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Performing its own testing will allow IU to spot trends and take appropriate action in a timely manner to avoid outbreaks.

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Indiana University’s plan to operate its own COVID-19 mitigation testing labs became a reality on October 21, 2020, when the testing facility in Myers Hall on the Bloomington campus processed its first run of tests.

Distinguished Professor of Biology Craig Pikaard serves as the lab’s scientific director and oversees the testing operations run by a team headed by Laboratory Supervisor Dr. Sumitha Nallu and Laboratory Manager Dr. David Merritt. Professor of Biology Matthew Hahn serves as the overall director of the facility, handling compliance issues as a CLIA-certified clinical laboratory as well as personnel management.

IU operates two other testing labs at the IU School of Medicine on the IUPUI campus. Pikaard lab members, Dr. Akihito Fukudome and Dr. Pascal Martin spearheaded the effort to establish the testing protocols now in use in all three labs, with Pikaard lab member Dr. Ramya Enganti and Innes lab members, Dr. Brian Rutter and Hana Karimi also involved.

IU started COVID-19 mitigation testing (or surveillance testing) on all of its campuses in August—randomly testing students, faculty, and staff. About 15,000 tests per week were sent to Vault, a third-party lab, for analysis and results. With IU’s testing labs up and running, the university’s ultimate goal is to process and track 15,000 tests per day. In addition to cost savings, having its own testing facilities provides IU with quicker result times, typically 24 hours or less.

The director of IU mitigation testing, Dr. Aaron Carroll of the IU School of Medicine, credits the testing as a
advice and job set the course for my life as I went on for a doctorate in genetics/microbiology. One of the few women faculty in the Zoology Department at the time, Dr. Dippell served as a role model for women students as an excellent researcher and teacher—and great person."

Dippell retired in 1982 and moved to Arizona to live with her older sister. She moved in 1990 to Corvallis and became an active volunteer in many nonprofit organizations, notably the Boys and Girls Club, where she had a strong following of young artists who enjoyed developing their budding talents under Dippell’s instruction. Art had long been a hobby of hers. She created the Art Center Endowment fund in 2016 to support art education for youth. Dippell also shared her appreciation for nature with the children.

Jeanne Smith, now-retired attorney in Corvallis, met her shortly after Dippell arrived in Corvallis. Smith was captivated by Dippell’s adventurous spirit and deep intellect. The two friends have shared many lunches, day trips, laughs, and fun. Smith was honored when Dippell, who has no local family, asked Smith to assist with her care as she ages.

Smith said of her dear friend, “Ruth is the longest residing tenant at her assisted living facility. Although the pandemic has limited her daily walks and joyful interactions with other residents, staff, and the folks at the local Boys and Girls Club, she continues to spread kindness and compassion to all. Age has not affected Ruth’s fervor for televised sports and her gratitude for friends and life’s simple pleasures.”

Gifted scientist, beloved teacher, and valued mentor. To echo Preer’s words in his retirement tribute to Dippell, “Ruth has earned her place in the sun.”

References
• “Prize Discovery.” Indiana Alumni Magazine. February 1950, pp. 5-6.

The four 96-well plates are then moved to an Agilent Bravo robot, which transfers a tiny amount of liquid (5 microliters) from each well of the four 96-well plates into a single 384-well plate. The Bravo robot also mixes in an equal amount of testing reagents that allow the detection of viral RNA.

Pikaard noted that each 384-well plate, which can fit in the palm of a
lab technician's hand, contains about $3,800 worth of reagents, which breaks down to about $10 per sample. Although this sounds expensive, Vault charged IU $86 for each sample it processed.

The 384-well plate containing the test reagents is then moved to an instrument known as a thermal cycler, which carries out programmed temperature changes to enable several reactions to take place. The first reaction copies any coronavirus RNA into DNA. The DNA corresponding to three different viral genes is then amplified through 40 cycles of DNA replication, doubling the amount of DNA with each cycle. The amplification process results in fluorescent products of different color for each gene target, if present. These fluorescent signals are measured after every cycle and displayed on the screen of the thermal cycler as it runs. Positive samples display amplification curves that are absent in negative samples and rise well above background signals.

