



Building Infrastructure Leading to Diversity
(BUILD) Program

PROJECT PATHWAYS

Building Integrated Pathways to Independence for Diverse Biomedical Researchers



Abstract

Breast cancer, which remains the leading cause of death in women. Chemo-resistance, which remains the main obstacle in cancer therapy, is due to prolonged exposure to chemotherapeutic agents causing the onset of drug resistant cells. Breast cancer cell lines have evolved to resist breast cancer therapy. Breast cancer cell lines have evolved to resist breast cancer therapy. Breast cancer cell lines have evolved to resist breast cancer therapy.

Introduction

Triple negative breast cancer occurs in about 10-20% of diagnosed breast cancers, and is more likely to affect younger people, African Americans, Hispanics, and/or those with a BRCA1 gene mutation. Triple negative is very aggressive and the most difficult to treat. Prolonged exposure to chemotherapeutics can cause resistant cancer cells, which leads to treatment failure. A novel approach to overcome chemo-resistance has been to target molecular pathways involved in cancer cell proliferation and metastasis.

Discussion

The mice were weighed throughout the week, and their weights were created using GraphPad Prism. The control mice were shown to have higher weights than the treated mice. At the time of the necropsy, the control animals had significantly larger tumors than the treated mice.

Materials & Methods

Human breast cancer MCF-7/TN cells were donated by Tulane University and were grown according to the standard tissue culture protocol. Female mice (10 weeks old) weighing between 20-30 g were purchased from Charles River Laboratories. MCF-7/TN cells were suspended in 50 µl sterile PBS with 100 µl of Matrigel, and injected into the mammary fat pad of each mouse. Mice that developed palpable tumors in a three-week period were divided into two groups of five animals each (control and treatment groups). Controls were injected intraperitoneally with DMSO (dimethyl sulfoxide), while treated animals were injected with 25 mg/kg of Analog 315 (in DMF) for five days. Tumor volume was determined by measurement with calipers, and calculated by the formula: $V = \frac{1}{2} \times \pi \times \frac{L^2 \times W}{6}$. Tumors, liver, lungs, heart, kidneys and spleen were harvested, isolated from surrounding tissues, and weighed. The tissues were fixed in 10% formalin for future analysis.

Results

Figure 6: Analog 315 Structure

Figure 7: Tumor Volumes

Figure 8: Organ Weights

Group	Weight (g)	Standard Deviation (g)
Control	1.80 (0.21)	0.43
Treatment	1.75 (0.21)	0.43

Group	Heart (g)	Liver (g)	Spleen (g)
Control	0.51 (0.05)	0.81 (0.08)	0.06 (0.01)
Treatment	0.51 (0.05)	0.81 (0.08)	0.06 (0.01)

Conclusion

Analog 315 exhibited anti-cancer properties. The amide backbone and amine function are expected to increase the molecule's ability to penetrate the lipid bilayer, increasing its bioavailability. Our results suggest that pharmacological manipulation of intracellular ceramide levels may have a therapeutic potential in treating chemo-resistant breast cancer.

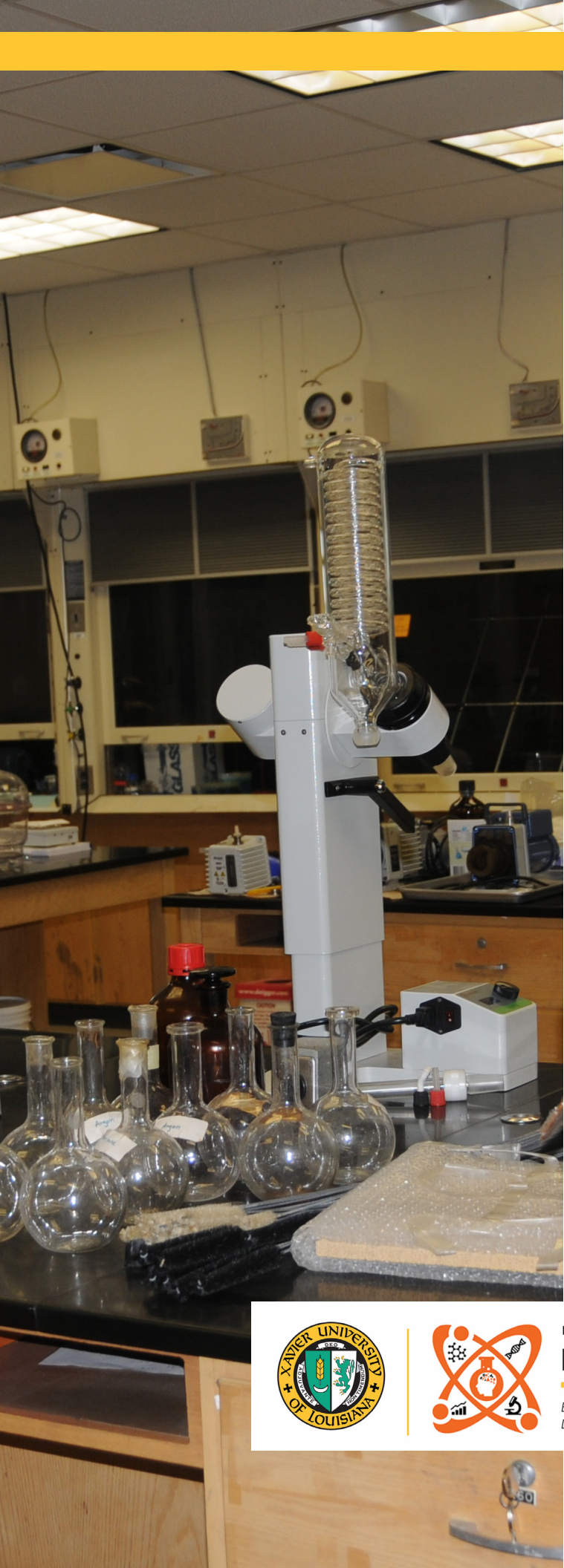


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Core **Infrastructure**



Institutional Development Core

The Institutional Development Core (IDC) provides resources for key offices and centers across the campus that assist with students' academic support, professional development and undergraduate research activities.



Student Training Core

The Student Training Core (STC) expands the number of biomedical research opportunities offered to Xavier students. This core also coordinates a number of activities designed to educate freshman and sophomore students about the variety of possible biomedical research careers they can pursue.



Research Enrichment Core

The Research Enrichment Core (REC) strengthens the supportive environment needed for Xavier students to overcome barriers to success through curriculum enhancement, mentor training, and post-baccalaureate research training for recent graduates.



Administrative Core

The Administrative Core provides administrative oversight of the other three cores and provides support to enhance faculty research competitiveness. It ensures that there is on-going communication with the NIH, implementation of the activities with input from external and internal evaluators and recommendations for best practices.

Introduction to **BUILD at Xavier**

The BUILD (Building Infrastructure Leading to Diversity) Program is funded by the National Institute of General Medical Sciences (NIGMS) at the National Institutes of Health (NIH). This highly-innovative initiative was designed as a set of experimental training awards made to ten institutions of higher education to study and implement effective approaches to engaging and retaining students from diverse backgrounds in biomedical research careers. The ultimate goal of this NIGMS Training, Workforce Development, and Diversity (TWD) program is to address the lack of diversity in the biomedical research workforce and prepare a diverse group of future contributors to the NIH-funded research enterprise. Xavier's Program, *Project Pathways*, now in its fifth year, focuses on the various pathways to success for students in the biomedical sciences, bringing together both academic areas and academic support areas to provide students with a holistic program that better prepares them for a research career.

