life IN THE lab

LIFE SCIENCES SOLUTIONS, EDUCATION, AND SCIENTAINMENT

ISSUE 23 | September 2019

Women in science

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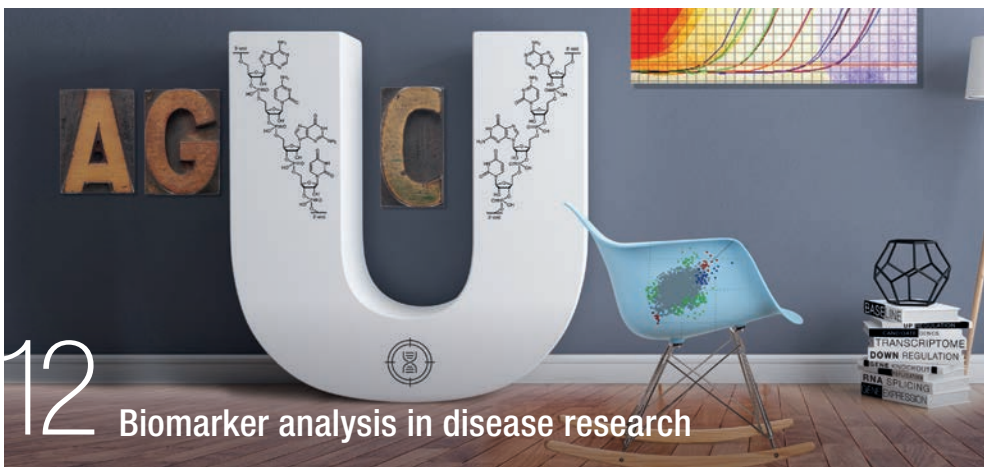

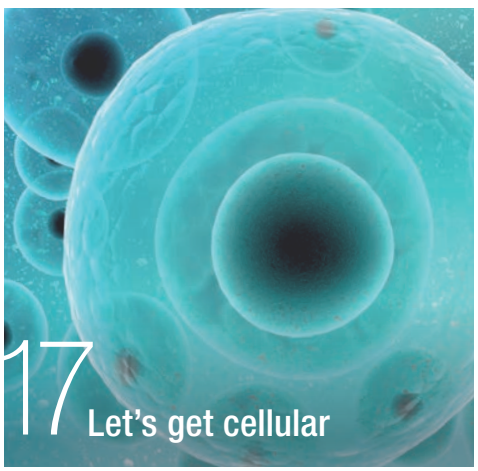

CHAMPIONING WOMEN IN SCIENCE

Organizations pursue diversity and inclusion to drive innovation

Despite women composing 48.5% of the global workforce, less than 30% of STEM jobs are held by women. *(uis.unesco.org)*

In an international initiative, the United Nations recently adopted the 2030 Agenda for Sustainable Development Goals, with strengthening gender equality as a priority. As part of this effort, a coalition called SAGA (STEM and Gender Advancement) was created to contribute to reducing the gender gap in STEM fields at all levels of education and research by addressing the qualitative factors that limit the number of women in STEM. Incorporating diverse perspectives in science will help ensure innovations have been more thoroughly vetted and treatments are applicable to more people. However, it's not enough to increase the diverse representation in STEM careers. Managers, executives, human resource professionals … all colleagues have a responsibility to create a psychologically safe environment in which employees feel comfortable sharing their ideas and concerns, in order to capitalize on diversity of perspective.

At Thermo Fisher Scientific, diversity and inclusion are vital to the future success of our organization. It's not just something we do, it's who we are. It enables our colleagues to openly share the wide range of perspectives they represent, creating an environment where differences are truly valued, authenticity is a state of being, and everyone feels they belong and can do their best work.

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CHAMPIONING WOMEN IN SCIENCE

Our Employee Resource Groups (ERGs) are vital to creating a sense of belonging in the workplace. Our Women's ERG specifically is committed to making Thermo Fisher one of the world's most admired companies by fostering the advancement of women and building a corporate culture in which female employees are recruited, valued, developed, retained, and promoted globally.

Our employees enable our customers to make the world healthier, cleaner and safer. Furthermore, our colleagues with scientific expertise are especially helpful in being the thread that connects leadership, innovation, and customer satisfaction. This makes them uniquely equipped to thrive in a multitude of careers.

We interviewed several women from across the organization in the next few pages so that you can learn about the different avenues available to professionals in science. Their full interviews can be found at **thermofisher.com/womeninscience**.

EXECUTIVE AND GENERAL MANAGEMENT

Amy Butler, PhD, VP and General Manager, Cell Biology

What would you say is the key to your professional success?
A love of learning and hard work. It was a bit of a risk leaving my postdoc and going into consulting, but I've always been happy when I decided to try something new. To quote the book "Lean in," your career should be a jungle gym, not a ladder.

STRATEGY: SCIENTIFIC COLLABORATIONS

Betty Woo, PhD, VP, Scientific Collaborations Strategy

What has surprised you about your career so far?
Twenty-five years ago, it was uncommon to make the leap from academia to industry, or from a scientific to commercial role. My first industry role was in marketing, having had no training in this area. Then I pivoted into sales. If you make a career decision that doesn't pan out, you can always choose to exit the situation with grace and professionalism.

MARKETING STRATEGY AND DEVELOPMENT

Ana Fiadeiro, MBA, Strategic Accounts Leader and Marketing Strategist

What advice do you have for women in science?

Find a place where you love to work that respects, supports, and helps you with your ambitions and moving toward your dream job. In addition, build your network. Being connected with the right people enables new doors to open and gives you opportunities to learn.

STRATEGIC MARKET DEVELOPMENT

Candia Brown, BS, Director, Genetic Sciences Commercial Marketing

What is your top piece of advice for other women in science?

Every successful person needs a mentor. Look across age, gender, race, and functional groups to identify people whose professional and leadership styles you admire. Seek them out, don't wait for a formal program to initiate the relationship.

(continued from page 5)

PRODUCT MANAGEMENT

Yun Gong, PhD/MBA, Sr. Product Manager, Transfection

How did you transition from academia to industry?
I spent so much time waiting in graduate school. I became passionate about helping scientists innovate faster and realized that business acumen would help me to make a larger impact. I pursued an MBA and joined Thermo Fisher in the General Management Leadership Development Program.

PROGRAM MANAGEMENT

Vicki Hurless, PhD, Program Manager, Product Commercialization

How did you transition from academia to industry?
After finishing my PhD in molecular biology, I started at Thermo Fisher as an R&D scientist where I developed molecular tools and solutions for customers. I've gone from the lab where I utilized our Product Commercialization Process tool to now managing the Product Commercialization Process across multiple divisions.

TECHNICAL APPLICATIONS

Radhika Gopal, PhD, Technical Application Specialist*

How did you transition from academia to industry?
During my postdoctoral research, I conducted informational interviews with industry professionals and identified roles that fit my personality and career goals. This process also helped in the application and interview process since I had built a network within the industry.

* Recently promoted to Associate Product Manager, Cell Biology.

SALES

Jonella Marie Gavin, BS, Clinical Sales Consultant, ImmunoDiagnostics

What do you find most exciting or inspiring about your role?
I get to help clinicians help their patients with suspected allergies by educating them on our diagnostic offerings. Every time they get called a "hero" I am excited for them and the small part I have played. Changing mindsets can change lives.

BUSINESS DEVELOPMENT

Shon Mallory, MA, Director, Business Development

What has surprised you about your career so far?

In my 29-year career, I've worked in the lab at a large pharmaceutical company then managed an organic chemistry lab. In my sales role I've traveled the world, won awards for achieving sales targets, met people at all levels within the company, and remained actively involved in the community where I live and work.

BIOINFORMATICS

Fiona Hyland, MS, Director, R&D, DNA Sequencing Informatics

What do you find most exciting or inspiring about your role?

It's fascinating to be a part of the advancement of DNA sequencing, which has gone from a research tool to a technology that makes a huge impact in oncology and more. I also enjoy mentoring my team and seeing them develop from young scientists to biotech leaders.

STAFF SCIENTIST

Chetana Revankar, PhD, Sr. Staff Scientist, Cell Biology

What has surprised you about your career so far?

Having the opportunity to work with so many people who want to help me to learn and grow. It's important to choose an environment that gives you the best chance to flourish.

SCIENTIST

Erica Heipertz, PhD, Scientist, Cell Biology

What has surprised you about your career so far?

The speed at which the work moves in industry vs. academia is much faster. In academia, you can spend a lot of time on a project answering many questions. In industry, you must stay extremely focused and move the project forward as efficiently as possible.

Your scientific expertise equips you with the understanding, confidence, and power to explore a variety of opportunities to positively impact the world. Read the full interviews of our women in science for more career inspiration at **thermofisher.com/womeninscience**.

WOMEN IN SCIENCE
A HISTORY OF INNOVATION

1903 and 1911

Marie Curie, PL

The first woman to be awarded the Nobel Prize. Known as a pioneer in radiation research, she discovered the elements radium and polonium.

1911 Nobel Prize in Chemistry
1903 Nobel Prize in Physics

1916

Alice Augusta Ball, USA

First African American and first woman to graduate from the University of Hawaii with a master's degree; successfully made the first injectable preparation of chaulmoogra oil for the treatment of leprosy.

