Cannabis in Washington state

The new era of green reconstruction
Features

As buildings go up, so does construction waste. By finding ways to recycle that waste, our researchers hope to usher in an ‘era of reconstruction.’

What keeps women from entering and remaining in science, technology, engineering, and math? It’s not new.

Upfront

Washington blazed new trails with the legalization of recreational cannabis. There were many unanswered questions but also new insights found en route.

WSU by the numbers

Dreaming of when clean energy is not a rarity

Discovering the undiscovered

Meet a scholar who digs it

Something has been zapping Washington’s tax revenue system.

It was a spiritual and inspirational time and place for multiple generations.
Private Support Helps Veteran Realize Dreams

While serving as a medic in the U.S. Army, Benji Stander completed many successful combat missions, including two life-changing tours in Afghanistan. Initially, he thought he’d become a career soldier but was so intrigued by medicine, he decided to pursue another dream. He received the Hix Family Endowed Scholarship, designated for non-traditional students, including veterans. Benji said, “Private support makes seeking a degree much easier and less stressful.” Benji majors in biology at WSU Vancouver and plans to seek a career in the medical field.

Students like Benji are changing the world because of private support. Learn how you can make a difference at WSU Foundation.wsu.edu/scholarships.

From java, no jive Clothing and gear from coffee grounds and other recycled waste UPFRONT

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WASHINGTON STATE MAGAZINE SPRING 2020
Create a Coug Legacy

In 1928, Wenatchee tree-fruit entrepreneur Grady Auvil began his mission to revolutionize the industry. His out-of-the-box thinking won him countless awards, including the Washington State Medal of Merit. Before Grady and his wife Lillie passed, they established the Auvil Fellowship at WSU through their estate. The couple wanted to sustain innovative thinking through undergraduate research.

Today, WSU Pullman sophomore Hannah Goodspeed is carrying on that legacy. As a Latinx woman in civil engineering, she is a 2019-2020 Auvil Fellow who conducts life-changing research and promotes equality for women and minorities in STEM. “The fellowship assures me that I am capable,” Hannah said. “And that I belong in engineering. Private support gives me confidence and motivates me to stay in STEM.”

Learn more about how you can create a legacy at WSU: foundation.wsu.edu/estate

WASHINGTON STATE UNIVERSITY Foundation

FIRSTwords

Ever a green state

There’s nothing new about being green. Two millennia ago, Chinese Minister for Agriculture Tsai Lun in the first-century Han dynasty called for subjects of the emperor to boil old linen rags for papermaking. Professional recyclers in medieval England collected dust and ash left from fireplaces, then sold it to brick manufacturers as an inexpensive base material. More recently, World War II saw an uptick in recycling, with many common household items like clothes, scrap metal, and tires turned into new products for the war effort.

The same spirit of innovative recycling inspired Washington State University’s Taji Miyasaka and David Drake to invent a construction block from gypsum drywall waste. Similar to a cinder block, the low-cost building material has insulating properties and great potential.

Another area of sustainable exploration at WSU, and one with some urgency, is finding replacements for rare earth elements and metals, such as cobalt and lithium, used in most of our tech devices. Not only are these materials expensive and difficult to extract, they’re often mined by children or gathered in exploitative situations. WSU’s JCDREAM seeks earth-abundant replacements for substances such as cobalt.

Of course, Washington is known for its green fields, and that includes the latest cash crop, cannabis. After recreational cannabis was legalized by an initiative in 2012, it opened the gates to sorely needed research into all aspects of the drug and related hemp. Almost 100 researchers at WSU are working to clear up misconceptions in this billion-dollar industry.

There are some evergreen problems that keep cropping up; one of the ongoing need for more women in engineering, mathematics, and other scientific fields. Thanks to work by WSU alumni and faculty, we might bring more girls and women into those areas, which we really need because, as Voiland College of Engineering and Architecture Dean Emeritus Candis Claiborn says, “the more people who look at a problem, the better the solutions.”
TALKback

Making much of good medicine

I write to compliment the superb feature “Good medicine” by Brian Charles Clark. Thank you for choosing the topic, one that deserves attention, but receives little in my experience. What the staff is doing to truly include Native people and their culture in the work of the new medical school is admirable. And Brian’s writing was quite extraordinary. Robbie Paul’s stories from her father will stay with me. “We need to learn to listen, and to listen to learn.” If future health-care practitioners from WSU can learn to listen quietly, they will have a much-needed positive impact in our state and beyond.

I am, once again, proud of the University for this initiative and for highlighting it in this magazine.

CHERRY L. TINKER ’67

Like we were never apart

On September 16, 2019, Cougs who lived in Neill Hall in 1979 reunited on campus. You can read Cathy Higgins’s full letter at magazine.wsu.edu.

We marvel at the incredible college experiences we had while we lived in Neill Hall, and the fact that we have all remained close friends for 40 years. Our group arrived as students to WSU and Neill Hall in different ways. Most of us came to WSU intentionally, but a few enrolled thinking they would be attending schools in different parts of the country. One thought he was going to a school in the Washington, D.C. area, and you can imagine his surprise when he arrived in Pullman, Washington, from New Delhi, India. Another came from Saggene, Michigan, thinking Pullman was a suburb of Seattle. I can’t speak to all the reasons everyone decided to stay in Pullman, but stay they did, and for this I am forever grateful.

Most of us knew we were coming to school in Pullman, but many of us were freshmen and didn’t expect to be placed into Neill Hall. Little did we know how lucky we were that 1979 was a year with a very large freshman class. To make room for so many new freshmen, we were placed into Neill Hall, which was a dorm for upperclassmen. We were also lucky that Neill Hall had been designated as an international dorm. If that had not been the case, we might not have met Pam from Alberta, Canada; Arjun from India; Gabriel from Chile; and so many other international students.

We are spread across North America, and yet the geographic distance between us does not dim our personal closeness. Some of us vacation together and see each other often. Some of our children (now grown!) grew up together and remain close friends. Some of us only see each others once a year. Some of us only see each other every few years. Here’s the great thing...it doesn’t matter. When we come together, it’s family. We fall together like we were never apart.

CATHY HIGGINS ’83 PSYCH.

Remembering a remarkable mentor and man

Jack Carloye’s passing ought not go unremarked. I took Professor Carloye’s classes in the mid-1970s, when WSU offered an M.A. in philosophy. He was, most of all, a kind and gentle man; he was also a smart and effective professor. I can say for certain that he prepared his students for a life of thought and reason.

RICHARD J. MCGOWAN, ’76 MA PHIL.

Note: Jack Carloye, WSU philosophy professor from 1962–1992, passed away August 29, 2019, in Pullman. He was 92.

CORRECTION

An erroneous version of the article “Power of language” was printed in the Winter 2019 issue. You can read the correct version online at magazine.wsu.edu/2019/11/01/power-of-language.

The WSU Holiday Bowl team of 1981, including 32 players, four coaches, and the head trainer, gathered on the shores of Lake Coeur d’Alene last August for a weekend of rekindled relationships, as they reminisced on an incredible season that sparked an era of football excellence at WSU. Courtesy Jean Sloan

Change your world

Yoni Rodriguez saw environmental problems up close when he was exposed to pesticides as a teenager.

The WSU biochemistry student—first in his family to go to college—helped develop air quality sensors and a low-cost air filtration system to screen wildfire smoke pollutants. Changing the world is the Cougar way.

wsu.edu
The legalization of recreational cannabis in Washington state and Colorado in 2012 opened a box full of questions and debates about the drug and its related crop, hemp.

What is the effect on youth? Will crime go up? How does cannabis interact with other drugs and medicines? What health claims are accurate? How does the potency of cannabis affect mental health? These gaps, and many others, in our knowledge—combined with unverified claims by both proponents and opponents of legalized cannabis—make it difficult to find the best ways to regulate and manage the substance.

To answer the call, almost 100 Washington State University researchers have begun applying scientific rigor to explore the questions, clear up misconceptions and questionable claims, and help the state navigate the legalization of cannabis.

Michael McDonell, associate professor at the Elson S. Floyd College of Medicine, is chair of WSU’s Collaboration for Cannabis Policy, Research, and Outreach (CCPRO). He testified to the Commerce and Gaming Committee of the state House of Representatives last September that WSU is aiming to be “the nexus for cannabis scholarship, policy, outreach, and community engagement” in the state.

McDonell notes that WSU has four priority areas for CCPRO: health and well-being, public policy and safety, economics, and agricultural research. Some research has already borne fruit in these areas.

For example, on health issues, inhaled cannabis reduces self-reported headache and migraine severity by nearly half, according to a study led by Carrie Cuttler, assistant professor of psychology. The study, published online recently in the Journal of Pain, is the first to use big data from headache and migraine patients using cannabis in real time.

On public policy, a Department of Justice study completed by WSU criminal justice researchers, led by Professor Mary Stohr, showed that racial disparities in marijuana-related arrests continue even though marijuana arrests overall went down after legalization. African Americans are still twice as likely to get arrested as white offenders.

