Ever wonder about the purpose of our written qualifying exam? Valued metric of student progress? Vetting to move on to the next level? Archaic hazing ritual? Perhaps it has a bit of all of this in it.

One thing that is a given is that it is a lot of work. A lot of work to study for, a lot of work to prepare, a lot of work to administer, a lot of work to take and to grade. And the consequences when a student does not pass generate a fair bit of anxiety. Especially for the student. So why bother? In fact, whether we should even have a written qualifying exam is a topic that has begun to be discussed among BCDB members, so much so that a preliminary committee was formed to address it. Where are we going with the qualifying exam process? In the short run, status quo – sorry incoming first years!

My own personal take is that we need something more concrete than an oral exam in order to fully determine whether our students are prepared to continue on with the program. And the skill set required to provide written responses to a question is distinct from that needed for an oral exam. This is part of why we do both in BCDB. At its best, the written qual exam is really a test of the ability to formulate and test hypotheses as opposed to simply recall a set of facts. Yes, there needs to be a base of knowledge in order to answer the questions, but is it even possible to master all the facts that encompass all that is BCDB? That’s a pretty vast knowledge space.

I first heard Andrew Kowalczyk describe Qual I as a test of breadth of knowledge and Qual II as a test of depth of knowledge. I think that is a great way to summarize the roles for the two different exams, enough so that I have repeated that line myriad times. And as such, I think that both exams have utility. But that does not mean that they should necessarily remain as is. For example, we recently changed the format of Qual 1 from one day to two days, to make it less of a feat of physical endurance. A strength of BCDB is our ability and willingness to re-invent ourselves.

The written exam as it currently stands depends largely on Foundations teaching faculty to submit questions. So in some sense the qualifying exam and Foundations have intertwined fates. Although faculty are not limited to frame questions based on what they covered in the class, they generally will. And again, should Foundations be fully comprehensive? Although many folks will disagree with me, I think that beyond a fairly tight core, Foundations does not need to cover “everything” and instead should represent strengths in our program and reflect the interests of faculty teaching the class.

Rick Kahn continues to be a champion of emphasizing that Foundations is an important tool to help students break through being confined as passive attendees in a class to grow into independent thinkers with the tools to find answers. I fully endorse this sentiment as well. Framing questions and knowing how, where and from whom to get information is a skill that will serve graduates regardless of career path. So where are we going? If you have opinions or advice, now is a great time to speak up!
I had been so excited to begin graduate school at Emory. But on the first day of my first class, I made a simple error. Instead of being the first day of the rest of my life, as the adage goes, this officially became the day my voice started to disappear. For many years, I found that the critical voices in my head drowned out all external praise or even any of my successes. At the time, I believed that I was the only one who felt like this which led to years of doubt and feelings of inadequacy.

But this feeling is actually common enough that it has its own name: Imposter Syndrome. Defined as an internalized sense of not being good or smart enough with a fear of beingouted as a phony, it was codified as a psychological phenomenon in 1978. Two women psychologists at Georgia State who drew on their own experience as women, designed a study that analyzed 150 women PhDs and observed a consistent theme: despite their numerous achievements, each of their subjects had intense feelings of not being intelligent enough for their position. Those suffering from this syndrome often attribute their successes to luck, instead of recognizing they were achieved through merit. If impostor syndrome festers too long, it could manifest as clinical symptoms including anxiety, depression, and a lack of self-confidence. It is estimated that about 70% of the population has experienced impostor syndrome, due to various life experiences including those that create a sense of not belonging, leading to the fact that minorities and women tend to be the most affected. Sociological studies of academics have shown that impostor syndrome is one of the main factors contributing to an underrepresentation of both groups in STEM professions. Women make up a little over half of the population, and at the undergraduate level, women are also about half of STEM majors. However, by the time they reach tenure-track positions, women in STEM make up less than 24% of the professoriate. The numbers are even more dismal for minorities. Among undergraduates, minorities are 18% of STEM undergraduates, but only 8% of these become professors.