1935

Irene Joliot-Curie, FR

Developed radioactive substances as an important tool in the investigation of atoms and created an artificial radioactive element for the first time in history. Daughter of Marie Curie.

1935 Nobel Prize in Chemistry

1942

Mary Golda Ross, USA

One of the first Native American mathematicians/ aeronautical engineers, joining Lockheed Martin in 1942; worked on the Agena rocket, which was essential to the Apollo space program.

1953

Rosalind Franklin, UK

Discovered that DNA can take two forms and produced diffraction photo of B form of DNA that confirmed Watson and Crick's theory of its double-helix structure in *Nature* on April 25, 1953. Franklin and colleague Raymond Gosling published their X-ray findings in same issue, noting that they are consistent with the model proposed by Crick and Watson.

1955

Annie Easley, USA

One of the few African American women in NASA; evolved from a human "computer" to a pioneer in computer programming and rocket science; worked on the Centaur rocket, which launched the Cassini probe to Saturn in 1997.

1978

Chien-Shiung Wu, CN

Explored the intricacies of weak nuclear interactions in relation to the Law of Conservation Parity, as well as characterizing the structure of hemoglobin.

1978 Wolf Foundation Prize in Physics

Sources:
nobelprize.org/women-who-changed-the-world
massivesci.com/themes/our-heroes

Whether they were the first to break down barriers or win a Nobel Prize, women have been essential to the advancement of science, technology, engineering, and mathematics. Their contributions have changed the world and it's only just beginning.

2008

Elisa Izaurralde, UY

Revealed new insights into messenger RNA, microRNA, and RNA translation, expression, and regulation—opening the door to novel therapeutic treatments.

2008 Leibniz Prize, Germany's highest research award

Françoise Barré-Sinoussi, FR

Discovered the retrovirus Human Immunodeficiency Virus (HIV), which was critical to improving the treatment of people afflicted with AIDS.

2008 Nobel Prize in Physiology or Medicine

2015

Tu Youyou, CN

Discovered a novel therapy against malaria, leading to the survival of millions of people.

2015 Nobel Prize in Physiology or Medicine

2018

Frances H. Arnold, USA

Pioneered directed evolution and harnessed the technique to develop new enzymes that are still in use today.

2018 Nobel Prize in Chemistry

1988

Gertrude Elion, USA

Revolutionized the pharmaceutical industry by developing a method for producing drugs synthetically; one of her early drugs treated leukemia.

1988 Nobel Prize in Physiology or Medicine

2009

Elizabeth Blackburn, AUS and Carol Greider, USA

Co-discovered the enzyme telomerase in 1984, after Blackburn discovered in 1982 that telomeres have specific DNA that prevents the breakdown of chromosomes.

2009 Nobel Prize in Physiology or Medicine

GET EMPOWERED

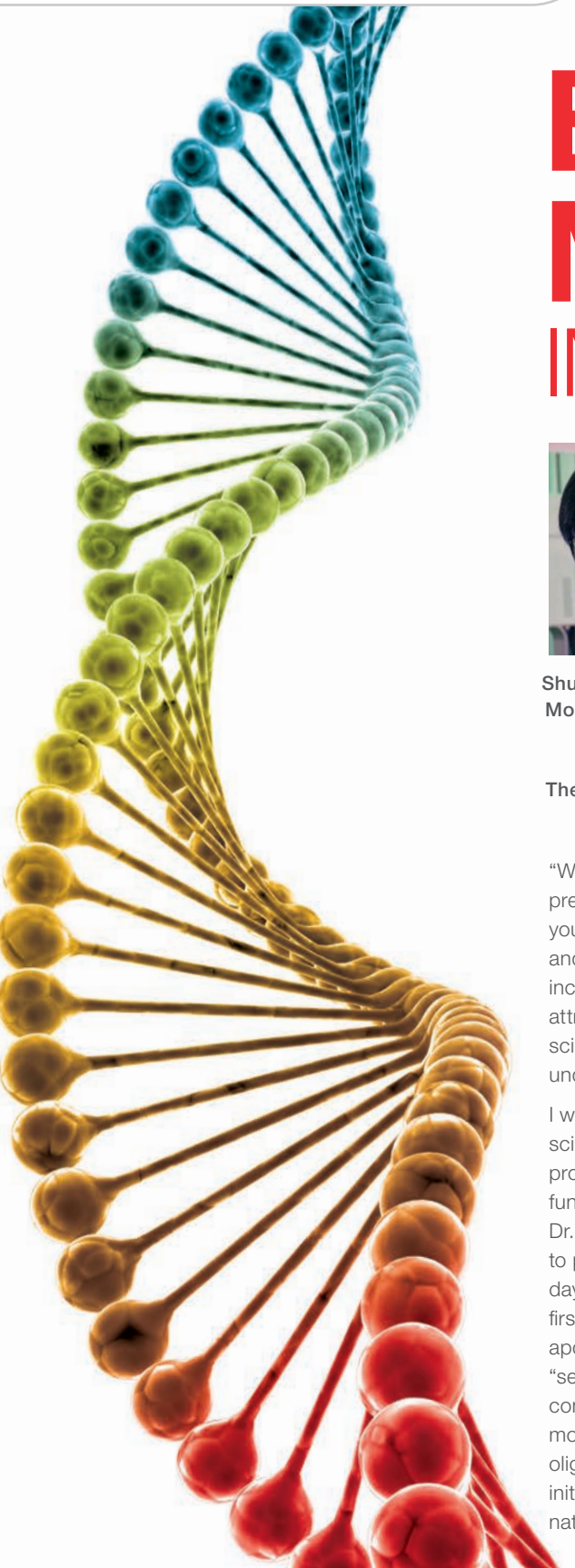
Are you part of an organization that supports women in science? If not, check out our favorites below:

Association for Women in Science (AWIS)
Global network with more than 100,000 STEM professionals
awis.org

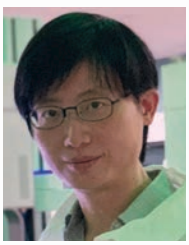
American Association of University Women (AAUW)
US-based organization with a nationwide network of 170,000
aauw.org

Graduate Women in Science (GWIS)
Nonprofit organization with an international chapter; 1,000 members strong
gwis.org

Million Women Mentors
US-based movement to advance women in STEM through the power of mentoring
millionwomenmentors.com



EXPLORING NEW TERRITORY IN STRUCTURAL BIOLOGY



Shujun Yuan, PhD, Molecular Biology Group Leader, Five Prime Therapeutics, Inc.

A scientist's journey of innovation as told to Life in the Lab.

Growing up in a small town in southwest China, I spent many of my after-school hours at a hospital where my father worked. I was inspired by how doctors helped patients. My plan was to go to medical school, until one day my father asked me, "Would you like to follow procedures and prescribe available medicines? Or would you prefer to study underlying mechanisms, and develop novel medicines to cure the incurable?" I found the latter to be more attractive, and I decided to study biological sciences and biotechnology as my undergraduate major at Tsinghua University.

I was immersed into modern biological sciences at Tsinghua. Fascinated by how protein structures determine biological functions, I joined structural biologist Dr. Christopher Akey's lab at Boston University to pursue my PhD. I still remember the day I built a pseudo-atomic model for the first helical resolution map of the human apoptosome. For the first time, we could "see" how the Apaf-1 protein changes its conformation from a compact, inhibitory monomer to an extended structure that can oligomerize, bind, and activate downstream initiator caspase-9. The structure explained naturally occurring mutations in cancer and biochemical mutagenesis studies. But how could I translate such knowledge to development of new medicines?

Membrane proteins constitute more than 60% of current drug targets; I decided to join Dr. Bob Stroud's lab at UCSF to work on these difficult targets. A main challenge for membrane proteins is the difficulty to express and purify them with good quantity, homogeneity, and stability. At Stroud lab, we produced well-behaved integral membrane proteins, some of which are drug targets, from our industrial collaborators. I was on a Bayer collaboration project and started to learn how drug discovery works. I utilized a wealth of structural information to design and engineer proteins to facilitate therapeutics discovery and optimization.

It became clear to me that combining rationale design and HTP approaches can be powerful in identifying targets for drug discovery and generating leads for new therapeutics, so I joined Five Prime Therapeutics in 2017. As the associate director of Molecular and Protein Sciences, I oversee production of thousands of extracellular human proteins to support proprietary screens. By integrating automation platforms and big data analysis, we can complete the entire process from protein production to screening in weeks and quickly identify new targets and pathways. We are deep into the process of developing novel cancer therapies, which I hope one day will cure the incurable.

Read Shujun Yuan's full story at **thermofisher.com/womeninscience**.

UNITING AROUND RARE DISEASES

Christina Waters, PhD/MBA, CEO and Founder, Rare Science

Getting to the heart of a global challenge

Geneticist Christina Waters' mom had been close to losing her life. At first she was misdiagnosed; but at last, her illness was identified. One day, during her recovery in the hospital, she told her daughter, "I finally understand what you're trying to do, and I want to help."

That offer sparked an idea that led to a global effort of 5,000 people in 50 countries helping to unite families of children with rare diseases—or as Dr. Waters calls them, "rare kids." As the founder and CEO of **Rare Science**, a nonprofit research organization focused on accelerating and identifying therapies for rare kids, Waters had been seeking ways to connect these communities.