Still, much of the research is ongoing, from the economics of hemp, to banking, taxation, and the genomic characteristics of cannabis. For example, Celestina Barbosa-Leiker in the College of Nursing leads a team that’s assessing better care for women who use cannabis during pregnancy and postpartum.

In the Department of Chemistry, Brian Clowers researches the trace detection of cannabinoids in order to develop a portable, sensitive instrument capable of assessing recent consumption of marijuana.

It’s not an easy area to research. WSU began by establishing its own policies in 2012, due to the federal status of cannabis as a Schedule 1 drug. As McDonell says, “When the initiative passed, we thought, ‘Woah, we better have rules around this.’”

Due to the need to stay in compliance with federal law, the University set up innovative collaborations with industry partners to support cannabis studies. The Puyallup Tribe, for instance, approached WSU to evaluate whether medicinal cannabis reduces opioid use and pain, and if it improves the physical and mental health of clients at the Tribe’s Qwibil Natural Healing and Research Center.

McDonell says WSU continues to engage with the state Liquor and Cannabis Board and other state agencies, and collaborates with the University of Washington on prevention research and practice to curb youth abuse of cannabis.

There’s a pressing need to answer the big cannabis questions in a definitive way, says McDonell, which will require financial commitment, focus, and more partnerships.

The following stories delve deeper into a few of those big questions, highlighting some WSU studies and providing some facts around cannabis use, to help us achieve clarity in this mostly unexplored area.
The sky isn’t falling

BY REBECCA PHILLIPS

“More than a few citizens held their breath when Washington legalized recreational cannabis in 2012. “There were many who believed it would trigger a massive increase in youth use and marijuana-related traffic collisions and fatalities,” says Clay Mosher, sociology professor at Washington State University Vancouver.

“But in the five years since sales began, those increases in youth use have not manifested, and while there have been some spikes in polydrug driving, they aren’t as significant as predicted.”

That hopeful trend is echoed by a recent retrospective on what the Washington legislature initially limited to 335. They also made personal cannabis cultivation a felony offense except for those with a medical marijuana card. To discourage corporate monopolies and Big Marijuana, Mosher says the legislature likewise prohibited vertical integration. “No one could hold all three licenses: producer, processor, and retail. You could hold two but not all three.”

Such protective barriers along with strict monitoring of producers have helped control the nascent cannabis industry as well as prevent black-market diversion. “There are lots of claims being made that may or may not be true and, in most cases, we don’t have the scientific evidence yet.”

At the same time, researchers have to go through many hoops to do a basic study—to see if the claims they are making are even valid. So, the public doesn’t have the balance of information they need to make an informed decision.”

McDonald is 1 of nearly 100 WSU researchers investigating cannabis since its legalization in Washington state opened the doors for wider study. “We are learning and responding as we go,” he says.

A child psychologist, McDonald works with adolescents who are developing serious mental health problems like schizophrenia, which typically begins in the teens or early twenties. He and other members of his team are evaluating a new program focused on first-episode psychosis called New Journeys. “We want to treat kids when they get their first symptoms of psychosis and are struggling to function—for example, hearing voices or seeing things that aren’t there,” he says. “Instead of waiting until they are hospitalized, jailed, or disabled, we try to intervene with the kids right away.”

Schizophrenia has long been anecdotal—linked with cannabis use and there is some evidence for a genetic predisposition and sensitivity to THC.

McDonald says studies show that smoking cannabis worsens symptoms in people with schizophrenia, but it can also lead to psychotic symptoms in those without the disease, especially when using the higher THC products. “It’s dose dependent,” he says. “The higher the THC dose you get, the worse your psychotic symptoms get.”

In contrast, early evidence suggests that cannabidiol or CBD might help counteract psychosis by regulating certain areas of the brain. In one study, children at high risk for developing psychosis and normal controls were given CBD. In all cases, subsequent brain scans showed the brain areas associated with psychosis were stabilized.

“The bottom line is that we need to fully understand the impacts of THC and CBD on mental health,” McDonald says. “The number of people using cannabis daily is steadily increasing, especially in those of college age.”

“In Washington dispensaries, you can buy cannabis products with a THC concentration of 70 percent or more. Using high-potency pot on a daily basis is likely to impair functioning in some way. Also, CBD oil is being promoted as a cure-all but it is not closely regulated by the FDA, so you really don’t know what you’re getting when you buy it.”

McDonald worries that people might turn to cannabis as a solution for mental health problems before they try more conventional treatments. “We have a lot of great evidence-based interventions that work for anxiety and comorbid conditions—treatments that are actually effective.”
For anxiety, the evidence is mixed. “In small doses, THC can reduce anxiety but in high doses, it can increase anxiety or even trigger a panic attack and paranoia,” she says. “So, short-term use might be beneficial but not for the long term.”

“If you don’t treat the root cause, the symptoms will keep coming back when the high wears off, and people can become dependent on cannabis,” Cuttler cautions. “It’s much better to seek proper treatment from a mental health professional, don’t have side effects.”

Cuttler reports that it is also very common for people to self-medicate depression with cannabis. Using her Strainprint app, she found that many patients reported a 50 percent reduction in depression symptoms right after cannabis use.

“The problem, however, was the longer they used cannabis to treat depression, the worse their baseline symptoms became over time,” she says. “Again, like a wound festering under the Band-Aid, short-term use may help but long-term could exacerbate symptoms.”

Cuttler says regular cannabis use can interfere with the body’s natural endocannabinoid system, which has a wide range of functions including regulating pain, fear, appetite, stress response, and mood.

“We have THC-like substances in our brain called endocannabinoids that are produced as needed by the body,” she says. “Endocannabinoids contribute to the ‘runner’s high,’ for example.”

“One of the reasons we think medical cannabis has so many effects is because the endocannabinoid system is so pervasive throughout the body and brain. If that system becomes dysfunctional, it could leave people more vulnerable to depression and anxiety.”

“Scientists are now looking at ways to augment this natural system without the use of THC,” says Cuttler. “They hope to develop drugs that will prevent the breakdown of natural endocannabinoids in order to retain higher levels in the brain. They’re just starting clinical trials and it’s showing potential promise for treatment of conditions like PTSD.”

Hemp on the horizon

BY REBECCA PHILLIPS

Washington was one of the first states to legalize recreational cannabis, but it has some catching up to do when it comes to industrial hemp and the lucrative CBD oil market.

“We are actually the only state that legalized marijuana before we legalized hemp,” says Randy Fortenbery, economics professor and Thomas B. Mick Endowed Chair at Washington State University. “It took two legislative sessions before we got it passed. Even under the 2014 Farm Bill, hemp had to be part of a scientific experiment affiliated either with a land-grant university or the Washington State Department of Agriculture.”

With the passage of the 2018 Farm Bill, however, the federal government finally removed hemp from the illicit substance list, effectively ending an 80-year prohibition against its cultivation. States are now free to set up their own commercial hemp management systems, including regulations to assure it isn’t being used to disguise marijuana fields.

Last April, Governor Jay Inslee signed further legislation allowing Washington farmers, including WSU researchers, to buy hemp seeds without federal approval. The bill also eliminated a four-mile buffer zone between hemp and marijuana fields—meant to prevent cross-pollination—that had previously kept much of the state off-limits to hemp growers.

As one of the earliest domesticated plants, hemp has provided benefits to humans for 10,000 years. Before fears of “reefer madness” led the U.S. government to shut down production with the Marihuana Tax Act of 1937, hemp was prized for its fiber, seeds, oil, and wide array of byproducts ranging from clothing, rope, and cosmetics, to paper and fuel. The plant’s checkerboard history is mainly due to its similarity to marijuana.

According to Fortenbery, both hemp and marijuana belong to the genus Cannabis and are typically of the varieties C. sativa or C. indica. Depending on growing conditions,
either of these varieties can produce high levels of THC, or tetrahydrocannabinol, the psychoactive chemical that creates a high.

It’s the concentration of THC in a cannabis plant that determines whether it’s called hemp or marijuana. A plant containing more than 0.3 percent THC is considered to be marijuana, a Schedule I federally controlled substance under the U.S. Drug Enforcement Administration. Cannabis plants with 0.3 percent THC or less are classified as hemp.

“When both plants are growing in the wild, you can’t tell them apart,” says Fortenbery. “But you can tell the fields apart. It’s the size of the plants and the size of the farm that differentiate whether cannabis is being grown as industrial hemp or marijuana.

“If I’m growing for marijuana, I will maximize production of leaves, flowers, and buds, the parts of the plant with the largest concentrations of THC,” he says. “For industrial hemp, I’ll grow for the stalk and seeds.

As a result, marijuana plants are generally kept short and bushy. They are also spaced farther apart in rows than industrial hemp plants, which are grown close together to increase height and discourage flowering.”

Fortenbery says another physiochemical called cannabidiol or CBD is also present in plants, which are grown close together to increase height and discourage flowering. “To be honest, the most difficult part of the process was getting the $300 permit,” he says. “It took four months, so it was relatively late by the time we planted our experimental plot in mid-June.”

The cost of hemp seed was another surprise—high CBD varieties run one to three dollars per seed. Working on a budget, Waters decided to grow the fiber type hemp instead, which cost $100 for a 50-pound bag from Canada.

