

ALL IN



Evan Deng (in the blue shirt)—a junior in the Department of Film, Television, and Media (FTVM)—works with three high school juniors as part of a summer camp where Michigan students learn television production, screenwriting, and media studies. A partnership between FTVM and the Wolverine Pathways program, the two-week camp has students working closely with faculty David Marek, Sarah Murray, and Dan Shere as well as students like Deng in class and at FTVM's North Quad studios, pictured here. Photograph by Levi Stroud





CONTENTS

Open House

Educational access means listening closely, thinking deeply, and working hard to erase hidden costs, empower students, and more.

[PAGE 4]



make it new

[PAGE 31]

not for the squeamish

[PAGE 35]

look again

[PAGE 38]

mix it up

[PAGE 42]

use what you've got

[PAGE 45]

do it yourself

[PAGE 49]

time to vent

[PAGE 53]

turn it on

[PAGE 58]



[PLUS]

MEET LSA'S
NEW DEAN,
**Anne
Curzan!**

[PAGE 62]



Better with Age
What did soldiers write to their moms 2,000 years ago?
[PAGE 12]



Plague of Plastics
After death, animals decay. But plastic stays.
[PAGE 24]

Open House




At LSA, access to education means more than an open door. It means asking students who might not have U-M on their radar to consider LSA, and it means making sure all students have the resources they need to get here — and to succeed and thrive as part of the campus community.



BY BRIAN SHORT

BECKY SEHENUK WAITE



I

Michigan has 28 community colleges, and Michael Hartman and his colleagues visit every one of them. Hartman is the assistant director of transfer initiatives and partnerships for LSA's student recruitment team. He and the transfer team travel on behalf of the college to meet potential transfer students where they are. It's very important, Hartman says, to reach students while they're still actively making decisions about their academic career — and to dispel a few myths.

“THERE'S A MINDSET, particularly from community colleges here in Michigan, that U-M is not accessible,” Hartman says. “Some students don't think we accept transfer students at all. Others look at the data on the admissions site. They see the stats for the incoming first-year class and say, ‘I'm not anywhere near that. What's the point of thinking about it because I won't get in?’”

Hartman works hard to show that people exactly like the students he's talking to do get in — and thrive. Hartman's office works with programs across campus to give potential transfer students a sense of what U-M is like. There are two specialized days for transfer students to visit campus based on their academic interests, one for students with STEM interests and another for students planning to major in humanities or social sciences. U-M's Undergraduate Research Opportunity Program runs a summer fellowship that brings Michigan community college students to campus for ten weeks of research done in close collaboration with University of Michigan faculty. And the new Transfer Bridges to the Humanities@Michigan program, funded by a \$1.6 million grant from the Mellon Foundation, connects LSA with Henry Ford College to support prospective transfer students through-

WRAP AROUND
SUPPORT

LSA is leading the nation in programs that combine tuition support, personal coaching, academic counseling, professional development, and more into a comprehensive leadership development and student support system.

ACADEMIC
INFRA-
STRUCTURE

Programs, including the Comprehensive Studies Program, work closely with students to make sure they're receiving the academic support they need to succeed from their first step on campus until the day they graduate.

out the transfer process. The program offers students the opportunity to participate in U-M programs such as optiMize and the LSA Opportunity Hub prior to transferring, and it engages collaboration between LSA and Henry Ford faculty to build better curricular pathways for the students.

All of this is done to give transfer students the understanding and perspective they'll need to be successful once they arrive on campus.

Despite these and other efforts to introduce students to U-M's communities and opportunities, Hartman still faces skepticism in conversations with prospective transfer students. The argument that Hartman offers to students who have this kind of doubt is simple: students who transfer to U-M succeed.

"Transfer students succeed just as well as other students at U-M," Hartman says. "Their grade point average at graduation is almost exactly the same as for students who came directly out of high school. There's sometimes a struggle that first semester, but it's not like they're getting here and just barely scraping by.

"So we tell them that," Hartman says. "We tell them that the proof that they belong here is that people just like them have come here, and they've done really well. And they can, too."



The outcome might be the same in terms of grades, Hartman says, but the path to graduation can look and feel a lot different for a transfer student.

Transfer students show up with different challenges than some four-year students do. First, there's impostor syndrome—the feeling that they're not meant to be here, that they're fakes and

Community

Places like the renovated LSA Building and the Transfer Student Center, both opening in 2020, and groups like First Gens @ Michigan are crucial connectors for LSA students to find like-minded peers.

they'll be exposed for not being "real" students.

There are also gaps in understanding about how majors work and how campus operates. Workshops in the Newnan Advising Center and a network of committed faculty members dedicated to helping transfer students go a long way toward ameliorating these problems. A team of 15 transfer student ambassadors also helps with outreach and mentorship for new students.

The college has done a lot, Hartman says, especially in the last four years to change the process and expand the resources available to transfer students.

"We've built a structure for students that they'll interact with from the time they first start thinking about coming to U-M to the time they graduate. We work to help them integrate to campus successfully, to help them integrate into their studies successfully, and then to graduate and move on. And if we're successful, it's because a lot of these initiatives came out of listening to transfer students talk about what they need."

Another resource that came out of conversations with transfer students about their needs is the new Transfer Student Center, set to open in 2020 in the renovated LSA Building. The Transfer Student Center will offer a space for transfer students to meet, chat, study, and learn more about the

university—and it can serve as a home base for commuter students.

"We hope students will see the transfer center as somewhere they can get what they need to be successful here," Hartman says. In addition to on-site staff, Hartman's office is actively trying to set up drop-in hours for organizations from across campus, including study abroad programs and the LSA Opportunity Hub. "Knowing what's available to you is a key piece of the transition process," Hartman says.

The speed at which students catch up with this information is incredibly important, because transfer students are only on campus for a short time. Despite their brief time on campus, though, transfer students make a strong impression—and add real value, Hartman says.

"A lot of faculty say, 'I love having transfer students in my classes because they have a unique perspective,'" Hartman says. "This is a group of students that kind of flies under the radar. Some people don't even know they exist, to be honest. But they add so much to our community in terms of life experience.

"We have students here now who never thought something like this was possible," Hartman adds. "We're trying to get out there so that students like that can realize that U-M is an option."



Once, the idea of greater access to higher education meant tuition reimbursement, and that was it. “When I started 20 years ago,” says Doug Fletcher, director of the LSA Scholarships office, “there were two programs. There were four-year scholarships for incoming first-year students, and there were scholarships for current students who needed help with tuition. The idea was that students would go to school for four years, get their degree, and get out the door. It’s not like that anymore.”

AS THE TIMES have changed, Fletcher says, so have the systems put in place to support students. Now providing access to a Michigan degree means working to give every student an opportunity to participate in all aspects of life in the College of LSA.

That means the chance to make professional connections through internships, even unpaid ones. It means getting help applying and paying for a passport and for opportunities to learn about other cultures and foreign perspectives through study abroad programs. And it includes participating in the kinds of regional and national academic and professional programs – including Camp Davis, the New England Literature Program, the Great Lakes Arts, Cultures, and Environments Program, and more – that would be a lot easier if students weren’t trying to pay for all of it themselves.

Students and their families can be skeptical about these kinds of programs, Fletcher says. There are concerns about unseen costs, about what kind of financial support the college will provide, about months that may have otherwise been spent working and earning money. When Fletcher started, that’s absolutely what students would have been doing – working for the summer. But expansions in support programs and in the kinds of academic, professional, and experiential programs

that scholarship support covers make it possible for students to use their whole year to explore, experiment, and learn about themselves and the world – not just during their semesters on campus. That’s a point that Fletcher stresses to students.

“It’s not just about an academic degree anymore,” Fletcher says. “Those kinds of experiences are necessary for being successful in the job market, for being an educated citizen and person.

“We look at students as individuals, and we’re trying to help them to have opportunities that a lot of wealthy students have in order to be competitive and leave with a resume that’s going to help them move forward.”

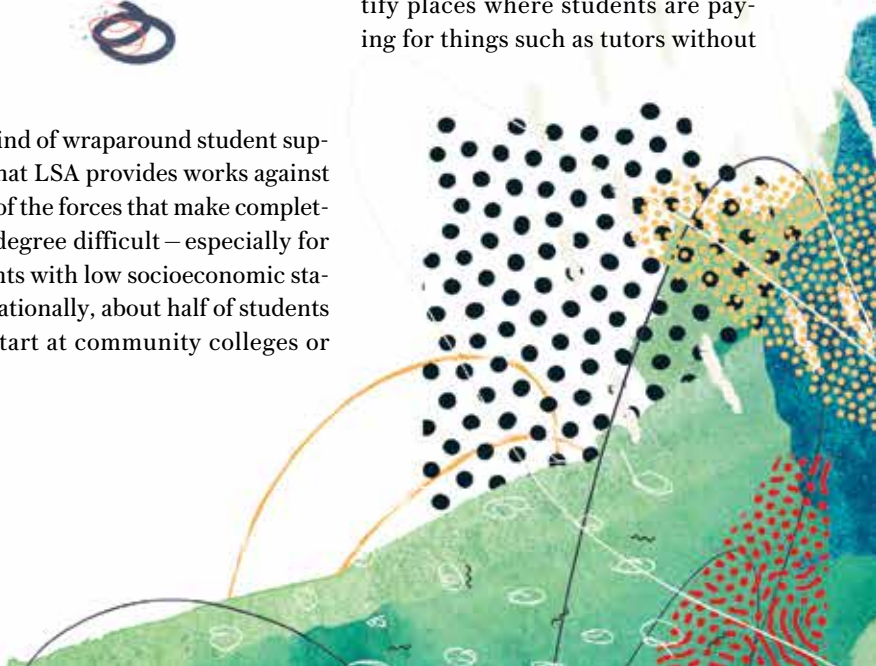


The kind of wraparound student support that LSA provides works against some of the forces that make completing a degree difficult – especially for students with low socioeconomic status. Nationally, about half of students who start at community colleges or

four-year-degree colleges drop out within six years of starting. Students from families earning under \$35,000 a year have a staggering 1 in 17 chance of graduating with a bachelor’s degree by age 24.

Part of the issue, Fletcher says, is that students qualifying for need-based scholarships face problems that don’t track well on a spreadsheet. Some face pressure from their families or themselves to send money back home. That can mean that money meant to pay for tuition isn’t there when the bill comes due, which means getting kicked out of school.

LSA’s scholarship office works with students to help deal with crises like these as they come up, and to identify places where students are paying for things such as tutors without



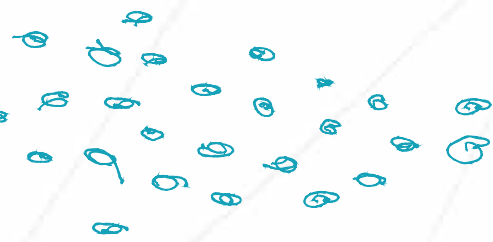


WE NEED YOU

LSA runs dozens of offices, programs, and initiatives to make sure that every student can participate fully in the life of the college and to make sure that all students have access to the same academic, extracurricular, and professional opportunities, regardless of financial means or industry connections.

You make that possible. The envelope on this page is an opportunity for you to open doors of opportunity for the best students on the planet.

Give now.



which it would be difficult for them to thrive – or even participate – in classes and in college.

“Listening to students and working closely with departments, we’ve figured out a lot of the hidden costs that students deal with,” Fletcher says. “Scholarships, gifts, and donors have done an incredible amount to help cover those.

“We all want to level the playing field,” Fletcher says. “We all want to create access. We all want students coming in from all walks of life, students with low-income status, students from rural areas. But it’s important that we’re not just bringing them in. The college is supporting them in ways that build their confidence, in ways that prepare them to go back to their community, to go out and start working. We take that seriously, and we do everything we can to help students achieve.”



Both LSA’s transfer student recruitment and retention efforts and the college’s scholarship and financial support programs are part of a much larger and more comprehensive endeavor to improve access, equity, and community on campus.

THERE IS A program to make sure students have laptops and a program to make sure students can get passports easily – an essential first step to studying abroad. There is a concerted and ongoing effort to find and equalize obstacles so that students coming into the college with fewer resources get access to the exact same opportunities as any other student.

And the costs and challenges can be much harder to see or anticipate than a laptop is, says Associate Dean of Diversity, Equity, Inclusion, and Professional Development and Arthur F. Thurnau Professor of Psychology Fiona Lee. As an example, Associate Dean Lee points to an essay written by a student that describes their experiences growing up in a financially disadvantaged background. The only source of food that was both affordable and accessible was a neighborhood gas station.

“When the student came to U-M, they found nothing they recognized as food in our dining halls. For example, they did not recognize cheese, something

they liked, because the only cheese they had known came in a squeeze bottle.

“So simply eating required spending time, energy, and mental resources,” Associate Dean Lee says. “This is way before we start considering inequities that come from not having access to laptops, tutors, and study abroad programs. We must understand the constant toll hidden costs can have on these students, and work hard to level the playing field for them.”




Financial Support

In 2018, LSA gave out more than \$2.4 million in returning student scholarships, spring/summer scholarships, and emergency scholarships; \$2 million in study abroad scholarships; and \$1 million in internship scholarships.

Hidden Costs

LSA is committed to finding and erasing hidden costs such as personal laptops and passports for study abroad programs so that every LSA student can participate fully in the life of the college.



Combining community, equity, and academic resources in a cohesive way means investing in multiple paths and programs that can provide students with wraparound support. One example of this is the Kessler Presidential Scholars Program, founded by alumni Fred and Judy Kessler Wilpon, which provides four years of financial support to exceptional first-generation

students. Students are organized into close-knit cohorts and supported by a team of professional staff to help them explore U-M and to empower them to succeed and lead after college.

Working in the same model by combining a cohort community program with comprehensive wraparound support is LSA's new U.P. Scholars Program. The U.P. Scholars Program supports students from Michigan's Upper Peninsula with four years of tuition as well as on-site academic counseling and specific curricular and pre-professional programming. The program, which plans to support 5-10 students each year, will launch in fall semester 2020.

The college is also making significant investments in wraparound support for all LSA students together through the LSA Opportunity Hub. This past year

LSA awarded more than \$1 million for students to gain access to internships around the globe. The Hub also supports exploration-based, regionally focused flash internships in fields such as writing and publishing in New York, technology in Silicon Valley, sustainability in Houston, and health in Nashville. These are all funded opportunities that are hosted and driven by alumni, and that create incredible access to a range of vital industries. The Hub also hosts alumni networking events and works with recruiters to connect them to the brightest students in the country.

These and other programs do and will succeed by finding and erasing barriers to academic achievement, professional success, and personal fulfillment wherever they're found. They work because they're built based on

sound research and on what students themselves say they need to come, stay, and succeed at LSA.

