THE VULCAN LETTER

Voice of the UAB MSTP

NOVEMBER 2015

Director's Welcome

Dr. Robin Lorenz, Program Director

First, let me welcome all of our applicants to UAB. Please use your time in Birmingham to get to know our MSTP family and to explore how UAB and our city can fit in with your future training plans. We will be interviewing 48 applicants this year and our currently scheduled interviewees include students from 20 different states and 33 different colleges/universities. Our interview process is similar to last year. The UAB School of Medicine evaluation will include both traditional interviews and the Multiple Mini-Interview (MMI). The MMI offers applicants a series of short scenarios at 7-10 stations. There are no right or wrong answers, but instead the MMI gives insight into critical thinking, communication, and decision making skills. In addition to these SOM interviews, MSTP applicants will also do a short "chalk talk" research presentation to the MSTP Advisory Committee and have traditional interviews with MSTP Advisory Committee members. Please use these opportunities to show us your passion for research and your drive to become a physician-scientist. Finally, you will have several meetings with research faculty. These are for you to explore the diversity of research available at UAB and are not for evaluation purposes, so enjoy your time chatting about science!

It is an exciting time for physician-scientists at UAB, as our Dean of the School of Medicine, Dr. Selwyn Vickers, recently established the Physician Scientist Development Office (PSDO). This is one of the first offices focused on physician scientists in the nation and I am excited about the new opportunities that it will provide for our MSTP students. One of the initial areas of focus for this office will be the facilitation of new interactions between MD/PhD students and academic physician scientists in residency/fellowship and junior faculty positions.

cont. on pg 3

Preclinical curriculum improvements leave students pleased

Dewey Brooke, Paige Souder

In 2015, UABSOM revised their preclinical curriculum and grading system to provide all students from diverse scientific and non-scientific backgrounds with an opportunity to have equal footing at the beginning of medical school. The first semester of schooling is now comprised of "Patient, Doctor, and Society" (PDS), a two-week introductory course covering medical ethics, healthcare logistics, and professionalism, and a "Fundamentals" course with five distinct modules. The Fundamentals course was previously two separate courses (Fundamentals 1 & 2) without modular distinction that provided a basic science overview to prep students for organ modules, the curriculum structure in later semesters. The new Fundamentals course is comprised of five modules:

1. Biomolecules and Bioenergetics
2. Development and Anatomic Structure
3. Cells and Foundations of Pharmacology
4. Pathology and Immunology: Response to Insult and Infection
5. Microbiology: Infectious Agents and Antimicrobial Therapy

This restructure was implemented to improve the integration of the wide diversity of topics covered in the first semester and better prepare students for organ modules (cardiovascular, pulmonary, gastrointestinal, renal, musculoskeletal, neuroscience, endocrine, and reproductive).

cont. on pg 9

Sloss is Boss! Sloss Music & Arts Festival 2015

Hayden Pacl

Photo Credit: Grace Oliver

Groups of attendees throughout the Sloss Fest Music & Arts Festival at the historic Sloss Furnaces in Birmingham, AL agreed that Sloss was "boss." What made Sloss so boss, you ask? As a frequent festival-goer, there were a number of unique factors that played into making Sloss Fest my best festival experience to date.

1. The Venue

What a venue! The clever design created a laid-back environment in which I could really have some fun. The two main stages—Blast and Steam—were positioned on opposite sides of an enormous clearing on the grounds of Sloss Furnaces (a national historic landmark), and the bands alternated between them. This design meant several things:

- Sound checks for bands were a matter of minutes
- Scheduling conflicts were minimal
- You can watch one band perform from across the field while you wait front-row for the next band
- If you so desire, you can catch all the action from one spot, either in the grass in the center of the clearing or in the shade of a conveniently located stand of trees!

Additionally, the incredibly unique Sloss Furnaces is open year-round for a number of other exciting events, such as the renowned Sloss Fright Furnace haunted house in October and the Local Flavor Festival—the premier food and wine festival in Alabama.

