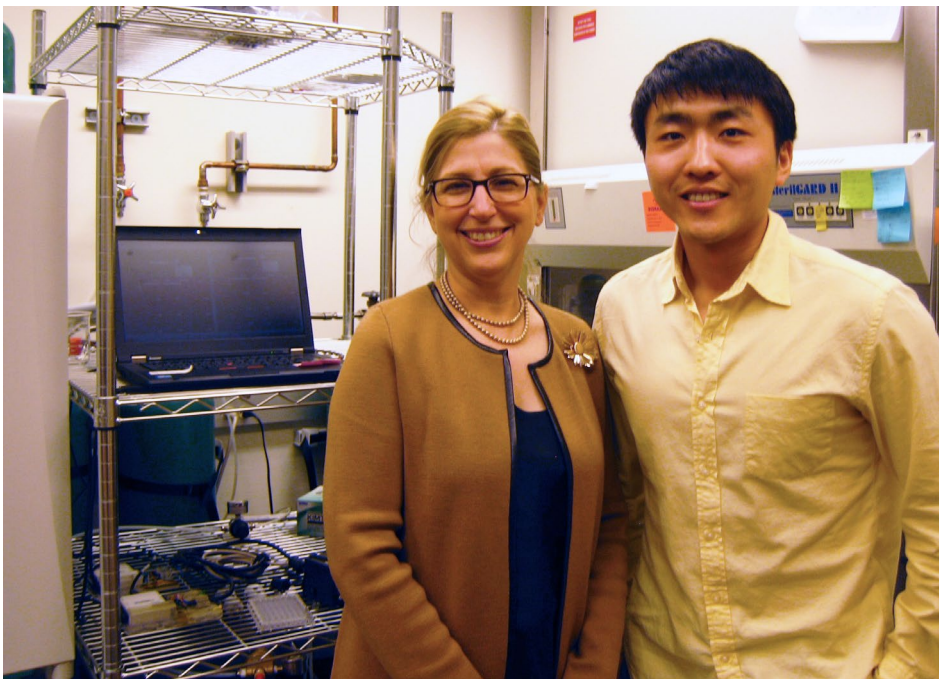
MASTER OF BIOTECHNOLOGY PROGRAM

FERMENT

MAY 2015

ENGINEERING REPRODUCTIVE HOPE FOR FUTURE FERTILITY



Teresa Woodruff and Mingyang Jiang beside their homonculous.

Every year, MBP research preceptors deliver presentations to our students with the hope of informing and enticing them to join their laboratories. Mingyang Jiang, one of MBP's own stellar students, chose to pursue his research project with Teresa Woodruff, PhD, director of the Woodruff Lab at the Lurie Cancer Center -- after she gave him a toy.

Well, not exactly a toy. More like a prototype of a new microfluidic system she and her team were imaging. But It left a lasting impression.

Dr. Woodruff's passion for her research is matched only by her enthusiasm for MBP students, and the contributions they make to her team. "I see myself as a recruiter for this program, because the students are so great," Woodruff said. Jiang, one of four MBP students collaborating with Dr. Woodruff, remains instrumental to the successful development of an ex vivo microfluidic system designed to replicate the in vivo environment of the female reproductive tract.

An engineer by training, Jiang enjoys solving problems, and engineering solutions. "My focus as an undergraduate was designing for improvement," he explained. In the Woodruff Lab Jiang makes life easier for his colleagues, as he brings his own expertise into harmony with the other talents of the group, building the tools that will deliver the desired results. As a consequence of his inventive nature and the problems he has tackled, he has submitted two patent disclosures during his time in the lab.

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Teresea Woodruff, PhD

But we're getting ahead of ourselves. Dr. Woodruff's interest in reproductive health dovetails with the contemporary cancer research conducted at the Lurie Cancer Research Center in Northwestern's Chicago campus. Her focus in reproductive tissues, specifically ovarian follicle cells, brings her work into contact with those patients suffering from ovarian cancer, or more specifically, suffering from the treatment of their cancer.

