

CAMB

Student Newsletter

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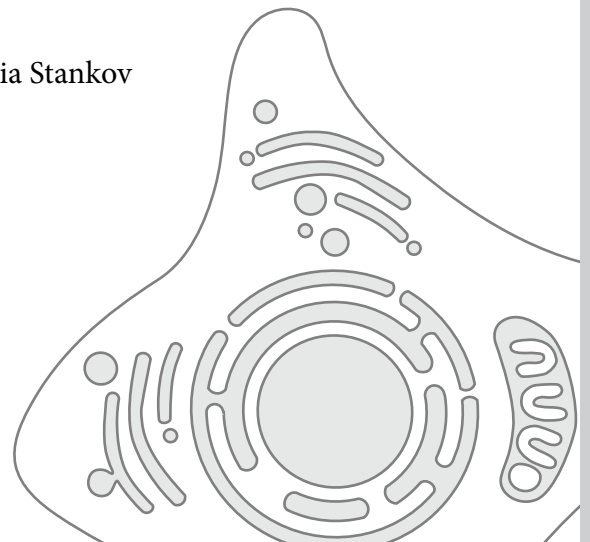
Letter from the Editors

Dear CAMB students, faculty, and alumni,

Here's to 2021! In this issue of the CAMB Student Newsletter, we chat with recent DSRB alumnus Dr. Christopher Natale about his work on a putative therapeutic for pancreatic ductal adenocarcinoma. We also share the results of our BGS-wide survey asking whether graduate students need a department of human resources. We talk with two senior CAMB trainees - Somdutta Mukherjee and Ernest Monahan Vargas - about their experiences preparing and defending in the virtual age. Finally, we catch up with Dr. Steve Bart, a 2018 MVP graduate now serving as a “disease detective” at the CDC.

For additional articles, past publications, and to learn more about the CAMB Student Newsletter team, visit our blog at cambnewsletter.wix.com/blog. Current students interested in contributing to the CAMB Student Newsletter can contact us at camb.student-news@gmail.com. We hope you enjoy the February 2021 issue!

Sincerely,
Hannah Kolev and Sylvia Stankov
Editors-in-Chief



Research Spotlight

Unlocking the Role of Nonclassical Estrogen Signaling in Pancreatic Cancer

Hannah Kolev

Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer, ranking as the fourth leading cause of cancer-related deaths in the world [1]. With a typical overall survival of 6 months from diagnosis, developing sensitive diagnostic tools and treatments is critical for managing this disease [2]. Current treatment options are complicated by the broad heterogeneity in genetic mutations observed in PDAC tumors, which frequently renders the tumors chemo-resistant [1]. Standard treatments remain largely palliative, aiming to prolong survival and ease symptoms; and conventional cytotoxic treatments such as chemotherapy and radiation therapy remain marginally beneficial. Thus, an active area of research seeks to identify novel, targeted therapies that effectively treat PDAC.

A recent study published by Dr. Todd Ridky's group in [Cellular and Molecular Gastroenterology and Hepatology](#) provides important insight into the efficacy of a putative PDAC therapy. Led by first-author **Dr. Christopher Natale**, a recent DSRB graduate, this work builds off of the frequent observation that female sex is associated with lower incidence and improved clinical outcomes for many cancers. Thus, biological differences between sexes, for example estrogen hormone signaling in women, likely influence tumor development, progression, and therapeutic response. Understanding the mechanisms that underlie the observed protective effect of female sex may be critical to identifying new cancer therapeutics.



Dr. Christopher Natale

Natale and colleagues hypothesized that **nonclassical estrogen signaling** mediated through the G protein-coupled estrogen receptor (GPER) may be key to understanding the sex differences observed in cancer etiology. Previous work conducted by Dr. Ridky's group revealed that stimulation of GPER, which is expressed in a wide number of tissues including melanocytes, inhibits tumor growth in cutaneous melanomas [3]. Importantly, melanocytes do not express classical estrogen and progesterone nuclear hormone receptors, suggesting that GPER activation alone drives an anti-tumor response. GPER activation also has tumor suppressive properties in multiple other cancers, such as colorectal cancer and non-small cell lung cancer [4,5]. In the present study, Natale et al expands upon these findings to determine whether GPER signaling is therapeutically beneficial in PDAC tumors.

To investigate GPER and its contribution to PDAC, Natale and colleagues utilized murine **PDAC tumor lines** as their model system. Recently developed by Dr. Ben Stanger's lab at Penn, these tumor lines represent different degrees of immune cell infiltration and responsiveness to cytotoxic and immune therapies. The cell lines ranged from minimal CD8+ T-cell infiltration with poor response to therapy (6419c5 cell line) to robust CD8+ T-cell infiltration with modest (6499c4 cell line) and strong (2838c3 cell line) therapy responsiveness. Thus, these cell lines represent the broad heterogeneity often observed in PDAC tumors.

