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PRISERS WEEKLY

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Cambridge, Massachusetts

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Lester Kim



Year: Rising senior
Concentration: Physics/Math
House: Eliot
From: Plainview, New York
PRISE Research Project: "I work with Professor Jeremy Bloxham through the School of Engi-

neering and Applied Sciences. I am coming up with theoretical models for Jupiter's magnetic field.

This is a rather important topic for a

couple of reasons. Jupiter is responsible for most of the Solar System's mass outside of the Sun so knowing more about its physical properties can give us a better idea about the evolution and origin of our Solar System.

Also, the magnetic field present in planets is still a mystery and studying Jupiter's would be very beneficial in enhancing our understanding of planetary magnetism."

Amazing lab fact: "Honestly, the most interesting thing I did in lab was reading up on the Aharonov-Bohm effect. Look it up! If it doesn't blow your mind, then Indiana Jones should hide in your head the next time there's a nuke going off."

Fun fact: "I enjoy playing the guitar and the piano. I also like to sing rock songs either really loudly or softly; for rock and roll, you've got to play in the extremes!"

Helen Yang

Year: Rising Junior
Concentration: History and Science. Secondary in Health Policy

House: Adams

From: Troy, Michigan.

PRISE Research Project: "I work in the Lauer Lab in the G.I. Research unit at Mass. Gen. Hospital. The lab researches the liver's immune response to the



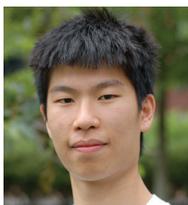
Hepatitis C virus, and my project involves looking at the distribution of T-cells in liver tissue at different stages of the disease, as well as learning more about the surface protein PD-1, which scientists only recently found suspect contributes to weakening a patient's immune system in chronic infection.

A deeper understanding of the regulation relationship between PD-1 (on T-cells) and the ligands on other antigen-presenting cells could eventually lead a way to control chronic infections. I found this particular research fascinating because it looks at a relevant disease from a new perspective and still be able to learn about the fundamentals of our immune system."

Lab story: "When I first got to lab, I wasn't allowed to work with the HCV-infected blood, as my P.I. wanted me to practice on healthy blood first. Since our lab almost never gets non-infected blood, on the

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Allen Shih



Year: Rising sophomore.
Concentration: "I am probably going to choose a concentration in the life science, perhaps chemical and physical biology."

House: "Eliot House!"

From: Morris Plains, New Jersey

PRISE Research project: "I work in the Liu Lab based in Conant Laboratories. My research project includes characterizing the properties of supercharged proteins, which consists of mutating surfaces amino acids into either tyrosine or arginine.

For example, the green fluorescent protein, or GFP, when supercharged through the substitution of more positive amino acids has increased stability and resistance to degradation.

Not only does GFP become more stable, but also, through the charge interactions between the negative cell surface and a positively-charged GFP, the protein can

be effectively localized to the cell surface, where it is readily undergoes endocytosis into the cytoplasm of cells.

The current drug system, based on small molecules, is limited by the need for hydrophobic pockets for targeting purposes. Unlike small molecules, proteins can affect a broader range of cellular activities.

The topic is extremely interesting because charged proteins are more stable and can potentially deliver proteins effectively inside cells. If the mechanism of cellular entry can be understood, it can also be used as a delivery platform for new drugs. RNA, proteins, and DNA can all be readily complexed with the supercharged protein and effectively enter the mammalian cell cytoplasm."

Fun moment at lab: "When I was purifying proteins through the cation exchange FPLC, the final protein concentrations and results were consistently way off target... As it turns out, one of the parts of the machine was broken, so I spent a day calling General Electric to arrange the repair of the FPLC."

Hobby: "I enjoy tennis, swimming, basketball, billiards, piano, violin, and ping pong."

second week I asked him where I could get some to do a practice run.

"Draw some from me," was his nonchalant reply. He was completely okay with letting me draw four tubes of blood from his arm, to my initial excitement and then subsequent anxious realization that I've never done anything like it before.

It turned out okay, and under Dr. Lauer's guidance, I successfully performed all the necessary steps after two tries, even down to tying the tourniquet properly. It was a triumphant moment, and I retreated to the culture room with the four crimson tubes."

