power up their iPad, Google their symptoms and join a chatroom for a different kind of “expert” opinion — that of ordinary people who have “been there, done that.” They can add a health-related “app” to their smart phone, or post their ailments on Facebook. (A story about a mom whose gravely ill 4-year-old was saved by a Facebook diagnosis went viral on the Internet.) They can ask their doctor for all sorts of new drugs being touted on TV — many of them designed for just-discovered diseases that seem to pop up as fast as new products for personal computing.

In this brave new world of “e-health,” there are bounteous benefits, says Kristin Barker, a sociologist at Oregon State University.

“I think the overwhelming trend of health information on the Internet is positive,” says Barker, who studies the impact of electronic technologies on medical decision-making and power dynamics. “It gives us access to information in ways that are unprecedented. It allows us to be more engaged in our own health-care decisions. It empowers us.”

Sitting in her third-floor office in Fairbanks Hall, she laughingly admits to typing in her own symptoms on a regular basis, looking for clues to why her head is aching or her energy is sagging.

“I’m a little bit of what’s called a cybercondriac,” she jokes. “I’ll look up two of my symptoms — headache and fatigue — and I’m convinced I have a brain tumor.”

This tendency to inflate or misinterpret ordinary aches and pains is one pitfall of seeking health-care information online. Others include grasping at “disease” models for problems that may, in fact, originate outside the biomedical sphere, and letting anecdotal evidence trump verifiable science.

Illuminating these kinds of hazards is the focus of Barker’s research. While she readily acknowledges that the “doomsday scenarios” of the Internet’s early days — people

self-diagnosing with disastrous results, or falling prey to online charlatans — have not materialized to any significant degree, she has identified certain trends that are cause for concern, both for individuals and for society at large.

The Loneliness of Fibromyalgia

A woman called Yolanda posts the following comment in a chat room: “What I find in reading others’ symptoms is that I’m not nuts, and this really is happening to me.” In other words, her pain is not all in her head. And there’s an important subtext: She’s not alone in her suffering.

You can sense the gratitude in her words. You can almost hear her sigh with relief as she types her thoughts into her computer and then clicks “send.” With that tap of her finger, she joins the millions of Americans who are turning to the Internet for an astounding range of health-care needs, from basic information to psychological support. Of the nearly 75 percent of adults who use the Internet, 80 percent have sought health-related information online, the Pew Internet & American Life Project found in 2010. That’s almost 60 percent of American adults. Their search topics range from health insurance and environmental health hazards to drug safety, chronic pain, elder care, memory loss and a host of specific diseases.

Sometimes, this electronic activity results in what social scientists call “illness affiliation” — identifying with others who report similar symptoms. These collectives of sufferers, joined in a spirit of “illness camaraderie,” as Barker calls it, typically push the medical establishment to bless their shared experience with disease status.

Yolanda (a pseudonym) is a case in point. Barker found her on a website fictionally named “Fibro Spot,” a chatroom for sufferers of a modern-day syndrome called fibromyalgia, which afflicts some 6 million Americans. Launched and run by laypeople, Fibro Spot’s homepage was one of the top 50 highest-ranked pages among the 6.7 million hits Barker got when she searched online for “fibromyalgia.”

For 12 months in 2004 and 2005, the researcher “lurked” in the background at Fibro Spot, eavesdropping on the conversations of Yolanda and about 250 other visitors who posted comments to the website. (Although some social scientists question the ethics of online lurking for data collection, Barker argues that if the site is public and doesn’t require a password or membership to join, then it’s open for anyone to read. The known presence of a researcher would alter the dialog, she says, diluting its authenticity and, hence, its value to science.)

Yolanda, having recognized her own plight in the stories of other virtual group members, found affirmation that her cluster of symptoms, ranging from pain and tenderness to anxiety, insomnia and fatigue, must certainly indicate an actual physical illness.

“By writing and reading postings at Fibro Spot, participants transform a collection of symptoms into a unified entity,” Barker explains in the *Journal of Health and Social Behavior*. “From the point of view of participants, shared symptoms,

In Brief

The Issue In Internet chatrooms, on Facebook and Twitter, people with fibromyalgia, chronic fatigue syndrome, breast cancer and other health problems share their stories. Through online media, people find solace, challenge physicians and argue for recognition, but they risk misdiagnosing symptoms and can confuse anecdotes with verifiable fact.

OSU Leadership Kristin Barker, professor of sociology, studies the role of online communities in the health-care system. One of her findings: Social factors may help to explain symptoms commonly felt by people when personal experience conflicts with medical evidence. She suggests that health care has become defined by broad social trends through the “medicalization” of the human condition.

