

MIT's Oldest and
Largest Newspaper

thetech.com



WEATHER, p. 2

THU: 68°F | 63°F
Showers and fog.

FRI: 64°F | 42°F
Showers.

SAT: 53°F | 41°F
Sunny.

Volume 139, Number 25

Thursday, October 31, 2019



CATHERINE WU—THE TECH

Melody Phu '21 of MIT Syncopasian sings "Me and My Broken Heart" Saturday at the Family Weekend A Cappella Concert.

Student committees created after Epstein student forum

Committees will investigate campus climate injustices and metrics to evaluate future outside engagements

By **Wenbo Wu**
STAFF REPORTER

The Undergraduate Association and Graduate Student Council created two new student committees to respond to concerns raised in the Student Forum on MIT & Epstein Oct. 1 and the results of the AAU Sexual Misconduct Survey released Oct. 15. Undergraduate committee members will be chosen after conducting interviews, holding student body elections, and receiving approval by the UA Council.

Mahi Elango '20, president of the UA, wrote in an email to *The Tech* that "the committees and the students have full ownership over scope, and therefore any and all ideas relevant to the charge are on the table for discussion." Both committees will produce a report by Spring 2020.

Elango wrote that the Student Committee on Campus Climate and Policies around Discrimination and Misconduct will "investigate systemic injustices on campus."

Meanwhile, the Student Committee on Guidelines for Outside Engagements "will review and discuss MIT core values and the metrics by which outside engagements should be evaluated."

Elango and Peter Su G, GSC president, will chair both committees.

Elango wrote that she and Su "have been meeting frequently with Professor Tavneet Suri, Chair of the Ad Hoc Faculty Committee on Guidelines, and other faculty mem-

New Committees, Page 2

Students must sign intellectual property agreement for UROPs

Agreement transfers ownership of some IP to the Institute

By **Kristina Chen**
ASSOCIATE NEWS EDITOR

Beginning in IAP 2020, students applying to participate in UROPs will be required to sign MIT's Inventions and Proprietary Information Agreement (IPIA). The IPIA transfers ownership of intellectual property satisfying certain conditions to the Institute.

When research is sponsored by a third-party or uses significant MIT funds and facilities, the IPIA transfers ownership of the research to MIT. Students may read the Technology Policy Guide to identify what constitutes "significant MIT funds and facilities."

Currently, students participating in UROPs that meet these conditions are required to sign the IPIA, but under the new policy, all students will be required to sign it during the UROP application process.

Siri Nilsson, IPIA and agreement officer at MIT's Technology Licens-

ing Office (TLO), said in an interview with *The Tech*, "It has always been required, and it's written into MIT policy that everybody who participates in sponsored research will sign it."

"The issue is that not all departments were necessarily aware that it was required, and some departments did not have formal processes in place to systematically collect the signed agreements. It's not a change in policy in any way. It's more of an effective implementation of policy," Nilsson clarified.

This new policy ensures that the Institute does not violate any federal regulations or other funding requirements. Not having the IPIA filed could result in loss of funding for the research project. Nilsson explained, "Under our funding contracts, ... [MIT is] expected to control the disposition of certain intellectual property, so federal regulations actually require MIT to own and to license intellectual

property so that that it's publicly disseminated."

Most UROPs that students participate in do not meet the conditions of the IPIA. In addition, if ownership is transferred to MIT, students can ensure they are credited as inventors, be named on a patent, or earn a portion of the revenue that the Institute may receive from a license agreement.

Michael Bergren, associate dean of academic and research initiatives, told *The Tech* in an interview, "Undergraduates are an integral part of the MIT research community, so it only makes sense that they also should have the opportunity to be in the conversation about intellectual property ownership, and I think one good outcome of this change with the UROP system is that they get to have this conversation sooner."

If students have any questions, they can contact the UROP office and TLO, Bergren added.

BioMakerspace to open this IAP in Building 26

Lab to have basic equipment including tissue culture room, incubators, pipettes

By **Edwin Song**
ASSOCIATE NEWS EDITOR

A new biology makerspace, called the "BioMakerspace," is scheduled to open this coming IAP in the basement of Building 26. The space, which is currently under construction, will be open to "the entirety of the MIT community" to be "used for whatever the student users really want to use it for," said Justin Buck PhD '12 in an interview with *The Tech*. Buck is the manager of the BioMakerspace and is currently overseeing its construction.

Buck said the lab will have Biosafety Level 2 capabilities and contain "all the basic equipment,"

including a tissue culture room, incubators, centrifuges, microscopes, pipettes, thermal cyclers, a refrigerator, a PCR, and common reagents.

Construction of the space is in the final stages and equipment is in the process of being obtained. "We're really hoping to have a very large and active launch over IAP," said Buck. "We plan to have workshops for folks to come and participate in if they don't have exposure to biology or would like to see and understand what it's like to work with different projects."

MIT students looking to work in the lab must submit a project

BioMakerspace, Page 2



CATHERINE WU—THE TECH

Grace Bryant '21 and Gabriel Owens-Flores '21 make appointments at MIT Medical's Tomorrow Time table Oct. 23.

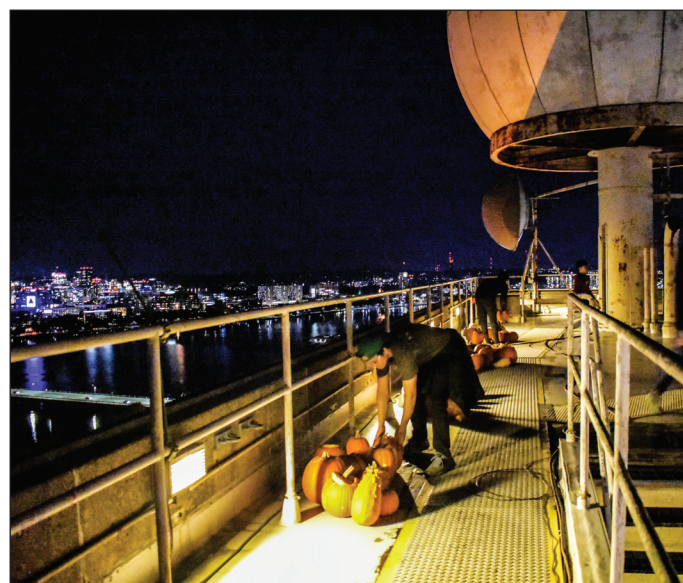
IN SHORT

Friday, Nov. 1 is the last day to **add a half-term subject** offered in the second half of term.

There will be no class on Mon, Nov. 11, **Veterans' Day**.

Interested in **joining The Tech**? Stop by for dinner Sunday at 6 p.m. or email join@tech.mit.edu.

Send news and tips to news@tech.mit.edu.



ARUN WONGPROMMOON—THE TECH

Residents of East Campus's 1W line up pumpkins atop the Green Building in preparation for Saturday night's pumpkin drop.

