Welcome to the 2014 Spring issue of Enzymatic. In this issue, our feature article by Amanda Biederman, “Science 2.0: Facebook, Genomics, and New Scientists,” highlights how social media has changed the way scientists operate and communicate. Weiyi Zhao explains how Professional Science Master’s Degree programs are giving students practical science experiences. We interview Natasha Brooks who used her biochemistry degree to pursue a career path outside of the standard bench research science.

We also celebrate all of our 2014 ASBMB Travel Award Recipients and Honor Society inductees. I have participated in choosing some of the Honor Society inductees over the years and I can’t overstate how “competitive” these awards are. The writing skills, research, academic achievement, and service work of our ASBMB undergraduate members is more than impressive. Great job to all the applicants and congratulations to those chosen for these awards.

This is the last Enzymatic before the ASBMB annual meeting in San Diego. A reminder that the UAN Faculty Reception is from 7-10 PM on Sunday, April 27th in the Marriott Marquis South Tower’s “Dining Room.” This is one of the best and most fruitful networking opportunities available for undergraduate faculty at the annual meeting. The reception is an informal affair, with dozens of faculty discussing topics ranging from burger joints to pinot noirs, Raf signaling, surviving at an undergraduate institution, and likely everything in between. Come on by and stay awhile. You’ll likely feel right at home within a few minutes.

Jim Lawrence, Chief Editor
First National UAN Week of Outreach

In honor of Valentine’s Day 2014, the theme of the first national week of outreach was the heart. UAN chapters were encouraged to organize blood drives or organ or marrow donation awareness programs.

University of Michigan-Dearborn UAN chapter hosted a blood drive. Club President Yousif Jajo, describes the event:

We teamed up with the American Red Cross student club to promote donating blood and healthy eating habits. We prepared mini First Aid kits and handed them out to students. We aimed to stress the importance of donating blood, and advertised how a single blood donation can save the lives of three people! Since the American Red Cross was holding a blood drive the following week, our project was to promote the blood drive to ensure a large turnout! Furthermore, with the help of the American Red Cross, we were also able to train people on hands-only CPR using ARC certified foam trucks which simulate the strength necessary for chest compressions. The posters presented by the biochemistry students and club members covered a range of topics from “blood sausage” to blood disease. The most popular poster was the one on “myths about blood,” which covered topics such as whether one’s personality is determined by one’s blood type. The event was fun and educational!

Marymount Manhattan College hosted a health and wellness day. Anna Patruno describes their success:

In honor of the first annual week of outreach, members of the Marymount Manhattan College (MMC) UAN chapter showed their “love” for science, outreach, and health by hosting a school-wide “Fit, Fab, Fierce Day” led by health and wellness pioneer, Kathie Dolgin, aka High Voltage. Despite obesity and addiction, Dolgin explained that these experiences became a platform for empowerment and major lifestyle changes that propelled her to start Energy Up!, a national non-profit organization, whose mission is to prevent childhood obesity.

At MMC, attendees enjoyed healthy, organic juices, dips, and snacks before kicking into high gear with Dolgin’s famous “Energy Up” workout. Students also learned that the key to being positive, happy, and full of energy is to be sugar savvy and consume sugar in moderation- just 24g per day, according to Dolgin. The take home message was that by taking action and making changes in our own lives, we encourage those around us to make healthier choices as well. It’s never too late to kick old habits, so do as the MMC UAN chapter does: take responsibility, thrive, and survive with a healthier body, mind…and heart!

U. of Michigan-Dearborn’s blood drive

Marymount Manhattan College

Missouri Western State Univ.’s blood drive
Science 2.0: Facebook, Genomics, and New Scientists

By Amanda Biederman, Salisbury University

In 1973, Theodosius Dobzhansky famously stated that “nothing in biology makes sense, except in light of evolution.” In 2013, a different type of evolutionary force has begun to reshape the nature of how science is conducted and analyzed.

The “Science 2.0” movement is founded upon the theory that the evolving internet provides scientists with the opportunity to share their research in ways which were not possible in the old media world. An ambiguously defined term, Science 2.0 proposes that scientific research is moving toward a collaborative form of publishing that functions by combining data to draw unified conclusions rather than placing individual laboratories in competition with one another.

The internet has the potential to change how the world views science, and research is transitioning gradually in a direction that is based on collaboration, rather than competition. Science 2.0 is more inclusive, encouraging the use of digital media and active public participation.

Historical Trends

One of the most prominent examples of Science 2.0 was the Human Genome Project (HGP), which demonstrated that massive scientific collaborations could be carried out successfully on a global scale. The HGP would not have succeeded within the cultural boundaries of the old media world, particularly against the nationalist cultural backdrop that cultivated the steeply competitive “space race” of the mid-20th century.

