

UNDERGRADUATE RESEARCH

# CASCADE

FALL 2015

UNIVERSITY OF OREGON COLLEGE OF ARTS + SCIENCES

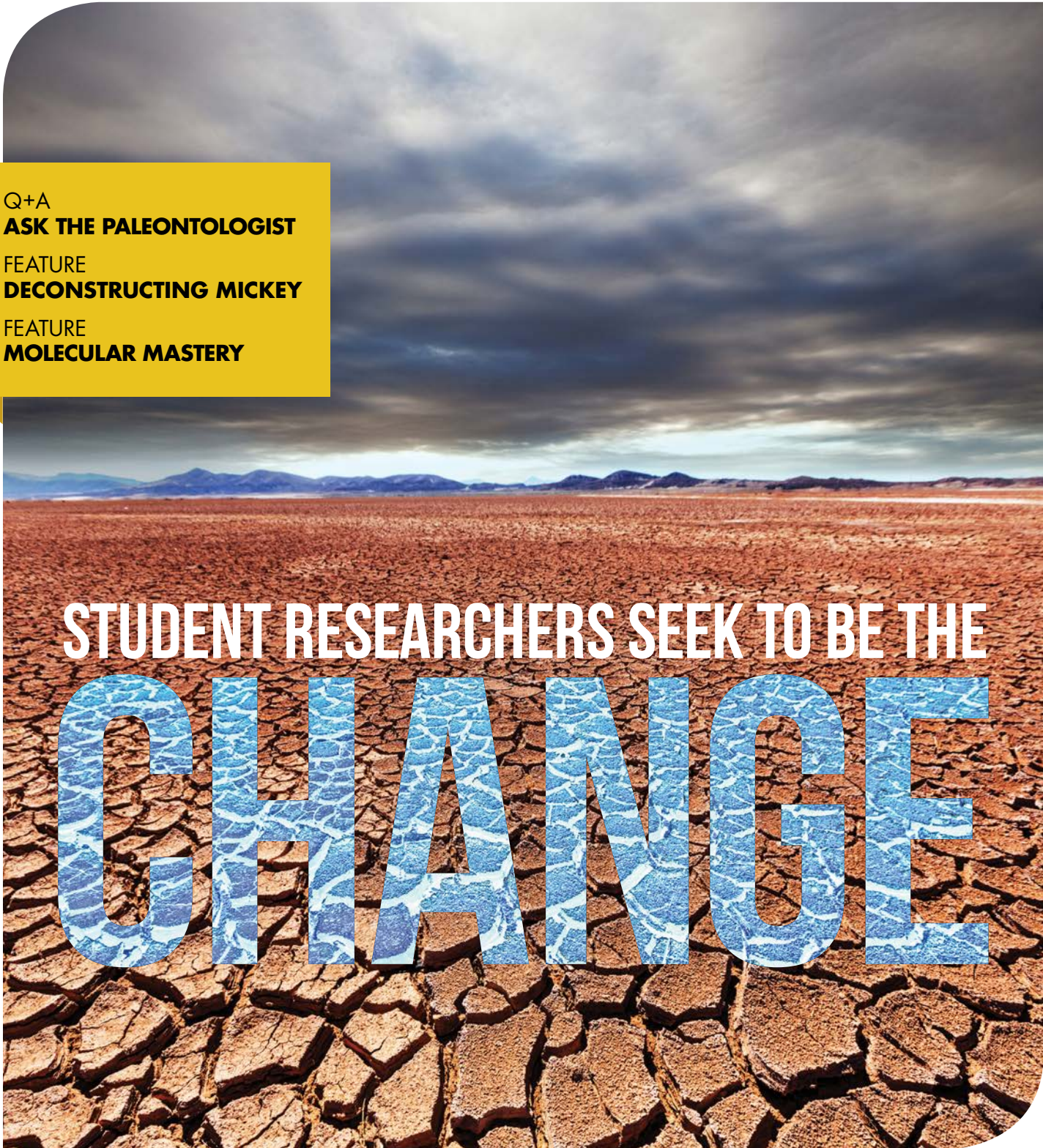
Q+A  
**ASK THE PALEONTOLOGIST**

FEATURE  
**DECONSTRUCTING MICKEY**

FEATURE  
**MOLECULAR MASTERY**

STUDENT RESEARCHERS SEEK TO BE THE

**CHANGE**



# RESEARCH . . . IN THE HUMANITIES?

BY KAELA THOMAS

*For this annual undergraduate research edition of Cascade, we invited Kaela Thomas—who recently received her degree in French—to write our guest editorial. She gave an impassioned speech at an awards reception in her department and we asked her the question, “What does it mean to conduct research in the humanities?”*

**W**hen I arrived at the University of Oregon in 2011, like most freshmen, I had a lot of anxiety about declaring my major.

I wasn't sure what I wanted to do after college, and I was also convinced that whatever major I did declare would certainly define the rest of my life. But just before classes began, I declared a major in the humanities—French—and in spite of all the anxiety accompanying that decision, I felt like a large weight had been lifted from my shoulders, because it was something I already knew I loved and something that would be valuable to study.

Not everyone I met was so sure. The question pops up in conversation: “Well, what are you going to do with that?” It's not easy to describe what learning another language provides. I would say that it's like getting to know a part of yourself, and a part of all humankind, that you didn't know existed.

As a student in the Clark Honors College, I was required to complete a research thesis to graduate. I chose to look at efforts to preserve French in Louisiana.

For many of the people I interviewed, language preservation is their lives. One woman in her seventies had traveled to



*In addition to French, Thomas speaks Spanish, Arabic, Japanese, Chinese, German, and just a touch of Klingon; she's a total Trekkie. She ran the Eugene Marathon—her first—in May. “It was a cool capstone experience for the end of my time in Track Town.”*

Normandy. Her grandmother, a French-speaking Louisianan, had always sung to her old medieval battle hymns; she connected with the people she met in France by singing these old songs in French. They have that shared history.

Listening to her story, I was touched. People think humanities research is just

and drained of all your energy. But as hard as it was, it was also fun—it was an opportunity for me to make that jump into the adult world, to say, “This is what I found, this is my conclusion, and this is research that I know like the back of my hand.”

It's a rite of passage. You start school at age five and you graduate when you're 22,

“YOU'RE THE ONE WHO IS DOING, RATHER THAN BEING TOLD WHAT TO DO.”

about dead, irrelevant people. It's actually the research of live people and their histories—it's the study of humanness, of what it's like to be human. Everyone is connected somehow, and in studying the humanities I've seen that firsthand. It has heart—it can affect us on an emotional level, even in the context of writing a huge thesis paper that can be an immense challenge.

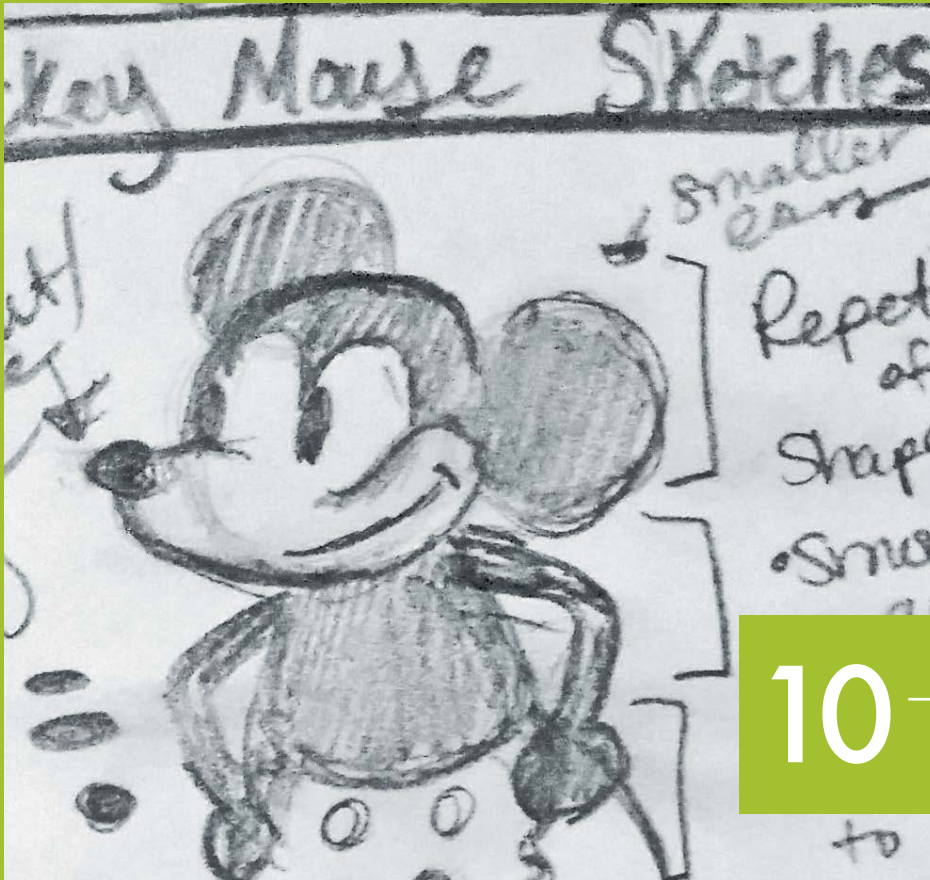
Everybody thinks that doing a research project means you'll be locked in your room

and by then you've been listening to other people teach for 17 years. The practical function of research is to turn the tables—you're the one who is doing, rather than being told what to do. You make that passage from learner to learned. The only way to make that transition is to take things into your own hands.

You can't just remain someone who is listening forever. Eventually, you're going to have to talk. 

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Among the 25 College of Arts and Sciences student researchers profiled in this issue, there are several who are also enrolled in the Clark Honors College even as they pursue majors in CAS. Students can also receive an honors designation in more than 20 CAS departments whether or not they belong to the Honors College.



# Ask the Paleontologist

## WHAT SKILLS CAN AN UNDERGRAD GAIN IN AN ANTHROPOLOGY LAB?

INTERVIEW BY MATT COOPER

If you've ever watched the Fox series *Bones*, Stephen Frost has a spoiler alert for you: it's nothing like real anthropology.

The show's stars use forensic anthropology to solve crimes, finding answers to their questions about human remains with a few quick keystrokes on a computer. In reality, anthropology research takes months of meticulous work. The big payoff usually comes to those with vast reserves of patience and persistence.

So says Frost (far right), a UO paleontologist. "To be a good researcher, you really have to stick with it," he says. "It's easy to say, 'This is getting tough, I'll just let it go.'"

As an expert guide, Frost regularly leads UO undergraduates through the meticulous process of anthropology research. His specialty is analyzing the size and shape of monkey bones, also known as morphometrics. He wants to know how primates evolved and what that says about our own evolution.

At any given time, he's helping several undergrads design their own projects in this area.

Frost sets the bar high. He urges his students to strive to publish their work in research journals and defend their findings at national conferences. These achievements serve them well regardless of whether their future is in anthropology or some other profession, he says.

"It means they've done something at a professional level," Frost said. "It will be a useful experience whether they're presenting at a corporate meeting or teaching students. They're learning how to present their ideas and communicate clearly what they've done."

**Q** What kind of research projects do your undergraduates pursue?

**FROST:** There's an old idea in biology which predicts that with mammals, the farther you are from the equator the larger you will be. One of my students, Julia Arenson, has been looking at how macaques, a group of Asian monkeys, vary with latitude. She measured the skull specimens of macaques from Indonesia, Nepal, China, and Japan, and how they changed across that distance. Sure enough, the macaques get bigger the farther you get from the equator. She presented at two national conferences—the American Association of Physical Anthropologists and the American Society of Primatologists—and will use this to write an honors thesis. And, hopefully, also submit it for publication.

Another student, Kelsey Clarke, collaborating with (department head) Frances White, took some of my data and looked at testosterone and social structure in primates. There's a theory that among primate groups with higher levels of male-male competition, the males tend to be bigger and have more testosterone. She was able

to confirm this and she also presented at the same conferences.

