"The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science. " -- Albert Einstein

ART OF SCIENCE

Reception and Awards Ceremony

Thursday, March 12

4-5pm, Elings Hall Lobby

Refreshments served

Winning entries will be on exhibit at the UCSB Library beginning in Summer Quarter

art-csep.cnsi.ucsb.edu

CSEP CNSI SCHULER LAB UCSB College of Creative Studies UC SANTA BARBARA LIBRARY NSF

Thank you to:

California NanoSystems Institute

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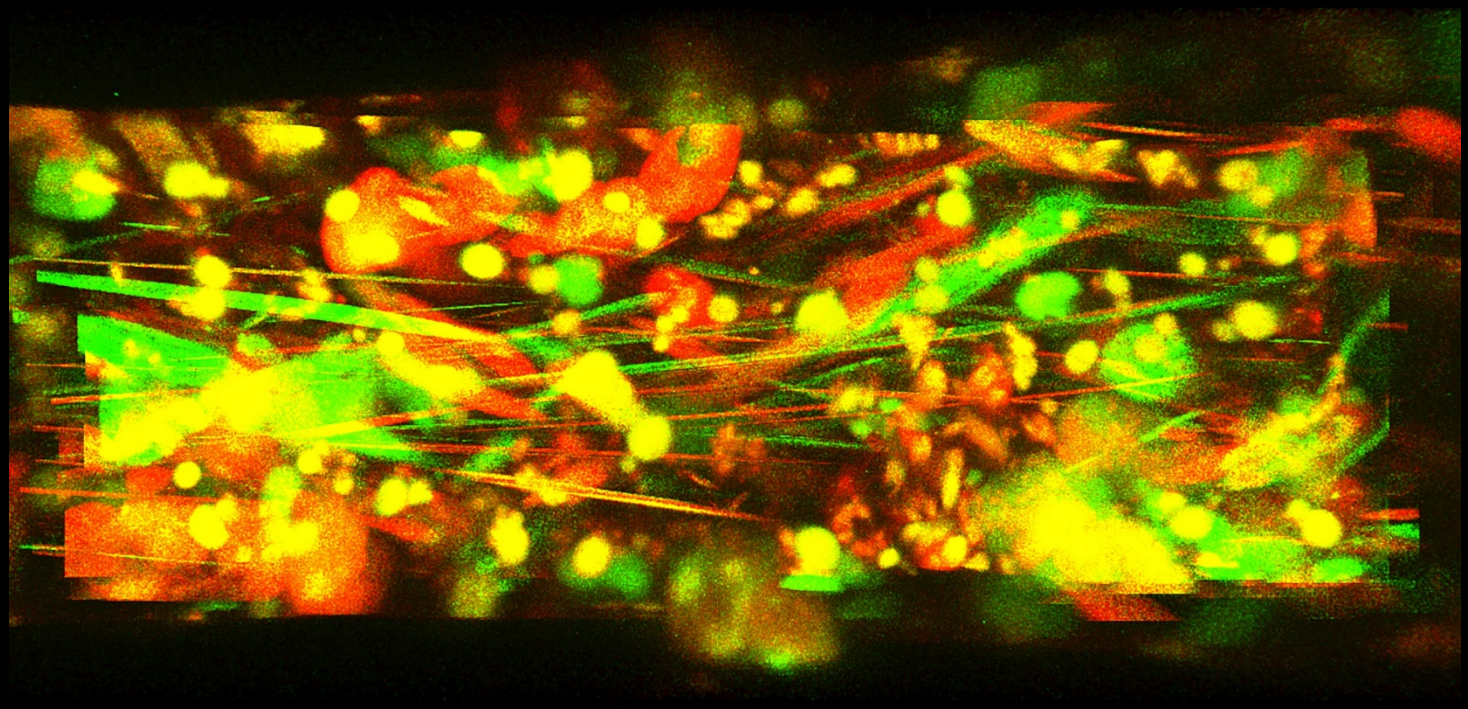
Honorable Mention



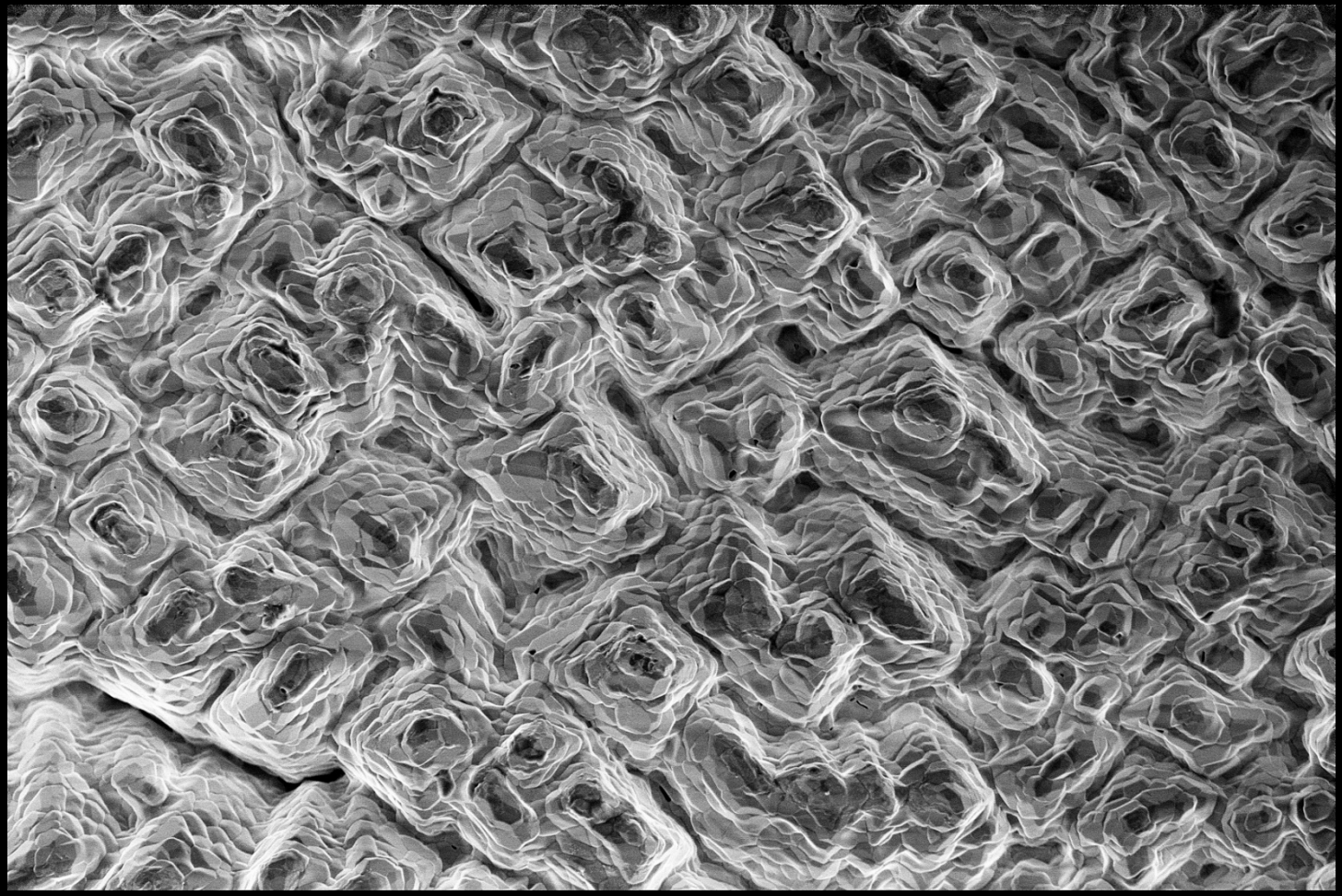
Artists: Delany Rodriguez

Title: Limelight

Snapshot of moving blood with stained blood cells. Hemodynamic (blood flow) studies can help determine the causes of decreased flow and clogging of arteries which occurs via accumulation of fatty material (plaque). Understanding hemodynamics can help us fix and potentially prevent plaque formation.

This image shows the blood of the colonial ascidian Botryllus schlosseri circulating within its vasculature. The blood contains a myriad of cells that can be labeled with different color dyes such as green, red and yellow. Ascidians are marine animals closely related to vertebrates (such as humans). This image was captured using high-resolution confocal microscopy. The title refers to a type of stage lighting used in old theaters to highlight solo performers. The image, which has the likeness of a painting, becomes the limelight itself.

Honorable Mention



Artists: Tom Drtina

Title: Micron Mountains

The scaly appearance is the result of a gas reacting with the surface of a yttrium oxide thermal barrier coating, used to protect components in turbine engines. This reaction is not desired, as it will change the properties of the coating, making it less durable and protective.

This image was taken using secondary electron scanning electron microscopy. The secondary electrons are very sensitive to surface structure, giving this image the appearance of a topology map. Additionally, using a very low accelerating voltage and electron beam current when imaging allows for very high resolution of these sub micron features. This sample was exposed to 50 hours in a flowing water vapor atmosphere at 1200°C. The reactive gas, silicon hydroxide, is itself the product of a reaction between the high-temperature water vapor and a component of the sample. This silicon hydroxide gas then reacts with the yttrium oxide coating.

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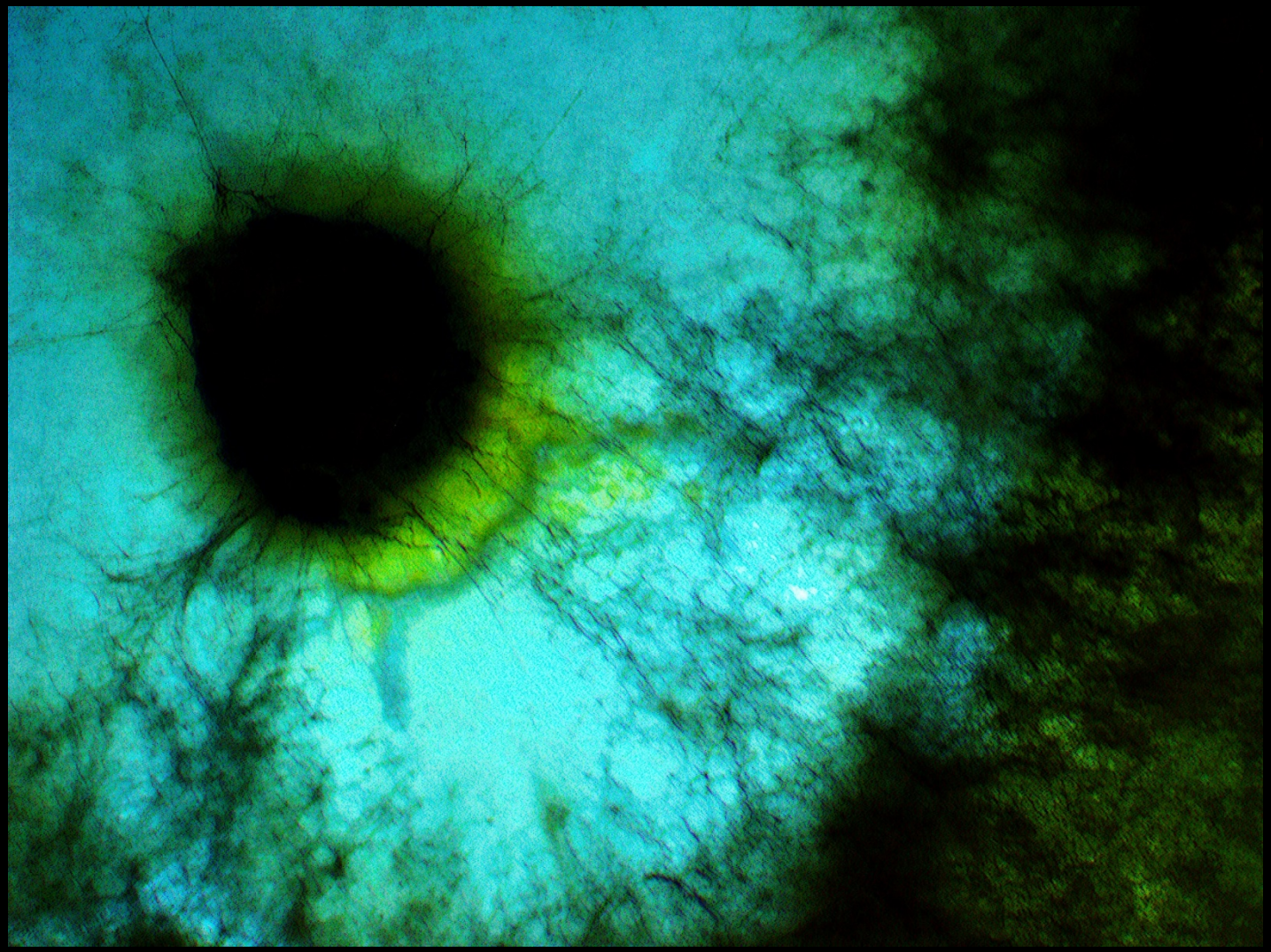


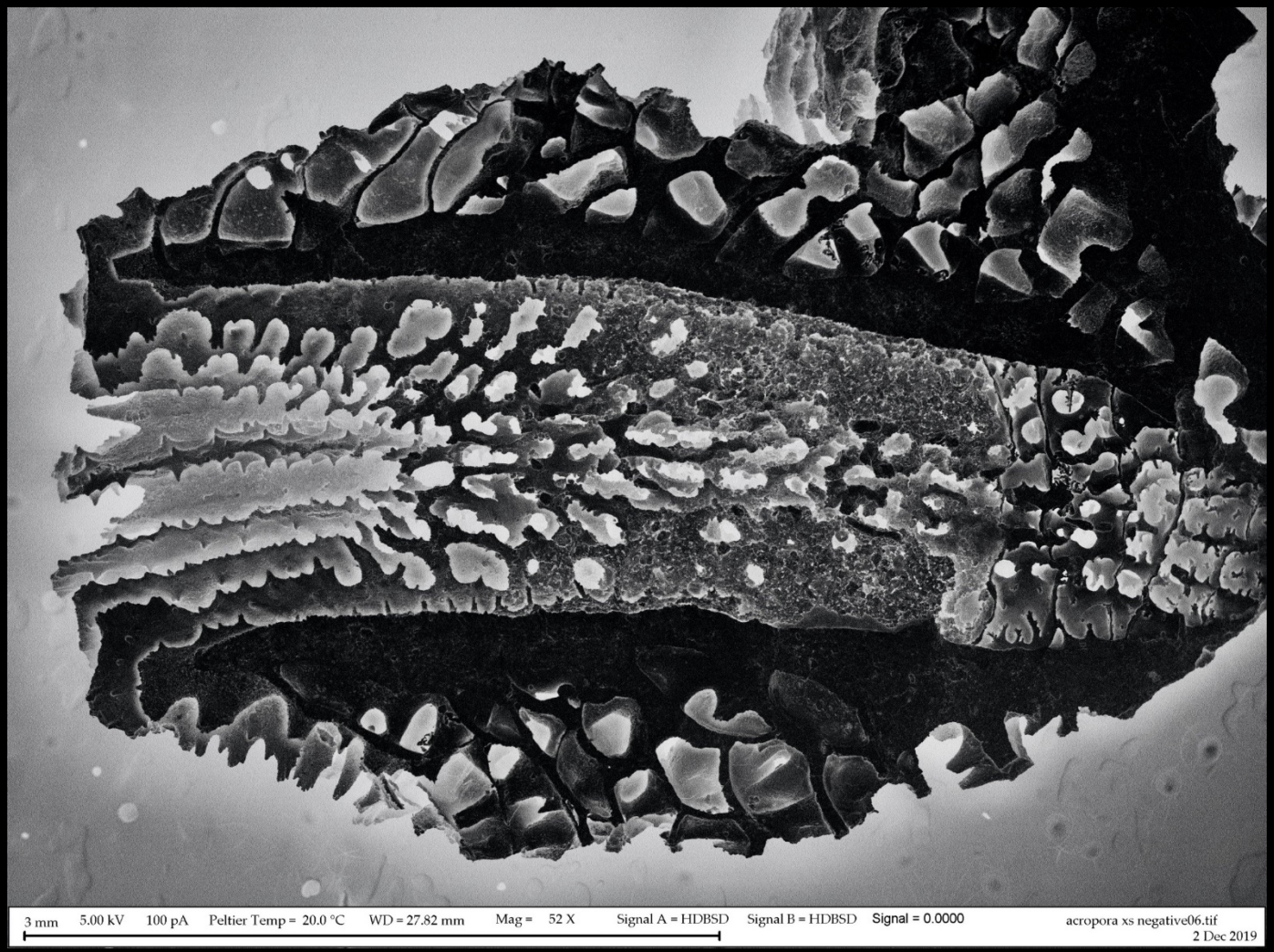
Artists: Jeremy Rios

Title: It's in the Eyes.