Fun fact: "I shook Dave Matthews' hand last weekend at a concert. T'was awesome."

Brandon Silverman



Year: Rising junior
Concentration: Chemistry

House: Future resident of the Sigma Chi house, but affiliated with Eliot

From: "Las Vegas..."

apparently not everything stays in Vegas, so be careful!"

PRISE Research Project: "I'm in the Schreiber group, working in the Diversity-Oriented Synthesis (DOS) lab on campus. DOS is all about introducing diversity into the space of organic molecules. In order to do this, we begin by synthesizing many different small, chiral "building block" molecules. Through coupling and pairing these molecules in every possible combination, we can come up with huge libraries of molecules exhibiting great structural, skeletal, and stereochemical diversity. These libraries are tested against human target proteins implicated in disease through a technique known as high-throughput screening.

So, as that sounds like a lot of work, the question "what's the point?" should naturally arise. Basically, pharmaceutical companies using rigid, age-old synthesis techniques have remained unsuccessful in curing many of the major diseases plaguing our world (see cancer and diabetes).

Even though it is still a young method, conceived by Harvard professor Stuart Schreiber in the 90's, our diversity-based approach, owing its brute force and wide trajectory, has already been shown to work in developing drugs and probes for disease. It is no wonder that the scientific community is excited about DOS's future as it continues to form and define itself. (Plug for the PRISE Schreiber faculty chat: go.)"

I like my job because I love the idea of building molecules. There is something really satisfying in seeing your molecules grow and change as you put more and

more work in. They're kind of like kids, just without consciousness and all. It's also a form of art. After all, it's nothing more than architecture on a really small scale."

Embarrassing moments in lab: "Since I break something in the lab almost every day, it's more like a never-ending string of embarrassing events than one single incident. What can you do when you handle glass under variable environmental conditions for 9 hours a day?"

Hobby: "I am a guitarist and I love playing the blues."

Neda Shahriari



Year: Rising junior

Concentration: Human Development and Regenerative Biology

House: Mather

From: New Haven, CT

PRISE Research

Group: "I am officially

part of the Rubin lab. For my particular project, the Schier lab and the Rubin lab are working collaboratively. Before elaborating on my own project, I should take the time to address current research methods and how my research project seeks a new way into stem cell research and applications.

Normally, research with stem cells involves the in vitro methods of research by culturing cells in a petri dishes and finding protocols, using compounds, for example, in order to facilitate differentiation towards a particular cell lineage.

If, however, we wish to utilize our research to ameliorate diseases, it is also significant to carry out tests in vivo. Therefore, my project addresses this particular need, since we perform chemical screens on zebrafish embryos. Using a library of drugs, the Schier lab is interested in finding "hits" that will increase the population of hypocretin neurons while the Rubin lab seeks to observe an increase in dopaminergic neurons—the neurons that are affected in Parkinson's disease."

Fun at lab: "As I explained before, we perform chemical screens on zebrafish embryos. Thus, we frequently set up containers with fish in order to facilitate mating so we can obtain their embryos. Following mating, we are expected to return the fish to their original tanks.

One time, my partner and I were returning a fish to its tank when suddenly the fish jumped out of the net and landed on the countertop. My partner, who claims she is afraid of fish, started screaming frantically and started running around the fish facility. I was trying to stay calm so I could return the fish safely into its tank, but the screaming was kind of distracting!

Finally, I grabbed it in my hand and placed it back in the tank. When my partner returned, she said, "Sorry about that, I guess I should have helped out..."

Fun fact: "I was born in Phoenix, Arizona, but lived in Iran for 5 years. I enjoy drawing in anime/manga style, and one of my favorite anime series, which is an oldie, is Sailor Moon. Lastly, I'm obsessed with cute, fuzzy animals, all of which I call "fluffy!"

Paul Yarabe



Year: Rising sophomore

Concentration: "thinking about HDRB, CPB, East Asian Studies or African Studies."

House: "I will live in Pfoho with my wonderful blockmates."

From: "I'm from Lincoln, Nebraska!"

PRISE Research

Project: "I work in Dr.

