

Winter18

vol18no1

Washington State

MAGAZINE



22
Plan bee

28
Super bugs

{ *Navigation tools* }

« / » COVER / BACK PAGE

⊕ ENLARGE QUADRANT

⊖ RETURN TO SPREAD VIEW

« / » PREVIOUS / NEXT PAGE

☰ / ☰ IN THIS ISSUE
CLICK ON PAGE # TO GO TO STORY

🖱 SCROLL PAGE
(IN ENLARGED VIEW)

🌐 WEB LINKS
URLS IN TEXT & ADS ALSO CLICKABLE

✖ CLICK HERE TO EXIT
OR USE ctrl/cmd-Q





Features

With honey bees in peril, agriculture turns to our wild bee species to help pollinate America's crops. **22**

In hospitals and at home, it's back to basics to combat the ever-evolving drug-resistant microbes. **28**

UPfront

Using three-dimensional scaffolding to "see" cancer better, map it, and defeat it. **8**

In the world of nutraceuticals, "all natural" may not mean "all safe." **10**

Women's clothes—finally for the majority of women. **11**

The dirt of the past can help us adapt to the future's shifting landscapes. **12**

This is a job for super swine. **17**

COVER: "PATTERNS OF WINTER" AT BASS LAKE, NORTH BONNEVILLE. PHOTO DARRELL WYATT
LEFT: OVERWINTERING SNOW GEESE ON FIR ISLAND, SKAGIT COUNTY. PHOTO JON MICHAEL

Fabric of Washington The Center for Digital Scholarship and Curation promotes ethical curation and collaborative scholarship within the wider WSU community **LAST WORDS**

52



CDCS codirector and MASC head Trevor James Bond knotting his Cougar tartan tie (Courtesy *The Daily Evergreen*)

Thematics

SERVICES CENTER 13

Healing for our Native American vets—in body, mind, and spirit.

SHORT SUBJECT 14

Not going to bed—or class—hungry.

Departments

5 Patterns **FIRST WORDS**

18 Embracing a second chance **SIDELINES**

20 The all-American bison **IN SEASON**

35 On the straight, tall, and narrow 37 Making artificial intelligence smart 38 From the horse's mouth **ALUMNI PROFILES**

39 *A Scientific Companion to Robert Frost; Spirit in the Rock; Complexity in a Ditch, Eyes Wide Open* **NEW MEDIA**

41 Once upon a time in Stephenson South **CLASS NOTES**

42 40by20 **ALUMNI NEWS**

47 IN MEMORIAM 49 A sacrifice, not forgotten

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FIRSTwords

Patterns. Just the right combination of cold and moist conditions last winter blanketed the trees, buildings, and grounds of the WSU Pullman campus with a layer of hoarfrost. The tiny, icy spikes added a new and beautiful dimension, even drawing my eyes to a fresh look at the cougar statue outside the Lewis Alumni Centre. I walk past that leaping figure nearly every workday, and yet rarely look at it like I did that day.

Sometimes we need a new way to perceive the world around us, even those parts that are invisible. For example, cancerous tumors notoriously adapt and resist treatment as they invade our cells. To fight them, we must identify their growth patterns within and around human cells, an effort that WSU biochemist Weimin Li has undertaken as both an oncologist and a research scientist. His solution: build a 3-D tissue “scaffold” out of organic material that matches the cancer’s location (like mammary tissue), and grow tumors in a realistic setting. Watching the tumors’ responses could then help develop better drugs and treatments.

A new look at infectious bacteria and other agents, which are growing more resistant to medical treatments like antibiotics, is also the approach of researchers at the Paul G. Allen School for Global Animal Health. Antimicrobial resistance looms over all of us as a complex and dangerous problem. But rather than get discouraged, say the WSU scientists and public health experts, a change in our patterns of behavior can help stave off the unnecessary overuse of antibiotics—often through simple habits, like washing your hands the right way.

The behavior of other animals, their habits and instincts, are certainly crucial to our survival. Bees, with their ubiquitous summer buzzing, pollinate the plants that provide a lot of our food. As wild bees face threats from loss of habitats or chemicals, we can, in turn, provide them with homes so they’ll thrive in the Northwest.

Much of the beauty of the natural and human-made world, like the hoarfrost last winter, can be seen in the repetition of shapes and colors. Even though the universe tends toward entropy, humans are pattern-seeking animals and we appreciate the appeal of hexagonal beehives (which, I learned from an “Ask Dr. Universe” video, have a very logical reason), long rows of loblolly pines in Georgia, or the furry brown humps of bison against a snow-covered field.

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TALKback

Instrumental journey

The article written by Wenda Reed on the life of Gladys Jennings was excellent. I graduated in '92, and had Gladys as an advisor in the Food Science & Human Nutrition Department. I transferred to WSU from the University of Alaska, Anchorage in the fall of '89, and Gladys was instrumental in that process. After phone conversations and mailings, the transition from U of A to WSU was seamless. She would guide me in my course choices while in Alaska, and told me that these courses would directly transfer. She was instrumental in the success I had as a student at WSU.

ALLAN BORCHARDT R.D. '92
FOOD SCI. & HUMAN NUTR.
Dietitian

Back in the saddles

[Equestrian Team coach Laura Bagby Moore '08 received this message about "Back in the saddles," Fall 2018]

Several years ago, I was disappointed to learn that the Equestrian Team had disbanded, because I had such a great time being on the team when I was in school.

After college, I moved away for several years, but then moved back to Pullman in 2013 where I've been working for WSU ever since. I recently read the article in the *Washington State Magazine* and was thrilled to see that the team was brought back!

Seeing your name and reading the article was a blast from the past, so I wanted to write and say "Thank You" for your help in bringing the team back and providing this opportunity to students. Your hard work and dedication has obviously paid off and you are such an asset to the team!

CHELSEA (CIUFO) JENDRO '09 COMM.

WSU hit man

So glad I took a look at the Fall '18 edition. Amazing all these "hits" in the one edition that related and surprised me:

On page six was a letter from Earl Otis in Puyallup. We worked together for several years in the WSU Extension Service Communications office.

Page 11: A flying item. I owned a plane for 25 years in Georgia and so found it interesting.

Page 20: A terrific story on the Columbia River. In 1978 I took a special three-day course on the river that included being on the river.

Page 27: Article on education. I earned an MEd at WSU. Used it to start and manage a professional distance learning education service for a state hospital association.

Page 37: Article on Merfeld and WSU wine studies. Back in the 70s I was fortunate to have been on Charles Nagle's wine panel and played a very small part in a very big thing for WSU and Washington.

Page 40: Nathan Myhrvold and the science of cooking. Several years ago at a science conference I heard him present a terrific report on his kitchen.

Page 44: Dr. Ghazanfar is in Atlanta where I am! He may help me find a missing friend from Pakistan who studied agronomy at WSU and roomed next door to me in graduate housing.

ROBERT SEARFOSS '73 MED
Atlanta

Going football nuts

Earl J. Otis '51 (Journalism) came up with this gem of Cougar Football history while going through a 60-year collection at his home in Puyallup. It was the passenger list for a College of Pacific football game trip, November 14–16, 1958. Historic? "How, pls.?" as we used to ask at the old United Press.

Well, for all you Football Filberts out there, this '58 team was the last football team to play for Washington State College! (The state legislature changed the name to Washington State University in the spring of 1959.) So this game—a 34–0 Cougar win—also, then, was the last football win for Washington State College on the road!

These '58 Cougs gave Coach Jim Sutherland his best season, 7–3, by beating the Huskies 18–14 in Spokane's Joe Albi Stadium.

If you're over 65, I'll bet you'd remember almost all the team members! Seven of them—Bill Berry, Gail Cogdill, Don Ellingsen, Jack Fanning, Keith Lincoln, Bob Newman, and Bill Steiger, are in the Cougars' Hall of Fame.

(Otis was assistant manager of the WSC News Bureau when he made this trip. He later served many years as information specialist at WSU's Puyallup Research Station.)

RICHARD B. FRY
Former WSU Sports Information Director
and News Director

Sign up for the monthly Washington State Magazine email newsletter to get previews of stories, videos, and more bonus features:
magazine.wsu.edu/email.

Leading the way to a better world

Jordan Frost rose from poverty to become a civic leader: The newest member of the WSU Board of Regents.

His inspiration: His teachers. Now he's studying to become an educator.

His goal: To help others overcome adversity and realize their full potential.

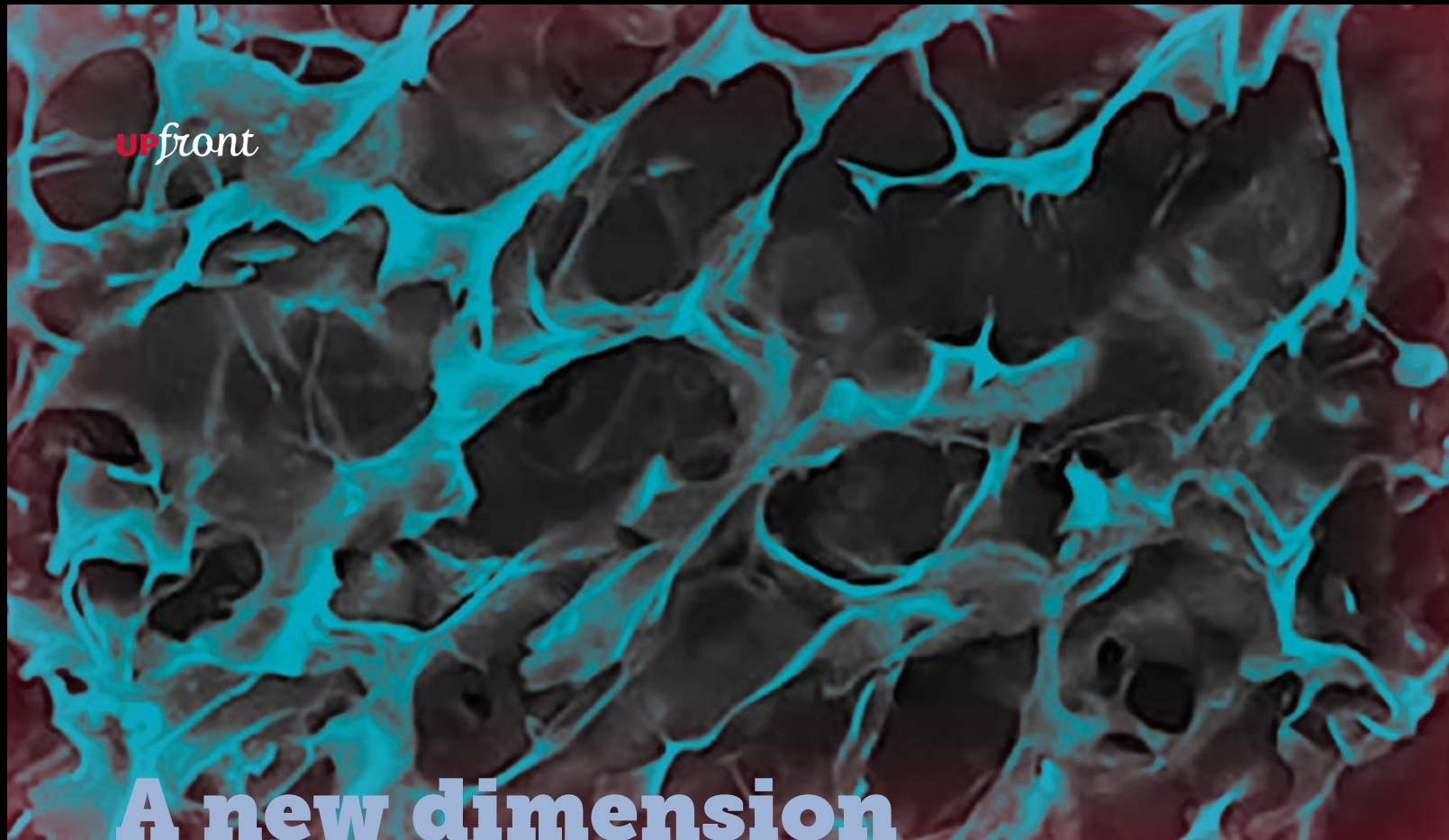
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A new dimension to fighting cancer

Any good strategist knows that an accurate map can win a battle. If your enemy is cancer, a chaotic and elusive foe that changes its environment, finding a new dimension to examine a tumor can make all the difference when developing treatments.

Like all scientists and doctors looking for ways to defeat cancer, Weimin Li wants to better understand how cancerous tumors grow and adapt. His innovative technology using 3-D tissue culture “scaffolds” delivers a far more relevant environment to research the deadly disease.

It’s a fight that Li has fought on many fronts. He spent seven years practicing oncology in China and witnessed the inconsistency of cancer treatments. “It was hard. So many patients were dying,” he says.

He was inspired to begin researching new methods of treating cancer, earning medical molecular genetics and biochemistry degrees in Scotland and Switzerland before moving to Wisconsin and then Washington State University’s Spokane

campus. Along the way, Li found that the tools used by cancer researchers to model tumors were also inconsistent, often with inconclusive results.

“I realized the importance of using proper disease-modeling systems to study the mechanisms of cancer progression,” says Li. “Biologically and clinically relevant research tools can help us understand fundamental questions of cancer and develop more effective therapeutics to treat human cancer.”

Now an assistant professor in the WSU Elson S. Floyd College of Medicine, Li says that many anticancer drugs fail in clinical trials in part because they’re studied and tested in inappropriate tissue cultures or animal models.

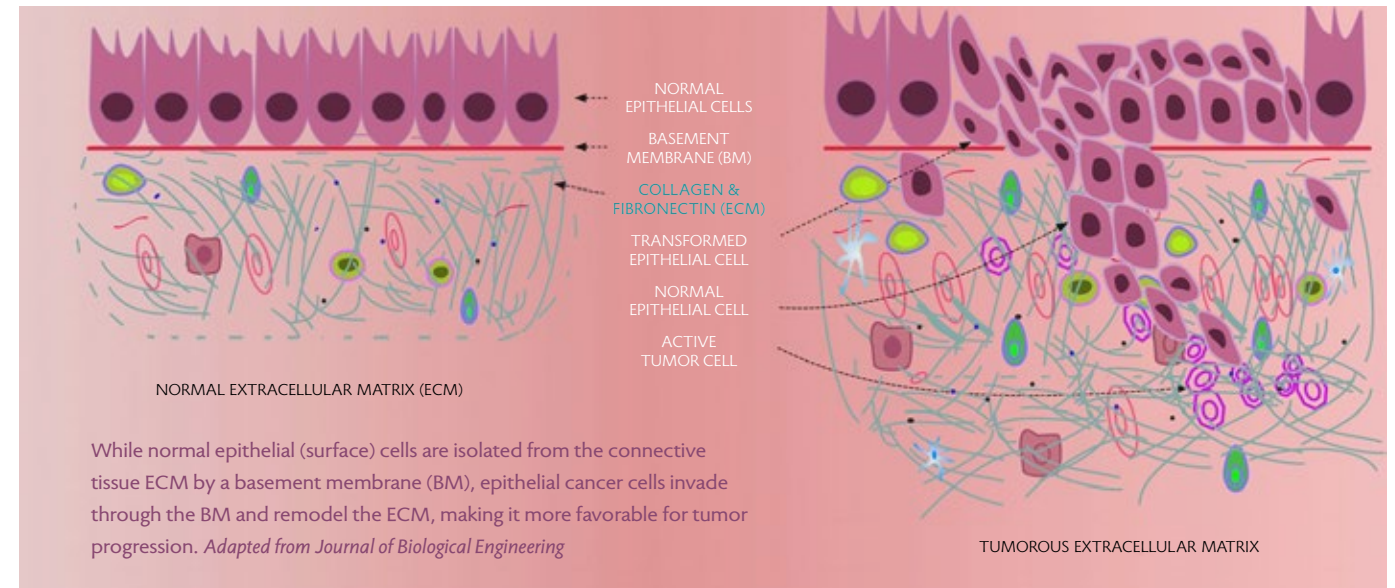
The traditional petri dish method sets up tissue cultures in 2-D plastic systems, an artificial model that can’t represent the complex tissue environment, nor show how cells spatially interact at all levels. By creating a 3-D tissue-like scaffold, tumors can form in ways that allow scientists to screen drugs in a setting that’s a lot closer to how native cancer cells grow and invade normal human bodies.

When cancer cells are in human tissues, they interact with other cells and their environment in every direction, secrete enzymes that help the cancer to survive and spread, and even change the environment within the tissue. That can’t be truly replicated in only two dimensions.

The concept of 3-D scaffolds to grow tissue cultures is not a new one, but other 3-D culture models mostly use plastic or synthetic polymers, or they use a single component of the extracellular matrix (ECM) of disease-irrelevant animal tissues. Since tumors interact with their environment in order to survive and grow, a scaffold made from synthetic or nontissue-specific materials won’t necessarily show researchers how tumors will express biomarkers and react to drugs as they would in patients.

To overcome that problem, Li and his team built scaffolds from the ECM of normal, native tissues that preserve the tissue’s properties and match the type of cancer they want to study.

For example, they use breast tissue scaffolds for growing tumors from breast cancer cells. As tumors grow in that 3-D



Tissue cells are organized by a protein meshwork—the extracellular matrix (ECM)—which is an essential part of the microenvironment for the cells. ECM not only acts as scaffolding support, but also provides many mechanical and signaling functions. Cancer cells can have pronounced effects on these ECM functions. Therefore, Li is pioneering *vivo*-mimicking tissue culture systems based on native versus synthetic materials to better understand these deleterious effects.

Opposite: Scanning electron microscopy micrograph of a tissue matrix scaffold. Courtesy WSU Franceschi Microscopy & Imaging Center **Below:** Weimin Li. Courtesy Elson S. Floyd College of Medicine

space, Li says the tissue matrix scaffold (TMS) creates a far more accurate replica. That optimizes research and drug development, in part because cancer cells will naturally show how they behave and resist drugs.

“There are complex interactions between cancer cells and other cells within tumors,” says Li. “We can isolate the cells and model tumor development in a way that recapitulates native conditions.”

Li’s innovation has won national awards for its novelty in modeling tissues for drug screening, but the TMS technology his team developed could have even more uses.

“One potential outcome is tissue regeneration. Another is personalized medical treatment,” he says.

For now, Li and his team, including postdoctoral colleague Girdhari Rijal, are keeping their research focused on cancer modeling and treatment. He hopes to commercialize the technology, so it can help doctors and other medical researchers to find new strategies in the ongoing fight against cancer. *



full story: magazine.wsu.edu/extra/supplements-interaction

Centering on supplements' safety

Dietary supplements. Natural remedies. Botanicals. Energy drinks. Wellness boosts. Health foods. Vitamins.

When choosing whether or not to use dietary supplements or other natural products, there are a lot of questions about the value of these products and their benefits. They often claim to be "all natural," but that doesn't necessarily make them safe for you. Natural products are not required to go through the same rigorous research and clinical trials as pharmaceuticals prior to marketing, so many potential health dangers are simply unknown.

Researcher Mary Paine, associate professor at Washington State University's College of Pharmacy and Pharmaceutical Sciences in Spokane and a registered pharmacist, wants to uncover potential interactions that may cause health risks with products like the wheat grass and bee pollen in your smoothie, the echinacea in your natural cold remedy, and the licorice and catnip in your herbal tea.

Many people turn to natural products for health benefits but also take at least one prescribed conventional medication. According to Paine, there needs to be more definitive information available to health-

care providers and patients about the risks of supplementing prescribed drug regimens with natural products. Interactions between natural products and conventional drugs are a concern because of their potential impact on drug effectiveness or toxicity.

"Patients often seek herbal and other natural products as a 'natural,' and therefore perceived as 'safe,' means to alleviate illnesses or supplement prescribed therapeutic regimens," Paine says. "Co-consuming natural products with conventional medications—either prescription or over-the-counter—can lead to adverse interactions."

For example, St. John's wort is a flowering plant used as an herbal remedy for mild to moderate depression, but has several known drug interactions including some post-organ transplant medications, which renders them ineffective.