GRAD STUDENT LIFE

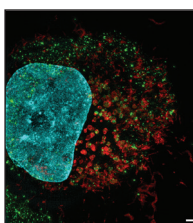
Living at MIT is financially impossible.
OPINION, p. 4

JOURNEY TO FREEDOM

One abolitionist's story is told.
ARTS, p. 8

BOSTON BOOK FESTIVAL

A heaven for book lovers. **ARTS**, p. 7



HAMMOND LAB

Developing nanoparticles to reprogram cancer cells.
SCIENCE, p. 9

IN BETWEEN GLANCES

Alicja Kwade's exhibit comes to MIT.
ARTS, p. 8

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WEATHER

Chilly Halloween sending shivers

By Sheila Baber
STAFF METEOROLOGIST

The falling leaves bear tidings from the north—winter is coming! There will be more rain and fog for the rest of the week, followed by a sunny break over the weekend. Doesn't mean it will get warmer though. Temperatures will steadily creep lower, with nights approaching the lower 40s and even hitting the high 30s. There will be some wind on Friday, so be sure to hold onto those hats, scarves and psets when

passing by the MacGregor wind tunnel! And if you are going trick or treating, consider wearing an extra layer to keep your spooky self warm, at least.

In terms of weather from the rest of the country, extreme fires are still raging on in California, which may be exacerbated by high winds. If only it were possible to send some precipitation from here... On the other end of the spectrum, parts of the midwest have already experienced snowfall—which may come sooner than you think!

Extended Forecast

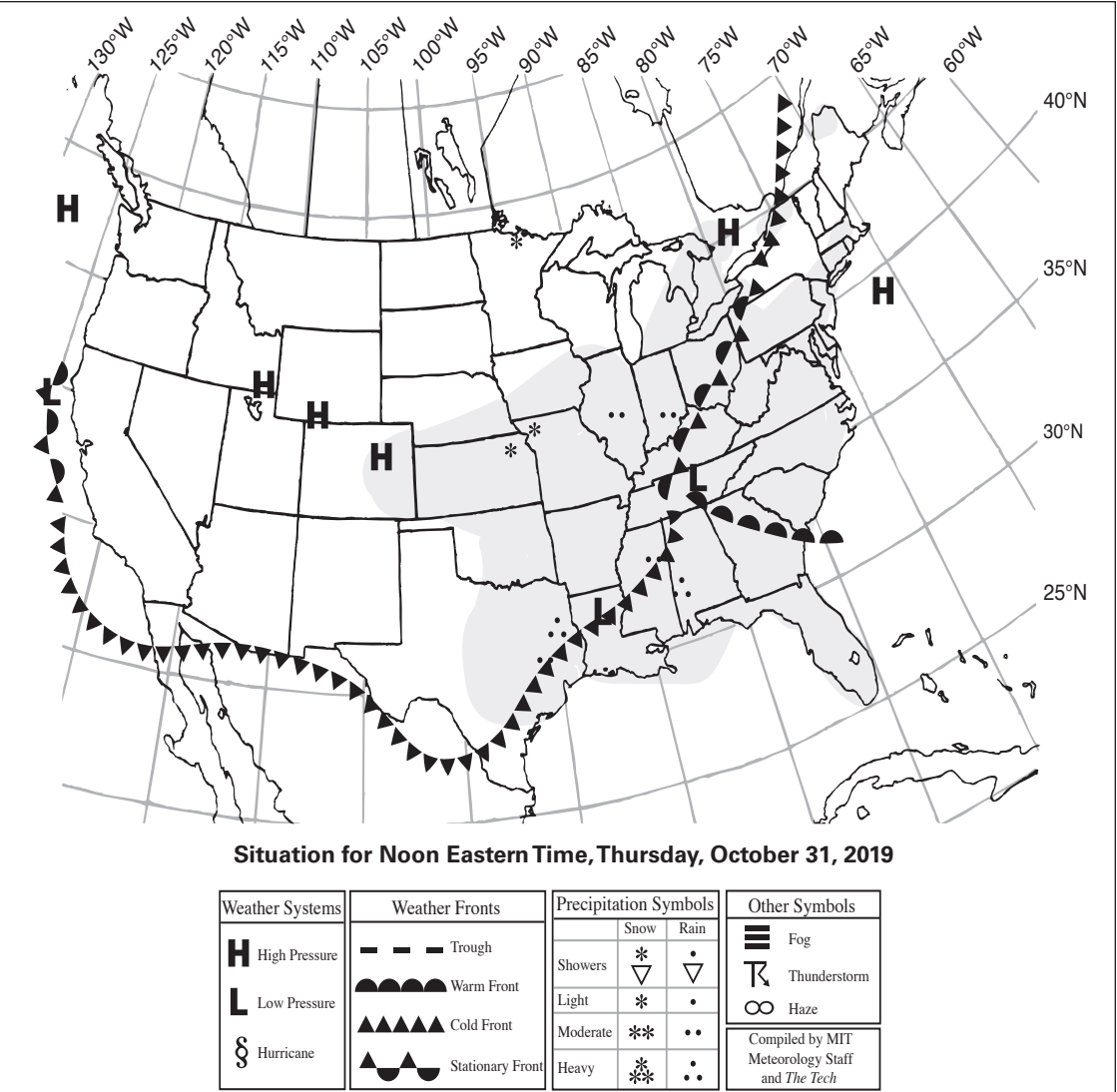
Today: Showers likely, with patchy fog throughout the day. High around 68°F (20°C) and low around 63°F (17.2°C). South winds around 9-16 mph.

Tonight: Showers likely, with patchy fog in the evening. Chance of precipitation 70%. South winds 16-20 mph with gusts as high as 34 mph.

Tomorrow: Showers mainly before afternoon. High around 64°F (17.8°C), low around 42°F (5.5°C). West winds around 8-15 mph with gusts as high as 26 mph.

Saturday: Sunny. High near 53°F (11.7°C) and low near 41°F (5°C). Northwest winds around 7 mph becoming south in the afternoon.

Sunday: Sunny with a high near 53°F (11.7°C) and low near 38°F (3.3°C). West winds around 7-13 mph.



Committee members to be determined by student body vote and UA approval

New Committees, from Page 1

bers on the committee and will continue to do so throughout this process." In addition, Elango and Su will coordinate with the Ad Hoc Faculty Committee on Guidelines and the Ad Hoc Committee to Review MIT Gift Processes.

For selecting committee members, Elango wrote that the UA is "looking for candidates with a strong interest in and ability to think deeply about the issues at hand. This may be manifested through a record of relevant experience on or off campus." The UA also seeks indi-

viduals who "demonstrate a desire to work towards structural change that challenges the status quo."

Each committee will comprise six undergraduate and six graduate students. Applications to become an undergraduate member of either or both committees are open from Oct. 29 to Nov. 2.

The UA will conduct interviews Nov. 2 and Nov. 3 to select ten candidates, and will soon announce the procedure through which students may vote to select the final six committee members.

The final committee members will be determined primarily by

student body vote, but may also be modified by the UA prior to approval by the UA Council to ensure "diversity and the balance of perspectives on the committee," Elango wrote.

In the executive summary attached to Elango's email to all undergraduates, Elango wrote that the committees were formed in response to student sentiment during the Student Forum on MIT & Epstein that MIT needs to offer more support to survivors, hold transparent discussions with community stakeholders, and agree upon institute-wide values.

Student feedback instrumental in the design and contents of the BioMakerspace

BioMakerspace, from Page 1

application and undergo lab training. Steve Wasserman, one of the biological engineering instructors who has helped run the biology makerspace program since its early stages, told *The Tech* in an interview that the lab has a stipulation that allows students to maintain intellectual property of the work they do in the lab and use it to launch their own companies.

