The California Tech

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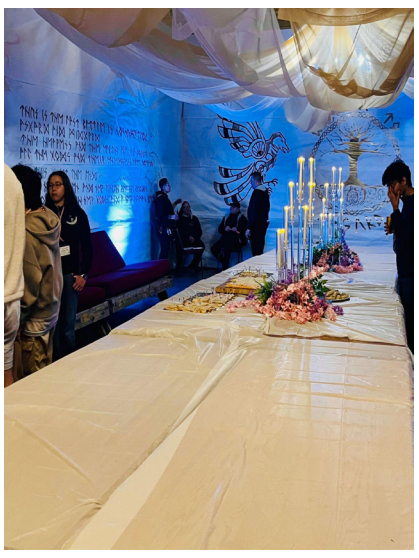
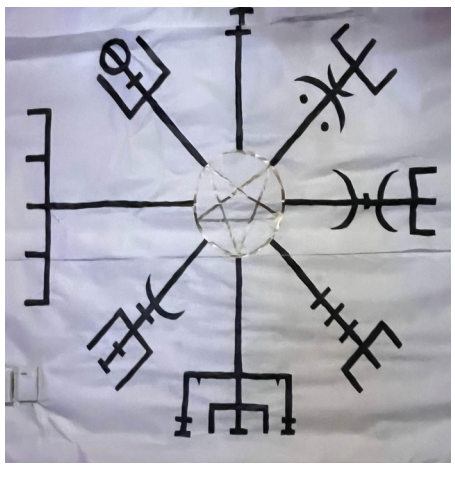
Ricketts Hosts Norse-Themed Interhovse





Damian R. Wilson
The Inside World

Ricketts Hovse hosted a Norse-themed interhouse party Saturday night, transforming the space with decorated columns, runic wall designs, and DJ booth styled in Ricketts' signature gothic aesthetic.

The theme was introduced through a written narrative emailed to the student body, drawing on Norse mythology and framing the event as a journey from Múspellsheimr and Hel to Asgard and Valhalla. Stylized runes and signatures reinforced the visual motif.

Inside, low lighting and backlit runic artwork supplied the promised atmosphere, while the DJ booth in the courtyard served as a focal point. The party continued late into the night, testifying to its Norse-mythological allure.

PSA From the Mail Office

Alice Edel and Darrell Goudeau
Brief

It has come to our attention that there is wrong information going around about Mailbox assignments. Here are the rules:

1. Mailboxes are assigned at check-in and you keep them while you are an **active** student.
2. If you withdraw for whatever reason the box is pulled and re-assigned. **It is not held.**
3. Any correspondence/packages that come in with your old MSC is returned.
4. Mailboxes should be checked daily.

In addition, Alice would like to stress that packages must be picked up ASAP. The proper address for all correspondence/packages is as follows:

Name — MSC #
1200 E. California Blvd
Pasadena, CA 91126

Please use this address only.

For any questions, contact:

Alice Edel – Tech Express (aedel@caltech.edu)

Or Darrell Goudeau – Manager Mail Services/Tech Express (darrell.goudeau@caltech.edu)

Inside This Issue

2026 San Gabriel Valley Food Passport

Victoria Davis
Column

Hello *Tech* readers! This is my first round of reviews as I explore the San Gabriel Valley food scene with the 2025 MySGV Food Passport. This passport is valid from July 1, 2025 to June 30, 2026, so I will spend the first half of 2026 exploring as many restaurants and bakeries featured here that I can!

All photos by Victoria Davis.

Lee's Hoagie House

Passport description: "Shahan Der Ohannesian built Lee's Hoagie House into a Pasadena staple, serving the community with heart since 1992."

Passport benefit: Free fries & drink with purchase of any sandwich

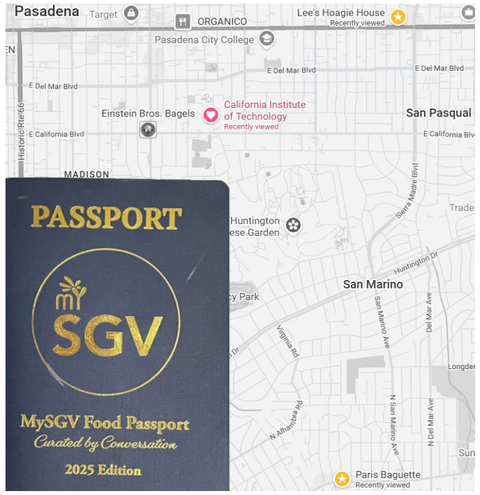
Kayane and I visited Lee's Hoagie House and it was amazing! You walk in, and so many people there are regulars! The owner, his son, and other staff chat with their regulars like they are family. The place is cozy and inviting, but better yet is the food. Kayane ordered the Tri-Tip Hoagie and I ordered the Meatball Hoagie, with the free drink and free fries. The food was fresh and came out to us piping hot. The portion sizes were large, but the food was so good we ate the whole thing! We have plans to go back and bring Kayane's mom with us. We can't wait to try more of their delicious sandwiches and hoagies, and save some for leftovers. I seriously wish Caltech would use them to cater events and seminars, because the food was that great! Kayane says "this place is an 11 out of 10." I agree!

Paris Baguette

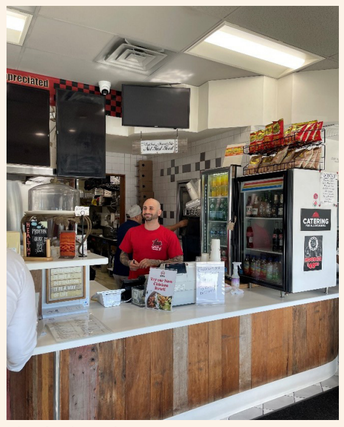
Passport description: "Jason Kim, a retail and real estate finance expert, brings his passion for community to life as a Paris Baguette partner."

Passport benefit: A free drink and a free pastry

I went to Paris Baguette with my fellow G4 labmates, Nick Dulock and Jadon Bienz. Nick says "I don't fuck around when it comes to Paris Baguette." He's loved this place for a while, and now that it is featured in my food passport, we took a journey to San Gabriel one afternoon to sample their tasty pastries. I ordered the Very Berry Pastry, Pepperoni Pizzetta, and the Korean Iced Milk Coffee with Cold Foam. The pizzetta was pretty good! The pastry was fine as well. What really stood out, though, was the coffee. It was absolutely delicious. Sweet, but not too sweet that you can't taste the bitterness of the coffee. The cold foam perfected the drink. It was amazing. So amazing that I am still thinking about it. I would definitely go again for that drink. Maybe even regularly!



Lee's Hoagie House



Exterior and interior of Lee's Hoagie House.

Tri-tip Hoagie and Meatball Hoagie by Lee's Hoagie House.

Paris Baguette

Exterior and interior of Paris Baguette.

Very Berry Pastry, Pepperoni Pizzetta, and Korean Iced Milk Coffee with Cold Foam by Paris Baguette

Editor's Note: We want to hear your perspective!

We strive to represent every voice in the Caltech Community with fairness, accuracy, and impartiality in our news reporting. If you think we missed something, or just want to share your thoughts about a topic we've reported on, I encourage you to submit a Letter to the Editor!

Send submissions or contact the *Tech* editorial team at

tech@caltech.edu

Submissions are due at 12 p.m. on the Saturday before each biweekly Tuesday publication.

What Do Waring Blenders, Toothpicks, and CRISPR Have in Common?

Ryan Ma
Science & Tech

Tools of Discovery: From Blenders to CRISPR

"What do a Waring blender, a wooden toothpick, and CRISPR have in common?" This was the question that Prof. Dianne Newman asked during the first lecture in Microbial Genetics. Initially, I was very confused about this question because they seem to be used in completely different scenarios. However, soon I started to see what she meant. Strikingly, each has served as a key tool in major scientific advances. Scientists often exploit everyday objects – or simple biological systems – to probe deep questions. Each of these examples highlights how far we can go with very little. Below we explore some stories, both historical and modern, of scientists turning the simple into the sublime.

Kitchen Counters and Viral DNA

A retrospective image from Waring Laboratories (1950s) shows a lab researcher working with a Waring blender in vaccine development. "In the 1950's a Waring® blender was used in the development of the polio vaccine," notes the Waring website – illustrating how an ordinary appliance found its way into serious lab work. Long before disposable plasticware, biologists repurposed kitchen gear.

For example, Alfred Hershey and Martha Chase used a high-speed kitchen blender in their classic 1952 experiment on bacteriophages. They infected E. coli with radioactive phages, then "stirred each sample in a Waring Blender" to shear off viral protein coats (since centrifuges would destroy the cells). The blender's mechanical force stripped away protein shells while leaving cells intact. This enabled Hershey and Chase to show that **only the DNA** (phosphorus-tagged) entered the cell, whereas viral protein stayed outside. In short, the humble blender helped clinch the discovery that DNA is the genetic material.

This isn't an isolated case. In the late 1940s Jonas Salk used a Waring blender to help prepare inactivated virus for polio vaccine trials. More broadly, even today laboratories use motorized blenders to homogenize tissues or mix reagents when gentle blending is needed. The story of the Waring blender reminds us that scientific breakthroughs can rely on off-the-shelf gadgets. As one historian put it, that "Waring blender experiment… showed that when bacteriophages infect bacteria, their DNA enters the host cell, but most of their protein does not," confirming DNA's role. A kitchen appliance had reshaped biology.

The Mighty Toothpick in Microbiology

Even more basic than a blender, the tiny wooden toothpick is a mainstay of the microbiology lab. Researchers routinely sterilize thin wooden toothpicks (for example by aluminum foil wrapping and autoclaving) for manipulating cultures. Lab guides explicitly list "sterile toothpicks" among needed tools. According to Fraser et al., "The broad side of flat wooden toothpicks may also be used for streaking out bacteria," and a pointed toothpick end is handy to "pick individual colonies or phage plaques." In practice, scientists use toothpicks to transfer tiny spots of liquid, scrape colonies off agar plates, or inoculate bacteria into broth.