Adverse health effects could impact anyone looking to use natural products and conventional medications at the same time. According to the CDC, nearly half of the American population in 2016 had used at least one prescription drug in the past 30 days—nearly 158 million prescriptions, not even accounting for people taking multiple medications.

To explore the potential impacts, Paine helped create the Center of Excellence for Natural Product-Drug Interaction Research (NaPDI Center) at WSU Spokane. Through a \$10 million, five-year grant from the National Institutes of Health National Center for

Complementary and Integrative Health, experts in clinical pharmacology, natural products chemistry, health informatics, and health communications will study the interactions between natural products and conventional drugs.

The NaPDI Center will also recommend detailed steps for studying pharmacokinetic interactions between natural products and drugs—how a natural product can alter the absorption, distribution, metabolism, or excretion of a drug. Their work, already published in a number of journals, could help develop policy, regulations, best practices, and the individual adoption and integration of natural products into the medication therapy of patients.

In the future the NaPDI Center hopes to extend its online database to health-care practitioners to both proliferate quality science and offer useful data for the health-care community.

Paine and the center is also preparing for the next, and perhaps most challenging, natural product on its research list: cannabis. "The legal and regulatory hoops are substantial, but this is when we need the scientific information to be reliable," says Paine.

Reliable, high-quality data on clinical interactions between cannabis and pharmaceuticals remains scarce, which makes the NaPDI Center's recommended approaches to studying natural products important for rigorous study of the plant. ✱

Ask Dr. Deb videos on issues like fat shaming on TV and movies: magazine.wsu.edu/extra/dr-deb

Inside an old yellow craftsman house, sewing machines whir, sketches adorn the walls, underwear and tank top prototypes hang from clothing racks, and a cat wanders through the living room.

Debbie Christel's childhood home in north Tacoma has transformed into the headquarters of Kade and Vos, a start-up company helping women get the clothes they need.

"We ask women, what do you need to be comfortable?" says company cofounder Christel '08. "Our design process doesn't go through a weight-biased filter. We don't take a small pattern and make it bigger. We know that doesn't work."

In the United States, 67 percent of women wear a size 14 or larger, while designers typically design for a size four or six. That can make it a real challenge for American women who wear a size 16 to 18 to find something that fits well.

It took just a year for Kade and Vos to launch their first clothing line and it all started with soft, breathable cotton underwear. If the

Her own research and other studies continue to back the narrative she's been hearing from women frustrated with comfort, fit, and lack of sizing options. It's part of the reason she began thinking about starting a business.

Since she had a limited background in business, she found support through the WSU Innovation Corps, a National Science Foundation-funded program that helps University staff, students, and faculty move research into the marketplace. They provided the guidance she needed and helped her build a business plan. One of the first things they suggested was finding a business partner.

Enter Kade and Vos cofounder Ashley Scott '16. Scott and Christel had both volunteered to make costumes at the Regional Theatre of the Palouse, and Scott was a student in Christel's class for three years. She had worked for seven years in her family's cherry orchards in Yakima and had a deep understanding of supply chains and small business management. Scott says in the back of her mind she always wanted to make sure curvy women had better clothing options.

"Fashion is looked at as something kind of silly, but it's not silly because everyone wears clothes every day. What you see people



DEBBIE CHRISTEL

ASHLEY SCOTT

COURTESY KADE & VOS

underwear isn't comfortable or distorts the body, says Christel, then whatever you put on top of it isn't going to look and feel right.

"We don't want to further segregate women by size," Christel says, noting that they offer sizes small to 6XL. "If we don't offer your size, we will make it for you."

Christel's mission to improve clothing fit for curvy women began in graduate school. While working on her thesis project with Nike, she noticed they offered more clothing sizes for men than they did for women. The sizing was even more limited for plus-size women.

"Our culture says everyone needs to be healthy, but the equipment isn't provided for women like it is for men," she says.

She researched movement and clothing fit, with one study revealing how clothing can derail women from doing something as seemingly simple as taking their kids to the park. She also started to explore the weight bias engrained in U.S. culture—not just in fashion, but other industries that portray larger people in a negative light.

Before launching the start-up, Christel was an assistant professor in Washington State University's Department of Apparel Design, Merchandising, and Textiles, where she incorporated weight-bias education into her courses. She liked teaching students how to design for different body types—and how to design with compassion.

wear affects society and how people are viewed," Scott says. "It's really important as a fashion designer to be able to dress all people."

Kade and Vos not only has a different approach to designing for their customers, but also the supply chain.

"So much in the fashion industry is dehumanized," Scott says. "It's designed on a mannequin, not even a person. That's one part of it. You don't see the thousands of people behind any garment you buy and that is important for us, to humanize the fashion industry."

Kade and Vos source supima cotton for their clothes from a family farm in the Southwest. The cotton biodegrades in two weeks, as opposed to synthetics that can take up to 40 years to decompose in a landfill. The company's knitter lives in North Carolina, and they work with a veteran-run manufacturing company in Georgia when they go into full production.

Christel and Scott are looking forward to their upcoming pajama line and putting together future collections. But in the end, it's not just about making clothes. Even the company name Kade and Vos translates from Latin to "The Caretaker and You." It's about the social responsibility of fashion designers and caring for people, says Christel.

"Beyond just offering clothing, we want women to know they are okay just the way they are, wherever they are, whatever shape or size." ✱

Days of future past

Rapid global cooling 13,000 years ago challenged early occupants of Alaska to adapt. People used to hunting mammoths and other megafauna with big stone tools suddenly found their weapons shattering in the cold. Access to the stone they used to make them got buried under snow.

As with any climactic change, the cold resulted in a shift in fauna, requiring new tools. Early Alaskans turned to microblade technology, a technique they'd kept alive for hundreds of years along with their dominant hunting tools. Microblades made efficient use of now-scarce toolstone and met the needs of a changing climate.

"Throughout the Holocene, the importance of microblade technology varies," writes Washington State University archaeologist Colin Grier, but it never disappears; it "is employed when needed to address new and changing ecological circumstance."

Grier and colleagues from the University of Idaho's Center for Resilient Communities note that archaeology has a lot to say about how cultures adapt to global climate change, shifting populations and ecologies, and transforming food systems.

"The way to ensure that we have some capacity to adapt is by having a diversity of options," says Grier. "Adaptation is not just technologies providing new solutions." Cultures from the past adapted "whole institutional and social processes that we can learn from."



COURTESY CRC/UNIVERSITY OF IDAHO

By moving beyond the 30- to 100-year window used in many disciplines into deep time, Grier argues, "paleodata—data derived from past ecological and social systems—reveal factors that were important in successful adaptation but which we may be unable to see from our present vantage point." Grier calls these "time-vetted" solutions to social and ecological challenges.

A few thousand years ago, the Coast Salish experienced considerable population density increases, so they reorganized themselves to sustainably ramp up food production. Clam gardens, fish weirs, and engineered wetlands were the result of investing in "large scale resource harvesting infrastructure," made possible by people working together to ensure long-term success.

"Decentralized control was a key" to that success, as people closest to the resources owned and managed them, thus promoting "local and intimate monitoring of changing ecological circumstances." This demographic and resource-management change was accomplished by major changes in social structure, from small family-centered groups to larger, multifamily organizations.

Much of the data used to make contemporary decisions about policy and resource management has little time depth to it, Grier argues. Both indigenous knowledge, which in the Pacific Northwest goes back at least 10,000 years, and archaeologi-

cal paleodata bring a great deal to these issues.

Indigenous knowledge offers a model that could easily be adapted to contemporary culture. Crowdsourcing and citizen scientists are examples of contemporary decentralized knowledge bases, but the oral knowledge of indigenous people offers novel ideas from deep time.

"When you're an archaeologist you have two benefits," Grier says. "You see the long-term perspective and you see a range of possibilities that people who are embedded in modern technological societies just don't."

Scholars from many disciplines, as well as policymakers, are waking up to the fact that archaeological data can and should be put to different uses now that bottom-up innovations to challenges aren't being addressed through the centralized administration of resources.

"Approaching resource management with a top-down approach, where a guy comes out for three hours with a little clicker to count fish or invasive weed species and then they go back to Washington or Ottawa to make policy—that's just not working! We have to reshape our institutions" to tap into the wealth of knowledge hidden in plain sight.

And that, Grier says, means looking everywhere for ways to mobilize local knowledge. Everywhere, including in the dirt and the distant past. *

SERVICEScenter

Peace for the wounded warrior

Since the earliest days of the republic, Native Americans have stepped up to defend the United States at higher rates than any other ethnic group.

From General Washington's inclusion of Tuscarora and Oneida warriors at Valley Forge, through the world wars and Vietnam to today's conflicts in the Middle East, Native Americans continue to answer their cultural calling to serve.

Traditionally, these soldiers were welcomed home with healing ceremonies that helped reintegrate them with the tribe and wider society. Compassionate medicine men, and women, used time-honored practices to mend the emotional, spiritual, and physical trauma of war.

"Unfortunately, the U.S. government banned Native religious ceremonies for many years, which subsequently limited their use in modern PTSD treatment programs," says Greg Urquhart, Washington State University counseling psychology doctoral student. Urquhart is a veteran of Operation Iraqi Freedom and descendant of the Eastern band of Cherokee. As a cavalry scout, he developed mild symptoms similar to PTSD which, with sweat lodge and other traditional practices, have since resolved.

Urquhart says Native veterans are often reluctant to seek PTSD treatment because western therapies

typically don't represent their cultural worldview or religious beliefs. Those who do attempt treatment frequently become frustrated and leave the program.

"The traditional Native view of health and spirituality is intertwined," he explains. "Spirit, mind, and body are all one—you can't parcel one out from the other—so spirituality is a huge component of healing and one not often included in western medicine, although there have been a few studies on the positive effects of prayer."

In an effort to give Native veterans a voice in shaping PTSD treatment options, Urquhart designed the largest pan-tribal veteran study ever conducted in the United States. His survey, which began in 2014, represents feedback from more than 200 tribes including 716 individuals from every branch of the military.

The comprehensive study examines veterans' attitudes, perceptions, and beliefs about PTSD and its treatment, including the use of equine

and other animal-assisted therapy.

The clearest takeaway, says Urquhart, is that a majority of survey respondents reported dissatisfaction with standard PTSD therapy.

Many said they would prefer programs to incorporate traditional healing elements such as smudging or the sweat lodge ceremony along with western behavioral and cognitive therapies.

Another common request was that treatment programs be staffed by veterans, who can better understand their military experiences as well as their Native background. Other participants expressed the need to tackle issues associated with PTSD such as drug and alcohol abuse, social difficulties, isolation, and lack of friends.

According to the survey, the biggest barriers to seeking treatment are practical concerns like location and cost of services. One respondent wrote that he had walked for two days to keep an appointment with the Veterans Affairs.

Urquhart says some Native veterans fear that disclosing a PTSD diagnosis will result in being seen as weak or "letting down the tribe." Instead, his findings show that most veterans view those with PTSD the same or more favorably than before.

"Historically, there are very few studies directly related to Native veterans and PTSD and most of them have been based on old datasets created in the Vietnam era," he says. "I'm hoping researchers will take my information, create friendly relationships with tribal governments, and build on it."

Though still a student, Urquhart has become a national advocate who often consults with professionals and presents research to groups like the Congress of American Indians and the American Psychological Association. He says the tide is slowly changing as VA hospitals and treatment centers expand their programs to include traditional practices like talking circles, vision quests, drumming, gourd dances, and more. *

Urquhart's account of Standing Rock Sioux Reservation pipeline protests: magazine.wsu.edu/extra/standing-rock



PHOTO: ROBERT HUBNER

Hungry

BY BRIAN CHARLES CLARK

At Rosario's Place, food on the shelves comes and goes like a tide. When staff at the Women's Center at Washington State University, which manages Rosario's, puts out a call for donations, stock rises and then falls again as students take what they need to get by.

Rosario's Place has a private entrance on the Pullman campus, and that simple fact, says Women's Center director Amy Sharp, reduces stigma; no one asks who you are or what you are doing. You just come in, take what you need (or leave what you can). In addition to food, Rosario's also stocks baby and toddler supplies and menstrual hygiene products.

Sharp's colleague at the center, Jennifer Murray, recalls one woman from this past summer. The woman in the hijab, she says, was certainly grateful to be able to take a few things so that her family would have food that night. What really touched Murray, though, is when the woman said that having a place to come, a place where people cared regardless of where you are from, meant nearly as much as the provisions.

Murray says that over the summer many international students come to Rosario's. "Their student visas prevent them from working," she explains, and with graduate student stipends on hold during summer, things can get dire.

Whether it's through Rosario's Place in Wilson-Short Hall, or the Campus Pantry on the WSU Spokane campus, or one of the many other pantries located at WSU campuses across the state, Cougs are feeding Cougs, and finding innovative local solutions to gather and distribute food.

While donating food looks like a simple act of kindness, it is, in fact, just the tip of an iceberg, as complex and as fraught with logistical difficulties as the American food system itself. Donations of shelf-stable foods tend to come at peak times like the winter holidays and not in the summer, when the need is often greatest. And though Washington state is an agricultural paradise, it looks like a piece of Swiss cheese when it comes to food accessibility. Food deserts, areas without a grocery store within a reasonable distance, mean many people subsist on processed foods with lower nutritional density than fresh foods offer.

In Pullman and surrounding Whitman County, the percentage of people who are considered food insecure is right about 20 percent, while the poverty rate is almost 17 percent, significantly higher than the national average. Student food insecurity, along with loan debt, is on the rise nationwide as the cost of higher education soars.

Food insecurity has no easy solutions and no one-size-fits-all definitions. It often means missing meals, or eating food that is high in calories but low in nutrition. Food insecurity means having to prioritize, for example, paying rent or buying gas over purchasing food—because low-income families, contrary to a popular misconception, are not rich in time while poor in money. Many low-income families have adults working multiple jobs, with little time to cook and barely enough money to cover basic expenses. Eating fresh food requires both income and time to prepare. When time is scarce, fast food, with its high caloric content and convenience, is a logical but risky stopgap.

Pablo Monsivais, a public health nutrition expert and associate professor in WSU's Elson S. Floyd College of Medicine, points out that food insecurity is a public health problem. Thinking of food banks and other programs as charity not only stigmatizes recipients but obfuscates the fact that we all pay,

in the long run, for one another's ill health. Whether it's through increased healthcare costs or loss of economic productivity, not having enough to eat—or not enough nutrition-dense foods—is a cost we all share.

Especially in rural settings, where people may know each other, the cost of that stigma may outweigh health concerns. "If someone sees me in here," says WSU sociologist Sarah Whitley ('07 MS, '12 PhD Socio.), "how is that going to make me look? If there is a job opportunity, am I going to be deemed unworthy because I took a handout from a food bank?"

She taught for a few years at Cal State University in Fresno, in the heart of one of the planet's biggest food producing regions, the Central Valley. "That really opened my eyes, the scale of ag," says Whitley.

And yet, much of the area surrounding the city was a food desert. "A lot of rural communities don't have any retail anymore, so folks drive many miles to get food, and that transportation cost cuts into their already constrained food budget."

Monsivais and Whitley say that people have the knowledge to eat healthfully, and will if given the opportunity. Both the sociologist and the public health expert point out that the growing obesity epidemic is connected to food insecurity, as are a host of other health issues.

"There's all sorts of research that talks not only about how food insecurity affects physiological development, including brain development, but about emotional and mental development as well," Whitley says. As Monsivais points out, the nutrients in food—such as calcium, potassium, magnesium, as well as fats—"are all essential components of our nervous system, including our brains, which are predominantly made of fat."

"Health takes input," Monsivais adds. "You've got to have the energy, the time, the skills, the money to engage in the behaviors that lead to health. And a lot of that is diet."

Ryan Lazo, the community partnerships coordinator at the WSU Center for Civic Engagement, works with food activists throughout Whitman County and beyond. With Joe Astorino ('15 PhD Socio.), the director of Pullman's Community Action Center, Lazo runs a food recovery program in collaboration with WSU Dining Services. They take food from dining halls that would otherwise go to waste to a commercial kitchen at the CAC, which is then distributed to the county's many food pantries.

The food recovery program, Lazo says, "started small, but it's growing." At a 2015 Pac-12 cross country meet, Lazo and his partners "recovered leftover fruit and granola bars, and took them to the food bank." Since then, the program has grown and stabilized. The recovery team even takes lentil chili left over from Pullman's annual Lentil Festival, packages it in family-sized portions, and freezes and distributes it to those in need.

"Now, on campus, things are fairly standardized," says Lazo. "Recoverable food is gathered at the Southside dining hall and once a week it is delivered to the CAC for repackaging." From there, Astorino says, it is distributed around the county.

But distances are great. Astorino says that a full circuit of Whitman County food pantries takes a couple of days. Keeping perishable food fresh is a problem.

Indeed, the logistics of food distribution inspired Nils Johnson, a WSU Extension educator in Stevens County in the remote northeast of the state, to a cool solution.

Johnson, a former high-tech engineer turned food activist, designed a mobile refrigerated trailer so, instead of having to take a refrigerated semi-truck into remote areas with a commercial driver at the wheel, the CoolPup—as Johnson calls the built-to-purpose rig—can be towed behind any six-cylinder vehicle.

Changing the way food is distributed is one way we'll beat food insecurity, Johnson says. And it'll provide a double bang. Johnson describes a loop through Ferry, Pend Oreille, and Stevens Counties, a 250-mile round trip, that encompasses food pantries, as well as rural schools and hospitals—all hungry for fresh food. It also crosses paths with dozens of small farmers hungry for a market.

The CoolPup trailer means volunteers can take cash, from either donations or grants, to the farmers, buy their fresh produce, and then distribute it to clients. It's a neat trick, an economic development and alleviating a public health problem with a single tool.

food maps, resources, and ways you can help: magazine.wsu.edu/extra/food-security

And, at about \$7,000 or \$8,000 each, CoolPups are not out of reach to organizations dealing with rural food distribution. Johnson says that his colleagues on the Olympic Peninsula are also eager to bring the CoolPup to their region.

At first glance, efforts to combat food insecurity appear haphazard.

A closer look, though, reveals that there is a patchwork of hyperlocal volunteers and activists all pushing to remove stigma, increase access, and empower small farms.

Brown notes that there's been an expansion of the number of small farms on the Palouse. Statistics also show more women and people of color are getting into farming. That changes the complexion of the region in multiple ways: vast fields of wheat grown for a global market are now interspersed with smallholder row crops and animal agriculture.

And, Johnson says, selling that small-farm-grown produce to food pantries and rural schools, hospitals, and markets creates a virtuous cycle that means everyone eats better.

Lazo says that students engaged in the food recovery and other programs gain tools "to be change makers. Wherever they go in the world," WSU students who have participated will be able "to face these issues with a sense of efficacy, sensitivity, and caring." *

Palouse Fresh Food Project — Connects students, resources to those fighting food insecurity: cce.wsu.edu/programs/palouse-food-project

A Guide to Food Recovery Programs — Things to consider when starting a food-recovery program: magazine.wsu.edu/extra/food-recovery-guide

Center for Civic Engagement — Fosters campus-community partnerships: cce.wsu.edu

Food Atlas for Puget Sound Region — How to eat local in the Puget Sound region: eatlocalfirst.org/food-atlas



Clockwise, from top left: Rosario's Place on the Pullman campus; Campus Pantry at WSU Spokane; Tri-Cities Cougar Cupboard partnership with Second Harvest; Cougar Food Pantry on the Vancouver campus; WSU Everett Food Pantry; WSU Extension's Nils Johnson with his "CoolPup" mobile refrigerated trailer

PHOTOS COURTESY RESPECTIVE SOURCES

Pork futures

Pig 135 snuffles and grunts inside his pen. Jon Oatley reaches through the bars to pet the more than 500-pound genetically modified animal.

"People have this image in their head of a pig with deformities, but they're just normal pigs," says molecular biologist Oatley '01 MS, '04 PhD as he rubs the pig's ears.