A lounge next to the lab will provide a place to work and congregate. "The idea that we're pursuing is that this facility will serve as the nucleus for a community that is interested in life science," Wasserman explained.

Construction began April 2019 after several years of what Buck described as a very successful "pilot phase," which operated out of the bioengineering department teaching laboratories.

Wasserman said the idea for a biology makerspace program arose several years ago out of student demand. "Students get all kinds of crazy ideas and they want to do them, and a lot of times there are barriers to doing them in various research labs around campus," Wasserman said, citing the lack of spaces with appropriate equipment, intellectual property rights, and supervision.

Past projects through the program range from therapeutic drug delivery to kombucha, mostly "independent projects thought up by

the students," Buck said. "That's what I think makes the space most unique and what it is. Perhaps its greatest value as an asset to the community is that it is open to any ideas."

Associate Provost Krystyn Van Vliet PhD '02 told *The Tech* in an interview that having an independent lab for the biology makerspace has several benefits over continued use of the bioengineering teaching labs, such as not having to risk disrupting classes being taught in the teaching labs and flexibility in regards to research groups and topics.

"Teaching spaces have to have things set up just so, and they're not places where we tend to do projects that would mix different research groups," Van Vliet said. "Creating a mechanism where students, post-docs, other kinds of research staff, and faculty can work on things together that might not be within the research interests and domain of the existing faculty is how new ideas get started."

Both Buck and Van Vliet mentioned the establishment of the biology makerspace as part of a campus-wide trend towards makerspaces. For example, Van Vliet pointed to the planned Project Manus community-wide makerspace that will be on the first floor of the Metropolitan Warehouse.

Buck said the BioMakerspace is the "first space that is really enabled and focused on working with biology as a medium."

Construction of the BioMakerspace is conducted by Greene Construction and sponsored by the biological engineering and chemical engineering departments, along with a donor whose identity Buck declined to disclose.

Van Vliet said additional funds were provided by the MIT Committee for Renovation and Space Planning (CRSP), which she co-chairs. According to Van Vliet, CRSP was responsible for much of the behind-the-scenes work in arranging for the bio makerspace to be designed and built.

Along with Buck and Wasserman, several other biological and chemical engineering faculty and instructors, including the department heads, are closely involved in the project. Additionally, a BioMakers student group is currently helping with "planning and launching the itinerary of activities for IAP," Buck said.

Wasserman described student feedback as instrumental in the design of the layout and contents of the lab and lounge. "In the more public areas, the windows are bigger. ... The windows get smaller and smaller as you go to more private places," Wasserman said. "We asked in one of our surveys how open they wanted to space to be, ... and the students said that they didn't want to be in a fishbowl."

Students interested in the BioMakerspace are encouraged to contact Justin Buck at jbuck@mit.edu.



KEVIN LY—THE TECH

The MIT Concert Band holds its annual Halloween performance in the Student Center Wednesday. Musicians can be seen wearing costumes in the spirit of the spooky season!



ALEX LI—THE TECH

Members of the MIT community visit the Hive Pollinator Garden, a space created by UA Sustain for students to relax and learn about the ecological importance of pollinators, Friday.

Leave marks,
not sharks!

Email
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Groundbreaking ceremony held for new Volpe Center

Center developed through collaboration between MIT and U.S. Department of Transportation

By Kristina Chen
ASSOCIATE NEWS EDITOR

The U.S. Department of Transportation (DOT) held a groundbreaking ceremony Oct. 30 to celebrate the start of construction for the new John A. Volpe Transportation Systems Center in Kendall Square. The construction of the new facility is expected to be completed in 2023.

Present at the groundbreaking were U.S. Transportation Secretary

Elaine L. Chao, Chief of Staff of the U.S. General Services Administration (GSA) Robert Borden, Massachusetts Governor Charlie Baker, Mayor of Cambridge Marc C. McGovern, and MIT Vice President for Research Maria Zuber, along with other speakers.

The new Volpe Center will replace the current Volpe’s six buildings and parking lots, spread across 14 acres, and consolidate them into a single building occupying approximately four acres of land. This

is the result of an Exchange Agreement executed January 2017 between the GSA and MIT.

The Exchange Agreement stipulates that MIT pay \$750 million to design and construct the new Volpe facility. The property no longer occupied by the federal government will then be conveyed to MIT for its own uses.

During the groundbreaking ceremony, Christopher Averill, regional administrator of the GSA, said, “The Volpe Center is at the cutting

edge of research into the challenges facing our nation’s transportation and infrastructure systems, ... but to undertake that work, the members of the Volpe team require a modern 21st century workspace.”

According to a DOT press release, the new facility will be “an energy efficient structure accompanied by underground parking and approximately 100 bicycle parking spaces.” It will “meet LEED Gold v4 standards, focusing on sustainability.”

MIT plans to use the remaining space as a mixed-use environment, which will include four residential and four commercial buildings. The buildings will serve as affordable housing, open space, lab and office space, retail and active street uses, and a community center.

“We are thrilled to be able to offer these amenities to the Cambridge community and to help further advance the Kendall Square innovation ecosystem,” Zuber said.

Woodie Flowers dies at age 75

Flowers was professor emeritus of mechanical engineering and co-founder of FIRST

By Ronak Roy
ASSOCIATE NEWS EDITOR

Woodie Flowers PhD ’73, professor emeritus of mechanical engineering, died Oct. 11 at the age of 75. Flowers is remembered for his passion, enthusiasm, and kindness that have inspired millions of engineering students around the world.

Up until his retirement in 2007, Flowers mentored countless engineering students and won a number of awards and accolades, such as the Ruth and Joel Spira Outstanding Design Educator Award, the Edwin F. Church Medal, and the J.P. Den Hartog Distinguished Educator Award. Flowers was a MacVicar Fellow and was also elected to the National Academy of Engineering. Additionally, he served as a distinguished partner and a member of the President’s Council at Olin College of Engineering.

After receiving his bachelor’s degree in engineering from Louisiana Tech, Flowers received his masters in engineering, masters, and doctorate degrees from MIT. Flow-

ers then joined the MIT faculty as an assistant professor of mechanical engineering.

As an assistant professor, Flowers taught 2.70, now 2.007 (Design and Manufacturing I). Under his leadership, the class evolved into its current form, a hands-on experience in which undergraduate students are challenged to design and build a robot to accomplish a set of tasks using given materials. The course culminates in a robotics competition.

Later in his career, Professor Flowers served as the head of the systems and design division in the mechanical engineering department and was named Pappalardo Professor of Mechanical Engineering in 1994.

Mechanical Engineering Professor Alexander Slocum ’82 was advised by Professor Flowers. Slocum wrote in an email to *The Tech*, “Woodie personified gracious professionalism and teaching. If there was ever a version of *Miracle on 34th Street* associated with teaching, it would be *Miracle on 77 Mass.*

Ave and Woodie would be Prof. Santa!”

He also shared the following poem: “I cannot say Woodie ‘was’ / because he will always be ‘is’ / His love for teaching and design / was simply pure and sublime / He was also a design whiz / and he did it all, just because.”

Inspired by the 2.007 final robotics competition, Flowers helped develop For Inspiration and Recognition of Science and Technology (FIRST), an organization that runs engineering and robotics competitions for students in grades K–12, with inventor Dean Kamen. FIRST began with 28 high school teams competing in a robotics competition similar to that of 2.007. Since then, FIRST has blossomed to span four levels from elementary to high school and include over 570,000 students in over one hundred countries.