“Hemp grows very fast,” he says. “When we harvested the plots in August, the average height was four feet tall. I was concerned about our late start, but we got the experimental establishment, herbicides applied, and the data we needed. “I think we learned a lot,” says Waters. “Next time, we might try feminized seed like commercial CBD growers use. We had both male and female seed this time but the male plants aged out much faster than the females, which stayed green and vigorous longer.”

As for the future, Waters and Fortenbery agree there are potential markets for hemp in Washington, but it will depend on supply and demand, the value of CBD oil, and how much is produced in other more established areas.

“Hemp will certainly grow here,” Fortenbery says. “The question is, can we be competitive? That will depend on the varieties we develop that take advantage of our local environmental characteristics.

“And, despite all the excitement about CBD oil and its possible uses, a lot of medical research hasn’t been done,” he says. “The size of that total market is uncertain as we don’t yet know CBD oil’s true functionality in the health-care system.

“The cosmetic and food markets are also very high-end and high-price markets but too much production could overprice those markets and trigger a price collapse.

“So, there’s still a lot of uncertainty on where this hemp market goes longer term.”

I’m a sucker for trying new things. I’m always interested,” he says. “There are lots of challenges with growing new crops—figuring out how to water them, how to plant, where to get the seed, and how much fertilizer they need.”

Waters’s first project was identifying herdbides that could be safely used for hemp fields. He worked in collaboration with WSU professor and weed scientist Ian Burke.

“Initially, there’s an inverse relationship between CBD and THC mize CBD concentration in a plant, it results in less THC. So, once it looked like industrial hemp was going to be legalized nationally, we started to focus on hemp as the main crop. Horticulturists and farmers are interested in maximizing CBD while minimizing THC to pass quality control tests.”

National markets and trigger a price collapse. The farming industry, the researchers say, has no idea of that total market is uncertain as we don’t yet know CBD oil’s true functionality in the health-care system.

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A rare solution

BY BRIAN CHARLES CLARK

“The thing about rare earths is that they’re not actually rare—but they might as well be,” says Aaron Feaver, director of JCDREAM, the Joint Center for Deployment and Research in Earth-Abundant Materials at Washington State University.

Along with critical elements such as cobalt, lithium, and indium, rare earth elements are essential to our smart device-rich lives. But those devices come at a cost.

“Rare earth elements aren’t concentrated enough to be easy to mine,” Feaver says. “They have similarities in electronic structure, making them very useful but also very difficult to differentiate from each other and hence extract. You end up with a mixture of a whole bunch of rare earth elements and have to use a solvent laden energy and waste-intensive processes to separate them.”

That’s why, Feaver says, a bipartisan group of Washington legislators sponsored a mini-bill that created JCDREAM in 2015. Using seed grants and larger capital investments, JCDREAM’s goal is “to accelerate the development of next generation materials for clean energy and transportation technologies in Washington.” Feaver says that, as far as he knows, JCDREAM is unique. Washington is the first state looking to ensure an economically stable and environmentally sustainable high-tech future through research on earth abundant alternatives for critical materials and rare earths.

Critical materials pop up everywhere, from computer memory and catalytic converters to fluorescent lights and cell phones. Rare earth mining and processing is dominated by China and is used as leverage against the United States in ongoing trade disputes. As for cobalt, Feaver says, “We used to talk about having to stop at the gas station to get blood because we had blood banks.” Cobalt is used in the cathodes of phone batteries. Children mine the metal in the Democratic Republic of Congo (DRC). MINERS reduce ores of copper and nickel by hand to get to the cobalt. They inhale toxic dust so thick they can asphyxiate in the 100-meter-deep pit mines.

Cobalt is also a component in batteries of portable electronics and electric vehicles. A major source of lithium is the Atacama Desert in the Andes, where mining threatens the water supply of farmers and flamingoes.

This is no way to run a stable and sustainable global economy, dependent on metals mined under dubious circumstances. Huge spikes in, for instance, the price of cobalt in recent years have manufacturers jittery while uncertain relationships with key mineral suppliers, like China and the DRC, only add to the unease.

The keys to stability, Feaver says, include finding earth-abundant replacements for some of these materials, as well as upscaled recycling efforts and simply using less of a critical material to begin with. Feaver says that “a clean-energy transformation is coming.” He points to a couple of on a sustainable supply chain of materials that are not focused on critical elements.”

Holding up an iPhone, Feaver says it’s a “microcosm of the technologies being used to deploy clean energy and green transportation infrastructure.”

Take the touch screen, for instance, which is coated with a very thin layer of ITO, indium tin oxide. While indium isn’t exactly rare, it is a byproduct of other forms of mining and, like other critical materials, China is a major supplier. Using funds from JCDREAM, researchers at the University of Washington developed the first ink-jet printer capable of printing a sub-micro copper grid that can replace ITO in touch screens. The grid is not only more transparent but also more conductive. And copper is fairly abundant, with major deposits scattered around the globe, including the United States. 3D printing metal offers some intriguing possibilities for reducing use of materials. Feaver explains that most metal parts are sold at the other to protect it from corrosion. You still might use two critical materials in the end but you’d use much less as you print a part layer by layer instead of tooling away the unwanted material from an ingot. Recycling could reduce the use of critical materials, too. Feaver says American Magazine News has developed a process to recycle batteries, resulting in a product that “battery manufacturers can drop right into their supply chain.” That technology is currently being scaled up for commercial use.

Before coming to WSU, Feaver researched and developed the use of highly abundant carbon and silicon for use in batteries. Both technologies were spun off as successful companies.

And storage—whether in batteries or some other technology—is the big challenge in getting renewable energy on the grid reliably. Solar may be cheap to deploy, but the sun isn’t always shining, early in the morning and in the evening. And once the grid gets to about 40 percent renewable, he says, it becomes unstable.

Our grid storage capacity is a fraction of what we use every day, Feaver says. With our current petroleum-based energy economy, “we don’t need storage, we just turn on turbines when we need more electricity.” These turbines might burn non-renewable natural gas or be powered by water, although hydropower also has serious environmental costs.

Your storage is the pile of coal, the natural gas supply, or the gas tank—the energy is stored as chemical energy. And fossil fuels are very efficient, which is why it is hard to compete with the energy density of gasoline.

But energy density is not destiny. JCDREAM is funding projects at WSU Pullman and elsewhere that Feaver describes as “phantom battery research.” Substituting earth-abundant materials for conflict-critical ones might mean an individual battery doesn’t carry as much energy but its production is less fraught with environmental and social concerns and is easier to recycle.

Stones unturned

BY SIDDHARTH VODNALA ’19 MS

Growing up in a small mining community in Michigan, Travis Olds descended from a family where mining was the livelihood for many generations.

As a boy, Olds was fascinated by the rocks and crystals that his dad would bring home in his lunch pail from the mines. He spent hours hunting for rare and striking specimens.

“I became obsessed with digging for strange and pretty crystals, and Michigan’s Upper Peninsula is a great place for a fossil-hunting collector because there are hundreds of mines there,” he says.

As a postdoctoral scholar at Washington State University, Olds built a career from his childhood love of finding unusual minerals. He discovered and named 13 new minerals, many of which contain uranium. He’s hunted underground for them all over the world from the Czech Republic to the deserts of Southern Utah, and even the drawers of very old mineral collections, where sometimes new minerals can be found hidden away.

If Olds suspects that he has found a previously unknown mineral, he tries to isolate a pure crystal of it and determine the structure. If the structure matches that of any previously known mineral, then it is “new,” and can be given a unique name. A commission at the International Mineralogical Association then votes on the name and soundness of the classification.

Olds has named minerals he discovered after the physicist Richard Feynman—feynminite—and for the unique paddle wheels found in the structure of paddlewheelerite. He also named the mineral redcanyonite after Red Canyon in Utah, the site of an ancient ocean where Olds and his colleagues have made multiple mineral discoveries.

Olds also worked with John McCoy, a professor in the School of Mechanical and Materials Engineering, looking at ways to safely store and dispose of nuclear waste.
From recycled materials, really

The world is full of garbage. Some of it is reusable. Let’s make athletic gear out of it.

Jeff Bradbury (‘88 Hosp. Busi. Mgmt.) didn’t come to this conclusion in an instant. It took a lifetime of hiking and snowboarding in his native Pacific Northwest, playing beach volleyball, traveling the world with a backpack, and meeting innovators in Asia and Europe to make the connections. He became a designer of eco-friendly textiles and apparel, specializing in outerwear and technical clothing for athletes and fitness buffs.


In 2016, he and his daughter, Brooklyn Gould-Bradbury, a collegiate volleyball player, and their friend, Allison Wood, started Five12 Apparel, named for the I-526 Highway between Tacoma and Puyallup. Now based in Sumner, Washington State, in his native Pacific Northwest, playing beach volleyball, traveling the world with a backpack, and meeting innovators in Asia and Europe to make the connections. He became a designer of eco-friendly textiles and apparel, specializing in outerwear and technical clothing for athletes and fitness buffs.