"Need-based scholarships can bring top students who might not be able to afford college tuition through the door," says Associate Dean Lee. "This is critical, but we also have to engage in the hard work of keeping these students at U-M. We need to assure them that they belong in U-M, and support them so that they can thrive and be successful. We have to be deliberate in creating this support because it does not happen naturally." ■



Better with Age

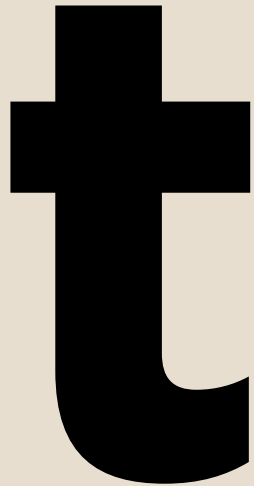


Today, the state-of-the-art preservation of U-M's papyri gives researchers and students a chance to learn about everyday life from thousands of years ago – but the texts can be incredibly hard to decipher. It's a mystery where the clues solve puzzles about ancient societies, literature, religion, commerce, and more – all happening right here on campus.

by
Brian Short

photography
by Liz DeCamp





THE UNIVERSITY OF Michigan's Papyrology Collection isn't just the biggest in North America, it's also the most diverse—with the most time periods, the most languages, the most kinds, types, and genres of any papyrology collection on the continent.

There are items from the time of King David in Israel to the reign of Henry VIII in England, including pieces written in hieroglyphics, hieratic, Coptic, Demotic, Greek, Latin, Arabic, and Hebrew. The archive includes an estimated 18,000 pieces of papyrus as well as other ancient materials such

as wooden mummy tags, wax and clay tablets, leather, parchment, linen, and potsherds.

It's also a surprisingly personal collection of items. Standing in the archive, one often feels as if one is peeking over the shoulder of people who lived and died thousands of years ago.

In the late nineteenth and early twentieth centuries, newspapers in England and the United States carried news of archaeological discoveries from around the world, with a strong focus on biblical finds and material on Egyptian monarchs. But the emphasis of papyrology as a field has changed dramatically since then, moving from the worlds of pharaohs and prophets, of prefects and apocrypha, to one that looks more closely at the lives of everyday people.

"In the beginning, people were looking for books and biblical texts," says Arthur Verhoogt, Arthur F. Thurnau Professor of Papyrology and Greek and the acting archivist for the collection from 2010 to 2013. "Now we're very excited about accounts. You can look at an account and see, for example, when a scribe gets busy and he starts buying lamp oil and paying for more assistants. He's obviously getting busy, right. You can get a sense of what was happening in a specific place, in a specific room, almost 2,000 years later."

"For the most part, when you're dealing with ancient Greek and Roman history, you're dealing very often with broad-brush pictures of politics at the very highest level," says Brendan Haug, assistant professor of classical studies and the current archivist of the papyrology collection. "But papyri, because they derive from much lower social strata, can open a window onto everyday people doing everyday things. They're paying taxes. They're filling out a census. They're buying vegetables or lamp oil. Sometimes, they're even doodling."

Ancient history is increasingly a story about the everyday lives of people living in multicultural, multilingual empires.

HAUG POINTS OUT a number of pieces that communicate powerfully and immediately certain truths about the lives of ancient people. He shows a plank of wood used by a child learning to write syllables where, in one section, the child has clearly added a syllable that they forgot to write their first time through. He shows a potsherd with a list of gods' names on it, gods that might have been deemed worthy of veneration by whomever was using the shard of pottery to practice their writing.

There are birth certificates and death certificates, marriage contracts and account ledgers. All of the items contain valuable information about what was happening at the time, about the ways in which people worked and lived and thought.

"People touring the collection show so much enthusiasm," Verhoogt says, "partly because when they think about ancient Egypt, they think about pharaohs, they don't think about people. But there were 2.5 million real people living there that were dealing with things similar to what people deal with every day right now."


GREEK


HIERATIC


LATIN

One type of document that gives some insight into the personality of people from the other side of history are personal letters. One letter shows a son writing to his mother to let her know that his wife is pregnant. Another shows a daughter chastising her mother for what the daughter has taken as ill treatment, and includes what might be subtle shade-throwing as the daughter refers to her sisters as "your daughters" instead of as "my sisters."

Among the collection are two letters that Haug brings out for display quite a bit. They are from a sailor named Apollinarius writing to his mother, and they bear a great deal in common with the kind of letter that a soldier might send home to his parents today.

"We know exactly where his mother lived, because the address is right here on the back of the document," Haug says. "And we know where it was sent from, the port of Rome, because Apollinarius tells us where he is. He's writing home to tell his mother that he's okay and to let her know he'll write again when he knows where he's being deployed to. And he writes again later to give her that information. That's all we have of their correspondence — two letters, both from the son to the mother. But it's an immediately recognizable moment. A young man wants his mom to know where he is. He wants her to know he's okay. Anybody can identify with that."

IT CAN BE tricky, Haug says, figuring out what's going on in a specific piece of papyrus when it's first encountered. Some are just small fragments that have been rolled or balled up and need to be unwound before anyone can attempt reading them. Once you've got the papyrus flat, then you're examining the piece for basic details, Haug says: the language it's written in, whether

“I want people who come to the archive to consider the idea that the story of the ancient world is not just one of the people up at the top of the social pyramid.”

there’s a date affixed somewhere, and what genre of document is being examined—literary or documentary.

If there’s no date, then handwriting can sometimes be used to suss out a rough timeframe. Earlier Greek writing, for example, tends to hang from the line above the letter, while later Greek letters are equally constrained by the lines above and below them. It’s remarkable, Haug says, how accurate you can date a piece just by examining the handwriting.

“You can reliably get the century, and often you can say whether it was written in the first half or the second half of the century,” Haug says. “And we can do that because we have so many thousands of thousands of thousands of documents that can be dated exactly to the day because the date is right on there.”

The papyrology archive regularly hosts classes in its space on the eighth floor of the Hatcher Graduate Library. Some classes visit and study for only a few sessions, where students are acquainted with physical objects from the time periods that they’re studying in courses on the Middle East, biblical history, or ancient languages.

Other courses, including one on general papyrological research skills taught by Haug himself, hold class in the archive and work on translating previously untranslated documents. Students—including advanced undergrad-

uate and graduate students working together—are paired up and given four documents to translate over the course of the semester. Haug tries to choose pieces that are legible, but even pieces that might have been clear to readers 2,000 years ago can stymie rookie researchers today.

“The first thing students have to do is form an alphabet,” Haug says. “What does this writer’s alphabet look like—their alpha, beta, gamma, etc.? Then the students have to figure out how those letters combine to form basic syllabic units, basic lexical units. Then you have to try to read the actual lines one after the other.

“It’s really hard,” Haug says. “That first time, there’s this deer-in-the-headlights look. The writing is cursive. It looks nothing like a printed, modern textbook of ancient Greek is going to look. Doing that by yourself can be kind of miserable, so we pair people up so they can work together toward a shared goal of figuring out something extremely difficult.”

“From the beginning, papyrology has been a very collaborative field,” Verhoogt says. “Two pairs of eyes are better than one pair of eyes. And digital archives make it much easier to share and collaborate. People can see whether there’s anything that connects to whatever they’re working on, and all of that happens much faster than it used to.”

Verhoogt is also associate dean for academic programs and initiatives at U-M’s Rackham Graduate School, and this is something he thinks a lot about for the students he serves there.

“Collaboration is one of the skills that we need to train all of our students on, including graduate students,” Verhoogt says. “It’s a critical skill to have not only if you go into academia. Employers are looking for people with strong collaborative skills. In terms of that, I think we’re ahead of the curve.”

PHARAONIC PERIOD



3,200 – 332 BCE



ROMAN PERIOD



30 BCE – 619 CE

THE VAST MAJORITY of the university's papyrus collection comes from Egypt, where a dry, arid environment has preserved texts that would have rotted away in wetter climates. Most was either purchased or procured by archaeological pioneer and esteemed classics and Latin Professor Francis W. Kelsey on his tour of the Middle East or was rediscovered through his 11-year seasonal dig at Karanis, Egypt, in the 1920s and 1930s.

An accomplished scholar of the ancient world as well as one of the instigators of the University Musical Society in Ann Arbor and the Archaeological Institute of America, Kelsey believed that students needed to encounter ancient objects in real life – not just read about them in books. His efforts to secure ancient material for the university's collection were accomplished specifically for this goal – so students could hold and see and reflect on material from people from the other side of the world and the other side of history.

While the first acquisition positioned the university's papyrus collection for success by including a range of languages and types of documents, the storage of early documents left much to be desired by later preservationists. Fragments were unceremoniously stuffed into soap containers and cigarette boxes. Separated sections were connected together with tape, while the 100-foot-long Karanis tax rolls were sliced up into smaller sections for easier storage.

But preservation has come a long way since the '30s. Now the papyrus in the university collection is stored in a special preservation room where the temperature and humidity are tightly monitored, and fragments are pressed between slats of archival glass, when possible, or tucked carefully into acid- and adhesive-free paper containers.

Preservation techniques improved

throughout the century, with some significant advancements developed at U-M in the 1990s including major improvements in joining and displaying papyrological fragments.

"Nothing that our conservators do can't be reversed," Haug says. "That's basically the mantra. Don't do anything that will damage the text, and don't do anything that can't be reversed. That was unfortunately what people often did in the past. They also used the Papyrus font on the labels," Haug jokes, "which doesn't look as good 20 years later."

In classes and during tours of the archive, Haug always stresses the democratic spirit of the materials – that ancient history is about more than battles and political struggles and that the lives of everyday people are worth considering and celebrating.

"I want people who come to the archive to consider the idea that the story of the ancient world is not just one of the people up at the top of the social pyramid," Haug says. "That ancient history is increasingly a story about the everyday lives of people living in multicultural, multilinguistic empires. I try to curate the classes and tours to the degree that I can to expose people to this idea of people from different areas speaking different languages, all trying to live together. These documents can create a bridge between the past and the present, to show how we did it then so we can consider more deeply what we're doing now." ■



DEATH +
DISEASE



WAR +
SOLDIERING



PREGNANCY +
CHILDHOOD



BOOK OF THE DEAD

P. Mich. inv. 3524



WRITTEN IN RED AND BLACK INK in hieroglyphics and hieratic—a cursive form of abridged hieroglyphics—this fragment of the Egyptian *Book of the Dead* depicts a scene in which an offering is proffered to the hawk-headed god Re-Harakhte.

What is often called the *Book of the Dead* was actually titled the *Book of Coming Forth by Day* to the ancient Egyptians. The books held a series of spells and instructions to guide the dead through the perils of the afterlife so they could achieve paradise or be reborn.



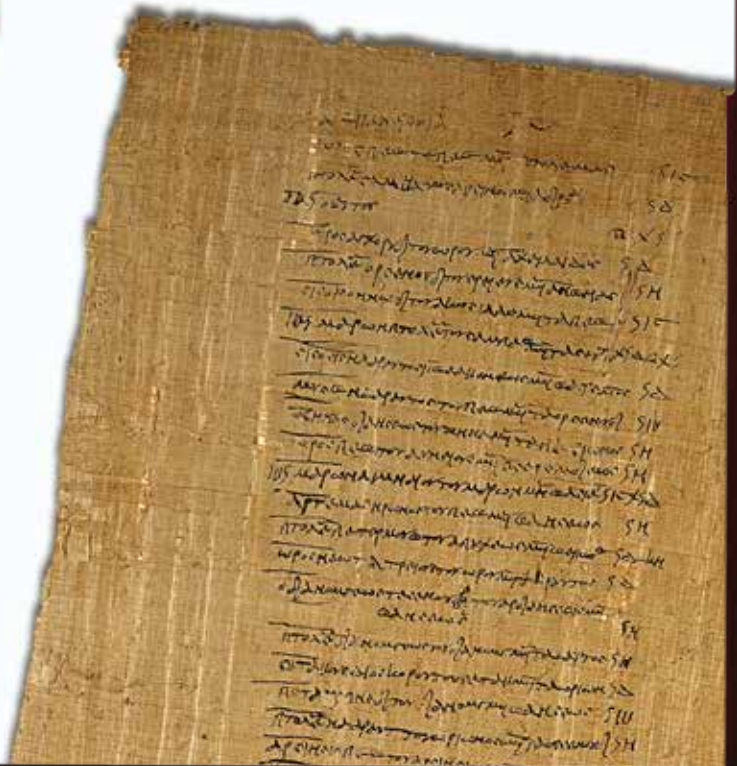
PLAGUE RECORDS

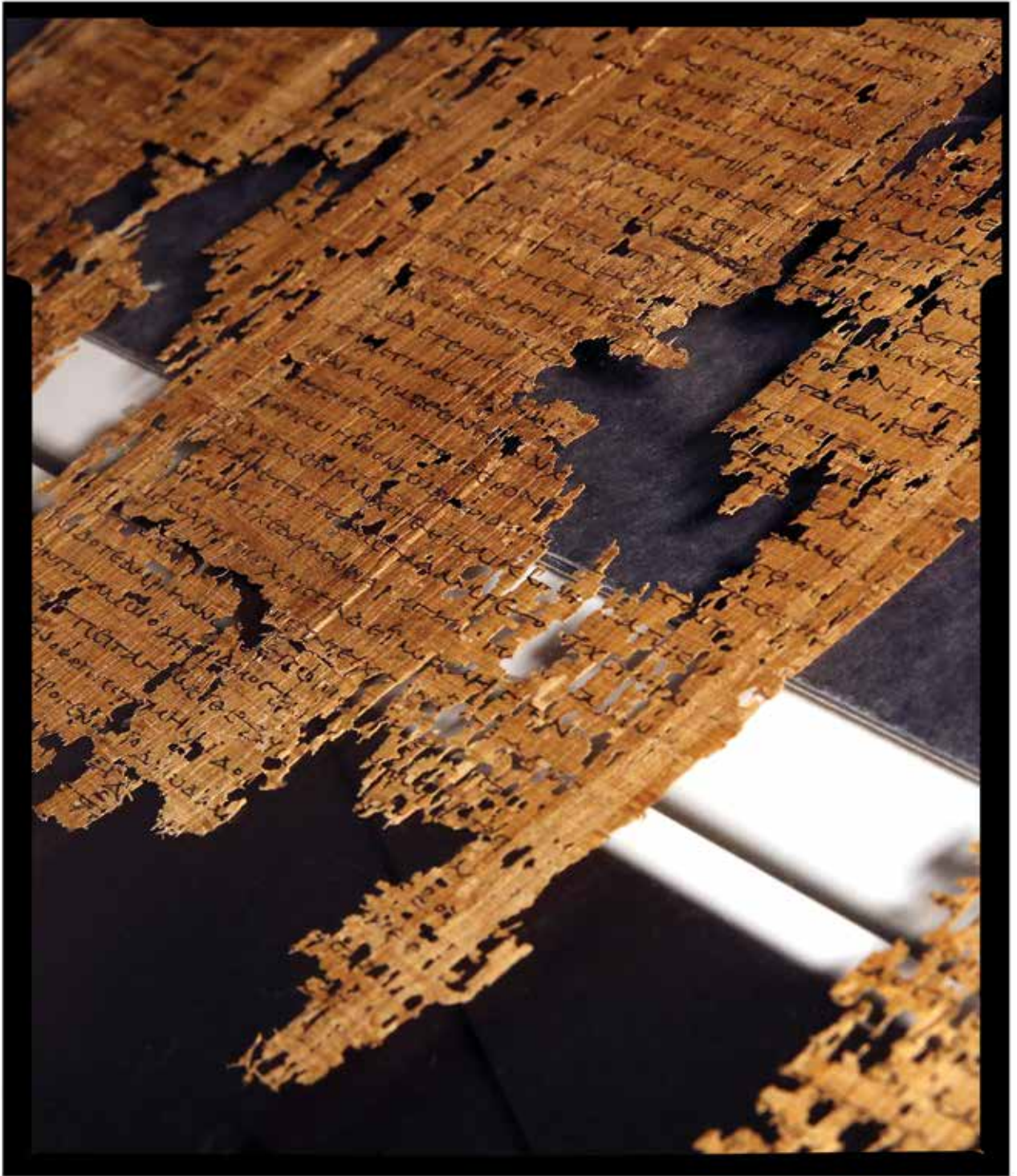
P. Mich. inv. 4171



THE UNIVERSITY OF MICHIGAN holds two complementary tax lists from Karanis, Egypt. One is from around the year 170 CE, and the other, from a few years later, shows a shocking number of people from the village are gone. Professor Arthur Verhoogt says the interstice lines up perfectly with reports of the Antonine Plague, which wiped out 30 percent of the Roman Empire.

