

# The California Tech

VOL. CXXII No. 28

PASADENA, CALIFORNIA

WEDNESDAY, JUNE 5, 2019

TECH@CALTECH.EDU

## ANSWER TIME WITH ASIMOW

JENNY DU | INTERVIEW

On May 3rd, we talked with Prof. Paul Asimow about geology, what it's like to have 23 pets, and his connections to the Salem Witch Trials.

### How did you know you loved geology?

The first semester of my freshman year of college, my brother encouraged me to think of science a little more broadly than physics. And so, I somehow stumbled upon this mineralogy class and took it. It was the last time it was ever taught by one of the great mineralogists before he retired. It was completely inspirational and amazing to me that the beauty and the mystery of minerals could be approached with mathematics, physics, and chemistry, and... I was hooked just like that. \*snap\*

### Can you describe why you loved mineralogy so much?

Minerals are objectively interesting, beautiful and useful. But the way that we understand their structure and what gives them their properties involves a lot of geometry and mathematics and 3-dimensional visualization, especially the analysis of the symmetry of their crystal structures that emerges from diffraction patterns. And as I teach a little bit in Ge 1, but which we went into in much greater detail in this mineralogy class, M.C. Escher understood all the symmetries that underlay minerals



Paul Asimow

and put them into his lithographs. And so you can actually teach them by analyzing Escher prints and seeing which symmetries they have. That was just one example of the art, underlying the math, underlying the way we understand minerals.

### What's your favorite rock or mineral?

I like them all, but my favorite rock is eclogite, which is a metamorphic rock that forms when basalt is compressed far enough. It's bright green and pink; it's extremely important in the earth's cycle, and it's completely beautiful to look at.

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## SCIENCE POLICY & CHOCOLATE: A RECIPE FOR THE PERFECT ALTERNATIVE SPRING BREAK TRIP

KAVYA SREEDHAR | TRAVEL

This spring break, a group of 12 undergraduates, graduate students, and Caltech Y staff travelled to Geneva as part of the Caltech Y's inaugural global science policy trip. They spent a week in Switzerland meeting policy leaders at various international organizations including the International Committee of the Red Cross (ICRC), International Telecommunications Union (ITU), World Health Organization (WHO), World Trade Organization (WTO), and United Nations Educational, Scientific and Cultural Organization (UNESCO)

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## LEARNING TO CRAFT HAND-MADE SCIENTIFIC TOOLS IN THE AUTOMATED AGE

ELISE CUTTS | PROFILE

Set against the glass-and-chrome futurism of nearby Schlinger Laboratory of Chemistry and the Spanish arches of its southerly neighbors, Caltech's Church Laboratory for Chemical Biology cuts an underwhelming figure. All unadorned concrete and 1950s brutalism, Church Laboratory practically begs us to forget that Nobel-Prize winning chemistry is happening inside.

Tucked away in the sub-basement of this unremarkable building, Caltech's glass shop is an understatement wrapped in an understatement. There, twenty feet underground, two men build the jungle of glass manifolds, flasks, and bubblers found upstairs.

"It's pretty much the same as it has been," says Rick Gerhart, who ran the shop for the past two decades. "Glass containers are getting smaller, since chemicals are more expensive and scientists are using lower volumes, but that's about it."

Gerhart, a short, smiling man with a voice like the breathy rumble of a gasoline engine, numbers among the shrinking handful of master glassblowers in Los Angeles. He is 73 years old. And when he retires in September, Gerhart will leave the shop – and his legacy – to his apprentice, 28-year-old Nathan Hart.

"A general day? Just come in and blow glass, you know?" Hart laughs,



Apprentice glassblower Nathan Hart continues the ancient tradition upon which 21st century researchers still rely.

thumbing through a dog-eared Chemglass catalogue pulled from the bookshelf in the glass shop's tiny office. He doesn't have the kind of tough, craftsman's hands you might expect, in spite of having burned himself more than once handling molten glass.

"We can make pretty much anything. Strass flasks, round bottom flasks, all different joints," Hart holds open the catalogue to a page advertising something that twists and turns like some kind of glass intestine. "But the fun stuff's custom."

Almost all scientific glassware more complicated than a vial is handmade. But, flipping through that catalogue from Hart's bookshelf, you might not guess it.

