 ROOTED PLEASURES
Welcome to SpotLight, a look at the people who make up Lawrence Livermore National Laboratory. This edition, which typically appears in print form, is available on the web only due to the shelter-in-place in response to COVID-19.

Members of LLESAs Organic Gardening Networking Group have different reasons for gardening. Some enjoy the camaraderie of sharing tips with fellow gardeners, others thrill at growing a vegetable or fruit from seed while others indulge in the fruits of their labor.

Mark Harts tools of the trade are a Geiger counter and black lights. He doesn’t use them for his day job of ensuring the safety and security of nuclear weapons. Instead, "Dr. Radiation" as he’s known, uses those devices to peruse antique shops, fairs and garage sales, looking for items to add to his collection of radioactive antiques and artifacts.

Craig Fishs vocation is working in environmental protection, but that love of the great outdoors goes beyond just his job. He takes that love beyond the fences of the Lab and volunteers building and restoring a network of hiking trails around the Bay Area and Northern California. He believes access to the outdoors is good for the body and soul.

We hope you enjoy this edition of SpotLight. We’d also like to hear from you. Send us your thoughts and suggestions, whether it’s what you like — or even what you don’t — about this magazine, or if there is something you would like to see in coming editions. You can reach us via email at pao@llnl.gov.

On the cover
Jim Magee waters some of his onions grown in his home garden.
Ed Magee remembers roaming his Livermore neighborhood with his sister, pulling a wagon full of zucchini, looking for takers of the squash that his mother had grown in their backyard.

"Maybe my love of gardening comes from that," said Magee, who works in the Engineering Directorate. "In our first garden, my mom planted seven zucchini plants (zucchinis are prolific producers). I remember loading the wagon full of the zucchini and meeting all the neighbors," he said, laughing as he looked back. "After two or three weeks, no one was opening their doors."

As chair of LLESA's Organic Gardening Networking Group, Magee knows a thing or two about gardening. He says his avocation is agriculture, but his vocation is a mechanical technician at the Lab.

"Ever since I was in high school, I've had a desire to grow things that people can eat. There's something special about putting a seed in the ground, growing it, raising it to harvest and then sharing the food and that experience with others," Magee said. Magee is a year-round gardener at home and at the Lab. Before he joined the gardening club, he was already a commercial grower, with a 40-acre peach orchard. But not all members have the area to grow as much produce as they would like.

"A lot of our members who come out to garden at the Lab live in small apartments or have small yards and just don't have the land," he said. "The networking group, in addition to providing plots of land, water and tools, gives members an opportunity to walk around and talk to one another, meet new people and share their experiences. Both with gardening and work."

The LLESA Organic Gardening Networking Group grows fruits and vegetables without using commercial pesticides or fertilizers; only organic products and natural methods are used to control insects and fertilize plants. There are 88 20-by-20-foot plots in the garden, located on the north side of the Lab just west of the Center for Accelerator Mass Spectrometry.

The club draws from diverse backgrounds and skill sets from across the Laboratory, but all have a passion for growing their own food.
And then there was the chicken

Ines Heinz, an infrastructure data analyst in the Weapons and Complex Integration Directorate, joined the club about four years ago. She didn’t necessarily enjoy gardening at home by herself. “I’m very social so I suckered in my friend and said, ‘Let’s do our own garden,’” she said. “It’s four of us now, so it’s a way of decompressing with co-workers, and that’s very important.”

Heinz’s specialty is peppers — any kind you can imagine: Thai, jalapeno, habanero, red beauty, serrano and poblano. She grew so many, in fact, that she couldn’t give enough of them away. So, she made roasted peppers, hot sauce and chile pepper paste.

But gardening isn’t the only thing that went on in the garden last year. “One day I was out there and there was a chicken in the garden,” Heinz said. “It had flown in under the cover of darkness and stayed in our garden for more than a month and then disappeared.”

This turned into a source of laughter and tomfoolery among the gardeners with sayings like “Viva la chicken,” “We want to save the chicken,” “We want to eat the chicken” and “free range chicken.”

“Ten people tried to catch the chicken,” Heinz said. “And then one day, he just disappeared.” Club members hoped he moved on to greener pastures.

A family affair

For Cary Gellner and Candice Bila, gardening is a family affair. The mother and daughter duo began gardening with the club close to three years ago.

Gellner, a National Atmospheric Release Advisory Center support technician, and Bila, a business development executive in the Innovation and Partnerships Office, share a plot with Miriam McKim, where they grow mostly summer vegetables: squash, tomatoes, cucumbers and peppers.

“I found out about it from my coworker who was gardening there and would bring food in,” Gellner said. “We would go walking through the garden all the time and admire everyone’s stuff.”

