The Pharmacologist
Vol. 67 • Number 3 • March 2025

Alice Hamilton

Pioneering Industrial Toxicologist

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A Publication by The American Society for Pharmacology and Experimental Therapeutics

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In this Issue

On the Cover: *Worker in Protective Gear Examining Chemical Pipeline with Steam and Industrial Lights During an Industrial Safety Inspection*

The Pharmacologist is published monthly by the American Society for Pharmacology and Experimental Therapeutics, 1801 Rockville Pike, Suite 210, Rockville, MD 20852.

Submissions are due on the first of each month for the subsequent month's issue. Visit thepharmacologist.org. Contact: thepharmacologist@aspet.org.

Message from the President

ASPET President, Dr. Carol Beck, welcomes you to ASPET 2025, gives updates on ASPET Divisions, the Washington Fellows program and more!

Watch the video

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A Note from Dave's Desk

Dear ASPET Members,

By the time you read this month's note, we will likely be just days away from the ASPET 2025 Annual Meeting! I hope you already have plans to join us April 3–6, 2025, in Portland, Oregon, for a dynamic gathering of over 1,000 pharmacology professionals, researchers, and students.

The ASPET Annual Meeting is your opportunity to engage with groundbreaking research, connect with experts, and advance your career in pharmacology and experimental therapeutics. This year's event will feature:

- **Cutting-edge scientific sessions** covering the latest advancements in pharmacology.
- **Networking opportunities** with fellow researchers, industry leaders, and potential collaborators.
- **Professional development workshops** tailored to support career growth at every stage.
- **Opportunities to present your research** and gain valuable feedback from peers.

Whether you are an early-career scientist looking to expand your network or an established expert eager to share your insights, ASPET 2025 promises a stimulating and enriching experience for all attendees. We also think attendees will greatly enjoy the city of Portland, also called the "City of Roses", with its unique blend of natural beauty, vibrant culture, and innovative spirit. Portland boasts a thriving arts scene, a renowned food culture with an emphasis on farm-to-table dining, and one of the country's most celebrated craft beer and coffee cultures.

If you haven't already, I encourage you to register to be part of the pharmacology event of the year. If you're already registered and set to join us, make sure to plan ahead and check out the program details to make the most of your ASPET 2025 meeting experience.

I look forward to seeing you in Portland!

Sincerely,

Dave Jackson, MBA, CAE
Executive Officer, ASPET

Share this!

Cover Story

Alice Hamilton

Pioneering Industrial Toxicologist

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thepharmacologist.org

By Rebecca J. Anderson, PhD

Since its founding in 1636, Harvard University had remained an all-male institution. Then, in 1919, Alice Hamilton was appointed to the Harvard faculty. She did not seek the post. Rather, she was actively and enthusiastically recruited by leaders in the medical school. The 50-year-old physician had amassed expertise and an international reputation unmatched by anyone else. She was simply the best person for the job.

It was quite an accomplishment for a schoolgirl who had avoided science and math. And she was only halfway through her extraordinary career.

Early Years

Alice Hamilton was raised on her family's estate in Fort Wayne, Indiana.[1–4] Along with her three sisters, she was home-schooled because their parents were not satisfied with the local public schools.[3,5] Her enlightened father wanted the girls as well educated as their brother. Her mother encouraged outdoor physical activity, where they studied nature first-hand.[4]

Most of Alice's indoor hours were spent reading books from the family's vast libraries, mostly the classics and history.[4,5] She learned a "smattering" of math from a governess, her father taught her Latin, her mother spoke to the children in French, and she picked up German from their domestic servants. She taught herself Greek and Italian.[5]

At age 17, the Hamilton girls were sent to Miss Porter's School for Young Ladies in Farmington, Connecticut, for two years.[3–5] The curriculum was entirely elective, and Alice chose Latin, Greek, German, and philosophy. No math or science.[3]

Changing Course

While Alice was at Miss Porter's School, Mr. Hamilton's business ventures failed. He would still fund his children's education, frugally, but he could no longer support the girls' privileged lifestyle.[4]

Women had few professional options: teaching, nursing, or practicing medicine. Alice did not want to be tied to a school as a teacher, or work under a boss as a nurse. Instead, she chose medicine, because "I could go anywhere I pleased—to far-off lands or to city slums—and be quite sure that I could be of use anywhere."[5] Unfortunately, she lacked the science prerequisites, and her father doubted her sincerity. He was unwilling to invest in a pipedream. But Alice was serious and determined.

She studied physics and chemistry with a Fort Wayne high school teacher and learned biology on her own. Then, she enrolled in the local Fort Wayne College of Medicine, a "third-rate medical school," where her father was on the Board of Trustees.[2,3] It was one of the many small schools that flourished before the American Medical Association set medical education standards.

After a year there, where she took biology and anatomy courses, her father was convinced.[3–5] He supported her admission to the University of Michigan, one of America's leading medical schools and one of the few that was coed.[3] Michigan's rigorous curriculum emphasized science in both the clinic and laboratory. All of the professors, including pharmacologist John J. Abel and physiologist William Howell, had trained in Germany. (The following year, Abel and Howell moved to Baltimore to launch the new Johns Hopkins Medical School.)

The small Michigan university hospital was the consultation center for the entire state, and cases "were worked up with great thoroughness."[5] Throughout her career, Hamilton would credit her training in Ann Arbor for providing the scientific foundation for her work in toxicology and industrial medicine. She graduated in 1893, one of 14 women in a class of 47.[6]

Alice Hamilton, graduation portrait
University of Michigan Medical School, 1893

sciencehistory.org/education/scientific-biographies/alice-hamilton

Research Skills

Although Hamilton had decided on medical research, rather than clinical practice, a professor advised her to take a hospital internship to round out her training.[3–5] Unfortunately, few internships were open to women. She spent two months at the Hospital for Women and Children in Minneapolis and nine months at the New England Hospital for Women and Children outside Boston.[4,5]

At that time, German universities offered the world's best medical training and research. In 1895, Hamilton sailed to Germany, intending to study bacteriology and pathology—only to discover that the German universities did not admit women.[3]

After long and elaborate negotiations, the University of Leipzig professors permitted her to attend lectures, as long as she remained "invisible" to the male students. In Munich, all lectures were closed to women. However, because she wanted to do lab work, "no one objected to that."[5]

