Transcript: The Lee Rayburn Show
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Lee Rayburn: Joining us to start today is Bassam Shakhashiri, a emeritus professor of chemistry at UW-Madison and the William T. Evjue Distinguished Chair for the Wisconsin Idea. And if you'd like to join our conversation about science and the election next Tuesday, you are welcome to join us at 1-800-642-1234. That's 1-800-642-1234. You can always send us an email to talk@wpr.org. And Bassam, welcome back to the show.

Bassam Shakhashiri: Happy to meet with you, Lee, and with our listening audience. And very eager to celebrate the conclusion of the Wisconsin Science Festival. There were over 300 unique events, and over 200 different venues in 57 counties across the state. I know people in our listening audience are outside of Wisconsin, and maybe in their localities they will think about establishing science festivals. I think it's a tremendous opportunity for all of us to learn about the beautiful, complex world that we live in and what science deals with—and what we can do to support research, research and science to support improvements in technology, all for the common good.

Lee Rayburn: Bassam, what struck me as being part of the variety show last week was how science touches everything. Every aspect of our lives is involved—somebody who has looked into it, tried to understand it, and the more they understood it, the more questions they had about it. And it really is our understanding of the world, all stems from scientific study.

Bassam Shakhashiri: Our understanding of the world, our understanding of ourselves, all stem from asking questions, being curious, being skeptical about the findings that we come up with, asking more questions. The more we know, the more we realize how much more there is to know. And this curiosity has to be nurtured. It has to be nourished at home, in school, in our community centers. And it has to be supported as youngsters grow up and think about pursuing careers in science—careers in science and in technology—but also sustaining the public interest in the beauty of science, the essential benefits from discoveries, and how we make intelligent decisions as not only we vote, but as we live on a daily basis, understanding the complexity and the beauty of the beautiful world that we're in.

Lee Rayburn: How do you make that connection between our scientific study, the fact that it touches everything that we know, including ourselves, and when we make our way to the ballot box next Tuesday? What's the connection there?

Bassam Shakhashiri: Well, let me say, frankly, science is not on the ballot. Fellow citizens are on the ballot. What our fellow citizens who are running for office say about their own agendas as they relate to serving society is what we must pay attention to. And I urge everyone in our listening audience, everywhere, to connect—to really connect with those who are running for office, so that support for basic research and science continues. Right now there is a perilous threat for supporting scholarly activities, at least as what those of us in science perceive. We have to really take responsibility in our civic duties and our civic obligations to inform and help our elected officials make wise decisions for the common good of society. This is so crucial. And so my plea is for each one of us to get five people who have not voted before to vote on November 3rd. Lee, can you do that?

Lee Rayburn: I will do my best, but from the perspective of a scientist, where is this perilous threat coming from, Bassam?

Bassam Shakhashiri: Well, it's coming from the huge reduction in federal support for science. There are a variety of events that have happened. The federal support for scientific and academic research has really dropped significantly due to policy changes, funding freezes, some grants being terminated, and also administrative edicts. There are over $3 billion of previously approved or active research grants through agencies like the National Institutes of Health and the National Science Foundation, among other agencies, that have been frozen or canceled. What this is sending as a signal to our workforce is that people are thinking about pursuing their interest in scientific research elsewhere, outside the United States. This is a concern not only for our national security and our economic security, but for the well-being of society.

So we need to continue having sustained, thoughtful, purposeful funding support for scientific explorations, for the development of new technologies that serve humanity. Advances in science and technology are what distinguish society today from past societies. But not all advances are for the common good of society, so we have to be selective. We have to be wise about what we do with discoveries. But we need people to make those discoveries, and we need to continue to be engaged in understanding the beauty of our complex world.

Lee Rayburn: Bassam, can you relay or explain the arguments for why federal funding for science would be cut? What is the argument being used to justify these reductions?

