

COLLEGE OF SCIENCE & LIBERAL ARTS

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Chemistry & Environmental Science Newsletter

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Chair's Message

By Dr. Wunmi Sadik, Distinguished Professor and Chair

If I were asked to take stock of the accomplishments that CES has enjoyed during the past year, I would first note that the list is long and growing. Four new awards were granted to CES faculty members: Pier Champagne and Farnaz Shakib received the American Chemical Society's Petroleum Research grant, Mengyan Li received the EPA award, and Zeyuan Qiu received a grant from the New Jersey Department of Environmental Protection through its Clean Water Act 319(h) grant program. The University-reported research productivity data for CES faculty was impressive. With 75 research journal articles and new funding per FTE at \$114,286, CES is the 2nd in the College of Science And Liberal Arts (CSLA).

Congratulations to the class of 2021 graduates. Our graduates received multiple accolades: Ogochukwu Enekwizu, who graduated with a Ph.D. in Chemical Engineering under the advisement of Professor Alexei Khalizov, spoke at the NJIT's commencement event on May 12 of 2021. Ali Hasani, another student, working with Professor Alexei Khalizov, received an Honorable Mention for Best Visuals in the 2021 GSA's Annual Three-Minute Research Presentation Competition, which took place on April 13. Bhoomi Dave, one of our graduating forensic science majors, received the CSLA Outstanding Undergraduate Award. Qi Wang, a PhD student working with Professor Hao Chen was recognized as the 2021 CSLA Outstanding Graduate Student.

Our enrollment numbers have continued



on an upward trend. Both our Biochemistry and Forensic Science majors are currently above 50 students—the first cohort of BS. Forensic Science graduated in May 2021! This edition of the CES Newsletter includes an interview with Dr. Andrew Falzon, NJ Chief State Medical Examiner and Adjunct Professor in our Forensic Science Program. He explains that a well-rounded forensic science program with a strong chemistry background is the right tool to prepare students for a successful career in the forensic science discipline.

CES is growing and has hired three new faculty members: Dr. Genoa Warner: Tenure-track Assistant Professor of Biological Chemistry. Dr. Lijie Zhang, Tenure-track Assistant Professor of Environmental Science, and Dr. Sara (continued on page 2)

DR. MENGYAN LI **GRANTED TENURE**

Dr. Mengyan Li, Associate Professor in the Department of Chemistry and Environmental Science, has been granted tenure effective with the beginning of the 2021-2022 academic year. He was appointed as Assistant Professor in the Department of Chemistry and Environmental Science at the New Jersey Institute of Technology in September 2015. Dr. Li's research interests are in environmental microbiology and bioremediation. He rapidly recruited students to his research program and has had three graduate students join his group, along with 13 undergraduates. His initial research efforts were met with exemplary success. To date, he has received the prestigious NSF CAREER Award (\$500,000), another NSF collaborative award (\$500,000), and a USDA-NIFA grant (\$500,000) totaling \$1.5M as PI. Dr. Li has also attracted various state, industry, and foundation funding of approximately \$228,063. He has published 16 peerreviewed papers in well-regarded journals. He has also applied for two patents for his work. The Department extends our warm congratulations to Mengyan Li for this well-deserved recognition.

(continued from page 1) Casado Zapico, Tenure-track Assistant Professor of Forensic Science. These hires are helping to ensure diversity and inclusion, as articulated in NJIT 2025.

One year into a global pandemic, our learning and teaching had been challenged. CES faculty members have taken steps to find creative ways to continually engage students and discover the best mode of keeping students engaged in the pandemic world. You will read about how Professor Pier Alexandre Champagne is developing new online educational resources for visualizing organic molecules.

In looking ahead, I am pleased to announce that CES now has its inaugural advisory board. Members of the Chemistry & Environmental Science Advisory board (CESAB) are: Drs. Nicholas A. Procopio, Chief, Bureau of Environmental Assessment, NJ Department of Environmental Protection; G. Dan Sykes, Associate Head for Undergraduate Education, Teaching Professor, Penn State University; Philip Demokritou, Professor and Director, Center for Nanotechnology and Nanotoxicology, Harvard School of Public Health, Department of Environmental Health: Peter T. Meinke, Sanders Director, TriInstitutional Therapeutics Discovery Institute & The Sanders Innovation and Education Initiative; and Subash Jonnalagadda, Professor, Department of Chemistry and Biochemistry, Rowan University. The role of the CESAB is to contribute to the academic quality and viability of the Department by providing insights, information, and support to our educational programs to enable CES to fulfill its mission better. The virtual advisory board kickoff meeting was held on April 27, 2021.