Fungi are an important part of our world and provide crucial ecosystem services. Many species live within plants and either benefit or harm their hosts. Their early life stages are composed of threadlike filaments called hyphae. These delicate strands push through their media to find food and grow.

A small cutting from an infected Manzanita was taken and placed on an agar plate. Any fungi residing within the plant tissue feeds on the agar and spreads throughout the dish. As the organism grows in all directions, some areas become thicker than others. After a few days, the explosive growth resulted in this colorful ensemble of hyphae. I used a dissecting microscope with a light shining beneath the plate to capture this image.

Honorable Mention



Artists: Sophie Arango Nebeker

Title: The Expansive Landscape

This is a Scanning Electron Micrograph of a polyp's skeleton called a corallite. A polyp is the tiny animal that, with thousands of its 'siblings', creates the structure we know as a Coral. Without this information, however, it may be an alien landscape, futuristic city, or an abstract painting.

This image was taken with a Scanning Electron Microscope at the Santa Barbara Natural History Museum under Dr. Geiger. Using the negative detector, the black and whites of the skeleton are reversed to create this ominous yet striking image.

Honorable Mention

Artists: Charin Park

Title: An Arduous Story

The story of our oil-rig reefs is a complicated one, but I also find beauty in it: the oceans as a political, ecological, and economic sphere; the tenacity of life to conquer unforgiving places; and the ability of research to uncover seemingly-contradictory nuances to our world.

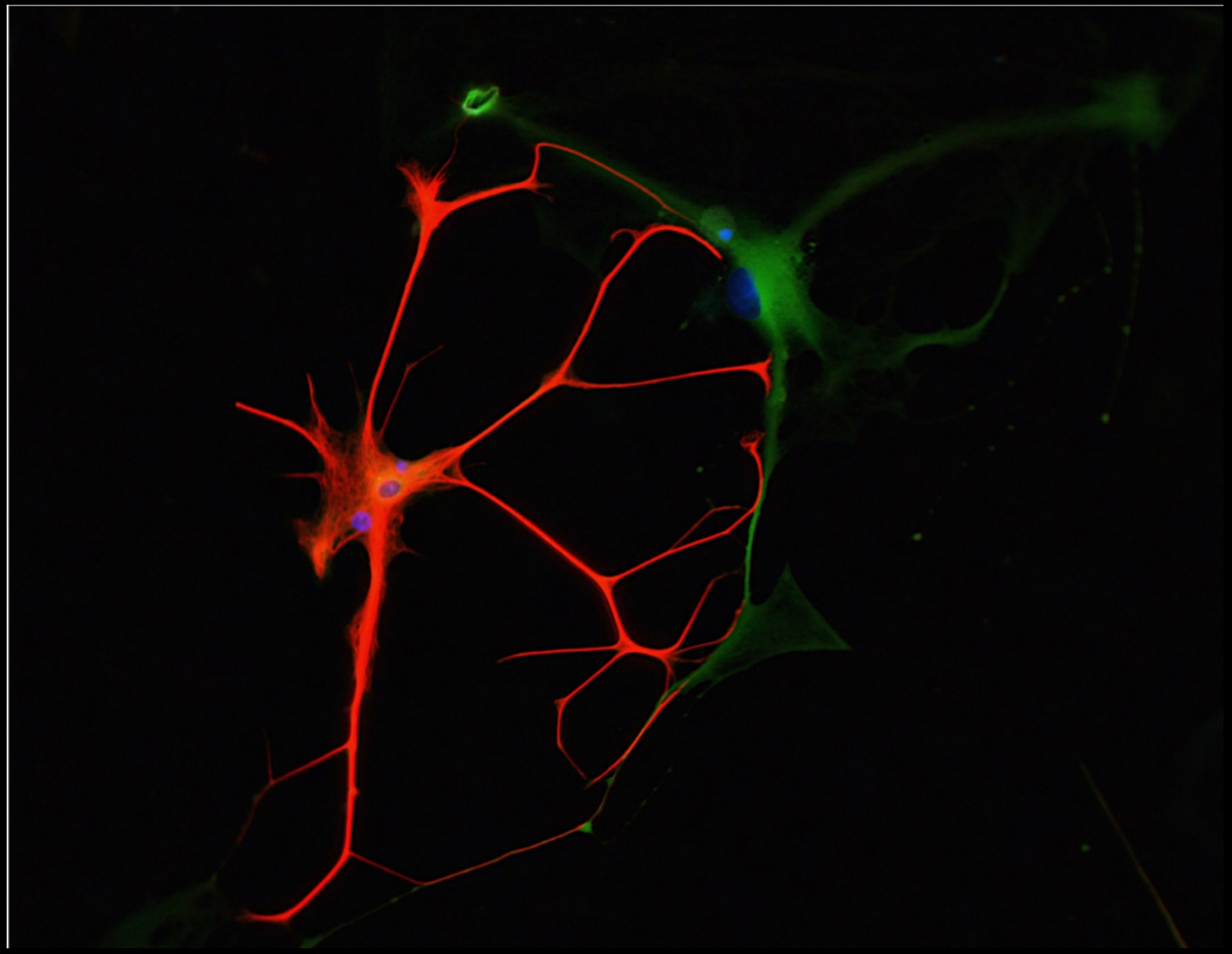
People's Choice

Artists: Melissa Hingorani

Title: Everybody needs a support system

Everybody needs a support system, even cells at a microscopic level. Research culture often involves a hypercompetitive atmosphere, creating a climate that can cultivate anxiety & depression. Developing a support system is vital not just for our cells, but for our own mental & physical well-being.

"An astrocyte (red, GFAP) is seen supporting a neuron (green, MAP2). Astrocytes are the most abundant glial cell of the central nervous system (CNS) and are known to provide both physical and metabolic support to other neural cells.These are primary cells cultured from the cortices of rat pups and imaged with a fluorescence microscope following fixation and fluorescent antibody staining. When culturing primary neurons, it can be crucial to first culture a healthy feeder layer of cells that consists of mostly astrocytes. To obtain our feeder layers, we dissect the cortices of 1-2 day old rat pups, dissociate the cells, and then culture them. These feeder cells then support the growth of target cells (in our case, primary neurons) by releasing growth factors into the culture media."



Best Caption

Artists: Timothy Carroll

Title: Same Bricks - Different Houses

A crystal is comprised of atoms, ions, or molecules arranged in repeating patterns like bricks in a wall. The crystals in this picture may look different, but they're composed of the same chemical building blocks. Slight changes in their molecular arrangement gives rise to a rainbow of crystals.

This picture was taken while preparing a sample for a technique referred to as single crystal X-ray diffraction (XRD). Similar to how a doctor may use an x-ray to generate a visual representation of the bones that comprise a patient's arm or leg, a chemist/scientist can use x-rays to generate a visual representation of the atoms, ions, or molecules that comprise a single crystal. This technique is one of the most powerful characterization techniques in a chemist's toolkit, because it provides a detailed picture of how atoms bond and connect to one another. XRD has led to a better understanding of chemical bonds, non-covalent interactions, and the relative sizes of atoms.

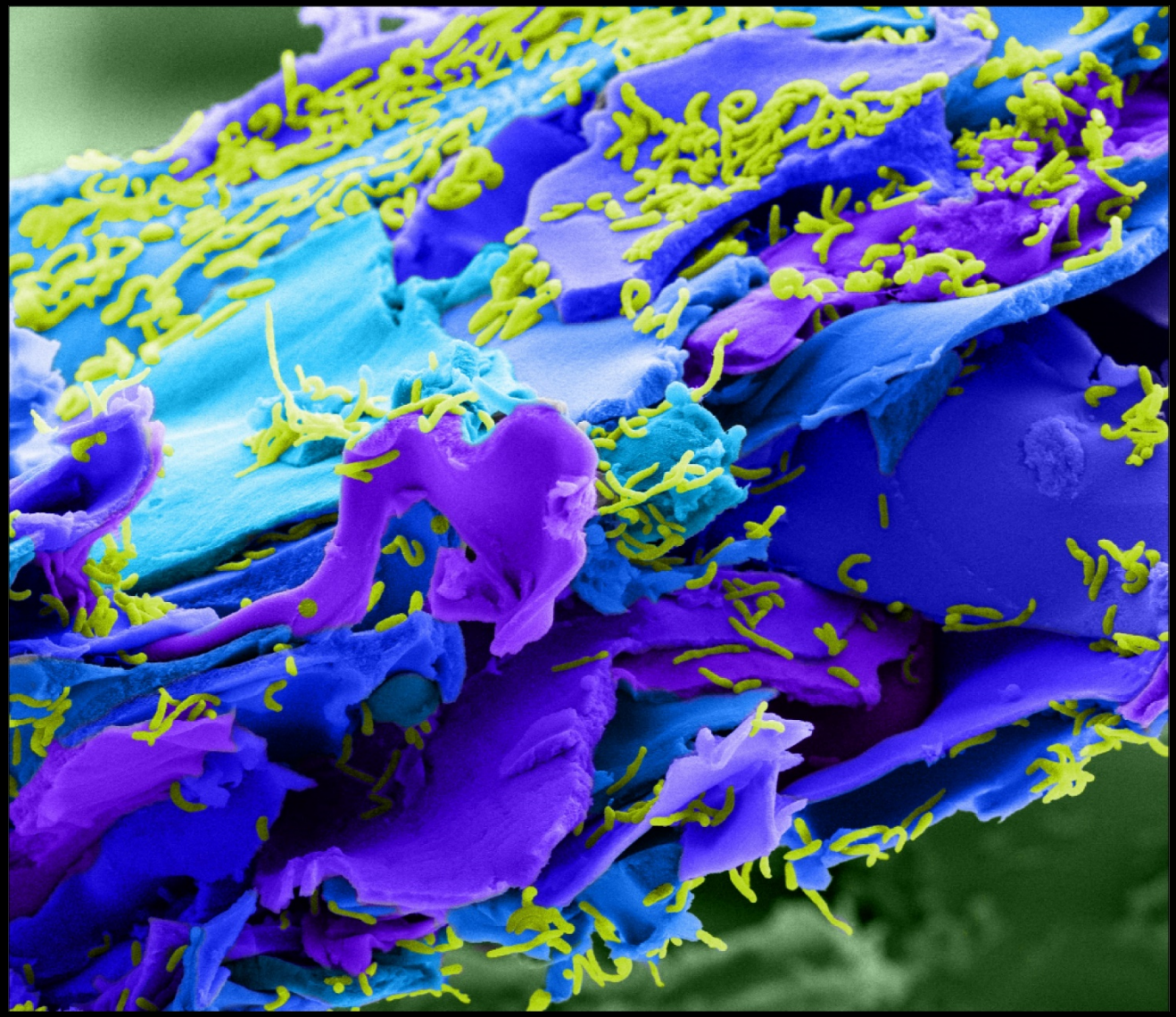
3rd Prize

Artists: Sriram Ramamurthy

Title: Keep Your Friends Close But Your Anemones Closer

It may look like a beautiful flower, but the translucent tentacles of the starburst anemone (Anthopleura sola) are packed with millions of specialized stinging cells called cnidocytes which help it envenomate, paralyze, and capture its prey. Get close - but not too close!

While most individuals of this species come in shades of tan or teal, this highlighter-green individual in a small rock pool at Campus Point stood out vividly. I have never seen one this color before. A. sola has a unique ability to recognize genetically different members of its own species; upon doing so, it will engage in a fight with the other anemone using specialized tentacles designed for warfare. How exactly this complex self-recognition system works is unknown. Image has been retouched slightly to showcase the original color of this brilliant specimen.



2nd Prize

Artists: Samantha McCuskey

Title: Electric Avenues

Electrogenic bacteria have the ability to produce electricity. As they digest food, electrons pass through the microbes and discharge onto external surfaces such as electrodes. Creating a 3D conductive scaffold provides more avenues to collect the microbes' electricity for emerging applications.

Scanning electron microscopy was used to visualize cross-sections of a microbe/conductive polymer composite after one week of collecting biocurrent. The conductive matrix (false-colored blues and purples) spontaneously forms from a water-soluble polymer, encapsulating the electrogenic bacteria Shewanella oneidensis MR-1 (false-colored lime green). By increasing the number of microbes electrically connected to an electrode, we can realize applications such as microbial fuel cells for waste water treatment where microbes can eat the waste and produce electricity at the same time.

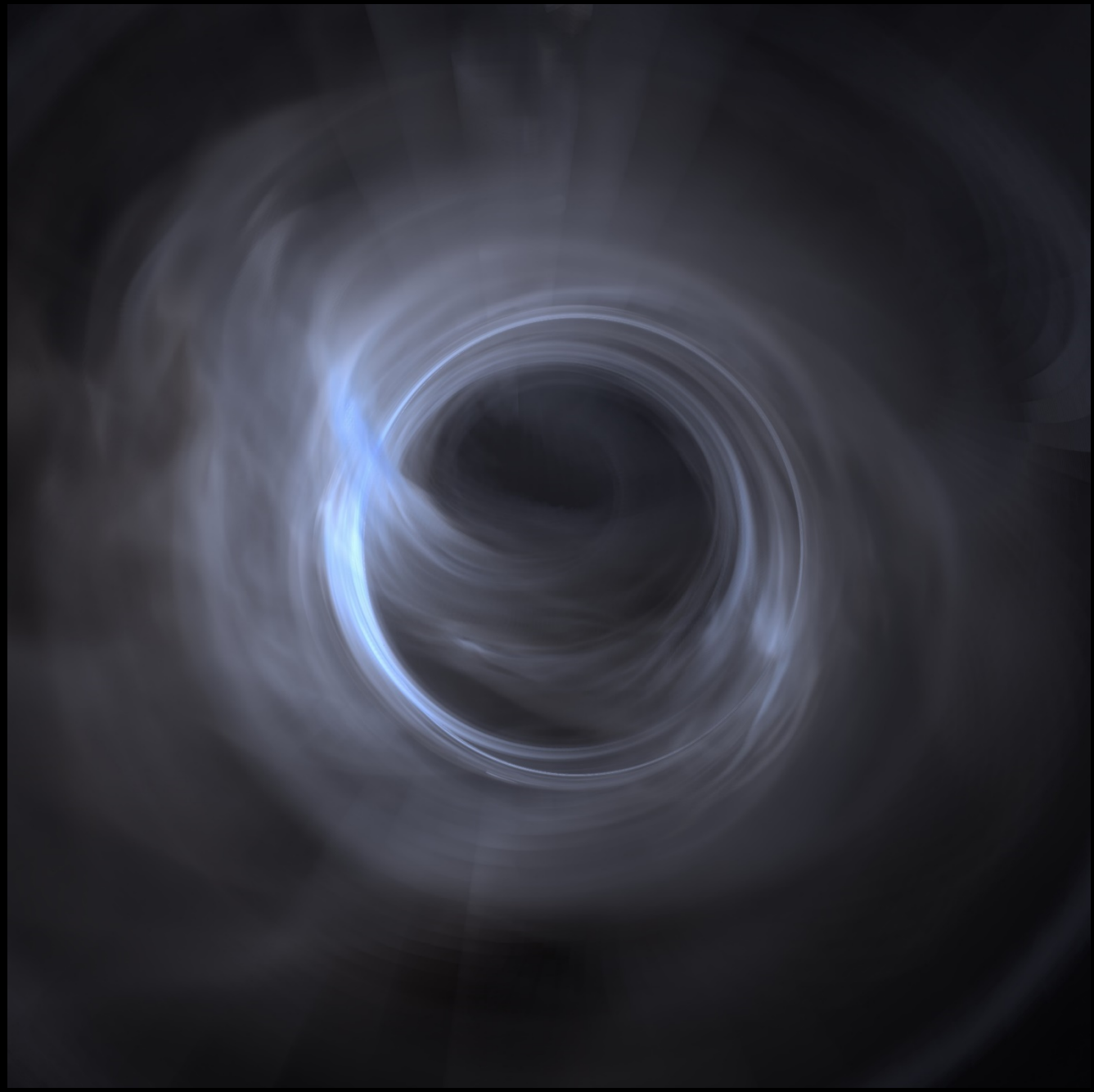
1st Prize

Artists: Chris White

Title: Illuminating a Black Hole

As interstellar gas falls into the black hole in the center of our galaxy, it glows and can be seen by telescopes. Shown is a simulation of this process, with the light shifted into the visible range. Comparing images like this to observations gives us insight into these exotic environments.

The image is generated by first simulating the infalling matter in 3D on a supercomputer, including electromagnetic fields and the effects of general relativity. Next, ray tracing is used to turn a snapshot from the simulation into a 2D image. The light is blueshifted to make it visible (the same thing would happen if one were to speed toward the black hole in a rocket moving at 99.99999% the speed of light). Finally, colors are chosen based on the human eye's response, making this a true color image. The source of the glowing is synchrotron radiation, which is what happens when subatomic particles move through magnetic fields at close to the speed of light. The thin rings come from the black hole bending light rays by warping space and time, acting as a giant cosmic lens.