National statistics point to decreasing numbers of US students, especially students from underrepresented groups, enrolling in biomedical fields of study at both the undergraduate and graduate levels. This decrease has resulted in fewer graduates entering the workforce in research in these areas. A diverse biomedical workforce provides several key benefits for both biomedical sciences and society as a whole. These include: increasing creativity by tapping into unique perspectives, broadening the scope of inquiry into often neglected areas, narrowing the health gap with a focus on health inequities, and promoting and ensuring fairness and understanding. One of the greatest potential sources for increasing the number of biomedical research scientists in the country is the African American population. Given their percentage in the US population, African Americans obtain a disproportionately low number of science degrees. In mathematics, engineering, and the life and physical sciences, less than 9% of bachelor's degrees, less than 8% of master's degrees, and less than 3% of doctoral degrees are conferred to African Americans (latest available data, 2012¹), even though they constitute 13.3% of the US population.

Xavier University of Louisiana (XULA) is the only historically Black and Catholic institution of higher education in the western hemisphere and nationally recognized for its Science, Technology, Engineering, and Mathematics (STEM) curricula while remaining close to its liberal arts roots. Seventy-eight percent of Xavier undergraduates in the 2017-2018 academic year majored in biomedical (Biology, Chemistry, Physics and Computer Science, Mathematics, Public Health Sciences, Psychology, and Sociology) disciplines². During the last decade, according to the US Department of Education,

Xavier has ranked first nationally in the number of African American students earning undergraduate degrees in Biology, Chemistry, Physics, and the Physical Sciences overall³. Xavier is also first nationally in the number of Black graduates who go on to earn doctoral degrees in the Life Sciences, and fifth in producing African American students who earn their PhDs in Science and Engineering⁴. Xavier has a national reputation for producing health professionals, and in 2012 was named the number one undergraduate source of African Americans who complete their medical degrees by the Association of American Medical Colleges⁵. In September 2015, the *New York Times Magazine* chronicled the unmatched success of Xavier's Pre-medical Program⁶. Xavier's academic excellence in Pre-medical education was also featured in a PBS News Hour segment on Tuesday, May 8th, 2018⁷. Xavier's College of Pharmacy has also been among the nation's leaders (top four) in awarding Doctor of Pharmacy degrees to African Americans⁸.

1. National Science Foundation, Division of Science Resources Statistics. (2015) *Science and Engineering Degrees, by Race/Ethnicity of Recipients: 2002-2012*. Detailed Statistical Tables NSF 10-300. Arlington, VA. Available at <https://www.nsf.gov/statistics/2015/nsf15321/pdf/nsf15321.pdf>
2. Office of Planning, Institutional Research & Assessment: Xavier University of Louisiana Profile 2017-2018. Available at <http://www.xula.edu/opira/ir/documents/university-profile/01.pdf>
3. Diverse Issues in Higher Education, Top 100 Degree Producers: Baccalaureate, 2017. Available at <http://diverseeducation.com/top100/pages/BachelorsDegreeProducers2017>.
4. Fiegenger, M.K. & Proudfoot, S.L. Baccalaureate Origins of U.S.-Trained S&E Doctorate Recipients. *National Science Foundation, National Center for Science and Engineering Statistics*, 2013 (NSF 13-323).
5. Student Data, Applicant and Matriculation File, 2015-2016. In: AAMC Data Warehouse. Available at <https://www.aamc.org/download/321446/data/factstablea2-1.pdf>
6. Hannah-Jones, N. A Prescription for More Black Doctors: How Does Tiny Xavier University in New Orleans Manage to Send More African-American Students to Medical School than Any Other College in the Country? *The New York Times Magazine*. New York; September 9, 2015.
7. <http://www.xula.edu/mediarelations/pbsnewshour.html>
8. Best Pharmacy Programs. Available at <https://www.usnews.com/best-graduate-schools/top-health-schools/pharmacy-rankings/page+4>

Basic Overview of **Project Pathways**

Project Pathways at Xavier is a NIH-funded program that seeks to increase diversity in the biomedical research workforce through providing research experience, enrichment activities and academic support for Xavier undergraduates. *Project Pathways* is one of ten grants funded through the NIH-BUILD mechanism that, together with the NRMN (the National Research Mentoring Network) and the CEC (the Coordination and Evaluation Center), make up the Diversity Programs Consortium, which is providing a data-rich experiment to identify and address the major barriers to success for students from populations underrepresented in the biomedical workforce.

At Xavier, the activities in *Project Pathways* are carried out through the combined and collaborative efforts of four cores: the Institutional Development Core (IDC), the Student Training Core (STC), and the Research Enrichment Core (REC),

in addition to the Administrative Core which oversees the activities of all Cores, and also provides support to enhance faculty research competitiveness. The STC, REC, and IDC have worked together to develop a series of activities designed for students from freshmen to seniors in addition to select recent Xavier graduates. These activities were developed to address the challenges and barriers Xavier students often encounter as they move towards careers in the biomedical workforce.



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A Note from the **President**

The BUILD *Project Pathways* continues extending the capacity of Xavier University of Louisiana to prepare its students for advanced study and careers in the biomedical sciences through rich biomedical research experiences as undergraduates. A key dimension of excellent education is that practical experience as scientists gained in our laboratories and those of our collaborators, whereby Xavier students develop as scientists by engaging in the enterprise of discovery and problem solving. The BUILD Program brings rich opportunity for this faculty to innovate and prepare the next generation of researchers.

The faculty recognize that not all students, in spite of talent and ability, have received pre-collegiate education needed to achieve their promise. We at Xavier have long committed to our calling to cultivate talented students and resolve any deficits that impede such talent. We have improved and deepened academic support.

The faculty has enhanced the curriculum to broaden the experience and horizons of our graduates, so that they may stand with the best minds of the nation and contribute to its advancement.

Xavier University of Louisiana has demonstrated the ability to educate African-American STEM students and to do so very well. Through BUILD, Xavier will share with sister institutions pathways to educate STEM students at the highest levels and to meet an important societal need. Through shared knowledge, we will expand the capacity of this nation to educate its talented minds and to realize the full benefits.

C. Reynold Verret
President
Xavier University of Louisiana

The NIH NIGMS BUILD Program at Xavier University of Louisiana, *Project Pathways*, aims to increase the diversity in the biomedical workforce by providing faculty and students with tools for enhancing undergraduate education and developing student leadership capacity. Financial support from the BUILD program and the community of scientists at other institutions have enabled faculty and staff at Xavier to engage in curricular design that puts our students at the center of knowledge creation; provide students with enhanced advising, tutoring, and opportunities through a national network of student researchers; create a physical and administrative infrastructure so that our students remain competitive for highly selective graduate programs, are prepared for the cultures into which they will enter, and are more likely yet to succeed.

As an HBCU, Xavier has an exceptional record in preparing individuals from underrepresented groups for successful pursuit of graduate and professional degrees and productive careers. As a values driven, Catholic university, Xavier furthermore prides itself in embedding ethical leadership training and human rights awareness in all that we do. The BUILD program allows us to build on our heritage, ensure an even greater legacy, and assist our nation as a whole in fulfilling its potential. For all of this, we are all thankful and inspired to do more yet.