“It’s easy to tell whether a sample is positive or negative most of the time,” Pikaard said. “But, there are inconclusive results sometimes.” There won’t be as much coronavirus in the system of someone who has either had COVID-19 and is getting over it or someone who has just been infected. Because of possible inconclusive results, the saliva samples are kept until a run is completed so that samples can be run again, if necessary to get a clear result. The samples are then sterilized and safely disposed of afterward.

Dippell and Sonneborn built upon his discovery of mating types in paramecium. In a retirement tribute to Dippell, fellow faculty member John R. Preer, Jr., noted that Dippell and Sonneborn’s achievements were impossible to separate. He wrote, “She was the chief person in charge of his laboratory for the better part of his career, and certainly during the most successful part of both their careers. Their impact in their field has been great; they made an impression on protozoology as few others ever have.”

In 1948 the American Association of University Women presented Dippell with the Florence R. Sabin Fellowship given to women for their promise as creative scholars in advanced science.

Dippell earned the Sigma Delta Epsilon Award in 1950. The prize, given for outstanding research to stimulate scientific research among women, was granted based on her discovery in genetics that certain particles in the cell cytoplasm that determine a hereditary trait could suddenly mutate and alter the character which they controlled.

She was elected a fellow of the American Association for the Advancement of Science in 1950.

After completing her Ph.D., Dippell continued her research in Sonneborn’s lab and taught an advanced zoology class as well. Although offered positions at other universities, she chose to continue at IU Bloomington because of the strong genetics program (referred to as the Athens of Genetics) headed by four internationally known geneticists (Cleland, Luria, Muller, and Sonneborn). She later took up work in the then new and promising field of electron microscopy.

Dippell turned to teaching relatively late in her career, receiving a part-time faculty appointment in 1967 and a full-time appointment in 1970. Preer noted that Dippell “took on teaching duties with her customary thoroughness, industry, and self-sacrifice. Whatever the course, it always seemed to have a laboratory—exciting for the students, but time-consuming for her. Her courses were popular and the enrollments were large.”

“I met Dr. Dippell my senior year at IU,” said Judy Dilts [BA '68 zoology, MA '75 zoology, PhD '76 genetics], Professor Emerita of Biology, James Madison University. “She taught cell biology and was an excellent teacher, partially because she took time to know her students. In conversations, she counseled me to apply as a research assistant in Dr. Sonneborn’s paramecia lab (she was a part of the paramecia research group). That
Her place in the sun

On the same day that Ruth Virginia Dippell [BA ’43 zoology, PhD ’50 zoology] celebrated her 100th birthday this summer, she received the IU Bicentennial Medal in honor of her scientific efforts and in recognition of her distinguished service to Indiana University.

An announcement in the Corvallis Gazette Times (local newspaper for Corvallis, Oregon, where Dippell now resides) commemorated Dippell’s achievements and also expressed the regrets of friends, family, and colleagues who were unable to properly celebrate her birthday and IU award because of the pandemic.

Ruth Dippell made a name for herself in research at a time when women dedicated to science were mostly invisible labor to prominent male scientists.

She grew up in the 1920s and 30s in Huntington, Indiana, observing the community’s respect for her physician father. She decided to follow in his footsteps. In high school, Dippell packed her schedule with science courses—chemistry, physics, and biology—and was fortunate to have several teachers who encouraged her studies. She entered Indiana University in 1938 to begin pre-med work. While an undergraduate, Dippell unknowingly set her fate to become a research scientist when she enrolled in a beginning genetics class taught by a scientist whom she did not know would become her mentor.

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Dippell completed much of the work for her Ph.D. degree in genetics under Sonneborn’s direction. In 1945 Sonneborn promoted Dippell to research associate in his laboratory. During the following year, she shared with Sonneborn and his research assistant the Newcombe Prize of the American Society for the Advancement of Science for their work on “killer” paramecia. (Her dissertation dealt with this phenomenon.) Additional honors were to follow.