The authors first asked how PDAC tumor cells respond to GPER activation. After treating each tumor cell line with **G-1**, a highly specific small molecule GPER agonist, the authors measured cell proliferation, as well as protein and gene expression changes. Strikingly, they observed a significant reduction in proliferative cells in each cell line, with an associated block to the G₁-S phase transition of the cell cycle. Furthermore, a key oncogene, c-Myc, was shown to be downregulated following G-1 treatment. RNA-Seq profiling of gene expression changes induced following G-1 treatment further confirmed the downregulation of gene sets related to cell proliferation and invasion. Together, these results suggest that activation of GPER signaling reduces tumorigenicity in mouse models of PDAC.

Translating these findings into an *in vivo* model, Natale and colleagues next injected PDAC tumor cells into the subcutaneous flanks of mice, thereby inducing tumor growth. A subset of these tumor-bearing mice were then treated with G-1, which resulted in reduced tumor volumes and prolonged animal survival, supporting a tumor suppressive effect of GPER signaling *in vivo*. Importantly, both male and female mice harboring subcutaneous PDAC tumors responded similarly to G-1 treatment, suggesting that the antitumor

activity of GPER signaling is not dependent on sex.

An important sub-field of cancer treatments utilizes immunotherapies to induce an anti-tumor immune response that targets tumor cells. Importantly, inhibition of the immune checkpoint programmed death 1 (PD-1) receptor using a monoclonal antibody (**αPD-1**) has been shown to prevent T-cell inhibition, promote anti-tumor immune responses, and reduce tumor growth [6]. Recognizing the critical

function of immunotherapies, Natale and colleagues next asked whether G-1 treatment can act synergistically with αPD-1 therapy to reduce tumor burden. PDAC-bearing mice treated both with G-1 and αPD-1 demonstrated lower tumor volumes and prolonged survival when compared to mice treated with G-1 or αPD-1 alone. This combinatorial effect was only observed in mice with tumors derived from

PDAC cell lines that express the αPD-1 ligand, PD-L1. Together, these results reveal that G-1 treatment increases the efficacy of αPD-1 immunotherapy and may provide a viable combinatorial treatment option for PDAC tumors that express the PD-1 ligand.

In a final set of experiments, Natale and colleagues sought to determine the function of GPER signaling in human PDAC. The authors first demonstrated that GPER is expressed to varying levels in clinical PDAC tissues, with approximately 61% of tested samples showing GPER expression. Next, treatment of three different human PDAC tumor lines with G-1 suppressed cell proliferation and reduced c-Myc protein expression. Furthermore, mice harboring subcutaneous human PDAC tumors responded to G-1 treatment with prolonged survival and tumor regression, demonstrating a tumor suppressive function of GPER activation in human PDAC cases.

“Given the anticancer activity observed in PDAC, melanoma, and other cancer models, developing GPER agonists could be a useful therapy in multiple malignancies.”



Together, the study presented by Natale and colleagues identifies and validates a tumor suppressive effect of GPER signaling in pancreatic ductal adenocarcinoma. Both murine and human PDAC cell lines responded positively to treatment with G-1, a potent and highly selective agonist of GPER; and *in vivo* studies advanced these findings to reveal G-1-mediated suppression of PDAC tumorigenicity in a clinically-relevant model.

When asked about the overall implications of his study, Dr. Natale notes that “given the anticancer activity observed in PDAC, melanoma, and other cancer models, developing GPER agonists could be a useful therapy in multiple malignancies.” Indeed, the expression of GPER in other tissues suggests that G-1 may act in a tumor suppressive manner in other cancers that are not typically considered sex hormone responsive, such as PDAC. Even more, significant sex differences were not observed following G-1 treatment, suggesting that both men and women will benefit from GPER agonist therapies in the future. Together with the observation that G-1 enhances the response of PDAC tumors to immunotherapy, this study identifies G-1 as a promising putative therapeutic for cancer patients.

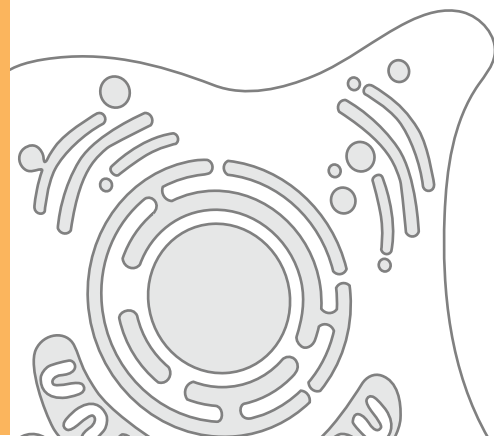
Since publishing, Dr. Natale’s and Dr. Ridky’s science has continued to advance. When asked about their next steps, Dr. Natale shares that they have been “focusing on identifying predictive biomarkers and the most sensitive cancer types.” In an exciting new venture, Dr. Natale and Dr. Ridky teamed up with the Penn Center for Innovation to establish Linnaeus Therapeutics, a start-up company designed to “advance these discoveries to clinical trials.” To learn more about their company’s mission and to follow their progress towards developing GPER agonist therapies, visit the Linnaeus Therapeutics website at <https://linnaeustx.com/>.



