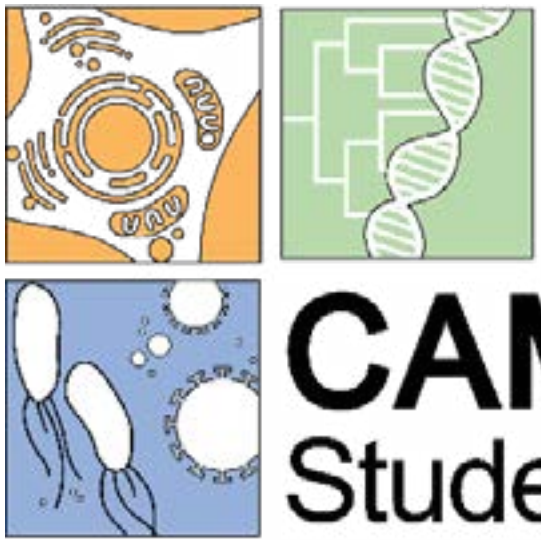


CAMB Student Newsletter

Volume 8 | Issue 2 | May 2023

In this issue

Letter from the Editors

Dear CAMB Students, Faculty, and Alumni,

We are thrilled to share the May installment of the CAMB Student Newsletter. In this issue, we hear from Dr. Isabel Sierra, a 2022 CAMB-DSRB alumnus, on her experience as a postdoc abroad in the Netherlands. We also feature a welcome to the newest incoming class of CAMB matriculants! As the incoming first years are preparing for the start of grad school, current CAMBers offer their best advice on housing, rotations, and anything else the new cohort might need to start grad school off strong. Next, this issue explores a recent paper by CAMB graduate student Desi Alexander and postdoc Dr. Tanya Corman on disrupting fear memory formation by targeting histone acetylation and the potential translational applications of these findings for posttraumatic stress disorder treatment. Finally, we hear about the results of the recent graduate student strike across town at Temple University.

For additional articles, past publications, and to learn more about the CAMB student Newsletter team, visit our blog at cambnewsletter.wix.com/blog or follow us on Twitter @CambNewsletter. Current students interested in contributing to the CAMB Student Newsletter can complete our volunteer interest form (here). We hope you enjoy the May 2023 issue!

Sincerely,

James Gesualdi and Kay Labella

Editors-in-Chief

Alumni Spotlight

Dr. Isabel Sierra

Sonresa Ochoa-Vidales

Peer Edited by Lauren Lee

Dr. Isabel Sierra graduated from Penn's CAMB - DSRB program in the year 2022 and is currently a Postdoctoral Researcher at the Hubrecht Institute (Utrecht, Netherlands) in Dr. Jop Kind's laboratory. She is studying epigenetic mechanisms of gene regulation during embryonic development at single-cell resolution.

Dr. Isabel Sierra

How did you start the conversation with your PI about pursuing a postdoc position abroad while in graduate school?

I had spoken with my PI about choosing postdocs and had a couple of potential choices in the US. My committee encouraged me to start applying about a year before my expected graduation date, so my PI and I both knew I was exploring options.

I did not prepare anything beforehand, and I don't remember if I had even started looking yet; I just brought up the topic in one of our one-on-one meetings. I told my PI that I had decided I wanted to move somewhere in Europe and was going to exclusively look for postdocs there. I think historically, some PIs have thought leaving the US can tank your academic career, as it used to be that foreign postdocs more often came to the US. However, my PI was very supportive in my choice. The only downside was that she couldn't really help me with suggestions of people or insight on specific PIs as her network was really only in the US.

What path did you take to get this position?

Originally, I knew of Germany, Sweden, and Switzerland as having good science abroad. I mostly focused on those countries, until a conversation I had with another PI on my floor, Dr. Chris Lengner, pointed me to the Netherlands (NL).

Chris mentioned the Hubrecht Institute and said the Netherlands put out really amazing science. I had never heard of the Hubrecht before, but it turned out to be a perfect fit for my research interests. To narrow down labs, I looked through their most recent publications and lab websites. Once I had a good number of options identified (both in and outside of the NL), I started contacting PIs. I did this through cold emailing, which I think is fairly normal for postdoctoral positions if you don't have a direct connection. With the help of a postdoc in my lab, I put together short but personalized emails for each PI and sent them out with my CV attached. I received replies back from all but one PI, and from there started scheduling interviews.

Did you learn Dutch before moving to the Netherlands?