That planted the seed. Gellner and Gila decided to have their own plot along with McKim so they could grow their own food and roses — Gellner’s favorite flower.

“For me it’s therapeutic if I just go out in the garden,” Gellner said.

Bila said she didn’t really know about the club until she talked to her mom. “It’s a nice break from all of the thinking we do during the workday,” she said. “It settles my mind and makes me appreciate the farmers and fresh food that we generally take for granted. It’s a labor of love. I appreciate the food more when I know we put our heart and soul into it.”

Have it when you want it

Computation programmer Jim Leek might just be the longest member of the garden club. As a 16-year Lab veteran, he joined the club more than 13 years ago.

Though he gardened a bit with his mother while he was growing up, Leek admits that he’s self-taught by reading up in gardening books and websites. As a kid, he grew Indian corn and sunflowers and sold them in farmers markets.

These days, Leek gardens year-round at home and at the Lab. His crops include winter vegetables like lettuce, turnips, beets and cabbage, as well as summer vegetables including tomatoes, peppers and squash.

Leek’s purpose is practical: He wants to feed his family. “I like good produce and I like to have it when I need it,” he said. “I’ve got a big family and I want us to eat good things. It’s really nice to go in your backyard and eat what you grow. Unlike most Americans, we eat a lot of produce. When I grow it, I feel duty bound to eat it.”

“It’s really nice to go in your back yard and eat what you grow.”

– Jim Leek

Mother Cary Gellner and daughter Candice Bila joined the gardening club together about three years ago. They enjoy gardening together at their homes and at the Lab.

Leek and his daughter Juno not only enjoy growing their vegetables and fruit, but also like to pick and eat them.

A family affair

For Cary Gellner and Candice Bila, gardening is a family affair. The mother and daughter duo began gardening with the club close to three years ago.
Dr. Radiation

Combats Fear With Knowledge

BY NOLAN O’BRIEN

Mark Hart has earned an unusual nickname over the years. It isn’t due to his work ensuring the safety and security of nuclear weapons, nor is it due to his prior hands-on work with plutonium. Rather, LLNL scientist Hart is known for perusing antique shops, fairs and garage sales with Geiger counter and black light in hand, searching for items to add to his collection of radioactive antiques and artifacts. To dealers at these events, Hart has come to be known as Dr. Radiation.

This extraordinary hobby, and his associated passion for public and professional education, has led Hart and his wife Jane to give more than 140 talks about radiation since 1993, helping audiences from all over the world gain a foundation for understanding radiation and radioactivity in the environment.

“There’s a certain satisfaction with giving the gift of knowledge,” Hart said. “The void created by ignorance can be filled with fear. We seek to replace fear with knowledge and understanding.”

Hart’s fascination with radiation grew from his work at a plutonium foundry in the 1990s. “Instead of sleeping through the radiation safety training, I was really interested,” he said. “I began to realize how much I didn’t yet understand.”

Seeing his interest, a coworker from Hazards Control took Hart to an antique store in Martinez where they had dinnerware with radioactive material in it. Hart recalled a diminutive, gray-haired shopkeeper. When Hart told her that he was looking for radioactive antiques, she pointed him to a few items.

“I asked her how she knew they were radioactive,” Hart said, recalling the conversation. “She told me, ‘I used a Geiger counter on it, and it gave off a lot of ohms.’ I bit my tongue, knowing that ohm is a measure of electrical resistance, not radioactivity. There are times when you should educate and there are times when you should go with the flow. However, that was an early hint that even folks who are aware of radioactivity in their environment don’t really understand it very well.”

Hart’s first talk on the topic of radiation came about when his niece at Westmont College heard that he was working in a plutonium foundry. She asked if he would be willing to give a talk on radiation. He agreed.

“I took a paper bag with seven antiques with me,” Hart said. “The professor had me speak before the class in a lecture hall, and I had the items out on the table up front. Nobody paid any attention to them until I mentioned about halfway through the talk that they are old consumer items that contain radioactive material. I was amazed by the college students’ reaction. After the half hour talk, most of the students stayed around for another hour to check out the antiques with a Geiger counter that I brought and ask more questions. That’s when I realized that there was something to this in terms of public education and having an accompanying exhibit of radioactive items.”

Ribbons of naturally occurring uranium meander across the surface of an autunite sample, glowing green under a black light. About the size of a ping pong ball, this particular sample came from France.
After a few talks to students and church groups, Mark reconnected with Jane. They had dated years prior but ended up going down different paths when they went away to college. Hart told her about his newfound hobby and the talks he had been giving. The two have functioned as a team ever since, both as a couple and also as collectors and partners in public and professional education.

Their collection now consists of more than 740 items, and they have given talks with exhibits of more than 100 radioactive items in communities across the country and in Canada to audiences including West Point cadets, U.S. Senate staffers, members of the U.S. Special Operations Command, NASA staff and delegations from South Korea and Qatar, among others.

