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COVER: KITES OVER LONG BEACH PENINSULA (PHOTO BROWN W. CANNON III) LEFT: PLUM TREE BLOSSOMING IN WHATCOM COUNTY (PHOTO EDMOND LOWE)
On the horizon  The Jordan Schnitzer Museum of Art/WSU to open

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Forged by fire: The intricate mastery of Japanese swordmaking relies on a smith’s deep understanding of fire, metal, and techniques to control both. Each unique sword shimmeres with thousands of layers from the folding of the metal, a work of art in itself. That steel, though, traditionally comes from an iron-rich sand full of impurities, pounded and blended by the smith. A smith then uses a secret mix of water, clay, ash, and other ingredients over the blade as they once again plunge the sword into fire to create a keen edge. Only when the blade glows a certain color is it quenched in water.

Humans have learned to use fire over the centuries to great effect, not only on our weapons but with our defenses. A 1,500-year-old hillfort in Sweden, for example, has rocks fused together with an ancient glass, now being studied by Washington State University materials scientist John McCloy. As he reverse-engineers the techniques and ingredients, we might even use the glass as a defense in a new battle against the radioactive waste at the Hanford Site.

There are other fires that forge the human spirit. We all face adversity in our lives, and it tempers our spirit and resolve. For Tom Haig ’09 as a young man, it was a bicycling accident that paralyzed his legs. He turned that moment into a chance to advocate for others with disabilities, and even set up a radio station in Nepal.

Leaving home is a traumatic event for many of us, particularly as we get older. Over 60,000 Americans turn 65 every day, and that wave will often look to new kinds of communities as they make the transition to their next phase. Students in WSU’s hospitality program are taking up the call for more managers in senior living communities, and finding rewarding work that assists older people in finding a new home.

Difficulties come in many forms. It may be trouble sleeping, or it could be traipsing through a jungle to track jaguars and ocelots. Sometimes it’s a societal problem, like the scourge of fake news that threatens our democracy. In troubled times like these, we need to hone our critical thinking blades to slice through misinformation, and come out the other side stronger and wiser.
TALKBACK

Yacht club
Is there still an active Cougar yacht club? My friends own the Elmore, which was featured in your magazine in the early 2000s. It’s for sale now, in great shape, and still owned by the Cougar fans. It would be a great boost for the yacht club and could possibly keep it in the Cougar family. She’s still painted Coug colors and was built in 1890!

SARAH SELTZER
Seattle

Rocket man
I was in the Signal Corps of the U.S. Army’s satellite tracking station at Ft. Stewart, Georgia, from April 1958–March 1959. I was working telemetry the night Cape Canaveral tried to send a rocket from Earth directly to the full moon above the east coast. The rocket went up 79,000 miles, turned around by gravity, and came back down. Since then all space travel goes up in orbit first and heads out into space. There were three satellites being tracked in spring of 1958, many more to follow. Our job was to watch their orbit path, to not drop down with a bomb attached, or burn up in space. It was an exciting time to be a part of NASA and the beginning of space travel.

RALPH H. QUAAS ’57 HORT.
Everett

Buried treasure
SHANE DUNBAR ’86, a former agriculture and biology teacher from Everett, asked for some background on the illustration in “A mother’s microbial gift,” Winter 2017 issue. Specifically, he was interested in the relationships between the bacterial representations in the intricate editorial artwork by Colin Johnson. I asked our art director if there was, indeed, subtle information the work conveyed:

“Since research of microbiomes is in its infancy, we simply gave our illustrator the names of the bacterial genera that are some of the ‘important players’ in the story—Streptococcus, Staphylococcus, Pseudomonas, Serratia, and Corynebacteria. Scientists at WSU and elsewhere are busy investigating the complex microbial and host interactions. All concur that there is still plenty to do and many more exciting discoveries to be made. Therefore, we left the positioning and interplay of the bacteria in the illustration up to the artist. We really only aimed for the illustration to convey the intricacy of the subject matter rather than any specific biological relationships.

“We do many times ‘bury treasure’ in our artwork—sometimes instructional, sometimes just for fun—so Shane was right to ask if there was any present in this particular illustration.”

— J. Paxson, AD

We are always most interested in our reader’s questions and comments that probe deeper into all the stories we tell. Remember to sign up for the monthly Washington State Magazine email newsletter to get previews of stories, videos, and even bonus features: magazine.wsu.edu/email.

— Editor
Clad in unique crimson mirrored glass tiles, the new Jordan Schnitzer Museum of Art/WSU will open April 6, 2018, across from the CUB. The 10,000-square-foot building has six exhibition spaces, which will debut with works by Jim Dine, Marie Watt, and Jeffry Mitchell, along with multimedia presentations. Designed by architect Jim Olson of Olson-Kundig, the new museum offers a beautiful home for the growing permanent collection and space for both traveling and WSU exhibitions.

Photo Robert Hubner

Read more: magazine.wsu.edu/extra/new-art-museum
When Omar Cornejo got his genomic analysis back from 23andMe, he and his wife, fellow population geneticist Joanna Kelley, were both a bit surprised and validated. Venezuelan, Cornejo expected to see the alleles of Caribbean American, western European, and North African populations. But he was unaware that his family’s deep history also included ancestors from sub-Saharan Africa.

That just goes to show the importance of broadly sampling the genome, says Kelley. “The lesson is that if you just look at the mitochondria, you’d assume this person is from Africa. But if you look at just the Y chromosomes, you’d assume that this is a Native American.”

Cornejo and Kelley study the emergence and spread, over space and time, of adaptations and mutations. Among many other things, population geneticists help pinpoint genes involved in disease, opening avenues of investigation that may result in treatments.

Population genetics is also a key part in conservation, as understanding genetic diversity can help ward off extinction.

The couple has adjoining labs and offices at Washington State University, just as they did at Stanford, where they met as post-doctoral fellows. At Stanford, they trained together. And there’s no hint that they’ll stop working together now that they’ve managed to both score jobs at WSU.

“Next door, Cornejo takes what amounts to a class, and he’s a tad bit more excited,” Kelley says. “Omar has this very Latin charm. So me, being a naïve Californian, I thought, ‘Oh, OK, I misunderstood that. And that was it.”

At least for a month or two. But as the days rolled by, Kelley says, “I really thought he was interested.”

“I had no idea he was interested! But when she asked, ‘Are you interested,’ I started looking through a different glass,” he says.

A week after they started dating, Bustamante asked Cornejo to move to Miami to work on a coral genome project. “I’m sorry, but I can’t.”

When Cornejo explained why, Bustamante nodded sagely and calmly re-played, “Just don’t break my lab.”

Not only did the couple not break Busta- mante’s lab, thanks to their research they managed to both score jobs at WSU.

In order to maintain academic inde- pendence, they don’t usually collaborate on projects together. But those adjoining labs and offices are home to a gaggle of grad stu- dents whom they train together. And there’s certainly plenty to do, as the population geneticists work to uncover the lineage and spread of important adaptive traits in fish and microbes.

Kelley works on mollies, tropical fish popular with home aquarium keepers because they are hardy and colorful. But the mollies Kelley studies are beyond hardy: They live in springs rich in deadly hydrogen sulfide.

“Trekking through one of the largest unexplored rainforests in the world, La Mosquitia in Honduras, Travis King set up traps last spring to catch jaguars—or whatever other animal came into range of the cameras.”

King, an environmental science gradu- ate student at Washington State University, was part of an international team conducting the first biological survey of the area known as La Ciudad Blanca or the Lost City of the Monkey God, astounding ruins first identified in 2012. It was already familiar work for King, who has used remote-sensing camera traps and other methods to identify the behavior and distribution of elusive big cats from Costa Rica, Honduras, and Belize all the way to central Washington.

Although his travels have taken him far from his hometown of Dickinson, North Dakota, King knows what he wanted to do from an early age. As he explored around Theodore Roosevelt National Park, says King, “I knew I had this interest in vertebrate animals, any- thing from frogs to cats.”

King sought a university that connected him to his interests and WSU fit the bill, where he first helped with cougar and carnivore research in the Selkirk Mountains. His diligence took him to Belize, where King joined Virginia Tech predator researcher Marcilla Kelley and set camera traps to look at wild Central American felines—jaguars, pumas, ocelots, margay, and jaguarundis—and their prey. It was quite a training for King. “There was no lack of enthusiasm for the wild big cats.” When he returned to WSU, King met Dan Thornton, assistant professor in environmental sciences and head of WSU’s Spatial Ecology and Conservation Lab. Thornton had done jaguar research in Guatemala, so he was a natural mentor for King.

“With the work I did in Belize, I realized that this is what I want to do.”

In addition to camera traps, King developed set collection kits and recruited local help, from Honduran national park rangers to subsistence farmers and hunters. King will analyze DNA from the foxes to identify distinct Iberian groups.

“We don’t have a lot of time to help this jaguar population because it’s really suffering from forest loss,” says King.

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Using 400 camera traps, King, Thornton, and former graduate student Arthur Scully ’36 MV covered a huge area in mountainous north central Washington. Among other finds, they confirmed the first lynx in the Kettle Range in 37 years.