Despite the competitive nature of the FIRST LEGO League, FIRST Tech Challenge, and FIRST Robotics Competition, FIRST describes itself as an organization that has

always been about “more than robots.”

The FIRST memorial fund for Flowers describes how, through Flowers’s guidance and focus on the core value of “gracious professionalism,” FIRST has not only served to spread passion for engineering, but also promote teamwork, inclusion, and cooperative competition, or “coopertition.”

FIRST alumnus Isabella Torres ’22 wrote in an email to *The Tech*, “When you hear about the culture of other sports, be they athletic or academic, it is completely different from FIRST because of Woodie Flowers. His concept of gracious professionalism made FIRST the welcoming community that it is, and he set an example of how to be not just a good engineer, but also a good person.”

Summer Hoss ’23, another FIRST alumnus, wrote in an email to *The Tech* that “Woodie Flowers always had a twinkle in his eye and a genuine passion for helping kids learn. He will be missed but his enthusiasm will live on through his

positive contributions to FIRST Robotics, MIT, and the world.”

FIRST alumnus Aditya Mehrotra ’22 wrote in an email to *The Tech*, “If I had to take one thing away from everything Woodie taught me, it would be this — we can achieve absolutely anything when we are together as one. He was the fiercest friend and most loving family member to anyone who knew him. Woodie, I’ll miss you so so so so much. And thank you, for everything you’ve done, to change my life.”

Even after his retirement in 2007, Flowers remained an active member of the MIT community. Flowers developed an ethos that was centered on people, and he left a lasting impact on everyone who he interacted with. Assistant Director of Admissions Chris Peterson SM ’13 wrote in an MIT Admissions Blog post about Flowers, “They say never meet your heroes, but I am here to tell you that Woodie is one of the single-digit number of heroes I have had who not only survived first-contact, but actually got better the longer and better you knew them.”

House Democrats propose College Affordability Act

Act aims to lower college costs, improve campus climate, and expand educational access

By Kerri Lu
ASSOCIATE NEWS EDITOR

House Democrats proposed the College Affordability Act Oct. 15. According to the Education and Labor Committee website, the act is a “comprehensive overhaul of the higher education system” aimed at lowering costs and expanding educational access for college students.

The Tech joined a press call with Education and Labor Committee Chairman Bobby Scott (VA-03) and Congresswoman Jahana Hayes (CT-05) Oct. 28 to discuss the act.

“The rising cost of college has put an affordable quality degree out of reach for too many Americans, and as a result, a growing number of students are regrettably questioning the value of higher education. Yet, research makes it clear that a college education remains the surest path to financial security and a rewarding career,” Scott said, citing that on average, bachelor’s degree holders earn \$1 million more than high school graduates during their careers.

The act has three main purposes: to lower college costs for students and families, improve college accountability and campus climate, and expand educational access for students from marginalized communities.

The act aims to increase federal and state investment in higher education. Scott said this includes “the single largest increase in the value of Pell Grants since they were created in 1965,” which will result in fewer student loans. Hayes said the federal-state partnership “will drive states to reinvest in their public universities, which will eventually cut the cost of tuition.”

“For those that do take out loans, the bill makes those loans cheaper to take out, simpler to understand, and easier to pay off,” Scott said, noting that these measures benefit both private and public college students. The bill will replace the current complex loan repayment system with one fixed repayment plan and one income-based repayment plan.

Hayes said the bill “requires colleges to counsel students on the cost of borrowing, so it forces full disclosure between the institution and the student in a way that we’re not seeing right now.”

Scott said the act will increase the accountability of colleges by “cracking down on schools that defraud students, veterans, and taxpayers.” The bill will block funding for colleges whose students have high loan default rates and colleges that “spend too much money on marketing and lobbying, and too little on educating the students.”

Scott said the act will also increase access to “flexible college options” while expanding on-campus services such as childcare, career advising, and grants to support students during financial emergencies. It will increase federal support for Historically Black Colleges and Universities and Minority Serving Institutions. By providing funding to states that make community college tuition-free, the act will expand

educational access for low-income students.

Scott said the act will benefit work-study eligible students by promoting “paid internships in their line of study, so that when they graduate they’ve actually got experience in a job related to their career.”

Additionally, the bill includes a provision to block the changes to Title IX proposed by Secretary of the Department of Education Betsy DeVos last November. Scott said DeVos’s Title IX rule “has too much of a blame-the-survivor aspect to it” and believes the new bill will “strengthen the prevention of campus sexual assault.”

The act is expected to cost \$400 billion over the next ten years. Scott said that the Education and Labor Committee is working with the Ways and Means Committee to secure funding without cutting other education programs such as school nutrition and Title I.

“Two years ago, under Republican leadership, [the House] passed

a \$1.5 trillion tax cut. If they were able to find \$1.5 trillion without paying for it, we ought to be able to find \$400 billion. It’s a matter of priorities,” Scott said, adding that a tax cut repeal could potentially help fund the act.

“Fixing present law is half the cost of the bill,” Scott continued, citing the example of the Public Service Loan Forgiveness (PSLF) program for federal student loan borrowers who work in public service jobs.

Scott said that under the current system, 99 percent of PSLF loan recipients are denied their discharge. The act will remedy this by broadening PSLF eligibility and ensuring loan forgiveness for those previously denied it.

“This bill will open access to opportunities for so many people who see college as a pathway to success. It will help first-generation college students navigate their pathway through college, and not be burdened with debt that they can’t understand,” Hayes said.

Solution to Fasten-ating

from page 10

C	A	B		G	A	S		P	O	P	E			
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A	C	R	E	S		T	A	M	E		P	A	T	S
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E	T	C	H		S	E	T			P	E	R		

Solution to Broomstick

from page 10

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7	4	9	5	2	1	8	6	3
5	6	2	3	8	4	7	1	9
9	7	1	6	5	3	4	2	8
8	5	4	1	7	2	9	3	6
3	2	6	4	9	8	1	5	7
4	9	8	2	1	6	3	7	5
2	3	7	8	4	5	6	9	1
6	1	5	9	3	7	2	8	4

Solution to Cauldron

from page 10

3	4	5	1	2	6
5	6	1	3	4	2
4	5	6	2	3	1
1	2	3	5	6	4
2	3	4	6	1	5
6	1	2	4	5	3

Solution to Black Cat

from page 11

3	7	6	2	9	8	4	1	5
8	3	2	7	5	4	9	6	1
9	4	3	8	6	5	1	7	2
2	6	5	1	8	7	3	9	4
6	1	9	5	3	2	7	4	8
1	5	4	9	7	6	2	8	3
7	2	1	6	4	3	8	5	9
5	9	8	4	2	1	6	3	7
4	8	7	3	1	9	5	2	6

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MIT's policies force many graduate students to live in poverty

By B. Mano

"You're lucky to be here."

The words from the MIT administrator hung in the air. I did feel grateful to study at MIT and receive a world-class education that hopefully one day would help me become an academic. But I was trying to explain to this administrator how unbearably difficult it is to pay my MIT bills while supporting my partner and child on an MIT graduate student's stipend. And here I was, a day late on clearing my balance, being told to feel grateful.

Those words hurt, but they were neither unique nor surprising. MIT administrators have been consistently dismissive towards my tenuous financial situation — a situation created by MIT's own policies that, as I will describe shortly, make surviving as an international graduate student with a family a nightmare.