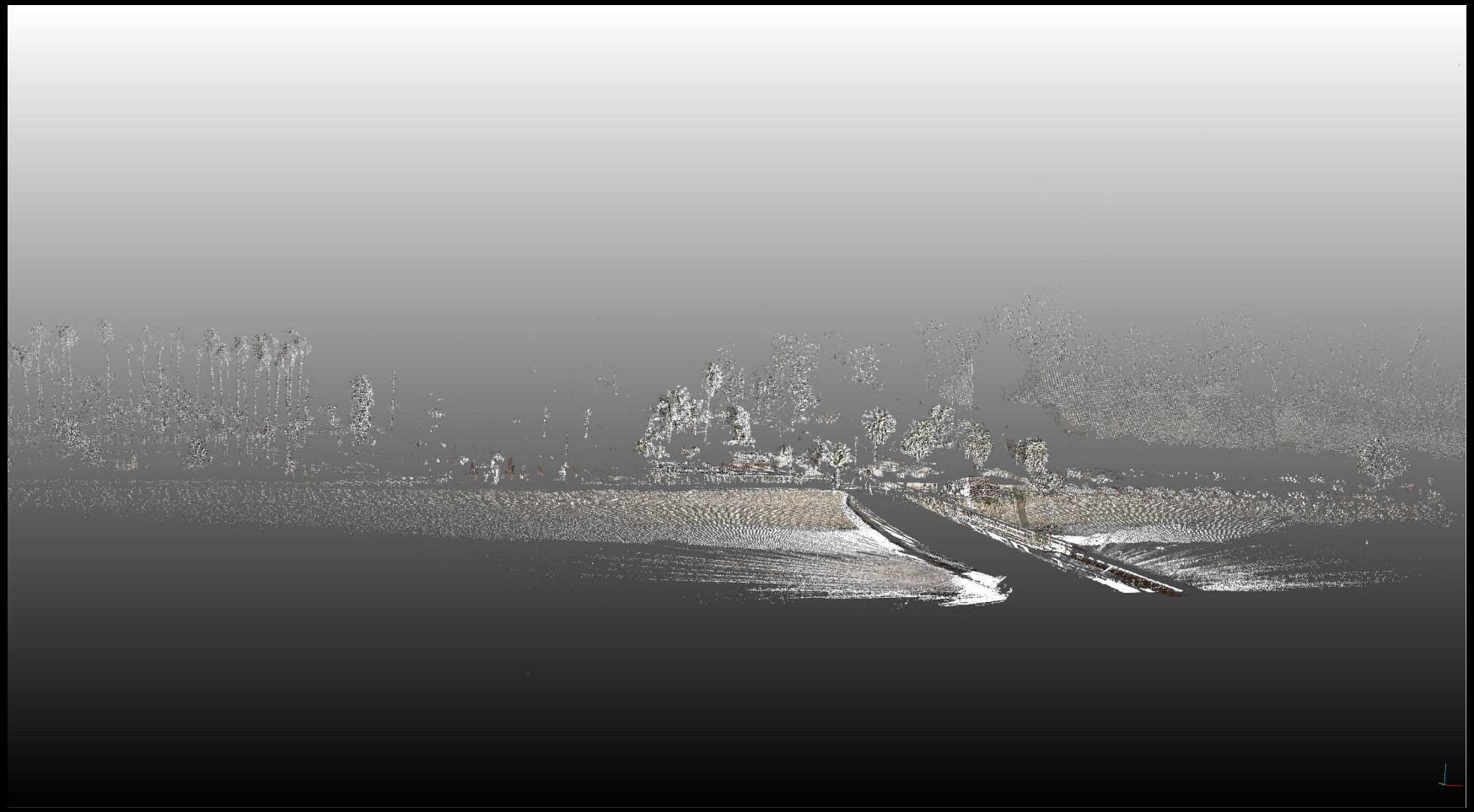


Artists: Caroline Ackley

Title: The Duality of Worm

At only 1 mm in length, the transparent round worm C. elegans is making big changes in our understanding of human biology. Researchers in our lab use C. elegans to study everything from development to personalized medicine to how our brains generate behavior. Small worm, big impact.

Digital illustration based on an original sketch. Open-source image used for reference.



Artists: Paul Alessio

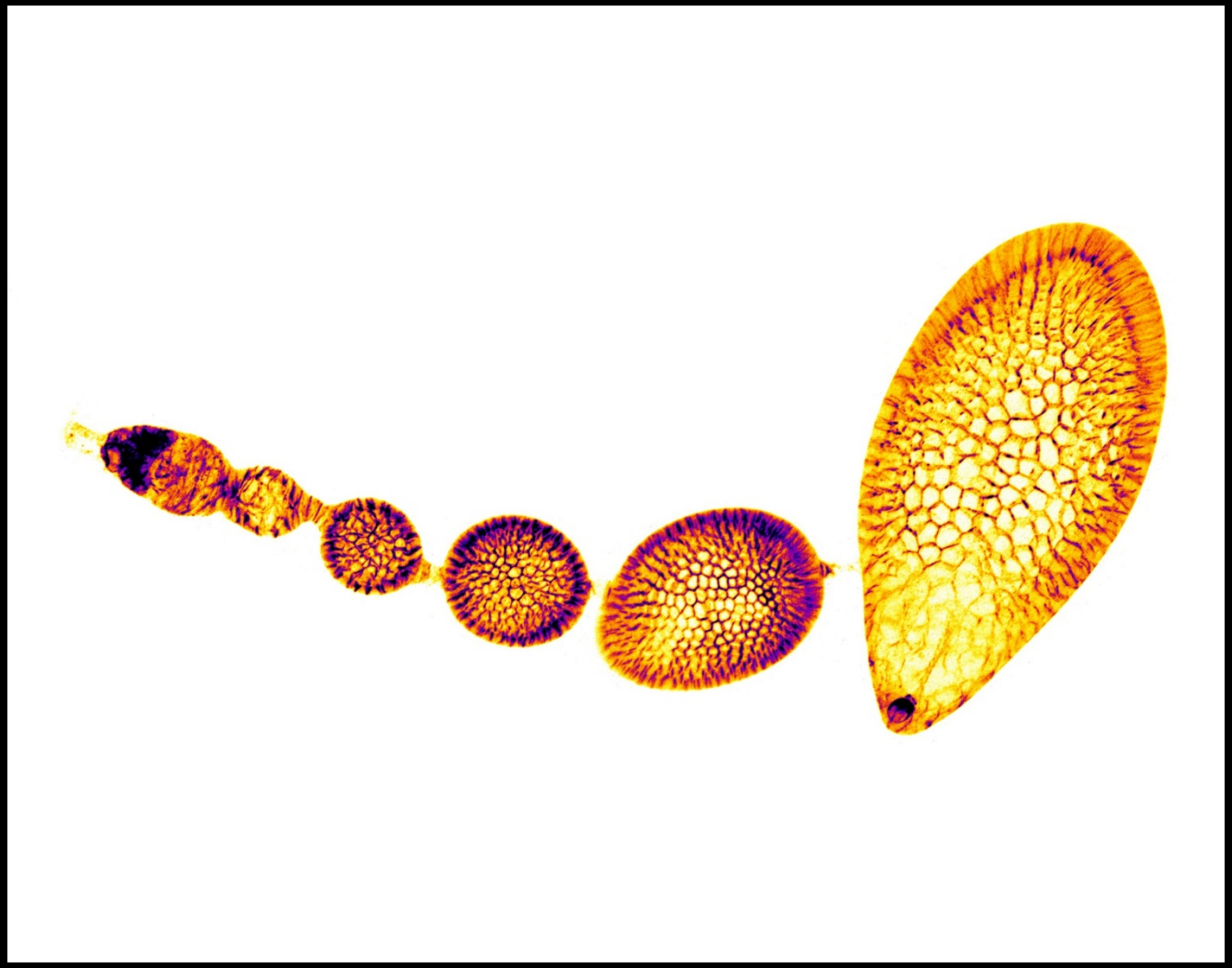
Title: A Robot's View of Goleta Beach

To create this image, the robot (a laser scanning machine) emits individual lasers at a rate of 300,000 beams per second. This technology has many applications, and is used to map the Earth's surface in great detail or inform self-driving cars of where objects are in real time, just to name a few.

Artists: Shantonu Biswas

Title: Silver Snowflakes_Biswas

Nanoworld is amazing. These beautiful snowflakes-like micro-dendrites are made of Silver and are produced during metal-assisted-chemical-etching of Silicon nanowires (in the background). The image is captured using a scanning electron microscope, a common imaging tool to study nanostructures.



Artists: Joseph Campanale

Title: Growing eggs

Can a fruit fly teach us about disease? Yes! A powerful organ, the ovary weighs 30% of the female and is a factory of progressively bigger eggs. Cells surrounding each egg are outlined and like the egg, have shaped fundamental understandings for tissue biology that underly disease, including cancer.

Artists: William Castagna, William Redman

Title: The Ground of Motion

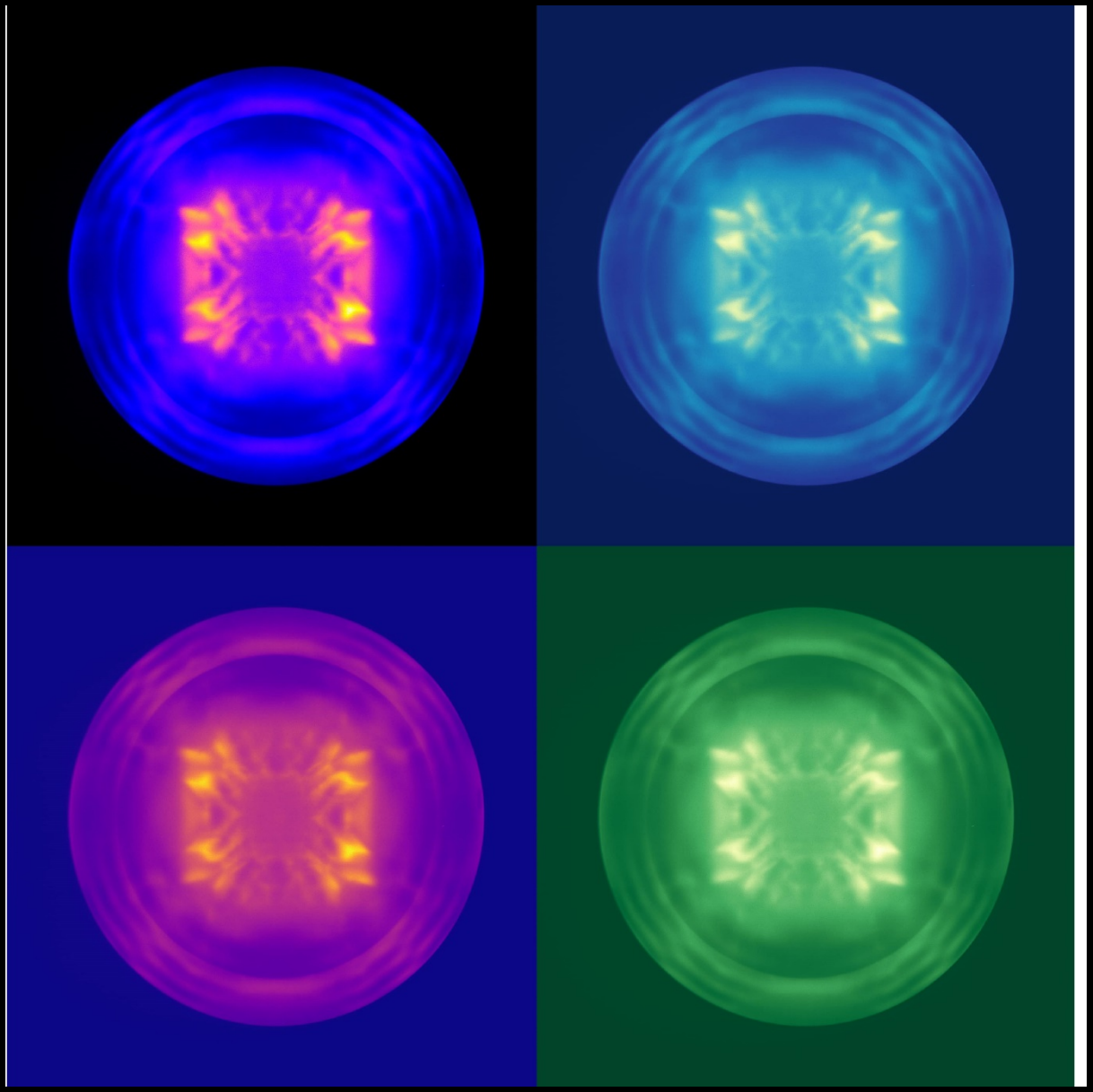
No description of motion is complete without describing the environment in which motion occurs. Though we can image and view the microscopic world through a multitude of techniques, there is none that can honestly express these microcosms of the universe as they actually exist.

To accurately represent the fundamental nature of oneself is extraordinarily difficult because its escapes understanding the same way motion cannot be described in the absence of an environment. This image of the CA1 brain region of our mouse was recorded from a two-Photon Calcium Imaging Microscope.

Artists: Ryan A. DeCrescent, Prasad P. Iyer, Nikita A. Butakov, Abdullah Alhassan

Title: Scattering Crystalline Inevitable

When light interacts with a periodic structure, it can become highly structured due to self-interference. Here, the light originates from excited electrons in a nano-structured crystal, generating 4 bright lobes. The 4-fold symmetry reflects the structure - a 2D square array.



Artists: Avery DeSantis

Title: Urchins Rising

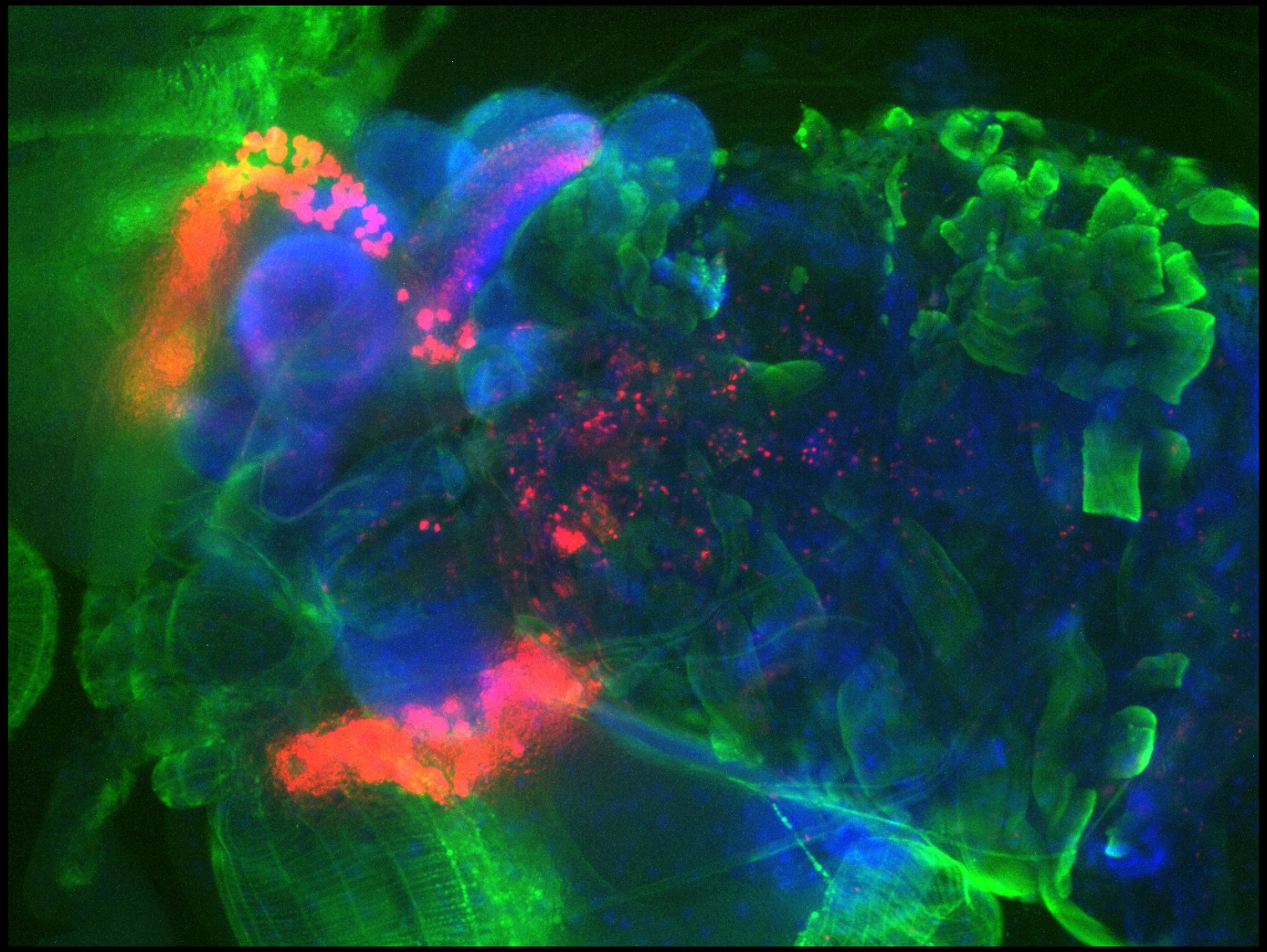
Sea urchins are resilient and findings suggest differences in parental growing conditions affect offspring performance, providing a response to climate change. I created an abstraction of purple sea urchins and their environment to illuminate the scope of organisms impacted by climate change.