“This is an instance where you can use the account to check and see if the historical record matches contemporary accounts of major events,” says Professor Arthur Verhoogt, “and here it does.”





HOMERIC PAPYRUS

Iliad XVIII, 23-617



THE EIGHTEENTH BOOK OF THE ILIAD, partly pictured above, begins with the fabled warrior Achilles learning of his cousin Patroclus's death at the hands of the Trojan hero Hector. Achilles wails, mourning Patroclus. It's an epic passage, featuring big emotions, a fateful decision on the part of a storied hero, and divine intervention.



PRIVATE LETTER

P. Mich.inv. 4527



FAR FROM HOME, THE REAL-LIFE EGYPTIAN sailor Apollinarius writes home to let his mother know that he has arrived safely in Portus, the port of ancient Rome, and that he'll write again soon when he knows where he's being deployed. He asks to hear about her health and well-being, that she convey his greetings and well wishes to his brothers, and that she write him back.

1

PRIVATE LETTER

P. Mich.inv. 340



2

BIRTH CERTIFICATE

P. Mich.inv. 766



3

SCHOOL EXERCISES

P. Mich.inv. 764



4

LETTER AND DRAWING

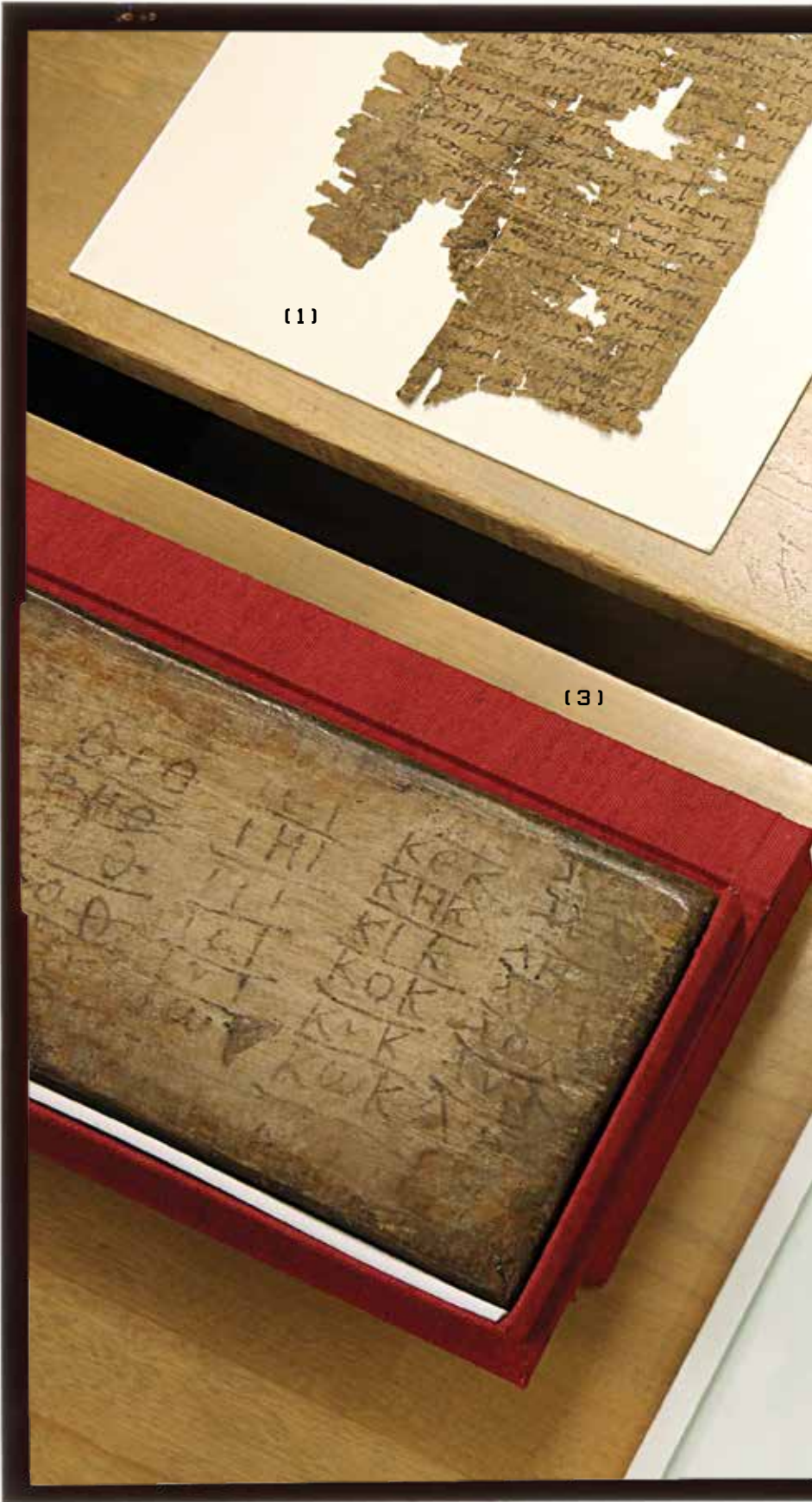
P. Mich.inv. 4290

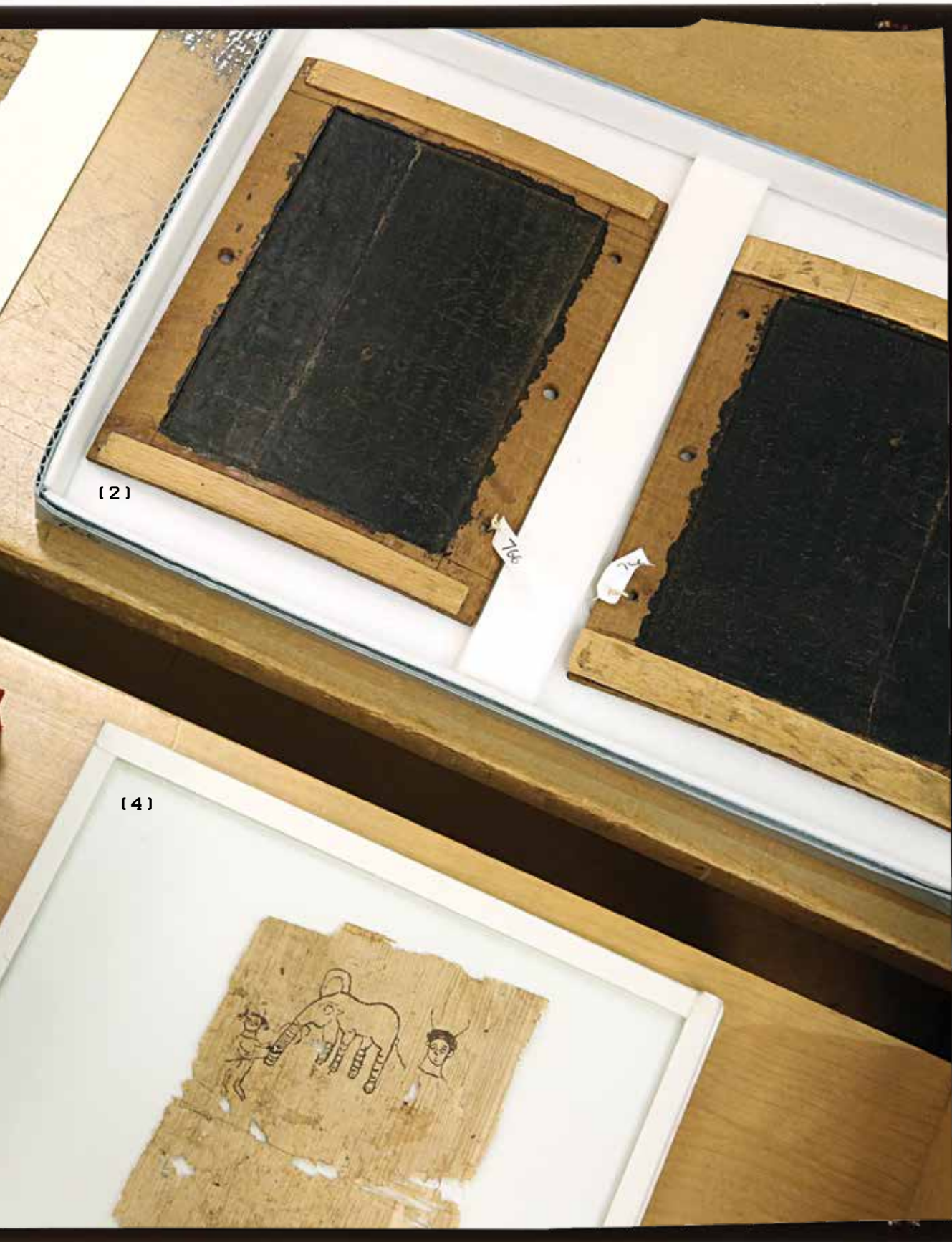


THE UNIVERSITY of Michigan Papyrology Collection holds numerous artifacts touching on death. There are mummy tags and death certificates and court papers recording a complicated dispute over the estate of a deceased military veteran.

At least as surprising and affecting, though, are artifacts that record ancient lives as they are beginning. There are letters sent from children to parents announcing a pregnancy (1); the birth certificate of a little girl, the child of Roman citizens (2); wooden writing surfaces recording children's schoolwork (3); and a delightful doodle of an elephant (4).

(It should be noted that we do not know with certainty the age of the doodler. They may have been young – or just young at heart.)





(2)

766

766

(4)





Plague of Plastics

An uncommon scientist who steps out of the lab onto boats and in front of policy makers, LSA Professor Melissa Duhaime turns a skeptical side-eye to the presence of plastics in our lakes and oceans. She wants to use science to keep our water healthy.

BY ELIZABETH WASON  JULIA LUBAS



It's near certain that humans are consuming plastic.

TODAY, THE MIDWAY Atoll hosts a species of bird called the Laysan albatross, 500,000 of which are born every year. Of these half-million young birds, about 200,000 die, leaving behind piles of bones and feathers. Amid their remains, in the place where their stomachs once were, lay piles of colorful plastics—bottle tops and pen caps and other fragments of garbage—things the birds ingested but that didn't decompose with the birds' flesh and feathers.

Plastic can be unexpectedly easy to find in the oceans, and easy for birds and other animals to mistake as food. When human trash misses the landfill, it can flow through rivers and lakes to the oceans, cracking and crumbling along the way into tiny pieces called microplastics. Those microplastics then accumulate into giant "garbage patches" in the ocean, merged and concentrated by the currents to create a peppery soup consisting of pieces of garbage no bigger than popcorn kernels.

Plastics haven't always been a problem; they once were seen as a solution—a means of preserving the environment. Until the invention of celluloid to create billiard balls, demand for balls carved from ivory wiped out herds of elephants. Plastic eyeglass frames made it possible to produce tortoiseshell glasses without harvesting shells from hawksbill sea turtles. And furniture designers thoughtfully made products from plastic to spare forests from the ax.

But plastic has turned into a danger that the world did not anticipate, and some people are working hard to address the problem. Melissa Duhaime, a professor in LSA's Department of Ecology and Evolutionary Biology, shares scientific research on the hazards of microplastics publicly and often, including at a Senate hearing in Washington, D.C., last year. The office of Michigan Senator Gary Peters invited her by email on a Thursday, asking her to prep and appear in the Senate on the following Tuesday—a tough, quick turnaround, which Duhaime figured was worth the extra effort.

"I appreciated hearing the perspective of the different senators on the committee," says Duhaime,

"hearing what they were worried about—whether it was fisheries or tourism. It was interesting. They brought up mechanisms of approaching the problem that I hadn't thought of before."

At the hearing, Duhaime reported on what's known about the issue, particularly in light of what she and her lab have studied in the oceans and on the Great Lakes. Her lab conducted the largest-ever survey of Great Lakes plastic pollution, finding plastic in every trawl they dragged through the water, at some of the highest concentrations ever recorded in the world.

"In the water, these plastics serve as sponges of persistent organic pollutants," she says. Those pollutants include antibiotics, herbicides, fungicides, and insecticides, all of which have been found on microplastics in Lake Erie.

And because plastics make their way onto our plates via fish, into our water glasses, and even into our pints of beer, Duhaime says, "It's near certain that humans are consuming plastic."

