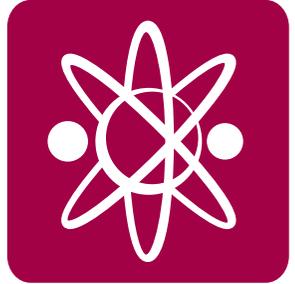
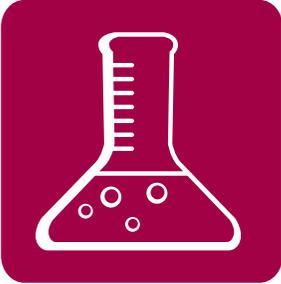


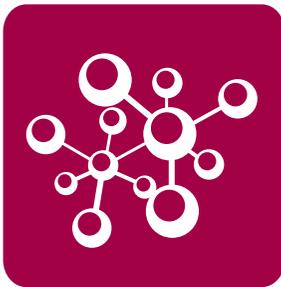
Endeavors

ISSUE 3

2011-2012



Women *in* Science



DEAR COLLEAGUES AND FRIENDS OF LOYOLA,

Welcome to this special issue of *Endeavors* focusing on women and science at Loyola. I am pleased to share with you the exciting work of Loyola's women working in traditional life sciences, social and behavioral sciences, and emerging fields. This issue also features those in other fields whose work bears on the ethical conduct or clinical application of science.

In addition to those featured here, there are and have been a number of outstanding women scientists at Loyola. Previously featured in *Endeavors* were Nancy Tuchman, PhD, Professor of Biology, founder and former Director of CUERP, and Vice Provost, whose expertise in aquatic ecology and water quality was recently called upon in testimony to Congress; Christine George, PhD, Assistant Research Professor at CURL, who studies the changing demographics of Chicago's homeless population; and Maria Vidal de Haymes, PhD, and Marta Lundy, PhD, Professors

of Social Work, whose work on Mexican immigrant family composition and demographics both within and across the border has implications for U.S. public policy.

Loyola prides itself on being a welcoming and egalitarian environment for women, and for all under-represented groups. While at present complete parity of men and women in the sciences has not been achieved at the faculty level, gender enrollment ratios at Loyola show substantial progress in this regard, indicating that such parity is soon to be a reality in the

sciences and other professional domains. On the lakeside campuses in the 2009-10 academic year, women comprised 70% of master's program students, 62% of doctoral students, and 52% of professional students. Of the master's and doctoral students, 42% of students enrolled in STEM (science, technology, engineering and math) programs were women. Further, trends for other traditionally underrepresented groups at Loyola are already following this democratic ideal.

As portrayed in the timeline presented on pages 8-9, women have made significant contributions to all fields of science dating to the earliest era of recorded time. Since Loyola was established in 1870, women faculty members have also made notable contributions. Some examples include: Magda B. Arnold, PhD (1903-2002), who joined the Loyola psychology faculty in 1952 and who was an internationally recognized specialist in

psychological aspects of emotion and brain function, a Fulbright Scholar, a Guggenheim Fellow, and Director of Loyola's Behavior Laboratory; Alice B. Hayes, PhD (1937-), a botanist who began her work in leaf blade morphogenesis at Loyola in 1960, chaired the Department of Natural Science, served as VP for Academic Affairs, and later served as Provost of St. Louis University and President of the University of San Diego, finally returning to Loyola as a trustee in 1997; and Jeanne M. Foley, PhD (1922-2002), who conducted developmental research in the psychology department beginning in 1966 and served as chair, and also served as Assistant Dean of the Graduate School and then Dean for Social Sciences.

Please join me in acknowledging and celebrating the noteworthy contributions of women scientists to scholarship at Loyola, past and present, and their continuing inspiration to Loyola students.



Sincerely,

A handwritten signature in black ink that reads "Samuel A. Attoh". The signature is written in a cursive, flowing style.

Samuel A. Attoh, PhD

Associate Provost for Research and Dean of the Graduate School

Endeavors

RESEARCH AND KNOWLEDGE IN SERVICE TO HUMANITY

LOYOLA'S MISSION

*We are Chicago's Jesuit, Catholic University—
a diverse community seeking God in all things
and working to expand knowledge in the service
of humanity through learning, justice, and faith.*

