Gene Peters: The FBI is very closely associated with forensic science. For those individuals who grew up watching the television shows, the CSI franchise, Law and Order franchise, that's been a passion of theirs from the very beginning of their interest in science. That wasn't the case with me. I grew up watching Quincy MD, if you're old enough to remember that TV show, as did I. And I wouldn't say that it spurred an interest specifically in forensics, but it did spur an interest in using science to solve problems.

Speaker 2: This is the ORISE Featurecast. Join host Michael Holtz for conversations with ORISE experts on STEM workforce development, scientific and technical reviews, and the evaluation of radiation exposure and environmental contamination. You'll also hear from ORISE research program participants and their mentors, as they talk about their experiences and how they are helping shape the future of science. Welcome to the ORISE Featurecast.

Michael Holtz: Welcome to the ORISE Featurecast. As ever it's me, your host, Michael Holtz, from the Communications and Marketing Department at the Oak Ridge Institute for Science and Education. The FBI Visiting Scientist Program is one of many research participation programs managed by ORISE. The FBI Visiting Scientist Program is a once-in-a-lifetime opportunity for early career scientists and recent graduates to participate in forensic science research at the FBI Laboratory, one of the largest and most comprehensive crime labs in the world.

I recently had the opportunity to interview the director of the FBI Visiting Scientist Program. What follows is my interview with Gene Peters. I hope you enjoy. Talk about your role and what it means to be chief of research at the FBI Laboratory.

Gene Peters: So the FBI Laboratory maintains a dedicated research group. These are scientists who conduct research to advance the state of forensic science, and that takes three different forms, three broad portfolios that we conduct. One is to develop new capabilities, new ways of analyzing evidence that we don't currently have or offer. The second is to improve our existing processes. Can we make them better, faster, more sensitive to different lower levels of chemicals by whatever metric one might consider an improvement? And the third main reason for which we do research is to strengthen the scientific foundations of forensic science, so that when forensic examiners testify in court, they're doing so from as strong a scientific foundation as we can provide.

The United States legal system provides defendants the opportunity to challenge the admissibility of evidence in court and that derives from Supreme Court decisions that are intended to protect the defendant and give them as much right as possible, and to prevent the introduction of scientific methods before they're ready. Sometimes you'll hear this revered to as junk science, that's a very pejorative term. We prefer to think of it as new and novel science that maybe hasn't been fully vetted through the scientific method.

In other cases, strengthening the scientific foundation means providing a scientific basis for methods that have been in use for more than 100 years, but really haven't gone through the scientific peer review process and allow the defendants to question again as is their right, and that's as it should be, the admissibility and how valid that science is. Our scientific defensibility portfolio of research is intended to provide the court, the judge, the jury, the triers of fact with confidence that the scientific methods used by crime labs are valid and appropriate for use.

Michael Holtz: And ultimately it's about justice.

Gene Peters: That's correct.

Michael Holtz: In either direction.

Gene Peters: Yes.

Michael Holtz: Prosecution or defense.

Gene Peters: Our research is used by defense attorneys just as much as by prosecuting attorneys.

Michael Holtz: Has science always been an interest for you, Gene?

Gene Peters: Personally, yes. I grew up near Buffalo, New York, and there's a world-class fossil location there, and it's an abandoned shale quarry at the time, that was my playground and I grew up digging for fossils. That's where my love of science came from. I went to college and got an undergraduate degree in geology. I paid for my college through a Navy ROTC scholarship. I served for five years in the United States Marine Corps, and after that, I went back into the sciences.

Michael Holtz: Awesome. What part of working in the sciences is empowering for you? What is it about science?

Gene Peters: For me, I like using science to solve important questions. I like knowing how things work and figuring things out, and science provides the tools to do that. I've been very fortunate throughout my career to be able to work in areas of important public interest questions. I worked in scientific consulting. I worked for environmental organizations cleaning up Superfund sites. Worked for a time at the US Nuclear Regulatory Commission, working on the disposal of spent nuclear fuel and geologic storage. And from both of those foundations, as I moved forward in my career, became responsible for managing larger and larger portfolios of science so that my career has gone more broad than narrowly focused. Many scientists focus their career on learning everything they can about one very specific problem, and the goal is to become the world's expert in that very specific thing. My career has gone in a different direction where I've broadened rather than narrowed my scientific focus.