Indeed, at one of the wealthiest universities in the world, in the richest country in the world, I have been pushed to live near the poverty line for many of those years. Through its policies, both big and small, MIT has made my life as a graduate student financial torture as I struggle to complete my studies. I have been threatened with eviction. I have been forced to forego essential medical care for my spouse and myself. And I have nearly dropped out of school entirely because I could not afford to remain.

I want to note upfront that I am not writing this article to seek any kind of charity, nor to seek action against any particular MIT administrator. In fact, I will refuse both of these if offered, so even if you are sympathetic — and I do appreciate it! — please do not reach out. Rather, in this piece I hope to show that the issues I face are structural, created by MIT's own policies, and faced by many, many graduate students across the university. I only tell my personal story to illustrate the larger struggles we students face.

My graduate stipend is not just my own salary; it is my family's income.

Given U.S. laws disallowing my spouse to work, I am meant to support my family — my partner and child — on my graduate student stipend. Put differently, my graduate stipend is not just my own salary; it is my family's income. Unfortunately, MIT's own policies make it nearly impossible to live on a \$30,000 salary.

While housing costs in Cambridge are astronomical for everyone, MIT does little to help international students who are limited by law in how much they can work. The U.S. Department of Housing and Urban Development defines those who pay more than 30 percent of their income for housing as cost-burdened. Those who pay 50 percent or more are *severely* rent-burdened. Towards my MIT housing, I pay about *70 percent* of my family income for rent. And this is the cheapest option that my family qualifies for. MIT provides no additional subsidy, even for students in its

own housing. As a result, I live in “shelter poverty”: unable to meet my basic needs because of extraordinarily high housing costs.

Given how I have to monitor money, I have occasionally been a few days late paying the registration. One time, after being three days late, I was charged a \$100 late fee and was threatened with eviction if I did not pay. This, by an institution that has, by its own rental structure and stipend amount, forced me into this position of stretching every dollar.

As if these housing costs weren't bad enough, MIT's exorbitantly expensive family health insurance plan (\$400 per month) puts further strain on my family. Then there is the seemingly minor — but for people like me, huge — \$50 per month student life fee. That leaves us with less than \$60 a week to pay for food, transportation, and any other costs that may arise — including co-payments.

My spouse and I never go to the emergency room on the weekend, even if we have to deal with the pain and illness until Monday morning.

While there have been crucial steps taken over the past two years by the Division for Student Life, including the Family Food Grant, TechMart, and the SwipeShare program, MIT has made a series of unfortunate changes to its policies that make even living on that amount all but impossible — policies that, had students living paycheck to paycheck like myself been consulted, perhaps never would have been made.

Two years ago, for instance, MIT doubled its co-payment for emergency room (ER) visits outside MIT Medical to \$100. Soon after, they cut the hours of the MIT Urgent Care to half a day (8:00 a.m.–7:30 p.m.), with even more limited hours for pediatric services, especially on the weekend. Even in those limited hours, the pediatric service is not usually available, and I am almost always told by Pediatrics to either visit an ER outside MIT or file a complaint with MIT Medical.

One particularly harrowing story illustrates how these changes have impacted our family. A few months ago, for instance, my child had a high fever. We called MIT Pediatrics and explained the situation. They said there was no schedule available and that we should take our child to the ER at the Children's Hospital. At Children's, the doctors emphasized that if the fever didn't subside by the next morning, my child should see her doctor at MIT Pediatrics. We tried to schedule an appointment at MIT but were told no time was available. My child was in pain with red rashes all over her body, so we did what any normal parent would do: took her back to the emergency room. Going back to MIT a third time, we were again told no appointment was available — and so went back to the emergency room for the third time.

Thankfully, my daughter got better within a week, but the effects lingered. That episode caused incredible stress for my wife and me over my daughter's health. In addition, given MIT's policy changes, I had to pay \$300 just in co-payments — more than my entire budget for a month. MIT must do better to ensure its own students can afford health care for their families.

As a result of these seemingly small and externally-caused changes, I live in fear of the weekends. Why? Because — terrible as it sounds — I feel anxious that my child might require medical care, resulting in copays that I cannot afford. So while everyone else is looking forward to a couple days off, each Friday afternoon is a portent of fear for me: what do I do if my child needs to go to the hospital?

My spouse and I never go to the emergency room on the weekend, even if we have to deal with the pain and illness until Monday morning. But we cannot do the same for our child. So when a friend kindly says, "Have a great weekend, long-weekend, or holiday," that simply means to us, "Hope your fears won't come true this weekend."

We always prioritize the health needs of our child. But as a result, our own health deteriorates. I cannot purchase a pair of eyeglasses that MIT Medical has emphatically recommended me to wear for two years now, nor can we seek dental care that we need, because these medically-necessary items have turned into “luxury goods” for us. Any parent would make such sacrifices for their children. This is the level of sacrifice I make every day.

MIT made these changes without consulting the students that would be impacted the most by them. And so, one of the wealthiest universities in the world is forcing its own students to put off essential medical care in order to save for co-payment costs of their children.

I pay about 70 percent of my family income for rent.

Living under this financial strain brings a toll on my mental health and that of my family — questions that MIT never asks in its multiple surveys of, and gestures for, students' mental health. There have been questions of how a student's family health may impact their financial situation, but MIT should recognize the reverse.

I have received tremendous support from my own department (DUSP) and have had only those caring staff and my incredibly supportive advisor to turn to. But unfortunately, the MIT administration, despite my multiple requests of them over the past six years, has not shown even a tiny portion of the same support.

Even worse, MIT has often passed my stories to my department people despite my having shared them in private. The attitude of “you’re lucky to be here” or “you’re responsible for your ordeal” is

Student Support, Page 5

Editorials are the official opinion of *The Tech*. They are written by the Editorial Board, which consists of Publisher Áron Ricardo Perez-Lopez, Editor in Chief Jessica Shi, Managing Editor Ivana Alardin, Executive Editor Nathan Liang, and Opinion Editor Fiona Chen.

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The SpongeBob Musical is a nostalgic yet progressive feel-good musical

Oct. 15–27

If there is a weakness to the film, it is by design. The film functions more as a meticulous experiment in mood and tone than as a clearcut, engaging narrative. Some viewers may be confused or turned off by the ambiguity of the film, which resists tidy explanations and ends with a surrealist final scene that offers more questions than answers. But Eggers relishes in how the multiple layers of the film leave it open to interpretation. When I probed him about his decision to "break the 180" in the nightly dinner table conversations by repeatedly switching camera positions so that Wake and Winslow keep changing places in the frame, he acknowledged the thematic undercurrent of identity without clarifying his intent in such scenes. Is Wake merely another of Winslow's fantasies, perhaps of his own future self? Is Winslow an unreliable narrator, insane, or simply the victim of a maliciously dishonest Wake? And what are we supposed to make of that dazzling final shot? Audiences will have to answer such questions for themselves, but one thing is for certain: Eggers is a master craftsman, and he's just getting started.

EVENT REVIEW

A day in Boston's book oasis

Writing Beyond Binaries talk at the Boston Book Festival 2019

The Boston Book Festival

Copley Square, Boston

Dudley Square, Roxbury

Oct. 19–20

By Lulu Tian

STAFF WRITER

The Boston Book Festival (BBF) is an annual celebration of authors, readers, and the brilliant community that comes from books. The event took place this year on Oct. 19–20, centered around Copley Square on Saturday, while on Sunday, it took place in Roxbury.