The enormous, three-year-old pig is one of a handful bred by Oatley, director of WSU's Center for Reproductive Biology, and his team to be surrogate fathers. Through genetic tinkering, Pig 135 is able to produce sperm that contains the genetic material of another pig rather than his own. This modification makes it faster and easier to breed pigs with desirable traits.

To modify a pig like Pig 135, it all starts with a single cell.

Using a gene editing process called CRISPR-Cas9, Oatley and his team of researchers are able to introduce a change to the DNA in a male pig embryo before it is implanted into a surrogate sow. Cas9, an enzyme that acts like a pair of scissors, is used to cut the DNA at a location of Oatley's choice.

The cell then tries to repair the strand of damaged DNA, either by adding a new sequence or deleting a sequence. In this in-

stance, the change causes the pig to be sterile when it reaches adulthood.

"It's a mutation that could've occurred in nature," Oatley says. "Nothing foreign was added."

Mutations like red hair, blue eyes, and freckles in humans, and coat color and stature in dogs were created in a similar fashion, except the genetic changes were driven by environmental pressure and selective breeding rather than the hand of a scientist.

With CRISPR-Cas9, Oatley and his team can speed up these processes to eventually breed food-producing animals that are bigger, more resistant to disease, and require less food and water.

"We can do it in a single generation instead of over thousands," Oatley says.

Once the modified pig reaches adulthood, Oatley's team can inject it with stem cells from another pig with more desirable traits, allowing the modified pig to produce sperm with the elite pig's genetic material rather than its own, making it a surrogate father.

Samantha Noll, a bioethicist on Oatley's team, says animal welfare is the first thing the team focuses on.

"During all stages of the research process," says Noll, "the researchers are discussing ethical and animal welfare implications."

"They're working to address these big problems like hunger, security, disease re-

sistance, and they're also taking the time to ensure that they don't create other problems during the research process."

When the research team eventually breeds new animals, Pig 135 and his brethren will be euthanized to make room. But instead of their bodies being used to feed the hungry, they will be incinerated—as is fitting for an animal labeled as a biohazard under current regulations.

"He can't even be composted," Oatley says. "It's the fear factor."

Noll says the label is just a precaution. "We're following the most stringent requirements now, just in case, that way we don't have an environmental impact that was unforeseen," Noll says.

Oatley says there's no experimental evidence it would be unsafe for humans to eat Pig 135 or others modified like him, but the process still raises ethical issues.

"We're doing things that Mother Nature never intended us to do, but it has to happen at some point or we won't be able to persist with the rate that human population is expanding," Oatley says. "It's a trade-off."

As food insecurity continues to be a problem in both developed and undeveloped nations alike, Oatley says he and his team hope that by modifying pigs and other livestock, they can improve access to food for people today and in future generations. *



PHOTOS LUKE HOLLISTER

Gold mettle man

BY REBECCA PHILLIPS

POLES PLANTED AND READY, SEAN HALSTED '92 WAITS AT THE STARTING GATE FOR THE 15-KILOMETER CROSS-COUNTRY SKIING RACE. It's March 2018 at the PyeongChang Winter Games and he's wearing the signature red cap and striped jersey of the U.S. Paralympic team.

Behind sunglasses, Halsted glances at the grandstand filled with thousands of cheering fans, colorful flags, and jangling cowbells. Cameras point in every direction and he catches a glimpse of himself on the jumbotron. Though the Air Force veteran has competed all over the world, the enormity of the event is overwhelming. His eyes turn back to the countdown clock where seconds creep by until the timer suddenly turns green and begins to beep. With an intense burst of energy, Halsted pushes off.

PyeongChang marks the north Idaho resident's third Paralympic Winter Games where he has excelled in Nordic skiing and biathlon since 2010. Throughout his journey, Halsted not only represented the United States in international competition but emerged as a role model and national advocate for adaptive sports, espe-

cially for those with disabilities in the greater Spokane area.

It could have been a story of heartbreak rather than adventure had he not found the strength and courage, 20 years ago, to persevere after a devastating injury.

The year was 1998 and Halsted was enlisted with the U.S. Air Force Special Ops Combat Control unit, an elite team of highly-trained soldiers who support military missions around the globe, including those in remote and hostile areas.

"The accident happened during regular training to keep up our skills," he recalls. "We were just practicing a search and rescue exercise. The insertion we used was fast roping, a technique where troops descend from the helicopter on a thick rope.

"I remember reaching for the rope and the next memory was me on the ground. They said my foot got stuck in the door and I couldn't hang on because of the angle and the prop wash. I fell 40 feet and fractured a vertebra."

Lying paralyzed on the ground, his first thoughts were of failure.

"For a while, it was the worst thing to rehash that. It tore me up," he says. "You're supposed to get from the helicopter to the ground suc-

cessfully, to be inserted on the ground. You're not supposed to fall.

"Being a veteran, I'm fortunate as I have a lot of people willing to help me. The Seattle Veterans Administration Hospital helped me learn to drive, take the bus... and cook food in my own apartment without burning myself.

"They were my umbilical cord for safety and I was afraid to cut it," he says. "I didn't know how to leave."

New doors began to open for Halsted when he attended the 2001 National Disabled Veterans Winter Sports Clinic in Colorado. There, welcomed by a large enthusiastic community, he began competing in adaptive alpine and Nordic skiing, sled hockey, shooting, and other events. He returned to Seattle inspired and ready for more competition but says it was a struggle to connect the dots.

Since he was already taking part in wheelchair racing and basketball at the VA, he planned to continue with that. Volunteers and therapists, however, pushed him further.

"They told me, 'You need to pick a sport and go to the Paralympics,'" he says. As a teen, Halsted had loved alpine skiing at Schweitzer

Mountain Resort, so he decided to try an adaptive sit-ski. Though exhilarating, he found it awkward to navigate the chairlift and missed the lactic acid burn he used to get with standing skis.

He'd done a little cross-country skiing in the past, so half-heartedly gave the sport another go. With surprise, he discovered a knack for it and the arm motion gave him the exercise burn he craved. It wasn't long before he was tearing up the slopes.

Through trial and error, he slowly prepared for national competition, including weaning himself off the opioid painkillers he'd been taking for years, an often difficult task.

By 2010, Halsted was competing in the Vancouver Winter Paralympics as part of the U.S. Ski Team. During that time, he was the number two adaptive Nordic skier for the United States with an overall top finishing spot of seventh place.

He'd also become a regular on the World Cup circuit where he finished sixteenth in overall standings his first full year on the team. The biathlon was gaining popularity at the time, so he soon added a rifle to his equipment list.

His successful run continued through the 2014 Sochi Winter Paralympics and by 2018,

Halsted was a well-known personality in the world of adaptive sports. Though no longer a top competitor, he says he went to PyeongChang to help promote the Paralympics.

"I'm not a good innovator of adaptive sport programs, so I went with the best I could do which was being on the national team," he says. "The Paralympics is now broadcast on TV and the internet and people can actually see what adaptive Nordic skiing is."

Looking back at his 15K cross-country skiing race in PyeongChang, Halsted says, "I loved my efforts, felt great about the energy I put into it, but like always for me, you can immediately see the results as you cross the finish line, and start comparing it to your times at Vancouver, Sochi, and world cups.

"Yes, it's not first, but first is not the be all, end all."

Halsted, husband and father of three, says his primary goal today is to create awareness and community for wheelchair athletes.

"Over the years, so many civilians have come up to me and said they didn't even know these sports existed, and they wish they'd known about them before," he says.

"In Spokane, we have Team St. Luke's and Parasports Spokane. It's a great pipeline for kids to get into sports especially wheelchair basketball and track and field.

"Then, these kids move on to the University of Illinois which gives scholarships in these areas. They become part of a community and can easily get 20 people to play basketball or 5-6 to go handcycling. Why would they leave?"

In a bid to keep more wheelchair athletes in Spokane, Halsted is working with Team St. Luke's and Parasports Spokane to develop competitive wheelchair basketball and track and field teams. The group is proposing that Eastern Washington University provide scholarships for varsity wheelchair basketball and eventually other sports.

At the same time, Halsted is collaborating with Mt. Spokane Ski and Snowboard Park to provide improved accessibility to the ski lodge and more opportunities for adaptive Nordic skiing and sled hockey.

"There's a lot of challenges ahead," says the veteran warrior. "I have to keep plugging along. Even if I'm no longer a medal contender, I still want to help promote the sport." *



LINTAO ZHANG/GETTY



Bison

BY LARRY CLARK

The day the bison herd swam across the river says it all.

About 80 of the legendary mammals, known for hardiness and stubbornness, decided to cross the half-mile wide Pend Oreille River in 1994—bulls, cows, and even calves—and all survived the crossing, recalls Ray Entz, natural resources director of the Kalispel Tribe of Indians in northeast Washington.

That same rugged strength of the woolly North American bovines—whether you call them bison or buffalo—helped the entire resilient species survive. Although bison are now the national mammal of the United States, they once balanced on the cliff of extinction with fewer than 300 wild animals in the late nineteenth century.

Critical to Plains, Rocky Mountain, and Plateau Native American tribes, bison have powerful spiritual as well as practical purpose. Bison herds continue to grow thanks to the Intertribal Bison Cooperative and others, and remain a valuable food source and a cultural touchpoint for many tribes such as the Kalispel. The Blackfeet even have a specific word for bison meat: *natapi waksin*, meaning “real food.”

The animals themselves strike an impressive profile. The immense bulls can weigh a ton or more and stand five to six feet high. The cows are not as massive but still imposing. They’re quite agile, with sprint speeds of up to 30 miles per hour.

The two species are the smaller plains bison and the larger wood bison, with a taller, square hump. The wood bison is one

of the largest wild bovines in the world and the largest extant land animal in the Americas.

Of course, the question about the name inevitably arises: Is it bison or buffalo?

The answer’s a little surprising: the European name “buffalo” precedes “bison.” French fur trappers and some explorers referred to the animals as *bœufs*, which became buffalo in English, around the early 1600s. The name “bison,” meaning ox-like animal in Greek, was first applied in 1774.

Whatever you call them, they’re certainly one of the most important North American animals. Bison originally spread as far south as Mexico and east to the Atlantic, and were seen in North Carolina as late as 1750.

We might not know just how many buffalo once roamed North America, but estimates range from 30 to 75 million. “The moving multitude ... darkened the whole plains,” wrote Lewis and Clark, who encountered a plains herd in 1806.

Overhunting and construction of the railroads across the plains decimated the buffalo populations by the 1880s. Train passengers would shoot the buffalo by the thousands as they ran beside the rails.

The bison were rescued thanks to the tireless efforts of mainly five groups, according to Ken Zontek, an environmental historian teaching at WSU Tri-Cities and Yakima Valley Community College. Zontek is the author of the 2007 book *Buffalo Nation: American Indian Efforts to Restore Bison*, which tells the stories of the frontline environmentalists who rescued bison. President Theodore Roosevelt and others later helped by establishing the National Bison Range and mandating protections, but it was really the efforts of both Native Americans like Sabine Walking Coyote, who physically captured and bred bison, and other westerners who ensured survival.

RAISING BISON CERTAINLY STILL TAKES SOME MOXIE.

“There’s never any end to the fun with managing a bunch of wild beasts,” says Entz. “We’ve only really ever had one incident in the 25 years I’ve been here. Nobody’s ever been trampled. I’ve been missed a few times really closely.”

Standard fences don’t do much to contain the animals, either. “They treat it like a piece of really light fishing line,” laughs Entz.

Entz has worked for the Kalispel Tribe since the early 1990s, but he hadn’t seen anything like that day in 1994 when the whole herd swam the river. Most of them eventually swam back home—save one recalcitrant bull.

“I was walking the last big bull back,” says Entz. “When the bull saw the pickup trucks, you could just kind of see his eye

get a little bit bigger. I started running next to him, doing the whole, ‘Yah, yah, you gotta go that way.’ And he didn’t want to have anything to do with it. So, I kind of gave up because I was looking at about 2,200 pounds of buffalo at that point, and he wasn’t happy.

“The truck, doing about 30, was trying to cut him off. That buffalo at a dead run jumped right over the back of the truck.”

During breeding season in mid- to late summer, the herds become restless. The bulls start bellowing and quarreling as they compete for females. The cows give birth usually to one calf a year. Buffalo can live about 20 years.

People who keep bison herds can work with the Washington Animal Disease Diagnostic Laboratory at Washington State University on pregnancy tests and tests for malignant catarrhal fever.

In 2003, that malady killed 825 bison in Idaho. Led by Naomi Taus, veterinary medical officer for the Pullman unit of the USDA’s Agricultural Research Service and a WSU faculty member, the WSU scientists realized the bison were exposed because they were close to a flock of sheep. The scientists used the sheep as a way of culturing the virus, with hopes of developing a vaccine.

While a vaccine has not yet been developed for malignant catarrhal fever, the ARS and WSU efforts have advanced the effort against a tough disease.

BISON PROVIDED MEAT AND HIDES for thousands of years to Native American tribes, and it still remains a great alternative to beef.

The majority of bison are raised for human consumption. The meat is generally considered very similar to beef in taste, but lower in fat and cholesterol and higher in protein. There’s even kosher buffalo meat available nationwide.

At the Kalispel Tribe, Francis Cullooyah, a tribal elder and Entz’s predecessor who brought in the buffalo in the 1970s, says the annual August powwow and buffalo barbecue give the Kalispel people a chance to enjoy the meat, along with huckleberries and other traditional foods.

“We usually butcher two animals and do a big traditional pit barbecue with roasts,” adds Entz.

Whether you cook up some bison roasts at home or you seek out a bison burger at a restaurant, you’re sure to enjoy it. Just remember to thank the early conservationists and Native Americans who saved an iconic animal over a century ago, and gave us the chance to relish and respect a truly original food of the continent. ✨

⊕ bison recipes, where to find buffalo meat, and how to meet the animals: magazine.wsu.edu/extra/bison

PHOTOS BY ZACH MAZUR

PLAN BEE

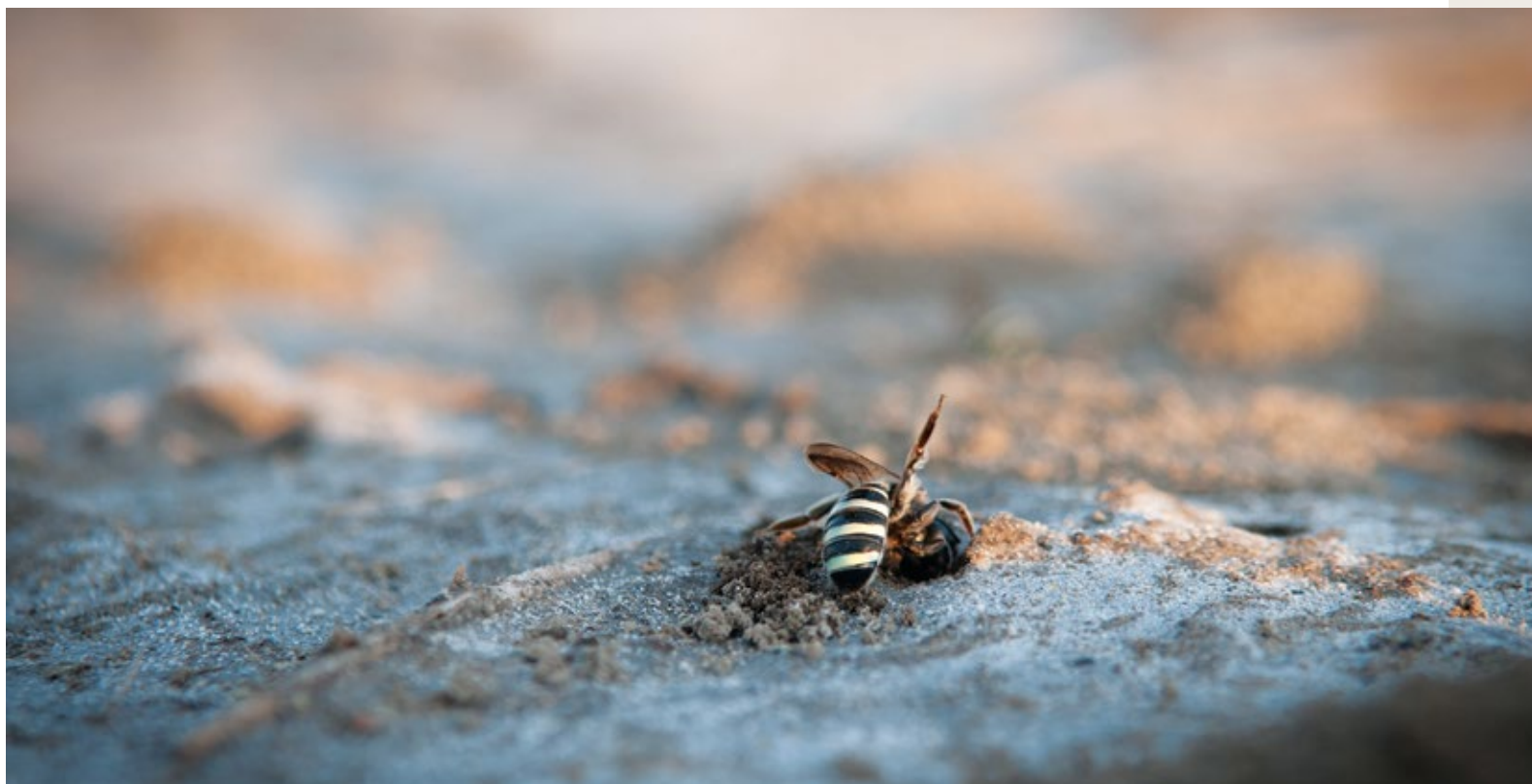
BY REBECCA PHILLIPS



For thousands of years, humans have relied on the European honey bee to pollinate agricultural crops. Now, wild North American bees are getting a second look.

On a hot, mid-June afternoon, I follow a caravan of vehicles as they pull over to the side of a dusty road in Walla Walla County. Opening my car door, I notice a hum like distant traffic yet the fields surrounding us are quiet and sweet with blooming alfalfa.

The drone grows louder as farmer Mike Ingham leads us toward a gray patch of ground on a nearby hillside. Within a few steps, we're engulfed by swarms of alkali bees—hundreds of thousands of iridescent-striped bees, crawling out of holes in the soil, taking flight, and buzzing our ears. I fight an urge to run but he calmly reassures us they're not aggressive.



The “bee bed” we’re observing is something absolutely unique to this little corner of southeast Washington—the only place in the world where farmers successfully manage native alkali bees, *Nomia melanderi*, for use as crop pollinators, specifically for producing alfalfa seed.

In return for building attractive nesting grounds for the bees, growers in the Touchet-Lowden-Gardena area are rewarded with 50 percent higher yields of alfalfa seed per acre than other producers. In fact, 25 percent of the nation’s alfalfa seed crop is grown here, which is then sold to raise alfalfa hay, the fourth largest agricultural crop in the United States. Hay, in turn, feeds cattle who produce beef and milk for cheese and other products.

Ingham ’78, third generation alfalfa seed grower and one of only about a dozen in the Walla Walla Valley, invites us to take a closer

Overleaf: Alfalfa leafcutter bees enter their nests in a bee board. Below: An alkali bee works on its hole in the bee bed. Opposite: Sunrise over an alkali bee bed. Doug Walsh sweeps an alfalfa field for insects.

look at his bee bed. Like an alien moonscape, the bare ashen soil is rutted from runoff and densely dotted with small holes that lead to the females’ nests, eight to ten inches below ground. The busy insects seem to ignore our presence as they fly in and out, digging little dirt piles, and poking their antennae out the openings.

“This relationship between alkali bees and alfalfa is a novel association—they didn’t co-evolve together,” says Ingham. He is referring to the fact that some North American bee species did evolve unique tactics for pollinating native plants like blueberries, tomatoes, squash, and pumpkins.

In the United States, there are more than 4,000 wild bee species, which, along with honey bees, play an important role in pollinating

agricultural crops. Unlike honey bees, however, most wild species are solitary and don’t live in communal hives. Seventy percent of these are ground-nesters like the alkali bee, while the other 30 percent prefer cavities such as hollow twigs or holes in wood.