Chemglass advertises not handmade glassware but "manufactured scientific and chemistry products." A researcher browsing their website would need to click through "About Us" to the "Glass Manufacturing" page before running across anything suggesting that apparatus she's about to order will be made by hand.

Perhaps the illusion is unintentional, born of expert bias. Among older researchers, at least, the importance (and existence) of scientific glassblowers seems obvious. "My students could not have done experiments in inorganic chemistry without the custom glassware that Rick made," says veteran Caltech chemistry professor Harry Gray. "He's our hero."

## SWAFF'S PICKS VOL. 3

IZZY SWAFF | REVIEW

Last month I attended the Just Like Heaven Music Festival with some other Techers, and we had a blast! The lineup was packed, and since it was a one day festival, we tried to see as many shows as possible between the two stages. I ended up making it to the front row of the main stage and stayed there for the rest of the night. So for this week's playlist, I want to share some of my favorite performances from my standing-for-ten-hours-straight music marathon!

SECOND CHANCE - PETER BJORN AND JOHN We had just gotten through security, and decided to go to the merch table. While waiting in line, I realised that Peter Bjorn and John was playing at the main stage. From a distance I heard my favorite song from them, "Young Folks," and I started dancing in line with my friends. I was bummed I missed them, but happier that I got a shirt before they sold out. Check out their song "Second Chance" for something a little different from their top hit. "Second Chance" is grittier, heavier on the guitar, and livelier. The vocals are grounded and matter of fact. The cowbell lightens the otherwise heavy drumbeat. This song also happens to be the theme song to the show "2 Broke Girls"; who knew?

OPEN YOUR EYES - STRFKR After a healthy meal of pulled pork nachos with extra cheese sauce, we headed

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But for young scientists – people who grew up in the age of automation and Amazon Prime – it is easy to assume that glassware is mass-produced by machines just like everything else seems to be. When asked where the glass in her biology lab came from, one Caltech undergraduate said that it was probably made in a factory.

Hart, the same age as a 5th or 6th year graduate student, grew up in the same mechanized, automated, digital world that they did, saw the same glorification of tech and Silicon Valley bleeding-edge-ism. But Hart never saw himself working in front of a computer screen. "I've always enjoyed making things," he explains. "At the end of the day, I leave the shop full of stuff I've built, and that's pretty amazing."

Hart has bright blue eyes and speaks with the easy cadence of a born-and-bred Californian. He grew up in Santa Barbara, where his father worked in the machine shop at the University of California, Santa Barbara (UCSB).

As a teenager, focusing in school was difficult for Hart. He liked playing sports and building things more than studying. He skipped the SAT exam for a baseball game – Santa Barbara City College didn't require the test for entry. Hart earned his associate's degree there in 2009.

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**SENIOR CLASS CO-PRESIDENT STATEMENTS**

Hi seniors! We, Helena Shield and Mei-Ling Lares, are running for Senior Class Co-Presidents. For the past three Ditch Days, we have seen the seniors put an amazing amount of work and commitment into their stacks, all for the stackees to have a fun, action-packed day. We want to continue this streak by dealing with Ditch Day logistics ahead of time, allowing all the seniors to focus on their own stacks. To do this, we will have safety approvals and room reservations done as early as possible and also work to make sure that funding is distributed to the stacking seniors equitably.

Although Ditch Day is going to be a great deal of the work as Co-Presidents, we also are super excited to put on the Senior Trip, coordinate the Senior Gift, and plan a great Senior Dinner for everyone. Since it's our last time to have fun as a class, we want seniors to be excited for our trip and will create a selection of itineraries for each location. The destination will be voted on using Ranked Pairs - as used in the ASCIT elections - to maximize senior happiness. Making the trip and Senior Dinner affordable for everyone will also be top on our priority list, as we don't believe anyone should be left out because of financial concerns.

Finally, we are so ready to graduate. Graduation is an exciting time, and everyone should have photographs to remember it by. To help everyone with finding photographers, we will help facilitate contact between our graduating seniors and the student photographers on campus. As for the day we are set free graduate, we'll do the best to make it a day to remember.