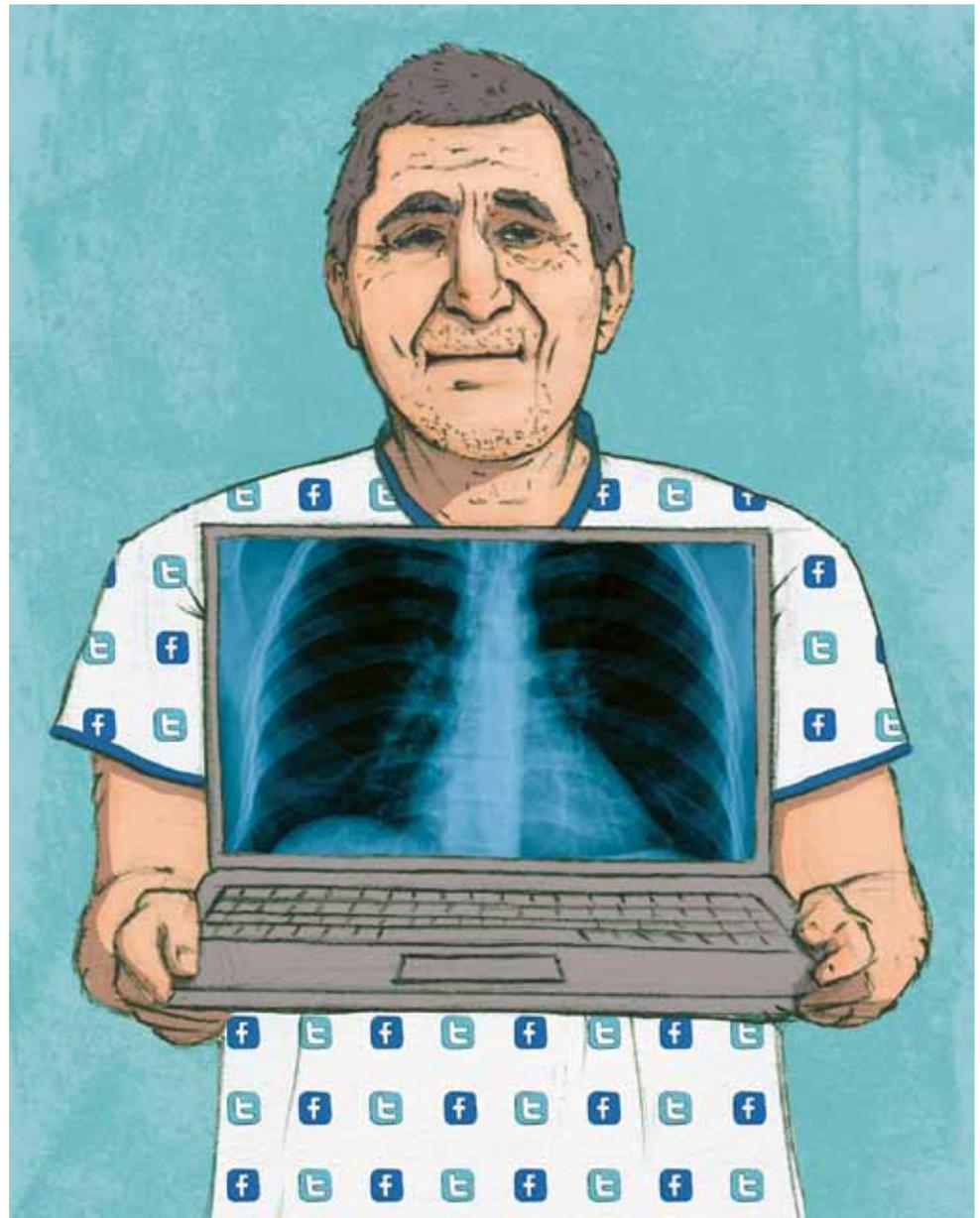
rather than objective medical evidence, substantiate fibromyalgia as an organic disease.”

Social scientists call this phenomenon “reification” – that is, inventing a real, material thing out of an abstract idea or belief that has been developed socially. In this case, the idea being reified is a perceived illness. But as Barker points out, just because people are reporting similar constellations of physical and psychological symptoms doesn’t mean there’s a biomedical basis for them. The aches and pains may be real enough, she grants. Their origins, however, may also lie in larger social forces that affect human wellbeing.

In the case of fibromyalgia, some research points to a central nervous system imbalance that causes hypersensitivity to pain. But medical science has yet to find a definitive source of illness. Social science, however, has given us perhaps the most telling clues to the disorder, according to Barker. Studies reveal that fibromyalgia affects mostly women (the ratio is nine women to one man), and that there is an over-representation of sufferers who fall on the lower rungs of the socioeconomic ladder.

To Barker, these demographics strongly suggest a social problem rather than a medical one. Fibromyalgia, she posits, is a classic example of a phenomenon she has studied extensively throughout her career: “medicalization.” She defines it as “the processes by which an ever-wider range of human experiences come to be defined, experienced, and treated as medical conditions.” In short, we are seeking pills and potions to fix problems whose solutions may well be non-pharmaceutical.

“I argue that the fibromyalgia diagnosis medicalizes a vast constellation of complaints that are associated with social, economic and



personal hardships that characterize the lives of many women,” she says. “By focusing intently on gaining medical legitimization, Fibro Spot participants remain largely silent on the social circumstances in which suffering is grounded and experienced.”

Fibromyalgia is just one of the “contested diseases” – medically unexplained syndromes such as chronic fatigue, multiple chemical sensitivity and sick-building syndrome – being driven in large part by online connections among people like Yolanda and her fellow sufferers. Indeed, more than 10 million Americans have a diagnosis

for a contested disease. Electronic “connectivity” and the collective validation of “lay expertise” that it fosters is “a potent element in contemporary lay challenges to scientific expertise and will become increasingly influential as online illness affiliation becomes ever more commonplace,” Barker and co-author Tasha Galardi, an OSU graduate student, write in the journal *Social Science & Medicine*.

Other examples of the “disease du jour” craze, such as “restless leg syndrome” and “low T,” are being propelled by drug companies pushing pharmaceuticals as “cures” for conditions that many physi-

cians chalk up to normal aging, poor lifestyle choices (such as too much sitting around) or even, as Barker puts it, simply “part of the human condition.”

These forces, which Peter Conrad

of the trend toward medicalizing experiences once accepted as normal vicissitudes of living. Riding right alongside the drug companies was the health-care consumer. Then the Internet arrived, creating the perfect

medical goods and services.”