She sought assistance from the IU Graduate School Office to obtain a laboratory technician position and was quickly hired by Sonneborn, who had taken notice of Dippell’s skills in his class the previous year. What was to be a two-year position to earn money for medical school instead became a career.

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IU Biology welcomes new faculty

We introduce you to our three newest faculty members: Manuel Baizabal, Cristina Landeta, and Lesley Weaver.

Assistant Professor Manuel Baizabal studies functional genomics of mammalian brain development, epigenetic control of neurogenesis and neuronal fate specification, and evolution of transcriptional regulation in neural stem cells. He joined the genome, cell, and developmental biology (GCDB) faculty on September 1, 2019.

Education: Postdoctoral Fellow, Harvard Medical School, Dept. of Neurobiology, 2012-2019; Postdoctoral Fellow, Harvard University, Dept. of Stem Cell and Regenerative Biology, 2010-2012; Ph.D., Biochemical Sciences, National Autonomous University of Mexico, Institute of Biotechnology, 2009.

Roots: Mexico

What you might not know about him: Baizabal plays drums. He played with the jazz ensemble “Some Nerve” (named after a second-line tune from New Orleans) in Boston for 6 years. Luckily he found a new, yet-to-be-named jazz band just three months after he moved to Bloomington! The band performed once in Bloomington at the Crazy Horse before the pandemic.

Assistant Professor Cristina Landeta joined the department in September 2019 as an assistant scientist and became an assistant professor in the microbiology program in July 2020. Her research interests include disulfide bond formation in pathogenic bacteria and microbial communities as well as antimicrobial discovery by high throughput screening.

Education: Postdoctoral Fellow, Harvard Medical School, Dept. of Microbiology and Immunobiology, 2011-2018; Ph.D., Biomedical Sciences, National Autonomous University of Mexico, 2007-2011.

Previous position: She worked for year and a half as a strain engineer scientist at enEvolv (now Zimergen).

Roots: Landeta grew up in Mexico, living in a small town in a valley near the highest mountain of Mexico.

What you might not know about her: One of her hobbies is to dance. Landeta has danced her whole life different dance styles, from Mexican folklore, middle eastern to afrobrazilian dances.

Assistant Professor Manuel Baizabal

Assistant Professor Cristina Landeta

Assistant Professor Lesley Weaver

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Assistant Professor Lesley Weaver, an alum of the department, returned in July 2020 to join the GCDB faculty. She studies physiological control of reproduction through inter-organ communication.

Education: Postdoctoral Fellow, The Johns Hopkins University, 2014-2020; Ph.D., Molecular, Cellular, and Developmental Biology, Indiana University, 2014.

Recent awards/honors: NIH Pathway to Independence Award (K99/R00), 2018; NIH Ruth L. Kirschstein National Research Service Award (NRSA) Postdoctoral Fellowship Award, 2016.

Roots: Having grown up in Marion, Indiana, Weaver is happy to be back in the Midwest and back at IU Biology to start her independent research journey.

What you might not know about her: She is a tap dancer (dancing childhood through some of her postdoc years). Weaver loves to read and listen to podcasts. She is a mom to Zoey, a miniature dachshund.

Research news in brief

Read more about these news briefs and others at https://go.iu.edu/3qMB.

Irene Newton to co-lead collaborative team awarded $12.5 million for new NSF Biology Integration Institute: GEMS team will address the fundamental biological question: “How do symbioses unify biology, from molecule to ecosystem?” by examining the interaction between clover and honey bees as a model. Newton’s research focuses on mechanisms of symbiosis, genomics, and bioinformatics. Other IU Biology faculty researchers on the multi-institutional GEMS team are Jen Lau, studying field ecology and rapid evolution; Jay Lennon, studying microbial communities and evolutionary ecology; and Mike Wade, studying population biology and co-evolution.

Migration shapes patterns of disease transmission: Study by colleagues Daniel Becker and Ellen Ketterson of IU and Richard Hall of University of Georgia is among the first to investigate how relapsing infections influence the seasonal timing of infection risk in migrants; new paper in Proceedings of the Royal Society B.