We're running for class co-presidents for a reason. We believe that we can do the best job in the role, and as a pair we can definitely do more than either of us would accomplish individually. We have known each other since before frosh year as rotation roommates and had experience working and playing together on the volleyball team. In addition to experience working together, we have a lot of individual experience organizing and putting on events, Helena as a Fleming social chair and Techstock President, and Mei-Ling as Blacker Vice President, and a part of Blacker and Avery social teams. With all this preparation, we are confident in our ability to organize and plan large-scale events. Our relationships with ASCIT and administrators like Sue, Tom, and Felicia, will help in fulfilling the role and responding to each houses' needs.

In the end, what we want is to be able to say our senior year was a good one. We know we can make that happen, so here's to hoping for a great senior year for everyone!

**ASCIT BOARD OF DIRECTORS MEETING**

Minutes for June 2, 2019. Taken by Rachel Sun.

OFFICERS PRESENT: Arushi Gupta, Erika Salzman, Yuying Lin, Varun Shanker, Irene Chang, Rachel Sun

GUESTS: Alejandro Lopez

PRESIDENT'S REPORT (VARUN):

There will be a vote on the proposed BoC amendments on Friday. There was an email sent out proposing two amendments. Details about orientation and FCC selections are still being worked out. ASCIT Committee applications will be sent out this week.

OFFICER'S REPORTS:

V.P. OF ACADEMIC AFFAIRS (ARUSHI):

Starting a new Option Buddy program to promote mentoring within options. ASCIT Teaching Award Presentation is happening this Friday. SFC survey is still open.

V.P. OF NON-ACADEMIC AFFAIRS (SARAH):

IHC retreat is next weekend. If there are any topics for IHC to discuss submit by Wednesday. The Title IX summit was last Wednesday and was attended by the IHC and Title IX board along with other guests. Please see the IHC website for more details.

DIRECTOR OF OPERATIONS (RACHEL):

Meeting with Dimitris and Felicia about evaluating the SAC.

TREASURER (YUYING):

Senior Boxes will be distributed on Tuesday. An email with more details will be sent out soon regarding distribution.

SOCIAL DIRECTOR (IRENE):

Met with the ESC on Wednesday to discuss next year's Interhouse dates. Met with Greg Fletcher to discuss how to combine events with the Caltech Y and encourage interaction between Caltech Y excomm and ASCIT. The Caltech Y would also like to work on making a combined calendar for campus-wide events with ASCIT.

SECRETARY (LC): Not present.

If anyone has any questions or concerns about a section of the minutes please email the appropriate officer. We are happy to answer any questions.

MEETING ADJOURNED: 7:56 PM



Hi Class of 2020,

Congratulations on making it to our senior year! As we approach our final year at Caltech, we, Dana and Alex, hope that next 12 months are filled with amazing memories that we will all fondly look back on after we graduate. The two of us have decided to run for Senior Class Co-Presidents because together, we represent a diverse range of perspectives and have the skill set and experience to effectively organize Ditch Day, the senior trip, and the senior gift. Having served as a senior rep this past year, Alex has experience with the organization and background work that goes into these events, and having served on ASCIT for two years, Dana is well-versed in what goes into planning campus-wide events and what funding sources are available to us. Together, we have strong existing relationships with a large portion of the administration that we can use to the senior class's advantage. As Co-Presidents, we promise to do everything we can to uphold Caltech senior traditions and plan fun and exciting events in order to make this last year our best.

For Ditch Day, we hope to simplify planning logistics for seniors and make sure that Caltech traditions are kept alive and expanded upon. First, we'd like to ensure that room registration and approvals this year are started early in order to avoid certain issues that happened this year. In the past, special requests like roof usage were not confirmed until the week before Ditch Day, making planning much more of a hassle than necessary. By starting conversations much earlier, we hope to give you more certainty at an earlier date to make planning as stress-free as possible. To this effect, we also want to simplify the room registration process to make it easier and less bureaucratic for the seniors. We also hope to keep Caltech traditions alive by holding effective all-campus fakes. We plan on coordinating with all the houses early and staying in close contact with the Senior Reps in order to create all-campus activities that are fun for the underclassmen to participate in and for the seniors to run. Finally, we want to use our existing positive relationships with administrators to make sure that our undergraduate traditions are not impinged upon and can continue to their fullest extent.