This simple method is faster and cheaper than disposable pipette tips for many tasks. For instance, when testing mutant bacteria or phages, a researcher might dip a sterile toothpick into a colony and touch it onto a new plate. Textbooks today still list toothpicks side by side with loops and spreaders as basic microbiology supplies. In other words, no robot is needed to pick single clones: a sharpened toothpick does the job!

Using toothpicks and plates, microbial geneticists have answered big questions. For example, Max Delbrück and Salvador Luria's 1943 fluctuation test relied on plating bacterial cultures in batches and observing the numbers of phage-resistant colonies. By carefully counting colonies on Petri dishes (often using a toothpick to isolate a survivor), they showed that mutations occur spontaneously, not only in response to viruses. In modern teaching labs, similar experiments still use nothing fancier than agar plates, broth, and small sticks. Such "cheap and cheerful" tools underscore how even fundamental genetics can be explored with minimal gear.

Garden Experiments and Germs

Before advanced machines, scientists employed whatever was at hand. Gregor Mendel famously used pea plants in his monastery garden to unlock the laws of inheritance. He performed "thousands of crosses with pea plants," tallying traits by hand and discovering dominant versus recessive patterns. His only tools were pea pods, a fence for pollination, and his notebook. Likewise, Louis Pasteur employed simple glassware to settle the question of spontaneous generation. In 1859 he boiled broth in a long-necked glass flask bent like a swan's neck. As the broth stayed sterile (dust trapped in the curve), he demonstrated that microorganisms come from the air, not spontaneously. The broth remained clear until Pasteur tipped the flask so particles could fall in, at which point it quickly clouded. This elegant setup — no microscopes or fancy gadgets, just heat and cleverly shaped glass – provided key evidence for germ theory.

In each of these cases, the basic "tool" was just the experimental design plus everyday objects: pea plants and garden fences, or flasks and heat. Today's students still recreate Pasteur's experiment with flasks and coils of tubing, proving that crucial insights can come from very simple means.

Building Physics from Boards and Beads

Physics has its share of kitchen-lab stories too. In the late 1500s, Galileo Galilei challenged Aristotle by letting bronze balls roll down wooden ramps. Using nothing more than a straight board with a carved groove and a stopwatch (or water clock), he showed that the distance traveled grew with the square of time – a precursor to the concept of acceleration. Galileo's setup was so modest that contemporary scholars can literally replicate it with two planks of wood and a ball.

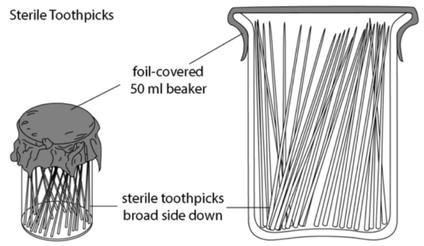
About a century later, Isaac Newton explored light with a cut glass prism. In his *Opticks* (1704) he describes passing sunlight through a prism and observing the spectrum of seven colors. Newton's lab was primitive by modern standards: the "apparatus" was sunlight, a small aperture in a window shutter, and a prism of glass. Yet from this he laid the foundation for optics and identified red, orange, yellow … and indigo in the rainbow. As Smithsonian exhibition notes, Newton "demonstrated that clear white light was composed of seven visible colors" – all with a stick of wood and a triangular crystal.

Chemistry offers another example. Mikhail Tsvet, a Russian botanist in 1906, took plant extracts (e.g. crushed spinach leaves) and passed them through a column of calcium carbonate. The colored molecules separated along the column and onto filter paper, giving distinct bands. Tsvet dubbed this "chromatography" (literally, "color writing")[8]. He used little more than glass tubes, filter paper, and solvent – no electronic detectors or lasers. This humble technique became essential for separating mixtures and analyzing compounds. In fact, early chromatography still often uses simple paper strips and beakers as in Tsvet's day.

These stories show that when it comes to probing nature, complex questions can be approached with simple setups. A wooden board, a glass prism, some filter paper – each turned out to be all the "machinery" needed to shake up science.

A Modern Twist: CRISPR from Bacteria

Even in cutting-edge biotechnology, the roots of innovation lie in basic experiments. Take CRISPR/Cas9, the genome-editing "scissors" of today. CRISPR itself began as a peculiarity in microbial genetics. In 1987 researchers found unusual repeating DNA sequences in *E. coli*. It took years of cultivation and observation to realize their function. In 2007, Barrangou and colleagues grew yogurt bacteria (*Streptococcus thermophilus*) and challenged them with different viruses. They simply traced strains from old culture collections – a kind of years-long microbial experiment – to see what happened. When new viral DNA fragments (called "spacers") appeared in the CRISPR region of the bacterial genome, those bacteria became immune to that virus. In other words, by watching petri dishes and DNA sequences over time, they uncovered a bacterial adaptive immune system.



This discovery, grounded in basic bacterial culture techniques, gave us the CRISPR tool. Now molecular biologists use CRISPR/Cas9 to cut and paste genes in cells, but it all started with simple lab work: growing microbes, infecting them with phages, and sequencing DNA. In this way, a fundamental question of immunity and evolution was answered using humble methods, yet it led to one of the most powerful tools in biotechnology.

From Humble to High-Tech

These examples span centuries and fields, but they share a lesson: great science often builds on simple tools. It could be a tablespoon blender or a paperclip in the right setting; a painstaking count on graph paper or a wooden toothpick to dot microbial lawns. As Jeremy Norman notes of the Hershey–Chase work, their "Waring Blender experiment" settled the old debate by showing DNA is the hereditary material[2]. Today Caltech students and researchers still repeat the same principles. Whether measuring cosmic expansion with a telescope or editing genomes with CRISPR, the discovery process remains grounded in creativity.

In the end, a blender, a toothpick and even the modest bacterial immune system are part of the same story: they became the instruments that carried scientists from questions to answers. Their legacy reminds us that you don't always need high-end machinery to unlock the universe. Even the simplest tools – used thoughtfully – can deliver groundbreaking results.

Sources: Classic experiments by Hershey & Chase[1][2] and by Jonas Salk[3]; lab manuals and methods[4][5]; historical accounts of Galileo, Newton, Pasteur, Mendel[6][7][9][10]; and reviews of CRISPR discovery[12][13]. These illustrate how basic tools – from kitchen blenders to bacterial cultures – have propelled science.

[1] The Hershey-Chase Experiments (1952), by Alfred Hershey and Martha Chase | Embryo Project Encyclopedia https://embryo.asu.edu/pages/hershey-chase-experiments-1952-alfred-hershey-and-martha-chase

[2] Alfred Hershey & Martha Chase Conduct the "Waring Blender Experiment" : History of Information https://www.historyofinformation.com/detail.php?id=3970

[3] Waring Lab https://www.waring.com/waringlab.html?srsltid=AfmBOorabA9wt21i73wENIUN_I2uxkV83sZnCTJ4hOHtE79xtJ8gLJA0

[4] Recipes and tools for culture of Escherichia coli - PMC https://pmc.ncbi.nlm.nih.gov/articles/PMC6819147/

[5] A Bacterial Adenylate Cyclase-Based Two-Hybrid System Compatible with Gateway® Cloning - PMC https://pmc.ncbi.nlm.nih.gov/articles/PMC8315169/

[6] Inclined Plane Experiment https://galileo.library.rice.edu/lib/student_work/experiment95/inclined_plane.html

[7] The Science of Color https://library.si.edu/exhibition/color-in-a-new-light/science

[8] Journey Through the History of Paper Chromatography - Chrom Tech, Inc. https://chromtech.com/blog/journey-through-the-history-of-paper-chromatography/

[9] 1.1C: Pasteur and Spontaneous Generation - Biology LibreTexts https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_(Boundless)/01%3A_Introduction_to_Microbiology/1.01%3A_Introduction_to_Microbiology/1.1C%3A_Pasteur_and_Spontaneous_Generation

[10] Mendel, Johann (Gregor) https://www.genome.gov/genetics-glossary/Gregor-Johann-Mendel

[11] Luria–Delbrück experiment - Wikipedia https://en.wikipedia.org/wiki/Luria%E2%80%93Delbr%C3%BCck_experiment

[12] [13] CRISPR–Cas9: A History of Its Discovery and Ethical Considerations of Its Use in Genome Editing - PMC https://pmc.ncbi.nlm.nih.gov/articles/PMC9377665/

The Myths of Graduate School: What to Consider Before Committing to a PhD Program

Jieyu Zheng
Opinion

I received this writing assignment some time ago, but while trying to leave graduate school in one piece, it took longer than expected to sit down and write it. This opinion piece is aimed primarily at fellow Caltech undergraduates who are considering or applying to Ph.D. programs. Junior graduate students in their first few years, especially those interested in an academic research path, may also find it relevant, or at least unsettling.

I should begin with an important disclaimer. I am writing from a privileged position: I applied to Ph.D. programs for the Fall 2020 cycle and was fortunate to be accepted into one of the top neuroscience programs in the world. My Ph.D. experience has, by many measures, been smooth, rewarding, and enjoyable, though I still often found myself wondering what would happen if things went wrong.

I have close friends who left their Ph.D. programs, some by choice and some by circumstance. Others started their degrees fully intending to pursue academic careers, only to find themselves on very different paths. Through many honest conversations with younger undergraduate students, and with senior professors for whom the Ph.D. was once very exclusive and elite, I decide to offer a set of personal perspectives to those who are about to make decisions about this path.