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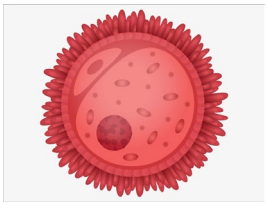


Woodruff Lab, 2014

Although cancer therapies become increasingly effective in saving lives, many of these life-saving treatments damage, if not entirely extinguish fertility in younger female patients. "We've been working to develop ways to preserve that fertility," Dr. Woodruff explained, "So one of our strategies has been to remove those follicles before chemotherapy and grow them in culture." Eventually the group hopes to provide healthy, fertilizable eggs back to the patients after they have recovered from cancer and at the time when they are ready to start their family.

When Jiang came to the lab in January of 2014, researchers had advanced their methods beyond growing follicle cells in a petri dish. Although they had worked out a way to preserve the three dimensional shape of the cells, the group was developing a way to put the tissues in a dynamic microfluidic system.

Jiang's job was to ensure that the new system worked exactly the way the lab wanted, and to provide improvement ideas based on their "user experience."

Successful collaborations such as these are a hallmark of modern science education. Dr. Woodruff commented, "There are a lot of masters programs out there in engineering and biomedical engineering but this one is distinctive for its rigor, for its research, and for its ability to get students into the community... and the program produces students of the highest caliber."

Dr. Woodruff so enjoys the work of MBP students, she expressed sadness at the thought of Jiang's inevitable departure. Such sentiments are testament to the abilities, innovations, and ambitions of MBP students.

Dr. Woodruff's optimism really makes you excited about the possibilities that could come from your research. She's a great mentor. She really encouraged me to explore what the lab has to offer.

Catherine Nguyen ('15)

GETTING BEYOND THE BENCH: TOTAL SCIENCE

Collaboration allows students to experience scientific research holistically, and gain a macro-view of industry.

Last spring, while Catherine Nguyen was working in the Woodruff Lab at the Lurie Cancer Center, she collaborated with fellow MBP classmate, Mingyang Jiang, to create a new lab device, the OviPoke.

Made with simple materials from the lab, the OviPoke facilitates the extraction of the oocyte from a follicle cell. Normally the extraction is accomplished using an implement with a single needle, however Nguyen and Jiang found that using a bundle of needles made for more successful extraction.

Encouraged by their success, the two submitted their device for a patent, and although it was not accepted, both students exhibited a tremendous amount of creativity while gaining valuable experience in product development and marketing in the process.

Nguyen came to the Woodruff Lab from a background in biology, searching for a project that would suit her own interests, and challenge her to think creatively. It was Dr. Woodruff's enthusiasm and her ability to present her research passionately that encourgaed Nguyen to join her team. "She had this really innovative idea: the menstrual cycle in a box, and that was what got me. I loved her view of what research could be."

During her 1,000 hour research project, Nguyen attended multiple NIH meetings, gained real-world experience with FDA trials, and delivered a presentation at the 33rd Mini-symposium on Reproductive Biology last March.

"She's a great mentor. She really encouraged me to explore what the lab has to offer." Working in Dr. Woodruff's lab enagaged Nguyen's ability to problem-solve, to troubleshoot techniques, to draft and review reports, to run ELISA's, to deliver presentations, to design scientific posters-- all while keeping up with her rigorous course load.

(No rest for MBP students.)

OPEN DOORS : ADVENTURES IN INDUSTRY

IRYNA OLYVA
Cook Pharmica, Summer 2014
Process Development

What, might you ask, would tempt a young scientist to endure stark beauty of Bloomington, Indiana for six months? How about the promise of professional experience with an integrated contract development and manufacturing company? (Yeah, we thought so.)

Situated amid a developing life sciences corridor, Cook Pharmica offered three MBP students the chance to gain industry insight, and strong lab practices, and in the summer of 2014, Iryna Olyva was among them.

Olyva worked in formulation development in a process development department. "When a drug is delivered into the system," she explained, "it's never delivered alone. It's mixed with sugars and other compounds that make it stable. And so that's what we call formulation. We develop that ultimate combination to give you the longest shelf life."

This sort of work resembles a trial-and-error process, and as an intern, Olyva was expected to troubleshoot and solve problems on her own. "Working in a professional lab, you have to be coachable, and you have to able to teach yourself." In a lab where technical manuals are ample and accessible, interns find themselves skimming a lot of paper.

"You have to be flexible, and adaptable. And you have to able to let go. A client-directed project isn't pure research, its contract manufacturing. We work to suit the needs of the client first." But Olyva isn't complaining—She plans move forward to a career in commercial science after she graduates in June.