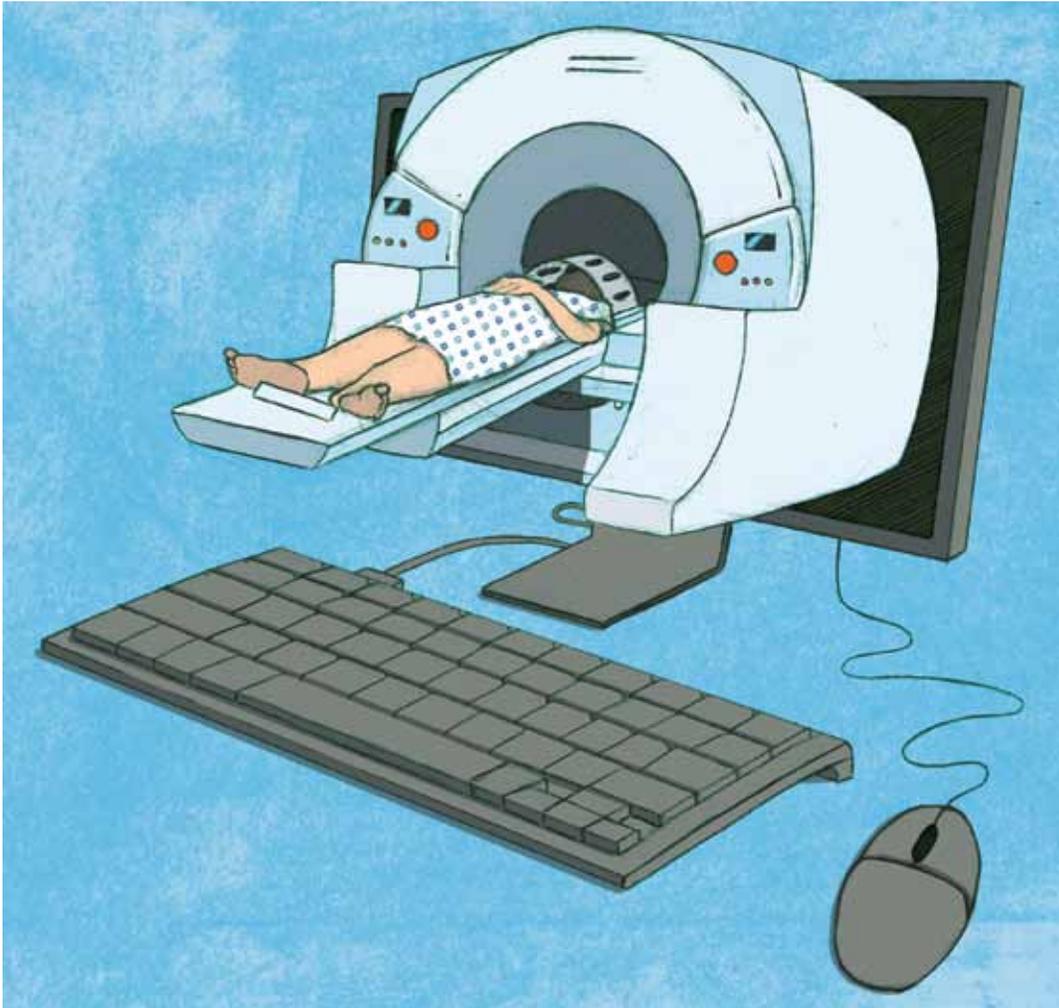
When we latch onto organic explanations for troubles that are actually social in nature, Barker says, we lose the opportunity to find and address true root causes. “My concern is how electronic support groups may push for greater medical intervention when it’s not necessary, not effective and not in our best interest, either as individuals or as a society,” Barker says.

Warriors for Mammography

For Yolanda, chatting with her compatriots online gave her the gumption to tell off her skeptical physician: *See? I told you so. You’re not so smart after all.* Indeed, questioning traditional medical authorities is a hallmark of health care in many of today’s online communities. Barker’s Fibro Spot subjects, who were more than 90 percent female, were uniformly bitter about their physicians’ unwillingness to recognize fibromyalgia as a legitimate disease. “Idiot,” “bitch” and “clueless” were some of the virtual insults they hurled at their doctors while nursing fantasies of slapping them or kicking them in the shins.

Their rage, clearly fueled by feelings of powerlessness, practically leapt off the screen. “Find a new doctor!” was their mad-as-hell advice to newcomers.

This rejection of doctors’ expertise and scientific findings, unheard of in the heydays of Rockwell and rock-n-roll, is at the heart of a firestorm that erupted on the Internet in 2009. This “populist uprising,” to use the words of Pew’s Susannah Fox, was triggered when a congressional



of Brandeis University calls “engines of medicalization,” have shifted over the decades. In the late 19th and early 20th centuries, Barker says, doctors were in the driver’s seat when they redefined natural processes — especially ones related to women’s bodies, such as childbirth and menopause — as needing medical management. By the end of the last century, however, the pharmaceutical industry was the primary driver

platform for ramping up medicalization trends to breakneck speed.

“The transformation of medicine from being primarily professionally directed to being increasingly market-driven places the patient in a new role vis-à-vis medicalization,” Barker asserts, again drawing on the writings of Conrad. “It is increasingly the case that patients contribute to medicalization via their consumer ‘desire and demand’ for

task force issued new guidelines for breast cancer screening. The panel of independent experts, the U.S. Preventive Services Task Force at the U.S. Department of Health and Human Services, announced that it was rolling back earlier standards for routine screening. For 40-something women without any breast cancer symptoms or risk factors, the panel reported that routine mammograms don't save lives and may, in fact, be harmful. And for women between 50 and 74, every-other-year scans are adequate, they said, thereby over-turning earlier recommendations for annual mammograms.

The reaction from breast cancer survivors and providers was "swift and furious," reported journalist Jennifer Goodwin on *U.S. News & World Report's* "HealthDay" website. Within hours, the Internet was aflame with angry denunciations against the task force, which had based its new recommendations on rigorous, population-level statistical evidence.

This brouhaha "was a great illustration of how two worlds collide," Barker told Goodwin for the *U.S. News* article. "On the one hand, you had the science that was saying mammography for women in their 40s might not be as effective as we thought, and on the other hand, you had the personal experiences of the women who believed they were saved by having a mammogram."

What's happening, she explains, is "a contemporary clash between scientific and lay ways of knowing." These "two faces of medicine" (as Harry Collins of Cardiff University and Trevor Pinch of Cornell phrase it) are not only pitting patients against physicians, but also private well-being against the public good. In an era of scarce resources, unnecessary screenings shrink access and siphon funds that could be used for more effective, more equitable preventions and treatments for larger swaths of

the populace.

"There's a lot of overuse of health care that is unneeded and, in some cases, harmful," Barker notes. "We have a right to be worried about not getting care we may need — that's a real fear and one that should not be dismissed. But we also need to be afraid of getting health care we *don't* need. Because somebody is profiting from it."

The Image of Health

Even as they lose faith in their doctors, Americans are embracing certain medical technologies with the fervor of true believers, Barker says. Our infatuation with imaging machines that peer inside our bodies to see what's wrong with us — CT scanners, PET scanners, MRIs — has exploded in recent years. High-tech imaging in emergency rooms, for example, quadrupled between 1996 and 2007, according to the Centers for Disease Control (CDC). In doctors' offices and outpatient clinics, imaging frequency tripled during the same time span, the CDC found.

Mammography, Barker suggests, along with these other high-tech imaging tools, has taken on the status of a "sacred technology" — something revered that cannot be questioned. Following the logic of sociologist Kelly Joyce of the College of William and Mary, who asserts that MRIs and the images they create "serve as totems and sacred objects" in the same way religious rituals and trappings do, Barker says the idea is an extension of the classic analysis in *Elementary Forms of Religious Life* by Emile Durkheim, who is widely recognized as the "father of sociology."