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BAM! The Black Arts Movement in Chicago

When Earth, Wind and Fire’s Maurice White took to the stage playing an electric kalimba in the 1970s, he was drawing on a deep well of inspiration. The iconic African instrument, sometimes called a thumb piano, had first been electrified in the 1950s by Phil Cohran, a pioneering musician who called his kalimba a “frankiphone.”

Cohran left the Arkestra to return to Chicago, where he founded the Arkestra to keep viewers riveted and hungry to learn more about a period of American history that birthed a rich aesthetic based on Black American experience. The Black Arts Movement (BAM) of the 1960s laid foundations, says Lewis, for the funk of Parliament/Funkadelic and Kool & The Gang, the soul of Earth, Wind and Fire, and contemporary styles like hip-hop (which is based on the collaborative aesthetic of sampling) and the Afrofuturism of Boots Riley and contemporary science fiction.

BAM! The Black Arts Movement is the subject of a film by two Washington State University Vancouver associate professors of English, Thabiti Lewis and Pavithra Narayanan. The 55-minute documentary took four years to make. It’s a quick-cut style that keeps viewers riveted and hungry to learn about what other Black people were experimenting with, Brocks, and other Black poets, fearlessly experimented with the rhythms and syntax of language, bringing legitimacy and a heightened aesthetic to Black Vernacular English.

Lewis says of his undergraduate years, when I had the chance to read BAM writers, I did so on my own. Lewis says, a lot of institutions that continue to thrive in Chicago and other cities. Schools and museums that touch and celebrate African heritage inspire young Chicagoans to this day. Haki Madhubuti founded Third World Press as not only a publishing house, but a workshop for aspiring writers. Muralists democratized art by painting, among others, a Wall of Respect which beautified a neighborhood and “not just an elite gallery.”

John Johnson, the owner/publisher of Jet and Ebony, teamed up with Hoyt Fuller to publish Black World, a journal that pushed Black writers to think deeply, read widely, and argue. Lewis says the foundations for Black studies and other ethnic studies programs taught in universities around the world. With such vast contributions to American culture, it’s no wonder Lewis and Narayanan are pushing ahead with a book-length account of the movement. Based in part on his own expertise, on the interviews he and Narayanan conducted for their documentary, as well as on contributions by other collaborators, Lewis aims to show that Chicago was a “matrix, an intellectual and cultural center” that was “an infectious source” of spiritual and revolutionary inspiration for multiple generations of Americans of all colors.

Clayburne, from top: Timo Queen, 1971, Wadsworth Atheneum Museum of Art, courtesy of the artist; Thabiti Lewis; (Photo courtesy WSU CAS)

THE WINNINGEST TEAM in WSU women’s soccer history climbed onto a plane to San Jose in the first week of December, but not for a vacation. They were bound for the first time to the College Cup, a contest of the top four college soccer teams in the country, to face top-seeded North Carolina.

The unprecedented road to the College Cup was filled with breakout seasons for several Cougar players, new records, and a lot of mojo. Coach Todd Schlenker’s team finished the regular season 12–4–1 overall. The team headed into the postseason for the third-straight season and eighth time in nine years after being selected for an at-large bid to the 2019 NCAA Tournament in November. They faced a tough challenge right away versus the Memphis Tigers. The Cougars hit their tournament stride when Maksamae Gomera-Stevens, with an assist from Anevia Collins, knocked it just inside the post for a 1–0 win over Memphis.

In the second round of the tournament, WSU grabbed the biggest upset in program history, defeating top seed Virginia, 3–2, in a high-scoring match. The momentum carried into the third round, where the Cougars notched another shutout with 3–0 against West Virginia. The Elite Eight saw a staunch defensive battle against number two seed South Carolina, ending 1–0 in overtime when defender Mykia Minniss nailed it to the back of the goal.

With that strike, Minniss became the twelfth Cougar to score on the year and the tenth to score a game-winner. It was a team effort all season, and Minniss was one of many players who stood out. Star forward and All-American senior Morgan Weaver tied a single-game record with four goals against Colorado in the home regular season finale. For her career, Weaver hit 43 goals—second most in Cougar history—after recording a personal-best 11 goals in 2019. Senior goalkeeper Ella Dederick extended her program record with 53 career wins while picking up 29 career shutouts.

Junior midfielder Gomera-Stevens also stepped up in crunch time. The native Hawaiian scored four of her team-best five game-winning goals against top teams, including two in the NCAA tournament. The Cougars couldn’t keep the magic going when they faced top team North Carolina in the College Cup. Although they lost 2–1 against the TarHeels, nothing would erase the greatest season in WSU soccer history. The team’s season ended there, but Weaver and Gomera-Stevens joined the senior U.S. national team camp in Bradenton, Florida, while Minniss played in the 2019 Nike International Friendlies with the U-20 team in Lakewood Ranch, Florida. Weaver and Gomera-Stevens became the first Cougars to be called into camp with the top team in the United States.

One kickin’ season

BY LARRY CLARK

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Whatever you do, don’t touch them. Stinging nettles will give you a painful, poison-ivy-like rash. Instead, consider eating this moisture-loving weed. Rich in vitamin A, calcium, fiber, and more, stinging nettles, or Urtica dioica, are actually very good for you—as long as you don’t directly handle them while they’re uncooked.

Nettles are among the first wild leafy greens of spring. And they grow in abundance in the Pacific Northwest, home to many wild edible greens—from dandelions to watercress. Be sure to wear gloves if you harvest nettles yourself. If you buy already-bagged nettles at a local farmers market, you can drop the contents right into a pot for simmering or boiling. Cooking destroys the toxic hairs with irritating chemicals on their leaves and stems. After that, you can treat nettles like cooked spinach. Purée them into soups or stew. Make nettle tea.

Like most wild spring greens, nettles are best early in the season—when they’re most tender and mild. “Later in the season, you don’t want to eat the older leaves,” says Jim Freed, an Olympia-based Washington State University regional extension specialist emeritus of special forest products. “They’re very bitter.” In general, wild greens “aren’t bland. They all have distinct flavors—everything from lemony to very bitter and earthy.”

Before retiring three years ago, Freed used horticultural techniques to help landowners manage forest plants and also developed agroforestry practices with indigenous people around the world. Today, he advises foragers to consider their location before collecting wild greens.

“I tell people not to pick cattails where people are walking,” Freed says. “Find a nice, fresh site somewhere, and go to where the newer growth is, the young shoots. Also, avoid ditches that might have agricultural run-off. You don’t want to pick watercress, for example, where there’s run-off from the road or pesticides or herbicides.”

Ken Mudge (’80 PhD Hort.), professor emeritus of horticulture at Cornell University’s School of Integrative Plant Science, Section of Horticulture, and co-author of Farming the Woods, cautions against over-harvesting. “Some collectors will go into an area and strip it clean. They will pick all the plants of a particular species, slowing down generations of that plant in that area for years and years. Someone who has respect for the forest is going to harvest much less. You can really only pick five percent in a given area, in general, if you expect the plant population to be stable.”

Wild spring greens don’t keep long and handled and shipped. These, once you pick them, often within a couple hours they don’t look very palatable.”

Watercress, or Nasturtium officinale, is often associated with high tea and crustless sandwichs. Don’t let its dainty leaves fool you; they pack a peppery punch. They’re also rich in vitamins A, C, and K. Look for watercress near ponds, shallow lakes, and slow-moving streams—and bring a zip-top bag. Freed suggests placing freshly cut stems in three or four ounces of water while continuing to forage. “They will last longer that way,” he says.

Miner’s lettuce, or Claytonia perfoliata, is as pretty as it is nutritious. A slender stem in the center of each leaf supports a sprout of small, white flowers. Packed with vitamins A and C as well as iron, miner’s lettuce grows in abundance in California where it helped Forty-Niners stave off scurvy during the Gold Rush. It can also be found along mountain streams and moist, weedy spots on either side of the Cascade Range. You’ll find it growing under trees in the northeast corner of the state, where Idaho and Washington and Canada come together,” Freed says. “If you get it before it starts to bloom, there’s no bitterness to it; it’s almost lemony. It makes a fantastic salad mix with spring greens.”

The tightly furled tops of young ferns, or fiddleheads, also look pretty on a plate. These whimsical spirals offer a grassy flavor, sort of like green beans. While they’re a good source of omega-3 and omega-6 fatty acids and are high in fiber and iron, certain types—such as the ostrich fern, or Matteuccia struthiopteris—have caused gastrointestinal illness when not fully cooked. Blanch them before sautéing, stir-frying, or roasting with lemon and garlic or mushrooms. Serve them with creamy hollandaise sauce.” I treat it like asparagus,” Freed says.

Deeply rooted dandelions are one of a lawn-keeper’s biggest blights. Why fight them when you can eat them? Healthful and readily available—in some yards more than others—dandelions, or Taraxacum, are packed with nutrients. They’re rich in vitamins A, C, and K and are also good sources of calcium, iron, potassium, magnesium, and fiber. The leaves are spicy, reminiscent of arugula or mustard greens, and can be used in soups, salads, pesto, and pasta, or wilted with other greens. Their yellow blossoms brighten salad ads and can also be steeped into tea, baked into cookies, fermented into wine, or dipped into light beer batter, then fried to make fritters. Just don’t harvest them, Freed advises, from lawns or fields that have been treated with chemical fertilizer, pesticides, or weed killers.