PAGE	PROJECT	RESEARCHER
4	The Sociological Context for the Naming of Disorders	Anne Figert, PhD
5	Resilience and Coping Among Urban African-American Youth	Noni Gaylord-Harden, PhD
6	Tracking the Evolution of Viruses	Catherine Putonti, PhD
7	Air Quality and Characteristics: Lake Air, Solar Wind, and Occupational Inhalants	Martina Schmeling, PhD
10	Promoting Well-Being in Urban Minority Youth	Elizabeth Vera, PhD
11	Ethics in Medical Practice for the Underserved	Aana Marie Vigen, PhD
12	Interrupting the Malaria Transmission Cycle	Kim Williamson, PhD
13	Culturally-based Influences on Stress in African-American Youth	Jamila Cunningham
14	Catalytic Enzyme Regulation of Carbohydrate Biosynthesis	Angela Mchaffey
15	Characterizing Potentially Pathogenic Bacteria	Jennifer Gomez
16	Interpersonal Style, Gender Bias, and Romantic Relationships	Kelly Silay



ANNE FIGERT, PhD

Associate Professor of Sociology

► “I want to make my work relevant to the public.”

The Sociological Context for the Naming of Disorders

Being a social scientist appeals to Anne Figert on several levels: the freedom to pursue theoretical work, or “the fun stuff,” as she puts it, the ability to use her research to effect change in the community, and the ability to provide a sociological context for the process and consequences of the medical labeling of physical and mental disorders. As a medical sociologist, Figert specializes in studying the sociological aspects of medical practice, education and expertise. Much of her research has involved medicalization theory, or the means by which a consistently observed set of symptoms becomes officially recognized and labeled as a disorder: for example, constructing PMS as a psychiatric disorder, or giving a label of ADHD to what were once considered rambunctious children, or establishing that a consistently patterned musculoskeletal pain disorder—fibromyalgia—is a medically-based illness. “The recognition that there may be something called fibromyalgia can have an economic benefit of insurance reimbursement and a psychological benefit [for the patient to say]: It’s not all in my head, it’s physical,” says Figert. Another avenue of Figert’s research involves working with Loyola University Health System colleagues to examine medical residents’ attitudes

toward underserved populations, as a way of studying the differential diagnosis and labeling of disorders among different populations. Results will be included in an undergraduate Learning Community course that includes the study of health care disparities among minority populations. “I always like to connect my research up with my teaching,” she says. “That’s what we do at Loyola, and that’s why I came here.”

Figert also strives to make her research matter outside the University’s walls and is using an AIDS Foundation grant to look at which practices and supports best facilitate the successful transition of people with both physical illness and substance abuse issues (a doubly underserved population) into Housing First models (which move the homeless immediately into stable housing). “I want to make my work relevant to the public. The theoretical work is fun, but the other research I do because it’s the right thing to do.”

The central question she has been asking since graduate school is “Why do we believe what experts tell us is the ‘truth’ about something?” It guides her work on medicalization and its relation to attitudes toward medical and scientific authority. “I keep coming back to that one question,” says Figert. “That’s why I got into this.”



NONI GAYLORD-HARDEN, PhD

Associate Professor of Psychology

► “I don’t want this research to just sit in journals.”

Resilience and Coping Among Urban African-American Youth

As a graduate student working with poor African-American teens in Tennessee, Noni Gaylord-Harden, PhD, was struck by the fact that, even with exposure to multiple stressors, some kids did succeed. “I started looking into factors that might explain why some kids become successful despite [such hardships],” she says. “I began to focus on the strengths and assets embedded in African-American families and communities that could buffer the effects of stressors.” These included spirituality, parent-child relationships, and a strong extended-family network.

While conducting research on low-income teens on Chicago’s south and west sides, Gaylord-Harden has found that stress caused by such challenges as poverty, community violence, and school struggles has a negative impact on children’s functioning, but less than might be predicted. “Anxiety and depression are not as high as you might expect, and we’re exploring why that might be the case,” she says. “We’re also finding that some strategies typically considered to be maladaptive are actually adaptive. Avoidance, for instance ... If you understand how to stay away from dangerous people and places, you’re ... going to do better.”

What interests Gaylord-Harden is how positive adult-child relationships can encourage effective coping. In collaboration with colleagues at the University of Illinois at Chicago, DePaul, and the University of Virginia, she is developing an intervention that uses mentors to teach youth effective coping. “We know that kids cope better when

they have a supportive relationship with adults,” she says, “and we’re using mentoring relationships to support the coping efforts.”

Studying how African-American culture may influence youth’s response to stress can sometimes be controversial in the psychology community, Gaylord-Harden says, but she feels it makes an important contribution. “Psychology has an interesting history with race,” she says. “Research has long been conducted with white middle-class kids and the findings generalized to everyone. Lots of research on youth of color has focused on the deficit model—there’s an expectation that if there were differences between African-American and other youth, they were viewed as deficits.”

“Now we’ve begun to challenge those beliefs and think about what are the strengths and assets of African-American youth and families that have been largely ignored,” Gaylord-Harden adds. “We’re saying that within any cultural group there are going to be ways that people navigate their environment that are different from other cultural groups.”