In 2013, Rick Kahn, then BCDB program director, sent out an article to the program that particularly resonated with me: “Imposter Syndrome: Beating the blue-eyed monster”. In the article, a (new professor) discussed the challenges of dealing with her ever-present impostor syndrome. This article gave a name to what I was feeling and helped me realize that I wasn’t alone. This realization fostered many conversations with classmates and other graduate students that not only empowered me but also helped me get through the challenges of graduate school. It was in one of these discussions that my classmate Laura Newman gave one of the best perspectives I’ve heard on Impostor Syndrome: we shouldn’t think about it in a negative light, since everyone has experienced it to some degree. We should turn it on its head and see that it’s actually a great opportunity to evaluate yourself, helping you to not only evolve, but to also take the time to realize your successes and actually celebrate them. As graduate students, we often don’t take the time to celebrate the little successes in our lives, since there always seems to be another hurdle to cross. Therefore, it becomes even more important to celebrate whatever successes you get to keep those creeping feelings of failure away.

Throughout my time here, I have learned that you are never alone, even the times when you feel like no one understands what you’re going through; because, well, nearly everyone in academia has felt that way. Fortunately for those of us in the BCDB program, students and professors are always waiting with open arms to help. Because graduate school is such a challenging time where there are a lot of uncertainties, isolation can lead many down a path that is often hard to turn back from especially with the added feeling of being an impostor. No one is immune from that feeling which is why it important to talk to people about your hurdles whether experimental or personal. You can never reach your fullest potential in isolation. In my six years here at Emory, the most important lesson I’ve learned is: Don’t get in the way of yourself.
Discovering Green Treasures in Georgia
~Rachel Turn

My love for hiking started when I was little and would play games of being a great explorer. On some days I would pretend that I was struggling to make my way out of quicksand in the midst of a tropical rainforest, while on other days I’d imagine that I was Tarzan hiding up in the treetops. I haven’t played these games in a long time, but I have to say my hiking trips in Tallulah Gorge remind me most of the sense of wonder and joy I felt in my early make-believe adventures. If you love the outdoors like I do and you don’t mind getting dirty, then Tallulah Gorge is definitely an experience you don’t want to miss during your time in Georgia. About 2 hours to the northeast of Atlanta, Tallulah Gorge State Park is situated in the Chattahoochee National Forest. This 1000 foot deep gorge is carved out by the Tallulah River as it flows down in a series of six waterfalls, the tallest of which stands at 96 feet (Hurricane Falls). I remember how amazed I was when I first gazed over the edge in the summer after fifth grade. You don’t see such breathtaking cliffs, rich red clay, or thundering waterfalls where I come from in Florida. This was a brand new world for me, and I could hardly wait to get started.

Now, the full Tallulah Gorge experience isn’t for the faint of heart. The hike down into the gorge, across the suspension bridge, and up the other side consists of 1099 stairs. Though this part of the trail is gorgeous because you can hover eighty feet above the tallest waterfall and gaze down at the thundering current, the real fun begins when you actually get to climb the gorge floor. There, you have the chance to crawl over giant boulders and shimmy your way along cliffs as you venture along the very edge of the six massive waterfalls. Every time I go, I imagine that I’m a spider monkey or some sort of mountain goat as I leap from rock to rock, trying to plan my next move so that I don’t slip. When you finally reach the end of the gorge floor, you’ll encounter the 16-foot tall Bridal Veil waterfall. This one is the favorite of most travelers because it is nice and smooth and, if you brace yourself for the cold, you can slide down this waterfall into the lake below. Though I come back caked in dirt and with my fair share of bumps and bruises after my ventures into the gorge, I love every moment of it.

So, strap on your hiking boots and trek your way to Tallulah Falls. Whether you love crawling around on Earth’s giant outdoor playground, are excited to see one of the great natural wonders of Northern Georgia, feel curious to see all of the amazing wildlife living there, or just want to swim down a waterfall (Tyler, please take your phone out of your pocket!), Tallulah has something to offer everybody. For me, I love the gorge because it lets me be a kid again, embarking on one more great adventure.