Finally, I would like to acknowledge our faculty and staff's dedicated efforts for the year, particularly during the ongoing pandemic—including our outreach committee's efforts towards the 2021 Virtual New Jersey Chemistry Olympics and graduate recruitments. We also express our thanks to Dean Kevin Belfield for securing funds and the NJACS for supporting this year's event.

Enjoy the newsletter, and have a great summer!

Omowunmi "Wunmi" Sadik, Ph.D. **Distinguished Professor and Chair Chemistry and Environmental Science**

NJIT, Rutgers University and Stevens Institute of Technology team up to clean New Jersey's water.

Professor Zeyuan Qui of the CES department at NJIT joins a project to help clean up New Jersey's water. The project "Developing a Watershed Restoration Plan for Eight Southern Barnegat Bay Tributaries" is funded by New Jersey Department of Environmental Protection through its Clean Water Act 319(h) grant program. Working with researchers at Rutgers University and Stevens Institute of Technology, this project's goal is to outline a roadmap to apply various best management practices that reduce sediment, phosphorus and nitrogen loads and to attain the desired water quality stan- Professor Zeyuan Qiu of NJIT dards in Barnegat Bay-Little Egg Harbor streams, and therefore improve the health of Southern Barnegat Bay.



Visualize Organic Chemistry: a New Online Educational Resource For Learning Organic



Visualize Organic Chemistry's home page, showing the interactive animation next to traditional 2D representations. (<u>www.visualizeorgchem.com</u>)



When NJIT assistant professor Pier Alexandre Champagne (from the Chemistry and Environmental Science Department, pictured on the left) read student reviews on his Fall 2020 organic chemistry course, he found a very interesting suggestion. States Dr. Champagne, "one student commented that visualizing organic reaction mechanisms from the simple drawings we use in textbooks and lectures

is difficult. As a computational chemist, I knew what they meant. Chemical reactions involve breaking and forming bonds on 3D objects (molecules), but what we teach students are simply 2D representations of those reactions." A quick Google search revealed a few online resources with animations of reactions, but none that provided the educational experience through a clean and interactive resource like Dr. Champagne wanted. "I figured that since my group focuses on modeling organic chemistry using computational tools, we could make one ourselves!"

Partnering with a long-term colleague, Prof. Claude Legault from the Université de Sherbrooke, Prof. Champagne's group designed a series of web-based animations that represent how molecules' structure changes during chemical reactions. He put together a diverse team to tackle this problem, consisting of Joie Kelly, a senior at the Applied Technology High School in Paramus, NJ, Rebecca Zaki (Biology '24) and Sean Larmore (Chemistry '23), undergraduate students at NJIT and Dr. Floris Buttard, postdoctoral researcher working with Dr. Champagne. Together, they generated real data using available computational chemistry software packages, then turned that data into animations. On the website, each reaction type has its own page, where the animations are compared sideby-side with regular representations of organic chemistry, to help users bridge the gap between "written" and "real" molecular structures.

"Visualize Organic Chemistry was imagined as a two-way educational project" says Dr. Pier Alexandre Champagne, the NJIT assistant professor who spearheaded the effort. "Internally, as students join my research group and learn how to run calculations, they will first practice on simple organic reactions and use that time for developing tutorials to post online. Externally, the work generated by these students can be turned into the interactive animations on VOC. Students and teachers from across the world then have access to these animations to better understand organic reaction mechanisms." Since its launch in March of 2021, Visualize Organic Chemistry was visited by more than 2000 users from 58 countries and has received positive feedback from the organic chemistry community. Still in its early stages, the website will be updated regularly with new animations prepared by the students working in Dr. Champagne's group. These now include some of the most famous textbook mechanisms such as those of the SN2, E2, Friedel-Crafts and Diels-Alder reactions. "There are too many reactions taught in organic chemistry for us to run out of work for a few years. Visualize Organic Chemistry is a long-term project."