THOMAS CAYTON
AuraSense Therapeutics
Summer 2014

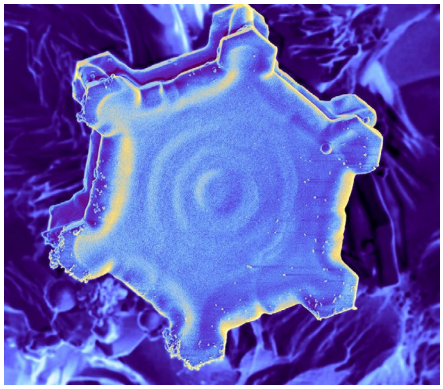
AuraSense® Therapeutics

Established in 2009 by Northwestern University's Chad Mirkin, PhD, AuraSense specializes in developing a new class of immunomodulatory and gene silencing drugs.

During the summer of 2014, the MBP's own Thomas Cayton worked with the organization's senior scientists to characterize and evaluate the therapeutic effectiveness of immunostimulatory nanoparticles. (That's a mouthful.) When Cayton came on board in June, he was inducted into the culture of professional laboratory work the old fashioned way: through safety trainings and the memorization of a staggering amount of new acronyms.

By his third week, Cayton was delivering his first presentation to the heads of the company. Of course, it's a small company, "only 22 employees or so," Cayton said. "But because it's so small, there's a willingness to explore new experiments."
As part of a diverse team of engineers, chemists, and microbiologists, Cayton absorbed the start-up culture and modeled the habits of his co-workers "You have to be able to adapt quickly to whatever comes down the pipeline."

Re-vamps, revisions, new requests—Cayton learned to roll with the punches, a skill that will serve him in his future endeavors inside and outside the lab.



SARTORIAL SUCCESS

MBP students dress to impress during their HEMA presentations last quarter. (Keep making us look good.)

CURRENT INTERNSHIPS

Fifteen MBP students will fight summer learning loss as they tackle internships in consulting, cancer therapy, pharma and global health.

SHIYU CHEN
Cook Pharmica

VAN CHEUNG
AbbVie

ALISON DUFOUR
Hospira

TAYLOR GRAFF
Nanocytomics

TOMMY HSAIO
Cook Pharmica

ALEXIS KENDRA
Deloitte

ISHAN PRAMANDA
Univserity of Cape Town, South Africa (Sue Harrison)

MASOOD QADER
Hospira

KEVIN RUI
Univserity of Cape Town, South Africa (Jonathan Blackburn)

YUKA WATANABE
Takeda

DORA WU
Fresenius Kabi

JESSICA YU
AbbVie

WEICHAO ZHANG
Allada Lab

SI ZHAO
Medimmune

FRESENIUS KABI
COOK PHARMICA
MedImmune
Hospira
THE ALLADA LAB
Takeda
abbvie
NanoCytomics
Deloitte.
UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

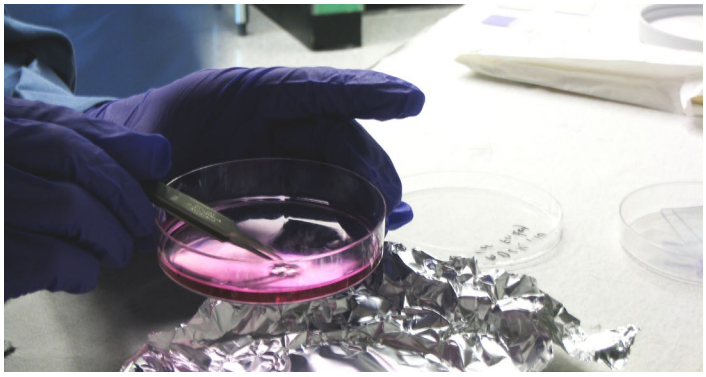
MOST PEOPLE SAY THAT IT IS THE INTELLECT WHICH MAKES A GREAT SCIENTIST. THEY ARE WRONG: IT IS CHARACTER.

ALBERT EINSTEIN

FOLLOW, LIKE, SHARE, CONNECT

Our program is a word-of-mouth phenomenon. If you tell someone this program is great, then someone else is going to hear this program is great.

SHARE YOUR FAILURES, VICTORIES, DISCOVERIES, AND INSIGHTS WITH *FERMENT*.



Northwestern | ENGINEERING