King’s interest in Central America drew him back to Honduras, where he studied over several years will look at landscape genetics of jaguars. He says they live in rapidly diminishing mountainous “islands” of forest and there’s a need to understand the genetic connectivity of the big cats.

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Eman Ibrahim started volunteering in Iraq’s first cancer support center in the northern Iraqi city of Erbil when she was 18, providing psychological support and reading to patients. It was satisfying work for the energetic young woman, if heart-wrenching at times.

Yet, when the 21-year-old Kurdish medical student from Hawler Medical University became head of the Erbil Hub center last year, she wanted to do even more to help—and that meant learning new ideas. Last July, she got her opportunity with the Iraq Young Leaders Exchange Program.

The highly competitive scholarship program brings 100 Iraqi college students to the United States for 17 days, to foster the next generation of Iraqi leaders through cultural and social exchange.

Washington State University was one of four U.S. universities selected in 2017 to host the program, which is sponsored by the U.S. Embassy in Baghdad and administered by World Learning. The focus at Washington State was public health, and all 25 participants at WSU were medical students. WSU will host another 25 Iraqi students this coming July.

WSU coordinator Cheryl Hansen says the Iraqi students didn’t waste a minute during the packed visit. They saw the global animal health program, veterinary hospital, and exercise therapy program, among many other departments, says Hansen, director of partnerships and outreach at WSU International Programs.

As future doctors, the visitors particularly enjoyed WSU’s Spokane’s health sciences campus, sharing a lunch with faculty physicians and touring the anatomy and nursing simulation labs.

Off campus, the students learned about civic life in Pullman with tours of police and fire stations, city government, and the Pullman Regional Hospital. They also had seminars on leadership, civic education, and diversity awareness.

“We were so impressed by the participants, a group of passionate medical students who want to make the world a better place,” says Aif Chaudhry ’88 PhD., vice president of International Programs.

One participant, Ahmed Darweesh from the western province of Anbar, exemplifies that altruistic nature. Darweesh says his father inspired him to always improve his community, and now he wants to pass that on.

“We need to improve the community through the youth,” says the 23-year-old Darweesh. “I want to encourage them to have the power to do something.”

The Iraqi students didn’t just visit WSU departments and Pullman offices. Each weekend, they lived with local residents. It had a profound effect on both host families and the Iraqis.

“The host families were tired of reading about Iraq in the newspaper and watching on TV, and wanted to talk with Iraqis face to face and find out what was really going on,” says Hansen.

For Ibrahim, the homestay was a high-light. “My family is so protective. I’m the youngest, and they were worried about the host family,” she says. But Ibrahim soon felt comfortable, particularly after she told her host family about her concerns that people would judge her for wearing the hijab head scarf.

“The mother was so gorgeous and kind,” says Ibrahim. “The second day she came to me with a scarf and said, ‘Can you teach me how to tie this?’ She said if she sees someone who is hijab, she’d wear the scarf.”

Hansen says host families showed the Iraqi students around the region, from visiting the Moscow farmers market to taking a seaplane over Lake Coeur d’Alene.

“This group left an indelible mark on the Cougar family, says Hansen. “One thing I taught them when we first met was ‘Go Cougs!’ They never let me down, and they said it at the end of almost every session.”

Hansen says she hopes the students will return to Iraq with fond memories and useful knowledge. “They were already leaders before they came, and hopefully they became better leaders here,” she says.

Ibrahim certainly returned to Iraq with some plans. She’s already heading up an expansion of the support center to assist Syrian refugees and orphans in Erbil.

Gaining on muscle loss

Cancer, says Dan Rodgers, is a hellish parade of horribleness.

Cancerous cells multiply aggressively, interfering with the normal function of healthy organs. Tumors secrete hormones and other chemicals that exploit the body’s own defenses to the cancer’s advantage. Your body knows something is wrong, so stress hormones are released in an effort to inhibit growth processes and channel nutrients to the brain.

Depleted of resources, muscles begin to atrophy. Washington State University muscle biologist Rodgers, together with colleagues at the Baker Heart and Diabetes Institute in Australia, investigated treatments for tumor-induced muscle wasting called cancer cachexia.

The research was so promising that Rodgers founded A.Vogen, a company dedicated to bringing the therapy to market.

For Rodgers, it’s personal. “My dad died of pancreatic cancer. He didn’t die from the tumor metastasizing. He died because of extreme muscle loss.”

Cachexia can be fatal but, more often, it reduces a patient’s mobility and quality of life—as does muscle wasting in muscular dystrophy. That’s the condition for which Rodgers and his team have found a treatment.

Myostatin, a protein that blocks the growth of muscles and helps optimize muscle mass, normally limits muscle growth, which is metabolically expensive to produce. Their treatment blocks the action of myostatin with a gene called SMAD7. Blocking myostatin in animals can result in double-muscled cattle, like the Belgian Blue.

Myostatin inhibitors have been tested in clinical trials to treat muscular dystrophy and cachexia but they worked outside the cell. “So if you injected one of these inhibitors in the circulation, they’d block myostatin from working on every tissue, not just muscles. They’d also block other hormones that are structurally very similar to myostatin,” Rodgers says.

Administering a myostatin inhibitor outside the cell can result in nasty side effects that weaken blood vessels and cause internal bleeding throughout the respiratory system. A.Vogen’s solution is to deliver the inhibitory gene directly to muscle cells using an attenuated virus that co-evolved with humans and does not cause disease. This works via injection but the virus only sticks to cardiac and skeletal muscles, Rodgers says. “The virus is recognized by a receptor, and the virus—and its therapeutic package of DNA—are engulfed by the cell. Once in the cell, the therapeutic package goes into the nucleus.”

In other words, it starts reproducing and doing its therapeutic work.

Rodgers says, “You don’t need to infect 100 percent of the cells in a muscle. If a few cells recover, the whole muscle is going to be better.”

The first goal is to get FDA approval for the targeted gene therapy to treat muscular dystrophy. To that end, late in 2017 A.Vogen received a $2 million infusion to run FDA Phase II toxicity and safety studies that are the prerequisite to human clinical trials.

“Our therapy increases the efficiency of the heart, so we could potentially treat heart failure, as well.” Rodgers says. Which means, he points out, that athletes will want to build up heart muscle. “Gene therapy is on the anti-doping radar,” Rodgers says, also developing an assay to determine if a person has been exposed to the delivery virus or has SMA/D7 in muscle cells.

Rodgers says he gets dozens of emails a week from people whose family members have muscular dystrophy and who have seen his papers in scientific journals. “I spend several hours a week trying to answer questions,” he says.

His surgery is palatable, not only because he lost his father to a potentially reversible condition but also because of another family member with muscular dystrophy. Flicking a
Truth or consequences

Fake news nearly started a war between Qatar and its neighbors in 2017. In Pakistan, a highly placed official bought into a fake news story warning that Israeli was going to destroy Pakistan, and tweeted a warning at Israel that his country, too, was a nuclear power. And in Washington, D.C., an armed vigilante burst into a pizzeria and fired three shots, thinking he was bringing down a sex-slave ring.

While news has never been neutral, something has changed. Information has become weaponized. What’s changed, says Washington State University communications professor Doug Hindman, is that the marketplace of ideas has broken down under the pressure of algorithm-driven myrmidons Facebook, Twitter, Google, and other ad-dependent social media and search platforms.

The marketplace of ideas, Hindman says, was the place where “truth and falsehood grappled,” with truth usually winning. “Where do you get your news?” And they told us, Facebook. We said, ‘Well, that’s not a niche’ topic where the web is larded with bad, viral information.”

Caulfield’s approach to information literacy is simple. He argues that we should teach students to be fact checkers instead of rhetoricians. Irrelevant, readers spend a great deal of time reading closely, analyzing syntax and word choice for tone. Fact checking, though, is quick, involving only “four moves and a habit.” Caulfield says. A recent Stanford University study supports the idea that a fact-checking strategy is superior to close reading.

Go upstream to the source. Almost all web content is reposted from another site. Find the original and evaluate it.

Read laterally. Don’t dig deep into a single site, read across many sites to see what others have to say about the source you’re reading.

Circle back. If you get lost, hit a roadblock, or otherwise start chasing your tail, stop and start over.

And the habit? I feel strong emotion when you read a social media post, stop. As WSU graduate student and Facebook researcher Rebecca Calloway says, content creators are trying to appeal to our basal emotions, so if that’s what you’re feeling, don’t give them the win.
What dreams may come

If Shakespeare lived today, the playwright would surely be a more calming orange tint at twilight. In a recent project, Karatsoreos found that mice with disrupted sleep cycles also gained weight despite eating the same amount of food. Additionally, they showed impaired cognitive flexibility and problems with working memory. The mice had trouble changing tactics, for example, or remembering short-term information—similar to memorizing a phone number long enough to make the call.

His research even suggests that repeated sleep disruption might accelerate aging—an idea hard to dispute when you trudge to the bathroom and look in the mirror after a rough night tossing and turning. “Oh, sleep that unites us as the nodal shove of care...” writes Shakespeare in Macbeth. Indeed, the sleep-deprived poet understood the value of rest.