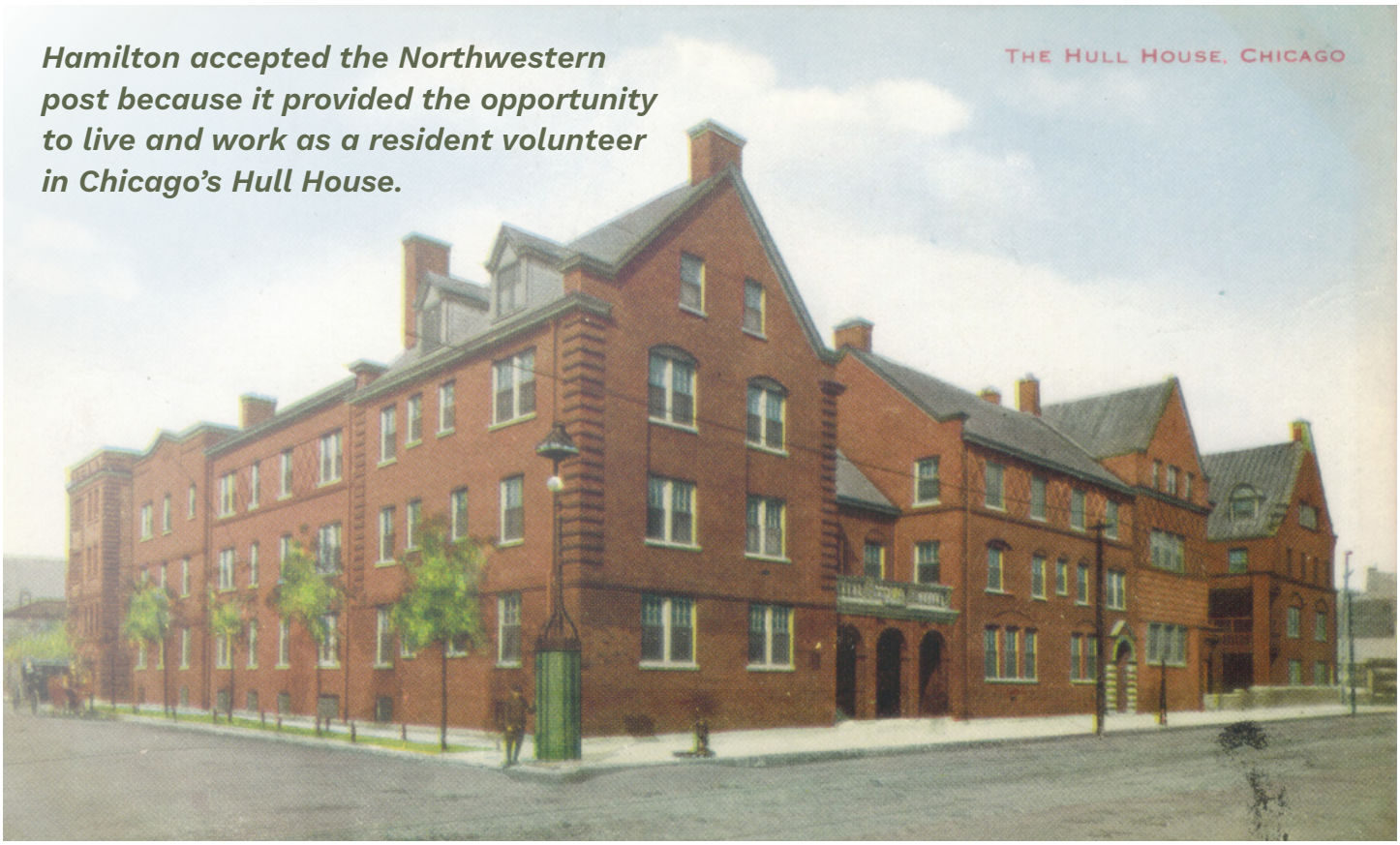
When she returned to the U.S., she could not land a job, despite her German training. "The only thing to do was to keep on fitting myself for a career and hoping that some day an opening would come."[5] She enrolled at Johns Hopkins University, working under Simon Flexner, a young pathologist.[2–4]

Flexner assigned her to two cases and both were published. In addition to research, he taught her to thoroughly and critically review all relevant literature and ensure that those references were appropriately cited.[5]

The training at Johns Hopkins qualified her to teach pathology at the Women's Medical School of Northwestern University.[4,5] To maintain her research skills, she went to the University of Chicago 2–3 days each week, where she was assigned to study neuronal regeneration after injury in newborn rats.[5]

In addition to medical research, Hamilton had always been motivated by social issues and wanted "a life full of human interest."[4] She accepted the Northwestern post because it provided the opportunity to live and work as a resident volunteer in Chicago's Hull House.[2,3,5]

Continued on page 20



Hamilton accepted the Northwestern post because it provided the opportunity to live and work as a resident volunteer in Chicago's Hull House.

en.wikipedia.org/wiki/Hull_House

Hull House

Leadership Profile

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A Conversation with ASPET's Division for Molecular Pharmacology Chair Michelle Kimple, PhD

Michelle Kimple, PhD is a Professor of Medicine in the Division of Endocrinology, Diabetes, and Metabolism and a Faculty Affiliate, in the Department of Cell and Regenerative Biology, both at the University of Wisconsin-Madison. Dr. Kimple is also Co-Director at the University of Wisconsin-Madison Diabetes Research Center Islet Core. She also serves as the Chair of the ASPET Division for Molecular Pharmacology. Dr. Kimple received her PhD in Biochemistry and Biophysics from the University of North Carolina, Chapel Hill and completed her postdoctoral fellowship in Pharmacology and Islet Biology from Duke University.

How did you get started in pharmacology?

As a PhD student in Biochemistry and Biophysics at UNC-Chapel Hill, I had the opportunity to work with two leaders in field of G protein signaling, John Sondek and David Siderovski, applying X-ray crystallographic methods to illuminate the mechanisms regulating G protein activity and signal transduction pathways. For my postdoctoral training, I aspired to apply my expertise in G protein signaling to a problem directly relevant to human health. This aspiration led me to the laboratories of Patrick Casey and Christopher Newgard at Duke University, who had just initiated a collaborative project aimed to elucidate the role of the unique inhibitory G protein alpha subunit, $G\alpha_z$, in regulating pancreatic beta-cell function and mass in metabolic health and diabetes. I am extremely privileged more than 20 years later to still be studying these same fundamental questions in my independent research program. While I credit all my mentors with giving me my start in pharmacology, it was during my exceptional postdoctoral training with Drs. Casey and Newgard that I truly became a pharmacologist.

How did you first get involved with ASPET?

I first became involved with ASPET during my postdoctoral training, when the ASPET scientific sessions were held in conjunction with those of several other professional societies at the annual Experimental Biology meeting. I applied for and received several ASPET postdoctoral travel and presentation awards to Experimental Biology, which were incredibly valuable to me both personally and professionally. Becoming more well-known in the pharmacology field during my early career led to invitations to serve as a poster or oral presentation judge for the ASPET Divisions for Molecular Pharmacology and Translational and Clinical Pharmacology graduate and postdoctoral competitions, and in 2016, I was selected as the Division for Translational and Clinical Pharmacology Early Career Awardee. These formative experiences solidified in me the desire to give back to the Society, which I did in 2019 when I was asked to run for Secretary/Treasurer-elect of the Division for Molecular Pharmacology's Executive Committee; a committee for which I now serve as Chair.

What do you want the ASPET membership to know about you and your ideas on how to move the organization forward during your term?

My membership and involvement in ASPET benefitted me immensely as an early-career scientist, and it is in targeting this career stage I believe ASPET has the most potential to advance its strategic mission. I am proud to have spearheaded the Division for Molecular Pharmacology Early Career Abstract Award to support presenting scientists at the start of their independent careers, an award that is now offered by all ASPET Divisions. I was also a strong advocate of the Division for Molecular Pharmacology providing financial support to the Transatlantic ECI GPCR Symposium, support that reaped rewards in attracting new ASPET members and submissions to ASPET journals. I was thrilled to be asked by the organizers to present to symposium attendees about the ASPET Division for Molecular Pharmacology, what we do, and how early-career scientists can get involved. I believe ASPET's involvement in the Transatlantic ECI GPCR Symposium should serve as the model for how ASPET and its divisions consider requests for external meeting support in advancing our strategic mission. Finally, I am a passionate advocate for promoting Inclusion, Diversity, Equity, and Accessibility (IDEA), and am currently working with other Molecular Pharmacology division members to brainstorm concrete ways in which ASPET can facilitate and support IDEA initiatives, particularly in these chaotic times.

What has been your proudest accomplishment in your career so far?

While I am proud of many of my scientific accomplishments, my proudest career accomplishment so far is not directly related to my scientific research program at all. Instead, it was, in 2023, the publication of my piece, "How My Bipolar Diagnosis Changed My Scientific Career," in *Nature*. This column led to national and international speaking opportunities and interviews, including for Women Inspiring and Elevating Leadership in Diabetes (WIELD), Women in Bio-RTP Chapter, *Nature Careers*, *Harvard Business Review*, and The Scientist Spotlights Initiative. Through these advocacy activities, I've had the opportunity to serve as a mentor to scientists at all levels of their careers, many of whom have written to say my mentorship has given them hope to persist and succeed in the face of serious life and career challenges.

What advice would you give young scientists who are just starting out in their careers?

