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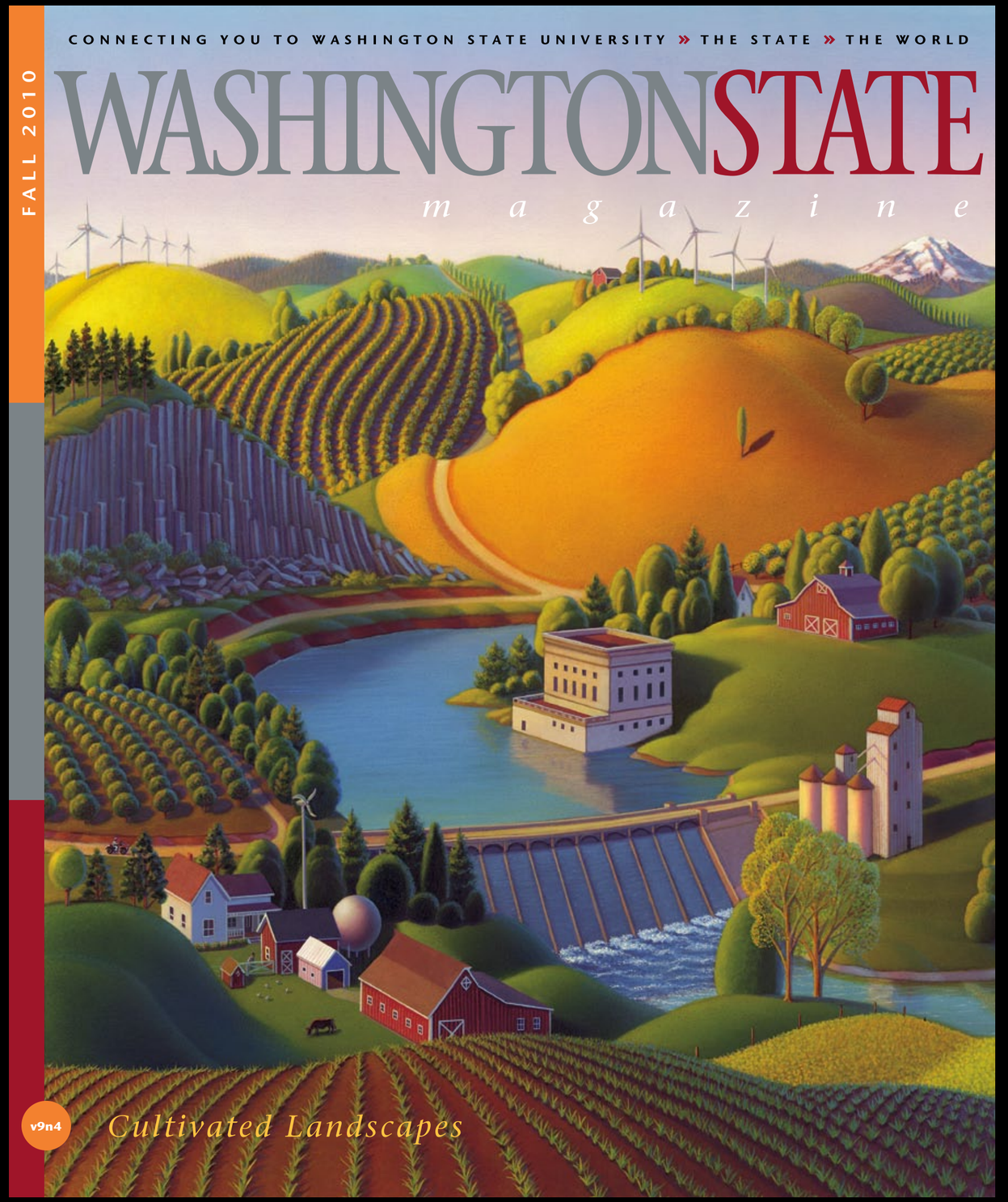

v9n4

Cultivated Landscapes

WASHINGTON STATE
magazine

FEATURES

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TRACKING

Cover illustration: *Stone City West* by Robin Moline.

WASHINGTON STATE UNIVERSITY

first words

The Cultivated Landscape :: One place you *must* add to your "must-visit-before-I-die" list is the Wenatchee Valley during full bloom of the pear and apple orchards in late April. Perhaps you've seen Van Gogh's lovely, but not often reproduced, painting "The Pink Orchard." It's very simple, a small orchard in bloom. But it's *so* simple and lovely it will make you cry with desire. Now imagine it juxtaposed with one of those sublime Western landscapes by Bierstadt. Impossible? Of course. But keep trying. Imagine these vast orchards, all in bloom. And behind them loom the magnificent Cascades, still etched with late spring snow. Once you have it in focus, you're looking at the sublimely perfect juxtaposition of the natural and the agricultural.

There are other such places as well.

A newly harvested potato field in northern Ukraine, bathed in warm October light, bordered by not quite familiar hardwoods, Ukrainian species of oak and maple, the onion dome of an Orthodox church hovering on the horizon.

The gently rolling mixed pasture, apple orchard, and woods, interspersed with half-timbered houses and brown and white Norman cows, the hedgerow-lined narrow roads of the *bocage* region of Normandy.

An Indiana bottomland hayfield on a mid-summer evening, the windrows curving gently into the shadows of honey locust and box elder that separate the field from the river, the intoxicating scent of fresh-mown hay permeating the humid evening air, a bouquet as integral to the landscape as the light of dusk.

And another landscape, more recent, added to memory. The precise geometry of the parallel rows and the deep blue green of Walla Walla Sweet Onion fields have always attracted my fancy. But now that I have visited with some of the onion farmers, now that I know some of the crop's history, of its Italian immigrant growers, the landscape now instills a much deeper aesthetic in my mind.

It may be true, as evolutionary psychologists suggest, that the African savannah prompts an ancient love, that all of us carry an archetypal memory of that open landscape's appeal. But I believe the most beautiful landscape is one that blends the cultivated with the natural.

Even monoculture holds a certain beauty, at least if framed against, say, the low forested mountains of the eastern Palouse—though endless miles of winter wheat depend to a large extent on the play of light and wind for their aesthetic appeal.

More beautiful—and I realize I'm entering an entirely subjective realm—are the locally consumable, the diverse, the old. Landscape that clearly defines the region, its food, its history, its culture. Cows grazing on an impossibly steep pasture in the Alps. Ancient rice paddies on the plains south of Bangkok. The old farm orchards of the upper Midwest.

It must be either age or appetite, with their irksome intimations of mortality, that drives one to seek meaning amongst the levels of landscape, to imagine, with deep satisfaction, one's place when landscape, culture, history, food, all blend into one. But perhaps that is simply the definition, the emotion, of home.

Tim Steury, Editor

v9n4 FALL 2010

WASHINGTON STATE magazine

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Growing Partnerships. Building a Stronger Washington State.

WASHINGTON STATE UNIVERSITY

Office of the President

August 2010

Dear Alumni and Friends:

A little more than three years ago, I returned to Washington as president of Washington State University. For me, one major attraction of WSU was its long-standing commitment to its land-grant mission—extension and agricultural research.

Sitting in my office in Pullman, I have a sense of the impact that our university has across our state. However, the only way for me truly to understand and experience the difference that WSU is making in people's lives is to hit the road.

So, this spring and early summer, I visited counties in every region of Washington as part of our Community Engagement effort. By the end of 2010, I plan to have stopped in all 39 of Washington's counties.

On the visits, I meet with the staff at WSU Extension offices. I talk with business, education, and community leaders. And, at open forums, I meet Cougar alumni and friends and update them on our progress as a university.

It is a considerable time commitment. I can assure you, though, that every minute is worth it.

On these trips, we hear from small farmers who are energizing local sustainable farming efforts with the help of WSU agricultural researchers and extension agents. We hear from young people who tell how 4-H has helped give them direction and self-confidence. We hear from people in some of Washington's most economically hard-hit counties who appreciate WSU's grass-roots efforts to help diversify their economies and develop community leaders.

The stories are inspiring. They provide me with first-hand knowledge of what WSU is doing and needs to do to fuel our state's economic rebirth. I also hope that the people we meet come away with the sense that WSU cares about their community. We're building relationships, building partnerships, and, in the process, we believe we are building a better Washington.

People in those same communities, of course, send their daughters and sons to WSU; over 85 percent of our students come from the state of Washington. Fall is upon us, and that means a new group will be joining the Cougar family. Even in the face of economic uncertainties, we continue to experience high demand for a WSU education.

As I meet our new students, I am always struck by their sense of optimism and infinite possibility.

Whether I am at town halls in Port Angeles, Stevenson, Colfax, or Yakima, or on our campuses in Pullman, Spokane, Tri-Cities, or Vancouver, the message I hear is similar. People are counting on WSU to help them make their lives better.

My message to them? We are not going to let you down.

Warm regards,

Elson S. Floyd, Ph.D.
President

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Imagine a future where farms routinely collect carbon dioxide in the soil to help deflate the greenhouse effect. Research at WSU is helping us reach that goal. In fact, the University is a leader in organic and sustainable agriculture research, steering us away from unhealthy overdependence on chemical use in food production. Not only that, WSU was the first in the nation to offer an organic agriculture major.

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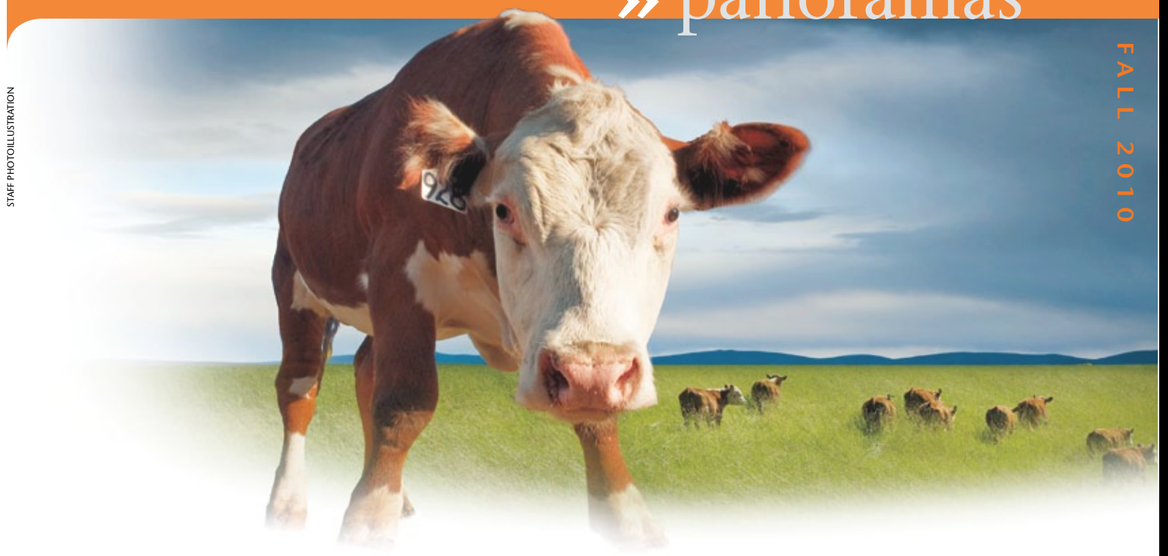


STAFF PHOTO/ILLUSTRATION

Cows deposit piles of diversity

by Tim Steury :: Holly Ferguson knows her cow pies about as well as anyone. In the first study of flies in managed pastures in the Pacific Northwest, the entomologist has spent an unusual amount of time traveling the state and assessing its cow pies.

No matter the obvious jokes, dung dispersal in pastures is serious business. Wherever there are cows, there will be cow dung, and lots of it. A beef cow can produce nearly a ton of manure per month. And if that ton sits there untended, there will be problems.

Oddly enough, the conditions of the cow's other major habitat, the feedlot, reduce the problem of dung dispersal, at least from one perspective. The constant crowded trampling of the feedlot cows eliminates the pasture's particular dung problems.

Unattended cow pies in a pasture are a rich breeding ground for cow pests and parasites. Also, rather than fertilize the pasture as it would once it broke down, the inert dung is actually toxic to the pasture and stops grass from growing.

Fortunately, the cow pie in its natural state is generally, and eagerly, consumed by a wide number of insects, including the appropriately named dung beetle and any number of Diptera, or true fly, species. (Tidying pastures is such a priority that Texas, for one, imports dung beetles from Africa.)

And so, with various cohorts, Ferguson set out to address a widespread concern about the effect of parasiticides on the cow pie ecosystem.

If the researchers could come up with a solid recommendation regarding the use of parasiticides in pastured cattle, went the rationale, the logical outcome would be healthier pasture ecosystems.

Part of this story resides on a large cattle ranch in Hawaii. WSU entomologist Laura Corley Lavine is interested in dung fauna, the creatures that inhabit the pie, particularly beetles.

She is also interested in whether the dung beetles have any effect on pest species and has conducted research on the Kahua Ranch on the big island. Realizing the importance of cow dung dispersal, Tim Richards '84 DVM, a family partner in the ranch, had observed the negative effect of parasiticides in the ranch's cattle on the resident dung beetles and so had established a special formulation for the ranch's cattle.

Hawaii has no native dung beetles, so it had imported them from Africa and Mexico.

Because of Richards's care, says Corley Lavine, the Kahua Ranch has a "fabulous" population of beetles. "He has no manure in his pastures, the beetles get rid of it so quickly."

However, says Corley Lavine, in Prosser, where Ferguson is stationed at the Irrigated Agriculture Research and Extension Center, they tried the formulation advocated by Richards and found no difference in the effect on beetle populations.

"Ranchers around here," she says, "(if you) tell them you work on dung beetles, they say,

'Oh we used to have great dung beetles, but now they're all gone.'"

Unfortunately, there is no baseline study of beetle populations in the Intermountain West. Also, points out WSU entomologist Rich Zack, there never were many native dung beetles in the area. The more common ones are actually European.

Regardless of origin, and to make a long story short, the researchers were hoping for

Above: WSU entomologist Holly Ferguson. *Photo Robert Hubner.* ***Below:*** Horn flies. *Courtesy United States Department of Agriculture.*

more conclusive advice regarding parasiticides. "We were hoping to say if you do this, you'll have more beetles," says Corley Lavine, which was the case in Hawaii and also in a North Carolina study. But here, in the Intermountain West, scientists could offer no recommendation, because of a surprising finding.

Work by graduate student Dan Skoczylas, who did his thesis on the effect of parasiticides on dung beetles, found no effect at all.

But what Ferguson did find in her survey of statewide pastures was another surprise—an incredible insect diversity in the cow pies. She and her fellow researchers decided to focus on Diptera as a diversity indicator. In her visits to 17 ranches in eight counties, both east side and west side, Ferguson found 47 dipteran families. Not species, but Family, the inclusive biological rank between Order and Genus. The only species identifications in the project were the pest species. And the rest? As they say in the business, more study is needed.

The pests to cattle are primarily face flies and horn flies. Adults of both species lay eggs on the fresh dung. Face flies can reduce weight gain in beef cattle and milk production in dairy cows. They are a vector, or carrier, for pinkeye, an eye infection that can lead to blindness.

The bloodfeeding by horn flies can irritate cattle to the point where they stop feeding, reducing weight gain and milk production.

Aside from some other, less noxious pests, says Ferguson, most of the dipteran species living off cow dung are beneficial, preying on the pests and also aiding in the degradation of the cow pie. That degradation is, in fact, a fine balance between maintaining adequate habitat for the beneficials and ensuring that the pies do not provide too good a habitat for the pests.

Interestingly, the study found greater diversity in pastures east of the Cascades. Although west-side pastures get more rainfall and would seem to encourage higher biodiversity, the habitat of east-side pastures is actually more varied. Not only do they contain the normal dry shrub-steppe, but they are often irrigated or have streams flowing through them, offering a broad habitat range.

Recruiting rural health care providers

by Larry Clark '94 :: On the quirky comedy *Northern Exposure*, an isolated Alaskan town enticed a New York City doctor to become the community's physician. While the city doc's angst and the eccentric residents—including a moose from WSU—drew laughs, the show highlighted a real challenge faced by many small towns and rural areas: recruiting and retaining doctors and nurses.

"There's a shortage of all health care providers: physicians, nurses, all of the technical programs," says Gary Smith, a senior project associate with the Area Health Education Center (AHEC) of eastern Washington. "The demand will increase even more when the economy turns around and people want to retire."

AHEC, a division of WSU Extension that works on outreach with the health science programs at WSU Spokane, helps recruit health care providers for rural and underserved populations.

Their mission is increasingly critical. A 2008 University of Missouri study estimated a shortage of 44,000 general practitioners in less than 20 years, a crisis that hits rural areas even harder with their aging population and difficulties in drawing in new health care workers.

In 2005, there were 55 primary care physicians per 100,000 persons in rural areas, compared with 72 in urban areas, according to Mark Doescher, a doctor and director of the University of Washington's rural health research unit. For registered nurses, the projected number of vacancies eclipses available RNs by 2020.

"It used to be that you had a primary care practitioner, and then you had a general surgeon, and that was kind of the delivery that happened in the rural areas," says AHEC project associate Bettie Rundlett. "You don't even have the general surgeons as much anymore."

Over the last 20 years, the number of health care students in the United States choosing primary care careers in rural areas has declined precipitously due to a number of factors: lower compensation for primary care, professional isolation, limited time off, less specialty support (especially for mental health services), and lack of respect and prestige among peers.

"I think there's a perception sometimes that the health care you receive in a small community

Schoolchildren are encouraged to imagine themselves in health care jobs. *Photo AHEC Eastern Washington*

isn't on a par with a bigger city. That's absolutely not true from my perspective. A family practice doc who's out in Grand Coulee or Republic has to deal with everything," says Rundlett.

AHEC project associate Bonnie Wagner identifies the further challenges of the spouse's employment and education of their children. "Not only are we asking physicians to go to these rural, isolated, pocketed areas, but we're also asking them to bring their families," says Wagner.

Changing demographics in rural Washington add cultural and linguistic challenges to recruitment of doctors and nurses. Despite very good clinical outcomes in rural hospitals, there are still huge health disparities documented within increasing Latino and other ethnically diverse populations.

Rundlett says, "If they don't have a provider from their same population, they're less likely to go. That's one of the things that we try to work on, talking to students from an ethnic minority background to get them better represented in the health care workforce."

To recruit doctors, nurses, and other health care professionals to rural areas, AHEC's staff—with state agencies, WSU and other universities, and the communities themselves—use several innovative programs.

Smith says three things are most important in recruiting to rural areas: if the individual is born and raised in a rural community, if any of the practitioners in their internships or residencies spent time in a rural community, and if the community helps to fund some of the education.

One program that covers all three factors enables health care workers to pursue an associate degree in nursing in their home communities. Rural Outreach Nursing Program students study through a combination of distance education and on-site clinical educators, while their employer pays for some of their education. The program started in 2009 with plans to expand to Davenport, Grand Coulee, and other communities.

Educating students from elementary school and up about health care job possibilities is crucial. "Health care is competing against manufacturing and other industries that require less education and get folks into the workforce sooner for a lot of times the same pay," says Wagner. Project Hope, an education program specifically aimed at Latino and other underserved populations, offers paid high school internships in clinics or hospitals in students' own communities.

Federal health care reforms also factor into recruitment for rural areas. In the legislation, primary care receives a higher Medicare and Medicaid reimbursement rate for a few years. The reforms also boost the National Health Service Corps, a loan repayment program for health care providers who agree to work in underserved and rural areas.

The *Northern Exposure* town—played by Roslyn, Washington—drew in its doctor with a loan repayment program, but he grew to love the place. The exposure to the benefits of practice in a rural area can also help retain doctors and nurses. As Smith says, "Getting people out there is the biggest recruitment. Communities have to look good."

A measure of time and history

by Hannelore Sudermann :: Matthew Cohen started wondering if what he knew of Renaissance architecture was true when he stepped into the San Lorenzo Basilica in Florence with a measuring tape.

The Italian city, known as the birthplace of the Renaissance, is home to many of the great works of Filippo Brunelleschi, perhaps the foremost engineer and architect of the period. And San Lorenzo has been studied by generations of architects and historians as one of the earliest examples of Renaissance perfection.

"It is one of the most famous buildings in the world," says Cohen, an architecture instructor at WSU Spokane. He first encountered the church when he was a graduate student visiting Italy. He had been asked by his professor to present a seminar on the Basilica of San Lorenzo. Construction on the church had been started in 1419, on the site of a Romanesque-style church from 1060. The new building, which was funded by the de Medici family, was built right at the threshold of the Renaissance.

Cohen had read about the structure and its proportions—its symmetry and geometry. "I just wasn't convinced," he says. So he took the tape measure to the church and, with the tourists around him, recorded a few measurements.

His hands-on examination suggested the layout was not on a perfect grid, which is the lecture he provided his classmates, much to the chagrin of his professor.

Cohen went on to study architecture at Harvard and Leiden University and then to teaching. All the while, he remembered his experience at San Lorenzo. One of his Harvard professors, a Renaissance expert, encouraged him to continue his inquiry. With a grant in hand, he moved to Italy for a year and set about getting more measurements at both San Lorenzo and its sister structure Santo Spirito, which Brunelleschi designed in 1436.

"I found they had never been fully measured before," he says. Most of what's written about the two buildings is based on documents and plans, not on the actual completed structure, he says. "I wanted to measure every column."

Above: Matt Cohen studies architecture up close in Florence.
Right: Columns in the church of Santo Spirito. *Courtesy Matt Cohen*

He convinced the Italian antiquities office that his research was important enough for him to be allowed to work inside the churches. "It was great timing because the Italians were just beginning a major conservation treatment of the building (San Lorenzo)."

Instead of satisfying his curiosity, the inspection caused him to wonder all the more. "I figured there would be a few irregularities here and there," he says. "I didn't expect so many." The bays, which from the ground looked identical, were quite different up close. He also noticed the quality was inconsistent in design and execution.

Cohen realized the irregularities contained historical information. "I was conducting above-ground archeology." Not only above ground, but often high, high in the rafters. Looking at the columns of San Lorenzo, for example, he found the most irregular measurements corresponded to the second phase of the church's construction. "It appears that they were rushing to complete the building."