And, though sleep as a whole remains a mystery—Karatsoreos says no one knows exactly why we do it—it’s clear that 7-9 hours of serene slumber can set the stage for a healthy and productive life, the kind that dreams are made on.

While Shakespeare’s restless, seventeenth-century nights were lit with a single amber flame, today’s insomniacs are usually staring at bright blue LED screens in a world increasingly devoid of darkness. From streetlights to nightlights, light pollution is taking a toll on peaceful slumber in modern societies all over the world, says Ilia Karatsoreos, associate professor in the Department of Integrative Physiology and Neuroscience at Washington State University.

Karatsoreos studies the circadian timing system—an elaborate network of internal clocks that keep our physiology running smoothly throughout the 24-hour light/dark cycle. The system is governed by a light-sensitive master clock located in the suprachiasmatic nucleus (SCN) in the hypothalamus. This tiny timekeeper receives input through the eyes which is relayed to various brain centers and peripheral clocks in the heart, lungs, liver, and other organs. Together, they control everything from hormone levels and metabolism to body temperature and sleep.

“We have special cells in the retina that are very sensitive to blue-rich light, which is essentially a signal for dawn and time to wake up,” says Karatsoreos. Unlike the rods and cones that provide vision, these photoreceptors regulate the sleep cycle through a direct line to the SCN.

Light also travels indirectly to the pineal gland which secretes the sleep-promoting hormone melatonin. As light diminishes and becomes more yellow late in the day, melatonin levels rise to prepare us for bed. That release can be delayed, however, by even brief exposure to artificial light.

While Shakespeare’s nights consisted of first and second sleeps separated by peaceful moonlight “watches,” Karatsoreos says using blue light-emitting e-readers or cellphones in the wee hours sends a jarring wake-up signal that can disrupt sleep patterns for the rest of the night. As a member of the Sleep and Performance Research Center at WSU Spokane, Karatsoreos is investigating how that disruption impacts our physical and mental health.

He explores questions like, “What happens to the liver if you change the light/dark cycle and how does that affect metabolism?”

To find out, he studies mice who live in a shortened 20-hour day. Through EEG readings, Karatsoreos discovered that although they sleep the same amount of time as control mice, the quality of their sleep is poor.

“They sleep, slow wave sleep was reduced, which we think is the most restorative stage of sleep,” he says. “It was also more fragmented—and they sleep in shorter bouts than normal.”

In a recent project, Karatsoreos found that humans with disrupted sleep cycles also gained weight despite eating the same amount of food. Additionally, they showed impaired cognitive flexibility and problems with working memory. The mice had trouble changing tactics, for example, or remembering short-term information—similar to memorizing a phone number long enough to make the call.

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A WALK AT NIGHT is relaxing but avoid heavy exercise 3–4 hours before sleep.

REDUCE SOCIAL JET LAG: Try to stick to a sleep schedule even on weekends.

REDUCE CAFFEINE INTAKE and avoid heavy meals several hours before sleep.

DITCH THE ALARM CLOCK: Try a dawn/dusk simulator such as the Philips Somneo.

TO HELP EASE SEASONAL AFFECTIVE DEPRESSION: Try the Verilux HappyLight or Philips GOLDlite BLU in the morning to brighten your mood and improve sleep.

Do microbes dream of circadian sleep?

Anticipation is sweet. In anticipation of the blooming light, plants unfurl their leaves. For many marine creatures, rising to the sea surface as the moon rises is the anticipatory signal that food is available. In our gut, too, microbes anticipate dinnertime because microorganisms have internal clocks that sound the dinner bell.

“Shift workers,” Van Dongen says, “consistently complain of their GI symptoms getting out of whack.”

In one longitudinal study of nearly 75,000 nurses, those who worked night shifts on a rotating basis were 11 percent more like to die early compared to those who never worked the night shift. While disruption of the sleep cycle typically takes the blame, another study with mice that were artificially lighted confirmed the disruption to their microbiomes. In a followup with humans, researchers confirmed that, indeed, the composition of the gut biome changed after a time zone-jumping trip. Immediately after the trip, the subjects had a higher proportion of Firmicutes, a group of bacteria that, in overabundance, is linked to obesity.

Again, Van Dongen cautions that “we don’t know this as a fact. It’s just an emerging idea.” ¬
I didn’t realize until I compiled this favorite-moment list just how much the dictum of “you cheating in the pressbox” has come to dominate how I watch/cover the sport. Unfortunately, I’ve done a good job—too good, in fact—of channeling the pressbox side of my personality. It makes me a better journalist and broadcaster, but it says some of the vitality out of being a fan. So as you’ll see, my list is very much front-loaded.

Chronologically, these self-centered moments sit with me (noting that I’ve restricted individuals to a single appearance apiece, or it would run the risk of being all Cary Grant and Henry Fonda).

May 1963—Don Partlow ‘63, who ran for the same track club-back home as I did, wins the Pre-Nats Games 800 gold medal.

March 1965—Bob Yard ‘66, who went to my high school, wins the pole vault at the first-ever NCAA Indoor Championships.

April 1965—The first-ever Moberry Relays, named after longtime Coug coach Jack Moberry, are held at Rogers High in Spokane. I won the long jump with a mark I never approached again.

June 1968—The Cougs check the form chart and finish second at the NCAA Championships. I wasn’t good enough to go to the Nationals, but that was the year I lettered.

November 1969—Cary Grant and Orson Welles legume Steve Prefontaine at Stanford; sport claims in the greatest cross country race ever seen. Cary narrowly wins the Pac-8 title. Added bonus: I’m there to see it, as I’m in town for my track and field meet vs. Cal.

May 1970—the setting is UCLA’s Drake Stadium for the Pac-8. Texierian Rick Riley ‘71, my best buddy in Pullman, wins the mile with the first sub-4:00 in school history and I cry after a race for the first time.

May 1972—the first time LA’s historic Coliseum and Craig John Delmore ‘74 turns the long jumping world upside down, literally, by unveiling his somersault style.

November 1974—it’s cross country time at Stanford again and I get to see Henry Rains ‘74 for the first time. I make the tail-end prediction that he’s going to be a world record setter. I conveniently ignore how many times I’ve said something similar and been dead wrong and never fail to bring up my prescience when he goes on for his two years later.

May 1984—I trot the honor of announcing the Pac-10 Championships in Pullman.

June 1988—Throwing in Eugene, Laura Lavine ‘88 becomes the first woman ever to win the NCAA discus title.

August 2004—I’m standing a dozen rows from the track in the middle of the homestretch in Athens as Bernard Lagat ‘91 and world record holder Hicham El Guerrouj ‘93 stage the greatest 1500-meter final in Olympic 1500. Bernard loses narrowly, but it’s another tear-inducing moment.

September 2017—Our ‘18 team is inducted into the WSU Athletics Hall of Fame.

Any favorite track and field events of your own? Send them to us at wsutf@wsu.edu.
Beets

BY LARRY CLARK
Not everyone will love a beet, but it has long been a vegetable of love.

The deep red of a beet and its earthy sweetness speak to some people, who adore the vegetable in all kinds of dishes. Beets have a lot of healthy qualities, too, and even potential chemical uses in solar panels.

That’s not to say beets don’t have detractors. That same earthiness, produced by the substance known as ‘pigments’, puts off some palates.

The beet—Beta vulgaris, also known as garden beet, blood turnip, beetroot, or red beet—was cultivated in ancient Greece and Rome, but there are stories of beets in the Hanging Gardens of Babylon as well.

It’s related to Swiss chard and, in fact, people mostly ate the leaves and stalks of the vegetable in all kinds of dishes. Beets have a lot of healthy qualities, too, and even potential chemical uses in solar panels.

A number of studies support the use of beet juice to lower high blood pressure, due to its high nitrate content. Nitrate gets transformed by an enzyme in nitrates, which relaxes blood vessels. Beet juice can lead to drops in both systolic and diastolic pressure at rates higher than some medicines.

Beets could help improve brain and liver functions. They’re an excellent source of fiber, vitamin C, magnesium, folate, potassium, and manganese.

The betalains could provide more than just a health benefit for us: they might improve our solar electrical panels.

Jeanne McHale, a Washington State University chemist, and her team of students study how betain, a betalain dye called beetroot red, can react to photons in solar panels. Betain as an additive could make dye-sensitized solar cells potentially more economical and environmentally friendly alternatives to silicon-based solar photovoltaics.

The strong betalain-red coloring in most beets is also used as a dye in foods and other substances. In the nineteenth century, women used their beet juice as a cheek and lip stain.

Beets grow well almost anywhere in the state, but they grow best in cool conditions and bright sun, according to WSU Extension. Make successive plantings every three to four weeks from spring to midsummer, and then in the fall about 10 weeks before heavy frost, if you plan for winter storage.

They’re biennial and normally grow an enlarged root in the first season.

Some recommended varieties for western Washington are Red Ace, Earli Wonder Tall Top, Detroit Dark Red, Lutz Greenleaf/Winterkeeper, Cylinda, Golden, and the mellow Chigiova.