Whether conducting her research in collaboration with Chicago schools and community groups or teaching Loyola students the importance of viewing psychology as a science, Gaylord-Harden wants to make an impact. Top on her list is moving increasingly into school and community intervention work. “I don’t want this research to just sit in journals. Nobody reads those but us,” she says. “Let’s take this and figure out how it can be used.”



CATHERINE PUTONTI, PhD

Assistant Professor of Biology and Computer Science

► “...I could do this for my whole career and still not have answered every question that needs to be answered.”

Tracking the Evolution of Viruses

Most people’s experience with viruses involves a sore throat, runny nose, and nasty cough—and it’s not a pleasant one. Catherine Putonti, PhD, has a very different perspective. To her, viruses are “cool. “They’re the most interesting thing to me in the world,” she says. “My pleasure reading is about viruses ... and Harry Potter.”

Putonti’s research focuses on understanding how viruses—microscopic biological agents that depend on a host organism to survive—evolve and may go on to infect humans and plants and thus cause disease. She and the students in her lab, which is unusual in that it encompasses both molecular and computational methods, are studying viral adaptation by examining and manipulating genomic sequences.

“We try to re-create the first moment that [a virus] jumps into the host and watch it and see what [the host] does in response,” says Putonti. The hope is to glean some understanding of the universal properties and forces that shape the host response and the speed at which the virus adapts. Such studies can have implications for tracking a newly emerged virus in the population to assess how quickly it’s evolving and the threat it might pose.

Putonti, who combined her interests in biology and computer science to develop a specialization in bioinformatics (the integration of computational and statistical tools for analyzing biological data) became

fascinated with viruses while working at the Department of Homeland Security during graduate school. There, she used computers to develop assays for the detection of potential biochemical weapons.

Even now, bioinformatics as a scientific discipline is relatively young, and Loyola is among the few universities to offer an undergraduate major in this field. In the future, Putonti believes that bioinformatics will splinter into different fields dedicated to specific avenues of research. One emerging area is metagenomics, in which advances in genomic sequencing are allowing scientists to more easily understand how entire communities of microbes, such as those that live in the gut, function together and may affect a person’s health.

As a professor, Putonti tries to sell her students, especially women, on just how creative applications of computer science can be. She loves when students come into her lab and report that they woke up dreaming about a virus and how to alter it. “That’s how you know you’re hooked,” she says. The biggest lesson she has to teach her students is patience, Putonti says. “Sometimes organisms don’t do what you ask them to do, and sometimes they die, and sometimes they do things for a completely different reason than you thought. I think I could do this for my whole career and still not have answered every question that needs to be answered.”



MARTINA SCHMELING, PhD

Associate Professor of Analytical Chemistry

► “Keep the enthusiasm for science ... Don’t do it because you’re thinking of a career; do it because you love science.”

Air Quality and Characteristics: Lake Air, Solar Wind, and Occupational Inhalants

While some researchers narrow their scientific focus early on, Martina Schmeling, PhD, prides herself on having flexibility and a broad range of interests. She has collected and analyzed data on air pollution, aided NASA’s Genesis mission by working on solar wind samples that were contaminated when the space capsule crash-landed, and forayed into biomedical research with a Loyola colleague.

“As a scientist, you mature and your interests can shift,” says Schmeling, who teaches classes as varied as General Chemistry, Instrumental Analysis, and Environmental Chemistry. “By training as an analytical chemist, that means I have a huge versatility.” Schmeling has spent much of her time at Loyola studying air pollution and how Chicago’s lake breezes affect the transport of pollutants. Using total reflection X-ray fluorescence spectrometry (TXRF), her laboratory analyzes samples collected at Loyola’s lakefront air station to find the chemical fingerprints that might provide information to answer these questions.

More recently, Schmeling has performed air sample analysis for NASA, which contacted her after the Genesis mission for assistance with processing solar wind samples. Schmeling’s research laboratory was the only one in the U.S. at that time having TXRF and enough expertise with the TXRF technique for this type of sample analysis. The first part of the project has involved examining the surfaces of the solar

wind sample collectors, which were broken into small, irregular pieces in the crash, and identifying individual contaminants. The idea of the Genesis mission, which collected samples from 2001–2004, was “that if we can analyze the composition of the solar wind—highly energized particles ejected by the sun—we will learn something about the origins of the solar system,” says Schmeling, who also has submitted a proposal to continue the solar wind analysis.