Though Nick is realistic about the drawbacks of working virtually, he notes that his project has more than made up for any difficulties by allowing him to work as part tech developer, part entrepreneur and learn more about SARS-CoV-2.

“[I]t’s been challenging. Challenging to stay connected and manage expectations. But it’s also been really interesting. I’ve learned a lot. It’s given me the opportunity to look into what published literature is out there about COVID, the disease itself, and the scientific recommendations for mitigation.”

Nick’s team didn’t present their website to Governor Holcomb, but their product stands alone as an outstanding community resource that promotes public health. Despite taking place remotely during COVID, this opportunity has still allowed Nick and other participants a chance to hear from guest speakers about interviewing for jobs, fellowship opportunities, and other resources to make them more career ready.

“Connections like that I found really helpful.” Nick says. “And I certainly hope I can continue to keep in touch with these people and groups and advance my career. I definitely view that as a likely outcome of this. These opportunities have been pretty worthwhile.”

Devyn Blandford is a content specialist for the IU College of Arts and Sciences Communications + Marketing team.
**Student profile: Nick Frecker**

**Extern, not intern**
by Devyn Blandford

Even in these COVID-complicated times, Biotechnology student Nick Frecker found a way to advance his career goals while making a difference.

Internships are more complicated than ever. COVID-19 made an already competitive market scarce, and the hunt has been on for remote offerings. Nick Frecker, a graduate student studying Biotechnology, was among the hopefuls pursuing a position. His opportunity came in an unexpected form: an externship with a group of strangers from across the state, tasked to create the next-big-thing in combatting COVID-19.

Nick, like many IU students, is subscribed to texts from Ascend Indiana, an agency that connects talent with employers and vice versa. He received a text from them about a project offered through a company called TechPoint: “I’d been in the process of looking but I hadn’t found anything. But when I saw this opportunity, they were putting it together quickly, and I figured I would jump at the chance.”

Last spring, Nick was accepted and plunged into TechPoint’s Summer Opportunities for Students (S.O.S.) Challenge, an intense five-week-long project. In this program, teams are given a topic or “challenge question” related to COVID-19, and they must prepare a product and a go-to-market plan in response. He explains, “[T]here are 9 challenge questions, and each one has a certain number of teams. My question is COVID-19 outbreak detection. The idea is to develop a solution to address how to identify where COVID is going to show up next and, if possible, to mitigate it.”

Students who complete the program are given $500 and each winning team receives $2,500 and the chance to give a virtual presentation of their project to Governor Eric Holcomb and leaders in Indiana’s technology sector.

The catch? For their safety, they’ll never meet in person.

All teams are divided into two squads: “There’s the so-called ‘Go’ squad who identifies the potential customer or customer profiles and also comes up with a business marketing plan. And then there’s also the ‘Pro’ squad who actually explains, “[T]here are 9 challenge questions, and each one has a certain number of teams. My question is COVID-19 outbreak detection. The idea is to develop a solution to address how to identify where COVID is going to show up next and, if possible, to mitigate it.”

Researchers awarded $1.4 million to study connection between farmers, soil microbes, and drought resilience: Jen Lau and Jay Lennon are part of an interdisciplinary team investigating how human adaptation (how farmers respond to drought) interacts with ecological adaptation (how microbial communities respond to drought) in ways that might affect resilience to climate change.

**Justin Kumar will investigate the role that inductive signals play in specifying the fate of the compound eye of the fruit fly, Drosophila melanogaster, with $1.5 million from the NEI for research on development of the insect compound eye.**

**Bird banding station nets 1,000th bird for population-level research:** Researchers and citizen scientists at the Kent Farm Research Station netted and banded their 1,000th bird—a White-eyed Vireo—as part of the international Monitoring Avian Productivity and Survivorship (MAPS) program.

### Faculty and student honors

**IU Biology faculty members honored with IU Bicentennial Medal** in recognition of distinguished service to Indiana University.