2. The Crowd

Ever been enjoying a great show when you have to play a game of "immovable object vs. unstoppable force" with hordes of people squeezing into the tiny remaining nooks and crannies of personal space between you and the people you're standing around? I generally find that this situation is my least favorite aspect of festivals, but don't worry about it here. After tactically waiting an hour for a great spot for the band, Cage the Elephant—and again the next day for the band, Primus—I didn't have to fight anyone for my space. In fact, there was even room to dance! This fun-loving, funky festival crowd was one of the most laid-back and boundary-respecting crowds I have ever had the privilege of rocking with. (Note: They can still get down! Ryan McMoniga was a key instigator in a mosh pit during the Primus finale—feel free to ask him about it.)

3. The Lineup

The lineup featured mostly folk and alternative rock artists. Over the two days of the festival, I saw some sweet headliners—Modest Mouse, the Avett Brothers, Cage the Elephant—as well as smaller acts that fit in perfectly, including Young the Giant, Manchester Orchestra, theme song, Primus. Unfortunately, I missed some of the more funky bands, including Big Gigantic and Tyler the Creator, but I hear they brought the funk.

4. The Sideshow

There were a number of other things you could find yourself doing if not listening to music:

- Food and Drink: trucks and stands from Jim 'n Nicks BBQ, Steel City Pops, burger joints, and a number of other vendors were present, as well as a beer garden and refreshment tent.
- Local Artisans: a number of homegrown artisans had stalls, which made for an exciting art gallery and a place to find a truly unique gift or memory while supporting Birmingham's creative vibe.

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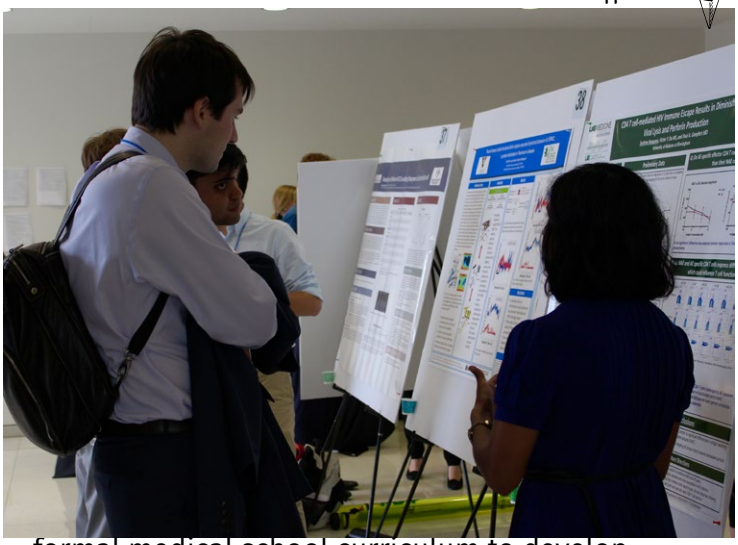
What happens in Nashvegas...SEMSS 2015

Paige Souder

Sushma Boppana, MS2



The 6th annual Southeastern Medical Scientist Symposium (SEMSS), a conference put on for MD and MD/PhD students by Emory, Vanderbilt, and UAB, was a treat for all in attendance. This year's conference was held at Vanderbilt University in Nashville, TN—a city with plenty of charm on it's own. A number of UAB MSTP students presented posters at the conference, and our own Fabio Raman (MS2) was selected for an oral presentation based on his summer rotation (go, Fabio!). Several UAB MD-only MS2s presented as well, representing the large percentage of the UAB medical school class interested in research.