Our faith in these technologies can blind us to the findings of science, Barker cautions. Despite the dramatic rise in imaging for injured patients in ERs, diagnosing life-threatening conditions has not improved correspondingly,

according to a 2010 Johns Hopkins study published in the *Journal of the American Medical Association*. As for mammography, research has found that for every cancer detected during routine screenings among 40-something women, nearly 2,000 mammograms are performed. The new guidelines were based on those findings. With no credible evidence linking more imaging with less mortality, the task force concluded that the risks (from radiation, false positives and follow-up interventions) were not justified for healthy, asymptomatic women.

Still, survivors and their supporters were outraged. Statistics, schmatistics! they lashed back. You're talking about my life, my mother's life, my sister's life! Their passionate beliefs became amplified on the Internet.

Barker has enormous respect and empathy for the patients, survivors and consumers she calls "citizen experts" or "lay experts." Anyone who has undergone breast cancer — or, for that matter, any life-threatening condition — attains a degree of expertise that has value and must not be discounted, she says. But she goes on to caution that when good science sheds light on questionable, wasteful or even harmful uses of medical personnel, equipment and money, connective resistance from stakeholders can be a dangerous barrier to good policy. That's e-health at its worst. At its best, e-health can be a powerful fulcrum for balancing anecdote and science, private and public, individual and societal toward better health and greater wellbeing for everyone.

"When the Internet first came out," Barker says, "it was a place where people went to get information. Then it started to be a place where people shared information. Now it's becoming a place where people create information." **terra**



Rice Paddy People

In a rural village, farmers fight industrial pollution

BY NICK HOUTMAN

The young Chinese laborer was desperate. Like millions of other migrant workers in China's dash to industrialize, he had left his home and family to work in a factory in the rural interior. Now, environmental officials had closed the zinc smelter in Futian where he worked, and without a job, nearly out of money and separated from his support community, he knocked on the door of the inquisitive American who had been conducting interviews in the village. He asked the foreigner if he could help him with another job or a bus ticket back home. Then he broke down in tears.

"I suspected that he was just looking for money," writes Bryan Tilt in his 2010 book, *The Struggle for Sustainability in Rural China*. Tilt, who was a University of Washington graduate student at the time, told the man to come back later and consulted with his landlord, Li Jiejie. She had an extensive family network throughout the region, the arid foothills of southern Sichuan Province. Eventually, Jiejie helped Tilt find the man a job carrying mortar at a construction project. The pay was less than half of what he had made at the smelter.

The laborer's problems were not unusual. Workers like him, China's so-called "floating population," have

Villagers (at left) work together to transplant rice into the paddy in late spring. The Chinese characters below were written by Bryan Tilt and literally mean "rice paddy people." At right is the zinc smelter where Tilt interviewed workers before it was closed in 2003. (Rice paddy photo: Jenna Tilt; smelter photo: Bryan Tilt)

transformed the Chinese countryside by operating make-shift mines and factories, often living with their families in industrial compounds fouled by coal smoke, polluted water and other wastes. In the 1980s, more than 100 million people moved from agriculture to industry — the largest employment shift ever recorded.

When Tilt, now an Oregon State University anthropologist and a Fulbright scholar, first visited Futian in 2001, it was a poor isolated village of rice farmers. Most residents call themselves *Shuitan zu*, literally "rice paddy people." The local government had built an industrial compound that housed facilities for smelting zinc, washing coal and producing coke for a steel mill in Panzhihua, the region's largest city. Flush with revenues from the factories, the town had constructed new cement buildings with storefronts and a six-story high-rise office building faced with white tiles to house municipal offices. On a small stream, it erected a dam to produce electricity.

This prosperity came at a price. Acrid coal smoke choked the industrial compound and wafted over homes and farm fields. The stream, a tributary to the Yangtze, ran black with effluents. Children played in slag heaps and other refuse from the factories.

"Piles of coal and ore-slag lay strewn about the factory compound," writes Tilt. "When it rained, pools of black industrial sludge collected in ruts and potholes in the road and in villagers' courtyards and gardens."

Interviews in the Smoke

Tilt had come to Futian to talk with

villagers, workers and government officials about their attitudes toward development and pollution. His goal was to reach a deeper understanding about environmental values in China and to learn how people responded to problems and sought redress for damages.

For anthropologists, fieldwork means interviews, so Tilt visited people in their homes and offices,



scribbling hurried notes in English and Mandarin, which he speaks fluently. ("As an anthropologist, you really can't understand people except through their language," he says.) He created questionnaires and asked villagers to fill them out. Enveloped in coal smoke with a handkerchief over his mouth, he interviewed workers in the factory compound.

Although he would have preferred to use a tape recorder to document his discussions, he found quickly that people were reluctant. "People don't want to talk into tape recorders," he says. "Recent political history has told them that doing things on the record can be dangerous."

At times, the conversations were casual and relaxed. Residents

honored their guest with refreshments before talking about more serious matters. "In China, you don't just show up and start doing your work and start pushing your agenda. You eat and you drink. There's an expectation that you socialize together," Tilt says. In Futian, Tilt was often served a homemade liquor called *bai-jiu*, a drink that challenged his palette. "It was like gaso-

line, only less tasty," he says.

Conventional wisdom about a society's attitude toward the environment holds that in the early stages of development, nature takes a back seat to more pressing needs, such as food, warmth and shelter. And yet what Tilt found during his fieldwork was that local farmers and townspeople, most of whom lived in houses with dirt floors and made the equivalent of less than \$500 a year, put a high priority on clean air and water.

It wasn't just a matter of treating nature as sacred. Although traditional Chinese religions (Confucianism, Taoism, Buddhism) regard humans as intimately linked to the environment, farmers told Tilt that pollution reduced their crop yields

and made the stream unusable for irrigation and livestock. Other residents complained that the coal smoke and black water made them and their children sick.

“These are people who rely on the land to make a living. If their crops fail, they’re done for. That’s a very pragmatic basis for an environmental value,” says Tilt.

Out of Compliance

In fact, it was pollution of agricultural water that broke the back of Futian’s industrial enterprises. In 2000, a group of farmers appealed to local government and to regional environmental officials to have the factories closed. Two years later, as the pollution continued to spew from the industrial compound, the farmers took a page from environmental activists in the West and called in the media. A TV reporter used a hidden camera to record the owner of the zinc smelter saying that his factory was too profitable — to himself and to the village — to be closed. A month later, environmental officials issued a written order closing the factories for noncompliance with emissions standards.