My first piece of advice would be to get involved in your professional societies! Attend their annual meetings and apply for any travel and oral presentation awards you are eligible for. As I describe above, my early involvement in ASPET truly helped springboard my career by giving me the opportunity to present my research to and network with a remarkable group of leaders in the field of pharmacology. While it may seem cliché, out of all the professional societies I belong to, ASPET has truly been the best "bang for my buck" as far as contributing to my career success. My second piece of advice is to take care of yourself and your mental health first, and success will follow. When I was an assistant professor on the tenure track, I said yes to every opportunity I thought could advance my career success, but, as I describe in my *Nature* piece, the year I was going up for promotion to associate professor with tenure, it all came crashing down in spectacular fashion. Fortunately, I had the support of my department and institution in my recovery and I was able to return to work full-time and with renewed passion, but if I had prioritized myself over my perceived accomplishments, I may not have had to go through that experience at all.

Member Highlights

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Gary Rankin, PhD Named to Health Care Hall of Fame

West Virginia Executive magazine has named Gary Rankin, PhD, to its 2025 Health Care Hall of Fame. Dr. Rankin is recognized for his commitment to pharmacology education and research, and is the vice dean for basic sciences, professor, and chair of biomedical sciences at the Marshall University Joan C. Edwards School of Medicine. Dr. Rankin is a longtime member of ASPET, joining in 1985. He currently serves on ASPET's Publications Committee and an as associate editor for *The Journal of Pharmacology and Experimental Therapeutics*. Over the years, he has served on the Program Committee, Science Policy Committee, and chair of the Division for Toxicology. He is also a member of the Division for Drug Metabolism and Disposition.

ASPET Welcomes New Members

Each month, ASPET welcomes new members to our home for pharmacology. This month, we recognize 100 individuals from 71 universities, colleges and companies who have joined 4,000 other members in the pharmacology community. Learn more about ASPET membership.

Alfaisal University
Ghaith Mansour

All India Institute of Medical Sciences
Abhinav Kanwal

Bose Institute
Utpal Nandi

Boston University
Cristabel Portillo

Brigham Young University
Caelen A. Jones
Liam Moss
Riley A. Nickles

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Jordan Darling

Central Institute for Experimental Medicine and Life Science
Shotaro Uehara

Cha University
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Chemveda Life Sciences Inc.
Srinivasa R. Cheruku

Colorado State University
Maritza Morales

Creighton University
Jillian Hinman

Danzum LLC
Syed Muzzammil Ahmad

Emory University
Rachel Choi
Kevin Gunawardana
Sanjit S. Hajgude
Zhao Jia Zhang

Fudan University
Di Zhu

Glasgow Caledonian University
Fatimoh I. Ojuade

Government Medical College & Hospital Chandigarh
Aaronbir S. Randhawa

Harvard Medical School
Dhanushan Wijayaratna

Indiana University School of Medicine
Yasmin Aydin

Jeonbuk National University
Seungwon Jeong

Mayo Clinic
Vagisha Kulshreshtha, MSc
Wei Tsai

Michigan State College of Medicine
Sophia Ripley

Midwestern University, School of Nursing
Veronica A. Mayer

Northeast Ohio Medical University
Zachary S. McCalla
Titilayo M. Olotu

Northern Michigan University
Joseph Walstrom

Nova Southeastern University College of Osteopathic Medicine
Anastasiya Sizova

Ohio Northern University
Dalia Abdelhamid
Bagdad Ahmed
John Curry
Makayla Eversole
Alexander Ham
Nicholas R. Kleinert
Brandon J. Steiger
Ke Wang
Xinye Wang

Oklahoma Medical Research Foundation
Ying Ann Chiao

Orlando College of Osteopathic Medicine
Natalia Borisova

Pacific University Oregon
Vincent Nguyen
Mahnaj Sultana

Pennsylvania State University
Nina Boyle

Pfizer Inc.
Matthew A. Cerny

Protagonist Therapeutics
Lawrence Lee

Purdue University
Josephine N. Banks
Subhashree Ghimire
Omar M. Hassan
Daye Kwon
Hannah R. Warner

Ross University School of Medicine
Oleksii Hliebov

Saint Louis University
Senuri Piyawardana

Saint Mary's College of California
Kelly F. Portes Veloso

Shobhaben Pratapbhai Patel School of Pharmacy
Vaibhav Chakkarwar
Suhas N. Hajare
Vaishnavi N. Padole
Pranali B. Yeram

Showa University
Ayaka Aoki

Southern Illinois University Edwardsville
Amrita Talukder Mohini

St John's University Queens
Nishant Agarwal

Stanford University of Medicine, Ohlone College
Sherry Peng

Temple University
Hriju Adhikari

Texas State University
Lucas J. Ferguson

Texas Tech University Health Science Center
Khondker Ayesha A. Akter

The Aga Khan University
Amber Palla

The University of Texas at El Paso
Leslie L. Sullivan

University at Buffalo
Shaman Luo

University of Alberta
Samar H. Nesr
Alicia O'Brien

University of Arizona
Hager Shogaaeldein

University of California San Francisco
Brian J. Wysolmerski

University of Connecticut Health Center
Kimberly Dodge-Kafka

University of Findlay
Michael O. Isei

University of Florida
Devon A. Borg

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Haidyn Stark

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Alisha Bajracharya

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University of Michigan
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University of Mississippi Medical Center
James Rowlett

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Kierra L. Bumford
Zachary Ellsworth

University of North Carolina Chapel Hill
Jingyu Zhao

University of Pretoria
Vanessa Steenkamp

University of South Carolina
Sarah Chugh

University of Technology, Jamaica
Samson Omoregie

University of Texas at San Antonio
Gopakumar Changarathil

University of Texas Health Science Center at San Antonio
Paul A. Martinez

University of Texas MD Anderson Cancer Center
Shao-Rui Chen

University of Washington
Christopher M. Arian

Wake Forest University Health Sciences
Caleb A. Aguayo

Washington State University
Kolter Grigsby

Western Michigan University
Lisa E. Baker

Western University, Schulich School of Med & Dentistry
George Trevor

Yeungnam University
Rahul Upadhyay Nepal
Ioannis Charisis

In Memoriam

Share this!

Dr. John Thornburg (1942–2025) was a member of ASPET for 41 years, joining in 1984. After graduating from the osteopathic medical (DO) program, Dr. Thornburg became a faculty member in Michigan State University's Department of Pharmacology in the College of Osteopathic Medicine. During his tenure, he published over 60 papers and book chapters, mentored students, and taught pharmacology for nursing students. He was also awarded numerous awards including the highest honors from the National Board of Osteopathic Medical Examiners (NBOME). In recognition the NBOME created the John E. Thornburg National Faculty Leadership Award in recognition of his significant contributions to the NBOME and the profession.

PHARMACO CORNER

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Interested in Being a Guest Writer?

ASPET's Pharmaco Corner blog seeks contributing writers on a rolling basis.

Pharmaco Corner **is a dedicated space where pharmacology experts can discuss issues that affect them professionally and personally. The blog connects science and society through various pharmacology disciplines.**

Contact us at pharmacocorner@aspet.org.

Advocacy Impact

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Become An Advocate for Science as a Washington Fellow

ASPET's Washington Fellows Program has been educating over 130 early-career pharmacologists since its inception in 2013. The Society's science policy advocacy program offers early-career pharmacologists the opportunity to immerse themselves in a unique policy learning experience. Regardless of one's career background, pharmacology fellows learn the basics of science advocacy, participate in Hill Day on Capitol Hill in Washington, D.C. and write a policy brief focusing on a topic of interest.

Nina Beltran is a 2024 Washington Fellows alumni who wanted to use her scientific communications experience to advocate for continued funding for scientific research and to highlight the importance of animal research. She is a fifth-year Behavioral Neuroscience PhD candidate in the Department of Psychology at The University of Texas at El Paso (UTEP).

In a discussion with *The Pharmacologist*, Beltran shares her interest in pharmacology, her experience learning about science policy as a Washington Fellow, and the mindset shift in career options in science policy that the experience created for her.

TPharm: Hi Nina, can you talk about your current research and career interests?

Nina Beltran: Hello! My research focuses on understanding how dietary factors impact sensitivity to the behavioral and physiological effects of opioids. My career interest is to become a pharmacologist/toxicologist in either government or pharmaceutical industry sectors, where I can apply my technical and scientific background to investigate pharmacotherapies in a collaborative environment.