Beets, like many root vegetables, transform subtly when roasted. The natural sweet flavor emerges and it becomes a little less earthy, which can please palates that don’t want that strong luminosity. If you boil them, leave four or five inches of stem on the beets so you don’t have the red color “leaking.”

In soups or stews, beets have long played a leading role. It’s said there are as many types of beet soup in Eastern Europe as there are villages. Beets pair nicely with sour cream or strong cheese in soups and other dishes.

Another way to appreciate the hardy flavor is a beet salad, combined with pungent greens, nuts, mustard, vinegar, and cheese.

Lentils with Roasted Beets and Carrots

Ingredients

For Eggless Aioli:

- 1/2 cup olive oil
- 2 cloves garlic
- Fresh ground pepper
- 1 lemon zest

For Lentils:

- 1 large bunch medium-small carrots, with their tops on
- 1/2 cup chopped carrot tops
- 1/2 tsp. salt
- 1/2 cup chopped lentils
- 1/2 cup olives
- 1/2 cup chopped feta cheese

Directions

1. • Remove the leafy tops from the carrots and beets. Reserve the carrot tops. (Beet greens can also be kept as they are extremely nutritious and delicious.) Wash and scrub the carrots and beets, removing any soil, leaving their skins on. Place the whole carrots and beets in a large French oven or enamelled iron pot and mix in the 2 tbsp. olive oil, fully coating the vegetables in oil.
2. • In a 375º F oven, roast the vegetables for about 30 to 45 minutes, until tender when pierced with a fork. If you wish, once the beets are cool enough to handle, you can remove the skins from the beets by gently rubbing them off with your fingers.
3. • Meanwhile, rinse the lentils and check them for small pebbles, then place them in a medium saucepan. Cover them with water and bring to a boil.
4. • Simmer on medium heat, uncovered, for about 30 to 40 minutes, until tender but not falling apart or turning mushy. (Add water if necessary through the cooking.) Drain the lentils and place them in a large shallow serving bowl.
5. • In a blender or food processor, puree the garlic, lemon juice, and salt to make the aioli. Add the olive oil and puree until thick and opaque and no chunks of garlic remain. Pour this mixture over the lentils. Add the chopped carrot tops, chopped beets, and grated lemon zest and toss it all together. Season with a bit of salt and pepper if you wish.
6. • Place the roasted carrots and beets on top, then crumble the feta all around. Serve warm or cold.

Yield: 6-8 servings

Recipe courtesy of Kitchen Vignettes/PBS
It’s never easy to find a new home. Just ask Barbara Nelson, a former account manager from Seattle. When her husband passed away, she moved from the century-old house where they had lived for 48 years. She has piercing eyes and a strong voice, but it trembles slightly as she explains, “It was so traumatic. After the estate sale, I took five things out of that house and walked away. I felt like I lost my neighborhood.” Barbara made the decision, consulting with her family, to move to a senior living community. She visited a number of locations in the Seattle area and two and a half years ago decided on Mountlake Terrace Plaza.

On a quiet street in the suburb north of Seattle, across from a lush park and library, the building could pass for any upscale complex. It’s become a new home, with benefits, for Barbara, her friends Mary and Pam, and about 75 other seniors. The three women are joined by Rosita Sandell ’11, the community’s executive director, after some tasty jelly-filled German doughnuts made from scratch in the building’s kitchen. Big band jazz plays from the speakers as the group describes the busy life at Mountlake Terrace Plaza: art classes, volunteering, yoga, Wii bowling, music, movies, barbecues, trips to Leavenworth for Oktoberfest, river rafting, and eagle watching, coordinated by their energetic activities director.

For Barbara, the active life and the friendly reception drew her into the community—oh and, she adds with a smile, that she doesn’t have to cook and do dishes.

Welcome to the rapidly evolving future of senior life, a blend of skilled nursing, technology, architecture, and business management all wrapped together with resort-style hospitality.

Sandell, who has been with the MBK Senior Living property for a couple of years, says the community, like a growing number of senior living facilities, provides a lot of what the residents need in a home, while allowing them independence. “You can’t always tell someone who’s 91 years old and made all their own decisions that this is the way it’s going to be.” Dressed in a red blazer with black slacks and shirt, Sandell, a graduate of Washington State University’s hospitality management program with a gracious demeanor, could be a top restaurant or hotel manager. She in fact has that background, helping start up concessions and catering at the launch of both Safeco Field and Seahawks stadium exhibition center, then later working at the Washington State Convention Center. Sandell grew tired of training her own managers, so she decided to get further education, first at Highline Community College and then WSU.

She was on track to go into the hotel industry, but a particular class her last year opened her eyes to senior living. “She had a moment when we visited residents and staff at a Seattle facility, and I saw the untapped potential.”

That place and others are a far cry from the past drab image of a “nursing home” with listless seniors just sitting around. The Mountlake Terrace community and thousands more across the state and country help seniors create new homes and enjoy their golden years. But the communities are swelling with the tide of Baby Boomers entering their active later years, and the need is dire for people like Sandell.

THE SILVER WAVE

With around 60,000 people a day in the United States turning 65, and senior living communities filling up and popping up all over, the industry is starting to feel the crunch. An estimated 90 million seniors will live in the country by 2050, and while some will continue living in their homes and “age in place,” many more will seek out apartment-style facilities or more residential active adult communities.

It was the pressing need that brought senior living executive Jerry Meyer to WSU and to Nancy Swanger, director of the School of Hospitality Management in the Carson College of Business, with a request in 2010. Meyer was then president of Áegis Living, a rapidly-expanding senior living company based in Redmond.

“When I first met with Jerry Meyer, he said to me, ‘We want people with a hospitality background and not just a skilled nursing background,’” says Swanger. At first she was a skeptic. “My 88-year-old parents still live in their own home. In my mind all I could think about was nursing homes. What was the connection to hospitality?” she says. Meyer explained that similar skills are needed when operating senior living communities as running hotels and resorts. Since over a million more managers will be needed in the senior living industry in the next decade, he thought WSU was in a prime position to train them.
A veteran executive with extensive experience in the senior living industry, Eckstein didn’t start in the field. He began in real estate in his native New York City. When the market turned sour in the late 1980s, his research showed growth potential in building for an aging population. The company he worked for went out of business, but his expertise with senior properties was in demand. But Eckstein’s professional insight in 1991 had an unexpected personal connection as well.

Eckstein notes that many millennial students don’t want just a job, either. They want to make a social impact while making a good living. “Imagine making a difference in the lives of grandma and grandma and their families. We talk about doing well by doing good,” he says.

THE OLD AND NEW COMMUNITIES

The idea of “retiring,” especially to warmer climes, certainly isn’t a novel idea. Thomas Edison had one of his houses in New Jersey dismantled in the 1890s and moved to Jacksonville, Florida, where he would winter and finally live permanently. He was soon joined by Henry Ford and his wife, and other wealthy families.

Eventually middle class seniors in the 1920s started heading south with their “tin Lizzies” pulling mobile homes to Florida for the winter. Hotels in Saratoga, St. Petersburg, Miami, and other cities also began catering to aging semi-permanent clients, the “Snowbirds.”

The grand social experiment in age-restricted communities really took off around 1960 with Del Webb’s Sun City in Arizona. The entrepreneur founded a large community featuring mostly smaller homes, which then expanded to similar communities in Florida and California. Webb’s Sun City properties dew the middle class, with their pensions and their dreams of an “active retirement” and country club lifestyles. They were often built around golf courses and maintained a strict 55+ policy for residents.

One of Webb’s competitors, Ross Cortese, opened Leisure World communities in Laguna Hills, Seal Beach, and other California locations. Cortese changed the language from “retirement” to “active adult,” with a concentration on recreational activities. The small, one-story homes were also more geared toward assisting seniors’ changing health needs, such as bars by the tub in bathrooms.

Fifty years later many senior living communities look quite abit different. Down I-405 from Mountlake Terrace, just blocks from downtown shops, Äegis Living Bellevue also sits on a peaceful street across from a verdant park. Past the flowers and manicured landscaping, the busy lobby hosts an exercise class. A baby grand piano awaits a player under tall ceilings with chandeliers. It has the feel of a fine hotel, and one can see why WSU students like Sandell were impressed when they visited.

The manager, Patrick Mazuca, greets residents by name as he leads a tour of the building, accompanied by his two vibracious goldendoodle dogs. Beyond a range of amenities, from a movie theater to gyms, beauty salon, a library, and more, Mazuca says the most important thing is residents’ happiness as they move in.

“Nobody says, ‘I can’t wait to move into senior living.’ It’s our job as staff to be compassionate and understanding, and to also help the families, who may feel some guilt,” he says.

One common feature with many senior living communities, like Äegis Living, is the continuum of care. The residents are able to move from independent apartments to assisted living, memory care if they develop Alzheimer’s or other forms of dementia, or other higher care needs.

In the memory care area, residents plant yellow flowers on a rolling cart. They’re surrounded by nostalgic reminders: an alcove with vintage Coca-Cola signs, a back garden with a 50s-era car and a Sinclair gas pump, photos of their families. Mazuca says it’s all designed to ease residents, and help them feel safe.