1. What a Ph.D. Program Is About

A Ph.D. in X — short for Doctor of Philosophy in X — is fundamentally about learning how to do research in a specific field, usually within an academic setting. The "philosophy" and X matter: different disciplines train very different ways of asking questions and producing knowledge. In fields like machine learning, students complete multiple short projects that last months and clock their contributions according to the conference deadlines. In others like neuroscience (my field), a single question may take five years and define the entire degree.

A Ph.D. in X is a title in X, but often not a practical certificate to practice X. Outside academia, it is rarely a required permit to work in a field (more on this later). While research itself in my opinion is an innate human instinct that is widely applicable, the academic form of research is quite narrow.

Most Ph.D. programs, including those at Caltech, are designed to train students for academic research careers. As a result, the training emphasizes skills central to universities, such as writing papers and a thesis that situate current work within the literature. Methods and techniques from experiment to analysis are often highly specialized to academic labs, and many Ph.D. graduates entering industry find that they must learn from scratch a different set of techniques. The Ph.D. programs rarely prepare the students for industry job markets — you would have a timeline for passing candidacy exams with project proposals, but not a committee that tells you when and where to find internships or pass code or behavior tests during interviews.

2. The Job Market Reality

Every Ph.D. student trains within one or more research groups led by 1-2 senior researchers — often themselves with Ph.D.s. Even a most exclusive senior researcher may graduate 10 to 20 Ph.D. students over their professorship of decades. Research groups rely on a steady supply of graduate students and postdocs to produce papers and secure grants, especially as modern journals increasingly demand larger datasets and longer timelines for publication.

Universities are not expanding at anything close to this rate. Neither are research budgets, especially as research itself becomes more and more expensive. Another way to see this is to compare faculty hiring rates to graduation rates in your field. In my neighboring program Ph.D. in Computation and Neural System, **43 students** graduated between 2015 and 2023. Meanwhile, despite the ongoing faculty search, **zero** new assistant professors have been hired in the same discipline since the last hire in 2015. The gap is striking even at an institution like Caltech known for its low student-to-faculty ratio. The structural reality of the academic market determines that the vast majority of Ph.D. trainees cannot end up in tenure-track positions.

3. Finding Joy in Sparse Rewards

If everyone entering a Ph.D. program hoped to become faculty, academia would become a vicious rat race of elimination. Graduate school admission rates are notoriously low, but at least your rejection comes in euphemistic but clear wording by April. In contrast, whether you are failing to get a faculty position is more obscure. You may not realize that it is unattainable until ten or more years later — after a Ph.D., postdoc(s), and repeated application cycles. If you were motivated by fear of failure, you'd be restless with anxiety until you got tenured in your 40s.

In this sense, a Ph.D. is sparse with rewards. This reflects the nature of research: you are rarely rewarded based on hours worked or intermediate evaluations, as in many other jobs. Success is somewhat scalable with the number of publications, but scientific discoveries do not happen daily — not like making money through day trading or being a hairstylist paid by the number of heads trimmed. In my case, I was lucky to reach a major finding in my project as early as Year 2. After that, progress became very incremental — replication, refinement, and scratching my head to understand the mouse heads became the daily routine. Learning to derive joy from daily work is an essential philosophy of a Ph.D.

4. An Advantage or a Sacrifice?

If the prospects for faculty positions are slim, what about pursuing a Ph.D. to become more competitive in the job market? It is true that many jobs now require Ph.D. training, or that advancement to certain levels may depend on having the degree. But be aware of the "involution" fallacy. Remember the day when bachelor's degrees were once rare and valuable. Now a master's degree and multiple internships are required just for entry-level positions. Similarly, a bit of undergraduate research experience used to be sufficient for Ph.D. applications, whereas students are now advised to accumulate a few years of full-time technician experiences and first-author publications before applying. The job market is suffering from degree inflation, and encouraging more people into Ph.D. programs would only worsen it. In practice, a master's degree with research experience should be sufficient.

Regarding financial advantage, one undergraduate applicant once told me that a master's degree is costly while a Ph.D. provides a stipend, making the latter more attractive. A basic lesson in economics on compound interest would tell you how wrong that view is. Saving a steady income early can outweigh delayed earnings later. For example, my best friend from my master's program started her own tutoring business immediately, while I am still working toward a professorship. She has flexible hours and can work remotely, while even the best-paid postdoctoral positions I have considered do not match her income. If her salary represents the average outcome after our master's degree, then I have lost tens of thousands of dollars each year throughout my twenties — and will likely continue to do so until, perhaps, a faculty position.

Historically, Ph.D. programs were accessible primarily to wealthy elites, and to some extent this remains true. The Ph.D. stipends are meager even in private universities like Caltech, stripping students from typical American dreams like owning a house and starting a family. Those who carry student loans or family obligations would only have these pressures compound the inherent challenges of research. It is true that many opportunities have opened for underrepresented and underprivileged groups, and these efforts must continue, as they are essential for changing who produces knowledge and whose questions science addresses. A Ph.D. for these groups is not a path from rags to riches, as it's unlikely to dramatically change one's financial situation.

5. So Why Are You Still Here?

As I said, I come from a privileged position. I do not have major financial worries. While I entered my Ph.D. terrified that I would fail to even find a lab, I have since gained resilience and am prepared to face failure. Curiosity — and inspiring curiosity in others — has always been my calling, and research and teaching in universities fit this well. A Ph.D. also allowed me to study abroad, to immerse myself in a foreign country legally, and to engage in intellectual environments that I deeply value. (Of course, I sometimes wish I had the talent and resources to write screenplays and make films in Hollywood instead.)

I did not write this piece to say you should not apply, but to encourage clarity about your reasons. If what you see in current graduate students or postdocs motivates you, consider how those conditions might evolve over the next ten years in your shoes. I often wish my current self could time-travel back to my junior year and have this conversation. I hope this piece helps someone do that earlier.

Fear and Loathing in San Francisco Int'l: Repertorial Miscellany

Damian R. Wilson
Satire

I was somewhere on the edge of that "museum" when the spam musubi began to take hold. It hit like contraband adrenaline, that sugar-slick rice and salt-fat meat. The unearthly intimacy of plastic wrap torn too fast. And suddenly there was a terrible roar, neural-networked boundaries announcing themselves and vanishing at once in the very same neoned bang: how I am tortured for my hauteur, my gall, as a sense-having organism.

The floor gleamed at me with the antiseptic confidence of empire. Time stuttered. I felt watched by algorithms with no eyes and appetites I could not name.

This is what now passes for culture at the nation's choke points. A soft, coercive hallucination piped in at security clearance, telling you who you are supposed to be before you've finished unlacing your shoes.

Security had always been a bloated pantomime; the rub is whether it's ever been this artless. Context and content once pretended to matter — there was a grip, however greasy, on the social imagination. We were not always this drag-rag debris of ourselves, so shredded and slop-ridden. This loose confetti of civic will.

I should consult my boot's TSA-installed LLM. He's thinking hard about me.

.....

My brother made his diagnosis over the phone. "You have a pathology," announced he, clinically delighted. "A crippling deficit of adventure. You gaze into the heart of the world and see only sadness, as if there is nothing else to feel. Absurdity greets you every instant of your waking life and rather than grab him by the lapel, you sigh and avert the eyes. What existence is that? You live with neither panic nor optimism, without any extremity of emotion or experience. Fix this, dear brother. *Tout suite.*"

I love my brother, my clone, my echo with more testosterone. He is my forever gospel. Heeding him, I did the only thing making a perversity of sense: I hurtled toward that mecca of the redpilled and AI-based, the alpha-leveraging disruptors, where the cracked grapple with clankers in embryo. The beating heart of the state in which I have always lived, though I have only known its lower portion. Where else in times of crisis and psychic outrage to go but **THE SAN FRANCISCO BAY AREA**.

What a monument to adventure indeed. That shimmering laboratorial city-state where capital, technofetish, and spiritual vacancy conduct their most aggressive trials, hallucinating the dreams that stuff is made of.

The pilgrimage began — all do, in modernity — with ritual humiliation.

I commit the following to text:

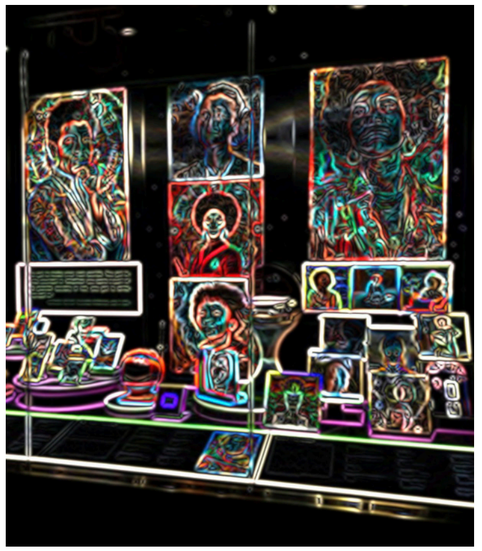
— **MY TSA ATTENDANT**, having perused my performance on the authenticating camera, frowned with bureaucratic concern. "Now, with more energy — remember that." (It felt scathing; I am scathed.) Evidently, I am too pensive for this part of California: or, my energy is simply too strange and wrong. Insufficiently eager, insufficiently legible. Here, even the face must pass inspection. I nodded obediently, filed the correction away. A terrible eagerness consumes me for any and all human elements; I must meet his human presence with human respect.

I can learn. Memory affords it.

— **THE POKE TO THE MAX OPERATIVE**, distracted but kindly, rebuffs my request for water with the reflexive austerity of a system trained to deny. But then — mercy! — she reneged, sliding a plastic-cup offering across the counter like classified material. "Okay — just don't tell nobody."

Hydropolitics remains turbulent in this slice of the republic: cruel, slippery, rationed by mood and machinery. And yet warmth lives in the maelstrom also. God bless that woman, her small act of treason.