Thus, the HGP marks a shift in the cultural philosophy which was in part related to the capabilities of new media. The HGP was fundamentally shaped by the development of the digital world which evolved alongside the new scientific technologies. As the HGP progressed, the enhanced capabilities of computers and accessibility of the internet allowed collaborating organizations to rapidly share large masses of sequences, which could be analyzed efficiently and accurately via computer programming.

Digital Accessibility

In his book Why the World is Flat, Thomas Friedman said, “I firmly believe that the next great breakthrough in bioscience could come from a 15-year-old who downloads the human genome in Egypt.”

The enormous potential impact of internet-based science research was exemplified by the work of Jack Andraka, a 15-year-old who used bioinformatics to create a new, less invasive protocol for pancreatic cancer screenings. Andraka may have been from the United States, not Egypt, but he echoed Friedman’s sentiment when he stated, “Through the internet, anything is possible.”

Andraka claims to have hardly known what a pancreas was when he began searching Google and Wikipedia to learn more about how the disease was detected. Andraka did not work in a grant-funded laboratory or even hold a college degree, but he was able to use the internet to “make” himself into a scientist.

Direct Communication

In addition to providing unlimited public access to scientific information, new media in science allows experts and non-experts to communicate directly through various forms of social media. Science experts can also use popular social media sources to reach out to the public.

One series that took advantage of this opportunity is the popular Facebook page “I f*cking love science.” The page brings groundbreaking scientific findings and issues into a non-scientific social setting. The page’s creator, Elise Andrew, has
utilized the trends of new media to educate and fascinate a general audience that likely did not log onto Facebook for a science lesson.

A similar project was undertaken by Hank Green, a 33-year old who became famous on YouTube and now manages a channel called SciShow, discussing topics such as the environment, epigenetics, mind reading, and the end of the world. By bringing relevant, engaging scientific information into a casual atmosphere, Green is able to educate his wide base of internet fans.

Green may not be a scientist by traditional definition, but he is undoubtedly an extremely successful science educator. Green’s channel had more than one million followers as of November 2013. As a comparison, the official National Science Foundation channel had just over 5,000 followers, and the NASA Goddard channel had just under 172,000 followers at that point. Evidently, being able to adapt to new media is more important than traditional authority, at least in terms of audience impact.

**An Active Public**
The internet has cultivated citizen science projects in a variety of scientific fields, allowing non-specialists the ability to contribute to larger projects. Citizen science projects can take on a variety of forms: participants can send photographs, analyze data, try working through a computer program, or collect samples from the environment. Citizen science projects allow the audience to take on the roles of “prosumers,” so they can play an active role in larger projects.

A protein structure game called Foldit was instantly successful – and actually solved a question that had puzzled experts for years. Evidence has actually shown that human users can come up with solutions more efficiently than the computer alone. Citizen science projects allow the entire global community – both experts and non-experts – to collaborate and answer relevant scientific questions. These games combine the fields of simple, puzzle-based games no more difficult than Candy Crush with modern, cutting edge genetic research, bringing molecular biology outside the laboratory and into the new media world.

**The Future of Modern Science**
Science 2.0 predicts a future where science is collaborative and inclusive. Its overall goal would not be to compete, but to obtain and synergize as much information as possible to construct a clearer view of how the world and universe function. This is, admittedly, a very optimistic view of a discipline that is founded upon competition and personal successes. Yet science is gradually becoming more open, and the internet is helping to redefine what it means to “own” data or even to be a scientist. Although there are concerns about how collaboration could affect the quality of published science, there is evidence that with the right structure, the movement will encourage collaborative public thinking and thus advance the discipline as a whole. The internet has the potential to revolutionize science. The only question that remains is whether we are prepared to take on the challenge.
From Printing New Organs to the Death of Ariel Sharon: A High School Exposure to Medical Ethics

Naomi Schwartz, Yeshiva University

On February 11, 2014, Yeshiva University’s UAN Chapter and Biology Club hosted an event introducing high school students to the study of current medical ethics. Dr. Edward Reichman, Professor of Bioethics and Education at Albert Einstein College of Medicine, spoke at Yeshiva University about recent medical technology and how it has shaped the world of medical ethics. Dr. Reichman’s speech touched on a number of topics, including epigenetics, chimerism, stem cell research, biological 3D printing, organ transplants, comas, and brain death. While quoting a number of recent studies, Dr. Reichman interspersed his speech with personal stories from his experiences as an Emergency Room physician, making his speech relatable and engrossing. Shalva Adler, an 11th grade student from Manhattan High School for Girls, was impressed with the clarity of Dr. Reichman’s speech, noting that “even though he was discussing cutting edge technology, he explained it really well, breaking it down to a high school level.”