But space is not Schmeling’s final frontier. She also is exploring the biomedical applications of analytical chemistry by teaming up with Bruce Gaynes, OD, Clinical Assistant Professor of Ophthalmology at Loyola’s Stritch School of Medicine and an optometrist at the Hines Veterans Hospital, to study exposure to toxic heavy metals and how the body metabolizes them. While most metal exposure is by inhalation, because ocular tissue retains these particles, Schmeling and Gaynes hope to develop an assay for tear drop samples that will assess levels of toxic metals in veterans and others who have been exposed. “It would be interesting to develop a quick-and-dirty method to take a tear sample and analyze it on the spot and figure out if a patient has had heavy metal exposure,” says Schmeling. With so many interests, surely she has advice for budding researchers? “Keep the enthusiasm for science,” she says. “Don’t do it because you’re thinking of a career; do it because you love science.”



2700 BC
Merit-Ptah
Physician, Ancient Egypt



600 BC
Theano
Greek mathematician, astronomer, scientific inventor, and student of Pythagoras



375
Hypatia
Greek mathematician, philosopher, and astronomer



1155
Hildegard of Bingen
German abbess, publishes the first medical text



1200
Trotula de Ruggiero
Italian physician, becomes a faculty member at Salerno Medical School



1705
Maria Sibylla Merian
Significant contribution to modern botany and zoology



1748
Eva Ekeblad
First woman inducted into the Swedish Academy of Science



1750
Maria Agnesi
First female author of a math text, and first female math faculty member

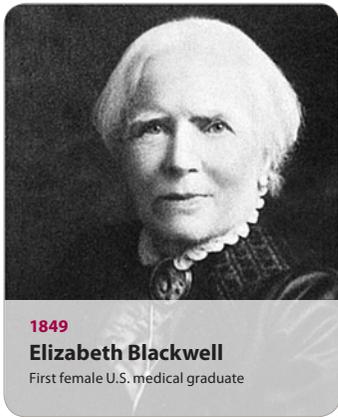


1790
Margaret Cavendish
British philosopher of science, publishes her book *Philosophical Letters*



1848
Maria Mitchell
First woman to be elected to the American Association for the Advancement of Science

Women in the History of Science



1849
Elizabeth Blackwell
First female U.S. medical graduate



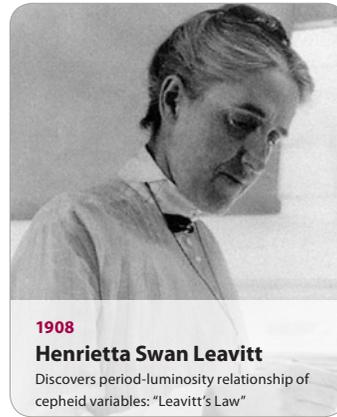
1864
Rebecca Lee Crumpler
First African-American woman to earn an MD, authored an early medical text



1898
Annie Scott Dill Maunder
British astronomer and mathematician, takes the first photos of sunspots



1903
Marie Curie
Wins Nobel Prize in physics, later wins Nobel in chemistry (1911)



1908
Henrietta Swan Leavitt
Discovers period-luminosity relationship of cepheid variables: "Leavitt's Law"



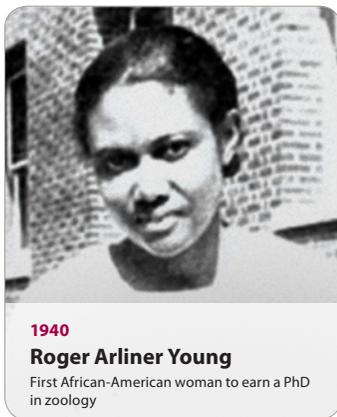
1931
Barbara McClintock
Demonstrates genetic recombination during meiosis; wins Nobel Prize in 1983



1933
Ruth Ella Moore
First African-American woman to earn a PhD in bacteriology



1939
Lise Meitner
German physicist demonstrates nuclear fission



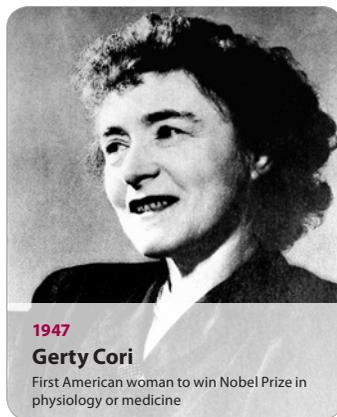
1940
Roger Arliner Young
First African-American woman to earn a PhD in zoology



1943
Euphemia Lofton Haynes
First African-American woman mathematician



1944
Maud Menten
Conducts the first electrophoretic separation of proteins



1947
Gerty Cori
First American woman to win Nobel Prize in physiology or medicine



ELIZABETH VERA, PhD

Professor of Education

► “If you’re going to be a social scientist trying to learn about the community, you have an obligation to give back as well, not just take data.”