Kristin Olson, former president of Equal Access Birmingham (EAB; the UAB student-run free clinic) and newly inducted MSTP (GS1), led a group of MSTPs involved with the clinic to present a poster "highlighting the incredible participation in both volunteering and leadership at EAB from MSTP students...who were involved in the founding of the clinic, and, in the last few years in particular, significant leadership positions." Our poster demonstrated how we use EAB to "not only provide a service opportunity for budding physician-scientists, but also develop structured avenues outside of formal medical school curriculum to develop skills important to us specifically." This made for a popular topic of discussion among conference attendees, more so since our clinic is modeled after Vanderbilt's student-run free clinic, Shades Tree. "We mutually agreed to follow-up with each other to start talking on a regular basis to share successes, pitfalls, and to start touring each other's clinics as a way of training new students and getting new ideas on how to run our clinics better." *cont. on pg 4*

Director's Welcome, continued.....

This type of peer-mentoring is essential in the success of not only individual students, but also in establishing a healthy culture for physician scientists at UAB. The establishment of PSDOs was recently recommended in the Journal of Clinical Investigation article, "Rescuing the physician-scientist workforce: the time for action is now" (JCI 2015; 125:3742), which I had the honor of co-authoring. Through our new PSDO and the MSTP, I plan on implementing many of these recommendations at UAB in the near future.

We have also continued to enhance the involvement of students in our MSTP administration with the addition of one new student committee: the Individual Development Plan Committee. This new group, along with our other established student committees (Events, Communications, Griffin Society, CAMS, and SEMSS) and our student representatives, are excellent ways to become involved in your MSTP. My heartfelt appreciation goes out to all of the MSTP students who have been giving their time and energy to making this a great MSTP. There are many more than I can easily list, but a special thanks goes to *1)* Muhan for helping to organize SEMSS 2015, *2)* to those who have put their efforts into the new UAB APSA chapter and have gotten us recognized by the national APSA (Alice and Tyler), *3)* to the leaders of the Griffin Society for helping us receive a teaching innovation award and are now working on collecting data for a publication on the impact of our innovative MSTP 795 Continuing Education Course (Katie, Stephanie, Alice, and Dr. Geisler), *4)* to the organizers of our fantastic retreat (Jeremie and Jon), and *5)* to Paige and Hayden for their efforts with this newsletter, our blog, and our new "Sketches" series. Also, a congrats goes out to our Associate Director, Dr. Louis Justament, who was recently named the Immunology Theme Director and will be working very closely with our immunology focused students and the rest of the Immunology PhD students. Finally, our MSTP family and our program would not be the same without the continuous support of Randy and Jackie. A big thanks goes to them for all their hours of involvement in our program and our lives. As the African proverb states, "It takes a whole village to raise a child," and I believe it is our "MSTP Village" that is raising each of us to become great physician scientists. All of your efforts help to make our MSTP a fantastic program and I am looking forward to our next year together.

Sloss is Boss, continued

Photo Credit: Grace Oliver

- Sloss Metal Works: a group of workers from the furnace were melting down and pouring iron so close to you that you could feel the heat (For $20, you could design your own mold for the iron and they would pour it for you with same-day pickup!)

5. The People

The only thing that could possibly make this festival any better was the people. I got to better know my MSTP classmates during my first month in Birmingham, before classes had even started. Of the eight students in my cohort (MS1), seven of us made it out to Sloss Fest. A good number of the upperclassmen were around as well, convincing me that my next eight years with such an exciting and cohesive group will be balanced well spent!

Suffice it to say, I will be at the 2nd annual Sloss Fest (July 16-17, 2016), and I hope to see you there!

SEMSS 2015, continued

In addition to student research presentations, two keynote speakers and a number of "breakout" sessions were offered to provide students with opportunities to receive commentary on current biomedical issues and gain valuable insight on topics specific to various levels in training. The first keynote speaker, Dr. James HIldreth, hopped over from Meharry Medical College in Nashville to discuss his research in HIV transmission and replication pathways. His CV boasts accomplishments such as NIH Director's Pioneer Award and his training was completed at renowned institutions such as Harvard and Johns Hopkins. The second keynote followed suit with Vanderbilt's own Dr. Ellen Clayton from the Vanderbilt Dept. of Pediatrics—who also happens to have a law degree—speaking on the intersection of law, medicine, and public health. She also did her Ivy League rounds with degrees from Stanford, Yale, and Harvard. Breakout sessions included advice for undergraduates in applying to MD/PhD programs, early MSTPs on transitioning to graduate school years, and late MSTPs on transitioning to clinical years and interviewing for residencies.