Bassam Shakhashiri: They are carried out by directions from the White House, from the Office of Management and Budget, and they are related to new directions to support technology development—specifically artificial intelligence. The White House says it is to "supercharge" scientific discovery through technology. So we all know, we've heard about

artificial intelligence; we sort of know what it means. It's the use of computing power and machine language to solve problems and address issues.

But now the director of the White House Office of Science and Technology Policy, Michael Kratsios, is promoting—and has been for some time—what he calls "superintelligence," not artificial intelligence. And he says—quoting from an interview that he gave in the *New York Times* last week—"I naturally and fundamentally believe that superintelligence will be the biggest unlock for scientific discovery in the history of our country. And we have to make sure that all pieces of the ecosystem are leveraging superintelligence to drive discovery." Well, okay, I think that sounds good, but we need the people who do the research that results in these technologies to be supported. And if we diminish and cut back on supporting basic research that is driven by our personal curiosity, new technologies will not develop. So that's part of what's going on.

Lee Rayburn: Bassam Shakhashiri, our guest, emeritus professor of chemistry at UW-Madison and the William T. Evjue Distinguished Chair for the Wisconsin Idea. You're welcome to join this conversation with your questions or comments at 1-800-642-1234. That's 800-642-1234, or send an email to talk@wpr.org. So this sounds like the difference between investing in human capital for understanding science versus investing in artificial intelligence, machine learning, or large language models for the study of science. Is that the breakdown here, or is there more to it?

Bassam Shakhashiri: That's one interpretation of what's going on here, but there's more to it. Lee, research in the social sciences that has been supported for a long time by the National Science Foundation has been eliminated. And I think we need to enable our social scientists and our citizens to pursue questions that they can explore and try to find answers to—whether it has to do with basic research questions in the laboratory or questions in the social sciences about how we interact with each other and how we make wise decisions. I think this is all very important to be continued.

It's not one or the other, Lee. Artificial intelligence and advances in computation and computers have resulted from basic scientific research. This also carries over to the biomedical area and to all aspects of our daily life. You know the old cliché: science and technology are the engines that drive our economy. We need to make sure that science and technology are supported properly and that the results of research are put to use for the common good of society.

Lee Rayburn: Bassam, what about the idea of privatizing scientific research? The thing that comes to mind when you're talking about federal cuts versus private investment, most

obvious to me, would be NASA versus SpaceX and the privatization of space exploration. Is there an argument to be made there as a scientist would see it?

Bassam Shakhashiri: I don't think it should be either/or. I think federal support for basic research must be continued. Private sector support is mission-oriented. There's a difference between having funds to support research and funds to procure research. The mission statements are important and they should be pursued, and the private sector has a very important role in our scientific and technological advances. But it should not be either/or. It should be proper support for pursuing fundamental questions in science, alongside support from the private sector. We welcome support from the private sector; it's essential. So it should be both.

Lee Rayburn: Bassam Shakhashiri, our guest. Again, you can join us at 1-800-642-1234 or talk@wpr.org. So would you like to see federal funding restored where cuts have been made, or what does the future hold? And while we talked about federal cuts, what role does the state play, Bassam?

Bassam Shakhashiri: All states have a very important role in our advances in science and technology. So yes, it's not only a matter of restoring the funding; it's a matter of being purposeful about what funding is for.

I'm not a reductionist, but let me mention two words that address what we're talking about, both beginning with the letter "I."

The first one is **ignorance**. We address and combat ignorance through education—in schools, colleges, universities, and at home. We are fairly good at handling ignorance, although we aren't always fully successful, so we should continue doing that. That's what basic research really deals with: attempting to know what we are ignorant about.

The second word beginning with "I"—and it's a much bigger challenge for all of us—is **indifference**. We cannot be indifferent about the quality of life that we enjoy in an advanced scientific and technological society. We have to care about the proper use of technology and scientific advances. We have to care for each other. This is how democracy flourishes—by not being indifferent. I sense that while dealing with ignorance is a challenge, a much bigger challenge is dealing with the attitudes and behavior we have toward each other and toward working with our elected officials.