Organizing our senior trip and senior gift are the two other main responsibilities of the Co-Presidents. For both of these points, we want to make sure that we have an accurate picture of what the class wants and be able to negotiate effectively with administrators in order to achieve this. In the past, these have both been points of contention because the methods used to make decisions resulted in them appealing to only a certain portion of the class. To address this, we are committed to being more transparent and communicating each step of the decision making process early, often, and consistently. This will ensure that all voices are heard and that we can come up with fun and creative ideas for our senior trip and senior gift. We believe that by reaching out to you early, before the Caltech Fund or other administrators come to us asking for answers, and then leveraging our existing relationships to work with administrators proactively, we can more effectively serve your interests and ask for what you want.

If you have any questions, comments, or concerns about our ideas for this coming year, please feel free to reach out to us in person or via email (dhhe@caltech.edu, alex@caltech.edu). We really appreciate each and every vote, and would be so excited and honored to serve as your senior class Co-Presidents!

-Dana and Alex

**SCIENCE POLICY  
& CHOCOLATE**

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in Geneva, and a day of sightseeing at Bern, a UN-designated World Heritage Site. At the European Organization for Nuclear Research (CERN), students met with researchers working on the Cosmics Leaving Outdoor Droplets (CLOUD) experiment, and its connections to atmospheric chemistry research in the Seinfeld and Flag-an groups at Caltech. Throughout the trip, students worked to understand the influence of ever-changing technology on regulations and the need for a mix of backgrounds in solving global problems. Students enjoyed getting to know other Caltech students interested in bringing their scientific training to the world of policy, as well as tasting Swiss chocolate and exploring the picturesque shores of Lake Geneva.



Caltech Y

*The global policy spring break trip was made possible with generous funding from the Frank and Elsie Stefanko Fund - established by Mike and Paula Stefanko ('70) in memory of Mike's parents. The fund provides opportunities for students to travel to a location outside of Southern California to pursue an interest outside of their Caltech studies.*



## BACKGROUND ON 5/8/2019 MEETING

As Tech editors, we wanted to schedule a meeting with the Vice President of Student Affairs (VPSA) every week or so as a way to get an administrator's perspective on undergraduate life and campus events. The meeting on May 8th was the second of these meetings.

Coming out of that meeting we were shaken and unsure what our next steps should be. Initially we were convinced that there was just too much pressure from administrators and student government that independent journalism would be impossible at Caltech. After talking to our advisor Richard Kipling, Tom Mannion and an unnamed administrator, we now believe that independent journalism is possible but that it will require a conscious and determined effort by student government, administrators and the future Tech editors to reach.

## LETTERS FROM THE EDITORS

UMESH: At the end of this term, I will resign from my position as a Tech Editor. This is, in part, due to my graduation this term and my availability next year. During my tenure, I have learned a great deal about the issues that matter to students and faculty, and how these issues have a deep impact on their lives. As an undergraduate newspaper, The Tech's goal is to accurately and transparently inform the community about these issues and more.

One of my major goals for my time at The Tech was to create a direct communication channel between administration and the students, and to setup infrastructure for students and administrators to become informed of both sides of the story. We took the initiative to request meetings and comments to this end, especially when we believed an article topic intersected with administrators' purview. With some exceptions, I became surprised and disappointed by administrators' lack of willingness to share their stories above generic statements. In many cases, our requests for short 15-minute interviews were denied or pushed weeks back. I would note that each student that we requested to interview graciously took the time to talk to us, even if they knew that their own reputations might suffer.

I believe administrators need to be introspective about this, and about the communication of news and policies on campus in general. Are students at-large informed about the reasoning behind policy decisions? How often is this reasoning transparent, evidence-based, and justified? Can you blame the average student for being confused if the reasoning and facts are not communicated to them well?

The Institute's reputation is hurt when the community is kept in the dark. It is hurt when an administrator reacts with an unprofessional tone to student editors in reference to articles that relate to him. It is hurt when student newspaper editors are asked to violate ethical standards, such as when an administrator advocates for the appointment of a faculty advisor to review all articles before publication.

Future student journalists at Caltech should be aware that you must develop a strong chin to criticism and intimidation, if you want to publish news topics that are not simply saccharine. In fact, articles that shed light on problems can be the ones that are most beneficial to the Institute.

I want to thank the myriad of students and faculty who have reached out to Albert and I in support of the work in The Tech, the students who took valuable time away from their school work to sit down for long interviews, and Professor Kipling for continuing to support our endeavors toward improving The Tech. Most of all, I want to thank our staff for being the engine by which all of us were able to make a difference in this newspaper.