Promoting Well-being in Urban Minority Youth

Even in high school, Elizabeth Vera, PhD, was intrigued by the study of psychology. She went on to major in it as an undergraduate at the University of Iowa and, thanks to an excellent mentor there, got the push she needed to move on to graduate school. This would not seem to be an atypical path for many academics, but Vera was the first generation in her Mexican-American family to attend college, and graduate school was an even less familiar concept. “With my background, I always had a personal eye toward working with kids whose families may not have had a lot of involvement in higher education,” Vera says. “I was interested in what we could do to help them.”

Unfortunately, graduate school didn’t do much to satisfy that desire, as most coursework was geared toward helping one segment of the population—those with access—while ignoring the needs of minority urban families. “What does it mean to grow up poor?” she found herself asking. “Or to grow up in a community where you can’t go outside all the time?”

Landing a job at Loyola “was the happiest accident of my life,” she says. “Loyola’s emphasis on social justice and having research as a tool for service and justice fit so nicely with the things I cared about.” Vera’s main research focuses on understanding how to promote healthy development in urban and minority youth, and particularly how to

keep them academically motivated and in school. Much of her research, done through both surveys and focus-group interviews, looks at “subjective well-being”: How do kids subjectively assess the quality of their life? This differs from typical objective measures like school dropout rates or incidences of teen pregnancy or gang membership. “Both measures are important, but in the social sciences we have much more information about the failures of these kids and what they’re not accomplishing,” she says. “That only tells part of the story.”

With the information she gleans—for instance, that school support is important for boys and family stability is key for girls—she can help schools or community groups create programming to address these needs. “If you’re going to be a social scientist trying to learn about the community, you have an obligation to give back ...” Vera says. “That’s part of my philosophy on research.”

Vera recognizes that the stereotype promoting males as scientists may sometimes keep women from taking the math, statistics, and experimental design courses necessary to become social researchers. Still, her research team is made up almost exclusively of women. “Use us as mentors and role models,” she advises women students. “I feel good about producing that next generation of people who’ll be professors and scientists in the community.”



AANA MARIE VIGEN, PhD

Associate Professor of Christian Social Ethics

► “People who come from places very different from what academics know have a lot to teach us about human dignity, about the divine, about compassion, about justice or injustice ... This is not abstract academic theory.”

Ethics in Medical Practice for the Underserved

Aana Vigen is bothered by inequality. She witnessed it after college while supervising minimum-wage home healthcare aides working under adverse conditions and while interviewing minority women about their breast cancer treatment experiences for her 2006 book, *Women, Ethics, and Inequality in U.S. Healthcare*. As an ethics scholar, Vigen says that bringing inequalities—whether based on racial, ethnic, gender, or socioeconomic factors—to the fore while employing an interdisciplinary research approach are central to her mission as a social scientist.

Many medical ethicists focus on big technological questions: Should we allow genetic testing, or assisted reproduction, or physician-assisted suicide, she says. “But I think you can’t [apply] ethics in a vacuum, so it’s not just about do we do this or not, but what is the larger social context? Who’s the most likely to be ignored, forgotten, displaced, marginalized, or disrespected in these kinds of decisions? Because there are always financial interests and limited resources,” says Vigen.

To answer such questions, many of them related to medicine and healthcare, Vigen looks beyond statistics and large data sets to conduct personal interviews with people most affected, whether they’re breast cancer survivors, undocumented immigrants, or welfare recipients. She thinks some of her fellow ethicists would do well “to enlarge the radar screen” by conducting more qualitative research, as outlined in her latest

book, *Ethnology as Christian Theology and Ethics*, written with Christian Scharen, an Assistant Professor at Luther Seminary in Saint Paul, MN.

One formative experience for Vigen was working as a hospital chaplain for nine months during graduate school. As the only Spanish-speaking hospital staff member, she had frequent contact with Latino patients, who commonly had challenges communicating with the doctors and also worried that their immigration status might be questioned. “People who come from places very different from what academics know have a lot to teach us about human dignity, about the divine, about compassion, about justice or injustice, and about what good healthcare looks like and feels like,” says Vigen. “This is not abstract academic theory. It’s about listening attentively and acknowledging that there’s wisdom and true moral and theological knowledge in the places that haven’t always been visited.”

As a teacher, Vigen says she loves being able to explain to students (most of whom are not going to become Christian ethicists), “why ... ethical reflection matters,” in both their professional and personal lives, “for thinking about these big questions and what they want to do with this one shot they have in life.” Vigen hopes to continue bringing attention to issues of inequality and to act as a “public” scholar. “I want to speak out on important issues in the public square,” she says, “and move ethical and policy discussions in helpful ways.”