A Few Words from the **Provost**



Anne McCall

*Provost and Senior Vice President
for Academic Affairs
Xavier University of Louisiana*



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Institutional Development Core







Institutional Development Core

The Institutional Development Core (IDC) provides resources for key offices and centers across the campus that assist with students' academic support, professional development and undergraduate research activities.

HIGHLIGHTS

Festival of Scholars

The Center for Undergraduate Research and Graduate Opportunity (CURGO) provides three opportunities for students to showcase their research at Xavier. The Summer Research Symposium held at the end of the summer allows students working on research during the summer an opportunity to present their findings to the campus community. The Research Scholar Showcase held in the fall prior to the Graduate School Fair allows students interested in graduate school an opportunity to present their research to graduate school recruiters. Xavier's largest research event is the Festival of Scholars. This is a two-day University-wide symposium of undergraduate research and creative work by Xavier students. This event allows students from all disciplines participating in research on campus an opportunity to showcase their research to faculty, staff, friends, family, and visitors. CURGO hosted the 15th annual Festival of Scholars event on April 12th and 13th of this year. This year's event featured over 100 presentations with 56 being poster presentations, 19 being oral presentations, and 33 being course presentations. At this year's Festival, all graduating BUILD Scholars (12) presented their research at the symposium, and the remaining BUILD student researchers (17) presented their research via poster presentation.



Festival of Scholars Participants



Jessica Anderson, BUILD Research Student



Step Up!

Step Up! is a program designed to introduce students to the basic professional steps you should take to ensure your ultimate success. Topics of discussion included career exploration, internships or research positions, resume/CV writing, interview preparation, preparing for graduate school, and dining etiquette.



Office of Career Services

Career Services @ Your Service and CURGO on the GO sessions are held throughout the semesters where staff members from the Office of Career Services (OCS) and CURGO meet students at various campus locations to promote and discuss the BUILD Program as well as provide an introduction of the services offered by OCS and CURGO.



Career Carnival

OCS staff handed out information about their services, the BUILD Scholars Program, and upcoming events including the speaker series, workshops, and On-Location/@ Your Service events.



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Student Training Core







Student Training Core

The Student Training Core (STC) expands the number of biomedical research opportunities offered to Xavier students. This core also coordinates a number of activities designed to educate freshman and sophomore students about the variety of possible biomedical research careers they can pursue.

Career Exploration

The Career Exploration panel held at Xavier in June featured professionals from the greater Boston area and was sponsored by the BEST BET Consortium. The panelists described their career paths and discussed the role of undergraduate research in the development of their career interests. They also answered student questions about the application process for graduate school and finding work-life balance.



Panelists: *Fadie T. Coleman PhD, Assistant Professor, Department of Medical Sciences & Education, Director of the Biomedical Laboratory & Clinical Sciences (BLCS) Program, Boston University School of Medicine; Portia Singh, PhD, Senior Research Scientist, Philips Research North America; Stanley O. King II, PhD, Vice President of Corporate Development, Emulate Inc.; Chinaemere Igwebuike, MD/PhD Candidate, Boston University School of Medicine.*



BUILD Interdisciplinary Summer Seminar

The BUILD Interdisciplinary Summer Seminar Series is held weekly and offers BUILD Scholars, BUILD Research Students, BUILD Post-baccalaureate Technicians, and all other interested research students an opportunity to present their research to the Xavier scientific community. Faculty, staff, and students from all Biomedical departments and disciplines are invited to attend and present their work at this informal gathering.

BUILD SCHOLARS: RECENT GRADUATES AND NEW APPOINTMENTS



Kamilya Hunter

Kamilya Hunter
May 2017 XULA Graduate
Atlanta, Georgia
Major: Biology
Minor: Chemistry

Thesis: "A Look into the Microbial World"
Publication: Blake, R.C., II, Anthony, M.D., Bates, J.D., Hudson, T., Hunter, K.M., King, B.J., Landry, B.L., Lewis, M.L. and Painter, R.G., 2016, In situ Spectroscopy Reveals that

Microorganisms in Different Phyla Use Different Electron Transfer Biomolecules to Respire Aerobically on Soluble Iron, *Frontiers in Microbiology*, 7:1963(1-9).

Mentor: Dr. Robert Blake II (College of Pharmacy)
Kamilya graduated from the Meharry Masters of Health Sciences Program in May of 2018. She was recently accepted into Meharry Medical School and will attend Fall of 2018.



Nhu Tran

Nhu Tran
May 2017 XULA Graduate
New Orleans, Louisiana
Major: Chemistry
Minor: Biology

Thesis: "Design, Synthesis and Biological Evaluation of Isoquinoline Alkaloids as Anticancer Agents"

Mentor: Dr. Florastina Payton-Stewart (Chemistry)
After graduation, Nhu participated in the BUILD Post-baccalaureate Technicians Program, and will begin PhD studies in Chemistry at the University of California, Davis in Fall 2018.



Ayinde Abanu

Ayinde Abanu
XULA Class of 2020
Minneapolis, Minnesota
Major: Biochemistry
Minor: Biology



Angel'Niqua Dixon

Angel'Niqua Dixon
XULA Class of 2020
Monroe, Louisiana
Major: Biology
Minor: Chemistry



Ashley Mello

Ashley Mello
XULA Class of 2020
Mansfield, Texas
Major: Biochemistry
Minor: Biology



Blaine Derbigny

Blaine Derbigny
XULA Class of 2020
New Orleans, Louisiana
Major: Chemistry
Minor: Biology



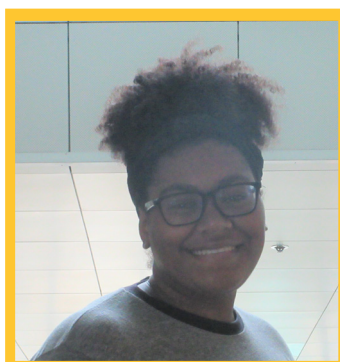
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Daniel Eyassu

Daniel Eyassu
XULA Class of 2020
Denver, Colorado
Major: Biochemistry
Minor: Mathematics



Marianne Alexis

Marianne Alexis
XULA Class of 2020
Lake Charles, Louisiana
Major: Biology
Minor: Chemistry



George Olverson IV

George Olverson IV
XULA Class of 2020
Fayetteville, Georgia
Major: Biology
Minor: Chemistry



Myles Bartholomew

Myles Bartholomew
XULA Class of 2020
Missouri City, Texas
Major: Biology
Minor: Chemistry



Jonah Brown

Jonah Brown
XULA Class of 2020
Rocky Hill, Connecticut
Major: Biochemistry



Taylor Perry-Crawford

Taylor Perry-Crawford
XULA Class of 2020
Baltimore, Maryland
Major: Psychology
Minor: Communications



Mack Williams

Mack Williams
XULA Class of 2020
West Helena, Arkansas
Major: Mathematics
Minor: Biology

BUILD **SCHOLARS**

BUILD RESEARCH STUDENTS: NEW APPOINTMENTS



Cemilia Shaw

Cemilia Shaw
XULA Class of 2020
Batesburg, South Carolina
Major: Neuroscience
Minor: Biology & Chemistry



Tiffany Phillips

Tiffany Phillips
XULA Class of 2020
Gardena, California
Major: Biochemistry



Denise Cayton

Denise Cayton
XULA Class of 2020
Corona, California
Major: Biology
Minor: Chemistry