A third, Rachel Glenzer, compared a new method for measuring skull specimens, called three-dimensional photogrammetry, to two other well-known methods: using a “microscribe” or using a 3-D laser scanner. With photogrammetry, you take pictures of an object and (with computer software) you can build a three-dimensional image. She was able to show that the photogrammetry images were not as good as laser scanners at accurately capturing the shape, but they were as good as the microscribe, which is a handheld probe. She ended up doing this project for her honors thesis and she presented at the AAPA as well.

### **Q How do students collect information?**

**SF** A lot of it is working with databases. It’s a lot of data management, data processing, and working with new and difficult software. I do a lot of helping over the bumps. I’ll also ask them to measure (skull specimens and other bones) in our labs—I’ll ask them to measure the same couple of specimens 10 times each, and if they’re still

American Museum of Natural History to conduct research. The duration of these trips is often limited by what the students can afford to spend, but our department does try to help undergraduates do this when we can.

### **Q How do undergraduates get started?**

**SF** You need to start freshman or sophomore year to really get something done. They’ll come to me and say, “I’m interested in getting involved in research or just doing something.” We’ve developed a track through which undergraduates can start to produce research abstracts and, hopefully, publications.

First, we send them to volunteer in the UO Comparative Primate Collection, where they’ll do things like clean the crock pots used to boil down flesh, or they’ll label all those little finger bones. It takes a lot of attention to detail, a lot of patience. If you like it—if it’s fun—then I’ll discuss with them, “What do you want to do?” I want to give them something they’re interested in, and that I’m interested in, and from which they could potentially get a publication.

“IT TAKES A LOT OF ATTENTION TO DETAIL, A LOT OF PATIENCE.”

around after that I know they’re motivated! I want to make sure they’re good enough at collecting data before they go and collect it on their own. A lot of times they’ll say, “The result (of my analysis) is not what I expected from what we talked about,” and we’ll look at it together.

Beyond the UO, museums can be major repositories for research data. One of our undergraduate students went to the Smithsonian—they found her a place in collections to work, and they pulled specimens she was interested in and she set them up in front of her device and measured them. Another student went to the

### **Q What’s your role as undergrads develop projects?**

**SF** When they take on a problem, I’ll give them some things to read and I give them my data first, so they can get a feeling for it. Then they collect data of their own. Also at the beginning, we discuss their goals—say they want to present at a meeting or write an honors paper—and I’ll walk them through the timeframe for when things need to happen. But I don’t hound them; I let them time-manage themselves. I review their (paper) drafts and we’ll talk about what they want to show in their presentation. I’m involved in all steps.




### **Q Your students often present at the UO Undergraduate Symposium. How do you help?**

**SF** Presenting your ideas at a conference is a good way to learn how to express yourself accurately and precisely. I’ll give students some thoughts about (how to present work in a poster). I don’t tell them what to do but we have a lot of posters up in the lab and they’ll look at those posters for ideas. One of the toughest things is, maybe they found five things in their project that are exciting—I’ll say, “Pick just one that you’re going to present in this poster, and think about what figures you’re going to use and how to illustrate it best,” and then we’ll fit some text around that.

### **Q How does the symposium benefit undergraduates?**

**SF** When they have participated in research, they know what’s in the data and what isn’t, and you can just see in the way they talk about it—there’s a confidence. They also know the limits of the data. People will ask them questions and they’ll say, “Well, the way I measured the data, we can’t really say that.”

When they get excited about what they’re doing and they get a result and it’s interesting, I get excited, too. That’s why I’m in this business—I got a result with something I did and I think, “Wow, isn’t that fun? My data show something.” 

# PROCEED AT YOUR OWN PERIL

## NOW WE HAVE PROOF: DON'T TEXT WHILE WALKING

It seems humans can't do anything well while texting.

We've learned that texting while driving, texting while operating a train, and even texting while riding a bike can lead to accidents ranging from the routine to the tragic. Now a pair of undergraduates at the UO have uncovered a new weakness: texting while walking.

With our noses buried in a smartphone, they've discovered, we can't even walk down the street without putting ourselves at risk for injuries and accidents.

Taylor Kay (right) and Deborah Wang (above), who received their degrees in hu-



man physiology last spring, were curious about something they saw happening every day on campus. Under the direction of graduate student Amy Lo, they put together two experiments that tested how well people could follow a path, avoid obstacles, or make sudden stops while texting and walking.

Kay's experiment involved people walking an oval course in the UO's biomechanics lab and stepping over obstacles that were 10 percent of their body height (in other words, a person 5 feet, 6 inches tall—66 inches—would step over obstacles that were 6.6 inches high). Wang's test involved people walking the course and stopping when a red line was suddenly projected on the floor ahead of them.

The subjects weren't actually texting on smartphones. But they did have a device—an iPod Touch—in their hands, and they used it to do a "Stroop test," which is a standard cognitive test that measures attention: The word "green" appears on the screen, for example, but in blue type; the subject then taps a color that corresponds to the color of the type (blue), not the color the word represents (green).

As they walked, the subjects did the test while a 10-camera motion-capture system monitored their gait, center of balance, speed, and direction—data that was analyzed with special software.



You can imagine the results. In the experiments, people with their eyes on a device walked slower, had worse balance (as measured by their swaying and center of balance), and generally were less in tune with their surroundings. In fact, these college-age test subjects could have been mistaken for their grandparents when it came to keeping their balance as they walked.

"They swayed," Kay said, "the way elderly people sway."

But there was one thing students did well while walking and using a handheld device: use a handheld device.

THE COLLEGE-AGE TEST SUBJECTS COULD HAVE BEEN MISTAKEN FOR THEIR GRANDPARENTS WHEN IT CAME TO KEEPING THEIR BALANCE.

Kay's test showed that students did as well on the Stroop test whether they were walking the course with obstacles or without. In Wang's experiment, subjects were a tiny bit slower on the Stroop test but just as accurate, regardless of whether there were unexpected stops in the path ahead.

In other words, the subjects put more of their attention into their devices at the expense of the world around them, further evidence that digital distractions are just that. "You do these things at a cost," Kay said.

"This experiment adds data to what we already knew previously," Wang added. "It also gives future researchers a jumping-off point for additional research." —GB





# FLIGHT TRACKER

## THERE'S MORE TO DRONES THAN GETTING THEM OFF THE GROUND

**Y**ou could say that Jack Ziesing's research really took off.

His lab experience as a student in computer and information science has given him entry into the growing industry of "unmanned aerial vehicles"—you know them as drones.

Working with assistant professor Michel Kinsy, a new member of the faculty, Ziesing (above, right), who graduated earlier this year, studied communications and control systems for drones. He put together the memory chips, processors, and circuit boards that control drones during flight.

Kinsy's lab is trying to solve problems that could ground the drone industry. One of them is getting all parts of the drone "brains"—the chips and circuit boards that control navigation, flight patterns, and onboard memory—to work together fast enough for flight. Once airborne, the drones also must carry out complex missions such as mapping, taking photographs, or looking for specific targets.

The other hurdle is making sure that the way all those parts pass information to one another, and the way the drone communicates with an operator, are secure against hacking or takeover by third parties. Researchers want drones to operate inde-

pendently by carrying out flight instructions programmed into their onboard computers, but they usually have a backup that also allows them to be controlled via radio frequencies by an operator on the ground. Both systems must be protected.

To do that, researchers have to understand a drone's components at a fundamental level. So the work in Kinsy's lab delves more into computer hardware and less into actual flying, at least for the time being. Ziesing's contribution, which also served as an independent research project, was to help build circuitry that boosts performance and communication.

To hear Kinsy tell it, Ziesing is a natural with drones. Although he wasn't the top

**HE EVEN CREATED A DRONE WITH A CAMERA, MOTION SENSOR, AND BUZZER TO TEACH THE FAMILY PUPPY TO STAY OFF THE SOFA.**

student in his major, Ziesing had an intense curiosity and a "learn-by-doing" approach that impressed Kinsy, who arrived last year. When the spunky Ziesing showed up looking for a shot at research, Kinsy decided to give the undergraduate a spot in his lab.

Ziesing quickly proved his value and became the heart of the group, showing up after classes, on weekends and during any other time he could carve out. He dove into computer architecture and drone controls

head first, learning as he went.

"He has a natural sense of what hardware is supposed to do," Kinsy said. "I'm a big fan of his."

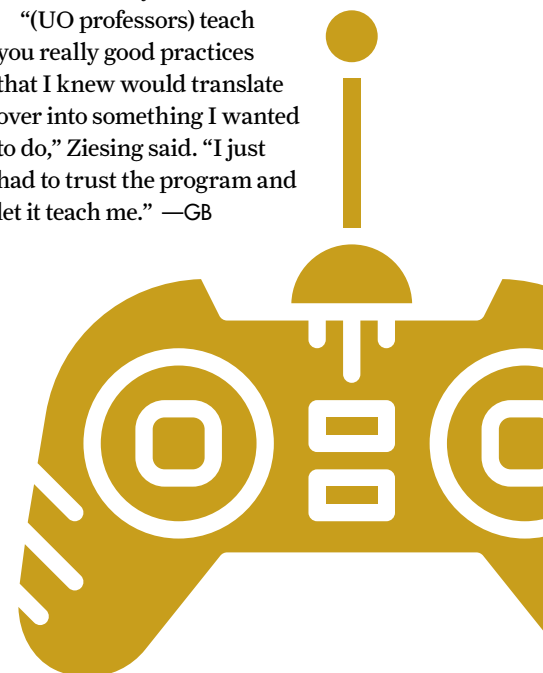
Rather than buy them off the shelf, Ziesing taught himself how to build drones from the chips up, an important skill in the research world. He has made large drones and also "quad copters"—ones with four propellers—that fit easily in the palm of a hand. The technology is extremely flexible, and he even used it to create one with a camera, motion sensor, and buzzer to teach the family puppy to stay off the sofa.

"I used it as a device to help train the dog and entertain me," he said. "I was having a blast with it."

His research goal was "teaching" a drone fitted with LED lights to carry out a robotic aerial ballet through programmed instructions. The program would send it whirling across the night sky in a choreographed pattern that would appear as a word—"Oregon" or "Ducks," for example—in a long-exposure photograph.

Although Ziesing built and tested prototypes, he didn't complete the LED light show project before graduation. He continues to work on it while he looks for his first software job, preferably in the budding drone industry.

"(UO professors) teach you really good practices that I knew would translate over into something I wanted to do," Ziesing said. "I just had to trust the program and let it teach me." —GB



# GOING TO THE DARK SIDE

PSYCHOLOGY-BUSINESS  
DOUBLE MAJOR EXPLORES  
THE GENDER POLITICS OF  
FILM NOIR

**T**here are femmes fatales, and then there is Kathie Moffat in *Out of the Past*.

The femme fatale—French for “fatal woman”—is a stock character from the heyday of film noir after World War II. Mysterious and seductive, she uses her charms to ensnare her lovers and lead them into trouble, in movies known for their bleak, pessimistic tone.

Arguably, no one was more lethal than Moffat—portrayed by Jane Greer—in the 1947 film noir classic. Playing opposite Robert Mitchum’s “Jeff Bailey” (above), she shoots dead two people and also kills Bailey and herself in a car crash. For good measure, she was also a suspected thief.

UO junior Brennan Heller loves Moffat. Not love in the romantic sense, mind you; he loves what the character shows us about the rising power of women—and its effect on men—after World War II.



Heller (right) is enrolled in the Clark Honors College, which requires students to take a research course in either history or literature. But as a major in both psychology and business administration, he was forced to stretch academically to meet this obligation. Fortunately, he found an English course that aligned with a personal interest: as a movie buff, he zeroed in on a class about the literature of film.

That was the easy part. More daunting was the prospect of completing, over the 10-week span of the course, a probing critique on a film genre that experts have already studied exhaustively.

The requirement for developing an original angle was stressful, but Heller had a helping hand in adjunct instructor Ulrick Casimir. A specialist in film noir, Casimir tipped Heller off to something that inspired the young researcher: even the experts don’t know everything.

There are plenty of questions that top academics in their fields still can’t answer, Casimir told Heller, so the best place to start is with your own curiosity. During discussions on the project, Casimir repeatedly encouraged his student by asking, “What do *you* think?”

