EP.137 – Dr. Judy Staveley

Narrator: You're listening to *BioTalk* with Rich Bendis, the only podcast focused on the BioHealth Capital Region. Each episode, we'll talk to leaders in the industry to break down the biggest topics happening today in BioHealth.

Rich Bendis: Hi, this is Rich Bendis, your host for *BioTalk*, and today we have a guest that is a first timer for the *BioTalk* podcast, but she is not new to the BioHealth Capital Region. Dr. Judy Staveley has been around for a few years here and actually has interacted in many different events and many different circles within the BioHealth industry, but we're going to focus on one of her primary areas of interest today, which really relates to STEM activities, STEM education, and getting people interested in the sciences. This is the role she has as the director of American Junior Academy of Sciences. Judy, welcome to *BioTalk*.

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Judy Staveley: Thank you for having me, Richard. I am very excited to be here today and very excited to talk on behalf of the National Association of Academies of Science and the American Junior Academy of Sciences.

Rich Bendis: Great, and I think this is the first time we've ever had this topic on *BioTalk* over the last seven years, so our listeners are going to learn something new, even though they've heard about the National Academy of Sciences, you're going to explain a little bit more about what their primary missions are. But before we do that, our listeners always like to know the backgrounds, the people who are being interviewed, so Judy, if you don't mind, why don't you give us a little background on yourself, in your experience in industry, education, and any experiences that you've been involved with, with young scientists and STEM education, even though we're going to delve very deeply into those topics later.

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Judy Staveley: I'm currently a contractor and I'm a biotechnologist, and currently my volunteer work extends across several science academies. Today's focus is on the National Association of Academies of Science and the American Junior Academy of Sciences, which is umbrellaed under NAAS. I also sit on the board for the Washington Academy of Sciences, which is one of the states or delegates that sits under the National Academies—a former

president from the Washington Academy of Sciences. I was a professor for 15 years, so I also was the director of a biotechnology program, and my students and I developed a lot of scientific research innovation projects that we presented on Capitol Hill and at the White House and on behalf of the community college's innovation program that National Science Foundation enticed us to do, so that was very exciting. I also have been a mentor for over 20 years in science academics, in all areas of science.

0:02:57 My education background is molecular biology. My undergrad was focused on cancer research and did some research area looking at SP140 [laughs] for the nerds out there who want to know more specific research areas that I did, and then after I graduated from the University of Alaska, Anchorage, I was accepted as one of the 12 students at the University of Florida School of Pharmacy in the area of medical forensic DNA and serology, and then further on I went on for a master's degree in science, in molecular biology, that focused more on infectious diseases and public health, and fell in love with that. I have an extensive education background, so please be patient. [laughs] And then further on went to a PhD program to study neuropsychology with an emphasis on biological neurobehavior, and then at Johns Hopkins for my residency.

0:03:56 Then further on, during my years of teaching, I fell in love with STEM innovation after we won with our innovation project with NSF, and learned the importance of innovation for our country, and how to mentor and entice and keep students in STEM education to provide opportunities and workforce development contributions for our state, and of course, now globally, and more specifically for our nation. So, I love enhancing STEM education. I love all areas of science, and my accomplishment today is being part of the American Junior Academy's Board of Directors—and also NAAS, part of their Board—and having to do this fundraiser on behalf of the nation, and trying to develop STEM education programs to help support innovation in all areas of STEM is a big focus of today's podcast.

Rich Bendis: Great. Thank you, Judy, and you mentioned "mentor" and your interest in STEM education, but who was a mentor or influencer early in your life who got you interested in science?

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Judy Staveley: In all honesty, I really didn't have any mentors! I was guided through clubs, and what kept me motivated for the most part through my undergraduate studies was partaking as a student in science clubs. I was part of the chemistry club. I was part of Sigma Xi, the Academic Honor Society. I was part of the Biology Club, and then TriBeta was one of the biggest ones—I was president for pretty much my entire academic career for TriBeta Honor Society. Just being part of all the clubs, being social, and learning everything that I possibly could through academic science clubs—and those have evolved over the years. I've seen more and more clubs come into fruition through community colleges.

0:05:54 So, when I was a professor, I had a biotechnology club that would keep my students interested—which, that club built that project that we ended up going to present on The Hill and at the White House. So, that's an experience that came [laughs] into fruition, but that developed ideas for young students to be innovative, so you've got to plant the seed very young.