I did not learn Dutch, and it is actually a hilariously hard language to pick up. One of the pros of the Netherlands is that almost everyone speaks fluent English. So, in terms of integrating and getting settled in a new country, that helps quite a bit in not feeling totally overwhelmed. The official language of the research institute (I think in most research institutes across Europe) is English.

My understanding is that it encourages researcher mobility across Europe. There are some grants that are only available to people who move countries at various stages of their research careers (e.g. EMBO and Marie Curie for postdocs), which is also to encourage movement and allow for a more "international" research environment. For example, my PI and many members of the lab are from the Netherlands, but we also have people from México, Portugal, Spain, Curaçao, Greece, and Austria. In terms of learning Dutch, I haven't taken a class outside of an introductory course offered by my institute. My coworkers don't really expect expats to learn Dutch unless they plan to stay long-term.

How did you decide on your chosen position?

Luckily, since Philly is on the East Coast it was financially feasible for Jop to fly me over for an in-person interview. This was super important for my decision to choose this lab, as I got to meet with each person and get a feel for the lab environment and Jop's mentorship style. I think it would have been very difficult to discern this over a virtual meeting only. I got a good vibe from the lab and it seemed like Jop and I would get along, and I was most excited about the science in this lab. I was also very lucky to meet someone at Penn who was from Utrecht and did their PhD at Hubrecht. She knew Jop and was able to give me her opinion on both the institute and living in Utrecht. I also really enjoyed Utrecht on my visit and felt I could be happy living here. All of those factors together led to me choosing this lab.

What is the quality of life in your position? In the Netherlands?

Quality of life was actually a big part of why I wanted to leave the US for my postdoc. As I started thinking of postdocs in the US, I grew increasingly worried about both the cost of living and the general academic work environment. Especially as the labs I was interested in within the US were in cities with a pretty high cost of living. I was fairly concerned about supporting myself on a postdoc salary and you don't really have any benefits besides slightly better healthcare. Combined with the general over-working culture prevalent in academic research, I didn't think it was overall feasible to do a postdoc in the US. Here in the Netherlands, while postdocs still don't make much money, my quality of life is significantly higher. One perk of immigrating to the Netherlands is you can get the status of "Highly Skilled Migrant". This allows you to be eligible for a tax break for five years called the 30% rule. This means for five years, 30% of your gross income is not taxed. On top of that my institute provides both an 8% vacation allowance and an 8.3% end of the year bonus. With this I am able to very comfortably afford my rent of 1200 euros and pay all of my living costs while also saving money. As well, I earn a pension here automatically through my institute which I've never seen offered at universities in the US. Outside of finances, I am afforded roughly 30 days of vacation time which is honestly more than I even know what to do with. People here also seem to keep a healthy work balance around life and have a better attitude towards maintaining separation from work.

How did your experience with CAMB/Penn help you get the job?

I would say that the default training gained from a PhD is geared towards an academic career, so I was very well trained for becoming a postdoc. Jop was especially impressed with the NRSA F31 I received as a graduate student, as it is very uncommon for grad students in Europe to apply for and receive grants. DSRB prepared us well for those applications, and having grant writing experience was definitely a big plus for my postdoc interviews. In terms of experiences at Penn, I left grad school pretty confident that I did not want to stay in academia. The lifestyle of a PI is not for me, and I think a lot of things need to change institutionally before it would be worth pursuing that career path. I still wanted to pursue a postdoc because I love doing science, but there was no way I would do a postdoc in the US, given the current systems and environment in academic institutions.

Did you have a backup plan if you were not accepted?

If I did not get an offer for any of the European labs I applied for, my plan was to apply to biotech companies in the US. I identified companies I liked, but did not go as far as applying to anything, as I wanted to see my European postdoc interviews through first.

What do you plan on doing after your postdoc?

I expect to transition to industry in some form after my postdoc, but whether that will entail returning to the US, staying in the NL, or moving to a different European city is unclear. My contract is for three years, so I will more seriously consider my options closer to that end point.

Do you have any advice for students interested in doing a postdoc/job abroad?

If you want to do a postdoc abroad, don't pick a lab purely because you want to live in that city or country. In your interview, people will want to hear that you are excited for the science and for the lab specifically, not that you just want to live somewhere cool and will work wherever. I've heard that question asked to many interview applicants that have come through our lab since I've been here and it's pretty clear when they don't value the science over the living environment. But that doesn't mean you should settle for living somewhere that doesn't excite you. It's not only very expensive to move, but you are also leaving behind whatever support system you may have built during your PhD. Therefore you want to be sure that making this choice is worth it both professionally and personally. Moving abroad is also predictably stressful so, if possible, I recommend giving yourself both some time off post your PhD and also time to get adjusted to your new city.