Leif Ellisen's lab at Mass General Hospital. I am investigating the use of PARP inhibitors in Triple Negative Breast Cancer, which is a type of breast cancer associated with poor clinical outcomes. TNBC is resistant to current drugs, so my project involves finding ways to make PARP inhibitors an effective front-line therapy for a stubborn subset TNBC. PARP inhibitors disable a key enzyme responsible for repairing single strand breaks in the DNA double helix, but these inhibitors are ineffective as single agents.

However, the lab has discovered that the gene p73 is upregulated in TNBC, and also promotes apoptosis in these cells. Therefore, my job is to try to answer the question: To what degree does the knockdown of individual p73 repressors, combined with PARP inhibition, produce a pronounced cytotoxic effect in PARP-inhibitor-resistant cell lines?

I find my topic interesting because I get to work on translational research that can make a difference in the breast cancer patient community. This knowledge gets me through the difficult days, when my breast cancer cell lines refuse to behave the way I would like them to."

Embarrassing moment at lab: "One time, I sucked up all my cells into the aspirator. It takes 5 days to grow that cell line, but my mentor just laughed and told me not to worry about it. When I feel like I am in an environment that allows me to take risks and make mistakes with impunity, I perform much better – (strange...same thing that happens on the basketball court!)"

Fun fact: "I love to play basketball, study Japanese language and culture, and eat warm chocolate-chip cookies. I also like to tell silly stories, and make people laugh."

Jake Weatherly

Year: Rising junior

Concentration: Bioengineering, AB

House: "My house is the most photographed building at Harvard. It is on the cover of the Legally Blonde DVD and was home to Massachusetts Governor Deval Patrick, Al Gore, and Tommy Lee Jones, whose carpet graces the magnificent library floor. It is the future home of fellow Priser Konlin Shen '13. Still don't know? Take a Hahvahd Tour. Seriously. It's fun if you have nothing else to do, and you may even hear something you haven't heard a thousand times before! I'm not being paid by Hahvahd Tours."

From: "I was born in Galveston, Texas, and grew up in the Cradle of the Confederacy and Birthplace of the Civil Rights Movement, Montgomery, Alabama. For the record, I'm not bitter about the War of Southern Secession, and I <3 the Union!"

PRISE Research Project: "I work at the Wyss Institute for Biologically Inspired Engineering at the Center for Life Science in Longwood with fellow Priser Michelle Vhudzijena. I'm studying walking in five-year old children, particularly how they adjust their gait before making a turn.

We hope to find out what is different about the steps before a turn so that we can program a smart sock to anticipate



when the wearer is about to turn. This sock would have fluid-filled actuators that activate muscles in children with pathological gait arising from conditions like cerebral palsy (CP) and drop foot syndrome.

The goal is to help children develop the muscles needed to walk more normally so that they will not depend on a cumbersome orthotic for the rest of their lives. Our work advances the Wyss Institute's mission of translating research discoveries into real-world products, and could improve the lives of children and families with CP."

Embarrassing moment in lab: "Once, when a five-year old came in for the gait study, she was shy and uptight. I decided to find some Dora the Explorer music on YouTube to get her to dance and loosen up before we did the study. I clicked the first Dora the Explorer hit that popped up, and unfortunately, it was a rap spoof of the Dora theme song with questionable lyrics. The kid's parent and my PI were horrified. I quickly clicked the back button before the lyrics seemed to register with the kid, and luckily, the next hit was the true Dora theme song. Now I keep Dora the Explorer on my phone. I recommend that you do the same; you never know when you'll need it."

Fun fact: "I am in love with Emma Watson. She would reciprocate if it weren't for the fact that we haven't met yet. This pic shows what it would look like if we were together. If you know/are Emma Watson, call me (334 315 7060)."

Amy Zhang

Year: Rising junior

Concentration: HDRB

House: Mather

From: NJ



PRISE Research Project: "Qiao Zhou's; stuff on the in vivo reprogramming of pancreatic exocrine cells to endocrine/islet, sorta like this: <http://www.nature.com/nature/journal/v455/n7213/full/nature07314.html>.

Fun at lab: "Umm.. well I guess our lab is very close, which is pretty nice; we lunch together a lot."

Fun fact: "I have a bump in my right foot which is supposed to be an extra toe."