She responded to her mom's offer of help by suggesting the creation of personalized teddy bears for rare kids. After her recovery, Waters' mom enlisted her quilting cohort to help make "Rare Bears," which have become a catalyst for identifying and uniting rare families around the world.

"There are about 8,000 identified rare diseases, and as a whole they affect an estimated 350 million people," Dr. Waters explains. "The challenge of rare diseases is universal, but they affect very small patient populations, scattered around the world, so it's hard to incentivize pharma to move into this space because of the risk."

To meet this global challenge, Waters formed Rare Science. "We need to unite these families, looking at what's similar and different across the individuals in those patient populations, so we can begin to build therapies to help them."

The initial obstacle facing the organization was finding families around the world with the same rare disease, so there would be enough families to look at the biology. This is where the Rare Bears came in.

Thousands of quilters in many countries create one-of-a-kind bears, and community groups help stuff and sew them. Each bear includes a serial number that allows Rare Science to identify the child who receives it. The "Rare Bear Army" connects rare families and communities, raising awareness of the diseases and creating patient-family groups for genetic sequencing to help understand the biology that can lead to therapies.

Dr. Waters reflects that to some, her unique plan to bring together community and science is as rare as the kids she's driven to help. "In the science world, we're trained to do things in a particular way. What you want to do may not fit in with the way things are done now—but if it's in your heart, you should do it."

Meet more innovators at **thermofisher.com/keepseeking**.

BIOMARKER ANALYSIS IN DISEASE RESEARCH

Female thought leaders analyze gene expression

Lorna Harries, PhD, Professor of Molecular Genetics, University of Exeter Medical School

TYPE 2 DIABETES AND AGING RESEARCH

Dr. Lorna Harries has developed an interest in gene regulation and alternative messenger RNA processing in endocrine disease and human aging. She now heads the RNA-Mediated Mechanisms of Disease group at UEMS. She has written over 90 peer-reviewed articles and was awarded the Diabetes UK RD Lawrence Prize Lectureship in 2011.

We understand that you study various aspects of both Type 2 diabetes as well as aging. Can you tell us about your research?

I'm in an RNA biology group, and I'm interested in the nuts and bolts of life. Aging is an increasing problem in our society; it underpins most of the common chronic diseases that we're subject to. Type 2 diabetes is one of those diseases. Obviously, diabetes is influenced by the environment, but age is actually one of the major risk factors for that also. So I'm interested in how and why we age, and during the aging process why it is that how many times you've been around the sun influences your chances of getting age-related diseases like diabetes.

Why RNA biology in particular?

I'm fascinated by complexity. A long time ago, RNA was just seen as a purely messenger molecule that was an intermediate between DNA and protein. Now we know that's not true. RNA that is expressed but doesn't make protein has a really fundamental effect on the biology of our cells. It goes and it regulates other things. I love the fact that we haven't begun to scratch the surface of how it actually works.

Are there any qualities you find important for researchers just starting their careers in science?

I can answer with three. Curiosity is really important. You need that curiosity to lead you to ask questions. Resilience, because it's a hard world and research funding is hard won. A research career is one big pile of "No, we won't fund you. No, we won't publish your paper." And you've got to be the sort of person that is not going to be fazed by that. The third one is enthusiasm. I think you need to love what you do. As a scientist these days, you've got to be able to get other people to buy into your ideas.

Have you had mentors who were also women in science? How has this helped shaped your career?

I'm actually really passionate about this as a subject and getting more women into science. I've been really lucky; I've had some amazing female mentors. You can have a life outside of work, and you can succeed. That's absolutely critical, and I think good mentoring is really, really key to that.

Antonia Sepulveda, MD/PhD, Professor of Pathology and Director of the Division of Gastrointestinal Pathology, Columbia University Medical Center

GASTROINTESTINAL PATHOLOGY AND CANCER RESEARCH

Dr. Antonia Sepulveda is an expert in gastrointestinal pathology and molecular diagnostic pathology of cancer. Her clinical practice provides specialized gastrointestinal, biliary, and pancreas pathology diagnostic services with integration of molecular testing. Her team utilizes genomics, epigenomics, and specific tumor biomarkers for personalized cancer management and precision medicine of digestive organ cancers and pre-cancer conditions.

Dr. Sepulveda's research is focused on an innovative integromics cancer research program exploring computationally generated networks integrating the molecular mechanisms and biomarkers of gastric and esophageal and pancreatic cancers and pre-cancer lesions. Through these cutting-edge approaches, she hopes to define novel tumor types and regulatory pathways of cancer development and progression, and biomarkers for their diagnosis and therapy. Dr. Sepulveda has over 120 publications.

Your research projects focus on regulatory pathways of cancer development and biomarker discovery. Can you tell us more?

My research focus is in the molecular mechanisms that drive pre-cancer tissues to dysplasia and cancer, particularly in the gastrointestinal tract and the pancreas. When a surgical resection is not feasible, cancers in these organs have a poor prognosis; so my reasoning is that ideally, we should use biomarkers in pre-cancer stages, to tell us which patients will develop advanced lesions so we can closely follow these at-risk patients and eradicate the lesions before advanced cancer develops. One of the goals of my research is to discover biomarkers that can be tested in patients' tissues that we use for routine diagnosis; namely, FFPE tissues.

You also have a clinical practice focusing on gastrointestinal pathology and molecular diagnostics of cancer. Can you elaborate?

My clinical practice integrates novel genomic testing of cancers, to report cancer predictive and prognostic biomarkers and standard histological diagnosis. In molecular diagnostics I report mutational alterations in a range of cancers in the field of molecular oncology, providing critical information for precision oncology. Practicing both diagnostic and molecular genomic pathology is synergistic and is intellectually stimulating to me; and I feel I can best contribute to patient care.

What are the challenges in the space of early cancer detection biomarkers?

First, there are technical issues we face when it comes to detecting alterations in small numbers of cells, which is like finding a needle in a haystack. This is particularly challenging for detection of multiple targets, so high-throughput and broad genome coverage is critical. So, we look for high sensitivity and high-resolution approaches. Second, we often deal with limited amounts of tissue and these samples are often from FFPE, which yields lower quality and quantity of nucleic acids.

What advice would you give to a young woman considering the pursuit of science or medicine?

We need more women in science, especially in leadership roles. If you are lucky to find a mentor who champions you, grab the opportunity. General pointers are: Focus, focus, focus; be proactive; reach out to establish collaborations; leverage opportunities; and network.

To read Dr. Harries' and Dr. Sepulveda's full interviews, go to **thermofisher.com/gexscientistspotlight**

To learn more about our gene expression solutions, go to **thermofisher.com/idealmatch**

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ON THE LEADING EDGE OF cfDNA DISCOVERIES

Jacqui Shaw, PhD,
Director, Leicester Precision Medicine Institute (LPMI), University of Leicester
@lpmi_UK

DR. JACQUI SHAW'S LAB IS REVOLUTIONIZING LIQUID BIOPSY RESEARCH

From Marie Curie's isolation of radium to Mary-Claire King's discovery that breast cancer can be inherited, women have helped to advance science in groundbreaking ways, even though it has long been a male-dominated field. According to 2015 statistics, women comprised only 28% of science and engineering professions in the United States as well as 28% of research and development occupations globally.[1] Fortunately, there are STEM fields where women are making strides and even achieving parity, such as life sciences (48% women).

One female scientist who stands out in the field of liquid biopsy research is Jacqui Shaw, PhD, a professor of translational cancer genetics at the University of Leicester in the UK. Specializing in both cell-free DNA (cfDNA) and breast cancer, Dr. Shaw is considered an authority on circulating tumor DNA (ctDNA) for early detection and disease monitoring. Her research is focused on circulating nucleic acids for early detection and monitoring of breast and lung cancers. Her recent work has highlighted that molecular relapse can be detected up to two years ahead of clinical relapse through ctDNA,[2] and that scientists need to consider both cfDNA and circulating tumor cells in clinical decision-making.[3] Here, she tells us about her journey, successes, and inspirations.

Can you tell us about your research?

Along with my role at the Institute, my research focuses on liquid biopsy in breast cancer. My lab is the cfDNA "hub" for the TRACERx national lung cancer trial, which aims to uncover mechanisms of cancer evolution by analyzing intratumor heterogeneity in lung tumors. I also lead the cfDNA advisory group for the 100,000 Genomes Project led by Genomics England, and I serve on a number of advisory and editorial boards.

To support our research, we have implemented Good Clinical Laboratory Practices within my research group; compliance with this QA system is important for a laboratory engaged in translational research studies relating to clinical trials.

Why did you choose a career in science?
I am a very curious person and I was interested in biology and human disease from an early age. I was lucky enough to study for my PhD with Professor Bob Williamson at Imperial College in the late 1980s, and his enthusiasm for science was infectious. This was a time when molecular genetics was just starting to come to the fore. I am passionate about how science can have a positive impact on our lives, and translational cancer research is my natural "home."

Tell us about a career highlight.
A recent career highlight is working as the cfDNA lead for the TRACERx trial in non-small cell lung cancer (with PI Professor Charles Swanton), and contributing to key publications in the *New England Journal of Medicine* and in *Nature*.

Have Ion Torrent systems contributed to any of your successes? How?
Ion Torrent™ next-generation sequencing (NGS) instruments have transformed our breast cancer liquid biopsy research and have enabled us to detect circulating tumor DNA with high confidence and sensitivity. We have developed and implemented standard operating procedures for our ctDNA workflows so that all samples in a particular study can be analyzed in the same way.

