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UC SANTA CRUZ

Researchers snap pics at new facility

By Elise Overgaard

UC Santa Cruz's new cryo-electron microscopy facility has a unique structure that makes the technique accessible for local researchers and is attracting international business. Structural biologists recently published the first paper to include data from the facility.

The new facility on UCSC's Science Hill houses a cryo-electron microscope — a tool that revolutionized the field of structural biology over the past decade. It allows researchers to vi-

sualize proteins by taking pictures of them. While similar instruments do exist within the Bay Area's thriving pharmaceutical and biotech industries, UCSC's Glacios microscope is one of fewer than 200 in the world. The facility is designed as a one-stop-shop that anyone can use, which makes the technology accessible to both local and international researchers and biotech businesses.

"It's really impressive," says Rose Marie Haynes, a microscopist at the Pacific Northwest Cryo-EM Center, the national center in Portland. "I don't

know of anywhere else that's quite as streamlined. It's definitely a valuable resource for anyone who's getting into the field."

Proteins are in your skin, blood, bones and every other tissue in your body. They run your internal clock, help you to heal, move your muscles, and enable every one of your senses. And they're very, very small. For reference, the diameter of a human hair is around 100,000 nanometers. The diameter of a single protein is around 5 nanometers.



UCSC's research specialist, Vitor Hugo Balasco Serrão, stands with the Glacios cryo-electron microscope. The microscope uses electrons, instead of light, to capture pictures of frozen proteins.

ELISE OVERGAARD — SANTA CRUZ SENTINEL

FACILITY » PAGE 4

HANUKKAH CAR PARADE

SHIFTING TO HOLIDAYS



SHMUEL THALER — SANTA CRUZ SENTINEL

A Hanukkah car parade sponsored by Chabad Center for Jewish Life passes by the Town Clock in downtown Santa Cruz on Sunday. With over 3,500 chapters in more than 85 countries Chabad organizations host classes, lectures, and workshops on Jewish topics and offer religious services, Shabbat meals and a Friendship Circle serving children and adults with disabilities and mental health conditions. Chabad has its roots in the Chassidic movement of the 18th century. Chabad Center for Jewish Life will be offering tie dye Hanukkah events for children Tuesday at The Mercantile in Capitola and Wednesday at the Zayante Fire Station. Locally two other Chabad Houses serve the community, Chabad by the Sea and the Rohr Chabad Student Center at UC Santa Cruz.

BIG SUR

Condors are on the cusp of rebirth

Wildfire in 2020 had ravaged the refuge and killed 12 of the endangered birds

By Luis Melecio-Zambrano
newsroom@monteseyherald.com

BIG SUR » Deep in the heart of this breathtaking wilderness, a California condor launches itself from the sunlit skeleton of a burnt Ponderosa pine. Its great wings cut through the mountain air with a low undulating hum. Soon, nearly a dozen more of the majestic birds leap from the crowded tree.

In a whirring chorus of wind and wing, they soar over the site, razing the refuge and killing 12 condors, a staggering loss for a decades-old effort to rescue the species from extinction.

Now, after overcoming major challenges, the society is nearing completion of its new and improved facility to monitor and release these iconic birds to the wild.

It's been a long road to recovery for the sanctuary and the society's senior wildlife biologist, Joe Burnett. In August 2020, he watched helplessly over a remote video camera as a ribbon of flame crested over the mountain ridge toward the condor



A young California condor lands at the Ventana Wildlife Society's condor sanctuary in Big Sur.

to help with its recovery, nearly covering the cost of rebuilding the sanctuary. "You're like, 'Oh my God ... we're gonna lose everything,'" Burnett recalled.

The approaching flames then burned through the camera's cords, and it wasn't until two weeks later that he was able to go assess the losses.

Nine birds and two chicks were missing, and their bodies were never found. One burned condor later died of infection. The release pen, the researchers' cabin and all of the equipment were unsalvageable. The society raised \$660,000

to help with its recovery, nearly covering the cost of rebuilding the sanctuary. After clearing trees and repairing the roads, the team at the sanctuary had to remove the debris from the burnt facility. Because the remains of the facility contained traces of toxic metals, the sanctuary staff had to hire a team of licensed hazardous waste specialists to clean up the burnt structures.