Overall, SEMSS was an informative and collaborative experience, providing students with an opportunity to mingle with students in all levels of training and explore Vanderbilt University and the great city of Nashville. Nashvegas, we look forward to seeing you soon, and welcome all next year to SEMSS 2016 at UAB!

MSTP Insider: Get in the Know

2015-2016 Applicants

- 48 applicants interviewed
- 20 states represented
- 43 colleges/universities

Current Students

- 63 students (42 male, 21 female)
- 27 states represented
- Average MCAT—33
- Average GPA—3.73
- Average Step—233
- Awesome pets (see pgs. 6-7)

University of AL @ Birmingham

- MSTP running 24 years strong (since 1991)
- Top 30 rankings in multiple clinical specialties
- Newly developed Physician Scientist Development Office headed by Dr. Lorenz
- Highest Level of Accreditation by LCME

Birmingham, AL

- Forbes 2015 #1 Most Affordable City in the US
- Zagat's #1 Next Hot Food City
- MAJOR downtown development in the works
- Outdoor recreation to the max

Open Access Articles: Changing Custom vs. Established Exclusion

Anna Joy Graves, Josh Cohen

A scientist's productivity is objectively measured by their publications, both via quality and quantity. Appropriately, a myriad of academic journals have become available for scientists, and physicians, to publish their work and stay up-to-date on the latest findings in their area of interest. For academicians with university affiliation, access to these articles is readily available via university-funded subscriptions and interlibrary loan systems; however, the general public is generally excluded from these articles (save those with open access). There is currently a debate as to whether this doctrine of public exclusion is the best means of scientific communication. Two of our MSTP students in the graduate school phase, in which this issue is particularly relevant, offer opposing views in the debate of whether all scientific research should be made open access.

Proposition: In its most noble form, the goal of science is to light the world, to understand and explain nature and use that understanding to better humanity. Sharing discoveries and results with other scientists and laypersons is an integral part of this mission, yet too many are left without access to scientific research, which is held behind publisher pay-walls. The majority of scientific research is published in journals that require exorbitant subscription fees or may charge over $30 for access to single articles. This leaves those without a major university affiliation virtually cut off from scientific discourse. Not only does this go against the highest ideals of scientific endeavor, it is wholly unfair. Most basic science research is paid for with US tax dollars. The public has a right to access the results of research they funded. Indeed, in 2013, the Obama administration issued a memorandum requiring federally-funded research to be made open access within one year of publication. However, I believe we can—and should—do better than this by making all published scientific research freely accessible, immediately. Open access journals have proven that his can be a viable model by passing the cost of publishing from the consumers/readers to the researchers/authors. The claim against widespread adoption of such a system is that it would be too costly for researchers. At a time when research budgets are already stretched thin, we can't afford to spend money on publishing. I find this argument unconvincing. While I am always a proponent for more science funding, I think we can make do with this added cost. We spend thousands or tens of thousands of dollars on animals, cell cultures, antibodies, assays, and next-generation sequencing, surely we can budget $2000 for the publication of our efforts. Additionally, the money saved on journal subscription fees by universities could be re-invested in research or used to offset the cost of publishing for faculty. Publishing open access is not only affordable, but it is also the right thing to do.