One of the unique items in their exhibit is a 16 million-year-old megalodon tooth. Based on its size, around 3 inches long, Hart estimates that the tooth came from a 50-foot ancestor of the modern great white. It was found in the Savannah River delta, downstream from the plutonium production plant at the DOE Savannah River Site. The tooth itself is radioactive, which raised the question in Hart’s mind whether its radioactive properties were naturally occurring or due to contamination from the plant, which used river water to cool its reactors. Hart called in a few favors and had an analysis done on the tooth, which showed that the radiation is due to naturally occurring uranium.

“Many people don’t realize that there are 2.7 parts per million of uranium in the Earth’s crust,” Hart said. “It is found virtually everywhere in nature — in rocks, soil, plants and our bodies. It’s also present in small quantities in seawater, which was the key to turning this shark tooth into a radioactive fossil.”

When uranium in seawater flowed past the megalodon skeleton and came into contact with carbon in the tooth, the uranium precipitated from the seawater to the bone, going from a water soluble +6 ion to an insoluble +4 ion. Over millions of years, uranium had concentrated in the tooth. This is a process similar to how minable uranium deposits are formed.

Another popular item in his collection is a naturally occurring mineral called autunite, which Hart jokingly refers to as “Kryptonite.” His autunite specimen features ribbons of naturally occurring uranium on the surface, which glow green under a blacklight. The fluorescence is not due to uranium’s radioactivity. Hart points out, but a property similar to dayglow paint. As he brings his Geiger counter close to the small rock, it comes to life with a crackling sound from low levels of alpha, beta and gamma radiation.

The fluorescent properties of uranium have been used for nearly 2,000 years to color consumer products, like Vaseline glass. Hart estimates that the Vaseline glass items in his collection contain less than 5 percent uranium by weight. Hart’s favorite Vaseline glass piece is an intricately patterned glass water pitcher made in Illinois around 1870, 25 years before radioactivity was discovered by Henri Becquerel in 1896. This discovery was made after experimenting with naturally occurring fluorescent compounds, like those found in Hart’s autunite sample.

As Hart begins his talk on radiation, he drinks from a Vaseline glass wine goblet. He points out that the uranium is dissolved within the glass, and that while the glass contains radioactive material — emitting alpha, beta and gamma radiation, similar to the autunite — the radiation from the Vaseline glass does not make the food or drink radioactive.

“Some people think that radiation is like a contagion spreading from item to item,” Hart said. “They’re afraid because they don’t understand how radiation works. Can radiation be dangerous? Yes, absolutely. But when radiation is put in perspective, there is no reason to be afraid of low-level radiation from radioactive potassium in a banana or the fact that there are roughly half a million naturally occurring radioactive disintegrations occurring in the human body every minute. When we give folks a chance to take a look at some of our items on exhibit and when we have a conversation about the various types of low-level radioactivity in our environment, that fear melts away. There’s something really fulfilling when I see those a-ha moments on people’s faces.”
For Craig Fish, the great outdoors is not just a pastime, it is his job, his hobby and his passion. From working in environmental protection at the Laboratory for 26 years, to volunteering for Volunteers for Outdoor California (VOCal), Fish takes his love of the outdoors and preserving the environment to a whole new level.

Fish's love for the outdoors runs deep in his blood and was instilled in him early on by his family, especially his father and brother. He spent his childhood in a suburb outside Boston, in Needham, Massachusetts. "As a kid I spent most of my time playing in the outdoors, exploring woods, creeks, reservoirs, sandpits and railroad tracks nearby my house and across town," Fish said. "I also loved climbing trees, building tree huts in my backyard and riding my bike. But my favorite thing to do was to find paths in the woods and find where they led."

Fish's family was instrumental in educating him and helping him build a connection with nature. "On vacations we would car camp or canoe camp, swim, hike and climb mountains," Fish said. "My favorite memories are of canoe camping. From the time I was a couple of years old I was fortunate to go with my family on canoe trips in New England that my dad would run for the Appalachian Mountain Club. We’d canoe on a lake or river and camp overnight. My dad, who was a fantastic cook, would make lobster Newburg for the participants on his white gas Coleman stoves. On our many family outings my parents, older brother and family friends would identify plants, birds, landforms and the history of the areas we visited. That certainly sparked my interest. After rainstorms, I would play on a private street near my house, learning about water transport and sedimentation. I also remember watching "Wild Kingdom," "Daktari" and Jacques Cousteau; all shows about exploration, adventure and the earth. By the fifth grade I had a strong desire to study and explore the earth and knew I wanted to work in that industry."