As ancient residents of the Pacific Northwest, alkali bees naturally gather in arid areas with damp, salty soil such as stream banks or salt flats. Once established, the bees will maintain their “neighborhood” for years as long as there is a ready supply of pollen and nectar.

And, come each June, the young bees emerge from their holes in pursuit of mates. Once bred, the females have only six weeks to build a new nest, procure pollen, and raise a brood before they die. As it turns out, that six weeks coincides perfectly with the Walla Walla alfalfa bloom.

It wasn’t always this convenient, says Ingham. The farmland, which receives minimal rainfall, was originally ditch-irrigated for wheat and hay production, and provided only a small alfalfa seed crop on the side. The turning point came with the legendary research efforts of Washington State University entomologists Herman Menke and Carl Johansen.

It was Menke who, in 1949, discovered that alkali bees could be of economic value.

“The ditch banks were moist and bees were digging nest holes in them. Menke realized they were pollinating the alfalfa and helped us begin to commercialize it,” says Ingham.

Menke’s first step was to build an artificial nesting site. Initial attempts were hit and miss—manmade ditches placed at the top of salty slopes to allow water to seep down, or trenches filled with rocks, soil, straw, and water.

Around 1970, Johansen came up with a different approach that more closely mimics the natural groundwater upwelling and alkaline environment the bees prefer. That system helped put the Walla Walla alfalfa seed industry on the map and is still in use today.

“In April, we put four to six tons of rock salt out per acre,” Ingham says. “It seals the soil surface and draws up moisture to make an attractive surface for bees to nest in. Then, we have a sub-irrigation system set up with white PVC pipes buried about 20 inches deep.



We pump water into the pipes till around July fourth when runoff from the Blue Mountains dries out.”

Doug Walsh, professor of entomology at WSU Prosser Irrigated Agriculture Research & Extension Center, estimates there are about 40 million alkali bees at work in the Touchet-Lowden-Gardena area each summer.

As the area’s fifth successive WSU bee researcher, Walsh proudly carries on the relationship first established with the alfalfa seed growers by Menke nearly 70 years ago.

Over time, he says the farmers have adapted their culture and depend on WSU leadership to help determine the best ways to control pests while also preserving bees during their critical six-week lifecycle.

Working with members of the Washington Alfalfa Seed Commission, for example, Walsh developed an integrated pest management program for controlling the lygus bug, a harmful insect that infests alfalfa fields at the same time bees are gathering pollen.

Instead of resorting to daytime spraying, growers now apply pesticides only at night when the bees are deep in their holes. And the pesticides they choose are some of the least toxic available. Walsh and graduate student Greta Dupuis are also developing soil temperature sensors to better predict when bees will emerge in the spring, giving farmers a head start on spray reduction.

Studies conducted by Walsh and his predecessors have even influenced state and local laws aimed at protecting the county’s insect partners—especially when the tiny creatures cross roadways. Alkali bees fly low to the ground and can travel up to five miles in search of pollen and nectar, so they are often hit by cars. The faster the speed, the more bees killed.

As a result, Walla Walla County claims to have the only government-created speed limit for an insect, says Walsh. The back roads are adorned with orange traffic signs warning: *Speed limit 20 MPH, 8 a.m. till 8 p.m., alkali bee area.*

They also have ordinances for pesticide use and one that limits the number of honey bees allowed on property between June and September.

“Honey bees steal nectar and food from the alkali bees,” says farmer Mark Wagoner ’75. “They’re a detriment to alfalfa seed production. They also sting our workers!”

Though honey bees can pollinate alfalfa, they aren’t very good at it, explains Walsh. Alfalfa blossoms have a trip mechanism that bops the bee on the head with pollen. The bee then carries the pollen onto the next flower.

“Honey bees don’t like that, so they learn to chew a hole under the blossom to suck out the nectar,” he says. “It only takes a honey bee worker one day to learn not to get bopped.”

To help ensure a fully-pollinated crop, Wagoner instead relies on imported Canadian alfalfa leafcutter bees (*Megachile rotundata*). A bit smaller than alkali bees, the leafcutters are cavity-nesters and live in a series of white bee huts set on stilts throughout the alfalfa fields. These miniature high-rise hotels are stacked with bee boards filled with hundreds of holes. Swarms of leafcutter bees hover around the “doorways,” their rapidly-beating wings filling the air with the loud drone we first heard from the car.

West of the Cascades, WSU entomologist Dave Crowder and doctoral student Elias Bloom are investigating the role of native pollinators in Seattle's urban environment. Their Citizen Science Initiative for Bees (CSI Bees) includes the first comprehensive survey of wild bee diversity in the Puget Sound region. In fact, all across the Pacific Northwest, WSU researchers lead the way in pollination ecology and efforts to conserve threatened populations.

By some estimates, pollinators like bees and butterflies produce up to a third of the world's food supply. Recent studies, however, have shown dramatic declines in many of these species, with some nearing extinction. Once common and widespread, the western bumble bee (*Bombus occidentalis*) has disappeared from large parts of its former range and other species are following suit.

"Wild bees are affected by the same pesticides, fertilizers, and herbicides that harm honey bees," says associate professor Crowder. "But most important, they are impacted by the loss of habitat.

"As we convert natural landscapes into agriculture or housing developments, we destroy some of the normal nesting sites," he says. "Plowing up ground and planting huge monocultures may deplete nesting options for ground-dwelling bees. Clearing forests and other vegetation decreases options for cavity nesters."

And, although there is scientific value to preserving species, Crowder says on a practical level, we need them to pollinate our food crops and native plants. In fact, for certain crops, wild bees are more effective pollinators than commercial honey bees.

Take the fuzzy bumble bee which has developed the clever trick of "buzz pollination" to release tightly-held pollen grains in cranberries and blueberries. They do this by unhinging their wings from the wing muscles, grabbing onto the pollen-filled anthers, and rapidly vibrating their bodies, something honey bees can't do.

Studies also suggest that crop yields are improved when both wild and honey bees are present in the same field. Like an insurance policy, the biodiversity provides farmers with more reliable pollination.

Tim Lawrence, associate professor and Island County Extension director in Coupeville, has been keeping bees for 56 years, including a stint as a professional bee wrangler. He shares an inside look at the mysterious ways these insects accomplish their mission.

"Bees are covered with fine feathery hairs that develop a positive electrical charge as the bee flies," he says. "When they land on a negatively-charged flower, pollen grains will literally jump onto those hairs. The bees then groom their legs and pack the pollen into little baskets on their hind legs called corbiculae and fly back to their nest. During this process, some of the pollen falls off and fertilizes the plant."

Lawrence says it was recently discovered that when a bee lands on a flower, it reduces the negative charge of that flower, leaving an electrostatic signature that other bees can sense.



"So, you'll see a bee hovering over a flower and then land on one that indicates it hasn't recently been visited by other bees and is more likely to offer a pollen or nectar reward."

Bees also have the help of a floral ultraviolet guidance system. "If you look at a flower under a black light, it shows ultraviolet radiation coming off like landing strips at an airport," he says. "These lines guide the bee to the nectar and pollen."

Despite their natural abilities, wild pollinators face an uphill battle against the challenges of climate change, widespread chemical use, and ongoing habitat destruction.

Crowder says the American public is stepping up to help. Citizen scientist groups across the nation have joined forces with federal and academic researchers to gather data and help restore pollinator habitat.

On a local level, he and Bloom launched the Northwest Pollinator Initiative in 2015 to study habitat conservation on small farms in western Washington. The initiative includes CSI Bees, a community information-sharing network where volunteers learn to observe, monitor, and catalog wild bee diversity throughout the region.

"The level of enthusiasm has been through the roof," Crowder says. "Well over 100 citizen scientists are participating in some of our different projects."

Crowder and Bloom began their efforts in 2013 when they reached out to Bob Redmond, founder of Seattle nonprofit The Common Acre, who helped locate urban gardens for study and introduced them to local farmers.

Unlike the east side, western Washington farms are typically smaller and more diverse with a mixture of fruits and vegetables that require pollination, such as tomatoes, peppers, squash, strawberries, and apples.

"There is a lot of organic agriculture there—CSAs and farmers markets," says Crowder. "Farms with diverse crops have plants blooming throughout the whole season which, in turn, helps keep wild bee communities healthy year round."

Crowder and Bloom have since established a network of about 36 sites for sampling bees—everywhere from downtown Seattle, Tacoma, and Olympia to outlying rural areas.

As a result, they've made significant progress in documenting the types of pollinators living around Puget Sound, and are now using the data to develop long-term conservation plans.

Their first step was to team up with P-Patch, a group of Seattle community gardens, where they recently installed a number of "habitat augmentation treatments."

Opposite: The honey bee can become a more efficient pollinator when wild bees are present.

Each treatment area consists of a patch of bare soil for ground-nesting bees, a section of lavender, lupine, or other flowers, and a bee hotel for cavity-nesters—often, incidentally, painted in bee-attracting bright blue.

CSI Bees volunteers observe these treatments and meticulously record the types of bees, wasps, flies, spiders, butterflies, and other insects that visit. In time, Crowder and Bloom will compare their results to observations made on farms without augmentation. The goal is to try to increase pollination and crop production.

They also hope to verify that the bees will continue flying out to the crops.

"Ultimately, we want bees to increase our food supply. If we provide too nice of a habitat for them, there is the risk that they will have no need to search for pollen and nectar in the fields," Crowder says. "These enhancements take time, labor, and money, so we have to know if the effort pays off for farmers to invest in it."

If nothing else, Crowder and Bloom's efforts have paid off in motivating people.

"Eli is probably asked to give up to 20 presentations per year to everyone from 4-H groups, schools, Master Gardeners, and Girl and Boy Scout troops, to farmers and home gardeners," says Crowder. "Every year, we put on multiple field days and workshops where we teach people to monitor bees and provide them the tools to augment habitat in their own gardens.

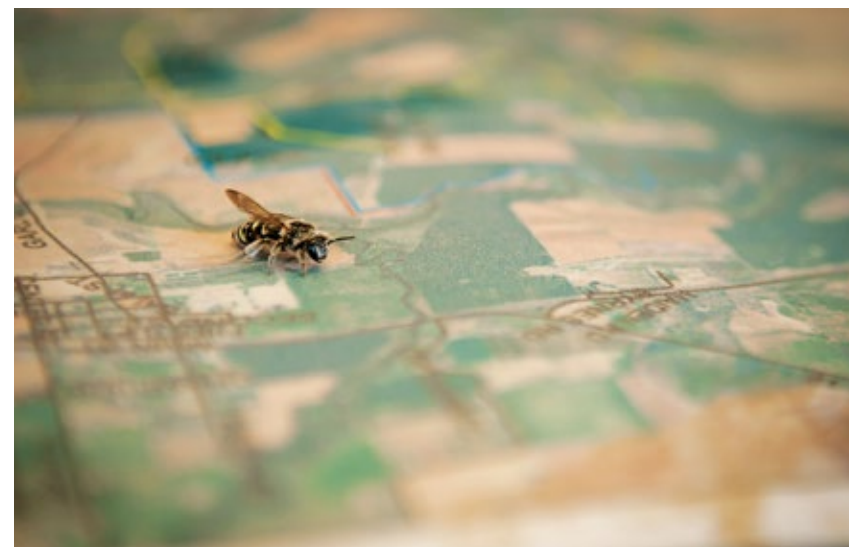
"We're now starting similar pollinator surveys in the Palouse area of eastern Washington."

There, among the vast monocultures of wheat, peas, and lentils—which don't require insects for pollination—Crowder and Bloom have discovered an unexpected flurry of diversity in the canola fields.

Crowder says canola is one of the few flowering crops in the area that benefits from the service of bees, but they expected most to be honey bees from local beekeepers.

Instead, net samples revealed over 100 different pollinator species including bumble bees, sweat bees, honey bees, mining bees, butterflies, flies—and even a variety of leafcutter bees.

"I was surprised at the diversity," he says. "There are very few patches of natural Palouse prairie habitat left to support bees, and those that are there must often travel long distances to find a canola field." *



build bee habitats and preserve pollinators: magazine.wsu.edu/extra/bee-hotels



STAFF PHOTO

BEE LINES

The virgin queen honey bee sits quietly in a tiny wire cage. Gently, WSU entomologist Brandon Hopkins '14 lifts her out and puts her into a clear plastic tube, rear-end first. Using carbon dioxide, he anesthetizes the queen and positions her exposed abdomen under a microscope.

With her stinger pulled back, Hopkins inserts a straw and injects ten microliters of Caucasian honey bee semen. He then clips a wing as a marker and glues a paper-punch sized number tag onto her thorax.

Hopkins does about 20 artificial inseminations each day.

"The Caucasian honey bee was lost in the U.S. in the 1980s when the main breeders retired," he says. "So, we resurrected this subspecies with frozen semen and backcrossing with other lines. Through artificial insemination, we can create a line that is 99.9 percent pure."

Maintaining high quality breeding stock is just one of the innovative projects slated for WSU's future Honey Bee and Pollinator Research Facility in the College of Agricultural, Human, and Natural Resource Sciences. Fundraising for the \$16 million complex is in progress.

The facility is scheduled to be built next to the Eggert Family Organic Farm on the east end of the Pullman campus. Plans include a molecular lab, controlled atmosphere rooms, and a cryogenic germplasm repository for honey bee semen collected from around the world. The area will also offer demonstration gardens and apiaries for public viewing.

It will be a welcome move for research scientists who are currently housed in different buildings scattered across the University.

Hopkins and entomology professor Steve Sheppard, for example, are looking forward to working in the controlled atmosphere lab where they study the benefits of keeping honey bees inside refrigerated buildings during the winter. Hopkins says that bees stay healthier and store more fat and protein when kept indoors than those who spend the winter outside in hives. Their research could help reduce annual honey bee losses.

Hopkins is also placing honey bees in refrigerated rooms during the summer as a safer method to kill varroa mites, which take a deadly toll on honey bee populations.

"Putting them in a cold, perfectly dark room appears to cause the queens to stop laying eggs and workers to stop raising the brood," he says. "So, in about three weeks, there is no brood and beekeepers can use a single treatment of miticide and get 99 percent effective varroa mite control without harming the bees."

More apian research at bees.wsu.edu.



SUPER BUGS

BY BRIAN CHARLES CLARK

A woman lies dying in a hospital bed in an acute care facility in Nevada. She has a common infection induced by a common bacterium, *Klebsiella pneumoniae*. But she's untreatable: her infection is resistant to all 26 of the antibacterial drugs available in the United States capable of treating the bacterium. The infection spreads further, which causes her blood pressure to drop precipitously until she finally succumbs to septic shock.

While death by "superbugs" is still fairly rare, the World Health Organization warns that, if bacteria keep evolving drug resistance at the rate they have been, such bugs will globally cause 10 million deaths per year by 2050. Not all resistant bugs are "super," as microbes vary in their acquisition of the genetic tools needed to resist the effects of drugs.

These more common drug-resistant microbes already infect over 2 million Americans annually, resulting in 23,000 deaths, according to the Centers for Disease Control and Prevention. Microbes resistant to healthcare's armamentarium of antibiotics and other antimicrobials are rapidly pushing up the costs and risks of treatment, as doctors must prescribe last-resort drugs that are both expensive and that, when used, risk inducing further resistance.

And while pharmaceutical researchers may be able to develop new antibiotics, bacteria are going to keep evolving, at the rate of one generation every 30 minutes or so, and winning the resistance war. But new research at Washington State University and elsewhere suggests that broad-spectrum antibiotics might be at least partially replaced with a multifold strategy: a variety of more narrowly targeted drugs, including one strategy that exploits the power of the cell being attacked to fight off infection.

Additionally, experts at WSU, along with their colleagues at the Washington State Department of Health, say that one of the main strategies for combating antimicrobial resistance is through stewardship of the current suite of antimicrobials, meaning they must be used much more judiciously. Another is deceptively simple: to improve our personal hygiene and food handling practices and thus block the transmission of infectious bacteria.

ILLUSTRATION LUCIANO COSMO

A WICKED PROBLEM

WSU pathologist Guy Palmer compares antimicrobial resistance—AMR—to a car wreck. We sit up and notice when a plane crashes, no matter how rare that is, just as we do when a scary disease outbreak, like the 2014–15 spread of Ebola, jolts Americans into awareness about our vulnerability to the spread of infectious diseases. Car crashes, though, while taking far more lives than do planes, barely register on our public health radar.

As WSU epidemiologist Margaret Davis ('85 DVM, '02 PhD Vet. Sci.) points out, "I think most of us feel distant from that scenario because most of us don't have infections in the hospital. But if you are talking about hospitalized people, or people with immune systems that are suppressed for whatever reason—there are a lot of people [in that situation]."

Doug Call ('87, '97 PhD Zool.), a microbiologist and a colleague of Palmer's at WSU's Paul G. Allen School for Global Animal Health, worries that we don't do enough public education regarding microbes and their health consequences. Where, he asks, is there room in the public school curriculum to teach kids how to prevent the spread of microbes through such basics as thorough hand washing and safe food handling?

Call, Palmer, Davis, and their public-health colleagues in the Washington State Department of Health, all agree that blocking transmission is the essential frontline defense that must be reinforced. And while the CDC funds surveillance and infection prevention programs for public health agencies, the "last mile" problem—how you and I behave in the face of spreading AMR—is much harder to deal with.

And then there's the fact that we are, like it or not, a global community. What happens in Scotland or Tanzania affects us here—and no border will ever keep microbes out. They arrive on humans, sure, but also on food and any evenly remotely hospitable-to-microbes surface.

It is, as Call, Palmer, and others confronting AMR say, the very definition of a "wicked" problem: deeply complex and with no simple solution.

AMR is as ancient as microbial life itself. Although humans began consciously using antibiotics to combat infections and diseases less than 100 years ago, microbes have been duking it out for billions of years. Fifteen-million-year-old microbes with resistance genes have been found in ancient permafrost. In water, soil, and everywhere microbes are found, they're competing for resources and do so with what some scientists have called "chemical warfare."

The first antibiotic was in fact a chemical extracted in 1928 from *Penicillium*, a common fungus. By the end of the second world war, resistance to penicillin was already resulting in untreatable infections. That's because whenever bacteria (and, for that matter, viruses, fungi, and other microbes) encounter antimicrobial chemicals, whether human-made or otherwise, they either die or evolve. The ones that survive pass on their resistance genes to their kin.

Bacteria have a distinct evolutionary advantage over humans, inasmuch as they reproduce, and thus adapt to changes in their environment, very quickly. Bacteria also exchange genes via plasmids—tiny bundles of genetic material that can be shared with neighboring bacteria—in a process called horizontal gene transfer.

Bacteria have several methods of resisting the chemicals designed to kill them. They build protective walls around the sites where antibacterial drugs are designed to latch on to the organism and disrupt reproduction or metabolism. Or they have pumps that sense the presence of a toxic compound, and pump it right back out again.

The reality is that modern healthcare is dependent on antimicrobials. Before 1950, infection and pneumonia were the primary killers of humans, but since then antibiotics and other antimicrobials have saved millions of lives. As Palmer recently told a room full of health-care professionals, "Transplantation and chemotherapy are not effective without antibiotics. Childbirth is much more dangerous. Pretty much every aspect of modern healthcare relies on the availability of effective antibiotics."

While AMR is naturally occurring, it has spread rapidly in recent decades due to the widespread use of antibiotics in human and animal healthcare. Indeed, as researchers from both the WSU



College of Veterinary Medicine and Washington Department of Health say, there is much finger pointing: Is it the use of antibiotics in dairies and other livestock production situations that is responsible for the spread, or is the lack of stewardship and infection prevention in health-care facilities the cause?

The "wicked" answer is that AMR is a result of both, and much more. AMR is, say experts, a "one health" problem that involves humans, animals, and the environment.

While use of antibiotics in the livestock industry varies, consumer demand has resulted in several companies, such as Pizza Hut, Costco, and Walmart, to stop selling chicken that's been exposed to antibiotics.