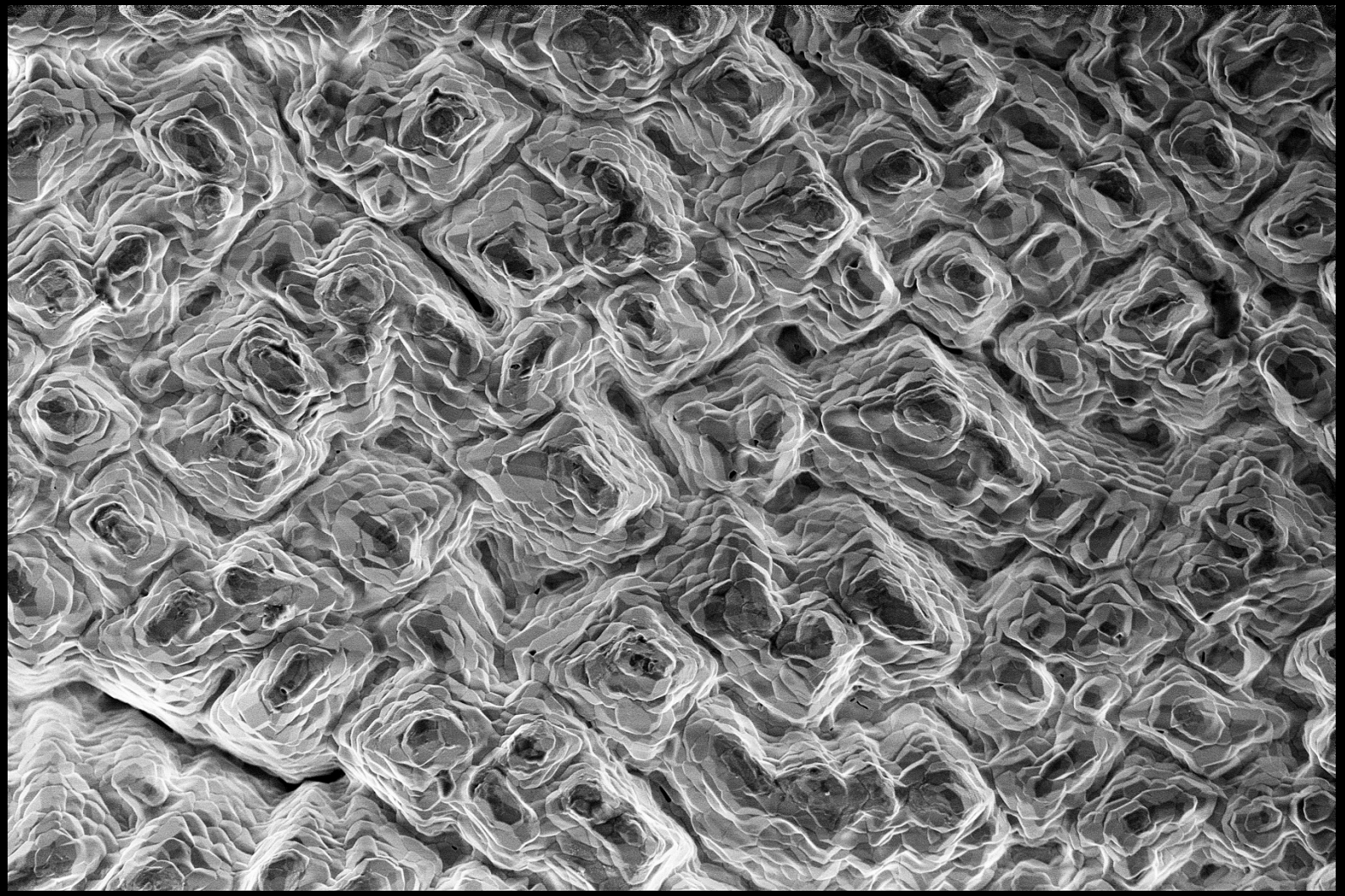
I captured images for this work while helping PhD student Terence Leach study the role of paternal experience on offspring DNA and development in purple sea urchins. When sea urchins release gametes (sperm and egg), they create a beautifully contrasting palette of orange and cream to their purple spines and exoskeleton. Photos of sea urchins, kelp, and the local ocean were illustrated using a Nikon DSLR (digital single-lens reflex) camera. Next, I used Adobe Lightroom and Photoshop editing programs to do the following: adjust the image lighting, extract a color from each environmental component, and create repeating geometric shapes using the color extractions to present a sea urchin landscape. Lastly, I included closeups of each source image to help give context to the piece.

Artists: Shwena Dhar

Title: Imaginal Discs of Drosophila Embryo

An image of the imaginal disc area of the anterior Drosophila embryo. Each color corresponds to a different biological area that will eventually develop into a fly, and demonstrates the intricate complexity of development.





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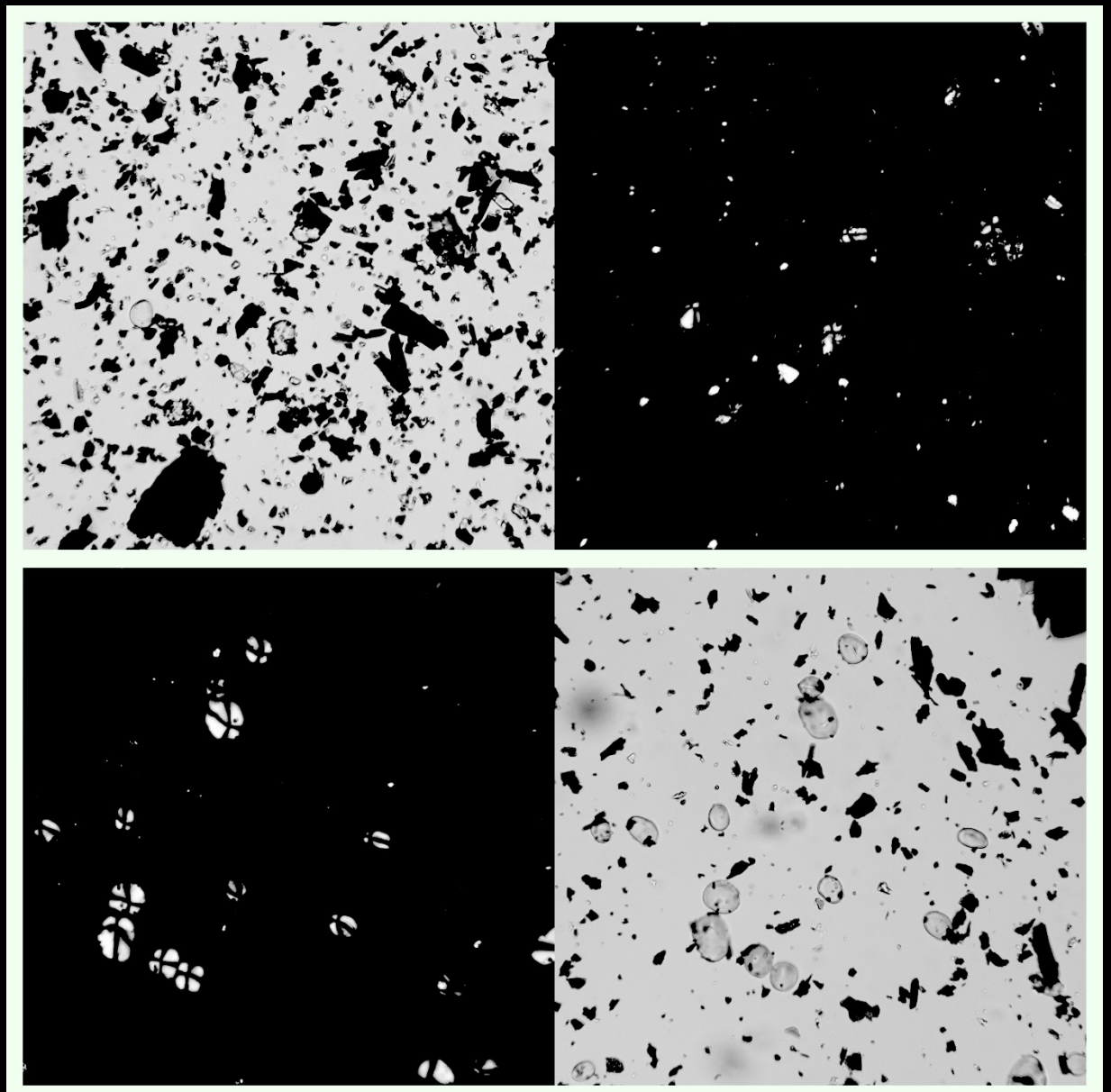


Artists: Delenn Ganyo, Mallory A. Melton

Title: Illumination: Enhancing Starch Visualization in Archaeological Residues

Archaeological starches allow for the identification of foods consumed by ancient peoples, but charcoal can interfere by sticking to these starch grains. These photos represent controlled samples of charcoal and starches prior to and following a procedure developed to minimize charcoal interference.

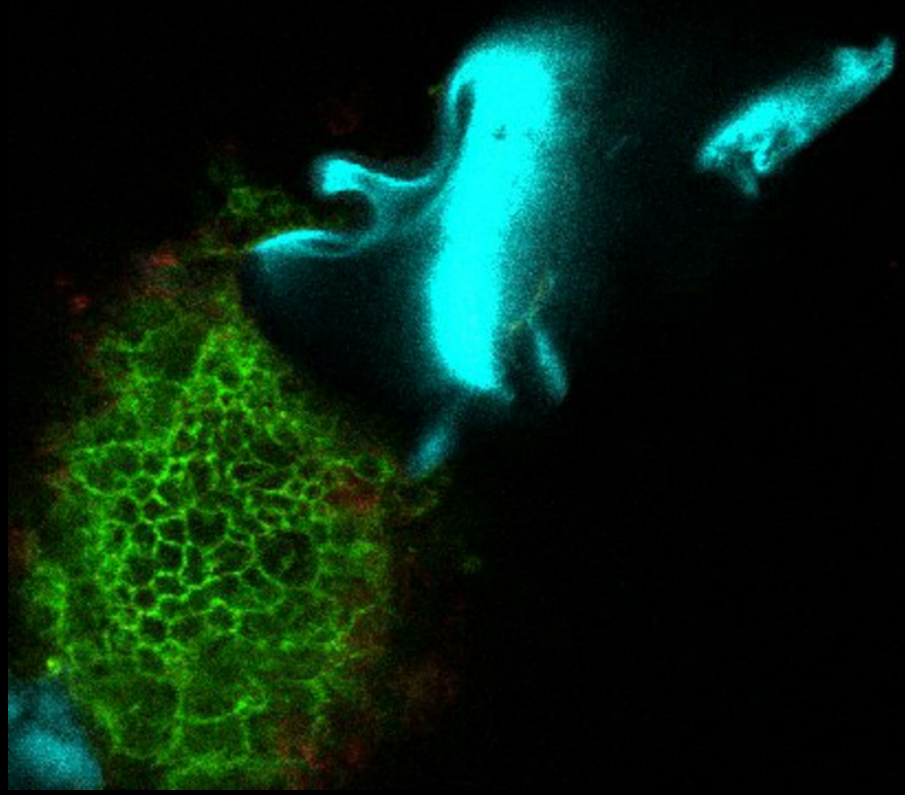
Upper left: 200x view of a controlled mix of charcoal and arrowroot starches, mounted and visualized without processing; upper right: polarized view of the same unprocessed starches; lower left: polarized view of arrowroot starches and charcoal, mounted and visualized following the filtration through a 100-micron screen and a 10% hexametaphosphate wash; lower right: nonpolarized view of the same processed starches.

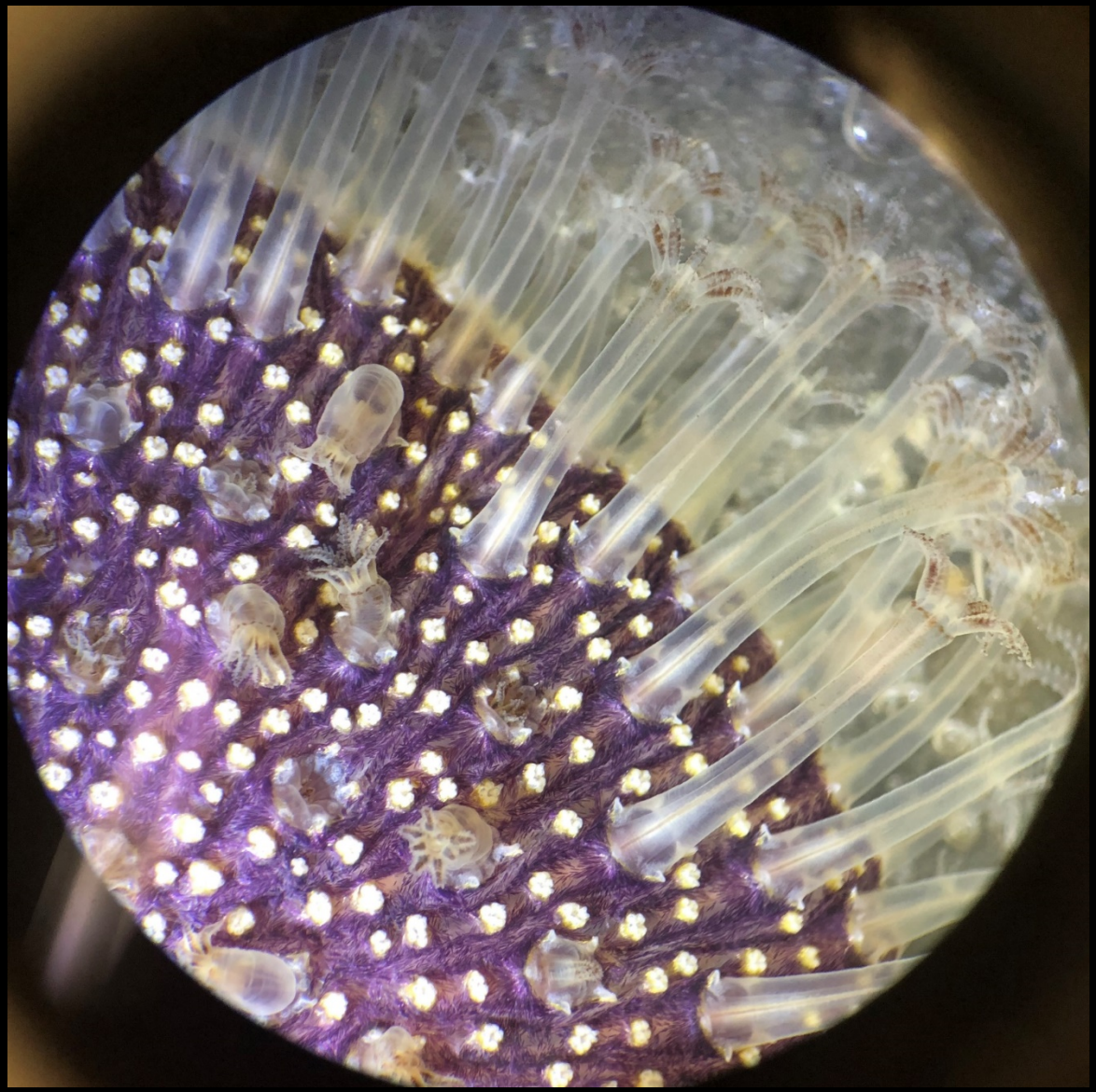
Artists: Carlos Gomez

Title: Ghost of Experiments Past

In our lab, we inject ferrofluid into tissue to measure its material properties. Here, we attempted to inject into a dissected mouse tissue that had its cells fluorescently labelled. Usually, the drop stays in the tissue, but this time it leaked out, giving rise to this eerie blue specter.