Last summer, the society finally got the green light from Monterey County officials to

start building.

Construction at the remote facility has been a complex logistical dance. To reach the site, crews must drive for two hours up a narrow dirt road that cuts a winding path through the mountains. The road is impassable for most heavy construction equipment, so concrete must be mixed and poured by hand on site. Much of the steel came in prefabricated panels, which were hauled up the mountain and assembled by hand by Burnett and contractors.

The loss of the sanctuary thwarted the care and release of Big Sur's condors, the largest land birds in North America.

Since 1997, the Ventana team has pioneered and perfected many of the standard procedures for trapping and releasing condors bred in captivity. But without the facility, team members have been unable to release the birds.

They have also been unable to trap and treat condors that are injured or sick from lead poisoning. This is the main cause of death for the condors and results from the birds eating carrion shot with toxic lead ammunition.

CONDORS » PAGE 5

PG&E

Proposal may trigger increased monthly bills

Utility wants state PUC decision by end of 2023

By George Avalos
Bay Area News Group

OAKLAND » Higher monthly bills might jolt PG&E customers due to the utility's request that state regulators allow the company to collect more revenue for its spending linked to wildfires and catastrophes.

PG&E wants to recover costs that arose from its expenditures for the mitigation of wildfires and dealing with certain catastrophes, according to recent state and regulatory filings.

Oakland-based PG&E is attempting to recover \$1.36 billion in costs, filings with the state Public Utilities Commission and the U.S. Securities and Exchange Commission show.

PG&E's equipment has triggered a series of fatal and destructive wildfires in Northern California over the past several years. PG&E also caused a fatal gas explosion that killed eight and destroyed a San Bruno neighborhood in 2010.

"Our most important responsibility is the safety of our customers and hometowns," PG&E spokesperson Mike Gazda said. "We also recognize our responsibility to keep energy bills as low as possible for our customers."

Monthly bills for PG&E customers could jump over a period of three years, with the first increases starting during the second half of 2023, depending on the outcome and timing of the state PUC's decision on PG&E's most recent revenue request.

For the typical residential customer who receives both electricity and gas services from PG&E, monthly bills would increase by an average of \$8.67 a month in the first year that the changes take effect, \$1.57 a month in the second year and another 12 cents a month in the third year.

Customers will experience higher bills primarily due to increases in the electricity portion of the monthly charges, PG&E indicated.

That's because the gas portion of the bill would be unchanged in the first year and third years that the changes go into effect. In the second year, the gas portion of the bill would increase by 8 cents a month.

No changes in monthly bills are expected to occur before mid-2023, PG&E said.

PG&E revealed several categories of spending for which the company aims to recover its costs:

- Complete wildfire risk mitigation activities.

PG&E » PAGE 4



High voltage towers cling to the steep canyons around Pulga on Nov. 9, 2018, near the reported start of the Camp Fire blaze that destroyed Paradise and killed at least 85 people.

Coast Lines

SANTA CRUZ
Ukulele Club to hold annual Holiday Party

The Ukulele Club will hold its annual Holiday Party on Wednesday, starting at 5:30 p.m. at the Greater Purpose Brewing Company (21517 E Cliff Dr. Santa Cruz, California, 95062). There will also be a costume contest with awards given, by people's choice, for the best holiday costume in three separate categories:

- Best in the Santa or Santa's elf genre.
- Best ugly Christmas sweater.
- Best Hawaiian holiday-themed ensemble.

SANTA CRUZ
Consulting firm to develop strategic plan

The city of Santa Cruz has engaged the national consulting firm Baker Tilly to help develop a strategic plan to prioritize efforts and resource allocation for the next three years, according to a release from the city.

The city's strategic planning efforts involve:

- Establishing a vision for the future.
- Developing multiyear goals and strategies.
- Identifying critical success factors.