KIM WILLIAMSON, PhD

Professor of Biology

► “Loyola provided me the opportunity and environment to continue to focus on that stage of [this disease] ... Many people give up on it.”

Interrupting the Malaria Transmission Cycle

When describing the life cycle of *Plasmodium falciparum*, the parasite that causes the most virulent form of malaria, Kim Williamson, PhD, can barely contain her enthusiasm. Briefly: After a malaria-carrying female mosquito deposits parasites in a person’s skin when it bites, most of the parasites replicate asexually within the human body while others develop into sexual forms called gametocytes. The gametocytes are then ingested by another mosquito when it bites the person (who by then has developed symptoms of malaria), and continue to develop within the second mosquito, eventually to infect again when it bites yet another person.

“The piece I specialize in is the conversion to sexual stages and their transmission to the mosquito,” says Williamson, noting that malaria can’t be passed on unless the parasite starts to develop into a sexual form. “It’s a fascinating part of the life cycle. It’s the one point where the parasite has a dramatic change in its expression profile and we don’t know the mechanism for that.” Apart from being intriguing from a biological perspective, the sexual stage may hold the key to diminishing transmission of malaria and eradicating the disease, adds Williamson. Right now, malaria kills about a million people every year and causes clinical symptoms in more than 250 million, mostly in tropical areas such as sub-

Saharan Africa, where warm weather allows mosquitoes to thrive year-round. Existing drugs kill the asexual stage of the parasite, but not the gametocytes, and that means the cycle of transmission continues and exacts an enormous personal and economic toll on the affected populations.

Williamson, who is on leave from Loyola to do research at the National Institutes of Health, has a variety of projects in the works: screening the sexual stages against drugs, studying immune responses to the parasite, and finding genes associated with infectivity, among others. “The most practical thing would be to identify compounds that block gametocyte production, kill them, [or] block transmission,” she says. “Drug development would be the most important achievement from a global perspective.”

Her passion for research and “grappling with questions that aren’t answered” is what drives her. “I totally love my work,” says Williamson, who would eventually like to help develop research capacity in the endemic countries, where people know the disease and its effects intimately. In the meantime, she’ll continue her gametocyte research, which few other scientists do because the life cycle is long and it’s a difficult stage to work on. “Bigger labs don’t have the patience. Loyola provided me [with] the opportunity and environment to continue to focus on that stage of the parasite,” she says. “Many people give up on it.”



JAMILA CUNNINGHAM, PhD Candidate

Department of Psychology

► “I hope that my research will inform treatments and interventions for African-American youth and families in under-resourced communities ...”

Culturally-based Influences on Stress in African-American Youth

Jamila Cunningham is a doctoral student entering her final year in Loyola’s clinical psychology graduate program. Cunningham has completed all of her coursework, with support from an Advanced Doctoral Fellowship and a Graduate Student Assistantship from Loyola. Currently, Cunningham is completing another requirement: a year-long clinical internship at Emory and Grady Hospitals in Atlanta, where she provides mental health services to a variety of in- and out-patient clients.

Among several rotations that she will complete during her internship, Cunningham is now on a child/adolescent service, applying her clinical training to assess youths’ problems and design interventions. Her next rotation will entail providing mental health services to severely mentally ill adult in-patients. She is expecting that service to be a challenge: “I’m both excited and a little nervous and about working with these patients,” she says.

Cunningham frequently returns to Chicago to collect data for her dissertation, “Towards a Multidimensional Model of Adaptation for African-American Adolescents Exposed to Racial Discrimination,” from Chicago high school students. This study, supervised by Dr. Noni Gaylord-Harden (also featured in this issue), examines how racial socialization, racial identity, and African-American culturally salient coping strategies may mitigate the effects of perceived racial discrimination in African-American youth. For example,

spirituality and communalism are two common coping mechanisms in African-American culture: spirituality as a coping mechanism invokes a reliance on religious faith, whereas communalism is support derived from group membership. Negative effects of perceived discrimination that might be reduced by such strategies include depression, anger, and/or lower levels of reported life satisfaction. Related work for her master’s thesis showed that spiritually-based coping had a protective effect. Youth who used more spiritual coping in response to school stress reported stable internalizing symptoms, while youth who used less spiritual coping reported increased internalizing symptoms such as depression.

Cunningham’s interest in stress, coping, and mental health in African-American youth and families developed while she was growing up on Chicago’s south side. While her own family was middle-class, she describes “family members living in under-resourced, impoverished communities, and thus I was afforded the opportunity to observe [the effects of] disparities between community resources ... and social environments, and how these interact with mental health.” She expects that her research will have policy implications for low-income, minority communities: “I hope that my research will inform treatment and interventions for African-American youth and families in under-resourced communities who experience uncontrollable stressors on a daily basis.”