Cosimo de Medici, who was funding the project, was running out of money and time. "He pushed to rush work done on the church, knowing he didn't have much longer to live and that the new basilica was crucial to keeping the memories of the Medici family and its influences alive," says Cohen. Tense personal dramas, harried construction management, and the errors of anonymous masons rushing to meet a deadline, "are written into the stones," says Cohen.

Then he turned to Santo Spirito, which Brunelleschi designed and which was built at a more leisurely pace years later, for a comparison. Getting permission to assemble scaffolding in there proved more difficult. "I found a scaffolding company, got my own insurance, and on the side I had to get the permission of the priests in charge of the church," he says. But even that wasn't enough. He still had to have the approval of the sacristan, who maintained the church. At first the man was dismissive. "But then one day his attitude changed," says Cohen. "He proposed a deal." On top of all the tall columns were light bulbs that had been burned out since the 1970s. "So we made a deal: If I put up the scaffolding, I would change the light bulbs for him."

Cohen realized he had a rare privilege. Millions of people had been on the floors of these churches, but hardly anyone had been up high since the time they were built. "When you get up there, the capitals are much bigger and much more detailed than you would imagine," says Cohen. He saw ancient iron hooks from which banners were hung, masons' tool marks, and little pyramids of dust collected over the centuries.

He also found that his measurements didn't fit the written descriptions, particularly with San Lorenzo. "The text says the proportions are a certain way, and they're not that way," says Cohen. "So what kind of proportional system was used? And how could historians have gotten it so wrong for so long?"

The architect started working out the mathematics. He took his measurements in centimeters, and then translated them to the *braccio*, a measure of length used in architecture centuries ago, the length of a forearm from elbow to fingertip, about 58.36 centimeters. He converted his measurements, and "that's the part where you start getting tingles down your spine," he says. "Numbers started appearing. Patterns started emerging." The ratio of one to the square root of 2 was everywhere.

It was in the distance between the plinths of the columns, the distance between the farther edges of the same plinths. It was also in the nave arcade bays. He also ran into Boëthian number

theory—a pattern explained by 6th century philosopher Boëthius in Rome and "a fundamental part of the intellectual framework underlying the medieval world view," according to Cohen. The number theory had prominence in medieval times, but was rarely used in the Renaissance or the centuries that followed.

"Why did they use these proportional systems," he wonders. "Why bother?"

He found plans and numbers connected to San Lorenzo that dated to 1418, before Brunelleschi was hired to the job. That begged perhaps his biggest and most controversial question: Was this church designed by Brunelleschi or wasn't it? "I'm challenging one of the fundamental assumptions of architecture history," he says.

Cohen believes the evidence shows that Matteo Dolfini, the original architect on the project, set the stage for San Lorenzo's structure. "My theory is that he designed the proportional system," says Cohen. "Brunelleschi took it from there."

So now Cohen is not only out to question the common theory about the architecture of a single church in Florence, he's questioning how historical architecture is studied worldwide.

:: *continued page 18*

Above: A student-athlete in the renovated weight room. *Below*: Former football coach Jim Walden. *Photos Robert Hubner*

by Jason Krump :: Early one afternoon in June, former head football coach Jim Walden drops by the newly-renovated WSU Athletics weight room to check in on the project.

Just a few students are working out. However, Walden observes, the relative tranquility belies how active the room usually is in the fall when scores of athletes from a variety of sports are in for training.

When he ran the football program between 1978 and 1986, getting his team quality time in the weight room was a regular challenge. "Having coached my entire career, and college especially, time is of the importance to athletes," said Walden. "They spend so much time practicing, lifting weights, they've got to go to class, and they have to spend time studying."

Back when he was coaching, the weight room was one of the most congested areas on campus as students waited for turns with free weights and exercise bicycles. "What a football player is coming in here to do is totally different than what a women's basketball player wants to do," he says. And it all takes time. "When men and women athletes go into a weight room at 2:00, they don't want to be in there until 4:15 to get done with a 45-minute workout," he says.

In 1997, WSU took a step to streamlining the training process when it completed an addition to Bohler Gym. With two floors covering 14,000 square feet, more weight stations and more equipment were added to the facility. And then, this summer, thanks to fundraising, it was improved even more.

It's still the bright and open space with a two-story window and a balcony of exercise equipment that perches over the main room. But the previous weight room layout featured eight stations each for squat press and Olympic-style lifting, and 12 for bench press. Now, after the

renovation, there are 24 racks for each of the three powerlifts, and there are new sets of solid rubber weights for each rack. A set of TR straps, a new suspension training system of nylon straps that allows athletes to use their own weight to do a range of exercises, is also installed at each station.

Despite the presence of more equipment, the layout has been altered to open things up and allow more space for athletes to move around. "We can safely and effectively train up to six teams at one time and up to 130 athletes on the first floor alone," says David Lang, director of strength and conditioning.

All 450-some students in athletic programs at WSU can use the enhanced stations to better design their workouts to the demands of their sports. "The student-athletes are able to complete an entire strength training workout without ever leaving a rack," says Lang.

The new setup is better for everyone, says football coach Paul Wulff, who played center for the Cougars from 1986 to 1989. Instead of working the players out over a six-hour period, the coaches can work them out over three hours. "Our weight room allows for better communication," he says. "Now the players face each other, and our coaches can see things better."

The new spaces and machines are not only key to recruiting, but crucial to helping the students do their best when they're here, says Bill Moos, WSU's newly-hired athletic director who spent some of his own time as an offensive lineman for the Cougars in the '70s.

In his day there was nothing like the hydrotherapy complex, which sits between the Hollingbery Fieldhouse and the Mooberry track. The resource, which opened in 2008, features an underwater treadmill where an injured athlete can submerge up to his or her shoulders and get a cardiovascular workout without putting much stress on an injury. The space also has a cold plunge and a warm therapy pool. It not only helps athletes rehabilitate, it also enhances their overall training efforts.

Among other surprises scattered around campus is an indoor rowing facility for the women's crew team. With two pools, each just wide enough to accommodate the length of an oar and long enough to fit a line of eight, the coach can get up close to the athletes and keep an eye on their form and technique. The $1.2 million project was completed in 2009.

Up north is the indoor batting cage, which can be set up to throw specific pitches or turned to a random setting. The cage is also equipped to tape the players so they can practice their swing, videotape it, and refine their technique.

Part of having the best teams is having the best equipment, says the athletic director. "We need to constantly be upgrading our facilities because our colleagues in the conference are doing so," says Moos. "We need to lead the way, to be innovative, and to provide first-class facilities for our first-class student-athletes."

It's all a long way from the free weights and exercise bikes of Walden and Wulff's day. Everything is more efficient, says Wulff, from having the right tool to work a precise set of muscles to knowing exactly what to eat to improve performance: "There are just so many more things available there than when I was playing."

For video of the weight room in action visit wsm.wsu.edu.

Below: Athletes from football and men's and women's basketball train along side the volleyball team. *Photos Robert Hubner*

REMEMBERING HIS EXPERIENCES as a coach motivated Jim Walden to contribute to a project to update the workout space in Bohler Gym. Rather than make a direct contribution, though, Walden came up with the Make Jim Pay challenge. For every $5 donated, Walden contributes $1, up to $200,000. "My impact was to try and get this place bigger and provide more opportunity for athletes to spend less time doing exactly what they need to do," Walden said.

He also hopes the effort will strengthen connections between former athletes and sports fans with the current program. "I did want to encourage more former athletes to give," Walden says. "The University gave you a college education; they gave you an opportunity to play in front of big crowds; they gave you an opportunity to cry, hurt, to bleed. And they gave you an opportunity to spend time with some great people that you'll remember the rest of your life. If that's not worth the payback, then I don't know what is."

ROBERT HUBNER

PAUL CASTOLDI

Walla Walla Sweets

by Tim Steury :: photos Chris Anderson

WHEN RETIRED FRENCH SOLDIER PETE PIERI settled in Walla Walla around the turn of the 20th century, he planted onion seed he had brought from Corsica. His new neighbors, Italian gardeners who had settled there earlier, admired the ability of the onion to winter over in the ground, which gave it a good size for an early summer harvest. The bonus, notes Walla Walla horticultural historian Joe Locati, was its mild flavor. The Italians called it the "French onion" (though it was actually Italian), and by 1910, it was about the only summer onion grown in the area.

In late May this year, Paul Castoldi and I admire his field of the French onions, now called Walla Walla Sweets, which he will begin harvesting in less than a month.

Castoldi '83, a descendant, like Locati, of one of the first Italian families to start farming around Walla Walla, farms with his brother Bob and nephew Nathan. This year they have about 26 acres of Walla Walla Sweets. They also grow hybrid sweet and red onions as well as other vegetables.

In spite of the onion's wide name recognition, nationally as well as throughout the Northwest, Walla Walla Sweets are grown by only about 30 farmers on fewer than a thousand acres within a 15-mile radius of the spot where Pieri originally planted his seed. Even so, a thousand acres can produce a lot of onions. In a really good year, says Castoldi, you can get 700-800 50-pound bags of onions per acre.

Growing Walla Walla Sweets is not something you just jump into. The timing and observation required for correct planting and subsequent crop maintenance are not things you get from an instruction manual. Onions require a lot of hand labor, including at least one, sometimes two, hand-weedings. Although storage onions can be harvested by machine, Walla Walla Sweets are too soft and, except for the tractor-assisted "lifting," must be harvested by hand.

Spring onions are vulnerable to onion thrips, which carry a virus that can stunt the crop. Overwintering onions are susceptible to fungal disease. The cool, wet weather the area experienced in May can lead to gray mold or white rot.

Locati, in his excellent *Horticultural Heritage of Walla Walla County: 1818-1977*, writes about the arrival of white rot. Locati was a state inspector in 1959 and noticed a "burned-out circle" in one of his neighbor's onion fields. After pulling up a few onions, he found white mold and embedded *sclerotia*, the fungus seeds. "The dreaded white rot was here!"

Locati worked with WSU Extension plant pathologists Marion Harris, Seth Locke, and Otis Maloy, and agriculture dean Louis Madsen and others to contain the white rot. Eventually, they developed different cultural and chemical practices to check the disease—though once in a field there's no getting rid of white rot altogether.

A few miles out of town on the highway to Lowden, Terry Bergevin, who attended WSU in the 1960s, is one of the rare growers whose roots do not go back to the first Italian gardener families. He grows anywhere from 20 to 80 acres of onions, "depending on how we feel about it," he says. Onions figure only about 10 percent of his production, which also includes asparagus, grain, garbanzo beans, canola, and some soybeans this year for the first time.

Bergevin has been growing onions for about 30 years. One of the biggest changes he's seen over the years has been in the marketing and distribution of Walla Walla Sweets.

"Twenty-five years ago, when they packed them, they owned them," he says, referring to the transfer of the onions from field to packinghouse. "Then somebody got ingenious and decided they'd become custom packers. Now basically you own them all the way," shifting the brunt of the risk to the growers.

Within that framework, Bergevin plans his crop for a quick harvest turnaround. Castoldi, who markets much of his crop directly, aims to spread the harvest as long as possible, using different strains of the sweet onions to stretch the season from mid-May to mid-September.

"Each family would select their own seed, have their own variety," he says of the local tradition. "My dad and uncle started selecting, especially for a super early variety." That May morning, he had been harvesting early spring salad onions.

Other regions of the country might boast their own sweet onions, but never Walla Walla Sweets. Under a federal marketing order established in 1995, Walla Walla Sweets can be grown only within the Walla Walla Valley, north to the Tucannon River and south just into Oregon. Anyone outside that area can grow Walla Walla Sweet seed, but they can't use the name. Still, some unscrupulous vendors will try to pass off other onions as Walla Walla Sweets. When reports of pretenders come in to the Walla Walla Sweet Onion Marketing Committee office, executive director Kathy Fry might jump on her Harley and head out to investigate. Usually, all it takes is a warning, says Fry, but if the offenders persist, the committee has the USDA to back them up.

In spite of their long and savory history, Walla Walla Sweets were not called Walla Walla Sweets until 1960, when the Arbini brothers were asked to ship samples for possible markets on the East Coast. Caroline Arbini and her sisters came up with the name to attach to the samples.

Walla Walla Sweets make up only about 10 percent of Washington's total onion production, the remainder being primarily yellow storage onions. The high water and sugar contents that make Walla Walla Sweets so sweet and mild also mean they do not keep. So eat them when they're ready, which is mid-June through September.

Walla Walla Sweets can be chopped up raw and used in salads, sautés, or salsas—or prepared like any other onion. But my favorite preparation, which is how I fixed several bunches of Castoldi's spring salad onions, is very simple. I peel them, slice them thick, brush them with a little olive oil, and grill them until just browned. They don't have to be soft all the way through. A little crunch is good. You'll find yourself ignoring whatever else you're grilling.

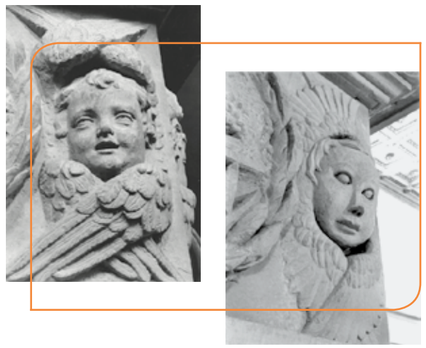
Unless, that is, you're also grilling a certain sausage. In Walla Walla, I was kindly directed to a hole-in-the-wall restaurant at First and Main called Onion World. Owned by 16th district legislator Maureen Walsh, Onion World specializes in sausages made from pork and Walla Walla Sweets. I ordered one, ate it, then went back for another. The cook told me that happens all the time. «

Video and recipe for grilling Walla Walla Sweet Onions at wsm.wsu.edu.

:: from page 12

Over the past several years, senior faculty member David Wang has both consulted and encouraged the younger architect in his research into the basilica.

Wang has even coined a term for the way Cohen has approached San Lorenzo, a term he plans to write about in the second edition of *Architectural Research Methods*. "Acute Observation



Details of the difference in workmanship on the columns in the San Lorenzo Basilica.
Courtesy Matt Cohen

is a combination of archival and archaeological research into an existing architectural artifact," he says.

"Matt's original contribution is actually creating a stir in his field," notes Wang. Cohen challenges the notion of Renaissance buildings as expressions of artistic and architectural "perfection."

Through his approach, Cohen is advocating the use of not only documents, engineering plans, and written histories for studying a particular building, he suggests exploring the building itself. "It's a primary source of historical evidence," he says.

Too much of a good thing

by Eric Sorensen :: Science has been predicting and measuring our warming planet for more than a century now. But it was only in the last two decades that most Americans came to believe the earth's temperature was indeed rising and that the main culprit is the growing amount of carbon dioxide in our atmosphere.

Now scientists are giving a lot of thought to another culprit: nitrogen. Like carbon dioxide, it's seemingly benign—colorless, odorless, tasteless, and a foundation of life on our planet. Left alone, it tightly binds to itself in inert, two-atom molecules, or N_2. It's ridiculously commonplace, making up four-fifths of our atmosphere. It's also a modern miracle: synthesized into fertilizer, it has revolutionized agriculture, often with the help of Washington State University researchers.

But it's easy for a lot of good nitrogen to go bad, as happens most often when nitrogen-based fertilizer is not assimilated by a plant and starts roaming the planet in other forms.

As nitrate fertilizer, or NO_3, it can end up in drinking water and contribute to multiple health problems. In surface waters, it stimulates blooms of aquatic life that die and decompose, removing oxygen and creating hundreds of "dead zones" devoid of marine life.

NOx, the collective term for nitric oxide and nitrogen dioxide, contributes to low-altitude ozone, a significant greenhouse gas. Nitrous oxide, or N_2O—yes, "laughing gas"—has more than 300 times the global warming potential of carbon dioxide and is equal to one-tenth of CO_2's contribution to global warming.

This makes it "a key player" in the global warming discussion, says Brian Lamb, an atmospheric scientist and principal investigator for a $3 million program that teaches nitrogen-cycle science and public policy to graduate students in a range of disciplines. "And the human part of that is we are big users of nitrogen fertilizers. The more nitrogen you apply to an ecosystem, even an agricultural ecosystem, the more N_2O gets released."

Before 1913, nitrogen cycled through the living world with the help of microbes that broke the N_2 bonds and "fixed" nitrogen for use by plants. Other microbes balanced this out, converting nitrogen compounds back to N_2 through a process called denitrification.

Fritz Haber and Carl Bosch's process converting nitrogen to ammonia changed that, as can be seen when Lamb calls up a chart showing the planet's nitrous oxide budget. The earth's atmosphere can process about 14 of the nearly 18 million metric tons of N_2O produced each year by natural and human sources. That leaves 4 million tons added each year. It's almost the exact amount coming from agricultural soils as fertilizer is not absorbed by plants.

"When it comes to N_2O, ag is the place people are looking to make changes," says Lamb.

That will be tough. The Haber-Bosch process helped the world population grow from less than 2 billion to nearly 7 billion, with more on the way. All those people will need amino acids to thrive, and almost all our amino acids come from crops and the animals that eat them.

"The biggest effect is on the enzymes needed for photosynthesis," says ecologist Dave Evans ('90 PhD Botany). "They take a lot of nitrogen. So when farmers are applying nitrogen, they're trying to increase photosynthesis so they get more growth. They want greener plants."

But for all the nitrogen farmers use, less than one-third ends up in the grain. One study at WSU's Cook Agronomy Farm estimated 5 to 20 percent of the applied nitrogen ended up as nitrate in nearby surface waters.

USDA-ARS soil scientist Dave Huggins ('91 PhD, Soil Fertility and Plant Nutrition) notes that the most efficient way to use nitrogen is to apply none at all, an "untenable" option because yields would be too low. Instead, farmers estimate their yield and apply the amount of nitrogen needed to get a theoretical "maximum return to N."

In reality, yields and nitrogen demands are incredibly inconsistent across a farm. On the 92-acre Cook farm, wheat yields can double from one spot to another, with fertilizer in the low-yield places largely going to waste.

Compounding the problem are recent lab trials, published in the journal *Science*, showing that wheat will pick up and assimilate nitrate even less efficiently as carbon dioxide levels rise.

Asaph Cousins, a co-author and assistant professor in the School of Biological Sciences, says plants are generally limited by the availability of CO_2, which has risen 40 percent since 1800. By the end of the century, it could rise another 35 to 150 percent.

"But like everything," says Cousins, "with too much of a good thing, you then become limited by some other factor in the environment."

In the *Science* paper, one new limit appears to be the plants' assimilation of nitrate.

"In some ecosystems the dominant form of that nitrogen is nitrate," says Cousins. "And so now there could be this additional limitation. The nitrogen could be in there, but it's not readily being assimilated."

Usually, says Huggins, wheat plants are fed anhydrous ammonia, which breaks down into ammonium and nitrate. The ammonium attaches to soil particles near the surface, but much of it is converted in a matter of days to nitrate, which is carried by water deeper into the soil and tapped by plants' roots that can reach as deep as six feet.

Over time, as much as 80 percent of a wheat plant's nitrogen is from nitrate.

One solution could be the development of wheat plants that use nitrogen in a different way. In the meantime, says Cousins, we may see farmers needing to use more nitrogen to get the best yields.

Tree Top: Creating a fruit revolution

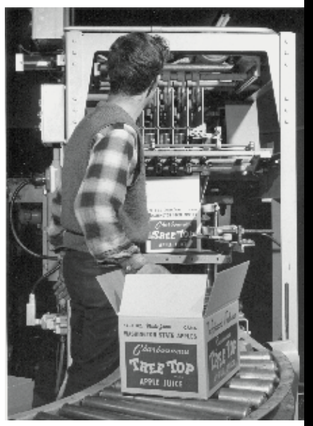
book review by Tim Steury :: In the September 10, 1951, issue of *Life* magazine is a picture of a bulldozer mounding apples in the Yakima dump. Seven acres of apples worth $6 million dollars rotted as pigs rooted through them, the result of failing foreign markets and high tariffs. At the time, if Washington's apples didn't sell, orchardists paid $5 a ton to have their culls hauled off to rot.

Culls are rejected from the fresh fruit market due primarily to shape, size, or color, but they are perfectly sound for such traditional uses as juice. The photograph aptly illustrated the need for a processing company like Tree Top, which is celebrating its 50th anniversary and is the subject of a new history by David Stratton and published by WSU Press, as an integral part of the tree fruit industry.

In *Tree Top: Creating a Fruit Revolution*, Stratton relates an assessment of the three major developments that transformed the apple industry: the switch from apple boxes to bins, controlled atmosphere storage, and the success of Tree Top.

Started by William Henry Charbonneau, described variously as eccentric, perfectionist, irascible, and roughshod, Tree Top from the beginning created an economic cushion for growers, a safety net against a volatile market. With its original plant and offices in Selah, Tree Top began by making filtered juice of local surplus and cull apples, then spread throughout Washington's apple growing region.

Although the beginnings of Tree Top go back to 1944, when Charbonneau bought Pomona Products Company, the company's true potential did not reveal itself until he turned it into a grower cooperative and made himself general manager in 1960. Supply was the driver for the move. Building a company on the growers and guaranteeing that it would buy everything brought in, a policy that endured until last year, Tree Top solidified its supply and set the stage



From left: Tree Top founder William Charbonneau, the destiny of juice apples before and after Tree Top.
Courtesy Tree Top

for great expansion. Charbonneau's insistence on the goodness of the juice is what built the company's reputation and grower loyalty.

Production and profitability exploded in the 1960s and 1970s. Sales grew from $1.3 million in 1961 to $7.1 million in 1969-70. Sales increased from there, growing an average of 20 percent a year, reaching $137 million in 1982.

Despite setbacks in the mid-80s and during the fruit industry downturn in the early 2000s, Tree Top has continued strongly to the present, expanding its products from the original juice and juice concentrate to many apple and pear products, from pear-based sweeteners to the dried "blueberries" in your breakfast cereal, which are actually colored dried apples.