Purslane, or Portulaca oleracea, is so hardy it can be found growing in cracks in sidewalks. Its stalks and fleshy leaves, reminiscent of a young jade plant, are packed with omega-3 fatty acids and vitamin A and C. Verdesegui in Spanish, purslane is commonly paired with pork in Mexico, where it also often complements salsa, stews, salads, and soups. Raw purslane provides a crunchy, lemony tartness. Cooked, it makes a simple side. Sauté it with garlic, olive oil, salt, and pepper, and finish it with a splash of fresh citrus.

Cattails, or Typha latifolia, grow where it’s wet—near ponds, marshes, lakes, rivers—and can help you survive in the wilderness. Dry stalks can be used to build a fire as well as shelter. The cigar-shaped heads can be used as torches. Parts of the plant are palatable, too. Just be sure to peel away the older plant material, “or it’s like eating cardboard,” Freed says.

The insides of fresh shoots can be sanitized and tossed with pasta or rice and other vegetables, or added to a stir-fry, pickled, or put into soups. While they’re still young and green, their corm-like flowers can be cooked for a sort of mushy version of corn on the cob. Their chlorenchyma can be processed into flour or roasted like a potato.” They take on the flavor of the soil in the area where they grow, and they grow in highly organic material. I always wash and scrape them before roasting them. Don’t leave any dirt on them,” Freed warns. “They’ll taste like rotten mud.”

Of course, he notes, “if you add the stuff to it” —“butter, salt, pepper, WSU Everything Seasoning—"it all tastes good." ⋆
Visit any construction site, whether it's a house or a 50-story skyscraper, and it's easy to marvel as a structure arises from the earth. But look back at the ground level. Piles or bins of wood pieces, asphalt shingles, bricks, concrete, and drywall wait to be moved to a landfill or recycled. The amount of waste is even more pronounced at demolition sites.

Landfills are getting clogged with all that debris, with additional difficulty to recycle drywall,” says Miyasaka. “That amount is huge — about three-quarters of all the drywall waste. So, you have contractors who don’t have a choice but to dump the drywall waste from demolition at about three times what they’d be paying if a recycler would take it,” Drake says.

“Now there’s no use for drywall waste from demolition, which is about three-quarters of all the drywall waste. So, you have contractors who don’t have a choice but to dump the drywall waste from demolition at about three times what they’d be paying if a recycler would take it,” Drake says.

“Drywall manufacturers want pure gypsum so there’s some difficulty to recycle drywall,” says Miyasaka.

Architecture Professor Taigi Miyasaka and David Drake, Fabrication Labs manager and adjunct professor in the School of Design and Construction, took a look at one common type of waste—gypsum drywall—and developed a way to convert it into a construction block.

Drywall, also called sheetrock or wallboard, covers walls and ceilings in many buildings, especially in North America. It makes up nearly 10 percent of unrecycled construction waste, with as much as 10 million tons going to landfills in the United States each year.

“When we started looking at this, we found a number of recent papers by people who were sort of working with drywall waste,” Drake says. “This seemed to indicate, ‘Okay this is not crazy, this is something that is really a problem.’ But, at the same time, it’s hardly something that’s saturated in terms of research. So, right place at the right time, I suppose.”

Miyasaka nods. “I knew that gypsum has been a problem, but I didn’t know a lot of information,” he says. “So, we talked about it and David said, ‘Well, in South America, people make adobe blocks’.”

Drake says their drywall waste block reimagines compressed earth blocks developed in Central and South America back in the 1950s. However, unlike earth-building traditions, drywall waste blocks divert waste from landfills instead of excavating soil, and are higher performance blocks better suited to colder climates.

The WSU drywall block experiment began in the basement of a building on the edge of the Pullman campus, where Drake and Miyasaka show off their simple, yet elegant, process in what looks like a converted truck bay. At first, they adapted surplus equipment or Drake welded it himself. With additional funding, they’ve been able to design custom machinery fabricated by the Villand College of Engineering and Architecturer’s tech shops.

Using gypsum drywall waste from projects such as the new plant sciences building at WSU Pullman, they grind up everything in a hammer mill, which Drake compares to a leaf shredder. “One of the things about our process, which is different from every other process we know of for recycling drywall waste, is we don’t separate the gypsum core from the paper. We grind it all up together, and paper facing and backing layers are incorporated into the blocks. It’s giving us a fair amount of strength from the paper fibers reinforcing it, and we believe that’s also part of what’s giving us the high insulating value,” Drake says.

“It doesn’t discriminate between types of wallboard either, alleviating the need for sorting.”

The ground-up material drops into a barrel and then to a surplus USDA seed coater to receive a minimal amount of water. The damp material is combined with a binder—waste slag from blast furnaces—and moved to a press. Miyasaka and Drake are on their third-generation block press. “The first one was made out of wood, and took about 15 minutes to make a block. I think we managed to make about 50 blocks or so on the wood press before it completely broke apart,” recalls Drake.

The latest press runs off a hydraulic power unit and makes about a block a minute. Drake estimates that, with automation, it could make up to six blocks a minute.

Miyasaka points to a pallet of blocks covered in plastic, where the drywall waste blocks (DWB) cure for 28 days. They have also successfully tested a low-pressure steam process used by the concrete block industry, which reduces curing time to 24 hours. The result: a masonry block that looks very similar to a concrete or cinder block, but lighter. It has high insulation value and slightly less compressive strength than concrete blocks. It can accept fasteners such as screws and nails, be cut with ordinary woodworking tools, and absorbs dyes and color similar to concrete.

The process is really simple, says Drake and Miyasaka, and for on-site production, all of the equipment will fit on the back of a pickup or a flatbed trailer.

“We’re trying to compete with concrete blocks that sell for a buck at Home Depot,” Drake says. They also built a hotbox testing apparatus, essentially a wood box divided in half by a wall of their drywall waste blocks, to simulate an interior room on one side and the outdoors on the other. They keep one “indoor” side at ambient temperature and cool the “exterior,” in order to measure the insulating value of the blocks.

Students in mechanical engineering faculty Rolan Chen and Chuck Pezeshki’s capstone class designed the cooling system.

Another group of mechanical engineering students designed a hopper for the future automated block presses.

“The tests were positive. ‘These are about half the density of a concrete block, and ten
times the insulation value,” says Drake. “We think that a commercial building, for example, nonresidential, you might be able to avoid additional insulation completely. We expect the blocks to be highly fire resistant and have good acoustic performance.”

Says Miyasaka, “I was surprised we were able to make a block which performs quite well.”

Drake nods. “It’s one of those few times that it was a good idea and no one ever really had it before.”

BLOCk OF SUPPORT

Others soon began to take notice of the DWB. In 2018, the researchers received an Amazon Catalyst grant, which encourages people to find innovative solutions to real-world problems. In addition to the grant, WSU’s Office of Commercialization connected Miyasaka and Drake with industry contacts interested in their product. In fact, as early as 2012, Seattle’s Great Northwestern Urban Forests Foundation signed on to serve as a public supporter of the block.

In 2019, Miyasaka and Drake were awarded a National Science Foundation’s R & D award, which recognizes innovation engineering, though, their funding is really for R & D and received Commercialization Gap Fund to solve an industry need,” says Miyasaka. “Our future architects and engineers will need skills in the design and construction with mass timber as well as University of Idaho students, are working with Katerra on a studio design experience. “What drove interest in it was the possibility of helping to spur rural economic development and to mitigate wildfire risk by reducing fuel loads in the national forest.”

For more than a half century, CMEC has conducted research in wood and composite materials that have changed industries and economies in the state and country. They began working with mass timber materials and received Commercialization Gap Fund support through WSU. They also garnered some initial funding from the American Institute of Architects.

Drake says that by the standards of engineering, though, their funding is really modest at just around $100,000. Last July, the drywall waste blocks received an American Institute of Architects R & D award, which recognizes innovation in architectural technology. The award was announced in Architect Magazine and is one of eight awarded nationally.

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Craig Curtis (’83 Arch., ’84 Const. Mgmt.), one of the other jurors for the award, told Architect Magazine that the project compares to “the introduction of fly ash into concrete, which now is commonplace. I honestly think this could become a commodity product.”

While discussions are still ongoing, the blocks could soon have niche uses, such as patio pavers, planters, or landscape walls. It’ll take more testing, possibly over a decade, to receive certification to use the drywall waste blocks as load-bearing walls.

NOT JUST A BLOCK

Miyasaka and Drake aren’t waiting around for 10 years. They’re already thinking about other possibilities for drywall waste.

Back in the lab, on a worktable next to shelves full of DWB samples, a cross-section of a wall shows the thick plastic foam that serves as a common building insulation. Drake notes that the plastic product works well on many levels: high R-value for insulating, fairly inexpensive, doesn’t absorb water, and fairly easy to install. However, even if you add fire retardants, it’s still flammable.