TPharm: What motivated you to apply to the Washington Fellows Program?

Nina Beltran: I really wanted to gain a deeper understanding of science policy and how it impacts biomedical research and drug development. As a PhD candidate with experience in toxicology and pharmacology,

I recognize the importance of engaging with policymakers to advocate for evidence-based policies that support scientific innovation and public health. The opportunity to receive hands-on experience in science policy, interact with experts in the field, and contribute to advocacy efforts aligned with my long-term goal of bridging the gap between research and policy.

TPharm: Did you have any science policy experience before the fellowship? What interested you in science policy?

Nina Beltran: My interest in science policy was heightened through my experience as a local organizing leader for the UTEP Biomedical Research Awareness Day (BRAD) events. BRAD is a global initiative to help raise awareness of the importance of the use of animals in biomedical research.

For the past five years, I have helped organize the UTEP BRAD events, where I have shared information with students on research breakthroughs and policies on the use of animals in biomedical research. I have thoroughly enjoyed this experience, which made me eager to understand better how public policy decisions are made, and how I can better advocate for the importance of biomedical research with my congressional representatives through the Washington Fellows program.

TPharm: What skills did you develop or refine during the fellowship that you find most valuable now?

Nina Beltran: The fellowship significantly enhanced my ability to communicate complex scientific concepts to non-scientific audiences, particularly policymakers and stakeholders. I refined my science communication and policy advocacy skills, which have proven invaluable in academic and industry settings. Additionally, I gained confidence in networking and professional outreach, which has helped me establish meaningful connections in the science policy space.

TPharm: How did the fellowship help you grow professionally or personally?

Nina Beltran: Professionally, the fellowship provided me with a broader perspective on the role of scientists in policy development and how regulatory frameworks shape research funding, drug approval processes, and public health initiatives. Personally, it strengthened my leadership skills, adaptability, and ability to advocate for scientific causes. It also reinforced my commitment to using my expertise beyond the lab to contribute to meaningful policy discussions.

TPharm: How has the fellowship influenced your career trajectory?

Nina Beltran: The Washington Fellows program solidified my interest in pursuing a career at the intersection of research and policy. Specifically, my experience in the program reinforced my goal of working in clinical development and regulatory affairs, where I could contribute to translating scientific discoveries into real-world applications. The skills I gained have been directly relevant to my pursuit of roles where regulatory considerations are crucial in trial design and implementation.

TPharm: Did you have opportunities to network with others in the science policy space?

Nina Beltran: Absolutely! The fellowship provided incredible opportunities to connect with Washington Fellows alumni and scientists engaged in policy work. Through meetings with scientific organizations through the Washington Fellows program, I built professional relationships in the science policy space. Additionally, I connected with other fellows, shared perspectives on science policy issues, and engaged in meaningful discussions about biomedical research.

TPharm: What was the Hill Day experience like for you?

Nina Beltran: My Hill Day experience was incredibly insightful and exciting! It provided a unique opportunity to engage directly with congressional staff and discuss the importance of federal funding for biomedical research and evidence-based policymaking. I appreciated the chance to advocate for science funding, highlighting how advancements in research impact public health, drug development, and regulatory decisions. It was both a privilege and a responsibility to represent the scientific community in these discussions, further fueling my passion for science policy advocacy.

TPharm: What about Hill Day stood out for you?

Nina Beltran: I had a unique opportunity to meet with my congressional representative from El Paso, Texas, Veronica Escobar, which was a meaningful experience. Many meetings on Hill Day are with congressional staffers, so speaking directly with my representative about the importance of federal funding for biomedical research was incredibly rewarding. Advocating for scientific research in my home district at the national level made the experience even more impactful. Additionally, Representative Escobar's staff went above and beyond by arranging a tour of Capitol Hill, an unforgettable way to conclude the Washington Fellows experience. Walking through the historic halls where crucial policy decisions are made reinforced the importance of scientists being involved in advocacy. The entire experience was inspiring and empowering, reaffirming my commitment to ensuring that science has a strong voice in policymaking.

TPharm: What was most surprising or unexpected about your fellowship experience?

Nina Beltran: One of the most surprising aspects of the fellowship was how accessible and receptive congressional staff were to engage in conversations about science. I had anticipated that discussions with congressional offices might be more formal or distant, but I was pleasantly surprised by the interest staff showed in hearing about research and its implications for public health and policy. Additionally, my perspective on science policy evolved significantly throughout the program. I entered the fellowship with a broad interest in policy, but by the end, I had a clearer understanding of the regulatory landscape and how I could contribute to science-driven policy decisions in my career.

TPharm: What advice do you give to someone considering applying?

Nina Beltran: If you're considering applying, I strongly encourage you to do so! The Washington Fellows program is a transformative experience that provides unique insights into the intersection of science and policy. My advice is to come with an open mind, be proactive in engaging with policy discussions, and take full advantage of networking opportunities. Additionally, think about how you want to apply the skills you gain—whether in academia, industry, government, or advocacy—and use the skills you gain from the fellowship to build a strong foundation for that path.

TPharm: Thanks so much Nina, it was great talking with you.

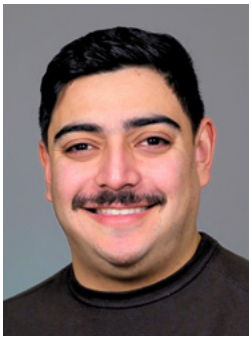
Nina Beltran: You're welcome!

Applications for the 2025–26 program will open on May 1, 2025. To learn more about the ASPET Washington Fellows experience, watch this recent town hall and view photos from our recent Hill Day in Washington, D.C.

On Their Way...

Share this!

Each month, the editors of three of the American Society for Pharmacology and Experimental Therapeutic's (ASPET) journals choose who they call their Highlighted Trainee Authors. These early-career scientists are recognized for their innovative research published in *The Journal of Pharmacology and Experimental Therapeutics*, *Drug Metabolism and Disposition*, and *Molecular Pharmacology*. This feature showcases selected young scientists, demonstrates what drives them and reveals why pharmacology is important to them. This month we are featuring the February 2025 Highlighted Trainee Authors.



Anthony Garcia

Anthony Garcia is a 6th year PhD candidate in the Department of Pharmacology at the University of Michigan.

As a first-generation college student, Garcia finds inspiration from his parents. His mom, a natural problem solver, taught him resilience; and his dad, who aspired to be a teacher, reinforced the value of education. As a child, during a visit to a bookstore, he picked up a book about Albert Einstein that was full of complex equations. Fascinated by symbols like psi and omega, he was determined to understand them and to learn more about science. Throughout the years and as he progressed with his education, Garcia periodically revisited the book, driven by his curiosity and desire to learn—qualities he considers vital for a scientist.

As an undergraduate at the University of New Mexico, he pursued medicine, engaging in the relevant extracurricular activities and courses. But it was his first organic chemistry course with Dr. Lisa Whalen that unexpectedly captivated him. "Organic chemistry opened the door to understanding the molecular basis of disease, and that fascinated me. I realized that research was something that I was interested in," said Garcia.

He also credits the mentors he's worked with throughout his academic career—Dr. Maggie Werner-Washburne, Dr. Eva Chi, Dr. Jimmy Rae, and Dr. Yoichi Osawa—for providing guidance and mentorship on what it means to be a good research scientist and pharmacologist.

Describing the basis of his research, Garcia explains, "There are few treatment options for neurodegenerative diseases, which are widely thought to be caused by formation and accumulation of toxic misfolded proteins. Treatments for these disorders often only provide symptomatic relief. As such, there is a need to identify strategies that will promote the degradation of these toxic misfolded proteins." He hopes that his research will be helpful in further dissecting the role of protein chaperones, especially Hsp70, as a potential therapeutic target for protein misfolding diseases. "Our research provides a new way to identify more compounds that target Hsp70 and promote the disposal of misfolded proteins," he explained.