Linnaeus Therapeutics, a biotech company started by Dr. Natale and Dr. Ridky, in partnership with the Penn Center for Innovation

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Gabrielle Henderson, Unsplash

Special Interest

BGS Department of Human Resources - The Missing Piece?

Kanika Jain

How often have you heard - ‘Earning your PhD is all about building character’? And how often have you found yourself questioning - ‘Is undergoing conflict an *inevitable price needed to earn a PhD*’?

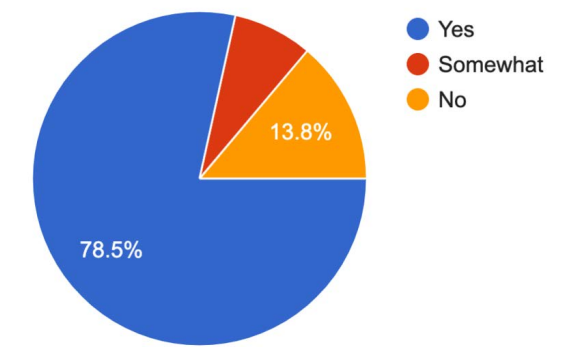
Since overcoming conflict is essential to continue forward in our PhD training, should conflict management be addressed more prominently in academia?

During a recent Newsletter meeting, a discussion about conflict management in academia motivated us to ask whether we need an independently-run Human Resources (HR) department to support graduate students. An independent HR department could facilitate conflict management, work toward racial and gender equity, vie for equal opportunities for minority groups and international students, deal with workplace harassment, provide career counseling, and most importantly, foster accountability and transparency in academia.

We conducted a BGS-wide anonymous survey asking graduate students about their thoughts. Sixty-five doctoral students spanning the seven graduate groups under BGS took the survey and shared their views with us. **78.5% of respondents agreed that graduate students could benefit from an independent HR department.** 64.6% admitted that they had faced problems (personal,

health, or work-related) at least once, and kept them private because they didn’t feel they had somewhere to turn. Furthermore, 72.3% of students mentioned they find it fairly difficult to communicate about sensitive topics entailing interpersonal relations, training, and career opportunities with their PI and program leadership. Unfortunately, these statistics indicate a gap in communication between students and their mentors in academia. They also speak volumes about the lack of a perceived safe space for graduate students to share their concerns.

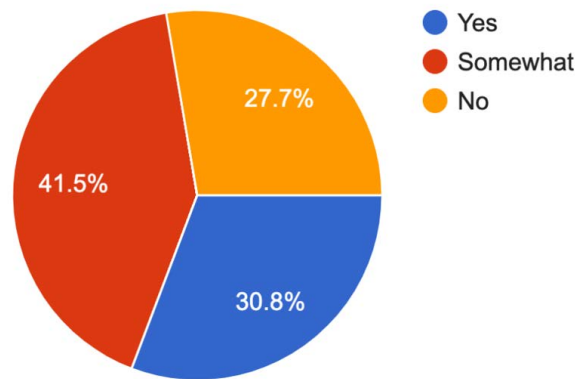
Based on our proposed scope, do you think graduate students could benefit from an independent HR department?



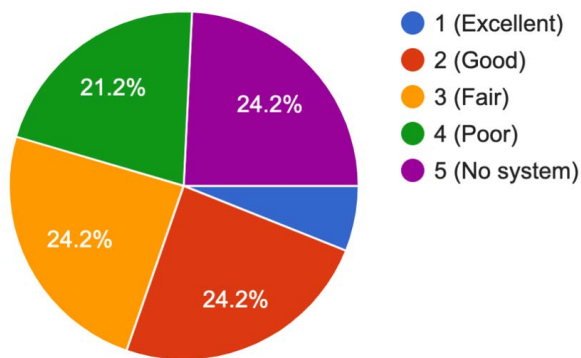
When asked about accountability in academia, only 20% of students felt confident in having someone to

talk openly to about the expected roles and duties of lab members. 30.8% of students admitted they had no one to talk to about a fundamental work-requisite like accountability. 45% of students admitted their labs have either no system or a poor system in place for conflict management and only 6% of students considered their labs to have an excellent conflict management system in place.

Do you find it difficult to communicate about sensitive topics (interpersonal relations, training and career opportunities, etc.) with your PI or program leadership?