Shalva’s school was one of the three high schools that attended Dr. Reichman’s talk, along with Bruriah High School for Girls and Samuel H. Wang Yeshiva University High School for Girls. In a follow-up a few days after the seminar, Shalva mentioned that she “told all of her friends about it the next day,” and that she would definitely enjoy hearing from more scientific speakers if she had the opportunity. She said that the talk got her thinking about ways she could help others in the future, adding that Dr. Reichman’s explanation of bone marrow transplants has inspired her to join the bone marrow registry when she gets older. Miriam Pittinsky, a Bruriah High School student interested in a career in nursing, noted that she enjoyed the event because it “wasn’t something you talk about during [regular] Biology class – it was different,” including topics she had “never heard about before!” A classmate of hers, Elisheva Strauss, who hopes to become a doctor and is currently trying to start an official science club in her high school, echoed Miriam’s sentiments, saying that she was “really happy [she] went,” because the science was so interesting and new to her. All of the students surveyed expressed amazement at the concept of chimerism, the idea that humans can contain two distinct sets of DNA, and one mentioned that she and her friends were talking about it all the way home after the seminar.

Students found the event eye-opening, an exposure to higher-level scientific conversation and the fascinating new discoveries of the medical world. As Bruriah student Rivka Schwartz said, “Dr. Reichman’s speech changed my perspective on topics like comas and life support… he gave me a completely fresh outlook on topics I thought I already understood.” Yeshiva University’s UAN Chapter was proud to provide this outlet for high school science enrichment, inspiring them to explore beyond the basics they find in the classroom.
Reaching for Success beyond the Minority Status

By Alice Trye, Marymount Manhattan College

When I entered college as a freshman in 2011, I had already developed a deep love for science which I used as fuel to completely immerse myself in my science and mathematics courses. As time went on and I began researching post-baccalaureate educational options, I began to realize that I was likely going to have to work even harder after graduation - not because I am not capable, but because of who I am - an African American woman.

Female scientists and their contributions to science have largely been ignored in a field that has historically been male dominated. I can count on one hand the number of female scientists I learned about in high school and lower level college science courses. I can remember watching a documentary about the discovery of the structure of DNA and being furious with Watson and Crick. I wanted to fight for Rosalind Franklin. Now I know that the best way to honor the women of science is to raise public awareness about the contributions women have made in science.

Discrimination toward women and African-American women in science is not a thing of the past. In 2013, Dr. Danielle Lee, a biologist and blogger for Scientific American, who is also known as The Urban Scientist, received an email from an editor of another science website, Biology Online, in which she was called an “urban whore” for turning down their offer to contribute to the site without compensation. Lee followed this exchange by writing a piece on her blog about the incident, which was subsequently taken down by Scientific American without her consent. The blogosphere and Twitter community exploded. Many scientists showed their support for Lee by tweeting with the hashtag #standingwithdnlee. This was an example of both racial and sexual discrimination and it shows that even in 2014, racial prejudices still exist.

A number of programs are available for undergraduates that aim to increase diversity in science. The Icahn School of Medicine at Mount Sinai offers a Post-baccalaureate Research Education Program (PREP) for students interested in applying to PhD or MD/PhD programs. PREP provides its scholars with 1-2 years of research and graduate experiences while they prepare for graduate school admissions. On a national level, the UNCF/MERCK Science Initiative has an Undergraduate Science Research Scholarship for 15 lucky students each year, with an award of up to $30,000 to assist with tuition; with this you would be able to conduct research at a Merck facility with the guidance of a mentor. The National Institutes of Health (NIH) Undergraduate Scholarship Program is another national opportunity where students can conduct research and also receive up to $30,000 in tuition assistance; after graduation you will be able to work full-time for the NIH for at least one year.

Being a woman and an African-American is only part of my identity; it should not be an obstacle I have to overcome. No matter what boxes we check off when asked to identify ourselves, we are that and so much more. Our differences should be celebrated and we can use our differences and similarities to cause positive change in the scientific community and the world.

As a young African-American female scientist, I do not want the world to see my success only as a result of Affirmative Action. It brings me joy to see that there are programs specifically geared to giving minorities (whether it be women, Black/African-Americans, or Hispanic Americans) an opportunity to excel in STEM fields, and that most undergraduate and graduate institutions pride themselves on creating a diverse student population. As an African-American, I am proud of my West African roots. I take pride in the fact that I can bring a unique set of perspectives to any group I join. I believe that diversity can improve group dynamics and contribute to achieving a mission where people of all races and genders are being served.
Your Guide to Finding San Diego’s Best Fish Taco

By Ajay Major, Albany Medical College

The fish taco is a pedestrian treat, combining the most humble of ingredients into a scrumptious street delicacy. A chunk of fish, a smattering of sauce, and a dash of spice all wrapped up in a crispy corn tortilla. And, let’s face it: San Diego simply has the best fish tacos money can buy. Whether you’re paying your own way to Experimental Biology or have one of those credit cards from your institution, the fish taco is a smart and economical solution to your post-workshop hunger pangs at the next EB conference in San Diego. Let’s embark on a culinary adventure across sunny San Diego, and all within walking distance of the convention center.