Casimir and Heller developed a premise—that the anxieties of a post-WWII America fed the film noir genre—and a plan for supporting it with a substantial number of concrete examples. Heller plunged in, reading works including Mark Conard’s *The Philosophy of Film Noir* and Judith Doneson’s *The Holocaust in American Film* and watching film noir,

both classic (*Out of the Past*) and contemporary (*Carlito’s Way*, *Chinatown*).

In his paper, Heller notes that veterans came home from war to find that their wives and girlfriends had kept their nations running by joining the workforce, and many of these women resisted resuming their traditional roles. Men were “troubled” and “conflicted” as a result, Heller writes, and these insecurities started playing out, in an indirect fashion, on movie screens, in story lines about scheming temptresses who ultimately are punished for their misdeeds (or, as in *Out of the Past*, take everyone down with them).

“The misogynistic feelings expressed in noir through the use of the femme fatale,” Heller concludes in his paper, “were a product of the perceived attacks on American masculinity.”

Said Casimir: “Brennan’s tendency to locate hard, material evidence for claims related to thematic concerns makes his work unique.”

And thus the psychology-business administration major has found an unexpected mentor. Even now that the class has ended, “I still talk to him about film,” Heller said.

“I never would have thought college would have been these relationships, where you could meet a professor on common ground about something you like. It was an interactive experience.” —MC







# The GREAT AMERICAN BASH

HISTORY THESIS WRESTLES WITH PERCEPTIONS AND PREJUDICES

For a young Brandon Parry, the allure of professional wrestling was escapism. He was skinny and allergic to the gym, but he could lose himself watching these hulking behemoths on TV throw each other around with a grace and power bordering on performance art.

Parry has grown up, and he still loves pro wrestling. Now he's not only drawn to the fantasy of the sport, but also to its ability to reflect reality—about complex ideas like nationalism and racism.

In his senior research paper, “All-American Babyfaces, Un-American Heels,” for which he won a \$1,000 “best thesis” award from the UO Libraries, Parry (top right) illustrates how perceptions and prejudices that grip the national consciousness show up in pro wrestling characters with names like Hulk Hogan, Triple H, Rey Mysterio, and the Undertaker (right).

His most salient example is the character Muhammad Hassan, who joined the World Wrestling Entertainment lineup after the terror attacks of September 11, 2001. As conceived by WWE, Hassan was an Arab American whose attempts to fit in gradually devolved into hostility toward his adopted country. The character was discontinued after a controversial WWE “terrorism” storyline coincided with the 2005 London bombings.

Because WWE audiences were meant to reject Hassan as a villain or “heel”—even though he is Arab American and makes appeals for our understanding—Parry argues that he is the embodiment of a slanted viewpoint rooted in the global war on terror: the nation is at risk of attack by Arabs, therefore it cannot sustain civil rights such as those sought by Arab Americans.



HIS SENIOR PAPER, “ALL-AMERICAN BABYFACES, UN-AMERICAN HEELS,” WON THE \$1,000 “BEST THESIS” AWARD FROM UO LIBRARIES.

It scarcely needs to be added, then, that Hassan’s evolution into an Islamic extremist ends with his defeat by a true patriot—the Undertaker—during an event that WWE titled “The Great American Bash.”

For Parry, it’s no great leap to draw a connection between how we are meant to treat the larger-than-life characters in the “squared circle”—and how we treat those around us in the real world.

“In real life, if enough individuals think of you as something, then that can

effectively be what you are,” he wrote in his paper. “Post-9/11 US nationalist rhetoric began associating Arab, Muslim and . . . ‘Middle Eastern’ identity with a threat. In the sensationalized and signifying world of professional wrestling, we can see through the presentation of Muhammad Hassan . . . the evolution of this discourse.”

A 2014 graduate with degrees in history and ethnic studies, Parry defends pro wrestling’s relevance for research by noting that it belongs to that category of the American experience that we tend to elevate above all others: popular culture.

“America doesn’t put on pedestals their philosophers and poets,” Parry said in an interview. “For me, as a historian, popular culture distills things into very digestible, bite-size pieces, so that in 2050 you can look back and get an idea of what people thought about society in 2015.” —MC



# ECONOMICS, À LA

## PREDICTING SUCCESS OR FAILURE FOR PORTLAND FOOD VENDORS

BY MATT COOPER

**I**t was his appetite for information—and, well, his appetite—that drew Jake Glicker into Portland’s thriving food cart scene.

Glicker loved to eat at places like Viking Soul Food and the Swamp Shack. And when he started poking around for data on the economics behind this industry, he stumbled across something far more valuable than finding, say, the perfect crawfish pie.

It was early 2014, and the senior in economics was sitting pretty, on track to graduate in March. He could have coasted through those last few months of school.

But Glicker was curious what data existed on Rose City’s burgeoning street-corner meal makers, so he made a call to the Multnomah County Health Department. Jackpot: the department licenses food-cart vendors and tracks them from entry into the market to exit, which meant Glicker had stumbled upon access to tidy information capturing the lifespan of more than 700 food carts.

If some aspiring economist had tapped this data goldmine previously, Glicker was unaware of it; his advisors in the department were beside themselves.

“I had a usable data set on an industry that no one has studied in a serious way,” Glicker said. “We were, like, ‘Yeah, let’s do it, it’s going to be fun.’ I wanted to see how good I could get at this process of applied economics.”

## WELL-BEHAVED VS. HAPHAZARD

Glicker sought to understand why the food cart market exploded between 2006 and 2011. The question was whether everything he’d learned in class about concepts such as “industrial organization” and “micro-economic relationships” would hold up in a real-world scenario involving haphazard, opportunistic businesses that are only as stable as the wheels carrying them throughout the city.

“Economics is full of theoretical explanations of how markets are structured, how firms behave, and what drives basic human decisions,” Glicker wrote in the introduction to his report. “But well-behaved economic ideals fly out the window as we walk out the door and toward the nearest food cart. Or do they? An in-depth analysis of this market over time affords a rare opportunity to evaluate and understand the essence of many market mechanisms.”

To determine what affects the performance of Portland’s food carts, Glicker assigned values to aspects of each business such as type, location, lifespan, local population and unemployment rates. Then, he ran a series of complicated calculations using equations from class that are meant to forecast economic outcomes.

Glicker essentially tested whether his efforts to “predict” performance based on economic principles would match what actually happened on the ground with the rise and fall of food carts over the six-year period.

One of his more interesting finds: food carts in northeast Portland were more likely to “exit the market” during that period—that is, go under—than those in the southeast. In the southeast, Glicker (above) wrote, “it

is anticipated most local consumers have less disposable income and are of a lower median age than anywhere else in the city, making them ideal consumers of street food meals.” That’s a good description of the college-age Glicker himself, of course.

## NINETY-FIVE PERCENT ACCURACY

His conclusions for the entire project were no less insightful: Glicker correctly predicted more than 95 percent of those instances where food carts eventually went out of business. In fact, Glicker found that the chance that any given outcome for a business was the result of a random event unforeseen by his model was less than 1 percent.

In other words, Glicker’s conclusion was wholly and completely predictable. Everything happened just as his model predicted it would. For an economist, this is cause for celebration.

“It turned out that all the things that I was expecting to happen were actually happening,” Glicker said. “I thought, ‘OK, cool. I can understand (these economic principles) and see them happen in the real world.’”

The paper earned Glicker an award for “outstanding work on a thesis” from the university’s Clark Honors College.

Glicker attributes his success with this study to experience gained in conducting an earlier research project through the economic department’s honors program, which gives ambitious students the opportunity to perform analyses for actual clients. Students complete a research paper, hone their skills in applied economics, and—perhaps most important—get a



# CART

firsthand look at how the real world works. Meanwhile, clients ranging from local community groups to the State of Oregon get useful analysis and recommendations that influence their policies.

## BUSINESS INCUBATOR—BOOM OR BUST?

This earlier project earned more recognition than Glicker could have imagined. Teaming up with fellow economics student Aaron Rouza on an analysis for the Eugene Area Chamber of Commerce, he assessed the possible impact of a \$7.5 million investment by the State of Oregon in creating a local “business incubator.” These programs draw off research universities, technology, and other existing resources to spark entrepreneurship and attract startups.

That exercise tested Glicker’s command of “econometrics,” which is a way to provide a quantifiable value to economic questions through mathematics, statistical methods, and computer science. Using a combination of economic theory, equations, and data from sources such as the

National Business Incubation Association, the duo predicted that the expenditure would create 94 jobs at technology-focused startups, generating \$23 million in annual wages and about \$1.9 million in annual tax revenue to the state.

The conclusion was less surprising to Glicker than the overwhelming reaction that followed. He and Rouza won “best

HE STUMBLER ACROSS  
SOMETHING MORE  
VALUABLE THAN FINDING  
THE PERFECT CRAWFISH PIE.

paper of the year” in the economics department and the chamber shared the work with partners across Lane County. In no time at all, Glicker and Rouza found themselves presenting a PowerPoint version of their report to a room of mayors and business representatives.

One of the more challenging aspects of the experience, Glicker said, was working with the chamber to shape broad questions into more narrowly defined queries that could be analyzed. He spent hours in the office of economics professor Bruce Blonigen, an associate dean in the college, working to match the chamber’s goals for the project with the data available. Blonigen said Glicker’s research for the business incubator and food-cart projects exemplified Glicker’s status as one of the best students he has ever advised.

Glicker, an aw-shucks type who is more comfortable talking “regression estimation coefficients” than personal accomplishment, credited his growth to the experience of doing real research.

“The best thing I got out of this was the process,” Glicker said. “I learned what a deliverable was and how to work with a client to get them something they can use. Meanwhile, the working world sees your ability to navigate (around obstacles) and produce something.”

# DECONSTRUCTING MICKEY

ASPIRING CARTOONIST  
ANALYZES THE BELOVED  
CARTOON CHARACTER

BY MATT COOPER

**M**ickey Mouse is one of the world's most recognizable cartoon characters, with those dinner-plate black ears, the plucky disposition, and a penchant for adventure. He was the first animated figure to have a star on the Hollywood Walk of Fame. He's even won an Academy Award.

None of this was an accident. Everybody's favorite mouse was deliberately manufactured by artists at the Walt Disney Company to become a star.

How did they do it?

Aspiring cartoonist Brandon Rains plans to find out. With his sights set on a career in animation, the UO senior dove deeply into the question of what makes Mickey Mickey; he has emerged with his own quirky creation, a grandmother-with-an-edge, who represents Rains' first step toward creating the cartoon world's Next Big Thing.



## FOCUS ON WHAT MATTERS—TO YOU

Rains, a major in cinema studies and digital arts, credits Priscilla Ovalle, associate director of the cinema studies program, for inspiring him to chase his dreams. In an early draft of a research paper for Ovalle's English course *Race, Sex, and Stardom*, Rains mentioned his hope of becoming a cartoonist; you should focus here, Ovalle urged him—that's where real research can be done.

Boom. Rains had assumed research meant pursuing questions important to professors—it was mind-blowing, he said, to be encouraged to dig deeply into an area that actually mattered to him.

"It was incredibly helpful—it was like coming up with my own course," Rains

said. "Because I was able to just go ahead and do essentially whatever I wanted, I was able to find a lot more."

Rains examined the evolution of Mickey Mouse from his original conception and first public appearance in the animated short film *Steamboat Willie* through his transformation in the late 1930s. He analyzed the mouse's design, mannerisms, voice and personality, constantly asking himself, "how did this contribute to the character's commercial success?"

Consider the first few seconds of *Steamboat Willie*—Rains spent more than a year on this sequence alone. In the title frame, the words "Mickey Mouse" appear in huge, distinctive letters, dwarf-



ing all other text, signaling his stature to viewers. In the opening scene, the mouse is quickly established as appealing—Mickey is drawn in friendly curves and circles, whistling a catchy tune while he bounces merrily along at the wheel of a steamboat. Meanwhile, the antagonist—a cat—is drawn twice his size, looming and ominous, an unsavory collection of jagged lines and sharp edges.

### SHE CAN KNIT A MEAN QUILT

Rains (above) took what he learned about Mickey Mouse in cinema studies and applied it to his course work in digital arts, creating the cartoon character Opal—a 60-something grandmother who can knit a mean quilt, but can also trade shots with the best of them at the corner bar. Everything about Opal—from the way she is drawn (lots of curves and circles) to her adventurous spirit—was informed by his research in Ovalle’s class, Rains said.