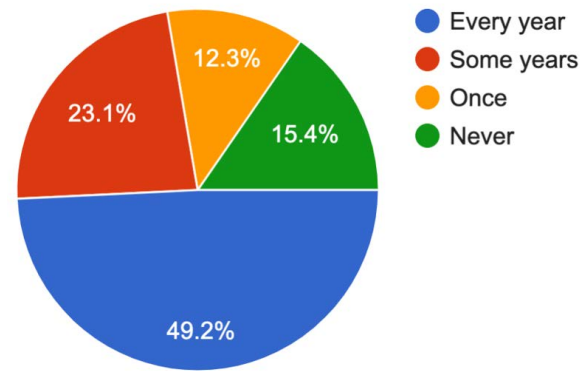
Do you feel your lab has an effective system for conflict management? On a scale of 1-5, 1 being an excellent communication system.



Another area of disparity highlighted by our survey was career planning. All BGS PhD students are required to complete an Individual Development Plan (IDP) on an annual basis. The IDP serves as an important tool to develop a personalized mentoring plan based on the needs and goals of each student, describes student's short- and long-term career objectives, recognizes trainee professional development activities, and facilitates communication with PIs. Surprisingly, only half (49.2%) of the students surveyed share their IDP with their PI every year. 15.4%

of students admitted that they have never discussed their IDP with their PI. The question is, what holds back the remaining 50% of students from discussing their career plans with their PI regularly? More importantly, do these students have any other forum to discuss their career plans?

Do you discuss your Individual Development Plan (IDP) with your PI?



While the overwhelming majority of survey respondents felt that there was a need for an independent HR department, nine students (13.8%) considered the proposal to be obsolete. These students referenced currently available resources, like Penn's Office of Ombuds. The Office of Ombuds offers a safe forum to resolve differences among members of the Penn community, including BGS graduate students. However, Ombuds is not BGS-specific and, most often, the last resort for students once a conflict has already escalated. While this resource is useful, it may be unsuitable for the day-to-day needs of BGS students. BGS also supports other organizations like the Office of Research and Diversity Training (ORDT), LTBGS+, the Peer Support Network (PSN) and Students Confronting Racism and White Privilege (SCRWP). While we acknowledge the important work done by these groups, they are mostly student and faculty-led, and hence, unequipped to fulfill all the needs outlined in our survey. A BGS HR department would be led by **trained HR specialists** that could work in conjunction with these pre-existing organizations. We have reached out to the office of Ombuds and ORDT to hear their perspectives on the results of our survey and the pros and cons of setting up an HR department for BGS students (*Look out for an update in our May 2021 issue!*).

Survey respondents also shared their personal reasons for why or why not BGS could benefit from an

HR department. Below, we have highlighted a few of the anonymous responses. You can find additional responses on the CAMB Student Newsletter Blog (<https://cambnewsletter.wixsite.com/blog>).

In support: Advantages of setting up an HR department

An independent system for accountability and conflict management

"When conflict or disagreements arise between a PI and student, there is nowhere to go. You can go to your thesis committee, but this is composed of peers or friends of your PI and it can be awkward to bring up issues. I had many issues with my PI on many levels and I felt uncomfortable talking to my committee about it and didn't know where to go...It would be extremely helpful to have an HR person or department completely independent of Department politics and friendships to help navigate these types of issues that arise."

"In the past, it was suggested that if I were to have a problem with my PI that the best course of action would be to go to a different PI and have them address it. It is pretty clear that this system behooves the PIs. I think having a third party for graduate students to go to would guarantee more protection for the graduate students."

"Everyone involved in our graduate programs are colleagues. We need advocates who do not have to risk their professional relationships to protect us."

"I think an independent HR department would be perfect for resolving a plethora of lab-related interpersonal conflicts. Many workshops offer ways to improve one's communication, professionalism, etc but can do absolutely nothing to address power dynamics or an unwilling/uncompromising party."

A centralized and BGS-specific resource

"I think it would give a source for BGS students to get help with various work-related issues without having to go to the BGS administration. Sometimes it feels like going to a CAMB chair, program chair, or others about issues we're having is elevating those issues a lot so we're less likely to come forward with smaller issues."

"I feel like we don't have a central location to take these types of concerns. We know there is a chain of command (i.e. your grad chair, CAMB chair etc.) but it feels nebulous. Additionally, we would benefit from

having a place to turn that is staffed with people trained in handling conflict."

"I think an HR department more specific to BGS would have the advantage of being able to tailor... to a science context, as well as break up the work done so that each item could potentially get more attention than if many schools within Penn are lumped together."

Professionally trained conflict managers

"...Graduate students are strongly disincentivized from bringing up problems with PIs because PIs are frequently not trained properly on how to handle them ... Interpersonal conflicts within the lab reflect poorly on the people involved with them to the PI, and some kind of anonymous mediating service would be greatly appreciated..."

"There is little to no structure for conflict resolution in the lab setting, so this responsibility tends to be considered an afterthought. PIs have little time to spare and tend to have little training to deal with such issues, so they often remain unaddressed. A dedicated HR department could help to address this gap."