But Charbonneau's major contribution was the introduction, following the citrus industry's lead, of frozen concentrated juice. Not only did the concentrate meet immediate consumer approval, the greatly reduced volume and weight made national expansion of Tree Top's market possible.

"Today, " writes Stratton in his preface, "in fulfillment of Charbonneau's vision, Tree Top's seven plants produce apple juice and cider as the backbone of its retail market in 30 states, with the core outlets in the West and Southwest, and also distribute consumer packaged goods, such as fresh apple slices, blends with other juices, and apple sauce."

The Tree Top cooperative currently has approximately 1,100 members, down from its historical numbers. But acreage has increased significantly. "This profile of fewer growers, but larger holdings," writes Stratton, "reflected a continuing trend in the overall Washington apple industry."

Stratton's book joins another recent work as a major contribution to the history of the tree fruit industry in Washington. He credits WSU graduate student Amanda L. Van Lanen for her help in the research and writing of Tree Top. At the same time Van Lanen was also finishing her dissertation on the history of the Washington apple industry, "*We Have Grown Fine Fruit Whether We Would or No*": *The History of the Washington State Apple Industry, 1880-1930*. A fine read, it is available electronically through the WSU Libraries website.

Round-Up and recovery

by Hannelore Sudermann :: Locals often see Mike and Jill Thorne on the two-lane highway between their ranch outside Pendleton and the Oregon city's rodeo grounds. As the 100th anniversary of the Pendleton Round-Up comes in September, the couple is busy preparing both the rodeo site and their community for the big party.

Since the first bronco bucked, the event has been drawing participants and spectators from across the Pacific Northwest. Today, it's one of the 10 biggest rodeos in the country. It may be rooted in Oregon, but the event has many ties to Washington, including two of its key volunteers, Mike and Jill Thorne.

For them it started at Washington State University, where Mike '62, a farm kid from Pendleton and member of AGR Fraternity, met Jill, a Pi Beta Phi from Olympia, on a blind date. They married in 1963.

"Certainly Jill brought a level of excitement and spark of life to our family," says Mike. If it wasn't for her, he may never have decided to run for public office. His first effort, in 1973, put him in the Oregon State Legislature as a senator representing District 29 while he was in his early 30s. "We weren't supposed to win," he says. But his constituents liked him and reelected him to continue serving for another 18 years. Then he headed the Port of Portland and later moved to Washington to be CEO of the state's ferry system.

Meanwhile Jill, who had an interest in public affairs since her days at WSU, had her own career path. She worked as an aide to Governor Neil Goldschmidt and chaired the Oregon Trail Sesquicentennial, for which she raised about $5 million. All the while, the couple raised two children.

After the Thornes "retired" (their quote marks) in 2004, they moved back to the family wheat farm and to a community they both loved and fretted over. They found a dying Main Street and a Round-Up that really hadn't changed much in the past few decades. "You can never go back home," says Mike. "We found a different set of circumstances and different people. You come back at a completely different level."

They talk about this as we walk into Room 17 at the back of the grandstands. It's a space reserved exclusively for the 17 Round-Up board members, like Mike, and their guests. On the walls hang pictures of the past Round-Up presidents including Mike's father. On another wall, among the pictures of the past rodeo queens, is their daughter Katy (Thorne) Coba, who today is director of the Oregon Department of Agriculture.

Taking up much of the room's long wall is a giant colorized photograph of the Round-Up grounds in the 1960s. I ask Mike if he might be in the picture. "Naw," he says. "If I am, it's because I was competing and I'm down there somewhere being drug around." Mike grows serious and starts considering the landscape. He points to the saw mill on the upper right and says, "That's the Walmart now." Then he points to the food processing plant. "That's a shopping center.

"Pendleton used to be the business center for northeast Oregon," he says. "But the agricultural, resource-based economy has gone away."

So what's left? A historic downtown, the woolen mills, a strong connection to the Umatilla Tribe, and the Round-Up. "To a great extent," says Mike. "Our past is the key to our future."

There is one other asset, says Jill. The volunteers. So many members of the community give their time and energies to the Round-Up each year. "The town works well together," she says. "All spectrums, all ages, all demographics. We bond over the Round-Up." And she's hoping that connection will serve the city beyond the weeks surrounding its hallmark event.

One of the Thornes' first efforts to protect the past was to help secure funding to restore the 25-some buildings of downtown Pendleton. Jill Thorne co-chaired a city resource advisory committee, and the pair put their own money into restoring two of the derelict buildings. One now houses a popular pub, and the other holds a shop run by local artisans. They hope that tourists visiting Walla Walla for its wine will enjoy a day trip 40 minutes south to get a taste of cowboy history.

The Thornes and some of their fellow volunteers saw the 100th anniversary of the Round-Up as a chance to push the town forward. They're in the thick of renovating the stadium, leading fundraising efforts, and bringing in outside grants for revitalizing the grounds.

There have been hurdles, including convincing the long-time Round-Up leaders to donate $5,000 per family to buy a brick pillar on the grounds and further fund the rehabilitation of the entry plaza. "They were more used to giving $500, not $5,000," says Jill Thorne. "But once they got over the initial shock, they stepped up."

The Thornes' fundraising savvy has paid off with grants from state entities, too. "Between the two of us, we bring experiences, the contacts, and the skills that can really help," says Mike. Jill jumps in: "And we don't take no for an answer."

Gone are the chain link fences and dinky stands. Instead the visitors will be treated to new sidewalks and trees, a beautiful iron gate with horse-shoe detailing, and seating for nearly 18,000, including 90 wheelchair-accessible spots.

With all the changes, many components have remained—there's no advertising to clog up the view of the arena, it's still a rich four-day event complete with cowboys and Indians, and it's still put together with the volunteer efforts of local families like the Thornes.

The Round-Up this year is September 11 through September 18.

MIKE AND JILL THORNE BY CHRIS ANDERSON

ROBERT HUBNER

The meat of the matter

by Rikki King '10 :: Dan Snyder can remember when local grocery stores would only buy one case of Cougar Brand Smokies at a time. Now, it's unusual for them to buy fewer than three or four. And when they run out, the Washington State University Meats Lab manager's phone starts ringing.

The meats lab building is tucked into the parking lot behind the Lewis Alumni Centre. It is primarily a teaching facility, used for animal science classes and agriculture industry professionals to learn how to evaluate live animals and grade and process animal carcasses. It's also home to one of the most popular meat products on the Palouse.

The German-style smoked sausages were invented 35 years ago to solve a dilemma of what to do with the extra beef and pork trimmings. They have developed a small, but loyal following.

At Ferdinand's Ice Cream Shoppe the Smokies have been offered alongside Cougar Gold Cheese for nearly 20 years. "They sell faster than Dan can make them sometimes," says Creamery Manager Russ Salvadalena '77. During a four-hour game-day shift, the shop can move up to 200 pounds of them.

At about $6 a pack, some customers will take home 10 to 15 packs at a time, knowing that the next time they stop by, the supply might be out. The wait for another batch can be anywhere between a week and a month, depending on the time and resources available at the meats lab.

Snyder, a soft-spoken man who displays his vintage knife collection on an office wall, has been at the Meats Lab for 24 years. He inherited the Smokies recipe with the job. Other than the beef and pork, he wouldn't divulge the ingredients, which were determined long ago by former meats lab employees including manager Duncan R. Dunn '68. Snyder would only say they are smoked with hickory or liquid smoke and that his sausage-making philosophy is simple: Use good meat, ensure a good product, and sales will stay up.

The meat is local, primarily pork from the WSU Swine Center and beef from the Cattle Feeding Lab. The process starts in the USDA-inspected "harvest room." While the pork is processed sooner, the beef carcasses are aged in the cooler for up to 14 days, which tenderizes the meat as the muscle fibers break down. "As far as aging, cutting, and wrapping, it's all done the same way today that it was done 50 years ago," Snyder says.

But there have been changes. Because of strict "zero-tolerance" USDA guidelines, the lab has more stringent rules for cleaning and sanitizing, Snyder says. Everything in the room gets "washed and foamed and cleaned and scrubbed and rinsed" before it's ready for another day.

Across the hall in the processing room, which doubles as a classroom, the carcasses are cut and wrapped, and the sausage is made. In an adjacent cooler, many dozens of plump Smokies hang, awaiting their delicious fate.

The Smokies are only one of the lab's meaty endeavors, Snyder says. Besides teaching and offering extension courses, the lab sells lamb, whole and half sides of beef and pork, salami, a breakfast-style sausage, bacon, and hams to people who call or stop by.

In our quest for details about the Smokies, we tracked down a few former students. Matthew Deebach '95, '96 worked at the meats lab for about three years. Now a teacher at Tonasket High School, he offers a meats unit where students make their own sausage. He has sampled a lot of Smokies in his day. They are the Rolls-Royce of sausages, he says. "It's the quality ingredients that go into that product that makes it heads and tails above everything else." He didn't have many details to offer, though.

Rod Cool '87, '92 MS worked at the lab from 1985 to 1988. He remembers Dunn as an "awesome guy" whose grandfather was Adam Duncan Dunn '02, the WSU Regent for whom Duncan-Dunn Hall is named. Cool now teaches at Chelan High School and does butchering for family and friends. His favorite experience at the lab was quality control—pan-frying sausages as they finished, making sure they turned out right. That would never fly anymore, he says with a laugh.

Though Cool was part of the operation, Dunn never let him see the recipe.

What we do know is that the lab tweaked the ingredients a few years ago, taking out a few, but everything is still weighed to ensure the right ratio of spices to 100 pounds of meat, Snyder says. A sausage that was too spicy or too mild wouldn't be a proper Cougar Smoky. "They do have a good spice to them," he says.

Lab employee Tina Tate '10 did at least give one clue: "The mix that we use has a little bit of sugar in it," she says, adding that it helps pull out the other flavors.

Next, the Smokies are moved into the lab's small industrial smokehouse, where they are both cooked and smoked for three to four hours. The links are then hung in a cooler overnight before being cut, vacuum-sealed into their packaging, labeled, and sent on their way to one of the local grocery stores or Ferdinand's.

If you're lucky, you may find a pack when you stop by. Regular customers always notice when the Cougar Smokies are missing from Ferdinand's cooler, says Salvadalena. There's not much he can do for their disappointment. «

Links to the Cougar links can be found at wsm.wsu.edu.

Coordinates

After the massive earthquake hit Haiti in January, Washington State University Athletics team physician Ed Tingstad headed to the disaster site when a friend called for help.

wsm.wsu.edu/coordinates

Cultivated Landscapes

N 47° 21' 3.6" | W 120° 17' 10"

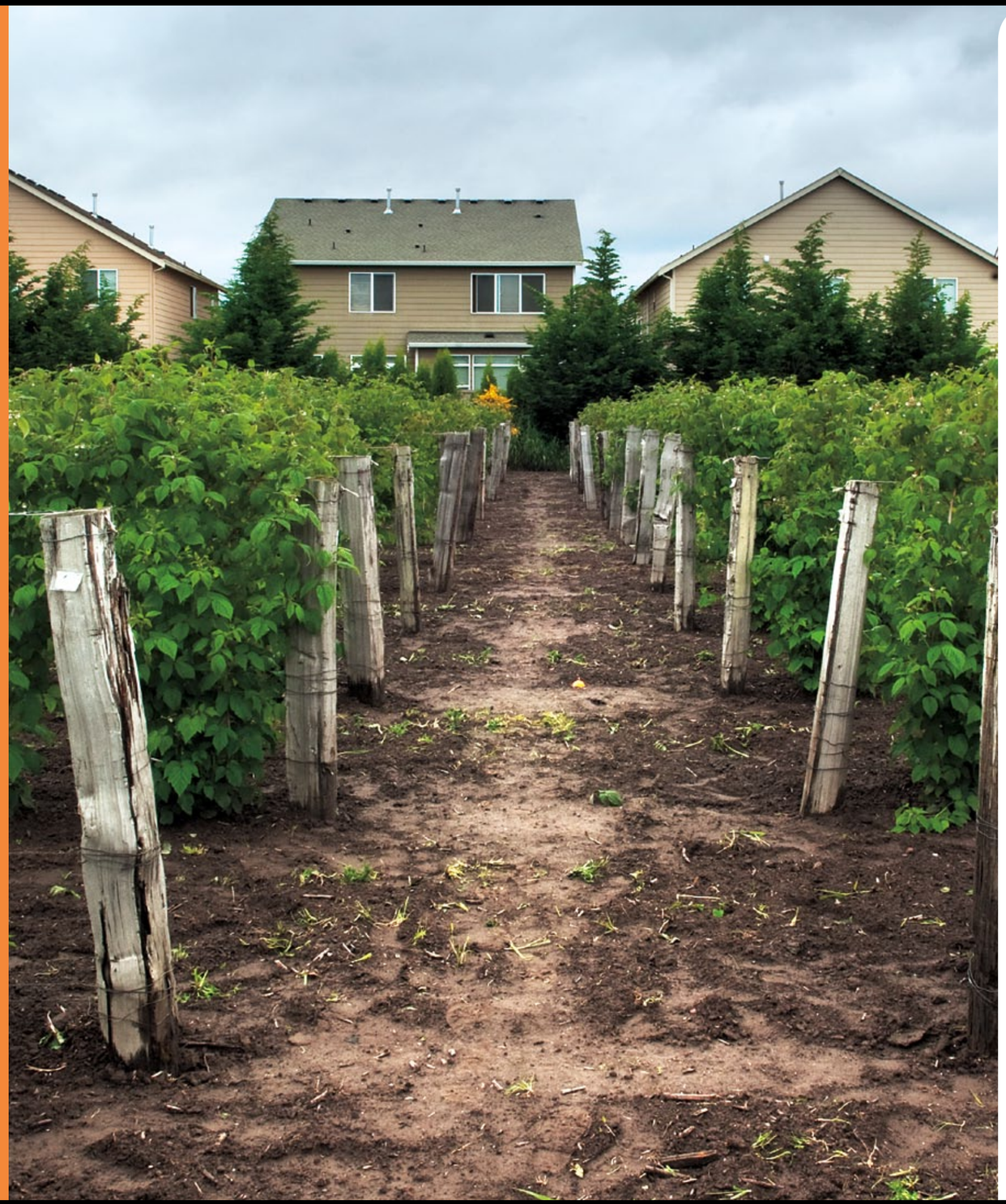
WENATCHEE HEIGHTS PHOTO BY ZACH MAZUR

Back to the city

Agriculture is rooting its way back into the urban landscape

photos by Zach Mazur

Hannelore Sudermann ::



THE LANDSCAPE around the Puget Sound has been in flux since the pioneers felled the forests to open up the bottomlands for agriculture. These loamy soils drew some of the earliest farmers, who were delighted to find the region suited a wide variety of crops.

The South Park neighborhood in South Seattle sprang up on fertile, level farmland adjacent to the Duwamish River. According to historian David Wilma, before the settlers arrived, the spot was occupied by Indians, who grew potatoes, fished, and harvested berries there.

In the 1900s this neighborhood became home to "Contadini," Italian immigrants who had been born into farming in their native country. This is where Carmine Marra and his wife Maria bought land in 1920 and set up a truck farm that for years to come would be a center for the community. Besides producing a bounty of food to sell in Seattle at Pike Place Market, the farm was a place to meet at the end of the day or play bocce on weekends.

Today the neighborhood is still home to immigrant communities, but much has changed. It sits just behind one of the most industrial and most toxic areas of the city. The Marra Farm, which survived as a community garden, is the only agricultural land left. It seemed inevitable. Development had started before the Contadini arrived. The river was redirected and channelized for improved shipping access. In the 1920s Boeing's air plant sprang up on the east side of the river, followed by recycling plants, concrete plants, rendering operations, and a foundry.

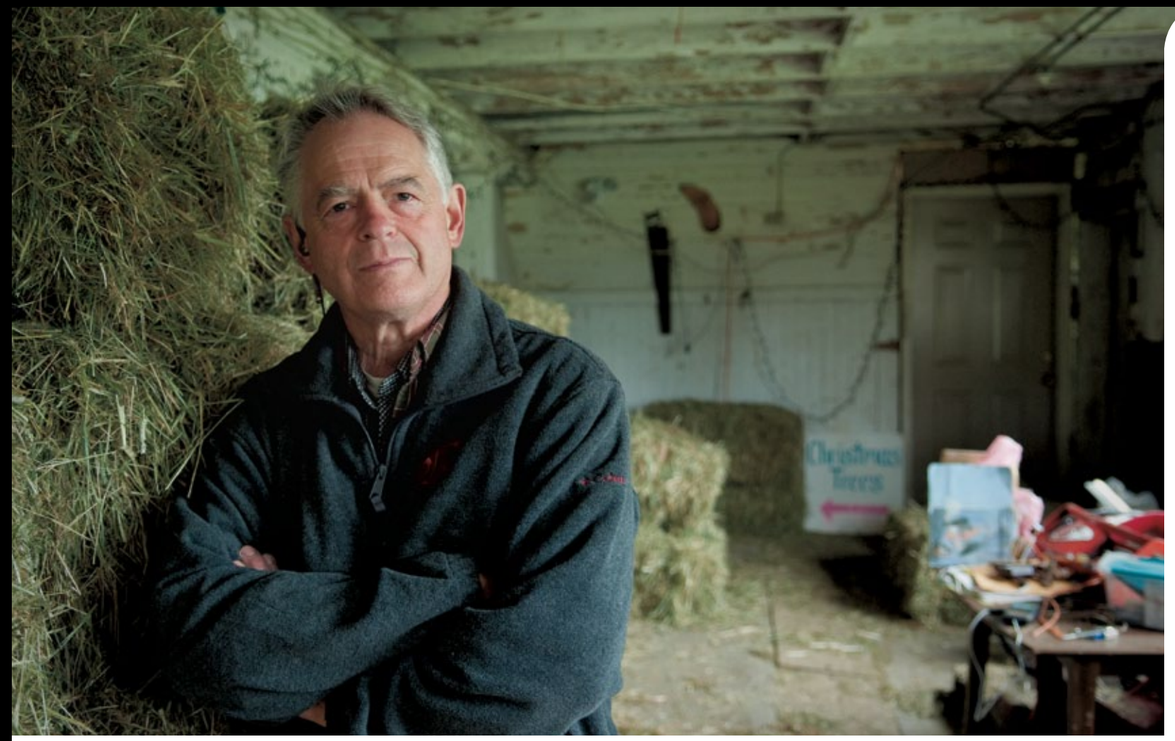
Besides the pressure of Boeing's expansions and increased industrial use of the neighborhood, by the 1940s the local farmers were finding it hard to compete with the large-scale California produce farmers. All the while, "the farmlands themselves were becoming too valuable for agricultural use," wrote the Marras' nephew Fred Marra.

While the story of the lower Duwamish is extreme, a similar tale can be told for many other fertile areas of the Sound.

Kent, once home to hops farms, dairies, and acres of produce, was known in the 1920s as the Lettuce Capital of the World. The area started to change in the 1960s after the Howard Hanson Dam on the Green River stopped the valley from regularly flooding. The Boeing Aerospace Center was followed by other industry and technology businesses. Today the valley is clogged with warehouses, trucks, and storage units. Is is also home to a variety of corporate headquarters including Oberto Sausage Company and Recreational Equipment Incorporated (REI).

To the east, along the Snoqualmie River, developers are pushing the question of what is a farm by packing the rolling hills with mini-estates complete with their own horse paddocks. Larry Pickering '68, who grew up among the 40-some dairy farms near Fall City, watches with dismay as these multi-million-dollar homes cover the land around him. "We took it so for granted," he says. "We didn't know what we had." Back in the 1960s, Larry Pickering enrolled at WSU with plans to study animal science and prepare to run the family dairy. But dairy farming was changing and the farms were growing to hold hundreds of cows. "I could see that I would have to become a manager rather than a farmer," he says. So he changed his course and became a veterinarian. "I figured I could switch to horses and have the life I wanted."

He watched in the 1980s as King County spent $50 million to preserve agricultural land, and then watched that farmland dissolve into one-acre horse estates. "Thirty years ago, we assumed if you couldn't put development on land, you would have to farm it," he says. But that



Larry Pickering '68 has watched agriculture leave and return to his hometown of Fall City.

proved wrong. "Now they put a $5 million home on it and some horses and it's lost to agriculture."

North of Seattle, in Everett, a similar story plays out along the Snohomish River. And south along the Puyallup, farms have given way to housing developments, warehouses, and shopping malls. In recent years, according to a USDA Natural Resources Inventory report, the state has lost an average of 23,720 acres of farmland per year (an amount about the size of Lake Washington).

But in this river of expansion there's a countercurrent, a push of agriculture back into the urban and suburban areas around the Sound. Farms are sprouting up on land where industry has stalled. In some areas, instead of selling off to development, old 50- to 100-acre farms are carved up into 10-acre operations that deal directly with consumers.

Farms are spreading back onto lands that have been rezoned for industry. No one's building warehouses right now, says WSU extension agent Chris Benedict. That means in places like the Green Valley, Renton, and Kent, people are farming again. "From Renton to Puyallup it's really helter-skelter amongst the warehouses," he says.

And within the larger urban populations, consumers are more interested in eating local food and knowing the farmer. Whether they're trying to shrink their carbon footprint or have more control over the sources and safety of their food, people are much more interested in where what they eat is coming from, says Benedict.

And their public leaders are hearing them. This is the year the Seattle City Council has proclaimed the Year of Urban Agriculture. "We are committed to making changes that are better for people and better for the environment," Mayor Mike McGinn announced in February. "This means making it easier to garden and grow food, to ensure that good food is available in all neighborhoods, and to find innovative ways to encourage local and regional food production."

It's not just happening through farm stands and farmers markets. Grocery stores are offering classes on how to find food produced closer to home. And some, like PCC Natural Markets, have established trusts to preserve ag land and support new farmers.

In her 1970 book *The Economy of Cities*, author and urban theorist Jane Jacobs hypothesizes that cities came first, and rural economies, including agriculture, were built upon city economies. She also points out that the most urbanized countries "are precisely those that produce food most abundantly." Growing, healthy cities, she argues, carry rural and agricultural productivity in their wake.