Get on Board

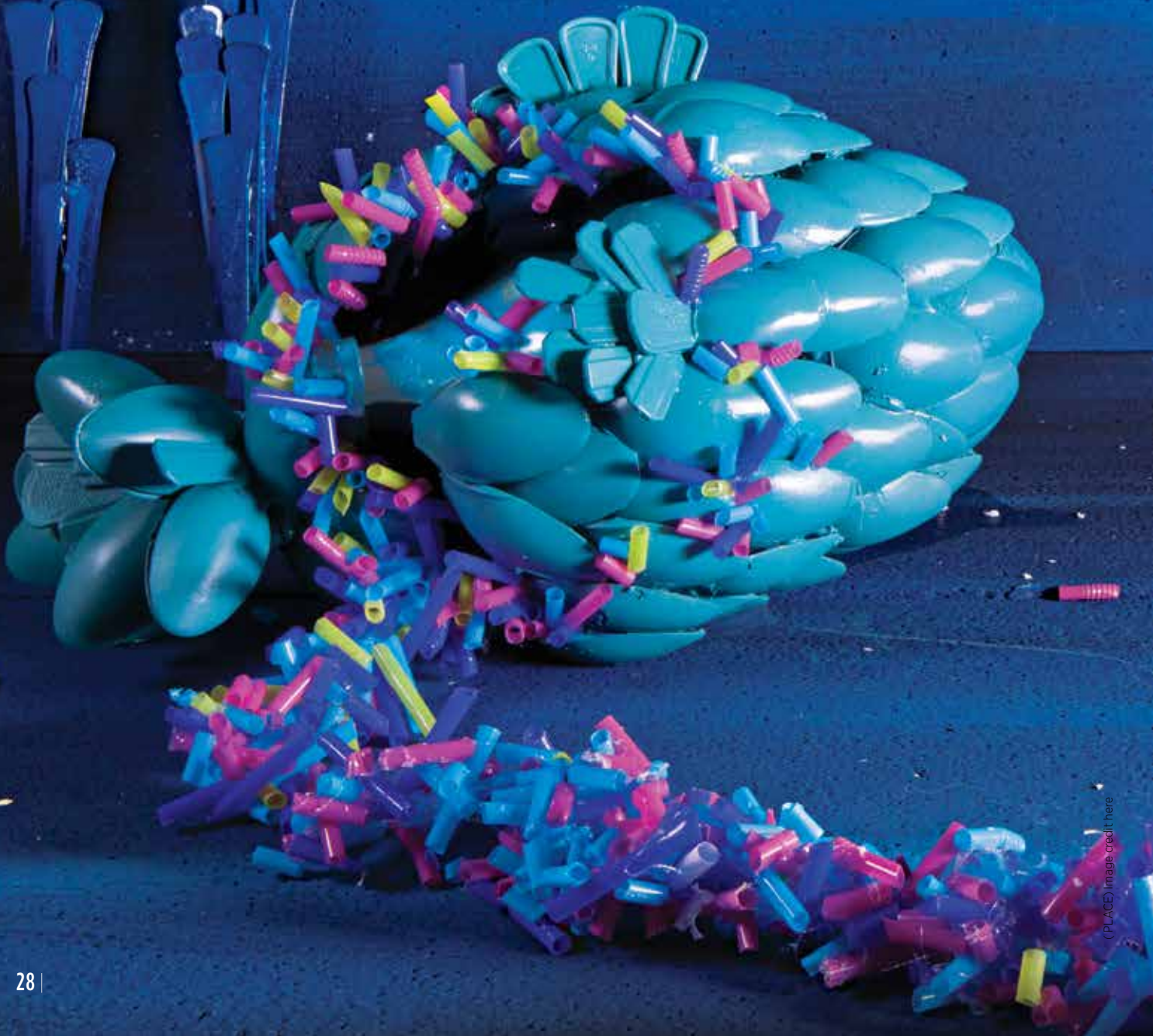
Duhaime's path to science and microplastics began with microbes and a dead whale.

She switched out of studying political science as an undergrad as soon as she took an evolution course for non-majors. "By the end of the semester, I knew I needed to change my major," she says. For an extra writing credit, she wrote a proposal centered on deep sea hydrothermal vents and their microbes. The work scored her an internship at Monterey Bay Aquarium.





Plastic can be unexpectedly easy to find in the oceans, and easy for birds and other animals to mistake as food.



The work she did during her internship involved hanging out on board a ship that was tethered to a deep-sea vehicle that dove almost two miles underwater to explore a whale fall – the carcass of a whale at the bottom of the ocean. The team ended up discovering two new species of worm feeding on the dead whale bones. They named the species after the Latin term *Osedax*, meaning “bone devourer.”

The experience had Duhaime hooked. She hopped on a handful of research vessels after that during graduate school and beyond, pursuing research as far as Antarctica.

“I was driven to solving problems in water use and sustainability combined with other research on microbes,” she says. “That was why I tracked down my first plastic pieces from the North Pacific, to see the microbial community on one piece versus another. If that can help inform something about the impact of plastic in these ecosystems, then all the better.

“Our current work is focused on the microscopic life-forms that live on plastic debris,” Duhaime says. But her lab also studies how microbes might feed on and help decompose the plastics they colonize, non-native microbes and contaminants hitching rides on microplastics, and even the viruses that attack microbes in the water.

Duhaime and her lab often go out in boats, which serve as “floating field stations.” For their earlier survey of Great Lakes plastic pollution, members of Duhaime’s lab boarded the *Nancy K*, a classic gillnetter fishing boat retrofitted for science research by David Brooks, someone whom Duhaime describes as “an uber-citizen scientist and wonderful human.”

A retired engineer from Chelsea, Michigan, Brooks has an outsized interest in scientific surveys. He built a side winch on the boat so the science crew could tow their plastic trawl, along with

bunks for overnight expeditions. “He donated all of his time and fuel,” Duhaime says. “His enthusiasm and interest in environmental monitoring and protection was the only reason we got our dataset. I don’t know what we would’ve done without him.”

Duhaime embarked on the *Nancy K* with Rachel Cable (M.S. ’12) – a longtime research technician who leads many of their plastic sampling trips and develops methods for analyzing the samples they bring back to the lab – along with the remaining crew of students. On a typical trip, Duhaime, Cable, and the crew – which has included many undergraduate students and, once, a barista from a coffee shop near campus – might send a manta trawl net out onto the water’s surface for 20 minutes at a time, coordinate to pull it in, and then dump everything from the net into bottles, picking out plastics to preserve for microbe sampling later. On other trips, bongo nets can collect plastics from lower layers in the water. On yet other trips, such as with the eXXpedition and its all-female crews, Duhaime and others trawl for plastics with the aim of raising the profile of women scientists while raising awareness about plastic pollution.

Drying Up and Raining Down and Flowing All Over

Duhaime especially has loved going out with students on the *Laurentian*, a 65-foot schooner on the Great Lakes, as part of her new “Microbes in the Wild” class, which receives support through U-M’s Third Century Initiative. The students love it, too.

“I really enjoyed going out on the ship and just talking with the crew about the science we were doing, answering their excited questions, and



talking about how our work could help the Great Lakes,” says Anna Kent (B.S. '18), who took the course a few years ago. “Some of the most fun parts weren’t really part of the class—like sitting around the campfire and sharing stories,” she says. From the boat, Kent’s class watched a solar eclipse from the middle of Lake Michigan.

Duhaime thinks of the class as “expanding beyond the campus community with what we can do in a field course,” merging education, research, and public interaction with formal coursework. For two weeks in the summer, the students live and work at LSA’s Biological Station, cruising overnight on the *Laurentian* to collect data for the research projects they’ll complete during the fall semester at U-M’s Central Campus. Students learn how to ask and answer science questions while considering sustainability and the lakes that surround them here in Michigan.

“We pull in nets that are just full of plastic—chunks and chunks of plastic,” Cable says about some of their fieldwork. “It’s good for the students to have the experience, because they bring the plastic back to the lab to sort, and they wouldn’t otherwise know that these plastics came from the beautiful lakes they visit.”

For Duhaime and the students she collaborates with, understanding and advocating for clean water through scientific work is a specific and personal story—especially here in Michigan.

“I grew up in Tecumseh, Michigan. I grew up with HOMES,” says Alexi Schnur (B.S. 2018), referring to the well-known mnemonic for the Great Lakes: Huron, Ontario, Michigan, Erie, and Superior. Schnur worked in Duhaime’s lab from her very first week as an undergraduate and took the “Microbes in the Wild” course during her senior year. “We don’t think about water, because we have it. We have so much freshwater here that’s usable and healthy. As a Michigander, it’s been there my whole life, and I want to keep it that way.”

Still, the plague of plastics translates as a global problem. Because water flows everywhere on

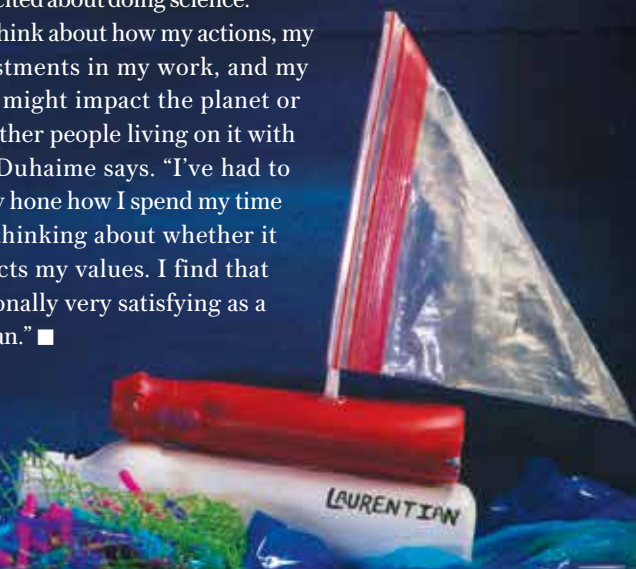


Earth, connecting to itself across the globe, drying up and raining down in a completely different place, Duhaime says, “All the people on Earth, no matter where they live, share all the water all the time.” Which gets Duhaime thinking that one of her most important jobs—and a way to show kindness as a human being—is to help keep water clean.

Duhaime helps through her research and when she speaks to senators at the Capitol. She’s been working with federal programs to develop an action plan for the Great Lakes. She has designed a class that encourages students to think in terms of water sustainability. And she’s intentional about modeling conscientious work in science for her three daughters.

And while most senators and scientists, including Duhaime, would say that we still don’t know enough about microplastics to call for immediate legislation, she does see a clear, immediate need to follow up with research about plastics and their colonizing microbes. It’s one of the reasons she gets so excited about doing science.

“I think about how my actions, my investments in my work, and my time might impact the planet or the other people living on it with us,” Duhaime says. “I’ve had to really hone how I spend my time and thinking about whether it reflects my values. I find that personally very satisfying as a human.” ■



Shed Some Light

Alumnus Justin Wong is only a few years out of school, but he's already worked for a number of transformational arts organizations — including one of New York's newest cultural spaces located in Manhattan's Hudson Yards.



IT'S HARD TO imagine what kind of profound and transformative thoughts you would have access to if you attended all of the first-year performances and programming at the Shed, a new art space in New York's tony Hudson Yards neighborhood.

The list of events is impressive, and it's *long*. The space opened in April with "Soundtrack of America," a performance directed by film director Steve McQueen celebrating African American music. After that came "Norma Jeane Baker of Troy," a new dramatic work by former U-M professor Anne Carson. Later still was "Art and Disobedience with Boots Riley," who directed last summer's indie film *Sorry to Bother You*.

The Shed defines itself as a multidisciplinary art and performance space, with a heavy stress on the "multi." The work there is multimedia, multigenre, multifaceted. One of the Shed's spring exhibitions is a collaboration between visual artist Gerhard Richter and composers Steve Reich and Arvo Pärt that includes still images, choral singers, animation, and live instrumental music. A Björk concert features the Icelandic artist's signature extravagant visual effects. *Dragon Spring Phoenix Rise*, a kung fu musical about twins who discover the power to extend life, opened over the summer.

Alumnus Justin Wong (A.B. '16), who has worked at the Shed since before it opened, says the space's meteoric opening and ambitious and intensely collaborative programming differentiate it from other cultural landmarks in the city.

"I grew up coming to these storied art institutions," says Wong, who was raised on Long Island. "I grew up with the Metropolitan Opera and Lincoln Center and the Whitney Museum of



American Art. You walk into them with this sense of history. You know what they do and you know that they arrived a long, long time ago. The Shed turns all of that on its head. It comes with the same gravitas, but it's entirely new."

The dexterity of the Shed's programming is mirrored in its architecture.

The most visibly striking part of the Shed is its husk — an eight-million-pound shell that can move back and forth based on what's happening in the space. An architectural and engineering attraction in its own right, the shell moves thanks to six steel "bogies" — basically giant six-foot-tall wheels — powered by six 15-horsepower engines.

For large events, the shell moves out to create an enclosed space for concerts and performances. On other days, it's retracted to create a walking and sitting space for pedestrians.

Wong was able to witness the construction of the place from the outside — and inside.

"I started working here in July 2018," Wong says. "Back then it was just a skeleton with no escalator. Now, nine months later, it's a real building, and it's entirely new. I've never been a part of anything like it."

FUEL FOR LIFE

Wong had trouble deciding on a major at U-M — a lot of trouble. So much trouble that he switched majors ten times in his first three semesters.

Eventually, though, he landed on a double major, studying history of art and Chinese language. His studies, along with a transformative internship at U-M's University Musical Society, became an engine that has powered his career since school.

"It's not necessarily the material. It's not about sixteenth-century German furniture," Wong says. "It's about the amount of detail you have to pay attention to, as far as art history. It's not just the content of



THE OUTER SHELL OF THE SHED, IN NEW YORK'S HUDSON YARDS NEIGHBORHOOD, WEIGHS EIGHT MILLION POUNDS AND MOVES ON SIX-FOOT-TALL BOGIE WHEELS, EXPANDING OR CONTRACTING BASED ON THE NEEDS OF THE ART SPACE. LSA ALUMNUS JUSTIN WONG BEGAN WORKING AT THE SHED THE YEAR BEFORE IT OPENED, WHEN IT WAS "JUST A SKELETON WITH NO ESCALATOR."



WONG, WHO NOW WORKS AT THE SHED, HAS ALSO WORKED AT THE GHOSTLY INTERNATIONAL RECORD COMPANY AND AT NATIONAL SAWDUST, A VENUE FOR NEW AND CLASSICAL MUSIC IN NEW YORK CITY. “THE WAY I INTERACT WITH MUSICIANS AND ARTISTS IS DEEPLY INFORMED BY THE OPEN-MINDEDNESS, CRITICAL THINKING, AND METHODS OF INTERPRETATION MY PROFESSORS ENCOURAGED IN EACH CLASS I TOOK,” WONG SAYS.



the painting that you’re looking at, it’s all the way down to the type of wood on the frame – all of those details are important. Learning to pay close attention, to think and write critically, those are the only reasons that I can do what I’m doing today.

“And Chinese has opened so many doors,” Wong continues. “Having more than a single way to think about things really makes the world more malleable.”

After school, Wong landed two part-time internships: one at the Ghostly International record label, started by fellow LSA history of art alum Sam Valenti IV (A.B. ’02), and one at the

Williamsburg music venue National Sawdust. He eventually was offered a full-time position at National Sawdust, and from there moved to the Shed.

At the Shed, Wong does everything from greeting esteemed guests at the front door to ensuring that performances, fundraising events, and high-level meetings are planned and executed perfectly.

“My team makes sure that the ship keeps running,” Wong says. “Every day and every project is different. I just have to be there and make myself available to get done whatever needs to get done that day.”

Wong says the job challenges him in ways he wasn’t expecting in terms of the kind of work that he ends up doing, the people he ends up connecting with, and the amount of effort it takes to make a home for the Shed’s raft of challenging, complicated art pieces.

“We worked so hard to get ready for the opening, and it felt like we were getting close to the finish line, but really it was the starting line,” Wong says with a laugh. “It’s going to be a big year.” ■

A (Piece of a) Bird in the Hand

We know why raptors would drop the inedible parts of the birds they try to eat, but why would anyone want to pick them up? The answer is—scientists! Welcome to the University of Michigan Museum of Zoology’s “prey drop” collection. (You might want to watch your step.)



W

HEN A PEREGRINE falcon attacks, watch out.

They hunt with the sun behind them, so they're harder to see by their prey, which are most often smaller birds. Peregrine falcons often fly high into the air, then dive straight down — a move that's called a "stoop" — tucking their wings in tight to their bodies and reaching speeds of more than 200 miles per hour, making them the fastest bird on the planet. Sometimes, they'll brake at the end of the stoop and pull up, striking their target from below. To attack larger birds, like ducks, they ball their feet into "fists" and punch the bird at high speed, likely breaking the bird's back so it falls to the ground.