Josh Cohen, GS3

Opposition: More information is not always better. If the quality of the information is suspect – or worse still, manufactured and distributed for a price – then we should be wary of supporting any process that produces that information. In order for open access journals to make their articles widely available to readership without charging a price, the manuscript authors are levied a fee. Many respected journals with a rigorous review process do this legitimately; fees are used to cover the costs of hosting their journals online and hiring expert editorial and administrative staff. The trouble is, a growing number of predatory journals have seized upon this publication method to make a quick buck – and are successful in doing so. One librarian, Jeffrey Beall, has compiled a list of over 400 such publishers (http://scholarlyoa.com/publishers/). These journals often have names that are nearly identical to those of reputable journals and are thus sometimes indistinguishable to academics, much less the general public. Some manuscript authors unknowingly submit their articles and are later hit with a hefty fee upon acceptance; others consciously select these journals and are willing to pay the fee in order to pad their resume or publish pseudo-science. More worrying is the concern that the untrained public readership may not be able to disentangle quality from junk science. They may seize upon articles that support their stance (need I say the word "vaccine"?) or be genuinely beguiled into thinking that every article published in a research journal is legitimate. Ultimately, the current model of institutions or individuals paying for the right to read a scientific article – while subsidizing or waiving fees for researchers in developing countries who may not have the resources to access it – puts scientific information in the hands of people who know how to use it. It also severs the direct financial tie between author and publisher, either of whom may have underlying motives for supporting a pay-for-publication model.

Anna Joy Rogers, GS3

Ruff day? There's a dog for that

Paige Souder and the MSTP pet parents

Man's best friend is an understatement. If you have a pet, you know the bond that forms between you and your canine (or feline, or other) companion is distinct, singular...exceptional. I can attribute to the rewarding experience of having a pet—even in medical school—and felt it necessary to give the other MSTP pet owners a chance to show off their pride-and-joys (cue Stevie Ray Vaughn sound-track).

Brahm Weaver: the Country-Clubber

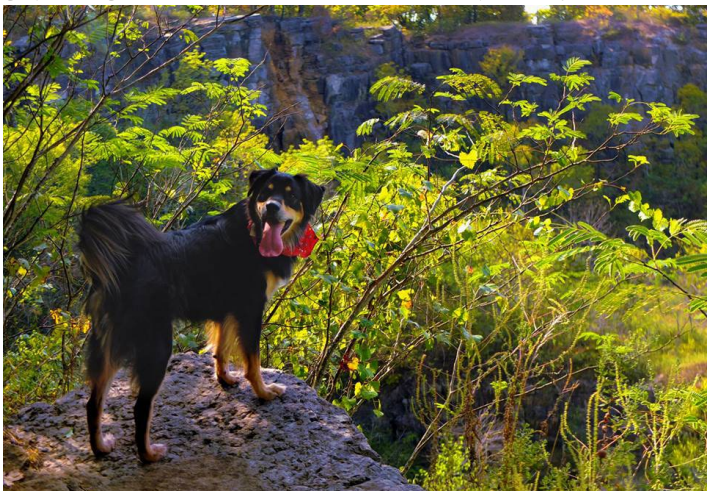
Brahm is a 4.5 year-old German Rottweiler who enjoys sunbathing, spectating tennis, tug o' war, and Muhan's dog, Shadow (see below). Brahm's proud owner is Alice Weaver, a GS3 who enjoys sunbathing and tennis-spectating with him.

Shadow Hu: the Traveler

Shadow is an almost 6 year-old flat coat retriever who is a proud alumni of "Adopt a Golden Birmingham." She has been with her owner Muhan (GS1) for 2 years and in that time has tranformed from a scaredy-cat to a lovable attention-seeking companion. Her favorite activity is hiking; she's completed her exploration of the Southeast and has even walked across the border at Niagara Falls!

Mars Zipperly-McLean: the King

Mars Maximilian Zipperly-McLean is a rescue dog from Charleston, SC. He is approximately 5 years old, and he is believed to be a rottweiler/border collie mix. Known to his subjects as "King Mars," he enjoys taking long walks around his ever-expanding kingdom, running wild in the mountains, trying new ethnic foods, and modeling his extensive bandana collection. He also loves pawing through the works of Ernest Hemingway, and considers himself an avid soccer player. A ferocious warrior, he fearlessly defends his kingdom from the daily onslaught of threats, including the mailman, the pizza delivery guy, neighborhood cats, and an army of squirrels.