In a building fire, like the horrific 2017 Grenfell Tower fire in London, the foam insulation is one-inch thick, made from next to the wall model. It’s an insulating foam, but the drywall waste panel serves as a common building insulation. Drake notes that the plastic product works well on many levels: high R-value for insulating, fairly inexpensive, doesn’t absorb water, and fairly easy to install. However, even if you add fire retardants, it’s still flammable.

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The ascent of using CLT

Small-diameter or diseased timber thinned from forests improve forest health and reduce fire risk.

Low-quality boards from that timber compressed and glued into layers make CROSS-LAMINATED TIMBER (CLT), also called mass timber, a building product developed in Austria in the 1990s.

When glued together, CLT is comparable in strength to steel and concrete.

It also requires much less energy to manufacture and transport than steel or concrete.

CLT is a carbon sink. Instead of having the wood degrade or burn in the forest, using it for buildings locks up carbon that contributes to climate change.

Due to its strength, CLT can be used for the structural components of a building.

Researchers assessed the material’s seismic performance, an important consideration for buildings in the Pacific Northwest.

The roof of Pullman’s Brelsford WSU Visitor Center, opened in 2013, is made of CLT — the first university building to use the material in the United States.

PACCAR Environmental Technology Building at WSU Pullman, built in 2016, also includes CLT.

In 2018, Washington became the first state to allow structural use of mass timber in buildings as tall as 18 stories.
Cultural constraints and biases keep women and people of color from entering and remaining in science, technology, engineering, and math. Washington State University and other national universities are working to increase the participation of these underrepresented minorities.
A. SCIENTIST

IT STARTS EARLY

Kelton collects representations of mathematicians in the media. "There’s a long tradition of thinking about math as a transcendental disembodied thing that’s up there," she says, gesturing vaguely. "It’s a separate metaphysical entity."

For Kelton, a contributing problem is that our education system is still largely premised on mind-body dualism, the idea that mental phenomena are not physical nor influenced by the body. In fact, through, the motor system affects the way our brains work just as our brains influence how our bodies work. The mind is in the body, not a separate metaphysical entity.

There’s a long tradition of thinking about math as a transcendental disembodied thing that’s up there," she says, gesturing vaguely. "And there’s quite a few pedagogical problems with that. It’s a setup for learners’ failure, because it’s this thing you can’t access.”

As a doctoral student, Kelton led a couple projects that aimed to demonstrate that moving away from a purely math-centric approach to teaching math is also a viable way of teaching kids to enjoy math. In Math Moves, she and her collaborators set up several interactive museum exhibits that got kids (and their adult companions) to experience ratio and proportion by using objects in the real world. In one, the kids stand in front of a bright light that projects her shadow on a grid on a big wall. As she moves, she begins to detect the pattern or inverse proportion that determines the size of her shadow. Kids had fun while doing math, running around becoming shadow全国人大

Another project was Taping Shape, an interactive exhibit staged at the Fleet Science Center in San Diego. Taping Shape was a huge sculpture made, Kelton says, “out of a humble material,” packing tape. “By design, you could walk around the inside of math objects,” like a torus, a donut-shaped object that fascinates geometers. “We strapped head cams on families and studied the video, where we found a lot of really rich engagement. Part of the intent of that is to be more inclusive. Everyone has a body, even if they are differently enabled.”

Indeed, cognitive neuroscientist Gina Rippon, writes in her recent book, Gender and the Brain, that there’s plenty of research to show that children’s gender-segregated activities account for many of the differences we see between boys and girls. Boys use computers more, and play more video games, research has demonstrated, and such play is male stereotypically, and girls, predominantly female stereotypically. In fact, means that you have much greater experience of constructing things or manipulating complex 3D representations (there is an uncanny similarity between the images used in mental rotation tasks and LEGO instructions), it is very likely that that will show up in your brain. Brains reflect the lives they have loved, not just the sex of their owners. And in a separate meta-study it is even more likely that that will show up in your brain. Brains reflect the lives they have loved, not just the sex of their owners. 3D representations (there is an uncanny similarity between the images used in mental rotation tasks and LEGO instructions), it is very likely that that will show up in your brain. Brains reflect the lives they have loved, not just the sex of their owners. But, she adds, “we’re in the bottom five in the country of students who go to post-secondary education. These folk are not going to be able to compete for all the jobs that are available” in the state, meaning em-

There are other: John Nash, white, a genius, and mentally ill in A Beautiful Mind. Or Luke Hidden Figures, which features three African-American women mathematicians who helped put the first astronauts into space. While Hidden Figures was lauded for advancing the visibility of women of color in science, Kelton was damaged to hear an interview with one of the Black actors who said he had to learn a new vocabulary to be able to play the part of a mathematician. Then there’s Beyoncé’s song "Lemonade," which has the line "I don’t know much about algebra." It’s normal in our culture to be averse to math,” Kelton says. “That’s what people see and hear in the media.”

Like Beyoncé, Kelton says that children develop “discipline-specific identities from a very young age. They say, ‘I’m not a math person,’ or ‘I love science.’" She’s interested in getting the anti-science kids to see the world a little differently. “Often we find that there are kids who have anti-science identities but feel very connected to particular arts practices.”

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She says there’s a growing body of evidence that thinking is always embodied. “There’s hard-to-sea-but nevertheless measurable motor engagement when people think about algebra equations.”

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Kelton says the arts are a tool to engage learners in STEM. By disrupting assumptions about science and math perceptions, STEM studies become more playful and creative. Together with WSU entomologist and artist Job Owens and colleagues in WSU Extension, Kelton has a National Institutes of Health grant to bring science to historically underrepresented and non-dominant communities. "If you’re a lawyer or a doctor,” Knack adds, “you know helped that client or patient. Engineers probably save more lives, though, by bringing in fresh water, and so forth.” But the United States doesn’t need roads to make a community accessible to the rest of the world, nor do we have especially pressing water distribution issues, potentially making engineering less appealing to women. Jones, who talks to many professionals to understand their recruitment and retention concerns, says that, “men and women approach STEM differently at times. I was talking to an engineering professor who observed that women want to think in terms of ‘How will what I’m doing affect my community and my fellow humans? A lot of times}

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Learning—focusing “on creating new inroads into STEM,” Kelton says. “The communities we work with are differentially impacted by West Nile Virus; they have higher rates of infection because they are a labor force in agriculture. We are concerned about health outcomes and STEM careers in biomedicine,” and empowering communities to take more direct control of their health care needs by bringing more underrepresented people into the field.

Just as Latinx ag workers are disproportionately affected by ag-related health issues, so too are they more in need of teaching strategies that let them see themselves in STEM as doctors, engineers, and microbiologists. Kelton’s HEAL project teaches kids to think holistically about, for instance, the gut microbiome.

“With the human microbiome, we don’t just want them to understand microbes and how they work but also how they are connected to human health and all the pathways to that,” she says. Not only do learners get a better sense of the complexity of an issue but they also learn that there are multiple career paths that might enable them to address that issue.

“We’re very careful to not use elitist forms of art. We do comic books with kids, for example. That helps kids find another pathway into science. And then there’s an epiphany: ‘I can use art to engage books with kids, for example. That helps kids find another pathway into science. And then there’s an epiphany: ‘I can use art to engage them to address that issue.’

Whether students take up a career in STEM, or “simply develop a lifelong interest and sense of empowerment in science and math,” the long-term goal is greater engagement. “Shorter term, we are thinking about complex scientific systems.”

WOMEN SEEKING BALANCE

Claiborn and Kmec are both tackling the issue of how to recruit and retain women and underrepresented groups in STEM. Claiborn has an NSF grant to investigate student engagement, retention, and success among undergraduate engineering students, including women and underrepresented minorities at the undergraduate education level. Working with Olusola Adesope, a WSU professor of educational psychology, and an engineering education professor at Utah State University, they’re hoping to learn why students leave engineering programs—and what might be done to keep them engaged. They are especially interested in retaining women and members of underrepresented groups.

Meanwhile, Kmec and her colleagues have been working on a long-term study of female engineers in predominantly Muslim countries.

Kmec and her collaborators, in their cross-cultural study of engineering education and practice, points out that in the United States there are more “off-ramps: If you fail at math once, that’s it. ‘Tis not good enough.’ And it happens early, before junior high.” She contrasts this with Malaysia, Tunisia, and other countries where women work as engineers at a much higher proportion. “In Malaysia, there is no expressed conflict between being female and an engineer. The two identities can exist side by side without tension. Engineering aligned well with girls who love math and physics, and they were encouraged to do so from a young age by parents, fathers, and teachers. Remedial classes helped those who needed to get up to speed in math.”

Kmec and her research team just garnered an Amazon Catalyst grant to produce a virtual reality environment that will make use of 3,000 minutes of audio interviews of women in Malaysia and elsewhere.

“Viewers will put on VR goggles and choose a theme like ‘Work and Family’ that shows how women in these other countries dealt with their struggles. No one has ever looked at how a tool like this could be used to help women deal with career, home, and life,” says Kmec. “To think that eventually the program might be useful to human resource departments to develop strategies that make women and underrepresented people more welcome in the STEM workplace.