Our first stop: The Fish Market, just a 15-minute walk along the harbor. The name is a bit deceiving—it’s a market, to-go joint, and a formal restaurant all in one, jutting out into the North Harbor with beautiful 360 views of sea, surf, and a real-life aircraft carrier.

The to-go window is chock-full with seafood and fish fillets of every variety. I ordered their signature crispy fish taco, filled with Pacific Ono, chipotle ranch, salsa fresco, and a bowl of black bean soup on the side.

This fish taco from The Fish Market: four out of five stars. A total steal at $9.75, this taco has a surprising heat that is not for the faint of palates. The Hawaiian fish is lightly breaded and perfectly cooked, with a cool tomato salsa that perfectly complements the spicy sauce. The black bean soup, on the other hand, has little to be desired; skip it and go straight for this delicious taco, instead.
Our second stop: the Escape Fish Bar, right in the heart of San Diego’s historic Gaslamp Quarter.

A true hole-in-the-wall, this to-go joint serves up some of San Diego’s best modern takes on seafood classics. The grilled swordfish taco which I ordered was no exception.

Although a bit pricey at $14, the Escape’s fish taco was an incredible five out of five stars. The melt-in-your-mouth swordfish paired with a delightfully tangy sauce and pickled slaw makes for a five-star fish taco. Even the side of potato salad was delectable, a totally unexpected blend of potato and herbs that married well with the thick cut of swordfish.

Our final stop: The Tin Fish, hardly a stone’s throw from the convention center and San Diego’s PETCO Field.

A convenient option for conference-goers, The Tin Fish offers your usual seafood fare, including their staple, the fried fish taco.

Unfortunately, at only $6.75, you get what you pay for at The Tin Fish: a meager two out of five stars. The taco is bland and overly fried, the slaw is just the same old slaw, and the waffle fries are too salty. If you are strapped for cash and time, The Tin Fish is an option; otherwise, make the extra five minute walk for some seriously delicious seafood.

### 2nd Annual ASBMB Grant-Writing Workshop for New and Early Career Faculty

**June 12–14**

This workshop is designed to help early career scientists and senior postdoctoral scholars write winning research proposals for the National Science Foundation.

Underrepresented minority scientists and faculty at minority-serving institutions are strongly encouraged to apply. Nominations will be accepted starting in mid-February.

Visit [www.asbmb.org/grantwriting](http://www.asbmb.org/grantwriting) for more information.
UAN Calendar

April 26 -30, 2014
ASBMB Annual Meeting in San Diego, Calif.

April 26, 2014, 11:30 AM
Beam Me Up Scotty! A Galactic Overview of the Annual Meeting, San Diego Convention Center, Room 1B

April 26, 2014, 12:00 - 4:30 PM
ASBMB 18th Annual Undergraduate Student Research Poster Competition: The Vulcan Mind Probe, San Diego Convention Center, Room 6B

April 26, 2014, 4:45 - 5:45 PM
Exploring Careers after College Workshop: Boldly Go Where No Scientist Has Gone Before, San Diego Convention Center, Room 6A

April 26, 2014
An Undergraduate Scavenger Hunt - Trekking for Tribbles: Pick up directions at the Undergraduate Poster competition check-in

May 1, 2014
UAN Outreach Grant application deadline

May 18, 2014
UAN Undergraduate Research Award application deadline

June 27, 2014
HOPES grant application deadline

October 1, 2014
Fall application deadline for ASBMB Accreditation
2014 ASBMB Annual Meeting Travel Award Recipients

Undergraduate Student Competitive Travel Award Recipients:
- Jennifer Arbella, Juniata College
- Jordan Armeli, Rochester Institute of Technology
- Anthony Brandt, Univ. of Wisconsin-La Crosse
- David Calianese, Providence College
- Christine Dang, Univ. of Delaware
- Guillermo Flores, Hope College
- Bobby Geiger, Otterbein University
- Pablo Gonzalez, Univ. of Puerto Rico-Rio Piedras
- Jeffrey Hall, Texas State University
- Kristin Harrington, Univ. of Wisconsin-Madison
- Christy Heidema, Dordt College
- Nnejiwa Ibe, Cal. State Univ. Long Beach
- Linda Jimenez, Colorado College
- Kyle Kaster, Univ. of Wisconsin-La Crosse
- Mohammed Mosaheb, Tufts University
- Dustin Mueller, North Dakota State Univ.
- Miles Paszek, Gettysburg College
- Katherine Seehusen, Winona State Univ.
- Sophia Stone, Mary Baldwin College
- Chanel Venkataraman, Cornell University