ALBERT: I believe that student journalism is an integral part of a Caltech community that strives for the equity idealized by the honor code. There is a distinct need on this campus for a third party that keeps students, student leaders, faculty, administrators and Caltech staff all accountable to the community as a whole. While the reporting in The Tech hasn't always been perfect, we have done our work ethically and in good faith and I believe this is reflected in our impact on this community.

Unfortunately, with Umesh resigning I don't believe I can continue alone as editor-in-chief of The Tech; my official resignation will come a couple weeks into Fall term. My intention in the meantime is to finish Umesh and I's work on The Tech's financial infrastructure, look for ways to increase The Tech's financial independence and help properly hand over the paper to the next set of editors. The job as Tech editor is a difficult and often thankless one, but it gives students one of the largest opportunities for improving the community. I am proud of the work Umesh and I have done on this paper and I hope that there are others willing to go "once more unto the breach."

## The California Tech

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## 5/8/2019 10AM MEETING WITH VICE PRESIDENT OF STUDENT AFFAIRS JOE SHEPHERD

The conversation starts with a focus on our advisor/their role. Professor Shepherd asks if we have every article read over by our advisor before publication; we tell him that we do not, and that if we did it would be a violation of journalistic ethics and would compromise our independence. We tell him that if we have had any questions we reach out to our advisor, Professor Kipling. Professor Shepherd tells us that he is "not in the business of censorship." He then disagrees with our assertion that our advising is sufficient and then disagrees with our assertion of journalistic independence.

We ask what problems he has had with The Tech. He says that we are "stirring the pot," and that we are "immature." We push him for specifics of what articles he thinks were problematic and he cites the "ASCIT holds 170,000K in Assets" article. We tell him that our job is only to inform the student body and that we thought students, as they have control over these funds, should know the magnitude of the ASCIT reserves. He does not dispute the factual nature of the article, rather he asserts that we are sowing "dissension" in the student body and tells us that "I find what you do troubling." We reiterate our editorial policies regarding honesty and transparency. Professor Shepherd tells us that we are "students first, journalists second," and follows up with "members of the Caltech community first, journalists second." He implies that our reporting is damaging the Caltech community. We tell him that our role in student government is that of the "fourth estate." He tells us that we are "pompous" and "immature." We assert that it was important for the student body to be informed about ASCIT's finances and that our reporting caused the Review Committee to issue a ruling requiring ASCIT to produce accurate, up-to-date budgets. Professor Shepherd discounts our assertion of improving ASCIT by stating "I am responsible for ASCIT." He tells us that our reporting was a non issue as "I wouldn't allow them to spend 150k." We tell him that ASCIT is an independent 501(c)(3) nonprofit and that it is supposedly entirely student run. He disputes this by telling us about how ASCIT and Caltech have a memorandum of understanding (MOU) regarding their relationship. We ask if we can see the MOU, he states "no."

We revisit our pledge of adhering to journalistic ethics, but the conversation begins to repeat itself ("you're stirring the pot," "students first, journalists second"). At some point he mentioned being dissatisfied with the satirical content that comes out of The Tech. We acknowledged that it was not unreasonable for him to be irritated about some of the humor, but that humor was a separate production and had no impact on the editorial standards of our news pieces. The meeting ended at 10:29am.

## SWAFF'S PICKS

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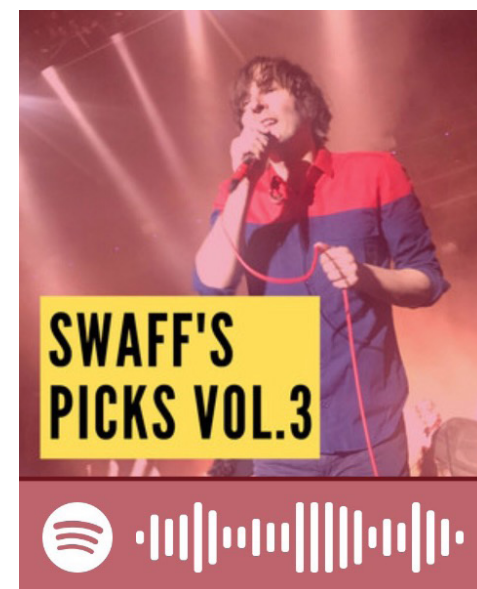
to the main stage and weaseled our way to the front of the crowd. STRFKR walked onto the stage dressed as a gang of astronauts with their entourage equally ready for spaceflight. Before the show, they prepared the stage for the performance with blow-up mannequins wearing their merch and one large inflatable penis hanging proudly from the side of the stage. Not long after starting their set, the stage crew brought out two inflatable unicorn pool floats on which some of the backup dancers surfed the crowd. What a great idea! If I were to crowdsurf I wouldn't want everyone grabbing my butt, so a pool floatie is a perfect solution to that! I especially enjoyed their cover of "Girls Just Want to Have Fun," but "Open Your Eyes" still holds the number one spot in my heart. It perfectly represents the band's ethereal, space-age beats and their signature laid-back vocals. As soon as I heard the distinct intro to this song, you know I was dancing like a fool.