Across the state, a similar experience awaits over 350 seniors at the Touchmark on Spokane’s South Hill. Ken Alexander ’94 manages the skilled nursing and assisted living area there; using his 14 years of industry experience. Beginning at an expansive lobby, he leads the way past apartments and through the dining area to recreation and art rooms. Large boards show the numerous daily activities. Nursing and memory care are in separate wings.

“We do a lot of transitions. As people age in place in the independent cottages and then might need extra help, they can move to nursing or memory care,” says Alexander.

Apartment facilities like Touchmark and Äegis Living aren’t the only model. Panorama, a 140-acre community in Lacey with 850 residences, comes from the same pedigree as Sun City. It was built 54 years ago as a “retirement” community, with 11 neighborhoods...
that hold single-family homes, duplexes, and apartments. It also has an assisted living and care facility on the premises.

Howard Burton, Panorama’s director of marketing, drives slowly through the winding streets, past the new pollinator garden (installed with help from WSU Extension), and to a recreation complex tucked amid the homes.

“It’s changed. It has become more about lifestyle enrichment,” says Burton, who’s worked at Panorama for 24 years. He walks past exercise rooms and a swimming pool. “We have 108 hobby and interest groups, including a writer’s group that’s been around for 27 years.”

At Panorama’s 286-seat theater, where residents perform plays and hold film festivals, Burton introduces Katherine Billings, the effusive arts director. “We have an intelligent, engaged group that writes, directs, and acts in plays,” she says.

“Some people may have felt invisible as they grew older,” she says. “No longer. They move to a community like this and they reflect how many communities like Áegis Living, Touchmark, and companies continue to the idea of a holistic degree and a research institute. The Gerontology Institute for Senior Living will focus on three dimensions: workforce development, collaborative management and sponsored research, and undergraduate education. It would be named for one of the founding fathers of the WSU senior living program and a pioneer of the industry who died of cancer in 2015 at age 55. Some of that research includes smart home technology, like that being tested by Fritz at Touchmark in Spokane.

WSU has also started a noncredit online certificate program that will allow people to train in senior living management over the course of a year. “The industry doesn’t have the supply of people to even meet the demand they have currently to run their communities,” says Swanger, and this certificate can help get people up to speed.

“Some claim they further fragment society by not engaging seniors but that means not just training, but generating interest. “We need to let students know this is a career opportunity. It’s a lot like a hotel, except the people check in and stay longer, and they might be, on average, older,” says Swanger. “If you want to be the manager of a hotel property, it can take 15 years or more to work into that position. Resita was running her own building in a year.”

The program still brings in industry insiders for classes, such as Patrick Dooley, chief operating officer of Vancouver-based Milestone Retirement Communities, the eighth largest privately managed assisted living company in the country.

Through classroom and online learning, and experiential field trips, the school continues to show students that senior housing is not what it used to be. As one example, for their final project, Eckstein asked hospitality students to create a group research paper discussing what future products and terminology Baby Boomers envision will be part of the senior living environment.

Even that lexicon is changing.

“In all likelihood, we won’t be using the term ‘senior’ as an industry,” Eckstein says. “Boomers do not like the terms ‘senior,’ ‘senior housing,’ or even ‘senior care.’ We are alerting students early on to this upcoming change in the conversation to help them develop a different mindset toward ‘retirement’ communities, though even the term ‘retirement’ will also be changing as we move forward. The definition of retirement is to cease to work, withdraw, or stop. That is not how the Baby Boomers will be doing it!”

After starting the business class, Swanger began conversations with other faculty around WSU who had interest in the field of aging and senior living. Maureen Schmitter-Edgecombe in psychology, Laura Hill and Cory Boklan in human development, Diane Cook in electrical engineering, and Catherine Van Son and Shelly Fritz at WSU Vancouver’s nursing department, to name a few. Swanger invited them over for lunch and the conversation led to the idea of a holistic degree and a research institute.

The Granger Cobb Institute for Senior Living will focus on three dimensions: workforce development, collaborative management and sponsored research, and undergraduate education. It would be named for one of the founding fathers of the WSU senior living program and a pioneer of the industry who died of cancer in 2015 at age 55. Some of that research includes smart home technology, like that being tested by Fritz at Touchmark in Spokane.

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Panorama serve a broad range of seniors’ needs.

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The theater at Panorama hosts plays, radio shows, and other performances by senior residents in the community. Courtesy Panorama

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fires burned

In the embers of an ancient winter day, a Swedish scout scrambles up the hill of snow-covered boulders, hurrying over the slippery ground between them along a narrow path. His panting breath trails after him until he stumbles through the castle gate gasping.

Vandals on the riverbank! Bandits to the east!

The heavy palisade slams shut behind him as men rush to position along a glinting rock wall. From 150 feet above the valley floor, they watch as silhouettes begin scaling the boulders below. With a signal, arrows and stones rain down upon them, yet the marauders advance, dragging their weapons or clenching them in their teeth. One heavy group attacks the wall with a battering ram but the rampart holds firm. In the end, wounded and spent, the intruders slink back to their ship in the darkness.

As the sun rises in 2018, that Iron Age hillfort is still standing. The Broborg (pronounced Brew-boy) castle, built around 450 C.E., located north of present-day Stockholm, Broborg provided a defensive fort scattered throughout Europe.

The Broborg (pronounced Brew-boy) castle, built around 450 C.E., remains surprisingly intact, one of the best preserved of the thousand or so defensive forts scattered throughout Europe.

The ancient glass project, as it’s informally known, is composed of an international team of scientists from universities, national laboratories, the U.S. Department of Energy (DOE), the Smithsonian Museum Conservation Institute, and more.

Leading the effort to reverse engineer the exact methods and ingredients used to make Broborg glass is John McCloy, associate professor of mechanical and materials engineering at Washington State University. He also founded the WSU vitrification research program in 2013 and has a joint appointment with the Pacific Northwest National Laboratory (PNNL) in Richland.

McCloy is not your typical engineer, however. He also holds a master’s degree in cultural anthropology and professes a life-long love of ancient technologies. As he talks about the unique adventure of studying Broborg, you can see a hint of the gold prospector’s twinkle in his eyes.

“Vandals on the riverbank! Bandits to the east!”

“I got to climb up an iron-age fort in Sweden as it snowed,” he says. “This is the first project I’ve worked on where I’ll collaborate with biologists—and people interested in Earth’s magnetic field, and others who specialize in ancient Scandinavian iron making. That diversity is what makes it so interesting.”

At the molecular level, glass evokes a certain sense of alchemy. The translucent material is neither completely solid nor liquid but something in between. And, despite the way it sparkles in the light, glass is not composed of crystals but is instead an amorphous substance that can interact with a wide variety of atoms.

That flexibility allows scientists like McCloy to dabble with the ingredients when making glass. They can adjust the recipe to produce a glass specifically designed to trap nuclear waste particles.

It’s good news for Hanford, where the waste storage tanks bubble with a thick yellow-brown sludge containing a witch’s brew of radionuclides such as uranium, plutonium, cesium, and technetium. The muck is also packed with leftover production chemicals and corrosion products including aluminum, zinc, lead, and copper. Though isotopes like cobalt-60 have short half-lives and decay quickly, others, like plutonium-239, remain hot for ages.

The idea of using vitrification to contain this waste first arose during the 1970s with the advent of environmentalism and growing concern over the dangers of radiation. Scientists agreed the toxic material should be stored in an impervious, solid form that would remain stable for thousands of years while the radioactivity safely dissipated.

Since then, glass has been successfully used for vitrification in the United Kingdom, Germany, France, Korea, India, China, Russia, Japan, and Switzerland. It is also in use at the West Valley Nuclear Facility in New York and the Savannah River Site in South Carolina.

But Hanford presents the biggest challenge yet. Projected to cover 65 acres, Hanfich National, Inc., under contract with the DOE, is designing and constructing the world’s largest radioactive
About. In the distance, we could see the site—-it looks like low walls sections using charcoal to increase the firing temperature. They may as the fusing material. McCloy says the Swedes melted rocks in boxed appear to have been made deliberately for defensive purposes. It was solid—there was no way you could go up without climbing over boulders. The top area is very flat position it really was,” he says. “There is only one narrow area you can go up without climbing over boulders. The top area is very flat and that’s where the glass was made; where rocks were melted to fuse boulders together. It was solid—there was no way you could knock it down.

Although similar sites contain melted rocks resulting from lightning strikes, cooking fires, or enemy attacks, the walls at Broborg appear to have been made deliberately for defensive purposes. These vitrified ramparts were constructed with chunks of local granite and smaller, greenish rocks called amphibolite that were used as the fusing material. McCloy says the Swedes melted rocks in boxed sections using charcoal to increase the firing temperature. They may have also added moss or other wet material to elevate humidity and create the optimum furnace conditions.

It was the pre-Viking era and they had been making iron for 1,000 years prior to that,” he says. “For me, realizing what they were able to do made our technology and self-assessment of our own abilities as humans seem kind of small.

“What will there be in 1,000 years for archeologists to find from our culture and what will they think of us? We don’t build very much in our society that lasts anymore. We don’t have that mindset.”