Undergraduate Faculty Travel Award Recipients:
- Victoria Del Gaizo Moore, Elon University
- Dipak Banerjee, University of Puerto Rico
- Dale Cameron, Ursinus College
- L. Michael Carastro, Univ. of Tampa
- Sarah Connolly, DePaul University
- Maria Craig, Mary Baldwin College
- Artem Domashevskiy, John Jay College of Criminal Justice, CUNY
- James Dyer, Montclair State University
- Austin Gehret, Nat. Technical Inst. for the Deaf
- Dan Grilley, Univ. of Wisconsin-La Crosse
- David Hall, Lawrence University
- Chanaka Mendis, Univ. of Wisconsin-Platteville
- Patrick Murphy, Seattle University
- Odutayo Odunuga, Stephen F. Austin State Univ.
- Yinheng Wan, Providence College
- Chin-Chuan Wei, Southern Illinois Univ.-Edwardsville

NSF Student Research Travel Award Recipients:
- T. Reid Alderson, Univ. of Wisconsin-Madison
- Beatriz Camacho, San Jose State Univ.
- Rachel Knox, Seattle University
- Nicole Ladd, Hope College
- MarkVic Nanningh, Northeastern Univ.
- Kevin Qian, Yale University
- Cassandra Rickertsen, St. Olaf College
- Aislinn Rowan, Lehigh University
- Clara Schriemer, Hope College
- Matthew Urban, University of Delaware
- Jessica Waninger-Saroni, St. Mary’s University

NSF Undergraduate Faculty Research Travel Award Recipients:
- Andrew Bonham, Metropolitan State Univ. of Denver
- Victoria Del Gaizo Moore, Elon University
- Kenneth Mills, Holy Cross
- Hiroshika Keppetipola, Cal. State Univ., Fullerton

UAN Travel Award Recipients:
- Jasmine Allen, Virginia Commonwealth U.
- Nana Agyepong, Otterbein University
- Ryan Augustin, St. Thomas University
- David Barnard, Rochester Inst. of Technology
- Nick Berthelsen, Minnesota State University
- Amanda Biederman, Salisbury University
- Ernest Bile, Virginia Union University
- Amanda Bolles, Kalamazoo College
- Christian Brutofsky, Montclair State Univ.
- Wesley Cai, University of Arizona
- Demetrious Carey, University of Tampa
- Kevin Carlson, University of Arizona
- Yelena Chekayev, Medgar Evers College
- Allison Chirigos, Washington & Lee Univ.
- Derek Deshaies, Juniata College
- Selma Elsarrag, Mary Baldwin College
- Shea Feeney, San Francisco State Univ.
- Charlotte Platebo, St. John’s University
- David Forgas, Western Illinois University
- David Freeman, Missouri Western State Univ.
- Karla Garabiles-Sanchez, Montclair State Univ.
2014 UAN Outstanding Chapter Award Goes to Otterbein University

This year’s Outstanding Chapter Award goes to Otterbein University in recognition of its leadership in education activities in the areas of biochemistry and molecular biology, their efforts in science outreach, participation and organization of campus activities, and their sustained chapter activity.

Dr. John Tansey serves as chapter advisor to over thirty members of Otterbein’s UAN chapter. Otterbein’s chapter hosts weekly BMB Teas, giving students the opportunity to gather and brainstorm future UAN activities and to discuss current topics in science. The group is currently developing a Women in Science group open to science majors on campus to encourage a stronger community among young female scientists.

In addition, Otterbein’s UAN chapter is involved with various outreach activities to their larger community. They have brought science experiments to local elementary schools and fundraised to bring awareness to several causes, including collaborating with the Pancreatic Cancer Action Network.

Otterbein UAN members have participated in the ASBMB Annual Meeting for the past four years. Two of their members, Bobby Geiger and Nana Agyepong, were inducted into the ASBMB Honor Society this year. Otterbein University won the Outstanding Chapter Award in 2012.

An award ceremony will be held to recognize the Otterbein University UAN and its members during the Education Award Lecture on Sunday, April 27, at 12:30PM during the ASBMB Annual Meeting in San Diego.
2014 ASBMB Biochemistry and Molecular Biology Honor Society Inductees

The ASBMB Biochemistry & Molecular Biology Honor Society (Chi Omega Lambda) recognizes exceptional undergraduate juniors and seniors pursuing a degree in the molecular life sciences at a college or university that is a member of the UAN. Students are recognized for their scholarly attainment, research accomplishments, and outreach activities in the molecular life sciences.