“It’s often the case that wealth and privilege are a way of buffering yourself against some of those risks,” says Tilt. “These people were on the front lines. They didn’t have those buffers.” To underscore the point, he notes that he and his wife Jenna bought bottled water to drink during their visits to Futian. Most residents did not have that luxury.

“So a lot of what I found ran completely counter to that idea that you need to reach a certain level of economic development before you even care about environmental issues,” he adds. “I think the reason is that these are people who, precisely because of their low socioeconomic position, were directly experiencing the impacts of a local pollution problem.”

In fact, Futian had only recently solved what the Chinese call *wenbao wenti*, the “warmth and fullness problem,” says Tilt. Many older residents remembered the famine during the Cultural Revolution, when people ate grass from steep, dusty hillsides above the town alongside their livestock (a time some sardonically referred to as “the era of green shit”).

Time for the Opera

Today, they don’t go hungry. They grow more than enough food — rice, vegetables, pork, chicken, beef — to feed themselves and to supply markets downriver in Panzhihua. Satellite TV dishes have even appeared outside some of the ubiquitous mud-walled houses (“I like to watch the Beijing Opera,” one woman told Tilt). In the busy morning market, villagers shop, chat with each other and play mahjong.

Tilt’s interviews show an unexpected divide among people based on where they lived and worked. Whereas many farmers and townspeople objected to the pollution, most factory workers like the young man who had knocked on his door thought that it was harmless or, at worst, easily remedied. They constantly downplayed the health risks, says Tilt. “They had been doing this work for years with no problems. They didn’t worry about it,” he adds.

Nevertheless, a woman who worked in a local health clinic told Tilt that factory workers often came to her complaining of respiratory problems and difficulties breathing. “There is nothing really that we can do for them,” she said.

While closing the factories may have cleared the air in Futian, it also left workers without jobs and the owners deep in debt. Tilt got to know some of the workers and spent his free time with the owner of the zinc smelter, Mr. Zhang, a retired college-educated school teacher who had sunk his life savings into the enterprise. The local government had attracted him to the area with promises of rich natural resources and tax breaks. Now he felt betrayed.

Before he went to China, Tilt considered the factories to be “faceless entities plotting to destroy the environment. They weren’t like that,” he says. “They were people like you and me who were trying to



During the dry season, farmers carry fodder home for livestock to eat. (Photo: Jenna Tilt)

In Brief

The Issue China has paid a steep environmental price in its rush to industrialize the countryside. Despite the wealth generated by rural factories, uncontrolled air and water pollution has compromised health, farming and other enterprises that depend on natural resources.

OSU Leadership In a remote village in southwestern China, OSU anthropologist Bryan Tilt has documented the cultural and political tensions between economic progress and environmental degradation. His interviews and observations shed new light on the source of environmental values and portray people in the struggle to develop a sustainable economy.

do right by their families. They were trying to make a living. They were doing it under tremendous uncertainty. The political and economic climate in China can change, turn on a dime. If the Party comes out with a new policy and it affects you, you're out of luck. So there's a Wild West mentality where, you gotta get what you can get now and move on."

The factory closures in Futian have been repeated across the country, evidence that environmental protection is being taken more seriously in China. Tilt expects to see continued progress as the government invests in pollution control and alternative energy technologies.

"China is kicking our butts on renewable energy technology," he says. "It's because the central government has decided to do that. They have a plan to spend \$800 billion on wind, wave, solar and hydroelectric. They are putting a lot of energy, initiative and money behind developing these technologies. And we are sitting around going, 'Who should take the lead on this?' Guess what, 10 years from now, they're going to have all the capacity, and we are not." **terra**



Love of Language

热爱学习语言

As a college student, Bryan Tilt spent three years in South Korea and returned with a love for a new culture and its language. "I don't know that I would have gotten into anthropology without that experience. It just opened up doors for me that I didn't even know existed, let alone knew how to walk through," he says.

He majored in Asian Studies at Utah State and focused further on environmental issues and values as a University of Washington graduate student. With its emerging environmental problems, China seemed like a logical place to study the tension between environment and economy at the grass roots. However, his first experience in the industrial city of Harbin in Manchuria didn't go well. "I had so many doors slammed in my face, I couldn't get the work done," he remembers.

It took a phone call to his adviser in Seattle and a connection to a research colleague at the Sichuan Nationalities Research Institute in Chengdu to

A member of the southern Sichuan extended Li family and author of a book on minority cultures discusses his research with Bryan Tilt. (Photo: Jenna Tilt)

open the door in Futian. Within a few frenzied days, he was doing interviews in the village.

In 2012, Tilt and his family (OSU faculty research associate Jenna Tilt and their children Avery and Miriam) will return to China. With support from a Fulbright Scholarship, Bryan will conduct interviews in Yunnan Province to investigate how people balance hydropower and dams with values such as biodiversity, community preservation and sustainability.

Working with OSU faculty colleagues Desiree Tullos (Biological and Ecological Engineering) and Aaron Wolf (Geosciences), Tilt has contributed to a decision-making model for future dam construction. In the current work, they are focusing on the Mekong and Nu (Salween) rivers.



Gitali and Arup Indra study the complex and elusive chemical and genetic mechanisms of melanoma, a deadly disease that claims thousands of lives every year. (Photo: Karl Maasdam)

Co-conspirators in *MELANOMA*

BY LEE SHERMAN

Researchers discover “partners in crime” in deadly skin disease

Americans spend billions to beautify their outermost organ — to make it softer and younger, to erase wrinkles, conceal freckles, fake a tan, flaunt a tattoo. In our obsession with skin’s cosmetic qualities, it’s easy to forget the role it plays as nature’s

biohazard suit. It defends our bodies against a barrage of environmental and biological assaults, from solar ultra-violet (UV) radiation and industrial pollution to extreme heat and deadly pathogens.

Given this constant battering, there's little wonder that skin ranks No. 1 on the American Cancer Society's list of most common cancers. Many of the 1 million new cases diagnosed in 2010 were easily treated. But the most lethal form of skin cancer — melanoma — took the lives of 70,000 Americans. Unlike more benign forms of skin cancer, melanoma can metastasize aggressively, spreading into lymph nodes and other distant organs of the body if not caught and treated early.