Maya Souder: the Free-Spirit

Maya is a 1 year-old schnauzer-mix who uses all of her 8 lbs of weight for optimal trouble-making and playtime. She enjoys hiking, escaping from the yard, eating carrots, and playing with Mars, Shadow, and Kona (coming up). Don't let her small size fool you, she's spunky to the core and will stand her own no matter the challenge. And don't expect to beat her in a foot race—she can run.

Kona Stoyka: the Destroyer

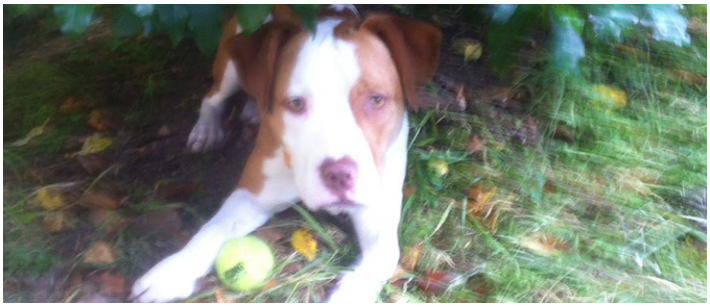
Kona is a 1 year-old shepherd mix. She was adopted her from the Humane Society when she was 4 months old, who thought she was a shepherd/ lab mix, but stopping growing once she hit 40 pounds. Her parentage is as unknown as the limits of her energy. Her favorite things to do are to learn new tricks (this month's trick: army crawl), destroy "indestructable" dog toys, play with other pups, and go hiking. Her owner, Lindsay, loves trying to keep up with her in her spare time.

Callie Robert: the Princess

Callie is a 6.5 year-old maltese that weighs a whopping 4.5 lbs, winning the award for our smallest pup. Her favorite thing, besides her owner Stephanie, is her "Bug." Pictured below with Callie, Bug is a blue ball with bug eyes (hence the name) that she has loved ever since they met when she was 7 weeks old and they were about the same size. Even though Callie has outgrown Bug, she has remained loyal, refusing to go anywhere without him or love any other toys.

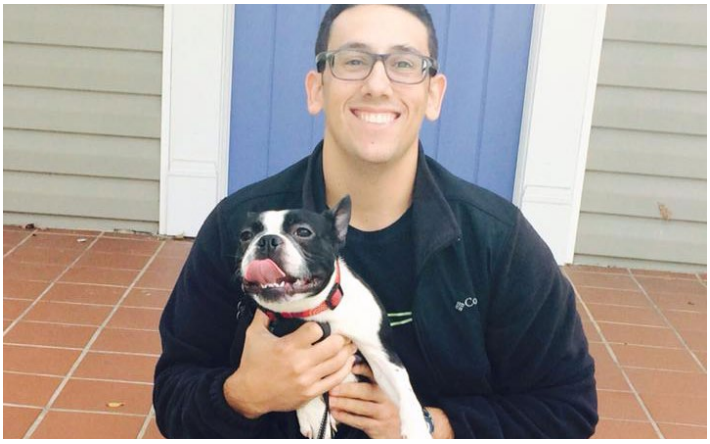
Asa Cohen: the Revolutionary

Asa is a 2.5 year-old pit bull. Her interests include tug o' war, food, and testing the limits of modern behavioral theory. Her owner, Josh, is grateful for her help in training him to become the best behavioral neuroscientist he can be.