The strategic plan will be used to guide work planning by departments to ensure timely results. All survey responses will be anonymous. No responses will be directly identified with any individual. The Baker Tilly team will analyze responses after the survey closes and prepare a summary, which will be shared with the City Council as it makes decisions about the strategic plan. The survey will take about 15 minutes and should be completed in one sitting.

To access the survey, visit cityofsantacruz.com/surveymonkey.com.

The survey will end on Jan. 3. For questions regarding the survey email ashley.garcia@bakertilly.com or call 949-809-5537.

SANTA CRUZ
Annual peace vigil scheduled for Dec. 31

The 19th annual New Year's Eve interfaith vigil will take place from 7:30-9:15 p.m. Dec. 31 at Holy Cross hall, 170 High St., Santa Cruz. The hybrid event, both in person and on zoom, and will feature speakers from the local Bahai, Buddhist, Christian, Hindu, Indigenous, Jewish and Muslim faith communities.

For tickets, visit eventbrite.com.

If you plan to attend virtually and cannot access Eventbrite, email bsanghal@gmail.com to request the Zoom link.

Masks are required for those attending in person, organizers say.

SANTA CRUZ
Literacy program seeks volunteer tutors

The Literacy Program of the Volunteer Center of Santa Cruz County invites all interested individuals to a free 40-minute online orientation to learn about becoming a volunteer tutor to a motivated adult English language learner.

Community members are invited to join program staff and volunteers for an informative and casual online conversation via Zoom designed to help individuals determine if this volunteer opportunity is the right fit before committing to the comprehensive tutor skills training course.

The schedule:

- 11 a.m. Jan. 10.
- 7 p.m. Jan. 17.

For information, visit literacysantacruz.org, call 831-427-5077 or email literacy@volunteercenter.org.

SANTA CRUZ
Class on roses set for Jan. 21

The UC Santa Cruz Center for Agroecology presents "Roses are a Celebration! Starting Right with Organic Rose Growing" from 9 a.m. to noon Jan. 21 at the Alan Chadwick Garden, 238 McLaughlin Drive, Santa Cruz.

This class will be an interactive demonstration/discussion on growing roses in the home garden. The cost of the event is \$60.

To pre-register, visit commerce.cashnet.com.

SANTA CRUZ
Rio screens She Adventures Film Tour

The She Adventures Film Tour comes to the big screen at 7 p.m. Jan. 28 at the Rio Theatre, 1205 Soquel Ave., Santa Cruz.

The tour features a selection of films of varying lengths from independent filmmakers from around the globe that showcase the inspiring women of the adventure world.

For tickets and list of films available, visit riotheatre.com. A portion of proceeds benefit Santa Cruz Mountains Trail Stewardship.

LIVE OAK
Community Health's clinic opens doors

Santa Cruz Community Health's new Live Oak Clinic is now open and accepting patients at 1510 Capitola Road, Live Oak.

Previously known as the East Cliff Family Health Center, the clinic serves the primary care needs of all people and all ages, regardless of their ability to pay, through high-quality, patient-centered care.

The 20,000-square-foot center opened Dec. 6 to provide primary care and mental health care. Most health insurances are accepted including medical and a sliding scale for the uninsured.

To schedule an appointment, call 831-427-3500. For information, visit sealhealthcenters.org.

SANTA CRUZ
Artist sought to create pathway project

The County of Santa Cruz is seeking an artist to create a site-specific public art component for the Green Valley Road multiuse pathway.

This project will replace a dilapidated pedestrian trail with a pervious, two-way, multiuse trail to provide a safe, accessible connection between the city of Watsonville and the unincorporated areas of Santa Cruz County to nearby schools, parks, social services, and numerous transit stops, according to a release from the county.

The budget for the public artwork, which includes all costs associated with but not limited to design, materials, travel, insurance, fabrication, installation and documentation of the artwork, is \$72,000.

A "Call to Artists," which includes detailed information about the RFP process, project map, sample contract and corridor map showing potential public project locations are available at sparks.com.