Rains’ blending of the two disciplines is “exactly what I had hoped for,” Ovalle

said. “It was an interesting question, whether my course could be productive for (his career plans). He started thinking about Mickey Mouse and how the research paper could help him in a tactile field like animation. It really empowered him.”

Rains exemplifies Ovalle’s focus on research projects with a purpose. She encourages students to study topics in cinema studies that will move them closer to what they hope to do for a job. She calls her classroom a “professionalization space”—a place to make professionals. Students practice liberal-arts skills—critical thinking and analysis, for example—with an eye toward possible careers.

“In the classroom, there’s a tendency for students to feel that the end goal is a short-term product: ‘I’m going to write a paper, get a grade, get credit and graduate,’” Ovalle said. “I’m trying to help them learn that the skills they are developing will serve them as they go out into the world.”

Rains is spending this year at the UO’s White Stag Block in Portland, where he’ll



“ARTISTS ARE RESEARCHERS, TOO. THAT’S HOW WE, AS ARTISTS, ARE EVEN ABLE TO CREATE.”



Rains drew Opal (above) with the “friendly” circles he practiced sketching Mickey (above left).

earn a bachelor’s degree in fine arts—with a specialization in animation—to complement his 2015 degree in cinema studies.

Then, he’ll start looking for jobs in animation. Regardless of whether he ends up with a large company or a small one, Rains is sure of one thing: his research on cartoon characters will continue.

He credits Ovalle with “this idea of not having separation between me as an animator and me as a researcher, or even me as a digital artist and me as a cinema studies student,” Rains said. “Artists are researchers, too. That’s how we, as artists, are even able to create.”

# GETTING OVER IT

RESEARCH SETS SCIENCE-AVERSE STUDENT ON A PATH FOR MEDICAL SCHOOL

**S**cience intimidated Alia Mowery when she entered the University of Oregon. But it was a closed door, not a locked one.

Mowery broke through when she found a research topic that fascinated her: new mothers and an enhanced ability to learn. Now Mowery sees more than the mere value of science—she sees her future in it.

She grew up homeschooled in Eugene, and science “had been a big gaping hole” in her education, she said. “I did not think I wanted to do anything at all in science or research.”

But then Mowery connected with psychology professor Dare Baldwin, who happens to be a family friend and studies language and cognitive development in infancy and early childhood. Seeking a topic for her senior thesis

in the Clark Honors College, Mowery (left) approached Baldwin about the possibility of joining a research project in her lab.

Baldwin had been pondering an intriguing theory: do breastfeeding mothers have a predisposition for learning because of high hormone levels? That notion had surfaced in studies involving mice, Baldwin said, “but no one had yet applied this idea to humans.”

Mowery jumped at the opportunity to explore a scientific topic that moved

her. In addition to scouring the academic literature for research on the subject, she taught herself how to write the computer code necessary for conducting online tests to examine the theory.

On the question of learning capacity, Mowery and lab colleagues examined how new mothers who breastfeed their

“RESEARCH ALLOWED ME TO FEEL CONNECTED IN A MUCH MORE ACTIVE WAY.”

babies compare with new mothers who do not, as well as with nonmothers.

The tests involved various object-recognition exercises that tapped different learning and memory systems of the brain. In one test, subjects heard a list of words, and then typed in as many as they could remember. In another, they watched a video showing shapes presented in various sequences; they then identified which sequences emerged most often.

“We were looking to see if new mothers would score higher on any or all of these tasks,” Mowery said.

The tests are part of a broader project that is still in its infancy, so to speak. It’s

too soon to say how well mothers performed on the tests because Baldwin’s lab group is still analyzing the data.

According to Baldwin, if the performance by mothers proves to be above the norm, it will suggest a correlation between motherhood and enhanced learning, and future research could then consider if hormone activity during pregnancy and breastfeeding plays a role in a period of enhanced learning ability.

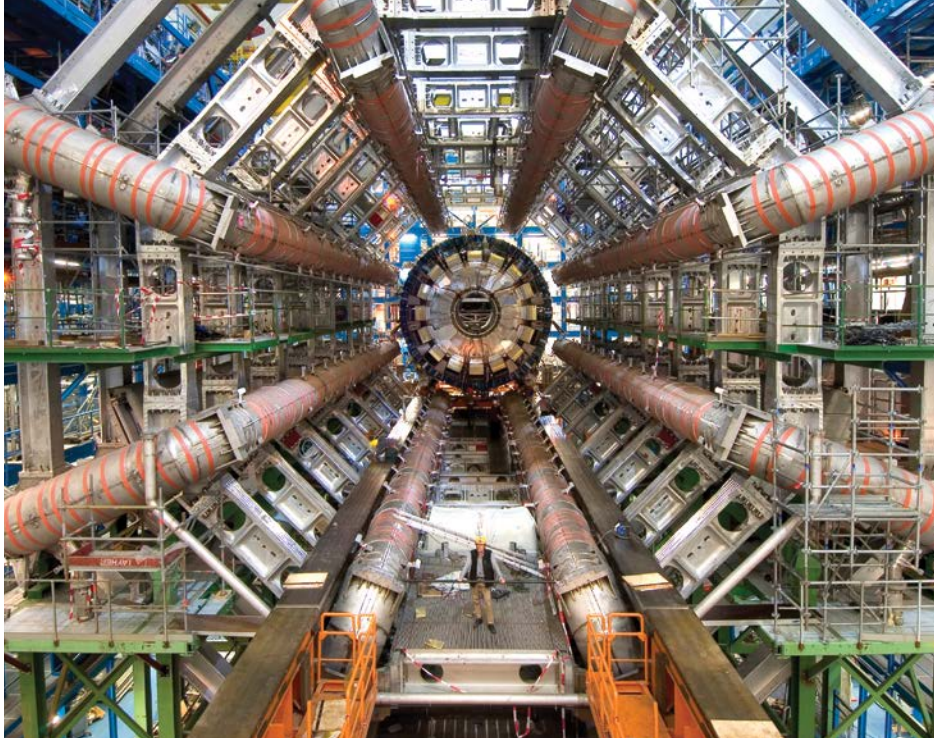
“The biggest contribution we’ve made is the gathering of evidence that shows that our topic is worth looking into,” Mowery said. “I don’t think people have really considered the potential for an enhanced period of learning during early motherhood.”

Doing research, Mowery said, made her more invested in her education. It’s also helped her view science in an entirely new light.

Consider this: a homeschooled child who didn’t focus on science—the same one who felt intimidated by the idea of research when she arrived at the UO—now plans to make a career out of it. Having graduated in June, Mowery is off to Oregon Health and Science University to study medicine.

“(Research) allowed me to develop relationships with professors that I wouldn’t have had otherwise, to plug into the university and feel connected in a much more active way,” Mowery said. “It gave me a really good appreciation for what goes on behind the scenes of what I was learning.” —JB





# COLLISION COURSE

MILLIONS OF BITS OF DATA—WHICH ONES MATTER?

**S**earching for subatomic particles using an atom-smashing collider is a bit like panning for gold in a stream. It takes a lot of effort to find the tiniest glitter.

UO physics students are doing something about that. In the lab of Stephanie Majewski (right), an assistant professor of physics, undergraduates are working on new tools to help researchers at the Large Hadron Collider (LHC) in Geneva—the massive underground collider that recently wowed the science world by detecting the elusive Higgs boson particle.

At any given time, Majewski has three or four undergraduates working on research projects in particle physics—specifically, in support of her work on the LHC. Her undergraduates are tasked with coming up with new algorithms—formulas that can be programmed into a computer chip to solve mathematical problems.

Researchers use these formulas to identify which of the trillions of “interactions” that happen in a proton collision are actually the rare result of something new

and interesting, and which ones are just so much humdrum atomic activity.

The collider produces vastly more uninteresting results than it does intriguing ones, so it’s helpful to sift as quickly as possible through the mathematical data describing those collisions. The best work of Majewski’s undergraduates stands a good chance of being incorporated into a

“THERE ARE NOT ENOUGH PEOPLE WITH PROGRAMMING SKILLS WHO CAN ALSO THINK AND ATTACK PROBLEMS.”

coming upgrade of the ATLAS detector (above), one of the primary observing stations at the LHC that records the tiny bits of subatomic debris thrown out by particle collisions.

“These students are doing real physics projects,” Majewski said. “These are extremely important studies we need in order to upgrade the detector.”

Majewski is always on the lookout for physics majors with solid programming skills to help the UO’s strong ATLAS team, which numbers more than 20 faculty members, postdoctoral researchers, and graduate and undergraduate students. It’s an opportunity for undergraduates to get in on the ground floor of a major research project and experience life as a scientist.

Research like this also provides students with skills in high demand in the working world. The fields of health care, insurance, medical research, finance, and others are snapping up graduates who can design algorithms that help them sort through vast troves of data to find the connections and correlations that lead to new or improved products or services.

“These sorts of skills are just extremely valuable,” Majewski said. “There are not enough people with programming skills who can also think and attack problems.”

The work also helps undergraduates determine if graduate school should be part of their career path, she added.

But number-crunching isn’t the only thing that



undergrads bring to the lab. Like the particles spinning around the LHC, younger students boost the energy level of Majewski’s team—this enthusiasm can’t help but rub off on older researchers.

Having undergraduates in the lab “gives everyone a boost,” Majewski said. “We get to see things through their eyes, like it’s the first time all over again.” —GB

# STUDENT RESEARCHERS SEEK TO BE THE

# CHANGE

STUDENTS PURSUE  
THEIR PASSION FOR  
ENVIRONMENTAL  
CONCERNS THROUGH  
AN ECLECTIC RANGE  
OF MAJORS

**PROFILES BY MATT COOPER**

**T**here's more than one way to study a human being. A biologist, for example, would zero in on our physical bodies. A social scientist might concentrate on our relationships. A humanist? How we think, imagine, and communicate. Complex subjects demand investigation and analysis from multiple angles. So it is with climate change. At the UO, undergraduates are grappling with climate change—its causes and effects—from numerous perspectives. What is the impact on animals, plants, rivers, and oceans? How are political systems and economies adapting? How do we express our fears and hopes in film, poetry, photography, essays, and even a new genre of fiction called cli-fi (climate fiction)?

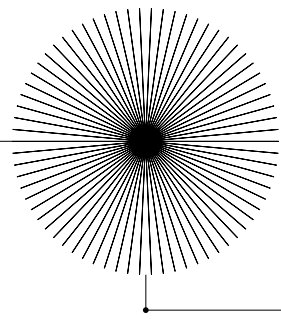
When it comes to climate change, UO students are asking the questions that matter to them—and finding the answers themselves, through research projects conducted in libraries, in the field, and in laboratories. Supervised by faculty mentors, they explore what is known—and probe what is unknown—in their particular line of inquiry. Then, they investigate, analyze, synthesize, and draw their own conclusions. A research paper or thesis is often the result.

The opportunity to do meaningful research is a hallmark of the undergraduate experience at the UO. This annual fall edition of *Cascade* is devoted to showcasing a selection of students who are pursuing compelling research topics, either on their own or as part of a team. But these students are only a handful of the hundreds who are engaged in research across the arts and sciences.

UO students place high value on environmental awareness and sustainability, so it's not surprising that the environmental studies major has quickly grown to be the sixth largest in CAS, with 500 students majoring in this field. But as the student profiles on the next three pages will show, students in virtually any major can pursue a research project that centers on climate change—from anthropology to geology, philosophy, biology, and even comparative literature.

Taken together, their work underscores the fact that any UO student can find a research topic and make it their own.





## A TALE OF THREE CITIES

### MILES GORDON

Class of 2016

**MAJORS** Political science and philosophy

**MENTOR** Ron Mitchell, professor, political science

**ECONOMIC MOTIVATION:** Gordon wrote a research paper that compared three cities in South Africa, evaluating factors that might prompt a community to take action to address climate change. Among them: local knowledge of the problem, engaged citizenry, and clear economic benefits for taking action. He found the last factor to be most powerful in predicting a city's adoption of policies responsive to climate change.