The falcons eat the meat of the bird, leaving ripped wings, discarded heads, plucked feathers, feet, and more behind. A mated pair of peregrine falcons that lives on U-M's campus has been discarding these uneaten prey parts locally for years, and some LSA scientists have collected the pieces for research. As a result, they not only got information on the falcons' diets, but they also discovered data about migratory birds in the area.

A FIELD GUIDE TO U-M'S PEREGRINES

The U-M falcons first made headlines when they began nesting in Burton Tower around 2010, high up amid the bells of the Central Campus carillon. Their presence was welcome evidence that these once-endangered birds were making a population comeback.

However, the birds' location in the tower wasn't ideal; summer storms would wash away their nest and eggs each year. So U-M researchers built nest

THE FALCONS EAT THE MEAT OF THE BIRD, LEAVING RIPPED WINGS, DISCARDED HEADS, PLUCKED FEATHERS, FEET, AND MORE BEHIND. SOME LSA SCIENTISTS HAVE COLLECTED THE PIECES FOR RESEARCH.





boxes for the birds on North Campus and the Medical Campus, and, by 2016, the pair had hatched 21 chicks.



The birds are thriving now—the couple hatched four chicks last year: Betsy, Bursley, Markley, and Mojo. And for years now, at their old and new homes, the falcons have regularly dropped bits of prey near their nests. Some of these discarded parts have made their way to the University of Michigan Museum of Zoology (UMMZ) thanks to people like Kenneth Elgersma, a former Department of Ecology and Evolutionary Biology post-doctoral fellow.

“When I first came to U-M, I collected the remains from their breakfast several times a week. I didn’t often collect guts—they eat those. More often it was heads, beaks, feet, wings, and other inedible parts,” Elgersma says. “A few times I collected whole birds that the peregrines probably just dropped and didn’t bother to pick up.”

Elgersma and others brought the remains to UMMZ’s bird division, where professionals prepared the remains as they would any scientific sample.

“If there was meat left over, that would have been removed,” says Ben Winger, a UMMZ assistant curator. “If there was a head, someone would have removed the brains. They’re dried and prepared in the same way as other specimens in the collection.”

This includes cataloging and identifying the leftover parts. “It’s a fun challenge to figure out what the falcons dropped or what they ate from just a wing or a beak,” says Winger.

Clues about the birds’ species can be found in distinctive patterns in the feathers, or in the size and shape of the beak. “If it’s a conical heavy beak, it’s more likely to be a finch for cracking seeds,” says Winger, “whereas, say, flycatchers have a big wide beak for snagging insects out of the air.”

The “prey drops” collection isn’t huge by any stretch—the entire grouping only takes up a few drawers in one cabinet—though it is slightly unconventional. “It’s basically a set of plastic bags with parts and incomplete carcasses and labels,” says Winger. “It looks like an evidence bag in a police locker or something.”

Of course, the “prey drops” collection is only a small part of the archive. UMMZ has one of the largest research collections of bird skins and

skeletons in the country, and it serves research requests from all over the world.

PIECES OF THE WHOLE

Winger says that what the peregrine falcons eat is a sample of the “diversity of birds that migrate through the area, so actually it’s an interesting window into what birds are around.”

The falcons have a strong preference for slow-flying birds like cuckoos or woodpeckers. “Cuckoos are seen by bird watchers, but not commonly,” Winger says. “So the fact that the peregrines are finding them could mean there are more cuckoos migrating through Ann Arbor than we would realize from records from bird watchers alone.”

And it’s not just cuckoos. “The falcons have caught birds that are almost never seen by bird watchers in the area,” Winger says. “We have one, maybe two, specimens of a bird called the yellow rail, which is quite a rare bird in southern Michigan. But somehow the peregrines caught them.”

Winger adds that even though the samples in the collections are incomplete, there’s still much to learn from them. “If someone wanted to study the origin of these birds—where they were migrating from or to, for example—they can still get chemical isotopes from the feathers. If there’s any meat on the specimens at all, that would be preserved in our liquid nitrogen tank for genetic analysis. And sometimes, if the whole skull is intact, there is data there for morphological analysis.”

A morphological analysis might include, say, a comparative analysis of the peregrine prey skull against other skulls in the collection to study size differences in bird populations. Winger studies these issues in his own research. “We have done research using other collections that shows migratory birds are getting smaller and their wings are changing shape due to climate change,” Winger says. “So being able to measure the beak or the wings, even if that’s all there is, is still useful information.”

And what can you do if you find some prey drops yourself and want to turn them in to UMMZ’s collection?

“The most important thing is for people to write the date that they found it and the location,” Winger says. “That’s enough for us to get it into the collection.” ■





FACULTY BY LARA ZIELIN

When in Rome

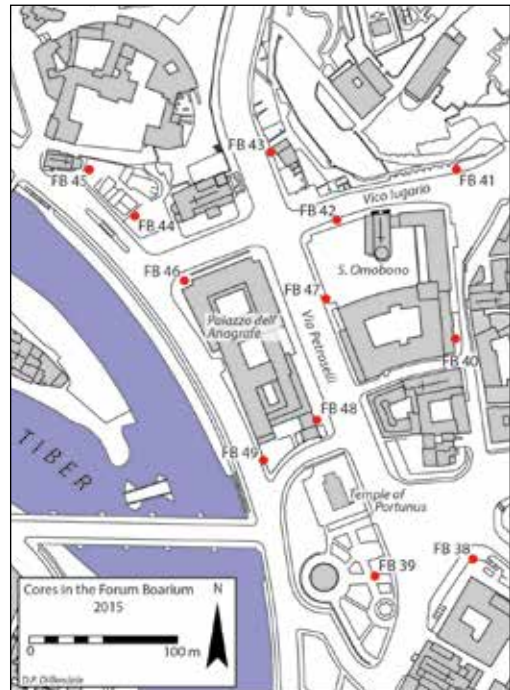
Collaboration is key as LSA researcher Laura Motta studies ancient Roman and Egyptian material to determine how cities — and the people in them — evolved and changed.

THE MYTHOLOGICAL HISTORY of Rome says that twin brothers Romulus and Remus were put in a basket to be drowned only to have the river flood and bring them to a wolf, who raised the boys as her own. When they were grown, Romulus and Remus wanted to found a city they could rule. According to legend, that city was Rome.

Ancient mythologists were likely inspired by the Tiber River for Rome's origin story, and rightly so. The river is prone to flooding, just like in the twins' tale, and it has played an important part in Rome's success as city, state, and global empire.

But what was it about Rome's location along the 252-mile river that made it special, especially with so many other budding, competing cities nearby? What made Rome able to grow and thrive the way it did?

(ABOVE) © Jorge Royan; (RIGHT) Courtesy of Laura Motta



(Above right) RESEARCHER LAURA MOTTA AND HER TEAM DRILLED CORE SAMPLES IN AND AROUND THE FORUM BOARIUM, THE CITY'S ANCIENT CATTLE MARKET AND THE SITE OF ROME'S FIRST PORT. (Left) A NIGHT SHOT OF THE TIBER RIVER FLOWING BENEATH AN ANCIENT ARCH.

According to Laura Motta, who works as a lecturer in LSA's Department of Classical Studies and researcher with the Kelsey Museum of Archaeology, part of the answer may be found in a sudden buildup of sediment that created the Tiber Island in the heart of Rome.

Motta's research—a meld of archaeology, geology, and environmental science—shows that the island may have been created very suddenly by a shift in the river's regime in the area of Rome in the sixth century BCE. This shift was created by a fault line that toppled the topography above it. As a result, the Tiber River changed course, and silt from the altered landscape built up in its waters at unprecedented rates. Within the short span of 100 years—a relatively short timeframe to a geologist—the island had formed.

And *this* was the game changer.

"The Tiber Island was crucial as a ford to cross the river," says Motta. The island slowed the flow of the river and allowed Romans to build the first bridge across the water. The island fostered the growth of the city's first river harbor. Goods could be shipped, sold, and traded here in a way they couldn't anywhere else along the river.

"The traditional story says that Rome became Rome because it was founded in the perfect spot," Motta says. "Instead it seems that the settlement existed there, and then all of a sudden the island appeared, and it became the perfect spot. So the real story is a little bit different."

DRILL, BABY, DRILL

Motta's evidence for the fault line was the result of a coordinated research effort between archaeologists, geologists, and volcanologists from two continents to drill and collect core samples of sediments in the heart of ancient Rome. The researchers pulled out sections from between 15 and 50 meters below the city to better understand the city's environmental history.

Motta studied the samples, looking at "differences in the sediments in terms of color, texture, and

“OUR GOAL IS TO CONNECT ENVIRONMENTAL PROCESSES AND EVENTS TO ARCHAEOLOGICAL MATERIALS AND SPECIFIC HUMAN ACTIONS. THEN, WE CAN CONNECT IT TO THE HISTORICAL CONTEXT.”

inclusions.” This material, she explains, gives scientists evidence about “the movement of the river sediment and the pace at which it’s being deposited. We sift samples of these columns to look for organic material, and use that organic material to date the deposit.”

Motta says she observed many inconsistencies in the sediments that couldn’t be explained by climate alone, including a huge increase in sedimentation at one point. “It’s a very localized thing, and we think a fault line could explain it.”

CORE SAMPLES WERE KEY TO THE RESEARCH TEAM DISCOVERING WHAT MIGHT HAVE BEEN RAPID CHANGES IN THE VALLEY AROUND THE TIBER RIVER APPROXIMATELY 2,600 YEARS AGO.

Motta’s working hypothesis is that the fault line caused one side of the valley to collapse, trapping sediment there and ultimately causing a buildup in the river that eventually became Tiber Island.

This work could provide missing details to explain the circumstances that allowed Rome to go from being one of many similar cities along the Tiber River to a regional superpower and, ultimately, a global empire.

Motta says that understanding how the physical landscape changed in this time period is critical to understanding the social, political, and economic development of early Rome.

“Our goal is to connect environmental processes and events to archaeological materials and specific human actions. Then, we can chronologically connect it to the historical context.”

CLIMATE CHANGE AND ROME’S BREAD BASKET

Motta’s research also includes projects that test material a little closer to home, in samples preserved at the Kelsey Museum of Archaeology.



Noted academic and archaeologist Francis Kelsey excavated materials in Karanis, Egypt, from 1924 to 1935. (You can read more about Kelsey and Karanis on pages 12–23.) The village was a treasure trove of artifacts that revealed insights about the daily lives of everyday Egyptians during Roman times, including the pottery they used, what kinds of crops they planted, the texts they wrote, and more.

Kelsey also excavated and preserved plant-based materials from houses and granaries in Karanis, which Motta is eager to study since the area in and around the village was producing crops that were being shipped to Rome. “Egypt was the bread basket of imperial Rome,” Motta says, “and Karanis was part of this commercial enterprise and system.”

Motta’s goal is to use DNA and isotopic analysis to gain insight into nutrition during this time. Motta and collaborators at the Free University of Brussels will analyze the nutritional values of Karanis’s ancient varieties of crops, looking at micronutrients such as zinc, iron, manganese, potassium, and proteins, and investigating how Egyptians were growing these grains.

The team has taken on this work with the hopes of testing and possibly disproving long-held assumptions about the quality of food for Egyptian nobles, farmers, and everyone in between.

“There is an assumption that nutrition in antiquity was very different between the upper and lower classes, that the upper classes had access to foods rich in nutritional value and the lower classes basically had a diet focused on staple cereals and some legumes. The problem is that most of the data used to assess nutritional values is gathered from modern foods and materials, which aren’t necessarily the same thing people were eating 2,000 years ago.”

Motta points out that high-yield grains were first developed during the 1950s and ’60s to increase agricultural output worldwide, and that those developments may have changed the nutritional value of the food.

“Modern varieties and the modern way of growing the crops affects the micronutrients a food contains,” she continues. “So this idea that lower classes in Egypt and Rome had poor nutritional value might be totally biased.”



SOME OF THE EQUIPMENT USED TO DRILL CORE SAMPLES, WHICH HELP RESEARCHERS CONNECT THE DEVELOPMENT OF ROME TO THE ENVIRONMENTAL HISTORY OF THE AREA AROUND THE CITY.

This, she says, may provide insights valuable to modern-day humans as the climate changes due to global warming. Ancient grains may, Motta says, be more resilient in extreme environments. We’re just not sure yet. “There may be something that we can learn from these ancient crop varieties that can be applied to modern varieties,” Motta says.

To conduct this isotopic research and complete her core sampling work in Rome, Motta teams up with other researchers from around the globe and across the country. These projects are incredibly complicated, and require lots of different scholars to bring their specialized knowledge and wells of experience to cracking ancient problems and understanding the truly big picture of environmental, geological, and social-political evolution.

“You can’t do any of it alone,” Motta says. “You need the expertise and brainstorming and discussing things to add different points of view that are converging from different backgrounds. These are not *my* projects, they are *our* projects.” ■



ALUMNI BY SUSAN HUTTON

In the Arena

Economics alumna Thea Lee has been a gladiator in trade and labor policy debates for nearly 30 years. As global relationships and alliances continue to shift, she's still ready for a fight.

IF YOU HAD lived in Ann Arbor in the fall of 1986, you might have opened your door one day to find Thea Lee (A.M. 1984) standing on your front porch. Dean Baker (Ph.D. 1988), a fellow student in her economics Ph.D. program, was running for Congress, and she was co-managing his campaign. "It was an interesting episode in my graduate career," Lee says with a laugh, "and, possibly, a distraction."

In the end, Lee never did get her Ph.D. "I eventually went out in the world and took on jobs that

were ultimately more interesting and compelling to me than finishing my dissertation, unfortunately,” Lee says. “I got an excellent, foundational education at Michigan. I learned a lot from my professors and my fellow students. I like to say I wrote three thirds of different dissertations—I just never put them all together into one. I wouldn’t advise anybody to take the route I did, but it worked out okay for me in the end.”

Making her own way is the emblem of her career. After U-M and a two-year stint as staff editor at *Dollars and Sense Magazine*, Lee joined the Economic Policy Institute (EPI), a left-leaning think tank, as a trade economist. There, she took on economics luminaries like Nobel Laureate James Tobin, Senator Bill Bradley, and U.S. Trade Representative Carla Hills on a national stage.

“Those were pretty interesting years in terms of trade policy,” Lee says. “The North American Free Trade Agreement and the World Trade Organization debates were happening at that time, and I became a voice for a progressive, pro-worker critique of mainstream trade policy.” Now, 20 years later, she still is.

“I needed all the econometrics and statistical and economic theory base that I had learned at Michigan to engage in those debates as an economist and not as an activist or just some hack,” Lee says. “It felt important to have the economics expertise and a mainstream economics education to be able to advocate effectively and understand the arguments on both sides of the

“I FIND THE BOLD POLICY PROPOSALS OF THE CURRENT MOMENT ENCOURAGING,” ECONOMIST THEA LEE SAYS. “THERE SEEMS TO BE MORE OF AN APPE-TITE AND AN ENERGY FOR THEM NOW.”