"I think a professional, funded HR department that is trained in conflict management, etc... could be a resource to students. Other groups are helpful but comprise either of faculty and/or students (not independent)."

"Arnaldo's office (ORDT) did a lot of that but I think the issue lies in training PI and lab managers better, and holding them accountable. Students, especially females get tons of disrespect and microaggression. Even if you reported, the PI will not do much."

Reporting workplace harassment

"...I'm fortunate to have a PI who is very supportive when I was the target of workplace harassment but not all PIs can do that and without my PI, I wouldn't know whom to talk to."

"Administration advises to use the anonymous site online to report harassment or conflicts in the lab, but these issues rarely get followed up with. We should have an office dedicated to this, where students know their concerns will be heard and actions will be taken."

Resource for career counseling

"Impartial career counseling. Not being put in the Post-Doc box and made feel guilty for deviating from it."

"There is a critical gap in support for BGS students when it comes to career counseling and conflict management. Both are largely de-prioritized relative to obtaining more experimental results, expanding the publication record, and "prestige" of the lab. Consequently, mental health/wellness and the transition to a career beyond the PhD tend to suffer..."

Addressing graduate students' role as employees

"...We are workers and deserve support and treatment as such. We would also benefit from clarity about expectations and accountability, and conflict resolution. Much of being a grad student is left murky and up to the individual to navigate, which induces a lot of stress and mental health effects."

"...We are both students and employees. I feel that a lot of the time our status as a paid employee is not fully addressed and we miss out on a lot of information relevant to that. For example, a lot of fellow students I've talked with are unsure about whether we would get a "raise" upon bringing in new funding or even whether we would be able to negotiate pay with our PI. An independent HR department would be a good way to ensure that our roles as more than just students are addressed and supported."

Against: Disadvantages of setting up an HR Department

Reasons why an HR department might be redundant

"Rather than establishing yet another department that's underfunded, we should urge administration to funnel money towards existing departments and programs that are already trying to meet the needs outlined, including ORDT, the Peer Support Network, the Minority Support Network, SACNAS, EEJust, PSPDG... As students, we are not employees, and I don't see how an HR department benefits us. Our relationships with our PIs are not one of employer-employee, and labeling it as such is very problematic in my opinion and changes the entire dynamic of the relationship."

"We are not employees so I don't see how human resources can help. Also the barrier to reach out to an HR department for help is significantly higher than it is to reach out to a program chair. Which is quite high as it is. Developing ORDT to provide these services would a much safer avenue for students"

"The University Ombuds serves as a source for conflict resolution and offers mediators even. I think this would be redundant. I am unsure of any additional benefit. In addition we have many resources for career counseling, so really what is needed is more accountability for racial and gender equity and that needs to come from administration down..."

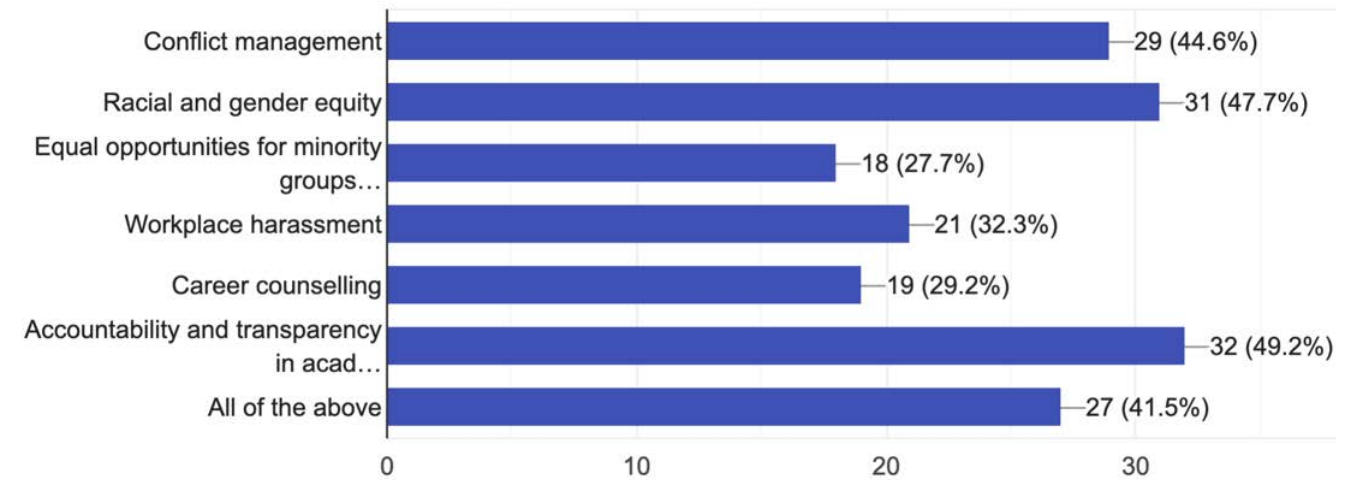
"Personally I've found support within the existing systems (I've turned to: PI, grad group chair, LGBT Center, CAPS, more senior students in my program)."