Even so, just because you buy something at the store, stress both Call and Davis, don't assume it is perfectly safe. Davis recalls a story she heard in the 1990s when she worked in public health, around the time of an *E. coli* outbreak. "A toddler pulled the fridge door open, saw some raw hamburger on the shelf, pulled it out, and started eating it," she says. "Even if you handle food perfectly, that kind of stuff happens."

As Call says, foodborne illness is not a matter of *if*, but of *when*. That's why restaurant workers must be specially trained to handle and prepare food safely—a training that would no doubt benefit everyone who handles and prepares food. "Attention to bacterial transmission is probably orders-of-magnitude more important in hospitals where the most vulnerable patients are at risk," he says.

CAR WRECKS IN SLOW MOTION

For most people, AMR is like the car wreck that happens to someone else. Sad, but no reason to change our personal behavior. Jon Yoder, an economist at WSU, studies exactly that kind of situation as he looks for ways to motivate people to change.

Economics, as Yoder points out, is a social science focused on the reasons people do what we do. One of the reasons most of us don't do much about AMR is because the costs associated with AMR are "external." If you don't personally pay the direct cost of antibiotic use, you're not likely to reconsider the way you use them. It's somebody else's problem.

For example, if I use antibiotics to treat a cold, I've done something that promotes the spread of resistance genes—and



that's completely ineffective because of course the common cold is caused by a virus. But I may not have to pay the price; rather, the person in the next hospital bed over may be the one to contract an untreatable infection. Likewise, the use of personal care products containing triclosan, an antibacterial in thousands of products, externalizes the cost of resistance by polluting the commons, the shared resources we all depend on for life.

Yoder is looking for ways to create incentives that will result in people recalculating the way they use antibiotics. Regulation and taxes are two common solutions. As with carbon emissions that contribute to global warming, it might be possible to tax antibiotic use—in essence raising the price of treatment—so they are used less frequently. But, Yoder points out, taxation and regulation are fairly blunt instruments with ethical challenges, especially where access to healthcare is limited. The real world is much more complicated.

Take the use of antibiotics in Kibera, for instance. Kibera, on the outskirts of Nairobi, Kenya, is one of the world's largest "informal communities." "A slum, in other words," Call says.

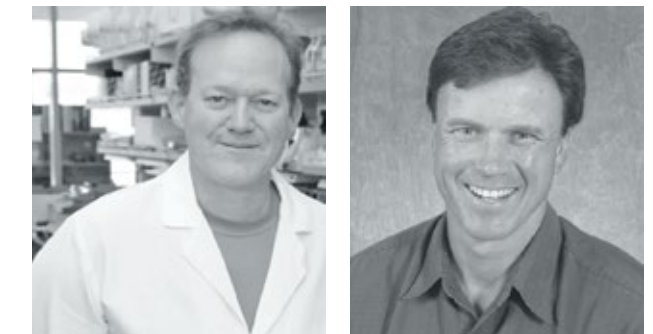
He and other WSU researchers have spent time there, trying to get a handle on the microbial situation. With 77,000 people per square kilometer and sharing a very limited number of public toilets, there is often no choice except to dispose of waste in the alleyways between buildings. Such conditions are ideal for promoting disease transmission and ramping up the demand for antibiotics.

In many parts of the world, including Kenya, access to antibiotics is restricted only by cost. But, as Call says, who's to say that the use of such drugs is inappropriate when your health may depend on them? Taxing or regulating the use of antibiotics in such situations would be inhumane.

As Call stresses, the solution is blocking transmission, making the use of antibiotics unnecessary.

Sara Podczervinski is an infection preventionist with the Washington State Department of Health, and blocking the transmission of disease-causing microbes is both her work and her passion.

"We've really expanded the number and types of health-care facilities we're working with. You talk about hope," she responds when asked about how she sees the future of our col-



lective management of antimicrobial resistance, "that's where I see a lot of hope."

Where once infection prevention was largely the sole purview of hospitals, the practice is spreading to long-term care and ambulatory surgery facilities, dialysis centers, and indeed every aspect of healthcare.

"You have to think beyond the hospital walls," she says. But you have to think about the walls, too, and that's just what is happening in facility design. Facility planning now involves not just architects but their clients: the doctors, nurses, and support staff who need quick and efficient hygiene practices.

Before something even gets built, Podczervinski says, building designers sometimes "take us to a warehouse where they have a cardboard mockup of everything, so you could walk through to see if the spaces make sense." Patient and caregiver flow are important considerations in blocking the transmission of infectious agents. Even in older buildings, infrastructure is being tweaked to make access to things like sanitizing hand gels "closer to where the action actually is" instead of

Opposite: Guy Palmer. Photo Robert Hubner. Below, left to right: Margaret Davis. Photo Matthew Weaver/Capital Press. Doug Call. Photo Henry Moore Jr. Jon Yoder. Photo Henry Moore Jr.

Below: Tom Kawula. Photo Henry Moore Jr.

down the hall—where the pressure of time may put it out of reach.

Stewardship of antibiotics and surveillance of where AMR-associated infections take place are the purview of Podczervinski's DOH colleagues Marisa D'Angeli and Kelly Kauber ('08 Ani. Sci., '11 Biol.).

Stewardship, Kauber says, is an effort to conserve the efficacy of antibiotics by making sure they are only used when really needed. This requires a "one health" approach because, says D'Angeli, "we don't know whether the biggest problem is coming from antibiotic use in humans, in animals, from pollution, from people throwing their antibiotics down the toilet—but we really want to move the needle in the right direction everywhere antibiotics are used.

"Everyone has a stake in better use of antibiotics," D'Angeli continues, "and everyone should play a role. Whether as a prescriber, a farmer, or a parent, or somebody who needs to get back to work and wants an antibiotic because they think it's going to make them feel better. My experience is that often an antibiotic is prescribed as part of a whole package of things."

D'Angeli's prescription is to "take a step back and be more thoughtful about these things." And, adds Kauber, "Wash your hands."



RIGHT ON TARGET

Drugs that target specific diseases may be a powerful tool in blocking the transmission of disease. As currently designed, broad-spectrum antibiotics kill bad bugs but they may also take down the good ones, too. "It's like using a sledgehammer when you need a scalpel," says D'Angeli. That can wreak havoc with a patient's gut microbiota, leaving, for instance, the notorious *Clostridium difficile*. A normal member of the gut biota, when left on its own it can cause unrelenting and sometimes fatal diarrhea and other complications.

"Ideally," says microbiologist Tom Kawula, director of WSU's Paul G. Allen School for Global Animal Health, "you'd want something more specific."

Researchers in the school recognize that humans are animals and that infectious diseases such as *Salmonella* are often "zoonotic," transmissible from animal to human and human to animal. Influenza is probably the most well-known example of

a zoonotic disease, harbored in poultry, swine, or other animals before jumping to humans.

Kawula's lab focuses on intracellular diseases, such as salmonella, chlamydia, listeria, and many others that actually cause infection by first invading host cells. A staph infection, by contrast, may cause a skin abscess but it's growing between the cells, not within them.

"Intracellular pathogens can take advantage of a host cell environment," Kawula says, by disabling a cell's normal antimicrobial defenses. Kawula and his colleagues specifically work on ways of countering the attacks of certain infectious agents on macrophages.

"Macrophages are a type of cell that are there to control infection. They have a lot of antimicrobial properties. They basically rip the bacteria to shreds, killing it so it doesn't cause any more disease," he says.

Bacteria, though, have figured out how to infect macrophages, and there is a long list of nasty diseases that are "recalcitrant to treatment" that could potentially be stopped in their tracks if we knew how to target them. Kawula's strategy is not to directly attack the infecting microbe but to use the host cell's resources to kill the invading bacteria.

Bacteria rely on their host cells for food. If a compound could be targeted to a particular aspect of the host cell's metabolism that, in turn, cuts off supply of an essential nutrient the bacteria requires, then the invader can no longer thrive and reproduce. End of infection.

This is a relatively new area of research called "host therapeutics." In Kawula's case, he says he and his team started out trying to understand how an invading bacterium manipulates the environment inside a host cell.

"We were looking for compounds that interact with the host cell but affect the growth of the bacteria."

Researchers elsewhere are exploring the possibility of using phages, those bacteria-destroying viruses that are a natural part of an organism's immune system, to treat disease. And new vaccines are also a possible avenue of defense.

But all agree that, as naively simple as it sounds, good hygiene is one of the primary ways of keeping organisms with AMR genes from spreading. Antibacterial soaps are not needed for good hygiene, says Podczervinski. They may even hurt more than help, potentially promoting the spread of resistance.

"Where you're going to get the most prevention is in the actual physical act of washing your hands and rubbing off germs. You have to make sure you rub your hands together with soap and water for a good 15-30 seconds. And you have to reach those areas that sometimes gets missed," like our thumbs and fingertips. "When we do the black light test [which reveals the presence of bacteria] you'll see them in the cuticles, or the nail beds," she says.

In other words, don't underestimate the power of hygiene, the original defense against infectious disease, to slow the spread of those resistant microbes. *

AMERICA'S MOST (not) WANTED SUPER BUGS

RIGHT, FROM LEFT:
CLOSTRIDIUM DIFFICILE (CDIFF),
CARBAPENEM-RESISTANT
ENTEROBACTERIACEAE (CRE),
NEISSERIA GONORRHOEAE

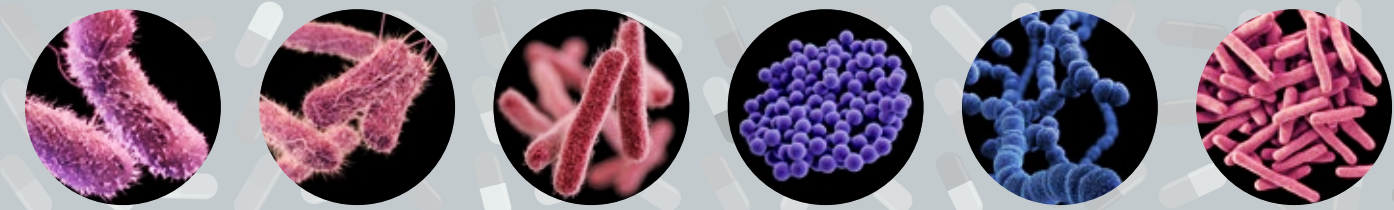


▲ **HAZARD LEVEL "URGENT"**: These bacteria are an immediate public health threat requiring urgent and aggressive action. *C. difficile* causes 14,000 deaths a year, CRE have become resistant to nearly all available antibiotics, and there are almost a quarter million drug-resistant gonorrhea infections a year.

BELOW, FROM LEFT: MULTIDRUG-RESISTANT ACINETOBACTER, DRUG-RESISTANT CAMPYLOBACTER, FLUCONAZOLE-RESISTANT CANDIDA, EXTENDED SPECTRUM ENTEROBACTERIACEAE (ESBL), VANCOMYCIN-RESISTANT ENTEROCOCCUS (VRE), MULTIDRUG-RESISTANT PSEUDOMONAS AERUGINOSA



▲▼ **HAZARD LEVEL "SERIOUS"**: Less urgent though significant, these bacteria and fungi cause hundreds to thousands of deaths a year (MRSA 12,000+). There are 1,300,000 *Campylobacter* infections a year. *Candida* is the fourth most common cause of healthcare-associated bloodstream infections. Staph bacteria is one of the most common causes of healthcare-associated infections. *S. pneumoniae* is the leading cause of bacterial pneumonia and meningitis. TB is also among the most common infectious diseases and a frequent cause of death worldwide.



ABOVE, FROM LEFT: DRUG-RESISTANT NON-TYPHOIDAL SALMONELLA, DRUG-RESISTANT SALMONELLA TYPHI, DRUG-RESISTANT SHIGELLA, METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA), DRUG-RESISTANT STREPTOCOCCUS PNEUMONIAE, DRUG-RESISTANT TUBERCULOSIS

▼ **HAZARD LEVEL "CONCERNING"**: Although antibiotic resistance is either low or multiple therapeutic options exist, these bacterial pathogens cause severe illness and demand rapid response. Resistant *Staphylococcus aureus* leaves few treatment options, Group A Strep is the leading cause of "flesh-eating" disease, and Group B Strep causes serious infections in newborns.

RIGHT, FROM LEFT:
VANCOMYCIN-RESISTANT
STAPHYLOCOCCUS AUREUS (VRSA),
ERYTHROMYCIN-RESISTANT
STREPTOCOCCUS GROUP A,
CLINDAMYCIN-RESISTANT
STREPTOCOCCUS GROUP B



SOURCE: CENTERS FOR DISEASE CONTROL AND PREVENTION, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, 2013



PHOTO SHELLY HANKS

- 35 alumni profiles
- 39 new media
- 41 class notes
- 42 alumni news
- 47 in memoriam



ROGER WERTH/THE DAILY NEWS

On the straight, tall, and narrow

BY LARRY CLARK

The straight, long rows of tall and thin loblolly pine grow very fast in the South's flat lands, especially compared to the slow-growing Douglas fir on steep Pacific Northwest slopes.

It's just one of many differences that Travis Keatley ('99 Forest Mgmt.) has witnessed as he manages more than seven million acres of timber across 11 states for Weyerhaeuser.

As vice president of southern timberlands for the timber, land, and forest products company, Keatley works out of Hot Springs, Arkansas, and travels from Florida to Virginia to Louisiana, and all states in between, as he oversees Weyerhaeuser's southeastern assets in one of the world's most abundant source of timber.

Keatley, who grew up in Castle Rock about 50 miles from Mount St. Helens, was amazed at the rapid tree growth. "The growth rates in the South are really impressive," he says. "You can almost see the trees grow. We can have five- and six-foot trees in some of our best conditions at year two. In the Pacific Northwest, it takes four or five years to do that."

Keatley's road to the South came as a surprise for him. After graduating from Washington State University, he had worked first on a research project in the Colville National Forest, then in silviculture for Weyerhaeuser in Longview. That led to management of tree farms and people near his hometown in southwestern Washington, where his family had lived for four generations.

In 2015, when his supervisor asked about his mobility and career path, Keatley didn't expect an opportunity in Arkansas. Weyerhaeuser had merged with Plum Creek, and she asked Keatley about moving there to play a key role in the transition. "I told her, 'I don't know

anything about the South. This is a little stretchy for me.”

He talked with his wife Alicia '99 and their two children, and they decided to take the leap. “It was a real hand wringer for us, but if we didn’t do this, would we regret it? We decided to think of it as an adventure.”

The move in 2016 has thrown significant challenges at Keatley, both professionally and personally.

The forests in the South, for example, are not only different species from the West, but their cultivation also varies. “The trees grow in a rotation closer to 25 years versus 45 in the West,” says Keatley. “The terrain is flat, so it’s very intensive and heavily mechanized silviculture. Some of our land we actually drop a plow and plant the trees on the berm to keep them up out of the low water table.”

Loblolly pine and other trees also require frequent thinning and pruning. The intensive management requires good timing and crisp execution, says Keatley. The timber can get

stained blue because of the humidity and the temperature, so the logs have to be processed within three weeks of harvest.

“In the middle of summer, if you sever a tree from the stump, in a matter of weeks it’ll get this blue stain color to it from fungus. Nobody wants that discoloration,” he says.

The hot, sticky summers aren’t the only weather obstacle for Keatley and foresters. Tornadoes, hurricanes, and thunderstorms can wreak havoc on the trees and harvest roads. Hurricane Katrina in 2005 leveled about 200,000 acres of Weyerhaeuser forests.

“There was one period since I’ve been here where it rained 31 inches in 40 hours in Louisiana,” says Keatley, noting that the trees can drown without the berms to prevent water getting to them.

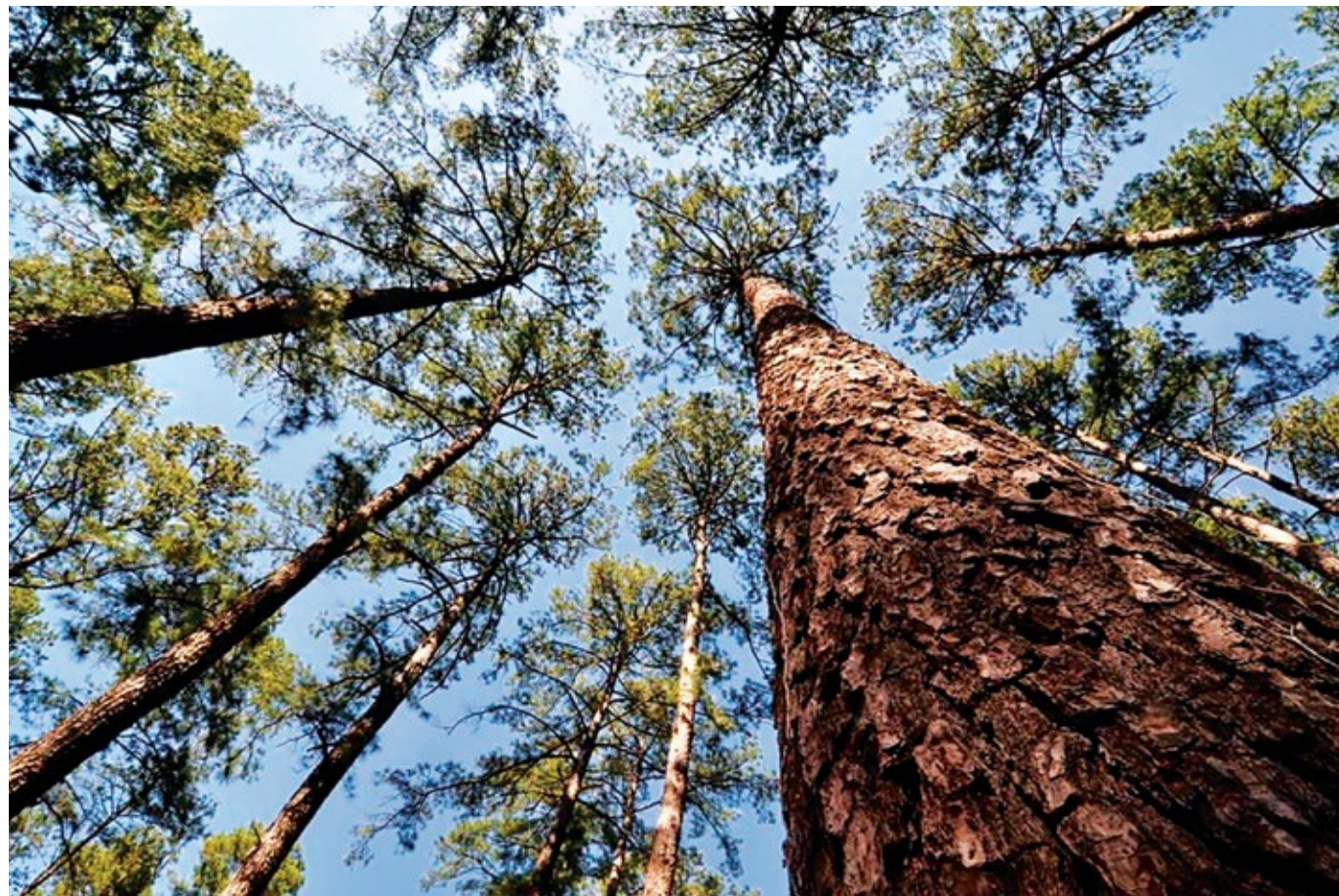
The Southern forests are home to a lot of fauna unfamiliar to Keatley, too. Chiggers and snakes, feral pigs and gopher tortoises live among the trees. “I’m not kidding

about the snakes,” says Keatley. He points out that they typically wear snake leggings to avoid the bite of venomous rattlesnakes and cottonmouth during summer.

Due to a generally oversupplied market, the lumber market tends to be more dynamic there, he says. Trees grow so fast, the number of logs exceeds demand. “As long as you put the roots down and the green side up, it’s going to grow,” says Keatley. With demand steadily growing and continuing capital investments, the market’s improving.

Keatley says his WSU courses in silviculture and forestry economics from professors like Keith Blatner and Roger Chapman prepared him for directing such a wide expanse of timberlands. Even the move to college helped him in the transition.