“I FEEL LIKE ECONOMICS GIVES PEOPLE THE TOOLS TO ASK AND ANSWER IMPORTANT QUESTIONS ABOUT HOW TO MAKE THE WORLD A BETTER PLACE.”

debate. My goal was to be an effective spokesperson who could critique the forecasts and economic models that were out there.”

Lee says it’s common for economists to use simple top-line models to refute the idea that markets can operate differently. “If you just draw your simple demand-and-supply curve and put your equilibrium, right at the intersection of demand and supply, it might



seem like there's only one answer to what's the right wage," she says.

"But if you get underneath and examine the assumptions about the asymmetry of power in the labor market relationships more carefully, then you might come up with a more interesting analysis that fits the world that we live in better."

As examples, Lee points to policy decisions that influence the way income is distributed through mechanisms that are considered to be free markets. A free market can be protected by things like pharmaceutical patents and copyrights, she says, and such protections have a huge impact on the way income gets distributed. Learning how to challenge the assumptions behind these policies, she says, helps ensure working people are not lost in the debate.

WORK IN PROGRESS

After leaving EPI in 1997, Lee went to work for the AFL-CIO, first as chief international economist, then as policy director, and finally as deputy chief of staff. In her two decades with the labor federation, her economic strategy

“GENDER, RACE, AND EVEN ECONOMIC PRIVILEGE ARE IMPORTANT ISSUES IN TERMS OF HOW WE LOOK AT THE WORLD AS ECONOMISTS. I THINK IT’S IMPORTANT FOR THE POLICY DEBATE TO HAVE A DIVERSITY OF BACKGROUNDS AS WELL AS A DIVERSITY OF VIEWS.”

and policy research helped to make her into a recognized authority in international trade and labor. Lee testified before Congress, headlined high-stakes and influential economics conferences, and appeared on programs such as *PBS NewsHour*, *Good Morning America*, and CNN to talk about trade deals, wage inequality, and worker rights. Lee stayed with the AFL-CIO for 20 years, until 2018 when she returned to EPI, this time as its president.

Her international trade experience has now put Lee in the center of the economic policy discussions that are happening behind the headlines. In 2018 she was appointed to Congress's U.S.-China Economic and Security Review Commission, which tracks the national security implications of the countries' trade relationship – a commission whose profile has reached new heights in the evolving trade war.

Trade tensions between the United States and China have gotten a lot of media, but Lee thinks there are still important details that most Americans don't know. "I think a lot of Americans do have a general sense that this is a lopsided and maybe unfair trade relationship," she says, "but the granular details might surprise people."

Using a moral compass and economics principles, Lee navigates trade discussions into territories that include Chinese and American workers. The way a country treats its workers is a fundamental part of competition, Lee says. "It is essential for countries to agree to respect internationally recognized core labor rights as a necessary condition of production so that countries can legitimately compete," she says. "Raising this as an international competition issue is, to me, both economically right and socially important."

Such arguments are staples of public policy debate, but Lee thinks economists' roles in these debates are beginning to change. "I think economists are playing a more interesting and a more nuanced role in the national conversation – maybe because we're not quite as predictable," she says. The idea about who an economist is has also become less predictable – a shift that Lee believes affects economists' work too.

"Gender, race, and even economic privilege are important issues in terms of how we look at the world as economists," she says. "It's important for the policy debate to have a diversity of backgrounds as well as a diversity of views."

These multiple perspectives have helped to develop new directions in the field, directions Lee believes will create new opportunities for economists to use their expertise and tools – and their data – to expand the policies they're working with. Such changes, she says, are good for the world.

Because in the end, for Lee, public policy is about making changes that are bigger than one person at a time. "I've always cared about social justice, and that's why I studied economics," she says. "Economics gives people the tools to ask and answer important questions about how to make the world a better place, and I see the policy arena as a particularly exciting and important place to engage. And I think that's an important place to be." ■

Thunder Lizards and Cigar Boxes

In the early-to-mid twentieth century, paleontologists dropped fossils into barrels and candy boxes — basically anything they had on hand. After discovering these containers in a museum basement, one LSA student worked hard to make sure that the quirky, improvisational archiving done by scholars of the past was recognized and celebrated.

**That's how we think it happened, anyway. Context clues from the barrel and Arnold's areas of research suggest that the details here are correct, but it's impossible to know for sure with the evidence that we've got.*

PICTURE IT— Illinois in the mid-1950s.

Professor Chester A. Arnold is standing on a steep slope, staring at a pile of fossils at his feet. He takes off his black-framed glasses and wipes the sweat off his brow. It's a hot summer afternoon, but the hard labor of hunting samples at this mine has been worth it.

Arnold was collecting coal balls — concretions found in veins of coal that often contain very well-preserved plant fossils. These particular plants are from the Carboniferous Period of about 300 million years ago, when this area of the country was a thick, tropical swamp, teeming with life. Arnold collects his specimens and now needs to ensure they all make it back to the University of Michigan, where he is one of the Museum of Paleontology's curators and a botany professor.

But how to get the fossils home?

That's when Arnold sees it: a discarded nail keg. The barrel's body consists of wooden slats bound together with thick wire. Its bottom is canvas. It's perfect.

Arnold tosses the fossils into the barrel and slaps on a label with his name and address at U-M. He'll ship the barrel east, and, eventually, it will arrive at the University of Michigan Museum of Paleontology. After the fossils are studied, there the barrel will stay for over 60 years — its contents safely tucked inside when they're not being studied.*

Fast forward to 2015. Anna Minnebo (A.B. '19) is a first-year student in LSA working to help with the U-M Museum of Paleontology's big move from the Alexander Ruthven Museums Building to its new homes at the Research Museums Center and the Biological Sciences Building. Like any

(continued on p. 48)





◀ (-1950-1960)

Christmas Card Box

A box of "Sixteen Distinctive Christmas Cards" from Slater's Book Shop, which existed at 336 S. State Street in Ann Arbor until 1971.

(-1920-1930) ▲

Willson's Gummed Paper Letters and Figures Box

Originally used to hold printing letters—in this case the letter "D"—this box long held small bone fragments and teeth.

(-1930-1940) ▼

Red Diamond Explosives Box

Originally containing dynamite or other explosives, this box from the Cleveland-based Austin Powder Co. held fossils from a dig that occurred sometime in the 1930s or 1940s.

(-1940) ▲

Hershey's Almond Milk Chocolate Box

A display box that once held candy bars that cost a nickel, this container has been retired from its fossil-keeping duties.





◀ (-1920)

Herman Cortez Cigars Box

One of many long-surviving containers from the museum's archives, this Cortez box is still serving as a container for fossil vials today.



(-1940-1950) ▶

Ammunition Barrel

Once intended to hold explosives like gunpowder used in mining, this barrel was repurposed in the field to hold fossils. The address is still visible on the mailing label.



(-1931) ▲

Ripley's Believe It or Not! Candy Box

Ripley's Believe It or Not! began as a syndicated newspaper panel in 1918, eventually branching out into radio shows, television programs, museums, and — apparently — candy. Questionable marketing tie-in or not, this box became a makeshift fossil container in 1931.

(-1939) ▼

Newspaper-Wrapped Bone Fragments

A page of ads from a 1939 newspaper has been wrapped around fragments of an Edaphosaurus, a four-legged dinosaur with a tall spine along its back.



move, there's a lot of work that needs to be done down in the basement. And that's when Minnebo first sees the kegs. There are about 15 of them, looking very much like they did the day they rolled off the train in Ann Arbor from Illinois.

Surprisingly, the barrels aren't the only unique fossil containers in the Museum of Paleontology's

THE FOSSIL CONTAINERS ARE A THROWBACK TO A BYGONE ERA WHEN PALEONTOLOGISTS USED EVERYDAY OBJECTS TO COLLECT AND SHIP SAMPLES.

collection. There are old cigar boxes, grenade fuse boxes, candy boxes, newspaper bundles and twine, and much more, each of them a throwback to a bygone era when paleontologists used everyday objects to collect and ship samples.

In 2015, most of the containers were still full of fossils – from small bone and teeth fragments to larger fossils, pieces of sediment, and “matrix,” which is the rock around the fossilized remains.

These packages and containers were never meant to house anything as historically significant as dinosaur bones. Without their precious cargo, the containers most likely would have been discarded long ago. But because of where they ended up, they've endured.

“These containers aren't meant to be preserved, but they just happen to be preserved because they're in the same environment as the fossils,” Minnebo says.

Minnebo's job was to remove the fossils from the old containers and re-house them in industry-standard cradles so they could be transported safely to the new Research Museums Center. In the process, Minnebo documented the variety of containers in the museum's basement as part of coursework for her Museums 301 class. Her work shines a light on just how much fossil collection practices have changed over time and how paleontologists' research interests have evolved. It also provides insight into what a research museum chooses to exhibit (or not).

CATALOGING THE PAST

Most of the containers that Minnebo worked with came from the 1930s and '40s. In many ways, they illustrate the resourcefulness of scientists from this era, using “found” objects that were cheap and efficient to procure to store and ship their finds. Once the specimens were transported back to Ann Arbor, the researchers would sort the material into whatever they had on hand – like a candy or cigar box – instead of buying costly new containers.

But by 2015, some of the containers were physically breaking down, potentially causing damage to the contents inside. In fact, some specimens had already been damaged in storage conditions that were less than ideal.

Minnebo's recovery work was conducted under the supervision of Adam Rountrey (Ph.D. '09), a collection manager at the U-M Museum of Paleontology, and was critical to ensuring the long-term safety and protection of the fossils.

Along the way, Minnebo fell in love with the historic containers. “I love mid-twentieth century history, and I was always amazed at the quality of the containers,” she says.

When her Museums 301 class was tasked with creating a digital exhibit, Minnebo knew she wanted to create one around the old boxes and barrels and bundles of paper in the Museum of Paleontology's basement. She photographed the containers and wrote display text for them. She even went a step further and created a catalog of the exhibit that could be shared beyond the class. “I've learned so much from these collections and objects, and I want to share that with others,” she says.

The work unpacking the containers, some of which eventually made the move out of Ruthven with the fossils, literally took years. Minnebo explains that the number of items she sorted through wasn't a result of neglect, but rather because the needs of the field have changed over time. “Some of the specimens are more helpful to researchers than others,” Minnebo says. “The interests of scientists change. So something that might have been important to a paleontologist in the 1940s can become less important later on.”*

What's more, only a fraction of any museum's collection is ever on display at any given time, so it's normal to have numerous objects stored for teaching and research – just maybe not in such unusual containers.

Minnebo graduated in 2019 with a double major in anthropology and American culture and a minor in museum studies. This fall, she'll head to graduate school to pursue a master's degree in museum studies, with a focus on education.

“I love working with objects, but I need to have that space where I can talk to others and share with others,” she says. “I hope that I can find a way to blend the two.” ■

**Those materials sometimes become less interesting, Rountrey says, but they are the basis of paleontological science and often become interesting again, noting that the collection recently had a request for samples of coal ball material.*

ALUMNI BRIAN SHORT

The Future of Film Is Female

LSA alumna Meredith Finch started the Nevertheless Film Festival to give female filmmakers from all over the world a chance to be seen and heard.



IT'S THE AFTERNOON before the opening of the Nevertheless Film Festival, and festival founder Meredith Finch (A.B. '13) is sitting at a long, L-shaped table, working and chatting with festival administrators. The table is in a large multipurpose workspace in North Quad. There are red velvet chairs and glossy, hourglass-shaped end tables at one end of the room. The welcome desk where Finch sits is covered with festival paraphernalia, including sponsor material from Zingerman's and Cherry Republic, festival calendars and flyers, and stacks of stickers—black text on a white background—that say THE FUTURE OF FILM IS FEMALE.

One of the administrators is double-checking ticket return policies while another queues up music. “We went with a playlist of really badass women,” she says, then clicks play on her laptop.

The festival went from July 11-14 and featured 26 films. In order to qualify for entry into the festival, a film's creative team must include more than 50 percent female-identifying

“WE REALLY WANTED THE ATMOSPHERE ON THE TEAM TO BE ONE OF INCLUSIVITY AND COLLABORATION,” SAYS MEREDITH FINCH, THE FOUNDER OF THE NEVERTHELESS FILM FESTIVAL.

“PART OF WHAT WAS SO APPEALING WAS THAT WE COULD REALLY HAVE FULL REIGN OVER EVERY ASPECT OF PUTTING ON THE FESTIVAL, WHICH NONE OF US HAD EVER EXPERIENCED BEFORE.”

filmmakers in leadership positions. That means not just directors, but producers, directors of photography, composers, and other key creative positions.

The festival, which debuted this year, comes at a time when the film industry is grappling with inclusion and diversity, with public calls for increased diversity behind the camera from actresses Brie Larson and Frances McDormand and by director Ava DuVernay as well as things like the 4% Challenge, which asks people in the industry to commit to working with a female director on a feature film sometime in the next 18 months.

Finch really wanted to stress inclusivity and collaboration both on the screen and for the team running the festival, involving them in every aspect and element of the event so that they could learn by doing.

“Part of what was so appealing about doing the work ourselves was that we could really have full reign over every aspect of putting on the festival,” Finch says, “which none of us had ever experienced before while working at other film festivals like Sundance or Tribeca. I really wanted everyone on the team to feel comfortable sharing their ideas and opinions, especially when they contradicted what I suggested.

“We really wanted the festival to be a true *experience*,” Finch says. “Going to a film festival is not the same as going to see any old movie, and we really tried to drive that point home by being friendly and helpful from the minute a guest walked into the Michigan Theater lobby to the minute they left. I don't imagine the average movie-goer always has staff standing and saying, ‘Thank you for coming!’ when they leave the theater, but that's what we were there to do! We chatted with them while they were in the theater. It was never just a transaction. We really wanted them to feel welcome and excited about what they were experiencing.”

THE PERFECT PLACE

Finch majored in the Department of Film, Television, and Media in LSA (then known as Screen Arts and Cultures), and worked for two summers at the Ann Arbor Summer Festival while she was attending U-M, work that she loved. After graduation, she put her enthusiasm for film and event planning together, working for the Sundance Film Festival, the Tribeca Film Festival, and the San Francisco Film Festival. It was while she was working for the last of those that she was inspired to start a new film festival in Ann Arbor—one that would focus on films made by creative teams led by women.

“I was riding the bus,” Finch says. “I thought of the female-identifying theme off the top of my head, and a few days later I thought, where can I do this? Then Ann Arbor entered my mind, and there was no question of doing anything else.”

From there, Finch got to work. She recruited a team of curators and film screeners including





fellow U-M alumnae Proma Khosla (A.B. '13), Emily Lyon (SMTD A.B. '13), and Radhika Menon (A.B. '13). The all-women programming team includes filmmakers, writers, designers, and a veteran of the film distribution industry all working to provide a showcase for female-driven films.