During high school, Fish was convinced he would follow Cousteau into oceanography or marine biology, but after taking a geology course in college, he completely fell in love with the subject. "I learned about order and balance and actions that humans take that cause ourselves complicated, expensive issues," Fish said. "In graduate school I learned about how these processes play out along coastal environments. Then in the work world, I learned to identify and mitigate human impacts. At LLNL, I have extended that learning to how constituents (chemicals, metals and radiological material) move, where to look for them and how to clean them up. I appreciate the challenge and am proud of my history of solving problems and preventing and cleaning up contamination."

As a young child in the early '60s, Fish went along on canoe trips with his family in New Hampshire and Massachusetts. Here he is with his mom and sister (upper), and with his mom (lower). Photos courtesy of Craig Fish.
“My inherent belief is that access to the outdoors is essential for physical and mental well-being and that improving access to special outdoor places in our local parks contributes to the overall well-being of our communities.”

- Craig Fish

Fish has worked at Lawrence Livermore National Laboratory since May 1994. Working in environmental protection, he has had a number of responsibilities over the years, from supporting decontamination and demolition of former research facilities to supporting the National Ignition Facility operations to coordinating tabletop exercises for Homeland Security. Fish is responsible for LLNL’s new drinking water permit, characterization and control of potentially radioactively impacted materials and equipment and environmental incident response.

While Fish spends his days working at the Laboratory, his weekends are spent building and restoring a network of hiking trails around the Bay Area and Northern California through volunteer organizations. “My inherent belief is that access to the outdoors is essential for physical and mental well-being and that improving access to special outdoor places in our local parks contributes to the overall well-being of our communities.”

Since 2009, Fish has been one of the principal organizers of VOCal. He serves on the project planning team, leads volunteer projects and kicks off new leader training each year. VOCal’s signature events are large, weekend-long trail building or improvement projects throughout the Greater Bay Area.

“At VOCal, we partner with federal, state, regional, county and local agencies from Napa to Gilroy and Livermore to Pacifica,” Fish said. “We’ve even organized projects as far as Big Sur and Sonora. One of my favorite partner agencies is Livermore Area Recreation and Park District. We’ve built a number of new, single-track trails in Sycamore Grove with them. We typically have 60 to 120 volunteers that participate from Friday night to Sunday afternoon. We provide all meals, trained crew leaders, tools and wonderful, satisfying projects that the volunteers can come back and visit for decades. The best part of our organization is the camaraderie that is built or rekindled during the weekend. Half of our labor force each weekend is comprised of a group of regular volunteers that includes a dozen or two from Livermore and Sandia labs. We’re a fun, diverse and supportive family.”

Organizing and inspiring people is something that Fish enjoys. “I’m driven to mentor others to step up and take on volunteer leadership roles because it is satisfying, builds character and many hands make for light work. Connection with the outdoors is essential to maintaining a healthy life for me. I’ve met many others that share that connection and appreciation and I’ve also learned to appreciate the benefit of giving to others. I’ve been a leader in volunteer organizations since I was in high school. The best, most valuable experiences in my life have been while I was pushing myself to lead and contribute to others, especially in a large group format. Whether it was from teaching lifeguarding, encouraging friends to follow their dreams or leading volunteers to build new trails in the outdoors, giving to others adds a rich, rewarding, fulfilling aspect to life.”

While the outdoors has always played an important role in Fish’s life, inspired early on by his family, he now inspires his own family. He and his wife Stephanie have a daughter and son who they have been taking camping and canoeing since they were babies. “Both of my kids enjoy backpacking with me when we have the chance,” Fish said.

In addition to his family, Fish also leads others on backpack and canoe trips. “I lead about five trips each year comprised mostly of folks that I’ve met through leading trail work,” he said. “The trips include eight to 24 friends of all ages and backgrounds. I’m proud of our track record of safely introducing new people to backpacking. We tend to visit remote locations in the Sierras, but also have explored in Death Valley, Los Padres National Forest, Lost Coast and Lassen.”

One of Fish’s favorite quotes is one that he lives by and comes from one of his favorite books, “Desert Solitaire,” by Edward Abbey: “One final paragraph of advice: do not burn yourselves out. Be as I am — a reluctant enthusiast…a part-time crusader, a half-hearted fanatic. Save the other half of yourselves and your lives for pleasure and adventure. It is not enough to fight for the land; it is even more important to enjoy it. While you can. While it’s still here…sit quietly for a while and contemplate the precious stillness, the lovely, mysterious and awesome space.”

Fish is loving life, enjoying his family, thriving in his career, enjoying the outdoors and helping others to enjoy it as well. “I look forward to many years of service to our parks and on a personal level I will always continue to seek adventures outdoors that help me reconnect and be at my best.”

For volunteer opportunities with the Livermore Area Parks and Recreation District visit the web for opportunities with VOCal visit www.v-o-cal.org.