Rich Bendis: Great. Well, thank you for that background. The lesson from that would be to have young people join a lot of these different clubs or societies so that they can learn more from experienced people, whether they become mentors or not. It just gives them a diversified experience and the background so they can explore to see if this is a field they'd like to go into. Apparently you've been a great mentor to other people now on the other side, but let's talk about the primary entities or organizations where this STEM focus of yours lies right now, and that's the National Association of Academies of Science and the American Junior Academy of Sciences. Could you give us a little background on both of the organizations? I know them relatively well, but for most of our listeners, this will be a first time hearing about them.

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Judy Staveley: The National Association of Academies of Science is a not-for-profit organization. The mission is to promote scientific and science education goals of its state for regional and municipal academies of science. The NAAS consist of 47 state, regional, and community academies of science, which are organized to encourage scientific inquiry and research experiences. One of the most important functions of the National

Association of Academies of Science is sponsorship of the American Junior Academy of Sciences, which I am the director of.

Rich Bendis: Great. Now tell us more, a little bit about the American Junior Academy of Sciences.

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Judy Staveley: The American Junior Academy of Sciences is the only US honor society recognizing America's premier high school students for their outstanding scientific research. Each state's academy, including the D.C. Academy of Science, nominates high school students as AJAS delegates. The chosen delegates that are invited to attend the AJAS annual conference, which is in February 2024, which is hosted by the AAAS, will be able to present their research scientific posters to become a recognized fellow at this event. The AJAS mission is to introduce, encourage, and accelerate precollege students into the professional world of science, technology, engineering, and mathematics. What I want to elaborate on this is we are fundraising next month to raise funds to send these US Honor Society students from across the nation to the annual conference that is going to be held in Denver, Colorado.

0:09:03 What we're raising funds for are the students who are underrepresented and will be able to participate and show off their scientific research at this annual conference.

Rich Bendis: Basically, this annual conference—when's that going to happen, Judy, by the way, in Denver?

Judy Staveley: February 15th through the 17th.

Rich Bendis: That's February 15th - 17th of 2024.

Judy Staveley: Correct.

Rich Bendis: But there are some other events happening before then that you're going to be involved with, one in our backyard in Washington, D.C., and you're probably also trying to raise money for that one as well, so talk a little bit about the one coming up on September 16th that will be held in Washington, D.C.

Judy Staveley: It's actually going to be held seven miles from the AAAS office in Alexandria, Virginia, which is right behind—it's right in our backyard in D.C., and we're going to be hosting a STEM education conference and fundraiser to inspire the next generation of innovators, problem solvers, and leaders.

0:10:06 This event is scheduled for September 16th from 1:00 to 5:00 at the George Washington Masonic National Memorial Theater in Alexandria, Virginia, and everybody is invited to attend. We do have a registration link on Eventbrite that you can register. In addition, we're going to have hundreds of educators, professionals from various STEM fields, student ambassadors from different colleges that are going to be hosting activities for middle school and high schoolers. In addition, we're going to have workforce development opportunities and panel speakers, and all disciplines areas are going to be focused on aviation, grant funding for high school students for the Denver conference, biomanufacturing and biohealth, cybersecurity, engineering and robotics, general science, and workforce development training and potential scholarships.

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Rich Bendis: Is there any cost for attendees, Judy?

Judy Staveley: No, this is all free, and we are excited! There's going to be a raffle to help raise funds for scholarships to go to Denver for the students. In addition, we're looking for donors to support the mission for STEM education to help push our innovators to go present their research at the AAAS conference. But the event is free, so we encourage everybody to attend.

Rich Bendis: I'm sure we will provide information on how people can register as we publish this podcast in our newsletter, so there will be a link there for people who want more information about this, as well as you can provide more registration information for people as we get later into the podcast too, Judy.

Tell us a little bit about some of the exciting life-science support programs that the American Junior Academy of Science offers, and how they encourage young people and young talents to pursue their careers in science, technology, engineering, and math.