For more information, visit www.visualizeorgchem.com.

ACS PETROLEUM FUND GRANT AWARDED TO NJIT GROUP TO STUDY THE ORGANIC CHEMISTRY OF ELEMENTAL SULFUR

Elemental sulfur is one of the main by-products of petroleum processing, and its massive stockpiles are growing across the world as production greatly exceeds consumption. Due to the chemical behavior of sulfur, which makes its reactivity misunderstood and seemingly unpredictable, the current applications of sulfur for the synthesis of value-added organic compounds are limited, in contrast with sulfur's abundance and low cost. Starting January 2021, Dr. Pier Alexandre Champagne's group is attempting to solve these issues by a combination of experimental and computational investigations on the organic reactivity of elemental sulfur. The work, funded through an ACS Petroleum Research Fund "Doctoral New Investigator" grant, will broaden the use of sulfur in organic chemistry, by providing a strong molecular understanding to predict its reactivity with nucleophiles, and by demonstrating its potential for the cheap synthesis of valuable chemical matter.around the country. "

https://chemistry.njit.edu/

NJIT Researchers Use Light and pH to Fight Chemoresistance



Time-lapse cell imaging of HeLa cells treated with BD-PAG and exposed to varied time of red laser light. a) HeLa cells treated with 10 mmol of BD-PAG, after removing extracellular. BD-PAG, time-lapse cell images were captured every 10 s during light exposure. b) 0 s of red laser irradiation. c) 50 s of red laser irradiation.

From a mitochondria-centric point of view, mitochondria are a crucial organelle that determines cell fate. The correct function of mitochondria is essential and their morphology, quality, and motility are finely balanced in healthy cells. Studies indicate that pH of mitochondria, pH_{mito} , plays an important and underappreciated role in physiological and pathological situations, such as apoptosis, proliferation, and cancer metabolism. Thus, being able to probe and regulate pH_{mito} in greater detail can provide significant new insights into the role of mitochondrial function in physiology.

In a recent study, Professors Belfield and Zhang's groups showed that mitochondria are important mediators and play a key role in drug resistance during cancer treatment. A unique mitochondrion targeting molecular opto-boimodulator is used to release protons under red LED light, and the ability to reduce pH_{mito} was confirmed using a fluorescence microscope. The consequent mitochondrial membrane potential and morphology change (from filamentous to punctate) were observed showing direct effects of altering pH_{mito} .

Then a preliminary exploration of the possible role of dysfunctional pHmito in drug resistance was performed. The hypothesis is that regulating the pH_{mito} can directly impact the permeability of the mitochondria membrane, while chemo-drugs are more accessible and, consequently, increase the therapeutic effect. Relatively low concentration of chlorambucil was employed in this study (5 µM compared with IC50 of ~ 100 μ M), conditions in which chlorambucil has negligible toxicity towards HeLa cells. In combination with the molecular opto-biomodulator, 70% of cells were killed after 20 min of red light exposure, indicating the potential impact of pH_{mito} regulation on drug resistance.

Given that apoptotic resistance is observed in many chemotherapy treatments, the ability to intervene by regulating pH_{mito} may enable the development of new anti-drug resistance approaches.



Interested in a degree offered by CES?

CES undergraduate programs include:

- B.S. Biochemistry
- > B.S. Chemistry
- B.S. Environmental Science
- > B.S. Forensic Science Forensic Biology, Forensic Chemistry, and Digital Forensics concentrations

More information can be found at: <u>https://catalog.njit.</u> <u>edu/undergraduate/science-liberal-arts/chemistry-</u> <u>environmental-science/</u>

Dr. Enekwizu Speaks At NJIT 2021 Commencement



Dr. Ogochukwu Enekwizu, who graduated with a PhD in Chemical Engineering under the advisement of Alexei Khalizov, spoke at NJIT's commencement event on May 12 of 2021. Ogo was nominated to be the graduate student speaker because of her significant accomplishments, including an outstanding aca-

demic performance, innovation in research, and excellent service to the university and broader community. Her research achievements, presentations, and service have been marked by multiple awards, including the 2020 APERG award, which provided her with a \$25k scholarship towards her PhD research. Currently, Ogo is a Postdoctoral Fellow in the Environmental and Climate Sciences Department at Brookhaven National Laboratory (https://www.bnl.gov/staff/oenekwizu). Ali Hasani Earned Honorable Mention For Best Visuals In GSA's 2021 Three-Minute Research Presentation Competition