Japan, after World War II, reinvented its agriculture, notes Jacobs. It did so on a foundation of city productivity. The result was a more diverse and abundant food supply. It is something other countries could do as well, she suggests.

This time shares much with the early 1970s, when Seattle saw its first community gardens and people were interested in fresh, local food. A new generation of farmers had come to the Northwest to drop out of the industrial culture and get back to the land. The public garden movement started when the families like the Marras sold their land to the city so the people living nearby could garden and grow food there.

Today the sounds of the Marra farm include the roar of airplanes and traffic as well as the voices of children tending their grade school P-patches and buzzing of bees in the hives on the west side of the farm. Here in the city on bits of farmland, neighbors meet over rhubarb plants, tomato seedlings, and rows of lettuce and beans. Since the 1970s these gardens have taken root all over Seattle—Ballard, the 1.3-acre Danny Woo Community Garden in the International District, and Jackson Park to name a few. And thanks to a recent flush of new gardens, Seattle's list of public P-patches numbers more than 80.

The city's P-patches provide food for those who garden there, and for food banks and schools. Depending on which garden, the land is owned by the city, the Seattle Housing Authority, King County, a P-Patch Trust, and private interests. The city estimates that more than 4,000 people are gardening in the community plots, with nearly 2,000 more on waiting lists. At the highest-demand sites like Queen Anne, Fremont, and Capitol Hill, the wait may take three years.

The question today, as agriculture is pushing into the cities, is whether we have returned to a period like the health-food conscious, back-to-the-land 1970s. Or is this something else?

From the perch of her farm above the Skagit Valley, Anne Schwartz '78 has watched agriculture and consumer demand from the time she harvested her first crop of organic vegetables. Back in the late 1970s, the new farmers were politically active and intent in finding a way to help save the world from industrialization. "In the '70s it was a general rebellion from things," she says. Today, when people go back to the land, it's much more complicated, she says.

Besides running a farm and supplying produce to farmers markets and directly to consumers, Schwartz has ventured into public policy and organized activism. She has served as president of Tilth Producers of Washington and participates in local and state farm and legislative advisory committees.

That movement from the '70s didn't disappear, says Schwartz. It matured. The original issues are still in play, but they have broadened to include countering global climate change, protecting farmland from development, securing the food supply, and instilling a sense of community.

"There certainly is enough of a public upswelling," she says. Add to it that the downturn in the economy is stalling development and that there's a greater public awareness of the need to preserve farmland. Then factor in a greater desire for fresh, local food. It has all worked together to put farming back near and into cities, she says. "It's a little bit of a perfect storm."

THE NEW FARMERS

A few miles uphill from the Marra Farm into West Seattle, right in the middle of a brand-new neighborhood, is the High Point Market Garden—where small-scale farmers can raise produce on public land that they sell at farmers' markets and through Community Supported Agriculture (CSA) subscriptions.

High Point is a born-again neighborhood. In 2003, working-class and immigrant families were moved out of the 60-year-old community and all the roads, homes, and utilities were removed. They were replaced with a mix of 1,600 low-income rentals, single family homes, condominiums, and town homes. And small farms and gardens.

The mixed-income community was completed this year. It houses about 4,000 people including new immigrants and refugees. On a warm spring morning, two Cambodian women water and weed in the High Point Market Garden. As one walks the hose around a raised bed, the other sits down for a break. They tend their portions of more than 70 raised beds. Here none of the soil is sacrificed to weeds. In this brand new farm in this brand new neighborhood, these women and their fellow farmers are using intensive cropping to grow enough produce to fulfill orders of weekly produce for 50 households.

These new farmers are bringing labor and energy to our cities, says Bee Cha, WSU's small farms agent who works directly with Hmong and refugee and immigrant farmers.

When Cha was 15, his family moved from Laos to Washington. Almost immediately he and his parents and siblings went to work on farms. Among other things, Cha helped his family earn money by picking strawberries. Though they farmed in Laos, "everything is different here—the crops, the system. The only thing that is the same is the willingness to farm and the energy."

A family member had started farming through WSU's Indochinese Farm Project and by the late 1980s was turning decent profits. That prompted Cha's father to grow his own crops in the Sammamish area. For Cha's family and the nearly 100 Hmong families who are now farming in Washington, agriculture was a means of making a living in their new country. Some of what they did went against their culture and traditions, says Cha. Growing flowers for example—in Seattle, the Hmong farmers are famous for providing gorgeous, affordable bouquets at places like Pike Place Market. "In Laos flowers are considered a nuisance," says Cha.

WSU's Bee Cha helps East African refugees assemble a seeder. *Staff photo*

It is not a love of their beauty, or a decision to provide an alternative crop at the market that causes Hmong farmers to grow the flowers. It's a simple equation of labor and economics, says Cha. "Vegetables are much more labor intensive," he says. They're harder to pick, you have to be more aggressive with weeds and insects, and you need things like water to irrigate and wash them and to have storage structures, probably cold storage, on site. Flowers, until you get to the market and have to start arranging them, are much easier, he says.

Cha's understanding of what it means to be a new immigrant, his language skills, and his knowledge of farming gives him a perspective for helping the newest refugees figure out farming in the Puget Sound region. One day this spring he drives down to Kent where a dozen East African farmers are waiting. It's Cha's day to teach them how to assemble and use a small seed planting machine. Back at the refugee camp in Somalia they planted everything by hand—and grew food to supplement their rations. Here they're trying to feed themselves as well as sell produce through small grocery stores.

The refugees' farm is a 10-acre lot at the base of a hill. At one end is a ramshackle blue shed. At the other, a home and yard littered with cars and appliances. Two groups of refugees are using these acres—a group from Somalia and a group from Burundi. The men gather around as Cha pulls the seeder in parts out of a medium-sized cardboard box. Celestine Sibomana, the farm manager for the project, follows Cha's instructions and uses the tool to sow a row of beets. "Part of the challenge for them," says Cha, "is just learning how to farm in the Pacific Northwest."

BACK TO THE FARM

On the day the African farmers in Kent are trying out their seeder, 30 miles north along the Snoqualmie River Siri Erickson-Brown and Jason Salvo spend their morning planting lettuces, tomatoes, and other seedlings.

Salvo and Erickson-Brown are both city kids, graduates of Garfield High School who seemed destined for urban lives. After college, Erickson-Brown went to graduate school in public affairs and Salvo headed to law school.

Above: Siri Erickson-Brown and Jason Salvo at Local Roots Farm. ***Below:*** Erickson-Brown washes greens by an oxbow of the Snoqualmie River.

But then while Salvo was studying for the bar, Erickson-Brown interned at a local farm. Why not? Not only did she enjoy farming, Salvo did too. A year later they found a landowner willing to farm with them and broke ground on his property along the Snoqualmie River.

At the same time, points out WSU extension agent Andrew Corbin, they live in one of Seattle's oldest and most urban neighborhoods, Capitol Hill, and drive a reverse commute out to the farm near Carnation.

"We're Local Roots in all its meanings," says Salvo, explaining that when they started selling their produce, they reached out to friends and family in the city. They sold subscriptions for weekly delivery of their produce simply by sending an invitation to everyone on Erickson-Brown's email address list. "It's our parents, our relatives, our friends, their friends, and so on," she says. They also sell their produce to about a dozen Seattle-area restaurants.

They aren't the small-scale farmers of the '70s, though, notes Corbin. Their outreach goes beyond farm and family. Each year they take on interns, training the next batch of new farmers. This year, more than 60 people applied for just six positions. Salvo and Erickson-Brown also participate in regional government advisory panels and nonprofit organizations supporting local food systems. And they keep an online blog on the challenges (slug and deer damage) and the pleasures (selling out at the market) of farming.

More and more 10- to 30-acre farms with hundreds of varieties of vegetables and specialty livestock are moving in, says Steve Evans, King County's farm specialist. Over the years he has seen established farms disappear for a variety of reasons—including encroaching development and increased environmental regulations. But as things like dairies die off, land is now available for smaller farms with high-value crops.

Despite the trend to more small farms, the future of agriculture in King County is uncertain, notes the county's 2009 Farms Report. While the conversion of farmland has been slowed, agriculture is still threatened

Above, clockwise from top left: Farmer Erickson-Brown, center, and an intern visit with King County Executive Dow Constantine. The Fremont P-patch. A sign at Terry's Berries farm in Tacoma. The U-District P-patch.

The markets are up

A century ago in Seattle, farmers and consumers did business on the city's streets to circumvent the commission houses that were jacking up prices and selling old produce. In 1907 their exchange was provided a home under an arcade at Pike and First Avenue.

Over the decades Pike Place Market has provided Seattleites a place to buy their food directly from the farmers. Truck farms from Bellevue, Bainbridge Island, the Kent Valley, and elsewhere supplied the stalls with produce, dairy, seafood, and meat.

At one point in the 1960s, though, the fate of the market hung in the balance. It was considered a blight by Seattle's leaders who unveiled plans to raze it and replace it with parking lots and office buildings. Fortunately a group of citizens lobbied to protect the landmark and get it listed as a historic district.

Today Pike Place Market draws nearly 9 million visitors a year and houses stalls for produce and flower farmers as well as seafood stands and specialty shops. Even though it's one of the major tourist draws on the West Coast, it stays true to its local farmer roots ensuring that those who sell food there grew it or caught it themselves.

In 1982, when Steve Evans '78, '82 went to work at the market, it was just one of two farmers markets in the entire state. The other was in Olympia.

Just 10 years ago the number of markets in Washington climbed to about 20. As demand for local produce has risen, so has the need for farmers markets. "This year, we're expecting to have 40 in King County alone," says Evans, now the head of agriculture for the county. "And there's about 110 state-wide."

To find a nearby farmers market visit www.wafarmersmarkets.com.

by population growth and upslope development that increases the risk of floods in the farmlands. Rezoning and real estate speculation drive up land prices. Still, enough land remains open in King County to grow sufficient produce for its entire population, says Evans.

The push to bring agriculture into the cities is quite organized. Schools are teaching children to grow their own food and nonprofits like Seattle Tilth, Lettuce Link, and City Fruit, a group that harvests fruit from neglected trees throughout the city, are advocating the local production of food. The nonprofit Cascade Harvest Coalition is a collective of farmers, chefs, teachers, land managers, and others who grouped together in 1999 to "re-localize" the food system in Washington.

The movement is pushing south into Pierce County and Tacoma, "which is a good indicator of changes beyond the primary tier consumer," says WSU extension agent Chris Benedict. In Seattle people will pay more and drive further to get fresh, local food. In Tacoma, where the median income is lower, "it has to be much more economically competitive," he says.

Terry and Dick '65 Carkner have managed to maintain their organic berry and produce farm in Tacoma for more than 25 years while the farmland around them has been swallowed into housing developments, warehouses, and a truck driving school. They've watched demand increase for their food and have expanded their business by selling CSA shares for their crops.

They're being joined by new urban farmers, as the City of Tacoma is converting seven city parcels into community gardens with the goal of someday being the city with the most community gardens per capita.

This growth of new farms and the revival of old ones is a pleasing sight to Larry Pickering, who serves on the King County Agricultural Advisory Committee. It's not just a phase, he says. When diesel reaches $10 a gallon and produce imported from California and beyond becomes too expensive, everything is going to change, he says.

"Local producers close a lot of loops," says Pickering. They give our region independence from the vagaries of the world market, he adds: "This is going to take off like crazy." ⊗

A view from Terry's Berries, Dick '65 and Terry Carkner's farm in Tacoma.

For more photos of agriculture in the city visit wsm.wsu.edu/gallery.

Cultivating new energy

:: Eric Sorensen ::

With just a whiff of irony, let's sing a song of praise for gasoline.

A SINGLE GALLON contains more than 30,000 calories. You wouldn't want to drink it, but in straight-up energy terms, that's enough to power a human for about two weeks.

Gasoline is convenient, portable, and for the most part, cheap. For the purposes of this story, I used it to log more than 1,000 miles around Washington State and make appointments, easily, and always on time. Tank low? More than 2,000 filling stations were out there for me to fill her up and pay with a piece of plastic.

"The liquid fuel distribution system in our country is a work of art in many ways," says Peter Moulton, senior energy policy specialist for the Washington State Department of Commerce.

More impressive still is the tortured narrative to the tank: Over millions of years, buried microbes are cooked and compressed to form long chains of carbon and hydrogen. Enter "Colonel" Edwin Drake's well in Titusville, Pennsylvania, oil booms in Texas and Saudi Arabia, plastics, modern agriculture, a massive infrastructure of wells, refineries, pipelines, tankers, filling stations, highways, and yes, the automobile, which now runs through more than 200 billion gallons of gas a year.

Just add new car smell, clean windshield, and mix CD.

But to briefly rain on the parade, that gasoline also contains more than a dozen hazardous chemicals, including some, to use the parlance of our times, known to the State of California to cause cancer. Its adjusted-for-inflation price, while blissfully unchanged for most of a century, is now scarily unstable. Fossil fuel production is polluting our oceans. Its consumption is warming our climate. Our dependence on foreign oil drains more than $5 billion a week from our economy.

If only we could simply grow our own fuel.

It's starting to look like we can.

Out on the windy reaches of the Columbia Plateau, researchers are looking to a day when the blindingly yellow flowers of a tiny camelina oilseed might transform millions of acres of dry, dusty, often fallow cropland. In a retired chicken coop on the WSU Pullman's old Carver Farm, researchers are cooking wood for oil and rotting manure for gas—possible uses for the slash from logging, the leftovers from food-processing, and dairy manure.

At WSU Tri-Cities, researchers in a new $24 million lab are taking a page from the Paleozoic Era, using microscopic algae and other bugs to produce hydrocarbons, but in a nano-fraction of the time.

All told, scores of WSU researchers are rotting and burning their way to a new energy future. In their world, if it is biological, if it contains a carbon atom, there is a way to draw some energy out of it. Now we just have to find a way to do that in a practical, economic way that approaches the practical, economic grace of gasoline, which, by the way, has had a 100-year head start.

"All of these fuel options have trade-offs," says Chad Kruger, interim director of WSU's Center for Sustaining Agriculture and Natural Resources, "and we can't predict what they all are. Nothing will be as 'simple' or 'competitive' as petroleum."

CRAIG FREAR BY ROBERT HUBNER

DIGEST THIS

Craig Frear is standing by a 10-gallon steel tank in an abandoned chicken coop on WSU's old Carver Farm. The tank is an experimental anaerobic digester capable of converting cow manure into a gas rich in methane, the main element of natural gas. It looks a bit like a modern wood stove, but in some ways, Frear sees it as a large, metal cow stomach.

"Lots of papers say look to nature to get your best engineering," says Frear. "A cow's rumen is perhaps the most perfectly designed digester on the earth. From an engineering perspective, your challenge is to mimic it and keep costs down."

Frear speaks with the clarity and directness of a school teacher. He was one for 12 years before undertaking a PhD, in part as a promise to his dad. He ended up receiving his WSU doctorate in engineering science last year, just six months before his father's passing. Along the way, he's analyzed more than 40 different materials that could be sources of bioenergy, focusing in particular on bringing cow-gut technology to our energy diet.

The cow's rumen, the first of four chambers in its stomach, is a fermentation marvel. It mixes the feedstock efficiently, excretes byproducts that could slow the process, and moves food out while keeping valuable bacteria in, all while converting the food into energy and protein.

By mimicking that design, a human-made anaerobic digester can run on just about any biological material—broken eggs, bad ravioli sauce, fish guts, beet pulp, human wastewater, and yes, manure. Through a combination of heat, bacteria, and the ancient microbe archaea, the process breaks down organic matter in a succession of synergistic reactions evolved over millennia. In the end, it produces nearly pathogen-free fiber for livestock bedding or soil amendments and a liquid that can be further treated for fertilizer. And it can outperform the rumen by capturing methane.

In a farm lagoon, manure is a potential water pollutant. In a cow's burp, methane is a greenhouse gas with more than 20 times the global-warming power of carbon dioxide. But in a tank, they're both potential cash cows.

"Biogas made from liquid manure has the best carbon footprint and it also has the least amount of fossil energy to actually make the fuel," says Kruger of the Center for Sustaining Agriculture and Natural Resources, whose Climate Friendly Farming Project has focused on reducing agricultural energy use and greenhouse gas emissions.

"The third part is it's the cleanest fuel," Kruger says. Purified and compressed, biomethane is almost pure—"your outputs are CO_2 and water and a tiny bit of other stuff."

Frear says anaerobic digestion is most economical for farms with more than 500 cows, which would account for 135 of Washington's 450 dairies. Outfitted with digesters and electrical generators, they could produce 130 megawatts—enough to power all the homes in Spokane.

But all those megawatts may be a better indication of biomethane's energy potential than its actual potential use, if only because the Northwest already has lots of clean, relatively efficient electricity.

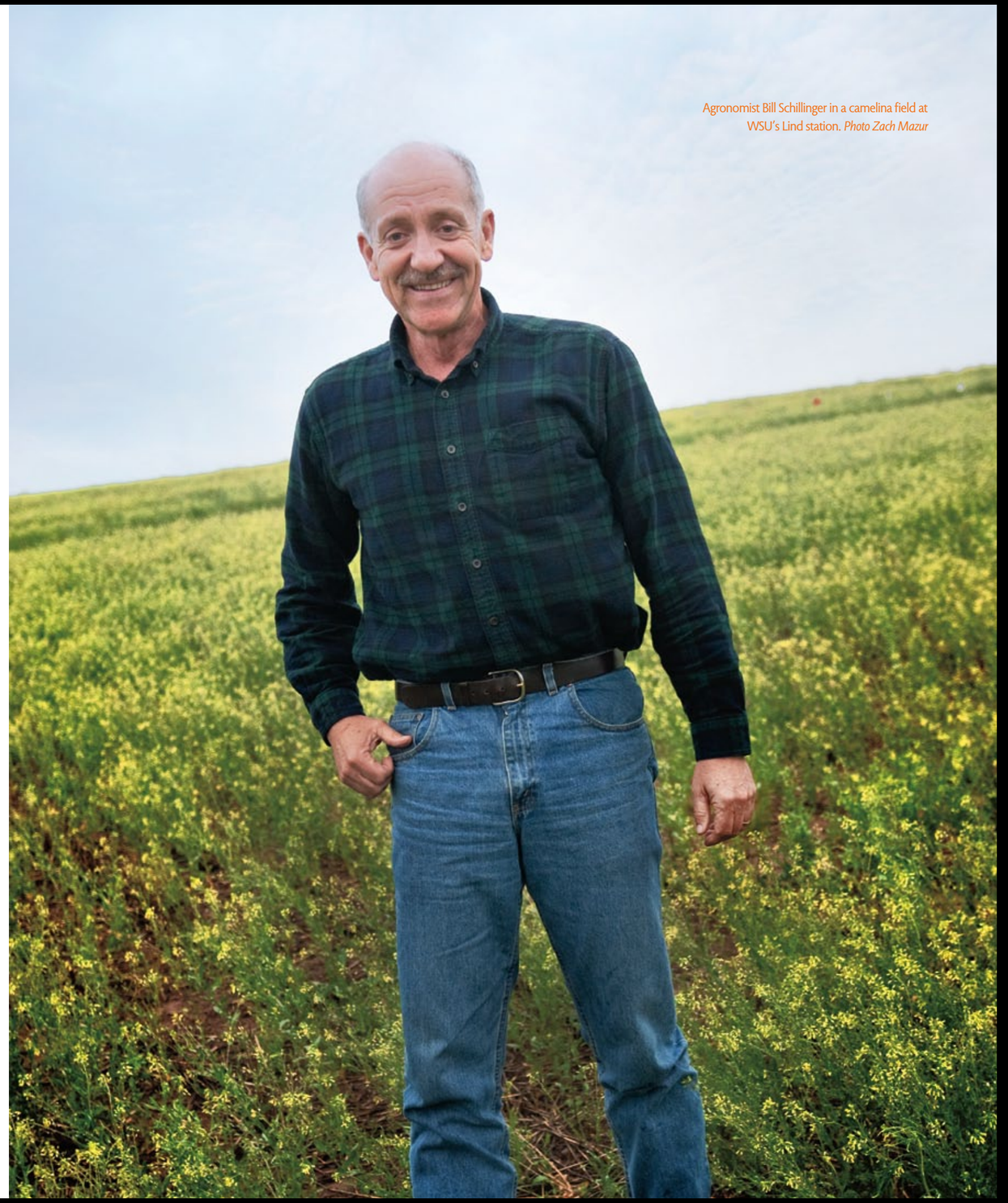
"We're better off using biogas for a more efficient energy outcome," says Kruger, like a heat source or fuel for a public fleet that returns to the same place each day for refueling. Plans are already underway to power airport shuttles on methane from Whatcom County cows.

"From a BTU standpoint, it's not going to solve all our problems," says Kruger. "But it's a low-hanging fruit. It has a really intelligent market that makes a lot of sense."

OIL IN THOSE HILLS

For most of the past century, farmers in the dryer, windier parts of eastern Washington have turned to agronomists like Bill Schillinger to tell them A, how to keep their soil from blowing away and, B, what is best to grow.

Faculty and staff of WSU's Lind Dryland Research Station have in the process helped reduce erosion from hundreds of tons per acre while WSU breeders have developed several varieties of wheat suited to the region.



Agronomist Bill Schillinger in a camelina field at WSU's Lind station. *Photo Zach Mazur*

Biofuel Production

Biofuels tap the intellectual and technological power of American agriculture with an eye toward reducing our reliance on fossil fuels. WSU has dozens of researchers working on a range of biofuels in centers on both the Pullman and Tri-Cities campuses.

Biofuel production relies on photosynthesis, converting water and carbon dioxide into oxygen and various forms of biomass with energy rich sugars, proteins, and fats.

Learn more about other areas of clean technology research at cleantech.wsu.edu.

The sun »

Whether you get gas at a pump or heat your house from a wood pile, all the energy you use originated at the massive nuclear fusion reactor that is our sun. Energy alternatives are variations on this theme, channeling solar energy through various forms and technologies.