For two researchers in the Oregon State University College of Pharmacy, the statistics are unacceptable. In a warren of labs tucked into the recesses of the college's historic building, Arup and Gitali Indra are urgently seeking — and beginning to find — clues to predicting, preventing and stopping this hard-to-treat disease before it spreads.

"Malignant melanoma continues to evade modern curative efforts as a result of the complex and elusive nature of metastatic tumors," the researchers write in the journal *Pigment Cell & Melanoma Research*. Their research, which explores the chemical and genetic mechanisms of melanoma progression "could hold therapeutic value when combating metastatic disease."

Skin Deep

When people look at each other, they perceive skin as a smooth surface that ranges in tone from pale pink to deep brown, depending on ancestry. But beneath the pigmented surface is a complex layering of cell types, each with its own function. Graphic renderings of human skin, magnified and cut away, bear an uncanny resemblance to geologists' drawings of rock strata. How skin, a complex multi-cellular organ, develops from a handful of stem cells, and how the various skin cell types interact and "talk" with one another with the aid of proteins that regulate gene expres-

sion, are the focus of the Indras' research. They began collaborating in the 1990s at the Institute of Genetics, Molecular and Cellular Biology (IGBMC), one of the leading European centers of biomedical research in Strasbourg, France. Arup was a post-doctoral researcher, and Gitali was a Ph.D. candidate.

"I was totally into skin," says Gitali, whose Ph.D. in molecular and cellular biology focused on head and neck cancers, which originate from epithelial cells — cells that form linings on many body surfaces, including the skin. Two years ago, the Indras, in collaboration with their colleagues in France and in the College of Pharmacy, announced a breakthrough in human head and neck cancers by showing that tumors in these areas contain a five-fold spike in CTIP2, a gene regulator thought to play a role in tumor growth. The Indras' findings, published in the journal *PLoS One*, could lead to the development of a promising new prognostic kit for fast, sensitive and accurate detection of head and neck cancer and some other epithelial cancers.

Melanoma is the Indras' nemesis. But in order to tackle that baneful foe, the researchers (who are partners in marriage as well as in science) investigate the full spectrum of mammalian skin, from the fetal to the fatal — from embryonic stem cells to metastatic cancer cells, from normal function to inflammatory disease and life-threatening cancers. Wound healing is yet another window into the mysteries of melanoma and the mechanisms that drive it.

Among skin researchers, there's a common saying: Cancer is a wound that never heals. "The processes of wound healing and cancer progression have similar pathways," explains Arup, whose mentor in France was renowned scientist Pierre Chambon, whom he calls a "guru"

in the field of gene regulation. "They overlap."

Scientists long have known that melanoma takes hold in the body's pigment-producing cells, which are called melanocytes (that is, producers of melanin, which gives skin its color and protects it against the sun's ultra-violet rays). But that's only part of the story, as the Indras have discovered. In the "microenvironment," or the local neighborhood, of the cancer site, the researchers have recently identified other skin cells that play a key role. Called keratinocytes (producers of keratin, a protein found in hair and nails as well as skin), these "co-conspirators" are not just bit players in the genesis of melanoma. They're lead actors.

"These adjacent cells are actually the driver for the changes and malignant transformation in the pigment-producing cells," Arup says. "So there are two avenues — the pigment-producing cells where the cancer develops, and the adjacent skin cells which 'talk to' the pigment-producing cells in the form of signals. They work in coordination. They are partners in crime."

To study melanoma cells in isolation from their surrounding biochemical and molecular environment, therefore, is to miss the intricate series of related interactions that give rise to the disease, he stresses.

East to West

The daughter of a mining engineer in southern India, Gitali was a gifted athlete, winning glory in badminton and table tennis. Arup, the son of a marine engineer based in Kolkata (then Calcutta), was a talented young musician, studying sitar with Sangeetacharya Gokul Nag, a pre-eminent sitarist of the Vishnupur Gharana of Bengal (a traditional form of Indian music), and with a nephew of the legendary Ravi Shankar. But when it came time to choose careers, the couple report, both fathers

steered their offspring firmly toward the sciences.

As his post-doc in France was winding down, Arup was invited to interview at OSU. Leafy Corvallis was an easy choice for the couple. The rimming mountains reminded them of Strasbourg's picturesque Vosges range. The shadowed woods echoed the Black Forest. And the nearby ocean recalled India's turquoise coastline. But it wasn't just the natural beauty of the place that tugged at them.

"There's so much collegiality here," Gitali says. "It's such a caring and loving community."

When the lights burn late in the Pharmacy Building on the east edge of campus, chances are they're illuminating the labs of Gitali and Arup (who is a self-confessed "workaholic") as they follow the threads of the day's investigations. For their recent "co-conspirator" research,

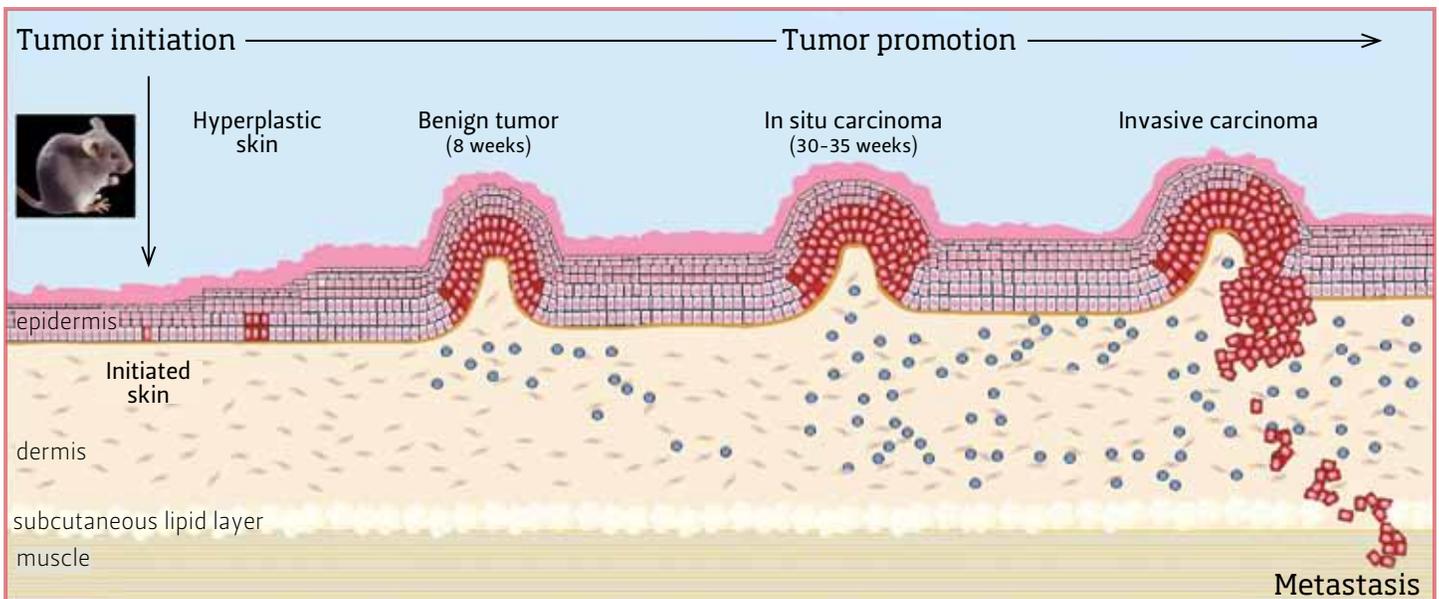
they used cell cultures from both human samples as well as animal models that carry a mutation in a gene called *Cdk4*, an inherited predisposition to melanoma that has turned up in families in Norway, France, Australia and England.