Ali Hasani received Honorable Mention for Best Visuals in the 2021 GSA's Annual Three-Minute Research Presentation Competition, which took place on April 13. Competing students joined the challenge to describe their research to a

general audience in three minutes, using only one slide as a visual aid. The goal was to communicate their research succinctly and effectively to those who are not familiar with their work or field. Ali's presentation was about processing of soot in the atmosphere and its impacts on climate. Ali's advisor is Alexei Khalizov.

Meet the Newest Faculty at CES

CES is growing and we would like to introduce our newest faculty!



Dr. Lijie Zhang received her Bachelor's degree from Tsinghua University (China) in 2012 and her Ph.D. from Washington University in St. Louis in 2018, with both degrees in environmental engineering. Her doctoral research was focused on mineral-water interactions and their implications in degradation of organic compounds and transport of fluids in subsurface engineered systems, such as geological CO₂ sequestration or conventional/unconventional oil/ gas recovery. After that, she joined Oak Ridge National Laboratory as a postdoctoral research associate, working on transformation of mercury (Hg) at critical interfaces. She investigated the biogeochemical and mineralogical processes that control Hg speciation, microbial uptake, methylation, and demethylation in natural water and sediments. Dr. Zhang's research interests include mineral-microbe-water interactions, trace metal biogeochemistry, contaminant fate and transport, remediation, and greenhouse gas emission.



Dr. Genoa Warner is opening her lab in the Department of Chemistry and Environmental Science at NJIT in Fall 2021 to study endocrine disrupting chemicals. She received a BS from Yale University in Chemistry and a PhD from Carnegie Mellon University in Chemistry. For her graduate work, she developed small molecule oxidative catalysts for degrading micropollutants in wastewater. She completed a postdoctoral fellowship in the Department of Comparative Biosciences at the University of Illinois at Urbana-Champaign, where she trained in reproductive toxicology. She was awarded a K99/R00 Career Transition Award from the National Institute of Environmental Health Sciences to support her research on the mechanisms of environmental chemical toxicity in the ovary. At NJIT, she will continue to study the effect of endocrine disrupting chemicals on the reproductive system using chemical biology methods.



Dr. Sara C. Zapico received her BS in Biology and her BS in Biochemistry from the University of Oviedo, Spain, and her MS in Forensic Anthropology and Genetics from the University of Granada, Spain. She completed her PhD in Biochemistry, with a focus in biomedical sciences, at the University Institute of Oncology of Asturias, Spain. This dual background defines her current research interests and projects, exploring the application of biochemical approaches to forensic science issues, like age-at-death estimation and the determination of post-mortem interval, with implications on aging and biomedical research. Based on these interests and applications, Sara was awarded the Peter Buck Award Postdoctoral Fellowship at Smithsonian Institution, where she is still affiliated as a research collaborator. She completed her postdoctoral training as an associate at the Forensic Unit from the International Committee of the Red Cross in Geneva, Switzerland, and with other visiting scientist positions. After that, she was appointed as an assistant teaching professor and graduate program director of the Professional Science Master's in Forensic Science at Florida International University. Sara will join the Department of Chemistry and Environmental Sciences at NJIT this Fall 2021, and she will open her Interdisciplinary Forensic and Biomedical Sciences Lab (ForenBioS). Interested students and potential collaborators, please, contact her.

CES Graduates Find Success

Check out the great achievements of graduate students and alumni of CES graduate programs!



Dr. Pyonghwa Kim (NJIT '21) will be joining the Laboratory of Genetics led by Dr. Michael W. Young (2017 Nobel Laureate) at Rockefeller University as a postdoctoral trainee. Under the guidance of Dr. Yong-Ick Kim at NJIT, his graduate work focused on reconstituting the cyanobacterial circadian clock in a test tube and functionally analyzing the role of each clock protein. Upon joining the Young lab, this experience would transition into studying the clock components in Drosophila melanogaster (fruit flies). Dr. Kim wishes to understand how the mechanistic interactions of endogenous clock components "tick" with a 24-h periodicity.