I started out as a geologist. I became responsible for human health and ecological risk assessment, certain aspects of engineering, and that prepared me very well for this current position in the FBI because our portfolio of research spans anthropology, biology, chemistry, geology, statistics, toxicology. I always try and keep them in alphabetic order. I'm working on getting a forensic zoology program so I can get the full A-Z metaphor. But in that capacity, and this is what gives me the greatest reward in my current position, is I get to work with scientist from all those disciplines, and that helps me learn and expand my knowledge base.

Michael Holtz: And really that's my next question is about collaboration. And I mean, nothing discovered in science happens in a vacuum. There's not that eureka moment of like, "I solved it," like we solved problems together.

Gene Peters: Absolutely. As Newton said, "If I see farther than others, it's because I stand on the shoulders of giants." The FBI Laboratory research program has a very rich history. For example, the use of DNA to help solve crimes by identifying people associated with biological trace materials. That concept was discovered in England, but the validation and the use of DNA analysis for forensic purposes in the United States was largely validated by the FBI Laboratory in our research group. Now, I wasn't there at the time, so I certainly had no part of that, but many of the people who did that work still work with us today. I've got a scientist, a research chemist who wrote the very first software used to analyze DNA profiles and create that database. Nearly 40 years later, he's still working very actively to advance forensic science. So building on that rich history, that legacy of scientific contributions, scientific leadership, in using chemical techniques, biological techniques to help investigate and solve crimes is very rewarding.

Michael Holtz: You talked a little bit about the trajectory of your career. I mean, you've done a lot. Was that opportunity or just changing interests or a combination of being in the right place at the right time?

Gene Peters: Very much right place, right time. Definitely an interest of mine to expand my knowledge. I really enjoy what I do, and part of that enjoyment comes from working in different areas of science. There's nothing that is uninteresting to me. I love learning about it all, learning new things. Still nearly 40 years into my career, I learn things every day, and that's the single most rewarding part for me.

Michael Holtz: Awesome. Can you share a time when you faced a sizable obstacle and how you overcame it?

Gene Peters: So we are a federal government agency, and funding is always one of our challenges to make sure that we have the resources available to conduct this research. I think the biggest challenge for us in the research program is making sure that our stakeholders, my management and leadership in the FBI, understand the importance and value of the research. Particularly when budget times get tough, research is often in any organization, one of the first areas to be trimmed back, and that's understandable. The main role for the FBI laboratory is to analyze evidence from crime scenes. That is first and foremost and always will be our priority. So in order to preserve the resources needed, I think our biggest challenge for research is to show that continued value, that there is a return on investment that warrants the continued funding for the program. And that really is how we overcome the obstacle, we show value.

Unlike other research models, if you take an academic research model where a professor gets a grant from a government agency or a private foundation to conduct research, they publish some papers, they use that to get their next grant, and they move on, and that's right and appropriate. It's good for their students. For us, the success model, the reward mechanism is when caseworking units adopt what it is we develop. When we see that new method for a novel chemical, a novel explosive, be put into casework and see that first case go to trial, see that examiner testifies to that method, that's the return on the investment that we show because absent that research, we would not have been able to do those analyses.

Michael Holtz: So it's a different paradigm altogether?

Gene Peters: Absolutely. I don't really get to declare success unless somebody uses what we build. It's like that old baseball field of dreams metaphor. If you build it, they will come. In our case, them coming, which means the use of our methods, is the reward for our research.

Michael Holtz: What role has being mentored by other scientists played in your career? And then on the other side of that, have you had the opportunity, I assume, yes, to mentor other scientists?