What is your favorite memory of CAMB/ Penn/Philly?

I was born in Philly, raised in a nearby suburb, and I did all my schooling and technician work in the city. Never having lived elsewhere was a major driving force for me to go somewhere new and I was very ready to leave. Of course, I have tons of good memories of Philly, but I mostly miss friends who I've had around me for 10+ years. For my time in CAMB, I really enjoyed the pre-COVID years with my DSRB graduate group. We had a really social group with a nice journal club and would keep track of all the holiday parties in a google doc around campus, so we could crash different departmental celebrations.

How did you stay grounded during graduate school?

I had a really good network of friends both inside and outside Penn, so that was very important in keeping me sane during my PhD. I also formed a small exercise group with two girls from my floor and we would go lift weights and talk our frustrations out, which was particularly helpful during the stress of my last year.

Year Zero: Advice on Getting Started in Grad School

Kay Zabella
Peer Edited by Zeenat Diwan

As the spring turns to summer, CAMB welcomes its newest cohort of incoming students. While they haven't arrived on campus just yet, they'll spend the next few months preparing to set out on a lengthy, arduous, exciting journey. To give them a hand, current CAMBers chimed in with their best advice on housing, rotations, and anything else they might need to start grad school off strong.

On finding housing and roommates:

Some students meet their future roommates during recruitment weekends. Others seek them out via Penn's Off-Campus housing site or the BGS Slack.

For the apartments themselves, it's helpful to ask yourself a few questions first. Are you looking for a more residential area, or is in the city proper more your vibe? Do you want to live in a row home, a highrise, or something in between? What sort of transportation and local shops do you want access to? How close do you want to be to campus? After you've considered those factors, it may be helpful to visit Philly (if that's feasible) to get a feel for the neighborhoods around campus. If a visit isn't in the cards, or if you're looking for an extra hand in the process, you can reach out to a real estate agent to help you find apartment listings that suit your tastes; usually, their fee is paid by the leasing company when you sign, so you won't have to pay for their services! Websites like Apartments.com and the Penn Off-Campus Housing site are also great places to find recent listings. Most apartments will be up for rent anywhere between 1 to 3 months prior to a potential move in date, so if you're starting in August, May to July will be the prime time to search out your future home!

If you're looking to furnish your apartment on a budget, start with the essentials and go slow! Philly is full of students who will, at various points, be looking to get rid of all sorts of furniture. Keep an eye on your favorite local seller app (like Facebook Marketplace) for whatever it is you need.

On rotations:

Take time before coming to Penn to research PIs you might be interested in working with, but also be receptive to new ideas. There will be a plethora of chalk talks and poster presentations in your first few weeks that might lead you to a rotation you might not have expected! Also take into consideration the lab environment as you make your list. Factors like the lab size and age, PI availability and involvement, and if you are working solo or with any senior lab personnel will have a significant impact on your graduate experience. As one student put it, "Everyone is different and you have to figure out what works best for you."

To get a healthy preview of the lab, reach out to both current students as well as those who rotated but didn't join. Current students can give you an overview of the environment and expectations. Learning why previous rotation students decided against joining – whether they simply liked a lab better, they felt they didn't mesh with the environment, other lab members, or the PI, or they had a genuinely negative experience – will help inform your decision to reach out to a PI to inquire about a potential rotation.

Over the course of a rotation, clear communication is key to set up healthy boundaries and ensure all your work gets done without excessive stress. Make sure your PI and/or postdoc is aware of your class schedule, especially upcoming exams or presentations

that you'll need to dedicate significant time to, so that you can plan experiments around it. Ask and understand up front what the expectations are for time spent in the lab, how often you'll meet with your PI, and if you'll be expected to present.

The goal of a rotation is to determine if a lab can be home for the next five or so years. Don't worry about producing a full paper's worth of data. Be present and engaged, but focus on the fit and not the feats.

On questions to ask before deciding on a rotation:

As you're planning your rotation, consider what you value most in a mentor and a lab environment. Try and envision what you are hoping for in your graduate school experience. Make time to seek answers from your fellow students and PIs whose labs you're interested in. We have compiled a few things to reflect on before and during a rotation to get you started:

To other students:

- How is the mentorship style?
- Is it easy to schedule a meeting with the PI?
- What are the typical "working hours" of the lab?
- Does the PI encourage grad students to present at conferences?
- Does the PI encourage students to apply for fellowships?
- Are you happy with your project?
- What is your relationship like with your PI?
- Would you recommend this lab as a thesis lab? Why?
- What advice would you give to someone entering the lab?
- How does the PI handle it when the project has setbacks or isn't working?
- How does the PI respond to and resolve disagreements and conflict in the lab?
- Is there anything about the PI that concerns you or can be improved?