### THE REELING - PASSION PIT

I've seen STRFKR once before, so I kind of knew what to expect from their set, but I had no idea what Passion Pit was going to be like, and boy did they deliver! Passion Pit ended up being one of my favorite performances of the night, and the lead singer, Michael Angelakos, had a captivating and contagious stage presence. During his set, he stopped to address the crowd and in thanking us for being there he said simply, "I've been asleep for so long, thank you for waking me up." Knowing that he suffers from mental health issues, specifically

bipolar disorder, it was quite moving to hear him say that, and it made each song just that much more meaningful to listen to. I chose "The Reeling" because it was written at an extreme low point in his life in which, it was learned later on, following some show cancellations, that he was considering suicide at the time. He credits his wife and a huge performance at Madison Square Garden as big steps toward improvement. In "The Reeling" you can hear his vulnerability at this moment in his life when he cries out in the melody, "Everyday I lie awake and pray to God / Today's the day, oh no, oh no / Here I am, here I am / When will someone understand, oh no, oh no." Angelakos let the crowd sing with him for this song, and from his energy in the moment, you could feel he was in a much better place today.

*This piece is continued on our website: [tech.caltech.edu](http://tech.caltech.edu)*



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## ANSWERTIME WITH ASIMOW

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### What is your favorite hiking trail in the area?

In Southern California, my favorite hike is the Bridge to Nowhere hike in the east fork of the San Gabriel River Canyon, which is where I'm going with 23 Ge 1 students tomorrow.

### What is your favorite spot on the planet?

I just get to pick one? Well, Kilauea volcano in Hawaii is amazing; you can see everything there. The Green Mountains of Oman, which is the best preserved section of oceanic crust visible on land, is a great place. Movie Flat, in the Alabama Hills, where I take the Ge 1 group: I could go back there as many times as I have to -- I love that spot. The Aso Caldera in Japan, too. It's also very clear and well preserved, so you can see the geology. But it's very beautiful and there's really nice hot springs.

### Where do you want to go next?

That would have to be the Galapagos.

### I saw on your website that you have a gallery page for pictures you've found of snowy owls. Why did you start doing this?

I was the computer administrator for the Stolper group when I was in graduate school when the very first web browser came out. And suddenly you could just put content on the web for everybody to see, which was a totally new thing. I'm talking about like 1993. I actually had a website that needed building for a science project, but as long as I was learning to do it, I was looking for stuff to do, so I just stumbled upon putting up owl pictures. It's still there, 25 years later. And once people know you're into something, they just start painting it for you and giving you stuffies of it.

### Do you have kids?

My older son from my first marriage is 23 now. And he's off on his own, he went to Polytechnic High School here across the street. He went to Harvard

College, turned in his completely Marxist senior thesis, and then went to work for a hedge fund. And my younger kids from my second marriage are 12 and 14 years-old.

### What does your wife do?

At the moment, she is a homeschool mom to our two younger kids. She's a licensed speech language pathologist, but she doesn't really like the work. She is also an athlete, and at the moment she is training for a powerlifting competition in October where there are not that many women over 50 in her weight class that compete in powerlifting, so she has an excellent chance of making state records.

### What do you like to do as a family?

They like to go mineral collecting sometimes, and we spend a lot of time these days taking care of our pets. We love snorkelling in Hawaii whenever we can. We go once a year, which is about as often as we can manage. We're getting ready to invest in good wetsuits so we can snorkel here in the cold water more often. There are kelp beds full of fish. Not maybe as colorful as you get in Hawaii, but interesting.