Timothy Perry

Timothy Perry
XULA Class of 2020
New Orleans, Louisiana
Major: Biology
Minor: Chemistry



Jessica Anderson

Jessica Anderson
XULA Class of 2020
New Orleans, Louisiana
Major: Chemistry
Minor: Biology



William Winchester

William Winchester
XULA Class of 2020
New Orleans, Louisiana
Major: Chemical Engineering
Minor: Mathematics



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STC Highlights



Bryan Redmond



Kylar Wiltz



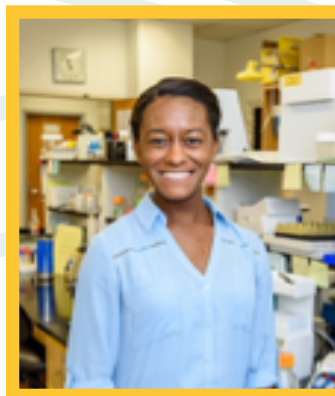
Hassan Owens

These three BUILD students received the highest honors and awards at the Xavier University of Louisiana 91st Commencement Ceremony. **Bryan Redmond**, a BUILD Research Student, received the Saint Katharine Drexel Award which is the highest honor for any Xavier Student to receive. **Kylar Wiltz**, a BUILD Scholar, received the second highest award which was the Mother M. Agatha Ryan Award and **Hassan Owens**, also a BUILD Scholar, received the Louis Israel Award. To be considered for these high honors students must exhibit good standing, maintain GPA and show active leadership on campus. Bryan will be starting MD/PhD studies at the University of Rochester in Fall 2018, while Kylar and Hassan will enter medical school at Howard University and UCLA.



Victoria George

Victoria Agbeke George was awarded a Fulbright Scholarship to study and conduct research in Africa's Ivory Coast. The Fulbright program is the nation's largest international exchange program.



Lauren Thornton

Lauren Thornton was selected as one of only two Louisiana recipients of the 2018 Barry Goldwater Scholarship and the first Xavier student to receive this honor.

BUILD Students: Current

Ayinde Abanu	Major: Biochemistry	Alysia Madison	Major: Chemistry
Marianne Alexis	Major: Biology	Ashley Mello	Major: Biochemistry
Jessica Anderson	Major: Chemistry	Olivia Morrison	Major: Chemistry
Myles Bartholomew	Major: Biology	George Olverson	Major: Biology
Kyla Bongay-Williams	Major: Biochemistry	Imari Parham	Major: Biology
Johan Brown	Major: Biochemistry	Timothy Perry	Major: Biology
Denise Cayton	Major: Biology	Taylor Perry-Crawford	Major: Psychology
Blaine Derbigny	Major: Chemistry	Nghi Pham	Major: Biology
Angel'Niqua Dixon	Major: Biology	Tiffany Phillips	Major: Biochemistry
Daniel Eyassu	Major: Biochemistry	Arlysse Rodney	Major: Public Health Sciences
Natalie Faciane	Major: Public Health Sciences	Cemilia Shaw	Major: Neuroscience
Chandler Golden	Major: Psychological Science	Josiah Sherman	Major: Biology
Lauren Goodes	Major: Neuroscience	Lauren Thornton	Major: Biology
Olivia Griswold	Major: Biology	Starr Villavasso	Major: Neuroscience
Aliyah Jones	Major: Psychology	Mack Williams	Major: Mathematics
Tamia Luster	Major: Biology	William Winchester	Major: Chemical Engineering

BUILD Students: 2017-2018 Graduates

Victoria Barnett

Major: Psychological Science

Thesis: The Impact of Intermittent Access to a Nutritionally Complete Palatable Diet on Motivation to Drink Alcohol

Mentor: Dr. Sunil Sirohi (College of Pharmacy)

Xiara Day

Major: Biology

Thesis: Investigations into the Antidiabetic Effect of Garcinia kola and Curcumin via Alpha-glucosidase Saccharomyces cerevisiae Inhibition

Mentor: Dr. Patience Obih (College of Pharmacy)

Victoria George

Major: Biology

Thesis: Investigation of lncRNA Targets of PAX3-FOXO1 in Alveolar Rhabdomyosarcoma Cells

Mentor: Dr. Kelly Johanson (Chemistry)

Khari Gilmore

Major: Biology

Thesis: Analysis of Human-Disease Causing Mutations In Kinesin Kif5A; Transposable Elements and Extrachromosomal Circular DNA

Mentors: Drs. Thomas Huckaba (Biology) and Maria Morales (Tulane)

Tarius Hill

Major: Biology

Thesis: Ceramide Analog 315

Mentor: Dr. Maryam Foroozesh (Chemistry)

Chelsea Kelland

Major: Biology

Thesis: Characterizing Mutations at the Kinesin-Microtubule Interface that Cause Hereditary Spastic Paraplegia

Mentor: Dr. Thomas Huckaba (Biology)

Brionna King

Major: Biology

Thesis: Oxidation of Ferroplasma acidiphilum

Mentor: Dr. Robert Blake II (College of Pharmacy)

Bria Landry

Major: Psychology

Thesis: Prominent Respiratory Proteins in Acidiplasma aeolicum as Revealed Using in situ Absorbance Spectroscopy

Mentor: Dr. Robert Blake II (College of Pharmacy)

Hassan Owens

Major: Biology

Thesis: Utilization of Nucleobase Interactions to Develop Energy and Electron Transfer System

Mentor: Dr. Candace Lawrence (Chemistry)

Bryan Redmond

Major: Psychology

Thesis: Stimuli Response Polymers

Mentor: Dr. Stassi DiMaggio (Chemistry)

Tyjah Saulsberry

Major: Chemistry

Thesis: Ceramide Analogs for Breast Cancer Treatment

Mentor: Dr. Maryam Foroozesh (Chemistry)

Tajhshea Walden

Major: Biology

Thesis: Flavopiridol Reduces Pathological Angiogenesis Induced by Kaposi Sarcoma Associated Herpes Virus G-Protein Coupled Receptor

Mentor: Dr. Harris McFerrin (Biology)

JaNiece Walker

Major: Biology

Thesis: The Paths They Take: Alu Elements

Mentor: Dr. Maria Morales (Tulane)

Amber Weatherspoon

Major: Chemistry

Thesis: Investigation the Role of a Dual Motif in DNA Binding by PAX3-FOXO1

Mentor: Dr. Kelly Johanson (Chemistry)

Simone White

Major: Public Health Sciences

Thesis: Understanding KDAC8 Function and Substrate Specificity

Mentor: Dr. Terry Watt (Chemistry)

Kylar Wiltz

Major: Biology

Thesis: Building Correlation Between MRP-1 and Cancer Cell Resistance as Preparation for si-RNA Knockdown

Mentor: Dr. Anup Kundu (Biology)