To the PI:

- Are students partnered with a more senior person in the lab?
- Does the PI see themself staying at Penn for the next 5 or so years?
- How many thesis students will the PI accept?
- Are there students who have previously graduated from the lab? What are they doing now?
- Are there certain career paths that the lab might prepare someone for better than other career paths?
- Will the PI be supportive of other academic or non-academic career paths that the student might develop interests for later?

To yourself:

- What kind of work-life balance do you want to keep?
- How often are you willing to stay late in lab?
- Would you be willing to come in on the weekends frequently if that is an expected part of a lab's culture?
- What other parts of your life are you balancing with graduate school?
- Do you prefer a smaller or larger lab environment?

On starting a life in a new city while managing the expectations of your rotation and classes:

Give yourself time, and give yourself a break. Grad school is a big adjustment, and it might be a little challenging for a bit with all the changes going on. If you're able to, move to the area a little bit before classes start so you can get settled into a routine. That means finding where the grocery store and pharmacy are, getting on a regular sleep schedule, getting set up with any doctors or dentists, and anything else you need to maintain a healthy and happy life.

If, like your author, it's been a while since you took any classes, don't just dive in headfirst and expect to remember every single biochemical pathway you studied in undergrad. Take some time to refresh your memory via YouTube or relevant journal articles. And don't feel shy about leaning on your cohort! They're your team, and you will all be able to help one another, whether it's buckling down to study or reminding each other to take a break.

On making friends:

Making friends as an adult, especially an adult in grad school, is hard. We're all living a life in close proximity to each other with what ought to be a similar interest in the biomedical sciences, but many of us are also at vastly different points in our lives. Some folks are coming straight from undergrad, while others have taken one or two or five years off to work or get a master's or other degree or certification. Luckily, CAMB and all of its subprograms put on regular events to help bring people together, and student groups can add to that social calendar. Keep an eye on your email for anything that might pique your interest. Take some time to peruse the Graduate and Professional Student Association (GAPSA) newsletter each week for their offerings like discounted theater tickets at the Kimmel Center and other budget-friendly events and activities both on campus and around town.

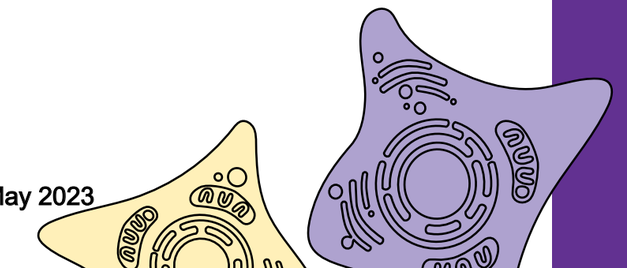
Don't forget to check in on life outside of the Penn campus, too! Philly is absolutely full of amazing events, recreational sports leagues, dance studios, gardens, hobbyist conventions, game nights, and much more where people can gather, chat, and make friends. Putting yourself out there is hard, but you never know who you might meet!

Anything else?

Don't forget to breathe and celebrate. You made it into grad school! Remember to take breaks, give yourself some grace, and have fun :)

Some helpful resources:

- **Off Campus Services**: https://offcampushousing.upenn.edu/
- **Wellness at Penn (formerly SHS and CAPS)**: https://wellness.upenn.edu/
- **Penn Campus Recreation:** https://recreation.upenn.edu/



Research Spotlight:
Desi Alexander and Dr. Tanya Corman

Zeenat Diwan

Peer Edited by Mara Davis

Have you ever wondered why you can never forget that one embarrassing incident where your phone went off real loud in the middle of a meeting? Or worse, how about the time you almost had a car accident? Fear memory, a type of ***long-term memory*** (LTM), is quite resilient and refractory to decay. It plays a central role in the precipitation of anxiety and trauma-related disorders, like posttraumatic stress disorder (PTSD) and is difficult to treat using existing therapies.

A major regulator of LTM, including fear memory, is ***histone acetylation.*** This process facilitates the initiation of a cascade of gene expression changes that ultimately leads to ***consolidation*** of LTM. Given the importance of histone acetylation in LTM formation, some studies have proposed the eradication of fear memory through the use of pharmacological agents that inhibit histone acetyltransferases (HATs), the regulatory enzymes that deposit acetyl groups on histones in the nucleus. However, loss of HAT activity can be lethal or at times result in severe intellectual disability. How do we then specifically target fear memory formation?