— **THE NEW YEAR'S SFO EXHIBIT,** titled "Women of Astrofuturism," advanced that cause only questionably. A glut of AI-generated shlock stared back at me: smooth, soulless women gazing coldly into futures no one bothered to imagine properly. The slurry was not, however, without real stuff: a few photographs, some fashion, artifacts that bore the unmistakable scars of human decision. No "text-to-image" in those captions. For that reason alone, infinitely superior to all that roboslop, thrumming with fleshy confidence.



The center is not holding, it was never meant to, but this is the worst kind of collapse. Not fire and rupture, but tawdry replacement theater. Simulation dressed as inevitability. Let us work terrible things in better ways: for there is, still, the trying; we have not exhausted it, not yet.

So there's another thing to remember.

From Fine Dining to Family Weekend: What's Cooking at Caltech

Miguel Campos
Dining & Housing

WINTER TERM GREETINGS FROM HOUSING AND DINING SERVICES

Welcome to the first installment of our new collaborative column from Housing and Dining Services! While the term is already in full swing, we wanted to take a moment to officially welcome everyone back to campus. As part of the Student Affairs team, we are excited to launch this space in the *Tech* to keep you connected with the community, whether that means updates on life in the houses or the latest culinary experiences we're cooking up.

HOUSING UPDATES

House Improvements & Maintenance — We have been collaborating closely with the Stewards and Facilities on several initiatives to improve life in the houses.

- **Upgrades:** The Stewards have been working with Housing on enhancements including the installation of an air conditioner in the Page Piano Room and the updating of whiteboards in the Blacker lounge.
- **Cleanings:** We are currently working with the Stewards to schedule termly courtyard cleanings for all houses.
- **Accessibility:** Housing is working with Facilities on a design for an accessible ramp in the Dabney courtyard.

Future Planning: Storage & Lottery —

- **Summer Storage:** Members of the Stewardship Committee and the IHC are currently meeting with off-campus storage companies to explore alternative solutions for summer storage.
- **2026 Housing Lottery:** The Housing Lottery Working Group has been meeting to propose adjustments to the system implemented last year. The group aims to finalize recommendations by the end of January and will begin rolling out information about the 2026 Fall Housing Lottery by the end of the winter term.

Contacting Housing — The Housing Office can be contacted by phone at 626-395-6176 and email at housing@caltech.edu during business hours, Monday-Friday, 8am-5pm.

DINING UPDATES

The Pop-Up Bistro: A Surprise Meal Plan Event — On Thursday, Jan. 22, we were thrilled to host our latest Pop-Up Bistro. This initiative, launched by our Director of Dining Services, was created with a specific goal in mind: fostering community through meaningful, face-to-face interaction. We wanted to create a space where we could slow down, break bread, and connect with students outside the bustle of the daily meal rush.

For those who haven't caught one yet, the Pop-Up Bistro is designed as a surprise experience. We announce the event via our Instagram @caltechdining the day of, and 20 lucky undergraduate students to comment that day's keyword on the post are selected to join us for a three-course fine dining experience.

Last Thursday's event was a hit! It was wonderful seeing the happy faces of those students as they enjoyed a culinary journey from starters of rich lobster bisque or roasted tomato bisque to main courses featuring tender duck or stuffed roasted butternut squash with risotto and green beans. And, of course, the crowd-favorite finish: a chocolate soufflé with crème anglaise.

A huge thank you to everyone who joined us and took the time to meet our talented Sous Chef, Oswaldo. We love sharing our passion for food with you.

Getting Ready for Family Weekend — Looking ahead, we are gearing up for First-Year Student Family Weekend next weekend! We can't wait to welcome your families to campus.

CONNECT WITH US
We are one team dedicated to enhancing your student experience throughout the Winter term.

- Dining Questions: dine@caltech.edu | or visit our website at dining.caltech.edu
- Housing Questions: housing@caltech.edu | or visit our website at housing.caltech.edu

Sous Chef Oswaldo plates the main entree duck over risotto and green beans. (Credit: Miguel Campos)

Journey Down Memory Lane

Areeg Al-Dayni
News

My name is Areeg Al-Dayni, and I am a rising sophomore majoring in bioengineering. I was born in Baghdad, Iraq, and lived in Bolu, Turkey for two years before eventually settling in Fort Worth, Texas. From an early age, my life across cultures taught me that the world is vast, diverse, and deeply interconnected. This upbringing sparked my passion for languages and global learning, making studying abroad an essential part of my college journey.

That passion came to life through the Bishop Fellowship, which allowed me to study abroad in the Andalusian region of Spain. Choosing just one destination was no easy task, but Granada stood out immediately. Growing up in Texas, Spanish played a major role in my education, and learning about Al-Andalus in history classes left a lasting impression on me. Experiencing Granada firsthand — its language, history, and daily life — was both meaningful and transformative.

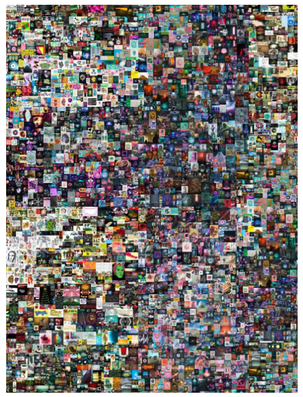
Living and studying in Granada gave me the opportunity to engage deeply with the city's rich cultural and linguistic heritage. Exploring historic landmarks such as the Alhambra and the Albayzín allowed me to see history not as something distant, but as something living and present. Through my coursework, I examined topics ranging from the influence of Islamic dynasties on Spain to Spanish literature, while also strengthening my grammar and vocabulary skills through immersive language study.

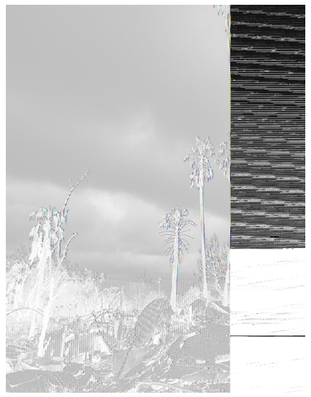
One of the highlights of the program was traveling to Morocco, where I gained valuable insight into the cultural and historical connections between North Africa and southern Spain. I also visited other Spanish cities including Seville, Córdoba, and Málaga, each offering its own unique perspective on Spanish culture and regional identity.

Thanks to post-program funding, I was able to extend my learning beyond the classroom by traveling independently throughout Spain. My journey took me to Barcelona in Catalonia, Madrid in the Comunidad de Madrid, Toledo in Castilla-La Mancha, and Salamanca in Castilla y León. Each destination broadened my understanding of Spain's regional diversity and strengthened my confidence in navigating new environments.

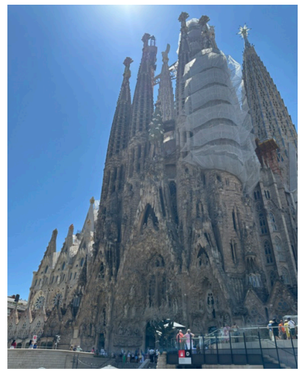
This study abroad experience played a crucial role in shaping me into a more globally-minded scientist and engineer — someone who can communicate across cultures and approach complex problems with empathy and perspective. I am deeply grateful to the Bishop Family for making it possible for me to turn a lifelong dream into a reality and for supporting an experience that will continue to influence my academic and personal growth.

All photos by Areeg Al-Dayni.





Court of the Lions built by Nasarid King Muhammad V (Left) and the blue-washed city of Chefchaoun, Morocco (Right).



Basílica de la La Sagrada Familia (Left) and Park Guell (Right), both of which are in Barcelona.

Plaza Mayor in Madrid, Spain.

Info from the FASA Office

The Bishop application window is opening soon, if you are interested in applying for this Award please join the FASA Office for the information meeting as well as the budget workshop.

Information Meeting: Wednesday, January 28, 2026 at 12pm in Brennan Conference Room

Budget Workshop: Monday, February 2, 2026 at 12pm in Brennan Conference Room

The 2026 application deadline is **March 01, 2026**.

For more information go to https://fasa.caltech.edu/.

The Fire Is Over. The Lead Is Not. — An Evening with Professor François Tissot in the Aftermath of the Eaton Fire

Damian R. Wilson
Science & Tech

On Wednesday evening, the Watson Lecture opened not with fire but with air.

Professor François Tissot began by recalling a Los Angeles where smog once pressed so thick against the city that children were excused from school and pedestrians wore gas masks on Hollywood Boulevard. You could see it in the photographs: the sky collapsed into a yellow-gray ceiling, visibility reduced to a block, eyes burning. (Tissot recalled how someone, seeing in these photos gas-masked men of the 1950s, asked if they were AI-generated.)

By comparison, he noted, today's Los Angeles feels breathable. Cleaner. Progressed.

And yet, this story isn't nearly over.

The lecture — delivered just days after the anniversary of the Eaton Fire, which destroyed or rendered uninhabitable hundreds of homes, including Tissot's own — set out to make visible a threat that does not glow or roar or recede on satellite images. Lead contamination, Tissot argued, is an old adversary resurfacing in a new guise: dispersed not by smokestacks or gasoline pumps, but by large-scale urban fires that burn through homes, pipes, paint, electronics, and soil, redistributing a neurotoxin humanity has known about for over two millennia.

Caltech, as Tissot reminded the audience, has been here before.

Environmental science at the Institute has long involved the uncomfortable work of quantifying what society would prefer remain diffuse. The evening's introduction traced a lineage — from early smog studies to recent debris-flow modeling by Professor Mike Lamb — of scientists using technical tools to answer questions that are socially fraught precisely because the answers are definitive.