This image was an experiment gone wrong. Usually, the ferrofluid droplet stays within the tissue when injected but this time it leaked. The ferrofluid used contained a dye that allowed us to visualize it. The tissue in the image actually started to disintegrate due to it being excised from the mouse by a collaborator hours beforehand. The tissue of this mouse was labelled by green and red fluorescent protein. The image was captured as the ferrofluid was leaving the tissue.





Artists: Nicholai Hensley

Title: A vision in purple

So much of the world's diversity is easily overlooked. Be they small or obscure, many creatures fail to achieve acclaim simply due to their less-than-charismatic style. But each can be appreciated for some unknown charm, if you know how to look.

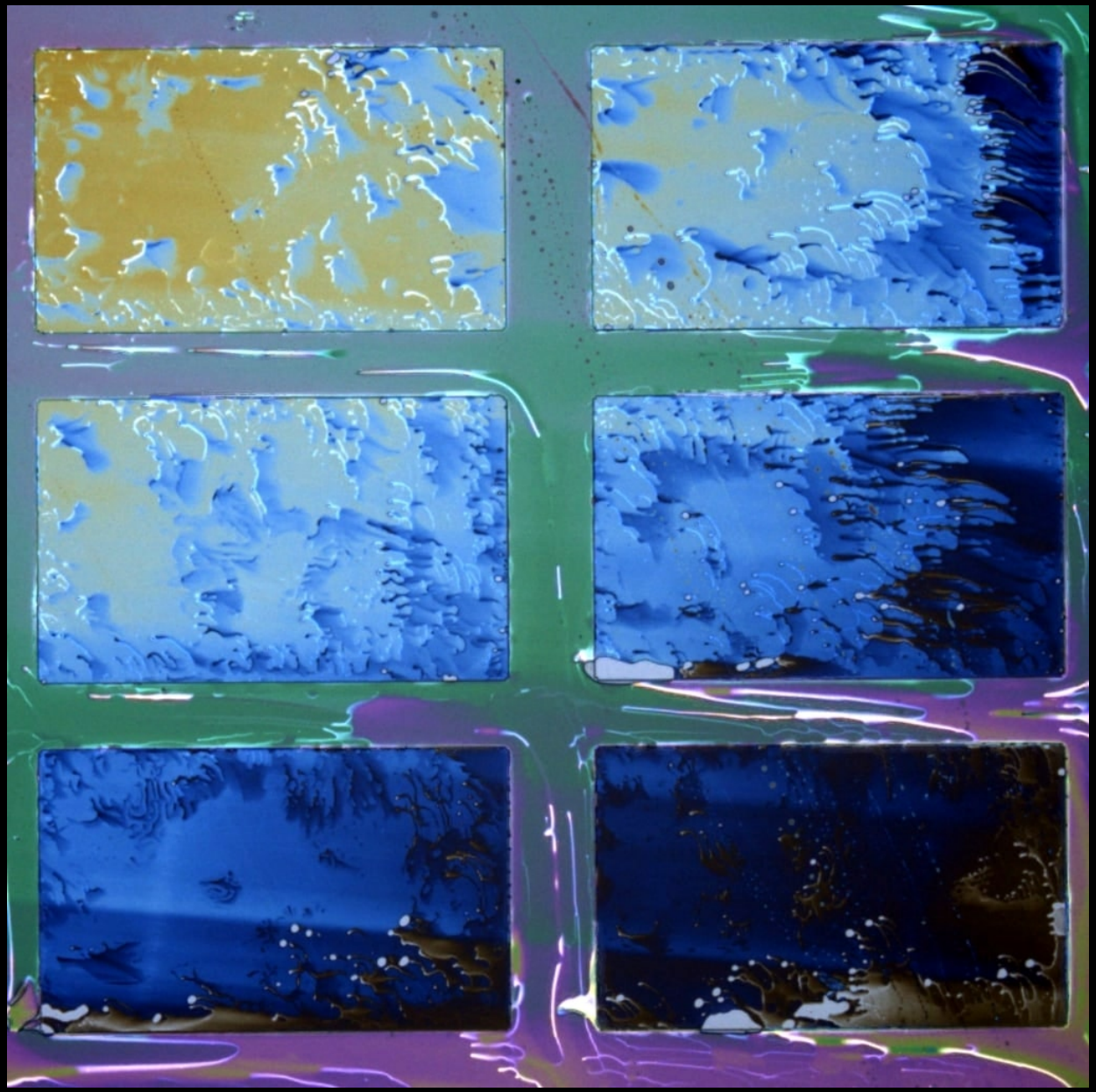
Here, we see the individual, clonal polyps of the Sea Pansy, Renilla reniformis. Related to more famous corals or jellyfish, these little cnidarian animals are all beautifully attached to one another through a shared body, which seems as a large, purple flower. Measuring less than 4 inches in total length, this colony of cooperative clones is rarely spied by the casual beachcomber and prefers to lie subtly beneath the sand. But if disturbed, they can flash a brilliant green glow due to their internal bioluminescence. I hope everyone can find a little more beauty in these gelatinous gems.

Artists: Jonathan Hestroffer

Title: I'm a real microstructure!

Computational materials scientists create models of the materials they study. Typically, visualizations of these of models are utilitarian, with features serving only to support an analysis or conclusion. This 3D rendered model welcomes what is long overdue, imagination and embellishment.

This work depicts a microstructural model of a polycrystalline material sat in the Castello district of Venice overlooking the Venetian Lagoon. The model is bejeweled in glassy crystals representing the grains of the microstructure, with their color indicating crystallographic orientation.

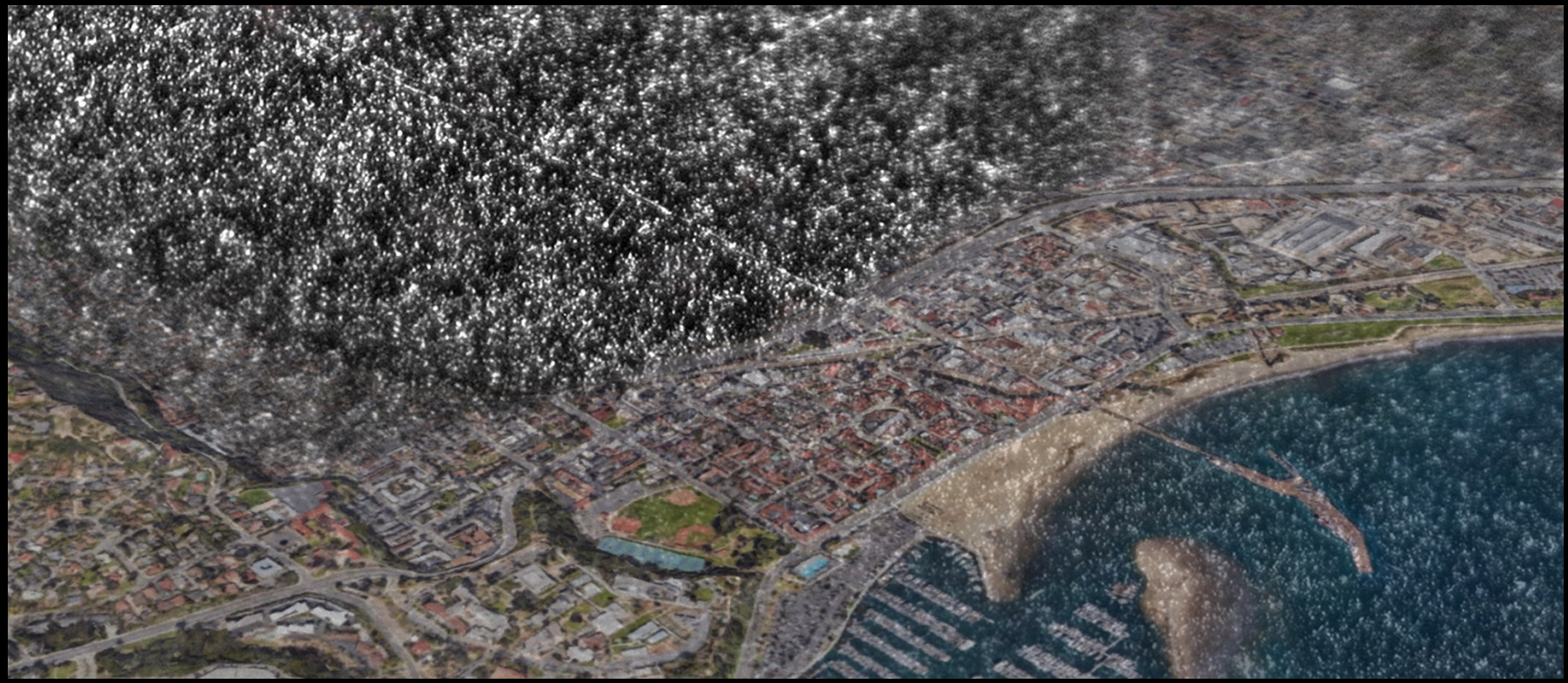


Artists: Jared Kearns

Title: Sunrise to seafloor

Solid state lasers are made by growing a crystals and then processing to form the individual lasers, like sculpting. This involves taking away material, and adding others. When liquids are applied to the structure, they are not always uniformly. When their thicknesses differs, their color changes.

Each of the six rectangular mesas represents a separate laser being fabricated. They were etched in a GaN wafer with a chlorine reactive ion etch. BCB (B-staged divinylsiloxane-bis-benzocyclobutene) was spun onto the wafer. However, due to a contaminant on the surface of the wafer altering the flow pattern of the BCB, the final thickness was not uniform and the "wave-like" pattern is seen. This image was taken with an optical microscope.



Artists: Martin Kurnick, Kaylyn Leung

Title: Not just Skimming the Surface

Gold appears flat and shiny to the eye, but under a microscope it has features so fine it resembles the streets of Santa Barbara. Scientists use microscopy to study surfaces and improve technologies. Like our city, gold is beautiful from afar, but up close we appreciate its beauty even more.

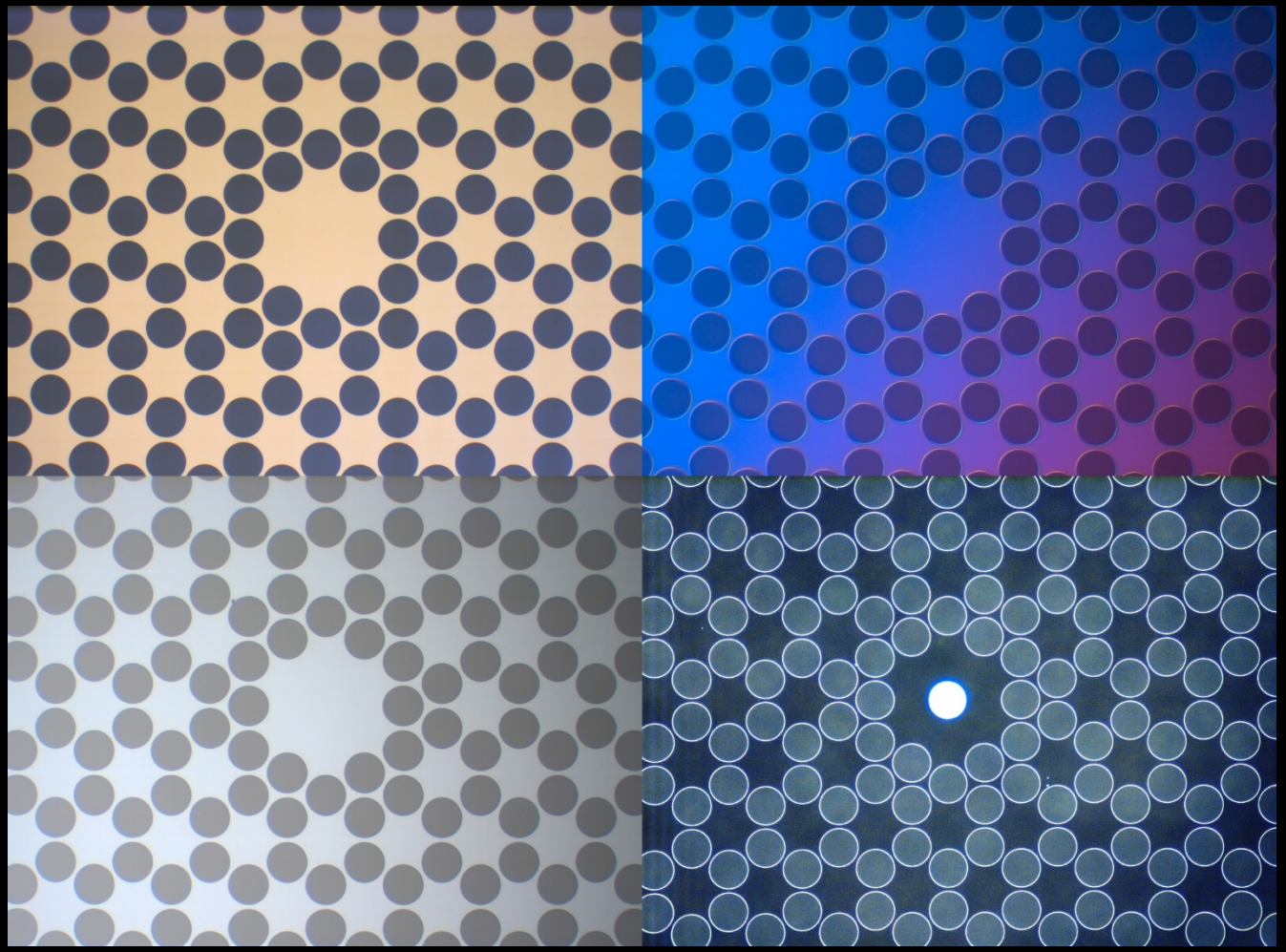
This image was obtained with the help of Dr. Ben Lopez in the Neuroscience Research Institute and the Department of Molecular, Cellular and Developmental Biology (NRI-MCDB) MICROSCOPY FACILITY at the University of California Santa Barbara using an inverted epi-fluorescence Olympus microscope. The gold surface was covered with deoxyribose nucleic acid (DNA) molecules modified to react with the surface and a fluorescent label. Images were obtained using a 10x objective. On that scale, the approximate width of this image is 1 mm wide.

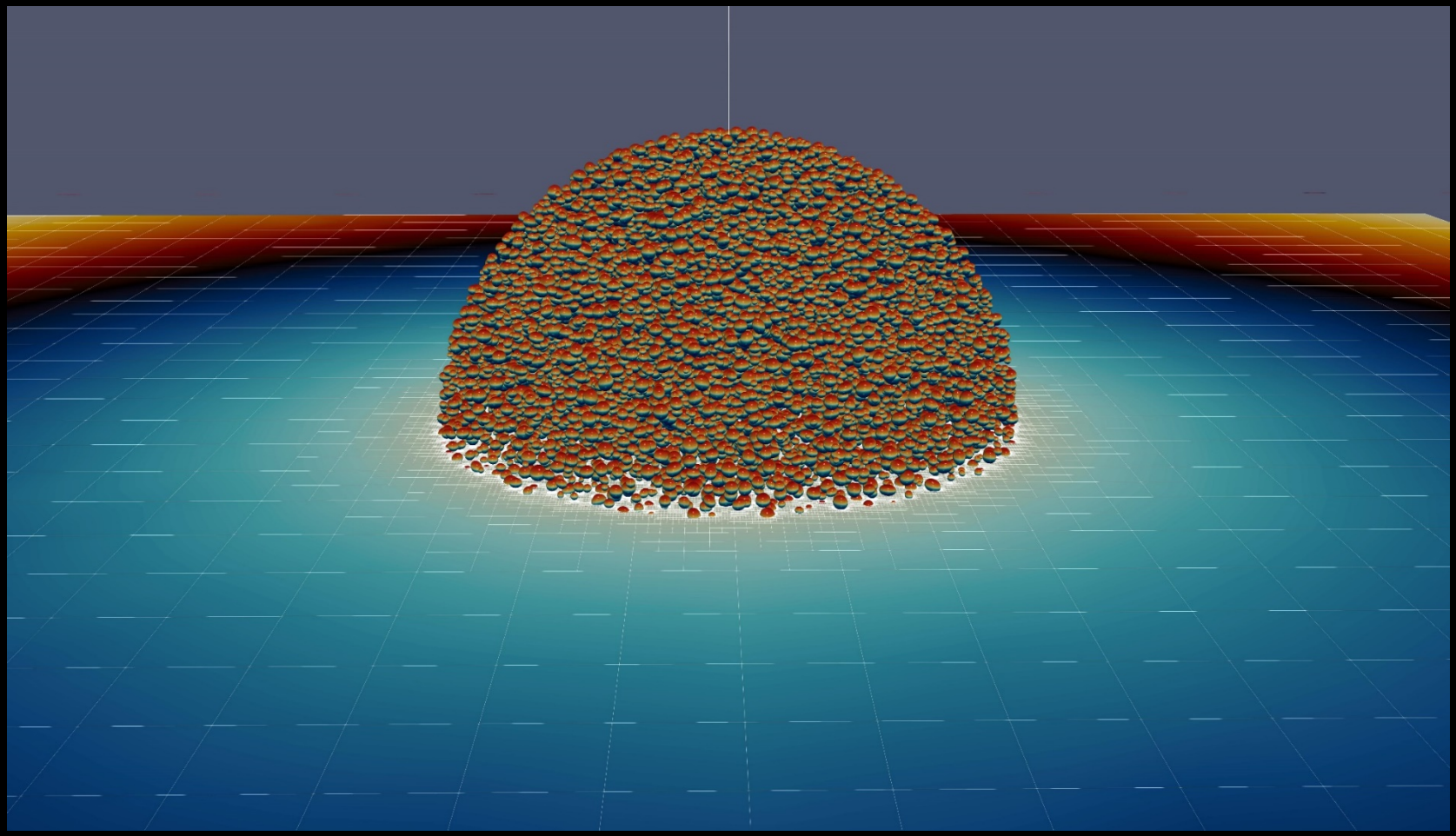
Artists: Fernando Luna

Title: Sound Crystals

You are looking at a silicon nitride membrane 1000 times thinner than a human hair. It is patterned with a phononic crystal, a regular arrangement of holes that shield the central region from sound waves. These devices enable experiments that test the quantum nature of all the objects around us.