Garcia aspires to be a pharmacologist in the pharmaceutical industry where he can continue to develop his research skills and contribute to the development of novel therapies and impact on human health.

When asked what it means to have his research published in *Molecular Pharmacology*, Garcia said, "To have been accepted to such a rigorous and prestigious journal such as

Molecular Pharmacology is an incredible honor. I am grateful to everyone who worked on this project with me, as I could not have done it without them, and I am proud of the work we completed. It is extremely rewarding to share these findings with the scientific community."

Asna Latif

"I have always aspired to be a life-long learner and sought a career that could give me the opportunity to fulfill this desire. While my interests were always in biology, I was more specifically able to cultivate a passion for molecular biology," said Asna Latif, a PhD candidate at the University of Alberta.

Once she started doing research as an undergraduate student, it was hard to stop, especially after seeing the impact that one's work can have. "At the crossroads of choosing a career path, research presented me with the unique challenge of asking my own questions and carving a path for innovation," Latif said.

Her research addresses the role of pharmacogenomics in cancer therapy, specifically the development of hearing loss due to cisplatin treatment. "By being able to test what kind of genetic pattern a patient has, we may be able to better predict their likelihood of developing hearing loss from cisplatin treatment and make more informed decisions about treatment options," Latif explained.

Latif hopes that through this work, she and her research team have contributed to justifying the importance of an individual's genetic makeup in their responses to drugs and identified ways in which therapy options can be improved by implementing other diagnostic tools that may be able to predict toxicity to cisplatin chemotherapy.

For Latif, being published in the February issue of *The Journal of Pharmacology and Experimental Therapeutics* means a great deal. "Seeing the hard work that my colleagues and I have put into our research be recognized in a journal as reputable as ASPET is deeply gratifying. I am honored to be a part of this community."

Joe Lim

Joe Lim, a PhD candidate in Environmental Toxicology at the University of Washington, has always been drawn to research, and how scientists think about a problem and generate and test hypothesis. "I especially liked the aspect that the findings have the potential to help people and can be used for the greater good. This thought process has been one of the key drivers of my motivation for research and made my graduate school career very fulfilling," Lim said.

His research focuses on the liver and the interactions of its various cell types and their specialized tasks that make up the liver's overall function.

"The degree to which each cell type is capable to metabolize drugs has not been extensively characterized. We hope our findings will aid in further understanding the mechanisms of chemical-induced liver injury with improved resolution and precision," explained Lim.

For Lim, one of the most exciting parts of his research is that there are so many unknowns that can be figured out. He hopes that the pharmacological and toxicological mechanisms of action in metabolic organs, as well as our basic understanding of how cell types in metabolic organs specialize in will help lead to positive outcomes to benefit people.

Joe's future career and research plans include continuing his scientific career and investigating how various xenobiotics impact the metabolic capabilities, components, and interactions in organs, such as the liver and intestines. Additionally, he hopes to unveil mechanisms of action for toxicity and therapeutics to better understand how certain therapeutics at the given amount function and how certain chemicals cause toxic effects.

When asked about having his work published in *Drug and Metabolism Disposition*, Lim shares that, "The ASPET scientific community meets high scientific standards with great recognition. I appreciate that my research contributes to advancing pharmacology and therapeutics."

Upcoming Events

ASPET 2025 Annual Meeting
April 3–6, 2025 · Portland, OR

Advancing the Science of Drugs and Therapeutics. Join us in Portland!

ASPET 2026 Annual Meeting
May 17–20, 2026 · Minneapolis, MN

Join us in Minneapolis!

20th World Congress of Basic and Clinical Pharmacology 2026
July 12–17, 2026 · Melbourne/Narrm, Australia

We will welcome the world's pharmacology and therapeutics community to the Melbourne Convention Centre in Melbourne/Narrm, Australia.

Cover Story

Continued from page 7

> *"I should never have taken up the cause of the working class had I not lived at Hull House."* - **Alice Hamilton**

Life at Hull House

Founded in 1889 by Jane Addams and Ellen Starr Gates, Hull House was modeled after the settlement houses that originated in England in 1884.[3,5] It was located in one of the poorest sections of Chicago, surrounded by dirty streets, poorly maintained sanitation, and bad streetlighting, and was home to many ethnic groups including Italians, Irish, Jews, and Greeks, among others.[3]

Addams's goal was to give the House's well-educated middle-class residents a chance to use their education in a socially beneficial way. In turn, poor immigrants received educational benefits and social services not otherwise available.[1,3] Rather than direct relief, Hull House assisted their impoverished neighbors with developing skills, broadening employment opportunities, and gaining an improved quality of life.[4]

Northwestern provided Hamilton's income, and Hull House's residents and visitors gave her companionship, exciting new experiences, and intellectual stimulation.[4,5] She had the opportunity to try her talents, to fail, and to build her confidence.[4]

Hull House also laid the foundation for her later achievements as a researcher, social scientist, reformer, and educator.[4] "I should never have taken up the cause of the working class had I not lived at Hull House."[5]

wams.nyhistory.org/modernizing-america/fighting-for-social-reform/jane-addams

Jane Addams, c. 1896–1900

During the first five years, when she was teaching pathology to women students at Northwestern, Hamilton's participation in settlement activities was limited to evenings and weekends.[3,5]

Her first contribution was opening a well-baby clinic, which soon expanded to take all children up to 8 years.[3,5,7] She also founded the Alice Hamilton Club for teenage girls and a hygiene and nursing program.[4]

Typhoid Investigation

In the summer of 1902, Chicago faced one of its worst epidemics of typhoid fever.[4,8] Most of the deaths occurred in the 19th Ward, where Hull House was located.[4] Addams asked Hamilton, because of her bacteriology training,

to investigate the possible causes. Hamilton surveyed the homes in the ward and found numerous outdoor privies, broken plumbing, standing water, and swarms of flies.[5]

She thought flies were the most likely vector, spreading the infection by landing on sewage and then on food. She collected flies from various locations, cultured the fly specimens, and found the typhoid bacillus.[3,5]

Hamilton reported her findings to the Chicago Medical Society and in a *JAMA* article.[5,8] "I gained more kudos from my paper on flies and typhoid than from any other piece of work I ever did."[5]

But, in fact, she soon discovered that flies had little to do with the localized outbreak. The primary cause was a broken 19th Ward sewer line, which contaminated the water supply for three days before the leak was discovered and repaired.[4,5]

Hamilton tried her best to downplay her report and explained over and over that her findings, though captivating, were not the primary cause.[5] In all of her future research, she took an exceptionally cautious approach, drawing conclusions only when the evidence was irrefutable.[4]

Cocaine Contributions

On July 8, 1904, a distressed mother asked Hamilton to help with her cocaine addicted 13-year-old son.[4] Unscrupulous druggists were giving free samples of cocaine to schoolboys, who quickly became addicted. Then, drug dealers would charge the boys, who were so desperate for a dose that they would commit crimes to get it.[5]

At first, the dealers' defense lawyers successfully argued that they were actually dispensing alpha- or beta-eucaine, synthetic drugs that caused the same psychoactive effects but, unlike cocaine, were legal.[4,5]

To build a stronger case, a local policeman confiscated samples for analysis.[5] In the absence of a definitive analytical chemistry test, a toxicologist at Rush Medical School taught Hamilton a sensitive bioassay. She took the results and testified in court that the samples were cocaine, because they dilated the pupils of lab rabbits. The eucaines did not.[4,5]

Soon, the defense lawyers began accusing Hamilton of animal cruelty.[4,5] So, she tested the samples on herself. "I used to go around the laboratory with one wide eye and one narrow pupil till everyone was so used to it that they took no notice."[5]

> ***The defense lawyers began accusing Hamilton of animal cruelty. So, she tested the samples on herself.***

Hamilton received public recognition for her efforts and recommendations. A *Chicago Tribune* story quoted "Dr. Alice," along with the Illinois states attorney and a judge, as authorities on the need for stricter state drug laws.[4] New legislation was passed, restricting the use of eucaines and providing more severe penalties.[4,5]

Hamilton's cocaine work solidified both her role as an investigator and her reputation for integrity. And she was growing increasingly comfortable with it.[4]

Turning to Toxicology

In 1907, Hamilton became interested in industrial hazards. Hull House visitors shared their findings, such as the industrial exposure and toxicity of white phosphorus in match factories. She also met working class laborers who had been permanently disabled by carbon monoxide in steel mills, palsy from lead exposure, and pneumonia and rheumatism from stockyard work.[4,5]

She read everything she could find on the dangers faced by industrial workers and the innovative toxicology research that minimized those hazards.[5] Those authors were all German, British, Austrian, Dutch, Swiss, Italian, or Spanish. None were American.