**POWER TO THE PEOPLE:** The three cities—Durban, George, and Khara Hais—voiced similar goals for environmentally friendly growth. But only Durban acted, by adopting green policies for development. Gordon attributed this to the city's "strong civil society," which prioritized the goal of becoming one of the world's most livable cities, and pushed leaders to adopt progressive policies such as funding research on greenhouse-gas mitigation and food security.



**THE TRAGEDY OF THE COMMONS:** In his analysis, Gordon likens climate change to "the tragedy of the commons"—the idea that individuals acting out of self-interest behave contrary to the best interests of the group by depleting a common resource. In the context of climate change, Gordon said, it refers to a country's pursuit of economic goals at the expense of the environment.

**THE MITCHELL DOCTRINE:** Working with political science professor Ron Mitchell, one of the nation's leading scholars on international environmental policy, was an experience both "rough" and "beautiful," Gordon said. Mitchell repeatedly poked and prodded Gordon to sharpen the focus and findings of his paper, and his critiques of each draft were to-the-point, to say the least. But the outcome was well worth it, Gordon said—"you crank out meaningful research with real-world applications. It's empowering."

## GET TO THE POINT

### JORDAN PRATT

Class of 2015

**MAJOR** Anthropology

**MENTOR** Patrick O'Grady, staff archaeologist with the UO Museum of Natural and Cultural History

**WARMING UP:** Pratt studied more than 300 "projectile points," a type of stone tool excavated from eastern Oregon. Her goal: to chart the movement of peoples reacting to a warming climate

“YOU'RE IN A SMALL HOLE, YOU'RE KNEELING IN THERE WITH A HAND TROWEL AND LOOKING FOR ARTIFACTS.”

7,500 years ago. Because the shape of a point can be specific to the period in which it was made, researchers use them to determine when and where humans have lived in certain areas.

**DOUBTS AND DISCOVERIES:** Pratt experienced a moment of self-doubt when she discovered that the people in that region—the ancestors of the Burns Paiute tribe—had inhabited a particular area that researchers had thought to be too dry. "My research didn't match the previous research and I thought, 'Oh my gosh, (my research) is all wrong,'" Pratt said. "But then it was like, 'No, that's the point of research—you want to discover something.' I learned not to be afraid of that."

**BACK TO THE FUTURE:** Although she focused on a period of climate change that occurred thousands of years ago, Pratt said there is a relevant takeaway for today: think globally, research locally. "You need to study localized regions and climates," Pratt said. "Different communities experience different effects of climate change, so mitigation and adaptation in these areas is going to be different."



**OBSIDIAN AND CHARCOAL:** Archaeological field work is grueling—"It's hot, you're in a small hole, you're kneeling in there with

a hand trowel and looking for artifacts,” Pratt said. But it builds camaraderie, too. Pratt recalled a dig during which the team next to her kept unearthing beautiful obsidian projectile points, while her crew could produce only the leftovers from ancient fireplaces—charcoal. “We joked around with them,” Pratt said. “They were finding the shiny things but we were finding the things that can date the shiny things.”

## A LITTLE BREATHING ROOM

### MARIA SCHANDL

Class of 2015

**MAJOR** Environmental science

**MENTOR** Tom Giesen, courtesy research assistant, Planning, Public Policy and Management

**INTO THE DEAD ZONE:** Hypoxic zones or “dead zones” are areas in the ocean without enough oxygen for most marine life to survive. Schandl reviewed the literature on factors that contribute to hypoxia—e.g., snowmelt timing, stream flow, ocean acidification, water conditions, and fluctuating sea levels—in Hood Canal, an estuary of Puget Sound. From there she explored how climate change might affect these factors.

### TEMPERATURE UP, OXYGEN DOWN:

Schandl found that, as climate change pushes global temperatures up, the amount of oxygen in our oceans goes down, because warmer water holds less oxygen. Research indicates that by 2050, Puget Sound could experience an additional 30 days per year of “hypoxic conditions,” she reported in her thesis.



**DATA DRIVEN:** Schandl cited about 40 reports for her investigation—she has her mentor, Tom Giesen, to thank for much of that. The two worked as “research partners,” she said, narrowing her topic to something manageable and then, together, diving

into the existing data on an issue about which neither was an expert. “He sent me at least 20 papers on the topic,” Schandl said. “Tom was incredibly helpful and available.”

**LIVIN’ ON RED BULL AND SOUR PATCH KIDS:** The research process taught Schandl something about herself—“I am a much more extreme procrastinator than I realized,” she said, laughing. As her project deadline approached, she recalled spending Memorial Day weekend in Knight Library, fueled by energy drinks and candy. “I ended up being awake for 60 hours or something ludicrous,” she said. “But I’m proud of myself for writing a thesis. I realized that I can accomplish anything I want as long as I will myself to do it.”

## COMPROMISED BY COLONIALISM?

### CHLOE TALBERT

Class of 2015

**MAJORS** Computer and information science and political science

**MENTOR** Ron Mitchell, professor, political science

**LESS EQUIPPED TO COPE:** In her research paper, Talbert assessed how a country’s history—namely, whether it was colonized or not—affects its vulnerability to climate change ills such as economic losses or natural disasters. In a review of China, Japan, Mongolia, and Indonesia, she determined that the latter two countries, which had been settled by a colonial power, are less equipped to cope. As with many colonized countries, Mongolia and Indonesia are still developing and have unstable education, infrastructure, health care, and governance systems—this hurts their ability to, say, provide emergency services during a



## HER FINDING COULD BE USEFUL FOR PREDICTING WHICH COUNTRIES ARE MOST THREATENED BY CLIMATE CHANGE MOVING FORWARD.

natural disaster. The finding could be useful for predicting which countries are most threatened by climate change moving forward, Talbert said.

**OIL, THE GREAT EQUALIZER:** While previously colonized countries appeared less able to recoup the economic losses of climate change, Talbert found two exceptions—Algeria and Saudi Arabia. Noting their large oil reserves, Talbert argued that worsening climate change is correlated with increased use of oil—which means profits, not losses, for oil-producing countries.

**A HELPING HAND:** Mitchell worked closely with Talbert, fine-tuning her premise and pointing her to the relevant data and literature for her project. They jointly analyzed the information and mapped out how to present her findings clearly. “I didn’t know quite how to research what I wanted to research,” Talbert said. “He helped me figure out how to analyze everything in an organized, scientific way.”

**POLITICAL SCIENCE MEETS COMPUTER SCIENCE:** Taking a deep dive into data analysis gave Talbert an appreciation for the similarities between her two majors. “Computer science is all about consequences—‘How does this decision affect what the consequences are?’” Talbert said. “Political science is the same—

'If this thing happens, what consequences will that have for who, and in what way?' That kind of logical, analytical thought ought to be applied everywhere."

## WALK WITH THE ANIMALS

### KENDRA WALTERS

Class of 2016

**MAJORS** Geology and biology

**MENTOR** Edward Davis, assistant professor, geological sciences

**MAMMALS ON THE MOVE:** Walters is studying how mammals are affected by climate change and the presence of humans. Using a database that records individual sightings of hundreds of thousands of specific mammals across the continental United States over the last century, she is creating a map that shows which areas of the country saw rising or falling diversity of mammals.


**NUMBER CRUNCHER:** Walters has to account for wrinkles in the data—some states reported far more mammals than others simply because more people submitted sightings of individual animals. California, for example, reported 84 times more mammal occurrences than Maine. Walters "standardizes" the results to project actual mammal numbers in states with underreported data.



**REMEMBER THE PIKA:** Managers of public lands are sure to sit up and take notice of Walters' results as they plan the adjustment of conservation areas as climate change pushes mammals in new directions. Consider the

American pika, a small, herbivorous mammal that lives in high-elevation areas: over the last century, the rate at which it has vanished from its typical habitat has jumped fivefold as the animal moves farther up the mountaintops, Walters said.

**PARTNERING WITH A PROFESSOR:** Walters is working side by side with her mentor, Davis, who is considering the same question for a period millions of years ago. Their results will be combined to predict how mammals will be affected in the future. To get there, the two are teaching each other the complex coding language necessary to run sophisticated computer analyses. "We bought a book about (the coding language)," Walters said. "We would read a chapter a week and meet and go through the challenge exercises."

**TALKING POINTS:** "I've learned how to write proposals, how to write concisely, and how to explain my science to someone who has no idea what I'm talking about," Walters said. "(Climate change) is a very important conversation and I'm excited to be a part of it." 

# INDIGENOUS VOICES MATTER

## A COMPARATIVE LITERATURE STUDENT ASKS, "WHAT GETS LOST IN TRANSLATION?"

A SINGLE WORD from the language of the Warm Springs tribe, translated to English, can become a paragraph.

As with many native peoples, this central Oregon tribe has infused place names and other words with rich cultural, historical, and ecological information. When scientists working with these indigenous groups translate their language and experiences into English, they risk losing part of the meaning that the native words convey—that is, even with a paragraph of many words, something essential can be lost.



So says Charlotte Rheingold, whose study of language translation in climate-change research was recognized as a standout. Her paper on the topic was chosen among thousands of submissions for presentation earlier this year at the National Conference on Undergraduate Research in Washington state.

Rheingold, who graduated in June, relied heavily on her major in comparative literature for the project. In a class on radical poetry last year, she learned that translation can be much more than simply swapping one word for another—if done meticulously, translation can be a portal through which groups gain a true understanding of one another.

"You can translate something to English and erase some of the cultural context," Rheingold said, "or you can really work to make the reader learn about the culture. It's the difference between trying to describe a particular custom by making an analogy to something that isn't quite right, and just taking the time to explain that custom in its own right."

**TRANSLATION CAN BE A PORTAL THROUGH WHICH GROUPS GAIN A TRUE UNDERSTANDING OF ONE ANOTHER.**

The idea took hold of Rheingold, and she didn't have to wait long to apply it. She was also taking a course in the Clark Honors College on

climate and culture in the Americas; for her term paper in that class, Rheingold used what she had learned about translation theory to show how indigenous groups can be either hurt or helped by translations into English.

Among her findings, Rheingold concluded that even well-meaning researchers aren't doing enough to ensure that indigenous customs and culture aren't "lost in translation" in the rush to report scientific information. In a study exploring the history of glaciers, she noted, scientists didn't conceive of the glacier as a sentient and spiritual entity—although native people do. And thus that perspective is omitted from the ensuing discussion about climate solutions.

"Since indigenous groups face some of the most dramatic effects of climate change, they strongly want their voices to be included in the conversation," Rheingold said. "But in a way that respects their cultural identity." —MC

# MOLECULAR MASTERY

UNDERGRAD'S CHEMICAL WORKAROUND COULD LEAD TO NEW DRUG TREATMENTS

BY JIM BARLOW

Some day, not too far in the future, devastating diseases may be treated with drugs built from specialized synthetic molecules, thanks to the research of recent UO graduate Muhammad Khalifa (below).

Khalifa worked for three years as a budding medical biochemist in the lab of professor Michael Haley. His exceptional work was recognized last July with the publication of a scientific paper with his name listed first—ahead of more senior members on the project and indicative of Khalifa's central role.

The paper documents a new approach for making analogs of compounds that show promise for treating disease, but actually can't be used because they are toxic. An analog is a specially constructed molecule that has an underlying structure similar

to another but with different chemical and biological properties. In this scenario, analogs would have the desired positive effect, but no toxicity.

In the paper, published in the international journal *Tetrahedron Letters*, Khalifa's team detailed how it's possible to make a class of analogs called "amidines" that are important to the development of drugs.

"The molecules we synthesized are not going to become drugs directly," said

Khalifa, a Portland native who earned a bachelor's degree in biochemistry last year. But they will contribute to the process of creating drug formulations.

"I think the important part of the paper is that we found a neat new way to make molecules that we are interested in," he said. "As a chemist, you are always building your way to molecules that have never been made before. Any kind of new wrench or other new tool in the toolbox can potentially become useful for you."

## TINKERING WITH THE PROCESS

Khalifa's process centers on the early steps when scientists tinker with the basic building blocks for creating amidines.

Chemists have historically created amidines in acidic solutions, but that was not ideal for the type of analogs that Khalifa wanted to create. Instead, Khalifa used a basic, or alkaline, solution, which the

To be listed as first author on an academic paper is an honor reserved for the person whose contributions were the greatest in a project. Khalifa did 90 percent of the work, including writing the paper, said Haley, who holds the title of Richard M. and Patricia H. Noyes Professor of Chemistry.