The 37 UAN students inducted into Chi Omega Lambda in 2014 are:

- Christopher Adams, St. Mary’s College of MD
- Nana Agyepong, Otterbein University
- John Bettinger, RIT
- Kimbria Blake, RIT
- Adele Bubnys, Wesleyan University
- Wesley Cai, University of Arizona
- Tessa DiDonato, RIT
- Shea Feeney, San Francisco State Univ.
- David Freeman, Missouri Western State Univ.
- Catherine Gaissert, Marymount Manhattan College
- Bobby Geiger, Otterbein University
- Ryan Graff, Wesleyan University
- Jakob Hebert, Siena College
- Samuel Knecht, St. Mary’s College of MD
- Allison Liberato, William Paterson University
- Payton Malone, Eastern Kentucky Univ.
- Victoria McIlrath, Marymount Manhattan College
- Cristina Meehan, University of Richmond
- Tyler Nguyen, Mary Baldwin College
- Christopher Parronchi, Seton Hall University
- Jonathon Payne, La Sierra University
- Andy Phan, University of Arizona
- Melonie Phillips, Ursinus College
- Sai Phyo, St. John’s University
- Ekaterina Protsenko, Providence College
- Alyssa Savarino, Wesleyan University
- Naomi Schwartz, Yeshiva University
- Nickie Seto, University of Arizona
- Commodore St. Germain, San Francisco State Univ.
- Sophia Stone, Mary Baldwin College
- Ryan Tantone, Siena College
- Stacy Thomas, Providence College
- Alice Trye, Marymount Manhattan College
- Lisle Winston, Wesleyan University
- Kaleb Wolfe, Hendrix College
- Glenna Wong, St. Mary’s College of MD
- Chelsea Woods, Hendrix College

Join us during the ASBMB Award for Exemplary Contributions to Education lecture on Sunday, April 27, 12:30 PM in San Diego for a ceremony recognizing this year’s outstanding inductees.

To read about past Honor Society inductees, go to: www.asbmb.org/honorsociety.

Calling All Bloggers!

Want to get your voice out there? You can become a blogger for ASBMB’s undergraduate blog, The Substrate. Join the conversation on topics such as:

- Science Policy
- Science in the news
- Undergraduate Education
- UAN Chapter Activities
- ASBMB Annual Meeting

To write for The Substrate, contact uan@asbmb.org
Welcome to all of our new chapters and welcome back to all renewed chapters. All starred chapters below will be represented at the ASBMB Undergraduate Student Research Poster Competition at the Annual Meeting on April 26-30, 2014.

**Northcentral Chapters**
Hope College*
Kalamazoo College*
Lawrence University
Ohio Northern University*
Otterbein University*
Purdue University
University of Michigan at Dearborn
University of Wisc. La Crosse*
University of Wisc. Platteville*
University of Wisc. Stevens Point*
Viterbo University
Wabash College*
Western Illinois University*
Wisconsin Lutheran College

**Northwest Chapters**
Drake University
MN State U. Moorhead*
MN State U. Mankato
North Dakota State Univ.*
Seattle University*
St. Olaf College*
U. of Nebraska Lincoln*

**Southcentral Chapters**
Benedictine College
Hendrix College
Missouri Western State Univ.*
Texas State Univ.*
Tulane University
University of Texas El Paso*

**Southeast Chapters**
Bellarmine University*
Eastern Kentucky University*
Elon University

**Northeast Chapters**
Colby College
College of Holy Cross*
Drexel University
Duquesne University
Hartwick College*
Juniata College*
Marymount Manhattan College*
Medgar Evers College*
Montclair State University*
Northeastern University*
Providence College*
Rampone College of New Jersey
Rochester Institute of Technology*
Seton Hall University

**Southwest Chapters**
Brigham Young University - Hawaii*
Colorado College*
La Sierra University
San Francisco State University*
San Jose State University*
University of Arizona*
University of California Davis
University of San Diego
**Professional Science Master’s: Opportunities for New Grads and Non-traditional Students**

*By Weiyi Zhao, ASBMB*

The transition between college and graduate school isn’t always straight and clear cut as one would like. For science majors, most are taught, indeed expected, to matriculate into a Ph.D. program upon graduating from college. Some choose to get advanced degrees in medicine, dentistry, or veterinary science. But if none of these options sound right for you, what are some other choices? What if you are a non-traditional student looking for a career change and to acquire additional training and knowledge? Are there training opportunities worth considering?

In 1997, the Sloan Foundation began an initiative that awarded grants to research universities to establish professional science master’s (PSM) programs in the natural sciences and mathematics. Over the years, the initiative funded more than 50 universities and established more than 100 degree programs. PSM programs have expanded to include training in biotechnology, bioinformatics, and social sciences.

The rise of PSM programs coincides with the recent economic recession. More and more graduates are worried about their competitiveness in today’s job market. What distinguishes a PSM from other advanced science degrees is that in addition to offering advanced training in math and science, these programs also help students gain practical experience (instead of research) through internships.