COURTESY OF JACKIE GIGANTES MCCABE

Attendees of the Boston Book Festival sit on the steps of Copley Square.

Through workshops for writers, fascinating speakers, and interactive events for everyone from children to adults, this weekend is a buzz of heartwarming enthusiasm for literature and learning. With NPR as the festival's presenting partner, many well-known speakers such as Meghna Chakrabarti, host of NPR's *On Point*, and Marie Lu, author of YA series *Legend*, participated in events.

Checking their website in advance, I found that each day had an astonishing number of events — over 100 on Saturday! From workshops for aspiring/current writers to discussions about climate change or the criminal justice system to storytimes for children, this festival touched upon every possible slightly book-related interest. Although a little overwhelmed, I was amazed to see how many people were involved enough in this writing community to host and speak at these events.

On Saturday, when I got to explore the festival, I was even more fascinated by how many people flocked to Copley. The area was filled with banners and volunteers wearing red shirts. Copley Square was a palooza of advertiser booths, book tents, and activities. Bookstores like the Brattle Book Shop had carts with books at discounted prices, independent publishers displayed their works under their tents, and organizations like the Boston Public Library and Boston Cultural Council had people you could speak to about the role of arts and humanities in the Boston community. Bustling, sunny, and teeming with stimuli, Copley Square on this day was a book lover's paradise.

I attended one talk in the “BBF Unbound” category called *Writing Beyond Binaries*, located in a venue on Boylston Street. The conversation focused around transgender and nonbinary representation in books and amongst authors, a relevant topic that I hardly hear discussed. Accomplished writers from across all genres, including mystery, poetry, and the graphic novel offered their insights into the publishing process as well as their own personal growth as nonbinary people, including Alex Marzano-Lesnevich (*The Fact of a Body*), Gabe Cole Novoa (writing as Ava Jae; *Beyond the Red Trilogy*), Cameron Awkward-Rich (*Transit, Sympathetic Little Monster*), Alex Myers (*Revolutionary, Continental Divide*), Lisa Bunker (*Zenobia July, Felix Yz*), L. Nichols (*Flocks*), and Kay Ulanday Barrett (*When the Chant Comes*).

The authors spoke to an audience of around sixty people and among themselves in a very down-to-earth way, often sharing laughs and building upon what the others had said. Although the mood always remained cheery, the authors shared their struggles, not only related to their sexual/gender identity, but in the case of Kay Ulandav Barrett and Gabe Cole Novoa, with

chronic pain, or as Cameron Awkward-Rich brought up, with people less willing to discuss “the craft” of writing as opposed to social justice implications. Through the conversation it became clear that each writer had to think about the balance between spotlighting advocacy for the LGBTQ+ community through writing and focusing on the technical skill and caliber of their “craft.” What is seen as bold splashes of representation by the diversity-dry mainstream landscape is really how the authors already perceive the world to be and expect their work to uphold.

Inevitably, publishers tried to censor the content of the authors who included more sexually explicit stories and “rainbow characters,” as worded by Lisa Bunker. Even with a great publishing team full of nice people, the process of creating unique narratives is met with endless editing, marketing, and personal trials. However, the writers retained an inspiring degree of positivity. Alex Marzano Lesnevich described their experience promoting their novel in a village in France, where the people had no idea about gender binaries, but a hundred people showed up to learn about the topic. Many authors shared the same sentiment, especially finding it amazing to be sitting at this event next to other currently prominent nonbinary authors. Their creativity and interest in the genres and stories of the other authors really spoke to their passion for writing and created a real, intelligent conversation. I only wish that there were more natural inclusion of the audience in terms of questions and interactions. However, even as a pure observer of the authors’ conversation, I found the event enjoyable and informative. Moderated fluidly by writer and teacher Milo Todd and very well-organized, this “BBF Unbound” discussion created the space needed to highlight a crucial narrative and wonderful talent.

CONCERT REVIEW

We're all Earthgang

Earthgang performs at Middle East

Earthgang

Middle East

Oct. 21

By Victoria Dzieciol

Earthgang is the stage name of a pair of rappers, Olu and WowGr8. Known for their off-center sound and lyricism, the two have earned a large audience and have collaborated with big names in hip hop like J. Cole. To kick off the release of their latest album, *Mirrorland*, Earthgang came to Middle East in Cambridge to perform.

The first act of the show was Benji. With just over 2 thousand monthly listeners on Spotify, he's pretty unknown, but after watching his performance, I'm definitely going to check him out. His regular street clothes matched the informality of his short set, during which he playfully joked with the audience and dapped up the people in the front. It was clear he was still a bit of a rookie; he didn't necessarily do anything special, and he did have a pretty underwhelming beat drop in one of his songs after hyping it up to the audience. But he did perform a variety of songs that I could see myself chilling to in the future, with a lyrical sound somewhere between Chance the Rapper and Aminé.

Duckwrth took the stage next and brought a completely different feeling to the show. Wearing an all-white outfit and

almost constantly bouncing around and dancing as he rapped, Duckwrth made it a point to put on a show. His songs were just as energetic as he was, and even the slowest parts were pretty upbeat. A guitarist accompanied Duckwrth, which gave his songs a unique sound that made them even more fun to dance to. The bass was incredible, and I could really feel the music, but it was a little hard to hear his voice clearly over it. Still, it seemed that Duckwrth wanted to emphasize the sound and energy of his songs more than the lyrics, so I didn't feel like I was missing out too much by not understanding every word he said.

Finally, it was time for Earthgang. In a hip and unique style that matched the feel of their music, Olu showed up in a white fur coat and colorful headwrap, while WowGr8 wore overalls and a collared shirt. Earthgang combined all of the best parts of their two opening acts. They radiated confidence and energy and turned the show into a party just as Duckwrth did. There was barely a moment where they stopped dancing, and Olu worked up such a sweat that, by the end of the show, he had removed both his coat and headwrap. They were also as playful and lyrically-focused as Benji. They involved the crowd in the performance, throwing water on the audience and inviting volunteers to dance on stage. They made jokes throughout the night, including pretending to leave halfway through the show as if the concert was finished.

The theme of the show was encouraging harmony among all types of people. Olu and WowGr8 rallied the crowd by having them chant "Earthgang," uniting them into one

voice. Halfway through the night, the duo gave a short speech that dismissed racism, sexism, and all other types of prejudice. And for the duration of the concert, WowGr8 kept repeating, "I am Earthgang. You are Earthgang. We are all Earthgang." They addressed real issues through their music and placed as much emphasis on the meaning of their songs as the sound.

To be honest, I was initially nervous that the duo would be slightly disappointing. I didn't love *Mirrorland* as much as some of their older music, but something about hearing them live made even the songs I

didn't like as much sound amazing, and the duo also mixed in a good number of their songs from older albums or *Revenge of the Dreamers III* by Dreamville. My only real complaint was that for a good amount of the time, the DJ was just playing the song and Olu and WowGr8 weren't actually rapping, although I don't know if that's typical because this was my first time going to a rap concert.

Overall, I had an incredible time. Great music, a meaningful message, and a fun environment made Earthgang's concert one of the best I've ever seen.