Khalifa had entered the UO with his eyes on medical school. "I wanted to be in pre-med because I was really interested in science," he recalled. "I had assumed at the time that people who liked science became doctors. By the time I got into my sophomore year, I realized that it wasn't quite that way—there were many other paths to take—and I decided that a PhD in research is the one I wanted."

## FROM NEWBIE TO VALUED TEAM MEMBER

Khalifa turned to biochemistry. He got into Haley's lab—before even enrolling in an introductory course in organic chemistry—

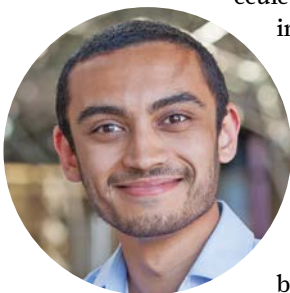
HE WAS LISTED FIRST ON A PUBLISHED PAPER—  
AHEAD OF THE MORE SENIOR RESEARCHERS.

building blocks of his amidines tolerated more easily. His approach also produced higher yields of the molecules in less time.

The new approach, Khalifa said, could be useful for making safer pharmaceuticals to treat myotonic muscular dystrophy, an inherited muscular wasting disease, as well as malaria and other tropical diseases.

only because Haley saw promise in him.

"Normally, I do not accept undergraduate students into the lab unless they have already taken the organic chemistry lecture-and-lab sequence," Haley wrote in a recommendation for one of Khalifa's graduate-level fellowship applications. "However, Muhammad's enthusiasm to start his research career made me change





my mind. I am glad I did . . . Muhammad went from being a complete newbie to a valuable member of the team.”

To gain that status, Khalifa stepped up when his lab supervisor left the UO and another key student departed from the program. Instead of “throwing in the towel,” Haley said, Khalifa took on an independent project to pursue the research on amidines.

Haley and Andy Berglund, also a researcher in the Department of Chemistry and Biochemistry at the time, had been developing molecules that might be effective against myotonic muscular dystrophy. Khalifa joined the project during his sophomore year.

Berglund was intrigued by pentamidine, a drug already approved by the US Food and Drug Administration to fight pneumocystis, a deadly lung disease. This medication repairs genetic defects in mice that lead to myotonic muscular dystrophy, but equivalent levels of the drug in humans are toxic.

Upon the departure of his two senior-level lab mates, Khalifa agreed to take the lead on finding a way to make analogs of pentamidine, based on efforts with amidines that his supervisor had wanted to pursue. In the end, the work provided a road map to six new analog possibilities.

His project became his senior thesis for the Clark Honors College, the subject of

several professional presentations, and the paper in *Tetrahedron Letters*, a weekly research journal that covers organic chemistry.

“It was really exciting because it was something I worked on during my undergraduate career,” Khalifa said. “And it does have relevance to the larger scientific community.”

### SCINTILLATING SENIOR THESIS

His 50-plus-page senior thesis scored in the top 10 percent of those submitted in 2014 in the honors college and was considered the best ever seen by Louise Bishop, an associate professor of literature who was associate dean of the college when Khalifa defended his work.

“Muhammad effectively—even scintillatingly—articulated his chemistry project in a fashion that made sense to a nonspecialist,” Bishop said. “Muhammad was flawless in answering questions about his topic, both to nonspecialists and to specialists, because he had so digested, lived with, his project and its import.”

Khalifa, who is now pursuing a doctorate in pharmaceutical sciences at the University of Wisconsin at Madison, says every undergraduate student should seek out a research experience.

“When you get to a place like the University of Oregon, there is so much happening,” he said. “It’s a large school


## NOT SO FAR AFIELD

It’s not all high-powered molecular theory for Muhammad Khalifa. One of his extracurricular activities has been much more down to earth: mushroom hunting.

In his first term at the UO, he and a friend took a course in the Outdoor Program. “We did a little workshop, bought field guides, and then we went out hunting,” he said. But in four years of hunting, driving hours out to the Cascades and over the coastal range, “we came back pretty much empty-handed,” he admitted.

However, success was just around the corner. He and his friend found a huge mushroom patch by one of the UO residence halls. His conclusion: “The UO is an amazing place for botany and mycology.” Not to mention biochemistry.

where there is research going on. It doesn’t really matter what your discipline is. You don’t have to be interested in being a hard-science student who wants to be a doctor to start doing what you want to do now. You can get involved in research in just about every department at the UO.”

The payoff? “Whether that shows you that you definitely don’t want to do research or that you definitely do, I think exploring the possibility is a key piece for finding your place or your niche.” 

# THE GOOD RUSSIAN DAUGHTER, THE AMERICAN GIRL

## HOW CHILDREN OF IMMIGRANTS NAVIGATE THEIR DOUBLE LIVES

**T**here were times, growing up, when Marilyn Pikovsky felt trapped between two worlds. Her parents, who emigrated from Ukraine to rural Oregon, wanted a good Russian daughter: reserved, fluent in Russian, successful in her career but

also competent in cooking and cleaning. Ready-made for marriage and a family.

But she was in America—the values were different. Teens were independent, if not downright rebellious: they experimented with smoking and drinking, and their desire to “question authority” often put them at odds with their parents.

Years passed, but Pikovsky eventually found people like herself when she enrolled at the University of Oregon, where she connected with the small-but-

active Russian student population. Like her, these fellow students had parents who had immigrated to the United States, but who still identified as Russian or Soviet.

Pikovsky (left) quickly realized that there were, in fact, tens of thousands of young Russian Americans across the country making their own way, making their own culture,

between the two worlds. She vowed to learn all she could, and now it’s paying dividends.

As a senior in the Clark Honors College, Pikovsky has launched a study of Russian immigrants that will be the basis for her honors thesis and also satisfy her personal interest in heritage.

There are more than three million Russian Americans, many of whom differentiate themselves based on their religion. There are five prominent Russian religious groups in the US and, conveniently for Pikovsky, all of them are represented in Oregon.

## SHE HAS ALSO DISCOVERED A HEALTHIER OUTLET FOR TEEN ANGST: HUMOR.

Using these groups as her subjects, Pikovsky—majoring in Russian, international studies, and history—is examining Russian culture in America. She wants to know which values from the homeland are retained, which are abandoned, which groups adjust more easily to their new surroundings, and why. Currently deep in fact-finding for a project that she’ll complete this winter, Pikovsky suspects that even though Russians have been arriving in America in large numbers since the late 18th century, most of them still identify, first and foremost, as Russian or Soviet.

Equally important to Pikovsky is how American culture affects her Russian

American peers in areas such as language. For example, the sons and daughters of Russian immigrants develop a hybrid tongue through which, she said, they “Russian-ize” certain English words to make them more understandable to mothers and fathers—“Safe-uh-vay” or “Val-mart,” for example, if it’s time to go shopping.

Some of these teens appear to struggle with what Pikovsky calls “double lives.” They’re having trouble at school or with the law, portraying themselves as virtuous to their parents while secretly they’re wrestling with the draw of drugs or gangs.

The young researcher has also discovered a healthier outlet for teen angst specific to Russian Americans: humor.

Garik Suharik, a young Russian American in New York City, has become an Internet sensation with five- and 10-second videos in which he pokes fun at Russian customs and expressions passed down from his elders. His Facebook page—Brooklyn Russian Vines—is followed by more than 24,000 people. Pikovsky sees in Suharik’s clever cultural send-ups, and the reactions they get, fertile ground for her project.

Her long-range goal is law school—specifically, immigration law. Pikovsky has seen firsthand the challenge that Russian immigrants face in trying to reconcile the laws and culture of their former country with those of the one they’re in now. She’d like to make that transition smoother for others, and she’s using her project to better understand the issues.

“I’m hoping to bridge the gap (between US and Russian cultures),” Pikovsky said. “I want to explain how we can go about adapting to both.” —MC





# THE HIDDEN STORY OF THE AMAKHOSIKAZI

## DIGGING DEEP TO FIND THE STORY OF POWERFUL ZULU WOMEN

**I**n the annals of African history, their stories are the stories of the powerful and the influential.

Mnkabayi, the kingmaker. Nandi, a political strategist. Bhibhi, a prominent figure silenced by assassination.

All were respected members of the Zulu kingdom in the continent’s southeast during the 19th century. More important, all were women.

Caellagh Morrissey has painstakingly stitched their lives together with the fleeting offhand references she has uncovered from historical records that extensively covered the affairs of men. The result is a series of thoughtful profiles that constitute her thesis, written at a propitious time: scholars are just now beginning to sit up and take notice of this elite community of women long overlooked.

A major in history and international studies, Morrissey was frustrated with how little she knew about the continent where her family had long volunteered for the Peace Corps. She penned a paper sophomore year on precolonial South Africa that “showed promise” in her professor’s words, and now she’s eagerly revisiting it as the foundation for her senior thesis, a requirement for graduating from the Clark Honors College.

First, she surveyed the existing research. South Africa’s “amakhosikazi”—elite queens, princesses, regents, and matriarchs—are beginning to draw the interest of historians. Morrissey and Lindsay Braun, an assistant professor of history, worked to develop an angle for her line of inquiry that would bring new knowledge to the field. She chose to focus on factors that caused the decline in power of this female class over the golden era of the Zulu kingdom, 1816 to 1906.

Morrissey also had to account for the fact that most history on the Zulu people was written by European colonists, carrying their biases; Zulus passed along their histories orally, through poems, proverbs, and riddles. Working from recordings of these oral histories preserved by researchers, she was able to develop a “counter-narrative” to the settler-centric point of view.

Mostly, though, Morrissey dug through mountains of historical information about male rulers, unearthing the occasional gem regarding the women who were integral

none of the power of her female forebears. Instead, Magogo endeavored to preserve her family’s place in history in a small but significant way—she became an expert on Zulu traditional music, arguably the era’s most important authority on the subject.

Morrissey even unearthed a recording of Magogo singing. Although the lives of the women she studied were captured almost



Research by Morrissey (top left) illuminated the life of Princess Constance Magogo, an expert on Zulu traditional music.

“THERE’S A SENTENCE HERE, A SENTENCE THERE. CONSIDERING THE AMOUNT WE HAVE ON THE MALE FIGURES, THE DIFFERENCE IS ASTONISHING.”

to the power structure—either behind the scenes or, occasionally, on full display.

“There’s a sentence here, a sentence there,” Morrissey said. “Considering the amount we have on the male figures, the difference is astonishing.”

Among her favorite figures is Princess Constance Magogo, the daughter of the last Zulu king recognized by the British.

Magogo came of age as the imperialists were overwhelming Zulu rule; she wielded

entirely by the written word, it was this simple audio artifact—a woman in song—that reinforced in Morrissey her ethic of careful responsibility for her subject matter.

“To hear that woman singing, it gave (my research) a human touch,” Morrissey said. “Finding somebody’s story is really an incredible moment. I want to honor the past and bring some dignity to the memory of these women who have otherwise been erased.” —MC

# PASSAGE TO INDIA



## INTREPID UNDERGRAD VENTURES OUT OF HER COMFORT ZONE

BY MATT COOPER

It was hot and dirty, and the men sitting in a semicircle around Irene Klock were yelling at her.

How had she gotten herself into this? Why had she chosen to come to this remote village in India, where she was drawing the ire of local farmers simply by asking questions about an irrigation project?

The farmers kept yelling, and Klock (below) kept her voice recorder running. She didn't speak a word of the Tamil language but, thankfully, she wasn't alone; her translator, Mr. Mathivanan, helped keep the situation from escalating. Klock finished her questions and the

two left quickly. She learned later that the men, mistaking her for an official, had been demanding answers about a lagging government project to bring water—to bring opportunity—to their parched land.

Oh, the glamorous life of a globe-trotting geographer.

### LEARNING BY DOING

In fall 2014, Klock, majoring in Japanese and geography, spent four months in southeast India surveying farmers about a project to irrigate their land by linking rivers in the area. She is a self-described kinesthetic learner—she learns by doing—and in choosing this research project, Klock was looking for a real-life learning experience outside of the classroom. She found it.