Gene Peters: Certainly. In terms of my own personal mentorship, there's a large number of people in my career who've contributed to it for both good and bad. In interviews like this, we always look for those feel-good, positive mentorship stories, and I've certainly got plenty of those. But I'd like to remind your listeners that you learn from everybody whether it's good or bad. Some of my most important lessons have come from the negative side where I thought as a manager, I didn't like how that person did things. So I've learned what not to do as much as what to do from the various more senior people in my career.

In terms of mentoring others, our visiting scientist program, which is an early career research opportunity for recent graduates to come into our program, conduct research alongside FBI research scientists, to work on those projects, to do those experiments that we've discussed. In order to keep the program fresh, we limit the time at which they can spend with us to four to five years. And our reward as mentors for those early career scientists is seeing them take the next steps in their careers. We have one alumna from the program who's a very senior executive at the Department of Defense now. We've seen our alumni from the program go on and achieve great things.

Michael Holtz: Let's talk about the kind of scientists that you look for for this program because as we talked about before we started the interview, A, it's hard. Scientists don't naturally think I'm going to go work for the FBI. And on the one hand, you think forensic science and the FBI go hand in hand, and they do to some extent, but those aren't necessarily the kinds of scientists you're looking for. You're looking for biologists and chemists and even anthropologists, etc.

Gene Peters: That's right, Mike. So as you said, the FBI is very closely associated with forensic science. For those individuals who grew up watching the television shows, the CSI franchise Law and Order franchise, that's been a passion of theirs from the very beginning of their interest in science. That wasn't the case with me. I grew up watching Quincy MD, if you're old enough to remember that TV show, as did I. And I wouldn't say that it spurred an interest specifically in forensics, but it did spur an interest in using science to solve problems.

Now, the first part of my career went in another direction, but what I'm looking to accomplish with this interview and with our visiting scientist program, which is an important part of our research resource, is to reach out to scientists who never thought that they might be able to work at the FBI Laboratory. For those who study forensic science and as undergraduates or in graduate school, they're going to learn about us, learn about our programs. I would love to reach out to the chemists, the molecular biologists, who never thought, "Wow. I can use what I'm learning to help solve crime." So I'm particularly interested in research in chemistry and biology and the people who are attracted to that.

So finding those very well qualified and knowledgeable early career chemists and microbiologists and molecular biologists, geologists, statisticians, to help them understand that you can use that knowledge to help us do research to further the state of forensic science. People don't usually think of the FBI as a STEM centric organization, but at the FBI Laboratory, we have about 800 people dedicated to using science to solve problems. Not all of them are scientists, majority of them are. And what I'm particularly looking for is people who have an interest in science, a passion for research, for solving problems, for doing new things to help them understand that they can use that in forensics as well.

Michael Holtz: And it sounds like really the opportunities are kind of endless in terms of how you can support and help the FBI solve absolute the problems and improve the technology and the processes.

Gene Peters: That's absolutely right. I like to say that in forensics, there are more problems than people time or money to solve them. We do have a research governance model at the FBI Laboratory that helps us prioritize our research. We have a research strategy, for example, that helps us focus our somewhat limited resources to make sure that we are working on problems that are worth solving, and that offer a good potential return on that investment of time.

Michael Holtz: I know this will be a little bit repetitive, but what is the importance of the Visiting Science program to the FBI?

Gene Peters: The Visiting Scientists Program is very important to the FBI Laboratory for a couple of reasons. One, by bringing in early career scientists from academia, one of the criteria is to be within five years of your most recent degree as well as faculty on sabbatical, is to bring that continual flow of new ideas, experience with new and novel technologies. Now, sometimes that's a challenge. Because as a publicly funded organization, we don't get the newest, latest and greatest tools and instruments. We've had early career scientists come in and had to train them on instrumentation that was built before they were born, not necessarily what they used in their home institutions, but the importance comes from that flow of new ideas. The visiting scientists who participate in our program get great experience under the mentorship of very senior FBI research scientists, so it helps them frame and understand their career.