As it turns out, there is a way to reduce histone acetylation and thus fear memory formation without adversely affecting the organism. Intriguingly, histone acetylation can also be facilitated by enzymes that produce acetyl-coenzyme A (acetyl-CoA), an important metabolic intermediate. This alternative route to histone acetylation, where a metabolic enzyme deposits acetyl groups on histones rather than a HAT, is the basis for a novel study (1) that targets fear memory formation through the downregulation of a metabolic enzyme, acetyl-CoA synthetase 2 (ACSS2). The study was published by co-first authors, Desi Alexander and Dr. Tanya Corman. Desi is a CAMB graduate student and Tanya is a postdoc alum from the lab of Dr. Shelley Berger. Tanya is also a former CAMB graduate student from Dr. Doug Epstein's lab.

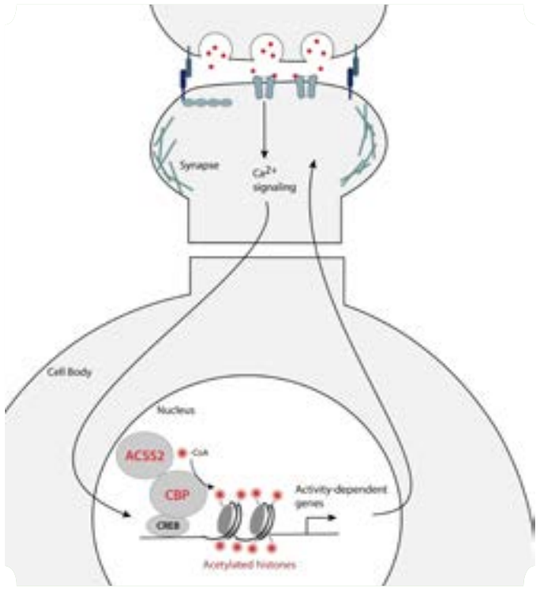
Why ACSS2? In contrast to various other metabolic enzymes that produce acetyl-CoA, ACSS2 can recycle acetate released by histone deacetylation reactions. This is of particular importance in neurons since they require faster signaling to mount instantaneous responses

Long term memory: A type of memory created from the stabilization of a temporary short-term memory to make it more enduring and ensure prolonged storage of information.

Histone acetylation: Transfer of an acetyl group to the lysine residue of a histone tail. For example, H4K5ac means acetylation (ac) of Lysine 5 (K5) on Histone 4 (H4).

Consolidation: The process by which a temporary, labile memory is transformed into a more stable, long-lasting form.

Working memory: A small amount of information retained in a readily accessible form to facilitate planning, comprehension, reasoning, and problem-solving.



Graphical abstract

to environmental stimuli. For example, ACSS2 was found to be critical for histone acetylation in the adult mouse brain.

To assess the contribution of ACSS2 to fear memory formation, the authors utilized two main approaches: an ACSS2 knock-out mouse model and pharmacological inhibition of ACSS2 by small-molecule inhibitors. The authors used CRISPR/Cas9 methodology to create loss-of-function mutations in the mouse Acss2 gene. Null mice (referred to as Acss2KO) exhibited complete loss of ACSS2 protein and mRNA, as verified by Western Blot and qPCR respectively. Interestingly, there was no compensation by other acetyl-CoA producing enzymes. Moreover, the Acss2KO mice were viable and showed no gross abnormalities in the brain. These results indicated that loss of ACSS2 is well tolerated in mice.

Loss of ACSS2 does not affect working memory but impairs LTM consolidation:

The authors then investigated behavioral characteristics of these mice, starting with the assessment of ***working memory***. Using the open field assay (2) and the Y-maze test (3), which measure locomotion and anxiety, the authors noted that Acss2KO mice performed very similarly to wildtype (WT) mice in both assays, suggesting that loss of ACSS2 does not impair working memory. Next, the authors tested two forms of LTM – spatial memory and fear memory. For the former, the authors used an object location memory (OLM) test that involves exposing the rodent to three similar sized but distinct objects followed the next day by moving one object to a new location. In contrast to WT mice, which exhibited increased discrimination for the displaced object (indicating appropriate recall of position from the previous day), Acss2KO mice showed significantly reduced discrimination, implying a deficit in the consolidation of spatial memory upon loss of ACSS2. To test fear memory formation, the authors utilized a cued fear-conditioning (FC) paradigm, which pairs an aversive stimulus with an auditory cue. This involves placing the rodent in an arena and presenting with a sound (auditory cue) simultaneously with a mild foot shock (aversive stimulus). The rodent is returned a day later to the same arena with just the sound (auditory recall) and analyzed for whether it can link the sound with the foot shock it experienced the previous day. Freezing behavior was used as a readout for recall capacity. Interestingly, Acss2KO mice displayed reduced freezing compared to WT mice during the auditory recall. This suggests diminished consolidation of long-term fear memory upon loss of ACSS2.