In 1908, she published an authoritative review article describing the various European countries' safeguards to lower disability rates in industries that used lead, mercury, arsenic, and phosphorus. She also noted the lack of industrial research in the U.S.[4]

That article brought her to the attention of key social reformers who recognized the detrimental effect of industrial poisons on laborers' wellbeing. One of them was Charles Henderson, professor of sociology at the University of Chicago. He knew Hamilton through his frequent visits to Hull House as well as her articles.[4,5]

Henderson persuaded the Illinois governor, Charles Deneen, to create the Illinois Commission on Industrial Diseases.[1,4] In December 1908, Hamilton was appointed as one of five physicians, along with Henderson, an employer, and two members of the State Labor Department, to the Commission.[5]

The American Medical Association had never held a meeting on industrial medicine. It was not a recognized branch of medical science in the U.S., and no physicians in Illinois specialized in the field.[5] No data on American industrial poisons existed.

In March 1910, the Commission directed a group of experts in bacteriology, chemistry, and pathology to survey industrial poisoning and the high industrial mortality rates in Illinois. It was the first such survey in the U.S. and was to be completed in one year.[3–5] Hamilton served as the Illinois Survey's medical director, and by her own account, this marked the beginning of her work in industrial toxicology.[2,4,5]

The Illinois Survey

Because no one knew which industries in Illinois used industrial poisons, they began by investigating the occupations that were obviously dangerous and hoped that, in the course of their work, they would discover others that were less well known.[3,5]

Hamilton chose to investigate lead, which was by far the most widely used toxin. The other team members investigated arsenic, brass, carbon monoxide, the cyanides, and turpentine.[3–5]

For the lead investigation, Hamilton was assisted by 20 young assistants, doctors, medical students, and social workers.[5] They borrowed some methodology from previous researchers, but mostly, because of the complexity of the work, Hamilton developed her own "shoe leather epidemiology" methods.[2,4]

First, she studied the technical details of each industry. Then, in the field, she observed all the factory processes, carefully checked hospital and dispensary records, and interviewed labor leaders, doctors, and pharmacists. She also drew on the social and interpersonal skills she had honed at Hull House: meeting with workers in their homes, union halls, and even saloons, if necessary.[2,3,5] Out of their bosses' earshot, the workers spoke freely and candidly.[5]

> ***Hamilton drew on the social and interpersonal skills she had honed at Hull House: meeting with workers in their homes, union halls, and even saloons, if necessary.***

The team had no authority to enter any plant.[5] But being a woman, she said, gave her a distinct advantage. "When I would go to the factory gates as a woman, and say, I am interested in the health and welfare of your workers and your

children, they'd let me in…If a man showed up with the same request, they would not let him in."[6] And, she was usually treated courteously.[5]

Her team identified more than 70 industrial processes that exposed workers to lead poisoning.[3,6] Some were already well known: paint manufacturing, enamelware, and pottery.[1,4] But other hazards had not been reported in the European literature. These included freight car seals, coffin trim, brass founding, polishing cut glass, and wrapping cigars in "tinfoil," which was actually made from lead.[1,3,5,6]

No quantitative blood assays or neurological tests existed to confirm lead poisoning. Remembering her typhoid fever investigation, Hamilton adopted a rigid standard. She counted a case of positive lead poisoning only if workers exhibited a clear "lead line" or a doctor had recorded the diagnosis at the time of an acute attack.[5] (The lead line is a narrow blue line at the gum line produced by lead sulfide.)

It was pioneering work. "Everything I discovered was new."[5] And for that reason, she carefully checked and controlled every bit of data.[2]

The Survey's *Report of the Commission on Occupational Diseases* was submitted to Governor Deneen in January 1911 and documented 578 cases of lead poisoning.[4,6] It was the first report that proved a connection between occupation and illness.[1,3]

A few months later, the Illinois legislature passed a law requiring employers to implement new safety procedures limiting workers' exposure to dangerous chemicals, provide monthly medical exams for workers in dangerous jobs, and report illnesses to the Department of Factory Inspection, which had prosecutorial authority.[1,3]

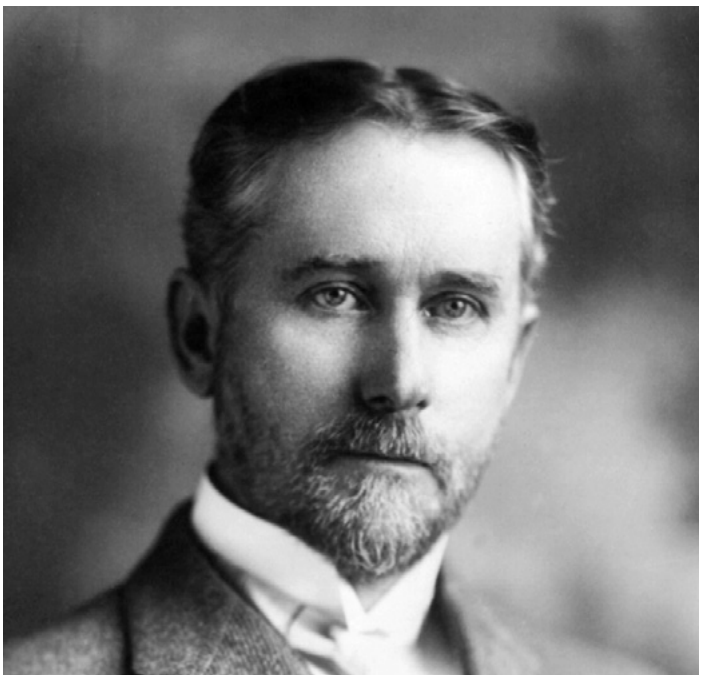
In a series of articles and speeches, Hamilton cited her lead results and pushed for recognition of lead poisoning as a real and serious medical problem. Other states soon followed Illinois's example and also passed worker safety laws.[5]

> ***The Illinois Survey was the first report that proved a connection between occupation and illness.***

Making the Switch

During the Illinois Survey, Hamilton was selected by the governor's Commission to present her results at the 4th International Congress on Occupational Accidents and Diseases in Brussels.[4,6] While in Europe, she visited factories in Germany and England and saw that they had implemented safer working conditions than U.S. manufacturers.[2,5]

Charles Neill, Commissioner of Labor in the U.S. Department of Commerce, also attended the Brussels Congress.[4,5] He had aided President Roosevelt in passing the Pure Food and Drug Act in 1906 and was impressed with Hamilton's efforts to improve worker safety in Illinois.