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Judy Staveley: A lot of the students that are AJAS delegates, they actually attend clubs, like I mentioned earlier in the podcast, where they are mentored by other scientists, or they're involved with the academies around the country in some form or fashion through events. However, when they're involved through these different science fairs or scientific events, they become very close to a mentor, and these mentors are attached to one of the academies and they are presented on behalf of their local academy to be able to represent at the National Conference as a research delegate, so that's how they become involved at their local regional state.

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Rich Bendis: Yeah, and basically, you've had a chance to watch the growth of our region over the last 20 years in the BioHealth Capital Region, and I would imagine some of the people you met 20 years ago were engaged in industry or education and that you saw actually continue their careers or begin their careers and are involved today, and tell us a little bit about some of the examples and success stories you might have.

Judy Staveley: I have been very involved since the inception of the biotechnology bust in Maryland and D.C. We really have a great biohub here in the state of Maryland. And BioBuzz, BioHealth Innovation—we have a lot of different networking events. Maryland is really great to support each other academically in workforce development. This podcast especially has amazing educational, informative lectures that I personally listen to.

0:13:55 But over the years, like I said, when I was a professor, I mentored my students into innovation and then workforce and pipelined them into biotech occupations, so to see over the years, have them graduate at the graduate level and to become supervisors in their field and still mentor them; they still come to me as of today to guide them through any other possibilities or collaborations or support in these types of events, and it's very exciting. It's an exciting time to be in the science field, especially coming out of the pandemic and seeing how things became innovative, such as the vaccines, and medical diagnostics, and how things evolve scientific scientifically to implement for our nation, for cures and stuff to get over this pandemic. So, it was really exciting to see a lot of my mentees be part of that and still be supportive on the other side of them mentoring high schools and building that pipeline.

0:15:00 So, now that they're graduate students, they oversee undergraduate students, and those undergraduate students are now mentoring high school students, and those high school students are now mentoring middle school students. So, you see this nice developed pipeline to keep the students engaged in STEM academics from middle school all the way up to graduate school so they can be continuously motivated to be informed in the area that they want to study. And that's what this panel discussion is going to be talking about come September 16th.

Rich Bendis: That's great. In an industry, in order for them to grow, they have to have a channel and flow of really smart people coming into their companies, and most of them have had a STEM background, but I think some of the companies are more progressive in promoting STEM education and creating STEM opportunities within their organizations.

0:15:57 I know that AstraZeneca, for example, has had some major STEM programs nationally, not just in our backyard, and actually globally. They're one of the largest global pharma companies, and they are very active in promoting STEM education in their backyard. So, can you give some examples of some companies that you have worked with within the BioHealth Capital Region that are really strong promoters of STEM?

Judy Staveley: AstraZeneca is one of the [laughs] most supportive in education when it comes to biomanufacturing. They supported my biotech program 100%. They are also a big supporter for the National Association of Academies of Science and the American Junior Academy of Sciences. They're one of our biggest donors to bring students to the national conference, so we have to thank AstraZeneca for doing that. Astrazeneca has been amazing.

0:16:54 They sat on my board when I was a board director for my own biotech program, and they would do tours when we might have not had the right lab equipment or the right PPE at the time—that we didn't have the budget for the program at the time—when I was a professor, so they stepped up to the game and said, "We're going to give you a tour of the facilities. We're going to have the students put the bunny suits here, and we'll train them in support of your program." So, that was really nice. And then over the years they developed more educational programs, workforce development opportunities across the state of Maryland and nationally—which I encourage all biomanufacturing companies to do that, because academically, the biotech academic programs are lacking a

lot in that area of experience of working with the fermentors, or the tissue culture areas of biomanufacturing. Some schools don't have the capability of having those fancy labs.

0:18:00 You do have some universities, luckily, having those great labs, but we were fortunate to work with different industry partners with the program to enhance my biotech program since I didn't have the room to expand on maybe fermentation or tissue culture, and if it wasn't for industry, my students would not be where they're at right now.

Rich Bendis: Industry plays a critical role, but also we're very fortunate to have the NIH in our backyard, the FDA, as well as some leading universities, so talk a little bit about how AJAS basically interacts with NIH or the universities in our region as well.

Judy Staveley: Through STEM events, the students are able to go as a club or as an academy. The academies will take the AJAS students that may be housed under the Washington Academy of Sciences. The Washington Academy of Sciences is umbrellaed under NAAS, and they have the AJAS programs.