What contributed to that highlight or other successes?
These successes have come from having more than 20 years of experience in the field and from working with large multidisciplinary teams. Science is very much a team endeavor with everyone contributing their particular expertise, so having good communication skills is key to success.

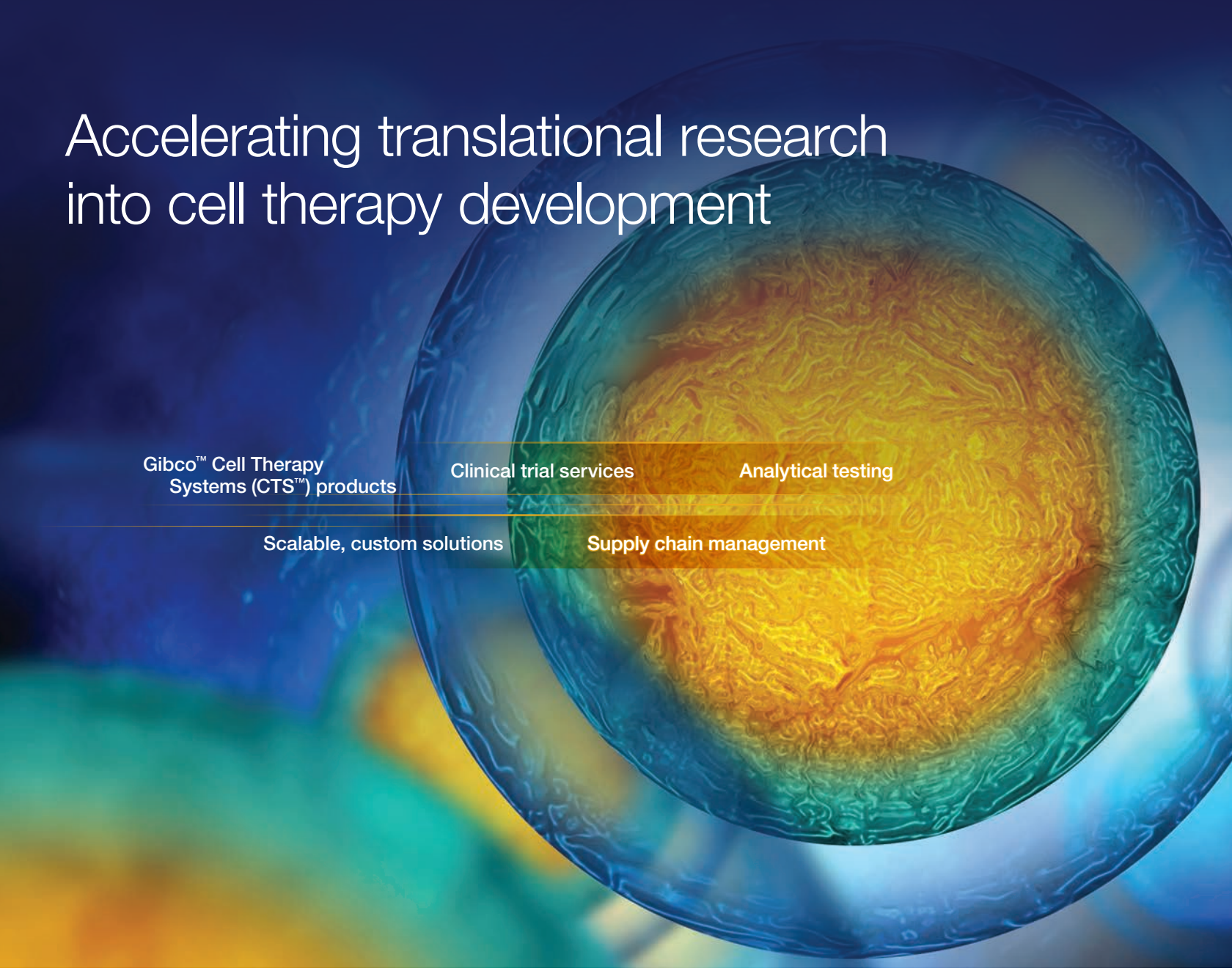
If you could change something about the perception of women in science, what would that be?
I would change the perception that it's hard for women to take a career break to have a family. Although science is still male-dominated, in some areas things are improving now. This is thanks to more and more women breaking through the glass ceiling, and is also a result of cultural changes in the university sector, supported by equality initiatives and the **Athena SWAN Charter**.

What would you tell others who might be interested in a career in science?
If it is your passion, then go for it—and I'm sure you'll have a great career. I think overall we really need to grow the next generation so that our future leaders can come through. The best career advice I have received was to be confident in your abilities, but to never stop doubting them either, so that you are continuously motivated to improve.

Learn more about the technology behind Dr. Shaw's research at **thermofisher.com/liquidbiopsy-ngs**.

1. National Science Board. Science and Engineering Indicators 2018. Chapter 3: Science and Engineering Labor Force: Women and Minorities in the S&E Workforce.
2. Coombes RC, Page K, Salari R et al. (2019) Personalized detection of circulating tumor DNA antedates breast cancer metastatic recurrence. *Clin Cancer Res* 25(14):4255–4263.
3. Shaw JA, Guttery DS, Hills A et al. (2017) Mutation analysis of cell-free DNA and single circulating tumor cells in metastatic breast cancer patients with high circulating tumor cell counts. *Clin Cancer Res* 23(1):88–96.

Accelerating translational research into cell therapy development



Let us help accelerate your cell therapy

As a scientific innovator, you know that every moment counts, because faster advances in cell therapy can help transform how we think about medicine. Our integrated, scalable, and custom solutions can provide the power to accelerate your cell therapy research to the clinic and beyond. Let's do this together.

Find out more at **thermofisher.com/celltherapy**

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LET'S GET CELLULAR

Spotlighting women in cell biology

GIBCO CELL CULTURE HEROES SHARE THEIR SCIENCE

Gibco™ Cell Culture Heroes is a global webinar series that spotlights PhD and postdoc researchers. We're proud that the majority of our Heroes are women and we're eager to give them a platform to share their research.

Learn more about these Heroes and their research at **thermofisher.com/cellcultureheroes**.

DR. HILLARY STIRES

Dr. Stires is a postdoctoral fellow training in the tumor biology program at the Georgetown University Lombardi Comprehensive Cancer Center. Her work focuses on endocrine resistance in breast cancer. She uses cell culture models of endocrine resistance to compare resistant and parental cell lines, which are then compared with clinical data to ensure clinical relevance. At Georgetown, she initiated the reestablishment of the Georgetown Postdoc Association to foster camaraderie and organize career development activities specifically geared toward postdocs. Connect with Dr. Stires **@hillstirsci** and **@hillary-stires-phd**

DR. DAISY SHU

Dr. Shu worked in clinical practice for two years before starting her PhD in ophthalmology at the University of Sydney, Australia, where she studied growth factor signaling pathways activated during the formation of fibrotic forms of cataracts. She is currently a postdoctoral research fellow at Schepens Eye Research Institute (Harvard Medical School), studying the role of TGFβ in retinal diseases. She currently serves on the Association for Research in Vision and Ophthalmology Advocacy and Outreach Committee. Connect with Dr. Shu **@EyeDaisyShu**, **@EyeDaisyShu**, **@Daisy-Shu**

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We want to know about your science. Share your cell culture work by tagging us in your next cell culture post with #gibcocellculture and follow us **@gibcocellculture**.

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SAMPLE PREP SENSATIONS

The faces behind our technologies

Every researcher understands that while sample preparation may not be the most exciting part of their workflow, it is essential to the success of their experiment. Our scientists get it. We asked them for an insider's view on how preparation, as well as their own passion for science, drives productivity.

EMILY ZERINGER, SAMPLE PREP R&D

How does your work drive productivity?
I work with customers who are processing hundreds of samples. I drive productivity by focusing on workflows that make the "un-fun" steps go faster, so you can get to the fun stuff sooner.

What inspired you to be a scientist?
When I was a kid I was fascinated by sharks and dinosaurs. I will admit to seeing all Jaws and Jurassic Park movies. Originally that's why I went into biology, and biology led to molecular biology.

What advice do you have for female scientists?
If you like science, go for it. I had a very supportive family and they encouraged me to pursue science when I expressed interest. Don't be afraid to pursue your passion.

JEN WHITING, SCIENTIST, SAMPLE PREP R&D

What inspired you to be a scientist?
When other kids were watching cartoons, I was out with a magnifying glass looking at ants and bugs crawling on the ground. I have always been drawn to how the world works, and especially to biology.

How are the solutions that you are working on driving productivity?
I am working on a project that drives automation for RNA/DNA isolation (Thermo Scientific™ KingFisher™ technology). We enable our customers to do more work with more accuracy and precision, taking their effort away from sample prep and putting it toward solving problems.

How is your research relevant to the general population?
My most recent research was in liquid biopsy. We all have someone we know who has been affected by cancer in some way. With liquid biopsy, the hope is that someday we can easily and rapidly detect cancer at very early stages, allowing a better prognosis for the patient and hopefully driving oncology to a much faster and less invasive treatment program.

What is one piece of advice that you would give to young female scientists?
Be tenacious and exercise your right to be curious.