NJIT Graduates First Class of Students with a BS in Forensic Science



by Prof. David Fisher

Prof. Fischer and the first graduating cohort of students graduating with a BS in foresnsic sicence.

NJIT became the first institute in New Jersey to offer a bachelor's degree in Forensic sicence and this May, NJIT's Forensic Science Program graduated its first cohort of students. These students are the first to be awarded the BS degree in Forensic Science by a university in the Great State of New Jersey!

Congratulations to Kazuki Akita, Charu Arya, Bhoomi Dave, Mahathi Mohan Gowda, and Claudia Sroka! These freshly minted graduates completed a rigorous curriculum in the natural sciences and mathematics, as well as handson training in crime scene investigation, analytical skills, and laboratory procedures currently used by forensic scientists in crime labs and in the field. Each student also completed a Capstone Project as the culmination of their studies (either through doing a research project or co-op internship in a Forensic Science Laboratory/Medical Examiner's Office) and also sat for the National Forensic Science Assessment Test (FSAT). Each of these students, who have built a strong foundation in STEM, are well equipped to use their degrees in the pursuit of justice through science.

NJIT and CES would like to wish these students great success in the forensic field and a fantastic start to their bright careers!

NJIT's CSLA & the North Jersey ACS Section Hold their Second Virtual New Jersey Chemistry Olympics (vNJCO)



The New Jersey Chemistry Olympics (NJCO), held again in virtual mode, triumphed over the pandemic as 116 students, teachers, judges, and NJCO leaders attended the virtual awards ceremony on June 14, 2021. The second virtual NJCO had as a foundation 34 years of in-person NJCO events hosted by NJIT's College of Science and Liberal Arts (CSLA) in conjunction with the North Jersey Section of the American Chemical Society (NJACS) as well as our first vNJCO in 2020. Attendees joined live from England to California thanks to the virtual nature of the ceremony.

The 2021 vNJCO participants included 134 high school students from 14 different high schools across New Jersey. While this is much smaller than a hands-on event where 250+ students from 20+ schools participate like we had in 2019, last year's virtual NJCO (74 students from 7 high schools) was nearly doubled. We welcomed Ridge High School and Woodbridge Academy for the first time and welcomed back Bergen County Technical School after a long absence. We are pleased to report that all three high schools won at least one medal in the competition!

Response to the pandemic varied greatly depending on each high school's district. Some coaches were able to meet in-person with their teams on a weekly basis while some districts were 100% virtual with no in-person meetings allowed. To compensate, high schools could register teams of 2 to 12 members. Difficulties scheduling around pandemic-affected Advanced Placement exam schedules turned Event Day into Event Two Weeks. Gold, silver, and bronze medals were given for each event but in fairness to teams that could not fully participate, no overall winner was named.

The theme for the 2021 vNJCO was Current Topics in Chemistry. Teams of students could participate in as many of the 8 events offered as they wanted as long as no school had more than 2 teams in any one event (a requirement of the in-person NJCO as well). The events were:

1. Chemistry Research: Vaccine Development (including CO-VID-19 specific parts)

- 2. Environmental Science Research: Sustainability of Batteries
- 3. Chemical Engineering Research: Costs of Bringing a Vaccine to Market

- 4. Website Design: CRISPR Gene Editing Technology
- 5. NEW for 2021!!! Experimental: Physical Chemistry of Your Microwave

6. Nomenclature test (on a new platform due to Adobe Flash deprecation)

- 7. Information Search: Disinfectants
- 8. NEW for 2021!!! Debate: Should PFAS be banned?

Event 5: Experimental : Physical Chemistry of Your Microwave was the only event that had an in-person (albeit remote) component. Students developed their own experiment using insulated containers from home with a thermometer, a voltmeter, and tap water to determine the power consumption of their home microwave. Thanks to CES Distinguished Professor (Emeritus) Joe Bozzelli for creating the event. Joe and retired teacher/longtime NJACS member Diane Krone, both seasoned NJCO judges, judged the event.