Many of them go on to careers in forensic science. Depending on any given year, about 40% of our alumni go to work for the FBI, mostly as scientists in the laboratory, some as special agents, the sworn agents, some as linguists, some as intelligence analysts. Many others go on to other government agencies. We have alumni in quite a large number of federal government, state and local crime laboratories, as well as non-forensic organizations as well, because it's all about the science and forensics is merely one application of that. We want to prepare them well to be research scientists in whatever environment they choose to move on to.

Our participants in the program do most of the day-to-day hands-on work, running samples, preparing them writing reports. We try to involve our participants in every aspect of the life cycle of research at the FBI Laboratory. From conceiving new ideas, helping to pitch them. I mentioned we have a governance model, so part of the process is convincing me, convincing the rest of the laboratory management that this particular research idea is worthwhile, worth pursuing. We have them work on the proposals and the plans, the experimental design. They do most of the work, collecting the data, interpreting it, and then presenting and publishing our results within the larger scientific community.

I mentioned a while back in the interview that the US legal system allows for defendants to challenge the admissibility of forensic science. Part of the criteria that judges used in admitting scientific evidence is general acceptance in the scientific community peer review, and those general attributes we associate with the scientific method. So presenting our results at conferences, publishing in peer-reviewed scientific journals is an important part, not only for us to validate our work to help those early career scientists participating in the program achieve the milestones and objectives that are part of any scientist's career, but they also get used in the courts in that judicial decision-making as to whether evidence should be admitted. So getting the word out is an important part of our mission set as well as our participants' career development.

Michael Holtz: And always, what I love when I talk to folks about ORISE research participation programs like the FBI Visiting Scientists Program is as a participant, you are hands-on, you likely will get published. I mean, there's a lot of good things that can happen for your career, if you participate in a program like this.

Gene Peters: In addition to those more general scientific attributes, you get exposed to work in a forensic laboratory. While I said earlier, we don't work on cases, we sometimes consult on them, but another unique attribute of our research model is every research team has representatives from the case working units. So if we're working on A DNA project, there are DNA casework examiners on the research team to provide that real world perspective of how things are done, what's practical, what's not practical. That helps guide and focus our research. And that component improves our ability to develop solutions that get used. We can do things in a vacuum. We could turn it over to casework units and they might say, "This is not grounded in our reality. We want to avoid that."

The benefit to our participants is they get exposure to and better understanding of how things work in a real crime lab, and if that feeds their passion, feeds their interest, it positions them very well to apply for positions either at the FBI Laboratory, any of the other many federal laboratories. We have alumni in many different state and local crime labs. They want to go to a different part of the country. They're very well-prepared to do so. In some cases, people find out they don't like forensics, and that's okay too. We want to help our early career scientists figure out where their passions are, what they're good at, what really rewards them in order to help them make good career decisions moving forward. And if they leave forensics, that's okay too. There's a lot of great things to do in forensics. There's some attributes that don't resonate with everybody. So helping refine one's interest is an important part of the program.

Michael Holtz: I'm suddenly feeling like I need to study biology and become a visiting scientist at the FBI. To a scientist who may be on the fence about applying to the program, maybe they don't know the program exists. Again, they don't see the FBI as a natural place to apply their knowledge. What do you tell them?

Gene Peters: I would say apply anyways. You can always say no. If you get selected for an interview and selected to the program, and our selection is pretty competitive. With rolling admission now, it's hard to keep track of the exact statistics. Before ORISE went to the online model, and it was more of a paper application process, 10, 15 years ago, we would get a monthly package of applicants, and it was really easy to keep track of statistics. Remember, I'm a science guy. I need data. I have to analyze data if I have it. Our selection rate at that time was probably on the order of about 15%. So can't really calculate that now, but it's probably about the same. So it is a very competitive program.

What I to tell people, especially early career scientists, and this applies to my own kids as well, two of three of which are in STEM fields, there are a lot of similarities. You come out with a bachelor's degree, a master's degree in a scientific discipline, it's hard to differentiate yourself from the competition, frankly. So the things that we look for as differentiators are that demonstrative passion for research. Did you seek out opportunities as an undergraduate to the extent you were able? And not every student is able to do this. We recognize that. We understand that, but did you find those opportunities to get into a lab and do science hands-on? Beyond just the required chemistry one-on-one lab course, but did you find opportunities to work with professors on their research projects as an undergrad research assistant? Of course, if you're a grad student, that is more directly a component of your academic preparation. Look for classwork and statistics to help us interpret data.