Biomass »

Crops specifically grown for energy include sugar beet and oilseeds—"first-generation" biofuels because they're readily converted to fuel. They can also compete with food production.

Second-generation biofuels target woody and grass fibers, some of which are often waste products. Some, like manure and food waste, are wet. Others, like wood and straw, are more solid and less competitive with food.

Third- and fourth-generation biofuels (algae and hydrocarbon-rich microbes) are more dedicated to energy production. They're also more speculative, potent, and less prone to using cropland.

Conversion »

Oilseeds are crushed for biodiesel and refined further for specific uses such as jet fuel.

Anaerobic digestion ferments wet biomass into biogas, a mix of methane and carbon dioxide.

Solid mass can be fermented like wet biomass. Or it can be treated thermochemically—burned freely or burned with controlled temperature and oxygen to produce various ratios of gas, oil, and a carbon product called biochar.

Third- and fourth-generation fuels attempt to go more directly to a usable form of fuel. Oilseeds like **canola** and **camelina** still need several steps to become a diesel-like fuel or jet fuel. **Algae** would also require extensive processing. Work is under way to develop microbes that exude hydrocarbons ready for use as "drop-in" fuel.

Application

Diesel-like transportation fuel

Heat

Electrical power

High-quality transportation fuels

The carbon dioxide produced was present in the atmosphere at the outset. With the exception of fossil fuels used in production and distribution, the fuels are largely carbon neutral.

Unlike solar and wind energy, biofuels also can produce carbon-containing byproducts—films, plastics, pharmaceuticals, textiles and more—currently being produced with petroleum.

Source: Craig Frear

But when it comes to alternative crops, says Schillinger, researchers have had "less than full success."

Now Schillinger and a host of other people are hoping to take the tiny camelina seed, in the words of Scott Johnson, president of Sustainable Oils, "from a half-inch under to 40,000 feet." They want to grow jet fuel.

"One thing very promising about this plant is it doesn't need a lot of water," says Schillinger, standing in one of several greening test plots at the station. "It's very cold tolerant. We can plant it in the fall and have some confidence that it will still be alive in the spring… This would definitely represent something new to grow."

Meanwhile, camelina's oily seed can contribute to a state mandate to have 2 percent of all diesel sales be in the form of biodiesel. It is technically a toothless guideline more than a rule. But it's been given momentum by the Seattle company AltAir's agreement to sell 750 million gallons of camelina-based fuel to more than a dozen airlines. The fuel would be processed at an Anacortes refinery and piped directly to the Seattle-Tacoma International Airport.

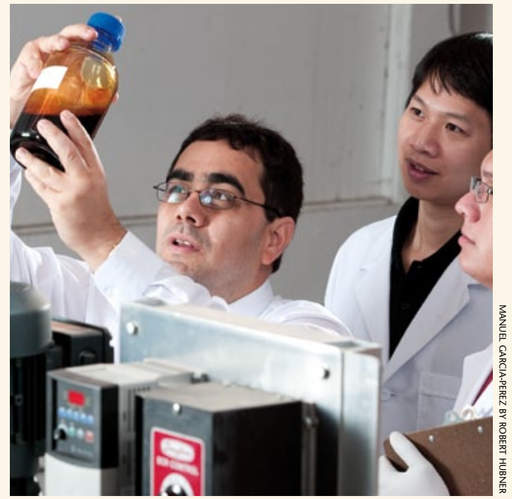
Camelina-based fuel has already powered a hydroplane at Seattle's SeaFair and airplanes in test flights by KLM, Japan Airlines, and the U.S. Air Force.

"If you look at where petroleum actually comes from, it was all plant based—whether it was algae or cyanobacteria or the actual plants from hundreds of millions of years ago," says Margaret McCormick of Targeted Growth, the bioscience arm of Sustainable Oils, which will provide oil for AltAir. "The idea that we're now using terrestrial life—plants, algae, what have you—to create a fuel isn't novel. We're just compressing time and making it suit our needs. I think it's the obvious choice. There's definite advantages to leaving sequestered the carbon that has been so long underneath the ground and using the plant life that's already out."

Still, it's a long way from Lind to runway 16L/34R. Like petroleum, Washington's wheat-production system has had more than a century to develop. Camelina is just getting started. An order of 750 million gallons of biofuel would need to see camelina's bright yellow bloom lighting up 1 to 1.5 million acres.

To some extent, camelina is walking in the footsteps of canola, which has been grown in the state for a few decades already.

A crop of canola may never pay as much as wheat, but it could improve a wheat crop enough to be worth growing. Bill Pan, co-director of the Biofuels Cropping Systems Research & Extension Project, a sprawling effort involving roughly 30 WSU-based researchers, calls it a "nitrogen catch-and-release crop." The crop's roots tap nitrogen deep in the soil and recycle it as the leaves fall off and break down. The root channel in turn traps water and prevents erosion while the overall crop rotation breaks weed and disease cycles.



MANUEL GARCIA-PEREZ BY ROBERT HUBNER

But would-be camelina growers might be wary of canola's own shakedown phase.

Four years ago, biodiesel based on canola and other sources was selling for less than conventional diesel and evoking a lot of warm feelings for its "triple bottom line"—good for people, the planet, and profits. The operators of Inland Empire Oilseeds, a crushing and processing plant in Odessa that opened in 2008, had a front-row seat.

"A few years ago, when biodiesel was actually cheaper than diesel, everybody went out and built plants and everybody wanted to buy biodiesel," says Pearson Burke, marketing and logistics manager.

But the industry had trouble putting out fuel to an acceptable standard. Soon, he says, "there were just some horror stories of school buses running down. The ferry system had problems with plugging in their filters."

It didn't help that the price of petroleum went down, the cost of seed went up, and the European Union put a tariff on imported biodiesel. Moulton, the state energy policy specialist, counts eight planned biofuel facilities in the state, but says an "economic perfect storm" left only four in operation.

Inland Empire Oilseeds survived. Its operators credit this to having a crushing facility and biorefinery in one place so they basically buy their oil at cost. Even then, General Manager Stephen Starr '78 compares the company's learning curve to not just reinventing the wheel, but "inventing the wheel for the first time."

The facility when last we checked was producing about 2.5 million gallons of biodiesel a year and hoping to boost capacity to 8 million gallons by the end of the year. That's about one-tenth of what AltAir hopes to produce each year from camelina.

"We look at that and view that as an extremely aggressive, optimistic plan," says Starr. "We will just to have to see if they can do it. Farmers are typically conservative. They stand a lot to lose if the crop doesn't produce they way they expect it to."

"I try to tell everybody, if you try to introduce a new crop it's just going to take several years," says Bill Pan. "It doesn't happen overnight."

SOMETHING'S BURNING

Manuel Garcia-Perez reaches into a refrigerator, pulls out a one-liter bottle of brown liquid, and offers a whiff.

It smells oddly familiar—burnt and woody but hard to place amid the clean benches and empty cabinets of a new lab in the old ag engineering building.

"It's barbecue," says Garcia-Perez.

Indeed, the very process Garcia-Perez uses to make this liquid is the same used by the Kingsford charcoal company, only faster. So where Kingsford slowly cooks wood scraps to keep most of the energy in a

briquette, Garcia-Perez cooks wood quickly to extract an oil containing 100 or so different compounds.

"My tool is heat," says Garcia-Perez, an assistant professor in Biological Systems Engineering. Specifically, he uses pyrolysis, cooking wood, straw—even the fiber from a manure digester—in an oxygen-free chamber at nearly 1,000 degrees F. Some of the gases that come off can be used to heat the reactor. Other gases condense into bio-oil, while solid material falls out as char.

The oil can be converted into green gasoline or diesel. The char can be used as a coal-like fuel or added to soil, where it can sequester carbon, take up pollutants, and possibly improve the soil's fertility. Similar material produced centuries ago by slash-and-char farmers is believed to be responsible for the super-fertile Amazonian "dark earth" soils, or terra preta.

The energy potential from Washington's forests is huge. The Midwest is far better at producing corn for ethanol, but we're one of the nation's top producers of wood. One WSU study tallied more than 11 million tons a year from just logging residues, mill waste, forest thinning, and land clearing. With other sources of biomass, the state could produce nearly half its annual gasoline consumption, says Jonathan Yoder, an associate professor of economics and leader of a major study of the state's biofuel economics and policy.

But press him on the details, and Yoder says, "I'm going to hem and haw here."

Problem One: Getting the wood out of the forest to a pyrolysis facility. A large, centralized factory has economies of scale but requires moving a lot of material over long distances.

"When it comes to biomass, transportation is a huge issue," says Yoder.

A fleet of smaller, portable pyrolysis units could operate alongside slash piles and thinning operations, transporting only the resulting oil, but with greater labor and capital costs.

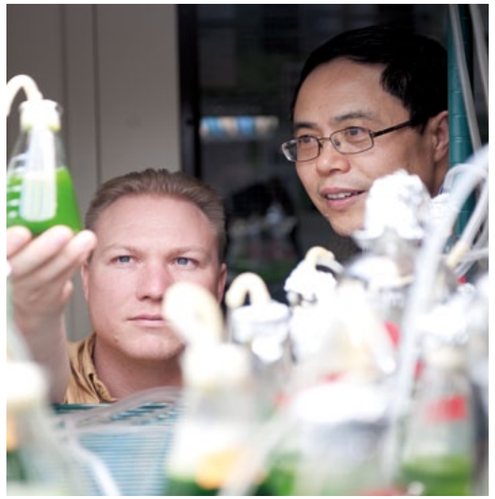
Then there's the not-so-simple problem of how fluctuating economics have to be considered if you want to ask which type of renewable energy source has the most energy potential.

"I think that's the wrong question," Yoder says. "The right question is: What is the appropriate balance among all our potential energy sources? Looking at the economic tradeoffs and the relative costs of utilization of forest biomass, of hydropower, of agricultural biomass production, of oilseed production—all of these have different economic costs that increase with production levels, but at differing rates."

If that's a bit bewildering, let's consider the desk in Yoder's office. We could run it through a chipper, cart it over to Garcia-Perez's oven and get a nice stock of oil and char from it. But then Yoder wouldn't have a desk.

Similarly, as the demand for wood-as-fuel grows, so does the price for wood for desks. A once-abundant resource and cheap source of fuel now becomes more scarce—and expensive. Even thinning residues can have a value, breaking down over time to build soil and provide nutrients. Take them away, and you cut into the long-term value of your forest.

"Wood for a table, wood for lumber, spotted owl habitat, water quality impacts, you name it," says Yoder. "You use that biomass for energy and likely it means you can't use it for something else."



SHULIN CHEN BY ROBERT HUBNER

REALLY, REALLY GREEN POWER

It's late one afternoon and Chad Kruger has spent about an hour extolling the virtues of manure digestion and camelina-based biofuel. He has a nearly four-hour drive to Wenatchee ahead of him, so by way of wrapping up I ask what else we might talk about.

"Um," he says, with no further prompting, "algae is the holy grail."

Off the top of his head, he quotes the following figures: camelina yields 30 to 40 gallons of fuel per acre, corn produces about 200 gallons per acre. But algae can produce orders of magnitude more—5,000, even 15,000 gallons per acre.

"You can see very quickly," Kruger says, "if you're looking for massive amounts of fuel, algae is it."

I run this notion by Shulin Chen, a professor in the Department of Biological Systems Engineering. Last year, he and a variety of partners around the state received a $2 million federal appropriation to develop algae and find a way to convert them into fuel and other products.

He pulls up a PowerPoint slide based on New Zealand research showing algae can produce tens of thousands of gallons per acre.

"Realistically," he says, "it's more like 2,000 gallons. We can do 2,000 now. We can design a system to do 2,000, not in a pond, but in a greenhouse."

More to the point, he says, pulling up a map of the United States, soy-based biofuel would use almost all the nation's cropland to replace just half its petroleum-based fuels. A similar amount of fuel from algae would take an area roughly the size of Vermont, and it need not be cropland and compete with food.

This is a big deal. The surge of interest and investment in crop-based fuels, followed by a surge in food prices in 2007, raised concerns that the world's food supply might be being sacrificed for energy. The Organization for Economic Cooperation and Development called on governments to end biofuel mandates and the United Nations Food and Agriculture Organization called for a review of biofuel subsidies and policies. This prompted a greater interest in "second-generation biofuels" derived from sources of organic carbon other than foodstuffs like sugar cane, corn, wheat, or sugar beets. It also spurred interest in "third-generation biofuels," more advanced technologically driven fuels that include algae.

Algae, says Chen, is "energy dense," with twice the energy per pound of ethanol. Like camelina, it can be processed as a ready-to-use "drop in" fuel. Grown near a conventional coal plant, it can use carbon-dioxide from a smokestack and reduce the fossil fuel's carbon footprint. Its production can also yield a variety of other products: pharmaceuticals and nutritional supplements, food and animal feed, specialty chemicals, pigments, and personal care products.

It is expensive to make, though, in that it needs nutrients to grow. Remember, we're talking here about algae producing orders of magnitude more biomass or recoverable oil than other technologies, and it has to eat. One key nutrient is nitrogen, and plenty of it. Kruger notes the nitrogen currently comes chiefly in the form of processed natural gas from the Middle East.

"There's a food-versus-fuel issue that very few people talk about," Kruger says.

Aware of that challenge, Chen has a provisional patent to use anaerobic digestion to extract and recycle nutrients from algae waste.

"Water probably is the bigger issue," Chen says. "We have to use wastewater resources and find other ways we can conserve water. But again, if you grow other crops, you use water also. It's all relative and there's no perfect solution."

Full development of algal fuel is still several years away. Peter Moulton, the state energy policy specialist, jokes that the technology has been "five to eight years away for the last 30 years."

Chen has heard the joke before and suspects a market for algae's byproducts will lead the way to making it a viable source for fuel. That and the changing price of petroleum.

"When you see $5 per gallon gas and diesel," he says, "the picture will change."

Birgitte Ahring discusses current bioenergy research with the media at the WSU Bioproducts, Sciences, and Engineering Laboratory in Tri-Cities. *Courtesy The Center for Bioproducts and Bioenergy*

BILLIONS AND BILLIONS OF REFINERIES

Birgitte Ahring and her colleague Aftab Ahamed have peered into a cell and seen a refinery.

The cell is a fungus called *Gliocladium*. It grows inside the bark of the ulmo tree, along the Andes in Chile and Argentina. Ahring and Ahamed were drawn to it a couple years ago, when a Montana researcher found that the fungus produced several hydrocarbon compounds similar to diesel.

It's the type of offbeat, cutting-edge discovery that attracts Ahring, a microbiologist and one of the first two researchers hired under Washington state's STAR program (Strategically Targeted Academic Research). As director of the WSU Tri-Cities Center for Bioproducts and Bioenergy, she leads an interdisciplinary effort focusing on turning biomass into fuel and other products.

She talks with farmers about using their straw for fuel. She talks with food processors about digesting their wastes for methane. At this February's Harvesting Clean Energy conference in Kennewick, the Danish native said she was drawn to Washington because, "I knew this is the place where all the biomass is."

At the same time, her new holy grail is "electrofuel." It would use photovoltaic electricity with carbon dioxide and different bacteria to make organic molecules. These molecules can then be converted into jet fuel or diesel using catalysis.

"A lot of organisms can actually grow with electricity and directly fix CO_2," says Ahring, sketching the process on a whiteboard. "And then you begin to engineer your pathway in here. So you actually have a situation where if you have a microbe, it doesn't need the sun directly. It actually grows directly off electricity, CO_2, or hydrogen-CO_2 coming from electricity.

As an added benefit, the microbe can capture CO_2.

"We can actually engineer the strains to do what we want," says Ahring.

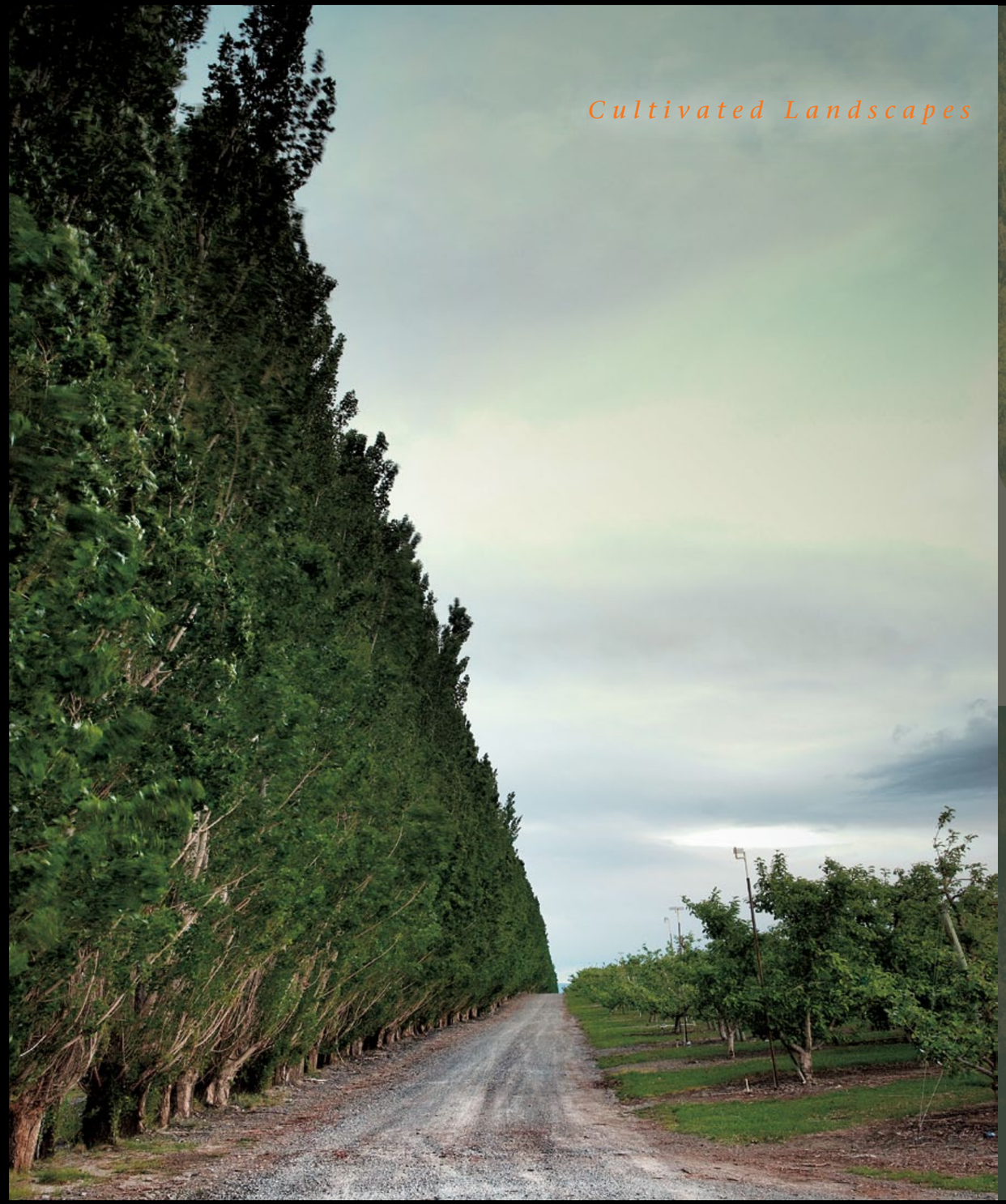
It sounds far-fetched and a bit too perfect. But it's the type of work that is being encouraged by the Department of Energy's Advanced Projects Research Agency Energy program or ARPA-E. Modeled after the Defense Advanced Research Projects Agency (DARPA), which brought you the Internet, the program aims to develop "high risk, high payoff" technologies that reduce our dependence on foreign oil, improve energy efficiency, and cut down on emissions.

Meanwhile, Ahring and Ahamed collect American, German, and Danish strains of Gliocladium and feed them cellulose. In some cases, they trick the fungus into producing more hydrocarbons as a defense mechanism.

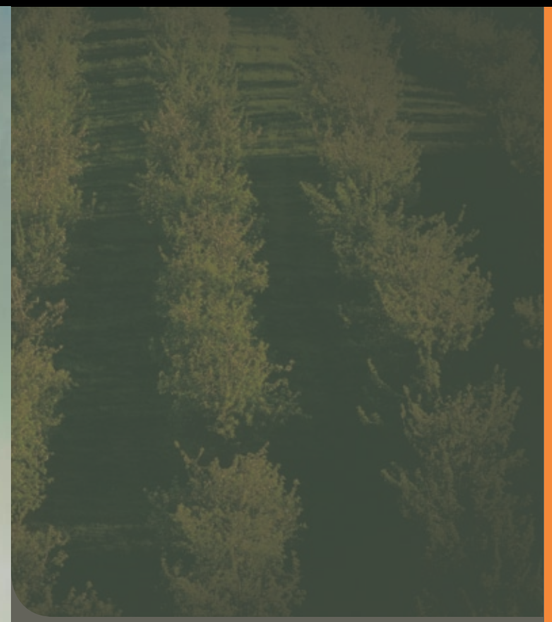
In an as-yet unpublished paper, the researchers document measuring 16 commercially used hydrocarbons, including benzene, octane, and others with varying numbers of carbon atoms. The paper notes that the compounds "are very similar to diesel fuel and could be used to power the diesel engine without any modifications."

"You get straightaway the hydrocarbons ready for fuel," says Ahamed. "That counts a lot for industry." ⊗

Watch video of WSU's biofuels research at wsm.wsu.edu.



The kinder, gentler orchard



photos by Zach Mazur

:: Tim Steury ::

MID-AFTERNOON IN LATE APRIL, I head out of Wenatchee on Highway 2. I turn off at Peshastin and cross the Wenatchee River. Much of the apple bloom lower down is already past. But here, upriver, the pears are glorious. Packed into the narrow valley and up every arable draw and cranny are pear trees, every one of them in full bloom, backed by the crags of the Cascades front.

Later that afternoon, sated by the beauty of the pear bloom, I meet Mike Robinson '80 in a pub in the Fifth Avenue Mall in Wenatchee. He tells me what it's like in the pear and apple orchard right now from the economic and management perspective, reflecting, at least to an extent, the harmony of the aesthetic spectacle.