The 3 research events required students to read and interpret articles from peer reviewed primary sources but unlike the in-person event there was no experimentation. Sandra Keyser (Columbia, NJACS) wrote the Chemistry Research event again this year. Sandra and along with new CES Assistant Professor Amir Khashayar Varkouhi and former Olympian now at Centenary University Jean Pierre Pinto judged the event. Amir and Jean Pierre were new to the NJCO this year. Professor Alexei Khalizov wrote the Environmental Science Research event and was joined by new chemistry faculty member Michael Eberhart in judging it. We reached across the pond to England to enlist the help of one of the NJCO's first Directors and Otto H. York Department of Chemical and Materials Engineering (CME) Professor (Emeritus) Reginald (Reggie) Tomkins to write the Chemical Engineering event. Reggie was joined by current CME Associate Research Professor Mirko Schoenitz in judging the event.

Website Design had the easiest transition to a virtual only event from its normally in-person presentation. CES Adjunct Instructor and newly minted Ph.D. Jon Buchspies wrote the event for us. He was joined by long time NJACS member and chemistry consultant (continued on page 9)

(continued from page 8)

Alan Cooper in addition to Carnegie Mellon University Physics Ph.D. student Matthew Ho in judging the event. It was Matthew's first Olympics and he did a marvelous job.

The Information Search event asks students to design an accurate model of their chosen disinfectant. Students found showing the judges their physical model challenging and the judges had a similar problem evaluating it but they got the job done. NJCO Directors and CES University Lecturers Kathleen Gilbert and Miriam Gulotta created this event. Former Olympian, Harvard University Ph.D. student, and seasoned NJCO judge Jason Anesini teamed up with retired high school teacher Debra Sweet in judging the event. Deb reports she enjoyed judging an NJCO event for the first time.

The Nomenclature Test had always been run using a program that required Adobe Flash (no longer available). Thanks to NJIT's Office of Digital Learning team (Blake Haggerty, Nikki Bosca, and Jolanta Soltis) for setting up a Moodle site for our Nomenclature Test. We recruited CES University Lecturer Chris DeSantis to help Sandra Keyser, Kathleen Gilbert and Miriam Gulotta make up the new test: 30 questions in 10 minutes in an online proctored environment. The Debate Event is a completely new NJCO event. CES University Lecturer, Environmental Science Advisor, and lawyer Mike Bonchonsky designed the event based on debates he runs in his classes. CES Forensic Science Junior Sara Ali joined him in judging the event. Sara was a great help in her first Olympics and we hope she will help again in 2022 and then after she graduates.

The NJCO would also like to thank Distinguished Professor and CES Chair Wunmi Sadik; CSLA Dean Kevin Belfield who tirelessly raises money for us and was kind enough to speak at the vNJCO Awards Ceremony; Dr. Mirlinda Biba who is Chair of the NJACS as well as a scientist at Merck and was also kind enough to speak at the awards ceremony; and Ms. Genti Price of CES who does a long list of things too many to enumerate. We also want to thank financial donors: Merck, Exemplify BioPharma and Ashland LLC as well as NJIT's CSLA, and the NJACS.

Respectfully Submitted Miriam Gulotta & Kathleen Gilbert Directors of the NJCO

And the winners are..... 2021 VIRTUAL NEW JERSEY CHEMISTRY OLYMPICS RESULTS -

CONGRATULATIONS!!!								
Event #	Event			Gold		Silver	Bronze	# teams in event
1	Ch	emistry	Research	MATES-A		PHHS	HCRHS-A	17
2	En	vironme	ental Research	HCRHS		RHS	BCTS	8
3	Chemical Engineering Research			WHRHS		RHS	SB-A	7
4	Website Design			WHRHS		SB-B	WPHS	11
5	Experimental			WHRHS		BCTS	SB-A	7
6	Nomenclature Test			HCRHS & SB- A			JPHS	13
7	Information Search			RHS		SB-B & THS- A		9
8	De	bate		SB		WPHS	WA	7
	2021 NJCO PARTICIPATING HIGH SCHOOLS – THANKS FOR BRINGIN SCIENCE TO YOUR STUDENTS!!!						BRINGING	
		BCTS	Bergen County Technical Sch		RHS	Ridge High School		
		BHS	Bergenfield High Sc	hool	RPS	Rutgers Preparatory School		
		HCRHS Hunterdon County H		High School	igh School SB South Brunswick High School		High School	
		(PSHS John Paul Stevens H		igh School THS		Tenafly High School		
		MATES	Marine Academy of Technology and Environmental Science		WA	Woodbridge Academy – Allied Health & Biomedical Sciences		
		PHHS	Pascack Hills High School		WHRH S	Watchung Hills Regional High School		
		PVHS	Pascack Valley High	School	WPHS	Whippany Park H		