Loss of ACSS2 dampens histone acetylation and downregulates transcription of LTM-associated genes:

Histone acetylation at specific sites (e.g., H4K5ac, H4K8ac and H3K27ac) is associated with LTM. To determine if ACSS2 loss impacts these acetylation marks, the authors subjected WT and Acss2KO mice to the FC paradigm and collected dorsal hippocampus (associated with FC) samples after 30 minutes. Measurement of histone acetylation at various sites revealed significant impairment of

Desi Alexander

H3K9ac and H4K5ac in Acss2KO mice subjected to FC. However, not all histone acetylation sites were affected in Acss2KO FC mice, suggesting that only specific histone marks depend on ACSS2 in response to fear stimuli.

Histone acetylation is essential for the expression of genes associated with learning and memory. Given the defects in specific histone acetylation marks in Acss2KO mice, the authors sought to ascertain changes in the transcriptome of hippocampal neurons of these mice. RNA sequencing of hippocampal samples from WT and Acss2KO mice after FC revealed around 4000 differentially expressed genes. Intriguingly, over half of these were downregulated in Acss2KO FC and associated with LTM formation, including several HATs. Such substantial changes at the transcriptional level in Acss2KO mice indicates that ACSS2 is essential for the expression of LTM associated genes. Together, these results imply that the impairment of fear memory consolidation in Acss2KO mice may be the combined effect of compromised histone acetylation and transcriptional activity.

Pharmacological inhibition of ACSS2 disrupts LTM Consolidation:

Motivated by the reduction in fear memory upon genetic deletion of ACSS2, the authors decided to assess the benefits of pharmacological inhibition of ACSS2 as a potential therapeutic option for targeting fear memory formation. Toward this, they used a commercially available small-molecule inhibitor of ACSS2, called cACSS2i. On performing the OLM test to assess spatial memory, the authors found reduced discrimination of the displaced object by cACSS2i-injected mice compared to control mice. This suggests that pharmacological inhibition of ACSS2 disrupts long-term spatial memory and has similar effects as genetic loss of ACSS2.

The authors next investigated the effect of ACSS2i on fear memory consolidation using the FC paradigm and found significantly reduced freezing in cACSS2i-injected mice during recall. These results recapitulated their observations in the Acss2KO model and confirmed the effectiveness of pharmacological ACSS2 inhibition in reducing LTM consolidation. Interestingly, performing the FC paradigm in a rat model injected with cACSS2i also revealed a reduction in long-term fear memory

Dr. Tanya Corman

consolidation, implying a conserved role of ACSS2 across species.

ACSS2 inhibition in a rodent model of PTSD causes reduced anxiety and fear memory:

To further explore the potential of ACSS2 inhibition as a therapeutic option for PTSD, the authors used the predator-scent stress (PSS) model. This involves exposing the rodent to well-soiled cat litter (predator-scent stress or PSS) or fresh unused cat litter (control), and assessing anxiety levels a week later. As expected, rats exposed to predator scent showed higher anxiety levels compared to control rats. Remarkably, however, PSS rats injected with cACSS2i displayed reduced anxiety levels compared to control PSS rats, confirming that inhibition of ACSS2 disrupts the consolidation of stress memory and thus might prove as an effective therapeutic strategy for ameliorating long-term fear memory.

Conclusion:

The study by Desi, Tanya, and colleagues represents groundbreaking work on fear memory consolidation by the acetyl-CoA producing enzyme ACSS2. The study presents an effective alternative route to targeting fear memory that could provide potential therapeutic benefits by reducing trauma associated with stress disorders like PTSD. A few questions, however, do remain to be addressed. The authors noted a reduction in LTM-associated HATs in ACSS2KO mice. This could secondarily decrease transcription levels since HAT activity is essential for activation of gene expression. Thus, of the nearly 2000 LTM-associated genes that are downregulated in ACSS2KO mice, it is unclear which ones are downregulated due to a primary effect of loss of ACSS2 and which ones were caused by lower HAT levels. Secondly, the study involved administering ACSS2i during the first few hours of each experiment for an effective reduction in LTM formation. This might not prove as feasible in real life scenarios where victims of trauma are treated much later than when the trauma actually occurred. This would necessitate the development of ACSS2 inhibitors with varying windows of activity, or, perhaps, elucidation of other acetyl-CoA producing enzymes that can regulate later stages of fear memory formation. Nevertheless, the authors have made crucial advances in bringing to light novel pathways to histone acetylation in the regulation of LTM and fear memory.