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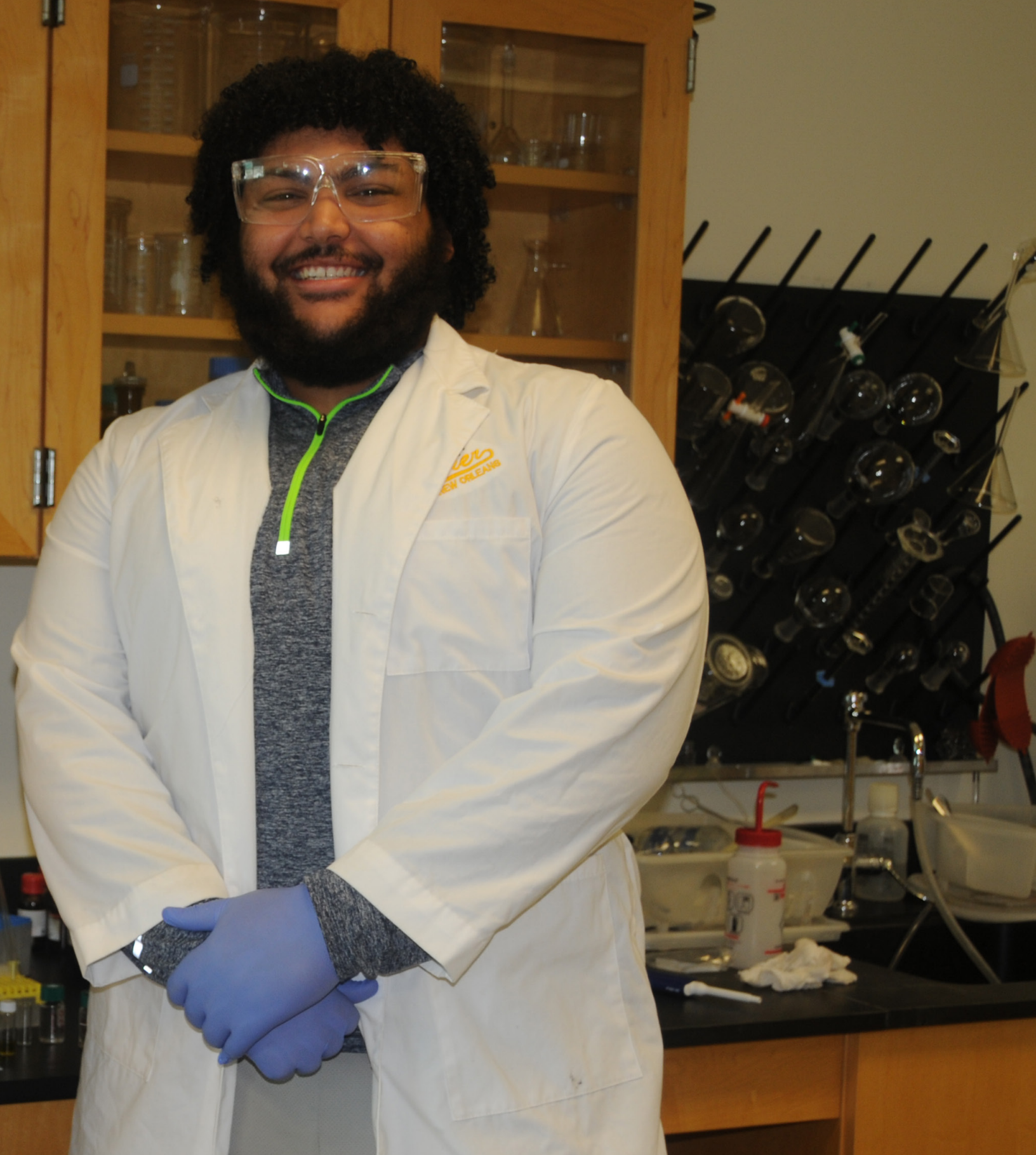
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Research Enrichment Core





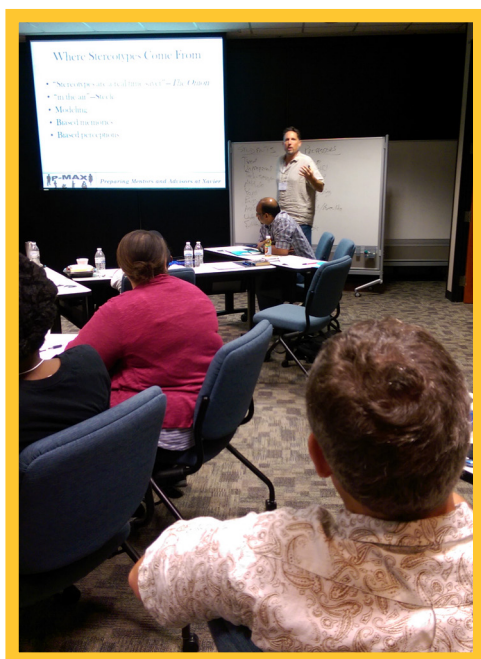


Research Enrichment Core

The Research Enrichment Core (REC) strengthens the supportive environment needed for Xavier students to overcome barriers to success through curriculum enhancement, mentor training, and post-baccalaureate research training for recent graduates.

Faculty Development: **P-MAX, SERG and SPW**

It has been demonstrated that supporting faculty in improving their teaching skills has a positive impact on student learning. In working toward the ultimate goal of BUILD to increase the participation of underrepresented individuals in the biomedical workforce, Xavier's Project Pathways Program helps to support three faculty development initiatives that work to assist faculty in their teaching and mentoring.



Preparing Mentors and Advisors at Xavier (P-MAX) is a training program that is designed to provide participating faculty with the knowledge and skills needed to effectively mentor and advise undergraduate students, especially those engaged in research. The P-MAX workshops in Year 4 of the Program started with a full-day session on Saturday July 22, 2017 with 27 faculty and staff attendees. Six additional hour-long workshops were offered over the academic year.

The **Science Education Research Group (SERG)** meetings are informal, pedagogical forums where interested faculty members can discuss their teaching experiences, pedagogical issues, and lessons learned with other faculty. The meetings are designed to improve interdepartmental communication and increase the ease of access to innovative resources on best practices and relevant educational research for the faculty involved. Twelve SERG meetings were held in Fall 2017 and Spring 2018.

Each summer, the faculty involved in course development/improvement projects supported by BUILD and other research education grants participate in the **Summer Pedagogical Workshops (SPW)**. During the two-week workshops, each faculty member presents his/her curricular project and exchanges ideas and experiences with workshop participants. Faculty

are also provided workshops on assessment, evaluation and pedagogical topics. This year's workshops were held on June 14, 15, 18, and 19, 2018. Dr. Regan Gurung from the University of Wisconsin Green Bay was this year's pedagogical speaker, where he spoke on the topic "Better Practices in Improving Teaching and Learning: Models, Processes and Pitfalls." Dr. Gurung's talk focused on the basic process for pedagogical research and ways to participate in the scholarship of teaching and learning (SoTL). The workshops also included robust discussions and exchanges among faculty participants regarding their curricular modifications and improvements.



Mentee Development: **ER XULA**

The **Entering Research** at Xavier University of Louisiana (ER XULA) workshop series is designed for undergraduate students who are beginning to engage in mentored biomedical research. The sessions are designed to support our mentees' independent research experiences. The mentees meet for ten, 90-minute sessions that introduce them to a variety of topics and activities that support their success in research. Some of these topics include choosing a mentor, reading scientific articles, fostering a sense of belonging in the scientific community, ethics and presentation of work. In 2018, three initial ER XULA sessions were held during the spring semester and were followed by seven weekly summer sessions. Fifteen students participated in the workshops.