“I remember being so scared leaving Castle Rock going to Pullman. It felt like it was a long way away,” he says, but it all worked out great. And, years later, “it helped me with my family’s move to Arkansas.” ✨



RONALD BILLINGS/TEXAS A&M

Making artificial intelligence smart

It’s not a simple thing to get a car to see what we see.

“The world is very complex. That’s what makes vision for self-driving cars a challenge. There are millions of scenarios and millions of contexts,” says Carolina Parada (’04, ’06 MS Elec. Eng.) from her home in Boulder, Colorado.

A senior manager for Nvidia, a company probably best known in the video gaming community for its top-shelf graphics cards but with a strong presence in the machine learning market, Parada and her team are working on machine perception, a key piece of getting self-driving cars safely on the road.

Parada is no stranger to the cutting edge of machine learning. When you say “OK, Google” to your Android device, you’re using a technology she helped develop. Now she’s got her sights set on teaching cars to see.

Many of the things we take for granted, like being able to tell a leafless street tree from a skinny teen standing on the edge of the sidewalk, are not so easy for computers. And once it does learn the difference, a process that involves showing the computer “many, many examples” of both trees and standing people, says Parada, it has to learn that difference in a vast array of contexts, from rain and fog to night and day. And that’s before we even get into road signs and markings, which vary by region and country.

It’s “deep learning” that “enables a computer to learn from vast amounts of data,” she says.

One of the ways that Parada and her team got voice recognition working was by “dogfooding.” As in, eat your own dog food, because you’re then going to be incentivized to get it right before you unleash it on millions of customers. She’d test the system at home, asking her two daughters to interact with it.

“The system learns what you give it,” she says. “If the data is more male voices than



RAYMOND YUEN/NVIDIA CORPORATION

female, then you’re fine-tuning the system to work better with male voices.”

Not surprisingly, there are lots of male voices in the high tech industry, one reason Parada values diversity on her teams. “It can only help,” she says, to have multiple perspectives on a problem. Which pretty much sums up her own perspective on engineering intelligent machines: fail fast and then try something different.

Parada certainly hasn’t been afraid to take risks. Originally from Venezuela, she was in engineering school in Caracas but dreaming of living in the United States. Her dream was realized when she and her husband, Jorge Bernate (’04, ’06 MS Chem. Eng.), got accepted to Washington State University and moved to Pullman.

Parada and her husband also had their two daughters while studying at WSU. “I had the girls during the breaks,” she says, laughing. “One in summer, one at winter break.”

She recalls how supportive everyone was. “People were always offering to help. I opened the door one day, and found a huge present, a bunch of baby clothes, hand-me-downs from neighbors.”

One of her engineering professors, Shira Broschat, is still a friend. Says Parada, “Shira was in Boulder a couple months ago, and she and her husband came over for dinner.”

Parada worked for Broschat for a couple years on computer simulations for bioengineering as well as electromagnetics. And when Parada decided to go on for a master’s degree, she jumped into robotic control systems.

“The mindset of taking risks is critical to the mindset of being an engineer,” Parada says. The mother of two girls adds, “Girls need to be taught to not be afraid to fail and take risks, to push their limits and maybe be a little uncomfortable. Most of the time you’re going to be surprised, because it’s going to work out and you’ll build your confidence over time.”

Parada regularly makes the lists of top women and Latinas in tech, so when she says that a passion for experimentation and exploration are keys to success, she’s speaking from experience. Just try it, she says: “This may fail but I’m going to try anyway because I think it’s worth a shot. That’s how you change the world, by trying things you haven’t tried before.” ✨

From the horse's mouth

BY DALLEN ROSE

When an international archaeology team needed to understand how an ancient civilization cared for its horses, they turned to Scott Bender '95, a veterinarian with the Navajo Nation in Arizona.

Bender will be the first to admit that his career didn't turn out like he expected—in fact, unforeseen twists are among his favorite parts. This particular turn got him involved in a research project that has changed our understanding of a pivotal point in human history: the emergence of horse domestication for war and transportation.

It started with a surprise phone call. Archaeologist William Taylor was examining horses exhumed from ancient tombs in Mongolia. He needed help differentiating between natural dental conditions and human intervention, and Flint Taylor '69, former director of the New Mexico veterinary diagnostic lab, had recommended Bender for the job.

He couldn't visit Mongolia, but the project dovetailed nicely with his longtime interest in archaeology and his veterinary experience.

Horses are a big part of life on the Navajo Reservation where he lives and works, Bender explains, having important roles in ranch work and sport. At times over half of his patients have been horses—and dental health is a major concern in the management of equine health.



COURTESY SCOTT BENDER

As part of his practice, Bender has curated a large library of horse skulls and teeth, many of them with unusual, but natural, dental pathology. He compared photos and samples of the skeletal remains against these specimens to differentiate natural dental conditions and postmortem damage from human intervention such as tooth extraction or bit wear.

His work on the project helped show not only how the advent of equine dentistry helped make horseback riding possible, but also that both developments occurred earlier than previously believed—more than 3,000 years ago.

Bender's emergence as a veterinary researcher was a bit of a twist in itself. Although he did research with faculty while studying veterinary medicine at WSU, he wasn't interested in a research career; he was focused on practicing in the field.

"I thought I was going to be a cowboy, cow-vet like Baxter Black," he says, "or else have a practice like the one in Dr. Alf Wight's James Herriot stories."

What he has been instead is a mixed-animal veterinarian, treating pets, livestock, working animals, zoo animals, and wildlife on the vast Navajo reservation in the southwest United States. However, his insatiable curiosity and love for exploration (and, he notes, the encouragement of WSU veterinary faculty) pulled him inevitably into research—most of it done on his own time.

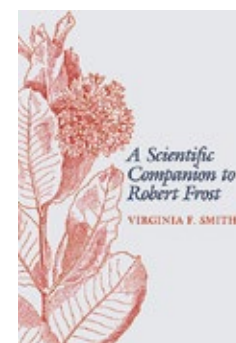
He has made important contributions to vaccine development and disease detection and prevention. He's also adjunct faculty in Navajo Technical University's veterinary technology program. And as fate would have it, his penchant for research has also connected him to his veterinary idols. A birth control and rabies vaccine project took him to the clinic in the Yorkshire dales where Alf Wight's pseudonymous James Herriot lived and practiced. And he frequently discusses feral horse issues with his good friend Baxter Black.

"I laugh at times thinking that the reason I avoided an academic veterinary path was the 'publish or perish' mantra," Bender says. "Yet here I am with papers ranging from zoonotic disease to archaeology." ❄️



WILLIAM TAYLOR/MAX PLANCK INSTITUTE

NEWmedia



A Scientific Companion to Robert Frost

VIRGINIA F. SMITH '97 PHD BIOCHEM.
CLEMSON UNIVERSITY PRESS: 2018

"Art," said the Roman philosopher Cicero, "is born of the observation and investigation of nature."

He said this two millennia before the arrival of Robert Frost, the New England poet who smuggled personal, subtle, and often dark themes into a vast, accessible, and popular body of work rooted largely in the natural world. As Virginia Smith notes in her fastidious *A Scientific Companion to Robert Frost*, the four-time Pulitzer Prize winner drew heavily from the scientific ideas and discoveries that burst forth in his lifetime.

At his birth in 1874, only half the known elements had been discovered. By the time he died in 1963, automobiles, light bulbs, television, telephones, and trans-Atlantic flight were commonplace. The world of technology and science ended up running through his work like the trains at Walden Pond. Frost, writes Smith, "calls into service more than one hundred plant species, including thirty-five species of flowers, thirty species of trees," and her list goes on. One-fifth of his poems incorporate an astronomical allusion.

Poem by poem across 256 pages, Smith details the science behind most every reference, adding a chronology of scientific advances in Frost's lifetime and concordances of plants and animals. By themselves, the entries are drained of emotion—matter-of-fact antitheses of Frost's many moods. But for scholars, other readers, and Frost himself, they're powerful launching points, like birches

that the poet climbs and bends, "to get away from earth a while/And then come back to it and begin over."

—Eric Sorensen



Spirit in the Rock: The Fierce Battle for Modoc Homelands

JIM COMPTON
WSU PRESS: 2017

Descending a great bluff towering above an endless sea of black in early 1873, the militiamen clench their rifles tighter as they wade into a thick gray fog among southern Oregon lava beds. A deafening crack and the flash of gunpowder pierces the dense mist. War paint-clad Modoc snipers poke their muzzles out between cracks in the blackened rock and fire unseen upon their adversaries. The bewildered U.S. troops search frantically through the opaque hellscape for any sign of the enemy, and then flee to the hills with 10 percent of their force dead.

The humiliating defeat of more than 1,000 soldiers to 66 Native Modoc warriors fighting from their impregnable fortress is but one of the Modoc War's many brutal tales, each recounted in grisly detail through *Spirit in the Rock*.

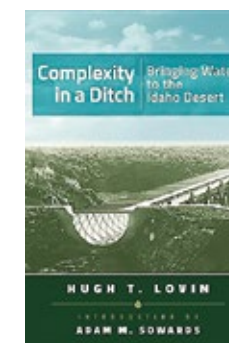
Compton's thorough research culminates in a richly detailed account of the Modoc War, bringing clarity and balance to the distorted narratives about Native Americans commonly portrayed in history books. Compton packs each page with comprehensive depictions of each character involved in the conflict, along with visceral descriptions of battles so lucid you'd swear he witnessed them himself.

Despite their victory at the lava beds, the Modoc people could only hold back the forces of westward expansion for so long. Their tale is a brutal, yet familiar one—a microcosm of the nineteenth century's "manifest destiny" mentality that viewed Indians as mere "rocks in the road" on the journey west.

For centuries the Modoc people prospered in the scrubland of Oregon's Klamath Basin. However, a few enterprising settlers bent on running freight trains through the tribe's ancestral lands upended their harmonious life in 1870, corralling the Natives into a cramped reservation shared by a rival tribe. Tension between the Indians and settlers grew quickly, stoked by salacious newspaper stories and eye-for-an-eye killings by both sides. Life on the reservation soon became unbearable and the Modocs, burned in peace talks, went to reclaim their homeland, leading them to battle with the U.S. Army.

What followed was the most expensive conflict between the United States and Natives in the country's history. Compton's blend of dogged fact-finding and storytelling prowess paint a portrait of that piece of American history that's as beautiful as it is disturbing.

—Will DeMarco '18



Complexity in a Ditch: Bringing Water to the Idaho Desert

HUGH T. LOVIN '56 MA HISTORY
WSU PRESS: 2017

Growing up on a farm near Inkom, Idaho, the young Hugh Lovin would engineer ways to divert water to the crops he produced for his livestock. Later in life, after years of writing

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histories of labor, Lovin turned his attention again to irrigation. In a number of articles, collected for the first time in this volume, he traced the history of the “dreamers, schemers, and doers” who brought water to hundreds of thousands of acres of southern Idaho desert.

Lots of “Eden-minded” Americans were sold a bill of goods and drawn to the Idaho desert with the promise of a paradise where water ran like sand. As Mark Twain said, “Many a small thing has been made large by the right kind of advertising.” By the early twentieth century, though, most of the schemers were outclassed by the persistence of dreaming doers, who actually managed to raise the funds to engineer irrigation projects that did water the desert.

Until then, though, early Euro-American settlers had to contend with the fact that their land would dry up and blow away on a windy day. And even when water did become available, they had to clear the land of sagebrush and rabbits. Thousands of apple trees, in one example, were “completely barked” by hordes of rabbits, which settlers killed by the thousands.

This volume serves to bring together Lovin’s painstaking archive-diving and well-presented research with an introduction by Idaho historian Adam Sowards. Anyone interested in the complex and nuanced history of water use in the West—which Sowards rightly points out is often presented as monolithic, and modeled on the Colorado River—will be well served by this book.

—Brian Charles Clark

Eyes Wide Open

JAMIE SHEW '98 MUSIC

2018

Jamie Shew’s *Eyes Wide Open* holds something for every vocal jazz enthusiast. With two stellar compositions and eleven superb arrangements of her own, the listener has many delights from which to choose. Although Jamie has had all the skills, passion, intellect, and talent to make this album a reality for many years (hence the wealth of tracks), it was only after her husband lost his fight with cancer that she came to see herself as more of a professional performer—and one



who could explore human emotions in the uplifting context of joy and healing.

Her fellow musicians on the album include some of Southern California’s finest. Guitarist Larry Koonse (a personal hero of Jamie’s late husband) has a long history of playing with such great singers as Cleo Laine, Mel Torme, Karrin Allyson, Luciana Souza, Natalie Cole, and Tierney Sutton. Koonse, pianist and Hammond B3 player Joe Bagg, bassist Darek Oles, and drummer Jason Harnell expertly interpret Shew’s arrangements and compositions. And expertly, too, go the vocals.

On “Easy to Love” and “You Don’t Know What Love Is,” Jamie’s 7/8 grooves flow so effortlessly that the lyrics are brought out in a very natural way. The straight-ahead swing tunes “The Flat Foot Floogie,” “Thou Swell,” “Reflections,” and Jamie’s composition “Get Out of My Head,” clearly demonstrate her virtuosic skills in a variety of tempos. Ballads “Detour Ahead,” “Easy Living,” and “First Song (For Ruth),” though vastly different, are united in Jamie’s easy delivery and the comfort they bring. My favorite interpretation by Jamie is the New Orleans street beat arrangement of “Mountain Greenery” with great interplay between guitar and piano.

Saving the best for last, though, Jamie’s composition “Eyes Wide Open” reminds one of a haunting Sondheim ballad that gives the listener an opportunity to examine loss within the confines of beauty and affirmation. All the song’s unexpected directions unite perfectly to create a cohesive, emotional journey, ending the album with, “I choose light. I choose love.”

I will choose to listen to Jamie Shew’s *Eyes Wide Open* again, and again.

—Kristina Ploeger

BRIEFLY NOTED

Freedom’s Racial Frontier: African Americans in the Twentieth-Century West

Edited by HERBERT G. RUFFIN II AND DWAYNE A. MACK '02 PHD HISTORY UNIVERSITY OF OKLAHOMA PRESS: 2018

Between 1940 and 2010, the black population of the American West grew from 710,400 to 7 million. With that explosive growth has come a burgeoning interest in the history of the African American West—an interest reflected in the range and depth of the works collected in *Freedom’s Racial Frontier* that link past, current, and future generations of African American West scholarship. The West is revealed as a place where black Americans have fought—and continue to fight—to make their idea of freedom live up to their expectations of equality. Mack is Carter G. Woodson Chair in African American history and associate professor of history at Berea College, author of numerous articles on African American history, and coeditor of *Beginning a Career in Academia: A Guide for Graduate Students of Color*.

Girls on Fire: Transformative Heroines in Young Adult Literature

SARAH HENTGES '06 PHD AMER. STUDIES

MCFARLAND: 2018

Hentges delves into the dystopian imagination portrayed in some 140 young adult novels. By focusing on the intersections of race, gender, class, sexuality, and power, Hentges’ “girls on fire” inspire progressive transformation and inspire hope for a better future.

Ludwig Richter: The Story Artist

MARTIN BROCKHAUS '88 NURSING 2018

Nineteenth-century German artist and book illustrator Ludwig Richter’s illustrations were used in novels, children’s books, travel guides, calendars, brochures, and songbooks. In this biography, Richter’s work, and the art of his friends and colleagues, is featured in over 150 color images.

CLASSnotes

In 1972, the tenth floor of the **STEPHENSON SOUTH** residence hall housed seven strangers. The stranger part didn’t last, as they soon became fast friends and poker buddies.

Today, those seven friends still meet and play cards, and have done so for the past 36 years.

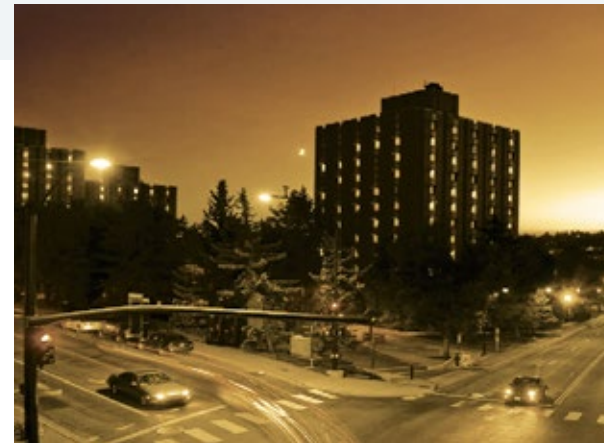
“We just immediately bonded,” says Marc Anderson ’76.

Anderson was a sophomore when he lived in Stephenson while the rest of the group were freshmen. The friends hailed from all over Washington: Tonasket, Gig Harbor, Forks, Oak Harbor, and Seattle.

Most of the group still lives in the state while one is in Idaho and another in California. Despite the distance, the friends have stayed in touch and had their first gathering in 1982.

Without Facebook or text messages, at first the group would see each other at weddings or send Christmas cards. After a few years, they decided to formalize an annual get-together.

During their five-day reunions, which are held in rotating locations, the group kicks off with a weenie roast and catch-up session,



STEPHENSON COMPLEX (COURTESY STEPHENSON SOUTH RESIDENCE HALL)

followed by outdoor activities like golf and hiking. They also play poker, a game Anderson says the group bonded over in college.

He says it’s funny that they started as strangers. “We’ve become so close it’s hard to believe it was a random pairing at Stephenson South.”

Although the friends have fun every summer, they are also there for each other through life events. Anderson says they’ve supported each

other through parent deaths, cancer, weddings, and funerals.

The group has had 100 percent attendance for about 30 years, Anderson says. He had to miss the reunion a few times at first, but now it is the norm for everyone to show up every time.

“We’ve got a commitment to each other, so we make it work,” he says.

It is a lot easier to connect these days with social media, but the group believes they are the longest-running, continuous alumni meetup.

“You gotta keep that Cougar spirit going,” says Anderson. ✨

YASMEEN WAFAI '18

60 AL ('66 Civ. Eng.) and SANDEE KIRKWOOD ('65 Speech & Hearing Sci.) received a Philanthropists of the Year award for their services to Clark County. The Kirkwoods met at WSU their freshman year and married when they were juniors. The couple has worked with several organizations in Clark County including the Boys and Girls Club of Southwest Washington and Clark County Food Bank. ✨ GORDON DAVIS ('68 Ag., '69 Ag. Ed.) received the Ruby C. McSwain Outstanding Philanthropist Award from the National Agricultural Alumni Development Association. A longtime agricultural educator at the high school and university level, Davis coached intercollegiate meats judging teams, including two national champion teams in 1973 and 1989.

70 ARTHUR BOGAN ('72 Anthro.) of the North Carolina Museum of Natural Sciences has received a Fulbright U.S. Scholar Program award to Portugal in invertebrate zoology. He will study invasive mollusks during his time at the University of Porto. ✨ STEVE LARSON

('72 Socio.) of AlSCO Inc. received the TRSA Operator Lifetime Achievement Award. AlSCO is the largest family-owned laundry operator in the United States. The award is the highest honor for a professional in the linen, uniform, and facility services industry. Larson has worked for AlSCO since he was in high school in Tacoma. ✨ REBECCA MCBEE-WILSON ('75 Psych.) was named codirector for Lincoln County, Oregon, Health and Human Services, after serving the previous seven years as director of the Lincoln County Federally Qualified Health Center. Before starting with the county, she spent 33 years with the Portland Veterans Administration, working in chemical dependency and mental health. ✨ Ste. Michelle Wine Estates CEO TED BASELER ('76 Comm.) retired after 34 years with the Woodinville winery. During his time with the company, including the last 17 years as CEO and president, Baseler saw tremendous growth. He is also a WSU Regent and helped raise \$23 million to build the Wine Science Center at WSU Tri-Cities in 2015. ✨ D. MICHAEL JACKSON ('76 MS, '78

PhD Entom.), a research entomologist with USDA-ARS for the past 40 years and recently retired, was awarded the J. H. Cochran Award for Excellence in Entomology, the highest award given by the South Carolina Entomological Society. He was also honored for serving as editor of the *Journal of Agricultural and Urban Entomology* from 2010–2017. ✨ WILLIAM H. MCELROY ('76 Comm.) was selected as the new Rotary District 5030 governor for 2019–2020. McElroy has had 41 years of experience in the financial industry and is the founder and CEO of Guardian Plus Inc., an investment advisory firm. ✨ DENNY WALLACE ('76 Ag. Ed., '81 Human Dev.), Washington state FFA advisor, was chosen to serve on the FFA Board of Directors as the National Association of State Supervisors of Agricultural Education representative. ✨ Homebuilding company TRI Pointe Group appointed to its board of directors VICKI D. MCWILLIAMS ('79 Apparel Merch., Design, and Textiles), executive vice president of stores for Williams-Sonoma, Inc. McWilliams is responsible for leading 20,000 associates

CLASSnotes

in 620 stores. Prior to joining Williams-Sonoma in 2008, McWilliams spent 29 years at Nordstrom, most recently serving as executive vice president.