CONGRATULATIONS RECENT GRADS!
Daniel Barron
Emily Kuiper
Jennifer Rha
Jadiel Wasson
This 4th of July, did you stop to think about how fireworks work? Sure, we probably know that they are tubes full of gunpowder that are caught on fire, but how do we get such diversity in colors, sounds, and shapes?

Fireworks are made of aerial shells, or hollow tubes that contain all of the chemicals needed to produce the explosion. Each aerial shell is filled with three major components: gun powder to serve as the explosive agent, small particles called “stars” to produce the different colors, shapes, and sounds unique to each firework, and a bursting charge attached to fuses to facilitate timed detonations. This aerial shell is housed inside a gun powder-containing mortar, which facilitates the explosive force needed to propel the firework into the air.

Two separate explosion steps are required to activate the firework. The first explosion occurs after the ignition of a fast-acting fuse, at which point the gunpowder inside the mortar catches fire. Then, the gases and heat released by the chemical reaction produce enough force to thrust the firework into the air. After it is airborne, the second, time-delayed fuse is ignited inside the aerial shell. This triggers the activation of the gun powder and stars, causing them to burst from the shell and create the visual and sound effects that we recognize as fireworks!

The different colors we see during a firework show depends upon the chemical composition of the stars. Each star is composed of four ingredients: the oxidizing agent to ignite the reaction, the fuel to sustain the spark produced by the oxidizing agent, the metal colorant, and the binding agent to keep all of the components together as one star. The electrons in the metal atoms are excited by the heat produced by the oxidizing agent and the fuel, causing them to become excited and to emit different colors depending upon the type of metal. See chart below for which metals emit which colors.

Different shapes of fireworks are produced depending upon the arrangement of the stars inside the aerial shell. Pyrotechnic specialists design fireworks with cardboard inserts to help the stars explode outward in a specific pattern. Furthermore, the shape of the aerial shell itself can also alter the shape of the firework.

The classic loud boom that we hear with fireworks derives from the rapid expansion of the gas upon igniting the gun powder. As a result, the gas moves faster than the speed of sound and creates a sonic boom. Besides this, other sounds that we hear during a show depend upon the composition of the firework. Humming fireworks create their sound when they shred their outer coating because they launch into the air at such great speeds. On the other hand, whistling is created by the resonating gas that comes from the rapid burning of the fuel. Depending upon the type of whistling effect that the pyrotechnician wants, he or she can change the oxidizing agent and the fuel source to optimize the sound.
Parting Wisdom from Recent BCDB Graduates

~Brenda Calderon

Getting your PhD can feel both like being a student and having a full-time job, but most of the time it feels quite different from either of these situations. As we get near the end of our training and start the process of securing our next step we might be filled with many emotions. Joy at being able to say you accomplished something very challenging, or maybe you contributed something special to your field. You might feel some sadness either for leaving a great lab or for the relationships with your mentors, labmates, and fellow graduate students that will no longer be a part of your daily experience. Even leaving your project might fill you with some sorrow knowing that someone else will get to chase the questions that are left. Sometimes we might feel anxious about what the next step actually will be and how to secure it. It’s not uncommon to have our goals or career outlooks change during our training, but when this happens near the end of our PhD it might make us panic just a bit more than we would like to. So what can we look forward to and what can we do if we find ourselves in any of these situations? We asked recent BCDB graduates about their transition period from PhD candidate to real-world adult and they share with us some gems of wisdom they learned during their exit phase.