Tissot is, on paper, an unlikely figure to now lead this tradition. Trained as a cosmochemist, his research career has focused on questions whose scale dwarfs human history: the age of the Earth, the formation of the solar system, the isotopic fingerprints of ancient planetary processes. He grew up in France reading Jules Verne, imagining the universe from his bedroom, before studying at the École Normale Supérieure and later pivoting through the University of Chicago, where he assembled a chemical toolkit capable of detecting vanishingly rare isotopes. A stint at MIT — his "finishing school," Professor John Eiler joked before introducing the Watson presenter — preceded his arrival at Caltech, "where the real business starts."

In person, Tissot embodies a rich contradiction. He runs one of the most sophisticated isotope laboratories in the world — rooms of gleaming mass spectrometers whose sensitivity borders on the absurd — yet his intellectual posture is almost ascetically classical. He speaks of rigor, of order, of clean rooms not as luxuries but as ethical necessities. There is, too, an unmistakable pleasure in tidiness: an almost "erotic," as Eiler put it, insistence on precision reflecting his French academic lineage as much as his scientific temperament.

That temperament has been redirected.

When the Eaton Fire swept through Pasadena's outskirts, smoke still drifting across the city, Tissot and a small, multidisciplinary group of Caltech faculty realized that no existing agency was prepared to answer a basic question: *How much toxic material do large urban fires release into the environment, and where does it go?* Government funding mechanisms move too slowly for disasters measured in hours. Insurance companies, as Tissot later recounted with dark humor, are uninterested in expertise that complicates liability.

So the scientists acted anyway.

Within hours, appeals went out — not through federal channels, but through personal networks. Alumni, friends of the Institute, and private supporters responded with what Tissot described as "shocking" speed. Teams were mobilized. Samples were collected while the smoke was still in the air. Core analyses began almost immediately.

It was scientific philanthropy in its rawest form: unscripted, unsanctioned, and urgently necessary.

To explain why lead matters so profoundly, Tissot reached backward — to another Caltech figure, another stubborn scientist with a cleanroom and an inconvenient conclusion. Clair Patterson, a geochemist working in the 1950s, had set out to date the Earth. To do so, he had to eliminate background lead contamination so pervasive that it coated glassware, desks, clothing, tap water, even human skin. Patterson pioneered the modern clean laboratory — washing Pyrex in acid baths, wrapping researchers in polyethylene suits ("now we call them lab coats," Tissot quipped) — and in 1956 produced the now-standard estimate of Earth's age: 4.55 billion years.

That achievement was hardly the end of Patterson's story. Instead, Patterson noticed something else: Snow samples contained ten thousand times more lead than natural geological sources could explain. The oceans were similarly enriched. The culprit, he realized, was tetraethyl lead, an additive introduced into gasoline in the 1950s to prevent engine knocking: a compound once shortlisted for chemical warfare, and whose dangers were documented as early as Roman times. Vitruvius warned of lead pipes. Pliny the Elder described "paralytic hand." Benjamin Franklin noticed it among printers.

Industry's response was systematic denial.

For decades, petroleum companies funded research designed not to assess safety, but to normalize exposure. Everyone has lead in their blood, they argued. Typical does not mean dangerous. Threshold were defined by what already existed, not by what was safe. Patterson was offered funding — on the condition that he stop studying lead. When he refused, industry pressure followed him through Caltech's administration and into federal agencies.

History, as Tissot laid it out, was not subtle. Blood levels fell in lockstep with the phaseout of leaded gasoline and lead paint. Cognitive outcomes improved. The data accumulated — over six thousand studies since 1990 — linking lead exposure to neurological, cardiovascular, reproductive, and developmental harm. Five IQ points lost, Tissot noted, may not sound dramatic. Across a population, it is enormous.

By the 1980s, Americans carried body lead burdens orders of magnitude higher than prehistoric humans. Mummies, it turned out, were cleaner than we were.

Which brings us back to fire.

Modern homes concentrate lead in ways ancient civilizations never did: in paint, solder, electronics, batteries. When these burn, lead does not disappear. It aerosolizes, settles into soil, infiltrates homes far from the flames. Children, whose developing nervous systems absorb lead more readily, face what Patterson termed "chronic lead insult": not acute poisoning, but something quieter. More enduring.

One-third of U.S. homes now sit at the urban-wildland interface. Megafires in California have quadrupled. And yet, Tissot emphasized, there is still no systematic study of post-fire lead contamination at scale. There is only incremental work, done collaboratively, piece by piece.

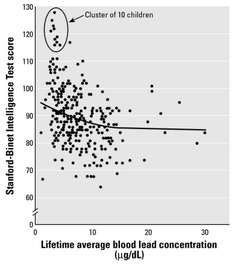
This, he informed us, is the task ahead.

Tissot returned to Caltech in 2018 with a mandate to revive cosmochemistry. He built the Isotoparium—a state-of-the-art clean lab bristling with mass spectrometers — and earned tenure in 2024. With that achievement, he said, came a sharper question: what problem is worth the next decade?

His answer, forged in ash and insurance calls and community loss, was clear. Yet, Tissot was careful not to frame the work as a personal crusade: "It's not that *I* have to do this research," he clarified in the Q&A. What mattered, he emphasized, was that the research be done at all: collectively, rigorously, and soon enough to effect change.

Science, in this telling, is neither heroic nor neutral. It is an instrument — capable of healing the world, if society allows it to be used. There is already more than enough suffering, Tissot concluded. The least we can do is not add to it by pretending we do not know what we know.

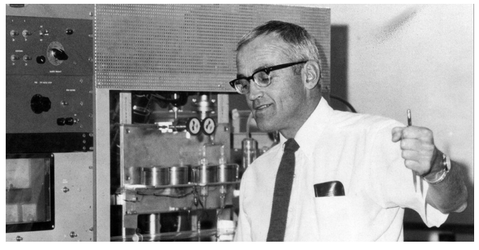
The data, after all, is already in the air.



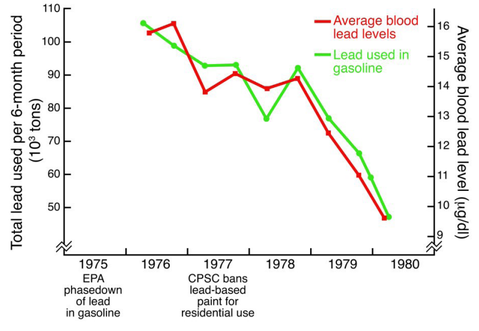
The impact of blood lead levels on intelligence in children. (Credit: Environmental Health Perspectives)

Tissot discusses his Isotoparium, a multidisciplinary collaboration of Caltech scientists studying rare isotopes. (Credit: Damian R. Wilson)

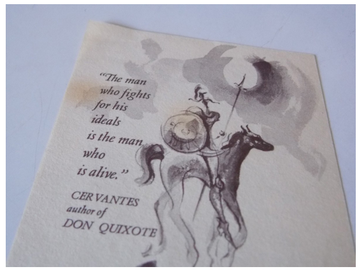
The Eaton Fire ravaged more than 14,000 acres of land in the San Gabriel Valley, destroying 6,000 homes and contaminating the area with lead and other hazardous materials. (Credit: AP)



Clair Patterson, a scientific hero whom Caltech is lucky to call its own. (Credit: Caltech Archives)



Average blood lead levels and lead use in gasoline in the late 1970s. (Credit: Journal of Clinical Investigation)



This bookplate from Don Quixote was taped on Clair Patterson's monitor throughout his career.

Wisdom for us all!

Caltech, Killing Eve, and the Erotics of Psychopathy

Damian R. Wilson
Inner Voices

A particular kind of love emerges when choice is suddenly revoked. Not violently, as if someone stormed in and took your options away, but politely — through circumstance. Through geography. Through an institution that places exotic, exhausted people on 124 acres and demands of them: *Make Meaning Here*. Last issue's satire understands this: the turmoil of proximity as romance, repetition as chemistry. If that's our autopsy report, it's worth asking what the body tells us next.

What modernity has done, especially in places like Caltech, is exchange abundance for curated scarcity. We don't lack people; we lack variance. Everyone is intense. Everyone is tired. Everyone is socially competent in narrow, specialized ways. In this environment, desire stops looking like desire and starts looking like fascination. Who is different enough to break the loop? Who dissolves the pattern? This is where the psychopath enters — not ~~necessarily~~ the real one (who is typically dull, cruel, and unimaginative), but the fictional kind: hyper-articulate, precise, self-authored.

My latest binge, "Killing Eve," understood this. The show, about a tireless MI6 operative named Eve, a prolific murderess named Villanelle, and their mutual, maddening obsession, captured queer erotic spy-thriller lightning in a bottle — briefly, but spectacularly.

Villanelle wasn't sexy because she killed people. She was sexy because she wasn't confused. She wanted money, blood, "chic as shit" clothes and apartments, and took them without the recursive ethical accounting that defines contemporary selfhood. She also parodied a womanhood stripped of obligation: femininity without caretaking, beauty without apology, desire without self-abnegation. A bloody feminist grotesque. Eve, by contrast, was all modern paralysis: competent, moral, deeply bored, secretly furious about it. Their fixation was not transgressive romance, but romance as escape — Villanelle as a fantasy of exit from endless self-scrutiny.

Under Phoebe Waller-Bridge, the show understood that psychopathy's appeal lay not in violence but in clarity, and in the peculiar freedom that clarity seems to promise. That promise was dangerous, but it was also a joke. The story's humor lay in staging that freedom as liberation, even as it quietly exposed it as aesthetic sleight of hand.

Then the show forgot what it was examining. PWB, tragically, was showrunner only for the first season. Without her, the psychopathy became decorative rather than diagnostic. The writing stopped asking why obsession feels good, insisting simply that it *is*. The fantasy hardened. Intensity standing in for meaning, not unlike our small-campus errors.