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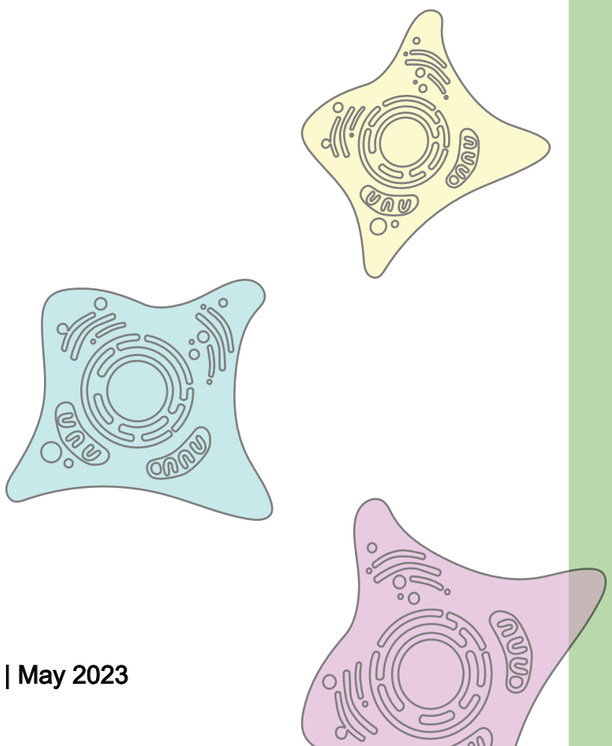

Temple Strike: A graduate student strike at Temple leads to stipend and benefit increases

James Gesualdi

Peer Edited by Kay Labella

Unions have been a fixture in the headlines of late, as several industries not traditionally associated with organized labor have seen major collective bargaining efforts. Workers in sectors such as food service and e-commerce have successfully formed new unions over the last several years, mostly in response to unsatisfactory wages in the face of ongoing inflation (1). Concurrently, many students and workers in higher education have formed or joined unions as well. For example, post-docs, TAs, and graduate researchers in the University of California system staged the largest labor stoppage of the year in 2022, with over 48,000 workers walking off the job across the UC's 10 campuses for over a month over demands for improved labor conditions and wages. Closer to home, another walkout took place at Temple University earlier this year, leading to a contentious back-and-forth between striking student workers and the university administration.

Our graduate colleagues at Temple University are represented by the Temple University Graduate Students' Association (TUGSA). TUGSA was officially born in 2002 after graduate students filed for a union election with the Pennsylvania Labor Relations Board (PLRB), which was an important and early case of the PLRB ruling that graduate students are in fact employees of their universities. TUGSA originally came together to oppose a major reduction in the number of teaching assistants at Temple, a lack of health insurance benefits, and a low baseline salary of just $10,000 at the time (2). This year, for the first time in TUGSA's history, unionized graduate students organized a strike and walkout beginning on January 31st in protest of continued precarious working conditions for both researchers and teaching assistants.

Before TUGSA's strike action, graduate students at Temple received a starting stipend of just $19,500 (3). This figure, of course, lags well behind the starting stipend for graduate students at Penn as well as other R1 Universities in Philadelphia such as Drexel, starts graduate students at $30,000 (4). TUGSA has stated in unambiguous terms that this stipend is unacceptable, out of date, and virtually impossible to live on in Philadelphia. Temple's unwillingness to offer any substantial raises for doctoral students has been cited as the main impetus of TUGSA's strike. At the start of the strike action, TUGSA sought a cost-of-living adjustment that would bring the starting stipend for graduate students up to $32,800 (3). This figure was likely influenced by Penn's recent decision to raise its minimum stipend for doctoral students from roughly $30,000 to $38,000 to help keep pace with inflation and rising rents city wide.

In addition to stipend increases, TUGSA also advocated for increased paid parental/family leave and extended health insurance coverage for spouses and children. Many TUGSA members cited spending large portions of their limited stipend on healthcare for themselves or their families, suggesting that increased support from Temple in this domain could go a long way toward helping graduate students make ends meet.