Indeed, Jones says, “One of the challenges is, how do we disrupt the norms in the workplace? That environment, where women don’t feel welcome, where they’re asked, ‘Why are you here? I’ve heard that said of classrooms, too. That’s a culture that was created over time. I’ve talked to different companies, too, and said, ‘You can change that!’ You have to be intentional about making people feel welcome and valued.”

Disruption and change, she says, “have to come from within and external. Managers at all levels have to be willing to change and come to workplace culture change but a lot of times they don’t know how to even start that.”

But that’s precisely why researchers at WSU, and elsewhere are investigating this complex situation from multiple perspectives. How to recruit and retain women and underrepresented minorities in STEM fields is not just a good idea with the challenges we collectively face, our futures may depend on it.
During his thirty-year career, Karr has worked with some of the biggest names in the music business and collected all kinds of keepsakes—from VIP passes and platinum records to props and guitars signed by the likes of Judas Priest and Slayer’s Kerry King. Exploring Karr’s 1926 Spanish-style home in the Hollywood Hills is like walking through a museum of rock-and-roll’s recent history. From his first-floor studio to his upstairs office, souvenirs tell the story of his work, which he sums up simply: “I just like making cool stuff.”

Karr is known for his bold style and fantastical storytelling. In his 2005 video for Seether’s “Truth,” for example, a cast of characters—from Santa Claus to the Easter Bunny—duke it out in a boxing ring with a surreal vintage vibe. For his 2000 video for “Kryptonite” by Three Doors Down, he “imagined a place where old superheroes go to retire.”

Karr drew on life experience for “No One Knows” by Queens of the Stone Age—hitting a deer on the drive home from Pullman during college—but added a twist. “When I pulled over, I couldn’t find it,” says Karr, who belonged to Tau Kappa Epsilon. “I was morbidly fascinated that he was going to come out of the woods and get revenge”—and that’s exactly what happens in the 2002 video.

Karr’s always been fascinated by the dark and bizarre. Summers during college and for months after graduation, he worked as a groundskeeper at a Seattle cemetery. That experience helped shape his aesthetic. Some of his signature imagery includes dead leaves, snakes, bats, top hats, and vintage masks and microphones. His 1970 “sublime” green Dodge Challenger has even appeared in a few shoots.

“I like working with contrasts,” Karr says. “I like working with things that don’t belong. I like contradictions, things that don’t make sense, absurdities, oddities, freaks.”

He started going to rock shows—and photographing them for fun—in high school. At WSU, he took graphic design and photography classes from Francis Ho, who taught in the Department of Fine Arts for 37 years before retiring in 2004—and whom
Karr considers a mentor. “He was always encouraging, honest, and helpful. He taught me to understand... ENTERPRISE SERVICES)

COURTESY DEAN KARR
COURTESY DEBORAH RIGHTMIRE GRANGER
WASHINGTON STATE MAGAZINE SPRING 2020 3938

Karr’s album images paved his way to... ALUMNIprofiles

The Rightmires—Five Cougar generations

BY LARRY CLARK

Frank Carey, an orphaned and... 2001’s “Rock in Rio”... ALUMNIprofiles

It was massive. But it had to be moved.

The artwork stretched more than 30 feet wide and stood two-and-a-half feet tall. It was also heavy, weighing some 20,000 pounds. And, it was highly breakable. Transporting something so large and fragile would be an exercise in engineering.

“Our whole job was move it, and don’t break it. It was definitely a challenge,” says Jonathon Waldrip (’14, ’16 MS Civ. Eng.).

Then a structural design engineer with KPFF Consulting Engineers, he was on the team that helped orchestrate the mural’s relocation in February 2019.

“The mural illustrates what Washington is all about,” Waldrip says. “And the state wished to preserve that.”

Made out of masonry and glass, the detailed mosaic is adorned with 150,000 small squares, or “lesseurs,” of Byzantine glass and stone. Each tile helps create imagery celebrating Washington state’s rich industrial and natural resources. Aerospace engineering, Nuclear Science, Cattle ranching, Salmon, Timber.

The artist, Jean Cory Brall, had assembled the mural—commissioned by the State Capitol Campus Commission-in 1989 on a gently curved wall of un-reinforced four-inch masonry with a ceramic coating inside the state’s now-mothballed General Administration Building in Olympia.

“The tiles were pressed into the plaster one by one. We couldn’t cut it up to move it; it had to be moved whole,” says Waldrip, who helped plan the mural’s big move. He designed a steel frame to support and transport the work.

If you simply picked up the mural from each end, it would flex in the middle and the glass would crack,” says Waldrip. “The glass and ceramic parts of the mural were very brittle, so the steel frame had to be very stiff. This was especially difficult because the mural weighed so much and was curved, which put a huge amount of tension on the frame. Nothing could be stiffened to withstand things up because the heat could propagate through the wall and damage the artwork. So everything was bolted and assembled in place like an Erector Set.”

The design took about a month to complete. Pre-work took about a week and included heavy shoring of the floor and front of the building. “To extract the mural, we actually had to cut open a large part of the front of the building,” Waldrip says. “The doors were not big enough to get it out.”

Once the frame was installed, the existing support was demolished around it, the frame put on airboats—“sort of like mini hovercrafts,” Waldrip says—then pushed out of the building. Once inside, the front of the frame was cut off, revealing the artwork. The back side of the frame remained in place, permanently anchoring the mural in its new home in Olympia’s 2017 Helen Sommers Building, which also houses the Washington State Patrol, Office of the State Treasurer, and other government agencies.

The move itself took a day. Waldrip, now a structural designer engineer at KPFF Engineering Co. in Federal Way, wasn’t able to be there. “But it’s really cool to me that the frame accomplished double-duty and is holding the artwork down in its final location.”

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In the right place

Annalise Miller saw a worrisome trend among local youths in northern Namibia, where she’s been working to promote financial literacy and entrepreneurship.

“What I noticed is many lack the basic critical thinking and leadership skills that are vital in becoming successful entrepreneurs,” she says. “They are in an economic crisis so job creation is really important.”

To help build their skills, she and her colleagues developed a five-day Exploring Entrepreneurship Kids Camp. The goal: teach 12- to 16-year-olds the basics of starting and running a business, beginning with simple principles—“like don’t spend more than you’re making.” Other focuses include personal and money management, teamwork.

“The idea was that their creativity and excitement around making things can be turned into something lucrative,” says Miller, a community economic development volunteer at a vocational training center. “It was so fun to see the campers take ownership of the program and be proud of the things that they made.

Miller (’17 Math., Busi.) is one of more than 7,300 volunteers currently serving around the world with Peace Corps. Most are like her: single, young, female, and living and working in Africa. Women make up 64 percent of Peace Corps volunteers in 62 countries throughout Eastern Europe, Central and East Asia, Central and South America, Africa, the Caribbean, and Pacific Islands. Their average age is 27. Ninety-nine percent are unmarried. Nearly half—46 percent—are in Africa.

In all, more than 235,000 Americans have served in 141 countries since Peace Corps’ inception. Founded 60 years ago next year—President John F. Kennedy created the program by executive order March 1, 1961—Peace Corps has three main aims: help meet the needs of interested countries, help promote a better understanding of people in other countries, and help promote a better understanding of Americans.

Nearly 10,000 volunteers have come from the state of Washington since Peace Corps’ inception. Founded 60 years ago next year—President John F. Kennedy created the program by executive order March 1, 1961—Peace Corps has three main aims: help meet the needs of interested countries, help promote a better understanding of people in other countries, and help promote a better understanding of Americans.

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Every year, WSU grads return to Pullman for their Reunion to reconnect with classmates and learn more about WSU’s research, leadership, and present-day experience.

Celebrate this important milestone with us!

alumni.wsu.edu/reunions

To Think Like a Mountain: Environmental challenges in the American West

He writes with the straightforward approach of a former newspaperman, presenting facts, history, policy, and modern milestones. He also includes some of his own photographs as well as short, personal, scene-setting vignettes—from the forests of Washington’s Olympic Peninsula and Pacific waters out past the Gray’s Harbor bar to Big Smoky Creek in the Soldier Mountains of central Idaho and the foothills of the Jarbridge Mountains in Nevada.

He concludes Mother Nature is losing ground. But, he writes, "When we think like a mountain, we will have clean air and water, forests will thrive, wild salmon will spawn naturally and make thousand-mile journeys to their natal streams, sage grouse will strut their stuff on their leks in the western sagebrush grasslands, and the wild green fire will burn in the eyes of the wolf—and that benefits us all."

—Adriana Janovich

A Sand County Almanac

"Thinking like a mountain" is the name of a short essay from Aldo Leopold’s 1949 book A Sand County Almanac. In it, he reflects on an old wolf he shot and killed as a young hunter and how he came to realize wolves play a critical role between prey, such as deer and elk, and the flora of the forest and other natural habitats. He lamented humans need to learn to think like a mountain, or take a long-term view of ecology, including the value of predators.

This similarly titled volume encourages people to do the same thing—to think like a mountain in terms of environmental concerns—in the specific setting of the modern American West. A quote from Leopold’s now-famous essay sets the tone: “Only the mountain has lived long enough to listen objectively to the howl of a wolf.”