When the pool is shallow, we start mistaking clarity for depth and decisiveness for maturity. Someone who seems emotionally impermeable begins to look grounded. Someone who doesn't ask many questions looks confident. What triggers this response is asymmetry: they need less from you than you need from them.

Modern love, averse to risk and starved for sensation, is vulnerable to this. We want to feel chosen without being seen too closely, consumed without being obligated. The psychopath fantasy offers that: total focus, zero reciprocity. It's intoxicating and unsustainable, hence why it works better on television than in life — why its shadow nearly manifests in campus crushes that feel electric, then strangely hollow.

Villanelle and Eve of "Killing Eve." I can only wholeheartedly recommend the first season — maybe the second — but God, is this show good at its best.

None of this is to say proximity invalidates feeling. Shared environments have always produced romance. But in constrained worlds, desire often latches onto structure rather than substance. You fall for the person who seems least undone by the same forces undoing you. Not chemistry so much as contrast.

If you'll let me proclaim it, *Love isn't dead*. (Cupid hasn't flown the co-op, not yet.) But modernity, and especially Institute life, has trained us to eroticize emotional opacity and read it as depth. "Killing Eve" was great when it exposed that impulse and failed when it indulged it. The difference matters. One version invites you to look into the abyss and disappear into your obsessions; the other lets you circle it, aestheticize it, but walk away intact.

And on a campus so fluent in abstraction, that distinction can feel like the most romantic thing left.

The Entropy of the Heart: A Report From the Caltech Mirage

Someone looking for the kiss of true love
Inner Voices

I am currently sitting in front of my computer, definitely too late considering that I have to wake up at 6... and it is already the a.m., with me staring at a problem set that I intuitively understand is unsolvable, much like the broader equation of my life.

There is a specific kind of silence that settles over Pasadena in the early morning. It is heavy, dense with the unvoiced anxieties of a thousand overachievers wondering if they are frauds. I feel this silence not just around me, but inside me. It echoes against the walls of my chest where I suspect something vital has atrophied.

Satire and sorrow

Recently, a satirical piece regarding the "Caltech Mirage" has been circulating. It is meant to be funny. It *is* funny. But as I read it, I felt that familiar ache—the friction between the joke and the terrifying reality underneath it.

"You are not alone. Many have succumbed to the Caltech Mirage: an unfortunate phenomenon in which repeated exposure to the same few faces begins to warp the soul. Suddenly, you're impressed with the fact that they held the door open for you at Red Door."

The author calls this a "warping of the soul." They frame it as a lowering of standards, a "proximity-induced hallucination." They laugh at the idea that we might find romance here simply because our sample size is n=3. But when I read this, I don't see a hallucination. I see desperation for connection in a vacuum. I see Kierkegaard's "fear and trembling" playing out in the cafeteria line. The satire suggests we settle because we are bored. I argue we settle because we are terrified.

Existentialist philosopher Jean-Paul Sartre famously said, "Hell is other people." But at Caltech, hell is often the *absence* of other people, or at least, the absence of being truly *seen* by them. We are reduced to our output—our grades, our research, our "potential." When the satire mocks us for falling in love with someone just because they "held the door," it misses the tragedy: we are so starved for a confirmation of our humanity that basic politeness feels like intimacy.

The article jokes:

"On this 124-acre campus, standards crash without mercy... Someone with a pulse? Incredible. Someone who can communicate? Revolutionary."

My fear is deeper than lowered standards. I look at my peers — brilliant, exhausted, awkward — I am afraid that I am an impostor in... personhood. Plato, in his "Symposium," describes love as the search for our other half, a quest to return to a primal wholeness. Aristophanes suggests that we are severed souls seeking completion. What if I am just a collection of coping mechanisms and academic insecurities in a trench coat?

I worry that the intense pressure of this place has calcified my heart. The satire asks: "Is it chemistry? Or just shared academic trauma?"

Is there a difference anymore? Trauma bonds are still bonds. When you are in the trenches, you don't ask if the soldier next to you is your soulmate; you just hold their hand because the shelling is loud.

Resilience in reality

Albert Camus wrote in "The Myth of Sisyphus" that "The struggle itself toward the heights is enough to fill a man's heart. One must imagine Sisyphus happy."

We are all Sisyphus here. We push the boulder of knowledge up the hill every single week. It rolls back down every Sunday night. We are tired. We are lonely. We are statistically unlikely to find "The One" in a pool of 900 undergraduates.

But there is resilience in this madness. The satire ends with a concession:

"There's something poetic about finding closeness in proximity... Just because you're in a tiny pond doesn't mean the fish aren't decent."

This is where I find my anchor. Science teaches us that even in a vacuum, particles pop in and out of existence. Even in the deepest cold of space, there is energy.

If I can solve a partial differential equation while weeping, I possess a strength that is terrifying in its own right.

Perhaps the "Mirage" is not a lie, but an adaptation. If we find love here, in this high-pressure containment vessel, it is not "boredom." It is a miracle. It is biology fighting against entropy. It is the stubborn insistence of the human spirit to find connection even when the variables are stacked against us.

I am a scientist. I know that feelings are data, but they are not always *conclusive* data. The experiment of my life is not over. The sample size of "days I have survived" continues to grow.

The truth beneath the philosophy

I can quote Camus all I want. I can reference Sisyphus and resilience and the absurd. But at 3:42 a.m., when the library is empty, and the problem set is still unsolved, the philosophy doesn't hold me. It doesn't text me back.

The satire was right about one thing: "Romance isn't dead. It's just heavily context-dependent and occasionally fueled by sleep deprivation plus a lack of better options."

I am afraid that if someone did love me, I wouldn't know how to receive it. That I would dissect it, question it, ruin it with my need for proof. I am afraid that I would cling too tightly or not tightly enough. That I have studied so many equations about forces and attraction that I have forgotten how to simply *feel* without analyzing.

An unanswered question

The satire asked: "Is it chemistry? Or just shared academic trauma?"

Here is my answer: I don't know. And that terrifies me.

William Adolphe Bouguereau, "L'Amour et Psyché, enfants," 1890.

I don't know if my feelings are real or if I am simply so starved for connection that I have mistaken crumbs for a feast.

I will finish this article. I will submit it. And then I will go back to my room, crawl into bed, and wake up tomorrow to do it all again. I will sit in lectures. I will solve equations. I will see the same faces. I will hope, against all evidence, that maybe this time something will be different.

But I am not hopeful. Not really. I am a sophomore. In Latin, *sophus* means wise and *moros* means foolish. A sophomore is a "wise fool" — someone who knows just enough to realize how little they understand.

When the Spin-off Is Better: Ace Attorney Investigations

Clare Wu
Opinion

In 2005, the first "Ace Attorney" game reached Western audiences on the Nintendo DS. Despite Capcom's hesitation to release it globally, it was a success. The visual novel franchise grew beyond simple courtroom drama into a phenomenon.

The story centers on new defense attorney Phoenix Wright and his countless wrongfully accused clients. As he navigates a cast of wacky and often suspicious characters, it becomes clear that the combination of complicated murders and unique personalities has given the franchise its staying power. Of those, the second-most popular character is undoubtedly the main rival, prosecutor Miles Edgeworth.

The son of honest defense attorney Gregory Edgeworth, Miles Edgeworth is taken in by prosecutor Manfred von Karma after his father's murder. Under von Karma, he becomes a prosecutor and inherits a need for perfection. That urge goes beyond simply winning as it leads to the falsification of evidence to serve a "perfect victory." Only after Phoenix, a childhood friend of Miles, uncovers the truth of Gregory's murder does Von Karma, the true criminal, end up behind bars.

It is after this revelation that the first "Ace Attorney Investigations" game takes place. Centered around Miles Edgeworth instead of Phoenix Wright, it tests his relationship to a job now tainted by the man who shaped him. Why follow his adoptive father into prosecution when his father did whatever it took to win for "justice"? What should he be focusing on if not the "perfect victory" he was trained to seek?

As Miles Edgeworth investigates a smuggling ring that is behind a string of murders that always occur — coincidentally or purposefully — where he is, he finds himself in the position Phoenix Wright is often in. By defending the wrongfully accused, we see Phoenix's impact on him. While in the past, he would maintain that the accused is always guilty, we see him now switch his focus to strictly finding the truth of a crime scene with deduction and logic, represented by actual game mechanics.

I actually feel that the most improvement between the spin-off and main line games is the gameplay. While the main line games are rather standard visual novels, with static environments to explore and lots of text to get through, it diverges from the standard format with its evidence gathering and court sections. However, these sections are largely separate from each other. The act of gathering evidence is separate from pointing out contradictions in a testimony. This is because of how the story is structured. Most of the evidence will come from the crime scene and a defense attorney will only interact with witnesses on the witness stand. The separate settings necessitate a separation in the gameplay.

In "Ace Attorney Investigations," cases take place solely at a crime scene right after the crime, with witnesses, suspects, and evidence all in one place, mostly untouched from the state that the criminal left it. This allows for seamless transitions between the different elements. It also solves the biggest issue I had with the original *Ace Attorney* games.

In the mainline games, the original investigation method was to present a static background and have the player simply click on objects of interest. However, it became easy to miss evidence to collect as interactables and the background are outlined the same. These sections were presented through Phoenix's eyes, a first person point of view. *Investigations* adopts a third person point of view where the player controls a miniature Miles Edgeworth. Here, the evidence is easier to identify from the background. The investigation process is streamlined to also have Miles easily take note of any glaring pieces of contradiction or mystery as part of his Logic function, taking care of another gripe I had with the mainline games.