80 **JANET KUSLER** ('80 Pharm.) was inducted into the Snohomish County Sports Hall of Fame. Kusler is one of four female athletes who were inducted. She was a four-year starter for the WSU women's basketball team, and later joined the AAU SeaBaskets and helped lead them to an AAU national championship. ✨ The Ecosa Institute welcomed landscape architect **CHARLES ANDERSON** ('81 Landscape Arch.) as a new faculty member. Anderson will facilitate a semester-long immersion program that focuses on ecological design as a problem-solving tool. Anderson has been a professor and lecturer at universities across the Northwest and Southwest and has been featured in several design and architecture magazines. ✨ *The Daily Herald* in Everett promoted **ERIC STEVICK** ('81 Comm.) and **RIKKI KING** ('10 Poli. Sci.) to local editor and assistant local editor respectively. Stevick has been a part of *The Herald's* staff for 28 years and King for 8. ✨ **SHARI HALLDORSON FREIDENRICH** ('82 Busi.) received a 2018 Trailblazer Award for the California Society of CPAs. CalCPA also awarded her the 2018 Women to Watch Award for Experienced Leaders. ✨ **LORA KNOWLTON** ('82 Forest Mgmt.) is owner of Current Events LLC in Littleton, Colorado. She also serves as one of the founding board members of the Columbine Memorial Foundation. ✨ **NORBERT CHIRASE** ('83 MS Ani. Sci.) received a U.S. presidential award for his work on expanding exports. Chirase, originally from Ghana, has recently been at the forefront of research on fulvic and humic mineral complexes. ✨ **KELLY SUSEWIND** ('84 Geol. Eng.) was chosen to be the Washington Fish and Wildlife Commission chief. Susewind was previously in the Department of Ecology and worked to prevent water contamination. ✨ Oregon Governor Kate Brown appointed **SHANNON CASEY CAREFOOT** ('86 Nursing) to the Nursing Staffing Advisory Board for

Alumni Association News

WSUAA's 40by20



Recently, the WSU Alumni Association announced its plan to achieve 40,000 members by 2020. The WSUAA calls its membership drive "40by20." At a time when other alumni associations across the country are shrinking, Washington State Magazine wanted to know more about the association's bold plan. Editor Larry Clark asked WSUAA 2018-19 President Ashley MacMillan '05 about 40by20.

Larry: Hi, Ashley. Can you tell me a little more about the 40by20 membership drive? What is it, exactly?

Ashley: Over the summer, the WSUAA reached 32,608 members—an incredible new record for our organization. We decided to set a new goal for 40,000 members, engaging more Cougs than ever in support of WSU. At 40,000, we will have more than tripled the number of members in the

WSUAA since we launched our drive in 2003. While other alumni associations across the country are decreasing in membership, we are excited at the momentum and support from our alumni. Which, in all honesty, does not surprise me because Cougs are the best!

Larry: Cougs do love to overachieve. So, what will the 40by20 campaign do?

Ashley: The 40by20 membership drive will dramatically expand the number of members in support of WSU. History has shown that Alumni Association members are more involved and back WSU at a higher level which really helps our alma mater. Our plan also expands the ways we connect alumni with WSU and with one another. The drive will add more activities including additional programming designed to help recent graduates transition from college to career. Cougs love to help other Cougs succeed, so we are working to leverage that fact to benefit more people who love WSU.

Larry: How can Cougs help?

Ashley: WSU is currently number three in the Pac-12 for the percent of alumni who are members, behind Stanford and Cal. That's pretty good, but I know we can do better. So, if you are not a member, please join. If you are a member, ask your friends to join the WSUAA. The more alumni and friends we get to join the WSUAA, the closer we get to number one in the Pac-12!

Larry: Is there anything about this membership drive that you're particularly excited about?

Ashley: Reaching 40,000 members will be beyond exciting! One of our motivations behind this drive is to bring together students, faculty, staff, alumni, and friends in support of WSU. We want to thank them and showcase the impact they have on our University. One thing that I am very excited about, we have created an online mosaic for all members to upload their favorite WSU photographic memories and tell us about their love for our great University as a way for Cougs to share their pride! To upload photos, Cougs can go to www.wsuaa40by20.com to get started.

Larry: Is there anything you want to add?

Ashley: Go Cougs!

40,000 MEMBERS BY 2020

BOLD, YES. COUGS ACHIEVE.*



*Well, Cougs overachieve, but you get what we're saying.

CLASSnotes

the state of Oregon. The term will last two years. ✨ T.E.N., a technology and information security executive networking and relationship-marketing firm, presented **CHUCK MARKARIAN** ('86 Math., Ed.), chief information security officer for PACCAR, with the Information Security Executive of the Year Award for the region. ✨ Key Technology appointed **BRET LARREAU** ('87 Ag. Eng.) as director of Latin America and Asia sales. Larreau not only manages sales in these regions, but also maintains Key Technology's relationship with PepsiCo's global business as their major account manager. ✨ The Auburn Police Department hired **WILLIAM PIERSON** ('89 Socio.) as their new police chief. Pierson's career has spanned 28 years.

LISA RIGGS ('90 English, Ed.) will serve as the new assistant superintendent for the Gersham-Barlow School District. In addition to her experience in several administrative roles, Riggs was also a

language arts and writing teacher. ✨ **WARD FLEISCHMANN** ('92 Marketing) is the new general manager at the Chevrolet of Everett. Fleischmann has more than 25 years of experience in the car business and was previously the general sales manager at the dealership. ✨ **TERRI TRICK** ('93 MEd) was appointed to the Walla Walla Public Schools Board of Directors. ✨ **RACHEL DRAKE** ('94 Comm.) is now the human resources director for Weyerhaeuser Wood Products Division. ✨ **BEN FERNEY** ('97 Ed., Biol.) became superintendent of the Valley School District in northeastern Washington after spending the previous five years as the principal of Freeman Middle School. His 32 years in education was honored with an Award of Merit by the NE Washington Association of School Administrators. Ferney previously taught and coached at Lewis and Clark High School in Spokane, and served in the Cheney School District administration. ✨ Today's Dental Center

doctors **JUDD** ('97 Zool.) and **SARAH SHERMAN** ('97 Pre-med.) have hired **NATE STEIM** ('14 Med. Sci.) as a new associate. The Shermans have been practicing at Today's Dental Center for 16 years while Steim, who is also their nephew, recently graduated from dentistry school. ✨ Alpha Phi Foundation announced **REBECCA ANDREW ZANATTA** ('97 Comm.) and three others to their board of directors. Zanatta, from the Beta Rho chapter of Alpha Phi sorority at WSU, was appointed to a 2018-2020 term on the board. ✨ **KARA KAELEBER** ('98 Hum.) joined the Washington Agriculture and Forestry Foundation as a program manager. Kaelber is a 2016 alumnus of the foundation's AgForestry Leadership program. ✨ PETRA, Inc. promoted **BRETT MYRON** ('98 Civ. Eng.) to president. Myron has managed both private and public sector multimillion dollar projects for the construction company since joining as a project manager in 2005. ✨ PrimeLending, a top ten national lender, has taken on **JEREMY BORDNER** ('99 Comm.) as the area manager for the Pacific Northwest. Bordner has more than 17 years of mortgage industry experience and has been a part of the PrimeLending team since 2015. ✨ **MIKKI ROGERS** ('99 Arch.) is back at JRJ Architects in Beaverton, Oregon, as senior project manager. Rogers has been in the design and project management field for 19 years.

JENNY RISNER ('01 MEd) took the reins as superintendent of Ames Community School District in Iowa. She worked most recently as Ocean Beach School District superintendent in Long Beach. ✨ **MARGUERITA (RITA) CATCHING** ('03 MN Nursing) recently published her first novel, a mystery set in Eastern Oregon titled *A State of Grace*. First of a series, the book was shortlisted for the 2016 Crime Writers' Association Debut Dagger Award and its protagonist is a nurse. ✨ **BRYNAN SHIPLEY** ('04 Human Dev.) is the new athletic director for the Ridgefield School District. Shipley was formerly at the Kalama School District where she

was a coach and athletic director. During her time there, Kalama High School won three team state championships for volleyball, football, and boys track and field. In 2018 Shipley was named the District Central 2B Athletic Director of the Year. ✨ **INES HANRAHAN** ('05 PhD Hort.) was selected as executive director for the Washington Tree Fruit Research Commission. Formerly an active member of the WSU tree fruit Extension team, Hanrahan grew up and studied in Germany. She takes over for **MIKE WILLETT** ('81 MS, '95 PhD Hort.), who will continue with some projects and transition after almost 40 years in the tree fruit industry. ✨ **ENRICO CASTELDA** ('06 Comm.) joined RBC Wealth Management as a senior practice management consultant. ✨ Plant pathologist **JAIME CUMMINGS** ('07 MS Plant Path.) joined the New York State Integrated Pest Management Program at Cornell University as its new field crops and livestock coordinator. A native New Yorker, she previously led Monsanto's soybean pathology team, and has authored over 40 crop-related publications. ✨ Whitworth University named **DAVID FERN** ('07 Sport Mgmt.), a PGA teaching professional at Downriver Golf Course since 2013, as their new women's head golf coach. Fern was the 2004 Pacific Northwest Men's Amateur champion and played on the Gateway Tour and the Southwestern USA mini tour from 2009-10. ✨ **NICOLE SCHMITZ ABEYTA** ('08 Crim. Jus.) was recently promoted by the United States Army to the rank of major. Major Abeyta participated in the Washington State University ROTC program while studying at WSU and was commissioned as a second lieutenant at that time. She now lives in North Carolina with her husband and children. ✨ **MOLLY SMITH** ('08 Comm.) launched a public relations company based in Seattle, the Good PR Company, focused on elevating female founders in the Seattle area and entrepreneurs who have unique visions. A third-generation Cougar, she previously worked in corporate public relations in Manhattan. ✨ **ROXANNE M. RICH** ('09 Neurosci.) is now a part of the International

90





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CLASSnotes

Association of HealthCare Professionals due to her work as an established pediatrician and her upcoming publication in *The Leading Physicians of the World*. Rich specializes in general pediatric care and childhood diseases. ✨ PCS Structural Solutions in Tacoma announced the promotion of three of their employees. **DAN TAPPEL** ('09, '10 MS Civ. Eng.) was promoted from project manager to an associate, and **EVAN OLSZKO** ('12 Civ. Eng.) and **TANNER REIJM** ('15, '16 MS Civ. Eng.) from design engineer to project engineer.

RIKKI KING ('10 Poli. Sci.) see *Stevick* '81 ✨ Outten & Golden LLP, added six new associates to its employee rights law firm including **MIKAEL ROJAS** ('11 English, Poli. Sci.). Rojas graduated from Stanford Law School and has worked as a law clerk and a civil rights litigation fellow. ✨ **KLAY THOMPSON** (x'11) received his third NBA championship in June. Thompson is one of two former Cougs to win a professional title in 2018. ✨ **EVAN OLSZKO** ('12 Civ. Eng.) see *Tappel* '09 ✨ **NATE STEIM** ('14 Med. Sci.) see *Sherman* '97 ✨ **CALLEY HAIR** ('15 Comm.) and **NATHAN HOWARD** ('15 Comm.) have joined *The Columbian* as a reporter and photojournalist, respectively. Both reporters come to the Vancouver paper from Newport, Oregon. ✨ **TANNER REIJM** ('15, '16 MS Civ. Eng.) see *Tappel* '09 ✨ St. Andrews University selected **ADAM BOKMEYER** ('16 MBA Fin.) to be the head coach of the recently reinstated men's lacrosse program. Bokmeyer was previously the assistant head coach and defensive coordinator at the University of Texas at Austin. ✨ Chef **PAULINE GARZA** ('16 Hosp. Busi. Mgmt.) was hired as the lead chef at Drumheller's Wine & Food and Vine, a new restaurant and wine bar in Richland. Garza started cooking at a young age and has studied in Italy and New York. ✨ **MADISON MOORE** ('16 Econ.) of Prosser, Washington, was selected as one of the five finalists for the 2018 #RootedinAg Contest from agricultural company Syngenta. The competition invited ag professionals to describe the person who helped inspire

their agricultural roots. Syngenta will give \$500 to the winner, donate \$1,000 to the winner's chosen charity, and feature the winning story in an upcoming issue of its *Thrive* magazine. ✨ **TONI LYNN ADAMS** ('17 Comm.) was named the Washington Apple Commission's new communications outreach coordinator. Adams has experience with the apple industry as her family has an apple orchard in the Yakima Valley. ✨ **DAVID CHIS** ('17 Elec. Eng.) has joined Elcon Associates Inc. as an electrical designer. Chis previously was a student designer at PacifiCorp, focusing on power systems protection and control with low-, medium-, and high-voltage projects. ✨ Swiss volleyball club Nuc Neuchatel has signed **KYRA HOLT** (x'17) to its roster. Holt transferred from the Spanish club Dimuro and is in her second professional season. Holt is a 6'1" left handed outside hitter. ✨ Donor Network West, an organ procurement and tissue recovery organization in Nevada, named **JOHN LILLEY** ('17 MBA) as their new regional director. Lilley has worked in organ and tissue donation for over 16 years and has worked with Donor Network West before. ✨ **ANDREW HALFMAN** ('18 MA Comm.) was promoted to senior digital strategist for Vladimir Jones, a Colorado Springs advertising, marketing, and public relations agency. Halfman has been with the agency for three years and was previously a digital strategist. ✨ The Walla Walla Union-Bulletin welcomed **FORREST HOLT** ('18 Comm.) as a reporter on the public safety beat in Walla Walla and Milton-Freewater, as well as the surrounding cities. As a student, Holt had internships with *The News Tribune* in Tacoma and *The Inlander* in Spokane, Washington. Holt also received an award from the Society of Professional Journalists for his reporting on the WSU budget cuts. ✨ **ALYSSA NORRIS** ('18 Civ. Eng.) joined the LONG Building Technologies team as an account executive in the Fairbanks, Alaska, office. LONG provides HVAC mechanical solutions, building automation systems, security solutions, and equipment for commercial properties in Alaska. Norris was also a student WSU Regent in 2017-18.

INmemoriam

L. OWEN CLINTON ('39 Fine Arts, '40 Ed.), 100, January 30, 2018, San Diego, California.

GORDON A. A. SMITH ('40 Elec. Eng.), 99, September 19, 2017, Spokane. **JACK MCVICAR HAYNE** ('43 Busi., Lambda Chi Alpha), 97, February 26, 2018, Conrad, Montana. **JAMES CONRAD STOVER** ('43 Civ. Eng.), 96, March 19, 2018, Richland. **ROBERT PEARSE GIBB** ('44 Pre-Med.), 95, July 16, 2018, Bellingham. **DOROTHY B. DAVIDSON** ('47 Chem.), 92, June 5, 2018, Monroe, Wisconsin. **WILLIAM F. JOHNSON** ('47, '70 MS Civ. Eng.), 94, January 10, 2017, Clarkston. **DONALD R. "DON" TAYLOR** (x'47, Alpha Tau Omega), 94, July 9, 2018, Kalispell, Montana. **WALTER D. BUEHLER** ('48 Arch. Eng.), 91, May 13, 2018, Sacramento, California. **LILLIAN G. CRONKHITE** (x'48, Alpha Gamma Delta), 93, August 10, 2018, Everett. **VIRGINIA L. GREENLEE** ('48, '57 MS Phys. Ed.), 92, June 27, 2018, Des Moines. **JACK ERROL DOWNEN** ('49 Busi.), 92, March 31, 2018, Rockwall, Texas. **RAYMOND A. GILKESON** ('49, '51 MS Soils Sci.), 97, May 29, 2018, Sequim. **WILLIAM H. GJERTSEN** ('49 Police Sci.), 90, March 22, 2016, Tacoma. **HELEN BENDIXEN MAURER** ('49 English, Pi Beta Phi), 91, June 15, 2018, Pasco. **CLAIRE D. NORRIS** ('49 Home Econ., '51 Child Dev., Delta Delta Delta), 90, June 6, 2018, Puyallup.

MARILYN JO CANARIS ('50 Socio., Delta Delta Delta), 88, May 6, 2017, Stevensville, Montana. **JULIA VIVIAN HARNS** ('50, '52 MS Home Econ.), 89, May 23, 2018, Pasco. **JOHN LEE HUGHES** ('50 Busi.), 90, July 14, 2018, Kennewick. **ELMER C. SCHORZMAN** ('50 Pharm.), 93, June 3, 2018, Hopkinsville, Kentucky. **MARILYN ANN STEDMAN** (x'50 Ed., Pi Beta Phi), 89, May 28, 2018, Spokane. **DAVID E. SUTHERLAND** ('50 Pharm.), 89, July 27, 2018, Auburn. **HAROLD PAUL BISHOP** ('51 Psych.), 91, June 3, 2018, Gainesville, Florida. **LEONARD I. FOSBURG JR.** ('51 Mech. Eng., Beta

Theta Pi), 88, May 12, 2018, Boise, Idaho. **LOIS B. HIBBS** ('51 Gen. St.), 94, August 19, 2018, Walla Walla. **MARY LEE LANDERHOLM** ('51 Home Econ.), 88, May 29, 2018, Issaquah. **WARREN SPENCER MOON** ('51 Arch. Eng.), 92, July 14, 2018, Silverdale. **CHARLES M. MURPHY** ('51 Elec. Eng.), 90, April 12, 2018, Beaverton, Oregon. **DONNA CHAFFEE** ('52 Bacterio.), 86, April 13, 2017, Mesa, Arizona. **JOHN EUGENE GUNN** ('52 Mat. Sci.), 90, May 13, 2018, Wenatchee. **JOANN BOWLING MILLER** ('52 Ed.), 88, April 26, 2018, Whidbey Island. **LYLE F. SCHULTZ** ('52 Acc.), 86, April 24, 2017, Los Angeles, California. **HOWARD H. SHUMAN** ('52 Comm.), 88, July 18, 2018, Everett. **AUDREY LOUISE STEHR** ('52 Hort.), 88, June 6, 2018, Lacey. **EVELYN MARIE HARSCH** ('53 Elem. Ed., Kappa Kappa Gamma), 86, August 6, 2017, Medford, Oregon. **WALTER R. HORNING** ('53 Civ. Eng.), 93, August 7, 2018, Spokane. **ROY LEWIS JENNE** ('53 Math.), 85, November 18, 2016, Boulder, Colorado. **RALPH NANSEN** ('53 Mech. Eng.), 87, August 30, 2018, Lopez Island. **CHARLES G. BIGELOW SR.** ('54 Geol.), 87, August 5, 2018, Lewiston, Idaho. **EUGENE EDWARD HINMAN** ('54 MS, '63 PhD Geol.), 87, December 29, 2017, Cedar Rapids, Iowa. **WAYNE WENDELL HOWELL** ('54 Ag. Ed.), 85, June 6, 2018, Olympia. **EDWARD A. MALONEY** ('54 Hort.), 85, July 1, 2018, Puyallup. **RONALD FRANCIS FRY** ('55 Sci.), 84, July 19, 2018, Portland, Oregon. **SHERMAN D. KNIGHT** ('55 Hort.), 85, June 8, 2018, Sequim. **MARY ALICE DUKE MARTYN** ('55 Ed.), 84, March 20, 2018, Tacoma. **JAMES L. MCCAUGHAN** (x'55 Busi.), 82, August 10, 2016, Houston, Texas. **DWIGHT CALL** ('56 Hotel and Rest. Admin.), 88, July 11, 2018, Bellevue. **DOROTHY LEE FRANKLIN** ('56 Hort.), 84, May 31, 2018, Hood River, Oregon. **JOAN BRICKA** (x'57 Ed.), 89, August 31, 2018, Mount Vernon. **LARRY L. HUBBARD** ('57 Ag. Eng.), 87, June 11, 2018, Portland, Oregon. **THOMAS HALEN TRIMBLE** ('57 Gen. St.), 83, June 12, 2018, Mill

IN memoriam

Creek. **ROBERT A. WARNECKE** ('57 MEd Ed. Admin.), 90, July 24, 2018, Mount Vernon. **ALICE SAARI DAVIDSON** ('58 Gen. St.), 82, August 1, 2018, Roseville, California. **HAROLD A. LOKOVSEK** ('58 Civ. Eng.), 86, August 8, 2017, Upland, California. **HARRY K. MURABAYASHI** ('58 Arch. Eng.), 85, June 3, 2017, Boulder, Colorado. **WILLIAM NEWMAN** ('58 Gen. St., Sigma Phi Epsilon), 83, July 30, 2018, Tucson, Arizona. **ROGER WILLIAM DAVIS** ('59 Busi.), 81, June 10, 2018, Seattle. **ANNETTE (BIENEK) MCGEE** ('59 Elem. Ed.), 82, August 6, 2018, Shelton. **CHARLES R. RANDALL JR.** ('59 MA Phys. Ed.), 89, March 9, 2016, Bellingham. **JOYCE MARGUERITE ROY** ('59 Arch. Eng.), 83, July 11, 2018, Oakland, California.