An Interview with Andrew Falzon, MD, Adjunct Professor in the NJIT Forensic Science Program



1) Why did you want to become a Medical Examiner? Someone once told me I was destined to become a forensic pathologist having been born on a Friday the 13th! Although I never considered becoming a medical examiner, I always enjoyed reading true crime and watching Quincy growing up. During my anatomic pathology residency, I went through a required 1-month forensic pathology rotation, and once I had completed that rotation I was hooked. By the end of the month, I had submitted my application for a forensic pathology fellowship and set up an interview. I have been working as a forensic pathologist for the past 24 years and have no regrets.

2) How has Forensic Pathology changed from when you first entered the field until today?

Advances in medicine such as molecular genetics are helping us determine a more precise cause of death, such as previously unrecognized hereditary cardiac conditions that cannot be characterized anatomically. This new information can now prevent similar deaths in other family members, which can be a gratifying experience for the forensic pathologist. Another change which the field has witnessed in recent years is the CSI effect, which has had a dramatic effect on the public's perception of what our work involves, many times leading to unrealistic expectations. This has led to some very interesting questions when testifying in court.

3) Tell us about a regular day in the life of the Chief Medical Examiner of NJ.

My job as the Chief State Medical Examiner is mainly administrative, but the great thing about it is that there is no such thing as a typical day. One day we may be talking to vendors regarding the purchase of refrigerated trailers in response to a surge in deaths related to the COVID pandemic, and the next day we will be reviewing statistics related to the ongoing drug-overdose crisis. A lot of time is spent in meetings, but the issues are varied, interesting and many times challenging, making for a very rewarding experience. There is always something new to learn, and meeting up with doctors, lawyers, epidemiologists, and experts in various fields can provide some very intellectually stimulating conversations.

4) How has COVID affected the work that you do and your office? Did COVID cases become ME cases?

The COVID pandemic has had a significant impact on the ME system in New Jersey. During the initial surge we saw a significant increase in the death rate. This, together with the fact that burials

and cremations were severely delayed because of pandemic-related gathering restrictions led to a large problem with body storage. The OCSME addressed the issue by working with various partners to purchase refrigerated trailers that served as temporary storage sites in different areas across the state. In addition to people dying from COVID outside of a hospital setting, people were dying at home from other natural causes since many patients were reluctant to go to hospital for fear of contracting the virus. Statistics show that during 2020, the number of deaths reported to the ME offices across the state were up 25% when compared to the number of cases in 2019. Only COVID cases that had not been attended by a physician fell under the jurisdiction of the Medical Examiner.

5) What would you tell students who want to become forensic pathologists?

I would strongly encourage anyone interested in pursuing a career in forensic pathology to specialize in that field. Forensic Pathology is unlike any other medical specialty as it combines law, police work and medicine, and although it may not be as glamorous in real life as portrayed on TV it will surely prove to be a very rewarding career choice.

6) Will virtual autopsies play a greater role in the future of forensic medicine?

In light of the severe shortage of board-certified Forensic Pathologists across the country, I can certainly foresee virtual autopsies becoming a more widely accepted tool in forensic practice in the coming years. CT scans can supplement external examinations in cases such as drug overdoses, obviating the need to perform a full autopsy, while trauma can be excluded in cases of religious objections to autopsies. In trauma cases (such as gunshot wounds, fractures in child abuse) the use of CT scans allows for the generation of 3-D models that can be used as visual aids during trials to better assist juries understand the nature of the injuries involved. The application of CT-imaging to Forensic Pathology is rapidly becoming an increasingly recognized field of expertise, which will more likely complement rather than replace traditional forensic pathology in the future.

7) How does NJIT's program prepare students for future careers in the forensic sciences?

A well-rounded forensic science program with a strong chemistry background is definitely the right tool to prepare students for a successful career in any forensic science discipline.