The deadline for submitting a proposal is Jan. 20.

DAVENPORT

Woman killed in driveway collision

By Jessica A. York
jjork@santacruzsentinel.com

DAVENPORT — A 76-year-old Davenport woman died Friday afternoon after a truck backed into her while she stood in a residential Swanton Road driveway.

The woman, whose name was not released Monday by the Santa Clara County Coroner's Office pending notification of family, suffered significant injuries in the impact and died after be-

ing airlifted to an out-of-county trauma center, according to the California Highway Patrol.

The 77-year-old Davenport man driving the truck remained at the scene, east of Highway 1, until CHP officers arrived, according to an agency media release.

While CHP investigators did not suspect drugs or alcohol to be factors in the fatal crash, they had not yet determined its cause Monday.

Facility

FROM PAGE 3

Structural biologists study the shapes of proteins. "If we want to understand biology, which means life, ... it's important to know how your protein looks," says Victor Hugo Balasao Serrão, the research specialist at UCSC's new facility.

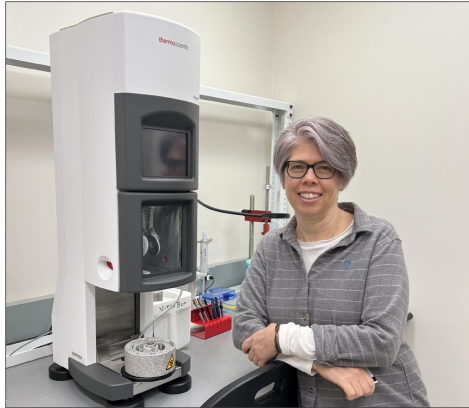
The shape determines the function. Proteins that have the wrong shape can cause disease. Like Alzheimer's and Parkinson's. And most drugs are based on protein shapes. Want to turn an overactive protein off? Find a compound that can stick to a crevice in that protein's shape; it's like jamming a stick into a bicycle wheel. But to study the structures of proteins, scientists have to be able to look at them.

Enter: the cryo-electron microscope. As its name implies, the technique is cold. Researchers place a tiny drop of water that contains the protein onto a small metal grid 3 millimeters in diameter. They plunge that grid into icy (-300 °F) liquid ethane so fast that the water flash freezes into a glassy form of ice, then shoot a beam of electrons through it. The electrons work just like rays of light through a camera lens; they create a 2D picture.

Powerful computers take thousands of 2D pictures and assemble them into a 3D model of the protein. That 3D model, which scientists refer to as a solved structure, can be used to design drugs, or learn about diseases. Remember that image of the coronavirus spike protein — the one that was in every article about COVID-19 for the past two years? That image was generated using cryo-EM. And it was a major reason researchers were able to design treatments and vaccines so rapidly.

Cryo-EM is much faster and more automated than traditional techniques, like X-ray crystallography. Melissa Jurica, a structural biologist at UCSC, says it speeds things up for researchers. "Instead of growing crystals, which would take weeks to months, now they get a sample and they can put it in the microscope and collect their data within a week and that is amazing," she explained.

In 2017, Jurica led the charge to secure an instrumentation grant to pay for the \$1.8 million microscope. Obstacles — including a room remodel, a lack of data processing infrastructure and the CO-



ELISE OVERGAARD — SANTA CRUZ SENTINEL
Melissa Jurica, who led the charge to secure the instrumentation grant for the facility, shows off the Vitrobot. The equipment flash freezes proteins, suspending them in glass-like sheets of ice.

VID-19 pandemic — delayed the grand opening. But Jurica worked hard to get the facility up and running, and researchers started collecting data in March 2022. Serrão said the final cost of the facility including building renovations and computing resources was close to \$4 million.

The grant paid for the microscope, but to keep it running, they needed a business plan. Serrão had ideas, and the timing was perfect. "We just got super lucky was looking for a job at the time," said Jurica. "He's going to be the reason our facility succeeds."