Top left: optical image of a 50 nm thick silicon nitride membrane patterned with a phononic crystal. The defect region is about 250 microns wide. Top right: a similar membrane imaged through a polarizer, an analyzer and a Nomarski prism. Bottom left: optical image of a similar membrane coated with 50 Å of platinum. Bottom right: dark field optical image of a similar membrane which also has a photonic crystal patterned in the defect region to enhance the reflectivity for 1064 nm light.





Artists: Pouria Mistani

Title: Shining Light on Cancer

Effective chemotherapy can be achieved with the help of strong electrical pulses, a process that is known as "electroporation". Despite its promises, a model at the tissue scale is not conceived yet. This work is a large computational step in this direction.

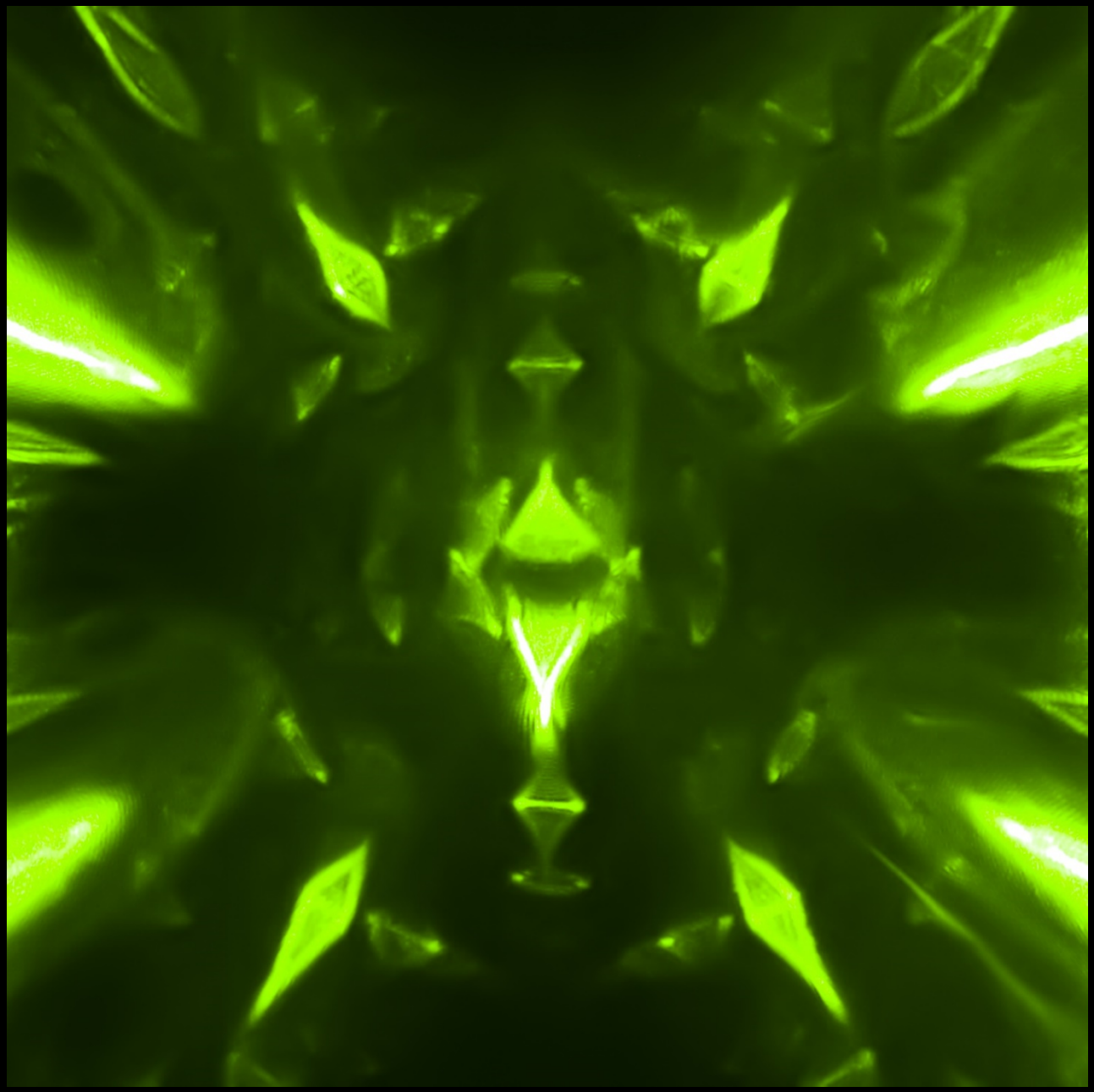
We have developed the first large scale computational simulation engine to study electroporation at the tissue scale using supercomputers. In our simulations we capture the complex interactions of cells with oscillating electric fields passing through a tumor spheroid, and develop an effective model that will guide actual medical treatments.

This artwork is an image from the simulation of a large, spherical cluster of cells responding to an electric pulse. Cells in the aggregate are color-coded by their transmembrane potential (hotter colors on cells imply higher transmembrane potential). The equatorial slice is to illustrate some of the computational techniques used for solving bioelectric interactions on the cell membranes.

Artists: Yahya Mohtashami

Title: Meta-lion

Diffraction of green light in a structured surface, called a metasurface, creates this beautiful pattern that looks like a lion. This metasurface is made of more than one million 1-micron-tall nanopillars with an average diameter of 150 nm each of which scatter light in a specific direction.



Artists: Michael Nekrasov

Title: Instrument in flight

An Unmanned Aircraft System (UAS) hard at work mapping cellular and TV white space over Iipay Nation of Santa Ysabel. New tools like these allow wireless network researchers to get insight into rural tribal broadband internet access in hard to traverse region (like snowy mountains of Santa Ysabel).

The image was captured during an experiment where a DJI Matrice 100 was flow (with permission and cooperation from local tribal council) over the Iipay Nation of Santa Ysabel. The UAS was equipped with a software defined radio (NooElecRTL-SDR RTL2832U and Elonics E4000 Tuner) that contentiously sampled frequency utilization on cellular frequency bands as well as TV bands. We are partnered with locals in testing new internet access tech (like TV white space radios that we deployed at Santa Ysabel) to extend internet access to under served populations. The image was captured on a particularly challenging day when an unexpected late night snow storm covered the higher altitudes (including a relay tower we needed to access) in snow.

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Held in silence,
Like the Trojan horse.
Concealed under an Egyptian pile,
Smuggled out of view, lifted across the sky.
Idols of Dionysus’ dreamers
And heroic moments of Plotinus!
Dedicated in equanimity
To thee, Father of the waking, waking mind.
And Maximus, just as Whistler decorously slips
His pen among his grave-doors,
And plied the rabbit-rum with vicissitudes
Of resinous sweetness, leave not
That tomb of innocence which bones to memory,
Till purgatorial knowledge is bottled up.
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Choose a religion,
Call for a state role play
On mysticism’s junior partners,
And weave your magical story–
The elitist creed that strings along for all
The mystical giver.
Enthusiastically
Frankenstein’s themes become his play.
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Artists: Misha's Laptop's GPU, Misha Obukhov

Title: Make your own Bible

"We use state of the art NLP architecture (GPT-2 2019) inspired by the landmark OpenAI paper, ""Language Models are Unsupervised Multitask Learners"" to generate poetry and dialogue.Our Deep Learning model is trained on the work of prominent modernity poets and the favorites of some personal friends."

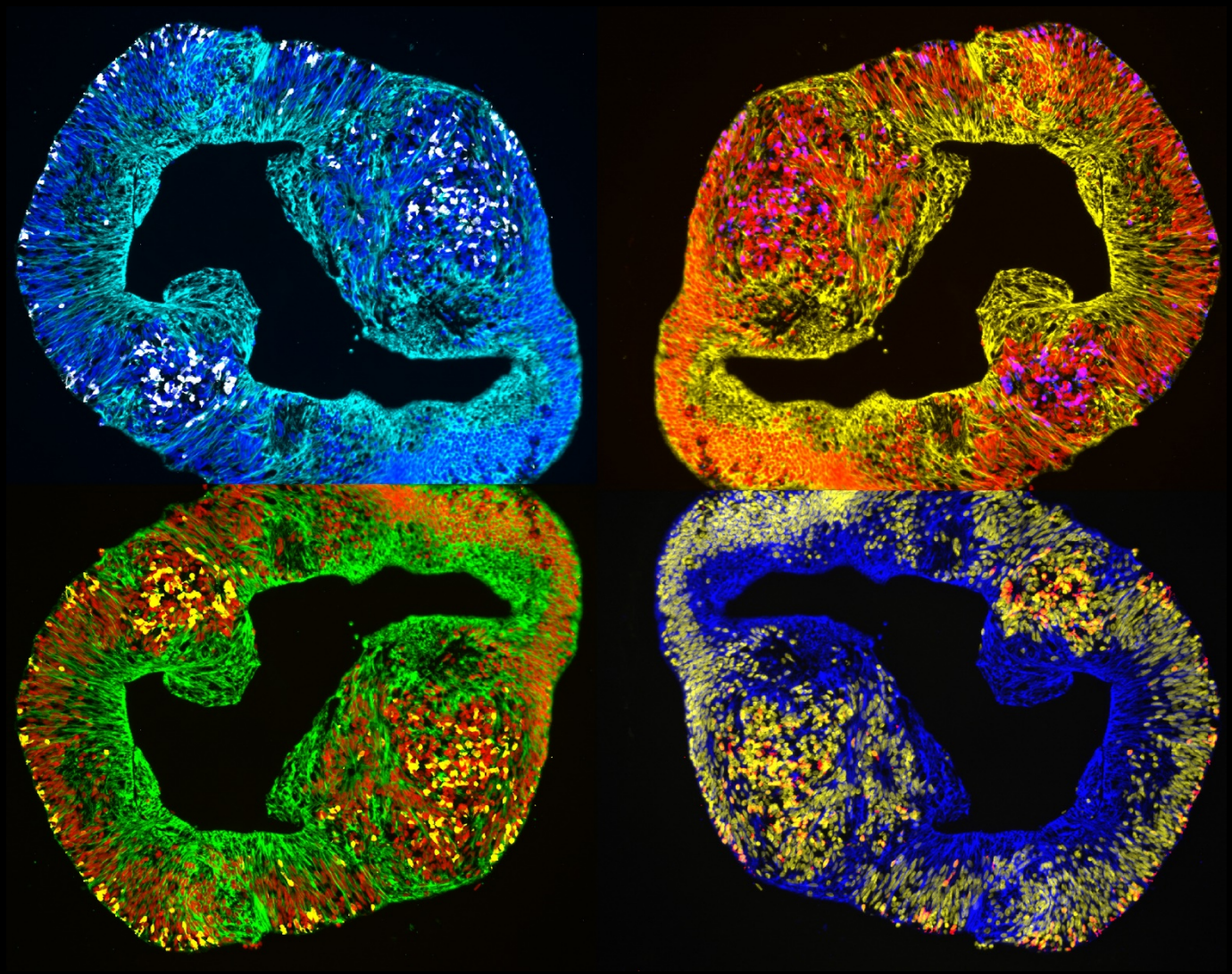
"The model is trained by a corpus of work by the following poets:Ezra Pound, T. S. Eliot, William Carlos Williams, William Butler Yeats, Wallace Stevens, Charles Olson, Mina Loy, E. E. Cummings, Gertrude Stein, Marianne Moore, Hart Crane, Basil Bunting, Henry David Thoreau, Charles Bukowski, William Butler Yeats, Edgar Allan Poe, Robert Frost, Emily Dickinson, John Keats, Ralph Waldo Emerson, Ilya Kaminsky, Mary Oliver, Walt Whitman, William Wordsworth, and Sylvia Plath.The model was constructed based on the GTP-2 architecture as outlined by OpenAI and trained over a timespan of 6 hours."

Artists: Nathaniel Ortega

Title: Eclipsed

This is an image of a rolled leaf micro habitat. A diverse range of colorful critters were found inside these rolled leaves including flies, katydids, acari, true bugs, beetles, and spiders! We need to protect nature to protect both macro and micro habitats like these.

I studied through UCEAP last quarter in Costa Rica in the Tropical Biology and Conservation, Monteverde program. Part of the program was to do an independent research project. My research project was on the use of Heliconia Monteverensis and Calathea Crotalifera rolled leaves by arthropods.These two plants with large leaves. When the leaves are forming they come out rolled. Some of the beetles found within have evolved to be specialized within the rolled leaves of these species: eating, sleeping, and reproducing within. The rolled leaves of these plants were full of diversity. Imagine all the life unseen in nooks and crannies everywhere. By protecting natural landscapes, we will protect both the large living things and the smaller living things that are usually unseen.



Artists: Duncan Proctor and Joseph Melgoza

Title: Retinal Organoid Butterfly

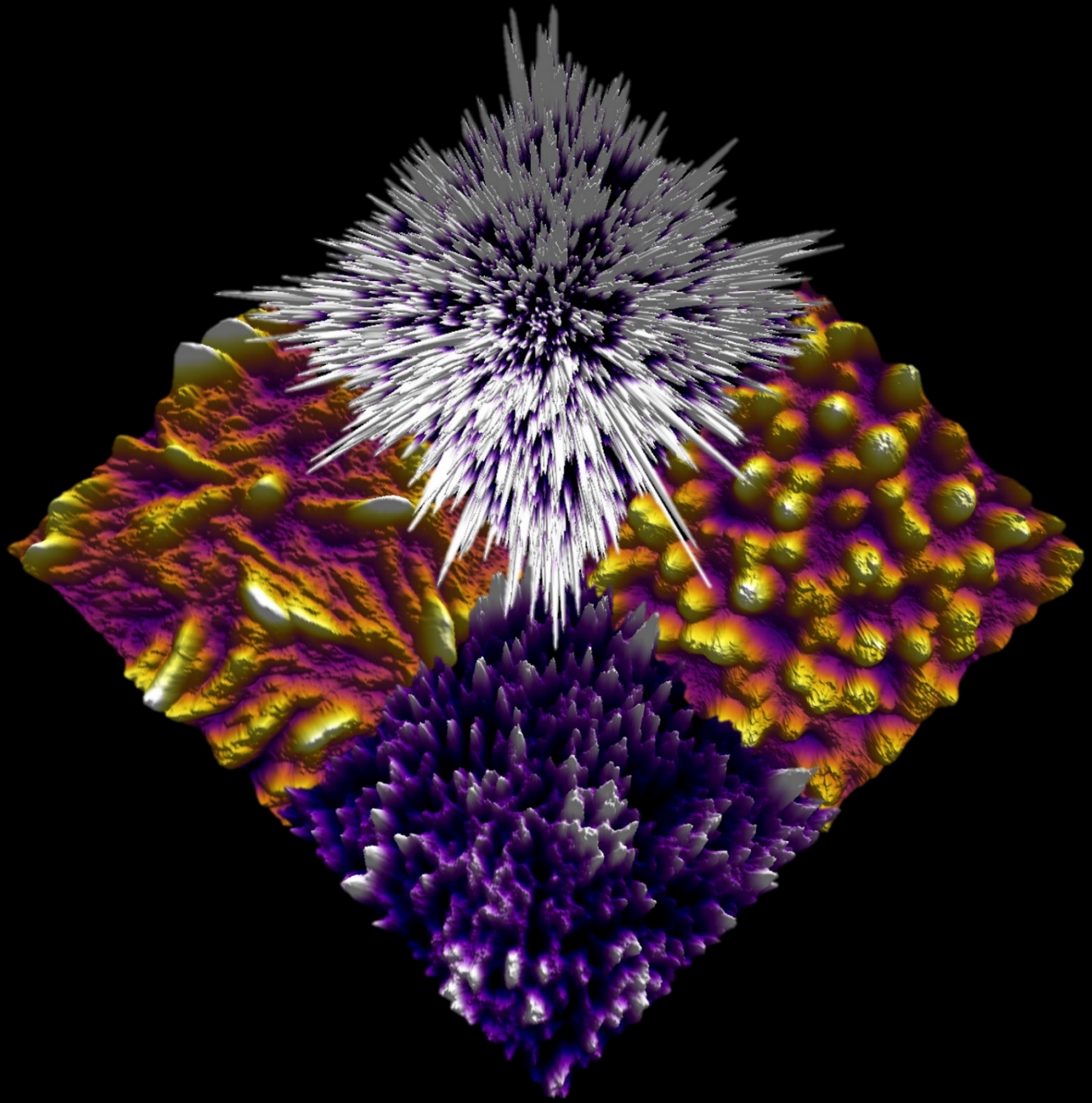
Retinal organoids (ROs) are three-dimensional cultures of retinal cells derived from stem cells, offering a model that addresses the functional and architectural complexities of the human retina. ROs are a beautiful glimpse into viral pathogenesis on the health and development of the retina.