ANGELA MCHAFFEY, Graduate Student

Department of Chemistry

► “The study of biochemistry answered so many questions for me that I’ve had since age seven.”

Catalytic Enzyme Regulation of Carbohydrate Biosynthesis

Having been interested in science for as long as she can remember (age five), Angela Mchaffey was probably destined to become a scientist. A native of Chicago, at 13 she entered an award-winning project on gibberellic acid (a plant growth hormone) in a city science fair held at the Museum of Science and Industry. That junior science project proved prophetic.

While an undergraduate biology major at the University of Chicago, there was a window when taking Organic Chemistry I would have been ideal for Mchaffey, but only Organic Chemistry II was offered, which she could not take without the prerequisite. Avoiding delay, she took both courses at Chicago State from Dr. Joseph Young while continuing her biology coursework at U of C. Mchaffey credits the “inspiring” Young with originally pointing her towards biochemistry as a career.

Mchaffey was also motivated toward the study of life science because of her mother, a counseling professional in the Chicago Public Schools, who learned that she had been born with a congenital renal disorder while Mchaffey was in college. Mchaffey became fascinated with the role of biochemical regulation in the functioning of the human body and how disruption in the function of just one molecule can lead to illness. “The study of biochemistry answered so many questions for me that I’ve had since age seven,” she says. Mchaffey was considering medical school when she met with Dr. Ken Olsen of Loyola’s chemistry

department, who convinced her to enter Loyola’s graduate program.

Currently, Mchaffey is working on her dissertation research in Dr. Miguel Bellacora’s biochemistry lab, which concerns the regulation of ADP-Glucose Pyrophosphorylase (ADP-Gl PPase), an enzyme involved in the synthesis of carbohydrates in bacteria. Similar enzymes are found in higher life forms, but simpler organisms are more easily studied in the lab. Since carbohydrates are the “fuel” for energy expenditure in virtually all life forms, carbohydrate manufacture is among the most basic of metabolic functions necessary for life, and the ability to store carbohydrates may be highly advantageous during starvation conditions. Mchaffey is studying the catalytic role of ADP-Gl PPase in the biosynthesis of glycogen, using *E. coli* bacteria to better understand the precise steps in this fundamental biosynthetic pathway.

While much of the lab’s work concerns basic physiological research at the molecular level, there are potential practical applications: understanding carbohydrate synthesis could lead to the ability to increase carbohydrate content of grains such as rice or wheat, enhancing the value of these for use in famine conditions. Enhancing grain carbohydrate content could also be used to increase the non-agricultural production of grain ethanol as an alternative fuel. The implications are not lost on Mchaffey, who enthuses: “I could not have come across a more exciting protein!”



JENNIFER GOMEZ, Undergraduate Student

Chemistry Major and Carbon Scholar

► “I really appreciate my teachers and my education. So many people have helped me ... I want to give back.”

Characterizing Potentially Pathogenic Bacteria

Jennifer Gomez (Class of 2012) had not considered following in her physician grandfather’s footsteps until recently. While growing up in Tennessee, her businessman and science hobbyist father was passionate about teaching her the science behind everyday phenomena, and through her mother, a pediatric nurse, she was exposed to medicine. These influences provided a fertile substrate for a fascination with biochemistry that was first ignited by a beloved female high school chemistry teacher, who introduced Gomez to the mechanism behind a covalent bond and many other basic chemical concepts.

Her passion for biochemistry was further enhanced and expanded at Loyola through taking classes from another highly influential instructor, Dr. Daniel Becker of Loyola’s chemistry department, whom she describes as “inspiring.” While she was leaning toward majoring in chemistry as a freshman, Becker’s organic chemistry course led her further to his class in medicinal chemistry and to begin to consider a career as a scientist. By the end of her first year at Loyola, Gomez had won the CRC Press (a medical publishing house) Freshman Achievement Award as an outstanding student in chemistry. Gomez then approached Becker about research opportunities in his lab.

With her interest in medical biochemistry, Becker’s work on characterizing potentially

harmful bacteria was particularly appealing to Gomez. This work involves developing a unique technique, carbohydrate nanoarrays, to capture whole bacterial cells for analysis. While many other techniques, such as PCR, involve damage to the cell to extract genetic or other information, the nanoarray method leaves cells intact and viable, which means they can be cultured for further analysis. Such analyses may include, for example, screening for antibiotic resistance and/or degree of virulence and toxicity present in the particular bacterial strain. These characteristics have potential clinical significance for treatment and containment of bacterial infections.