"Here's an industry that's losing its old standby number one product for its number one pest," he says, initially suggesting a very un-idyllic scenario.

"You don't read about it. You don't hear about it. Nobody's upset. Nobody's even concerned. "

He seems almost blissful as he leans back and takes a sip of beer.

"That's perfect."

Robinson is an apple grower and also an orchard manager for Double Diamond Fruit in Quincy. He's a key player in an industry that expects to produce 100 million boxes of apples this year. Because of a competitive, and picky, world market, every one of those apples has to be perfect. And the greatest threat to perfection is the codling moth.

The larva of the codling moth is your basic worm in the apple. The codling moth is prolific, persistent, and omnipresent. Anywhere there's an apple tree in North America, you're going to find codling moths.

Despite all that, for the last 40 years, fighting the codling moth was pretty straightforward. Just spray them at appropriate times with azinphosmethyl, trade name Guthion. Azinphosmethyl is a broad-spectrum organophosphate pesticide that is very effective at killing codling moth and other insects. Unfortunately, it isn't partial only to insects. Like other organophosphates, azinphosmethyl's roots are in neurotoxin research during World War II. In other words, if misused, it can be toxic to anything with a nervous system.

Still, for decades, the fruit industry relied on it, applying it, for the most part, judiciously, until Congress, reflecting a changing mood in the country, cast a pall over the future of organophosphate control.

In 1996, both houses of Congress unanimously passed the Food Quality Protection Act. The FQPA required the Environmental Protection Agency to re-register, or re-evaluate, all pesticides within 10 years. The act also shifted the EPA's approach from a risk-benefit consideration of those pesticides to one based entirely on a measure of risk. The EPA initially focused its attention on the organophosphates, which it considered the highest-risk class of pesticide. The result has been a gradual phasing out of the organophosphates. Azinphosmethyl will be history by 2012.

After the passage of the FQPA, growers were understandably afraid they'd lose all their tools, that no new pesticides would be registered, says Jay Brunner '75 PhD.

Brunner is director of WSU's Tree Fruit Research Station in Wenatchee and, even more pertinent to Mike Robinson's good mood, the director of the Pest Management Transition Project. The PMTP is a primarily educational endeavor that has enabled the Washington tree fruit industry to find its way into a new, very complicated, and initially unsettling era of orchard management.

Opposite and below: The new softer pesticides have reduced re-entry time for workers from as much as 14 days to four hours.

Many of the changes in pest management brought on by the FQPA were difficult. Some pesticides were restricted. Lorsban, for example, which was a standby summer spray for San Jose scale, leafrollers, and codling moth, was suddenly restricted to pre-bloom, so there would be no residue on fruit. The re-entry period of Guthion, the weapon of choice against the codling moth, was boosted from 3 days to 14 days. Re-entry is the period orchardists must wait before re-entering an orchard after spraying.

But the positive developments of the FQPA, if not obvious at first, eventually far surpassed the oppressive restrictions.

"What did happen over the last decade," says Brunner, "lots of new pesticides were registered that targeted key pests that organophosphates were targeting, but at low risk to birds and wildlife."

And humans.

ROBINSON AND HIS FELLOW APPLE-GROWERS likely would not be so calm about the looming loss of their codling moth weapon were it not for a couple of developments over the decades: integrated pest management and mating disruption.

Mating disruption is the controlled release of synthetic pheromones, or sex attractants, in an orchard to prevent or delay reproduction. Although it's not entirely clear how this works, the omnipresence of the pheromone seems basically to confuse the males. The intensity of the pheromone is about 10,000 times what the female moths emit, says Brunner, a long-time pheromone researcher who has been instrumental in getting growers to adopt mating disruption as a regular management practice. Although the male codling moth can find the female by sight at close range, smell is the primary means of finding the female, and the male simply cannot find his way amidst the overwhelming presence of the synthetic pheromone.

Better than 80 percent of Washington's apple acres are treated with mating disruption, says Brunner. When used at the recommended density, mating disruption is very effective. Although 100 percent control of codling is not feasible with the pheromones, it is sufficient to dramatically ease the need for additional chemical control.

Mating disruption has thus become a major part of the strategy called integrated pest management, a combination of chemical, behavioral, and biological controls.

THE IDEA OF IPM goes back to soon after World War II. As soon as the pesticides that grew out of nerve gas research during the war were released, scientists started worrying about the development of pesticide resistance in the pests. Although scientists in California had used an early IPM approach in alfalfa, it really hadn't progressed much beyond theory.

When entomologist Stan Hoyt joined the WSU research station in 1957, he turned his attention to two of the major apple pests at the time, the seemingly eternal codling moth and McDaniel spider mite. The spider mite, though, was not yet a serious problem.

"We had a brand new miticide called Kelthane," says Hoyt. "So things didn't look too bad."

But by the following year, some McDaniel populations had already developed resistance.

"Well, we still had another one, Aramite."

But then, Aramite was found to be a carcinogen at high rates and was withdrawn from the market

"So it quickly went to a difficult situation," says Hoyt.

McDaniel spider mite populations exploded. Mites feed by sticking their mouthparts into leaf cells, then sucking out the contents, including chlorophyll. Infested leaves eventually turn bronze. When the mite pressure is severe, it can reduce photosynthesis and fruit quality. At their worst, says Hoyt, McDaniel infestation can denude a tree in midsummer.

Without predators present, he says, spider mite populations could increase in one month from an average of fewer than one mite per leaf on average to over 200. Also, their lifecycle is as rapid. A spider mite can go from hatching from an egg to laying eggs in eight days.

The McDaniel spider mite is a native species that is a pesticide-induced pest, says Hoyt. They developed resistance to the pesticides, while their predators died under the onslaught.

While doing some of his codling moth studies, Hoyt noticed that one treatment, involving a lower dose of spray, stood out. There was no mite problem. Hoyt found some predators. Not many. But not many spider mites either.

The next year he tried the treatment on a larger area. It wasn't very effective against codling moth, so he switched to Guthion.

But at the standard rates, the mites increased again. So they lowered the application rate to a level that controlled codling moth, but allowed predatory mites, *Typhlodromus occidentalis*, in the orchard to survive. It worked. The McDaniels population dropped to tolerable levels. But selling the approach to growers was another story.

"There were people who called it 'Hoyt's Folly,'" he says. Even though Hoyt knew the way to increase control of spider mites was to decrease the amount of pesticide to a level that spared the predators, it was a hard concept for an anxious grower to swallow. But Hoyt persisted.

Then in 1965, the area was hit with severe frosts. Growers, faced with small crops, suddenly were eager to save money in any way possible, particularly pesticide applications, and turned over large acreages to Hoyt's experiment.

"When we started applying lower rates of Guthion, our actual costs for pesticide for a box of fruit was like 20 cents," says Hoyt. Growers who continued to spray conventional mite control were spending five or six times as much.

By 1966, growers were using Hoyt's system on 9,000 acres of apples. By 1967, the program had grown to 40,000 acres.

Eventually, says Brunner, growers adopting Hoyt's program were able to eliminate sprays for spider mites. He estimates that since its implementation, Washington growers have saved over $120 million in pesticide cost alone.

"ESSENTIALLY, HIS [HOYT'S] IDEAS are what have driven how management occurs for the last 50 years," says Vince Jones, a research entomologist currently at the Tree Fruit Research Station.

Jones is the project director on a federally funded project, "Enhancing Biological Control in Western Orchards," a cooperative effort with UC Berkeley, the USDA Agricultural Research Service, and Oregon State University.

Combine Hoyt's work, the additional decades of modifications, mating disruption, and the continuing shift from organophosphates to softer pesticides, and "right now we're at a teachable moment," says Jones.

The situation gives us more chances to use more biocontrol, he says. "We need more ways of incorporating natural enemies into the system. The problem is, most people don't think biocontrol is important until it's gone."

For example, he says, "You don't think of spider mite management generally because of work that Stan did unless you disrupt that system—and suddenly you have spider mites everywhere."

An unintended consequence of the transition to the newer generation of pesticides has in fact been a disruption of the orchard ecosystem. Because of work by Hoyt, Brunner, and others, the effect of Guthion on the insect interactions is fairly well understood: If you apply just enough at appropriate intervals to control the codling moth but not kill off the predators, you end up with a fairly good balance.

"With the new materials, the effects are not as obvious," says Jones. "They're not always just increased mortality."

The problem is that the new generation of pesticides works with much different mechanisms. While they have been designed to be generally harmless to mammals, it turns out that they're not so benign toward non-target insects.

"Some are more acutely toxic than we thought, just through contact," says Brunner.

"Some of the new pesticides are steroidal," adds Jones. "They alter sex ratios, make them all males, reduce fecundity, reduce longevity.

"All of these factors really affect population dynamics."

Also, says Brunner, "Instead of having one product for codling moth, now we have nine. All are active in slightly different ways.

"Some of those products control just codling moth. Others control codling moth and Pest A, others codling moth and Pest B, depending

on when they're used. Weaving that all together in a program is what's complex."

Add to an already complex situation the problem of resistance.

"You need to mix them around.

"Ten years ago people didn't worry about resistance," continues Brunner. "Now, we go to meetings and we say use this product or use this product, and growers ask, well how does this fit in resistance management?"

The members of the PMTP have been communicating not only with growers and managers, but with farm workers also. One of the main messages carried by team members such as postdoc Nadine Lehrer to this group is that the new products they're working with really are safe.

With the older chemicals, sprays would be applied and then workers were able to go back into the orchard for anywhere from three to fourteen days.

"Now it's four hours," says Brunner.

A powerful tool that Jones, Brunner, and others have developed for growers and managers to navigate the new, softer-but-complex strategy is the web-based Decision Aid System. Jones offers me a chair next to him behind the two large computer screens he spends much of his day behind and logs on to the DAS.

The DAS basically tells growers "this is what insects are doing, and this is what you need to do," says Jones. The DAS "imports weather data, uses the data to drive insect and disease models and then integrates that information with physiological time-based pest status and management messages." The system contains ten different insect models, offering information on their seasonal development, when they are active, when they reproduce, and so forth. It also contains three disease models (for fireblight, scab, and powdery mildew) and one horticultural model.

The DAS system is linked to AgWeatherNet, the localized weather system directed by WSU's Gary Grove and others, which has 132 stations throughout the region. The DAS also uses NOAA and Weather Service forecasts to look into the future. It links to a wealth of supplemental material on insect behavior and phenology and usage information on all the next pesticides.

"The DAS has changed my life," says private pest management consultant Nick Stephens. He now joins most of the region's growers and consultants in logging into the DAS every morning. It does not do their work for them, but rather helps them decide which among the many choices to apply when for codling moth, for example. What spider mite predators are vulnerable to spray right now? Have there been enough degree-days of heat to make spraying for fireblight necessary?

As powerful as the DAS is, Brunner also stresses that there is no cookbook recipe for managing an orchard.

"Every site is different. The permutations are huge."

The Washington fruit industry is an enormously complex web of packinghouses, fieldmen, private consultants—and WSU scientists.

Although the new pesticides are far safer, their application demands more complex timing and coordination. Entomologists Elizabeth Beers, Vince Jones, and Jay Brunner and postdoctoral researcher Nadine Lehrer have led grower education through the Pest Management Transition Project.

Opposite: Wenatchee Heights

Brunner estimates there are between 200 and 250 consultants working in the industry. A few are private. Some work with the warehouses. Some work with chemical distribution companies.

"They're highly trained," he says. "They're taking our information and they integrate it into the needs of every grower."

"ONE HUNDRED MILLION BOXES" is the first topic of conversation at breakfast the next morning. I've met Harold Schell and Nick Stephens at Smitty's on Wenatchee Avenue, the main drag. A hard wind is still driving out of the Cascades, and it's cold enough for a warm jacket. But Schell and Stephens are upbeat.

Stephens, a private consultant, you met earlier. Schell '77 is the lead horticulture fieldman for Chelan Fruit, one of the main packing warehouses in the region.

The hundred million boxes is the size of this year's projected apple crop. In spite of what might seem a potential oversupply, prices are good and holding firm, says Schell.

Yeah, everyone's feeling good. But you can feel the intensity of what these guys do. Washington is the largest apple growing state in the country. No one comes close. And Stephens and Schell aim to keep it that way. Not only is the pressure of producing perfect fruit intense, so of course is the economic pressure.

Later that morning I drive up to Wenatchee Heights. The apples and cherries at that elevation are still in full bloom. The roads between orchards go on forever. Orchard upon orchard spread down toward the valley, a panoramic landscape of enormous scale, of fruit, of beauty, and of livelihood.

Earlier, Brunner had given me a quick tour of the investment and risk landscape.

WSU recently planted a new research orchard south of Wenatchee at a density of 1,452 trees per acre. "And that's not highest density," he says. Some orchards on dwarfing rootstocks and trellis systems push 2,000 trees per acre. Figure $7-8 a tree. Then there's irrigation and other infrastructure.

"These guys are investing, in the first three years, anywhere from $25-27,000 an acre with no return. They have to have a full-bearing crop by year six or seven to pay back investment. The capital intensity is huge compared to wheat or almost any other agricultural crop.

"There's opportunity for great reward, but it's a huge risk. You used to be able to produce a lot of fruit with two-thirds of it high quality. Now you've got to have 90 percent high quality fruit and still produce a big yield," he says.

Schell and Stephens know that risk inside out. It's their job to ensure that 90 percent high quality.

Still, even before our pancakes arrive, they're talking about how beautiful it is out there this year.

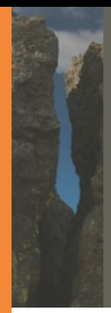
"When your office is your truck," says Stephens, "and you're going up and down the highway, and that's all you're looking at, it's a real funny dichotomy of emotion we have. You're so keyed into these bloom stages and the appropriate timing of these different activities you have to get done by growers—but then there's just the aesthetics … snowcapped peaks in the background and the pears in full bloom."

They both talk about how great the smell is this year.

"I've always thought if you could bottle the smell, you'd make a mint," says Schell. Then he talks about how his grandfather came out from Louisiana and planted 40 acres of golden delicious, taking a huge risk, without a buyer and before anyone knew what a golden delicious was. But he made it. And now here's his grandson talking about how much he loves going to work and how beautiful it all is.

"Anyway," says Stephens, "this time of year it's … the point where not only are there all sorts of horticultural activities taking place, you're thinking about the implications, the ramifications of the kind of weather … and it's just another odd year in a row, and cold, wind, hot, flowers opening up, the stigma, will they still be receptive when the wind stops blowing, full bloom, and then you start thinking when are we going to set a biofix on codling moth?" ⊗

More orchard photos are available at wsm.wsu.edu.



One version of pastoral

I'VE NOTICED LATELY that people rely on the term "pastoral" more often than they used to when they talk about nature writing. The long pastoral tradition in European literature, for instance, is now commonly seen as a garden plot of writerly attentiveness to the natural world that burst into bloom with the rustic lyricism of John Clare and the meditative prose of Thoreau and Muir, Mary Austin and Aldo Leopold, Wendell Berry and the rest. This is an attractive notion, and perhaps it's true. But to me it looks like wishful thinking—a quixotic misreading of early poetry in the interests of conferring a pedigree on literary habits that never needed one in the first place.

In other words, we've *always* had nature writing, just as we've always had writing about love, or war, or death. Gorgeous passages in Homer's *Odyssey* describe the Mediterranean Sea at dawn, and George Herbert's poem "The Flower" offers a stunning evocation of the life-cycle of a common perennial, even though its primary purpose is to encourage Christian devotion. Nature writing is often accidental, secondary, a by-product of other more pressing concerns. Yet it's no less valuable for that. And by the same token, considerations of the natural world embedded in pastoral are frequently stilted and conventional, displaying little in the way of authentic observation. Take the opening stanzas of Christopher Marlowe's famous lyric, "The Passionate Shepherd to His Love":

> Come live with me and be my love,
> And we will all the pleasures prove
> That valleys, groves, hills, and fields,
> Woods, or steepy mountain yields.
>
> And we will sit upon the rocks,
> Seeing the shepherds feed their flocks
> By shallow rivers, to whose falls
> Melodious birds sing madrigals.

I don't know about you, but I've never heard a bird serenading a waterfall. And even if I had, I don't suppose I would have been able to make out a melodic line. Marlowe's poem is pastoral in the classic fashion—"pastor," after all, means "shepherd" in Latin—but it doesn't give us "nature writing" in any meaningful sense, and neither do hundreds of other pastoral works produced in early modern Europe.

Even Shakespeare, in *As You Like It*, offers precious little to work with in terms of convincing natural description. It's true that the exiled Duke praises the Forest of Arden, but he does so in language that draws attention not to what the forest *is*, but to what it *isn't*:

> Are not these woods
> More free from peril than the envious court?
> Here feel we not the penalty of Adam,
> The seasons' difference, as the icy fang
> And churlish chiding of the winter's wind,
> Which when it bites and blows upon my body
> Even till I shrink with the cold, I smile, and say
> "This is no flattery. These are counselors
> That feelingly persuade me what I am."

In short, this is a moralized forest, a setting where the Duke finds "tongues in trees" and "sermons in stones," but it's not a place he cherishes for its inherent beauty or for any sense of the *de facto* value of natural creation. Generally speaking, Shakespearean pastoral depicts the rural world as a refuge from ambition, decadence, duplicity, and greed. It's still a fallen realm; it just hasn't fallen as far as the city and the court. In effect, such pastoral involves social critique through negative implication.

Indeed, this is precisely how Renaissance literary theorists understood the genre. Sir Philip Sidney, for instance, wrote that through "tales of wolves and sheep" pastoral poetry could "show the misery of people under hard lords or ravening soldiers," and George Puttenham added that the motivation for pastoral lay not in the exploration of rustic life "but under the veil of homely persons, to insinuate and glance at greater matters." Both these writers, of course, lived in a world without newspapers, television, film, cell phones, iPods, or the Internet—a world where poetry did far more cultural work than it does today. It's hardly surprising that they saw pastoral as a vehicle for social commentary. Even as late as the 1940s, Kenneth Burke could argue that literature was "equipment for living": a fundamental tool-kit for analyzing political questions and contemplating human existence. But that understanding has largely vanished today. A magnificent pastoral elegy such as John Milton's "Lycidas"—which uses the death of a young clergyman to launch an attack on the corruption of the English Church—is virtually incomprehensible to modern undergraduates until they've received a crash course in the social utility of literary forms.

So what would modern pastoral look like? I think we often see it in popular songwriting; country music is full of sentimental pastoral, and you can find traces as well in the lyrics of singers from Robert Johnson and Mose Allison to Joni Mitchell and Bonnie Raitt. Discovering that "they paved Paradise," after all, isn't so far removed from recalling the stark words of Death: "Et in Arcadia Ego" (I too dwell in Arcadia). There's always a snake in the garden—except perhaps in John Denver—and the snake is often more interesting than the flowers.

Let's suppose that a recently-divorced Wall Street banker abandons his seven-figure salary in Manhattan and moves to the Northeast Kingdom of Vermont, leasing fifty wooded acres and an old farmhouse with the idea of producing maple syrup. At first he's intoxicated with his dream. He scorns the country-club mentality he formerly held, relishing a newfound recognition of the ultimate sterility of money, power, and influence. But after enduring a six-month New England winter and finding that long hours of manual labor can be mind-numbing as well as bone-crushing, he begins to revise his views. It dawns on him, moreover, that his social horizons have vastly contracted: The locals don't golf or read *The Sporting News*, his landlord is verbally challenged, the farmer down the road seems furtively malevolent, and the nearest sushi bar is forty miles away. Going back to New York isn't an option, at least not now. His teenage daughter has fallen out with her mother and decided to move in with dad until she finishes high school. And she's bringing her horses—a pair of thoroughbred geldings currently boarded at a posh stable on Long Island. What to do?

Such a scenario might propel the early chapters of a modern pastoral novel, opening a range of social terrain for exploration and analysis. As with classical and Renaissance forebears, this fiction would be set in the country, and it would be narrated from a position of partial alienation: Its speaker would inhabit an ostensibly bucolic realm, but he would not be *of* that realm. And this, in turn, would give the author considerable traction in pursuing whatever lines of cultural investigation might seem appropriate. Perhaps there would be a bit of nature writing along the way. But it's unlikely that the book would be primarily concerned with an accurate and sensitive account of the natural phenomena encountered by our erstwhile banker. Nor would we desire such a thing. Nature writing, like cod liver oil and comparative theology, is best administered in small doses.

Good writers have always known this. Because the spectrum of possible attitudes induced by serious nature writing is relatively narrow—and because reverence and awe can quickly degenerate into pseudo-spirituality and maudlin enthusiasm—writers like Shakespeare and Montaigne keep their passages of natural description within sharp limits, usually interlacing them with other thematic and narrative concerns. In "Venus and Adonis," for instance, it's only when Adonis's stallion discovers a wild mare that Shakespeare turns to verbal portraiture. He ends up offering one of the more vivid depictions of any horse in English literature:

> His ears up-pricked, his braided hanging mane
> Upon his compassed crest now stands on end;
> His nostrils drink the air, and forth again,
> As from a furnace, vapors doth he send.
> His eye, which scornfully glisters like fire,
> Shows his hot courage and his high desire.
>
> Round-hoofed, short-jointed, fetlocks shag and long,
> Broad breast, full eye, small head, and nostril wide,
> High crest, short ears, straight legs, and passing strong;
> Thin mane, thick tail, broad buttock, tender hide—
> Look what a horse should have he did not lack,
> Save a proud rider on so proud a back.

@ See more photographs of Waterville Plateau erratic boulders at wsm.wsu.edu/gallery.

> Sometime he scuds far off, and there he stares;
> Anon he starts at stirring of a feather.
> To bid the wind abase he now prepares,
> And whe'er he run or fly they know not whether.
> For through his mane and tail the high wind sings,
> Fanning the hairs, who wave like feathered wings.

Not bad for a casual effort.