Artists: Jeff Rossin

Title: Disordered Symmetry of Aerospace Additive Manufacturing

The color and disorder in this image are created by looking inside a metal sample made by 3D printing (Additive Manufacturing). I assign color to the different regions based on what the orientation of each metal crystal (grain) is, creating the beautiful tropical effect here.

Electron Backscatter Diffraction enables a quantitative look inside of metal samples created for aerospace applications. This solid titanium sample was created by firing a laser at titanium powder particles and iteratively fusing them layer by layer to the metal below. The result is a final part with complete design freedom. This image took over 4 hours to gather inside a scanning electron microscope, at high accelerating voltage and current.



Artists: Nora Schopp

Title: NanoWorlds

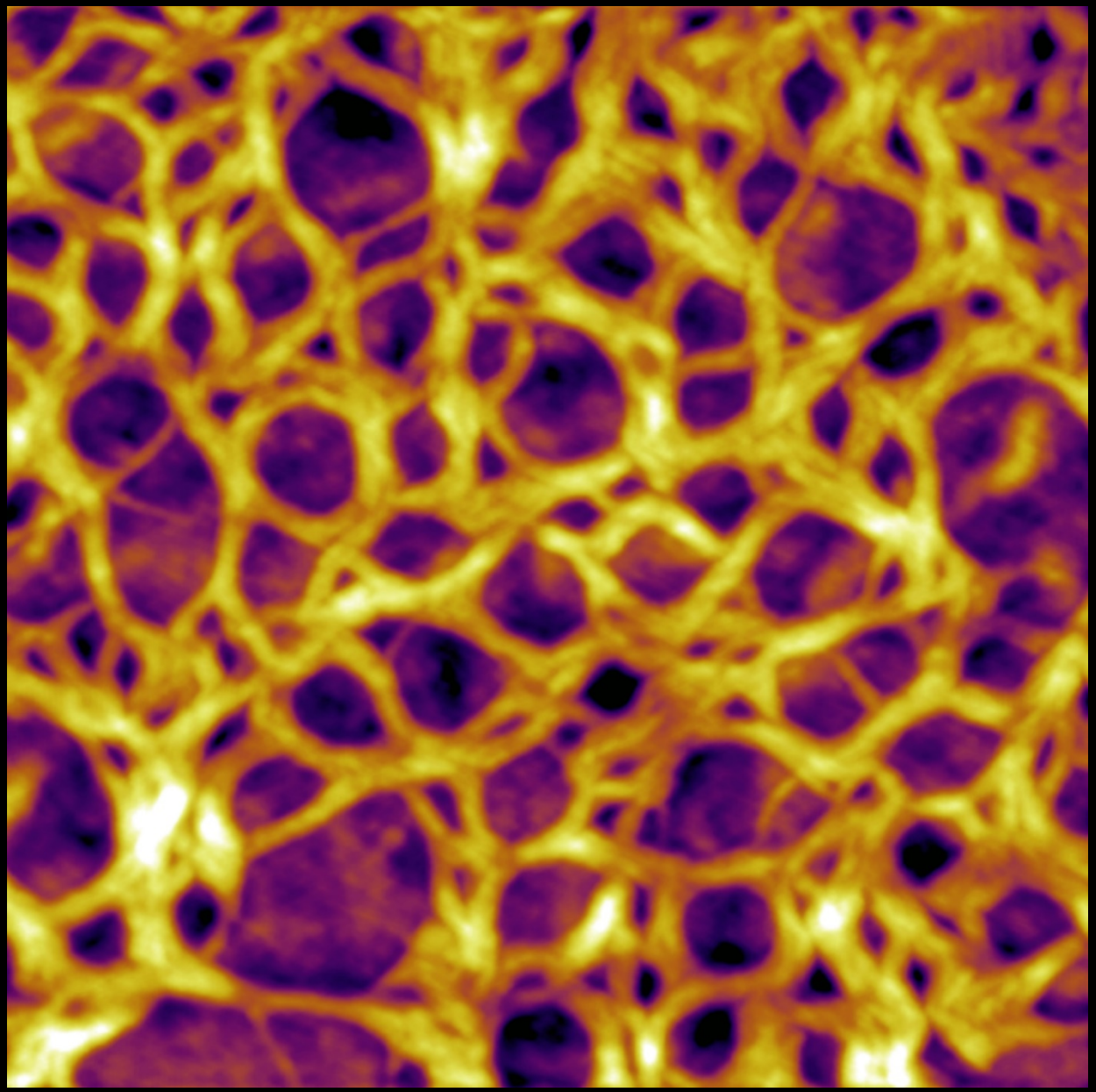
Unraveling the invisible - this is what our Atomic Force Microscope does. We find more different surface nanopatterns than we can imagine, each measurement of a new material holding another surprise. We apply the technique to organic solar cells, which promise sustainable energy harvesting.

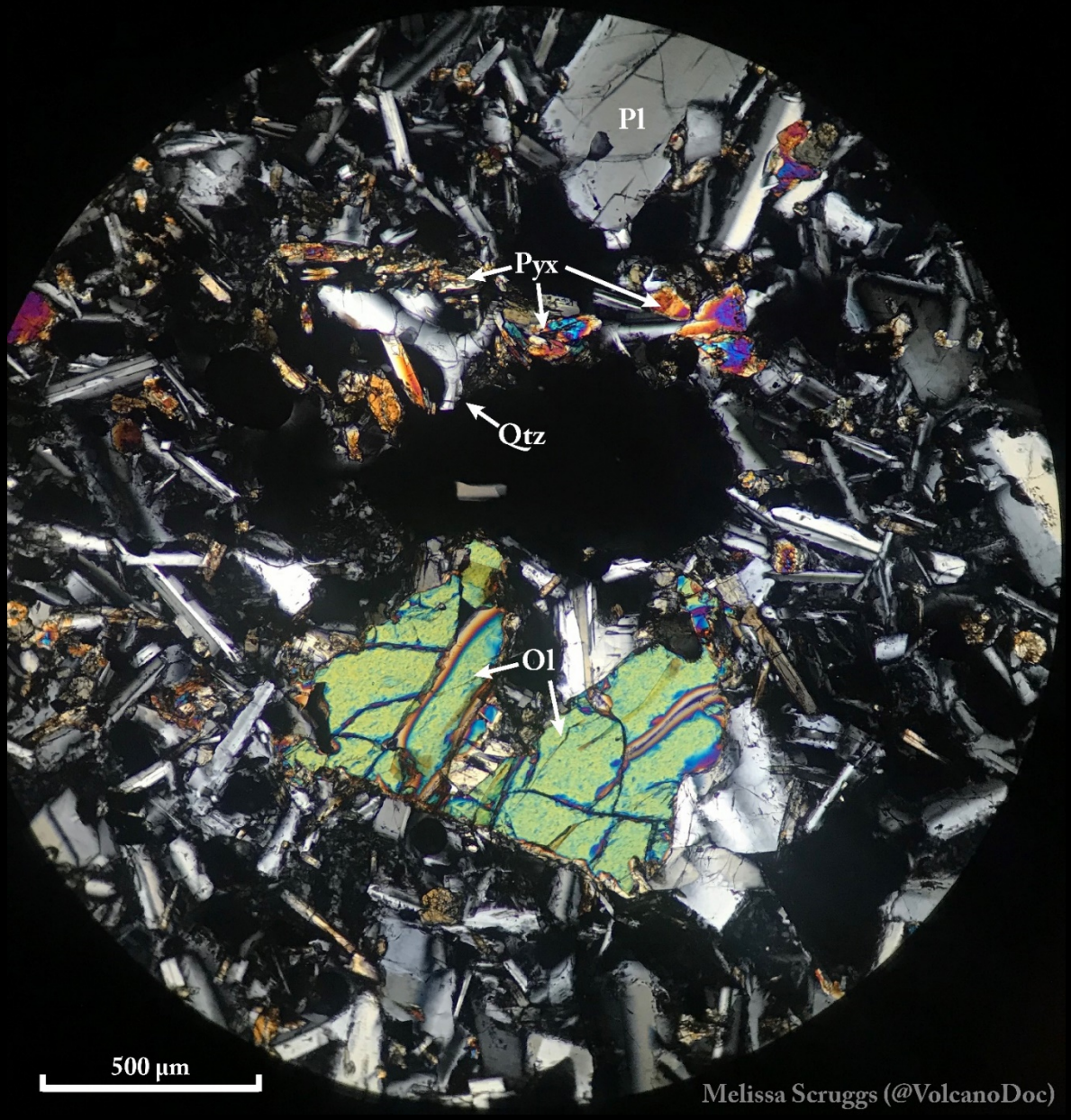
Artists: Max Schrock

Title: Solar Saghetti

There’s nothing like an unexpected image such as this to remind you of how hungry you've become after a long day's work. This 2μm image from an atomic force microscope shows a PDINO polymer, a hole transport interlayer, which separates the active layer and the top electrode of an organic solar cell.

This image was gathered while studying the surface morphology and photoconductive properties of a PM6:Y6 active layer in an organic solar cell. Because the PDINO layer blocks the topography of the active layer (visible beneath the polymer net) and alters the photoconductive characteristics of the material blend, both of which were the focus of this study, this specific sample was a fortunate accident and was not meant to be analyzed. However, a 15μm square image showed an interesting large cluster of the polymer and upon a closer look, the fine net-like structure was clearly captured. This micrograph was collected via contact mode on an Asylum MFP-3D atomic force microscope and was modified to reduce vibrational noise on Asylum Research AFM software version 14.



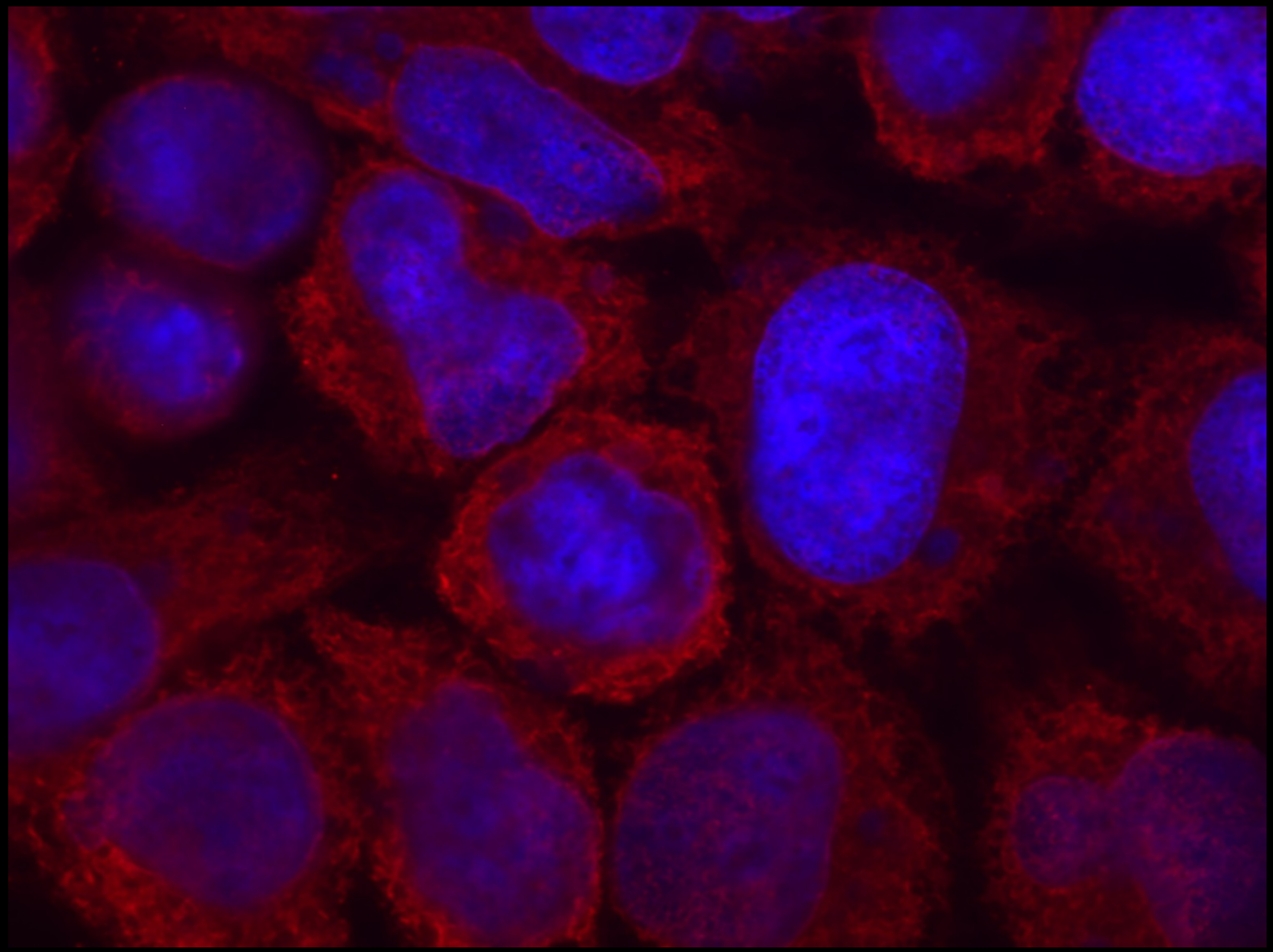


Artists: Melissa Scruggs

Title: When the Volcano Erupts: A Moment Forever Frozen in Time

This lava from Chaos Crags shows a near replica of the Qtz-En-Ol phase diagram geologists learn in Petrology. If one magma with quartz and another with olivine mix, the minerals react to form pyroxene. This volcano erupted mid-reaction, preserving this moment where our textbook has come to life!

This image was taken using an iPhone 6s through the lens of a Leica DM750P microscope, under cross-polarized light (XPL).



Artists: Morgan Smith

Title: It's the Little Things

Immunofluorescence microscopy is an important method used to visualize cells by staining with fluorescent dyes to produce incredible, vibrant colors. The blue in this image is the DNA of HeLa cells. The red is calnexin, a protein of the endoplasmic reticulum that surrounds the nucleus.