- Keith Clay, Distinguished Professor Emeritus
- Lynda Delph, Distinguished Professor
- Roger Hangarter, Distinguished Professor
- Roger Innes, Distinguished Professor
- Thom Kaufman, Distinguished Professor
- Ellen Ketterson, Distinguished Professor, ERI Science Advisor and Founding Director
- Curt Lively, Distinguished Professor
- Jeff Palmer, Distinguished Professor Emeritus, Class of 1955 Professor
- Craig Pikaard, Distinguished Professor, Carlos O. Miller Professor, HHMI Investigator
- E. William “Bill” Ruf, Senior Lecturer
- Mike Wade, Distinguished Professor

**Undergraduate Andrew Quest was awarded the prestigious Goldwater Scholarship.** Quest is a dual major in microbiology and chemistry. He is the 15th departmental major to receive the award.
To say that the 2020-21 academic year has been an incredibly unusual and unsettling one thus far is a substantial understatement. When this academic year began in August, nobody was confident we would make it until Thanksgiving without another lockdown due to the ongoing pandemic. Despite these challenging times, we nevertheless persevered.

Our research labs, shuttered last March when the pandemic hit, began reopening in June and most are now operational again (albeit with smaller staffs, social distancing, and rigorous mask-wearing). Students, faculty, and research scientists are holding virtual lab meetings. They publish their research and submit their grants—whether it's from a chair in their offices, a sofa in their living rooms, or the back porch on a particularly pleasant autumn day.

Many of our staff members have returned to at least partial in-person work during the fall semester, while others continue to work remotely. Regardless of whether physically working in our buildings as essential workers or working all hours day and night as remote workers, all of our staff members have toiled tirelessly to ensure departmental operations run smoothly.

It is especially important to acknowledge the amazing contributions of our faculty members who continued to teach our students—whether in-person, online, or both—despite the many challenges they faced, ranging from the sudden quarantining of their students to adapting to novel learning modes and technologies on the fly.

The word “hero” is often overused, but the dedication, hard work, tolerance, and grace our instructors displayed—all while essentially doubling their teaching loads due to online teaching—was nothing short of heroic. We all owe them our sincerest gratitude.

Also, a huge thank-you to our amazing students, both graduate and undergraduate, who had their personal and educational lives disrupted this past year, many forced to retreat to their small apartments to continue their training largely online. Despite these challenges, they pursued their educational goals with tenacity and good spirits. Many of them have been able to resume their research projects in their labs.

Lastly, I am extremely proud of the major leadership role taken on by the staff of the IU Center for Genomics and Bioinformatics (affiliated with Biology) in spearheading the COVID-19 testing on the Bloomington campus (see story on page 2).

The fall semester has come to its end. We persevered. And while challenges no doubt await us in the new year, I am grateful for the creative solutions that the IU community developed to keep us all healthy and safe. The promise of vaccines in the near future provides hope of a return to normal.

As we put this trying and tiring semester behind us and head into winter break, please try your best to relax, unwind, and recharge. Although many of you will unfortunately not be able to travel to visit friends and family over the holidays, take time to connect via phone, FaceTime, and Zoom. Make it a priority to take care of yourselves and loved ones as we continue to move forward. I am confident that a time will soon come when we can resume the activities that inspire us... that keep our lives enriched and fulfilled.

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**Jordan Hall renamed Biology Building**

The IU Board of Trustees approved removing the name of IU’s seventh president (David Starr Jordan, 1875-85) from the building, river, and parking garage on the IU Bloomington campus during its October 2, 2020, meeting. The decision to remove Jordan's name stemmed from his belief in and advocacy for eugenics.

A letter signed by members of the IU Biology faculty and sent to IU President Michael McRobbie in July was the catalyst for the name removal. Upon receipt of the letter, McRobbie formed a committee to review the request. After extensively researching the issue, the committee recommended to rename the building, river, and parking garage.

Jordan Hall will be known as Biology Building, Jordan River as Campus River, and Jordan Parking Garage as East Parking Garage. McRobbie recommended that these names remain in place for at least a year to allow thoughtful consideration of new names.

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**Greg Demas** is a professor of biology and chair of the Department of Biology at Indiana University Bloomington.