We look for differentiators and depth in the scientific curriculum. Did you take classes in microscopy? It's a very basic skill set that isn't often taught at the undergraduate level anymore, but it's still an important part of applying forensic science. So we look for demonstrated differentiators like that. Have you gotten on papers or presented at conferences? Have you taken advantage of every opportunity to thrive as a student that was available to you? Obviously good grades are important, and having that degree and that preparation, that gives you the knowledge, skills and experience that contribute to the FBI's mission.

Michael Holtz: Awesome. Is there anything we haven't talked about that you want to make sure we say?

Gene Peters: In terms of applying to the FBI, we do require a security clearance for all of our participants. So that's both a requirement and a benefit. You graduate, if you will, from our program with either a secret or a top secret clearance depending on the nature of the work that you're doing with us. And that's a valuable commodity in applying to government work generally, whether for a government agency or for contractors that might be working for the federal government. So that's an intrinsic benefit that comes along with participation in our program. With that comes certain responsibilities to conduct one's life in appropriate manner. It is particularly challenging given the state of marijuana legality in the United States. Many states local jurisdictions have legalized marijuana use. In the eyes of the federal government, it is still an illegal substance. So compliance with the FBI's pre-employment drug policy, which can be found online on fbi.gov is an important part.

Certain things are waverable. We understand as an institution that decisions you make at 18 years old maybe shouldn't affect the rest of your life, but we are willing to look at certain things and evaluate them in the context of your entirety as an applicant. There are certain things that are obviously beyond the pale. So suitability for employment, and even though this is not an employment relationship, but our standards for the acceptability of applicants are the same as for federal government employees.

I would also like to note that the FBI Laboratory is not the only ORISE program that the FBI has. We get a lot of applicants with backgrounds in the social sciences who are interested in the behavioral analysis. We have an entirely different part of the FBI that does behavioral analysis. This is your traditional criminal minds TV show profiler types of things, and their program's a bit smaller than ours, but they do take a post-graduate, early-career social scientists, just like we take physical science, chemistry, biology, and so forth. So that's another opportunity. It is on Zintellect, the ORISE website. So that's an opportunity for folks who are interested in the social sciences, sociology, psychology, and so forth.

Michael Holtz: Lots of great opportunities for people who, again, may not have thought of the FBI as a stepping stone or as a place to conduct research, whether on the scientific side or the behavior science side. Last question, Gene. What brings you joy?

Gene Peters: Seeing people succeed. One of the most important parts of the program is what step do they take next in their career? As we talked about, this is a term-limited position, four to five years. Not everybody stays that long. There's an interesting phenomenon where when the federal government budget is a little bit more easygoing, it's easier to find jobs, people stay longer. When times are tight, we find our participants tend to leave a little bit earlier because they want to take that first job that becomes available, recognizing there may not be many other opportunities down the line. It's a little bit of a counterintuitive phenomenon, but it is understandable. We take pride in seeing our alumni succeed. I've got about 10 senior research scientists who mentor our ORISE participants. Seeing them take those next steps in their career is really what brings us satisfaction from the mentorship perspective.

Michael Holtz: Awesome. That's all I have. Thank you so much.

Gene Peters: Thank you.

Michael Holtz: Spending the time today.

Gene Peters: That's been my pleasure, Michael. Thank you.

Speaker 2: Thank you for listening to the ORISE Featurecast. To learn more about the Oak Ridge Institute for Science and Education, visit orise.orau.gov or find us on Facebook, Twitter, and Instagram @ORISEconnect. If you like the ORISE Featurecast, give us a review wherever you listen to podcasts. The Oak Ridge Institute for Science and Education is managed by ORAU for the US Department of Energy.