60 WALTER CHRISTENSEN ('60 English), 80, June 24, 2014, Des Moines. **BETTY A. EVANS** ('60, '62 MA Home Econ.), 92, May 30, 2018, Mount Vernon. **WILLIAM L. MACBOYLE** ('60 Busi.), 81, February 15, 2014, Billings, Montana. **RICHARD W. COURTEAU** ('61, '67 MS Mech. Eng.), 80, June 28, 2018, Port Orchard. **EARNEST LEE FRENCH** ('61 Hort.), 84, August 10, 2018, Oak Harbor. **MICHAEL B. AGATHER** (x'62 Poli. Sci.), 77, April 20, 2017, Gilbert, Arizona. **MIKE STEPHENSON** ('62, '65 MS Mech. Eng.), 77, May 16, 2018, Bellingham. **JUDITH ARLENE STRAUSS-CLEMENT** ('62 Busi.), 78, May 14, 2018, Yakima. **WAYNE E. SUMMERS** ('62 MAT Music), 97, December 23, 2016, Kirkland. **MARILYN RUTH BALDWIN** ('63 Ed.), 76, March 9, 2018, Camano Island. **ROBERT DEAN HILDEN** ('64 Busi.), 77, July 10, 2018, Olympia. **MYRON WARD HILLMAN** ('64 Civ. Eng.), 84, November 10, 2017, Port Townsend. **KATHLEEN M. DARGAN** ('65 Foreign Languages), 75, March 8, 2018, Manchester, Connecticut. **MICHAEL J. LEINWEBER** ('65 DVM), 78, May 26, 2018, Spokane. **THOMAS E. MICHAELS** ('65 Mat. Sci., '72 PhD Physics), 74, May 31, 2018, Spokane. **WILLIAM JAMES**

CHURCH ('66 Gen. St.), 75, June 2, 2018, Spokane. **DON EMERY GORDON** ('66 Poli. Sci.), 80, May 18, 2018, Mount Vernon. **LINDA ALICE HODGE** ('66 English), 73, June 12, 2018, Bellingham. **G. SCOTT RUTHERFORD** ('66, '68 MS Civ. Eng.), 74, April 28, 2018, Seattle. **DENNIS L. SHERRELL** ('66 Gen. St., '71 Chem. Eng.), 75, December 13, 2017, Kennewick. **PAUL PHILIP CAROSELLA** ('67 Busi.), 76, August 10, 2018, Spokane. **THOMAS THADDEUS GLOVER** ('67 Poli. Sci.), 73, August 13, 2018, Snohomish. **DOUGLAS L. HEIMGARTNER** ('67 Acc.), 72, March 16, 2015, Walla Walla. **MERLE H. KUNZ** ('67 MA History), 76, July 9, 2018, Seattle. **CHARLES ANTHONY LENARD** ('67 Marketing), 73, May 31, 2018, Bainbridge Island. **JERRY M. VLAHOVICH** ('67 Fine Arts), 72, August 14, 2018, Spokane. **DIXIE LEE BRANNON** ('68 Phys. Ed.), 71, June 19, 2018, Colfax. **RAYMOND J. HOFF** ('68 PhD Botany), 84, July 9, 2018, Moscow, Idaho. **WILLIS JOHN PIERRE** ('68 MAT Math.), 80, June 8, 2018, Philadelphia, Pennsylvania. **JUDY (MAUGHAN) BUSCH** ('69 Ed.), 70, February 26, 2018, Pullman. **JACK C. SPANNER** ('69 M.S. Mat. Sci.) 86, May 25, 2018, Richland.

70 JOHN ANDREW HORVATH ('70 Police Sci.), 81, May 20, 2018, Las Vegas, Nevada. **RICHARD ALAN LEMARGIE** ('70 Poli. Sci.), 70, June 13, 2018, Ephrata. **GARY LEE REPP** ('70 Pharm.), 71, August 16, 2018, Spokane Valley. **TIM JONES** ('71, '73 MA Comm.), 66, September 28, 2015, Reno, Nevada. **RILEY P. RICHARDSON** ('71 PhD Physics), 73, November 28, 2017, Oceanside, California. **NORMAN FLOYD SATHER** ('71 Marketing, Theta Chi), 69, June 5, 2018, Lakewood. **CHRISTOPHER L. WILSON** ('72, '76 MS Mech. Eng.), 63, February 19, 2014, Republic. **GREGORY A. HRANAC** ('73 Arch.), 66, June 22, 2018, Portland, Oregon. **JUDITH J. PAYTON** ('73 Home Econ.), 66, January 15, 2018, Ames, Iowa. **DAVID ALAN PHELPS** ('73 Ani. Sci.), 80, June 30, 2018, Reno, Nevada.

LINDA LOUISE (TRAPP) PHILLIPS ('73 Clothing and Textiles) 67, Aug. 9, 2018, Ogallala, Nebraska. **JOHN C. SHERROD** (x'73 Forestry), 75, May 26, 2013, Sitka, Alaska. **STUART C. GALLION** ('74 Acc.), 66, June 7, 2018, San Francisco, California. **STEVEN GEORGE HAYDEN** ('74 Forest and Range Mgmt.), 70, March 29, 2016, Gervais, Oregon. **STEPHEN E. MANTHEY** ('74 Arch.), 70, August 19, 2018, Renton. **THOMAS R. PINCKNEY** ('74 Busi.), 64, December 28, 2014, Tacoma. **HARLIS CARL ULRICH** ('74 EdD), 88, June 8, 2018, Oak Harbor. **KENNETH WAYNE DOANE** ('75 Pharm.), 66, July 6, 2018, Kirkland. **STEPHEN K. FISCHNALLER** ('76 Bacterio.), 66, May 8, 2018, Olympia. **WILLIAM JOHN SCHUTT** ('76 MS Psych.), 74, February 2, 2016, Watertown, South Dakota. **EILEEN STANLEY** ('76 Phys. Ed.), 60, October 7, 2014, Des Moines. **DIANE LOUISE KALLSTROM-SEWELL** ('77 Soc. Sci.), 63, July 14, 2018, Viola, Idaho. **KELLY DALE NORRIS** ('79 Food Sci.), 61, October 20, 2017, Ephrata.

80 CATHLEEN ANN PARTEN ('80 Pharm.), 58, May 1, 2014, East Wenatchee. **ROBERT WAYNE PEAVEY** ('80 Acc.), 60, January 31, 2014, McMinnville, Oregon. **H. ADELE SEN** ('81 Nursing), 79, January 27, 2016, Richland. **STANLEY W. DEVEREUX** ('82 Comm.), 58, June 1, 2018, Elk Grove, California. **MICHAEL V. HICKMAN** ('82 MS Agro.), 66, May 26, 2018, Seattle. **BARRY STEVEN KATZ** ('82 MS Food Sci.), 64, July 26, 2016, Las Vegas, Nevada. **ROSS GREGORY LYLE** ('82 Busi.), 59, August 10, 2018, Richardson, Texas. **LOUIS F. "LOUIE" SAUER** ('82 Ed.), 71, June 11, 2018, Spokane. **ALBERT V. VANDENBERG** ('82 EdD), 87, June 13, 2018, Seattle. **BENJAMIN BERT LEWIS** ('82 Psych.), 82, June 10, 2018, Weaverville, California. **CHRISTOPHER WILLIAM JOHNSON** ('84 MA Ag. Econ.), 59, May 25, 2018, Eugene, Oregon. **JEFFREY SCOTT SMITH** ('85 Marketing), 53, August 4, 2016, Olympia.

OUR story

A sacrifice, forgotten not

World War I ended 100 years ago this November 11, where 116,516 Americans gave their lives. Forty-two of them had attended Washington State College and their names grace a plaque on the Veterans Memorial at the heart of the Pullman campus.

Ivan Price was one of the fallen.

Price graduated from Pullman High School in 1915. He played football, basketball, and track, and helped Pullman High to the state football and basketball championships his senior year.

That fall he entered WSC and played on the freshman basketball team. The following season, Price started as forward in all 26 games for a Crimson and Gray varsity team (they wouldn't be known as Cougars until 1919) that put together one of the greatest seasons in Washington State basketball history.

Depth was a luxury that Coach J. Fred "Doc" Bohler did not enjoy, so Roy Bohler (captain and brother of the coach), Ed Copeland, Bob Moss, and Al Sorenson also played every game.

Starting the 1916-17 season with an 8-0 record, the Crimson and Gray went into a key stretch of back-to-back games at the University of Washington.

WSC entered the Washington series anything but healthy. Bohler's knee was injured, Moss was battling the flu, and an old sprain was bothering Price. The *Evergreen*

reported that Price was seen hobbling around campus on a cane.

However, injuries did not deter the team. The Crimson and Gray defeated Washington 31-24 and followed that up with a 26-14 triumph.

After improving to 15-0, WSC fell for the only time of the season at California, but quickly avenged the loss with a 32-29 victory over Cal the following day.

WSC completed the 1916-17 campaign 25-1 and 8-1 in Pacific Coast Conference play. It was even more remarkable considering the team played 18 of its 26 games on the road.

WSC claimed its first Pacific Coast Conference championship, in addition to defending its Northwest Conference title. Nearly four decades later, the Helms Athletic Foundation named the team as national champions. Today, Washington State is listed as the 1917 men's basketball national champion by the NCAA.

Prospects looked bright for Washington State's 1917-18 season. Three of the five starters would return since Roy Bohler had graduated and Moss had enlisted.

But on April 6, 1917, everything changed.

The United States' entry into World War I altered the lives of millions of Americans, including Price and Copeland from the WSC basketball team. Price enlisted with the Marine

Corps and trained in California and Virginia before sailing overseas in August 1918.

He fought in the Meuse-Argonne offensive in France, the biggest operation of the American Expeditionary Force (AEF) during the war. The battle ran from September 26 through the signing of the armistice that ended the war on November 11, and 26,277 AEF soldiers were killed there. Price was one of them.

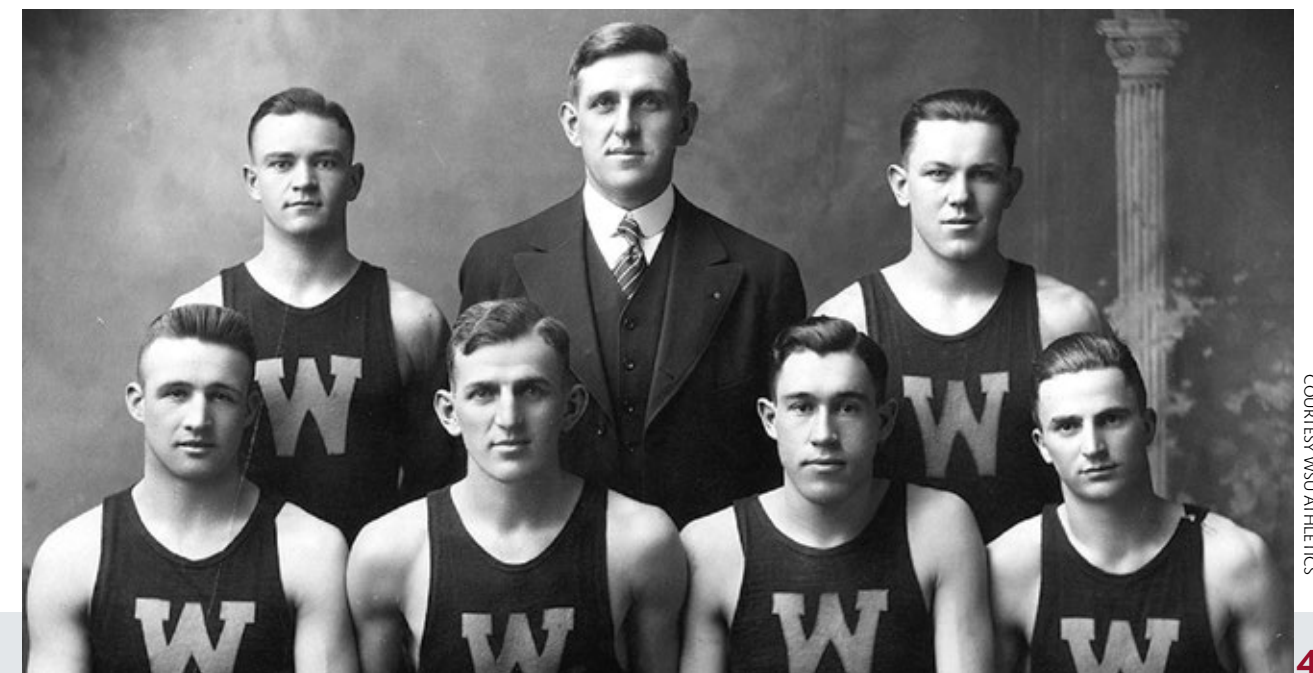
He was killed in action on November 3, 1918. His final resting place is at Plot A, Row 21, Grave 27 at the Meuse-Argonne American Cemetery in Romagne, France.

The January 8, 1919, edition of the *Evergreen* delivered the sad news to Pullman.

The tribute stated Price was one of the greatest all-around athletes from the school who had "reached the zenith of his remarkable basketball career, and was a potent factor in the winning of both the Northwest and Pacific Coast Conference titles for his college."

It also described Price as a "class of man who would ungrudgingly give his last penny to his friend... and as a result of his unselfish disposition and his spirit of whole heartedness his circle of friends included the entire community." *

Below: 1917 National Champion Basketball Team. Ivan Price is at the upper right.



COURTESY WSU ATHLETICS

INmemoriam

90 **JOSEPH E. BEKEY** ('92 Civ. Eng.), 50, April 3, 2017, Tacoma. **LARA ANN URSIN CUMMINGS** ('93 English), 47, August 11, 2018, Pullman. **DEBRA LYNN HODGE** ('94 Hotel and Rest. Admin., Gamma Phi Beta), 47, July 3, 2018, Boise, Idaho. **MARILYN WATERS** ('97 DVM), 57, October 26, 2016, Eugene, Oregon. **JAIME MARIE MILLER** ('98 Hotel & Rest. Admin.), 42, May 29, 2018, Vancouver. **STEVE GEORGE MATAYA** ('98 Comm.), 59, May 31, 2018, Seattle.

00 **MARY MARGARET WOODFORD** ('03, '06 MN Nursing), 59, July 4, 2018, Seaside, Oregon. **JANET GAYNOR** ('09 Nursing), 49, January 13, 2015, Marina Del Rey, California.

10 **AUTUMN STARR ALEXANDRIA KORVIN** ('11 Women's St.), 40, December 6, 2017, Burien.

FACULTY AND STAFF

JONATHAN BIXBY, 69, WSU Spokane, 2007-2018, August 14, 2018, Spokane. ✨ **DIXIE LEE BRANNON**, 71, Graduate School, 1973-2004, June 19, 2018, Colfax. ✨ **V. HELEN CAMPERO**, 97, Student Health, 1969-1988, July 9, 2018, Pullman. ✨ **LARA CUMMINGS**, 47, Libraries, 2001-2018, August 11, 2018, Pullman. ✨ **KATHLEEN M. DARGAN**, 75, Foreign Languages, 1960-1965, March 8, 2018, Manchester, Connecticut. ✨ **KENNETH EKLUND**, 69, Energy Program, 2010-2018, August 6, 2018, Olympia. ✨ **LORRAINE FRAZIER**, 77, Publishing, 1970-1994, June 28, 2018, Moscow. ✨ **JOHN GARDNER**, 60, University Advancement, 2007-2011 and 2014-2017, July 29, 2018, Seattle. ✨ **OLIVE**

CHARBONNEAU HEDRICK HEALY, 89, Dining Services, 1954-1991, May 31, 2018, Pullman. ✨ **ROLAND LINE**, 83, Plant Pathology, 2000-2003, June 4, 2017, Pullman. ✨ **WINSOR SCHMIDT**, 69, Health Policy and Administration, 1998-2009, May 18, 2018, Davidson, North Carolina. ✨ **DAVID M. SCOTT**, 87, Architecture 1960-1994, November 11, 2017, Yakima. ✨ **JAMES F. SHORT JR.**, 93, Sociology, 1951-1993, May 13, 2018, Pullman. ✨ **BARBARA SITKO**, 79, English, 1989-2005, May 27, 2018, Pittsburgh, Pennsylvania. ✨ **KENNETH D. SPITZER**, 76, Office of Vice Provost for Research, 1975-2007, February 6, 2018, Pullman. ✨ **KELLY WARD**, 54, Provost's Office and Education, 2003-2018, July 8, 2018, Pullman.

Dog's Best Friend

THEY SAY DOGS ARE MAN'S BEST FRIEND. WSU'S KATRINA MEALEY MAY BE DOG'S BEST FRIEND. AS THE RICHARD L. OTT ENDOWED CHAIR IN SMALL ANIMAL MEDICINE AND RESEARCH, KATRINA INVENTED AN INEXPENSIVE TEST TO FIND OUT WHETHER DOGS HAVE THE MDR1 GENE MUTATION, WHICH MAKES THEM SUSCEPTIBLE TO A VIOLENT OR FATAL REACTION TO CERTAIN ANTIPARASITIC DRUGS.

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WASHINGTON STATE UNIVERSITY FOUNDATION

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LAST words

STORIES, PHOTOS, PAINTINGS, AND BELONGINGS

like baskets and tools tell the rich history of Plateau tribes of the inland Pacific Northwest, a history now shared online.

The Plateau Peoples' Web Portal, a gateway to those cultural materials, is maintained by Washington State University's Center for Digital Scholarship and Curation (CDSC) in partnership with WSU's Native American Programs.

The materials have been chosen and curated by tribal representatives from the Spokane Tribe of Indians, the Confederated Tribes of the Colville Reservation, the Confederated Tribes of the Umatilla Indian Reservation, the Coeur d'Alene Tribe of Indians, the Confederated Tribes of Warm Springs, the Nez Perce Tribe, and the Confederated Bands and Tribes of the Yakama Nation.

The CDSC also sponsors other innovative digital research projects at WSU, such as a public history of the **Spokane River**, digitized profiles of Washington State College students and alumni who served and died in **World War II**, and documentation of pivotal incidents in **Hanford's history** of secrecy and safety.

+ CDSC and Plateau Peoples' Web Portal: cdsc.libraries.wsu.edu

Photos courtesy CDSC and Wikimedia Commons



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WASHINGTON STATE UNIVERSITY  FOUNDATION

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