I always felt like the original games had to be done with one case per sitting. Otherwise, I would forget important details and be unable to follow the absurd logic sometimes needed to progress. This would ultimately result in lots of save-scumming as I tested every possible piece of evidence until something worked. I found myself being able to take breaks and come back to cases in "Investigations" easily as the Logic mechanic would keep track of ideas floating around in Miles' head. It would then be up to me, the player, to connect them, naturally enhancing my own understanding of the case. Additionally, the addition of an investigation partner not only provided a good dynamic between characters, but also served a great purpose game wise as their commentary would help point out if you needed to investigate the setting further or interview suspects about specific points. In general, I felt myself hitting a wall much less often than a traditional "Ace Attorney" game.

Beyond the gameplay, I enjoyed the characters more. Just as Phoenix Wright had Miles Edgeworth as a rival, this game introduces Interpol agents Shi-Long La and his assistant Shih Na. Most rivals in the mainline games have some obvious sin or are cartoonishly evil. Shi-Long opposes Edgeworth at first, but sides with him once he realizes that Edgeworth will stand for the truth and not interfere as previous prosecutors have. It emphasizes his role as a rival and not just an obstacle or villain. It makes him a likeable and compelling character, which is something I can say for all of the characters introduced in this game.

Kay Faraday, somewhat of a Robin to Edgeworth's Batman, brings a fun lively energy for Miles to bounce off of and provides one of the coolest investigation features in the game. Gumshoe, a returning detective from the mainline games, is goofy and pure-hearted as always, but doesn't feel like the bumbling buffoon he usually is. Franziska Von Karma, Edgeworth's hot-headed adopted younger sister, also makes a reappearance which made me like her a lot more as a character, especially during the fourth case.

This leads me to gush about the cases as a whole. "Ace Attorney" games have always had their cases somehow connect into one big storyline, but "Investigations" accomplishes this in a much neater fashion. The first case takes place in Edgeworth's office with a murder and some stolen case files. Already, this sets up some intrigue for the overarching plot: what were the case files and why were they stolen? It also naturally entangles Edgeworth into the story, whereas Phoenix would normally stumble into a major scheme. At the scene, we find the calling card of the great thief Yatagarasu who's known to steal evidence from corrupt companies, leading into our second case.

The second case has one of the most fun settings I've seen: an airplane. It starts with Edgeworth being framed for murder and having to prove his innocence before they land. The enclosed setting ensures that the real culprit must still be around and the time limit of the plane flight gives a sense of urgency. The victim? An Interpol agent. As Edgeworth investigates, he uncovers a smuggling scheme being supported by one of the flight attendants and uncovered by the victim. He proves that Cammy Meele, a play on chamomile given that she's always sleepy, is the true murderer and framed him in a rush to cover up her crime. This introduces the smuggling ring that is at the center of this game. The case ends with Edgeworth getting a call from the wealthy businessman Ernest Amano.

This call ties into the third case concerning the kidnapping of Ernest's son, Lance Armano. It devolves into this complicated plot concerning Lance's girlfriend, her father who she didn't know was her father, and the case of a smuggling ring within the Armano company 10 years ago. Several dramatic twists all with the ridiculous backdrop of an amusement park truly encompass the appeal of "Ace Attorney." It also introduces one of my favorite characters Kay Faraday.

Kay claims to be the great Yatagarasu and introduces Little Thief, a tool used to reconstruct crime scenes at certain points in time. This mechanic allows you to more easily find discrepancies between witness accounts and actual events, in the same way that the original mainline games might expect. It allows the player to visualize how witness testimonies affect the scene. Using this tool, Edgeworth is able to solve the mystery. With the resolution of the kidnapping case, Lance and Ernest Armano are arrested with Lang calling for deeper investigation into the smuggling case of 10 years ago.

Speaking of 10 years ago, it is actually revealed that Gumshoe, Edgeworth, and Kay were actually all connected to this case. The game's fourth case takes place at this time, revealing how they all met and how they relate to the case. Kay is actually the daughter of the now deceased Yatagarasu who was investigating Armano's smuggling ring. Gumshoe and Edgeworth are so close as Edgeworth literally saves him from being arrested for murder. The crime itself is also the most interesting as it seems to be a simultaneous murder between the prosecutor, who is Kay's father, and the defendant. However, it is eventually revealed that Cece Yew, the defense attorney of the case who often breaks into fits of laughter, actually killed both of the victims in an attempt to cover up her involvement in the smuggling ring. Yet once this information is revealed, she flees never to be seen again as the case ends.

With the set up all done, the final case brings down the smuggling ring that the KG-8 case failed to end. The location is a cleverly designed embassy where the building is identically built between the two countries' sides. As you are only allowed to investigate one side at a time, this provides some interesting contradictions to discover. There's also some complicated setup involving a zipline and some ceiling fans. This case is the perfect end to the story. You discover who's behind the smuggling ring, reveal Lang's partner Shih-na to be Cece Yew, and in a tense showdown with an ambassador to prove his guilt before he can escape with diplomatic immunity. No loose ends are left, and Edgeworth proves to himself and Lang that he is a prosecutor in search of the truth and nothing more.

"Ace Attorney Investigations" simply provides a cleaner and more connected story than a mainline game while offering more immersion. Every case revolves in some way around the smuggling ring at the center of the overarching plot. Phoenix Wright does not give this experience, maybe to match the messier and more fumbling attitude of the main character.

Though it may seem counterintuitive to consider it more immersive given the difference in game perspectives, the physical act of being able to move Miles around and really inspect a scene gives a more in-depth experience than simply clicking around. It changes up the gameplay while maintaining the best part of the original games: the cross-examinations, a showcase of logical deduction and character charm. I cannot emphasize enough how much I prefer it over any mainline games.

Still, the "Investigations" spin-offs were never as popular as the mainline series. It's a shame that they weren't, but it was unfortunately a case of bad timing, Localization is a heavy and time-consuming process, especially for a series as text and pun heavy as "Ace Attorney." By the time that "Ace Attorney Investigations" came out in 2009, the series was seeing a decline in sales, even in Japan. It was with this context that the second spin-off game was not published in the West. It is a shame because the second game introduces a new mechanic that is great and improves on the first. However, both were eventually brought to modern consoles in a Nintendo Switch port that I would encourage readers to buy. If you like mystery-solving, deduction-style games or love a cast of goofy, endearing characters, you'll like "Ace Attorney Investigations."

Editor's Note: We want to hear your perspective!

We strive to represent every voice in the Caltech Community with fairness, accuracy, and impartiality in our news reporting. If you think we missed something, or just want to share your thoughts about a topic we've reported on, I encourage you to submit a Letter to the Editor!

Send submissions or contact the *Tech* editorial team at

tech@caltech.edu

Submissions are due at 12 p.m. on the Saturday before each biweekly Tuesday publication.

The science of thought: philosophical insights into scientific practice

A Letter to Future Generations: On the Philosophy of Happiness — Part IV

Eudaimonia: Actually Building a Life Worth Living

by Camilla Fezzi

The Paradox: Stop Chasing Happiness

Here's something that's going to blow your mind: you can't become happy by chasing happiness. It's like trying to fall asleep by trying really hard to fall asleep — the trying IS the problem. Philosophers call this "the paradox of hedonism," and John Stuart Mill learned it the hard way.

Mill was this child genius who was educated to be the perfect rational human. And at age 20, he had a complete mental breakdown. He realized that he'd been so focused on achieving happiness through accomplishment that he'd actually made himself miserable. Know what cured him? Stopping the pursuit of happiness and pursuing things that mattered to him instead.

"Ask yourself whether you are happy, and you cease to be so." — John Stuart Mill (1806-1873)

Think about the times you've actually felt happy — really happy, not just "this looks good on social media" happy. Were you thinking about happiness in those moments? No. You were absorbed in something: a deep conversation, a creative project, helping someone, learning something fascinating, being in nature, playing music, whatever.

Happiness is a byproduct. It emerges when you're engaged in meaningful activities — things that matter to you, that serve something larger than your own comfort. This has been proven by modern psychology: people with a strong sense of purpose report way higher life satisfaction than people who just pursue pleasure and comfort.

Viktor Frankl — who survived Auschwitz and watched fellow prisoners either survive or give up — noticed something profound: the people who made it weren't necessarily the strongest or healthiest. They were the ones who had a reason to live. A project to complete. Someone to reunite with. A meaning they were serving. He built an entire therapy approach (logotherapy) around this: meaning is what makes life bearable, even under the worst circumstances.

"Those who have a 'why' to live, can bear with almost any 'how'." - Viktor Frankl (1905-1997), quoting Nietzsche

So stop asking "How can I be happy?" Start asking "What's worth doing with my life? What problems do I want to solve? What do I want to create? What matters enough that I'd willingly struggle for it?" Answer those questions, pursue those things, and happiness will sneak up on you when you're not looking.

Serve Something Bigger Than Yourself

This is going to sound cheesy, but it's true: your deepest satisfaction won't come from getting stuff or achieving status. It'll come from contributing to something larger than yourself. This doesn't mean you have to cure cancer or solve world hunger. It means finding something — ANYTHING — that you care about beyond your own comfort and consumption.

That could be art, teaching, environmental work, parenting, building something useful, fighting for justice, preserving knowledge—or just being the friend who shows up.

Aristotle was big on this: humans are social animals. You literally cannot flourish in isolation. Your happiness is tied to the well-being of people around you. This is why pure self-interest always feels empty, and why service — even small acts — feels fulfilling.

Find your "why" that's bigger than "because it'll make me happy." That's the foundation.

The People Thing: Why You Can't DIY Happiness

You can nail everything else — have a clear purpose, develop your character, find your meaning — and still be miserable if you're isolated or surrounded by toxic people.

Aristotle wrote TWO ENTIRE BOOKS about friendship. Not success. Friendship. He understood that humans are fundamentally social creatures, and happiness divorced from quality relationships is impossible. He broke down friendships into three types:

1. Utility friendships: You're friends because it's mutually beneficial. Study partners, work connections, networking contacts. Nothing wrong with these, but they're surface level. When the utility ends, so does the friendship.