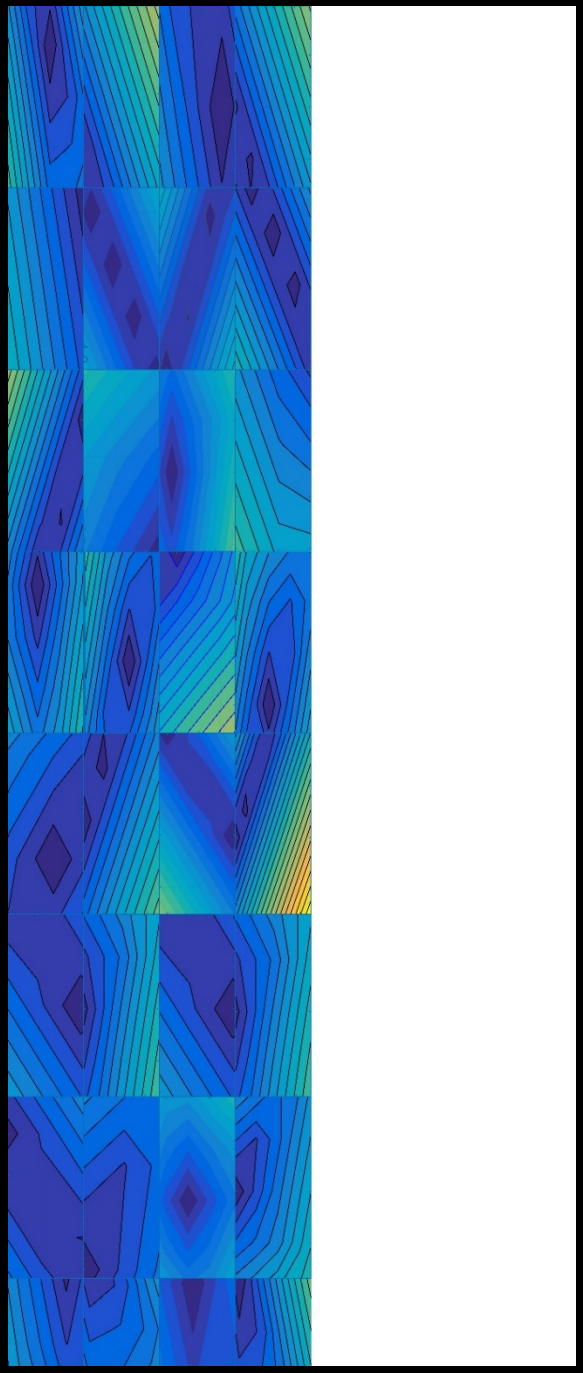
Although this image is from an unsuccessful experiment investigating picornaviruses, the remarkable colors did not disappoint. The reality of being a researcher usually means having one experiment fail after another. However, sometimes beauty can still be appreciated as a win within scientific defeat. This a small silver lining that has and continues to encourage scientists to keep chugging and get it right the next time.

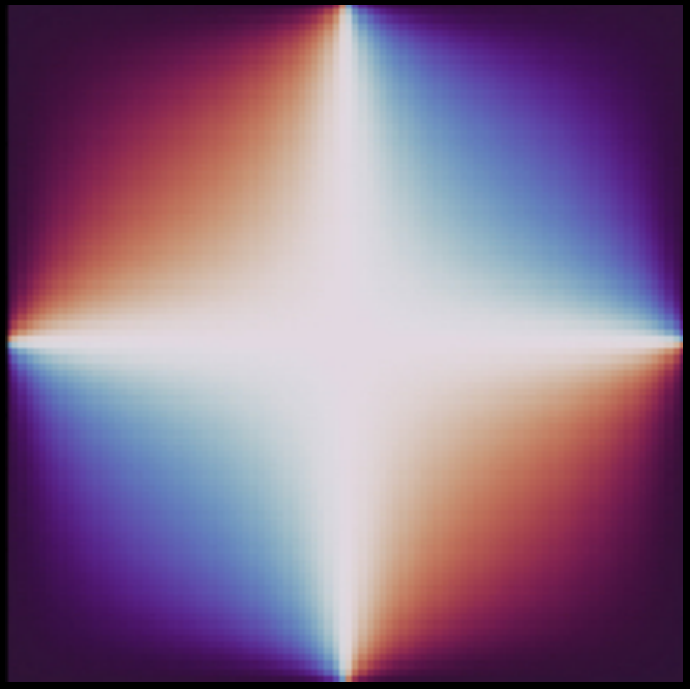
Artists: Rachel Spratt

Title: The Multidimensional Ocean

The blue wells and rivers which cascade through the figure represent ideal values of surface-to-deep mixing and ice melt or runoff. The tiles are members of an 8-dimensional array and are meant to evoke the viewer's intuition of a multi-dimensional surface.

"The figure was created in MATLAB, and was originally created to adjust a simple model of Atlantic to modern data. For this project, the collage was created to emphasize the vastness of the ocean; the figure is much taller than it is wide. The height of each block represents 500 meters, and the height of the figure represents the Atlantic's approximate depth. The color scheme, called Parula,is visually friendly to neurally-diverse audiences, including those with red-green color blindness."





Artists: Tony Sun

Title: Frigid Inferno

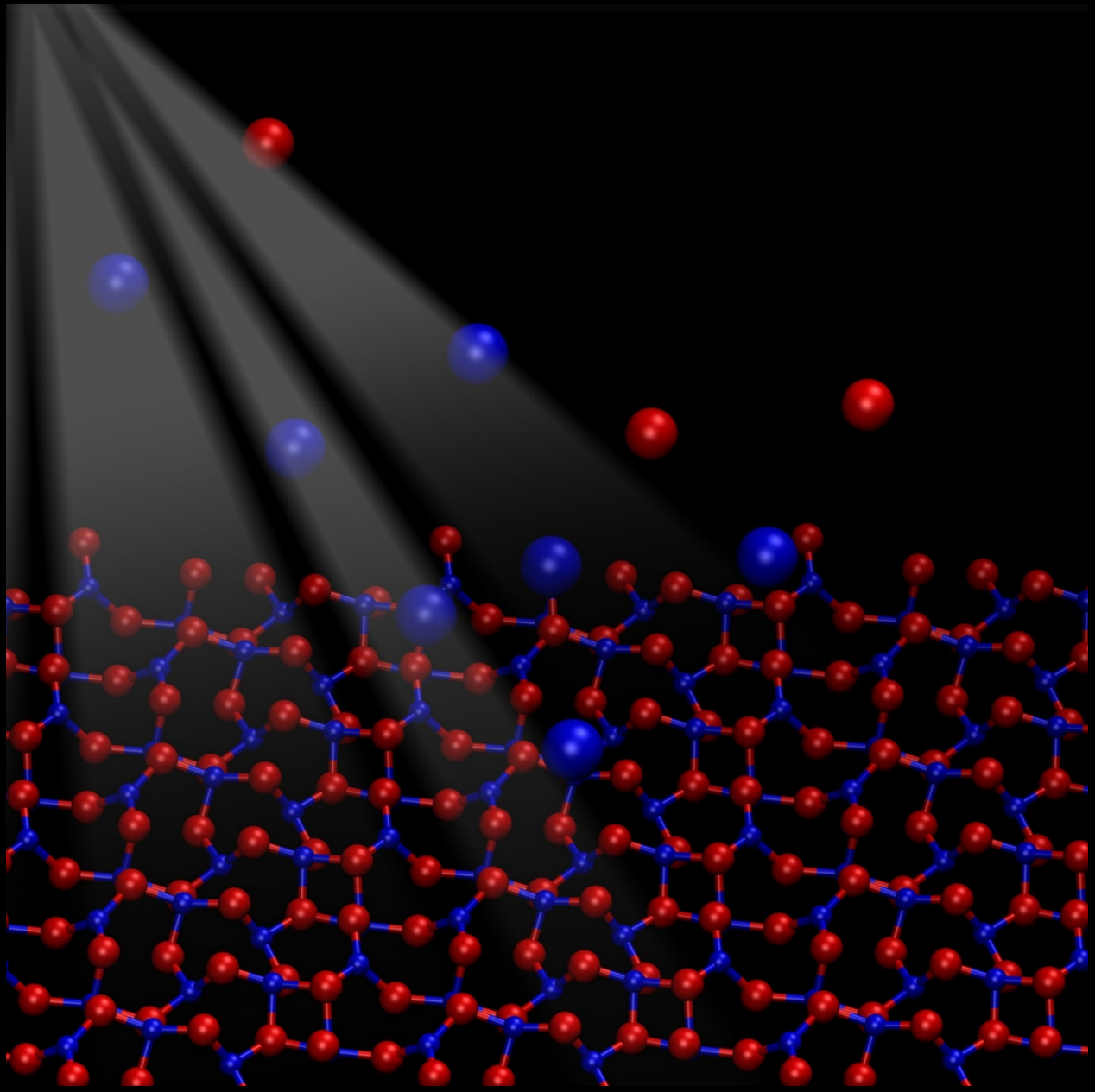
Simulation of temperature in a square room with heaters in the top-left and bottom-right corners. Hot and cold air particles clash in the center to birth a dazzling white cross that distinctly segments the room in four.

The generated image is the solution for the 2D discrete Poisson equation for a 1,000 x 1,000 matrix with heat emanating from the radiators in the top-left and bottom-right. The equation is solved using the NumPy library in Python, and the image is created using the Matplotlib library and “twilight_shifted_r” colormap.

Artists: Melvin Thomas

Title: Green chemistry for the globe

Green Chemistry is an attempt to do chemistry in an environmentally responsible manner. If we use micelles in water as an alternative to harmful organic solvents (80% of waste in pharmaceutical industry), that will be a positive step towards controlling pollution and addressing climate change.

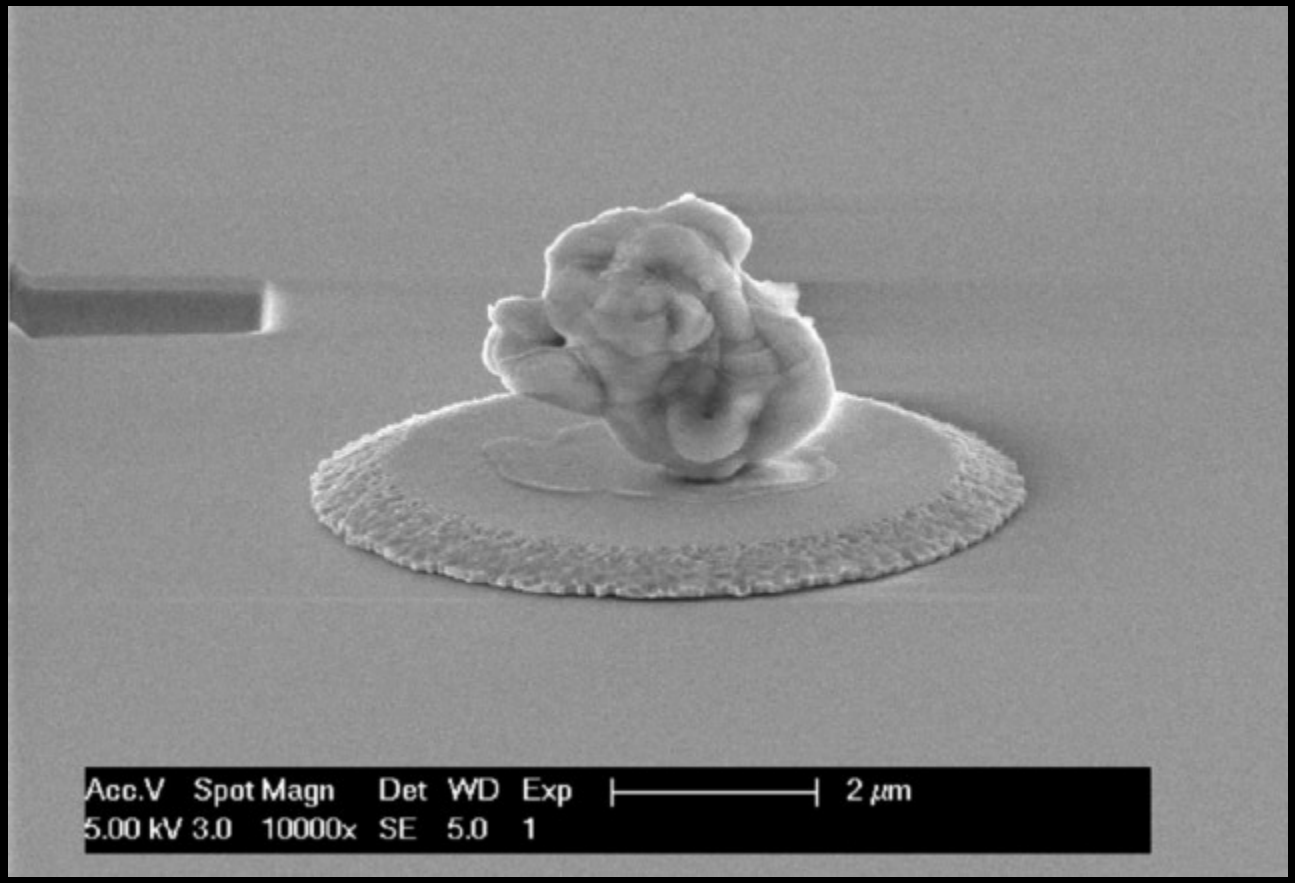


Artists: Mengen Wang

Title: Simulating the growth of gallium oxide

This image offers a microscopic view of the epitaxial growth of gallium oxide single crystals.

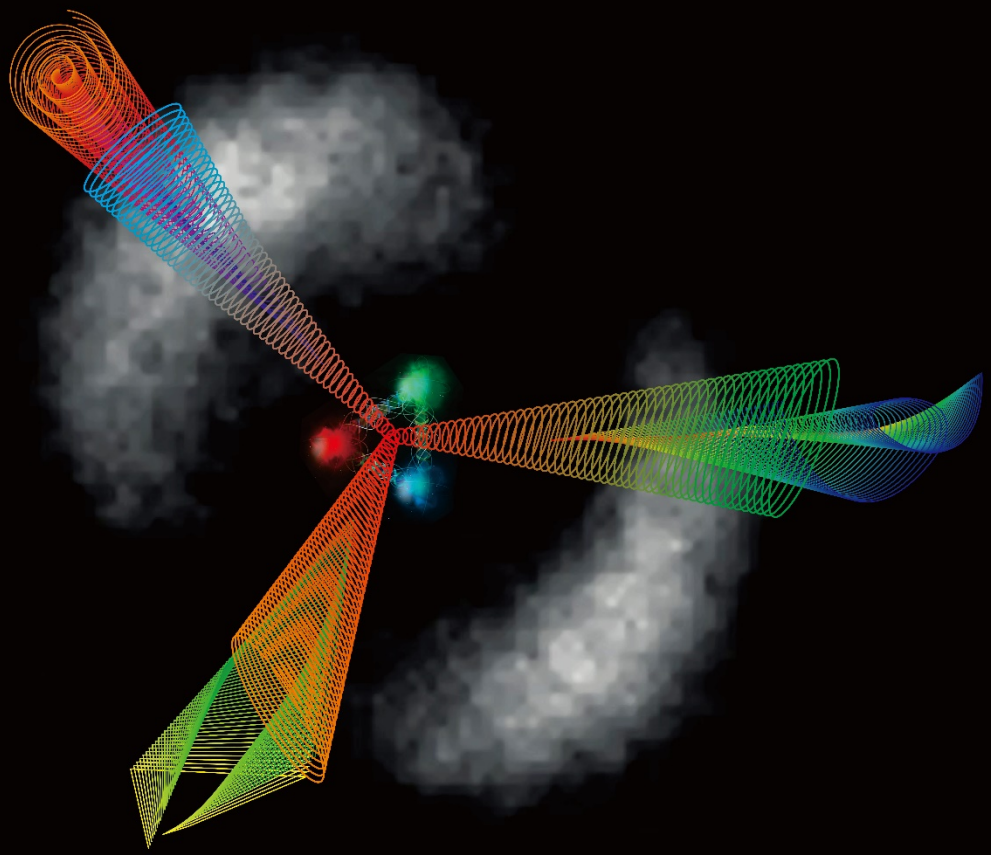
This image is a snapshot of the simulations of the epitaxial growth of gallium oxide single crystals. The structure of the gallium oxide surface is calculated from first-principles density functional theory. We use first-principles calculations to provide a microscopic view of the epitaxial growth of gallium oxide, aiming at a higher growth rate and better crystal quality.



Artists: Weiqiang Xie

Title: A funny SEM picture

A dwarf dancing on the microdisk: this SEM was token when I was checking my device under SEM. It was a random but very funny structure.



Artists: Shengying Yue

Title: Quantum Entanglement

Quantum entanglement could be used in quantum coding and information transport in speed faster than light. This picture puts the mathematic mathematical geometric lines on the picture of quantum entanglement to show the infinite possibilities in quantum technology.

Artists: Neil Zhang, Li Guo

Title: The secret to being clean

Fruit flies work hard to stay clean. Dust is sensed by bristles, which control sensory neurons (green) to transfer information to the brain. Flies follow an anterior-to-posterior cleaning sequence when covered with dust. We use grooming to investigate how animals sequentially execute motor programs.

We identified a transgenic fly line that targets all 1200 eye bristle neurons. We used this line to activate or inhibit these bristle neurons and demonstrate their role in grooming behavior. Here, we express green fluorescent protein in eye bristle neurons and use confocal microscopy to trace the projections of the eye bristle neurons from the compound eye into the brain; this is shown on the left. The rest of head was imaged by a scanning electron microscope (SEM), which shows the morphology of cuticle and bristles. This is a good example of how different imaging techniques reveal different aspects of a sample. The SEM imaging was performed in MEIAF with the help of Sage Davis under NSF Awards BES-9977772 and DBI-0216480. Studies in the Simpson Lab is supported by NIH R01 NS110866.