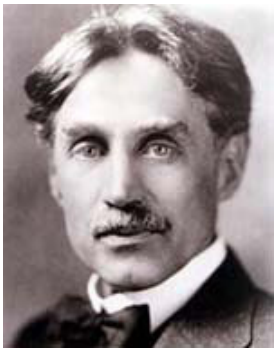
en.wikipedia.org/wiki/Charles_P._Neill

Charles P Neill, PhD, Commissioner of Labor, 1912

When she returned home, Neill asked her to do nationally what she had done in Illinois: first, to document lead exposure, and then survey other industrial poisons.[3–7] Thinking she would "never be more than a fourth-rate bacteriologist," Hamilton eagerly accepted Neill's invitation.[5]

"I have never doubted the wisdom of my decision to give up [the lab] and devote myself to work which has been scientific only in part, but human and practical in greater measure."[4]

She became a federal agent under contract as a special investigator for industrial diseases.[2–4] She worked independently, decided on the methods of investigation, and set the time devoted to each survey.[5]



en.wikipedia.org/wiki/Royal_Meeker

Royal Meeker, PhD, Commissioner of Labor Statistics, 1913

Officially, she reported to Royal Meeker, Commissioner of Labor Statistics in the newly created Department of Labor. He never interfered or edited her work, was always ready to help, and always backed her findings.[5] Hamilton liked that freedom and turned down job offers with larger salaries but more restrictions.[2]

The Labor Department covered her expenses, but she received no salary.[3–5] When each report was ready for publication, the government bought it at a negotiated price.[5] Best of all, the work allowed her to continue living at Hull House, which remained her base throughout her extensive travels and investigations.[3]

> ***"I have never doubted the wisdom of my decision to give up [the lab] and devote myself to work which has been scientific only in part, but human and practical in greater measure."*** **- Alice Hamilton**

The Federal Surveys

Her first federal investigation was white lead (lead carbonate), which was commonly used as a paint pigment. And she employed the same "shoe leather epidemiology" techniques that she used during the Illinois Survey.[3,7]

Hamilton would work with anyone, adjusting her strategy to maximize her effectiveness. She was also aware of the politics that influenced each manufacturer. When she faced pushback from owners or they concealed their factory processes, she solicited information from pharmacists, visiting nurses, undertakers, charity workers, and priests.[4]

As with her earlier findings, the main danger came from breathing air laden with lead, not from ingesting it.[3,7] Meeker credited her lead poisoning studies with inducing manufacturers to eliminate or reduce exposure to lead.[2]

By 1915, Hamilton had become America's foremost authority on lead poisoning and one of a handful of prominent specialists in industrial disease. She may not have been the first or only specialist, but she was the undisputed leading researcher in industrial toxicology and probably its only fulltime practitioner.[3,4]

After lead, Hamilton investigated specific products or industries that utilized multiple toxins, such as rubber, printing, paint, and dye manufacturing.[2,3,5] Each investigation covered all states, taking one trade at a time. And always, she insisted on irrefutable evidence before drawing conclusions and making recommendations—the characteristic for which she was best known.[4]

Over time, her national surveys became more efficient, and her productivity was striking. She produced one federal report each year from 1911 through 1915 and a final one in 1919. They were all written at Hull House.[4]

The Personal Touch

From the beginning, Hamilton made it a practice to provide the factory's decisionmakers with a summary of the dangers she had discovered before leaving the plant and prior to writing her report. Often, even with her limited engineering knowledge, she saw simple steps that could be taken and used the information she gathered to persuade them to minimize hazards.[3,5]

She dreaded conflict and, perhaps due to her Victorian upbringing, she was convinced that people of goodwill, once presented with the facts, would do the right thing.[3] And they usually did. This same "personal touch" (i.e., verbal, on-site briefings prior to writing official reports) is still practiced by government inspectors and greatly facilitates implementation of corrective actions.

> ***She was convinced that people of good will, once presented with the facts, would do the right thing. And they usually did.***

Hamilton was a prolific writer and tailored the text of her reports and articles to maximize their impact on each target audience. The people she most wanted to influence were factory owners and managers. If they could be convinced to make the necessary changes, convincing physicians, politicians, and the general public would be both easier and less necessary.[4]

Physical Demands

Hamilton insisted on evaluating potential hazards from the workers' perspective, no matter the personal risk. And her physical stamina was legendary. As one colleague observed, "At five foot three dressed in tweeds and black, she looked harmless, but she was not."[6]

> ***"At five foot three dressed in tweeds and black, she looked harmless, but she was not."* - Colleague of Alice Hamilton**

At an Arizona copper mine, she donned a helmet and overalls, stepped into a flimsy elevator cage without walls, and descended 800 feet into the mine. Then, she crawled on hands and knees across deep pits on an 80-foot ladder with rails "that were so far apart I felt sure I could fall between them if I slipped."[5]

While investigating the fumes in a tank house that was used for leaching ore, she climbed to the third story of the crushing mill at night on "a sort of glorified ladder running up the outside wall."[5] The crushed ore was leached with dilute sulfuric acid in enormous tanks. She inspected them by walking on a narrow track that ran along the tanks' edges, with "only a hand rail between me and that evil-looking, dark, bubbling acid."[5]

In 1917, limestone cutters in Indiana and their labor unions demanded a federal investigation of a different type of industrial hazard. Although Hamilton's expertise was industrial poisons, the Labor Department sent her to investigate the causes of stonecutters' "dead fingers" when operating air hammers.[5]

Dead fingers syndrome (most commonly in the left hand) was a previously unknown medical condition. When she examined some of the stonecutters, Hamilton, as a physician, noted that their fingers did, indeed, look dead.[5]

So, she personally operated several air hammers. Holding the air hammer lightly with her right hand lessened the vibration. But her left hand, which was used to guide the cutting tool, needed to be continually held tightly, and this explained why the workers' left hand suffered most from dead fingers.[5]

She concluded that tightly gripping the air hammer caused spastic anemia in the fingers. Vibration-induced vasomotor activity drained blood from the fingers, and cold weather worsened the condition by constricting the blood vessels.[5]

War Work

When World War I broke out in Europe, the Labor Department shifted Hamilton's priorities. U.S. manufacturers had largely imported aniline and other coal tar dyes from Germany for use in the rubber, textile, dye, and other industries.[2,5] When the German blockade cut off that supply, U.S. manufacturers ramped up domestic production, creating a new set of hazards for American workers.[5]

Aniline was by far the most complicated industry Hamilton ever tackled, and she relied heavily on her organic chemistry training at the University Michigan. She said, though, that she needed to pick up even more chemistry to do a proper investigation.[5]

The U.S. government was officially neutral, but various American manufacturers clandestinely shifted production to picric acid, mercury fulminate, and other chemicals that were used to manufacture munitions and explosives.[3,7]

The government instructed her to investigate these rapidly expanding industrial practices. Hamilton's dedication to social issues made her an ardent pacifist, and she struggled with how to work as a government agent investigating weapons manufacturers.[2,4] She reconciled her views by focusing "not [on] the destructive side of war but on the saving of life."[2]

As with her earlier investigations, Hamilton lacked formal authority to visit sites. Even more challenging, because secrecy surrounded the factories, she had no information on where to look.[4] No one in Washington knew the munitions factory locations (or would reveal them).[5] Her boss, Meeker, suggested that she rely on gossip. So, she followed up on rumors after visiting hospitals, bars, union halls, and peoples' homes.[4,5]

For example, to investigate picric acid exposure, she gathered tips indicating a plant was located in the marshes of New Jersey. Once in the area, she looked for the characteristic giant plumes of yellow and orange picric acid smoke. When she spotted dozens of workers with yellow-stained work clothes, she followed them to the plant.[5]

In addition to picric acid, she investigated toxic exposures in munitions and airplane factories that were using potentially poisonous nitrogen oxide, benzine, nitrobenzene, toluene, ether, phenol, sulfuric acid, mercury fulminate, ammonia, nitronaphthalenes, and chlorine.[4]

After the U.S. entered the war in April 1917, the medical community's interest in industrial toxicology and protecting workers dramatically increased.[5,9] Hamilton's workload also increased, and she needed help. The National Research Council appointed a committee, which she chaired, to study health problems arising from these poisons.[2,5]

For example, the committee provided resources for her to send a group of lab-trained medical students into TNT plants. They identified the earliest symptoms of TNT poisoning and documented the compound's absorption, elimination, and pharmacokinetics.[5]

Hamilton's reports on the dangers in war-related industries led to adoption of many new safe manufacturing practices.[3,7] American medical journals began publishing articles reporting the effects of various chemical exposures, as well as methods to protect workers.[5,9] The U.S. Public Health Service added a large division devoted to industrial medicine. "Industrial medicine had at last become respectable."[5]

"A Very Unusual and Sound Person"

Toward the end of World War I, David L. Edsall, dean of the Harvard Medical School, invited Hamilton (now a widely recognized authority) to deliver a series of lectures at Harvard.[4,5] Edsall also had an ulterior motive.