So, how could an independent HR department benefit graduate students?

From our survey, it is clear that many students find it difficult to communicate effectively within the existing academic structures. An HR department could encourage graduate students to come forth with their concerns more readily, provide a platform with increased anonymity, and limit trainee fears of retaliation. The HR department could function as an important advocate for student rights, and an intermediary to encourage open communication between students and their mentors. This structure could also promote accountability of PIs with respect to their mentorship style, commitment to trainees, and biases that may exist. In parallel, an HR department could help to explicitly outline work expectations from graduate students.

An HR department could also play an essential role in vouching for the marginalized and minority groups like first generation and low-income students, the LGBTQ community, and international students. An area of concern that emerged from our survey centered on gender and racial equity. **Our results show that only 9 students identifying as male participated in the survey, of which 5 belong to the LGBTQ+ community (from 53 responses to this question). The remaining 44 responses were shared by students who identified as female and/or LGBTQ+.** The substantial difference in responses reflects that trainees who identify as female and/or LGBTQ+ may feel more strongly about the need for a potential HR department. Being a graduate stu-

If BGS were to adopt an HR department, what area would you be most excited for?



dent (who may feel at the mercy of their PI and graduate program) may make it challenging to voice these concerns, especially when they are often a result of unconscious-bias and microaggressions. An HR department could provide an anonymous platform for students to report instances of sexism, racism, and workplace harassment.

An HR department could also reach out to students regularly to ensure their mental and emotional well-being, refer students to CAPS whenever required, and conduct regular follow-ups for specific cases. They can also play an integral role in initiating proactive, science and alternative careers-directed career counseling, and mediate networking among current BGS students and program alumni. Many students also expressed a need for professional advice on pay negotiations, taxation, student-loan deferment, healthcare and insurance, vacation/sick days, international travel, and housing.

The HR department could serve as a one-stop centralized forum, specifically designated for BGS graduate students. The HR office should be easily accessible to students, both in-person and online. For the HR department to function autonomously, the HR representatives should be hired impartially, function outside BGS leadership, and most importantly, have some mechanism to take action and intervene. The department could draft a detailed outline of their responsibilities and appropriate courses of action to resolve issues. These templates would allow a standardized approach to conflict management and streamline the process.

Where do we go from here?

The hierarchical dynamics in academia often make graduate students feel as if they sit at the bottom of a metaphorical pyramid. PIs, graduate group chairs, and thesis committees do their best to provide a safe, accessible forum for graduate students to voice their concerns. However, our survey suggests that the majority of respondents perceive their mentors' collegiate relationships with one another as superior to their relationships with their trainees. This structure weakens students' trust, does not allow for anonymity and ultimately deters them from openly sharing their concerns. A majority of students who responded to our survey would like an independent, anonymous platform to deal with issues like conflict management. Can BGS amplify our already-existing platforms to meet these needs? Or, is an independently-run HR department the missing piece?

Look out for our May 2021 issue to read about our discussion with ORDT, the Office of Ombuds and BGS management about the results of our survey.

Relevant links

- [CAMB Student Newsletter Blog](#)
- [Office of Research and Diversity Training \(ORDT\)](#)
- [Office Of The Ombuds](#)
- [Peer Support Network \(PSN\)](#)
- [BGS Association Student Groups](#)



Dr. Ernest Monahan, above, defending his thesis over BlueJeans.

Special Interest Defending in the Virtual Age

Somdutta Mukherjee and Ernest Monahan

The thesis defense is an exciting, stressful, and sometimes elusive event that every graduate student works towards in order to earn their PhD. To finish their doctorate, students write a description of the research performed, and present that dissertation in an oral defense. The defense is a culmination of a graduate school career, giving students the opportunity to share the research that they've been devoted to for the past few years. It also allows students to acknowledge the hard work and growth, both on a scientific and personal level, during their training. Not only can students celebrate their achievements with fellow classmates and faculty members who have been present for the whole journey, they can also share their work with family and friends who have always wondered how they spent their time during graduate school. The best part of this fanfare, besides earning a PhD of course, is the party at the end!

When the COVID-19 pandemic reached the US in March of 2020, it became clear that the traditional

thesis defense would no longer be possible. Having large groups of people packed into an auditorium just wasn't safe. Thesis defenses transitioned to a virtual platform, with students presenting their work and conducting the closed-session defense portion with their committee via video conference. There are both pros and cons to having a virtual thesis defense, and two of our staff writers reflect on this unexpected change to the end of their graduate careers. Somdutta is an eighth-year DSRB student who will be defending her thesis in April, and Ernest is a recent DSRB alum who defended his work in October of 2020.