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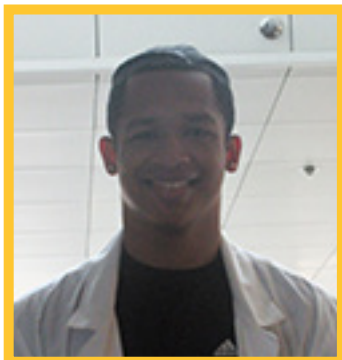
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BUILD Post-Baccalaureate Technicians



Miriam Hill-Odom
 May 2017 XULA Graduate
 Chicago, IL
Major: Biology
Minor: Chemistry
Current Research: “*In vitro* and *in vivo* Bioassays on Ceramide Analogs for Breast Cancer Treatment; Organic Synthesis of Potential P450 Inhibitors and Their Bioassays”
Mentor: Dr. Maryam Foroozesh (Chemistry)



Joshua Hunter
 May 2017 XULA Graduate
 New Orleans, LA
Major: Chemistry
Minor: Mathematics
Current Research: “The Synthesis of Functionalized Nucleobases for Use in the Exploration of Energy Transfer Systems”
Mentor: Dr. Candace Lawrence (Chemistry)



Nhu Tran
 May 2017 XULA Graduate
 New Orleans, LA
Major: Chemistry
Minor: Biology
Current Research: “The Design and Synthesis of Liver X Receptor Inducer as a Potential Anti-Cancer Agent”
Mentor: Dr. Florastina Payton-Stewart (Chemistry)



Amira Gee
 May 2017 XULA Graduate
 Brooklyn, NY
Major: Chemistry
Minor: Biology
Current Research: “Developing Aptamer-Based Sensors for the Recognition of Biomarkers”
Mentor: Dr. Mehnaaz Ali (Chemistry)



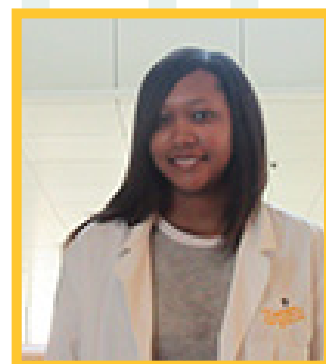
David Heron
 May 2017 XULA Graduate
 Naperville, IL
Major: Biology
Minor: Chemistry
Current Research: “Underlying Cell Signaling Pathways Involved in Diabetic Retinopathy with Respect to the Neuroretina”
Mentor: Dr. Partha Bhattacharjee (Biology)



Ferralita Madere
 May 2017 XULA Graduate
 Marrero, LA
Major: Biology
Minor: Chemistry
Current Research: “Studying the Inhibitory Effects of a Phytochemical Supercocktail on Breast and Lung Cancer”
Mentor: Dr. Shubha Ireland (Biology)



Kyazia Felder
 Dec 2017 XULA Graduate
 Kennesaw, GA
Major: Biology
Minor: Chemistry
Current Research: “Mental Health, African American Men’s Health, and Health Disparities”
Mentor: Dr. Krista Mincey (Public Health Sciences)



Amber Weatherspoon
 Dec 2017 XULA Graduate
 Harvey, LA
Major: Chemistry
Minor: Biology
Current Research: “Brain Structure and Function Relationships with Behavior; Autonomic Functioning and Control”
Mentor: Dr. Jeremy Cohen (Psychology/ Neuroscience)



Tyra Ivory
 May 2018 XULA Graduate
 Macon, Mississippi
Major: Biology
Minor: Chemistry
Current Research: "Human Immunodeficiency Virus (HIV), Human Herpes Virus-8 (HHV8), Herpes Simplex Virus-1 (HSV-1), Tumor Angiogenesis, Diabetes"
Mentor: Dr. Harris McFerrin (Biology)



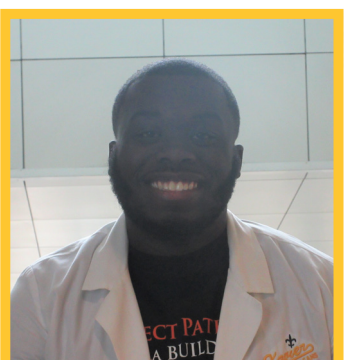
Wendy Dang
 May 2018 XULA Graduate
 Marrero, Louisiana
Major: Biology
Minor: Chemistry
Current Research: "Maternal & Child Health Disparities in Minority Communities"
Mentor: Dr. Tyra Gross (Public Health Sciences)



Victoria Barnett
 Dec 2017 XULA Graduate
 Tacoma, WA
Major: Psychology
Minor: Business
Current Research: "Intersection and Inter-Relatedness of the Influences of Racism, Power, Supremacy, and Systemic Oppression on One's Psychological and Emotional Functioning"
Mentor: Dr. Shantoyia Jones (Psychology)



Linh Ha
 May 2018 XULA Graduate
 Marrero, Louisiana
Major: Chemistry
Minor: Biology
Current Research: "Design and Development of CDK9 and VEGFR2 Dual Kinase Inhibitors as Anti-Angiogenic Agents"
Mentor: Dr. Jayalakshmi Sridhar (Chemistry)



Cory Gettridge
 May 2018 XULA Graduate
 New Orleans, Louisiana
Major: Chemistry
Minor: Biology
Current Research: "Design and Synthesis of Anticancer Agents for Triple Negative Breast Cancer"
Mentor: Dr. Florastina Payton-Stewart (Chemistry)



Jazmin Stenson
 May 2018 XULA Graduate
 Oakland, California
Major: Biochemistry
Minor: Mathematics
Current Research: "Characterizing Inhibitors of the LINE1 Endonuclease"
Mentor: Dr. Cecily DeFreece (Biology/Biochemistry)



Jedera Nwoke
 May 2018 XULA Graduate
 Macon, Georgia
Major: Biology
Minor: Chemistry
Current Research: "Mutations in the Neuronally-Enriched Kinesin Transport Motor, Kif5A, Cause the Neurodegenerative Disease Known as Hereditary Spastic Paraplegia (HSP) in Humans"
Mentor: Dr. Thomas Huckaba (Biology)



Jordan Coward
 May 2018 XULA Graduate
 Ramseur, North Carolina
Major: Biology
Minor: Chemistry & Spanish
Current Research: "Molecular Determinants Critical in the Progression, Migration, and Invasion of Triple Negative Breast Cancer"
Mentor: Dr. KiTani Lemieux (Pharmacy)

Technician Highlights



Jade Meyers
Waggaman, LA

Jade Meyers graduated in 2015 with a Bachelor of Science degree in Chemistry with a minor in Biology. Jade was accepted into the Tulane University Master's of Biochemistry and Molecular Biology Program. Jade received her Master's degree in one year and served as a Lecturer in the XULA Biology Department. She is planning to apply for PhD programs in the near future.



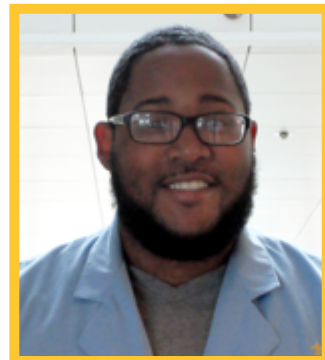
Kamrin Johnson
New Orleans, LA

Kamrin Johnson graduated in 2016 with a Bachelor of Science degree in Biology with minors in Chemistry and Spanish. Kamrin was accepted into the Tulane University Master's of Pharmacology Program. Kamrin graduated with his Master's of Pharmacology in May of 2018. He is currently working in a clinical setting and is planning to apply for a PhD or medical program in the near future.