Their studies, funded by the National Institutes of Health, have found that a protein called RXR-alpha in skin keratinocytes appears to protect pigment cells from damage and to prevent them from progressing to invasive melanoma. This protein co-operates with *Cdk4* and suppresses the release of chemical signals to adjacent pigment cells. These signals can, in effect, promote and augment the abnormal proliferation of pigment-producing cells in laboratory mice. Not surprisingly, when the protein is removed or repressed, melanoma cells become aggressive and invade the animals' lymph nodes.

However, the Indras caution, both the protective protein and pigment cells can suffer damage from chemical toxins or ultraviolet sunlight exposure in the skin cells, creating a "double-edged sword" in melanoma's complex etiology.

The Indras' findings could lead to promising new prevention tools down the road. The scientists plan to use their unique animal models to screen for novel natural compounds with anti-proliferative activity on cancer cells in collaboration with other medicinal chemists in the college.

"Better understanding this process will help us design new and novel strategies for prevention and, possibly, a cure," Arup says. "This could be a predictive prognostic tool for discovering melanoma predisposition in humans. And that could lead to better and earlier diagnostics." **terra**



Skin cancer cells proliferate in this model that shows stages of the disease. Specific mutations (red cells) slowly expand and multiply to give rise to benign tumors in the epidermis or in melanocytes. Eventually, they can develop to become squamous carcinoma or melanoma and metastasize to other organs (lymph nodes, brain or lung).

To understand the mechanisms underlying promotion and progression of melanoma and non-melanoma skin cancer, researchers mimic the entire process in an animal model (for example, in mice). They use a tumor initiator followed by applications of agents that induce tumor formation, promotion and progression to invasive carcinoma. Inflammatory cells that promote tumor development are shown as blue dots. (Illustration: Indra laboratory)



Polar Plunge

Fur coats may not be enough for Weddell Seals

BY DYLAN MCDOWELL [Editor's note: Dylan McDowell is an undergraduate in the Department of Fisheries and Wildlife]



In 2007, Horning's research team studied Weddell seals in Antarctica. Here, they leave a seal to recover while they remove equipment before the ice melts. (Photo: Markus Horning. Research Permits NMFS #1034-1854; ACA #2007-007)

WITH ICE COVERAGE SHRINKING IN the Arctic and parts of the Antarctic, scientists are scrambling to predict future consequences. But one Oregon State University scientist isn't as concerned with the ice itself as with the animals that use it to rest. Markus Horning, pinniped ecologist for the Marine Mammal Institute, will venture to the Antarctic in October to study Weddell seals (*Leptonychotes weddellii*), the southernmost mammals on the planet.

Horning and his colleagues Jo-Ann Melish and Allyson Hindle of the Alaska Sea Life Center want to know how these animals regulate body temperature and how they might fare in an environment with less ice. Weddell seals seem ideally adapted for polar seas. They sport a thin fur coat over thick layers of body fat, can exceed 1,200 pounds and dive for an hour or more to a depth of 2,000 feet.

"Although this might not be the biggest consequence of climate change, certainly the cost of spending more time in the water rather than hauled out on the ice might be important," Horning said as he greased his boots in preparation for his upcoming expedition in his office at OSU's Hatfield Marine Science Center in Newport. "We don't have any idea what the cost might be."

Past studies have attempted to model thermal regulation (the cost to an animal of keeping warm in a cold environment) in pinnipeds (seals, sea lions and walrus), but many of these estimates have been based on assumptions. It is difficult to collect energetic data on animals that dive long and deep under the polar sea ice. Now, with support from the National Science Foundation, Horning, an associate professor of fisheries and wildlife, is collaborating with a company called Wildlife Computers to take

another crack at analyzing the seals' swim speed, body temperature and heat loss.

This team has worked with Weddell seals in the past, but this time new equipment may enable them to collect more information. They will place custom-built data recording devices (heat flux data loggers) on the animals to record the amount of heat lost to the environment. They will combine those data with the temperature and flow speed of the water, and with data on internal heat production by the animal, to measure the cost of thermal regulation.

"Surprisingly, that type of work has never been done on any kind of pinniped really swimming in cold waters under any kind of conditions," Horning says. "And that is kind of a big knowledge gap, because a lot of estimations of the impact of climate change on ice seals are based on what we call an individual-based energetics model. So you kind of model all of the costs associated with the different activities in the life of a seal; then you can see how that might change if certain environmental conditions change."

October heralds spring time and months of continuous sunlight in Antarctica. Horning's team will watch the last sunset soon after arriving. Average temperatures will gradually increase to a point where Horning gladly welcomes the occasional day above freezing as he bundles up in warm clothing and treks across a disappearing world.

➤ **Online:** Read updates about the Weddell seal thermoregulation project from Mee-ya Monnin, an undergraduate working in the Horning lab, at blogs.oregonstate.edu/hailingfrozenthoughts/.



What's in a Name?