### Do you have any pets?

Today, I have 23 pets. That's two cats, two doves, five ducks, and 14 chickens. We only eat the eggs of the chickens. We are vegan except for our own chickens' eggs. One of our ducks is sitting on an egg that's going to hatch in the next couple of days. We have one male and 4 female ducks. So the females all lay eggs, and one of them got broody and started not letting us take them, so we're letting her hatch it.

### When did you decide to go vegan?

We went vegan in the last year, and were vegetarian for the last 3 or 4 years. Becoming vegetarian was motivated by basically the thermodynamic argument that I could lower my climate footprint by eliminating the inefficient protein machines called animals, from the cycle. And being vegan is motivated by my daughter who is very passionate,

and doesn't like the way dairies run, or industrial egg farms. But we know that our chickens are taken care of so that's our exception.

### Tell us a crazy story.

One of my hobbies that I didn't mention yet is actually genealogy. And even though my last name is derived from the Russian "Asimov", and even though my great-great-great-grandfather was born in the same village as Isaac Asimov, we are unable to establish any actual connection. On the other hand, following my wife's genealogy, she is directly related to all of the witches who were burned in Salem. They were mostly related to each other, and if you go far enough to the early Yankee settlements, there weren't that many people around. So it's all very well tracked. I started following some thread, and I went back many many many generations, and then I ended up in Salem, and then I was like "Oh. These are all the witches."

### What is your favorite thing about Caltech?

It's hard to pick just one thing, because I really love Caltech. I'm really happy to be here and I don't ever want to leave. And I think the one thing that influences all the other things, and therefore you can more or less assign to be the root cause is our small size. I think the institute is a great size for being able to minimize bureaucracy and maximize person-to-person interaction and teach students as individuals, rather than as a flux.

### How do you feel about students thinking that you are their favorite professor?

I love that! I really appreciate that and feel it deeply. When people say they became GPS majors or when they learn to appreciate the outdoors because of my teaching, that's great -- I really like that. It feels very gratifying. Teaching is something I believe in and enjoy, and I find it rewarding. And the reason I find it rewarding is hearing things like that.

### What is the story behind asimowite?

Good question. A mineral is a nat-

urally-occurring solid material with a particular structure and a defined composition or range of compositions. When a new mineral is recognized and characterized, it is submitted to the Committee on New Minerals, Nomenclature, and Classification (CNMNC) of the International Mineralogical Association (IMA), which votes on whether it is a legitimate new mineral. If so, it gets a name. Mineral species are named by their discoverers, sometimes in a way that describes their composition or structure, sometimes for the locality where they were found, but most often recently in honor of someone. You can't name them for yourself. So, two groups of mineralogists in Italy, one in Florence and one in Padua, independently found the first two occurrences of Fe-rich crystals of the high-pressure mineral (Mg,Fe)<sub>2</sub>SiO<sub>4</sub> in the modified spinel structure, in two different meteorites. The Mg<sub>2</sub>SiO<sub>4</sub> end member with that structure is called wadsleyite, and static high-pressure experiments show that wadsleyite only hosts up to 30% substitution of Fe for Mg before its stability field pinches out. So, all known instances of that structure so far have less than 50% Fe substitution and that makes them wadsleyite. Anything with more than 50% Fe substitution would count as a new mineral. Both the meteorite finds report 55%-60% Fe substitution and that counts as a new thing. It isn't usually stable, but there it is. In both cases, it formed during short-lived high-pressure melting events due to high-velocity collisions in the asteroid belt; such a process can make metastable minerals and then preserve them due to rapid cooling. The Florence group is led by Luca Bindi, who has been my collaborator on three recent papers about quasicrystals in meteorites and how we reproduced them by shock wave experiments, so Luca thought it would be appropriate to name this discovery for me in honor of my contributions to high-pressure mineralogy.

## LEARNING TO CRAFT HAND-MADE SCIENTIFIC TOOLS

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Hart's mother holds a master's degree in chemistry and sometimes still encourages Hart to finish school. His younger sister went to college for geology and works in the Bay Area. "She was the perfect one," Hart muses, "all straight-As and never getting called to the principal's office."

It wasn't ever learning that Hart struggled with -- it was stillness. He walked away from the machine shop job he took after earning his associate's because operating a computer-driven machine to make the same parts every day evoked in him the same restless dissatisfaction he felt sitting through lectures.