Ferralita Madere
Marrero, LA

Ferralita Madere graduated in 2017 with a Bachelor of Science degree in Biology with a minor in Chemistry. Ferralita will be attending the University Of Rochester School Of Medicine in the Fall 2018. She will be seeking a PhD in the Immunology, Microbiology and Virology Program.



James Armstrong
Memphis, TN

James Armstrong graduated in 2016 with a Bachelor of Science degree in Chemistry with a minor in Biology. James is now attending Louisiana State University and is working toward a PhD in Organic Chemistry.



Technician Lihn Ha is explaining a research technique to BUILD Research Student Denise Cayton



Technician Amire Gee showing BUILD Research Student Jessica Anderson how to perform an experiment



Building Infrastructure Leading to Diversity (BUILD) Program

PROJECT PATHWAYS

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Administrative Core







Administrative Core

The Administrative Core provides administrative oversight of the other three cores and provides support to enhance faculty research competitiveness. It ensures that there is on-going communication with the NIH, implementation of the activities with input from external and internal evaluators and recommendations for best practices.

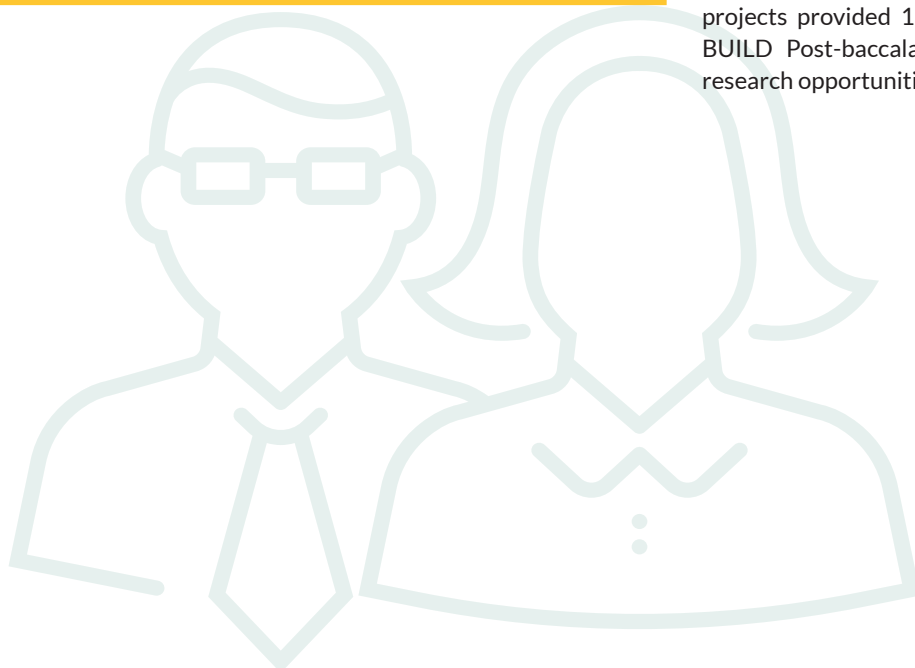


Administrative Core Highlights

In Year 4 of the BUILD grant (July 1, 2017-June 30, 2018), the Program funded the following research pilot projects:

- **Dr. Mehnaaz Ali**, Chemistry Department: Redox tag triggered via specific binding of oligonucleotides
- **Dr. Robert Blake**, College of Pharmacy: Optimizing bacterial redox reactions at the cathode of microbial fuel cells
- **Dr. Jeremy Cohen**, Psychology Department: Dynamic connectivity modeling of human emotion networks during social stress
- **Dr. Stassi DiMaggio**, Chemistry Department: Stimuli response polymers
- **Dr. Galina Goloverda**, Chemistry Department: Development of novel labeling agents for cancer cell tracking
- **Dr. Sunil Sirohi**, College of Pharmacy: The impact of intermittent access to a nutritionally complete palatable diet on motivation to drink alcohol

In addition to their scientific merit and productivity, these projects provided 16 undergraduate students and two BUILD Post-baccalaureate Technicians with hands-on research opportunities at Xavier during this period.



Faculty Pilot **Research Projects**



DR. MEHNAAZ ALI

Dr. Ali's research thrust is aimed at developing biosensors for the detection of clinical targets and disease biomarkers that are readily adaptable to the target type. Applications of detection systems at the nanomedicine regime require highly sensitive, quantitative and selective analysis platforms for the real-time multiplexed monitoring of target bio fluids. Towards this end nucleic acid based recognition probes for the detection of a panel of clinically relevant targets are being explored. Another area of interest is on developing allosteric aptamer scaffolds that will serve as elegant conduits to study nucleic acid and small-molecule interactions. Dr. Ali's fundamental interest is in using structural modifications to enhance or inhibit binding within the aptamer scaffold. These alterations can be used to study the effects on kinetic and affinity parameters of the binding partners. The work carried out in Dr. Ali's group is spearheaded by a group of highly motivated undergraduate students who are interested in careers in the biomedical sciences. The results from these projects have been published in high impact journals such as *Chemical Communications* and *Analytical Chemistry*.



DR. THOMAS HUCKABA

Dr. Huckaba's research primarily focuses on a neurodegenerative disease known as Hereditary Spastic Paraplegia (HSP). HSP is a progressive disease that presents initially with lower limb spasticity and weakness, and eventually leaves patients wheelchair-bound. Interest in this disease began with the discovery that mutations in the neuronal transport motor known as kinesin led to this disease. Using a combination of biochemical, biophysical, cell biological, and computational methods, the Huckaba lab is working toward better understanding the mechanism by which mutations in kinesin cause HSP. Students working on this project express and purify recombinant kinesin for *in vitro* studies and gain experience with cellular studies of kinesin function by the expression of fluorophore-tagged proteins and their analysis via confocal microscopy. Dr. Huckaba has also begun working on a project in collaboration with the Sridhar lab (Chemistry) on the development of novel therapeutics to treat Alzheimer's disease. One of the hallmarks of Alzheimer's disease is the formation of neurofibrillary tangles that include a microtubule-associated protein known as Tau. The goal of Dr. Huckaba's lab for this project is to test the efficacy of compounds generated in the Sridhar lab in terms of their ability to cross the blood brain barrier, inhibit their cellular target(s), and block the formation of neurofibrillary tangles.



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Faculty Pilot **Research Projects**



DR. ANUP KUNDU

Dr. Anup Kundu's research is in the highly interdisciplinary areas of nanoparticle formulation, characterization, and targeted delivery of drugs and genes into breast cancer cells. Chemotherapy remains one of the major treatment options for metastatic breast cancer; however, acquired resistance of cancer cells to chemotherapeutic drugs makes it quite difficult to treat many cancers including the metastatic breast cancer. Recently, it has been reported that knocking down the expression of MDR1 P-glycoprotein (P-gp) by P-gp-specific siRNA could increase the delivery of doxorubicin to doxorubicin-resistant breast cancer cells, which could improve the metastatic breast cancer treatment. However, the challenge is to deliver the siRNA specifically to the targeted breast cancer cells. In light of this current challenge, the Kundu lab is aiming to conjugate nanoparticles with a cancer cell-specific aptamer that would enhance the delivery and subsequent knock-down of multidrug resistant genes, which in turn increase the delivery of doxorubicin into breast cancer cells leading to enhanced cellular toxicity and antitumor effect as compared to unconjugated nanoparticles. With an effective collaboration with Dr. Srikanta Dash at Tulane University and Dr. Tarun Mandal in the College of Pharmacy at Xavier, the Kundu lab was able to set up a nano-biotechnology research lab in the Department of Biology at Xavier to produce drug and gene delivery to chemoresistant breast cancer cells. A significant part of Kundu lab research activities is accomplished by undergraduate students and research technicians from the College of Arts and Sciences.