As she enters her senior year, Gomez is seriously considering medical school, but first, her current plan is to spend a year as a science teacher for Teach for America, as a way of giving back to the teachers that so inspired her. Says Gomez, “I really appreciate my teachers and my education. So many people have helped me and taken the time to teach me. It’s been a wonderful experience and I want to give back.”

The Carbon Scholars Program offers a full two-year, interdisciplinary research opportunity for science and math majors to work closely with faculty mentors. This program is designed for students who plan to pursue research in graduate or professional schools.



KELLY SILAY, Undergraduate Student

Psychology Major and Provost Fellow

► **“Doing scientific research has shown me how complex people and the relationships they have truly are.”**

Interpersonal Style, Gender Bias, and Romantic Relationships

Kelly Silay (Class of 2012), a psychology major and peace studies minor, is an achiever. In addition to three Provost Fellowships, Silay received a LUROP student travel award to present her research at the National Conference on Undergraduate Research this year in Ithaca, a LUROP research symposium poster presentation award, and has Damen and Lambda Theta Alpha scholarships. She has now worked in Dr. Tracy DeHart’s Self and Social Interactions Lab in the psychology department for three years. “One of the first classes I took at Loyola was social psychology,” she says. “I really loved the class and wanted to get more involved with the psychology program at Loyola. The graduate student teaching the course was looking for undergraduate students to be research assistants in the lab.” Silay volunteered and soon was collecting data for three research projects.

During her three years of experience in DeHart’s lab, Silay has worked on research projects involving the influence of explicit and implicit self-esteem on verbal and nonverbal behavior during relationship conflict, how attachment style and interpersonal rejection affect romantic relationship functioning, and how stigma consciousness and perceived discrimination experienced by women affect relationship satisfaction. Among other findings, these studies showed that a partner’s implicit self-esteem is correlated with positive behavior toward their partner/spouse during

relationship conflict, and that women who have high levels of stigma consciousness and also experience what they perceive as gender discrimination have less positive relationships with their partner. Silay has a lot to say about what working on these studies has taught her: “Doing scientific research has shown me how complex people and the relationships they have truly are. In learning this, I have and will become more understanding and patient when interacting with others.”

What advice does she have for other students? “My biggest piece of advice would be to get involved in research that excites you. Be passionate about what you are doing, learning, and exploring. If you took a class you loved or met a professor who inspires you, ask if there are related research opportunities,” says Silay. The coursework and research experience she has had at Loyola have led her to take new classes and explore fields that she hadn’t considered before, such as social work. She is currently applying to master’s programs in both social work and speech-language pathology, and plans on using her degree to work with developmentally-disabled children. Her final advice to peers: “There are many fields of study out there ... Don’t be afraid to branch out!”

The Provost Fellowship is designed for undergraduate students in any academic discipline who are interested in either establishing an individual project with faculty mentorship or working as a research assistant with a faculty member on his/her ongoing research.

Loyola’s Resources for Women:

Ann Ida Gannon, BVM, Center for Women and Leadership

Piper Hall • Second Floor
1032 W. Sheridan Road • Chicago, IL 60660
773.508.8430
LUC.edu/gannon

Women’s Studies and Gender Studies

Piper Hall • Room 202
1032 W. Sheridan Road • Chicago, IL 60660
773.508.2934
LUC.edu/womenstudies

The Women and Leadership Archives

Piper Hall • Room 306
1032 W. Sheridan Road • Chicago, IL 60660
773.508.8837
LUC.edu/wla

Faculty Center for Ignation Pedagogy

Granada Center • Suite 400
1032 W. Sheridan Road • Chicago, IL 60660
773.508.7470
LUC.edu/facultycenter

Questions regarding externally funded research at Loyola can be directed to:

Office of Research Services

Granada Center • Suite 400
1032 W. Sheridan Road • Chicago, IL 60660
773.508.2471 • ors@luc.edu
LUC.edu/ors

General information regarding student research at Loyola can be provided by:

Loyola’s Undergraduate Research Opportunities Program (LUROP)

Center for Experiential Learning • Sullivan Center
1032 W. Sheridan Road • Chicago, IL 60660
773.508.3366 • experiential@luc.edu
LUC.edu/lurop

Loyola’s Research Incentive Award for Graduate Students (RIAGS)

The Graduate School
Granada Center • Suite 400
1032 W. Sheridan Road • Chicago, IL 60660
773.508.3396 • gradschool@luc.edu
LUC.edu/gradschool



Office of Research Services

1032 W. Sheridan Road
Granada Center, Suite 400
Chicago, IL 60660

Office of Research Services • 773.508.2471 • LU.Cedu@ORS