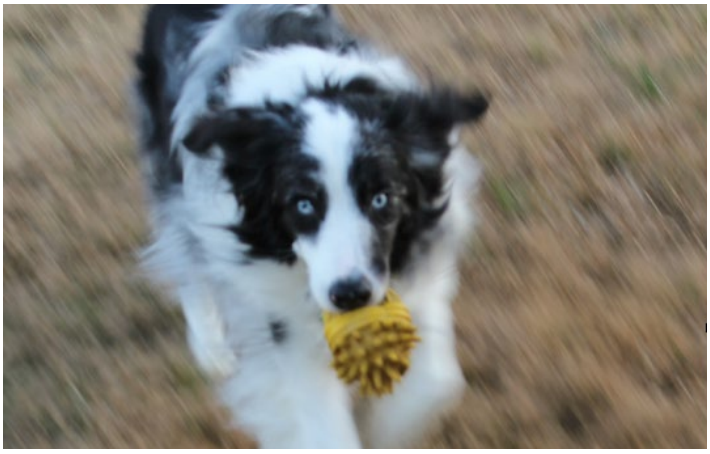
Kobe Bean Lever: the All-American

Kobe is a 2 year-old boston terrier. Jeremie rescued him last year and it's been true love ever since. Kobe loves to play in the yard, play in the house, play in the park, and play anywhere else Jeremie dares to venture.



Hank Stanley: the Heartbreaker

Hank is a 5(ish) year-old Australian Shepherd. He woos all the ladies with his dashing blue eyes and enjoys playing fetch and running around outside. He is oh so fluffy and oh so lovable.



Grant Writing: Tackling the F30/F31

Anna Joy Rogers

Being a physician scientist means being a master of many trades. Some lessons are best learned in the classroom, like statistics and molecular pathways. Others skills, like scientific reasoning and experimental techniques, can only be properly learned in a lab. Writing a manuscript is a skill that comes after reading many papers and co-authoring a few before serving as a lead author. Writing a grant, however, is a different ball game. You only learn to hit when you're up to bat.

I had that opportunity this spring when I decided to submit an F30 Predoctoral MD/PhD Individual Fellowship grant proposal to the National Institutes of Health. (In reality, the decision was made for me; the MSTP rightly requires that every student submit a grant proposal precisely because that's the only real way to learn this essential skill. We do have a class that teaches the mechanics of grant writing, but there is nothing like trial by fire.)

The first step to grant writing is knowing the "why." If you aren't convinced that your project is worthwhile, the reviewers won't be either. The second step is to have a good overview of all the moving parts of the grant application. For the F30/F31, this is how I broke it down:

1. The Research Plan

This is the meat of the application. It is comprised of the "Specific Aims" page and the six-page "Research Strategy." The former is the equivalent of a manuscript abstract in that it contains a succinct project justification and outline. The latter is where you get to expound on your project using several standard categories: scientific significance/rationale, innovation, design/methods, and expected outcomes.

2. The Training Plan

This section is unique to research trainees who have yet to achieve independence as investigators. This section is easily relegated to being written after the research plan, but in reality reviewers are told to place almost equal weight on both sections. They want to know that they are funding someone who has long-term potential, not just a great dissertation project. The training plan is comprised of your overall goals for this fellowship and your career and the activities other than research that you have planned with the grant money (such as taking classes, assistant teaching, and attending seminars and conferences). Make sure to weave this training justification throughout your application.

3. Supporting Documents that You Write

Reviewers need to know that you have the support system in place to conduct your research. This section comprises mundane, but necessary, components such as a cover letter, ethical conduct of research/institutional review board documentation, and a description of the mentorship, facilities, equipment, and institutional support systems in place that will ensure your success.

4. Supporting Documents that Others Write

In any application, it is crucial to know upfront what you have to wait on others to assist you with. This section has three components that other parties write entirely: letters of reference, a document written by the training program director (in our case, Dr. Lorenz) describing how the program is suited to meet the objectives of the fellowship, and biosketches of your mentors describing their academic qualifications. This section also has one component that you write in conjunction with your mentors to describe how their skill set will guide you through your training plan. In my experience, it was an iterative process that took much more time than expected.

5. Miscellaneous

Finally, there are a lot of minor pieces of information that you'll need. These include how much money you should be asking for and your mentors' eRA Commons IDs among others. Don't worry too much about these aspects of your grant, but do recognize that because of them the NIH "due date" of the application isn't your deadline. UAB needs time to process your grant and take care of these details for you, so they will require that you submit it to them at least ten business days in advance. Make sure to plan for this buffer time!