That's why it's crucial that we participate fully in our democratic institutions. It's not only on Election Day; it's year-round. It's having conversations with each other about science, the economy, politics, and history—both for self-enrichment and for the benefit of everyone else. And if we disagree with each other, as we will, we should do it in respectful ways. We are a civilized society, so we should be considerate of each other's views. We don't

necessarily have to agree with every idea or program proposed, but we should engage in civil and civic discourse so that we arrive together at what is for the common good.

Lee Rayburn: Let's go to Bob in Stoughton. Hi, Bob.

Bob: Hello. Yes, I have a comment in support of what you're talking about regarding the funding of scientific research. This was reported on public radio: there was a bill—maybe the CHIPS Act or similar—to move the manufacturing of microchips back to the United States as a national security effort. In it, money was allocated to double funding for chip research and manufacturing: half for manufacturing, and the other half to continue research. Well, the manufacturing half has been spent, and we've got factories coming online soon. But the other half for research hasn't been spent for whatever reason, even though it was approved by Congress. That research is where the United States makes the big bucks—we make billions on the patents from that research. Manufacturing used to be done overseas, and moving it here is good for security, but if we want that economic boost, we need to do the research because that's where the dollars come from.

Bassam Shakhashiri: Thank you, Bob, I appreciate what you're saying. It's a situation where we have to make wise choices and decisions. The way our democracy works is that Congress appropriates funding and the executive branch carries through to make sure the funds are used properly. What is happening now is that some of the funds are being held back, perhaps for ideological reasons. We should pay attention to what is really happening and why it's happening. This relates to what I mentioned a few minutes ago about not being indifferent. We should become aware of what is happening and why, and then expect our elected officials to take wise steps to ensure our investments are addressed for the common good.

Lee Rayburn: That's another "I" you can add to the list: **investment**. That's something that gets missed sometimes in scientific research—the return on investment that we put into what scientists are looking at.

Steve emailed to ask about the importance of science to climate change, Bassam.

Bassam Shakhashiri: Oh boy. The science of climate change is sufficiently well understood. What is appalling to me is that we collectively as a society, not only in the United States but around the world, are not acting swiftly enough to help protect the environment. Climate change happens; there are natural causes for climate change, no question about it. But there are also human causes for what is happening to the climate. If we are indifferent and fail to pay attention to these causes, dire situations will develop quickly—as they are developing right now—not only for us, but for our children and

grandchildren. It's part of our stewardship to understand these causes and act responsibly together.

Lee Rayburn: Bassam, I only have a couple of minutes left, but I wanted to get this comment in from Bill in Oregon. He emailed to say that AI isn't a creative entity, but an aggregator of information. It may be able to reassemble human research, but Bill says humans doing science is required for all of it.

Bassam Shakhashiri: He took the words right out of my mouth! Yes, with artificial intelligence or superintelligence, "we the people" must remain in control.

Lee, I know you said we're running out of time, but I'd like to mention something about technology that relates to the World Series. The World Series is underway, and there is something you've seen called the "Robo-Ump"—an automated ball-strike system. That's a fantastic technological advance. It is being used to aid in decision-making, and there's a very good article in *Science* magazine that describes how it works. For anyone in the listening audience who wants to learn more, I've put a link to this article on my website. I invite you to visit my website at scifun.org, where you'll find the article titled "Eyes on the Ball." It's about the technology that calls balls and strikes.

Lee Rayburn: Yeah, it's been exceptional for calling balls and strikes! It's been a boon for William Contreras behind the plate. But now I'm betting Tampa Bay fans are asking for an automated system for checked swings as well.

Bassam, it is always a pleasure. I thank you for joining us and welcome you back anytime.

Bassam Shakhashiri: Thank you, Lee.

Lee Rayburn: Bassam Shakhashiri, emeritus professor of chemistry at UW-Madison and the William T. Evjue Distinguished Chair for the Wisconsin Idea.