As for Montaigne, though he's fascinated with the question of what constitutes "nature" and "natural" behavior, he seldom engages in extended description of the natural world. Probably his most interesting meditation occurs in the essay "Of Cruelty," just after he tells us that, unlike most of his contemporaries, he doesn't enjoy hunting. The custom of killing animals for pleasure, he says, leads him to doubt Biblical assertions of human dominion over the earth and all its life-forms:

> I am led to abase our presumption and to lay aside that imaginary kingship over other creatures which is attributed to us. There is a kind of respect and duty in humanity that links us not merely with animals, but even with trees and plants; between them and us is a kind of intercourse and a degree of mutual obligation.

Written in France in the 1570s, these words articulate an outlook unheard of in its time—an astoundingly forward-looking perspective that conveys an eerie sense of prescience in light of today's imperatives toward environmental responsibility. One might almost think of it as an early expression of ecological thought, a delineation of basic presuppositions undergirding modern views about sustainability and the need for humans to diminish their "global footprint."

Montaigne lived in the French countryside, very much in an agrarian setting, and he would have understood the realities of rural life more thoroughly than most authors of his day. Perhaps this explains why he never participated in the literary tradition of pastoral: It must have seemed exceptionally artificial for a writer with his particular background and temperament. Nonetheless, he gave us one of the most remarkable early accounts of human interconnectedness with the natural world. And as a consequence we're reminded that, despite the many versions and virtues of pastoral, nature writing must look elsewhere for its deepest, most nourishing roots. ⊗

Will Hamlin teaches literature at WSU. He is currently writing a book titled Montaigne's English Journey.

Class notes are now online!

wsm.wsu.edu/mystory

myStory

CLASS NOTES

1950s

Richard P. Kim ('51 Pharm.) led the charge to build a Korean War Memorial at the Vancouver division of the Portland, Oregon, Veterans Administration Medical Center. He and his fellow volunteers raised about $16,000 for the project. He did most of the design work, public communications, and paperwork. Kim's father Chan Jay Kim was born in South Korea and graduated from WSU in 1922. His brother Chan Jay Park Kim Jr. attended Washington State in 1947 and was killed during the Korean War. During the war Richard Kim served as a Corpsman in the U.S. Navy, primarily at the Naval Medical Center in Bethesda, Maryland. He has worked as a pharmacist for 50 years, 27 of which he worked as a chief pharmacist in VA Hospitals around the country.

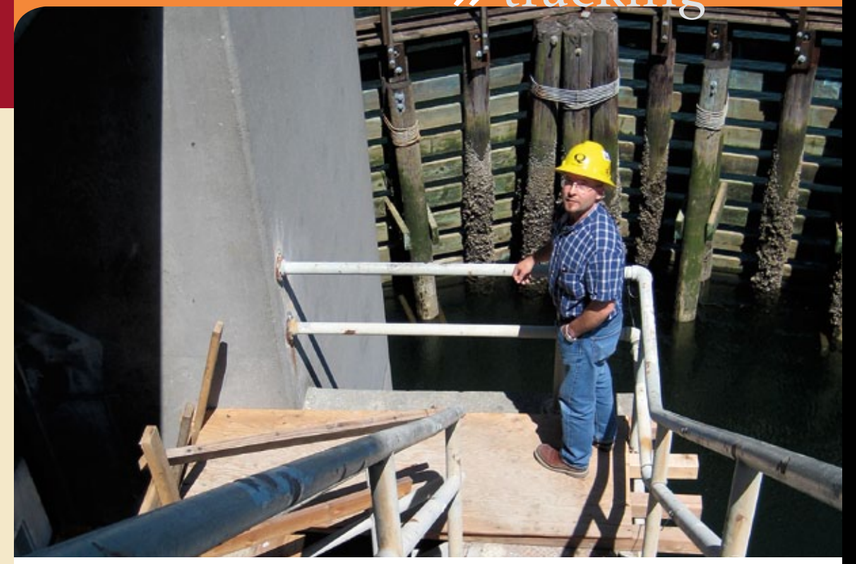
Audrey Hurley Murray x'55 and **Harold Murray** ('56 Civ. Engr.) were friends at WSU. They met up again after their spouses passed away. They are now married and live in Arizona.

1960s

John N. Terrey ('64 EdD), widely recognized as the builder of the state's community college system, was honored with the Washington State University Alumni Association Alumni Achievement Award in April. He spent 15 years teaching English in various school districts in Washington before becoming Tacoma Community College's first dean of instruction in 1964. In 1969, he became deputy director of the Washington State Board for Community College Education; he was promoted to director in 1978 and held that post until 1987.

Stephen Fausti ('65 Speech and Hearing Sci.) received the 2010 James Jerger Career Award for Research in Audiology. Founder of the National Center for Rehabilitative Auditory Research at the Portland VAMC, he currently serves as director. The NCRAR is now the country's leading research center in rehabilitative audiology. After graduating from WSU, he went on to study at the University of California at San Francisco, and received his PhD from the University of Washington. Fausti is also a professor in the Departments of Otolaryngology and Neurology at Oregon Health & Science University and has taught at various universities throughout the state of Oregon.

Steven L. VanAusdle ('66 MA, '68 Ag. Econ.), president of Walla Walla Community College, was presented with the Washington State University Alumni Association Alumni Achievement Award in May for his dedication to higher education and many contributions to the economic vitality of the Walla Walla Valley and the state. An Elks Lodge member since 1969 and a Rotary Club member since 1982, he has served on the United Way Board of Directors and was president in 1984 and has served as president of the Walla Walla Valley Chamber of Commerce.



Hans Breivik oversees the $15 million project to repair the 1938 Hylebos bridge in Tacoma. *Staff photo*

Hans Breivik '88

About a bridge

by Hannelore Sudermann:: Tacoma certainly has had its share of broken bridges. But lately Hans Breivik '88 has been coordinating the repair of one of them.

The double-bascule bridge across the Hylebos Waterway at the Port of Tacoma was built in 1938 and has been frozen in the open position since 2001. "Double bascule means that it has two leaves that open and close," says Breivik, a construction management graduate who is now managing the $15 million Hylebos project. "When it worked, it worked on kind of the principle of a teeter-totter." He raises his arm, imitating the way one arm of the bridge would, with a counter weight, open and close.

One day, nearly a decade ago, a drive shaft broke and the bridge stopped opening. The city could have replaced the broken part for about $50,000, says Breivik. But after examining the timber, steel, and concrete apparatus, the council members decided the bridge should either be abandoned or overhauled. In 2004 an arson fire on the east side damaged the bridge's motors and steel. And scavengers have since made off with a lot of the machinery and metal parts for scrap.

Eventually, though, it was decided to save the bridge, which once connected the port's Blair Peninsula with the mainland. "It's kind of a bridge to nowhere," says Breivik. "But the port needs it." A refurbished bridge would provide an emergency escape route in case of a fire or chemical spill and would allow the port to add a new terminal as well as serve two more new terminals on tribal land across the waterway.

Breivik met me at his office at Quigg Brothers near the silos, refineries, and waterways of the Port of Tacoma. Pictures of his wife and daughters mingled with souvenirs of some of his previous big projects. The bolts, lights, and signs are reminders of the hours he and the crews he managed have spent repairing and replacing some of the Northwest's water landmarks.

In 2006 Breivik's employer won the bid for the Hylebos project. It's more than just replacing the machinery, says Breivik, taking a long white binder from a shelf. He turns to a side elevation of the bridge and its approach. "We had to remove

STAFF PHOTO

these timber piles and then dig eight-foot shafts and pour columns," he says, pointing to the piers leading up to the bridge. "Then we set precast concrete girders on top."

With each 100-plus-foot-long span, Breivik's crew will have to replace the existing motors. "New motors, new gears, new instrumentation, new controls," he says. "It's an interesting project. Not overly difficult, but it has some challenges."

Breivik is not new to challenge. In addition to having worked on projects around the Port of Tacoma, including a job rebuilding the dock beneath the Working Waterfront Maritime Museum, he has worked all around the world. After a short stint with a firm in Bellevue, he traveled to Arizona to build a dam and later to Egypt to demolish one building and build an addition to the U.S. Embassy in Cairo. Then he moved to the east coast and spent some time in St. Lucia.

"A few years ago I decided I had enough of being a gypsy, so I came home," says Breivik. He ultimately settled in with Quigg Brothers, a fourth-generation-owned Aberdeen-based business that does projects involving ports, docks, bridges, and waterways.

The Hylebos project is more than just repairing a bridge, says Breivik as we drive down Taylor Road to the site. It includes rebuilding the approaches and mending the fence system, which is made up of wood pilings around the base of the bridge. The workers found that once the horizontal side rails were removed, the vertical pilings would fall right over. "So we replaced 60 pilings," says Breivik, pointing to the fences. "We hadn't expected to do that."

We climb up to the approach and walk past a group of workers pouring concrete. Breivik looks skyward. In order to replace certain parts on the lifting arms, the crew will have to unhinge the open bridge and jack up the arms to get at the bearings, measure them, and replace them, he says.

If Breivik could keep a souvenir from this project, it would probably be the old control tower, he says as we climb the narrow metal stairs inside the small two-story building where the controller would spend his days watching the waterway. Besides the fact that it's too big to bring to his office, "it can't be saved," he says, pointing to the rust eating through the walls. A brand new, air-tight version will be put in place before the job is completed in October 2011.

When this job is done, Breivik wouldn't mind working on Tacoma's other broken bridge. The 97-year-old Murray Morgan, just a few miles across the port, was closed in 2007 for safety reasons. The city recently bought it from the state and reopened it to pedestrians and bicycles. But it still needs work, about $61 million worth. "And," says Breivik with a grin, "it's going out to bid."

Kevin Tomlinson '75

Back to the garden

by Hannelore Sudermann :: On a roadtrip with a friend in 1988, Kevin Tomlinson stumbled onto what would be the seed of a great story. At the time, he just knew he had to collect it and save it.

"We were out to see the American West," says the filmmaker, who graduated from the Murrow School in 1975. "It was a Jack Kerouac, Neil Cassady kind of thing."

Keeping off the main roads and camping from their car, the pair landed in Tonasket where they came across the local food co-op. When Tomlinson perused the bulletin board to get a flavor of the community, he spied a flier adver-

KEVIN TOMLINSON BY DAVIS FREEMAN

tising a healing gathering in a couple of weeks time and knew he had come across something interesting. "I thought, 'What is this? A love in?'" says Tomlinson. "This was 1988, not '68."

He was intrigued. He went home to Seattle and told his wife Judy about the event. She not only urged him to return for it, she agreed to go along to see what it was about.

When they arrived at the site in the hills of the Okanogan, they weren't disappointed. "There were 400 people. They showed up in magic buses, put up tepees, and were walking around with children and beads." Tomlinson knew he had to film it. "I brought my gear with me just in case," he says. "I was amazed that 20 years after Woodstock, I had found these back-to-the-land hippies."

It was dicey at first. Many of the people were wary of Tomlinson and his Betacam. "But they got used to me," he says. Judy asked the questions, and he filmed them visiting, dancing, eating, and playing. "We're trying to live peace and love," one man named Skeeter told them. A woman named OnePine offered, "It's saying a simple life can be satisfying."

"It sounds cliché," says Tomlinson, "but there really was this beautiful vibe there."

When he got home to a Seattle of the late 1980s steeped in the Reagan era and listening to Huey Lewis and Whitney Houston, he knew he couldn't release the footage. "I realized people are not going to take this seriously," he says. So he stashed it away in his garage and his basement, it survived four different moves, and mostly "It was just decomposing," he says.

Tomlinson continued his career as a cameraman, producer, and director. He worked for

James Aho ('68 Soc., '71 PhD) retired from Idaho State University in December 2009 and has been working on his ninth book, *Sociological Trespasses: Interrogating Sin and Flesh*. Aho has also authored numerous articles, book chapters, encyclopedia entries, and reviews. He came to Idaho State University during the 1969-70 school year and became a full professor in 1982. His research interest has ranged from comparative religions and warfare to right-wing extremism in Idaho and the sociology of suicide in Idaho. His work has been featured in a number of prominent broadcast interviews including on the PBS McNeil/Lehrer news program and National Public Radio.

1970s

Marcia Whitney-Schenck ('73 Comm.) recently published *What God Gives*, a photo essay of Cameroon and Congo.

Sue McGill ('76 Ed.) will retire in November from her position as deputy superintendent of Olympic National Park. McGill began her 31-year career working for the National Park Service as a student intern at Mount Rainier. She has since worked at parks across the country including Mesa Verde, Everglades, Carlsbad Caverns, USS Arizona Memorial, and Great Smoky Mountains. In addition, McGill served on the Senate Energy and Natural Resources Committee and earned several awards for service.

John Armenia ('78 PhD Ed. Admin.) has joined the board of directors of Phi Delta Kappa International, a professional organization for educators. Armenia has worked in a number of leadership roles including serving as the president of the PDK Washington State chapter from 2005 to 2009. He was also named a World Affairs Council Fellow in 2004. Armenia was awarded the title of professor emeritus in 2008 upon his retirement as director of City University of Seattle's Educational Leadership Program, where he continues to teach in the superintendent and administrator certification programs.

Dan Youmans ('78 Polit. Sci.) has been named State President-Washington, AT&T External Affairs.

Suzanne Brooks ('79 Engl.) co-founded March 1st as Women of Color Day and now is CEO of the International Association for Women of Color Day. She is also bandleader of The Jazz Generation with seven CDs. Brooks is releasing two new books after more than 30 years of human and civil rights activities. The newest is *The Constructive Extermination of Women of Color: Consequences of Perpetual Socio-Economic Marginalization*. In March 2010, she produced and performed in a new show, *I Believe I Can Fly* featuring 112-year-old Mother Ruby Muhammad.

1980s

Rhoda L. Altom ('80 Const. Mgmt.) was awarded the Washington State University Alumni Association Alumni Achievement Award. Altom is the first woman to graduate from Washington State University's construction management program. Today, she is president of Milestone Properties and oversees its portfolio of properties across the country. She is also a philanthropist and community volunteer with a special affinity for health care and women's issues. Among her many efforts, Altom founded the Pediatric Brain Tumor Research Fund and established the Pediatric Epilepsy Foundation at the University of Washington. Together with her husband Cory Carlson, she established the Altom+Carlson Foundation to support various organizations.

Cary Pillo Lassen ('80 Fine Arts) is a Seattle illustrator whose latest book was just published by Parenting Press. *Where Is My Mommy? Coping When A Parent Leaves (And Doesn't Come Back)* shows a small child working through abandonment by his mother. She is the mother of Seth Lassen, a new WSU alum.

Doug Hammond ('82 Const. Mgmt.) has been hired by Graham Construction & Management Inc. of Spokane as Business Development Manager. He previously worked for Empire Health Services.

Robert Hoon ('82 Poli. Sci.) is the new general counsel at the University of North Carolina Wilmington. Hoon served as UNCW's deputy general counsel for more than five years. Hoon's previous experience in higher education includes serving Washington State University as an assistant attorney general, real estate officer, public finance officer, and director of business services. After relocating to North Carolina, Hoon worked at NC State University for three years before moving to UNCW.

John "JD" Sicilia ('84 Psych.) has been named Director of Strategic Management and Performance for the Department of Defense. He previously served as the Chief of Performance Management for the Defense Intelligence Agency (DIA). He is certified as a black belt, master black belt, and master black belt trainer. Prior to joining the DIA, Sicilia served as an officer in the United States Army. He retired from active duty after 21 years of service.

Jenny L. Hitch ('85 Geol. Engr.), director of marketing at Full Circle Solutions Inc. in Jasper, Georgia, has received the ASTM International Award of Merit and accompanying title of fellow. The Award of Merit is ASTM's highest recognition for individual contributions to standards activities.

Carl Wommack ('88 Soc. Sci.) has been a police officer at the Moscow Police Department for just over 20 years. In 1995 he was selected for a specialty position of Campus Community Policing Officer at the University of Idaho. He has also served as a detective, a crime prevention officer, a patrol officer, and coordinator of the citizen's police academy.

Dennis P. Maguire ('89 PhD Ed.) is the associate superintendent of curriculum and instruction for the Pasco School District. In May he was recognized by the Washington Association of School Administrators with the Robert J. Handy Most Effective Administrator award. Maguire has worked as a school administrator for 36 years, 11 of which he has served in Pasco.

1990s

Brian F. Kuhn ('90 Zool., '91 Anthro.) is one of the scientists who found and described the geological setting around the newly found hominid *Australopithecus sediba*. Among his discoveries at the site in South Africa were the fossil remains of an infant around 12-18 months old. Kuhn is a researcher for the Institute for Human Evolution at the University of the Witwatersrand in Johannesburg. He is one of the co-authors for the paper published in *Science*, "Geological Setting and Age of Australopithecus sediba from Southern Africa."

Chris Aker ('91 Bus.) bowled for the Cougar bowling team from 1988 to 1991. During that time the team placed second in the nation and Aker was named a collegiate All-American (honorable mention). Recently he bowled a sanctioned 900 series for 3 games in a league in Winnemucca, Nevada, where he now lives.

FRAME FROM "BACK TO THE GARDEN" BY KEVIN TOMLINSON

King TV and later *Bill Nye the Science Guy*. He went on to shoot programs for the likes of CBS News, *Dateline NBC,* Discovery and History channels, and Rick Steves's travel program. He also freelanced for corporate clients including Microsoft and GTE. "I am now working as a professional cameraman, basically doing everybody else's projects," he says. All the while, he felt guilty about leaving the footage from the healing circle untouched.

It wasn't until a Dutch producer said she'd like to see the film that Tomlinson dug it out. He went through it again, selecting sound bites and editing a segment to show her. "I realized, 'Oh my God, this is just perfect for today,'" says Tomlinson. "All the people we interviewed back then were living simply, sustainably. Isn't that what we're trying to do now?" He contacted the food co-op in Tonasket and asked for help reaching the subjects. "One by one, I contacted them," says Tomlinson. That October he took 58 minutes of film from the 1988 footage to the Okanogan barter fair where he knew he would find more of his subjects. "Many of them had forgotten I had filmed them. They were amazed and pleased to see it." And a few agreed to let him follow them for the next two years.

While some had moved away (one now lives in Bellevue and works for Microsoft), most were still living the lives they had been so enthusiastic about when he met them nearly two decades earlier. Maeyowa, who had come west to find a long-bearded guy and live in the mountains, today makes her home in the Methow Valley where she farms and lives in a solar-powered home. Tomlinson found Jeffrey Stonehill living on a school bus on Lopez Island where he gardened and taught music and language. And Skeeter is farming produce and living communally and still organizing events like the healing gathering and the barter fair.

By knitting the then and now together in *Back to the Garden*, Tomlinson had captured a slice of our state's history and culture, showing that something that started in the 1960s was still going strong in the 1980s and had lasted and even grown to today.

The movie has played at 15 film festivals internationally, from Seattle's film festival to Berlin, Tel Aviv, Amsterdam, and Barcelona.

"I could have made this movie in 1988," says Tomlinson. But it wouldn't have resonated the way it does now. "We've hit a Zeitgeist. People today are really receptive to these ideas."

When they're not traveling or making films in Seattle, Tomlinson and his wife have made time to go "Back to the Garden" themselves. They've recently acquired a small, solar-powered cabin east of the Cascades.

See clips from *Back to the Garden* at wsm.wsu.edu.

Matt Kirsch ('95 Crim. J.) is Court Operations Supervisor with the US District Court for the Middle District of Florida. He lives with his wife Susan and two children, Kade and Kiera, in Clearwater, Florida.

Matt Saski ('97 Comm.) welcomed daughter Olivia Noelle in March. Her big sisters Maria (8) and Annika (5) are excited and helping out.

2000s

Sarah Houghton-Jan ('00 MA Engl.) has published her first book: *Technology Training in Libraries*. Houghton-Jan is the Digital Futures Manager for the San Jose Public Library and blogs at LibrarianInBlack.net. She was named a Trendsetting Mover & Shaker in 2009 by *Library Journal*, and won the UIUC Library School Alumni Association Leadership award. She lives in San Rafael, California, with her librarian husband and decidedly non-librarian cat.

Andrew J. Miller III ('06 Psych.) welcomed his son Andrew Jackson Miller IV in November.

Casey M. Jones ('08 Bus. Admin.) recently completed U.S. Navy basic training at Recruit Training Command, Great Lakes, Illinois.

Neil Padrick Wilson ('08 Philosophy) received the Sam Wilkins Criminal Law Award, given to an exceptional student in Criminal Law at Mississippi College School of Law.

Nathaniel I. Clark ('09 Comp. Sci.) recently completed U.S. Navy basic training at Recruit Training Command, Great Lakes, Illinois.

IN MEMORIAM

1930s

Mary Thompson Reed ('31 Engl.), 100, February 27, 2010, Seattle.

Milford J. Schultz ('32 Ed.), 101, February 25, 2010, Manson.

Eleanor Peterson ('33 Ed.), 97, March 10, 2010, Spokane.

Ernestine B. Adams ('35 Econ.), 100, March 14, 2010, Seattle.

Walter E. Zuger ('37 Econ.), 96, February 4, 2010, Corvallis, Oregon.

Herman H. Hayner ('38 Bus. Admin.), 93, February 26, 2010, Walla Walla.

E. Walker Baylor ('39 Chemical Engineering), 94, March 31, 2010, Fallbrook, California.

Dorothy Colvin ('39 Home Ec., TC Ed.), 95, May 7, 2010, Chehalis.

Ivan Roe Sayles ('39 Bus. Admin.), 82, May 24, 2010, Pullman.

1940s

Virginia E. Sieveke x'40, 90, April 16, 2010, Tekoa.

Ray H. Bradbury ('41 DVM), 93, February 6, 2010, Skagit Valley.

Arthur Hartwig ('41 Mech. Engr.), 96, March 20, 2010, Illinois.

Michael Martin McGarvey ('41 Pharm.), 91, February 24, 2010, Spokane.

James Robert McKay ('41 Ag. Ed.), 92, February 7,2010, Spokane.

Alfred St. Clair Polson ('41 Bus.), 88, January 19, 2007, La Conner.