LAURA CHAPMAN, SAMPLE PREP R&D

What advice do you have for female scientists?
Be bold. Don't be scared of asking questions if you don't understand something. Get to know people. Networking is a great opportunity for finding new opportunities.

How is your research helping ordinary scientists?
Science and its impact on the general population is becoming more visible every day. The things that we produce in R&D at Thermo Fisher Scientific are helping in the development of therapies, like biological therapeutics. That means that what we produce here ultimately aids in getting these solutions to patients quicker.

What solutions are you working on and how do they drive productivity?
I was responsible for developing Invitrogen™ Cells-to-C_T™ kits that enable qPCR analysis without RNA purification, from cell lysates. That's driving productivity from scientists by enabling gene expression analysis without the tedious RNA purification and cDNA synthesis as a separate step. It's all bundled together, which allows scientists to get to the next step quicker. It reduces both hands-on time and human errors, making results more robust.

MADHU JASTI, MICROBIOME SCIENTIST, SAMPLE PREP R&D

What increases your productivity?
My work on cutting-edge and groundbreaking technologies for future diagnostic and clinical solutions made me a passionate researcher, and my dedication and hard work toward this kind of research is driving my productivity.

What advice do you have for female scientists?
Discover your passion first and work hard to achieve your goals. Be curious to know how things are happening and why.

What inspired you to be a scientist?
I grew up in a remote village in India with high biodiversity, and my curiosity about my surroundings made me explore everything to see what wonders I could find. In addition, my mom was a botany lecturer and we used to spend lot of time talking about nature and plants, which inspired me to be a scientist.

RNA ISOLATION TIP

How do I know when to use DNase treatment?
In general, most applications requiring RNA from animal tissue or mammalian cell lines do not require additional DNase treatment. However, some applications such as gene expression analysis by qRT-PCR without intron-spanning primers or working with samples from organisms with very small or no introns may require more complete removal of residual contaminating DNA.

We have 9 more RNA isolation tips—read them all at **thermofisher.com/rnaisolationtop10**.

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BACTERIAL BIOFILM RESEARCH

COLLABORATION HELPS INCREASE CREATIVITY

Adyary Fallarero, PhD, Senior R&D Scientist, Protein and Cell Analysis, Thermo Fisher Scientific

Dr. Adyary Fallarero is a renowned scientist in the field of bacterial biofilms for drug discovery. She is both a senior scientist at Thermo Fisher Scientific and an adjunct professor at the University of Helsinki, winning the Oskar Öflund Foundation's Grand Prize in 2018. We sat down with her to learn more about how she balances it all.

Can you tell us about your background and success as a researcher in Helsinki?

For more than ten years, I worked with anti-infectives, with my primary focus on bacterial biofilms. A biofilm is a fascinating microbial structure in which a community of cells is developed; they're increasingly associated with chronic infections, and many of them are resistant to current antibiotics. Our goal has been to identify new classes of molecules better suited to tackle this specific type of infection. As a principal investigator, I have published more than 60 peer-reviewed publications, and in 2018 I was honored to receive the Oskar Öflund Foundation's Grand Prize.

This sounds like a very prestigious honor and award. How were you chosen?

I was one of the first scientists developing microbial biofilms in Finland, and my group had been leading this topic in the realm of drug discovery. In January 2016, we organized the first meeting ever held in Finland on the specific topic of microbial biofilms.

> It is an important lesson for all young scientists: the most creative ideas come when you're exposed to research outside of your own field.

Have any women in science inspired or mentored you?

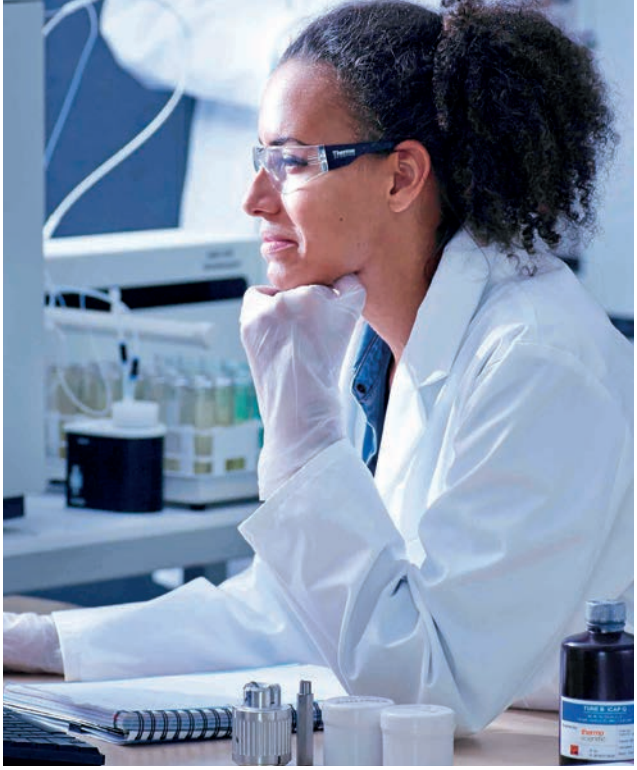
The supervisor of my doctoral thesis, the late Professor Pia Vuorela, was a very accomplished researcher in Finland and supported me tremendously during my academic career. I learned from her the importance of collaborating and the benefits of doing true interdisciplinary research. I think it is an important lesson for all young scientists: the most creative ideas come when you're exposed to research outside of your own field.

How did you come to work as a senior scientist for Thermo Fisher Scientific? What has your experience been like?

Some years ago, I realized I wanted to be involved in more translational efforts, and this position with Thermo Fisher gave me the opportunity. What I enjoy most is working with physicists, engineers, software architects, and my fellow bioscientists to develop new products. Only with this plurality of expertise and knowledge can quality products be effectively developed. For biofilm research, scientists need fluorescent and chromogenic dyes, microplate readers, imaging systems, cell counters, and more—all of which our company not only offers as products; it also invests in R&D to continuously improve the tools. I love doing my part to help researchers answer important scientific questions.

To see the instruments and applications that Dr. Fallarero helped to develop, go to **thermofisher.com/platereaders**.

CHROMATOGRAPHY MULTITASKING MADE EASY



Are your chromatography methods giving your laboratory an advantage? These four tips can help maximize productivity.

Keeping LC-MS and GC-MS instruments working at high standards for optimal laboratory efficiency can be challenging. Here we present top strategies for improving chromatographic performance.

1 REDUCE INTERFERENCE IN LC-MS ANALYSIS WITH EFFECTIVE FLUSH SOLUTIONS

Interference in LC-MS analyses compromises detection sensitivity and data integrity. Integrating the complete range of Thermo Scientific™ ChromaCare™ flush solutions into LC-MS workflows can help scientists move toward interference-free LC-MS methods, preserving data integrity and minimizing downtime.

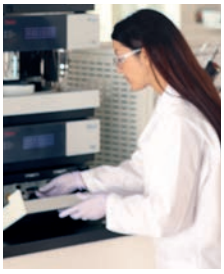
2 DETECT ULTRALOW CONCENTRATIONS WITH UHPLC-MS ANALYSIS BY MINIMIZING IMPURITIES

Ultrahigh-performance LC-MS (UHPLC-MS) technology is capable of incredibly sensitive analyses, but impurities in reagents and solvents can increase baseline noise. Thermo Scientific™ ultrapure solvents for UHPLC-MS are ultrafiltered to minimize impurities and packaged in borosilicate bottles to avoid contamination with metal ion adducts.

3 IMPROVE EFFICIENCY BY CHOOSING THE RIGHT REAGENTS

New Thermo Scientific™ Chromplete™ reagents allow laboratories to reduce their total reagent inventory, as a single grade is suitable for GC, LC, and UHPLC analyses and separations, including those complying with requirements of the American Chemical Society and the United States Pharmacopeia. With increased turnover, reagents will be fresher and can be sourced in bulk to reduce costs.

4 COMBINE HIGH-QUALITY REAGENTS WITH ADVANCED INSTRUMENTATION



These high-quality reagents, ultrapure solvents, and flush solutions work in perfect harmony with advanced Thermo Scientific™ analytical instruments, helping scientists avoid contamination and interference issues and get the most from their chromatography methods. By sourcing equipment, solvents, and reagents from the same manufacturer, labs can benefit from complete compatibility and minimal instrument downtime, helping to push research further.

For Research Use Only. Not for use in diagnostic procedures.

Learn more at **thermofisher.com/analytical-reagents**

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LEADERSHIP SPOTLIGHT: A TOUCH OF PERSPECTIVE

Technical Services and Support leader brings a clear vision to serving science

Julia Alege, PhD, Director, Global Operational Excellence Platform, Thermo Fisher Scientific

At 11 years old, Julia Alege wanted to be a molecular biologist and sequence the human genome. This early connection to science continued as she obtained her PhD and developed many sequencing projects of her own. Now that childhood drive comes full circle as Dr. Alege leads the Technical Services and Support team at Thermo Fisher Scientific as they usher in a new era of scientific discovery.

Your team spans the globe and fields over a million customer requests a year. How do you create a consistent, high-quality experience for the scientific community?

We enable a seamless customer experience and hire people who love to serve scientists. We're looking for people who can explain complex scientific issues in a simple way. Whether that's by identifying which instrument is the best for them to use, knowing which technology is the most applicable, or troubleshooting—we help scientists to be successful in their endeavors. Our mantra is, "we accelerate customer success."

How do you make that vision stick?