In February, the Temple administration offered a collective bargaining agreement to striking students that would have raised base stipends for beginning students by 10% to $21,500 and a ceiling of $23,500 for more senior doctoral students. The offered agreement did not include any extension of existing healthcare benefits. To the surprise of the university administration, this agreement was voted down by decisive margin, with 92% of TUGSA's voting workers rejecting the agreement as insufficient (5). TUGSA members and leadership both made it clear that this initial agreement would not be nearly enough to bring the strike to a close, citing that the offered percent increases on a stipend that is already much too low to live on would not significantly alleviate graduate students' financial problems.

This meager initial proposal came during the fourth week of the strike as participating graduate students began to struggle under the weight of the university's retaliatory measures. Temple discontinued health coverage and tuition remission of striking TUGSA members, leading to pileup of unpayable bills for many of students (6). Tuition charges for doctoral students – many of whom work as teachers and/or researchers full time and are often not enrolled in any courses – are an absurd exercise in collecting payment for a service that is not provided. Suspension of these 'benefits' is a common tactic of university administrations attempting to quell graduate student organization.

Temple's punitive approach early in the strike was clearly an attempt to single out participating TUGSA members and make continued withholding of labor financially untenable, without having to provide significant concessions to the union. Perhaps the administration felt emboldened by the fact that less than half of TUGSA's 750 strong membership chose to participate in the strike (6). Given this division within the ranks of TUGSA, Temple's administrators assumed that they would be able to break the strike without hurting their bottom line via the bargaining agreement offered in February. Therefore, when TUGSA resoundingly rejected their first proposal and continued to picket on campus, there were feelings of surprise and frustration among senior administrators.

Indeed, Temple's COO Ken Kaiser disparaged TUGSA's demands for a living wage in excess of the $21,500 offered in February as 'completely unrealistic' given the context of decreasing enrollment at Temple over the last few years (6). Kaiser went on to imply that doctoral stipends higher than $20,000 are exorbitant because graduate students only work 20 hours out of the week for nine months out of the year (6). As CAMB students and faculty we of course know that this claim about doctoral student workloads is far from the truth, but this is another typical refrain of university administrators facing labor unrest. Unfortunately, insincere statements like this one are often printed without comment by insufficiently critical newspapers. However, for administrators like Kaiser, this is an effective tactic to further obscure the intentionally opaque working conditions of graduate students and portray measured and reasonable demands for pay increases as absurd or selfish. Therefore, this false narrative remains prevalent in press coverage of higher education organizing, allowing management to diminish the natural solidarity between the broader working class and striking academic workers.

As the strike dragged on into March, it became clear that TUGSA was willing to fight it out until Temple offered real concessions. Additionally, TUGSA members effectively created positive press coverage of their strike by exposing Temple's retaliatory measures to local press and politicians. This tactic proved highly effective for the union, as the City Council, Mayor, and District Attorney came forward with statements in support of the strikers, condemning Temple's approach as punitive union busting (6).

Just under a month after the initial offer from Temple was voted down, the university came forward with another proposal, this time offering a raise of the base stipend to $24,000 with annual raises as well as a one-time $500 cash payment to help students recoup income lost during the action. The contract also stated that this base stipend would be raised to $27,000 starting in 2026. Further, Temple also offered to begin paying 25% of healthcare premiums for grad students' dependents and

increased paid parental leave days from five to 21 (3). Though the offered starting stipend remains below the figure demanded by TUGSA at the start of the action, an overwhelming majority of TUGSA members voted to approve this second offer from the Temple administration and bring the strike to a close during the second week of March.

Based on the margins on the vote on this now-accepted offer from Temple, TUGSA members clearly considered the concessions offered by the university to be sufficient for now. By passing on the first offer from Temple, striking grads were able to win themselves a raise of nearly 23% as well as increased healthcare and family benefits. The conclusion of the strike also resulted in Temple restoring the tuition remission and insurance coverage they previously withheld from striking students. TUGSA's members have now returned to their teaching, lab, and fellowship appointments with a fairer wage and the knowledge that sustained union action can force substantial concessions from their university when necessary.

The strike by TUGSA is one of the latest in a growing list of successful higher-education union actions over the last few years, including the aforementioned UC-system-wide strike last fall and a strike by both graduate students and adjunct professors at Rutgers University this semester (3). Unions for both doctoral students and undergraduates have been coming together more frequently all over the country of late as conditions for students become more precarious due to rising costs of living. As of now, there is no professional student labor organization at Penn, but that could change in the coming years.

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