Now that the first festival is over, Finch is very happy with the result. Over 230 films applied to be included in the festival, and 26 — nine feature films and 17 shorts — were screened over the festival's four-day run. The films screened during the festival included dramas taking place in rural Quebec and industrial China, a period piece set in the 1920s, and documen-

taries about pop stars, competitive organ playing, and the daily lives of Syrian refugees. Ninety-six percent of the directors for the films were female identifying; 50 percent were women of color; and 20 percent identified as LGBTQ+.

Now that it's over, Finch is taking stock of what she and her team have accomplished.

"On Sunday, after the final festival screening wrapped, I took the team to both Ashley's and Charley's — I had to show them how we used to celebrate in college!" Finch said a few days after the festival ended. "Even before the festival had started, I started taking notes in a Google doc called '2020' about what I would do differently if I were to do this again."

If Nevertheless happens again, Finch says, she'd love it to stay in Ann Arbor.

"My four years in Ann Arbor and my four years studying film in LSA changed my life completely," Finch says. "Ann Arbor is such the perfect place for people to try new things and take risks, the perfect place to bring a new pair of eyes to arts and culture and film." ■

“I’M STILL PROCESSING THE RESPONSE TO THE FILMS AND THE FESTIVAL OVERALL BECAUSE IT TRULY BLEW ME AWAY,” FINCH SAYS.
“NOT THAT I’M SURPRISED THAT THE ANN ARBOR COMMUNITY EMBRACED US, BUT THE WAY THAT THEY DID WAS REALLY SPECIAL.”

All the Rage

The digital age has accelerated our internal clocks to a degree that getting stuck behind a slow walker is enough to make us furious. But understanding why we get so mad can help us make better decisions about our anger and about helping other people, too.



P EOPLE MAY DISAGREE about a lot of things, but most of us are unified by a hatred of the slow. Slow WIFI, slow grocery lines, and slow drivers in the fast lane all have an uncanny ability to turn an ordinary afternoon into a frustrating one. LSA Professor of Psychology Stephanie Preston, whose lab researches the way emotions affect our well-being and encourage us to help others, says episodes of outsized fury such as sidewalk rage can teach us a lot about our better selves because they bring out our worst.

“Sidewalk rage is an example of the social bonds between people breaking down,” she says. “These feelings are usually unleashed on a stranger on the street, and it’s usually because we’re already stressed and running behind. All of the cues we naturally use to be empathic and connect to others in a positive way are missing.” In order to understand why rage takes over, Preston says we should begin with the brain.

Way back in our evolutionary history, humans developed the hypothalamus, an area of the brain about the size of an almond located down near the pituitary gland. The hypothalamus oversees essential bodily functions, such as regulating temperature, appetite, and sleep. It’s also responsible for some of our strongest feelings, like rage.

All-out emotional responses like rage were essential to our survival because they helped us defend ourselves against predators and other threats. “The hypothalamus is the source of our most innate behaviors, the kinds of things you want to happen almost reflexively,” Preston says. We’re eons away from those early automatic responses, but now the digital age has rewired the circuits in our brains into nearly reflexive responses because technology has changed the way we perceive time.

And that, Preston says, can make it harder to be generous and easier to blow a fuse.

NOT SO FAST

The neural structure in the middle of our brains is keenly tuned to things we find rewarding and one piece of processing a reward is time. The period of time between anticipating a reward and receiving it once served an evolutionary purpose. If our ancestors expended too many calories on the hunt or

walked too far to find food, their internal clocks made them impatient, which told them to move on.

When your phone pings because someone likes your photo, Preston says, the reward – and response – are immediate. This abbreviates the period of time we think a reward should take. And now that we spend our days sending texts, answering emails, and ticking off our virtual tasks as we do everything else, that accelerated perception of time has spread



into the rest of our lives. When you encounter the slowpoke standing in the walk lane of the moving sidewalk, it throws off your expectation of how long the walk should take and arouses your impatience. And if your evening already includes a trip to the store before you pick up the kids from day care and preparing for a big meeting after you put them to bed, encountering a clueless lollygagger who's obstructing your path can sometimes be enough to trigger a sense of rage.

SOMETHING OF THE KIND

In her Ecological Neuroscience Lab, Preston studies the mechanisms in our brains that “unfold automatically—as if your brain is making calculations all on its own based on the cues given, with no rationalizing or meditating.” Though episodes of sidewalk rage feel automatic, research has shown that they're not entirely.

Sidewalk rage is revealing, Preston says, because it requires specific conditions. “Because the person who is the target of your rage is a stranger, there are no cues like social hierarchy, so there's no reason to keep yourself in check,” Preston says. “When you're in an unfamiliar neighborhood where you feel out of place, you're less likely to rage at a stranger.” Conversely, when you're in an environment where you feel comfortable, you're more likely to feel like you have a license to vent.

But our ancestors weren't only developing the capacity to rage when they developed that part of their brain. The hypothalamus also has regions that encourage something that's pretty close to that feeling's opposite—altruism. “I don't like to use the word hardwired,” Preston says, “but there are mechanisms that cause us to be highly motivated to help others and be emotionally affected by others' emotions and distress, even to a degree we would call heroic. These neural systems are shared across species, in rodents and monkeys and, of course, in humans. The exact same brain areas in all of these animals promote this emotional response to need.”

In identifying the conditions necessary for sidewalk rage, the ways to encourage people to be kind and generous become clearer too. Our altruistic inclinations are bolstered by familiarity, a felt similarity, and common goals, Preston says. We're also more inclined to assist someone who we see as vulnerable—especially when we feel competent enough to help.

One solution to problems like sidewalk rage might be found if people could save themselves from the toll their outbursts take, Preston says. “If you raise your blood pressure for hours a day while you fight traffic or walk city streets, it's going to have an impact on your health,” she says. If, instead, we can cultivate the conditions that inspire us to be kinder to others, we might end up being kinder to ourselves, too. ■





M

ONE DAY.
ALL OF US.

SUPPORT WHAT
YOU ♥ ABOUT LSA.

#givingblueday
givingblueday.org

GIVING
BLUEDAY
12.03.19

M | LSA

LSA MAGAZINE IS PUBLISHED TWICE
EACH YEAR BY THE UNIVERSITY OF
MICHIGAN COLLEGE OF LITERATURE,
SCIENCE, AND THE ARTS

ANNE CURZAN
Dean
College of Literature, Science, and the Arts

MARTHA LUCKHAM
Interim Assistant Dean for Advancement

JOHN LOFY
Director, Marketing and Communications

TAMRA TALMADGE-ANDERSON
Director of Communications

ANTHONY CECE
Marketing Director

BRIAN SHORT
Editorial Manager

SUSAN HUTTON, ELIZABETH WASON
Editorial Staff

KATHRYN KOPALD
Creative Director

ALICIA VAZQUEZ
Art Direction and Design

NATALIE CONDON, LIZ DECAMP,
LEVI STROUD
Photography

LYNNE GOULD
Project Management

©2019 Regents of the
University of Michigan

ARTICLES MAY BE REPRINTED BY
OBTAINING PERMISSION FROM:

Editor, College of Literature, Science,
and the Arts, University of Michigan,
101 North Main Street, Suite 850
Ann Arbor, MI 48104

734.615.6333 | lsamagazine@umich.edu

REGENTS OF THE
UNIVERSITY OF MICHIGAN

Jordan B. Acker, Huntington Woods
Michael J. Behm, Grand Blanc
Mark J. Bernstein, Ann Arbor
Paul W. Brown, Ann Arbor
Shauna Ryder Diggs, Grosse Pointe
Denise Ilitch, Bingham Farms
Ron Weiser, Ann Arbor
Katherine E. White, Ann Arbor
Mark S. Schlissel, *ex officio*

The University of Michigan, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action. The University of Michigan is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation, gender identity, gender expression, disability, religion, height, weight, or veteran status in employment, educational programs and activities, and admissions. Inquiries or complaints may be addressed to the Senior Director for Institutional Equity, and Title IX/Section 504/ADA Coordinator, Office for Institutional Equity, 2072 Administrative Services Building, Ann Arbor, Michigan 48109-1432, 734.763.0235, TTY 734.647.1388, institutional.equity@umich.edu. For other University of Michigan information call 734.764.1817.

/umichLSA    

(RIGHT) Scott Soderberg / Michigan Photography



INSPIRE THE FUTURE.

An LSA junior majoring in biopsychology, cognition, and neuroscience, Rachel Rigole is fully embracing her college experience by working as an assistant coordinator with Michigan Medicine Volunteer Services and participating in the Undergraduate Psychology Society. She even finds time to take the field on football Saturdays as a member of the Michigan Marching Band.

Receiving scholarship support from LSA has made it all possible.

Rachel is exploring a career in psychology so that she can make a difference in the lives of others. And you can make a difference, too.

Your gift to the LSA Fund for Scholarships means that students like Rachel can benefit from an education that encourages the exploration of new ideas without worrying about how they're going to afford it.

Give today and help ambitious students like Rachel get the most out of LSA.



SUPPORTING EXCELLENCE

734.615.6376 | myumi.ch/lsagivenow



CAMPUS ELIZABETH WASON

Big Secrets of Tiny Phenomena

If you treat molecules' atoms like little magnets, their nuclear magnetic resonance (NMR) can reveal what they look like and what they do—but it takes very expensive and highly technical machines. Luckily, a new resource on campus has some.

ANYONE INTERESTED IN using nuclear magnetic resonance (NMR) for their research needs to make sure they leave their car keys, steel-toed boots, cell phones, and credit cards outside the lab. The metal parts could fly across the room and smash into the superconducting magnet inside a big NMR instrument. The NMR's strong magnet also can disrupt electronics and erase the swipe stripe of credit cards.

But with a few precautions, NMR instruments can safely make some powerful science possible. The magnetic resonance in NMR is the same as in the MRI machines that a patient might find in a hospital. In the same way an MRI can reveal what's inside a person's body, an NMR instrument in a science lab can scan a sample to get a sense of what's inside of it.

An NMR's enormous superconducting magnets can help reveal the big secrets inside tiny phenomena, such as molecular structure, chemical dynamics, and pharmaceutical targets. "People are using NMR to determine RNA structures for chemistry and biophysics research, or they're working on large molecules like protein structures," says

Emily Scott, a professor in LSA's Department of Biophysics, the College of Pharmacy, and the Medical School. "Learning about the structure of a protein or RNA helps researchers find potential drug and disease applications or the basic science of how enzymology works. It helps us understand the dynamics of how these molecules live and breathe, and how they function in the body."

Scott is the faculty director of the new BioNMR Core on campus, which formally opened in summer 2018 and makes NMR instruments readily available to researchers. For her own research, Scott studies liver enzymes that clear drugs and other foreign chemicals out of the body. "When we determine structures of these enzymes by another technique called X-ray crystallography, we get the equivalent of a snapshot, or a frame in a movie," she says. "But when we determine the structures of these proteins by NMR, we get to see the equivalent of the movie — how it moves to do what it needs to do."

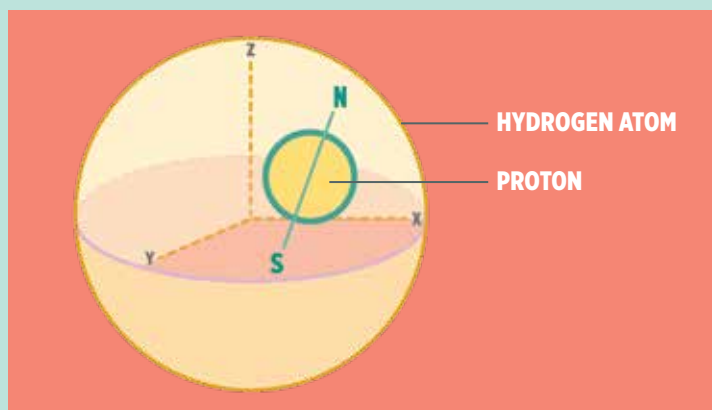
"It's much easier to build up a complete knowledge of the functionality of the enzyme if you're watching the movie than if you're guessing from a single image."

LSA runs the BioNMR Core with U-M partners in the Life Sciences Institute (LSI), the College of Pharmacy, and the Medical School. The Core offers equipment that otherwise would be too expensive for most individual labs to buy and maintain. Already, the most powerful NMR instrument in the Core gets booked weeks in advance.

Researchers like David Sherman, a professor in LSA's Department of Chemistry and LSI, looks at the structure of natural products that he extracts from coral reefs and other natural sites or cultures grown in the lab. His very small quantities require the high sensitivity of instruments available in the BioNMR Core. Chemistry and Biophysics Professor Sarah Keane uses the Core for research aimed at structure determination of large RNA molecules implicated in cancer, heart disease, and bacterial pathogenicity. Anna Mapp, a professor in the Department of Chemistry and LSI; Neil Marsh, a chemistry professor; and members of the Ramamoorthy Lab in chemistry and biophysics all use NMR to figure out the folds in proteins. Their research has relevance to diseases such as Alzheimer's, Parkinson's, cancer, and diabetes.

For these researchers and the students in their labs, the BioNMR Core provides new access to NMR, instrument training, and expertise on campus. Traditionally, these resources had been unavailable to most researchers, with NMR instruments sequestered in individual units or labs. Now, researchers on campus who need to run their experiments with NMR can do it.

The Core comes with an in-house expert, its director Debashish Sahu, who supports faculty research on its NMR instruments, and another staff member with expertise in small molecule and protein NMR, Mini Xing. "They're using newer techniques or even sometimes developing new ways to analyze something that wasn't possible before," Sahu says. He helps to create and facilitate those innovations. By staying on top of new NMR technology, Sahu helps researchers take full advantage of the machines for their experiments. "By coming up with intelligent ways of making samples that are visible with NMR, they can tackle problems in ways that no one has done before." Sahu has the expertise to train new users — including non-specialists — and get those researchers up and running on the instruments.



HYDROGEN (H) ATOMS ARE GOOD TO USE IN NMR, BECAUSE LOTS OF RESEARCH SAMPLES CONTAIN THEM. OTHER KINDS OF ATOMS CAN WORK IN NMR, TOO, INCLUDING CERTAIN KINDS OF CARBON, NITROGEN, PHOSPHORUS, AND MORE.

EVERY H ATOM'S NUCLEUS HAS ONE PROTON. EACH PROTON HAS A SPIN AND RESPONSE TO MAGNETIC FORCES.

EACH PROTON ACTS LIKE A TINY BAR MAGNET, SIMILAR TO A COMPASS NEEDLE, WITH A NORTH AND A SOUTH POLE.

Because the BioNMR Core centralizes the expensive, highly technical instruments, they're used efficiently. One lab might run experiments 25 percent of the time, which means the remaining 75 percent can be shared with other researchers. Even off-campus researchers can run experiments on BioNMR Core instruments, which helps to cover operating costs and maximizes the instruments' use. And Sahu shares his expertise with undergraduate and graduate students in a biophysics course that covers NMR methods.