Somdutta

During my time in graduate school, I have attended my fair share of thesis defenses. I am always impressed by the research, but what strikes me the most was that every person experiences some kind of challenge and then perseveres. This common thread has been an encouraging reminder that, even when fin-

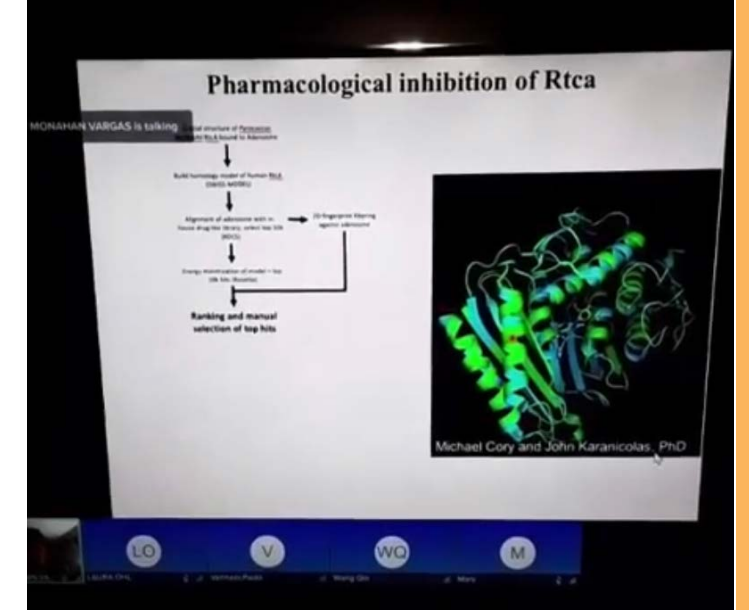
ishing graduate school has felt impossible, I too could make it through to the end. I have experienced many failed experiments, long and frustrating days in the lab, and a project change at the end of my fifth year. Despite these struggles, I have made a lot of good memories during my time in graduate school: I grew as a scientist (and made some interesting findings along the way!), spent the last three years writing for the CAMB Student Newsletter, made the wonderful city of Philadelphia my home, and made some lifelong friends, without whom I couldn't have made it this far. To me, the thesis defense has always been more than just finishing and getting a degree; it is a significant milestone in both your career and your life. I couldn't wait for the day to share my research and celebrate earning a PhD with all my friends and family together.

Initially, when I realized that a traditional defense (and party) would not be in the cards for me, I was disappointed. As nerve-racking and stressful as the day is, I had always looked forward to it. Not being able to experience that "rite of passage" in person was not what I expected when I started this journey years ago. After the sting of disappointment wore off, I focused on the advantages to a virtual defense day. I can avoid extra nerves from speaking in front of a large group of people, but, perhaps more importantly for me, many of my family and friends who wouldn't have been able to attend my defense in person will now be able to hear about my thesis work. As my defense draws nearer, I count on these silver-linings to brighten the prospect of defending in this virtual world.

Ernest

Defending my dissertation during a pandemic was certainly bittersweet. The joy of sharing the accomplishments of years of research with colleagues, family, and friends was undermined by the uncertainty of the circumstances. It was exciting, but also vastly different from what I expected.

The hardest part of the process was preparing for the virtual event itself. It felt surreal that my priorities for the day were making sure that WiFi was consistent, and that the presentation was visible to the audience. In addition, the lack of the traditional formality left



A snapshot of Ernest's screen as he presents at his defense virtually.

a lot to be desired. Hearing the applause of my committee members after the defense was encouraging, but it almost didn't feel like a culmination. I celebrated with a couple of close friends but not being able to host a larger celebration was unfortunate, and I'm looking forward to celebrating in person with my lab members once it's safe to do so.

Although some things didn't live up to expectations, there were surprising benefits to a virtual format. For example, virtual conferencing allowed family members to join in from places as far as Puerto Rico and Egypt, and the recording can be shared in the future with people who couldn't attend. Also, the chat capabilities allowed attendees who might not have spoken up at an in-person defense to ask more questions. Finally, defending from the comfort of a room without shoes on was a big highlight!

It is likely that virtual thesis defenses and committee meetings will continue for the foreseeable future. Thinking ahead, I believe that recording thesis defenses will remain a part of the process even after we've resumed in-person gatherings. This will increase accessibility for people who can't physically attend and allow wider dissemination of our work. My advice would be to practice often before the big event, and to have a virtual celebration after. These moments are important milestones and should be celebrated accordingly!