River linking, common in India, is the use of canals to connect rivers, bringing water to dry areas and supporting agriculture, drinking water, and flood control. Drawbacks include loss of land, increased contamination of rivers, and damage to ecosystems and wildlife.

It begs the kind of question that appeals to a student in environmental geography such as Klock: what are the ramifications of fundamentally altering the relationship between a people and their natural environment?

Klock had been searching for research projects abroad that combined farming and irrigation. She connected with a nonprofit organization in India called ATREE (Ashoka Trust for Research in Ecology and the Environment), which is working to conserve the country's biodiversity. Paying her own way, Klock flew to India and, after receiving training at the organization's office in urban Bengaluru,

she and her translator headed for Tamil Nadu, a southeast Indian state famed for its Hindu temples.

On paper, Klock's assignment seemed simple enough: She was to interview villagers from water-deprived districts, gathering public opinion on a new river-linking channel that was only partially complete. Mathivanan would be her intermediary, gaining permission from village leaders for the young woman to talk to farmers.

In reality, it was a project that pushed Klock out of her comfort zone. She endured pangs of homesickness and conditions for the project were less than ideal: temperatures routinely topped 100 degrees and sometimes the setting for the interviews was no more luxurious than a concrete bench at a bus station.

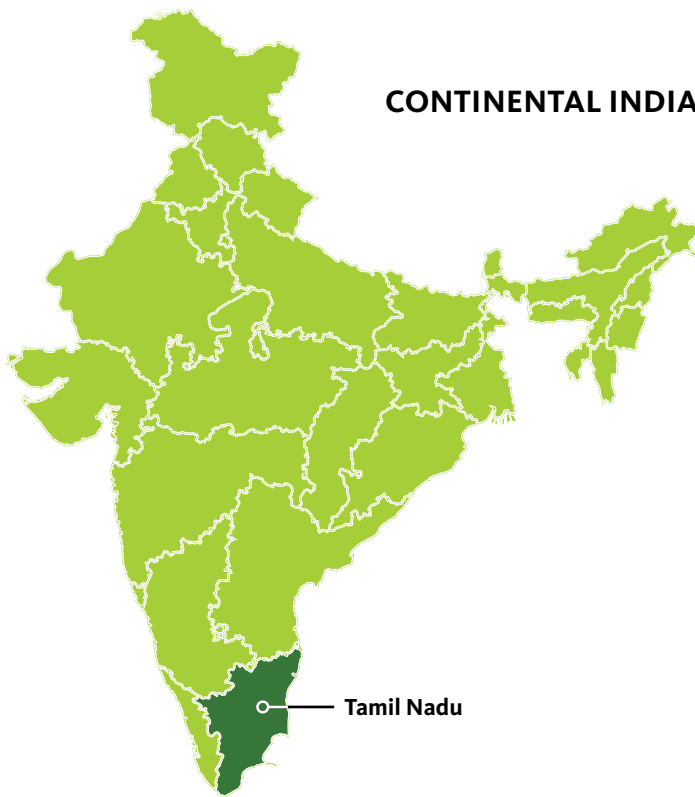
### PIPETTES AND RECORDERS

Klock also wrestled with the challenge of the work itself. Her project was one in "qualitative" research—which prizes observations of the world around you—as compared to "quantitative" research, in which answers are typically derived from calculations and formulas.

"I've taken chemistry and biology—I know how to do research with quantitative data," Klock said. "For this, my methods were different. I wasn't using a pipette, I was using a voice recorder. How I interpreted the data was different, as well. It was more like writing a story rather than writing a scientific paper."



## CONTINENTAL INDIA



*Left: Klock found widespread support among farmers for the irrigation project. Above: Tamil Nadu is a state located in southeast India.*

Klock visited 12 villages, conducting hourlong interviews with groups that varied from five to 20 people. She was armed with 20 questions meant to spark conversations on the new canal project; the participants were all Indian men, ages 40 and older.

As she conducted the interviews, and during analysis of the farmers' responses later, Klock listened for patterns or repeated references to the canal's benefits or detriments—say, the ability to grow cash crops or loss of land to make way for the project. Working with ATREE, she organized this information into a narrative with numerical data. Klock also compared current and expected crop harvests and assessed each village's dependency on agriculture as a livelihood.

Klock found that the villages, without exception, supported the new canal, even though a third of the groups could expect to lose land for the project. With irrigation, farmers hoped to add an additional crop cycle and to increase the production of "wet" crops such as paddy rice and cash crops such as chilies and sugar cane.

Klock also identified problems that might have influenced her results, including mistakes in translation and transcription. Throughout the experience, she noted, there was also a "recurring misconception" that the research was for governmental purposes.

their answers to similar questions later on in the discussions . . . and after villages claimed they were water-poor when data showed that they received high amounts."

### AMAZING ADAPTABILITY

While ATREE helped Klock analyze and organize her data, she also leaned on her advisor at the UO, Leslie McLees, the de-

partment's undergraduate coordinator and an adjunct instructor.

Before Klock left, the two mapped out McLees' expectations for the project: a research report, classroom presentation, and submission to the university's undergraduate symposium, all of which Klock completed. While Klock was abroad, McLees also talked the young researcher through some of the more frustrating moments of the experience.

"I was struggling, I was living alone, it is the hardest country I've ever lived in,"

"It is possible that focus group discussion participants may have answered questions or made comments under the impression that their answers would influence government assistance for their village," Klock wrote. "The credibility of the data collected from some of the focus group discussions became uncertain after participants changed

Klock said. "It was probably the hardest four months of my life."

McLees, citing the logistical challenges that Klock overcame for the project—international travel, language barriers, and a cultural divide—said the student showed "amazing adaptability and maturity."

Klock's project was an excellent example of the geographer's goal of understanding how political, economic, and cultural processes play out in a particular place, McLees said—in this case, how a state water project affects people at the local level.


"When students head out into the field and have extended stays in a place and are open to the variety of people they will encounter, they bring that back with them," McLees said. "Rather than seeing people as helpless or poor or uneducated, students who approach these places with an open mind—as Irene did—can help us see that the reality is far more complex."

For Klock, there is no better example than the friendship she developed with her translator, Mathivanan.

Initially, she misinterpreted his quietness as aloofness; he seemed unapproach-

“RATHER THAN SEEING PEOPLE AS HELPLESS OR POOR OR UNEDUCATED, STUDENTS CAN HELP US SEE THAT THE REALITY IS FAR MORE COMPLEX.”

able and it was intimidating to ask him questions, Klock said. But as the two spent more time together—and navigated together through the rigors of the experience—they became closer.

"After that very hard focus group discussion, we were driving in the car and he said, 'I'm sorry about that. You're very brave for coming out here as a young woman,'" Klock said. "Being able to bond with him over that made me more comfortable for the rest of the time. We became friends." 

# THE MYSTERY OF THE MONKEY FLOWER

BIOLOGY STUDENTS CONTRIBUTE TO GENETIC RESEARCH

**T**hroughout California, an unassuming wildflower grows in shades of yellow and orange. But in the southernmost part of the state near San Diego, its petals are red.

To most, the change in color of the monkey flower would go unnoticed. But for Matt Streisfeld and his students, the flower provides a glimpse into evolutionary history.

“There’s a small area in the extreme southwestern part of California where all the monkey flowers are red. Just 30 miles inland, the flowers are all yellow,” said Streisfeld (above), an assistant professor of biology who leads a lab in the Institute of Ecology and Evolution. “What’s unique is that in a small transition area, the flowers are hybrid and have mixed orange colors, but only there. Why does the transition happen right there? By studying the monkey flower, we are trying to understand the underlying evolutionary mechanisms that tell us how species form.”

The flower’s geographic idiosyncrasies translate well for work in Streisfeld’s labo-



“I REALLY ENJOY WORKING WITH STUDENTS AND SEEING THEM GROW AS SCIENTISTS. I SEE THEM INVEST THEMSELVES AND DELVE INTO PROJECTS.”

ratory and greenhouse, where students immerse themselves in the inner workings of biology research. Students join Streisfeld in trying to better understand the diversity among species and the process of adaptation.

“Classwork is great, but to understand the process of how science is conducted, there is nothing more important than doing lab work,” said Streisfeld, who has undergraduate, graduate, and postdoctoral students working in his lab. “Science is an incremental process and lab work leads students through the process of coming up with ideas, designing and conducting experiments, analyzing data, and communicating findings.”

Connor Benson (left) started working in Streisfeld’s lab in fall 2013, after becoming interested in evolutionary biology. Benson started with general lab tasks such as working in the greenhouse, prepping for experiments, and sterilizing equipment. Then, he worked with Streisfeld to develop a biology honors thesis, an independent project related to the lab’s overall research.

His project was a study that followed up on previous work in the lab on the genetic basis for the flower color change. While

Streisfeld has shown that one major gene controls the change, Benson’s project was to test the function of additional genes that also may regulate production of the floral pigment.

Benson’s results ended up contradicting the established research, but he was undaunted, noting that unexpected outcomes also help push knowledge forward. His work has opened several new lines of inquiry that Streisfeld expects to carry on with other students.

“I really enjoy working with the students and seeing them grow as scientists,” Streisfeld said. “I see them invest themselves and delve into projects and pull out information in the end. I think they learn a whole lot more than what can be taught in the classroom.”

Working in a lab helped Benson earn his honors biology degree in June and, equally as important, enriched his collegiate experience.

“The lab gives you a mode of thinking that you don’t get in classes,” he said. “You get to see the entire process of experimental design, data collection, analysis, and in some cases publication, which really brings the whole process of biology and science together.” —HH





# ICEBREAKER

ENVIRONMENTAL  
STUDIES MAJOR ASKS  
HOW THE STUDY  
OF GLACIERS BEGAN

**L**incoln James likes slippery slopes. That's slippery as in ice. James is a junior environmental studies major who spent a good part of his second year at the UO exercising a newfound curiosity about glaciers. He's turning it into a research project that probes the origins of glaciology—the study of ice as it occurs in the world around us, including seasonal snow, sea ice, and, of course, glaciers.

James wants to know how glaciology came to be a science, and especially whether the early European climbers who ventured onto mysterious, ice-jacketed mountains were the ones who put glaciology on the scientific map. But rather than strapping spikes to his boots and grabbing an ice axe, James made a bold ascent of the Knight Library stacks, looking for copies of expedition journals and early accounts in both scientific journals and the popular press.

His hunch was right: the same people who summited those peaks were the first ones to study the ice shrouding them. Starting in the early 18th century and continuing through the next one, James (top, right) learned the early mountaineers of the modern climbing era took the first measurements of glacial ice, its movement, and the high-altitude weather, collecting data that formed the foundation of what would become glaciology.

“There was this element of exploration and wanting to be the first to get to the top of these peaks and say they did it, but there was also a lot of research they wanted to do while they were up there,” James said. “After peaks had been conquered, the focus changed to the glaciers and how they had shaped the environment.”

It took those early explorers some time to develop a theory for the formation of glaciers that stood up to the data that they were collecting. But they eventually came up with



JAMES IS DOING HIS RESEARCH AS PART OF A MAJOR NATIONAL SCIENCE FOUNDATION GRANT.

a premise that closely tracks what's known today—namely, that glaciers are moving rivers of compressed ice formed through eons of snowfall. James found that from the early 1700s through the end of the 1800s, the scientists interested in glaciers gradually split off from the explorers, realizing that they didn't have to reach the summit to study ice that extends thousands of feet below.

“The way that people understood glaciers changed completely over that period of time,” he said.

Glaciers are a new interest for James, one that blossomed from a serendipitous encounter with a UO researcher with his own fascination for those eerily blue, slow-moving rivers of ice. Mark Carey, an associate professor of history in the Clark Honors College, has long studied the way glaciers affect people, communities, and ways of life.

Carey runs a website called *Glaciers*,

Climate, and Society that collects global information and resources on glacial hazards, climate change, and water. Of particular interest is the danger indigenous people face from avalanches and floods set off by melting ice that, once gone, will also close the spigot on a main source of drinking and irrigation water.

James is doing his research as part of a major National Science Foundation grant that Carey received to study how glaciers affect people and society. As James sifts through the history books, he is building the beginnings of a future honors thesis while gaining a valuable research experience.