Niels Sparre Nokkentved spent two decades as an environmental and natural resources reporter for newspapers in Washington, Idaho, and Utah, and eight years as a writer, editor, and photographer for the Idaho Department of Fish and Game. His new book of essays explores environmental challenges such as wolf recovery, threats to public lands, overcutting ancient forests, and more.

Explore the magic—and science—of bread baking in this bright, slim, straightforward, hardbound children’s book, published in cooperation with the Bread Lab at Washington State University in Mount Vernon, and sponsored by the Bread Builders Guild of America. Aunt Mary, a plant scientist whom young Iris affectionately calls “Plant Mary,” comes over with a Saturday morning mission: “Let’s
turn your kitchen into a bread lab!“

Noosovels is by far Giants' most famous member, known as the bassist and co-founder of the iconic grunge group Nirvana, which

BRIEFLY NOTED
Lost Cattle Recovered: An Odyssey
S.M. GHANAFAR (’24, MS, 69 PhD)
ECON 2019

The book of the focus features a baker's bread, plus a diagram of a whole wheat dough berry depicting the bran, germ, and

develop a sourdough starter, whole wheat flour, water, and salt. And they make it seem so easy. Of course, that's the point.

This volume aims to inspire young bakers and their families to not only bake their own loaves but consider where the wheat is grown and milled. It includes playful illustrations and sensory details—smells, sights, to engage young readers.

The character of Aunt Mary, inspired by agriculturalist and conservationist Bethany Barns, serves as a conversation starter about women in science. Iris—curious, con- genial, and a diligent note-taker (she tracks the process of making bread step-by-step in her notebook)—sports red glasses and a halo of curly hair. She's brash, but dear to his heart, and her mom—and Aunt Mary—are dear to his heart.

The book of the focus features a baker's bread, plus a diagram of a whole wheat dough berry depicting the bran, germ, and endosperm, as well as an easy-to-follow recipe for whole wheat sourdough bread.

Coauthor Kim Binczewski is the manager of the Bread Lab. A short “About the Bread Lab” section at the end of the book written by the director, Stephen S. Jones.

Volume 2 of this series explores how bread can be used to advance a variety of research interests and applications in food science, nutrition, and agriculture.

Volume 2 EXPLORE THE TREES

The American Association of Feline Practitioners has awarded BRYAN SLINKER (’19 MFA English) with the Spokane (WA) Women of Achievement Award for education. She helped create the critical racial and ethnic studies minor at Carnegie Mellon. She received her Ph.D. in African American Studies and a certificate in Women’s Studies from Columbia University.

The Northwest School of the Arts has namedled hand,let me sing along in the chorus of “Sasquatch,” arguably a quintessential Pacific Northwest rock song. Born in a grange hall in a sylvan setting in Washington Giant.

The Washington State Department of Transportation, Highway Division, has named LEONARD HILL the new CEO of Washington State Employees Credit Union. He started at the credit union two years ago out of college as a loan officer in 1989. More recently, he served as senior vice president and chief operating officer. Assane Themame, chairman of the board of directors for the WSCU, appointed DAVID MARK (’87 Bus. Admin.) as chief commercial officer. The Citizens Bank of Spokane, which is in the Gilmore family’s name, named Hand,let me sing along in the chorus of “Sasquatch,” arguably a quintessential Pacific Northwest rock song. Born in a grange hall in a sylvan setting in Washington Giant.

Class Notes

The Association of American Geographers (AAG) has namedled hand,let me sing along in the chorus of “Sasquatch,” arguably a quintessential Pacific Northwest rock song. Born in a grange hall in a sylvan setting in Washington Giant.

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She’s used to the question. She bears it all the time. And she gets it. Her name is unusual.

And the answer is yes. MAJESTIC STORM (’18 Comm.) is her real name.

It’s almost as though she was destined to do the weather. She’s a forecaster for KPR and FOX28 in Spokane as well as the morning show “Wake Up Montana” on KULR, KRFB, KQKR, and KTMY.

“I love being able to start someone’s morning off on a positive note, smiling, with lots of energy, lifting them up,” she says. Plus, “People rely on the weather. They use the weather to plan their day.”

Tschabold-Grant started working at KPR full-time shortly after graduating from WSU Pullman, where she was a first-generation college student and worked for Muir News as well as Cable 8 Productions.

Today she does four hours of live TV from Monday through Friday, waking up at 1 a.m. and arriving at the station by 2 a.m. (Most nights she’s in bed by 6 p.m.)

This leads to another oft-asked question. The answer is also yes: “She is a morning person.”

“I love morning shows,” she says. “We’re drinking our coffee, we’re listening to music, and we’re having fun.”

Another peculiarity: She’s off work by 30 a.m.

BY ADRIANA JANOVICH

eworthy.

GRACE WELLER GILMORE (’36 Home Econ., Kappa Alpha Theta), 106, September 1, 2019, Irvine, California.


JANET ELIZABETH FOTHERGILL (’41 Pharm.), 98, March 7, 2019, Kingman, Arizona.


ALBERTA AHN BURRESS (’51 Fine Arts), 89, October 19, 2019, Tacoma, Washington.

For more on WSUAA members, World-class wines that spotlight WSU alumni wineries and support WSU scholarships? We’ll toast to that. Choose from four different shipment options and enjoy premium Cougar-connected wines delivered right to your door, four times a year.

alumni.wsu.edu/valenwines
Helping Cougs excel in life after college

Learning doesn’t stop after graduation. In some ways, it begins—and, at the very least, continues. However, focusing on post-degree development can be challenging, especially for new graduates. In an effort to support Cougs as they navigate life after college, the WSUAA is dedicated to crafting programming that specifically addresses these struggles.

This spring, the WSUAA is working with BECU to conduct financial literacy training events in Seattle and Spokane, as well as online opportunities for those in other areas. Additional in-person events will be brought to other campuses throughout the coming year. The programming will include relevant tools such as information on managing a budget and student loan payoff, tips for purchasing a house, and other pertinent topics.

Also coming to Seattle this May, the first-ever WSUAA Women’s Summit will focus on helping women achieve success in their chosen profession. Noel Schulz, electrical engineering professor and WSU’s first lady, will be the keynote speaker, joining other highly talented alumnae to guide female Cougs on their paths to greatness.

Available online, the first class in the Cougar Career Academy provided ways in which Cougs could maximize their job search opportunities. This collection of online workshops is designed to provide graduates with the necessary tools for advancement by connecting them with career development professionals and field experts. This spring, additional classes will focus on résumé building, LinkedIn networking, and more to help guide participants professionally. Whereas all WSU alumni and students are welcome to participate, these workshops place a special emphasis on recent WSU graduates.

For those of all ages who are interested in furthering their personal development, the Alumni Learning Network is available year-round for WSUAA members. Individuals may take classes, designed by WSU faculty, without paying tuition or worrying about exams.

The WSUAA has much more to come for those looking to advance their careers. WSUAA chapters around the country will be focused on networking opportunities within each group, in an effort to connect Cougs with one another.

To learn more about WSUAA programs intended to help alumni excel in life after college, visit alumni.wsu.edu/lifeaftercollege.
Washington State University physicist Brian Collins explores the nanostructures of polymers—large molecules with many repeating units. Most of us know polymers from everyday life as plastics. Because they’re flexible, polymers can be used to make all sorts of electronic devices, such as phones—or solar panels.

“Scholarships helped me earn a college education and made a difference in the life of my son.”

You have the power to help students like Jessica. Starting at age 70½, you are able to transfer IRA funds directly to the WSU Foundation, which is a tax-smart way to support WSU students. Because of you, Jessica will achieve her goal of becoming a teacher.

Learn more about how you can support students through your Individual Retirement Account: foundation.wsu.edu/ira

Solar energy really gets rolling

Washington State University physicist Brian Collins explores the nanostructures of polymers—large molecules with many repeating units. Most of us know polymers from everyday life as plastics. Because they’re flexible, polymers can be used to make all sorts of electronic devices, such as phones—or solar panels.

Primarily made of carbon, one of the first big success stories for polymers in electronics was the organic LED display. Beautiful images displayed on large, lightweight screens are a result of the exploration of the fundamental properties of polymers.

Instead of projecting light, as OLEDs do, Collins says, “you want to run them backwards,” so the polymer takes light from the sun and creates power, “which is a solar panel.”

Now solar panels, like OLED TVs, can be printed on a roll. Instead of bulky panels that have to be mounted on rooftops or large solar farms, solar panel rolls can be easily installed in all sorts of environments and configurations, such as coverings for windows.

Physics at Washington State turned 100 this year. Watch videos and read about a century of physics research and innovation at WSU:
magazine.wsu.edu/extra/physics-100.

Generation Coug

College was always in Jessica Santana’s plans; however, in addition to the rigors of studying elementary education, she’s raising a son. Scholarships helped Jessica focus on her studies and attend to her future Coug, while staying on the President’s Honor Roll.

Load more about how you can support students through your Individual Retirement Account: foundation.wsu.edu/ira