As a management team we try to behave in a way that shows that the customer is the priority, every time. If we have a meeting that will cause a customer to wait, I cancel that meeting. No matter what I need or want, they are more important. I think if you live that philosophy, then it moves across the organization.

What do you predict for technology and the road ahead?

In my own experience I see so many great examples of how companies use technology to make customers' lives easier. This is how I benchmark our own service and try to advance our offerings for our customers and see what works and what doesn't. This includes integrated knowledge management, making sure data flows from one point to the next seamlessly across the world, and even our movement toward 24/7 support. We've talked about these plans a lot, and now we're gearing up to put them into action.

Explore how Dr. Alege's team helps reduce lab downtime for scientists at **thermofisher.com/instrumentservices** and **thermofisher.com/hero**.

FIVE INSIGHTS
TO TAKE YOU FROM ACADEMIA TO INDUSTRY

Ready to make a move? Read on for tips from established industry researchers and insightful experiences from those transitioning from academic careers.

1 "ALWAYS PUT YOURSELF OUT THERE."

–R&D scientist at a pharmaceutical company in La Jolla

Researchers have gotten jobs in academia by approaching PIs, so why wouldn't the same approach work when it comes to industry? Attend conferences, industry events, and open houses. Talking to people about what they do and how they got there is valuable information-gathering. Make sure your LinkedIn™ profile is updated so that you can always connect digitally (especially if you've forgotten business cards).

2 "KNOW YOUR 'WHY' BECAUSE THEN YOU'LL FIND A WAY TO MAKE IT WORK."

–University researcher in Houston

This is perhaps the most powerful piece of advice. Having a deep understanding of your long-term goal or field of interest will help keep you focused, even when pursuing an industry opportunity gets challenging. Have conviction in yourself and your abilities. Take things a step at a time with perseverance and patience. You will get there.

3 "WORK ON THE KIND OF DRUG DISCOVERY THE INDUSTRY FOCUSES ON."

–Scientist at a pharmaceutical company in San Diego

Academia can be the time to develop and master your area of discipline, and being strategic about your choice can open doors in the future. You'll get to know other people within the same field and by doing so, expand your connections beyond your current place of employment.

4 "SHOWCASE PARTICULAR SKILL SETS THAT ARE IN HIGH DEMAND."

–University researcher in Cincinnati

Becoming a subject matter expert, especially in an advanced technique or emerging technology, can strengthen future candidacy for an industry position. Having honed specific skills can make all the difference when you're up against others with similar academic backgrounds.

5 "USE WHO YOU KNOW."

–Senior principal scientist of immunology at a therapeutics company in South San Francisco

Never underestimate the power of networking. Whether it's through friends made from graduate school or the principal investigator that first mentored you, those contacts are valuable. Maintain your relationships and help others too—networking goes both ways.

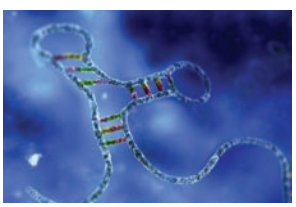
Have you made the transition from academia to industry? Do you have other tips, insights, and stories to share? We'd love to hear from you. Email us at **lifeinthelab@thermofisher.com**.

Save time with 5-step workflows

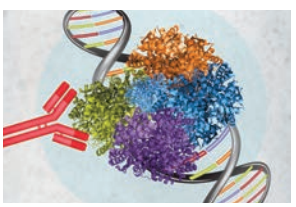
These 5-step workflows can help you get out of the lab by 5:00, so you can do the things you love. **thermofisher.com/keepseeking**

Discover our 5-step workflows

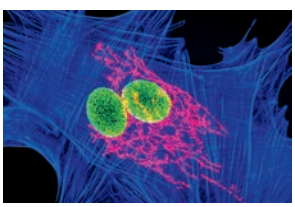
Get accurate and fast RT-PCR results



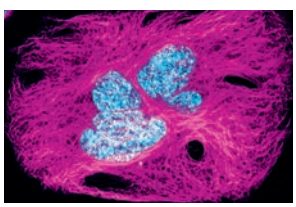
Achieve optimal cDNA synthesis



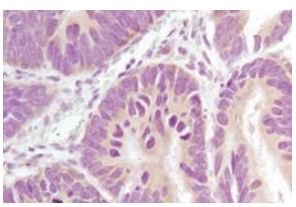
Successful ChIP experiments



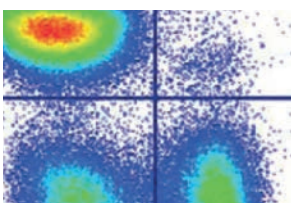
Publication-quality fixed-cell images



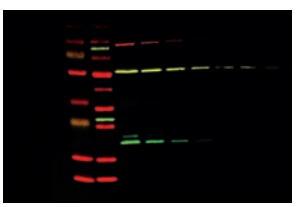
Capture beautiful live-cell images



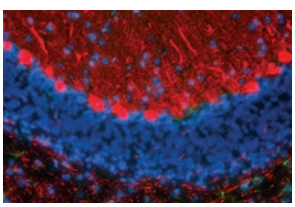
High-quality IHC images



Design intracellular flow cytometry experiments



Easily get optimal fluorescent multiplexed western blots



Improve your success modeling Parkinson's disease using human iPSCs

MY FIRST BREAKTHROUGH

Celebrating the defining moments in careers of female scientists

Scientific discovery has a long and storied history, but equally as fascinating as the discoveries themselves are the women who uncovered them. Thermo Fisher Scientific has proudly supported scientific breakthroughs for decades, providing essential products that have helped many researchers first discover their love of the sciences. Today, we're celebrating the first breakthroughs that led female scientists to where they are today, starting with our very own employees at Thermo Fisher.

HANNAH SAUNDERS,

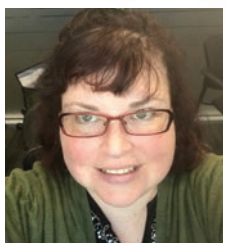
Scientist, Molecular Biology, Austin, Texas, United States

"In one of my first jobs, I implemented real-time qPCR in our lab to detect mouse pathogens in research animals at the National Institute of Environmental Health Sciences (NIEHS) during an outbreak of mouse hepatitis virus and mouse parvovirus. Each person in our lab received an NIH merit award for our role in controlling the outbreak quickly and for its positive impact on research at the Institute."

ELISE MARTIN,

Scientist III, Molecular Biology, Lissieu, France

"It was during a master's degree internship, in an academic lab that specialized in signal transduction in the cell. I worked with a PhD student on the characterization of a new protein involved in the transformation of the cell cytoskeleton (Refilin). It was really a breakthrough for me to see that such a small protein may have a considerable action on cell morphology and how we could study this phenomenon."

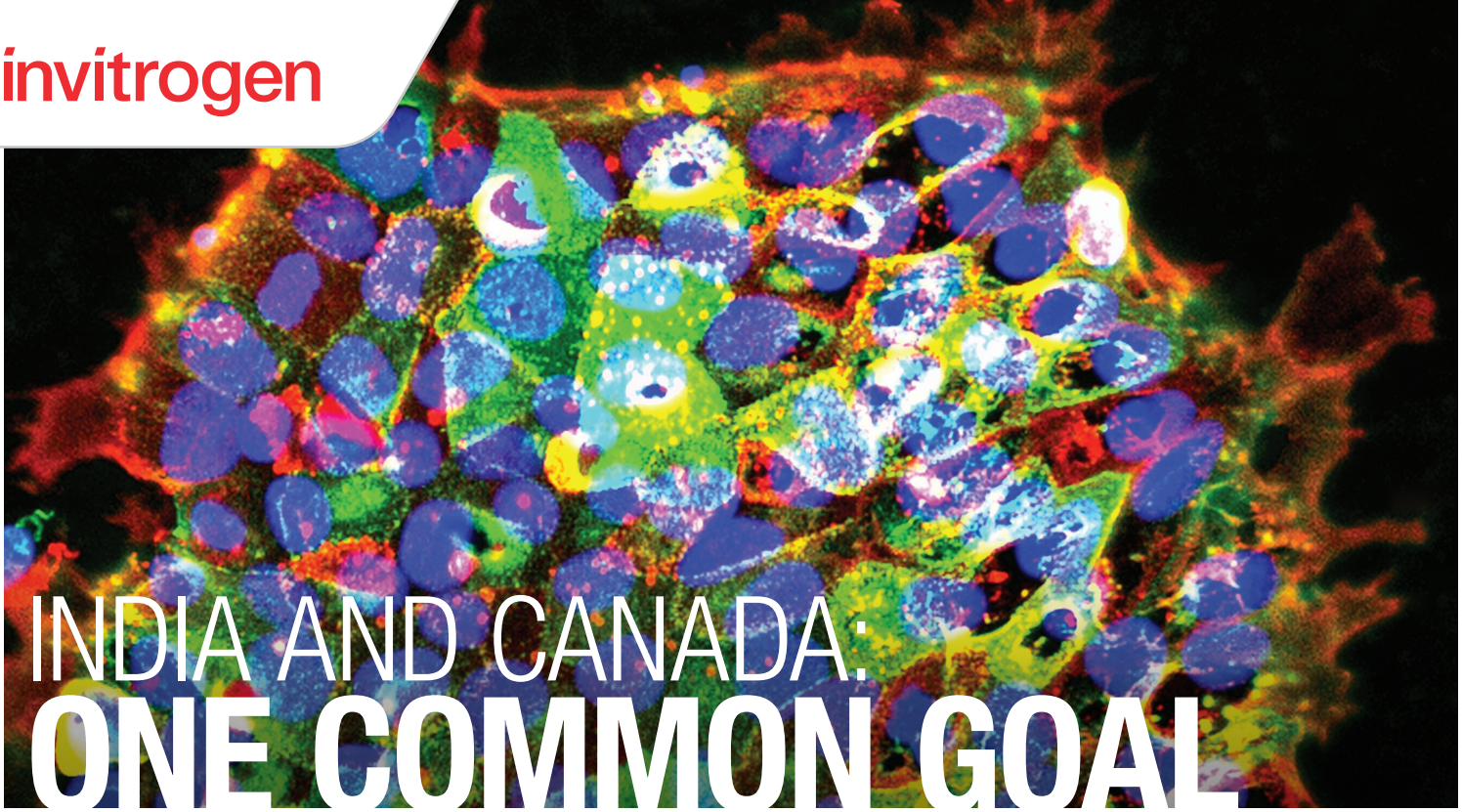


KAREN CLYDEKA,

Staff Scientist, Molecular Biology, South San Francisco, California, United States

