



“Dishing the dirt” takes on a new meaning as NJCU students share information in a world-wide research initiative.

Student Researchers Join Small World Initiative (SWI)

Tackling Biomedical Issue of Antibiotic Shortage

Every one of NJCU's 100 first-semester biology majors is working to address a critical worldwide health crisis—the diminishing supply of antibiotics. The budding scientists are among hundreds of students and microbiologists from 109 schools in 32 U.S. states, Puerto Rico, and eight other countries who are part of the Small World Initiative (SWI), an international collaboration that is harnessing the collective power of student researchers across the globe to discover new antibiotics from soil microorganisms.

The global effort to discover novel antibiotics involves laboratory and field research to isolate new bacteria from soil collected from local environments. The NJCU students are working with soil samples they have individually collected at sites around New Jersey. Some of the sampling areas include the abandoned hospital, isolation wards, and the morgue at Ellis Island, a promising site as lore has it that one of the most successful producers of antibiotic variety was found in topsoil from an old cemetery.

By Kelly Resch

Photography by
Paul Gargiulo

The urgency of this quest for new drugs has intensified steadily since the mid-1980s, when pharmaceutical companies began to abandon this line of research as it became increasingly unprofitable due to its time-consuming nature and FDA-approval requirements. This desertion and resulting scarcity has been compounded by a worldwide drug supply that is becoming ineffectual.

NJCU students are working with an interdisciplinary faculty research team comprised of biochemists, geochemists, cell biologists, and a microbiologist. The work of these nascent biologists is also passed along to geoscience students for analysis and extension and then on to upper-level biology and geoscience majors for phylogenetic, biochemical, and geochemical characterizations.

Some of the materials used by the NJCU students have been provided by Dr. Jo Handelsman, associate director for science at the White House Office of Science and Technology Policy. Handelsman's Yale University course, "Microbes to Molecules," inspired SWI, which was launched in 2013 and is now managed by the Institute for Life Sciences Collaboration. Dr. Cindy Arrigo, an associate professor of biology, and Dr. Freda Robbins, a professor of mathematics, trained under Dr. Handelsman that same year.

Fast forward to last summer when Dr. Arrigo and her colleagues, Dr. Nurdan Duzgoren-Aydin, a professor and chair of geoscience/geography, and Dr. Natalia Coleman, an assistant professor of biology,

Students in all STEM areas are working with an interdisciplinary faculty research team on the urgent biomedical project.



IN STUDENTS' WORDS

I never thought I would see what my eyes saw today; every day is a chance to experience new things.

JOSEPHINE VALLE

Be open-minded as you can be surprised in the field of science every day.

AIMY SALMERON

The world without bacteria is boring. We can't live without it.

LUZ BRITO

Going out to Liberty State Park to collect soil and coming into class to isolate bacteria was an interesting way to see how microbes isolate and colonies form from tiny samples of a water and soil solution.

ALEXANDRIA DIMOPLON

Soil samples from an area with abundant plant life will have more microorganisms than a soil sample with little to no plant life. The discovery was no simple task.

CARMELA TRAPP

The idea that regular undergraduate students, especially 'beginner biologists,' may be able to contribute to research that can lead to new discoveries in the creation of novel medication is exciting and I am glad to be part of it.

UZMA SANDHU

If we knew what we were doing it would not be called research. Sometimes you have to test out the wrong keys to find the right one.

DANIELA KACZMAREK

This research not only give us a chance to look for a new antibiotic, but also gives us the opportunity to interact with the world. We get to discover something outstanding and new to others.

GISELY NUNEZ

This science class, biology, has opened up a whole new way of thinking. And what I have learned is that science never solves a problem without creating ten more.

GRACE VALENTIN

It is amazing to perform an experiment with set procedures and end up with diverse, live colonies that could possibly have the potential to help millions.

MELISSA MINGUEZ

Every day is a new day to learn. The capacity to learn is a gift; the ability to learn is a skill.

KATHRYN GHALY

As a senior biology student at NJCU, I am so excited for what is happening within the department and with this new project. The new coursework not only allows for active student learning through early hands-on and authentic scientific research, but allows students to be part of a larger global initiative to solve a real life problem...how exciting for young scientists.

LINA MARCELLA HENAO

The labs are very interesting. It's not just a simple step-by-step lab that we follow. The students are actually doing their own research and coming up with their own ideas. For example, students are allowed to bring in their own soil to check the bacteria content and come up with different ways to isolate them. We are treated like actual scientists.

TREVER HILL



spent a week at a National Academies of Science Summer Institute on “Research-in-the Classroom” at the University of Texas, Austin. While there, the NJCU team was inspired to bring the SWI project home by embedding the research into their courses, replacing the canned and cookbook labs that they had been using.

Biology Department faculty members Dr. Reed Carroll and Dr. Meriem Bendaoud, associate and assistant professors respectively, added their expertise and their classes to the project it which allowed for all incoming biology students to start their major program with an individual, authentic, hypothesis-driven research project focused on a

real-world, pressing biomedical question.

“This first semester alone we are over 200 research hands strong,” noted Dr. Coleman, before adding, “We are getting results and the students are really inspired.”

The ambitious and innovative project enables undergraduates to complete authentic research and to “own” their discoveries. Research shows that when students participate in research early in college, they are more likely to persist in science majors. This supports the national effort to encourage more students to enter into STEM—science, technology, engineering, and math—programs.

While antibiotic discovery and development take longer than a semester,

Undergraduates complete authentic research and “own” their discoveries.

the collective effort of many students increases the chance of identifying potential candidates for new drugs.

Dr. Bendaoud says, “We have already identified several antibiotic producers,” and Dr. Duzgoren-Aydin offers one possible explanation, “Geochemical characteristics of urban soils in Jersey City have been strongly impacted by anthropogenic activities.”

“Who knows,” says Dr. Bendaoud, “The next generation antibiotic may come from New Jersey soils and through the hands of NJCU students.”

The world looks forward to it. **NJCU**