0:19:02 So, the Washington Academy of Sciences takes our local DMV area students to events, so we have an event coming up on Thursday that the students will meet for robotics and engineering. We take them to events that maybe the BioHealth Innovation community will offer. We also take them to the BioBuzz events for workforce development opportunities, so all the events we try to collaborate, and we have to remember that collaboration is very important for success, and that's how we manage to take these students and to find mentors. So, these events not only present them with workforce opportunities, internships, academic opportunities such as scholarships, but they also are able to find a possible match for mentor or role model that they can say, “Hey, I want to be like that person. They did it. They can guide me in the area of research study that I might be passionate about,” and do a match.

0:20:03 I have a lot of mentees that I met over these events that might not have been part of the Washington Academy of Sciences, but there were other students that said, “Hey Dr. Staveley, you're just like me. I want you as my role model.” [laughs] “Will you take me under your wing?” And I sit there and I ask them, “What's your field of study? What are you

passionate about?" And then we start collaborating, and then I'll take them under my wing and manage to guide them in their research.

Rich Bendis: Well, how big are your wings and how many people can you take underneath them, Judy?

Judy Staveley: They rotate. [both laugh] So, I do have a lot. I have a lot of mentees, and I have mentees from doctoral studies all the way to middle school right now. My youngest one is a fifth grader.

Rich Bendis: Wow, that's fantastic! So, based on your focus on the STEM area for over 20 years now, what are the things you see that we still need to improve upon? And where are the gaps for America and our region to actually be a leader in things that we need to be doing that we might not be doing today?

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Judy Staveley: We're still working on the gaps of attrition rights, so I recently published a couple articles in the Washington Academy of Sciences Journal about attrition rates. Right now, we're still struggling to fill the gap of students staying motivated in STEM education, so we scientists who are in industry need to go out and motivate these kids. And that's what this upcoming STEM education conference / fundraiser event is about, is that all of us coming together as a nation and speaking on the panels and giving these students the motivation to stay in STEM academics.

0:21:50 We lose them somewhere along undergrad studies, either algebra's too hard, or they just had a really bad professor, or they get discouraged and say, "You know what? I don't want to do this area of study." But then they'll come back later and say, "You know what? I want to give it another chance, but maybe I'll look at this area." So, that's the gap, is keeping them motivated in the area of STEM education. We also have a bigger gap in biotech, and especially with females, and when I did the statistics, [laughs] females in the biotech area of study are really low, but we really want to encourage the area of biomanufacturing. Right now, with the pandemic, we really need a strong biomanufacturing workforce and want to encourage students to look at that area. When I was a professor trying to recruit for biotechnology or for biomanufacturing, at the time my program was called Bioprocessing.

0:23:00 So, every time I went to higher schools to recruit, it was one of these things that my high school students would come up to me and ask me, “What is bioprocessing?” And I had to go through all the education to entice them and tell them, “This is an area of biotech that you might be interested in. Maybe pharmaceuticals, maybe innovation. There's all these areas to downstream, upstream.” So, it took me a long time just to explain what bioprocessing was. Eventually we got the name changed to Biotech *just* for marketing purposes, and students were like, “Oh yeah, I know what biotech is!” So, once I had them in my program, then I could engage them in biomanufacturing, do field trips to AstraZeneca, or brewing companies for fermentation, and then go into genetic engineering type of stuff that they could be enticed into used for R&D or upstream/downstream type projects.

0:24:00 So, it was difficult to keep the biotech program at 100% of students in the program. When I was a professor, I had a 100% of students fill the seats, but it was challenging during my time because you constantly had to keep them engaged, and that's where a lot of professors need to be creative in academics to keep them engaged in academics, so we close that gap.

Rich Bendis: Yeah, so you talk about the attrition gap that you might lose them through the educational process, but those who stay and graduate and make it all the way through and get that experience in those degrees, whether they be basic or advanced degrees, how is the retention rate of people who are educated within our region being able to find the jobs in the industries they are interested in, the STEM jobs in the BioHealth Capital Region? How do you see the connection there between academia and industry in retaining those smart people who we'd like to keep in our region?