VICTORIA DZIECIOL—THE TECH

WowGr8 (left) and Olu (right) of Earthgang perform for an excited crowd in Middle East Cambridge Oct. 21.

DID YOUR MIT ESSAYS GET YOU IN?

The Tech is collecting successful application essays (**hint:** yours!).

Email your pieces to cl@tech.mit.edu!

Moses is a woman

Cynthia Erivo stars as Harriet Tubman in *Harriet*.

At the intersection of art and technology



In Between Glances is an exhibition worth checking out. On campus, it's easy to stop by after or between classes. Kwade's works are great to contemplate the world we live in. There could not have been an art exhibition better suited for MIT than this one.

LAB SPOTLIGHT

Targeting tumors with nanoparticles

The Hammond Lab develops polymeric nanomaterials for cell regeneration and drug release

By Kerri Lu

Since its founding in 1995, the Hammond Lab has been an integral part of the Koch Institute for Integrative Cancer Research, developing nanoparticles that encapsulate and release drugs to reprogram cancer cells. Chemical engineering department head Paula Hammond '84, Ph.D '94 leads research initiatives that range from designing thin films for tissue regeneration to embedding nucleic acids into nanomaterials to silence cancer cell expression.

Hammond Lab researchers use a layer-by-layer process to create ultra-thin films that can enclose dissolved biological materials. "You are absorbing positively charged material until the charge is reversed, and then negatively charged material until the charge is reversed. And because it's a self-limiting process, each layer of material that is absorbed is only a few nanometers thick," Hammond explained. These films allow researchers to program the transport and release of proteins and nucleic acids in the body. The lab also develops materials that rapidly release peptides for blood clotting and wound healing.

According to Hammond, a central focus of the lab is to “use these layer-by-layer nanoparticles to target tumors selectively over healthy cells, [which] allows us to design combination therapies.” In particular, the lab enhances the effectiveness of chemotherapy drugs by combining them with nucleic acids such as siRNA (which silences genes that enable cancer cell survival) and microRNA (which replaces functions that were lost in healthy cells during the growth of cancer). The layer-by-layer architecture enables the “staged release” of drugs, so

that researchers can block different genetic pathways in specific time frames to orchestrate cancer cell death.

Natural biological barriers, such as the blood vessels in the blood-brain barrier, often make the transport of large nanomaterials difficult. To address this problem, Hammond Lab researchers have developed ligands that use transcytosis, a process in which nanoparticles are taken in at one end of a cell and ejected from the other. Another major challenge involves the stability of siRNA. The nanoparticles must be designed so that the siRNA remains stable during its transport in the bloodstream but destabilizes once it enters the tumor cell, where it can interfere with mRNA to prevent the expression of cancer genes.

Hammond recalls several exciting moments in the lab's 25-year history. In 2006, she collaborated with Professor Angela Belcher, head of the Department of Biological Engineering, to design a layer-by-layer electrochemical battery that contained nanoscale wires made from viruses. This project was published in *Science*. More recently, the lab has pioneered new methods in combination therapy for tumor targeting: "We've been very excited about the fact that we can deliver nucleic acids, including siRNA, directly to wounds. For me, that means that we may be able to deliver other kinds of nucleic acids like gene editing components directly to tissues as well," Hammond said.

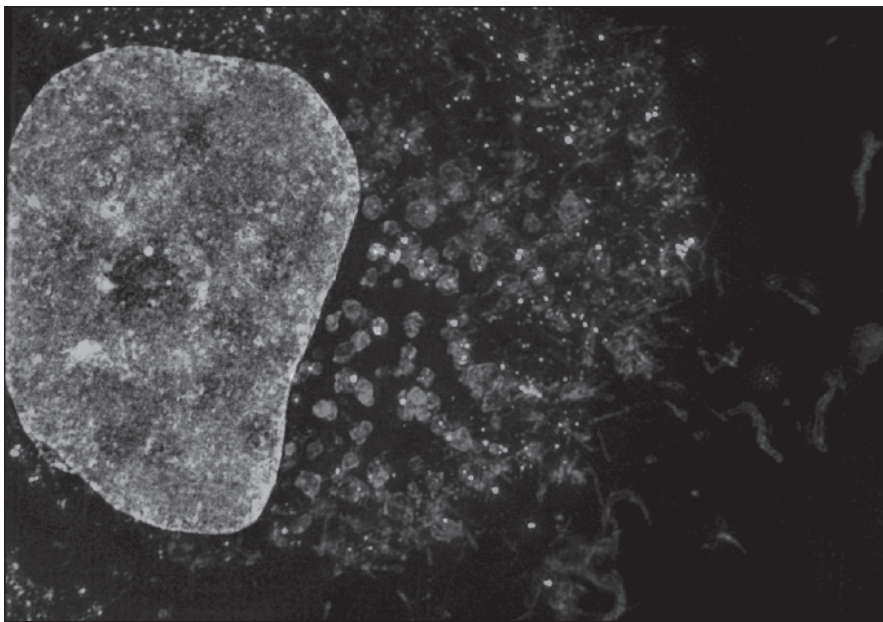
Currently, the lab is developing an immunotherapy for ovarian cancer. In collaboration with biological engineering and materials science professor Darrell Irvine Ph.D '00, the lab has incorporated cytokines (proteins that activate the immune system) into a new type of nanoparticle

that can “sit on the outside of tumor cells rather than go inside them,” Hammond said. She believes this treatment, which has been successfully tested in model mice, could potentially raise the long-stagnant ovarian cancer survival rate.

Hammond also looks forward to applying biological nanoparticles to treat resistant infectious disease. Through the Singapore-MIT Alliance for Research and Technology, researchers have used the Hammond Lab's technology to encapsulate antibiotics in nanoparticles and disrupt the protective biofilm surrounding pathogenic bacteria. "Here, instead of targeting cancer cells, we're targeting bacte-

ria cells. Here, instead of the barrier being these epithelial, these blood vessel linings, it's this biofilm that the bacteria build," Hammond said.

More broadly, the lab aims to develop nanomaterials that circulate in the bloodstream and target different cell types, taking on immune cell functions. Looking towards the future, Hammond hopes that “if we can do that, we can not only generate disease-targeting nanoparticles more effectively and target a broader set of diseases, but we might be able to design nanoparticles that can monitor the immune state, treat the immune disease or chronic disease, and help us characterize it.”



COURTESY OF THE HAMMOND LAB

Ovarian cancer cells treated with nanoparticles designed to target cancer cells and deliver siRNA.