"I was in the lab on a weekend staring into a microscope at something that nobody had ever seen before: I had infected cells with bacteria in the presence of an enzyme that altered the bacterial life cycle. It changed the way I thought about science forever."

Read more stories at
thermofisher.com/firstbreakthrough



INDIA AND CANADA: ONE COMMON GOAL

One of our researchers traveled across the world to help validate antibodies for neuroscience research

Priyanka Swamynathan, R&D Scientist, Protein and Cell Analysis, Thermo Fisher Scientific

Priyanka Swamynathan has been with Thermo Fisher Scientific in Bangalore, India, for two years and is part of a team that develops research-grade antibodies. She has a master's degree in regenerative medicine and previously studied clinical applications of mesenchymal stem cells. She spent six months in the lab of Dr. Peter McPherson with the Montreal Neurological Institute (MNI) at McGill University (Quebec, Canada), in a collaborative effort to help develop and validate antibodies for neuroscience research.

Swamynathan shares, "The goal of this partnership was to leverage Thermo Fisher's expertise in antibody development and MNI's knowledge of neurodegenerative disorders. Many commercially available antibodies against proteins implicated in various neurological diseases have been found to be inconsistent, which is why scientists from Thermo Fisher and MNI aimed to developed antibodies that would perform with high specificity across applications such as western blotting and immunofluorescence."

Thermo Fisher employs advanced verification testing standards for antibodies. For Swamynathan and her partners, "It quickly became obvious that validating these antibodies using genetic methods was the best way to provide customers a sense of confidence in them. In order to do so, we had to work with each other to understand how antibodies are developed by companies and what academics look for in a high-performance antibody."

Given the number of labs that worked on neuroscience proteins at MNI, the team felt that embedding a scientist within their workflow to learn their process would help glean insights that could be leveraged in antibody development.

According to Swamynathan, "One of the more important goals of this project was to generate CRISPR knockouts of each target that we were making antibodies for. We were successful, and this allowed us to test our antibodies in different applications. With our advanced method of antibody validation, we were able to showcase their superiority in performance. [Working with MNI was] the first collaboration of its kind at Thermo Fisher and it has helped us understand the value of working directly with academic scientists."

She emphasizes that her time spent with other scientists at MNI helped illuminate what academic researchers look for in a product. With novel antibody verification techniques honed and new friends made, she also left with an enriched understanding of neuroscience and felt proud of a "beautiful collaboration" with MNI.

See antibody validation in action at **thermofisher.com/antibodyvalidation**.

WORMS AND ALLERGIES:

WHAT DO THEY HAVE IN COMMON?

Elia Tait Wojno, PhD, Assistant Professor of Immunology, University of Washington

Worm parasites and allergies are both under investigation by the laboratory of Dr. Elia Tait Wojno (pron. Tate Voy-no). Dr. Tait Wojno is interested in understanding why there are very similar characteristics in the human immune response to these two very different maladies. After she studied with Nobel Prize winner Dr. William Campbell as an undergraduate, she pursued a PhD in immune parasitology at the University of Pennsylvania. She says, "My studies in this area were very exciting and fulfilling and paved the way for me to develop the type of research that I currently undertake in the lab." Dr. Tait Wojno's lab uses many different approaches, including flow cytometry, to study worm parasites that cause helminth infections and how they affect the lung and intestine.

Hel…what?

Helminths are "creepy crawly" parasitic worms that are responsible for significant challenges in global public health; almost two billion people are infected worldwide. According to Dr. Tait Wojno, "Morbidity related to those infections in terms of anemia, failure to thrive in children, and limited cognitive development in children are very real consequences. In addition, livestock can be infected with these parasites, resulting in a huge effect on the economics of the food supply chain."

The link between parasites and allergies

"Interestingly, the immune response during worm infection looks very similar to the immune response that occurs during allergen exposure," Tait Wojno continues. She believes that understanding key events that occur in both cases will be helpful in understanding parasite pathogenesis and allergic disease, and in developing new treatments for each. "We have seen broadly in the cancer field and in autoimmune disease, and in infectious diseases, that if we can target the immune system, manipulate it, ask it to work for us to achieve therapeutic outcomes, that those approaches can be very successful."

Existing treatments and gaps in therapeutic options

"In allergic disease we have an expanding suite of different drugs and management approaches, but many remain relatively nonspecific. There is a lot of room to translate our understanding of basic immune responses into targeted therapies to limit allergic disease. There are zero vaccines for helminth infection in humans, and improved knowledge of anti-helminth immune responses could be useful for developing therapeutics or new vaccine strategies to prevent infection."

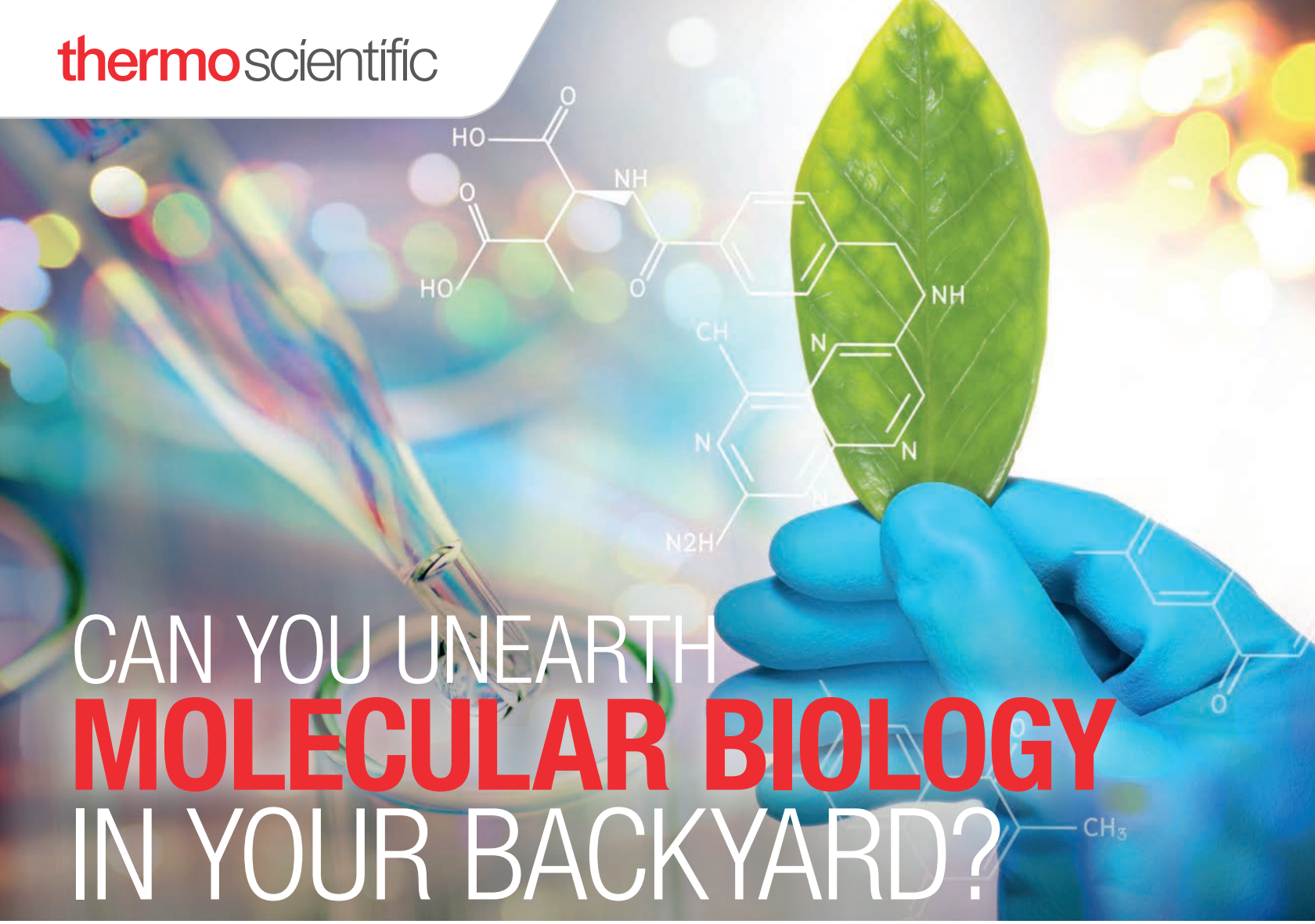
Everyone needs support

Dr. Tait Wojno has been well funded throughout her career as a researcher, but credits much of her success as a woman in science to her exceptional mentors. She specifically mentions Dr. Christopher Hunter (her PhD mentor at UPenn), her postdoc mentor Dr. David Artis, and Dr. Yasmine Belkaid. "Yasmine, an immunologist and prominent researcher at the National Institute for Allergy and Infectious Disease, has been a tremendous mentor and very supportive as I have grown my program," she shares.