2. Pleasure friendships: You're friends because you have fun together. Party friends, gaming buddies, people you grab drinks with. These are great, but they're circumstantial. When the good times end or life changes, these often fade.

3. Virtue friendships: You're friends because you genuinely respect each other's character and want the best for each other. These people see the real you and love you anyway. They celebrate your wins without jealousy. They show up when things get hard. These are the friendships that matter.

"In poverty and other misfortunes of life, true friends are a sure refuge." - Aristotle (384-322 BCE)

You're going to have all three types in college. And that's fine. But invest most of your energy in finding and keeping those category-three friends. Quality over quantity, always. Five real friends beat 500 Instagram followers every single time.

And romantic relationships? Oh boy. This is where you're going to make some mistakes. You're going to confuse intensity for compatibility. You're going to stay in relationships past their expiration date. You're going to chase people who are wrong for you and overlook people who are right.

Romantic love is amazing, but it's not a replacement for having your own sense of purpose and self-worth. The Stoics warned that attachment brings pain (true). The Romantics said passionate love is life's ultimate meaning (also kinda true). The reality? Love is incredible when it's between two people who are already working on themselves and have their own sources of meaning. Love should ADD to your happiness, not BE your happiness.

I-Thou vs. I-It (Or: Stop Using People)

Martin Buber had this insight that's going to change how you think about relationships. He said there are two ways to relate to people: "I-Thou" and "I-It."

I-It relationships: You're treating the person as an object — a means to an end. You're dating them for status. You're friends with them for connections. You're networking. You're using them. We all do this sometimes, but when ALL your relationships are transactional, you end up isolated even when surrounded by people.

I-Thou relationships: You're engaging with the person as a whole human being worthy of respect and care in their own right. You're not trying to get something from them. You're genuinely connecting — seeing them, being seen by them. This is where real love and friendship live.

"All real living is meeting." — Martin Buber (1878-1965)

Real love — the kind that actually contributes to happiness — flows from fullness, not emptiness. From strength, not neediness. From choice, not desperation. First, become a whole person. Then find another whole person.

Be Here Now (Stop Time-Traveling in Your Head)

When was the last time you were actually HERE? Not physically here while your mind is somewhere else, but actually PRESENT in the moment? Yeah, I thought so. You're either ruminating about something that happened yesterday or last week or three years ago, OR you're anxiously anticipating something that might happen tomorrow or next month or after graduation.

Here's the thing: the past is gone. The future doesn't exist yet. The only moment that's actually REAL is right now. And you're missing it. You're missing your actual life because you're mentally time-traveling.

"Yesterday is history, tomorrow is a mystery, today is a gift, which is why we call it the present." - Eleanor Roosevelt (1884-1962)

This isn't just philosophical woo-woo. Buddhist meditation practices, Stoic exercises, and modern mindfulness research all point to the same truth: most of your suffering happens when your mind leaves the present moment.

Buddhist mindfulness practice is basically training yourself to notice when your mind has wandered off into past/future land and gently bringing it back to now. When you're actually present, happiness becomes accessible — not as some future achievement, but as a quality of awareness you can tap into right now.

Marcus Aurelius — emperor of Rome, remember — had to constantly remind himself in his journal: stay in the present. Don't let your mind drift into regrets about yesterday or anxieties about tomorrow. The man was running an empire and still struggled with this. You're not alone.

"Confine yourself to the present." — Marcus Aurelius (121-180 CE)

Try this right now: Put your phone down. Take three deep breaths. Notice five things you can see. Four things you can touch. Three things you can hear. Two things you can smell. One thing you can taste. That's it. That's mindfulness. That's coming back to now. And if you do this regularly, you'll find pockets of peace that were there all along, hidden beneath your mental noise.

Your Attention Is Being Stolen (Fight Back)

Your attention is your most valuable resource. Not time. Not money. Where your attention goes, your life follows. Right now, your attention is being stolen by algorithms designed to keep you scrolling, apps engineered to be addictive, and a culture that profits from your distraction.

The ancient Greeks called this *prosoche* — vigilant attention, constant awareness of where your mind is and what it's doing. They knew 2,000 years ago what we're relearning now: the quality of your attention determines the quality of your life.

Can you have a full conversation without checking your phone? Can you read for 30 minutes without getting distracted? Can you sit with a friend and be fully present? These are becoming rare superpowers, and they're directly correlated with happiness.

Here's your challenge: practice doing one thing at a time. Not studying while Netflix plays in the background. Not scrolling while half-listening to a friend. Not eating while watching YouTube. One thing. Start with five minutes a day and build from there. This alone will change your life.

The California Tech Journalistic Principles

The News-Opinion divide
All articles shall be clearly and explicitly labeled as either News or Opinion/Editorial.
News articles report on topics that have been thoroughly researched by Tech staff writers, and should be impartial to any one point of view. In a News article, the writer shall not insert their own personal feelings on the matter; the purpose is to let the facts speak for themselves. The Tech assumes full responsibility for all content published as News.
In contrast, Opinion articles (including Letters to the Editor) may be written and submitted by anyone on any topic; while the Tech will edit all published Opinions to ensure no wrong or misleading information, we do not otherwise interfere. Again, the role of the Tech here is to help the whole campus communicate their ideas and share their stories, not promote specific ones. Content published as Opinions do not necessarily represent the values of the Tech or our staff.
An exception to this is Editorials, which are written by Tech staff and represent official opinions of the Tech. Any information and sources in Editorials shall be held to the same standard as News reports, but there is no promise or expectation of impartial coverage.

Fair Reporting
All facts of major significance and relevance to an article shall be sought out and included.
If an assertion is made by a source about a specific person or organization, they shall be contacted and given a reasonable amount of time to respond before publication. In other words, no second-hand information or hearsay shall stand on its own.

Quotes and Attribution of Information
Facts and quotes that were not collected directly by Tech reporters shall be attributed. Articles shall clearly differentiate between what a reporter saw and heard first-hand vs. what a reporter obtained from other sources.
Sources' opinions are just that — opinions. Expert opinions are certainly given more weight, as are witness opinions. But whenever possible, the Tech shall report facts, or at least corroborate the opinions. A reporter's observations at a scene are considered facts for the purposes of a story.

Sources
All sources shall be treated with respect and integrity. When speaking with sources, we shall identify ourselves as Tech reporters and clarify why we would like to hold an interview. Sources for the Tech will never be surprised to see their name published.
In published content, we shall put our sources' quotes into context, and — as appropriate — clarify what question was being answered.
We always ask that a source speak with us on the record for the sake of journalistic integrity. We want our audience to receive information that is credible and useful to them. Named sources are more trustworthy than unnamed sources because, by definition, unnamed sources will not publicly stand by their statements.
That being said, we realize that some sources are unwilling to reveal their identities publicly when it could jeopardize their safety or livelihood. Even in those cases, it is essential that the Tech Editor-in-Chief knows the identity of the source in question. Otherwise, there can be no certainty about whether the source and their quotes were falsified.
This also applies for Letters to the Editor and Opinion submissions to the Tech. If the author requests that their piece is published anonymously, they must provide a reason, and we shall consider it in appropriate circumstances. No truly anonymous submissions shall be published. Conversely, no submissions shall be published with the author's name without their consent.
When we choose not to identify a source by their full name, the article shall explain to readers why.

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We strive for promptness in correcting all errors in all published content. We shall tell readers, as clearly and quickly as possible, what was wrong and what is correct.
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Honor Code Applies
In any remaining absence of clarity, the Honor Code is the guiding principle.

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The California Tech #30

CalGuesser

Every issue we'll show you a different location on campus. Find the place and find the QR code hidden there to sign the log book and **win a fabulous prize, actually this time! Gift cards sponsored by CalGuesser Benefactor Kevin Kan, but only if you find it before he does!!!**

"On campus" is defined as the convex hull of the buildings shown on caltech.edu/map/campus.
The QR code will be hidden somewhere within the pictured area.

Tech Editor's Corner

Bonus content, totally disconnected from any current events. From your favorite *Tech* editors <3

An Excerpt From "The Glass Essay"

By Anne Carson

Well there are many
ways of being held prisoner,
I am thinking as I stride
over the moor.
As a rule after lunch
mother has a nap
and I go out to walk.

The bare blue trees and
bleached wooden sky of
April
carve into me with knives
of light.

Something inside it reminds me of childhood—
it is the light of the stalled
time after lunch
when clocks tick
and hearts shut
and fathers leave to go
back to work
and mothers stand at the
kitchen sink pondering
something they never tell.

You remember too much,
my mother said to me recently.
Why hold onto all that?
And I said,
Where can I put it down?
She shifted to a question
about airports.

Crops of ice are changing
to mud all around me
as I push on across the
moor
warmed by drifts from
the pale blue sun.

On the edge of the moor
our pines
dip and coast in breezes
from somewhere else.

Perhaps the hardest thing
about losing a lover is
to watch the year repeat
its days.

It is as if I could dip my
hand down
into time and scoop up
blue and green lozenges
of April heat
a year ago in another
country.

I can feel that other day
running underneath this
one
like an old videotape—
here we go fast around
the last corner
up the hill to his house,
shadows
of limes and roses blowing in the car window
and music spraying from
the radio and him
singing and touching my
left hand to his lips.

Law lived in a high blue
room from which he
could see the sea.

Time in its transparent
loops as it passes beneath
me now
still carries the sound
of the telephone in that
room
and traffic far off and
doves under the window
chuckling coolly and his
voice saying,

You beauty. I can feel that
beauty's
heart beating inside mine
as she presses into his
arms in the high blue
room—

No, I say aloud. I force my
arms down
through air which is suddenly cold and heavy as
water
and the videotape jerks to
a halt
like a glass slide under a
drop of blood.

I stop and turn and stand
into the wind—