DR. SUNIL SIROHI

Dr. Sunil Sirohi's lab focuses on discovering and developing improved pharmacotherapeutic agents to treat addictive and related neuropsychiatric disorders. The Sirohi lab utilizes an integrative, behavioral, pharmacological, biochemical, and molecular approach to examine how patterned feeding (over-consumption of a palatable food and under-consumption of less preferred food) impacts the brain and behavior (e.g., alcohol drinking, emotional states, and brain neurochemistry in rats), which has potential therapeutic implications in the management of alcohol use disorders/neuropsychiatric disorders. These research efforts provide research opportunities to a number of Xavier students and have resulted in several peer-reviewed publications and presentations at national conferences.



DR. TERRY WATT

Dr. Terry Watt's research focuses on proteins called lysine deacetylases (KDACs). KDACs chemically modify other cellular proteins, and have been linked to a wide range of essential cellular behaviors. Aberrant KDAC activity appears to be linked to numerous disease states, including many cancers. However, because it is largely unknown which proteins are being modified by KDACs, the reasons for the links to diseases are unclear. The goal of the Watt lab is to understand the physical interactions between KDACs and other proteins. Approaches utilized in the lab include characterization of purified KDACs and genetic engineering to control KDAC behavior in cells. Greater understanding of these interactions, and identification of particular target proteins, will lead to new therapies and diagnostics for diseases via new cellular pathways and drug targets. Xavier students are involved in all stages of these projects.



Building Infrastructure Leading to Diversity (BUILD) Program

PROJECT PATHWAYS

Building Integrated Pathways to Independence for Diverse Biomedical Researchers

BUILD Team



Left to Right

First Row: Kathleen Morgan, Maryam Foroozesh, Marguerite Giguette; Second row: Deborah Marshall, Kelly Johanson, Amy Billizon, Ja'Wanda Grant; Third row: Tiera Coston, Nathaniel Holmes, DeMiracle Woodson, Ashley Irvin; Fourth row: Doryne Sunda-Meya, Linda Hardy, Marian Minnard, Gene D'Amour, Harris McFerrin

Program Highlights

In the 2017-2018 academic year and summer, the *Project Pathways* Team continued the day-to-day program activities in addition to coordinating an NIH Site Visit in February.

The National Institutes of Health (NIH) released the Funding Opportunity Announcement (FOA) for Phase II of the BUILD (Building Infrastructure Leading to Diversity) grant on April 3, 2018 with a due date of June 11, 2018. Previous to that date, the *Project Pathways* Team had discussed various aspects of the Phase II proposal, considering program evaluations and assessments, to determine which aspects of Phase I should potentially be continued and/or enhanced. In addition, new elements for Phase II were also considered. Throughout the proposal writing process, team members worked together to form and submit a cohesive proposal that addressed those elements delineated in the FOA. The proposal focuses on identifying and optimizing the most effective activities from Phase I, with a goal of institutionalizing and disseminating our best practices. The Team also completed the annual progress report for the current program which was due May 1, 2018.

Partner **Liaisons**

Albert Einstein College of Medicine
Dr. Victoria Freedman

Boston University Medical School
Dr. Andrew J. Henderson

Dartmouth College
Ms. Jane B. Seibel

Emory University
Dr. Amanda Marie James

George Washington University
Dr. Jeffrey Brand

Icahn School of Medicine at Mount Sinai
Dr. Matthew O'Connell

Johns Hopkins University
Dr. Juliette Lecomte

Meharry Medical College
Dr. Evangeline Motley

New York University School of Medicine
Dr. Joel Oppenheim

Northwestern University
Mr. Damon William

Tulane University
Dr. Quincy Brown

**Tulane University School of Public Health
and Tropical Medicine**
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University of California Davis
Dr. Steven P. Lee

University of California San Francisco
Dr. Mitchell D. Feldman

University of Chicago
Dr. Janine Franklin/Dr. Regina Dixon-Reeves

University of Rochester
Dr. Vivian Lewis/Ms. Ashley Campbell

University of Wisconsin Madison
Dr. Amber Smith/Dr. Janet Branchaw

Louisiana State University Health Science Center
Dr. Allison C. Augustus-Wallace/Dr. Paula Gregory



Building Infrastructure Leading to Diversity (BUILD) Program

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*Building Integrated Pathways to Independence for
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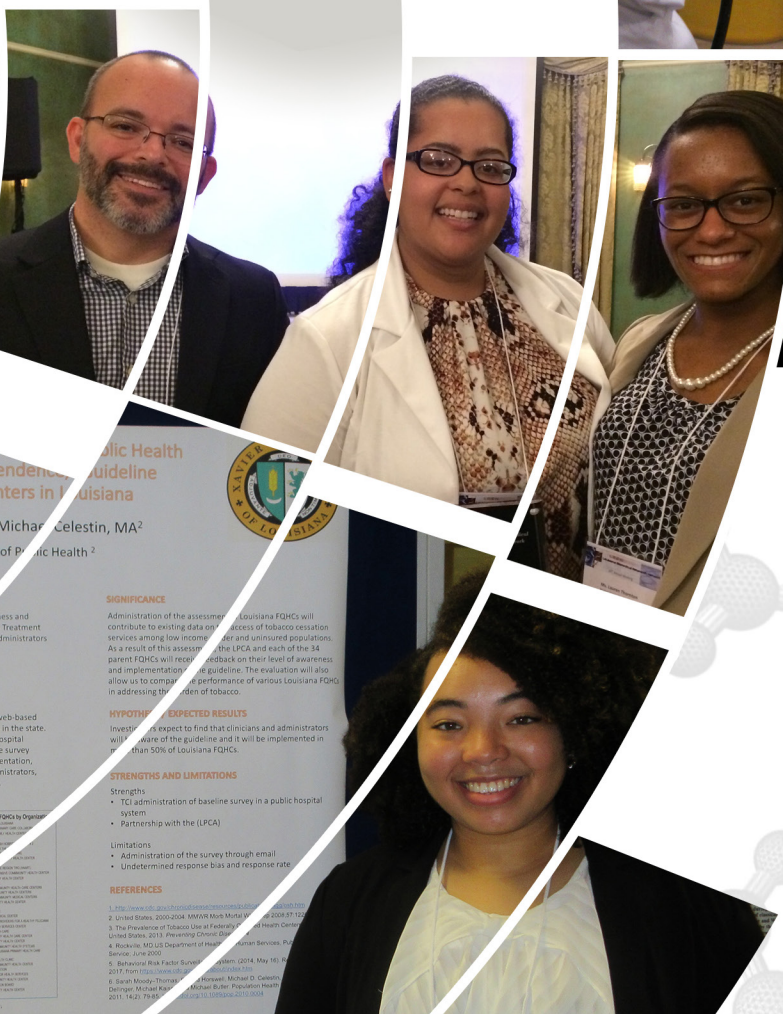
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PROJECT PATHWAYS

*Building Integrated Pathways to Independence for
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