The young researcher is undaunted by the pace of discovery, which might best be described as, well, glacial.

“I've learned that research can be a frustrating and slow process, but also a very rewarding one,” he said. “I can't imagine a better way to learn.” —GB

# A LANGUAGE WITHIN A LANGUAGE

## REVIVING THE TONGUE OF AN OREGON TRIBE, NOT SPOKEN FOR 80 YEARS

BY MATT COOPER

In 1906, anthropologist Edward Sapir—a pioneer in the development of linguistics—met with a Native American woman in southwest Oregon named Frances Johnson, who was the last fluent speaker of an indigenous language called Takelma.

Over a series of interviews that summer, Sapir developed what would become the largest body of material available on the language by making audio recordings as Johnson provided

personal narratives, medicine formulas, elicitations, and Takelma mythology. With Johnson's death in 1934, Takelma fell silent. Until now, Johnson's

descendants have be-

gun to restore a language that has not been spoken in more than 80 years. Their efforts will rely in part on the work of Stephanie Evers (above), a 2015 UO linguistics graduate whose research on the topic can best be described as exacting.

"I loved working with this language," Evers said. "It was a new challenge, a new

puzzle every day. I found it intellectually rewarding and it was also extremely meaningful to me personally."

### THOSE ALONG THE RIVER

The Takelma were a Native American people who originally lived in the Rogue Valley, with most of their villages sited along the Rogue River; "Takelma" means "(Those) Along the River." Their land was agricul-

IN TAKELMA, "COYOTE THREW FROG INTO THE WATER" WOULD BE SPOKEN IN THE ORDER COYOTE-FROG-WATER-THROW.

turally rich and highly valued by settlers, leading to the Rogue River Wars and forced relocation of the Takelma in 1856.

In its effort to restore the language of their descendants, the Cow Creek Band of the Umpqua Indian tribe has partnered with the UO's Northwest Indian Language Institute (NILI). The institute provides

native language teachers and community members with training in linguistics, language teaching, and development of materials and curriculum. Students in the linguistics department have also worked on a revitalization of Takelma; that opened an opportunity for Evers, who was seeking a subject for her senior thesis, to tackle a six-month research project.

It's been a humbling experience, says Evers, and not just because her work is a link in the chain that connects the Cow Creek to their ancestors. She was challenged by the fact that she had to rely on dated and hard-to-use source material to prepare her analysis of a long-dormant and complicated tongue.

In an effort to provide future teachers of the language with course material, Evers documented verb structure: verb stems, tense, and the order of subjects, objects, and actions in a sentence. Takelma often, but not always, employs a subject-object-verb order, so that the idea "coyote threw frog into the water" would be spoken in the order, coyote-frog-water-throw.

Evers first had to interpret a language within a language—Sapir's records. The anthropologist-linguist published his work on Takelma in the early 1900s, well before the standardization of modern linguistic conventions that would have made it easier for Evers to find patterns in usage.

"It was a lot of work just trying to understand what he was saying," Evers said. "I had to figure out how things he identified in the language correspond to what I'm seeing now, which is very tricky."

### ONE WORD, A COMPLETE SENTENCE

Even more challenging was the task of translating Takelma itself. Verbs in the language can be lengthy compounds constructed from smaller parts, capable of expressing a complete sentence's worth of ideas in a single word. For example, the verb "teekwält'kwiip'anp" translates to "take care of yourselves."

Evers noted every utterance of a particular verb and the context in which it





*The Takelma were one of the major Native American groups in southwestern Oregon in 1850.*

## EVERS' WORK WAS POSSIBLE ONLY BECAUSE OF THE LINGUISTICS DEPARTMENT'S FOCUS ON LESSER-KNOWN LANGUAGES.

was used, developing a spreadsheet that quickly comprised nearly 1,500 verbs.

"This kind of analysis is very painstaking," Evers said. "It requires a lot of attention to detail. That's always challenging."

Evers' work was possible only because of the linguistics department's focus on lesser-known languages and empirical research in syntax, semantics, and phonology (the organization of sounds in a language).

Some linguistics majors at the UO study second-language acquisition, Slavic linguistics, or the relationship between language and society. But all of them take grammar, which introduces them to language morphology and syntax, both necessary for breaking words down and understanding how they come together in a language, Evers said.

In classes on syntax, she did weekly assignments in which she analyzed samples from languages around the world, look-

ing for consistencies across cultures. Meanwhile, her studies on morphology gave her a foundation with "morphemes," which are the smallest grammatical units in a language. "Dogs," for example, is composed of the morpheme "dog," which indicates the canine species, and the morpheme "s," which means plural, of course.

### NUANCES AND BUILDING BLOCKS

Her command of morphemes was put to the test in documenting a language where the order of subjects, objects, and verbs is extremely fluid and verbs themselves can stand alone as a complete sentence. For her research, Evers put aside some of Takelma's more complicated nuances and instead zeroed in on "building blocks" such as the order of morphemes in a simple verb.

During her project, Evers leaned heavily on department head Scott DeLancey

and Joana Jansen, a research associate at NILI, for resources, guidance, and feedback. "There's absolutely no way that I could have done this without them," Evers said. "They were both immensely supportive."

Evers was inspired to study indigenous language preservation while taking a course in linguistics policy and planning from Janne Underriner, who is also director of NILI. Underriner put Evers to work at NILI, where the student applied her growing knowledge of grammatical analysis to better understand Takelma.

"She saw it as an academic challenge," Underriner said, "and an opportunity to make accessible this language data that had otherwise been unreachable to tribal community members."

Underriner called Evers' work "unique for an undergraduate student," and now Evers is taking it to the next level: she has been accepted to a doctoral program in linguistics at the State University of New York at Buffalo. Her first exposure to an independent research project was so satisfying that she can't wait to start another.

"Whatever I do with my life, I need it to be two things," Evers said. "I need it to be a challenging problem that I get to solve, and I need it to be something that tangibly benefits society. That's what it's all about to me." **EAS**

## THE TAKELMA TONGUE

Evers' research focused on verbs in the Takelma language. Below are some common examples she's come across, with English translations:

**alt'ayák':** s/he/they discovered  
him/her/it/them

**k'eme'e'n:** I did it

**miiliitá'n:** I love him/her

**tiihiliikwa'n:** I am glad

**t'kunúuk'te':** I feel cold

**uuyuú'skwasi:** s/he laughs at me



## NATIONAL AWARD WINNERS

**T**he experience of research is often its own reward: the intellectual challenge, the chance to be mentored, the skills and knowledge gained.

And then there are the external rewards.

Over the years, numerous Ducks have earned national and even international recognition—in the form of prestigious scholarships—for their undergraduate research. Three more joined their ranks in the last year:



**Kyla Martichuski** and **John Gillies** were named **Goldwater Scholars**, raising to nine the number of UO students who have received the award since 2009. The scholarship fosters students to pursue careers in the fields of mathematics, the natural sciences, and engineering; Martichuski and Gillies were the only recipients from an Oregon university, and each received up to \$7,500 for tuition, fees, and room and board for their senior years.

Martichuski (above, left), from Salem, is a biology and human physiology major with a minor in chemistry. She studies the dynamics of fungal communities in the atmosphere. Gillies (above, right), from Junction City, is a biochemistry major exploring protein interaction with single-strand DNA.

Another UO undergraduate, **Sean Hixon** (far left), earned a graduate research fellowship from the **National Science Foundation**. The program supports research in science, technology, engineering, or mathematics at the master's or doctoral level at US institutions.

Although the awards typically go to first- and second-year students who are already in graduate school, Hixon received his fellowship prior to earning his undergraduate degree earlier this year in geology and anthropology, with a focus in archaeology. He's headed into a PhD archaeology program at Penn State—one of the best in the country—with full funding, courtesy of university support and the NSF award.

# CASCADE

*Cascade* is the alumni magazine for the UO College of Arts and Sciences

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**CLARIFICATION:** An article in the print edition of the spring issue suggests there is an ongoing scientific debate about the possible existence of zombies in Haitian history. Anthropology professor Philip Scher notes, however, that most evidence does not support this claim.

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## FUNDING AND AWARDS FOR UNDERGRADUATE RESEARCH

**F**aculty researchers get funding for their projects from agencies such as the National Science Foundation and the National Endowment for the Humanities. But you don't have to be a professor to get financial support for research efforts.

Undergraduates have funding opportunities, too. And it's not only in the sciences (although there's plenty of support for students doing science research—see below). The newest funding source for undergraduate research on the UO campus gives financial help to student researchers in the humanities.

The new **Humanities Undergraduate Research Fellowship** (also known as HURF) grants a **\$2,500 research stipend** to students over two terms of work with a faculty mentor in the humanities. The fellowship funds as many as eight UO students for 16 weeks during the winter and spring terms.

Among the wide range of other options:

- **Presidential Undergraduate Research Scholars:** **\$5,000 research stipend** for the academic year
- **Vice President for Research and Innovation Fellowship:** **\$5,000 research stipend** for the summer
- **Undergraduate Research Opportunity Program minigrants:** up to **\$1,000 in research funds** awarded during fall and winter term
- **Oregon Undergraduate Researchers in the Summer Program for Undergraduate Research:** approximate **\$4,200 research stipend** for the summer
- **Foreign Language and Area Studies Fellowships:** **\$5,000 living stipend**, plus tuition and fees up to **\$10,000** for the academic year; **\$2,500 living stipend**, plus tuition and mandatory fees for the summer
- **Undergraduate Research Fellowship Program:** **full tuition waiver** for the academic year
- **Center for Sustainable Materials Chemistry Summer Research Program:**



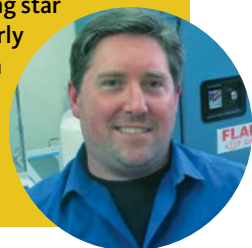
- **\$4,000 research stipend** for the summer
- **Science, Mathematics, and Research for Transformation (SMART) Scholarship-for-Service Program:** cash **stipend of up to \$38,000 a year**, full tuition, required fees, health insurance contribution, and book allowance
- **McNair Scholars Program:** tuition support plus a **\$2,800 summer research stipend** for

- low-income and first-generation students, or those from a group that is underrepresented in graduate education
- **UO R25 Summer Research Program:** approximate **\$3,800 summer stipends** and professional training for undergraduates to participate in research projects funded by the National Institute of Child Health and Human Development

Visit **Online Extras** to find **more options for undergraduate research funding**. While you're there, be sure to check out the following:

**MAKING THE NEXT MICKEY.** Aspiring cartoonist Brandon Rains is on a mission to create a cartoon character with the appeal of Mickey Mouse (see page 10). To better understand Mickey's qualities, he examined the animated star from conception through the mouse's first public appearance in *Steamboat Willie*, a short film from 1928. Visit Online Extras at [cascade.uoregon.edu](http://cascade.uoregon.edu) to see an animation that Rains created in an attempt to represent, in an abstract fashion, the expressions and personality of Mickey.

**DEMYSTIFYING SCIENCE.** Associate professor Josh Snodgrass, a rising star in biological anthropology, studies global health issues. He also regularly recruits undergraduates to work in his lab; in the Online Extras section of [cascade.uoregon.edu](http://cascade.uoregon.edu), watch a video interview in which Snodgrass describes his work in Siberia and also his commitment to undergrad research. "I try to get them into labs," Snodgrass says in the video. "It's a way of demystifying science."





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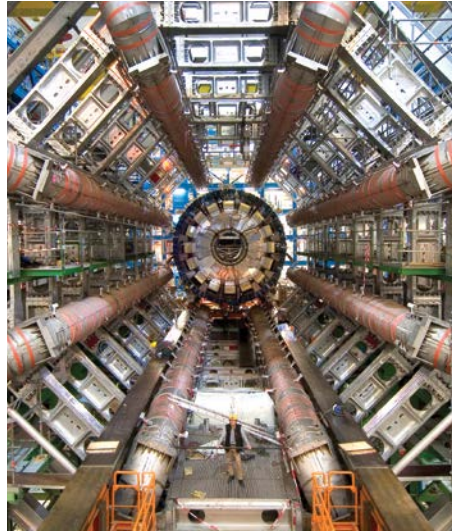
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