Harvard and the Massachusetts Institute of Technology had established a joint School for Health Officers in 1913. It was an interdisciplinary program that trained students on environmental health hazards and promoted public health. They soon realized that a major cause of disease and injury was the work environment, such as black lung in coal miners and silicosis from asbestos exposure. Industrial medicine and occupational health were becoming major fields, but the school had no one qualified to teach these subjects.[4]

For more than a decade, Hamilton had researched occupational health hazards, published a series of academic articles, and successfully advocated legislation to protect workers. Following her Harvard lectures, Edsall and his colleagues recommended that Hamilton be offered a faculty position.[4] But the Harvard Board said, "no." Harvard had always been an exclusively all-male institution.

Edsall and his colleagues stood firm. He told Harvard's president, "Her studies stand out as being of unquestionably both more extensive and of finer quality than those of anyone else who has done work of this kind in the country. A very unusual, and sound person."[4]

Harvard did appoint Hamilton an assistant professor of medicine, with three caveats. She could not enter the Faculty Club, get football tickets, or march in the commencement procession.[5] For her part, Hamilton agreed to teach only one semester each year, so that she could continue her investigations and return to Hull House for part of the year.[3,5,7]

harvardartmuseums.org/collections/object/304751

David Edsall, portrait by Charles Hopkinson, 1929

Hamilton began teaching industrial hygiene in September 1919. All of her students, of course, were men.[5] In 1922, she moved to Harvard's newly established School of Public Health, which continues to be among the top schools of public health in the U.S.[3]

Her years at Harvard were notable for her role as a mentor, colleague, and author. She later said that becoming the first female faculty member at Harvard was the highlight honor of her career.[4,5]

> ***Hamilton later said that becoming the first female faculty member at Harvard was the highlight honor of her career.***

Harvard Studies

Hamilton continued her official connection with the Department of Labor until March 1921, allowing her to complete the complicated study of aniline dye manufacturing and other studies begun during the war.[5]

During 1921–1922, she served as a factory inspector on a Harvard study of hat manufacturing. The industry had a long history of mercury poisoning, known as "Mad Hatter disease" (tremors, irritability, and other neurological symptoms). She found working conditions had significantly improved and credited the Public Health Service and industry leaders, who had already replaced mercury nitrate in most processes with nonpoisonous compounds.[5]

After her official connection with the Labor Department ended, Hamilton continued to monitor the "dangerous trades." Previous poisons (lead, mercury, methanol, benzol, and carbon monoxide) were largely being controlled, but new dangers were emerging from the increased use of solvents.[5]

Her longstanding reputation as an expert on lead poisoning remained influential. In 1925, she prompted the federal government to hold a conference on the toxicity of the anti-knock gasoline additive, tetra-ethyl lead. She also continued to urge passage of worker compensation laws as "the best preventative measure for industrial diseases."[2] Employers would rather improve working conditions than pay large numbers of worker compensation claims.[2]

While at Harvard, Hamilton contributed articles to the *Journal of Industrial Hygiene*, edited at Harvard.[2] She also wrote several books, including *Industrial Poisons in the United States* (1925) and her autobiography, *Exploring the Dangerous Trades* (1943). In 1934, she published *Industrial Toxicology*, the first textbook in the field.

en.wikipedia.org/wiki/Harriet_Louise_Hardy

Harriet Hardey, MD

Her most famous protégé, Harriet Hardy, later became the first female full professor at Harvard Medical School. In 1947, Hamilton decided to issue a second edition of her textbook but realized she needed help and asked for Hardy's assistance.[4] The book is now in its 6th edition (2015) and is known as *Hamilton & Hardy's Industrial Toxicology*. It remains a comprehensive reference on all aspects of industrial exposures and toxicants.

Humanitarian Efforts

Hamilton traveled widely and was a strong advocate for humanitarian relief operations to address the widespread post-World War I poverty and disease in Europe, particularly in children. Although the U.S. did not join the League of Nations, Hamilton served on the League's 20-member Health Committee from 1924 to 1930.[4] She was the Committee's only woman and the only industrial medicine expert.[5]

To address the desperate need for public health physicians and sanitation engineers, the Committee made arrangements for European governments to send selected healthcare candidates to the country offering the best instruction. The students pledged to return to their home countries and enter public health service.[5]

Hamilton had a number of these international students in her classes at Harvard, and "it was a pleasure to teach them, for they were so eager to learn."[5] In one class, she taught representatives from 13 countries.

Hamilton was never promoted at Harvard. She held only a succession of three-year appointments and remained an assistant professor until retirement at age 65.[3,7]

On September 1, 1935, she was appointed assistant professor of industrial medicine emeritus. Noting the "emeritus" designation (instead of "emerita," the female form), Hamilton said the title was "a great honor and pleasantly ignores my sex."[5]

> ***Noting the "emeritus" designation (instead of "emerita," the female form), Hamilton said the title was "a great honor and pleasantly ignores my sex."***

Senior Advisor

After her retirement from Harvard, Hamilton returned to the Department of Labor as a parttime medical consultant in the Division of Labor Standards. She conducted surveys, offered advice, attended conferences, testified at hearings, and brought neglected problems to the Department's attention.[5] Her most notable work during this period involved a study of poisons in viscose rayon manufacturing.[2]

Alice Hamilton, US postage stamp, issued July 11, 1995

postalmuseum.si.edu/exhibition/women-on-stamps-part-2-health-saving-lives-health-and-social-reform/dr-alice-hamilton

Viscose rayon is pure cellulose and is produced by treating wood pulp or cotton fibers with carbon disulfide and other chemicals. In the course of production, fumes of hydrogen sulfide are emitted.

When Hamilton received inquiries from concerned nurses and realized that no medical data on affected workers existed, she decided to investigate the industry herself, at the age of 71. With the cooperation of state authorities and medical specialists in Pennsylvania, Hamilton compiled sufficient data to make a compelling case that carbon disulfide was a poison. As a result, laws granting compensation for occupational disease were passed, and Hamilton said "changes in this industry came more rapidly and completely than any in my previous experience."[5]

By the 1940s, major reforms in industrial hygiene had been implemented. Hamilton claimed that industrial medicine had become one of the most important medical branches, and hundreds of doctors chose it as their specialty.[5]

Productivity

Hamilton remained remarkably resilient. When she and Hardy visited research sites that required climbing steps, the nearly 80-year-old Hamilton would "hop up the stairs as if she were about sixteen or seventeen, and I'd come panting behind her."[4]

In her career, Hamilton published 15 federal government reports, 17 books and pamphlets, and 165 articles.[4]

In addition to the numerous advisory boards on which she served, Alice Hamilton was awarded five honorary degrees and several honorary memberships in professional societies. In 1947 she received the Albert Lasker Public Service Award for her leadership in industrial toxicology.[10] She was *Time* magazine's Woman of the Year in Medicine (1956) and inducted into the National Women's Hall of Fame (1973) and the Connecticut Women's Hall of Fame (1994).

Buildings at the National Institute for Occupational Safety and Health, Miss Porter's School, and the University of Michigan were named in her honor. In 2002, the American Chemical Society installed a plaque at Hull House, naming it a National Historic Chemical Landmark, in recognition of Alice Hamilton's pioneering work in industrial toxicology.[3]

Hamilton spent her later years in Hadlyme, Connecticut, where she died in September 1970 at the age of 101. Three months later, Congress passed the Occupational Safety and Health Act (OSHA).

References can be found on page 32.

Alice Hamilton, portrait by Emil Otto Hoppé, c. 1915–1955

Rebecca J. Anderson, PhD

Rebecca J. Anderson holds a bachelor's in chemistry from Coe College and earned her doctorate in pharmacology from Georgetown University. She has 25 years of experience in pharmaceutical research and development and now works as a technical writer. Her most recent book is *Nevirapine and the Quest to End Pediatric AIDS*.

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