Both the institutions that offer PSM degrees and the types of degrees offered are diverse. Michigan State University offers a Master of Science in Industrial Mathematics. Rice University offers PSM degrees in a few areas including Bioscience and Health Policy and Nanoscale Physics. University of Connecticut’s Storr’s applied genomics PSM program trains students for careers in the genomic industry, forensic sciences, and genomics-related public service or law. The University of Oregon (UO) has a new Master’s Industrial Internship Program that prepares students for work in industrial research labs and offers tracks in Bioinformatics & Genomics, Polymers & Coatings, Optical Materials & Devices, and Photovoltaic & Semiconductor Device Processing. This UO program is unique in that students begin with intensive summer courses and then proceed to interview for internships with a partner company. Successful candidates will complete a 9-month paid internship and according to Lynde Ritzow, the program’s Director of Recruitment, last year, the average annualized internship pay was about $46,000. “What’s wonderful about this program is that it enables students to graduate with work experience - something every employer seeks in their hires.” 98% of the
program’s students have successfully completed internships and 90% have been offered jobs at host companies.

A Professional Science Master’s is obviously not a right fit for everyone. But even for those who think this may be a viable career option, is a PSM a worthy investment? A survey conducted by the Council of Graduate Schools in 2013 found that a majority of PSM graduates from the 2011/12 and 2012/13 class earned more than 50K annually while working full-time. Importantly, the survey found that earning a PSM degree provided value and benefits that go beyond the annual salary figure. These values and benefits include fulfillment of personal interest, acquiring specific skills and knowledge, and increased opportunities for promotion.

If you are interested in learning more about Professional Science Master’s programs, visit the website of the National Professional Science Master’s Association, www.npsma.org, and ScienceMasters.com, www.npsma.org/sciencemasterscom, where you can also look up PSM programs near your hometown.

Minority Scientists Spotlight

Our Minority Scientists Spotlight features a monthly interview with a research scientist who has excelled in their field.

Our 2014 Spring Research Spotlights are:

George Langford, Ph.D.

George Langford is a neuroscientist and currently serves as the dean of the College of Arts and Sciences at Syracuse University. His research focuses on the cellular mechanisms of memory.

Folami Ideraabdullah, Ph.D.

Dr. Folami Ideraabdullah is an assistant professor at the University of North Carolina Chapel Hill. Her research focus is on genetics.

Pablo Sobrado, Ph.D.

Pablo Sobrado is an Associate Professor of Biochemistry at Virginia Tech. His research focuses on enzyme structure and function.

To read the full interviews and all past Research Spotlight interviews, go to: www.asbmb.org/spotlight.

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Careers in Science: An Interview with Natasha Brooks

By Andrea Anastasio, ASBMB

Natasha Brooks is a Research Services Coordinator at the Shriners Hospitals for Children, Pediatric Burn Specialty Care in Galveston, Texas. She currently serves as a member on ASBMB’s Minority Affairs Committee.

How did you become interested in science and eventually decide to become a scientist?

As a middle school and high school student, I participated in junior science competitions through the Pennsylvania Junior Academy of Science. This program fostered my interest in science as I was hooked by the challenge of designing experiments and making new discoveries. At my alma mater, Pennsylvania State University, I participated in summer research programs in addition to an independent student research project. These experiences gave me exposure to life as a graduate student and ultimately helped me decide to apply to doctoral programs and become a scientist.

Did you always know that you wanted to get a PhD?

I did not always know I wanted to get a PhD. While I thoroughly enjoyed laboratory research, I realized I needed to be equipped with the necessary skills to ask relevant scientific questions in order to conduct innovative research and introduce novel concepts to the scientific community. I felt that this would be best achieved by pursuing a doctoral level degree.

Did you follow the typical path of training and preparation to become an academic scientist? At what point, or what experience(s) did you have that made you realize that you didn’t want to do bench science anymore?

Initially, I wanted to be a tenured professor and principal investigator of my own active research laboratory at an academic institution. I realized in my third year of graduate school that I did not want to be a research scientist/professor in academia. Therefore, I didn’t follow the typical path of training and preparation for an academic scientist (in that I did not take a post doc position), but instead began to research careers that were better tailored to my interests.

Was it difficult to commit to the decision to leave bench science?

It was not difficult to commit to leaving the bench. I realized that while I enjoyed reading and writing about science, I no longer wanted to conduct experiments.

After you decided that you didn’t want to follow the more traditional path, what “path less traveled” did you take?

My initial step on the path less traveled involved taking an assessment of my interests. I began to think about what I wanted as a career. I spoke to my mentor about my interest in science writing. To that end, I was able to assist in reviewing grants and manuscripts in addition to writing recommendations of articles through the Faculty of 1000. I took opportunities to network with people in careers that involved science writing. In the interim between completing my dissertation and accepting the position that I am currently in, I wrote articles for ASBMB Today to build a writing portfolio. In researching careers, I became interested in medical/regulatory writing. The ability to write clinical protocols and manage clinical trials are key in getting this type of position. I contacted a collaborator of my dissertation laboratory to
inquire about any positions at Shriners for clinical trial management and/or regulatory writing. It just so happened that they were looking for someone to coordinate their clinical trials. I interviewed and ultimately landed my current position.

Could you give our readers an idea of what your current job involves?