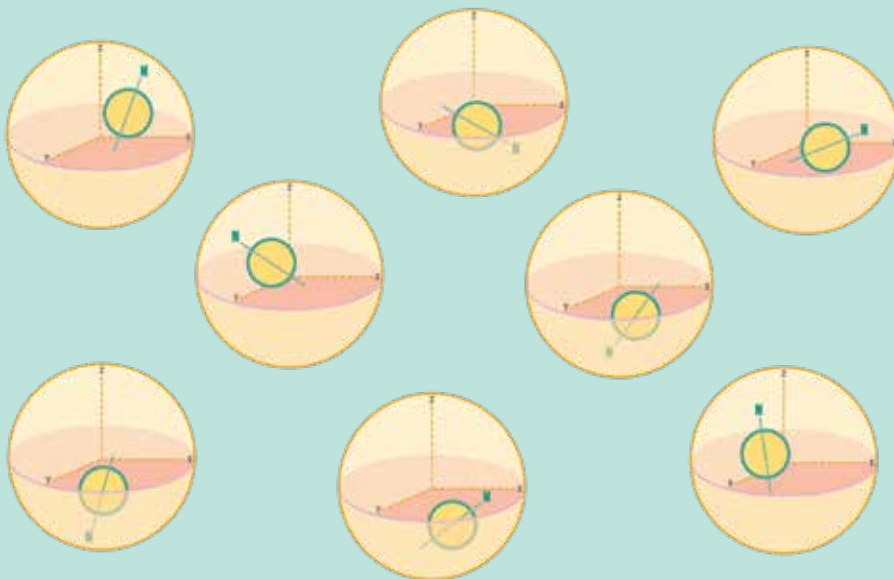
"Any technique that gives you a glimpse of how biomolecules work that you've never seen — that nobody's ever seen — is really exciting," says Scott. "That's why many of us are in this business. For the discoveries." ■

NMR In Four Steps

LSA walks you through the process that scientists use to research tiny and tough-to-see elements.

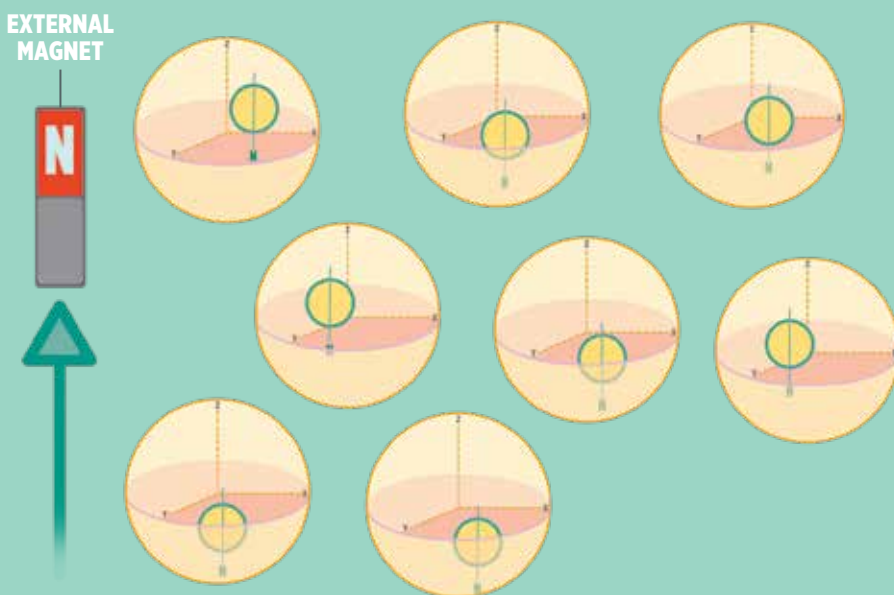
1

AT REST, ALL PROTONS IN H ATOMS NATURALLY ORIENT IN RANDOM DIRECTIONS IN A SAMPLE.



2

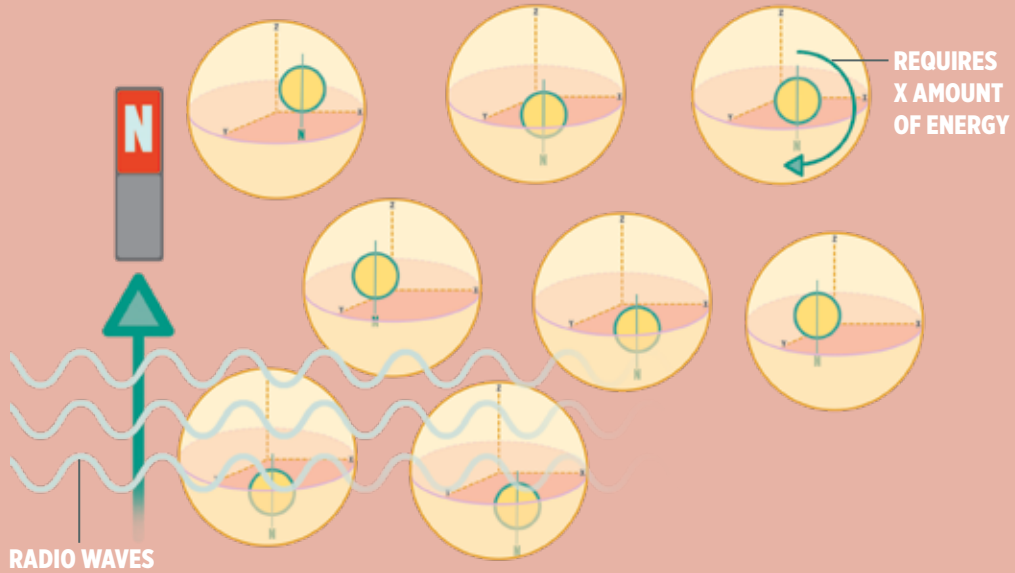
IN THE SAME WAY A COMPASS NEEDLE ALIGNS WITH THE EARTH'S MAGNETIC FIELD, MOST PROTONS ALIGN WITH A STRONG EXTERNAL MAGNET, SUCH AS THE SUPERCONDUCTING MAGNET IN AN NMR INSTRUMENT. ALIGNING TAKES THE LEAST AMOUNT OF ENERGY.



3

SENDING A RADIO-WAVE PULSE THROUGH A SAMPLE CAN ADD ENOUGH ENERGY FOR THE PROTONS TO ABSORB THE ENERGY AND FLIP DIRECTION.

THE AMOUNT OF ENERGY THAT GETS A PROTON TO FLIP DEPENDS ON WHAT SURROUNDS THE PROTON, WHAT'S ATTACHED TO THE PROTON, AND OTHER FACTORS CLOSE TO THE PROTON.

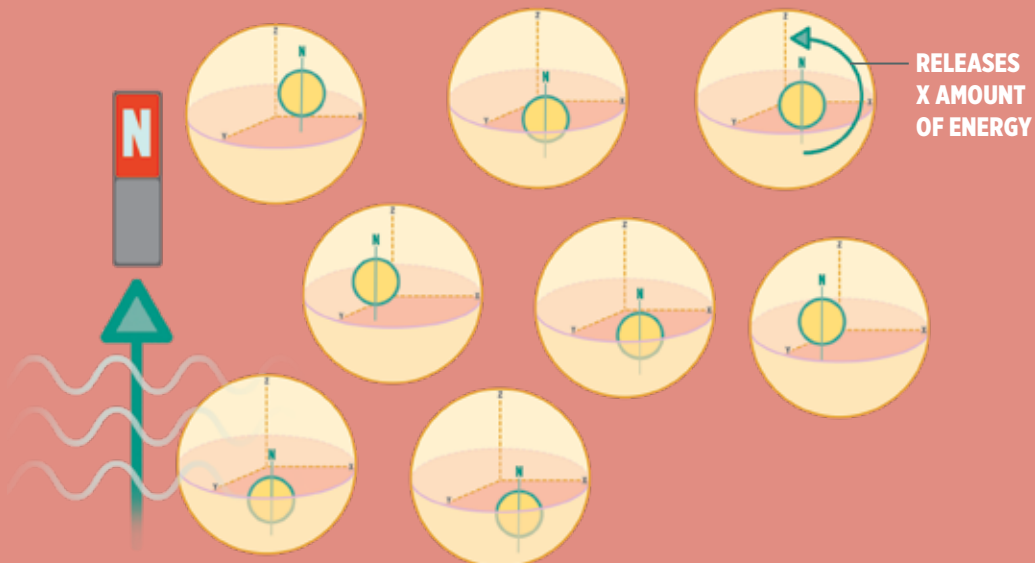


4

WHEN THE RADIO-WAVE PULSE GOES AWAY, PROTONS RELAX BACK INTO ALIGNMENT WITH THE EXTERNAL MAGNET.

PROTONS RELEASE THE SAME AMOUNT OF ENERGY THAT THEY ABSORBED WHEN THEY RELAX.

NMR MEASURES THE ENERGY RELEASED BY THE PROTONS. THE AMOUNT OF ENERGY RELEASED IS A CLUE ABOUT WHAT SURROUNDS THE PROTON, WHAT'S ATTACHED TO THE PROTON, AND OTHER FACTORS CLOSE TO THE PROTON.



ANNE CURZAN IS



DEAN ANNE CURZAN began her work as the new dean of LSA on September 1—and she hit the ground running, working with new members of the dean's cabinet and meeting with students, faculty, staff, and alumni.

Thankfully, the new dean already knew her way around the building. A professor of English, linguistics, and education, Dean Curzan has been an inspiring member of the U-M faculty for 17 years. During her time here, she has worked as the associate dean for the humanities for LSA and as the faculty

athletics representative to the National Collegiate Athletic Association for the University of Michigan. Dean Curzan is also an alumna, having received her Ph.D. in English Language and Literature from U-M.

Dean Curzan's research focuses on the history of the English language, and she describes herself as a fount of random linguistic information about how English got to be the way it is – information she shares every Sunday on the show "That's What They Say" on Michigan Radio. She has also dedicated one

major strand of her career to helping students and the broader public understand linguistic diversity as part of cultural diversity, and language change as a natural part of living languages.

LSA's new dean has repeatedly distinguished herself as an educator and administrator. An Arthur F. Thurnau Professor and the Geneva Smitherman Collegiate Professor of English Language and Literature, Linguistics, and Education, Dean Curzan has received both the Henry Russel Award and the John Dewey Award for outstanding



In

research and undergraduate teaching. When she was announced as the dean over the summer, former students reached out over Twitter and in person to share their excitement and their enthusiasm for their former professor.

We sat down to talk with Dean Curzan about who she is, what kind of dean she hopes to be, and what alumni can do to help shape the college's future.

Read an extended version
of this interview at
[MYUMI.CH/LSA-ALL-IN](https://myumich.edu/LSA-ALL-IN)



Q & A?

WITH DEAN CURZAN

What kind of dean do you aspire to be?

AC: A dean who is genuinely invested in people, the common good, the power of learning and discovery, the value of play, and the importance of well-being. I will also be the fiercest of advocates for the value of a liberal arts education and for the research we pursue here in LSA.

I aspire always to be guided by this principle: “In the end, it’s all about people.” These wise words come from John Hannah, the president of Michigan State for 28 years, who was also my grandfather. I am deeply invested in the success of everyone in the college — students, faculty, and staff — and I want that “everyone” to be as diverse and inclusive as possible. An organization is only as good as the people in it, and fundamentally my job is to foster an environment — with the resources and support structures and expectations for excellence — that allows everyone to thrive.

To me, thriving means pursuing meaningful work, leading a meaningful life, and contributing to positive change. This requires strong relationships and a vibrant sense of community around a shared vision, mission, and values.

What do you do for fun?

AC: I have been an athlete my entire life, and I love sports — both playing and watching. Growing up, I was a tennis player and a rhythmic gymnast (yes, with the ribbons and balls and hoops), and in college I played varsity squash and 17 intramural sports. I have no idea in retrospect how I got any studying done!

After college, I turned myself into a triathlete, and I still do distance swimming and running. Believe me, I know this is not everyone’s definition of fun, but, for me, it’s a form of meditation.

I always have a novel on my nightstand and try to read at the end of every day, and I really enjoy cooking for others. Someday I hope to return to playing the piano.

Do you have a favorite spot on Central Campus?

AC: I think the new Trotter House is now my favorite spot on Central Campus. I also have a real fondness for the reading room in Rackham because I wrote big chunks of my dissertation in that beautiful, quiet space.

What’s the most Ann Arbor-ish thing that’s happened to you lately?

AC: I was walking through the Diag the other day and stopped to watch a young man slowly but surely kneeling down to pet a big fat squirrel — and the squirrel let him!

What do you think would surprise readers of *LSA Magazine* most about you?

AC: I went to college as a math major. And honestly, I didn't really know what linguistics was. My first year in college I took the sequence of intensive math courses for majors and did well. I also took an introductory linguistics course because I enjoyed learning languages and I knew linguistics was in some way related to the study of languages. I liked the course enough to sign up for a course called "The History of the English Language" in my sophomore year—and that class changed my life.

I wanted to know what my professor, Marie Borroff, knew. Reading about what had happened to English over the past 1,500 years was so much fun that I felt like I was on a playground. Could I really study this topic and get credit, let alone a job? I often share this story with first-year students to help give them permission to change their minds about majors and discover new fields. After all, how could you know you wanted to study sociology or women's studies or biophysics or linguistics if you have never encountered them before? That kind of exploration is one of the real joys of a liberal arts education, and all of us get the best education when we are studying something that genuinely excites us.

What role do you see alumni playing in *LSA's* future?

AC: *LSA* alumni are a vital part of what makes *LSA* such a remarkable place to work and be a student because they are the biggest part of the *LSA* network. When I think about the impact of *LSA* on the world, I am thinking about both the work happening on campus and the work that our alumni are doing all over the world. I am grateful for all the alumni who provide mentoring for today's students and help with internships, career opportunities, scholarships, and much more. I look forward to continuing to think with alumni about how the expertise and life experience they have gained over the years can contribute to the education of today's students.

What should alumni know about the challenges and opportunities today's students face?

AC: In the first week of class, I always ask students to tell me about all the other activities they are engaged in—in addition to classes—and I'm always floored by how much they do: working one or more jobs (often to pay for school), participating in clubs and singing groups and religious organizations, doing volunteer work, pursuing entrepreneurial ventures, playing sports and marching in bands, tutoring, teaching preschoolers, raising their own children, assisting in research all across campus, and the list goes on. It is inspiring, and I never want us to lose sight of how much today's college students are juggling as they "student."

We know that many of today's students suffer from stress levels that hinder learning; we know many are managing mental health issues.

Today's students have more information at their fingertips than ever before, with higher expectations for what they will do with it.

First-generation students—and there are more and more first-generation students at U-M—are breaking new ground for their families, which is an exciting opportunity that comes with lots of challenges. Today's students are facing an insecure landscape in terms of jobs, the effects of climate change, and much more. They have more information at their fingertips than ever before, with higher expectations for what they will do with it.

I would ask that we all be wary of discourse that disparages younger generations and today's college students. I am continuously inspired by the ways that today's students are already trying to change the world. It is one of the true privileges of working at a university. I would also ask that each of us who has the means considers what we can do to help students afford to come to U-M and then to have equal access to the educational and extracurricular opportunities here.

University of Michigan
College of Literature, Science, and the Arts
101 North Main Street, Suite 850
Ann Arbor, MI 48104

NONPROFIT
U.S. POSTAGE
PAID
ANN ARBOR, MI
PERMIT NO. 144