“The transition from graduate student to whatever you choose to do next is a very busy time. It is difficult to focus on both finishing up and a job search. Many advisors say to start looking for a post doc position a year before defending. That's great advice if the next step for you is a post doc, but that's not always the case. However, I think this is good advice for any career path. While most jobs outside of academia are looking to fill positions when they need them filled (versus when you graduate), it's never too early to network and to learn about companies you may be interested in to better understand their hiring practices.” -Shea Cadwell

“Hello BCDBers! In my postdoc at the NIH one thing really stands out. Nobody has had the scientific, written, oral and professional training that we have in the BCDB program. Thank you to all the professors and coordinators who made this possible. I appreciate your hard work a ton. When looking back at my graduate career, I picked up a few lessons: 1) Thanks to everyone for being so supportive and such good friends. It means a lot to me. 2) Balance your scientific life and relationship with your significant other. I messed this up. 3) Go after the million dollar question. The question that our field most needed answered became apparent to me in the middle of graduate school. I shied away from going after it because I was worried about pushing back my graduation date. Looking back, I really wish I would have worked on this problem. So, if you see such a question, please go after it. The extra year or so in graduate school will totally be worth it. Cheers and thanks for everything.” -Marc Schureck

“Despite enjoying my time in BCDB and in graduate school, I struggled approaching graduation to decide what I wanted to do next. I so enjoyed the periphery of bench work, but felt that I could not commit to more time focused mostly on experimenting. I came to realize that I enjoyed going to seminars outside of my field, writing grants and papers with my mentor, and making PowerPoint presentations to effectively communicate ideas. Although I realized this quite late (in my fifth year), I was lucky enough to have had the experiences available to me both inside and outside of my lab environment which helped in honing skills likes writing, presenting, thinking logically and critically, and speaking to broad audiences and different people about many fields across the basic sciences. (BCDB emphasizes this program advantage quite a bit---but you don’t truly appreciate it until leaving). I started talking to anyone that I could get a hold of---professors, former students, friends and even people I found on LinkedIn with interesting jobs---to figure out how to get a job that involved communicating science. (Side note, you are all very qualified, finding a way into an interview is the hardest part). There are many many options that utilize these skills and I found one of them as a medical writer at MediTech Media on a team that works with companies developing therapies for CNS disorders. I have been there two months now, and have genuinely enjoyed every day. Each day is different, in terms of both topic and work. I’d be happy to talk to anyone curious about this field, or struggling with what to do after graduate school. Feel free to contact me at megleana@gmail.com.” -Megan Allen
BCDB Annual Retreat

When: August 19th-21st
Where: Sautee Mountain Retreat Center
What: Come join faculty and students for a fun weekend in the woods. Outdoor activities will include hiking Raven Cliff Falls, ziplining, and tubing down Helen. We will once again hold a 3 Minute Thesis Competition with a trophy prize and bragging rights for a full year! All food, drinks, and snacks are provided. No outdoor survival skills required.

BCDB RETREAT T-SHIRT DESIGN CONTEST WINNER
Congratulations, Elizabeth Minten!
THE LAGGING EDGE

VACATION RELAXATION?

TRY TO FINISH EVERYTHING BEFORE YOU LEAVE! AAAHHH!

STRESS

WORRY ABOUT ALL THE THINGS YOU HAVE TO DO WHEN YOU GET BACK.

RESIST URGE TO CHECK E-MAIL.

CHECK E-MAIL.

REALIZE THERE'S MORE TO LIFE THAN WORK.

EXISTENTIAL CRISIS.

WAIT, MOST OF IT IS SPAM.

BACK TO "NORMAL"?

BRIEFLY CONSIDER NEVER GOING BACK.

350 NEW MESSAGES IN INBOX!!

PHREW, NO ONE REALLY NOTICED YOU WERE GONE.

DOES THAT MEAN YOU'RE USELESS??

PHD COMICS

source: xkcd.com

Movie Science Montage

Actual Science Montage

Paint Flecks from the Killer's Clothing Match an Anti-Matter Factory in Belgrade!

Quick, We've Determined There's Neither Sporium Nor Protium in This Sample. Probably.

Cellular Division

Source: xkcd.com

The Leading Edge Editorial Team
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