George Provan Hebner x'42, 86, March 8, 2010.

Rev. Roland O. Wittrock x'42, 86, February 11, 2010, Federal Way.

Robert Stanly Duncan ('43 Mech. Eng.), 89, May 9, 2010, Bothell.

Dorothy M. Thill ('43 Music), 88, December 14, 2009, Clarkston.

James Hajime Mizuki ('45 For. and Range Mgmt.), 87, May 4, 2010, Seattle.

Mary Ruth T. Meade ('47 Soc. Sci.), 85, April 5, 2009.

Harry L. Krause ('48 Ag., '68 MEd), 88, February 4, 2010, Lacey.

Betty J. Myklebust ('48 Soc. Stud., '51 Ed.), 82, March 6, 2010, Seattle.

Edith I. Swanson Volosing ('49 Home Ec.), 85, February 18, 2010, Spokane.

1950s

Walter Warrington Harrison x'50, 81, April 23, 2010, Seattle.

Robert Parsons ('50 Sci.), 2009, Colorado.

Reginald L. Scodeller ('50 Ed. and Hist.), 81, March 19, 2010, Mukilteo.

Richard B. Broxson ('51 Psych.), April 15, 2009, San Jacinto, California.

Kathryn Hamilton ('51 Soc.), 81, February 20, 2010, Kentucky.

Ann Hayes ('51 Ed.), 80, March 3, 2010, Everett.

purchased a light airplane and both became accomplished pilots. They were at home on the plantation when the Japanese attacked Pearl Harbor on December 7, 1941. With war raging, Ed joined the Army, and in 1942, when the WASP Corps was formed, Jeanne was one of the first to volunteer.

Above: WASP Jeanne Norbeck with one of her test planes.
Below: A memorial for Norbeck who died testing a plane.
Courtesy the Atterbury-Bakalar Air Museum

Jeanne Lewellen Norbeck '33

Recognition at last

by James Quann '54, '71 :: In March of this year, a special Congressional action signed by President Obama awarded the Congressional Gold Medal to the Women's Airforce Service Pilots, the "WASPS" of World War II. Jeanne Lewellen Norbeck '33 was awarded the medal posthumously.

Jeanne graduated from Washington State College with a degree in English. President Roosevelt had funded the start of construction on the Grand Coulee Dam, and Jeanne was an early hire. She married a young engineer on the project, Ed Norbeck.

Later, Jeanne and Ed became managers of a large plantation in one of the outer islands in the Hawaiian chain. Given the lack of transportation between islands, Jeanne and her husband

The WASPS flew over 60 million miles and logged nearly 300,000 flying hours in every airplane in the American arsenal, from P-51 Mustang fighters to the B-29 Superfortress. Also, they ferried more than 12,000 aircraft to bases abroad. A few of the more experienced women pilots—and Jeanne was one of them—served as test pilots.

When you think of test pilots you automatically think of exotic new aircraft just off the assembly lines. But these test pilots tested aircraft that had been badly damaged or worn out in war, then rebuilt to fly.

In October 1944, Jeanne was testing a BT-13 in South Carolina. It crashed, and Jeanne was killed.

The WASPS were civilians hired by the Army, with no benefits whatsoever. According to Lt. Col. Yvonne Pateman, neither the military nor the U.S. Government assumed expenses for Jeanne's funeral, nor even provided a military escort or a flag for her coffin. Jeanne's fellow WASPS took up a collection to pay for her funeral, and one of the ladies volunteered to accompany her body home to her parents.

Three other test pilots were killed in the line of duty, as were 34 other women pilots—all without military benefits or honors.

In 1977, President Jimmy Carter signed a bill granting veteran status for the WASPS. For Jeanne and most of the WASPS it was too late in coming.

Now the women flyers have been awarded the nation's highest civilian honor, the Congressional Gold Medal, recognizing their courage and service to their country.

James Quann ('54, '60 MA, '71 EdD) was WSU's registrar from 1971 to 1990. He is the founder of the WSU Veteran's Memorial and author of WSU Military Veterans: Heroes and Legends *(Tornado Creek Publications 2005), which chronicles 120 case studies.*

Edward Claplanhoo '56
Bah-duk-too-ah
August 8, 1928–March 14, 2010

by Tim Steury :: Ed Claplanhoo '56 was chairman of the Makah Tribe in Neah Bay when a winter storm in 1970 eroded the bank above the beach at Cape Alava on the Olympic Peninsula coast, revealing the village of Ozette. The village, ancestral home to many Makahs, had been buried in a mudslide in the 1700s.

Once he realized what the storm had exposed, Claplanhoo called Richard Daugherty, an archaeologist at WSU. Daugherty had been the freshman class advisor in the early 1950s, and Claplanhoo had been the class treasurer.

Claplanhoo and Daugherty worked closely together to explore and preserve what archaeological crews found in Ozette, with the resulting artifacts and interpretation presented in the Makah Cultural and Research Center.

Claplanhoo first enrolled at WSC in 1947 with a full-ride scholarship from the Washington State Department of Education. His studies were interrupted by military service, but he returned and graduated in 1956 with a degree in agriculture and forestry. He was the first Makah college graduate. Soon after graduation, he was hired by the Department of Natural Resources. He also began a long career of community involvement. This will be the first year since 1965 that Claplanhoo will not be the master of ceremonies for Makah Days, a community celebration held every August.

His civic engagement was wonderfully extensive and varied. One of his last contributions was the Fort Núñez Gaona-Diah Veterans Park, on the west side of Neah Bay. The park now occupies the site that once held a fort built and briefly occupied by the Spanish in 1792. Claplanhoo envisioned the park as a monument both to the fort and to tribal veterans. He worked with the Lieutenant Governor's office and the Spanish government to develop the idea, and he and his wife dedicated family land for the park.

His loyalty extended not only to veterans, his people, and his community, but also to WSU. A visitor to his house would have no doubt where he went to college. In a note, Thelma, his wife of 50 years who did not attend WSU, wrote that "living with Ed you had to be a Coug at heart."

Claplanhoo died unexpectedly of a heart attack in March. His heart was operating at only partial capacity, says Thelma, but he simply couldn't slow down. More than a thousand people crowded into the high school gym in Neah Bay for his funeral. «

ZACH MAZUR

Read more about Ed Claplanhoo and view the Ozette gallery at wsm.wsu.edu.

Thomas E. Lian ('51 Pharm.), 79, January 19, 2009, Anacortes.

Bruce Monroe ('51 Hort.), 72, April 18, 2010, Wenatchee.

Russell Birnie Bass ('52 For. and Range Mgmt.), 83, March 3, 2010, Longview.

Alvon L. Mochel ('52 Polit. Sci.), 83, April 19, 2010, Spokane.

Donald K. Dodge ('53 Bus.), 80, June 21, 2009, Kirkland.

Peter A. Breysse ('54 Ed.), 87, May 10, 2010, Seattle.

Bjorn F. Hrutfiord ('54 Chem.), 78, February 16, 2010, Bellingham.

Edward F. Renshaw ('54 Ag.), 77, January 14, 2010, New Hampshire.

Ardell E. Schilke ('54 Bus. Admin.), 82, March 8, 2010, Seattle.

Eugene Edwin Curnow ('55 DVM), 85, April 9, 2010, Portland, Oregon.

Jean L. Howard ('55 Pharm.), 82, December 6, 2009, Selah.

Marilyn C. Segle Dorsey x'56, 74, March 20, 2010, Spokane.

Betty Ilene Hopper ('56 Chem.), 82, April 10, 2010, Bellevue.

Robert "Bob" F. Mock ('56 Hort.), 75, March 21, 2010, Fountain Hills, Arizona.

Rodney A. Plath ('56 Bus. Admin.), 80, January 31, 2010, Surprise, Arizona.

William M. Tavenner ('56 DVM), 88, September 30, 2009, Wisconsin.

D. Joseph Clark ('58 Gen. Stud., '59 MS Bact.), 73, April 30, 2010, Seattle.

Jack Marler ('58 Gen. Stud.) 75, March 31, 2010, Seattle.

Richard F. Hensel ('59 Civ. Engr.), 73, April 7, 2010, Maple Valley.

Joseph Perry ('59 PhD Soc.), 80, May 20, 2010, Bowling Green, Ohio.

1960s

Ernest V. "Ernie" Dunbar ('60 Chem.), 75, May 7, 2010, Vancouver.

Cordell Martin Harder x'60, 72, April 22, 2010, Clarkston.

Dr. Irving Medcraft Field ('62 MA Bus. Admin.), 76, February 23, 2010, Pullman.

Linda L. Day Steitman ('63 Comm.), 68, March 7, 2010, Scottsdale, Arizona.

John Peckham ('67 Vet. Sci.), 75, February 26, 2010, Raleigh, North Carolina.

Richard Beadle ('68 Gen. Stud., '74 MS Biol.), 64, February 19, 2010, Palm Springs, California.

Glenn Ray Howze ('69 Soc.), 72, May 24, 2010, Chapel Hill, North Carolina.

1970s

Elizabeth Ann Schmalz x'70, 61, May 9, 2010.

Charles Cecil Drury ('71 Bus.), 61, April 6, 2010, Renton.

Richard Sturza ('71 Bus.), 61, February 23, 2010, Camano Island.

Christine Sue Steelhammer Landt ('72 Animal Sci.), 59, February 1, 2010, Centralia.

Donna L. Peterson ('73, '75 DVM), 68, January 10, 2010, Boise, Idaho.

Gary Richard Hirst ('74 Phys. Ed.), 59, March 26, 2010, Yakima.

Deborah Lynne Miller ('75 Polit. Sci.), 55, May 2010.

Lloyd Eugene Whelchel ('76 PhD Anthro.), 86, April 2, 2010, Pullman.

Catherine Coffey ('77 Fine Arts), 56, March 19, 2010, San Francisco, California.

1980s

Jane Carolyn Weekes Shapton ('80, Gen. Stud.), 52, April 2, 2010, Irvine, California.

Peter William Berney ('81 Am. Stu.), 52, February 13, 2010, Seattle.

David Johnson ('82 Pharm.), 52, April 2, 2010, Kennewick.

Albert Albright x'84, 46, April 28, 2010, Torrance, California.

1990s

Shay Eugene Dickson ('94 Elect. Engr.), 40, March 13, 2010, Kirkland.

Shane Sullivan ('94 Comm.), 39, March 19, 2010, Morton.

Jerud Steven Melcher ('96 Int'l. Bus. and Asian Studies), 37, April 18, 2010, Newport, Oregon.

2000s

Frank Edward Petek x'03, 59, April 8, 2010, Spokane.

Naseem A. Shqueir ('09 Bus. Admin.), 22, March 27, 2010, Salem, Oregon.

Faculty & Staff

Wander Hammer Bailey, 96, retired WSU College Bookstore employee, February 28, 2010, Pullman.

Bernette Berry, 88, April 26, 2010, former staff.

Clinton J. Callaway, 80, retired staff, April 11, 2010, Pullman.

Regginal Ralph Engebretson, worked in chemistry dept., 66, May 26, 2010, Moscow, Idaho.

Alex Fabian, retired electrician, 84, May 28, 2010, Spokane.

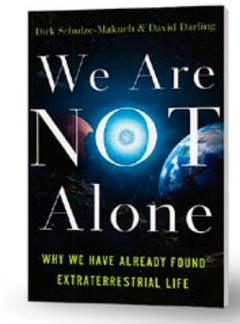
Clara Fern Hessdorfer, 93, retired WSU Center for Nursing Education, March 31, 2010, Spokane.

Romana Hillebrand, retired from English, April 3, 2010, Pullman.

Marilyn L. Hirschfeld, former publications staff, 74, October 17, 2009, Bremerton.

Scott Lukins, 81, former Regent, April 12, 2010, Spokane.

Larry Lee Stern, 71, retired staff, April 23, 2010, Seattle



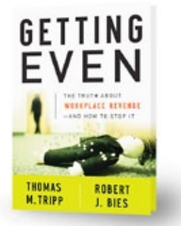
We Are Not Alone: Why We Have Already Found Extraterrestrial Life *by Dirk Schulze-Makuch and David Darling* ONEWORLD PUBLICATIONS, 2010 :: *Review by Eric Sorensen* :: From Percival Lowell's maps of Mars to 1938's ill-fated "War of the Worlds" broadcast, claims of life in outer space have been tinged with whimsy and sensationalism. But in recent decades, more rigorous thinking and evidence-based science have been able to elbow their way into the discussion. As WSU astrobiologist Dirk Schulze-Makuch and author David Darling note, we now "have real data to work with."

Using the findings of numerous space missions, as well as compelling analogues of odd life forms here on Earth, the two make a convincing case that life exists off our planet and even on the planets next door. They point to Mars' earlier years as a more hospitable place, with abundant water, above-freezing temperatures, and energy from volcanic activity. Even now, the circumstances could be right for some form of extreme-loving bacteria to be on or near the Martian surface. (See "Questioning the Questions" in the Summer 2007 issue.)

They also describe how alien microbes could account for the odd spectra and particles detected in the lower clouds of Venus, which, billions of years ago, may have been even more livable than Earth. They like Europa, too, noting how the Jovian moon has deep, nutrient-rich oceans beneath its crust.

But as the authors note, "alien forensics is a tricky business." Its extraordinary claims require, as Carl Sagan said, extraordinary evidence. It can be hard to know just what you're looking for. The tools and laboratory conditions a billion miles away can be pretty trying.

That scientists can do this work at all is amazing. Schulze-Makuch and Darling describe their efforts in a readable, often anecdotal prose that evokes a sense of wonder at both the science done here on Earth and the life forms that might exist elsewhere.



Getting Even: The Truth About Workplace Revenge and How to Stop It *by Thomas A. Tripp and Robert J. Bies* JOSSEY-BASS, SAN FRANCISCO, 2009 :: *Review by Larry Clark '94* :: Most people who have worked in a group have probably faced a "getting even" situation.

For managers, or anyone working in an organization, the consequences of a workplace conflict can quickly escalate. *Getting Even: The Truth About Workplace Revenge and How to Stop It* takes a broad look at the causes of workplace revenge and methods of defusing those situations.

Thomas Tripp, a professor of management at WSU Vancouver, focuses on workplace conflict in his research. In this text, he defines "revenge" as a common response to perceived harm. Based on their 15 years of research, Tripp and his co-author Robert Bies analyze workplace revenge as an often-misdirected or exaggerated attempt at achieving social justice.

The book does a fine job delivering practical advice on understanding, avoiding, or remedying revenge situations. The authors blend actual business cases with pop culture references—the acrimonious break-ups of The Eagles and Pink Floyd—to make their points.

The chapter on preventing revenge offers some solid ideas. It begins with a quote by Publilius Syrus that sums it up nicely: "It is folly to punish your neighbor by fire when you live next door."

Legacy of Angels *by B.J. Scott '68* AUTHORHOUSE.COM, 2008 :: *Review by Tim Steury* :: The issue of whether to review self-published books resurfaces here at WSM periodically. The argument against reviewing such books assumes that publication by a commercial publisher promises some standard of quality, whereas self-publication is relegated to the "vanity" press. However, a half hour in any bookstore should at least shed doubt on that assumption.

Of course there are many presses from which one can expect consistently excellent work. But there is also plenty of dreck produced by both commercial and "literary" presses. In the end, the reader and, by extension, the critic, is still the final arbiter of taste and quality. Add to this scenario the fact that many well-known authors (Blake, Anaïs Nin, Proust) self-published at some point. Granted, acceptance by a publisher generally indicates the publisher is willing to bet a great deal of money on the book's success. But that success can depend as much on literary or political whims as enduring quality.

Still, I approached *Legacy of Angels* with some hesitation. The final novel of a self-published trilogy of historical fiction, it is a blend of family saga, Western romanticism, a little metaphysical fantasy. Its characters are overblown at times, some of the plot twists require a little willing suspension of disbelief, and the book would benefit from fewer adjectives describing the "Connelly women."

But B.J. Scott tells a great story, which starts in book one in Ireland with Kathleen Connelly and traces the trials and fortunes of her remarkable daughters through the Gold Rush, concluding with Bridgette, the granddaughter, overcoming extraordinary odds and assuming leadership of her family's holdings. "Never, ever, cross a Connelly woman," she warns.

For complete reviews and sample tracks go to wsm.wsu.edu.

Live & Kickin' *The Wanderers* 2010 :: *Review by Eric Sorensen* :: Bill Murlin '63 and Carl Allen '60 created The Wanderers soon after they met in September 1959. With Al Hansen on bass, the singer-guitarists performed around Pullman for three years. Murlin and Allen continued after graduation with a folk repertoire of tunes by the Kingston Trio, Bill Staines, Pete Seeger, and their patron icon, Woody Guthrie.

As an unemployed and largely unknown folk singer in May of 1941, Guthrie was hired to write songs promoting the Bonneville Power Administration's hydroelectric dams on the Columbia River. His 26 songs include "Roll On Columbia, Roll On," the state folk song.

The Wanderers and Guthrie merged in the 1980s, when Murlin, himself a BPA employee, collected and edited Guthrie's Northwest work for Bonneville's 50th anniversary. Allen developed a first-person characterization of Guthrie singing the Columbia River Songs. Together, Murlin and Allen opened a Smithsonian exhibit of Guthrie memorabilia and performed at Guthrie festivals in Oklahoma and Texas.

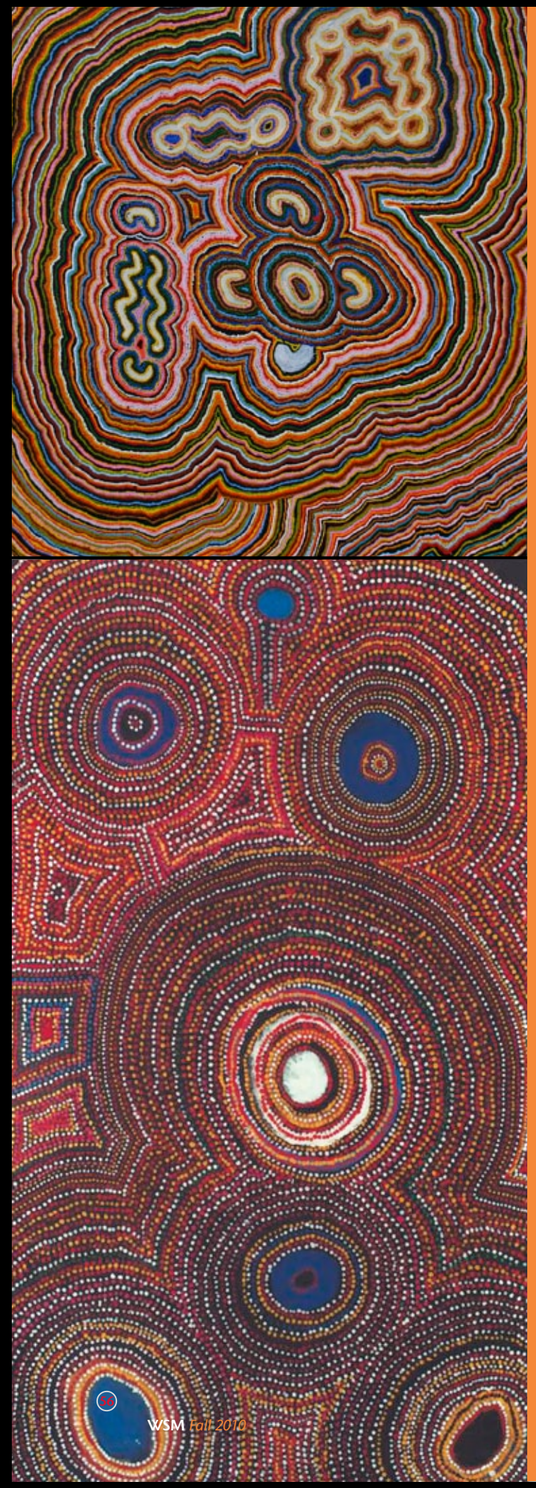
The Guthrie spirit runs through "Live & Kickin'," the Wanderers' latest CD. Released last year for their 50th anniversary, it neatly coincided with their Golden Grads weekend. The CD features four Guthrie tunes, a fifth song with Guthrie lyrics, and Dean Cook's "I Think That I Saw Woody."

Jump Into Life *by Eclectic Approach* 2008 :: *Review by Rikki King '10* :: Eclectic Approach, a funk-rock Seattle band that includes Jowed Hadeed '06, Ryan Jander '06, and Tony Poston '07 released its third album, "Jump Into Life," in June.

Feel-good messages dominate. One track, "Change," encourages love over drama, while another pushes focusing on the ups rather than the downs. Themes of living life more fully and recovering from setbacks are threaded throughout.

Catchiness is their strong suit. The lyrics could use a little more weight. For all its playful and uplifting qualities, the album seems to be built for a more carefree day, something to blast on the long ride between Seattle and Pullman, or to dance to at a house party on College Hill, but generally not something to lie in bed and ponder.

Still, the infectiousness of the upbeat groove grows over time.



Spiritual landscapes

Contemporary Aboriginal Paintings
From the Collection of Margaret Levi and Robert Kaplan
WSU Museum of Art, October 1–December 11, 2010

Although the details and relationships vary amongst Australian Aboriginal groups, in the beginning the landscape of the world was formed by mythical ancestral beings. Every action of these ancestors had landscape consequences. According to the fine study *Aboriginal Art* by Howard Morphy, art establishes a connection with those foundational events, enabling people to maintain contact with a timeless spiritual dimension. Beginning in the 19th century, anthropologists trying to understand that relationship referred to "the Dreaming," an exploration of the nature of the world. Not surprisingly, the translation is imperfect, and some Aborigines object to its use because the spiritual process is not dreaming, but reality. Nevertheless, art is both the means of access to Dreaming and also the product of Dreaming, resulting not only in laws, but maps.

Left, from top:

Ngamaloo, 2008, acrylic on linen
by Elizabeth Gordon (Balgo Hills region)

Kapi Pati Yalli, 2000, acrylic on linen
by Simon Hogan (Spinifex country)

For more information on this and other exhibitions and events at the WSU Museum of Art go to museum.wsu.edu.

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