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Judy Staveley: In this area of Maryland, we do have a really great support system all the way from the Maryland Department of Commerce to each county, each county has a supportive system for the biotech industry, the biohub area. We have a really unique ecosystem here in Maryland. I've encourage other states to have a really great ecosystem and to model what we have. I'm starting to see Boston have a growing ecosystem. Some of our colleagues have moved up to Boston from biomanufacturing companies

that have expanded out there, but Maryland still has a unique ecosystem. We encourage and support each other. We do the tours within the industry, that collaboration is essential, and that's what makes it successful.

0:25:57 It's because we can run to each other and say, “Hey, Rich, I need support in this area.” Or, “This person or this student is looking for a job position. Have you heard any openings within this area?” And you'll say, “Yes, look at the job postings on our website.” And I will forward that to my mentees, and then they'll apply and then land the position. So, there's a lot of opportunities, but I can't stress enough that Maryland has a unique ecosystem, and I've also seen North Carolina and the Carolinas starting to build an ecosystem because there's a lot of biotech expanding within those areas, and also now Texas. But we're growing. It's slow, but we're getting there as a nation.

Rich Bendis: Well, one of the encouraging things is CBRE, one of the real estate firms, does an annual talent ranking of the different regions and states around the country, and the Maryland / D.C. BioHealth Capital Region is ranked #2 right now in talent for scientists.

0:26:59 So basically, we are very fortunate to have Johns Hopkins, University System of Maryland, all of the academics; but having NIH, FDA, and all of the other people here in our backyard creates several opportunities for people interested in STEM work, whether it be in the industry, whether it's in non-profit organizations, NGOs, academia, foundations, whatever. So, I think we're blessed to have a really diverse background here for people who would like to pursue the STEM careers.

Judy Staveley: I totally agree, 100%. As you mentioned, CRB, FDA, they sat on my biotech board, and they always were supportive of my students. We did field trips to the FDA every quarter. They bought my students pizzas. [laughs] They got to sit in on talks and collaborate and learn regulations. CRB was always inviting my students for tours or events or they sponsored them for the ISPE, new memberships for students.

0:28:05 And it was all that support and that collaboration that made these students successful, because they felt, “I am supported. I am motivated. I am engaged. I have the industry here that is supporting me, so if I need

to pivot in my career, if I'm in R&D or going to biomanufacturing, I know I can do that. There are opportunities."

Rich Bendis: What's coming through here, Judy, is your passion that you have to work with young people to get them interested in STEM careers and STEM education, so what are some of your personal goals and objectives that you have for the future around this topic?

Judy Staveley: It's important to promote biomanufacturing. I don't think a lot of Americans understand the importance of biomanufacturing, and I'm very passionate about advanced development manufacturing.

0:29:00 I'm also very passionate of biotechnology and innovation. Again, it's very important that people do their research and get educated on science, because these past few years there's been a lot of miscommunication on science. So, my future goals is to continue to advocate for STEM education, workforce development. I love my current job because I do all that area of study, so I'm working with the academies and giving them support and working together. Just doing what I'm doing already. I love what I do.

Rich Bendis: Great. It's nice to have people happy in the place that they're at. Is there anything that we haven't discussed you'd like to have the listeners be aware of?

Judy Staveley: I'd just encourage the listeners to register for this upcoming STEM education conference that the National Association of Academies of Science is hosting on September 16th. Again, you can find us on Eventbrite or on our website.

0:30:01 If you're interested in donating any funds for potential scholarships for the national conference for these high school students, you can just go to the NAAS website and hit the donation button which is to the right of the screen, and just put that it's for AJAS students to attend the national conference.

Rich Bendis: Great! And we'll close by saying that this NAAS/AJAS STEM education conference and fundraiser is going to be September 16th in George Washington Masonic Memorial in Alexandria, Virginia, and it's a half-day event. Correct, Judy?

Judy Staveley: Correct.

Rich Bendis: If anybody wants any more direct information, they can contact you directly. If they wanted to get your email address, could you give that to the listeners as well?

Judy Staveley: Sure! They can contact me at doctorstaveley@yahoo.com.

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Rich Bendis: Super. Our guest today is Dr. Judy Staveley, Director of American Junior Academy of Sciences, and one of our great STEM promoters and champions and mentors within the BioHealth Capital Region. Keep doing what you're doing, Judy.

Judy Staveley: Well, thank you, Richard. I appreciate you inviting me.

Narrator: Thanks for listening to *BioTalk* with Rich Bendis.

End of recording