At nearly 8 feet tall, the scope takes up serious space. It clicks and wheezes as Serrão loads samples from researchers in Brazil. This is part of his business plan — anyone can use the scope, but they're charged for the time. UCSC has some grant money available to help university researchers with the costs, and internal users get a discount, but everyone pays.

The UCSC facility is designed for doing the initial dirty work and optimizing the process. "Our facility is for sample preparation, optimization and screening," says Serrão. Researchers can perfect important parameters, like ice thickness, sample concentration and grid conditions. They can get a decently high-resolution structure on the Glacios.

If they need even higher resolution, they can send their optimized grids to one of three NIH-funded

national centers, located in Stanford, Portland and New York City, which house more powerful scopes. "Some people don't need to go to another institution to polish off their data, some people do," says Jurica. Time on the national microscopes is free as long as the project is accepted, so doing the screening work at UCSC helps researchers to write strong proposals that are likely to be accepted.

Researchers who depend on the technique can now work at UCSC. "We were able to hire Sara Loerch, who needs electron microscopy for her research program," says Jurica. And the facility is speeding up research for structural biologists that were already there. "Labs that were specializing in other techniques are now all kind of moving toward cryo-EM," says Jurica.

The unique setup makes the technique accessible to newbies. "One of the things that makes cryo-EM challenging to approach is that it requires so many different fields of expertise to go through the full workflow," said Haynes. "The sample prep requires a crazy amount of biochemical knowledge. And then, if you're extremely well-versed in that, it's a pretty big learning curve to figure out the actual grid optimization followed by the screening and data collection, the processing, these are all totally different sets of skills. So offering a facility that goes through that entire process like as a one-stop shop makes it actu-

ally an approachable thing rather than having to piece-meal all of that together."

Since they started collecting data, UCSC researchers have already solved seven protein structures. This is impressive; with other techniques it could take years to solve a single structure.

Scientists are forging ahead to explore some of the world's most pressing biological questions. 13 UCSC labs currently use the equipment to study Alzheimer's disease, nanoparticles, viruses, cell cycles in cancer and more. Serrão also has users from three local biotech companies and universities from the East Coast, Canada and Brazil.

To anyone who needs to visualize something very small, Serrão says: "Come over here, visit the facility, become a user, push your PI to say 'Let's do cryo!' It's a matter of scheduling a meeting and seeing if your stuff can be imaged." And to anyone considering a foray into structural biology, he says, "It's the future. If you look at every single pharmaceutical company or biotech company in the Bay Area, every single one has an electron microscope and every single one is hiring. And the salaries are great."

Structural biologists published the first paper to include data from the facility on Oct. 28. A second paper is currently being peer-reviewed.

Anyone interested in the facility can learn more at www.ucscryoem.org.

PG&E

FROM PAGE 3

Respond to government-declared catastrophic events to repair damaged facilities, restore utility services, and protect the utility's employees and customers.

Implement various customer-focused initiatives.

The utility hopes the state PUC will rule on the request by the end of 2023, although it's possible a decision could occur earlier.

At present, the typical

PG&E residential customer pays an average of \$233.67 a month for combined electricity and gas services, \$167.23 a month for electricity service and \$66.44 a month for gas service.

That means the current proposal could lead to monthly bills of \$242.34 for combined electricity and gas services in the first of the three years, \$243.91 in the second year and \$244.03 in the third year.

The year 2021 marked the first time that PG&E's average residential customers endured monthly bills that topped \$200 for combined

electricity and gas services. The PUC might act on other PG&E requests for increased revenue and higher monthly bills as a result of other proceedings.

At the end of December 2021, PG&E's monthly residential bills were around \$202 for combined electricity and gas service. By about mid-2022, PG&E's average monthly residential bills had risen to the latest amount of \$233.67. That represented an increase of 15.6% over the six-month period.

In contrast, the Bay Area inflation rate, as measured

by the consumer price index, rose 4.7% over the similar first six months of 2022. Put another way, PG&E bills have been rising this year three times faster than the region's overall inflation rate.

"We are working toward our longer-term goal to keep customer rate increases near the level of inflation," Gazda said.

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