Albert Kruger, chief glass scientist for the DOE at Hanford, joined McCloy on the expedition and agrees, “Never underestimate the intelligence of the ancients. The things these people figured out without modern analytical chemical equipment were incredible.” It was Kruger who came up with the idea to study vitrified hillfort glass in 2013 while chatting with Swedish waste disposal researcher Rolf Stridh during an excursion in France. Kruger, engaging and cheerful in his round glasses and flowered bowtie, leans across a table at PNNL explaining how the chance meeting further led to an introduction with Swedish geologist Peter Kreren. For 30 years, Kreren had collected samples from vitrified forts scattered across Europe and he kindly agreed to share a few from his personal museum.

The artifacts are now under the expert care of Carolyn Pearce who has been sitting quietly next to Kruger. Originally from England, Pearce is now a staff scientist in the geosciences group at PNNL and fellow member of the Broborg expedition. She gives a brief project overview and then escorts us to their laboratory where we do protective glasses.

With gloved hands, Pearce unlocks a small metal cabinet and withdraws a box. “We store the artifacts in museum-grade specimen boxes with special paper,” she says.

Carefully unperturbing a large, brick-like chunk of rock that appears to be glazed with white icing, Pearce explains that two kinds of glass formed at Broborg—-clear and dark.

The clear glass, with its high sodium content, is very similar to that used to vitrify low activity nuclear waste or LAW. The dark glass is high in iron and analogous to material used for treating high level waste or HLW.

Kruger and Pearce analyze both types of glass to determine how it degrades through processes like weathering, corrosion, and the microbial action of anabas, bacteria, and fungi. Their primary focus, however, is on the clear glass.

“By adopting highly abusive tests, we can show that glass is a very durable material,” says Kruger. Typically, we grind glass into fine powders and put it through 200 degrees Celsius steam, or cut it into wafers and submerge them in water.

“But at Hanford, we’ll eventually be burying glass logs in steel containers that may not experience anything more than 50 degrees Celsius and some humidity. They’re certainly not going to be immersed in water until another Missoula flood comes.”

To better determine how Broborg glass truly degrades over time, Kruger and Pearce are developing a new accelerated aging test in collaboration with Vanderbilt University and the University of Sheffield in England. The goal is to ultimately develop a test that will reflect aging in thousand-year increments.

Once in place, they will test the artifacts and use that data to model what happened at Broborg 1,500 years ago. This will be followed with tests on new glass made from the reconstructed recipe McCloy is developing. If the results match, they’ll be in business.

McCloy’s chemical synthesis lab dominates most of third floor Dana Hall in the Voiland College of Engineering and Architecture. The old 1930s lab, with its low ceilings and traditional fixtures, is just one of the five laboratories he oversees throughout campus.

Here, with state-of-the-art equipment, McCloy’s graduate students tease out the specific elements and processes needed to concoct a replica of the hardly Broborg glass. One autumn afternoon, he introduces a few of them as they work on various projects.

Kneeling beside a small, boxy furnace, doctoral candidate José Marcial is patiently melting a bit of ordinary glass. Dressed in blue coveralls, heavy red gloves, and a welding helmet, Marcial periodically peers into the furnace’s tiny window. When the temperature reaches 860 degrees Celsius, he opens the door and removes a crucible full of molten glass with a long pair of silver tongs.

Gently, he pours the liquid glass onto a metal plate to cool. McCloy says a similar process is used to melt amphibolite, the glue that fused the granite Broborg boulders together.

“The Swedes had to get to 1,200 degrees Celsius to melt amphibolite,” he says. “It was right at the edge of their iron-making technology. They would have needed bellows or drafting in furnaces to reach that temperature.”

In the lab, McCloy tries to replicate their actions by heating the amphibolite to different temperatures. At 750 degrees Celsius, for example, it develops a copperish sheen. By 1,000 degrees Celsius, the rock begins to transform and by 1,200 degrees Celsius, he says it appears glassy.

As the texture changes, so, too, does the rock’s mineral composition. They track this metamorphosis by identifying the mineral content of each sample at different stages of melting—-noting crystals of quartz, feldspar, mica, olivine, and others. This is followed with a series of high-end tests that zero in on the sample’s chemical structure and physical properties.

The process is complicated by the fact that the rock’s mineral content also varies depending on where it was located at the Broborg site. Another wild card in determining how water played a role in the melting process.

Though it’s still too early for conclusions, McCloy says he’s starting to get a handle on the sequence of changes that occur as the minerals undergo extreme heating.

“We’re studying samples from five different sites and trying to find the boundaries—or edges—of what is normal,” he says.

McCloy has no shortage of helping hands—his students are keen to learn, grind, and test the samples in order to extract their secrets. They especially enjoy the “alchemy” of pouring glass.

“They get to take part in what feels like a mystical experience—to see that phase transformation,” he says. “I can only imagine these people making hillforts must’ve had a similar experience. One moment, a rock is solid and the next, it’s liquid. It must’ve been incredible.”
Cleaning up Hanford’s nuclear waste is a tough job. Any way you look at it. Despite extensive remediation efforts, scientists still struggle to solve a multitude of lingering problems—most related to radioactive material leaking from rusty underground storage tanks.

Among the most critical questions is how quickly those radioactive liquids can travel through the soil and when they might reach the groundwater. It’s a question that Jim Harsh and Markus Flury, professors in crop and soil sciences at Washington State University, are trying to answer. Their specialty is studying the way microscopic particles carry chemicals and radioactive elements through soil and water. These colloidal particles, as they’re called, can accelerate the migration of contaminants within the environment.

The two were invited to investigate Hanford when troubling core samples indicated a radioactive called cesium had leached farther into the subsit than expected. This one knew why.

Working with researchers at PNNL and other national laboratories, Harsh and Flury demonstrated that colloidal particles bind cesium and carry it along “piggyback.” But over time, cesium is quickly stripped off by larger particles in the soil.

Last October, McCloy, Kruger, and Pearce returned to Broborg with a team of Swedish archeologists to collect samples directly from the vitrified walls. Their hope is to better understand environmental impacts as well as to gather clues about ancient production methods.

McCloy also went armed with a special drill for obtaining magnetic core samples, on loan from the Pacific Northwest Paleomagnetism Laboratory at Western Washington University in Bellingham. The lab can measure magnetism in the rock’s crystals and accurately date Broborg glass production to within 50 years.

Despite a few glitches with the drill, McCloy says they had a productive week at the windy, mushroom-dotted excavation site, patiently watching as archeologists cut their way through the 16-inch-thick wall.

They found holes that were used to feed the fire and heat up bowls—like sections of the wall,” he says. “Below these bowels was a trench filled with ashes and charcoal. We think they made a wooden framework around the box with a firing hole on each end.”

Ones his eyes were opened to the landscape, McCloy says the world of the ancients emerged like a 3D image. “I saw firing holes all over the site. There were edges of boxes and charcoal impressions everywhere. It felt like the site is still alive with memories,” he recalls. “Some days were cold and rainy and it would’ve been hard to carry boulders. Other days were sunny and nice. There’s so much life on the hill—you can almost see them lugging the rocks and building the hillfort.”

Meanwhile, work will continue on the ancient glass project. Kruger says that within five years, they should have enough data to “support the use of the accelerated aging test with a high degree of confidence.”

The reverse engineering project is likewise moving toward completion.

“People in the Washington State University system are working with federal scientists, and ultimately, Washington state citizens and economy. —Editor

Crystals and accurately date Broborg glass production to within 50 years.

According to DOE, the facility will begin treatments as soon as 2022, and is scheduled to be fully operational for both LAW and HLW by 2036. The bulk of Hanford’s radioactive waste is LAW and is slated for burial onsite. The HLW will eventually be shipped to the national waste repository.

The beauty of all this effort is that reconstructed Broborg glass has the potential to trap and hold more nuclear waste than other types of glass, says Kruger. That means more efficient containment of radionuclides and lower stainless steel containers to bury at Hanford. Which translates into significant savings for America’s collective pocketbook. Not to mention a bit of ‘relief’ and considerable health and safety benefits for citizens of the Pacific Northwest—especially those who call Hanford’s spare, high-desert county their home. *

Though the feeling wasn’t the definitive answer Harsh and Flury were hoping for, it did provide a positive outcome. They now know that cesium, with its relatively short half-life, will lose most of its radioactivity before reaching the groundwater. Therefore, cesium-contaminated soil can be left to decay in situ.

It’s a different story with technetium-99, a radionuclide with a very long half-life. Technetium-99 is one of the most widespread contaminants at the Hanford site and quite difficult to remove. Unlike cesium, scientists expected the element to move quickly through the soil but instead something is slowing it down.

Harsh and Flury speculated that perhaps a substance called sodalite is holding technetium-99 in place under the storage tanks. Sodalite is a “framework mineral” that acts like a tiny cage to trap other elements and ions. They thought sodalite might trap both cesium and technetium-99. A 5.6-foot soil core, their studies showed sodalite has a little impact on the movement of either element. But harsh says sodalite cages are probably very important for transport of highly radioactive elements like plutonium and uranium. As an example, he points to the Nevada Test Site, 65 miles north of Las Vegas, where plutonium is mysteriously migrating much faster than anticipated.