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Solution, page 3

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6	1		9		7			

Fasten-ating by Brad Wilber

Solution, page 3

- 1 Taxi
- 4 Auto fuel
- 7 Vatican City boss
- 11 Common blood classification
- 13 Computer buyer
- 15 Operatic solo
- 16 Ranchland measures
- 17 Gentle, as petting-zoo animals
- 18 Small butter portions
- 19 Fastener that keeps laundry on the line
- 21 Otherwise
- 22 Past and present, for verbs
- 23 Occupational suffix for auction
- 25 Secret agent
- 27 Classroom boss
- 31 Hollywood cops' org.
- 35 Western defense alliance
- 37 Sportscast replay speed, for short
- 38 Not very friendly
- 40 Go bad, as fruit

- 1 Ride a bike
- 2 Cook's cover-up garment
- 3 Deep red veggies

- 4 Courage, informally
5 Without delay, in memos
6 "Half" prefix for final
7 Fastener that keeps pages together
8 Of the mouth
9 Centers of peaches
10 Ill-at-__ (edgy)
11 Diplomatic skill
12 Campfire residue
14 Actress Zellweger
20 Sports cable channel
24 Toward the right, on maps
26 Golf course distances
27 Sum's bottom line
28 "There's no place like __"
29 Give off, as light
30 Fishing sticks
31 Doily material
32 Actor Alda
33 City where ships dock
34 Fastener that keeps an apartment shut
36 Tip of a sock
39 Pest on a pooch
44 Baby sheep

Solution, page 3

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		6+		3

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| 47 Receded, as a tide | 56 Suit to __ (fit just right) |
| 49 Tire pressure checker | 57 Totally attentive |
| 52 Metal in a junkyard | 58 Guitarist Clapton |
| 53 Ice hockey footwear | 60 Historical periods |
| 54 First-born of two | 61 Green citrus fruit |
| 55 Viewed | 62 Try out |

ihthfp

by Jaeho Kim '20

a comic about life at the 'tvte



Welcome, everyone,
to the reveal of our
newest dorm!



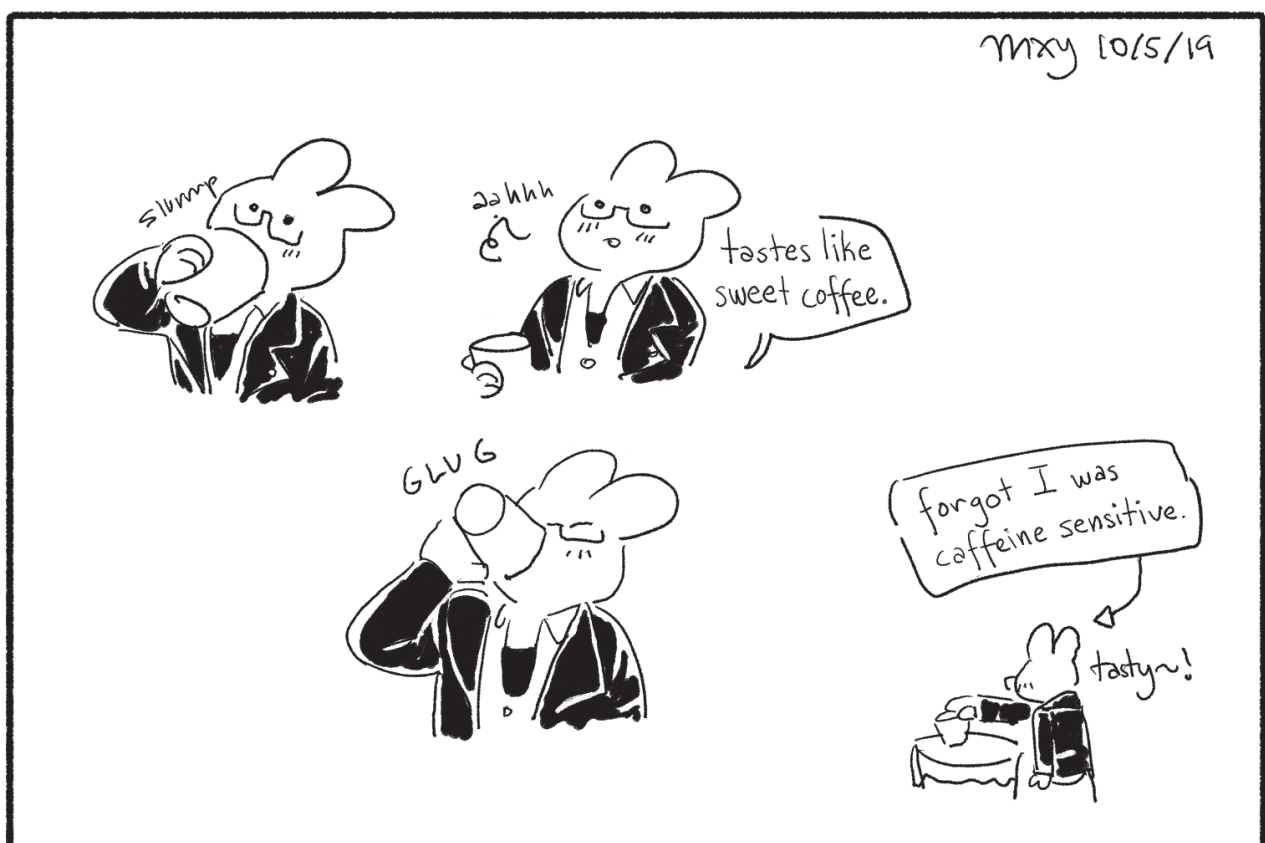
And now, please
welcome..



Solution, page 3

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miscellany #5: cuppa woe



FIELD HOCKEY

MIT Women’s Field Hockey beats Clark University

MIT Women’s Field Hockey secure an 8-1 win

By Suleman Thaniana
SPORTS WRITER

The festivities of the match began by honoring Devon Goetz ’20 and Taylor Grey ’20 for their contributions to the MIT Women’s Field Hockey program during their four-year careers. Because the match took place over Family Weekend, the families of both seniors were present to celebrate their achievements.

The Senior Day celebrations continued as MIT gained an excellent first quarter start with two goals by Amanda Garofalo ’21 and Jenna Haque ’21. Haque’s goal was unassisted, coming on a backhand, while Garofalo’s goal came from outside the circle. The team continued the second quarter in the same fashion as Goetz scored an early goal off a pass from Paige Forester ’23. Another goal by Garofalo followed, coming off an excellently set up penalty corner. The first half ended with a 4-0 lead for the Engineers.

The third quarter was dominated by a show from Forester



BEN KETTLE—THE TECH

Devon Goetz ’20 and Jenna Haque ’21 protect the ball from defenders in Saturday’s 8-1 win against Clark..

as she scored two goals, then assisted one, scored by Delia Stephens ’21. During the last quarter, Anna Joyce put Clark up on the board with a goal. Goetz eventually scored another goal, and the match ended 8-1.

Throughout the match, Goetz finished with two goals and three assists, Forester with two goals and two assists, and Garofalo

with two goals. As a whole, the Engineers outshot Clark by a 43-3 margin and attempted 16 penalty corners, while Clark attempted only one penalty corner. This victory marked the 50th win for the senior class. The team will conclude the regular season on Saturday, Nov. 2 with an away game against Springfield College beginning at 1 p.m.

Friday 1st

Rifle
vs. Wentworth
6:00 p.m.

Men’s Squash
vs. Boston University
5:00 p.m.

Men’s Squash
vs. Boston College
6:30 p.m.

Saturday 2nd

Men’s Water Polo
vs. Iona
12:00 p.m

Men’s Water Polo
vs. St. Francis
5:00 p.m.

Football
vs. WPI
12:00 p.m.

Sunday 3rd

Men’s and Women’s Cross Country
at NEWMAC Championship at Franklin Park
Men’s Race—11:00 a.m.
Women’s Race—12:00 p.m.

Tuesday 5th

Men’s Soccer
NEWMAC Tournament
TBD

Women’s Volleyball
NEWMAC Tournament
TBD

Field Hockey
NEWMAC Tournament
TBD

Men’s Basketball
at Harvard
7:00 p.m.

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