Alumni Spotlight

Stephen Bart, Epidemic Intelligence Service Officer

Sylvia Stankov

As the COVID-19 pandemic continues into its second year, so does our growing appreciation for public health workers. Their efforts to mitigate the spread of SARS-CoV-2 have been at the forefront of our battle against the virus. We spoke with Dr. Steve Bart, a 2018 CAMB MVP alumnus from Dr. Paul Bates' lab, who now serves as a "disease detective" at the Centers for Disease Control and Prevention. Members of the Epidemic Intelligence Service, like Steve, are first-line rapid responders to disease outbreaks, natural disasters, and other threats to the public's health. Below, Steve shares with us his path to a career in epidemiology in the middle of this global pandemic.

The following transcript has been edited for clarity.

What is your role within the CDC?

I'm an Epidemic Intelligence Service (EIS) officer, and I'm stationed at the Connecticut Department of Public Health in Hartford. I started in July 2020.

EIS officers are sometimes called "disease detectives" and work at [the Center for Disease Control and Prevention] (CDC) headquarters or in the states [themselves] to investigate disease outbreaks, analyze data, and implement control measures. There's a big emphasis on EIS officers being CDC's "boots on the ground" and they will often deploy to areas in the US or globally that need help dealing with a disease outbreak or other health threats that are causing problems in those areas.



Dr. Stephen Bart

What does a typical day look like?

Things have been pretty busy as you might expect. I've been working remotely during the pandemic, but a normal day will usually include coordinating with local health departments to investigate potential COVID-19 outbreaks, answering questions from members of the public, and working with our partners to get our COVID-19 wastewater surveillance system running. And, of course, a lot of data analysis and writing.

How did you decide to pursue a career in public health?

I decided about halfway through grad school. I had become a little frustrated with what I saw as a gap between my work at the bench and public health action. At the time, I was reading *And the Band Played On*, which was written during the 1980s and described the early days of AIDS in the US. As I read, I realized that there were people out there whose job it was to actually investigate outbreaks of new and old diseases. I did some searching, found out about EIS, and decided on a new career path.

How did you prepare to work in this field?

Because EIS officers work primarily as epidemiologists, I had to take advantage of whatever opportunities I could to shift my focus. I worked with Dr. Hillary Nelson with the Public Health Certificate Program and took night classes in epidemiology and biostatistics at Penn. I also expanded my network and started cold-emailing people to learn more about their jobs. On the side, I worked on a project at the Philadelphia Department of Public Health looking at factors affecting vaccine uptake. I thought that was an incredibly valuable experience, since I was actually doing public health work instead of just talking about it. After grad school, I did a postdoc at the FDA which also really helped to shore up my analytic and writing skills in a public health environment.

What skills from your PhD do you think have translated into your current position?

People always talk about "soft skills" but never actually say what they are or how they can help! Project management is the biggest one I think – being able to drive a project from conceptualization to publishing (or whatever endpoint you have) is huge. Also, as terrifying as giving my grad school presentations were, I did find that presenting really helped a ton to prepare me to answer hard questions and communicate more effectively.

In terms of directly applying technical knowledge from my PhD, I haven't touched a pipette since leaving Penn, but I have been able to apply my virology

experience as new SARS-CoV-2 variants have arisen.

How would you advise students looking to work as an EIS officer?

The EIS program accepts PhDs, MDs, DVMs, RNs, and other health professionals. Nearly everyone has a doctorate, and most people have some kind of public health experience. I really recommend doing what you can during grad school to get some of this experience so you can understand if this path is the right one for you. Talking to people and networking is critical, and I think that applies to any job after grad school. I'd also try to take advantage of the opportunity to take some classes while you don't have to pay for them.

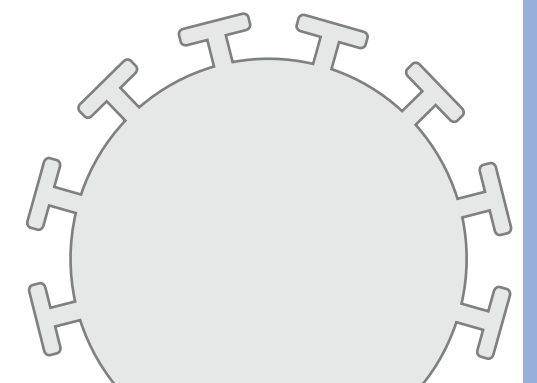
What is the best thing about working in public health?

The best part for sure is being able to make a direct impact. I have never once wondered whether the work I am doing is important, and it's really fulfilling to see the impact of your work on people's health. The people are also fantastic and it's great to be able to learn from them – both my colleagues here in Connecticut and my fellow EIS officers around the country.

How has your career in public health been affected by the COVID-19 pandemic?

It's definitely been an exciting and unique experience starting at the CDC in the middle of a pandemic. It's busy and a little "trial by fire", but I think it's been a great training experience and is going to be incredibly valuable in whatever path comes next.

You can learn more about the CDC Epidemic Intelligence Service fellowship program and how to apply at <https://www.cdc.gov/eis/index.html>.



Thank you for reading.

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