One step forward, one step back. The earthy detective work continues.
Six years before Hudson was born, construction of the Garrison Dam submerged 550,000 acres of Hidatsa, Mandan, and Arikara (the Three Affiliated Tribes) land, resulting in Lake Sakakawea and forcing hundreds of families to flee, including Hudson’s. The tragedy only inspired his parents to triumph over it.

He carried the Hidatsa values of community, charity, education, and the environment with him to WSU. In its Native group, Ku-Au-Mah (“cougar” in Nez Perce), “I immediately found a supportive network of Native people from all over the Columbia Plateau,” says Hudson, who first double-majored in forestry and environmental science. He was headed toward a professional path many of his relatives had taken, in Indian law, education, health, and the environment.

A talk by visiting Makah filmmaker and poet Sandra Sunrising Osawa “opened my eyes to the passion for the salmon issue in the Northwest,” he says. “The best way I saw to make change was through journalism and filmmaking.”

With his bachelor’s degree in communication, Hudson worked at Seattle’s now-defunct Alpha Cine Labs on post-production for everything from experimental films to Hollywood blockbusters. Fifteen years in, married and raising three sons, he was working on Kevin Costner’s The Postman when he “became disillusioned with Hollywood’s self-indulgence and excess,” he says. “To make real change, I knew I needed to make a major course correction in my life.”

A good start was the University of Washington’s yearlong certificate program in philanthropy, delivering him to the culture...
It’s a clear, warm Sunday morning in Portland. Sandy Boulevard is nearly deserted and Tom Haig is cruising on his bicycle. He tucks into the teardrop position, thinking, *This is awesome.*

Suddenly, an elderly couple blows through a stop sign. Haig reacts quickly—but he’s pipped and, looking back at them, yells something unprintable. A second later, he returns his attention to his direction of travel. Yellow light! And a truck coming at him. Bicyclist and driver lock eyes. Both brake and Haig thinks, I’ve got this. That truck has enough clearance for me to lay it down and slide right under.

Then the unthinkable happens—his brake cable snaps. “I went headfirst into his grill,” Haig ’09 recalls. “At first I didn’t think, I’ve got this. That truck has enough clearance for me to lay it down and slide right under.”

Haig lives his adopted home of the Northwest just as much. “Whenever I am, I want to try to strike the right balance between modern demands and the preservation of all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.” And always, there’s family. “We’re thebearers of our people’s past, with all things wild.”

The unthinkably happens—his brake cable snaps. “I went headfirst into his grill,” Haig ’09 recalls. “At first I didn’t notice I was paralyzed. I put my hands on my legs and thought, at least I can feel them. But what I didn’t realize in the moment was that my legs were not feeling my hands. My feet were still clipped into my pedals and I tried to move—and then just stopped moving.”

That was 1996. Haig says, “Here’s the really crazy thing. My brother, Andy, is one of the world’s experts on exactly what happened to me. I’d called him lots of times because I used to be a professional platform diver. Thud. I hurt my knee.”

“Not this time. ‘Um? Andy? I broke my legs.’”

“I fly over there and there’s a big problem with this radio station. It’s not on the highest point in the region but it’s on one of them because they want to put the stick way up in the air,” Haig explains, using radio engineer jargon to refer to the antenna. “The road to get up there was absolutely inaccessible by wheelchair.”

Every day he was picked up and driven to the station—and then carried up the 24 steps to the broadcast booth. “They had a nice set up. But the station was running on someone’s iPod playlist of a thousand Tibetan classical songs that just played over and over.”

Haig tried to get the locals to read the news in Tibetan but was met with resistance. He was told, “I can go to my mother to give her information, but not my mother’s friend.”

The intricacies of social respect inhibited the locals too much to actually read the news on air. “They thought their voices shouldn’t be so ‘big’ and heard by that many people. That was the Dalai Lama’s role.”

So Haig improvised. He scored an interview with novelist Alice Walker. He set up an open mic at a local café, then broadcast the recordings. “People from all over the world come to Dharamsala, the home of the Tibet government-in-exile, so there are lots of musicians.”

After the 2015 Nepal earthquake that killed some 9,000 people, the world traveler was back in the Himalayas. His mission this time was to produce occupational therapy training videos for distribution across the country.

“It’s a five-day trip to get to the far end of the country,” he says, but the clinic there, with its patients in wheelchairs, badly needed current-practices information. The quake injured 22,000 people. One physician Haig met, Rani Dhakal, said his rehabilitation facility went from 30 patients to over 100 in a single day.

Haig has become an expert on disability cultures. He’s done videos on French disability sports. He was alarmed by what he saw in Albania, where people in wheelchairs were largely ignored. In Ghana he was delighted to find one of the most advanced disability cultures he’s ever seen.

To date, Haig has visited 62 countries, something his family of seven siblings keeps track of. “I was in the lead for a while,” he says, “but then my Mom and Dad retired and now they’re crushing me.”
What a time it was

BY REBECCA PHILLIPS

One by one, they share memories of curfews, 42-cent dinner dates at the CUB, the JFK assassination, and the birth of women’s lib. A few regale listeners with the infamous tale of the 1964 “Pot Push,” which had nothing to do with cannabis.

These are just a sample of the treats recorded at the recent Diamond and Golden Grads digital storytelling workshops, led by Washington State University English instructor and former assistant director of the Digital Technology and Culture program Rebecca Goodrich.

The workshops, held at the Lewis Alumni Center during the Diamond and Golden reunions, are available to visiting 50- and 60-year graduates who would like to contribute oral histories of their time at WSU. The stories will eventually be archived by Manuscripts, Archives, and Special Collections in the Terrell Library.

Goodrich matches alumni with students who conduct the interviews. She says the project is a win-win-win.

“The grads really enjoyed it and some brought newspaper clippings to share with the students. The old yearbooks were out and it was a great social event. “It was wonderful for the students too,” she says. “They were so interested in what the alumni were telling them. They asked great questions and later I heard them telling each other about the stories they heard. It was the perfect activity to get generations talking.”

Jonathan Wallis, a senior in neuroscience, took part in last April’s workshop and says he would gladly do it again.

“I heard stories I wouldn’t have known about, like the football stadium bleachers being burned down by an arsonist.”

Wallis says it also made him appreciate the aspect of time and how the alumni had contributed to society in many important ways, which all began at WSU.

“There was a civil engineer who worked many years in the field and had fond memories of a particular professor,” he says. Fifty years later, “he was still grateful to that professor—it was eye opening.”

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ALUMNIprofiles

Listen to the stories of these Cougs and others: magazine.wsu.edu/audio
At Home with Ernie Pyle

Hippie Ain’t Dead: It’s Livin’ in the White House

Playing White: Privilege and Power On and Off the Field
This isn’t even hate. This is a racism so ingrained, so deeply systemic, that it becomes a kind of blinding fog that causes many whites—and others—to fear every black face in the room.

With Richmond and Leonard’s army of documentary evidence, though, we should all begin to see ourselves in the mirror.

—Brian Clark

NEWMEDIA

Henry Womborn (’68 Anthro.) and Art Christenson (’79 Business) recently retired from the Port Angeles High School Rookerhill Hall of Fame. Henry served for high jump at Port Angeles in 1957, and went on to break WSU’s high jump record three years later. Art held the second-fastest 800-meter time in the history of American track while at WSU, and still holds the state’s fastest 800-meter time for college or high school athletes, which he set for the Rookhill in 1965.

Classnotes

Materials and Devices for Bone Disorders
Edited by Susmita Bose and Amit Bandyopadhyay
ELSEVIER: 2016

Written by a cross-disciplinary team of research scientists, engineers, and clinicians, this book bridges the gap between material science and bone disorders, providing integrated coverage of biomaterials and their applications. The book was edited by WSU materials engineering professors Susmita Bose and Amit Bandyopadhyay, who also contributed to the volume.

Oregon Pioneer Cattle Barons
DORCY S. GROVER 69 PHD
PAGE PUBLISHING: 2017

The lives of four central Oregon cattlemen—John Devore, Peter French, Henry Miller, and William Harley—from the late 1860s to the 1900s are detailed in this volume, along with brief vignettes of other prominent livestock raisers of that period. The book is the fourth book from 96-year-old Grover, who received her doctorate from WSU in American studies and is now an emeritus professor of literature and languages from Texas A&M University, Commerce.

CLious,”。 have spent over 50 years of their lives

JANET R. COLLINS
Arctic explorer  and geologist
ANTHROPOLOGY: 2018

On the Arctic Frontier:

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also left detailed, accurate maps of Alaska’s

studies,  and charted  the geology  and wildlife

shelves—the first  solid evidence  that searching

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Performance in the Oil Industry

Robert Hardney’s Polar

BOVINE

50 YEARS OF RESEARCH

of construction projects around the city.