In a new college of public health, community partnerships are key

BY TAMMY BRAY, DEAN, COLLEGE OF PUBLIC HEALTH AND HUMAN SCIENCES



IN “ROMEO AND JULIET” SHAKESPEARE famously penned, “What’s in a name?” I’ve been asked that many times since our college changed its name in July. It may not have meant much to Juliet in the case of her beloved, but for the College of Public Health and Human Sciences, it speaks to the very essence of who we are.

Just what is public health? And why are we moving toward becoming an accredited college of public health? My explanation usually starts where all great stories do – at the beginning.

Long before national health-care reform came into the spotlight, students and faculty in our college and at OSU were solving Oregon’s health challenges. One-third of deaths are attributed to poor eating, lack of physical activity and tobacco use. More than 75 percent of our health-care spending is on people with chronic conditions, especially in our aging population. The good news is that the majority of these chronic diseases, such as heart disease, cancer, obesity and diabetes, are preventable.

That’s where we come in. Inspired by our land grant mission and the university’s strategic focus on improving human health and wellness, our college is changing its name to reflect our continued evolution and deep-rooted strengths and commitment to ensuring lifelong health and well-being for every person, every family and every community in Oregon and beyond. In short, we are transforming our college to respond to the public health challenges of the 21st century.

And what is public health? It is most simply defined as organized community efforts to protect, preserve and promote health and prevent disease, disability and death. It’s a definition that has evolved and continues to evolve as we focus not only

Tammy Bray, dean of the College of Public Health and Human Sciences, and Carmen Wong, right, study links among diet, immunity and diabetes. (Photo courtesy of the College of Public Health and Human Sciences)

on prolonging life, but also improving its quality. On not only protecting health, but also promoting it. It’s about more than individuals; it’s about local and global communities.

Because public health is a community effort, a particularly innovative approach at OSU is the collaboration and partnerships formed through a program known as Outreach Collaboratives for a Healthy Oregon, or OCHO. OCHO ties our campus to every corner of the state, forging successful partnerships between county Extension offices and health departments for public health and human sciences practice improvement. We believe that community engagement is paramount to a successful public health solution and that outreach begins with the answer; engagement ends with one. That philosophy also guides the mission of our new Hallie Ford Center for Healthy Children and Families.

In fact, our new name reflects the college’s synergy of teaching, research and outreach – instrumental to our role as a land grant institution and part and parcel of the university’s strategic plan for improving health and the college’s “Healthy People” partnership with the colleges of pharmacy and veterinary medicine.

Most importantly, we are becoming an accredited college of public health because we have a responsibility and privilege to shape the country and our world, creating lifelong health and well-being for every person, every family, every community.



Testing Our Metal

Research sharpens manufacturing's competitive edge

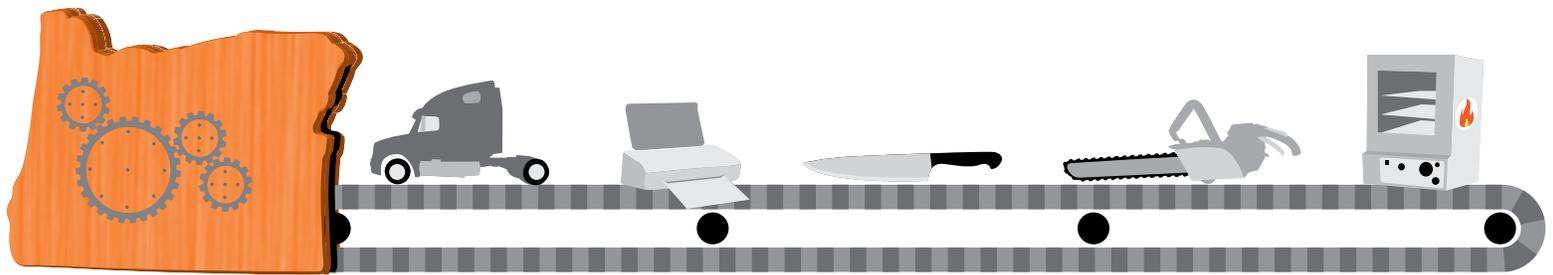
THINK OF OREGON: MAJESTIC MT. Hood, towering Cascade forests and Crater Lake. But aluminum baseball bats, jet engine parts and chain saws? They and other products of the state's metal products industry — truck bodies, custom metal alloys, bridges and high-end kitchen knives — are as Oregon as hazelnuts. In 1998, the industry included more than 1,700 companies accounting for about 55,000 jobs with an average salary of \$35,000 (Source: Public Affairs Counsel).

And for more than 20 years, engineers, metallurgists and computer modelers at Oregon State and Portland State universities have been working with companies such as Wah-Chang, Precision Castparts, Benchmade, Boeing, Intel and Daimler Trucks

to sharpen their competitive edge. Their game plan is a program created in 1990 by the State Legislature: the Oregon Metals Initiative.

John Parmigiani, research assistant professor in the College of Engineering, represents OSU on the OMI board of directors. He says that since 2007, OSU researchers have conducted more than \$2 million in projects with funding shared equally by industry and the legislature. The benefits include new knowledge for industry and real-world experience (and full-time jobs) for students.

These five projects are among those that are shaping the Oregon economy.



COMPANY: DAIMLER TRUCKS NORTH AMERICA, Portland
Project: Effective composites to replace metals
Goal: Reduce vehicle weight to create more fuel-efficient trucks and tractors

COMPANY: HEWLETT PACKARD, Corvallis
Project: Materials for high-performance actuator applications
Goal: Develop thin-film piezoelectric material (exerts a force by changing shape in response to an electric current)

COMPANY: BENCHMADE, Oregon City
Project: Blade steel alloy formation
Goal: Determine how different metal alloys perform in cutting experiments

COMPANY: BLOUNT MANUFACTURING, Portland
Project: Self-contained cutting-fluid system for concrete- and metal-cutting chain saws
Goal: Increase saw portability by designing an internal lubrication system



Find more technology success stories at the Partnering with Industry website: oregonstate.edu/research/partnering/.

COMPANY: SHELDON MANUFACTURING, Cornelius
Project: Humidity and Temperature Control of Thermal Chambers
Goal: Add features to an incubator and vacuum oven

The Teapot Song has universal appeal. Bryan Tilt used it to teach English to students during his visits to Futian, a small village in rural China. Drawn by emerging tensions over industrial development, the OSU anthropologist was interviewing workers and townspeople to understand how they balanced pollution and prosperity. See "Rice Paddy People," Page 20, (Photo: Jenna Tilt)