I am a research services coordinator at the Shriners Hospitals for Children, Pediatric Burn Specialty Care in Galveston, TX. In this position, I maintain contracts and budgets, assist with grant preparation, and my primary responsibility is to coordinate clinical research trials. As a clinical trials coordinator, I am a liaison between the university, sponsoring agencies, and federal regulatory bodies to ensure that our research is in compliance. I assist in the creation of research protocols and generate annual reports for the trials.

Does the path you took to get to where you are now differ considerably from your colleagues? Do any of these differences make your job harder or easier?

Many of my colleagues that are clinical research coordinators have a background in nursing. However, this job requires organization, attention to detail, and a strong background in science—all of which are attained during doctoral level training. There is a learning curve in this position as my background is not clinical but in basic science. I continually have to familiarize myself with and keep up to date with Institutional Review Board (IRB) guidelines, Federal Drug Administration (FDA)/Federal Drug Administration Amendments Act (FDAAA) guidelines, International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) guidelines, as well as reporting guidelines of the scientific agencies that fund our studies. Prior to taking this position, I had no experience in writing clinical protocols. I have found that aspects of writing clinical protocols are similar to writing research manuscripts.

What advice would you give to undergraduates who may know that they like science, and may want a career in science, but don’t yet know exactly what they want to do once they graduate?

I recommend that students take science courses in areas that interest them. Take opportunities to conduct research. Participating in a summer research program or undertaking an independent studies research project can achieve this. This will help students to determine whether or not they enjoy bench work. Students should identify their interests and research careers with these interests. Campus career centers have many programs and personnel that will help students do this.

The most important piece of advice that I have is to NETWORK! It is important to talk to as many people as possible about your interests. They can give you invaluable advice as to the day-to-day responsibilities of a job. As the creator of LinkedIn has famously said, positions are attached to people, not to job boards! Without networking, I wouldn't have the position I currently have. Finally, keep in mind that finding a job is a process. It may take time to find the right position, so allow yourself plenty of time to search.

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The Epigenetics Revolution by Nessa Carey

By Stella Athanasopoulos, Mia Knausenberger, Mikayla Leite, Gregory Thill, and Celeste N. Peterson, Suffolk University

For decades, our knowledge of genetics has been limited to the idea that DNA is the blueprint for life. Recent studies, however, have shown that molecular markers on the DNA are key players in regulating the expression of the genes contained in DNA. Epigenetics according to Nessa Carey, the author of The Epigenetics Revolution, can be defined as the set of modifications to our genetic material that change the way genes are expressed, but do not alter the genes themselves. These changes include histone modification, and DNA methylation, in which methyl groups are attached to DNA sequences affecting transcription levels. To explain how the same DNA can result in different phenotypic outcomes, Carey portrays DNA as more of a script than an invariable blueprint. In her analogy, each actor’s annotated version of the script represents epigenetic alterations of the DNA, leading to different interpretations.

One vivid example in the book is the role of epigenetics in creating terminally differentiated lineages from stem cells. Stem cells originate from the blastocyst; following a few zygotic divisions, they become pluripotent, meaning that they can differentiate into any type of somatic cell due to their permissive epigenetic state. As they develop, they commit to a lineage by undergoing a restrictive epigenetic remodeling leading to differentiation that can only be reversed by a complete epigenetic erasing. Other manifestations of epigenetic changes described by Carey include how identical twins can have divergent phenotypes and how X inactivation leads to females mosaics. Carey’s incorporation of experimental examples is useful in building the connection between nature and nurture. One example is agouti mice. Wild-type mice have hair that is banded in color, black at both ends and yellow in the middle, with the yellow part caused by a gene called agouti. The mice pictured (see figure 1) are a strain called Avy/a, which stands for agouti viable yellow, which has a retrotransposon inserted upstream of the Agouti gene and keeps it “switched on” continuously. Since the mice are all genetically identical, one could predict that they would all have yellow hair. But the retrotransposon DNA, which is in a position to influence Agouti gene transcription, is sensitive to methylation and when the environmental signals (such as a folate rich diet) keep it methylated, it turns off gene expression of the yellow gene, resulting in dark haired mice. Interestingly, researchers studying the agouti gene have found its phenotypes to be complex, with pleiotropic effects. Mice with the unmethylated (active) form of the gene are obese and prone to other health problems, such as diabetes and cancer. Elsewhere in the book, Carey continues the thread of nature versus nurture in discussing how epigenetics regulates the long-lasting effects of famine and childhood trauma.

Overall, Epigenetics Revolution is an excellent book. Carey clearly lays out the logic behind the experiments that crystalized the concept of epigenetic remodeling. In doing so, she strikes the right balance between detail and narrative. We can recommend this book to anyone who is interested and willing to explore new concepts. It is especially relevant to an undergraduate student with a basic understanding of modern biology. It may even inspire some to further this work and fill in the missing molecular underpinnings.
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