ROC but in his second term. As

DIVER' s science and technology through

those in need of health care, chronic pain

also check out class notes online:
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of the old Pullman Building Supply © Skiplife, a technical academy offering the most in-demand skills training to underrepresented populations in the high-tech sector, added ERIKA PRICE ('99 MBA) as its business development manager. She spent over a decade working in product and program management for Microsoft, Symantec, and Intel. Erika recently completed Reboot Seattle, the career accelerator focused on women returning from a career break. © JEFF SNELL ('99 MED, '17 EDF) regularly runs marathons to raise money for various charities with his son, Nahval, who has a developmental genetic disorder that affects his ability to walk and speak. Jeff started Micah’s Miles in 2012, a non-profit that started as a personal challenge and has raised over $1 million for various programs. © SPRING 2018

BY BRIAN CHARLES CLARK

Belinda is not one to surrender to the inevitable. “Going into high school, I was apathetic, as I was in high school, and if I can help someone find purpose, then I can continue to do my job,” he says. “It’s not easy being an educator of America’s future. I work with over 150 adults every day who have suffered the worst of circumstances, but they’re here the next day.”

Siyam says that Multicultural Student Services was critical in recruiting him and facilitating his transfer from Seattle Central Community College to Pullman and Washington State University. At WSU, the Filipino American was an activist and mentor for other underrepresented minorities. He misses the Palouse but he might soon have reason to visit. “My stepson Derek is applying to universities,” he says. “I’m hoping he chooses WSU.”
What is the definition of the Coug family? WSU PARENTS CHAT CAFÉ is a Facebook group where the parents of WSU students come together in support of each other. We handle the noncampus types of questions that WSU staff might not have the personal know-how or time to answer. We handle questions around ordering cupcakes, pizza delivery, local medical services, flight and travel information, winter tires and clothing, and many others. I tell pull numbers, those questions that wake you in the middle of the night? We have also had them and we have the answers. There really isn’t any question you can come up with, that we can’t answer.

Check us out: facebook.com/groups/351822357167004.

Some of the great things about this group: If you need something delivered to your Coug, chances are there is another member making a trip to Pullman. If your Coug is sick, there is probably someone that we can’t answer. There really isn’t any question you can come up with, that we can’t answer.

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Check us ou...
IN memoriam

June 1, 2017, Huntsville, Alabama
DONALD BRUCE BUTLER (85 Years), 81, September 11, 2016, Beaverton, Oregon.
RONALD CLARK OVERBY (56 Const. Mgmt.), 82, May 6, 2017, Bellevue, Nebraska.
CLAIR LUCY CARPER (57 Nursing), 84, September 17, 2017, Barien. WALTER ALVIN DION (57 Chem. Eng.), 84, October 22, 2017, Yuba City, California.
RICHARD LEE GORDON (58 PhD Physics), 81, August 24, 2017, Spokane.
DIANNE J. MATTLER (59 Acc.), 81, September 10, 2017, Spokane.
ROBERT "BOB" CLAY NORVELL (60 Busi.), 65, September 30, 2017, Richland.
GENE H. NELSON (60 Civ. Eng.), 81, September 17, 2017, Seattle.
JOHN "TOM" DRUMHELLER (62 Ed.), 88, October 22, 2017, Yuba City, California.
SUE GLENN RICHEY (62 Bacterio.), 87, September 16, 2017, Spokane.
NEIL WILLIAMS (62 Env. Sci.), 64, October 8, 2017, Ridgefield.
FRANK W. R. KEATING (63 Elec. Eng.), 88, October 22, 2017, Yuba City, California.
RICHARD LEONE HARDY (65 MCE Human Dev.), 81, November 1, 2017, Moscow, Idaho.
SAMUEL IFANYI OKOCHA (91 Arch.), 60, May 21, 2017, Concord, California.

FACULTY and STAFF

S. BROOKES GILLIAM (80, 81 MA Ed.), 64, September 16, 2017, Spokane.
ROBERT "BOB" CLAY NORVELL (60 Busi.), 65, September 30, 2017, Richland.
RICHARD "RICH" LEONE HARDY (65 MCE Human Dev.), 81, November 1, 2017, Moscow, Idaho.
GENE H. NELSON (60 Civ. Eng.), 81, September 17, 2017, Seattle.
MICHAEL J. WYLAND (62, 65 Elec. Eng.), 64, October 22, 2017, Yuba City, California.
TODD W. KELLEY (63 Elec. Eng.), 88, October 22, 2017, Yuba City, California.
JOHN "TOM" DRUMHELLER (62 Ed.), 88, October 22, 2017, Yuba City, California.
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The perfect gift for every Coug

When you choose a gift for a special person in your life, you want to pick just the right one. A gift that will delight when it’s opened and make an impact for years to come.

Recently, we received a postcard from a 1947 graduate whose father gave her a WSU Alumni Association Life Membership for graduation over 70 years ago. She told us that she thinks of her dad every time she receives something from the WSUAA. There aren’t many gifts that can prompt that kind of gratitude nearly three-quarters of a century later.

Many of our members choose this gift for the Coug (or Cougs) in their lives. Mike Polito ’79, a Platinum Life Member and devoted Coug, wanted to provide a meaningful graduation gift to his oldest son, Spencer ’10. Mike recalls, “When we presented him with his Life Membership in the Alumni Association, he was ecstatic. Spence loved it.”

Steve Huhta ’73 saw a similar opportunity when trying to pick the perfect birthday present for his son, Karl ’09. Because Karl’s birthday falls during the holiday season, the gift needed to stand out. In addition, since Karl works for WSU Athletics, Steve wanted the gift to radiate Cougar Spirit. As a Platinum Life Member himself, Steve decided to give his son his own Platinum Life Membership. Now their names are both engraved on the Platinum Life Member Wall of Honor in the Lewis Alumni Centre in Pullman.

Whether it’s a graduation, birthday, or holiday gift, we hear so many stories of how much the gift of membership means to Cougs. Kristen Vog ’89 received annual gift memberships from her father, Wally, for years. “When I graduated, I told him I wanted to stay connected to WSU.” Kristen said her dad saw a WSUAA ad in Washington State Magazine (true story) and decided membership would be a great way to help his daughter stay in touch with the University. “That year, and every year after, my annual membership card showed up in the mail. It was just something he did for me. The year I decided to become a Life Member, but I’m so thankful for my father’s gift of helping me stay close to my alma mater.”

If you would like to give the gift of membership for any occasion, please let us know. We will be glad to help you make someone’s day, year, or life.

March 28, 2018

On Washington State University’s 128th birthday, the Cougar family will come together again to show what makes WSU special. Join us in building a strong future for the next generation of Cougs.

On March 28, 2018, help us show how #CougsGive.
Dear Darae,

Hair comes in lots of different colors. There’s black, medium brown, auburn, light brown, strawberry blonde, and copper, to name just a few. But in the end, almost everyone will have hair that’s gray or white. Ever since you were born, different cells have been working on your hair. Each hair sprouts from a follicle, a sort of little hair-making factory under your skin. Here, some of your cells are making your hair and others are coloring it.

The cells that color your hair are called melanocytes. They produce a pigment, or natural coloring matter, called melanin. This is the same pigment that gives your eyes and skin their color, too.

I decided to visit my friend Cynthia Cooper, a biologist and researcher at Washington State University, for help answering your question.

Cooper and the other scientists in her WSU Vancouver lab are really curious about cells. They are investigating questions about how some cells end up becoming the kind that produce skin pigment.

As people get older, she said, the pigment-producing cells in their hair follicles gradually die. They can no longer make enough pigment to keep coloring their hair.

If we took out all the pigment from your hair, it would be totally white. So when melanocytes stop producing melanin altogether, your hair turns white.

"Why hair follicle melanocytes die over time, and are not replaced, we don’t entirely know," Cooper says. "Our skin doesn’t turn gray, so the biology is quite different."

While Cooper works on pigment in skin, she says some scientists are also working on the pigment in hair. These scientists are especially curious about the inner workings of the cells and how gray hair is part of people’s DNA.

Perhaps, you’ve heard someone say their kids are giving them gray hair. But scientifically, if anyone is giving someone gray hair, it’s likely their own parents. Those that come before us pass down their hair color to us through our genes. It’s the same with graying hair.

Scientists have even pinpointed specific genes and parts of cells that are involved in growing gray hair. The new knowledge is helping us put together a better picture of how pigment works. Still, there’s a lot more to discover.

Maybe as you get older and find that first gray hair, you’ll remember some of the science that’s at the root of it all. If you have a cat or dog, maybe you’ll notice that they go gray around their muzzles, too.

I’ve actually had gray and white hair ever since I was a kitten. I think it’s pretty great. Our pigment, or lack of it, help make us all unique.

Sincerely,

DR. UNIVERSE

“I have not failed. I've just found 10,000 ways that won't work.”
–Thomas Edison

THIS TAX SEASON
PUT YOUR MONEY TO WORK

Are you 70½? A gift to the Washington State University Foundation directly from your IRA is a tax-smart way to support your favorite WSU program and is excludable from your gross income (a TAX-FREE gift!).

Of course, everyone is unique. We are happy to chat about any additional tax benefits or criteria that might apply to your situation.

Call the WSU Foundation Gift Planning Office at 800-448-2978 or visit foundation.wsu.edu/giftplanning to create your legacy today.

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