In conclusion, there really is nothing like writing your first grant application. It requires you to sharpen your research question to a point, think clearly about how your project and training plan contribute to your career plans, and perform a balancing act between boasting about past successes and demonstrating how you need the funding to build on your weaknesses.

I could give you pages of advice, but ultimately there's only one way to learn grant writing. Just do it.

Awards

- **Elizabeth Ma**: 2nd place Student Investigator, Obesity Week 2015 & Pat Simons Travel Award
- **Alice Weaver** & **Tyler McCaw**: Winning poster, UAB Research and Innovations in Medical Education Week
- **Brian Warmus** & **Kristin Olson**: 2015 Gold Humanism Honor Society Inductees
- **Morgan Locy***, **Anna Joy Graves***, **Heather Allen**, **Vincent Laufer**: UAB Medical Student Research Day Oral Presentations (*Winner)
- **Carson Moseley**, **Muhan Hu**, **David Figge**: UAB Medical Student Research Day Poster Awards

Dissertations

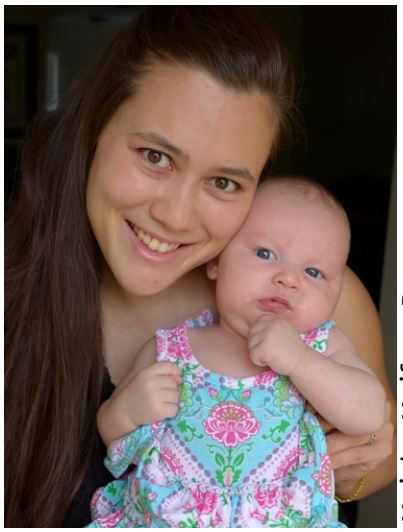
We have new doctors in the house! Congratulations to them both..onWARD they go!

- Jennifer Stanley, PhD
- Jarrod Meadows, PhD

New Members of the Homeowners Club!

- Garrett Brinkley *Crestwood*
- Sushma Boppana *Highlands*
- Emma Dean *Crestwood*
- Ryan McMonigle *Homewood*
- Jacelyn Peabody *Vestavia*
- Brandon Pope *Pinson*
- Paige Souder *Crestwood*
- Morgan Zipperly *Crestwood*

Come on over, Baby



Maisha Meifong Rogers
Daugher of Anna Joy Rogers

Amelie Pepin
Daugher of Mark Pepin

Curriculum Changes, continued.....

Though the structure of organ modules is largely the same, input from student course reviews has been taken into account to improve the details of course implementation. These include keeping good lecturers and course directors, replacing less good lecturers and course directors, improving quiz and test questions, and targeting content to Step 1 (the super important board exam) relevant topics.

Further, lecture hours were reduced by 50% to provide more space for self-directed and team-based learning. These modes of learning provide students with an opportunity to identify, analyze, and synthesize information relevant to their current learning needs and assess the credibility of various resources—this is an important skill considering the wealth of resources available to medical students. They also stimulate collaboration between students by allowing them to share information with peers and supervisors, and to receive constructive feedback. The previous year, lecture attendance was made non-mandatory, giving students the freedom to attend lectures or listen to lecture recordings via Echo360, an online lecture capture system. All lectures are available for online streaming or download within a few hours of the original lecture recording (bonus: recorded lectures can be sped-up, paused, or slowed-down to fit the viewer's preference).

Lastly, grading was restructured to a purely pass/fail (P/F) system in the first semester (PDS and Fundamentals) without percentiles or honors, and a P/F + Honors system for the eight organ modules. Several medical schools across the country have adopted similar grading systems, which promote an environment of cooperation, rather than competition, among students. Look for an upcoming student debate on the incorporation of the P/F grading system at our blog, Unabridged—unabridgedmstp.wordpress.com (shameless plug).

Overall, these curriculum changes have enhanced the preclinical experience for MD and MSTP students alike, making the first two years of medical school a happier, more effective learning experience. Expect even more updates and improvements in the future, strongly influenced by student feedback.

Publications

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