More opportunities in a changing landscape

Dr. Tait Wojno feels that it's important for mentors, thought leaders, and scientists to encourage graduating PhD students to explore the various opportunities offered by academia, industry, policy, and government. "Fifteen to twenty years ago, the emphasis for PhDs out of large universities was to remain on the academic track and become a principal investigator. Now the landscape has changed, and graduates should consider an array of career options." She believes PhDs can find very rewarding careers as group leaders in both academia and industry.

Want more ideas on different careers in science? Learn more at **thermofisher.com/womeninscience**.



CAN YOU UNEARTH MOLECULAR BIOLOGY IN YOUR BACKYARD?

Yes, and it can lead to a love of discovering and mentoring

Jolanta Vitkutė, Director of Research and Development, Thermo Fisher Scientific

Exploration. Discovery. Finding the unknown. Whether it is uncovering a biological process, discovering a new experimental tool, or gaining insights about your field of study, nothing quite compares to the excitement that comes with the revelation of new findings.

Meet Jolanta Vitkutβ, with Thermo Fisher Scientific in Vilnius, Lithuania, whose scientific career was founded on exploring the unknown. Beginning at the Biotechnology Institute, her work on restriction enzymes has significantly contributed to the scientific community, including the discovery of novel enzyme prototypes and new unique properties of restriction enzymes. In this interview, we will walk with Vitkutβ through her past and current research, including what she has learned and how she uses her knowledge to give back to the next generation of scientists.

What is a restriction enzyme?

Restriction enzymes are one of the biggest discoveries to change molecular biology. These enzymes, which are found in a wide variety of bacteria in nature, have the ability to recognize and cleave double-stranded DNA at specific sequences, which allows the movement of genes between organisms. First discovered in the 1970s, restriction enzymes quickly became the enabling tools of molecular biology, genetics, and biotechnology by setting the stage for an era of genetic engineering (cloning).

How are they discovered?
Restriction enzymes are found in bacteria and archaea strains from different natural sources within the environment. As such, our young team would collect samples every time we would travel somewhere—even when we were on vacation. You never knew what enzymes you might find in the bacteria. The more exotic the location, the more likely that your enzymes would be novel.

What novel findings did you discover?
I spent 10 years looking for new restriction enzymes. Our small company was attempting to develop restriction enzymes as commercially available products; all in all we analyzed ~20,000 different organisms during this time. Personally, I was able to discover seven new prototypes. Two of these enzymes proved to be extremely significant to the field of molecular biology. Most restriction enzymes require divalent cations (usually Mg^{2+}) for catalytic activity. My investigations, however, uncovered a novel enzyme that did not require magnesium. This was the first of its kind. The second finding was the discovery of an enzyme that was able to specifically cut methylated DNA. Although we now know that there is a family of these enzymes, the discovery at the time was extremely unique.

How did you first become interested in restriction enzymes?
After graduation from Vilnius University, I began to visit the Biotechnology Institute, also in Vilnius, where the main interest was around restriction enzymes. Eventually I joined the team there and began my PhD studies on *Helicobacter pylori*, which is located in the human stomach. I found the research to be interesting and inspiring, and there was always the opportunity to find something new, with a large amount of collaboration with structural enzyme teams, chemists, and manufacturing departments. You felt like a member of a large team, but still had individual opportunities for discovery.

How is your current work helping to progress the field of science?
I lead a team that supports all products that are manufactured by Thermo Fisher Scientific in Vilnius, including restriction enzymes. My responsibilities include quickly resolving any issues that arise while seeking to improve the quality of our existing products and technologies. We know that the most critical components of a large number of experimental workflows are enzymes. In order to help ensure the success of our customers' experiments, it is critical to understand the types of issues our customers face and to supply them with products that will improve, rather than hinder, their workflows. Solving these difficult and complicated problems is what I do with amazing collaboration and support teams.

Trust yourself. We all make mistakes, but don't change course after your first fail.

Was there a piece of advice that made a difference in your career?
Controls, controls, controls—they will give you confidence in your results. Gather joy before starting an experiment as it will make your time worthwhile. Don't be afraid to try. You will be amazed at how your opinion on something can change.

All of these came from an early mentor of mine, Professor Arvydas Janulaitis. He was an expert in molecular biology enzymes and was always willing to share his tips and tricks in the lab. We were providing a large number of enzymes (~200) to our customers; each enzyme was unique and required specific buffer conditions. It was Professor Janulaitis' idea to create a universal buffer that the majority, if not all, of our enzymes would have specific activity in. Impossible, we told him. Nevertheless, he convinced us to try. After many, many, many experimental trials…we began to believe. Eventually we were able to produce a universal buffer for most of our enzymes, which was the first of its kind and also resulted in the Thermo Scientific™ FastDigest™ Buffer and enzymes that are still being sold today.

What is one thing you would tell early researchers they should remember as they start their career?
Trust yourself. We all make mistakes, but don't change course after your first fail. Failing is human nature, and the world is not easy. Understand that it is a long journey with many bumps along the way. A good discovery will come, and you will forget all of your previous mistakes. The important thing to remember is that we are all survivors. We survive different situations and we learn from them. Always remember to come to work each day with good motivation and looking forward.

How have you shared your experiences with the next generation of scientists?
I am very lucky to have an amazing team around me. The people here are extremely encouraging, and they love the work. I love to teach team members the tricks of what I know and lead by example. I try to do my best and expect the best from those that follow me. I tend to be surrounded by younger scientists, which makes me feel very good. We are very smart in science, but our human nature has not changed. We are very simple people who all want to love and be loved in return.

For more information on restriction enzymes, go to **thermofisher.com/fastdigest**

GIFT GUIDE

Amusing gifts for the scientist in your life (even if that scientist is you)

Massive science

We love their Women In Science tarot card deck and posters. Get 10% off using this promotion code: THERMOFISHER

bit.ly/massivescience

Cell cookie cutter by Bakerlogy

Just add an aliquot of candy sprinkles for extra effect.

bit.ly/cellcookiecutter

Epidemic virus poster by TheForestCloak

Who knew pathogens were so pretty in pastel?

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Cell coasters by TheBeanWarehouse

Ready for your favorite beverages: toast and cell-a-brate.

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Two Photon Art

Jewelry, apparel, enamel pins, and prints galore—these name plate necklaces are a big hit with researchers on social media.

bit.ly/scientistnecklace

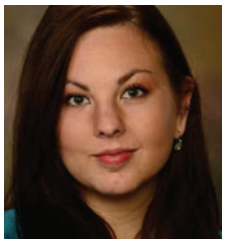
Chemistry joke apparel by Stag and Peach Co.

For scientists with a goofy streak.

bit.ly/sciencejokeapparel

ILLUMINATING
RESEARCH IN FEMALE REPRODUCTION

How does motherhood impact female physiology? One woman's research seeks answers.



Chloe Josefson, Auburn University, Department of Biological Sciences

How would you explain your current scientific work to a nonscientist?

I am interested in looking at how competing physiological demands (for example, mounting an immune response) during reproduction impact female physiology, as well as the physiology of her offspring, using mouse models. Females are often ignored in this field, since studies on males tend to be the default. As a result, we know surprisingly little about female physiology outside of the context of medicine. My goal is to understand how mom's competing demands impact what's in her milk. This is a huge gap in the literature, despite milk being the first source of nutrition, energy, and immune defense for mammalian offspring.

If you could change anything about society's perception of science and scientists, what would it be?

I would love to explain the scientific method to society. I feel that many people mistrust scientists because they don't quite understand what we do, or may fail to see the big picture. I would love to explain the amount of work that goes into planning and executing studies, the grueling ethical considerations, the peer review process, and how rare faked data is. Additionally, I think that society has an antiquated view of scientists; many people see scientists in academia as being older white males who judge others from their ivory towers. This perception couldn't be further from the truth; I would love to show others that science is diverse and inclusive, and the majority of us are humble, personable, and approachable.

What science icon inspires you?

There are so many excellent female scientists in history, but my personal icon is my PhD advisor, Dr. Wendy Hood. I have been lucky enough to be privy to both her highs and her lows during the last few years and have gotten to understand that every scientist has setbacks during their careers. We often only see our idols' accomplishments without seeing what it took for them to get to that point, and as a result, we end up unaware of the hard work and struggles leading to their success. She has taught me many lessons, such as the importance of perseverance and having faith in yourself and your abilities, even in the face of rejection.

Why did you choose to pursue science?

Robert Sapolsky's "Why Zebras Don't Get Ulcers" initially got me interested in stress physiology when I read the book in ninth grade. During undergrad, I joined several labs and couldn't get enough of doing research.

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