Hart didn't know what to do next. So he called in a favor from Richard Bock, the scientific glassblower at UCSB and an old family friend. Bock set him up with a lamp, handed him a glass tube, and told him to have at it.

A third-generation glassblower from Tübingen, Germany, Bock spent the last 40 years watching his family's trade slowly dwindle out of existence. Back in the 1980s, he says, there were somewhere between thirty and fifty masters in Southern California alone. Now, he can count his fellows on one hand.

As glassblowers retire, shops close down. But the problem often isn't that an institution wants to discontinue its

glass shop but rather that they can't find anyone to keep it running.

"I've been up against this for decades," Bock says, "I think part of the problem is, at least a little bit, the stigma of being in trades." Hart was not the first youngster Bock introduced to glassblowing. Most walked away after a few days.

But Hart didn't walk away. He enjoyed the feel of the glass, working with his hands -- and he was good at it, too. "You need *fingerspitzengefühl*," explains Bock. "You need finger-tip feeling, sensitivity -- not literal, but a knack for things. Creating things, doing things. A lot of hand-work. You have to have that. And Nate does."

Hart, for his part, says that he did a terrible job those first few days.

After a month at UCSB, Hart moved to New Jersey to attend Salem Community College, which offers the United States' only scientific glassblowing program. He graduated in 2014. Many years ago, Gerhart, too, attended Salem.

In 2015 Hart took a job at Elemental Scientific in Golden, Colorado. Bock stayed in touch, offering Hart advice and encouraging him to move forward. "Richard told me that you can learn everything a shop has to teach you in about a year," Hart recalls. "After that, he said, it was time to go somewhere new."

Hart spent three years "shop-hopping" at Bock's direction, refining the skills he had been introduced to at Salem. He learned to twist delicate

Schlenk manifolds out of long, straight tubes, to balloon squat pyrex cylinders into round-bottom flasks and to always keep glass turning while under flame-- whether on a lathe or in his hands.

All the while, he kept Caltech in mind. Bock knew that Gerhart was winding down, and told Hart that a job could be opening up in Pasadena. Gerhart actually did retire in 2017, and he was replaced by a new hire. But new man didn't work out. Gerhart returned part-time in 2018 and began searching for an apprentice.

After months of fruitless interviews, Gerhart reached out to Bock, who introduced him to Hart. Gerhart knew immediately that he'd found his man. In September, Hart came on as an intern.

It wasn't easy at first. After the problems with Gerhart's first replacement, administration was cautious about taking on a new glassblower. So, for two weeks, Hart was only allowed to work during Gerhart's limited hours. He would drive in from Santa Barbara on Tuesday, stay in a motel in Pasadena, then drive back to Santa Barbara on Thursday. "It was killing him," Gerhart says. "There's no way he could afford to get a place working those hours."

When asked about those days, Hart laughs. He puts the Chemglass catalogue down on his desk and leans back in his chair, readjusting his LA Dodgers baseball cap. "It's what I needed to do to get the job, I guess. You know how it is."

Hart is interrupted when two gradu-

ate students holding pairs of long glass bubbler tubes walk into the main shop, just outside the office. They are greeted by Gerhart and scolded fondly for having just been here yesterday. The tubes, Hart guesses, are too long for their laboratory fume hoods. He'll have to cut them down later.

"I just try to find out what people are screamin' about," he says, nodding in the direction of the students. "Sometimes they come back in, need something changed, but that's what this is -- learning, figuring out how to make things work. These last few months, I've just been keeping my head down and trying to do my best."

Like the Church Laboratory, Hart doesn't seek attention. He doesn't complain. He doesn't speak loudly, nor quite softly either. Though tall, about 6-foot, he doesn't loom or tower. He wears basketball shorts and sneakers, and has a fluffy black rescue dog--Kingsley--who he named after a hockey team.

Forty years from now, he hopes to be working at Caltech -- though he doesn't really think that far down the line all that often. He likes making things and learning from Gerhart, and looks forward to September when he's slated to start running the shop on his own.

But for now, Hart is just happy to do something he enjoys, and to have made it back to California. "I don't know what it is exactly," he says, grinning, "but it's not like it was in New Jersey. I think -- I think people smile more here."